GRASS VALLEY GROUP

Installation Manual

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SERIES 7000

SIGNAL MANAGEMENT SYSTEM

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Online User Documentation

Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes may be downloaded via the Product Documentation link on the Grass Valley Group home page:

FAQ Database

Many solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database. To access:

1. Select the Service / Support link on the Grass Valley Group home page.
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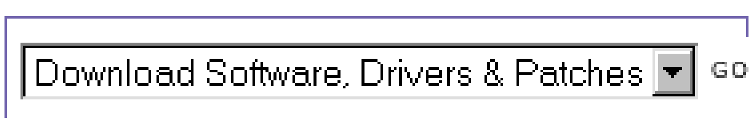
Software Downloads

Software updates, drivers and patches may be downloaded via the Download link on the Grass Valley Group home page:



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Preface

About This Manual

This manual provides information specific to installing Series 7000 Signal Management Systems.

Documentation Set

This Installation Manual is part of the Series 7000 manual set which also includes an Service Manual, a Configuration Manual, and a User Manual. An electronic copy of the manual set is on the Documentation CD-ROM.

Conventions Used In This Manual

Menu selections, soft buttons, and other software generated items in the Series 7000 Configuration Editor GUI are shown in the following type:

- Click **OK**.
- Under **ONLINE**, select **CONTROL,** then **TAKE** to access the Take window.
- **EXCLUDED** (software generated item) momentarily appears in the **PRESET** (control panel label text) display if a Take is attempted of a valid Source that is excluded by the system.

Button text and other labels on the Series 7000 Control Panels are shown in the following type:

- Press the **Protect** button.
- Press the **SRC** button.

Code text is shown in the following type:

- `SMS7000> booted`
- Enter **`booted`** at the prompt.

Safety Summary

Read and follow the important safety information below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may be found throughout the manual.

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.**

Safety Terms and Symbols

Terms in This Manual

Safety-related statements may appear in this manual in the following form:

WARNING **Warning statements identify conditions or practices that may result in personal injury or loss of life.**

CAUTION Caution statements identify conditions or practices that may result in damage to equipment or other property.

Terms on the Product

The following terms may appear on the product:

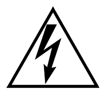
DANGER — A personal injury hazard is immediately accessible as you read the marking.

WARNING — A personal injury hazard exists but is not immediately accessible as you read the marking.

CAUTION — A hazard to property, product, and other equipment is present.

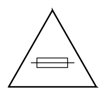
Symbols on the Product

The following symbols may appear on the product:



Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

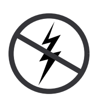
Indicates that user, operator or service technician should refer to product manual(s) for important operating, maintenance, or service instructions.



This is a prompt to note fuse rating when replacing fuse(s). The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.

Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.



Indicates that static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Warnings

The following warning statements identify conditions or practices that can result in personal injury or loss of life.

Dangerous voltage or current may be present — Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

Do not service alone — Do not internally service this product unless another person capable of rendering first aid and resuscitation is present.

Remove jewelry — Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

Avoid exposed circuitry — Do not touch exposed connections, components or circuitry when power is present.

Use proper power cord — Use only the power cord supplied or specified for this product.

Ground product — Connect the grounding conductor of the power cord to earth ground.

Operate only with covers and enclosure panels in place — Do not operate this product when covers or enclosure panels are removed.

Use correct fuse — Use only the fuse type and rating specified for this product.

Use only in dry environment — Do not operate in wet or damp conditions.

Use only in non-explosive environment — Do not operate this product in an explosive atmosphere.

High leakage current may be present — Earth connection of product is essential before connecting power.

Dual power supplies may be present — Be certain to plug each power supply cord into a separate branch circuit employing a separate service ground. Disconnect both power supply cords prior to servicing.

Double pole neutral fusing — Disconnect mains power prior to servicing.

Use proper lift points — Do not use door latches to lift or move equipment.

Avoid mechanical hazards — Allow all rotating devices to come to a stop before servicing.

Cautions

The following caution statements identify conditions or practices that can result in damage to equipment or other property

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Use correct voltage setting — If this product lacks auto-ranging power supplies, before applying power ensure that the each power supply is set to match the power source.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Do not operate with suspected equipment failure — If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and / or options.

Route cable properly — Route power cords and other cables so that they ar not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Use correct replacement battery — This product may contain batteries. To reduce the risk of explosion, check polarity and replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Troubleshoot only to board level — Circuit boards in this product are densely populated with surface mount technology (SMT) components and application specific integrated circuits (ASICS). As a result, circuit board repair at the component level is very difficult in the field, if not impossible. For warranty compliance, do not troubleshoot systems beyond the board level.

Regulatory Notices

Certifications and Compliances

FCC Emission Control

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by Grass Valley Group can affect emission compliance and could void the user’s authority to operate this equipment.

Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n’emet pas de bruits radioélectriques dépassant les limites applicables aux appareils numeriques de la classe A préscrites dans le Règlement sur le brouillage radioélectrique édicte par le ministère des Communications du Canada.

EN55022 Class A Warning

For products that comply with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Canadian Certified Power Cords

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Canadian Certified AC Adapter

Canadian approval includes the AC adapters appropriate for use in the North America power network. All other AC adapters supplied are approved for the country of use.

Laser Compliance

Laser Safety Requirements

The device used in this product is a Class 1 certified laser product. Operating this product outside specifications or altering from its original design may result in hazardous radiation exposure, and may be considered an act of modifying or new manufacturing of a laser product under U.S. regulations contained in 21CFR Chapter1, subchapter J or CENELEC regulations in HD 482 S1. People performing such an act are required by law to recertify and reidentify this product in accordance with provisions of 21CFR subchapter J for distribution within the U.S.A., and in accordance with CENELEC HD 482 S1 for distribution within countries using the IEC 825 standard.

Laser Safety

Laser safety in the United States is regulated by the Center for Devices and Radiological Health (CDRH). The laser safety regulations are published in the “Laser Product Performance Standard,” Code of Federal Regulation (CFR), Title 21, Subchapter J.

The international Electrotechnical Commission (IEC) Standard 825, “Radiation of Laser Products, Equipment Classification, Requirements and User’s Guide,” governs laser products outside the United States. Europe and member nations of the European Free trade Association fall under the jurisdiction of the Comite European de Normalization Electrotechnique (CENELEC).

For the CDRH: The radiant power is detected trough a 7 mm aperture at a distance of 200 mm from the source focused through a lens with a focal length of 100 mm.

For IEC compliance: The radiant power is detected trough a 7 mm aperture at a distance of 100 mm from the source focused through a lens with a focal length of 100 mm.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may no cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation. This device has been tested and found to comply with FCC Part 15 Class B limits for a digital device when tested with a representative laser-based fiber optical system that complies with ANSI X3T11 Fiber Channel Standard.

Certification

Category	Standard	Designed/tested for compliance with:
Safety	UL1419	Professional Video and Audio Equipment

Section 1

Overview

Planning the Installation

This section provides information that must be considered before installing the Series 7000 routing Signal Management System (SMS). An overview of the frames required for the various Series 7000 matrices is provided to help determine space requirements. Cooling options, power, and cable requirements are detailed.

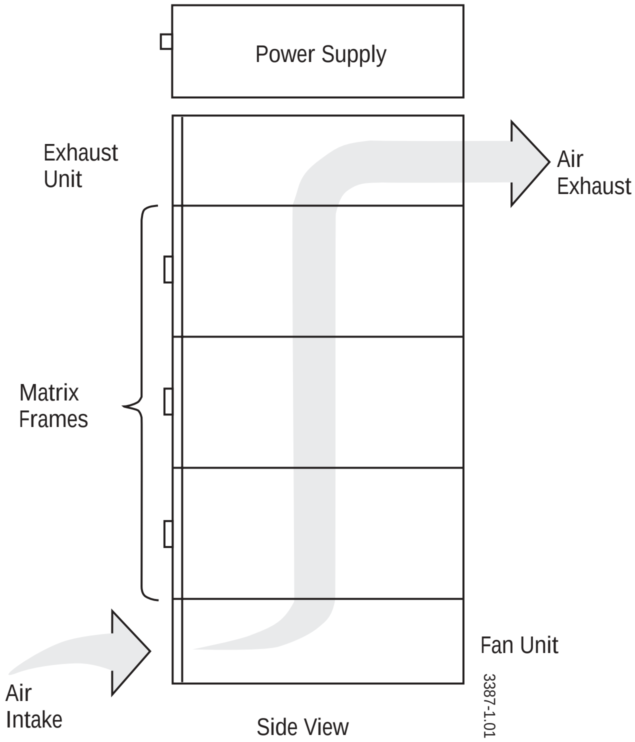
Rack Layout and Space Considerations

Install the Series 7000 system in a standard 19”(482.6 mm) equipment rack. Racks should be located in a clean, well vented area with no air restrictions in front or back.

The system matrix frames have been designed to create a chimney air flow through the vertical modules and open grill tops. Refer to Figure 1-1. If using forced-air racks, the Series 7000 may not need additional cooling. If the installation does not use forced-air racks, the Series 7000 Convection Set option will provide the necessary air flow. Calculations for required air flow are explained in this section.

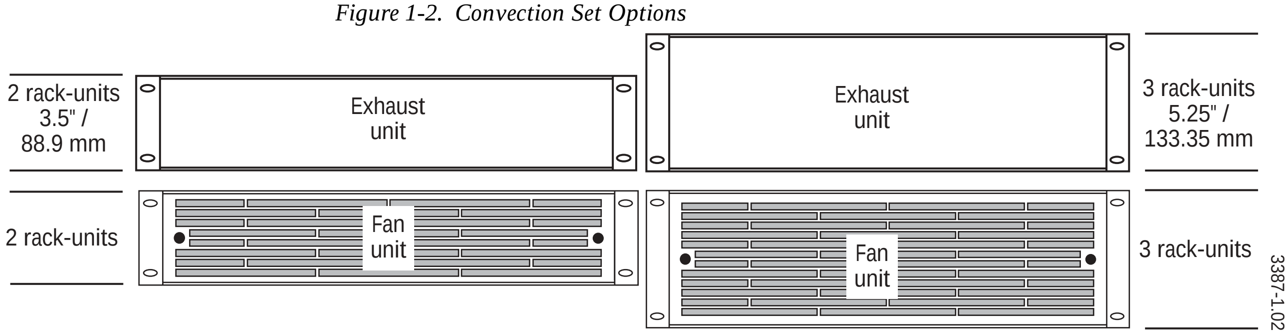
CAUTION Do not leave the frame doors open for extended periods of time. This decreases the cooling capability of the fans/exhaust units by disrupting the chimney air flow.

Figure 1-1. Typical Rack Configuration with Convection Sets



The convection sets consist of rack-mounted fan and exhaust units in either 2 or 3 rack unit sizes. Air intake is at the lower front of the rack; exhaust is at the upper rear. Allow 2 or 3 rack units (depending on the set size) above and below the matrix and control frames for the Convection Set. Refer to Figure 1-2. For specifics on Convection Set installation, see Section 2.

Figure 1-2. Convection Set Options



Convection Set dissipation capacities (in Watts of power) are:

- 2 RU set - up to 600 Watts
- 3 RU set - up to 1000 Watts

To calculate the required Convection Set, total the power dissipation of the frame types (listed in Table 1-1) in the rack and select the unit that meets or exceeds that amount. If a frame stack exceeds 1000 Watts, a 3 RU combination fan / exhaust unit can be placed in the middle of the stack.

Table 1-1. Power Dissipation

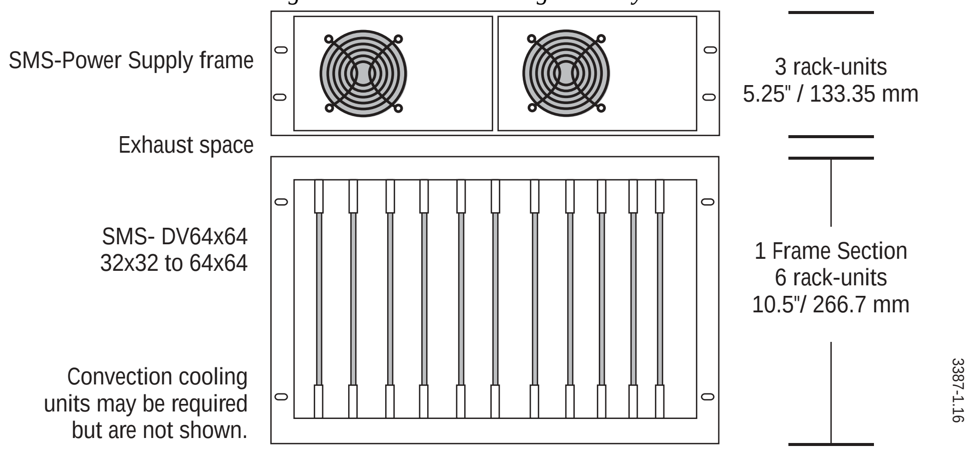
Frame Type	Power Dissipation Analog	Power Dissipation Digital
64x64 Video Matrix Frame	600W	600W
128x64 Video Matrix Frame	600W	600W
128x96 Video Matrix Frame	825W	825W
128x128 Video Matrix Frame	1000W	1000W
64x64 High Density SDV Matrix Frame	N/A	300W
128x128 High Density SDV Matrix Frame	N/A	520W
256x128 High Density SDV Matrix Frame	N/A	780W
Controller Frame	225W	225W
Node Controller Expansion Frame	225W	225W
DS/Secondary Power Supply Frame	250W	250W
Video Distribution Amplifier Frame	160W	160W
Video Secondary Switch Frame	160W	160W
64x64 AA Audio Matrix Frame	300W	150W
128x64 A Audio Matrix Frame	300W	150W
128x128 A Audio Matrix Frame	600W	300W
64x64 Data Matrix Frame	N/A	150W

Series 7000 systems are measured in 1.75" (44.5 mm) rack units:

High Density Serial Digital Video Systems (DV Series)

High Density Serial Digital Video Systems range from 64x64 to 128x128 to 256x128. They employ stand-alone power supply frames as shown in Figure 1-3, Figure 1-4 and Figure 1-5.

Figure 1-3. SMS-64x64 High Density SDV Frame



The 64x64SDV frame can be loaded with up to 2 MCPUs. The frame with MCPUs can control other 64x64SDV frames without MCPUs. The 64x64SDV frame can be used in place of a control frame in any Series 7000 system that uses the same Node Controllers. This allows the 64x64SDV system to be configured as either a compact stand-alone system or as part of a larger system.

The 128x128SDV and the 256x128SDV systems employ control frames as shown in Figure 1-4 and Figure 1-5.

Figure 1-4. SMS-128x128 High Density SDV Frame

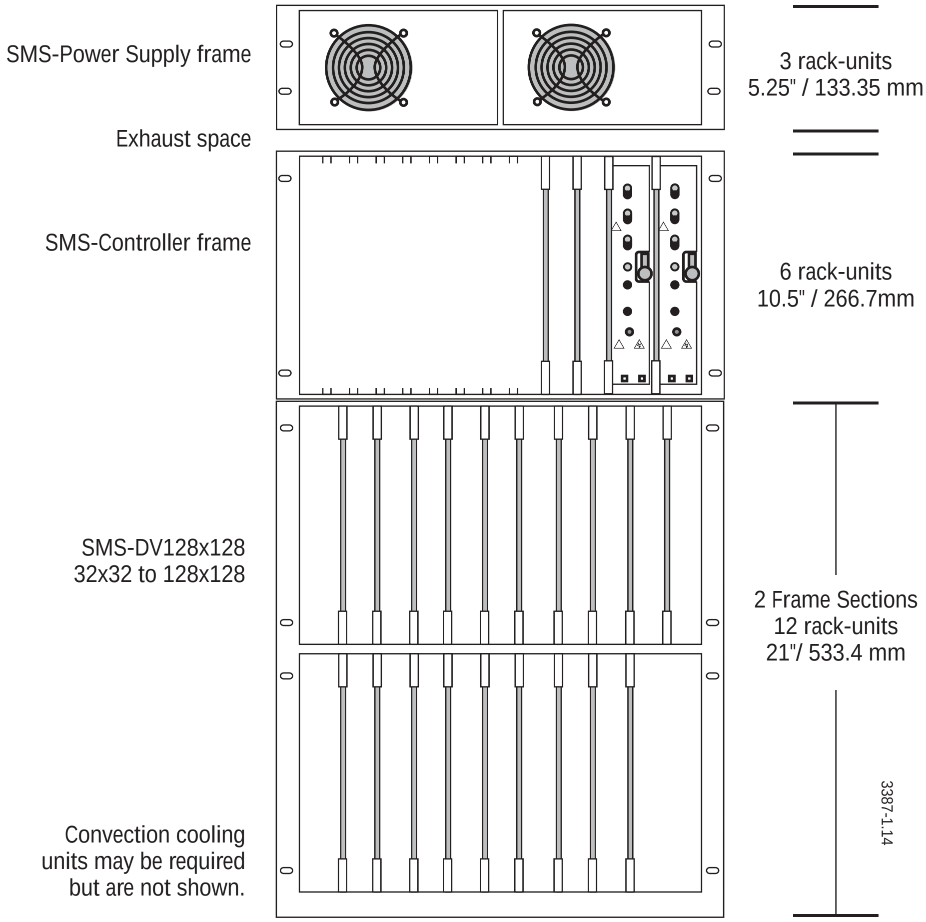
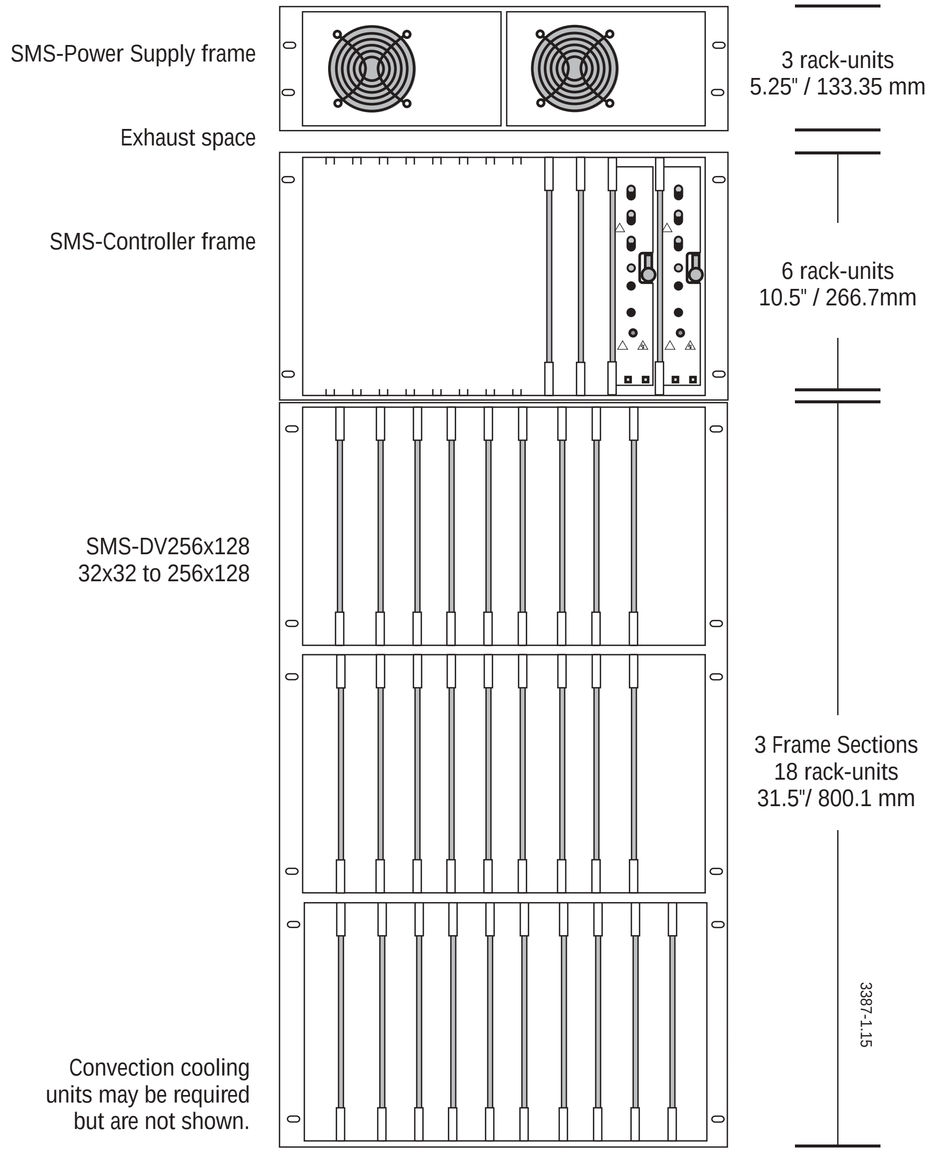


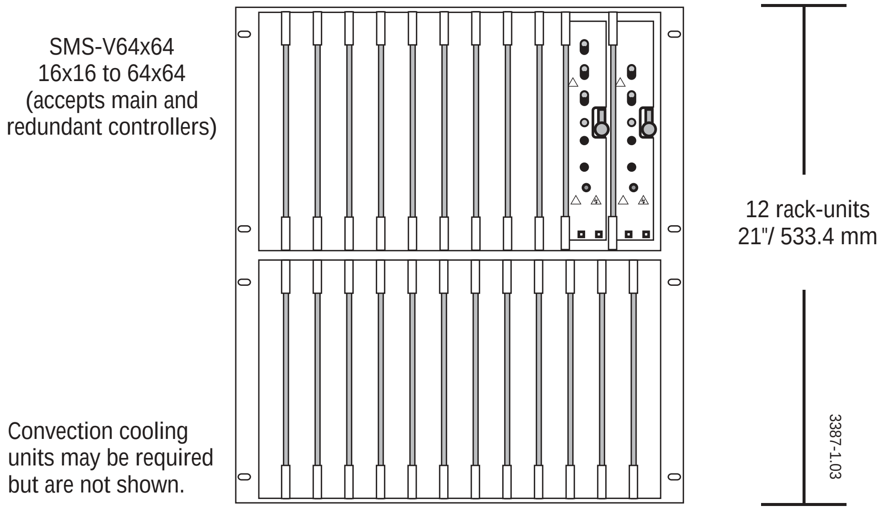
Figure 1-5. SMS-256x128 High Density SDV Frame



Classic Compact Systems

Compact systems are 12 rack-units high, contain power supplies, and MCPU modules. Refer to Figure 1-6.

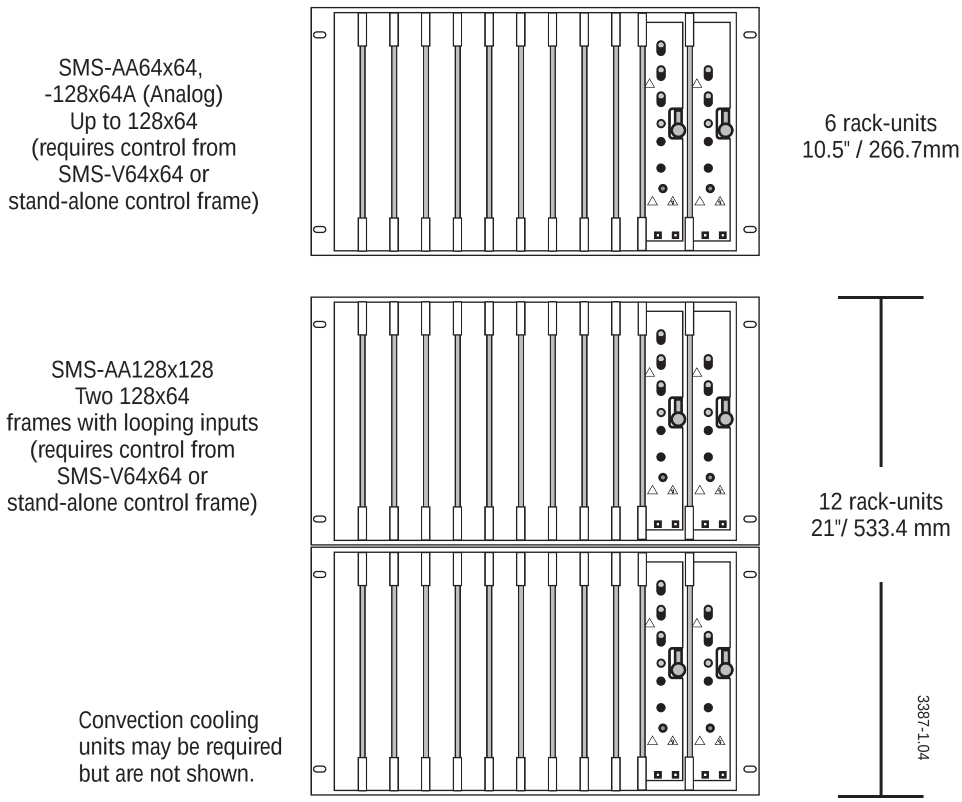
Figure 1-6. Video Compact Frames



Classic Analog Audio Systems

Analog Audio systems up to 128x64 can be housed in a single six rack-unit frame. To expand to 128 outputs, inputs are looped to a second 128x64 frame. Expansion to larger systems is accomplished by adding frames, looping inputs to increase outputs, and paralleling outputs to increase inputs. Refer to Figure 1-7.

Figure 1-7. Analog Audio Frames

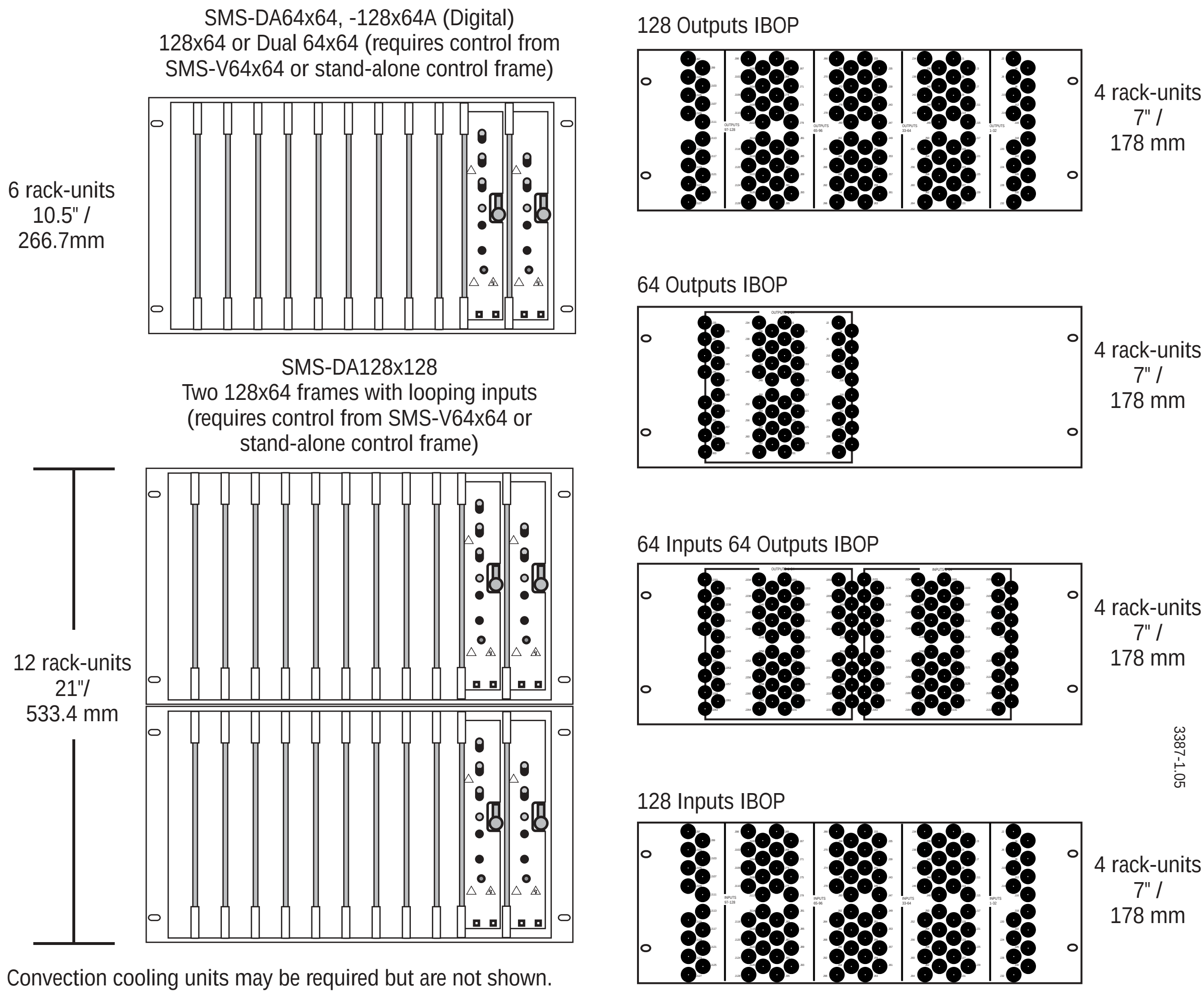


Note Analog Audio frames do not accept Digital crosspoint modules. If you plan eventually to convert to Digital, Digital frames should be used with Analog modules and power supplies.

Classic Digital Audio Frames

Digital Audio systems are built of 6–RU frames and typically employ Interconnect / BreakOut (IBOP) panels for user input and output connections.

Figure 1-8. Digital Audio Frames with Interconnect/BreakOut Panels



A 128x128 system combines two 6–RU frames with a single 12-RU interconnecting backplane. Larger Digital Audio systems are constructed by looping 128x128 input and output connections from frame to frame to create systems up to 384x384. For details, see the Matrix Cabling section.

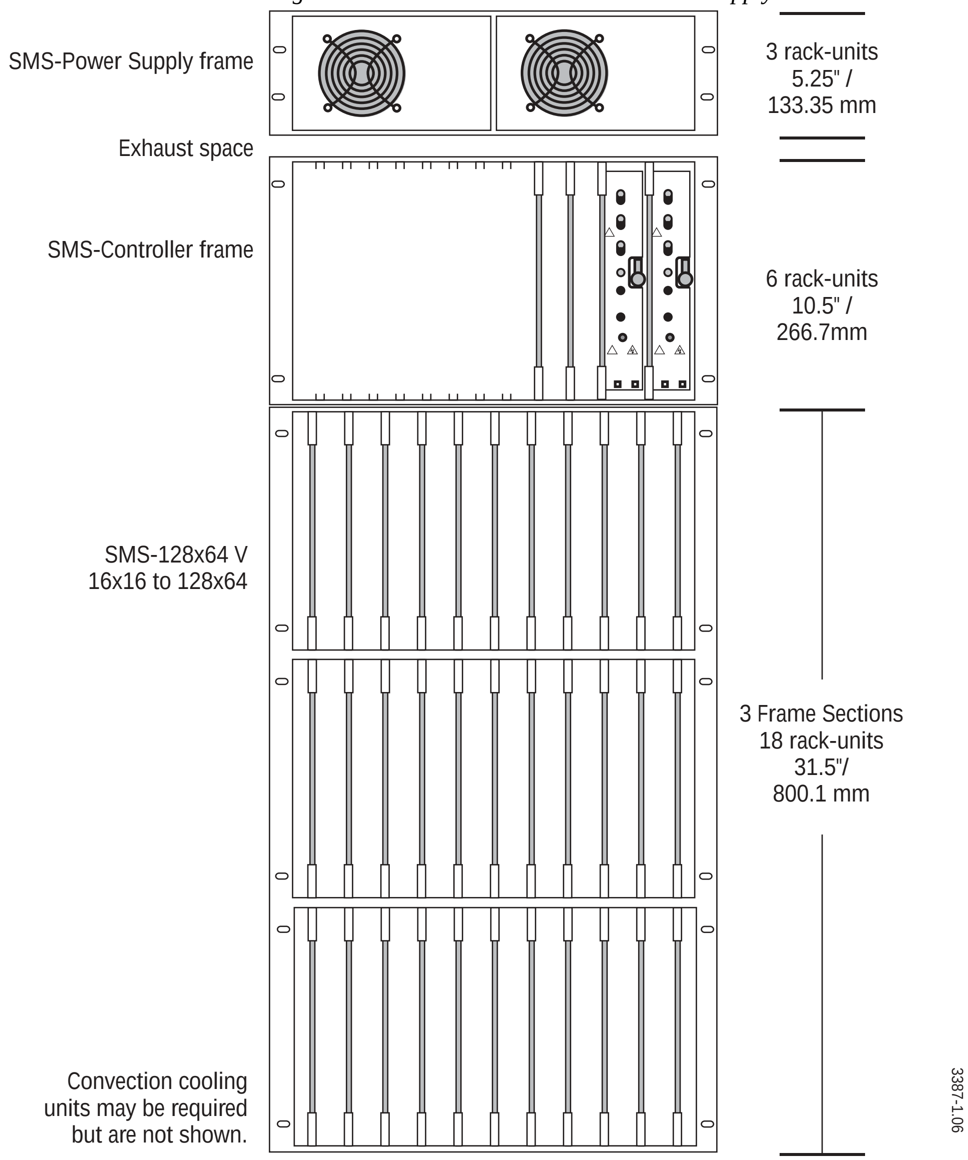
Systems using IBOP panels mounted at the rear of the rack require a minimum 30" equipment rack depth.

Digital Audio frames can be used to transition from Analog to Digital. These frames will accept Analog Audio crosspoint modules and Power Supplies, while analog frames do not accept digital modules.

Classic Expanded Video Systems

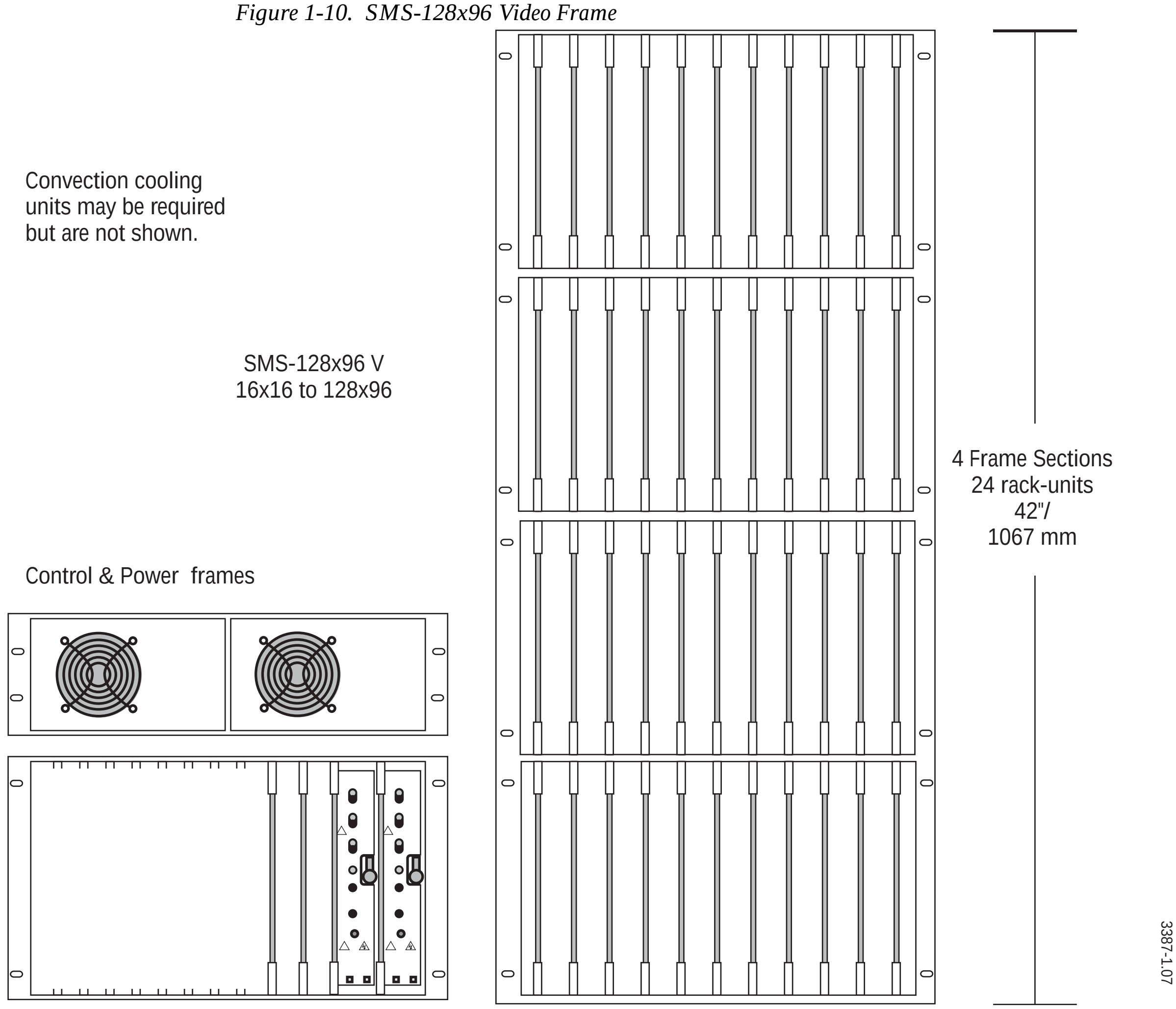
Expanded systems range from 128x64 to 128x128. They employ stand-alone power supply and controller frames as shown below. The stand-alone controller frame allows large scale system expansion and a variety of control options. Refer to Figure 1-9

Figure 1-9. SMS-128x64 Video with Power Supply and Controller Frames



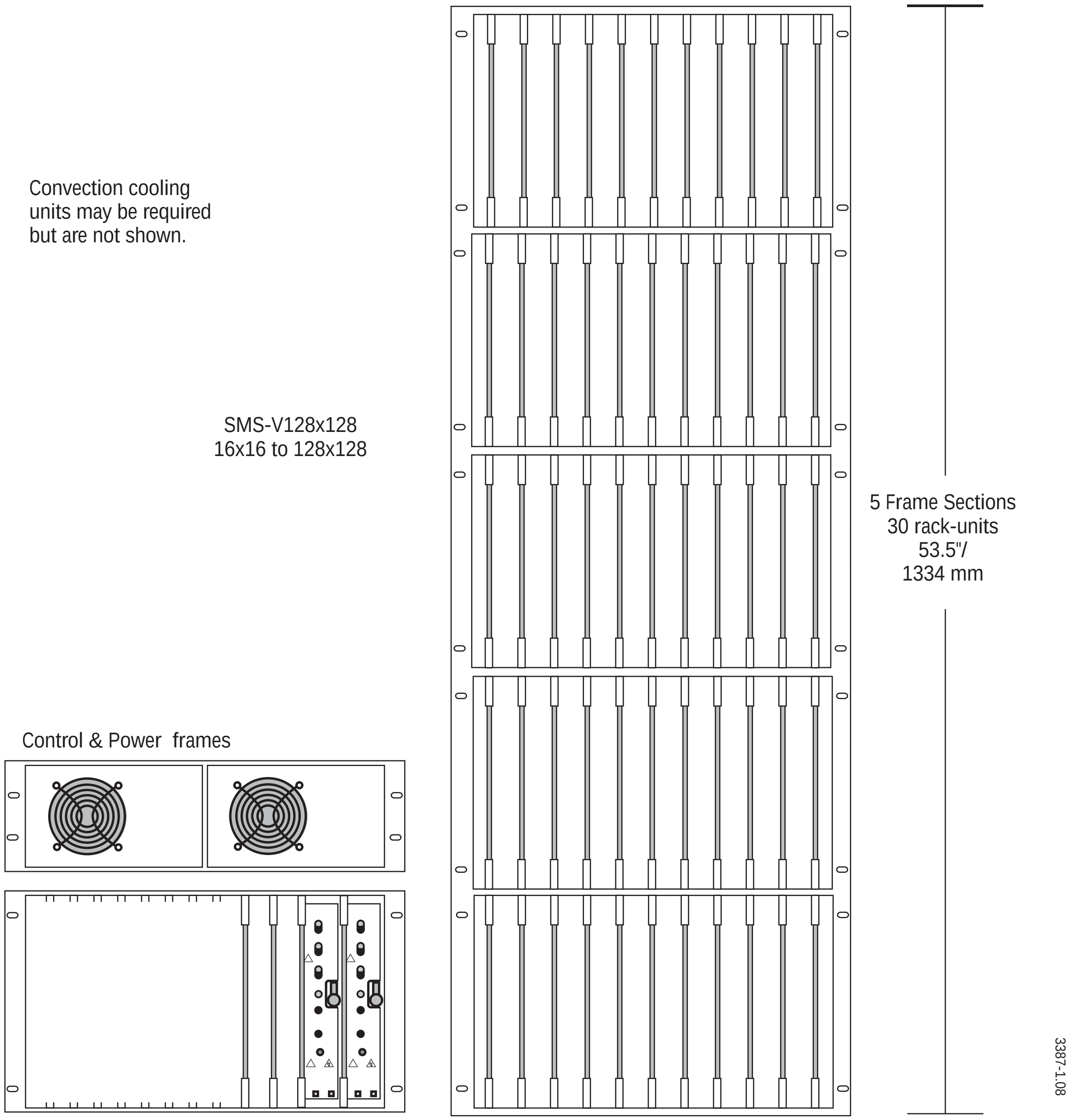
The SMS-128x96 system adds another six rack-unit frame section to accommodate destinations 65-96. Refer to Figure 1-10

Figure 1-10. SMS-128x96 Video Frame



The SMS-128x128 system adds another six rack-unit frame section to accommodate destinations 97-128. Refer to Figure 1-11.

Figure 1-11. SMS-128x128 Video Frame



Secondary Video Systems

Secondary systems are large video systems ranging from above 128x128 (256x128 DV Series) to 1024x1024. These systems consist of Expanded System blocks interconnected with Video Distribution Amplifiers (DAs) to expand outputs, and Secondary Switches to expand inputs. Control of large systems is through the stand-alone Controller frame and one or more 6 -rack unit Node Control Expansion frames. DA and Secondary Switch frames are powered from a separate 6-rack unit Power Supply frame.

Output Expansion

Series 7000 DAs are used to fanout sources to multiple matrices to increase outputs as shown in Figure 1-12.

Figure 1-12. Video DAs for Output Expansion

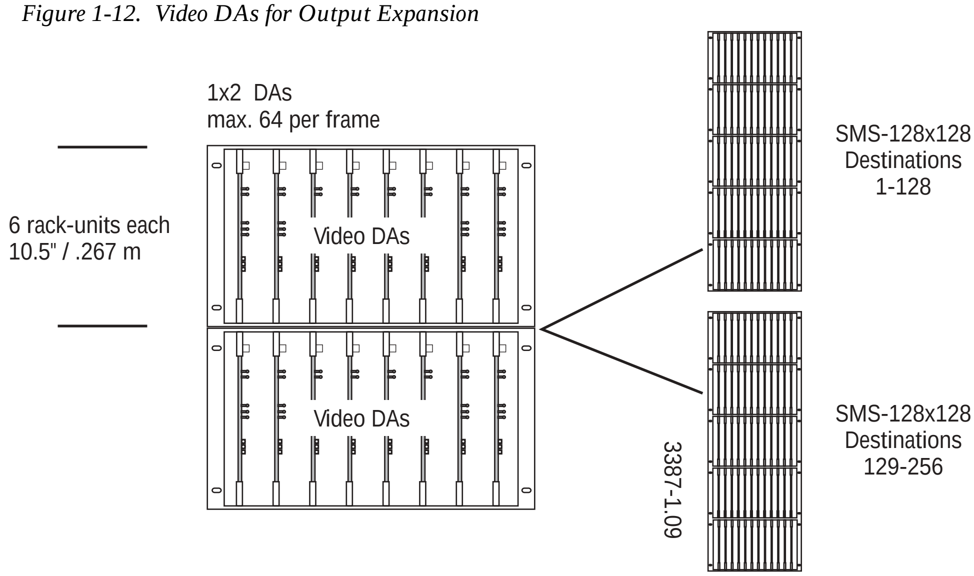


Table 1-2 shows the video DA requirements for output expansion.

Table 1-2. DA Requirements for Output Expansion

Core Frame	Max Outputs	DA Type	# Per Frame
SMS-128x128V	256	1x2	64
	512	1x4	32
	1024	1x8	16
SMS-DV256x128	256	1x2	64
	512	1x4	32
	1024	1x8	16

Input Expansion

Like the input DAs, Secondary Switches are available in three sizes, determining ultimate system size as shown in Figure 1-13.

Figure 1-13. Secondary Switching for Input Expansion

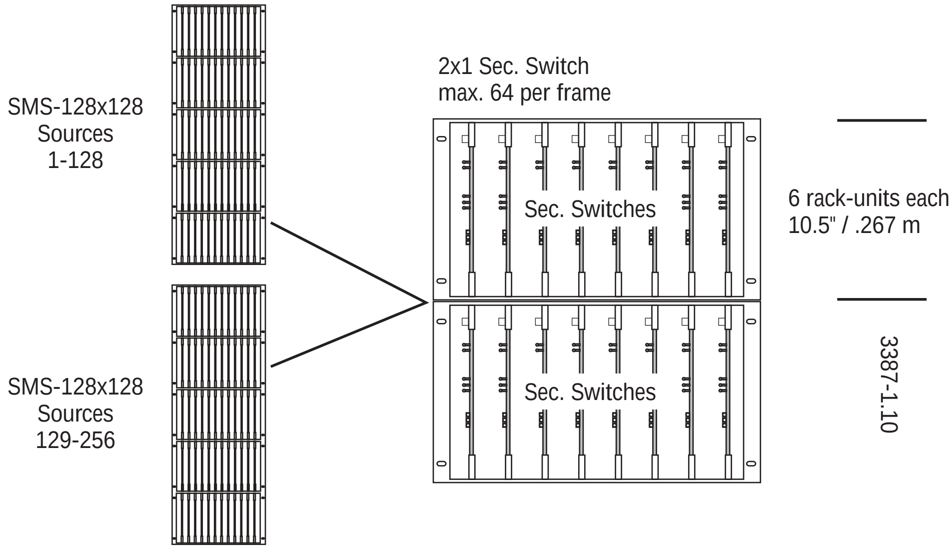


Table 1-3 shows the video DA requirements for input expansion.

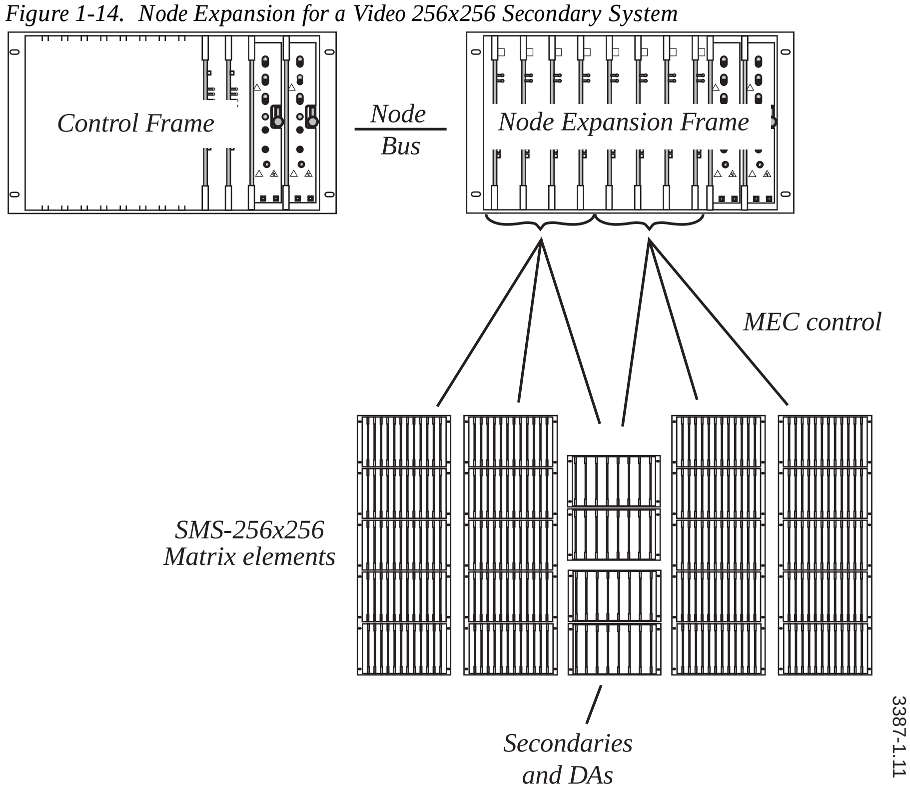
Table 1-3. DA Requirements for Input Expansion

Core Frame	Max Inputs	DA Type	# Per Frame
SMS-128x128V	256	2x1	64
	512	4x1	32
	1024	8x1	16
SMS-DV256x128	512	2x1	64
	1024	4x1	32

Node Control Expansion

Secondary Systems use Node Expansion modules to increase the number of Matrix Element Control (MEC) lines to the matrix frames. A Node Expansion Frame provides slots for two sets of primary and backup Node Controller and Node Control Expansion modules (four modules per set). Figure 1-14 illustrates The Control and Node Control Expansion Frames used with a 256x256 Secondary System.

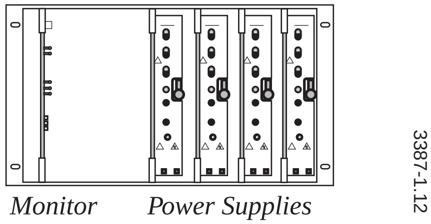
Figure 1-14. Node Expansion for a Video 256x256 Secondary System



Power for Secondary and DA Frames

Secondary Switch and Distribution Amplifier frames receive DC power from a separate 6RU frame that contains Power Supply Modules and accepts the optional Output Monitor Module. A fully populated frame is illustrated in Figure 1-15.

Figure 1-15. Secondary/DA Power Supply Frame

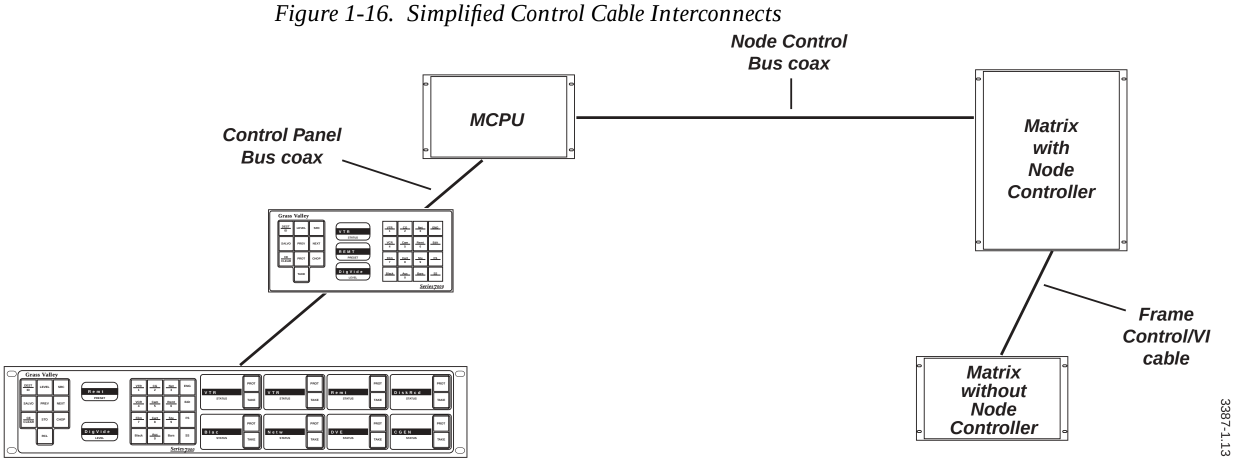


Cable Lengths and Types

The maximum distance between the frames and / or control panels of a system is determined by the interconnecting control bus cables. Maximum recommended lengths are listed below:

- Node Bus coax – control frame to matrix frame / node controller 1,500 ft. / 460 m.
- Control Panel Bus coax – each port with max. 16 panels 1,500 ft. / 460 m.
- Frame Control / Vertical Interval cable – multi-conductor matrix element control bus (RS-485) 300 ft. / 100 m.

Figure 1-16. Simplified Control Cable Interconnects



All coax (CP Bus, Analog video, Digital video) should be 75 Ohm Belden 8281 or equivalent. The 9-conductor cable should be Belden 9539 or equivalent.

For detailed frame interconnect planning see the Interconnect Diagrams in Section 3, *Frame Interconnect Cabling* in this manual.

Section 2

Frame Installation

Introduction

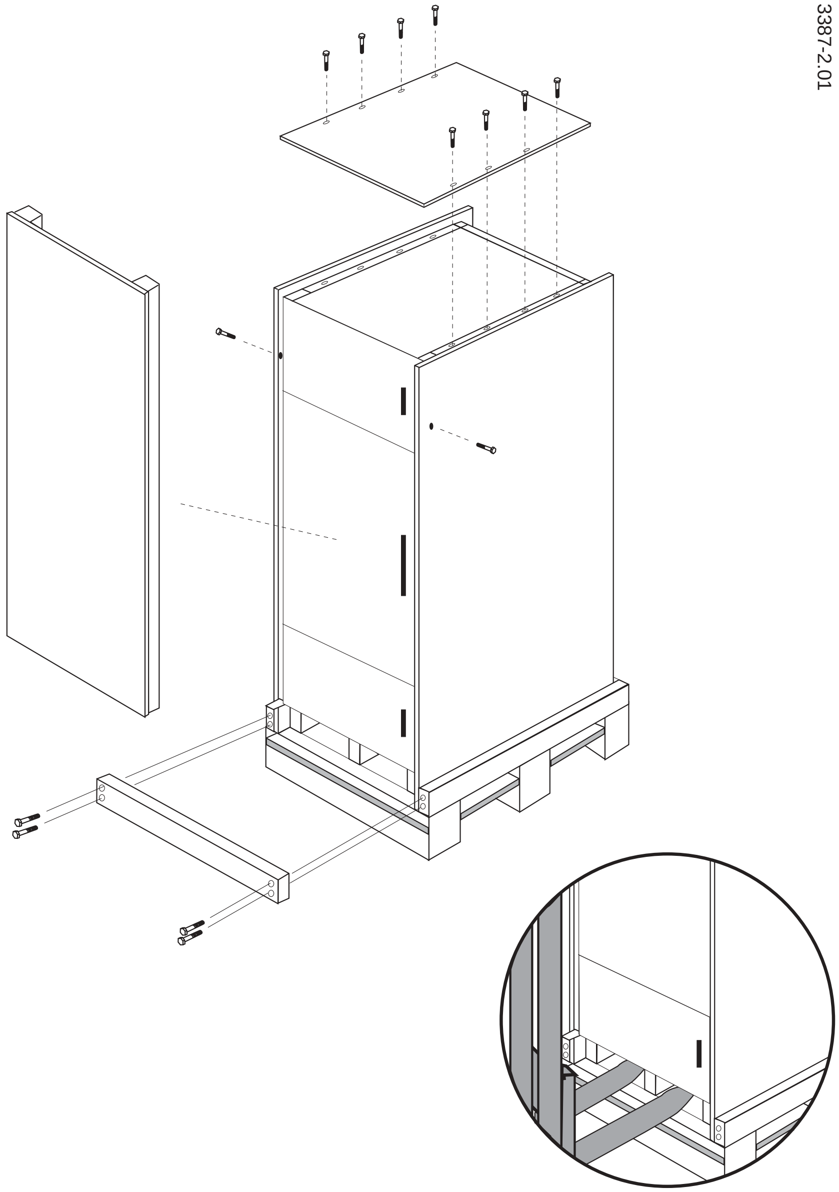
This section contains information required to install Series 7000 frames in equipment racks.

Unpacking Large Frames

Large Series 7000 matrices are packed in containers with built-in pallets for a standard forklift or pallet jack. Figure 2-1 illustrates container disassembly and lift fork insertion.

Note Remember to remove retaining screws from the frame rack mount slots before lifting the pallet. Also check for cables, spare parts, or important technical documentation that may have been shipped in the container.

Figure 2-1. Shipping container disassembly



System Survey

Examine the equipment for any shipping damage. If damage is found, report it immediately to the carrier and to the appropriate representative listed on the inside title page of this manual. Check all parts received against the packing list enclosed with your shipment.

Line Voltage Check

All frames and control panel power supplies are clearly marked for proper input Line Voltage (120V or 240V). Please verify that each device is of the correct Line Voltage for your installation.

Installing Frames in Racks

Install your Series 7000 system in standard EIA 19” equipment racks with sufficient depth for cable bundles. Cable bundle weight must be properly supported by the equipment rack to avoid undue stress on matrix connectors.

CAUTION All equipment racks should be securely fastened to the floor or wall to eliminate the possibility of tipping due to top-heavy rack loading.

Equipment rack location should be:

- Clean and well vented
- Distance between the various frames of a system must be within maximum control and interconnect cable length requirements, see Section 1, Planning the Installation

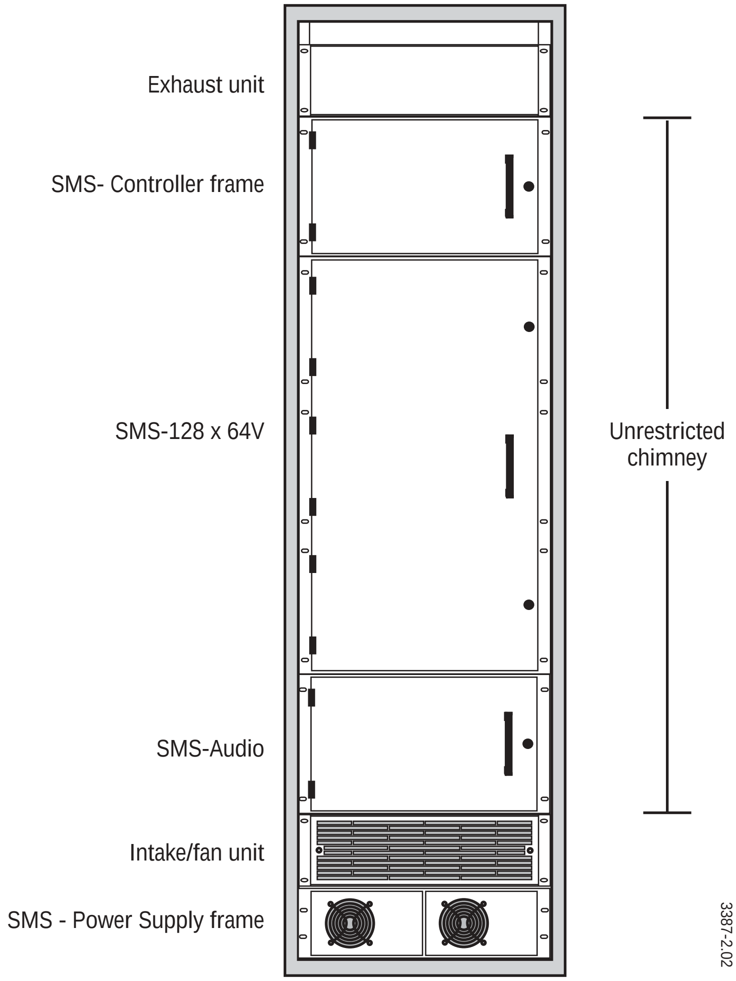
Air Flow in the Racks

Series 7000 frames are designed for vertical air flow cooling (convection or chimney air flow). To support this:

- Individual matrix and control frames must be mounted contiguously in the rack to create an unbroken, unrestricted column or chimney
- No solid-body frame (for example, power supply frame) should be placed in the column so as to block air flow to the exhaust section of the rack
- Use forced-air equipment racks or the Series 7000 Convection Set option to provide the necessary air intake and exhaust

CAUTION Do NOT leave the frame doors open for extended periods of time. This decreases the cooling capability of the fans/exhaust units by disrupting the chimney air flow. Refer to Figure 2-2.

Figure 2-2. Proper Frame Placement for Chimney Air Flow

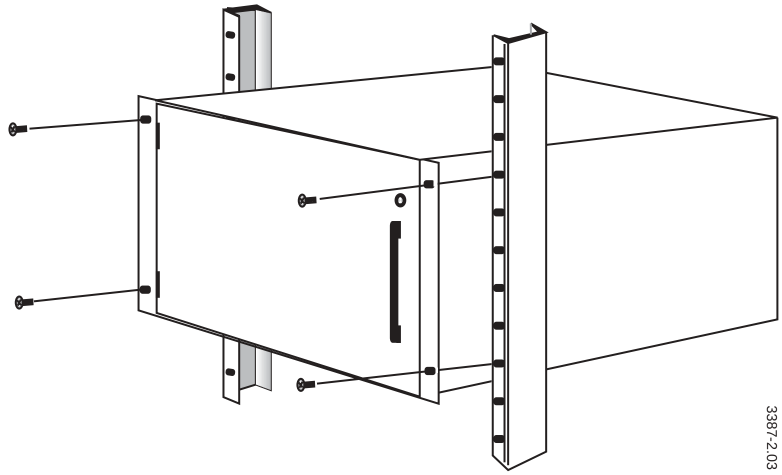


Convection sets consist of a fan unit for the bottom of the chimney and an exhaust unit for the top. These units may be 2 or 3 RUs tall. The exhaust unit size (in Rack Units) must match the fan unit.

Frame Lifting and Securing

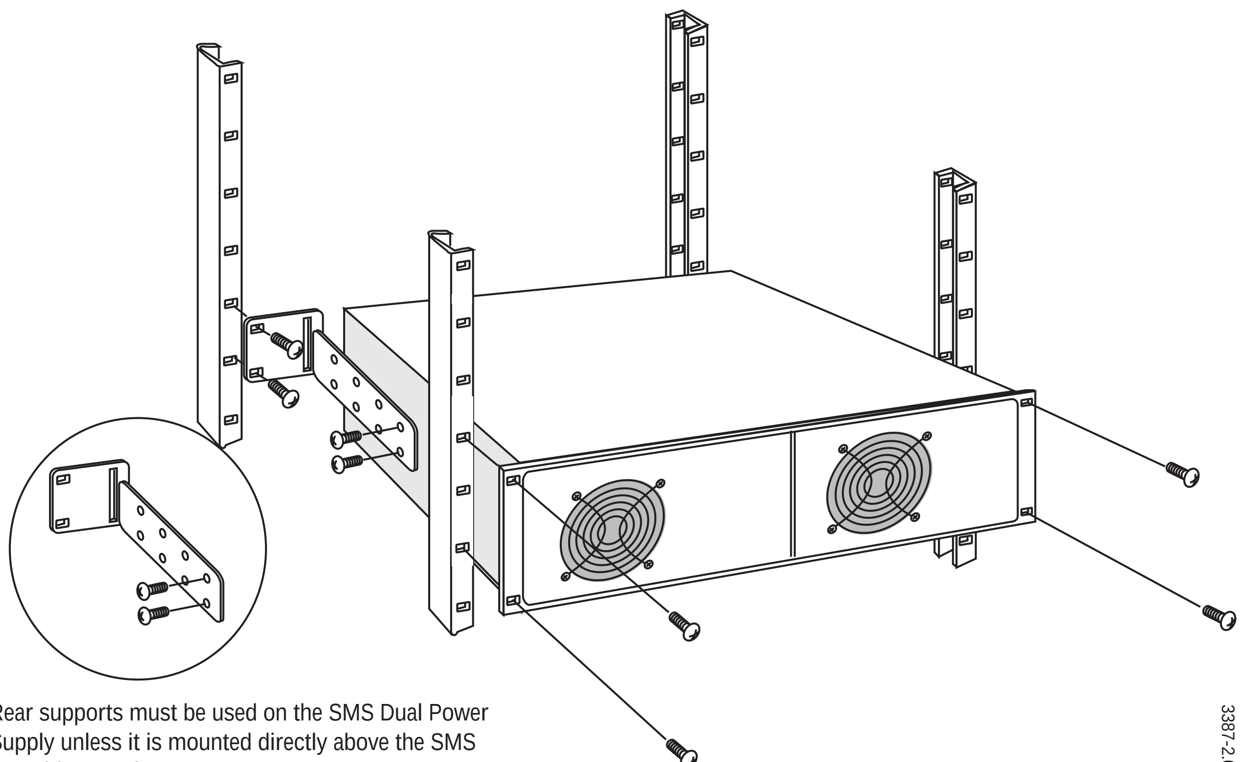
Use bolts specified by your rack manufacturer (not supplied) to secure the frame in the equipment rack. Be sure to place a bolt in every mounting slot in the frame. Refer to Figure 2-3.

Figure 2-3. Typical Rackmount Frame, 6 Rack-units



Smaller frames may require rear support brackets. Check frames for the bracket kit shown in Figure 2-4 and install as shown.

Figure 2-4. Rear Frame Support Bracket Assembly



Rear supports must be used on the SMS Dual Power Supply unless it is mounted directly above the SMS 128 Video Matrix.

CAUTION Use a frame hoist or other lifting device to support heavy frames while installing them in your equipment racks. Approximate weights of fully populated Series 7000 frames are listed in *Appendix A—Specifications*.

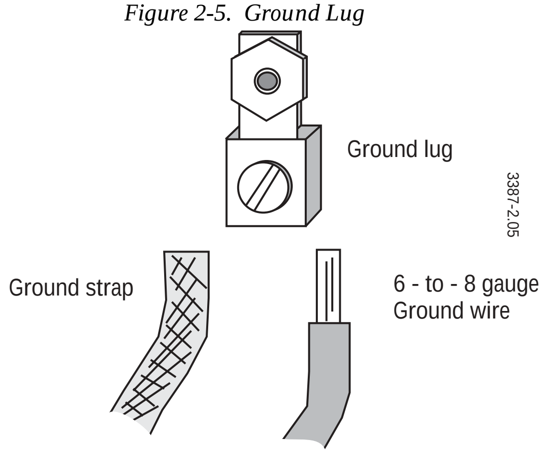
System Grounding

This product is grounded through both a frame grounding connection and the grounding conductor of the power cord.

CAUTION It is essential that your routing system be properly grounded before you connect AC power.

Series 7000 systems use a ground lug which is located on the rear of each independent frame. A typical ground lug is illustrated in Figure 2-5.

Figure 2-5. Ground Lug



You may use grounding strap or appropriately sized (we recommend 6-to-8 gauge) insulated wire to ground your frames to the equipment racks or station ground.

After you have connected the frame ground(s), plugging in the AC power cords will provide the second ground path. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting product inputs or outputs.

Section 3

Frame Interconnect Cabling

Introduction

This section helps you connect control, synchronization (sync), power, and alarm cables prior to power-up and basic operation check. The operation check should be done before the cabling of Input and Output signals.

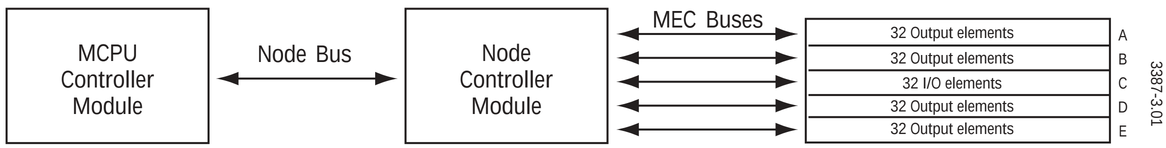
Control Interconnect Cabling

Series 7000 frame interconnects include control, sync, and DC power cabling. (This section does not address audio and video signal cabling, see Section 7, Matrix Cabling, in this manual).

Since your installation may consist of elements of any system size, your interconnects may not exactly match those provided. For instance, a stand-alone Control frame may be used in several of these examples if rack space is not limited and expanded control and options capacity is desired.

Control interconnect cabling consists of connecting the Series 7000 MCPU (Controller) to the Node Controller module(s) via the Node Bus. Refer to Figure 3-1. The Node Controller module then drives a number of Matrix Element Control (MEC) buses. The MEC bus connects the control circuits of the various matrix modules in a frame section to the Node Controller. In some cases, when the MCPU and Node Controller reside in the same frame, these connections are all internal to the frame. More often, there are multiple Node Controllers in a system and a coaxial cable is run between Node Bus ports of each frame in the system. Only secondary systems and a particular compact configuration run external MEC buses.

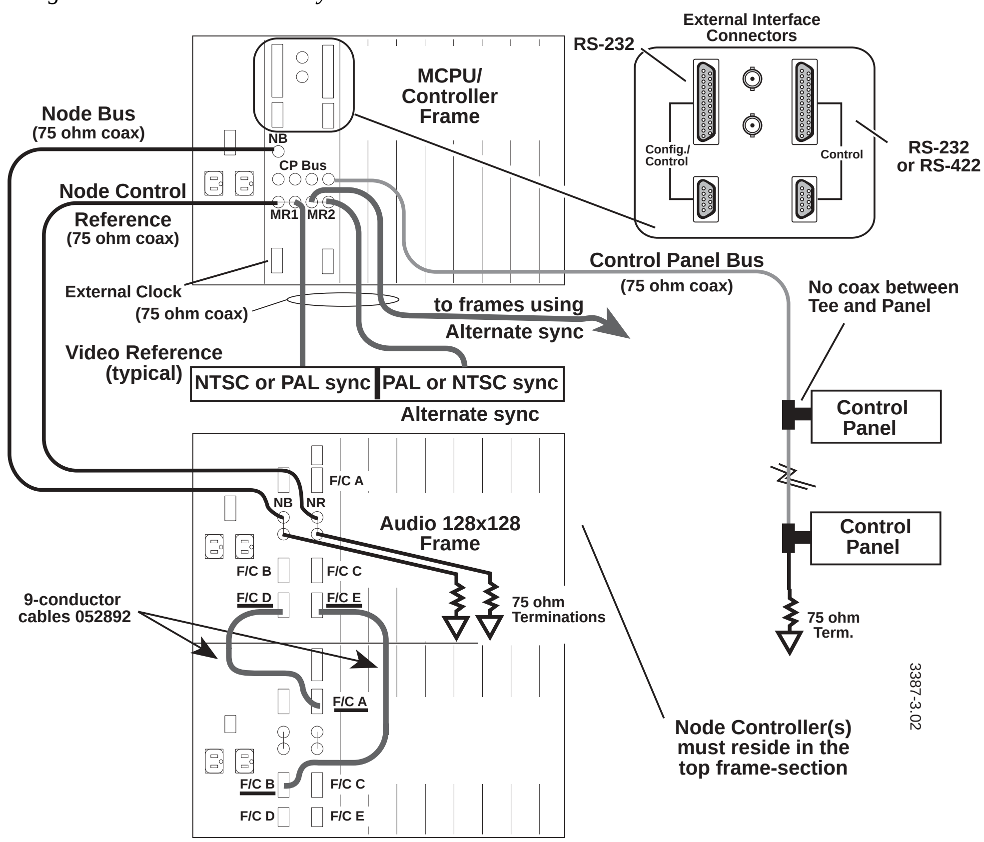
Figure 3-1. Series 7000 Matrix Control Buses



Audio 128x128 with Controller Frame

Refer to Figure 3-2. This system configuration combines two 6 RU 128x64 systems to produce the 128x128 Audio matrix. Note that active control for the Audio System is in the top frame-section where the Node Controller module(s) must reside.

Figure 3-2. 128x128 Audio System with Controller Frame



Compact 64 with Controller(s) in the Video Frame

Refer to Figure 3-3 and Figure 3-4. This example represents the most common compact system configuration. Control interconnection consists of looping the Node Bus coaxial cable from the Video frame to the Audio frame. The Video frame contains the Controller and its own Node Controller. The Audio frame also contains its own Node Controller. If the Node Bus port in the video frame is not used (there is no audio frame), terminate one of the Node Bus BNCs with a 75 Ohm termination. When a Controller Frame with MCPU is used with the Compact 64V, the Node Bus ports are treated as a standard loop through (terminate the un-used BNC).

Figure 3-3. 64x64 Video and Dual Audio in 24 Rack-units

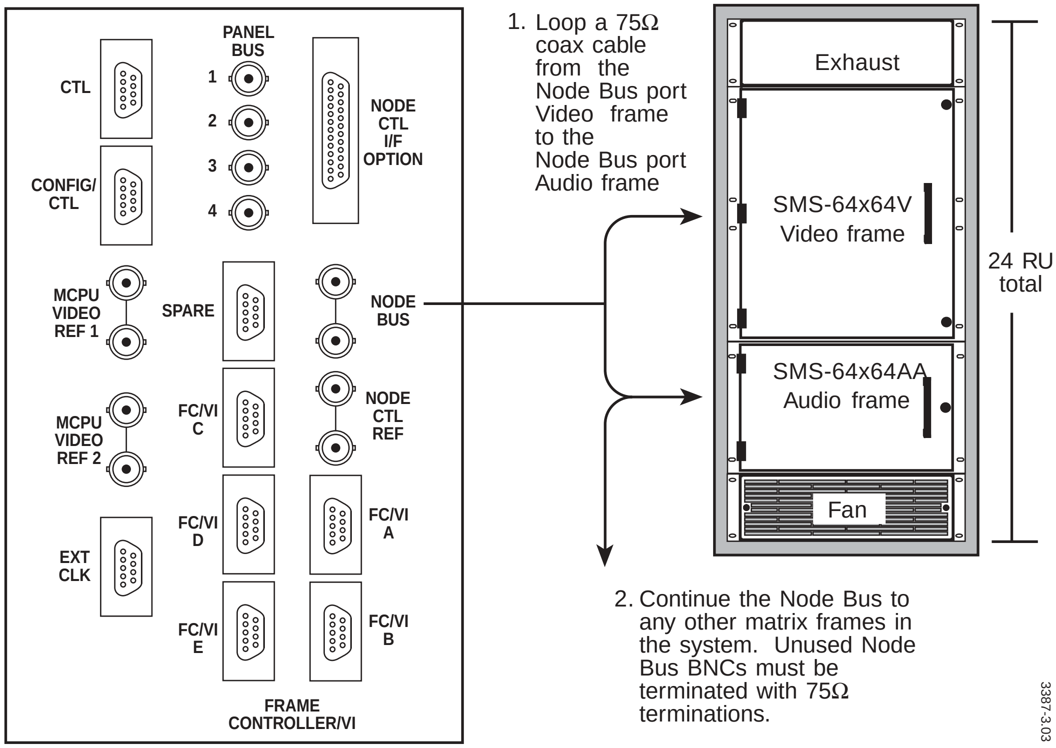
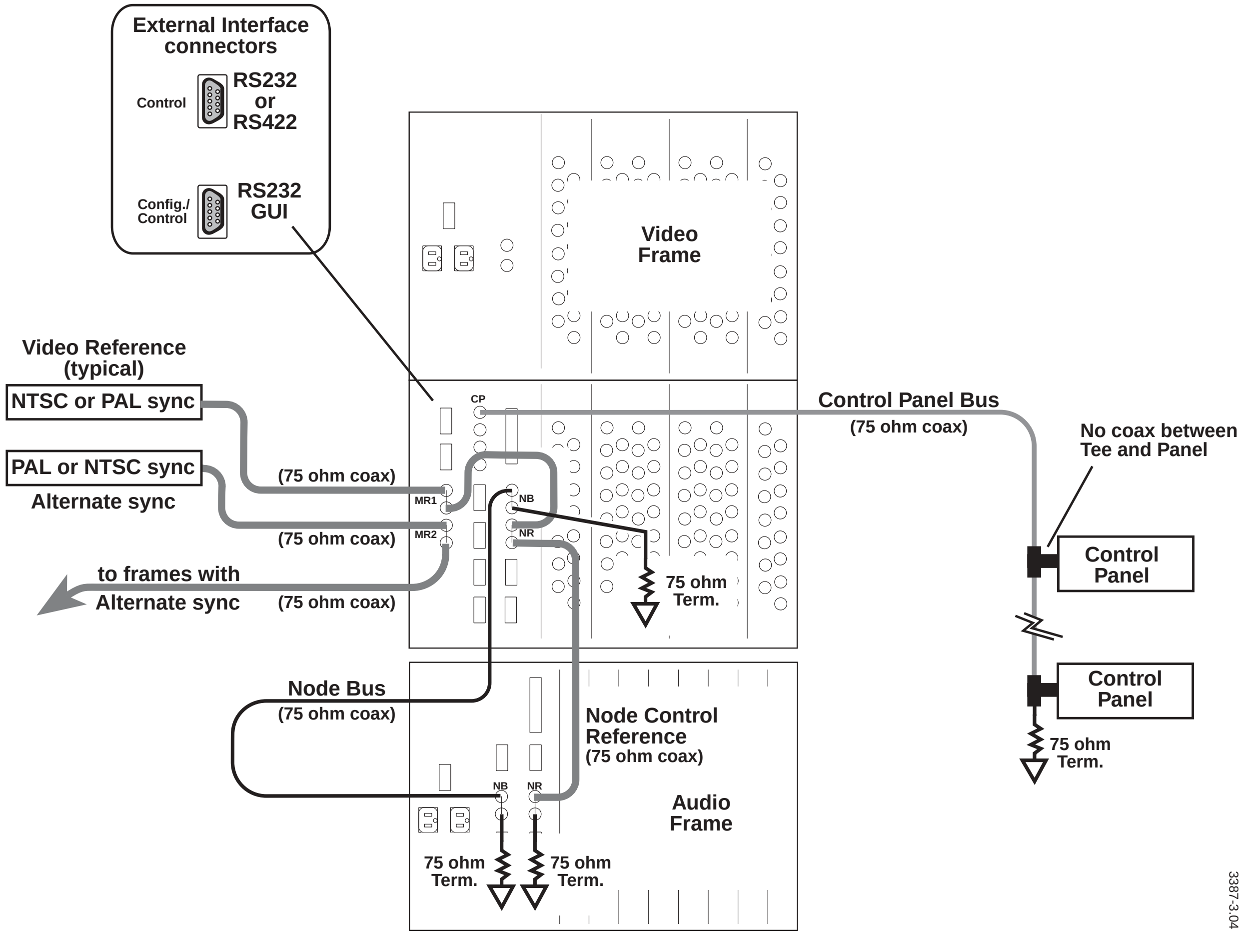


Figure 3-4. 64x64 Video and Audio System Interconnect



Note If the 64 Video Frame contains no MCPU, the node bus BNCs allow the node coax originating from the frame containing the MCPU to be looped through the 64 Video Frame. If the MCPU is in the 64 Video Frame, only one of the BNCs should be used for node bus origination; the other BNC should be terminated.

Expanded 128 Video System with Controller Frame

Expanded systems are built around the 128x64 Video core frame with top and bottom Expansion frames that extend the physical matrix size up to 128x128 (refer to Figure 3-5).

Figure 3-5. Typical SMS-128x128 Video Rack Layout

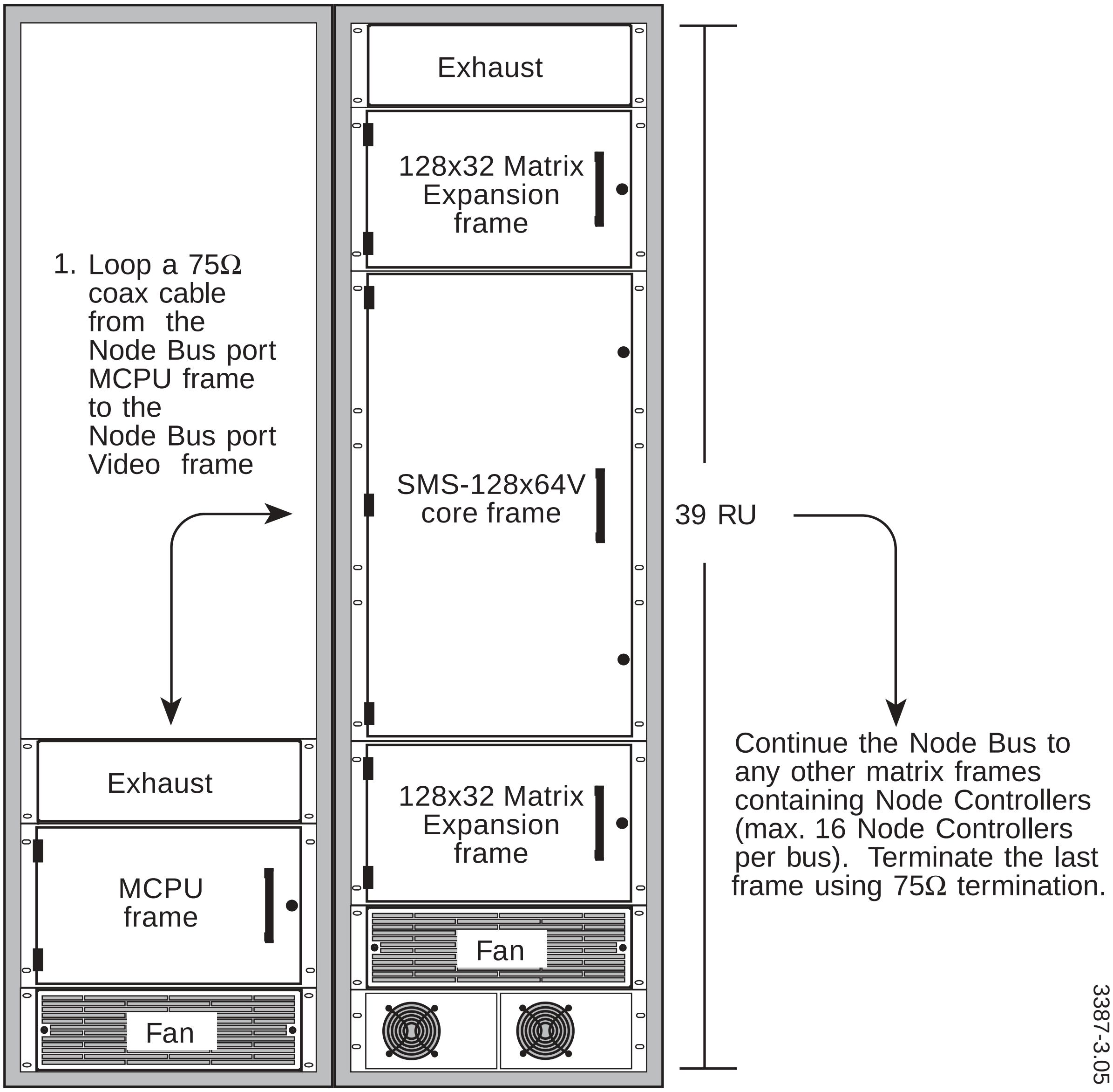
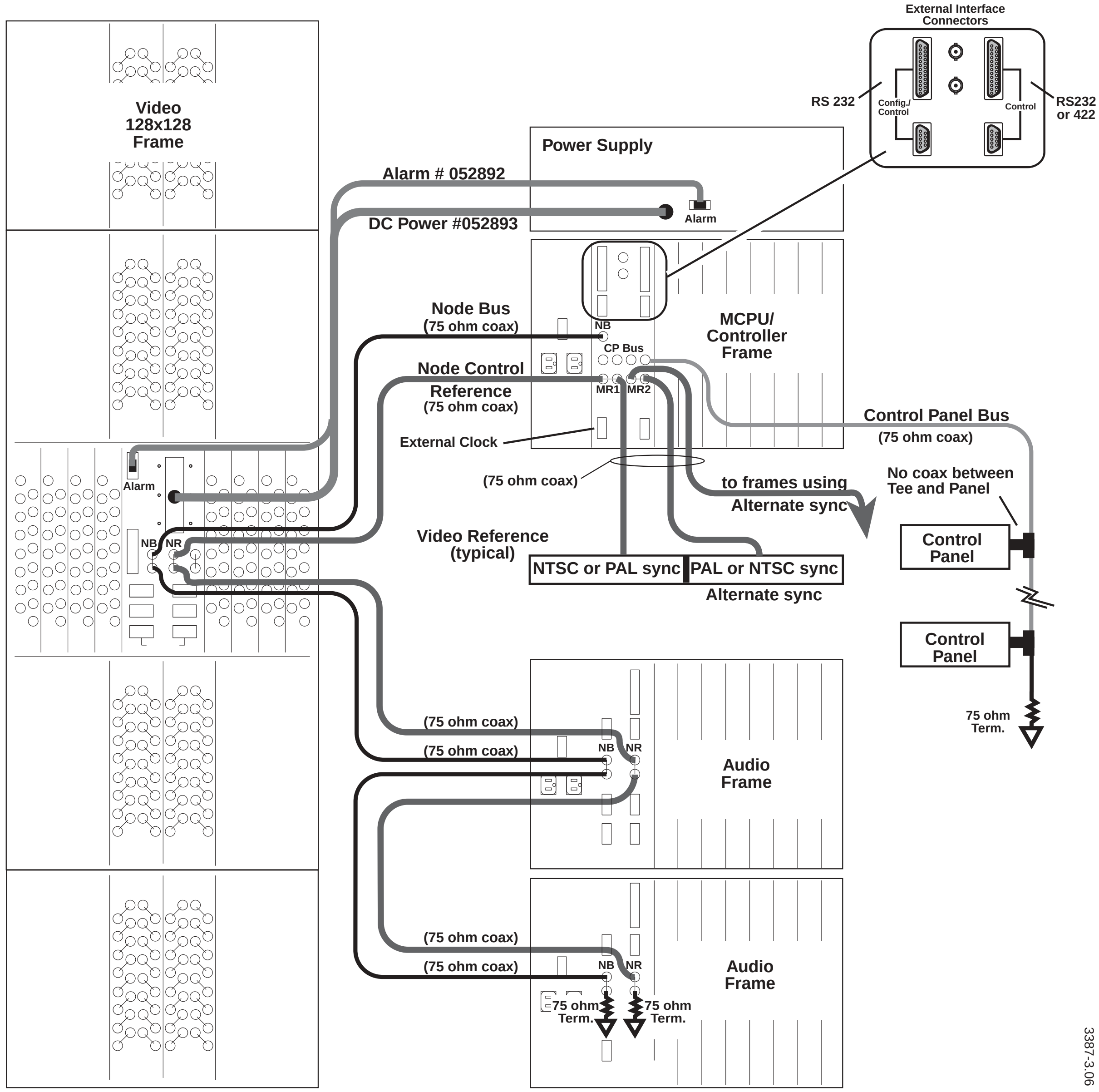


Figure 3-6. 128x128 Video with 128x64 Dual Audio Control Interconnects



High Density 128x128SDV System

High Density systems are built around the Serial Digital Video core frame (refer to Figure 3-7).

Figure 3-7. Typical SMS-128x128 Serial Digital Video Rack Layout

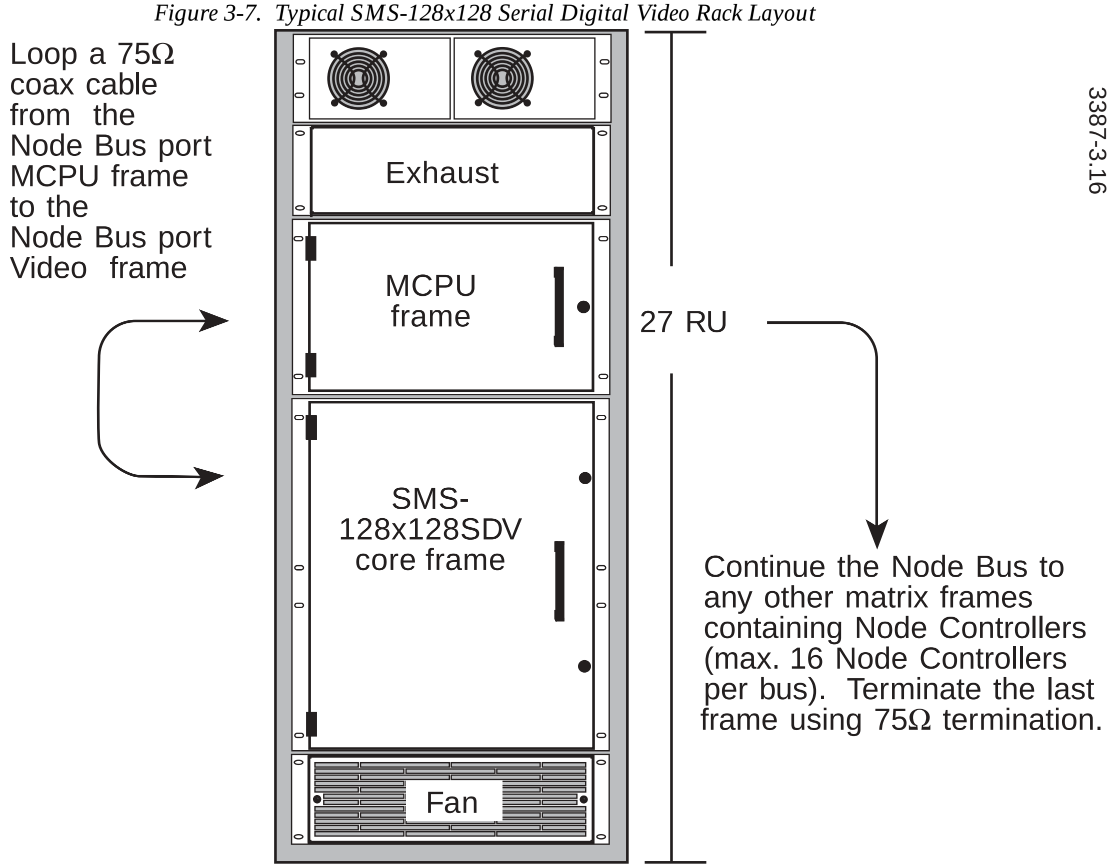
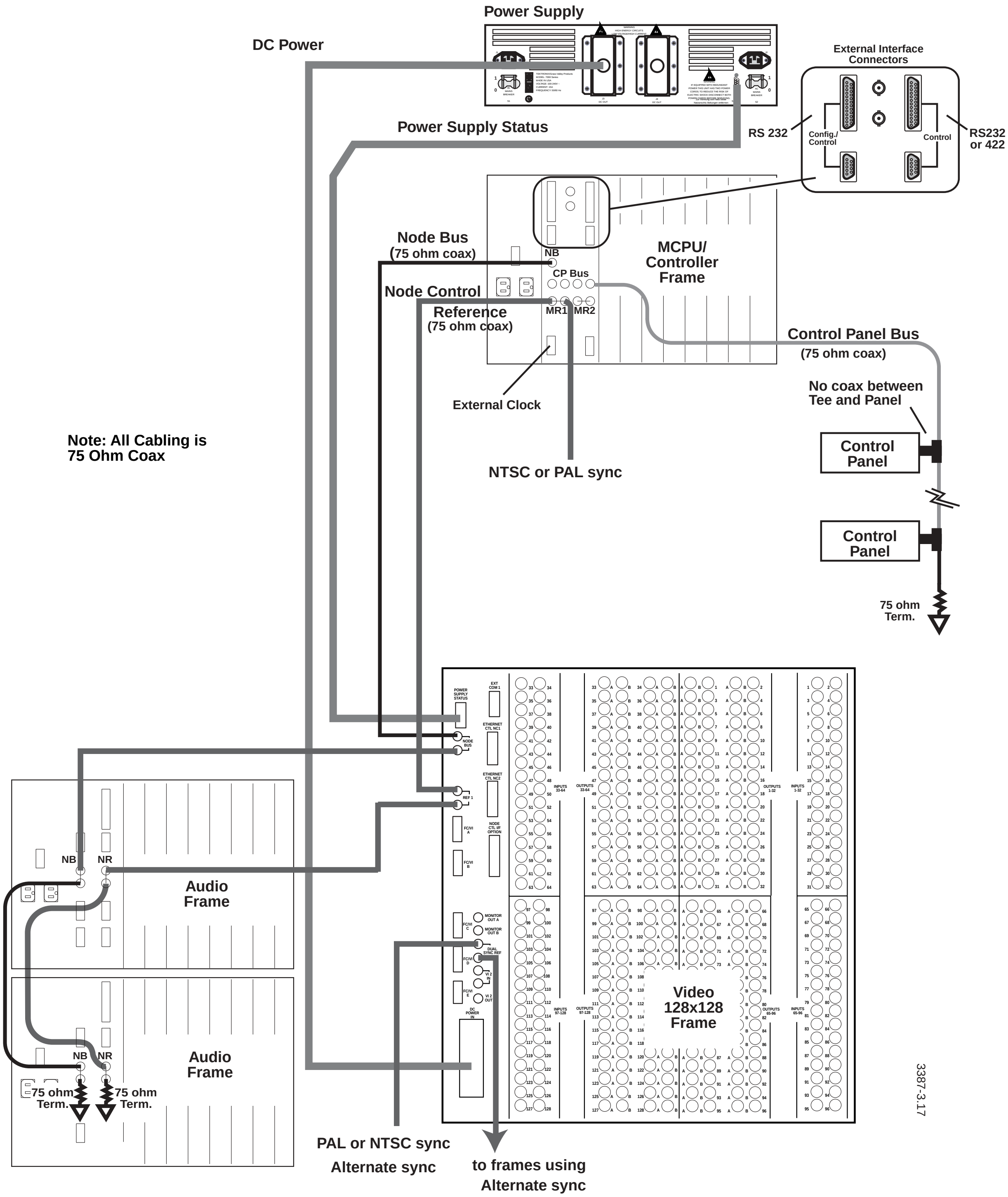


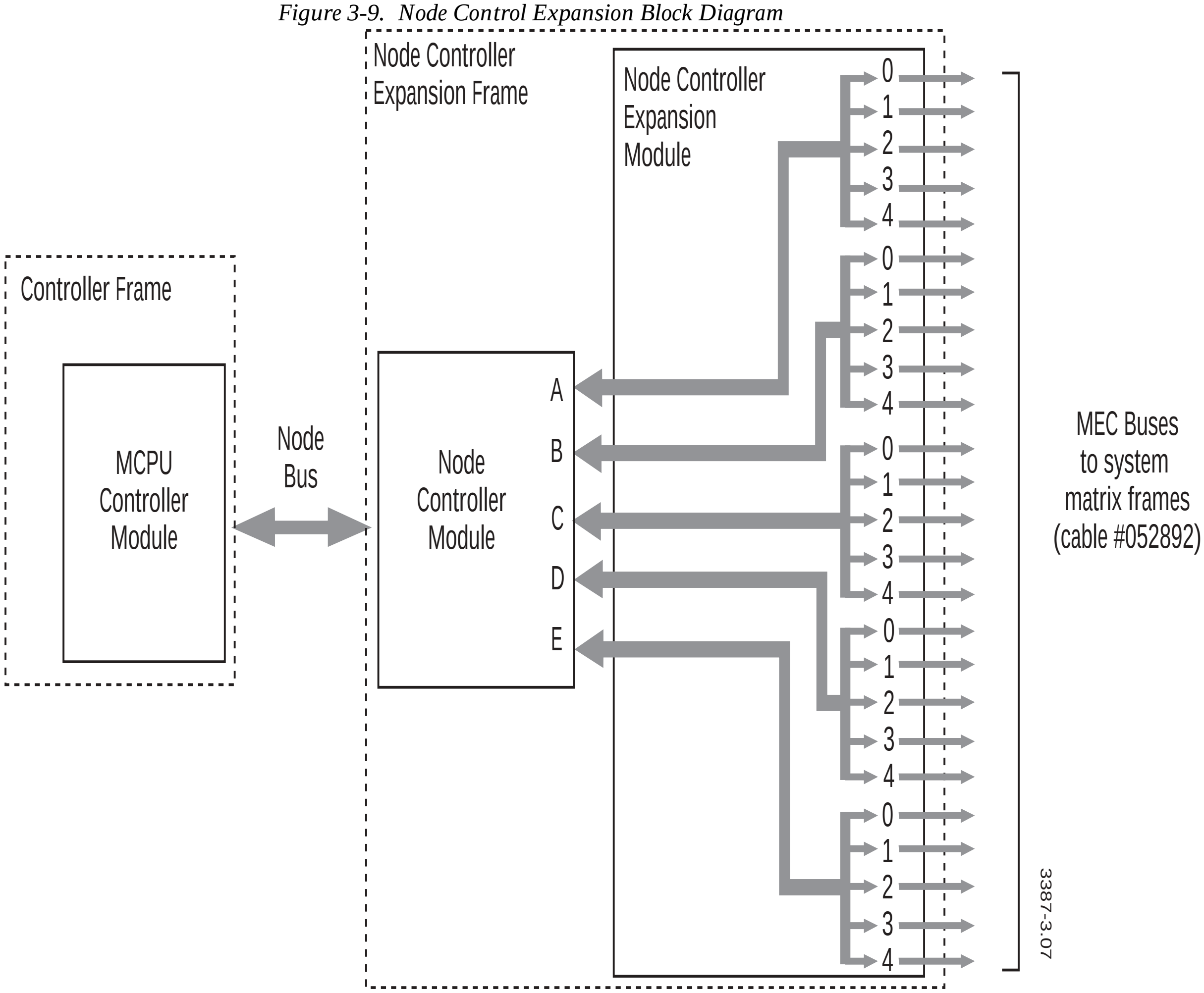
Figure 3-8. 128x128 Serial Digital Video with 128x64 Dual Audio Control Interconnects



Secondary Video System with Controller Frame

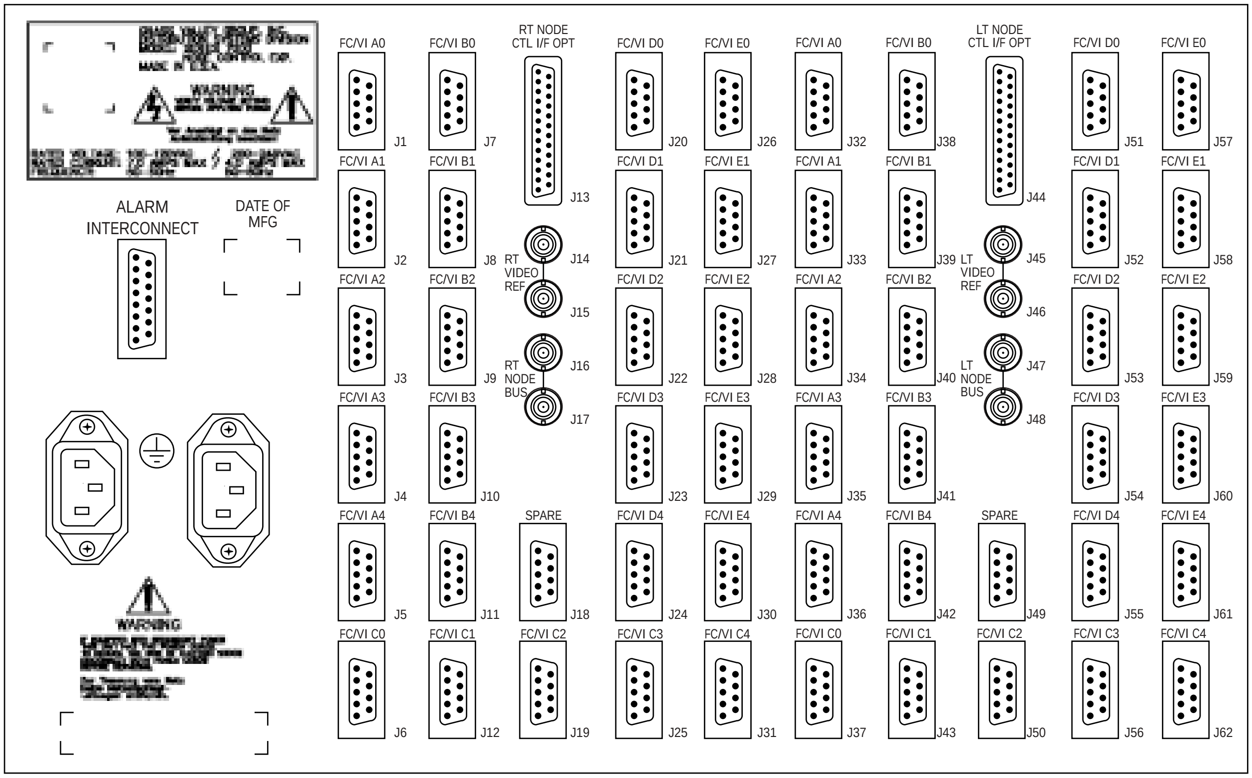
Secondary systems expand beyond 128 Inputs or Outputs using Distribution Amplifiers (DAs) for output expansion and Secondary Switches for input expansion. These larger sized systems use Node Control Expansion modules to fanout the Matrix Element Control buses to more matrix frames. (Refer to Figure 3-9). The variety of system sizes and resulting Node Control distribution possibilities demand that cable run lists be generated on a case by case basis.

Figure 3-9. Node Control Expansion Block Diagram



Node Control Expansion modules reside in Node Expansion Frames as illustrated in Figure 3-10.

Figure 3-10. Node Control Expansion Frame



Each Node Control Expansion frame will accept two sets of Node Control and Node Control Expansion modules (with redundancy). Each provides two sets of expanded Node Bus and MEC connectors labeled **Right** and **Left**. The Right and Left labels refer to the physical location of the modules in the frame (as viewed from the front).

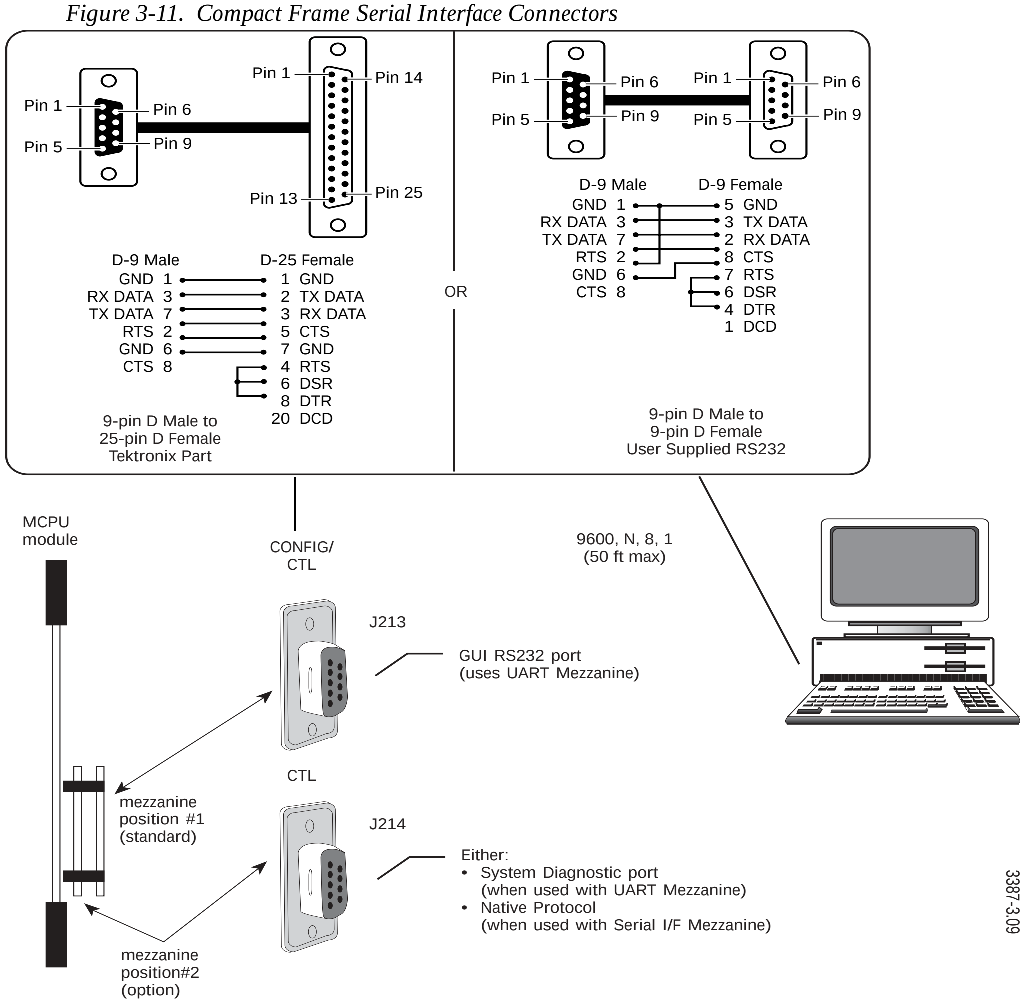
External Interface Connections

The MCPU module offers External Interface flexibility using Interface Mezzanine Cards of differing functionality. Mezzanine cards mount in two mezzanine option positions on the MCPU module. This section outlines the configurations available to the MCPU in a Compact frame and in a standalone Controller Frame.

Compact System Options

When the MCPU module resides in a Compact frame, the Mezzanine Cards support the connectors shown in Figure 3-11. The standard MCPU for Compact Systems carries a single mezzanine card — a UART (SMS-UART-MZ) card in position #1. Optionally, position #2 will accept either a UART card or a Serial I/F (SMS-SER-MEZ) card for use as shown below.

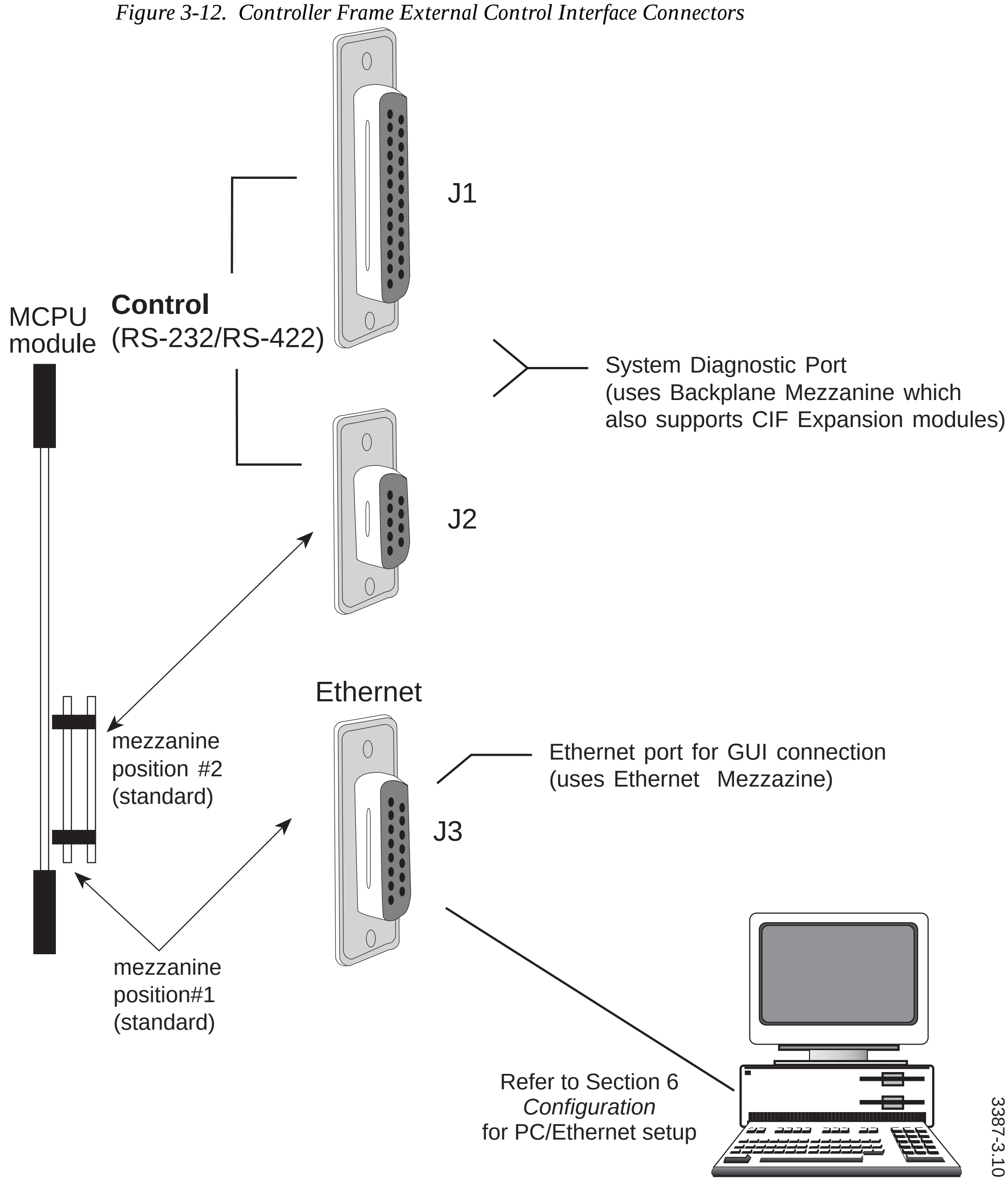
Figure 3-11. Compact Frame Serial Interface Connectors



Controller Frame Mezzanines

When the MCPU module resides in the stand-alone Controller Frame, position #1 typically receives an Ethernet mezzanine card for PC / GUI connection. Position #2 typically receives a Backplane mezzanine card to support the System Diagnostic Interface via the Control ports and to drive the Backplane bus for CIF Expansion modules. Figure 3-12 illustrates the control connectors available and the mezzanine position on the MCPU to which they are dedicated.

Figure 3-12. Controller Frame External Control Interface Connectors



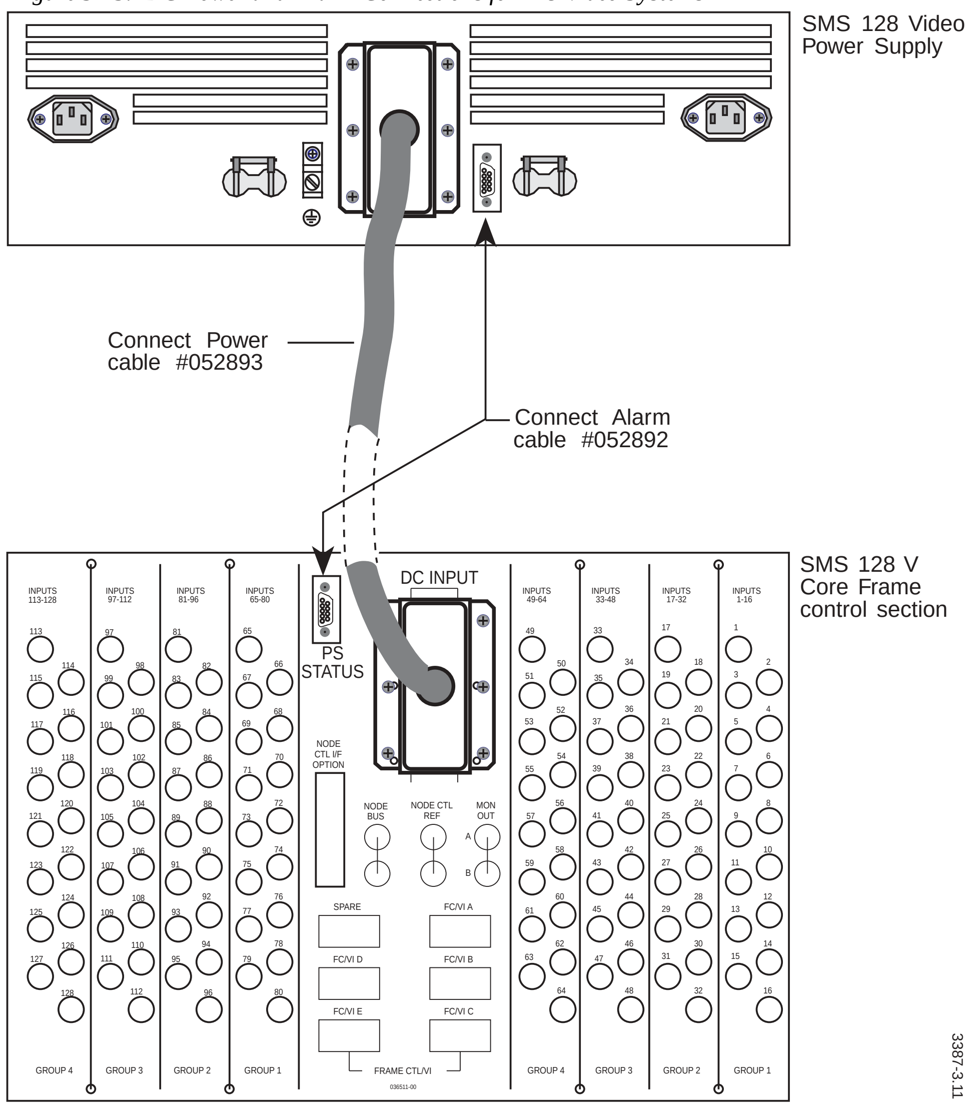
DC Power Connection

Some Series 7000 frames are powered by dedicated power supply frames. The Expanded 128 Video System and Secondary Video System (above 128x128) use these external power supply frames to furnish DC power to the primary, secondary, and distribution amplifier frames.

Expanded 128 Video Power

Figure 3-13 illustrates the DC power cable connections from the power supply to the core (or home) frame of a 128 Video System. The Alarm cable should be installed at the same time to allow power failures to be reported.

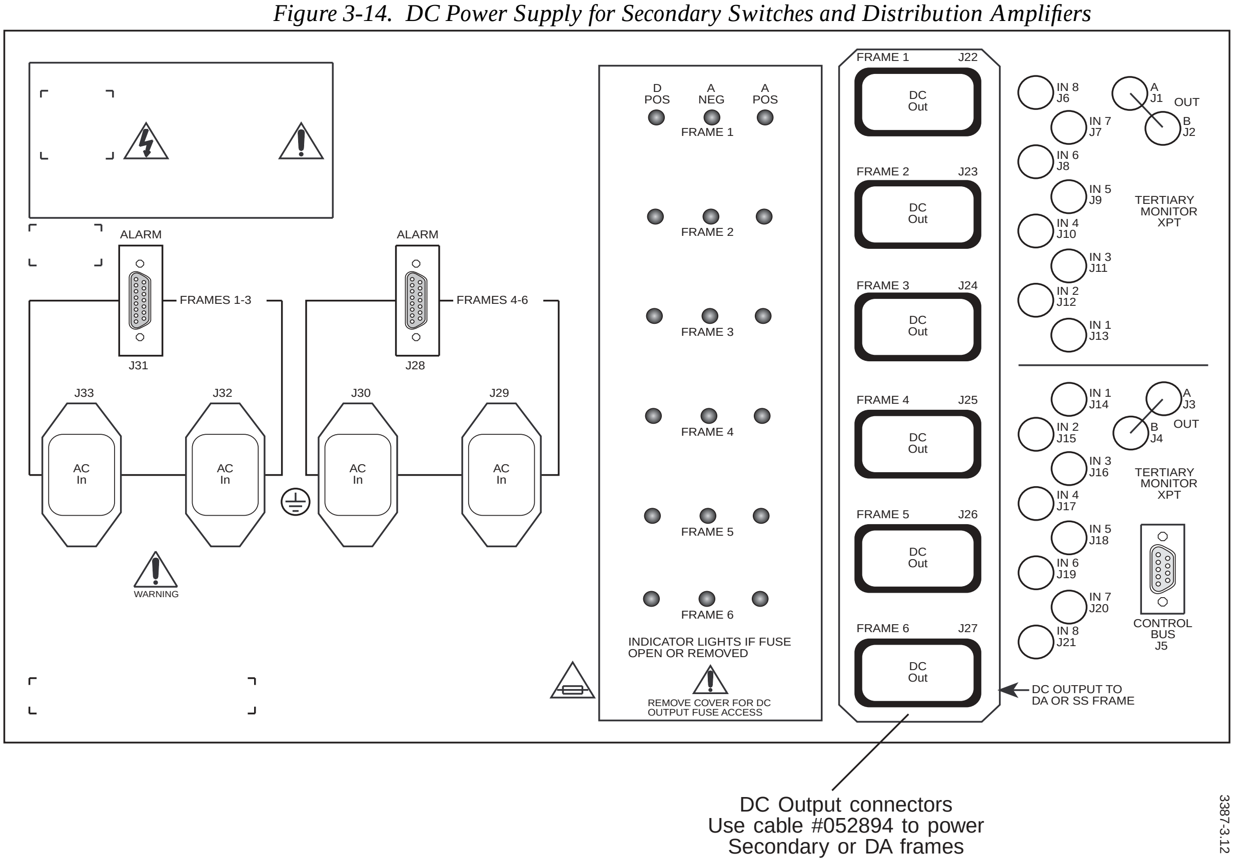
Figure 3-13. DC Power and Alarm Connections for 128 Video Systems



Secondary Switch/Distribution Amp Power

Figure 3-14 illustrates the DC power cable connectors on the Secondary Switch / Distribution Amplifier (SS / DA) Power frame. Connectors J22, J23, and J25, J26 furnish power for Secondary or DA frames (J24 and J27 are not currently used). The frame contains two sections, **FRAMES 1-3** and **FRAMES 4-6**, each accepting a power module and an optional redundant module.

Figure 3-14. DC Power Supply for Secondary Switches and Distribution Amplifiers



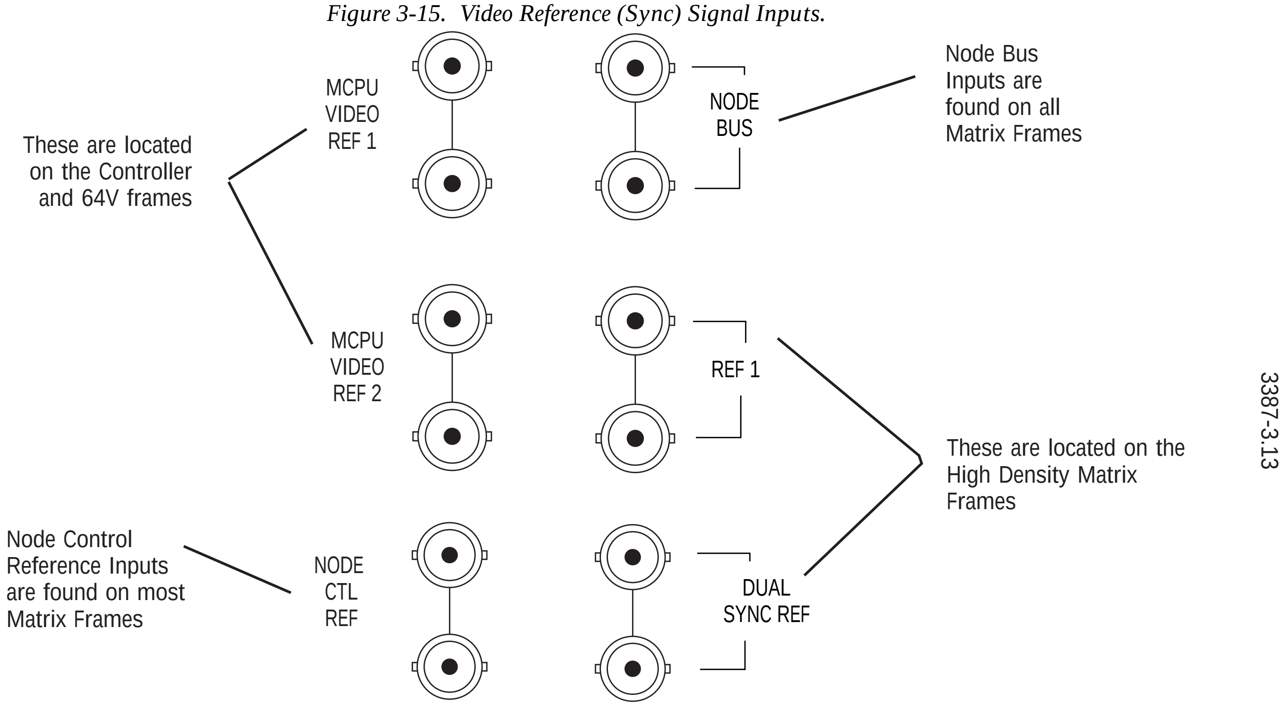
Synchronization (Video Reference)

The Series 7000 accepts, for switching synchronization, any video reference signal containing vertical interval information. The negative-going sync pulse can be from approximately 150 mV (double-terminated video) to 8V in amplitude.

Note Excessive noise or hum can disrupt the sync signal. We suggest you use the higher amplitude Composite Sync signal, rather than Color Black, for reference signal. In excessively noisy environments, use a Distribution Amplifier with common mode rejection to clean up the reference signal to the Series 7000. Hum blocking units on the inputs may be used to eliminate line noise.

Loop-through BNC connectors labeled Node Control Reference are provided on each matrix frame for sync input. Refer to Figure 3-15.

Figure 3-15. Video Reference (Sync) Signal Inputs.



Multiple References

The Series 7000 system can be partitioned to handle two sync reference signal types. The MCPU accepts two reference signal inputs as alternate sync sources. The MCPU uses the reference input to extract the proper timing footprint for control messages it sends to the matrix. The Node Controller for the matrix is assigned the appropriate reference signal type (during Configuration) and all signals within the matrix it serves must match this type of reference signal see Figure 3-16.

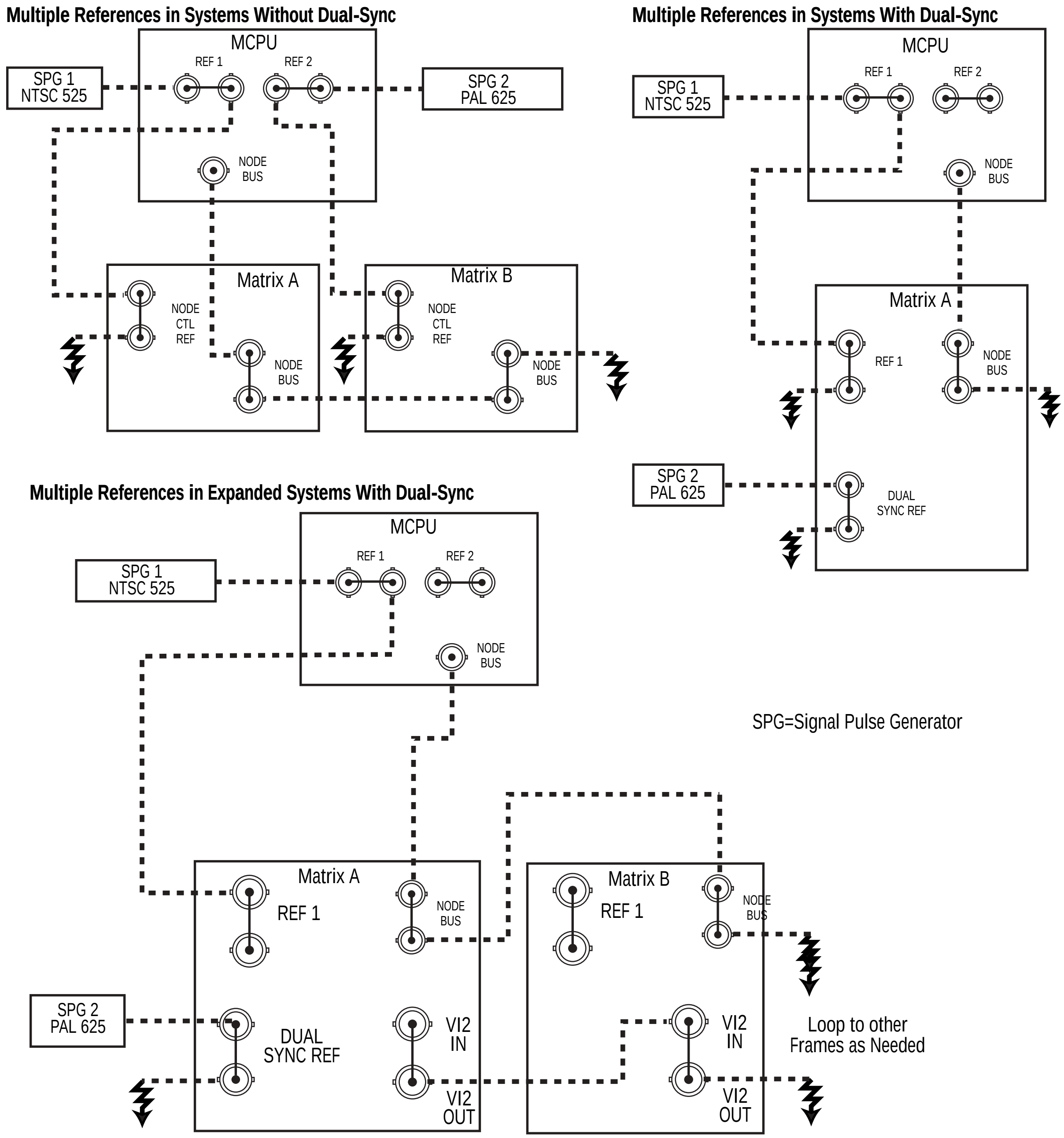
The signals may be the same standard, but with different Timing (for example, different NTSC sync sources for Analog and Digital video) or different standards (example, NTSC and PAL). The loop-through BNC connectors in the Controller and 64V frames labeled MCPU Video Ref 1 (MR1), and MCPU Video Ref 2 (MR2), accept these signals.

During System Configuration, each Node Controller is assigned a Reference signal type and the Controller Frame port number to which that reference signal is connected. (Refer the Configuration manual.)

Dual-Sync References in High Density Systems Only

The High Density Systems (128x128V and 256x128V) contain the Dual-Sync feature. Dual-sync enables a single matrix to use two different references. The signals may be the same standard, with different timing, or different standards (example, NTSC and PAL). Ref 1 is connected to the MCPU Controller and the Matrix, Ref 2 connects only to the Matrix via the Dual-Sync Ref connector see Figure 3-16.

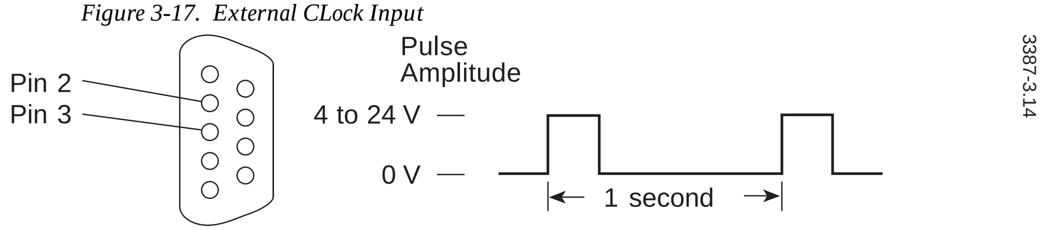
Figure 3-16. Multiple Reference Signals



External Clock

Any frame that accepts an MCPU Module has a 9-pin D connector labeled External Clock. This input accepts a 1 pulse-per-second timing signal (across pins 2 & 3) from any external timing device. Figure 3-17 illustrates the connector pinout and acceptable pulse amplitude.

Figure 3-17. External CLock Input



The input circuit is an opto-isolator which will accept either polarity.

If the external clock pulse is working, LED 6 of DS5 on the MCPU module will blink at the rate of the external clock.

Section 4

Options

Introduction

This section describes Series 7000 Options installation and use of certain atypical features of the Series 7000 control system. Adding options to existing systems may require changing System Configuration. Configuration is addressed in the Series 7000 *Configuration Manual*.

Enhanced Node Controller (ENC)

The Enhanced Node Controller (ENC) is the replacement for the Node Controller (NC). All systems that use the NC module can use the ENC module. The ENC has all the functionality of the NC and provides a connection for Dual Control of a matrix. The ENC does not work with a Kscope mezzanine.

CAUTION The ENC can be hot swapped with a NC for replacement purposes. Do not leave an ENC and a NC in the same matrix frame during normal operation.

In a single matrix frame all Controllers have to be of the same type. Do not attempt to replace the NCs in a frame with ENCs, unless you have enough ENCs to replaces all the NCs in the frame.

The following procedure is for replacing a NC pair with an ENC pair. If there is a problem with an ENC and you need to re-establish the original NC see *To Re-establish Original Node Controllers*.

Replacing a Node Controller with an Enhanced Node Controller

CAUTION The router must be in a stable inactive state for this procedure. The router can be powered up but do not attempt to switch Crosspoints.

1. Use the GUI to connect to the router.

2. Open the Active Node Ctrlr - Actions window. Under **ONLINE** select **ACTIVE NODE CONTROLLERS**.
3. Starting at the top of the list, begin selecting one NC module name at a time. Click on **ID**. The yellow **Busy** LED will flash steadily on each NC as it receives the **ID** command. Locate and note the slot and name of each NC to be replaced.
4. Locate and remove Backup NC.

   The Primary NC will show a steady yellow **Busy** LED. The yellow **Busy** LED on the Backup NC will be off.
5. Insert and seat ENC.

   The red LEDs on the ENC will show a steady light for a few seconds. When the red LEDs begin to flash wait at least thirty seconds before going to the next step.
6. Highlight the same NC module name as in Step 4.

   If the name does not appear refresh the window by closing it and reopening. Replacing the NC with the ENC will not change the Active Node Controller (ANC) name.
7. Click on **ID**, in the Active Node Ctrlr - Actions window. The yellow **Busy** LED will flash steadily on the ENC.
8. Press the **Reset** button on the Primary Node Controller.

   The yellow **Busy** LED on the ENC should light immediately. The ENC is now the Primary Controller. See *To Re-establish Original Node Controllers* (page 3), if the yellow **Busy** LED does not light.
9. Highlight the remaining NC module name. Click on **ID**. The yellow **Busy** LED will flash steadily on the NC
10. Remove the NC.
11. Insert and seat ENC.

    The red LEDs on the ENC will show a steady light for a few seconds. When the red LEDs begin to flash wait at least thirty seconds before going to the next step.
12. Highlight the same NC module name as in Step 9. If the name does not appear, refresh the window by closing it and reopening.
13. Click on **ID** in the Active Node Ctrlr - Actions window. The yellow **Busy** LED will flash steadily on the ENC. See *To Re-establish Original Node Controllers* (page 3) if the yellow **Busy** LED does not light.
14. Repeat procedure for additional NC pairs.

To Re-establish Original Node Controllers

If there is a problem with an ENC, either try using a different ENC or follow this procedure to re-establish the original NC:

1. Remove the ENC and replace the NC removed in Step 4 (page 2).
2. Verify that the NC has the same name as noted in Step 3 (page 2), the ENC may have changed the Active NC name. If not, rename the NC to its original name for that slot.
3. Contact Customer Service to replace the ENC.

In normal router operation, for redundancy a NC must be paired with a NC, and an ENC must be paired with an ENC. If you do not have two good ENCs then re-establish both original NCs to maintain redundancy.

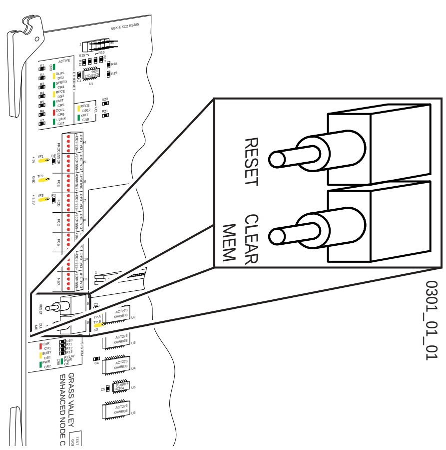
Moving an ENC

When an ENC is seated in a frame, a map of the inputs, crosspoints, and outputs related to the frame is saved in the non-volatile random access memory (NVRAM). If the ENC is then removed and reseated in the same slot it will remember the saved map. If the ENC is moved to a location where it is controlling a frame different than the frame where the map was saved, errors can occur. Therefore, every time an ENC is moved it is recommended that the NVRAM be cleared as the ENC is seated.

To Clear NVRAM

1. Press and hold the **CLEAR MEM** switch on the ENC module as you are seating the module in the frame. (See Figure 1)
2. Wait 1 second.
3. Release the **CLEAR MEM** switch.

Figure 1. Reset and Clear MEM Switches on the ENC



Dual Sync/Video Output Monitor — DV Series

The Dual Sync / Video Output Monitor, standard on High Density systems has two functions. The first function is the Dual-Sync feature, which enables the user to have a single matrix switch video of two different references without glitching. The second function is the Video Output Monitor feature, which allows the user to monitor the video on any destination in the router.

Dual-Sync

The dual-sync circuitry performs several functions. The first is to accept a video reference from the Dual-Sync Ref port and convert it to a strobe that is used by the crosspoint boards to perform takes according to the Dual-Sync Reference. This strobe is also output via the **VI_2 OUT** BNC, which can then be connected to **VI_2 IN** on other frames in expanded systems. Those frames would not use the Dual-Sync Ref input. (The node controller accepts Ref1 and converts it to a strobe that is used by the crosspoint boards to perform takes according to Reference 1.) The Dual Sync / Video Output Monitor (DS / VOM) also receives the strobe created by the node controller. It is then able to determine what line rates the two different references are.

If the two references provided to the system are different, the Dual-Sync feature will select between the two references based on the settings entered during configuration.

If the two references provided to the system are the same line rate (perhaps with different timings), it is then up to the user to set in configuration which reference a particular destination should switch on. See the Series 7000 *Configuration Manual* for details.

Video Output Monitoring

The Video Output Monitor feature allows the user to monitor the quality of the video at a selected router output. Each video output module in the SMS7000 has a special monitor crosspoint capable of selecting any of the outputs produced by that module. Selected video from an output provides two copies of the monitored destination signal through BNC connectors for routing to user-supplied video monitors. A Monitor In BNC is provided on 256x128 SDV frames for allowing monitor expansion in expanded systems.

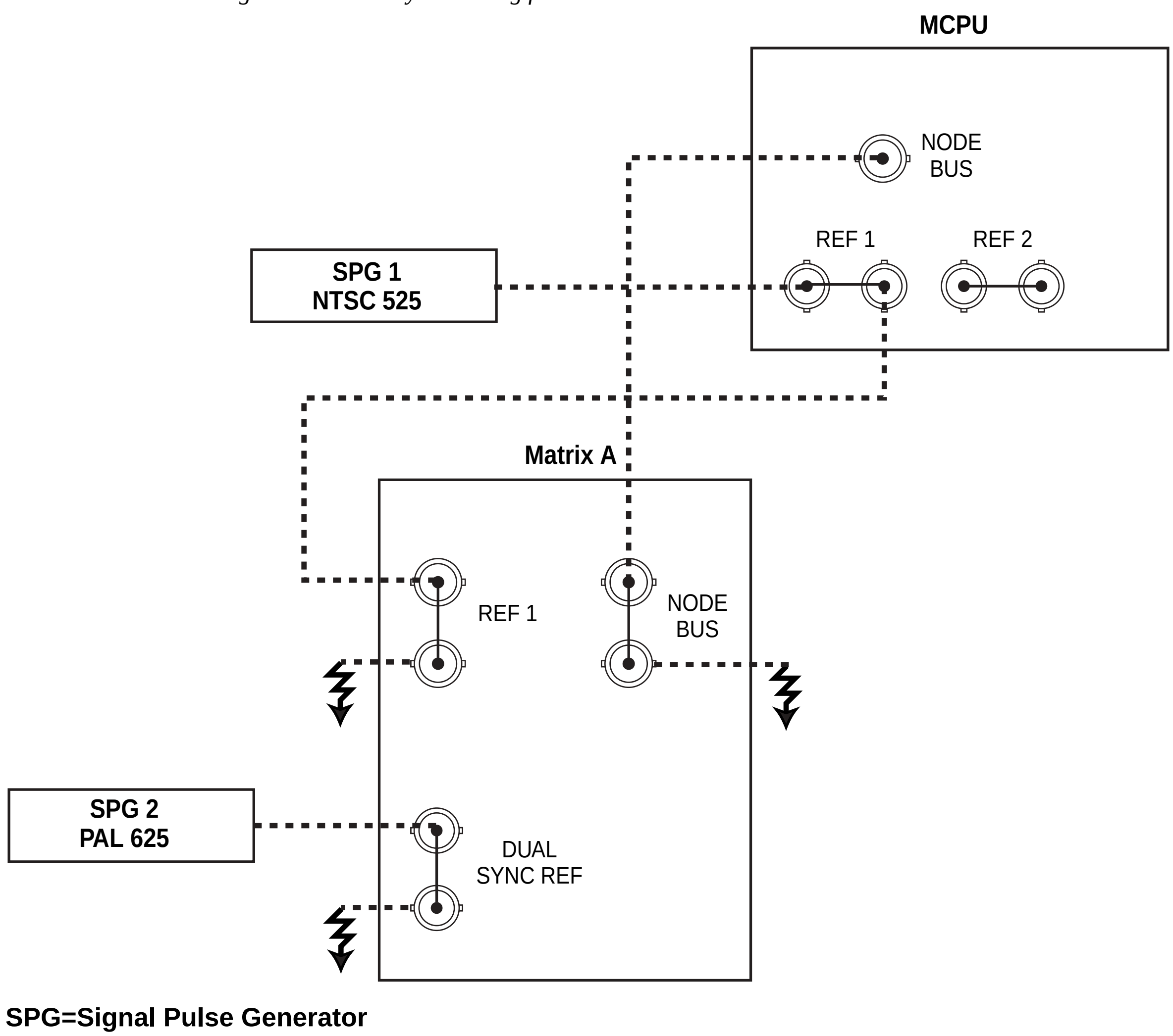
Monitor crosspoints are controlled using control panels which have the **MonCtrl** flag set during configuration to control monitor outputs, refer to the Configuration manual. The output monitor control panel is cabled to the Control Panel Bus just as are the other 7000 control panels.

64x64 to 256x128

Systems in this size range use from one to four Output Modules. The monitor crosspoint outputs of each of these modules is internally routed to a 4-input by 1-output Video Output Monitor module (digital assembly 160261) which provides two duplicates of the monitored destination signal.

Figure 4-2 provides simplified cabling diagrams of the interconnect schemes used to monitor up to 256 inputs by 128 outputs systems.

Figure 4-2. Dual Sync Cabling for 128x128 SDV or 256x128 SDV Frames



Cabling

Up to 128 Destinations

- Using 75 Ohm coaxial cable, connect the primary MON OUT A BNC to your video monitor. Connect the duplicate MON OUT B BNC to a second video monitor. (If unused, terminate redundant connector into 75 Ohms.)

Over 128 Destinations

1. Using 75 Ohm coaxial cable, connect the MONITOR OUT A BNC of your frames with the lower 128 destinations to the MONITOR IN BNC on the frame with the next 128 destinations.
2. Using 75 Ohm coaxial cable, connect either the MONITOR OUT A or the MONITOR B BNC from the frame with the next 128 destinations to the Video Monitor.
3. Using 75 Ohm coaxial cable, connect the other MONITOR OUT A or MONITOR B BNC to a second video monitor. (If unused, terminate this connector into 75 Ohms.)

Repeat steps 1-3 for each 128 destinations.

Figure 4-3. 256 Destinations Cabling

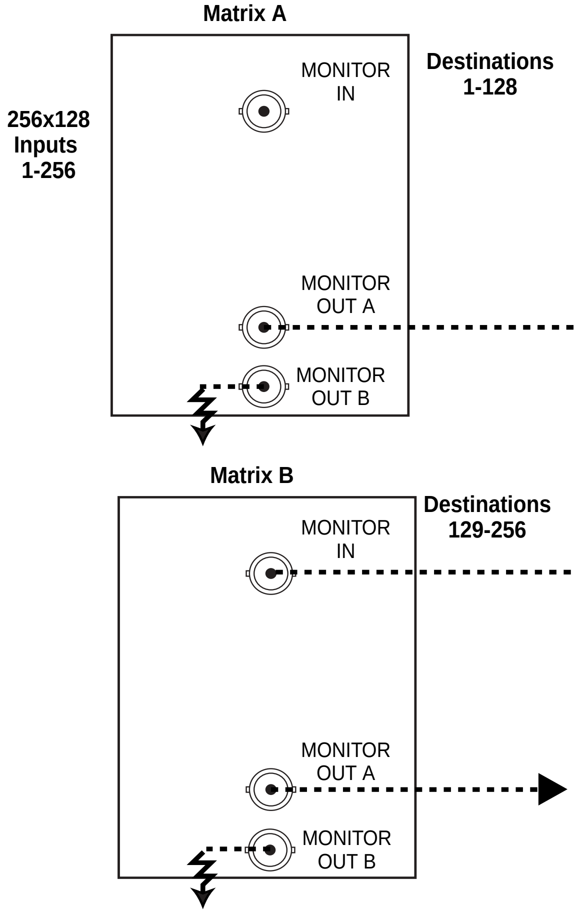
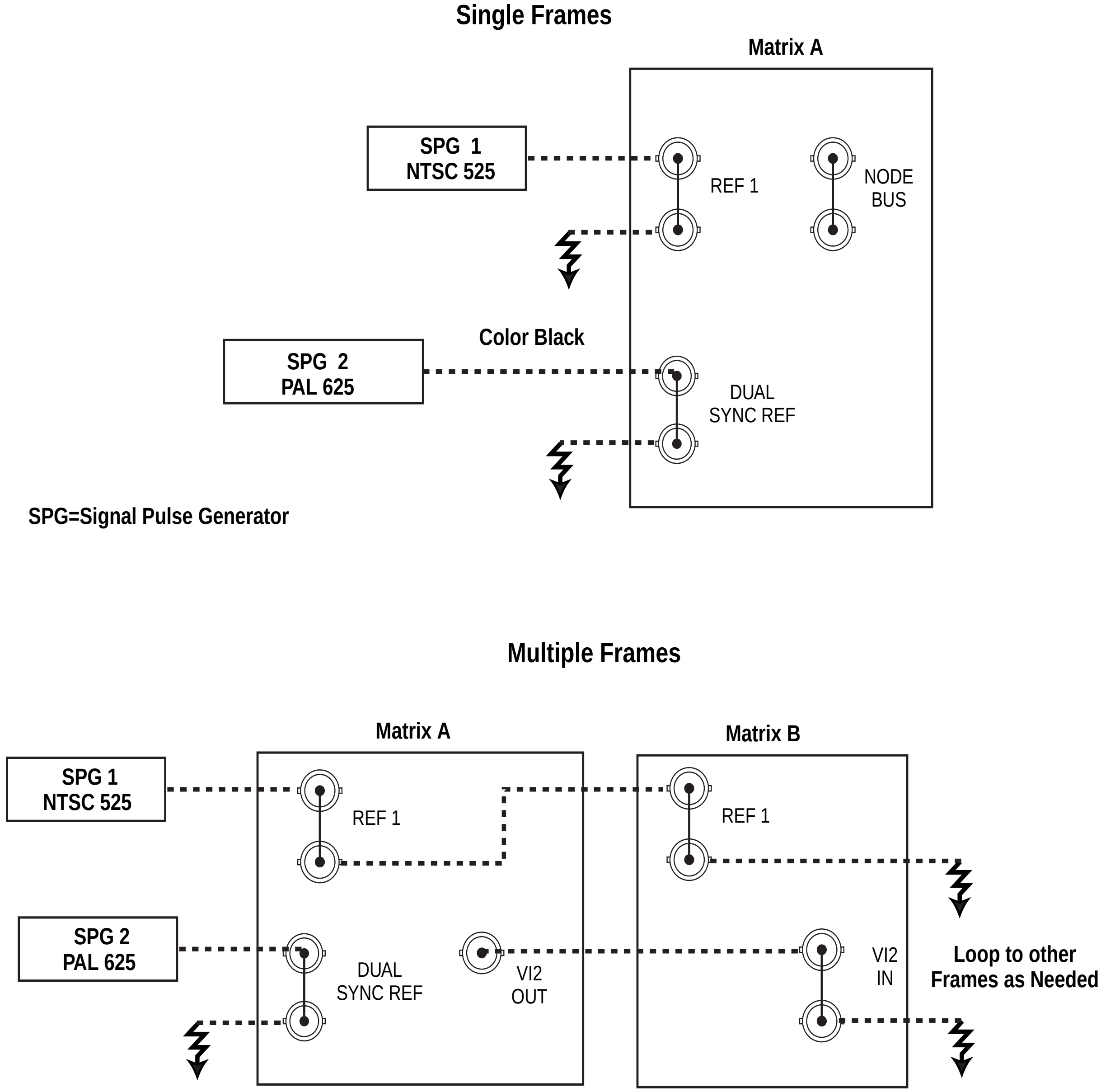


Figure 4-4 shows the cabling for Dual Sync in single or multiple frames.

Figure 4-4. Dual Sync Cabling for Single and Multiple Frames



Video Output Monitor Option— Classic Systems

The Video Output Monitor option to the Series 7000 allows users to monitor the quality of the video at a selected router output. This option is not available on DV Series systems. Each Video Output module in the 7000 has a special monitor crosspoint capable of selecting any of the outputs produced by that module. Selected video from an active monitor crosspoint is routed to an Output Monitor module. Different types and numbers of Output Monitor modules are used depending upon system size and configuration. A monitor output provides two copies of the monitored destination signal through BNC connectors for routing to user-supplied video monitors.

This section describes monitor control followed by module installation for the following systems:

- 16x16 to 64x64
- 128 Input Systems to 256 Outputs
- 256 Input Systems to 256 Outputs

Monitor Control

Monitor crosspoints are controlled using control panels which have the **MONCTRL** flag set during configuration to control monitor outputs, refer to the Configuration manual. The output monitor control panel is cabled to the Control Panel Bus just as are the other 7000 control panels.

16x16 to 64x64

Systems in this size range use from one to four Output Modules. The monitor crosspoint outputs of each of these modules is internally routed to a 4-input by 1-output Video Output Monitor module (analog assembly 062843 or digital assembly 062866) which provides two duplicates of the monitored destination signal.

Module Installation

If you ordered your Output Monitor with your system, rather than separately, the module was installed at the factory and you can skip to the Cabling description following Module Installation.

1. Refer to the module location map inside the frame door of your Series 7000.
2. Install the Output Monitor module, 062843 analog or 062866 digital, in the slot indicated.

Cabling

The BNC output connectors for the Output Monitor are on the rear connector channel of your Series 7000.

1. Using 75 Ohm coaxial cable, connect the Series 7000 **MON OUT A** BNC to your video monitor.
2. Using 75 Ohm coaxial cable, connect the Series 7000 **MON OUT B** BNC to a second video monitor (or terminate the connector into 75 Ohms if you do not intend to use it).

128 Input Systems

Table 4-1 lists the output monitor configurations for 128-input Series 7000 Systems.

Table 4-1. 128–Input, Output Monitor Module Configurations

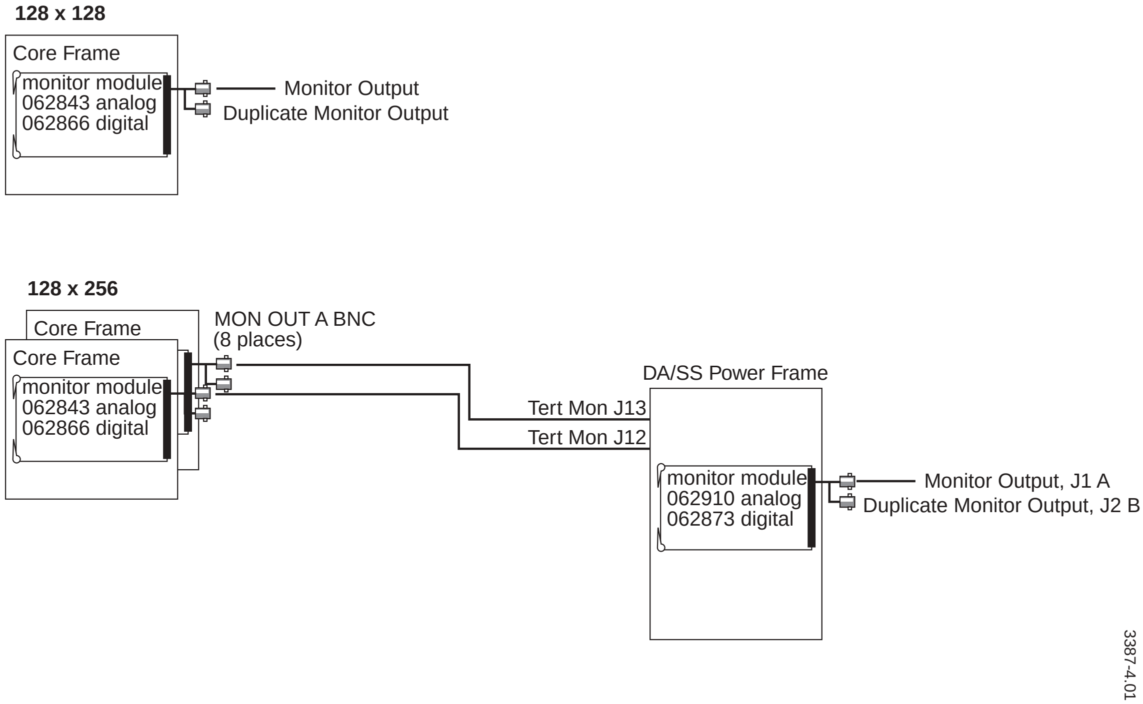
System Size	128 X 128	128 X 256
Analog System Monitor Modules in Core Video Frame(s)	1 062843 Module in the core frame	2, one 062843 Module in each frame
Analog System Monitor Modules in DA/SS Power Frame(s)	None	1 Module 062910
Digital System Monitor Modules in Core Video Frame(s)	1 062866 Module in the core frame	2, one 062866 Module in each frame
Digital System Monitor Modules in DA/SS Power Frame(s)	None	1 Module 062873

Note that input DAs are required to expand an analog 128-input system beyond 128 outputs. When input DAs are used, the 062843 Analog Video Output Monitor modules are augmented with an 062910 8x1 Secondary Switch module that resides in the DA / SS Power frame where it can collect monitor outputs from each of the core video frames.

The Digital Video Output Monitor modules, 062866, are similarly augmented with an 062873 Digital Video Tertiary Output Monitor module in the DA / SS Power frame.

Figure 4-5 provides simplified block diagrams of the interconnect schemes used to monitor 128–input systems.

Figure 4-5. 128–Input Systems Output Monitor Interconnect



Module Installation

If you ordered your Output Monitor with your system, rather than separately, the modules were installed at the factory and you can skip to the Cabling description following Module Installation.

Up to 128 Destinations

1. Refer to the module location map inside the core frame door of your Series 7000.

2. Install an Output Monitor module, 062843 analog or 062866 digital, in each core frame in the slot indicated by the location map.

Over 128 Destinations

1. Refer to the module location map inside the core frame door of your Series 7000.

2. Install one Output Monitor module, 062843 analog or 062866 digital, in each core frame in the slot indicated by the location map.

3. Refer to the module location map inside the DA / SS Power Frame door.

4. Install an Output Monitor module, 062910 analog or 062873 digital, in the slot indicated.

Cabling

Up to 128 Destinations

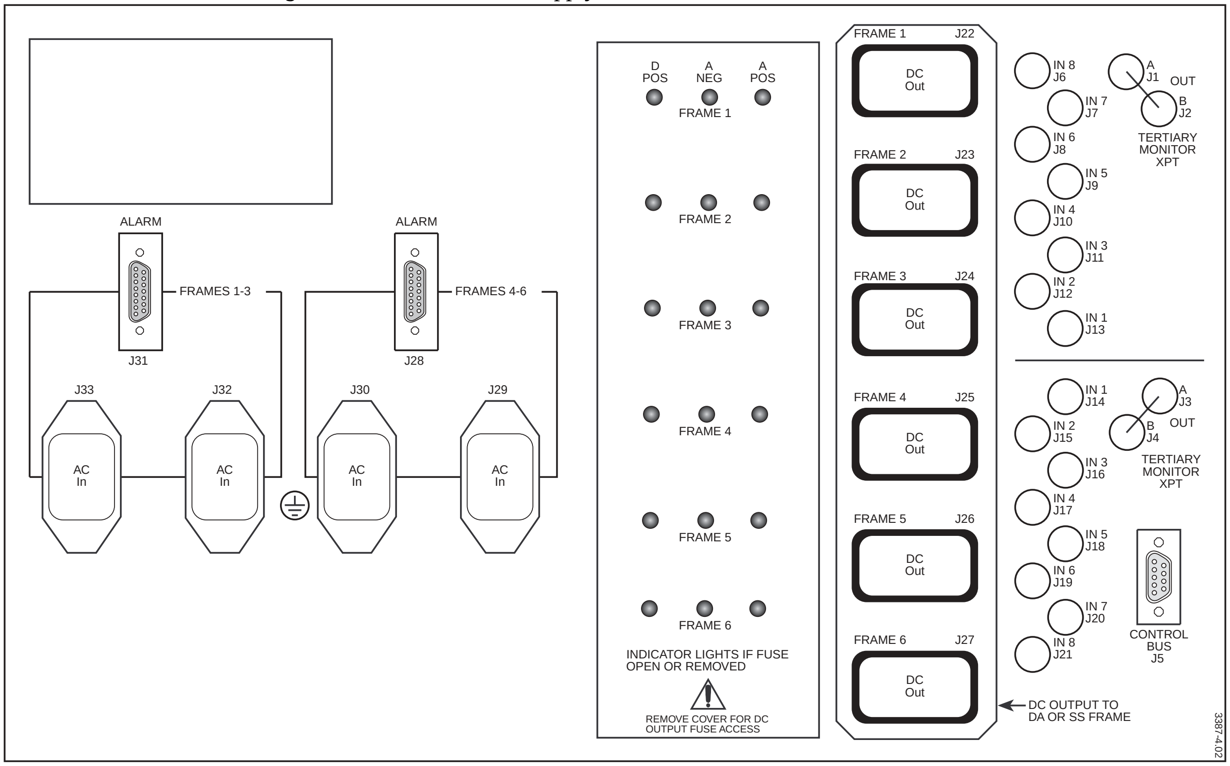
1. Using 75 Ohm coaxial cable, connect the primary MON OUT A BNC of the core frame to your video monitor. Connect the duplicate MON OUT B BNC to a second video monitor. (If unused, terminate redundant connector into 75 Ohms.)

Over 128 Destinations

See Figure 4-6 for connector locations.

1. Using 75 Ohm coaxial cable, connect the MON OUT A BNCs of your core frames to Tertiary Monitor inputs J13 and J12.
2. Using 75 Ohm coaxial cable, connect the DA / SS Power Supply Frame, Tertiary Monitor output J1 to your video monitor.
3. Using 75–Ohm coaxial cable, connect the duplicate DA / SS Power Supply Frame, Tertiary Monitor output J2 to a second video monitor. (If unused, terminate this connector into 75 Ohms.)

Figure 4-6. DA/SS Power Supply Frame Connections



256–Input Systems

Table 4-2 lists the output monitor configurations for 256-input Series 7000 Systems. In systems larger than 128 inputs, monitoring begins in the 2x1 Secondary Frames.

Table 4-2. 256–Input, Output Monitor Module Configurations

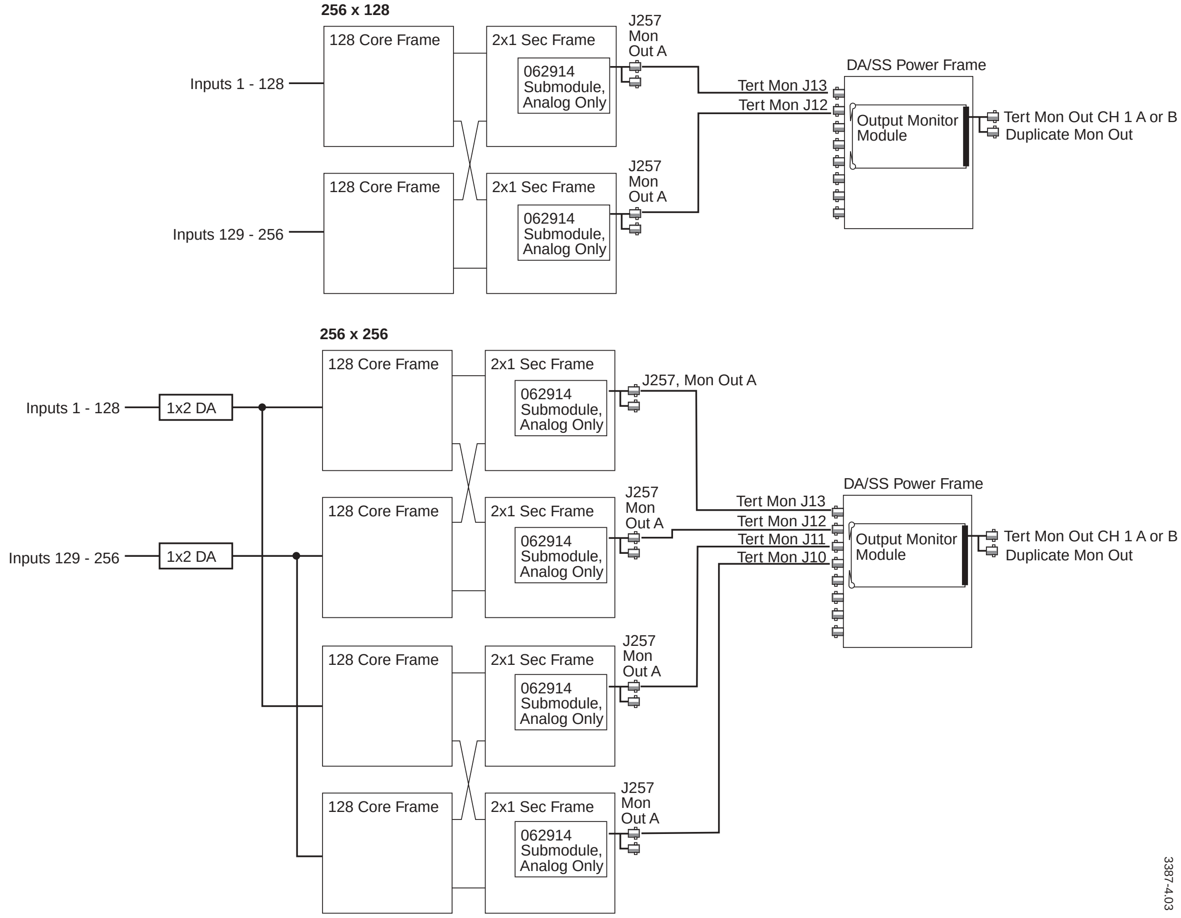
System Size	256 X 128	256 X 256
Analog System Monitor Modules in DA/SS Power Frame(s)	1 Module 062910	1 Module 062910
Analog System Monitor Modules in 2x1 Secondary Frame(s)	2, one 062914 Submodule mounted on one 062908 Secondary Switch module in each frame	4, one 062914 Submodule mounted on one 062908 Secondary Switch module in each frame
Digital System Monitor Modules in DA/SS Power Frame(s)	1 Module 062873	1 Module 062873

When an analog system exceeds 128 inputs, Secondary Switching Frames are required. 256–input systems use the 2x1 Secondary Switch Frame. An Output Monitor module, 062910, is installed in a DA / SS Power Frame and a Monitor Submodule, 062914, is installed on one of the 062908 Secondary Switch modules of each Secondary Switch frame. The 062910 module provides the output to the user-supplied monitor.

Digital systems of this size require only an 062873 Output Monitor module in the DA / SS Power frame.

Figure 4-7 provides simplified block diagrams of the interconnect scheme used to monitor 256–input systems.

Figure 4-7. 256–Input Systems Output Monitor Interconnect



Module Installation

If you ordered your Output Monitor with your system, rather than separately, the modules were installed at the factory and you can skip to the Cabling description following Module Installation.

Analog

1. Refer to the module location map inside the 2x1 Secondary frame doors of your Series 7000.
2. Install an 062914 Submodule on one of the 062908 Secondary Switch modules in each 2x1 Secondary frame.
3. Refer to the module location map inside the DA / SS Power frame door.
4. Install an Output Monitor module, 062910, in the slot indicated.

Digital

1. Refer to the module location map inside the DA / SS Power frame door.

2. Install an Output Monitor module, 062873, in the slot indicated.

Cabling

1. Using 75 Ohm coaxial cable, connect J257 MON OUT A of your Secondary frames to DA / SS Power frame Tertiary Monitor inputs J13 and J12 (up to 128 destinations) or inputs J13 through J10 (up to 256 destinations).
2. Using 75–Ohm coaxial cable, connect DA / SS Power frame Tertiary Monitor Output CH1 A to your video monitor. Connect output B to an additional monitor or terminate it into 75 Ohms if unused.

Horizon Node Controller Interface

The Horizon Node Controller Interface Option allows the Series 7000 control system to control Horizon matrices over the Node Bus. This modification replaces the Horizon control system and all associated control devices.

Note Control of Horizon Matrices can also be performed via the Horizon GPI using a 7000 Serial Mezzanine Module, SMS-SER-MZ (see External Interfaces, Horizon GPI Interface on page 4-42).

This section discusses the following topics:

- Requirements - procedure overview
- Control Level rules for single and multi-level Horizon systems in single-level or compact (multi-level) frames
- Hardware Modifications - step-by-step modification and installation instructions
- Node Controller Configuration - using the Series 7000 Graphic User Interface (GUI) to configure the level and frame type information of the Node Controller

Note Version 4.0 Series 7000 software does not allow control of HX Relay matrices.

Requirements

This procedure requires:

- Hardware modification of the active Horizon control frame section
- Removal of Horizon Controller Modules
- Installation of a Series 7000 HX Node Control module in the Horizon frame(s).
- HX Node Controller Software Configuration via the GUI

Control Level Rules

Horizon systems can be divided into three types according to Control Level configurations:

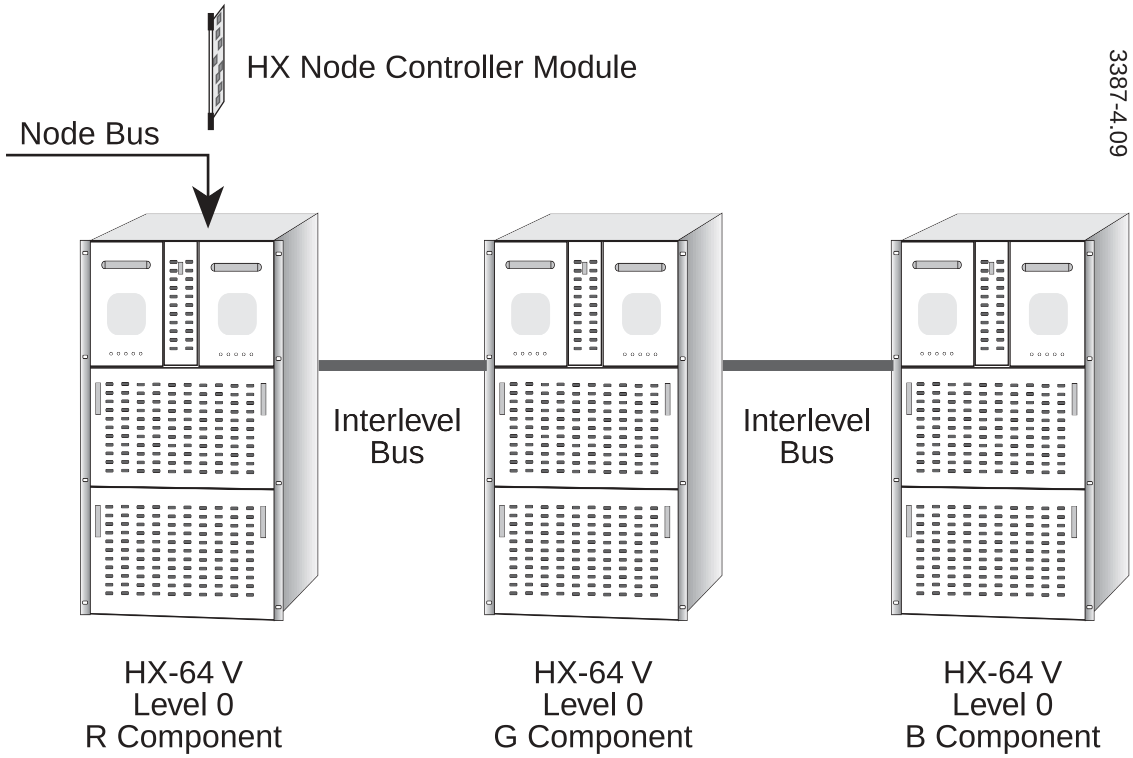
- Single-level or slaved levels (component video, stereo audio)
- Multi-level (breakaway) Multi-frame systems using a number of single-level frames
- Multi-level in compact frames (more than one control level in a single frame)

Single-level

A Single-level or slaved system requires only one HX Node Controller module. It could be a compact frame with more than one level, slaved, in a single frame, or a group of larger single-level frames strapped for the same control level number (see Figure 4-8).

The frames in the illustration are of a single control level and only the active control frame requires the HX Node Controller module and hardware modification. The Interlevel bus between frames must remain connected.

Figure 4-8. Single Level, Multi-frame Horizon System (Component Video)



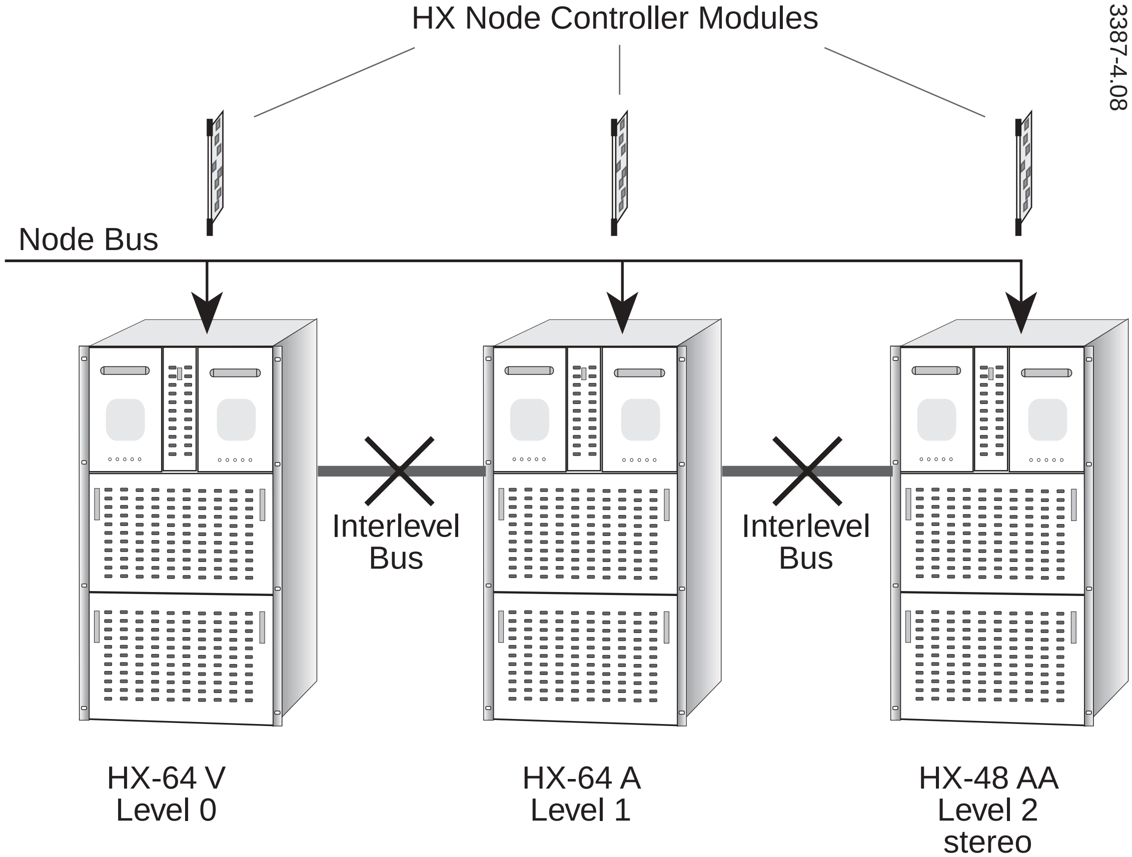
Multi-level Multi-frame

When more than one Horizon frame is used to form a multi-level system with breakaway switching (see Figure 4-9), each frame requires the HX Node Controller module and the Hardware modification. Communication between frames with the Node Control modules is via the new Node Bus, therefore, the HX Interlevel Bus cable must be removed.

Multi-level Compact Frame

When the system uses a compact Horizon frame with multiple levels, a single HX Node Controller module is used in the frame. In this case the Node Controller must be configured via the GUI for multiple Slices (see Node Controller Software Configuration).

Figure 4-9. Multi-level, Multi-frame Horizon System

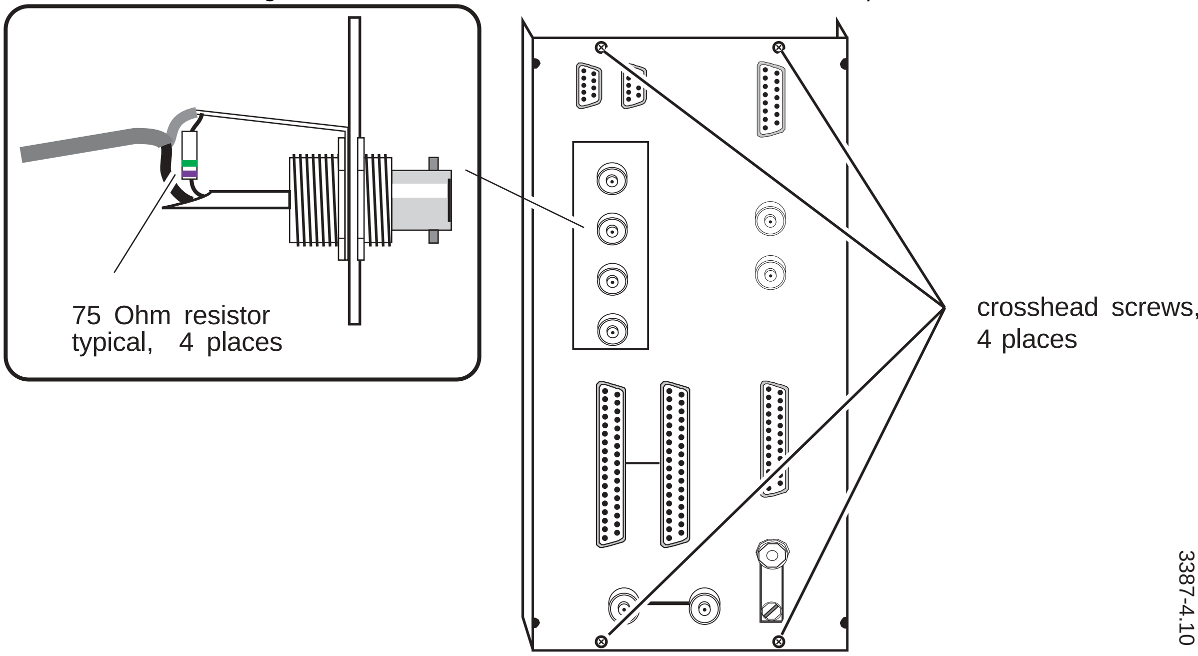


Hardware Modification

To modify a Horizon system to accept the Series 7000 Node Controller module, follow the steps listed below.

1. Remove power from the Horizon frame and remove the HX System Controller and Changeover modules.
2. On the rear of the Horizon frame, remove the four screws that secure the control section connector channel (see Figure 4-10).
3. Carefully pull the channel out enough to clip the 75 Ohm resistor from the top BNC associated with the C-Bus. Do not allow the internal cable to disconnect from the motherboard. Carefully disconnect (pull) the lower three cables from the rear motherboard, tie-wrap them and leave them disconnected in the frame.
4. Re-install the connector channel and restore power to the frames. Refer to Figure 4-10.

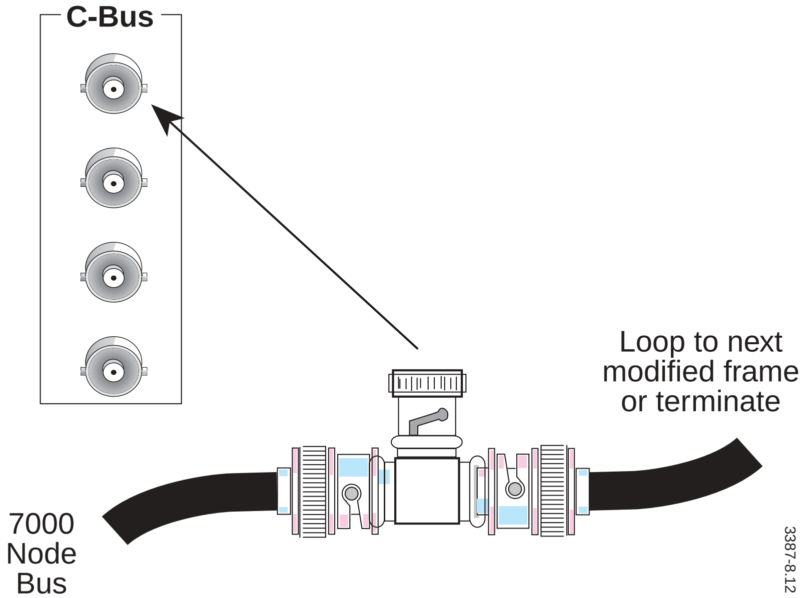
Figure 4-10. Horizon Control Section Connector Channel Modification



Note If you have a multi-frame, multi-level system as previously described, repeat steps 2 through 4 for each control section receiving the HX Node Controller module. Then, remove the Interlevel Bus Cable(s) #052414, between these control sections. Each modified frame connects to the 7000 Node Bus.

5. Connect the 7000 Node Bus cable to the top BNC of the modified HX C-Bus port as shown in Figure 4-11. Place a 75 Ohm termination on the tee if it is the end of the Node Bus. The three BNCs below are disconnected. (The maximum number of modules on a Node bus is 16 including redundant Node Controllers.)

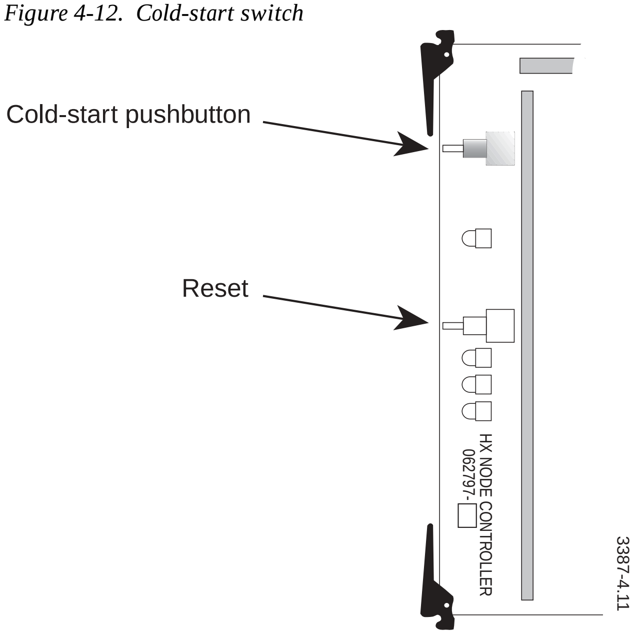
Figure 4-11. Node Bus Cabling



Installing HX Node Controller Module(s)

Place a Series 7000 HX Node Control Module (062797) into one of the Horizon Controller module slots on either side of the Changeover Module slot. (The Changeover Module is no longer required.) Hold in the cold-start pushbutton at the top of the module as you seat the module in the rear connector. Refer to Figure 4-12 for pushbutton location. Continue to hold the pushbutton until the red **ERR** LED is extinguished.

Figure 4-12. Cold-start switch



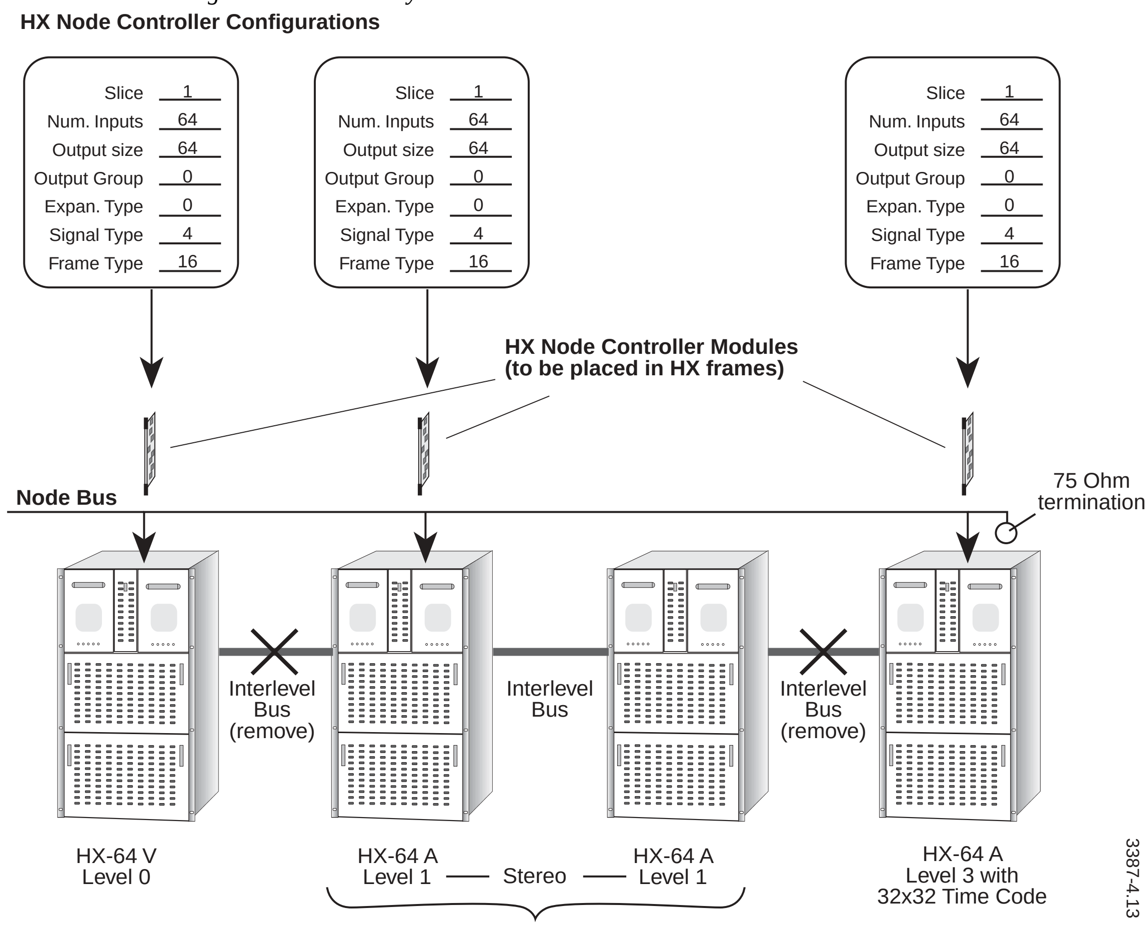
Note Unlike the standard Node Controller, the HX module has battery back-up RAM that stores the module ID and status information. When the module is placed in a new cell or frame, or when any EEPROM firmware is changed, it must be Cold-started to clear RAM.

Node Controller Configuration

The HX Node Controller is configured as any other Series 7000 Node Control Module (refer to the *Configuration* manual). The entries shown for Slice and Frame Type (1 and 16) are used for HX 128 or HX 64 frames that contain a single level. For multiple-levels within compact frames Frame Type is 64 and the Slice number represents the number of levels within the compact frame.

Four HX-64 frames with Interlevel cabling are illustrated in Figure 4-13. The illustration provides cabling, Slice, and Frame Type information for each Horizon matrix in this typical HX-64 VAAA system. Note that the Interlevel Bus remains between slaved frames, but is removed between frames with Node Controllers.

Figure 4-13. HX-64 System with Stereo Audio and Time Code



Note Frame type 16 (for HX64 & HX 128) ignores the level strapping on the Horizon system top motherboards. Frame type 64 (for Compact frames) demands that the Slice designation corresponds to the HX Level designation (note base zero offset, for Horizon 1=0):
Slice 1 = HX Level 0
Slice 2 = HX Level 1
Slice 3 = HX Level 2
Slice 4 = HX Level 3

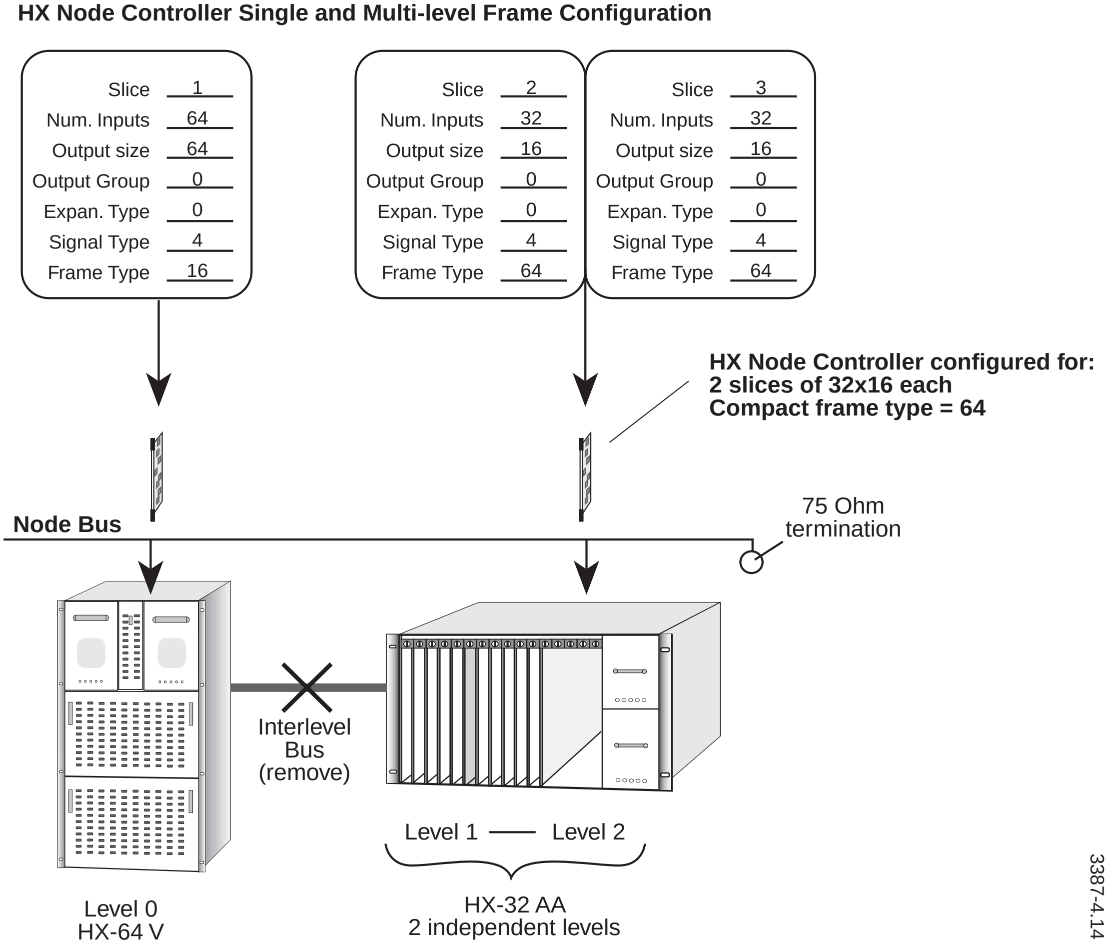
Compact Horizon systems are built of frames containing more than one control level. These frames have slots for one HX Controller Module pair (active and redundant). For independent (breakaway) control of more than one level in a single frame, the HX Node Controller placed in the frame must be configured for 2 Slices (in HX-48 or 32) or 3 Slices (in HX-16). The Frame Type number to be entered for any Compact system (HX-16 thru HX-48) is 64. (See Figure 4-14.)

If the Levels in a compact frame are slaved (one control level), the Node Controller is configured for only one Slice.

Upon completion of HX Node Controller configuration, proceed with Level, Source, and Destination configuration.

Your Horizon system will now be controlled as part of the Series 7000 and the Horizon control panels (and other Horizon C-bus options) will no longer be operational.

Figure 4-14. HX-64 System with HX-32 Dual Channel Audio (with breakaway)



Kaleidoscope/Kadenza (Kscope) Interface

The Series 7000 interfaces to Kaleidoscope and Kadenza digital effects systems to allow use of a portion of the Series 7000 as a Source Selector. (For brevity, we use the term Kscope to refer to both systems.) The optional Kscope Interface submodule is installed on the Series 7000 Node Controller module and the Node Controller module is configured (refer to the Configuration manual) to assign specific sources for Kscope to access.

Installation

Kscope Interface Submodule 062903 is plugged into two headers, X2J2 and X2J3, on the Node Controller module, 062840. An interface control cable is connected to the frame that has been designated for Kscope control and contains the Kscope Interface submodule. The first 16 output connections in the frame are dedicated by the Interface submodule for Kscope use— the first 8 for Video channels A through H, the second 8 for Key channels A through H.

Connect cable assembly 052848 from the Node Controller I/F Option connector on the rear of the Series 7000 matrix frame to the Source Selector J30 connector on the Kscope Controller frame. Figure 4-15 and Figure 4-16 illustrate the connectors and pin outs.

Figure 4-15. Series 7000 Connector Pinout

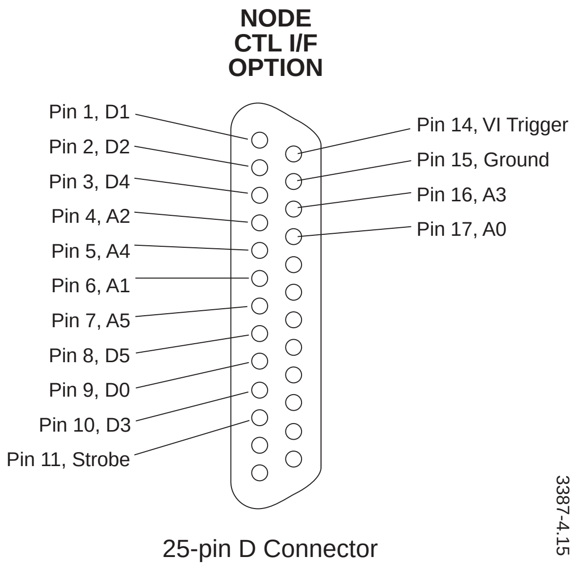
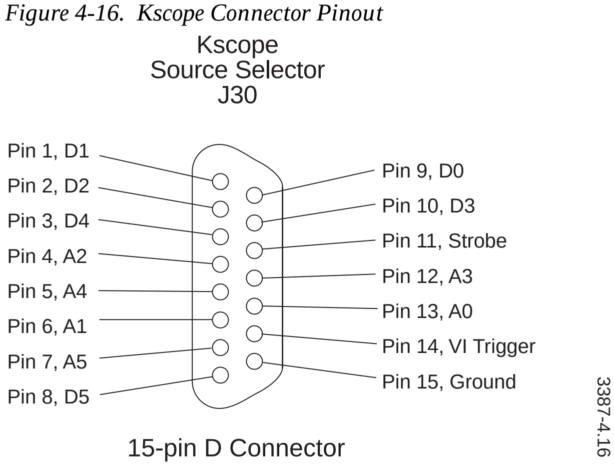


Figure 4-16. Kscope Connector Pinout



Matrix Cabling

Any of the Series 7000 inputs are available to the Kscope Source Select buses. The Kscope Source Selector, however, is able to choose from a maximum of 32 Video sources and 32 Key sources. The selection of 32 Video sources and 32 Key sources from the available Series 7000 sources is made in the Kscope Router Configuration section of the System Configuration menu (see the *Configuration* manual).

When the Kscope Interface is installed, the first eight Series 7000 outputs (1-8) are reserved for the Video signal inputs to the Kscope processors; the second eight outputs (9-16) are reserved for the Key signal inputs to the Kscope processors. These inputs to the Kscope should be cabled accordingly. Refer to Kscope manuals for specific cabling information.

Operation

Kscope systems that are configured for less than eight channels will only output crosspoint change data for the number of channels in the system. A four-channel system sends data for only four video and key sources to the first four video and key outputs (outputs 1-4 and 9-12). Outputs 5-8 and 13-16 can be used as AUX outputs, or as normal router outputs with the following caution.

CAUTION Kscope control updates override Series 7000 control panel selections. As a result, Series 7000 control panels controlling these outputs will function but will not provide valid tally information.

To minimize the potential of the Kscope Aux overriding a Series 7000 control panel selection:

- Disable the Kscope Aux panel, or,
- Configure the Kscope system for 8 channels (preferred), automatically disabling the AUX Bus panel.

Tally System

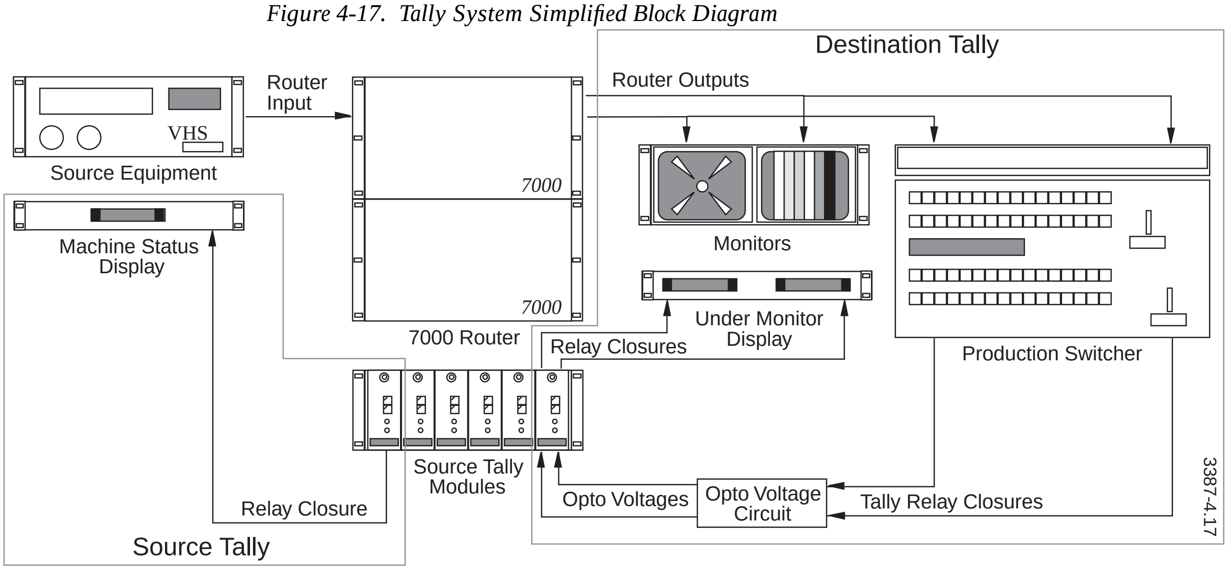
The Series 7000 Tally System consists of Tally Modules which are housed in a MAX Series, rack–mount tray. Each Tally Module accepts 16 opto–coupled inputs and provides 16 dry contact relay closure outputs. The relays can be configured to close whenever there is an appropriate signal at the associated input, or they may also require that certain software–dependent conditions (set during 7000 system configuration) are met.

The Tally System is used in one or more of three ways:

- To automatically alert machine operators that the output of a device (VTR, Film Island, Still Store, etc.) is on–air (Source Tally)
- To automatically alert studio operators that their destination is on–air (Destination Tally)
- To provide a relay closure to be used as desired by the customer in response to a software configured opto-coupler input (Direct Tally)

Tally Modules are typically used in conjunction with Under Monitor Displays for Destination Tally, or with Machine Status Displays for Source Tally. Because they are not essential to the basic tally function, these devices are described separately in this section of the Installation Guide (though they are frequently included in the Tally descriptions which follow). Figure 4-17 is a Tally System simplified block diagram.

Figure 4-17. Tally System Simplified Block Diagram



Understanding that this is only a single example of Tally System application and referring to the block diagram:

- Source equipment (VCR) provides an input to the Series 7000 Routing Switcher.
- One destination of the Series 7000 is fed to a primary input of a production switcher; the second output of the same destination is fed to a video monitor with which is associated an Under Monitor Display.
- The production switcher primary input fed by the Series 7000 is selected on the production switcher preset bus.
- The preset selection is transitioned to the production switcher Program Bus.
- The production switcher Program Tally relay associated with the primary video input closes, providing connection from a user-supplied power source to a tally module opto-isolated input.
- The Opto input activity is detected by the Series 7000 Global Serial Channel Mezzanine Board[1] supervising Tally System activities and a Tally Module relay (output) is closed, causing the on–air tally LED[2] of the Under Monitor Display to light (Destination Tally).
- The Series 7000 control system checks look–up tables and determines what router input is providing the on–air signal. It then closes the associated Tally Module relay, causing the on–air tally LED[2] of the VCR Machine Status Display to light (Source Tally).

Tally Conditions

Using the Graphic User Interface, the System Administrator configures the Tally System to assign relays and opto–isolators to sources and destinations and to set the conditions under which tally is active. (Read the Tally section of the Configuration manual.) Potential tally conditions are:

1. A Global Serial Channel Mezzanine Board, mounted on the Control Interface (CIF) Module of the 7000, is used to monitor the Tally System. Tally Systems are not available for systems without a separate controller frame. The user configures Tally Module relays and opto–isolators using the GUI (Graphical User Interface) to inform the 7000 which sources and destinations are associated with which relays and opto–isolators and to provide the conditions under which tally will be provided.

2. Under Monitor and Machine Status Displays have both red (on–air) and green (source tally) LEDs. The Tally System may be configured (A/B or Two Level Tally) so that a first Tally Module relay closure will light the source tally LED (someone is using your source or destination) while a second Tally Module relay closure will light the on–air tally LED (your source or destination is being sent to the transmitter).

Source Tally

- Router Status – A source tally is active if the destination selected is configured as Unconditional. No other conditions are required.
- Router Status, Input Opto–Isolators – A source tally is active if the destination is selected and the opto–isolator associated with the destination during configuration is active.
- Resource Assignment[1], Router Status – A source tally is active if the source (machine) is assigned to the controlling resource / destination (studio, etc.), and the source is actively selected by the controlling destination.
- Resource Assignment, Router Status, Opto–Isolators – A source tally is active if the source (machine) is assigned to the controlling resource / destination (studio, etc.), and the source is actively selected by the controlling destination, and the opto–isolator associated with the destination is active.

Destination Tally

- Destination tally is usually conditioned by an existing source tally relay association. Destination tally is not active unless the source tally relay for the source connected to the destination is active. Source tally precedes any destination tally.
- Router Status – A destination tally is active if the source is selected. No other conditions required.
- Resource Assignment, Router Status – A destination tally is active if the source (machine) is assigned to the controlling resource / destination (studio, etc.), and the source is actively selected by the controlling destination.
- Destination tally conditioned by existing source tally relay AND Resource Assignment.

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1. Resource Assignment is one of several industry names for an computerized, external control system which attempts to assign and control resource availability throughout a facility. For example, a Resource Assignment system might determine during what times a particular studio has access to certain pieces of source equipment, like VTRs or Still Stores. The Series 7000 will interface to Resource Assignment systems and use information gleaned from the system as input in determining whether a source tally is active. For more information about 7000 interfacing capabilities, see Section 4 of this manual.

Tally System Installation

Tally System installation consists of:

- Installing the Global Serial Channel board on the CIF Module
- Installing MAX Series Frames and Tally Modules
- Connecting Tally Module relays and opto–isolators
- Connecting the 7000 Tally Bus
- Configuring the Tally System

Installing the Global Serial Channel Board

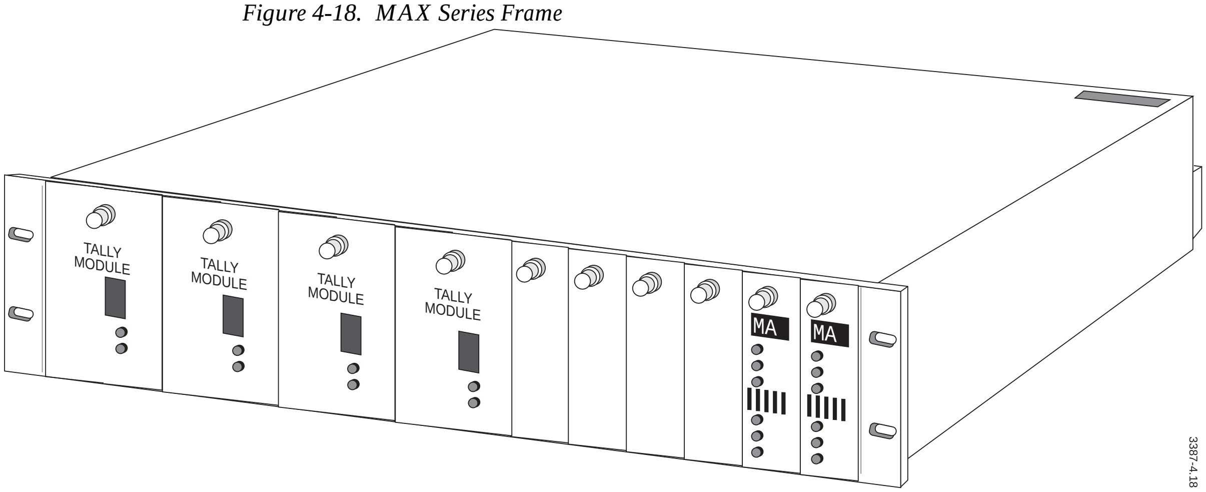
The Global Serial Channel Mezzanine, assembly 160019, supervises the Tally System and interfaces the Tally System to the 7000 MCPU. The Global Serial Channel Mezzanine (GSC), mounts on the Control Interface Module (CIF) in the Series 7000 Control Frame.

Refer to Communications Interface in Section 4 of this manual for GSC mounting and Control Interface installation instructions. Note that the selected location of the mezzanine determines which GSC BNC ports will support the Tally Bus.

Installing MAX Series Frames and Tally Modules

The MAX Series Frame is a multi-use 3RU frame designed to house MAX Series Modules. Refer to Figure 4-18, The frame will contain six Tally Modules, a primary power supply, and a redundant power supply.

Figure 4-18. MAX Series Frame



MAX Frame Specifications

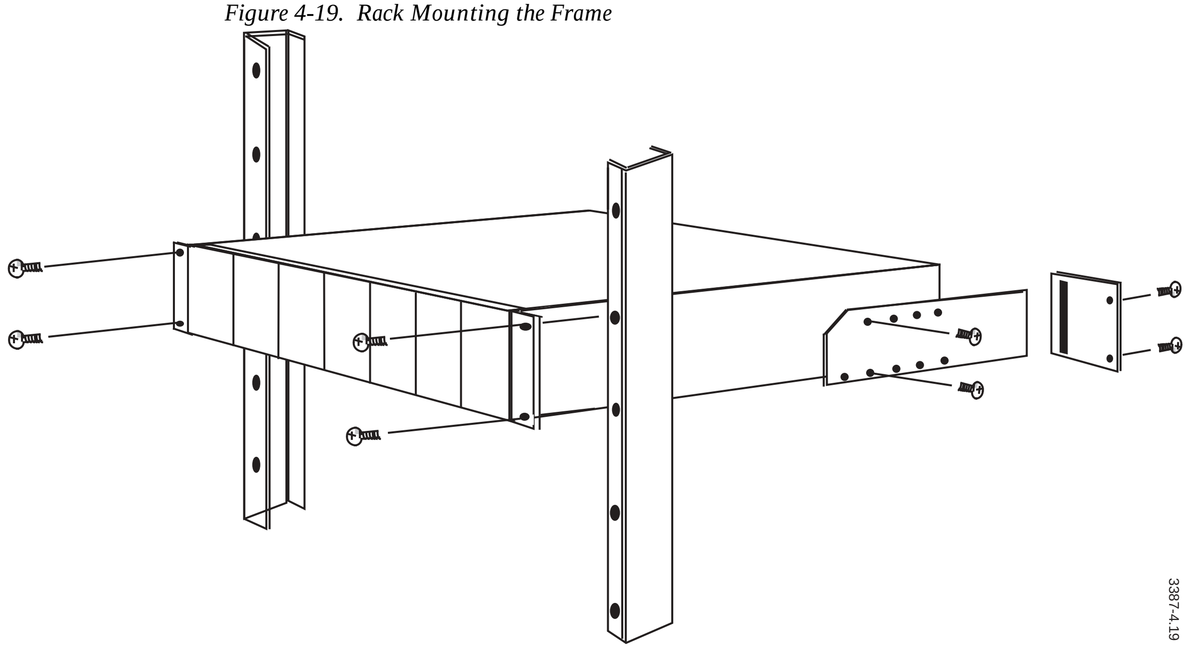
Table 4-3. MAX Frame Specifications

Frame	3RU/ 5.25" (13.35cm) high
	19" (48.3 cm) wide
	16.5" (42cm) deep
Weight	14.4 lb (6.52 kg) for frame and one power supply
Input Power	90–264 VAC, 48–64 Hz
Power Consumption	133 Watts maximum
Temperature Range	For specification listed, 0–50° C
Humidity	Up to 95% non-condensing

Rack Mounting the MAX Frame

The MAX frame is designed to mount in a standard, 19-inch equipment rack. Mounting space of 5.25" (133.4 mm) vertically and mounting depth of 20.75" (527.1 mm) are required. Figure 4-19 illustrates frame and rear support hardware installation.

Figure 4-19. Rack Mounting the Frame



Setting Tally Module ID Switches

There are two switches on the front of each Tally Module which identify the modules location for the 7000 control system. This ID must be unique and must be set before the module is inserted into a frame with ac power and Tally Bus connected. Since there is a limitation of no more than forty (40)

Tally Modules per Series 7000 system, we suggest you set the ID numbers from 1 through 40. Each Tally Module must have a unique ID setting. Figure 4-20 illustrates the rotary ID switches.

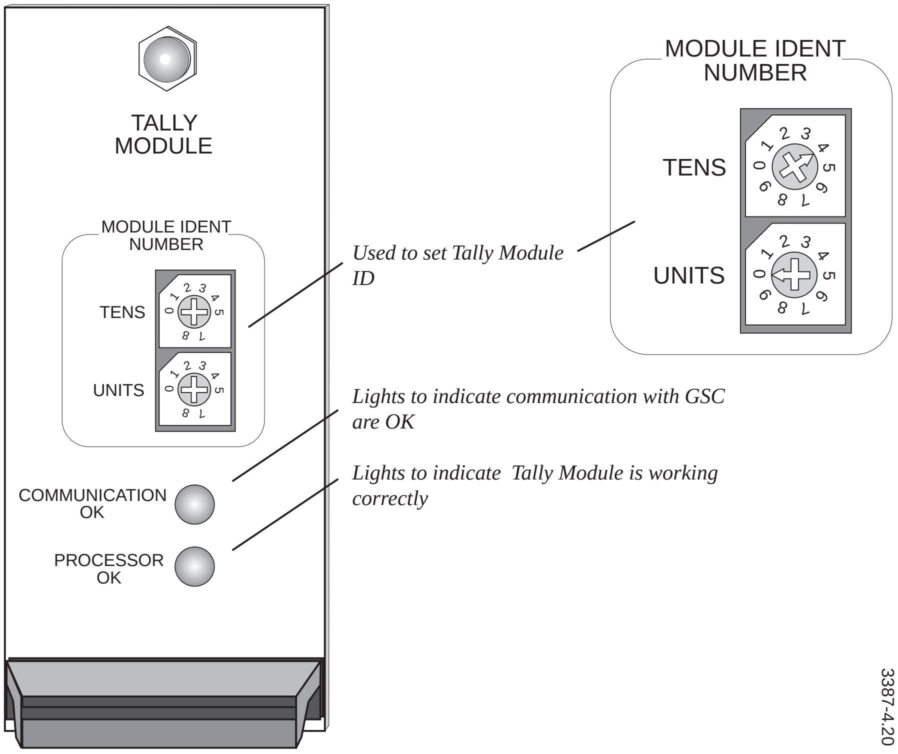
CAUTION **For First-time Power Up**: when a Tally Module is first inserted into a frame with AC power and Tally Bus connected, the Module Identification Number set on the rotary switches on the front of the module is written into an EPROM on the rear connector assembly. To avoid having to erase and reset this number, be certain module ID is correctly set before insertion into a powered-up frame.

To set the ID:

1. Look at the ID switches; note the small arrowhead at the end of one of the screwdriver slots in the center of the switch. The number the arrowhead is pointing to is the value of the switch setting (TENS switch to 4 =40, UNITS switch to 0 = 0). To set a module to 12, set the TENS switch to 1 and the UNITS switch to 2.

2. Use a cross-head (Phillips) screwdriver to set the module ID.

Figure 4-20. Tally Module ID Switches

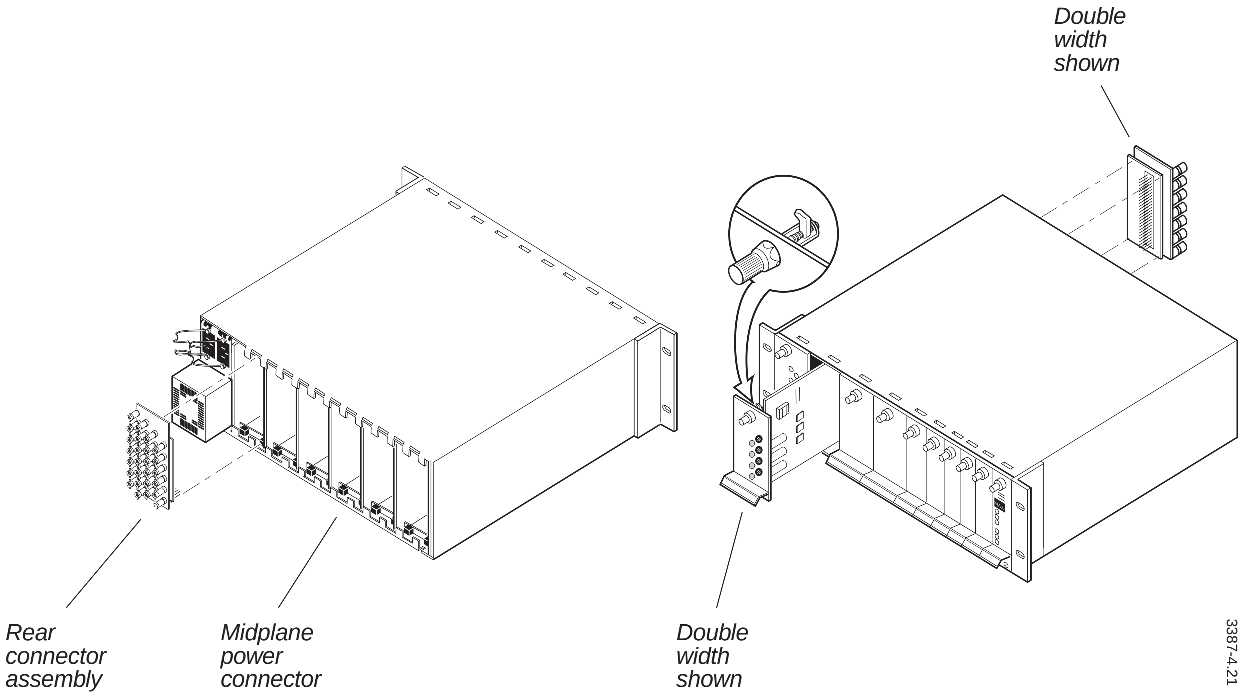


Installing Rear Connectors and Modules

CAUTION There are many different modules which can be installed in a MAX frame. Module rear connectors are uniquely keyed (module to connector assembly) to prevent a module from being inserted in the wrong slot. Forcing a module into the wrong slot will damage the key and may damage the module and/or the frame.

The rear connector assembly for each module is shipped with that module. To install the assembly, refer to Figure 4-21 and the instructions following.

Figure 4-21. Installing Tally Modules



1. Remove power from frame, if connected.

2. Carefully plug the rear connector assembly into the midplane connector at the spot you choose on the back of the MAX frame.

3. Loosely attach the assembly in place using the two (for single width) or four (for double width) metric screws provided. DO NOT TIGHTEN SCREWS. This will allow the rear connector assembly to align correctly with the module when inserted.

4. From the front of the frame, install the module so that the top and bottom edges of the circuit board slide inward between the card guides embossed into the frame and the module connector mates properly with the rear connector assembly. Turn the front-panel retaining knob clockwise to lock the module in place.

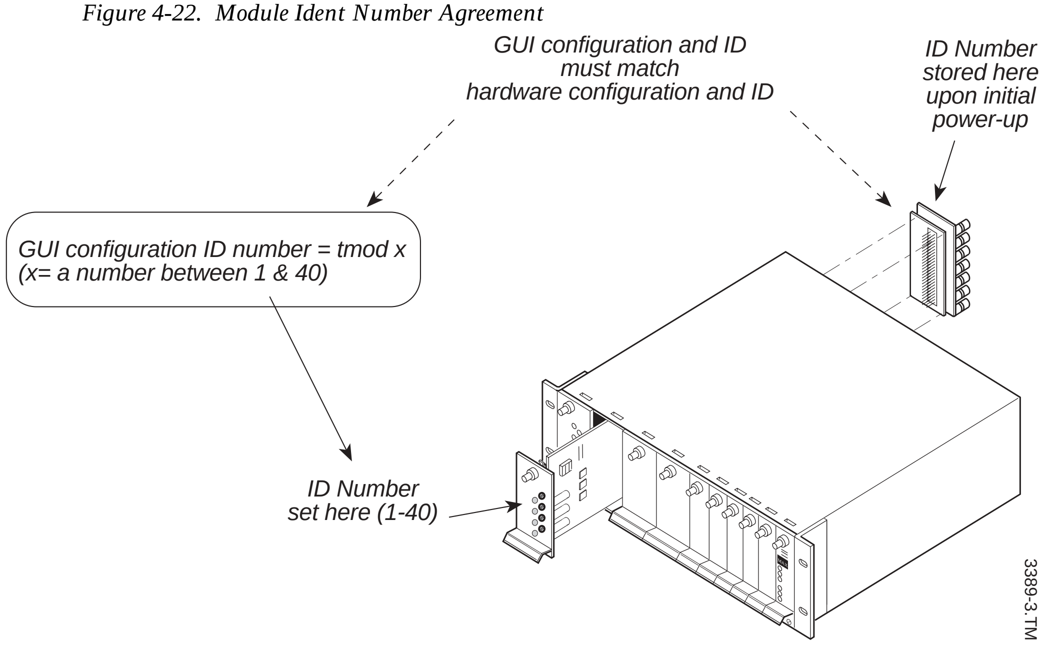
5. Secure the rear connector by tightening the screws used to attach the assembly in step 4.

6. Install blank front panels over unused slots. (Empty slots may be left uncovered EXCEPT for the backup power supply slot. If you do not have a backup power supply, the slot MUST BE COVERED to ensure correct ventilation of the power supply.)

Module Ident Number

Each Tally Module is identified according to the **MODULE IDENT NUMBER** in the Series 7000 GUI Configuration. The configured relays and opto-inputs are wired to the rear connector channel. Thus the wiring and configuration demands that any replacement Tally Module should not be allowed to disturb the original Module Ident Number for this Module slot. An EEPROM memory IC within the Rear Connector Channel assembly stores the ID number after initial power-up of the Module in the slot. The ID PROM must be programmed with the intended Module Ident Number at initial Installation and this number will then override any replacement Tally Module ID number on its Front Panel that does not agree with the slot's ID PROM. Refer to Figure 4-22.

Figure 4-22. Module Ident Number Agreement



If the ID number on the front of the module does not agree with the stored slot number, the Communication OK LED will blink rapidly. Selecting the correct ID number to match the slot will cause the LED to stay on.

To identify the stored slot ID number:

With the module powered in the slot, set the front panel ID numbers to 00. The Communication OK LED will blink the number of the stored slot ID, pause, and then repeat the sequence continuously. For example, a module in slot number 4 will blink four times, pause, and repeat.

Clearing Tally Module ID PROMs

If you need to clear the ID written into a Tally Module ID PROM:

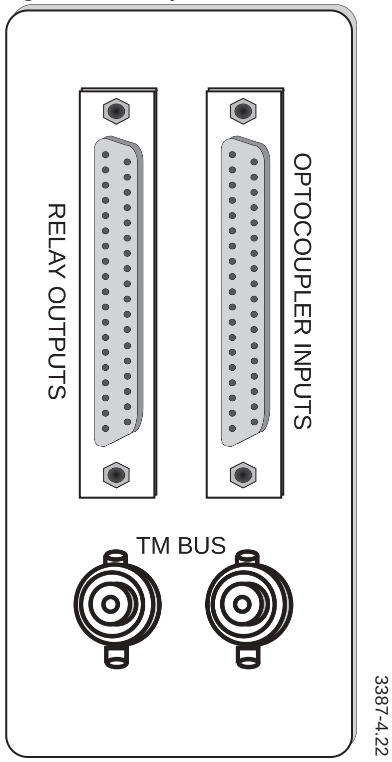
1. Disconnect the TM BUS connection.
2. Remove the Tally Module and connect a clip lead between TP2, DIAGS, and TP4, GND.
3. Replace the Tally Module in the frame (ac power connected). Watch the COMMUNICATION OK and PROCESSOR OK LEDs on the front panel until they go out momentarily.
4. Remove the clip lead between TP2 and TP4. Set the Tally Module ID correctly and put the module back in the frame.
5. Re-connect the TM BUS; the GSC will write the new address into the PROM.

Connecting Tally Relays and Opto–Isolators

There are 16 Opto–Isolated inputs and 16 dry–contact, relay closure outputs on each Tally Module. During system configuration, you configure the opto inputs and relays to associate them with 7000 inputs and outputs, and to place conditions upon their operation. There is no direct correlation between opto inputs and relay outputs – input to output correlation is determined during configuration.

The rear connector channel of the Tally Module is illustrated in Figure 4-23.

Figure 4-23. Tally Module Rear Connector Channel



Relay Outputs

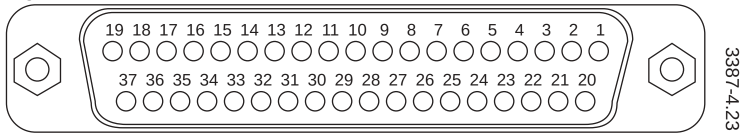
The sixteen relay outputs of each Tally Module are connected through the 37-pin D connector labeled RELAY OUTPUTS. The relay closures provide only a pin–to–pin connection (no power). The relay specifications for the Tally Module are found in Table 4-4:

Table 4-4. Tally Module Relay Specifications

Initial Contact Resistance, max. (By voltage drop 6V DC, 1A)	50 m Ohm
Maximum Switching Current	1A
Minimum Switching Capacity	1μA, 10mV DC
UL Rating	1A, 30V DC
Expected Life, 20cpm, 1A 30V DC	2 x 10^5 Closures

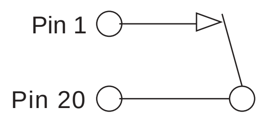
Figure 4-24 illustrates the pinout of the 37-pin D RELAY OUTPUT connector.

Figure 4-24. RELAY OUTPUT Connector Pinout



Relay	**Pins**	**Condition (all relays)**
1	1, 20	Active = Closed
2	2, 21	Inactive = Open
3	3, 22	
4	4, 23	
5	5, 24	
6	6, 25	
7	7, 26	
8	8, 27	
9	9, 28	
10	10, 29	
11	11, 30	
12	12, 31	
13	13, 32	
14	14, 33	
15	15, 34	
16	16, 35	

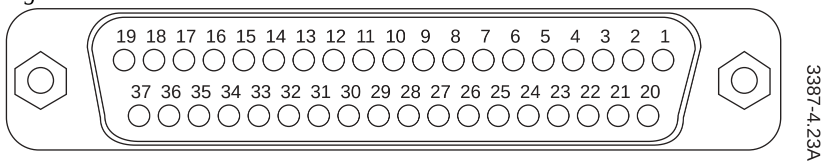
Relay 1 (Typical of all)



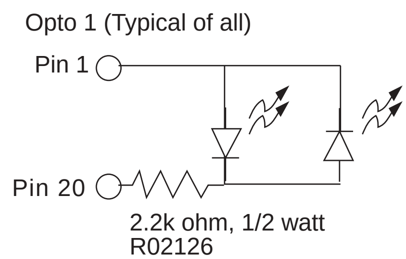
Opto–Isolated Inputs

The sixteen opto–isolated inputs to each Tally Module are connected through the 37-pin D connector labeled OPTOCOUPLER INPUTS. As shipped from Grass Valley, the module is designed to operate with input voltages ranging from +5V to +34.5V. The individual inputs are not polarity sensitive; either input pin may be positive or negative. Figure 4-25 illustrates the Optocoupler Input pinout.

Figure 4-25. OPTOCOUPLER INPUTS Pinout



Opto	**Pins**	**Conditions (all optos)**
1	1, 20	Applied Voltage = Active
2	2, 21	No Input = Inactive
3	3, 22	
4	4, 23	
5	5, 24	
6	6, 25	
7	7, 26	
8	8, 27	
9	9, 28	
10	10, 29	
11	11, 30	
12	12, 31	
13	13, 32	
14	14, 33	
15	15, 34	
16	16, 35	



If it is necessary to alter the factory input voltage range (+5V to +34.5V), the resistor associated with each opto input may be changed. These are the large resistors immediately beside each opto (Q1 through Q16). Table 4-5 lists voltage ranges correlated to resistor values. Factory default = 2200 Ohm, 1/2W.

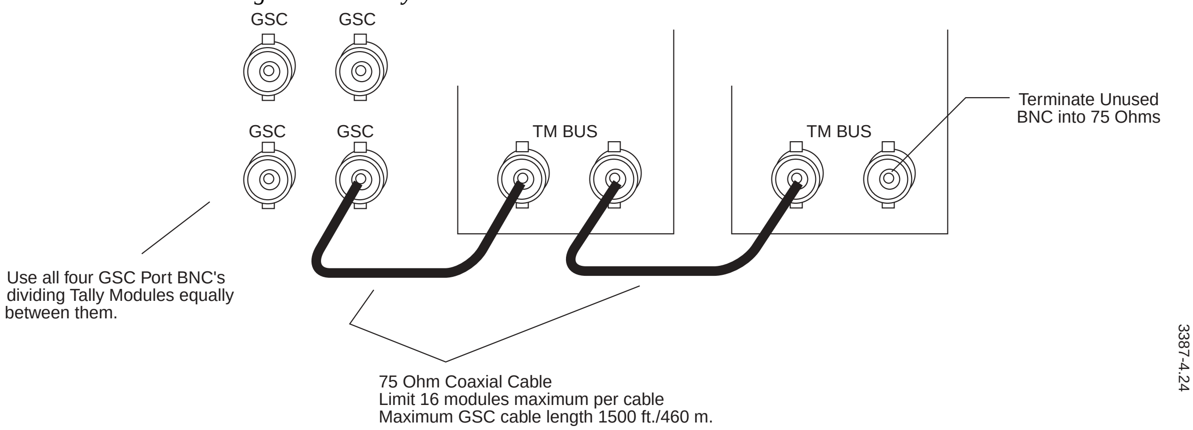
Table 4-5. Opto–Isolator Input Voltage and Resistor Values

Input Voltage Range	**Resistor Value, 1/2W**
+2V to 10.5V	470 Ohm
+3V to +21.5V	1000 Ohm
+5V to +34.5V	2200 Ohm

Connecting the 7000 Tally Bus

The Global Serial Channel (GSC) mezzanine board which supervises Tally System operation is mounted on the CIF Module in the 7000 Control Frame as described earlier in this section. The associated CIF connector channel provides four BNC connectors for Tally Bus use. We recommend that you use all four GSC port BNCs, dividing the Tally Modules between them. Refer to Figure 4-26.

Figure 4-26. Tally Bus Connection



The standard rules for the Series 7000 Global Serial Channel Bus (CP / Node Bus) apply to the Tally Bus:

- Each coax bus must be limited to a maximum 16 tally modules.

Note Only Tally module are allowed on this bus.

- Maximum length of a single bus is 1500 ft. / 460 meters
- Any one or all four of the GSC coax BNCs may be used to connect to Tally Modules. Modules should be distributed equally among the four buses.

Configuring the Tally System

The Tally System is configured using the Graphic User Interface. Please see the *Configuration* manual for instructions on using the Graphical User Interface and explanations of how your configuration choices will affect the operation of your Tally System.

Under Monitor and Machine Status Displays

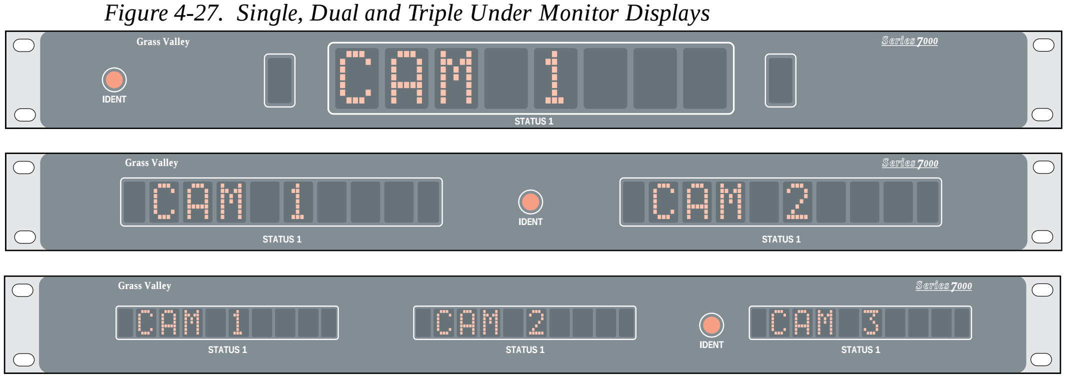
Under Monitor Displays (UMDs) mount beneath a video monitor or monitors in a standard 19–inch equipment rack. They are each one rack unit in height and are powered by an external supply. The single UMD has an eight–character display which indicates the video Source currently being input to the associated monitor. A single LED array is at each end of the eight–character display; one LED array is green, the other is red. The LEDs are software configured. The LEDs are intended to be used with the 7000 Tally Modules. The dual UMD has two eight–character displays with corresponding red and green LED arrays and is intended to rack–mount beneath two video monitors (one display per associated monitor). The Triple UMD has three eight-character displays with corresponding red and green LED arrays. All UMDs have a single, recessed IDENT button which causes UMD configuration and software version to be displayed when pressed:

- Tally Level
- Assigned Destination (or machine)
- Panel Name
- System Name
- Software Version

The Machine Status Display (MSD) is physically and electrically identical to the single UMD. Its function is differentiated during configuration and depends upon the Series 7000 Assignment system. When the Assignment system is enabled, Sources may be Assigned to particular Destinations. The MSD displays the name of the Destination to which its Source is Assigned, when the Source is active on the Destination. The red and green LED arrays are again intended to indicate in–use and on–air.

Figure 4-27 illustrates the front panels of the UMDs.

Figure 4-27. Single, Dual and Triple Under Monitor Displays



Installing the Displays

This section describes:

- Rack Mounting
- Cabling
- Configuration

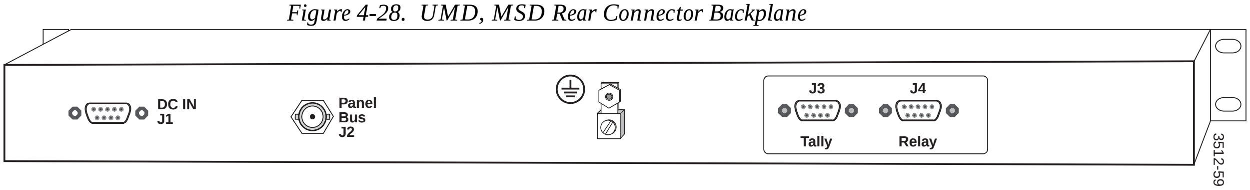
Rack Mounting

The displays are one rack unit tall and designed to mount in a standard, 19–inch equipment rack.

Cabling

The display rear connector backplane is illustrated in Figure 4-28.

Figure 4-28. UMD, MSD Rear Connector Backplane



Ground

Ground the display before making any other connections.

Panel Bus

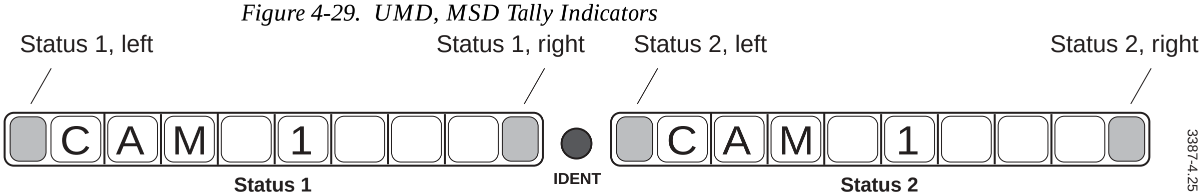
Cable to the coaxial Control Panel bus using 75 Ohm Belden 8281 or equivalent. If the display is not the last device on the bus (16 devices maximum per bus), use a (user-supplied) BNC T-connector. Unused Panel Bus connections must be terminated into 75 Ohms. Maximum cable length is 1,500 feet (300 meters).

CAUTION The Control Panel bus is a 1MB/sec bus and does not allow pigtail coax extensions between the BNC Tee and control panels or displays.

Tally

The Tally inputs are opto–isolated inputs accessed through the 9–pin or 15-pin (UMD3) D Tally Connector. During Tally Module configuration, the user determines whether a valid opto–isolator input will cause a tally LED (red or green) to light directly or whether other conditions must be met as well. Refer to Figure 4-29.

Figure 4-29. UMD, MSD Tally Indicators



Display opto–isolator inputs are not polarity sensitive; either pin may be positive or negative. If it is necessary to alter the factory input voltage range (+5V to +34.5V), the resistor associated with each opto-isolator input may be changed. These are the large resistors immediately beside each opto-isolator. Table 4-6 lists voltage ranges correlated to resistor values. Factory: 2200 Ohm, 1/2W.

Table 4-6. Opto–Isolator Input Voltage and Resistor Values

Input Voltage Range	Resistor Value, 1/2W
+2V to 10.5V	470 Ohm
+3V to +21.5V	1000 Ohm
+5V to +34.5V	2200 Ohm

Relay

The Relay outputs are dry–contact, pin–to–pin closures accessed through the 9–pin or 15-pin (UMD3) D Relay Connector. During Tally Module configuration, the user determines whether an active Tally LED will cause a relay closure directly or whether other conditions must be met as well.

Relay specifications are found in Table 4-7.

Table 4-7. Tally Relay Specifications

Initial Contact Resistance, max.	
(By voltage drop 6V DC, 1A)	50mOhm
Max Switching Power	30W, 62.5VA
Max Switching Voltage	110V DC, 125V AC
Max Switching Current	1A
Max Switching Capacity	10µA, 10mV DC
UL Rating	1A, 30V DC
Expected Life, 20cpm, 1A 30V DC	2 x 10^5 Closures

Table 4-8 correlates Tally connector and Relay connector input pins and LEDs.

Table 4-8. Tally Indicators and Associated Connector Pins

	Status 1		Status 2		Status 3		
Tally Indicator	Left	Right	Left	Right	Left	Right	GND
UMD 1 (Tally & Relay	1 – 6	2 – 7	–	–	–	–	5
UMD 2 (Tally & Relay	1 – 6	2 – 7	3 – 8	4 – 9	–	–	5
UMD 3 Tally	1 – 8	2 – 9	3 – 10	4 – 11	5 – 12	6 – 13	7
UMD 3 Relay	4 – 13	3 – 11	2 – 11	1 – 13	5 – 9	6 – 8	7

DC Input

The Displays use the same external power supply as the 7000 Control Panels. Connect the power supply only after all other connections have been made.

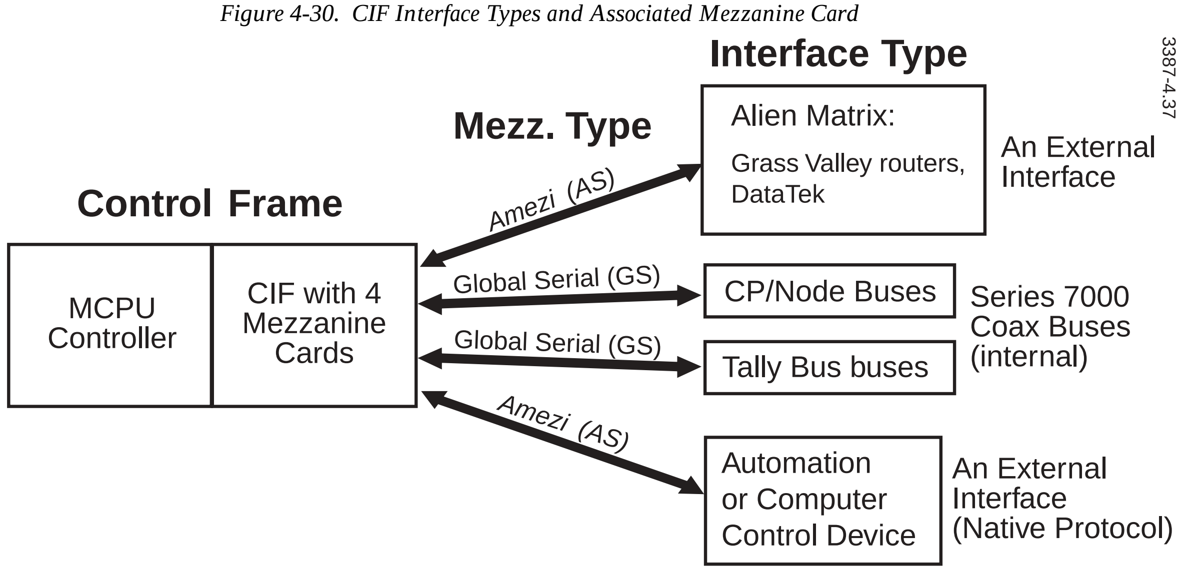
Configuration

Tally Module / Display interaction is configured through the Graphic User Interface during 7000 system configuration. Refer to the Series 7000 *Configuration Manual*.

External Interfaces & Global Serial Channel Expansion

The Series 7000 provides external interfaces to various routers, switchers, and control systems through the serial communications ports of the Communications Interface Option (CIF). An interface can allow the Series 7000 to be controlled by an external device using Series 7000 Native Protocol (for example, a computer or automation system), or allow the 7000 control system to control an external, alien matrix like the Horizon Routing Switcher. Refer to Figure 4-30. Controlling a 7000 using Native Protocol is discussed the Series 7000 *Protocol Manual*.

Figure 4-30. CIF Interface Types and Associated Mezzanine Card

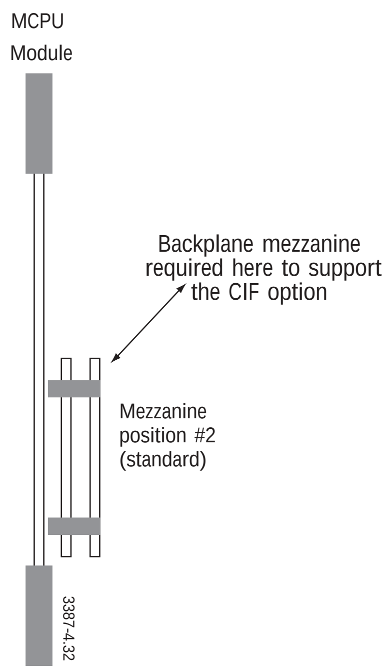


The CP bus, Node bus, and Tally bus are coax buses driven by Global Serial Channel (GS) mezzanine cards. Although these do not connect to external (non-7000) equipment, Global Serial hardware Rear Panels (RPs) and Coprocessor setup are discussed in this Section.

General CIF Interface Hardware

The Communications Interface (CIF) option provides expansion of internal control ports—the Series 7000 Node Bus, Control Panel Bus, and Tally Bus Serial Control (RS-232 / RS-422) Bus. To use the CIF option in the Control Frame, the MCPU module(s) must have a Backplane Interface50 (BPI) mezzanine in the top (#2) mezzanine position. Refer to Figure 4-31.

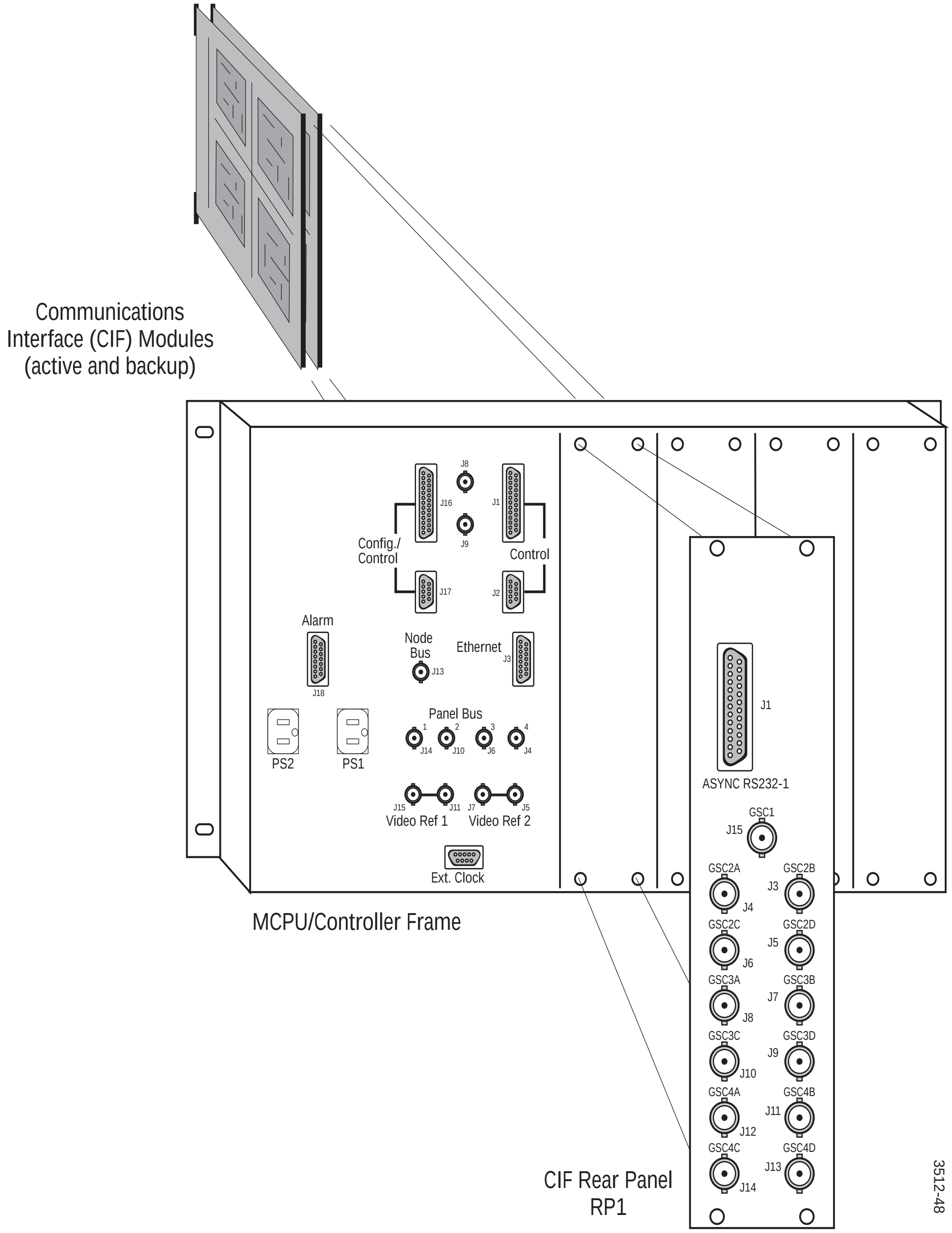
Figure 4-31. MCPU BPI Mezzanine Position



CIF Components

The Communications Interface (CIF) option is installed in the MCPU / Controller frame and consists of a CIF module #062884 and a rear connector backplane assembly. Refer to Figure 4-32

Figure 4-32. Components of the CIF Option

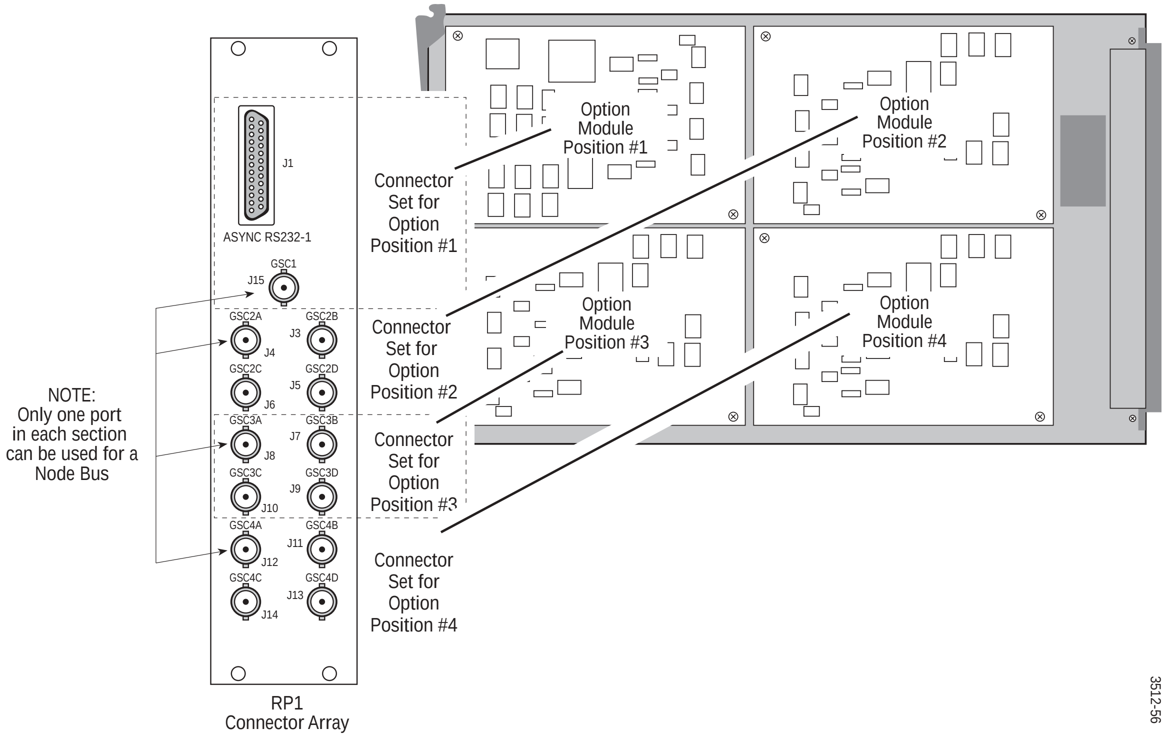


Mezzanine Board and Connector Array Options

The CIF module is an option motherboard divided into four sections. Each section accepts a mezzanine card supporting either a serial (Amezi) or coax (Global Serial) type of interface. The Rear Panel (RP) connector channel provides four corresponding groups of connectors. How the connectors function is determined by the type and version of mezzanine card used with the specific group, and by configuration via the GUI. Figure 4-33 illustrates an SMS-CIF-RP1 rear panel connector array (one of several RPs available) and its associated mezzanine positions on the CIF module.

Note Main and back-up CIF modules must be identical in mezzanine placement and configuration.

Figure 4-33. CIF Module and Connector Array, SMS-CIF-RP1

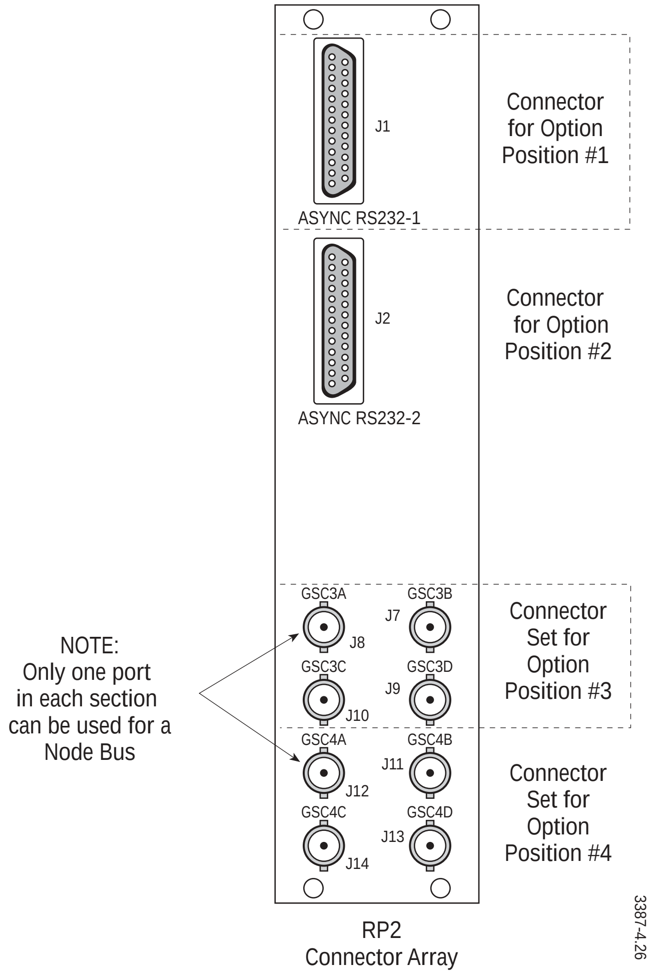


The connector array shown above (RP1) supports the following types of mezzanine cards in the appropriate CIF module mezzanine position:

- Position 1 — SMS-SER-MZ (for RS-232 / -422) or SMS-COAX-MZ (for Node or Source Tally Bus)
- Positions 2 through 4 — SMS-COAX-MZ (for CP, Source Tally, or Node Bus)

Figure 4-34 illustrates the SMS-CIF-RP2 connector array for use with two serial mezzanine and two coax mezzanine cards on the CIF module.

Figure 4-34. RP2 Connector Array



The connector array shown previously (RP2) supports the following types of mezzanine cards in the appropriate CIF module mezzanine positions:

- Position 1 and 2 — SMS-SER-MZ (for RS-232 / -422)
- Positions 3 and 4 — SMS-COAX-MZ (for CP, Source Tally, or Node Bus)

Table 4-9, Figure 4-35 and Figure 4-36 show each RP type and its connector configuration. Notice that some RPs offer two serial connectors in some positions (RP1D, RP2D, RP3, and RP4). These connector pairs may be electrically either single-wire (Or'ed) or dual-wire. Dual-wire pairs offer independent electrical connection to each of the mezzanine cards in a redundant pair. Only RP1D and RP2D serial connectors are dual-wire (D / SER).

Table 4-9. Rear Panel Connector Arrays

Rear Panel Type	Position 1	Position 2	Position 3	Position 4
SMS–CIF–RP1	SER/Coax	Coax	Coax	Coax
SMS–CIF–RP1D*	D/SER/Coax	Coax	Coax	Coax
SMS–CIF–RP2	SER	SER	Coax	Coax
SMS–CIF–RP2D*	D/SER	D/SER	Coax	Coax
SMS–CIF–RP3	SER	SER	SER	Coax
SMS–CIF–RP4	SER	SER	SER	SER
SMS–CIF–RP5	Coax	Coax	Coax	Coax

Note If you are installing a serial interface that uses two cables for dual-wire redundancy, you must use position #1 on SMS-CIF-RP1D or position #1 or #2 on SMS-CIF-RP2D. All other RP, SER connector pairs are wire-or (branched) rather than independently connected to the Mezzanine pair.

Figure 4-35. Dual and Single-Wire Rear Panel Wiring

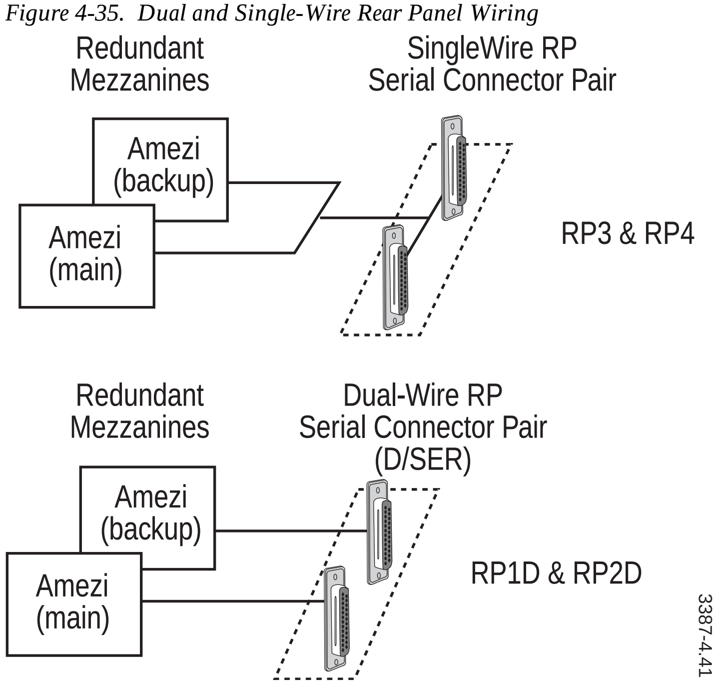
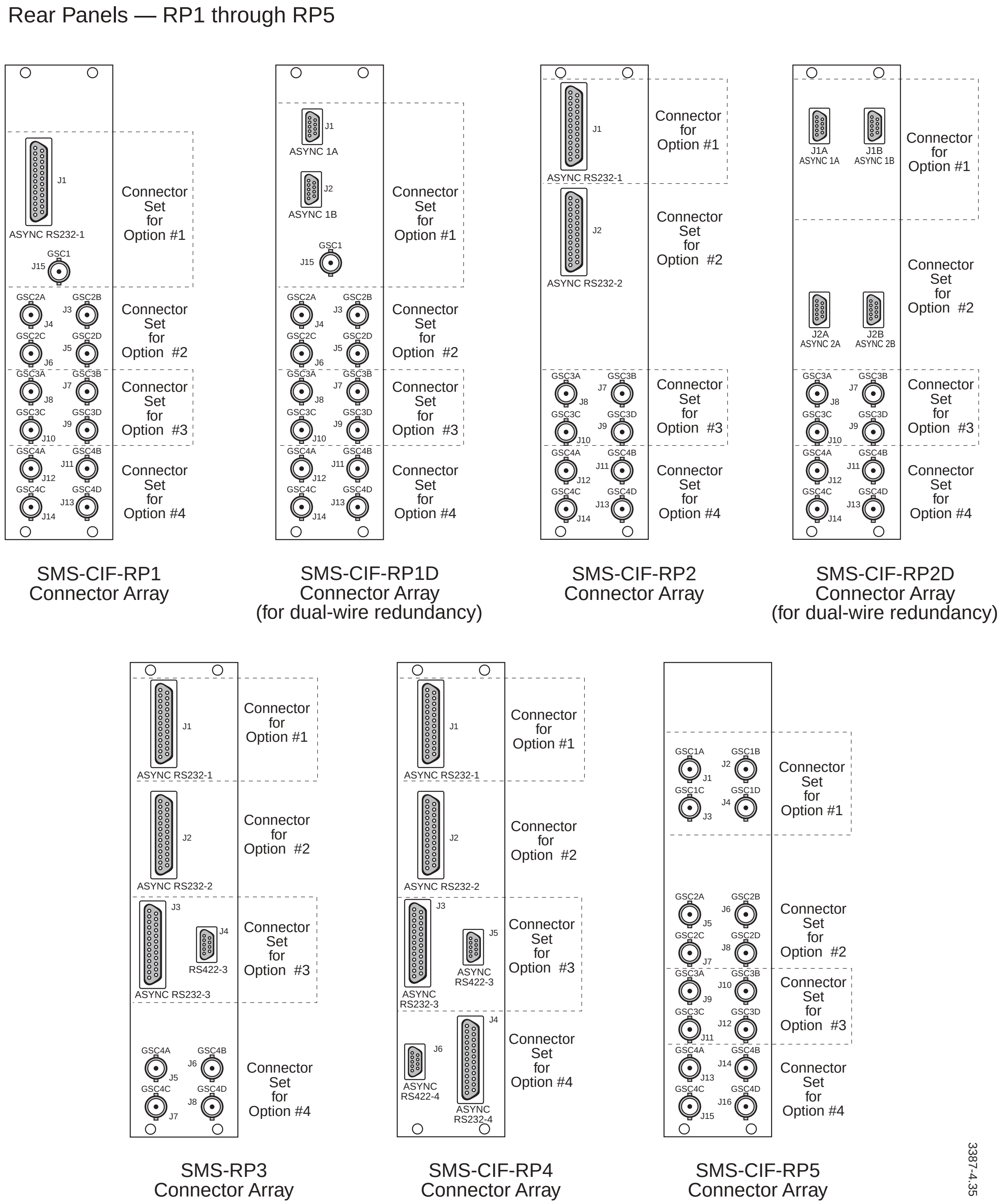


Figure 4-36. CIF Rear Panel Connector Arrays

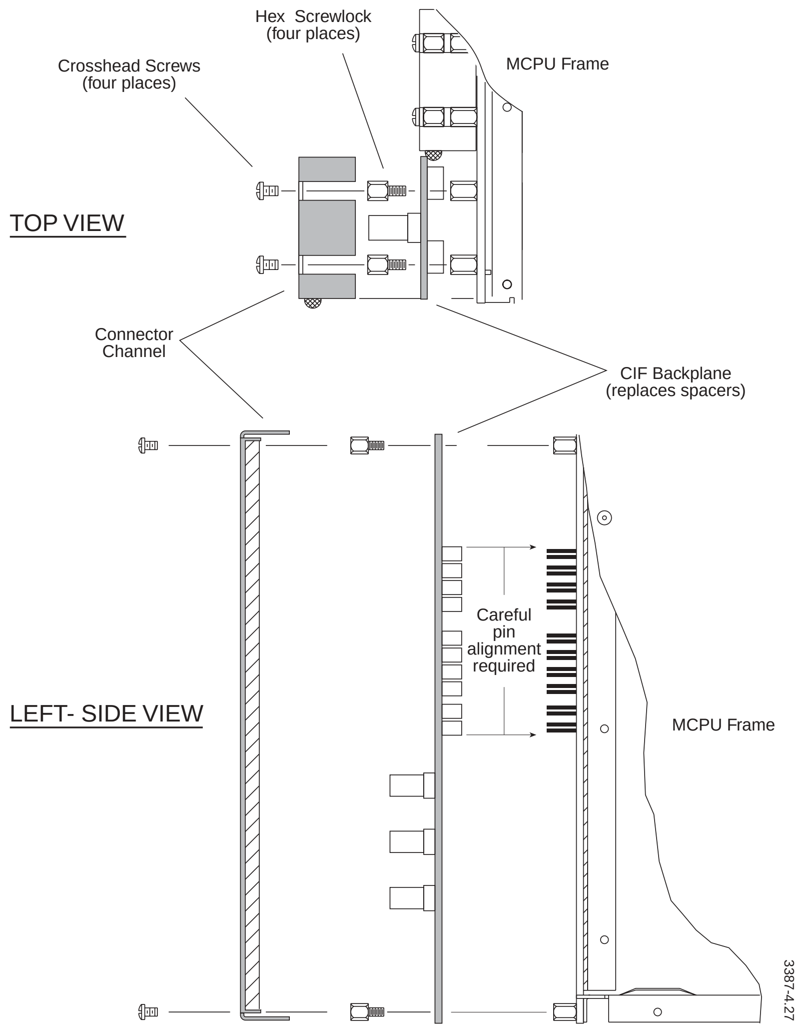


CIF Connector Channel Installation

To install the CIF Connector Channel in an existing frame, you will need a crosshead (Phillips) screwdriver and a 1/4 inch (M4) hex nut driver. Refer to Figure 4-37 while performing these steps:

1. Remove the blank connector channel in the desired frame slot by removing the four crosshead retaining screws.
2. Remove the four hex screwlocks behind the connector channel and remove the flat spacer bar representing the backplane board thickness.
3. Carefully plug the new CIF backplane board onto the pins of the frame motherboard and re-install the four hex screwlocks.
4. Install the new CIF connector channel and replace the four crosshead screws.
5. Insert the new CIF module(s) in the appropriate frame slot(s) supported by the new Connector Channel.

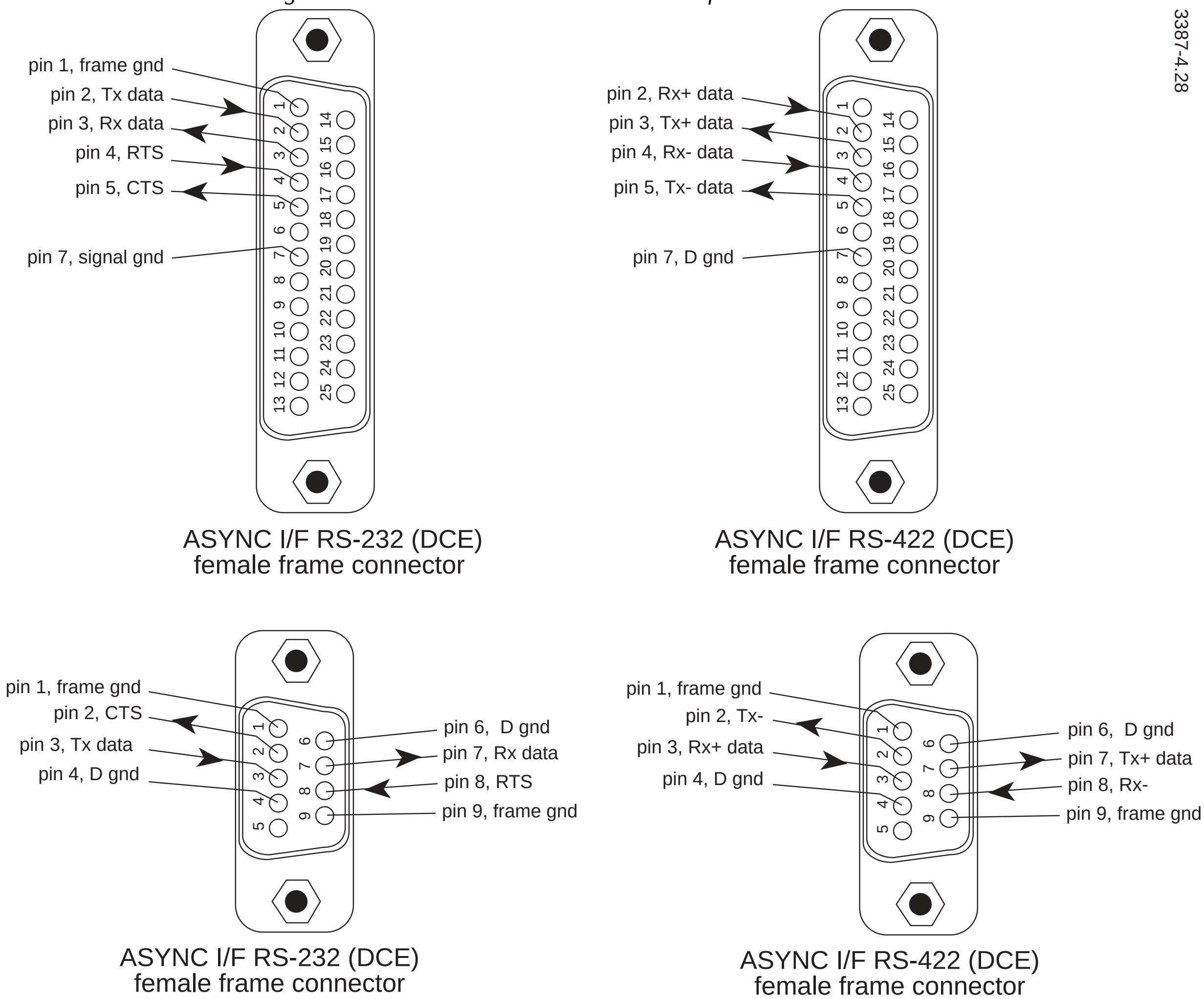
Figure 4-37. CIF Backplane Assembly



Serial Control Connector Pinout

The Serial Control Port connector is a 25-pin, female Sub D connector with pin function as shown in Figure 4-38.

Figure 4-38. Serial Control Connector Pinout for RS-232 and RS-422



Note Dual-wire redundancy is supported only on rear panel RP1D and RP2D where the two connectors for a single mezzanine are independently wired to the main and backup CIF modules.

Native Protocol Serial Interface

The Series 7000 Routing System can be controlled by an external, serially communicating device using a RS-232 or a RS-422 interface. This is intended to facilitate computer control of the Series 7000. A dumb terminal is not a practical controller. The *Protocol Manual* contains the Native Protocol Command Set.

Requirements

In order to control a Series 7000 system using an external, serially communicating device such as a personal computer or an automation system, both the Series 7000 and the external device must be properly equipped.

Series 7000

The Series 7000 must be equipped with a Communications Interface (CIF) module and an RS-232 / RS-422 Interface board. See *General CIF Interface Hardware* *on page 4-43*.

The SMS-64V Compact System has to have the upper UART mezzanine on the MCPU changed to an Asynchronous Mezzanine (Amezi).

Note The use of Native Protocol via a SLIP connection to a compact router is not recommended or supported. While it is possible to do this, the poor performance of the slow SLIP communications link is likely to cause problems with the client application. Performance would be degraded even further if either the GUI or VSD were operated concurrently; these programs would probably fail because of communications time-outs.

To Change the UART Mezzanine to an Amezi:

1. At the System Diagnostic Interface, enter the following commands:

```
SMS7000> del “console.ini”
SMS7000> del “slip.ini”
```

2. Verify that these files have been deleted using the dir command:

```
SMS7000> dir
```

3. Switchover to the redundant MCPU, if present

```
SMS7000> switchmcpu
```

4. At the system diagnostic interface, enter the following commands:

```
SMS7000> del “slip.ini”
SMS7000> del “console.ini”
```

5. Remove the MCPU board(s) from the system.

6. Remove the top UART mezzanine(s) and install the Amezi board.
7. Insert the MCPU(s) in the compact frame.

   Native protocol will automatically run on the CTL port with communications parameters 9600 / 8 / N / 1.

   SLIP will automatically run on the CNFG / CTL port.
8. Run the PC GUI and configure the Amezi board.
9. Connect the computer or equipment running native protocol to the CTL port.

The Amezi installation is complete.

External Controller Requirements

The external device must be equipped with an RS-232 or RS-422 Serial Port capable of 300, 600, 1.2k, 2.4k, 9.6k, 19.2k, or 38.4k BPS communications rates.

Device Connection

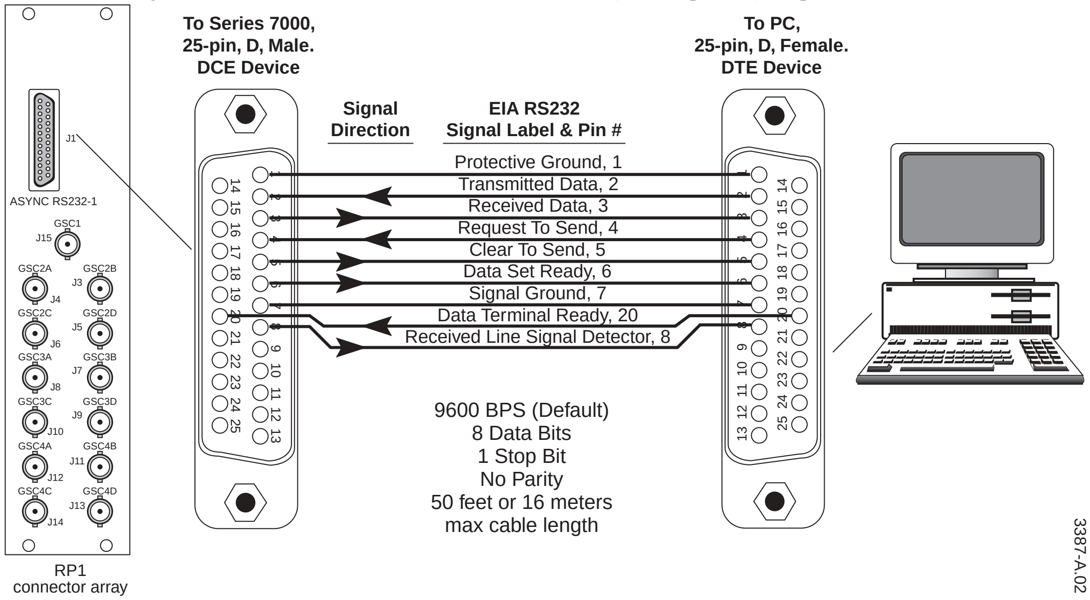
The Series 7000 System is capable of using an RS-232 or an RS-422 interface. Both use the Controller Frame CIF connector labeled ASYNC I / F RS-232 (some CIF backplanes have two of these connectors – use either one). See *Serial Control Connector Pinout on page 4-50*.

Default settings are:

- RS-232 Protocol
- 9600 BPS
- 8 Data Bits
- 1 Stop Bit
- No Parity

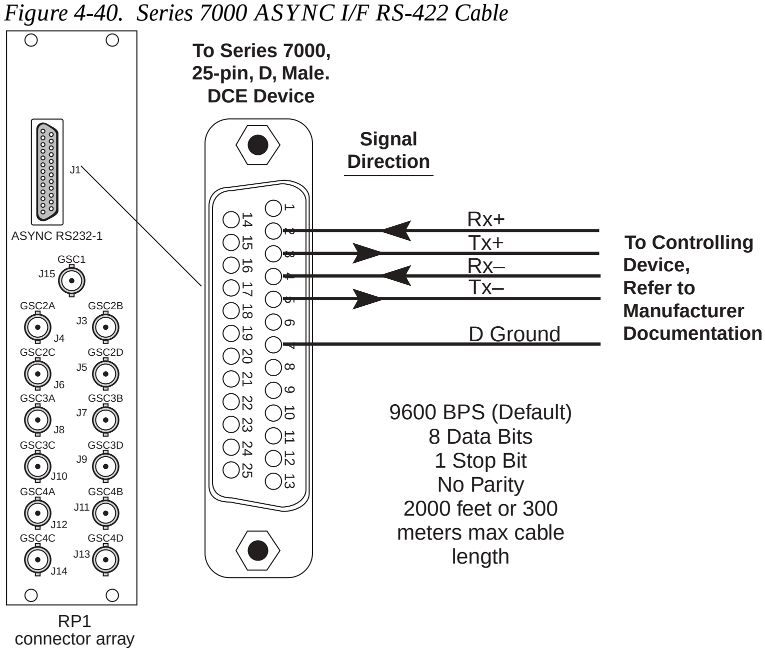
The RS-232 cable (Figure 4-39) is available from electronics suppliers. It has a 25-pin, Female, screw-lock, D connector at one end and a 25-pin, Male, screw-lock, D connector at the other end. The connectors are wired straight through, pin-for-pin (pin 1 to pin 1,...pin 25 to pin 25). This cable is used to connect DCE and DTE devices according to EIA RS-232 protocol.

Figure 4-39. Series 7000 ASYNC I/F to IBM PC (or Compatible) 25-pin RS-232 Cable



Because the RS-422 connector may vary at the PC end depending upon the serial board manufacturer, no pinout information is provided for that end of the cable. Figure 4-40 provides Series 7000 RS-422 cable information.

Figure 4-40. Series 7000 ASYNC I/F RS-422 Cable



Redundant Control Connections

The following is a description of the Series 7000 / Native Protocol redundancy mechanism.

Terminology

- Amezi - An Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices
- BPI - The Backplane Interface used to connect Mezzanines (e.g. Amezis) to the primary database and routing Series 7000 CPU.
- Communications channel - This term is used to describe the communications path along the wire(s) between an Amezi or Amezi pair and the external device port or pair of ports.
- MCPU - The main controller board of the Series 7000.

Single-Wire Interface

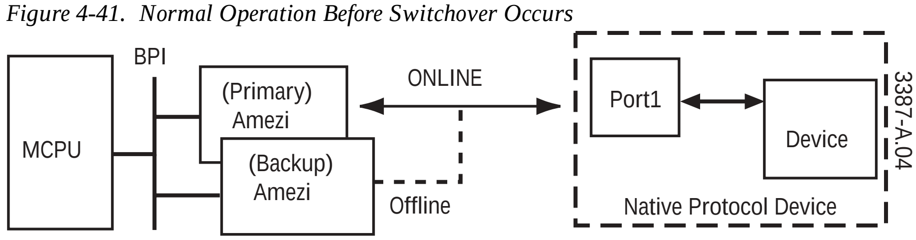
A single wire connects the two Amezis to one Native Protocol port.

One Amezi (the primary) will be fully functioning, i.e., receiving the heartbeat and commands and issuing responses.

The other Amezi (the backup) will have its communications drivers tri-stated, effectively taking this Amezi off the communications channel (i.e., the RS-422 or RS-232 cable).

The Native Protocol Port1 will be fully functioning, i.e., issuing the heartbeat, issuing commands, and receiving responses.

Figure 4-41. Normal Operation Before Switchover Occurs

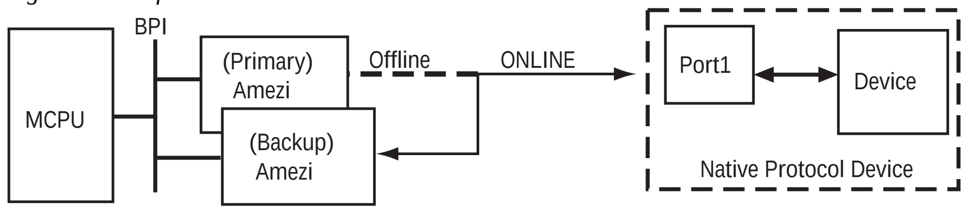


Switchovers - Series 7000 Directed.

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi.
- No heartbeat or other commands are being received from Port1. The Native Protocol Device is responsible for a heartbeat message to the Amezi. If this heartbeat fails to be received by the Amezi, the communications channel is considered down.

Figure 4-42. After Amezi Switchover Occurs



The MCPU is capable of monitoring the health of the Backup Amezi, but is not capable of determining the viability of the Backup communications channel.

The Series 7000 will not switch back from a Backup Amezi to the Primary Amezi, even if identical or different errors are determined after the switchover has occurred. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel to the Primary Amezi

In the event of a Backup Amezi / communications channel failure (including loss of BK2 heartbeat) while the Primary communication channel is operating properly, an alarm will be issued by the MCPU.

Note If an MCPU switchover occurs, the client software may not immediately detect that the connection is lost. It is a good idea to include a software time-out which can detect that an expected response is never received.

Special Case: For NP Devices Not Capable of Issuing Heartbeat

There will be some cases in which the External Native Protocol Device will not be capable of issuing the expected periodic heartbeat (BK command). For those devices, proper redundancy operation is not possible. Even proper operation of the MCPU's active device list is inhibited in this mode of operation.

The problem results from the fact that when no heartbeat is to be monitored by the Amezi, there is no case, except failure of the Amezi itself, in which the channel will be regarded as failed or down. Additionally, the Device, once added to the MCPU's active device list, will never be deleted from the MCPU's active device list, which could cause operator confusion. It takes a reboot of the Series 7000 to clear the associated Native Protocol Device from the MCPU's device list.

To emphasize, a switchover from the Primary Amezi to the Backup Amezi will only occur if the Primary Amezi itself fails. It will be impossible to detect any other communication failures: loss of cable, loss of device, etc.

To disable Amezi monitoring of the Native Protocol heartbeat, use the **BK,I** command to set the periodic heartbeat rate to zero (0).

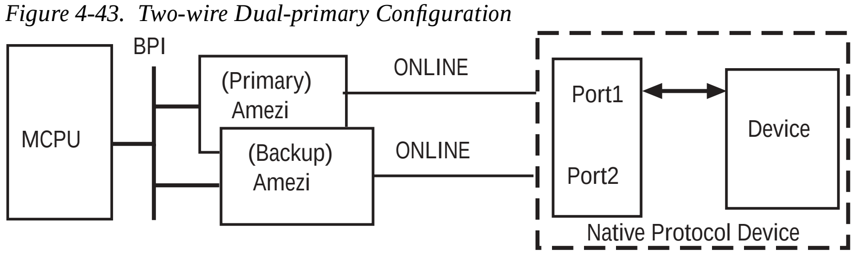
Dual-wire Redundancy

In this mode, two wires connect two Amezis to two Native Protocol ports.

Primary Amezi to Port1 is the primary communications channel. Backup Amezi to Port2 is the Backup communications channel.

The Primary communications channel carries the Native Protocol commands to the Series 7000. It is the responsibility of the Primary Port1 to issue such traffic to keep the device on-line, using the Native Protocol BK heartbeat message if necessary as fill.

Figure 4-43. Two-wire Dual-primary Configuration



The Backup communications channel maintains itself on-line by issuing, at periodic intervals, the Level 4 BK2 command. (BK2 is a new Level 4 Native Protocol command added for redundancy).

Switchovers - Series 7000 Directed.

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi.
- The 7000 will switchover to the backup Amezi any time it receives a Native Protocol command from the backup Amezi. The BK2 command is captured by the Amezi and not sent on to the MCPU. So the BK2 command should be used to tickle the backup Amezi and will not force a switchover. Any other NP command (including all other **BK** commands [**BK**, **BK,I**, etc.]) sent from the Native Device to the backup Amezi will cause a switchover to occur.

The Series 7000 will not automatically switch back from a Backup Amezi to a Primary Amezi, even when errors are determined on the Backup after the switchover. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel to Primary.

Interface Configuration and Testing

Once the external controller is cabled to the Series 7000 System, the communications settings (baud rate, data bits, etc.) have to be matched between the two devices. The Series 7000 default settings are:

- RS-232 Protocol
- 9600 BPS
- 8 Data Bits
- 1 Stop Bit
- No Parity

Refer to the manufacturers documentation for the PC (or other controlling device) to change the controlling device's communication settings to the Series 7000 System defaults.

All Amezi's need to be configured using the GUI before operation is possible. See the *Configuration Manual*.

Control Cables for Alien Matrices

Refer to Figure 4-44 through Figure 4-49 for the supported Alien Matrix interface cable pinouts.

Figure 4-44. Horizon-GPI Interface Control Cable

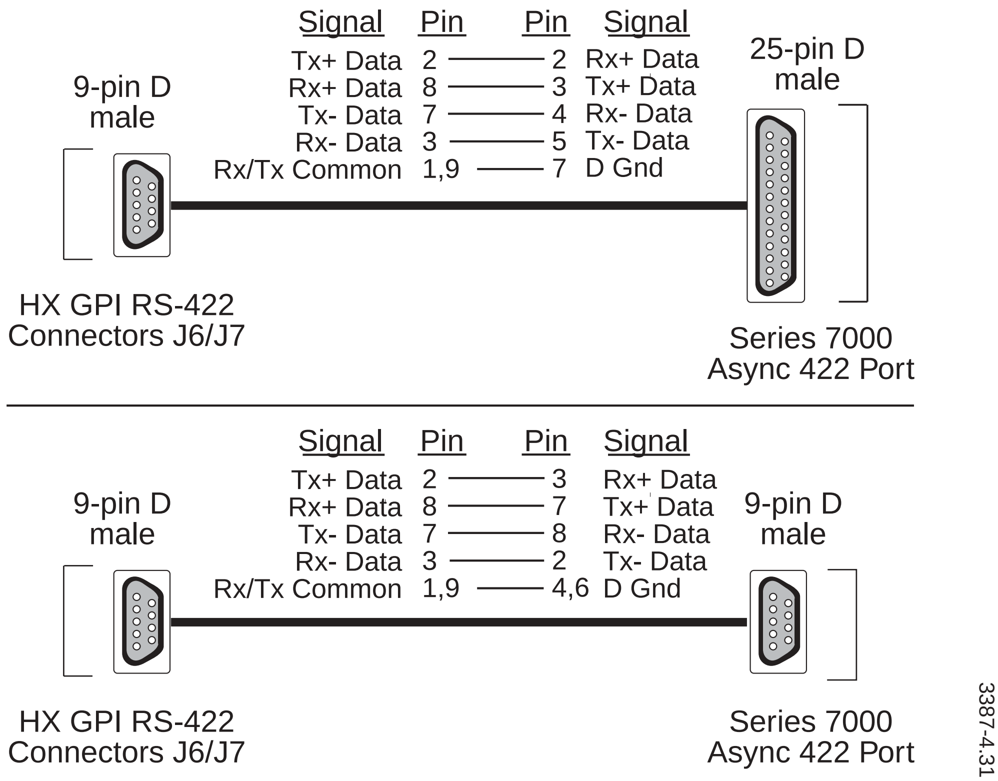


Figure 4-45. 440 Router Interface Control Cable — RS-422

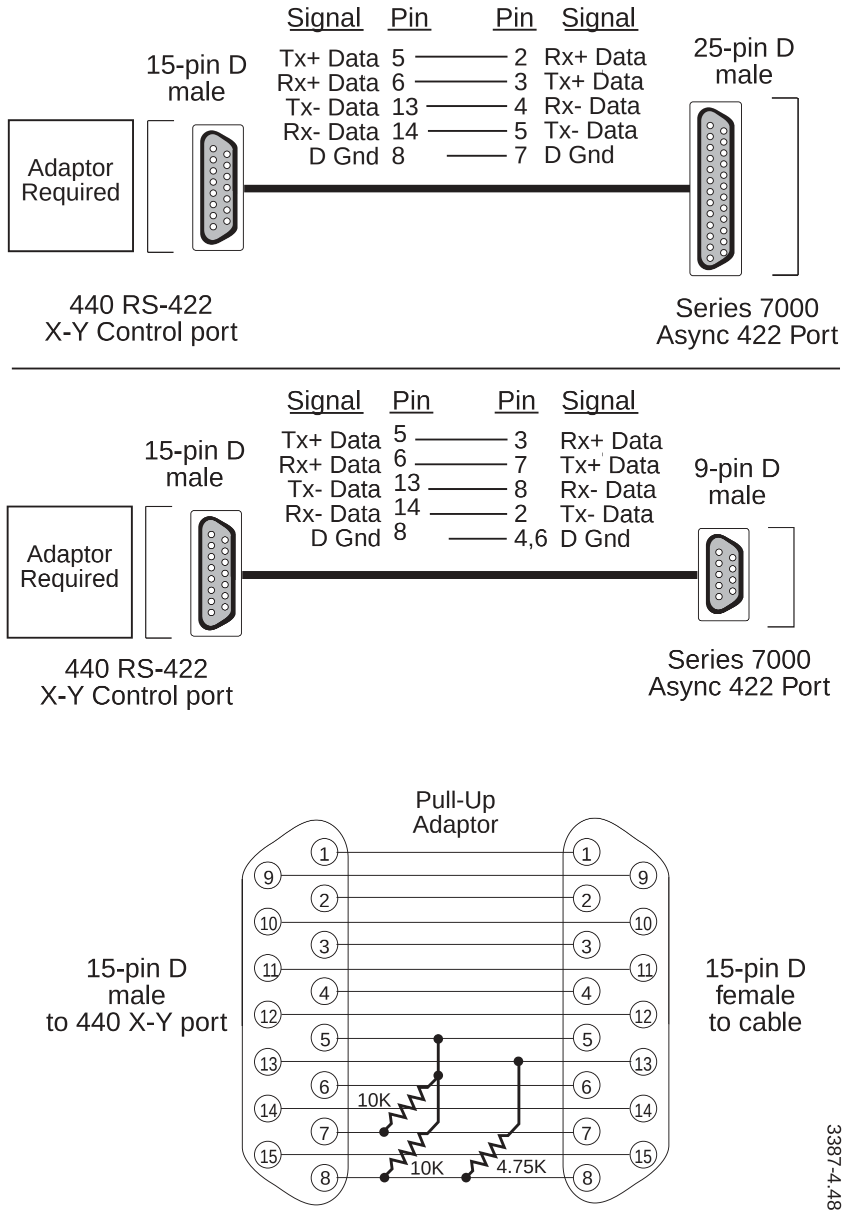


Figure 4-46. Performer Router Interface Control Cable — RS-422

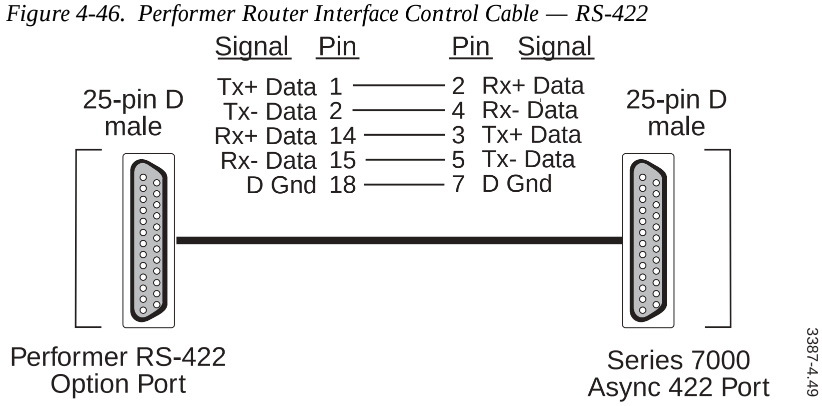


Figure 4-47. 20-TEN Router Interface Control Cable - RS-422 or RS-232

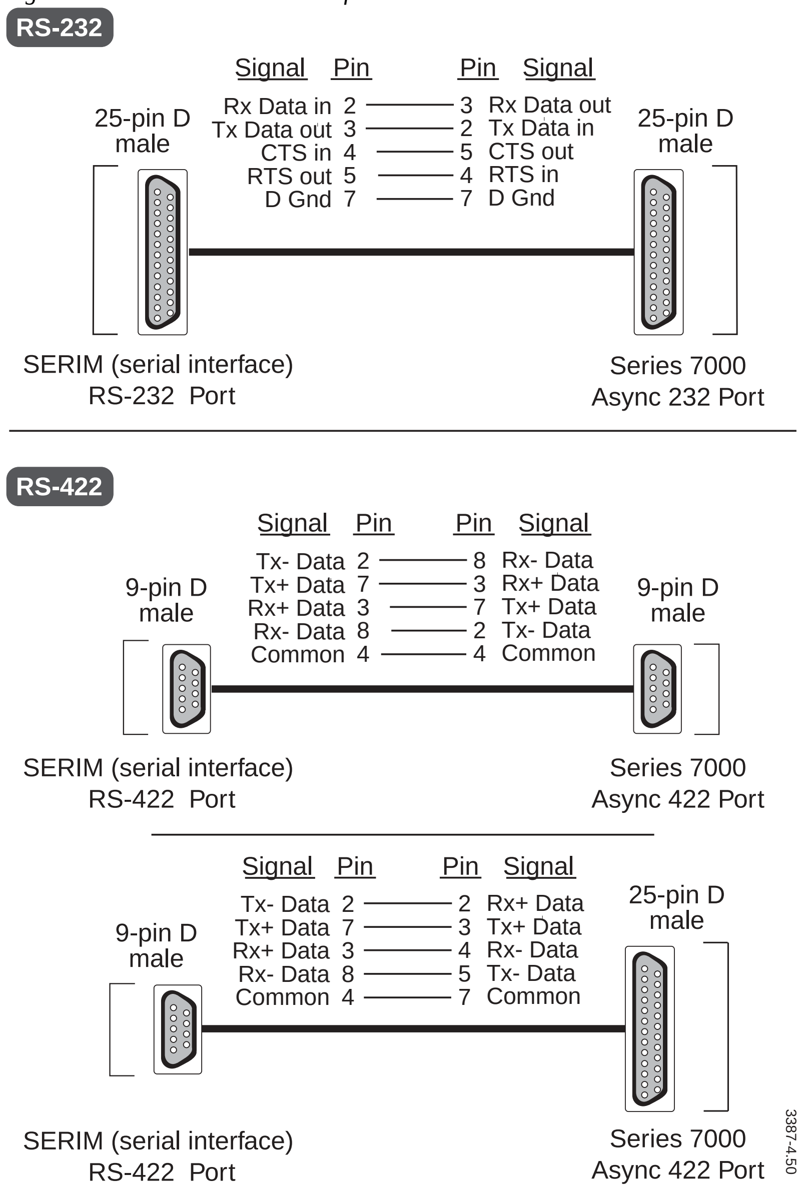


Figure 4-48. DataTek Interface Control Cables — RS-232 & RS-422

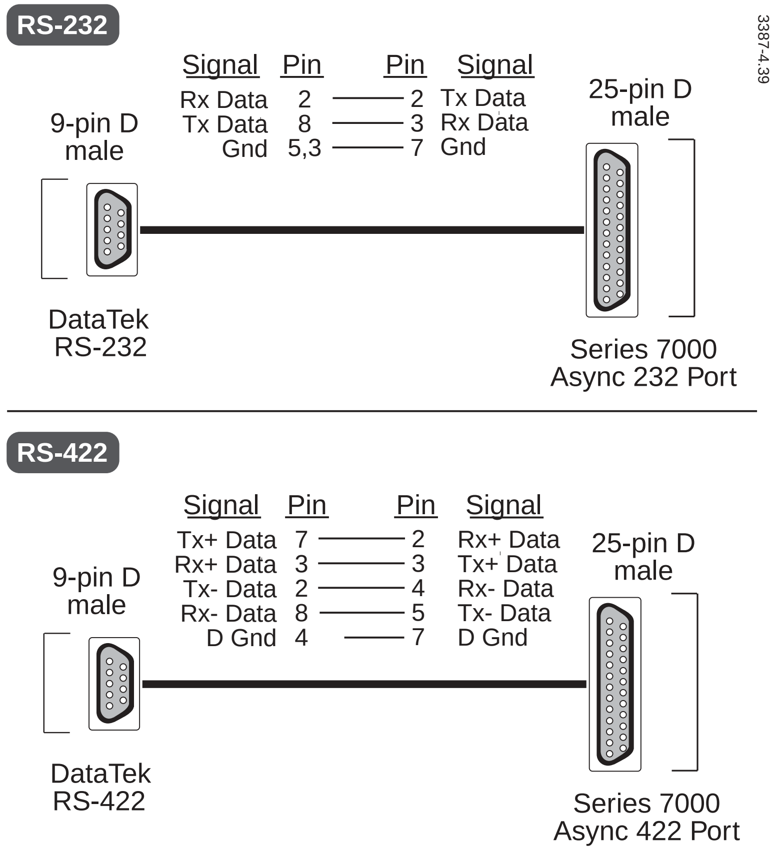
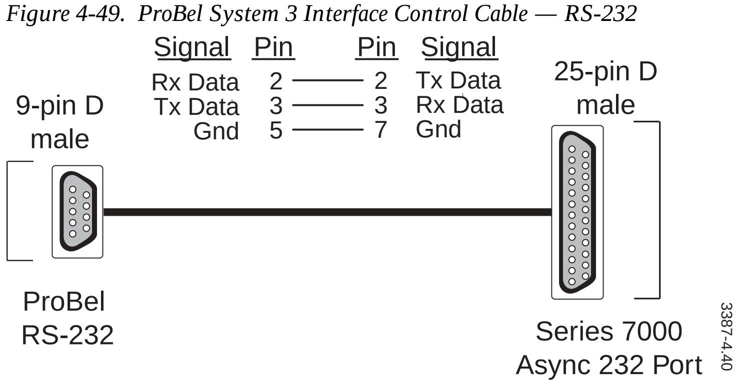


Figure 4-49. ProBel System 3 Interface Control Cable — RS-232



Configuration

Alien Matrices are configured through the Graphic User Interface during 7000 system configuration. Refer to the *Configuration* manual.

Section 5

Power-up

Introduction

The Power-up section guides you through the process of installing your power supplies, powering-up your Series 7000 system, and setting up local fault alarms to monitor power rails and over-temperature in the matrix frames.

Applying Power (All Systems)

Before applying power, refer to Section 2, *Frame Installation*, for System Grounding details. When your system is properly grounded, follow the steps below:

1. Verify line input voltages are correct.

   Compact and expanded control power supplies

   Each supply and frame is clearly labeled for 110 or 220 volt operation. If the input voltage is not correct for your installation, refer to the Service Manual, Circuit Details section for instructions on changing input voltage selection

   DV 1200W and 7500 systems AC auto ranging power supplies

   These power supplies are continuous.

2. Verify that all power supplies are fully seated and locked in the frame

3. Install the line cords and apply power

WARNING **To reduce risk of electric shock, be certain to plug each power supply cord into a separate branch circuit employing a separate service ground.**

Battery Backup/Removing MCPU Power Supplies

Should the Series 7000 system suffer a power failure, a battery on the Power Supply module provides MCPU backup power for Static RAM. While the power supplies remain in the frame, this battery backup will sustain cross-point and protect status for approximately six hours (on a full charge).

Removing the Power Supply or MPCU module(s) disconnects battery backup causing:

- Loss of matrix crosspoint status
- Loss of protects and assignments
- MCPU cold-start upon re-installation

The MCPU will regain crosspoint status from the system Node Controllers but protect status will not be restored. If you have dual MCPUs and remove one, and then replace it, its data will be restored from the other MCPU.

Basic Operation Check

Operational checks are categorized according to four basic system sizes:

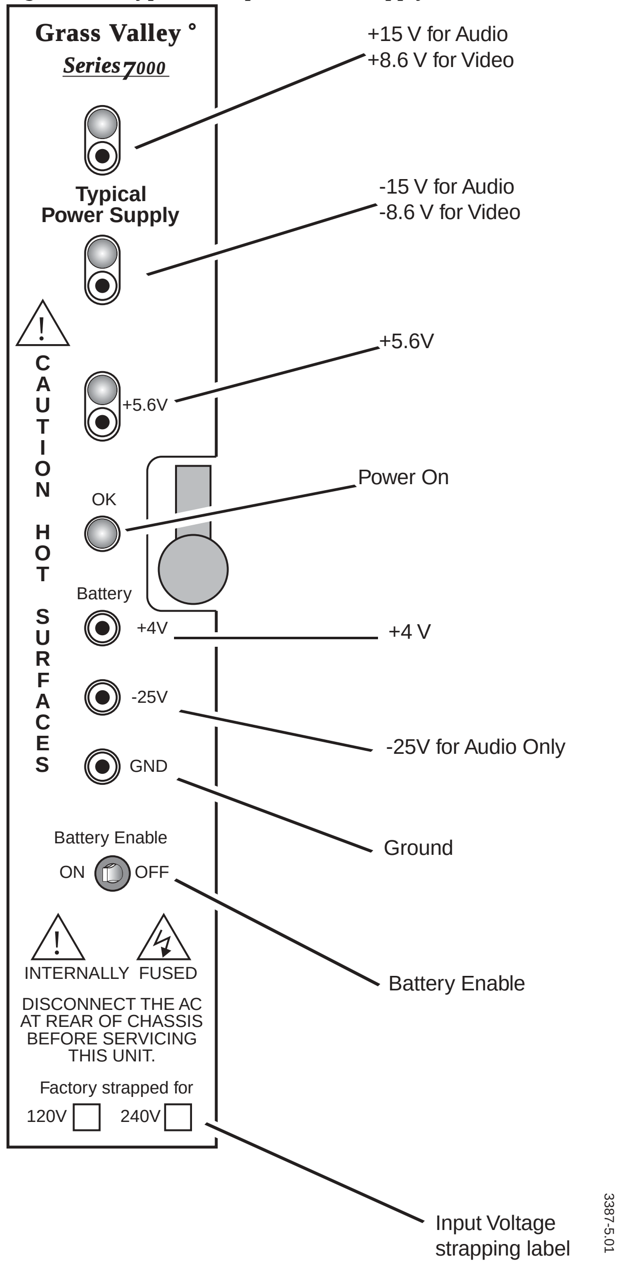
- Compact (SMS-32V, -64V, Analog Audio, and Control)
- Expanded (SMS-128x64V, x96V, x128V)
- DV Series (SMS-128x128SDV & 256x128SDV)
- Secondary video (above 128 inputs or outputs, employs DAs and/or Secondaries)

Compact Systems

Refer to Figure 5-1 and follow the steps below to complete the basic operation check.

1. Verify the green power-on LED is lighted.
2. Set the Battery Enable switch to the ON position.
3. Verify each test point to ensure the correct voltage.
4. Check each matrix module to ensure the green power-on LED is lighted.

Figure 5-1. Typical Compact Power Supply Front Plate



Expanded Systems with Stand-alone Control Frames

If more than 6 Communications Interface (CIF) Option modules are used in a Stand-alone Control Frame, one of the following Power Supply modules must be used in that frame:

- Expanded Control Power Supply 117 VAC
- Expanded Control Power Supply 230 VAC

Refer to Figure 5-2 and Figure 5-3 while following the steps listed below to complete a basic operation check.

1. Set circuit breaker to the ON position.
2. Check to see that the power OK LED is lighted.
3. Verify each test point to ensure the correct voltage.
4. Check each matrix module to ensure the green power-on LED is lighted.

Figure 5-2. Power Supply Module (Expanded System)

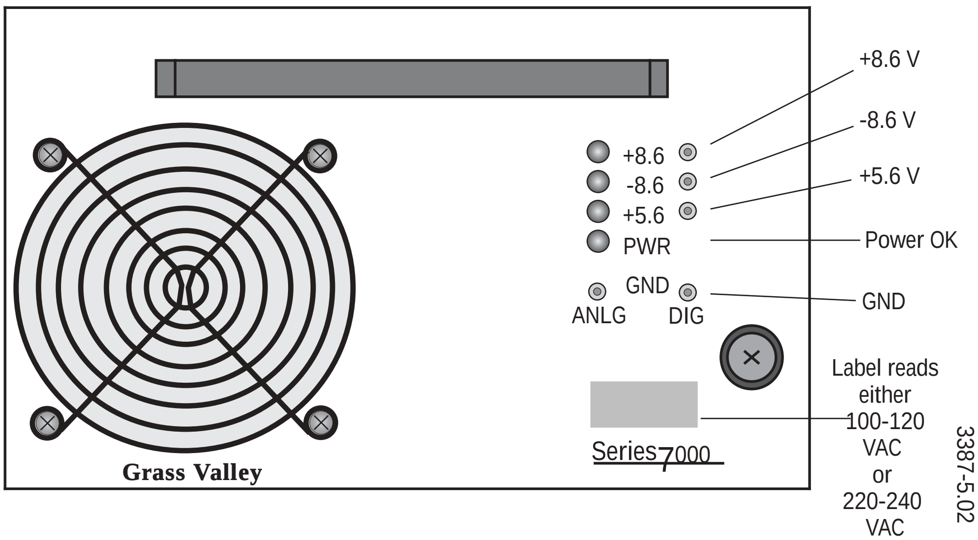
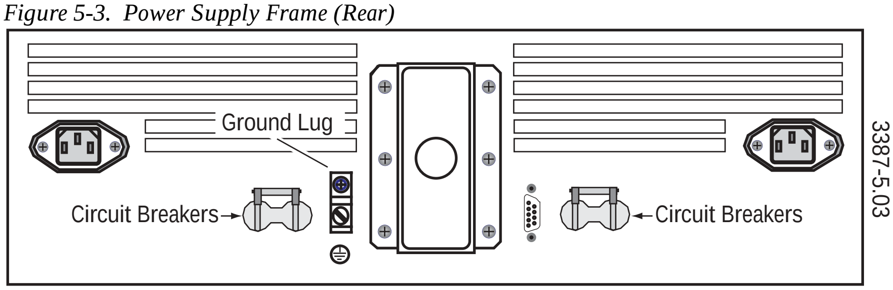


Figure 5-3. Power Supply Frame (Rear)



High Density Systems

High Density systems use a three rack-unit dual power supply frame with 1200W Power Supply modules (part #190111-00). The power supply frame is equipped with two DC Out cords to supply power to more than one matrix frame. The Power Supply will provide redundancy to either two (2)

128x128SDV systems or one (1) 256x128SDV system. The 64x64SDV systems can have redundancy for up to four (4) frames if none of the frames contain a MCPU module.

Table 5-1 shows system combinations that will still allow redundancy from a single Power Supply frame with two power modules.

Table 5-1. System Combinations to Allow Power Supply Redundancy

System Configuration				
256 x 128	+	64 x 64		
	+	64 x 64[a]		
128 x 128	+	128 x 128		
	+	64 x 64	+	64 x 64
	+	64 x 64	+	64 x 64[a]
64 x 64[a]	+	64 x 64[a]		
	+	64 x 64	+	64x64

[a] With MCPUs.

Table 5-2 shows system combinations that operate without redundancy from a single Power Supply frame loaded with either one or two power modules.

Table 5-2. System Combinations Without Power Supply Redundancy

System Configuration					Required Power Supply Modules
256 x 128					1
	+	256 x 128			2
	+	128 x 128			2
	+	64 x 64			1
			+	64 x 64	2
			+	64 x 64[a]	2
128 x 128					1
	+	128 x 128			1
	+	64 x 64			1
			+	64 x 64	1
			+	64 x 64[a]	2
64 x 64					1
	+	64 x 64			1
	+	64 x 64			1
			+	64 x 64	1
			+	64 x 64[a]	2

[a] All MCPUs in one frame.

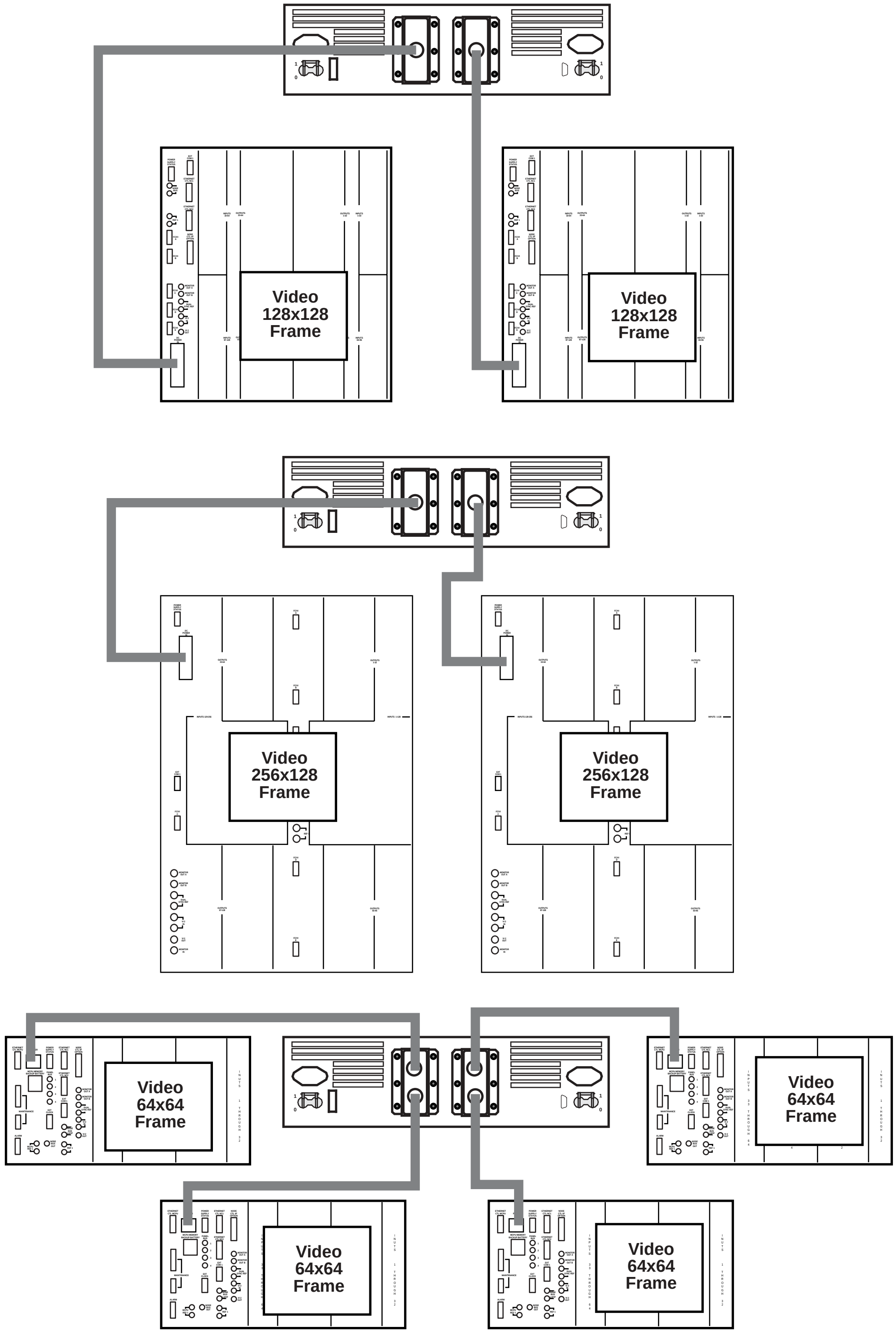
The power supply current requirements are listed in Table 5-3.

Table 5-3. 1200W Power Supply Current Requirements

	System Requirements			Available Per Supply		
System	**+8V Current**	**-8V Current**	**+5V Current**	**+8V Current**	**-8V Current**	**+5V Current**
256x128SDV	40.3A	40.3A	13.6A	60A	60A	34.5A
128x128SDV	25.3A	26A	9.54A	60A	60A	34.5A
64x64SDV with MCPUs	11.1A	11.1A	16.35A	60A	60A	34.5A
64x64SDV without MCPUs	11.1A	11.1A	6.35A	60A	60A	34.5A

Figure 5-4 shows non-redundant maximum system cabling combinations from a single Power Supply frame. The 64x64SDV power breakout adapter is used to connect two frames to each side of the Power Supply frame.

Figure 5-4. System Cabling Combinations



Refer to Figure 5-5 and Figure 5-6 while following the steps listed below to complete a basic operation check.

1. Set circuit breaker to the ON position.
2. Check to see that the power OK LED is lighted.
3. Verify each testpoint with a Volt-Ohm meter to ensure the correct voltage.
4. Check each matrix module to ensure the green power-on LED is lighted.

Figure 5-5. 1200W Power Supply Module (High Density System)

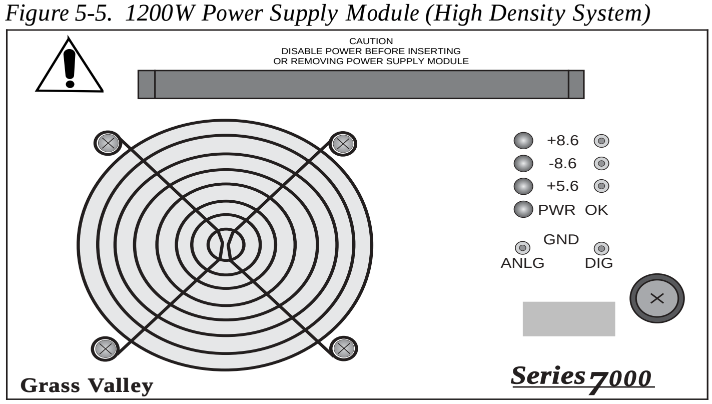
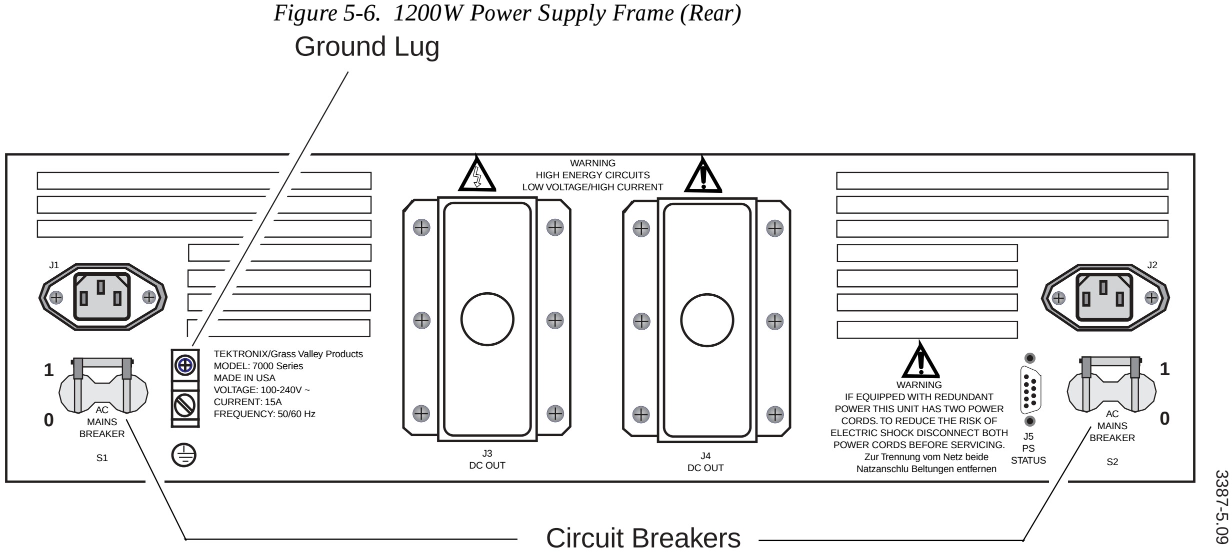


Figure 5-6. 1200W Power Supply Frame (Rear)

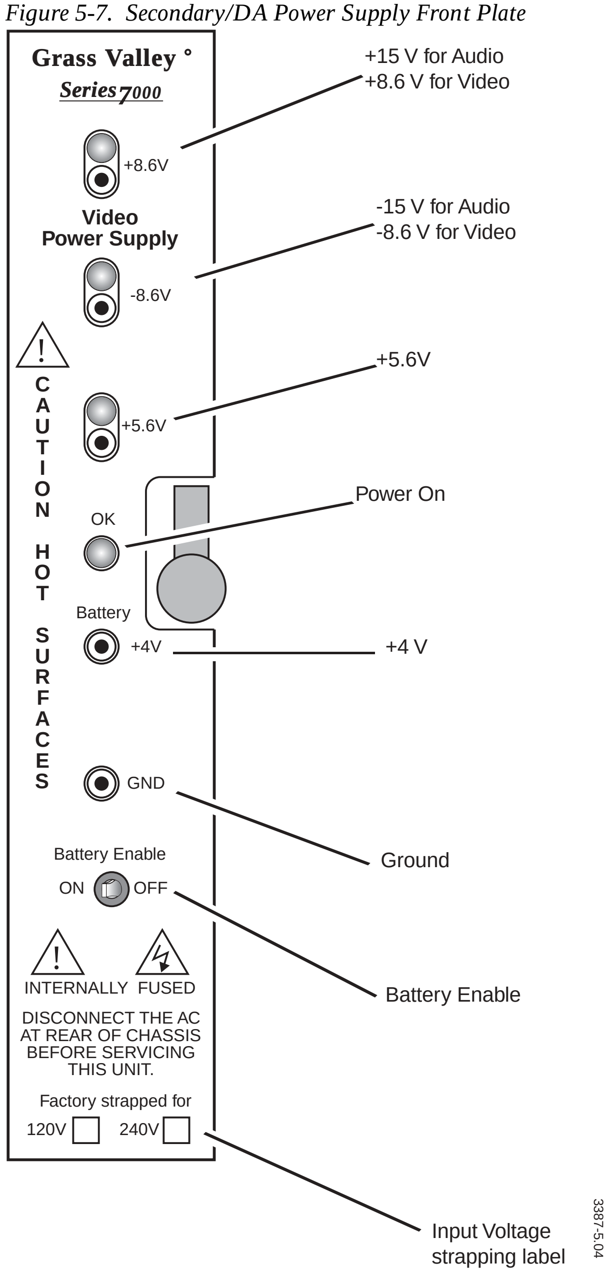


Secondary Systems

Refer to Figure 5-7 and follow the steps below to complete power-up.

1. Verify the green OK power-on LED is lighted.
2. Set the Battery Enable switch to the OFF position.
3. Verify each test point to ensure the correct voltage.
4. Check each matrix module to ensure the green power-on LED is lighted.

Figure 5-7. Secondary/DA Power Supply Front Plate



Fault Detection

The Series 7000 uses multiple test and monitoring methods. This section discusses:

- Power-up Diagnostics
- Visual Checks

On-going maintenance and diagnostics are discussed in the Service Manual. The topics covered in that manual include:

- Functional Checks
- Background Checks
- Diagnostic Tools

Power-Up Diagnostics

A series of power-up tests are performed by the microprocessors in your system. The processors are located on the MCPU module, the frame Node Controller modules, and in the control panels.

The cold-start power-up tests are essentially the same for all microprocessors in the system:

- Checksum tests of application code in Flash ROM
- Checksum tests of boot ROM
- Random pattern write / read tests of dual-port RAM
- Algorithm tests of static RAM
- Functional test of communications processors on MCPU

The Memory Checksum tests verify the integrity of stored application code (device operating system). The Write / Read and Algorithm tests are used to identify address lines, data lines, and data bits latched high or low.

Warm-start power-up tests (initiated by MCPU reset or by a power interruption) are the same except non-destructive read RAM tests are performed (instead of Write / Read tests).

If a microprocessor does not pass its power-up tests, the system-wide error message is sent to the diagnostic port for display on a user-supplied terminal.

Visual Checks

Three LEDs are provided on the front edge of each matrix module. These can be used to verify fault messages communicated by the MCPU and to locate a failed module in a frame.

1. Green LED (PWR) lights when module power is operational.
2. Red LED (ERR) lights when an error has occurred on the module.
3. Yellow LED (BUSY) blinks when normal communication is occurring. Lights steadily if a crosspoint is latched (Crosspoint module) or if an input is active (Input module).

Each power supply has test points and LEDs for each voltage. These are used to verify fault messages communicated by the MCPU, locate a failed supply, or for manual checking purposes.

Local Fault Alarms

Each Series 7000 power supply has four alarm relays used to provide alarm closures for user-designed alarm systems. The MCPU in the Controller Frame or Video 64 Frame, uses the relays in an intelligent system to identify various levels of system failure. The various triggering conditions for Controller / Video 64 frame alarms are selectable using the Graphic User Interface (see the *Configuration* manual). The relays are designated:

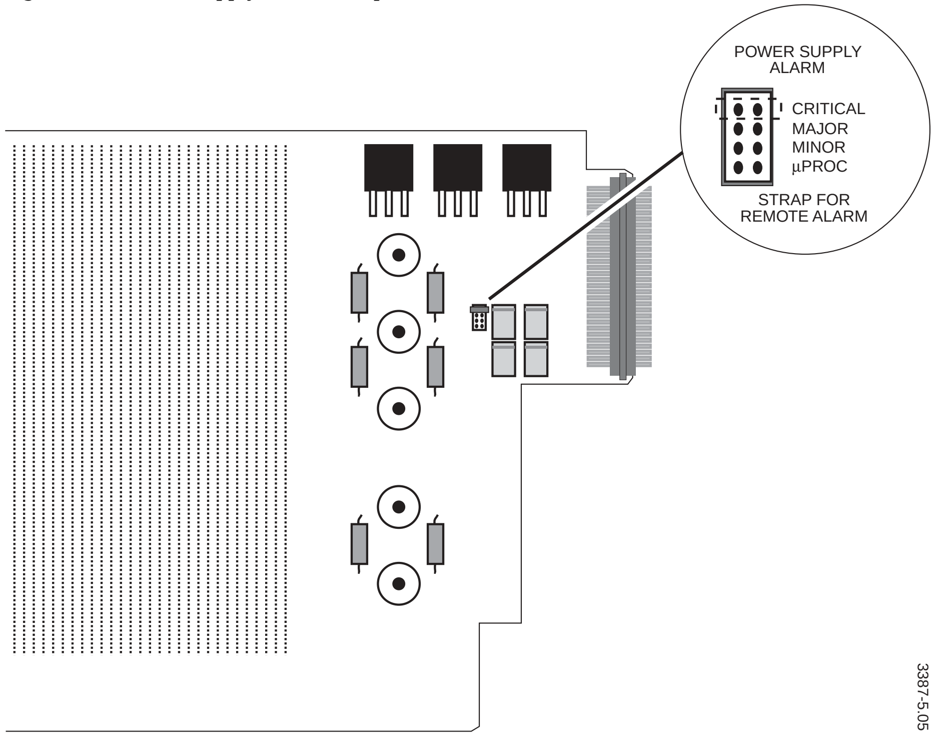
- Critical Alarm
- Major Alarm
- Minor Alarm
- µProc (Microprocessor) Alarm

These designations apply to the MCPU's intelligent monitoring of the system rather than the local fault alarm system described below.

In all Series 7000 matrix and power frames, the power supply relays connect to a 15-pin Alarm connector on the back of the frame. You may select one of the relays on each supply, to trigger a dry-contact closure at the connector. In this local application, a relay closure indicates a failed power rail (over / under voltage) or over-temperature condition. The external alarms are user–supplied and can be aural or visual. A sample alarm circuit is described in this section.

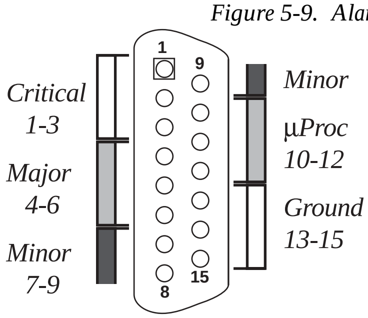
To select the active relay (which determines the connector pins used) for each supply, place the shorting jack on jumper block JA1 as shown in Figure 5-8.

Figure 5-8. Power Supply Alarm Jumper



The selected sets of relay contacts can be accessed through the alarm connector on the rear of the frame. You may decide to place the left power supply jumper on Critical Alarm (pins 1-3) and the right power supply jumper on Major Alarm (pins 4-6). The pinout for the connector is illustrated in Figure 5-9.

Figure 5-9. Alarm Connector Pinout and Contact Closures



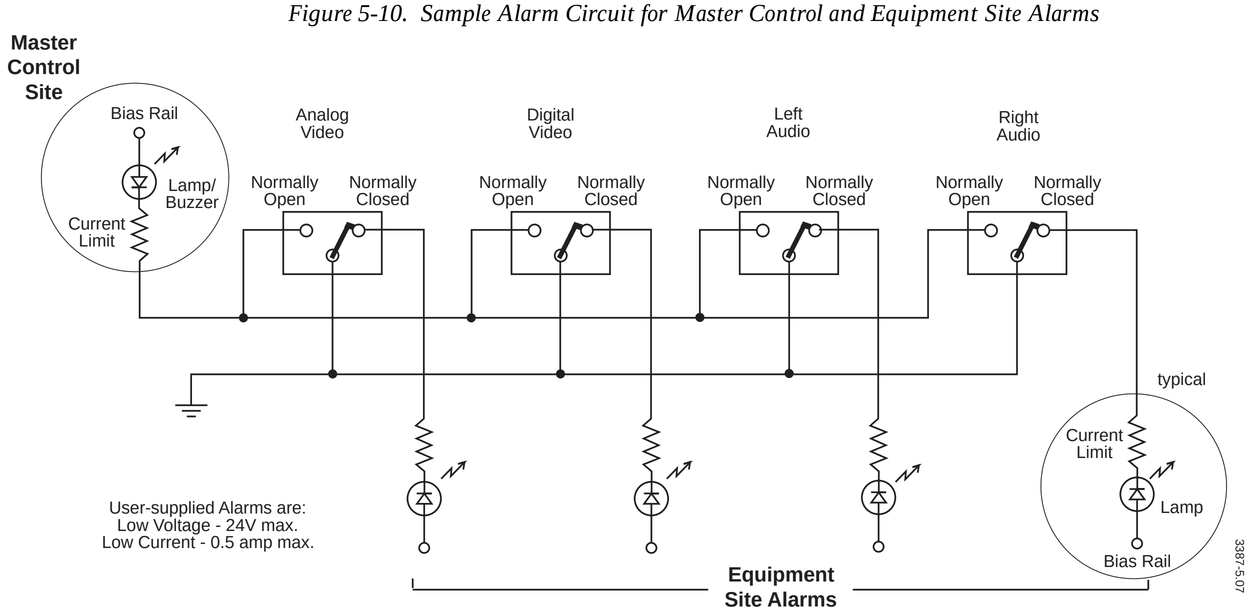
Contact Closures

	Condition Good	Alarm Condition	
Critical	1 to 3	2 to 3	
Major	4 to 6	5 to 6	
Minor	7 to 9	8 to 9	
µProc	11 to 12	10 to 12	*(Controller frame)*
µProc	10 to 12	11 to 12	*(other frames)*

3387-5.06

Figure 5-10 is an example of a typical hard-wired alarm circuit that provides Master Control with an aural and visual alert and allows visual identification of the problem frame at the equipment site. Master Control's (light / buzzer) alarm would be activated during a failure condition; the Equipment Site (light only) alarms would normally be ON but would extinguish during a failure condition.

Figure 5-10. Sample Alarm Circuit for Master Control and Equipment Site Alarms



Section 6

User Hardware and Software Installation

Introduction

There are two hardware components that interface to the Series 7000, the Diagnostic Terminal and the GUI PC-compatible (PC-compatible computer used to run the Series 7000 software). The Diagnostic Terminal operates as a dumb terminal controlled by the MCPU. The GUI PC-compatible has to be configured and have software installed before the Series 7000 software applications can be used.

Diagnostic Terminal Interface

The Diagnostic Interface functionality is determined by the Series 7000 operating system. Commands are detailed in the *Service Manual*.

Diagnostic Terminal Requirements

- A VT-100-compatible (dumb) terminal. This can be used by any Series 7000 system but it is required for the SMS-64V compact frame.

  or

- An PC-compatible 386-, 486-, or Pentium-based personal computer with VT-100 terminal emulation software. This will allow both the Series 7000 software applications and the Diagnostic functions to be performed on the same computer. This applies to all systems except the SMS-64V compact frame.

Terminal Connection and Setup

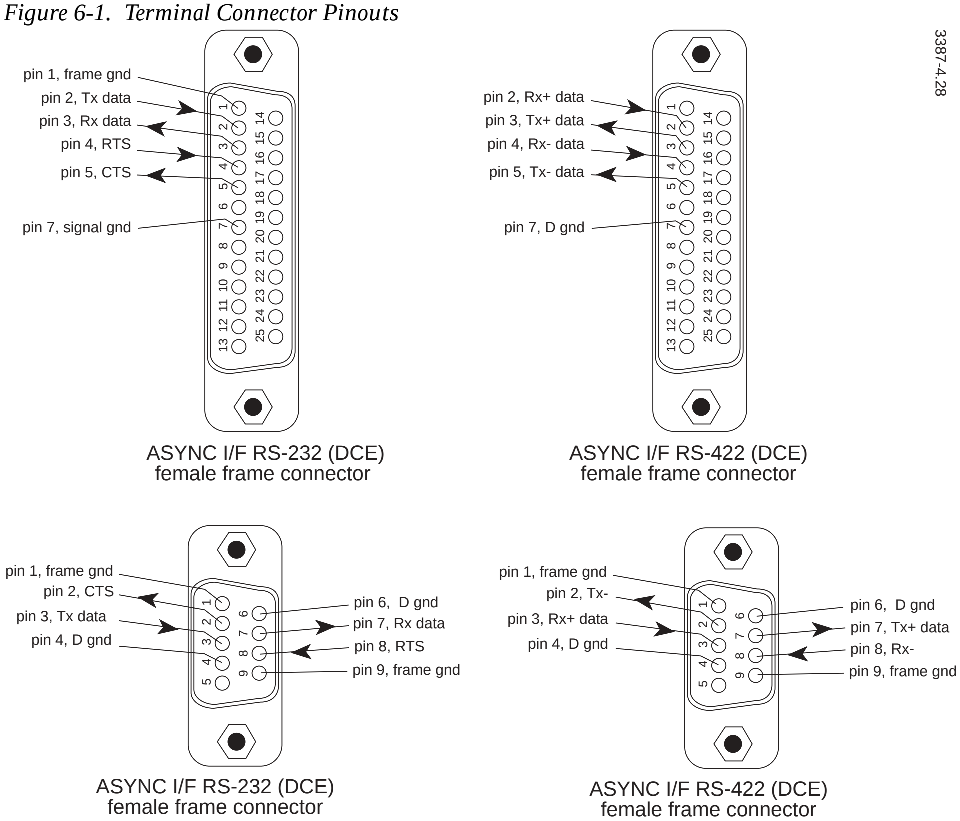
A serial connection is required to operate either the VT-100 terminal or the terminal emulator.

The Series 7000 is capable of using an RS-232 or an RS-422 interface. Both use the Controller Frame CIF connector labeled **ASYNC I/F RS232** (some CIF backplanes have two of these connectors – use either one), or the **CONFIGU-RATION/CONTROL** connector on compact systems without a stand-alone controller.

Factory Defaults
RS-232 Protocol
9600 BPS
8 Data Bits
1 Stop Bit

There are a large number of possible controlling devices for the terminal interface, so a interconnecting cable is needed based upon which connector is used. Figure 6-1 shows the Series 7000 connector pinout for RS-232 and RS-422 interfaces. Arrows are used to indicate direction of signal since this is not always clear from the RS-232 or RS-422 standard labels.

Figure 6-1. Terminal Connector Pinouts



Setting the Clock

The clock is set using the Diagnostic Terminal. If all the MCPUs become disconnected from the battery backup on the Power Supply (cold-start), the clock will re-set to the default value.

To Set Time

At the SMS7000> prompt type:

```
SMS7000> st mm dd yyyy hh mm ss
```

Where:

st = Set
mm= Month of year (01 through 12)
dd= Day of month (01 through 31)
yyyy= Calendar year (i.e., 2000)
hh= Hour of day, 24-hour clock (01 through 24 [01=1:00am, 24= 12:00pm])
mm= Minutes
ss= Seconds

Setting Chop Interval

When two video sources are continuously alternated on the same destination, each being displayed for some specified period of time, then replaced by the other, it is referred to as Chopping. The period of time each video source is connected (and presumably displayed on a monitor) is referred to as the Chop Interval. Note that the Chop Interval you set is stored in volatile RAM and, if your MCPUs become disconnected from the battery backup on the Power Supply (cold-start), the Chop Interval will re-set to the default value.

To Set The Chop Interval

At the SMS7000> prompt type:

```
SMS7000> chopint nn
```

Where:

chopint= Chop Interval (can be used alone to query for current setting)
nn= numeric entry specifying chop interval in frames (from 1 through 16)

Repeat this procedure for the Back-up MCPU (with Back-up MCPU online).

GUI PC-Compatible Interface

The procedures and requirements are the same for Windows95 or Windows98 so Windows95/98 is used to represent both systems.

Computer Requirements

Series 7000 software applications include; the Configuration Editor GUI, the Visual Status Display, and the Printconfig. These applications require an PC-compatible computer with either Windows95 or Windows98 or WindowsNT. They are not supported with Windows 2000.

For Windows95/98:

- Windows95/98 operating system software
- PC-compatible Model 486DX (Pentium is preferred)
- 66MHz or faster processor
- 16MB of RAM (minimum)
- 250 MB or larger hard drive
- 3.5inch 1.44MB diskette drive
- CD-ROM or DVD-ROM drive (prefer fast)
- VGA or higher-resolution monitor
- FTPD utility (provided on SMS 7000 CD-ROM)
- Serial Port(s) (one is required for systems using SLIP and one is recommended for the Diagnostic Terminal Emulator connection)
- Communication Interface

  Ethernet requires an Network Interface Card and drivers. Ethernet is required for all systems except the SMS-64V compact frames.

  or

  SLIP requires a Serial port connection. SLIP is only required by SMS-64Vcompact frames
- Cable

  Ethernet requires either an Attachment Unit Interface (AU) interface cable, or CentreCom MX10EEE 802.3 Micro Transceiver 10 base 2.2 Medium Access Unit (MAU), or equivalent. Ethernet cannot be used with a SMS-64V compact frame.

  or

  SLIP requires a serial interface cable. SLIP is only used by SMS-64Vcompact frames

For WindowsNT:

- WindowsNT operating system software
- Administrative authority to install software
- PC-compatible Pentium
- 16-32MB of RAM
- 250 MB or larger hard drive
- 3.5inch 1.44MB diskette drive
- CD-ROM or DVD-ROM drive (prefer fast)
- VGA or higher-resolution monitor
- FTPD utility (provided on SMS 7000 CD-ROM)
- Serial Port(s) (one is required for systems using SLIP and one is recommended for the Diagnostic Terminal Emulator connection)
- Communication Interface

  Ethernet requires an Ethernet Interface Card and drivers. Ethernet is required for all systems except the SMS-64V compact frames.

  or

  SLIP requires a Serial port connection. SLIP is only required by SMS-64Vcompact frames
- Cable

  Ethernet requires either an Attachment Unit Interface (AU) interface cable, or CentreCom MX10EEE 802.3 Micro Transceiver 10 base 2.2 Medium Access Unit (MAU), or equivalent. Ethernet cannot be used with a SMS-64V compact frame.

  or

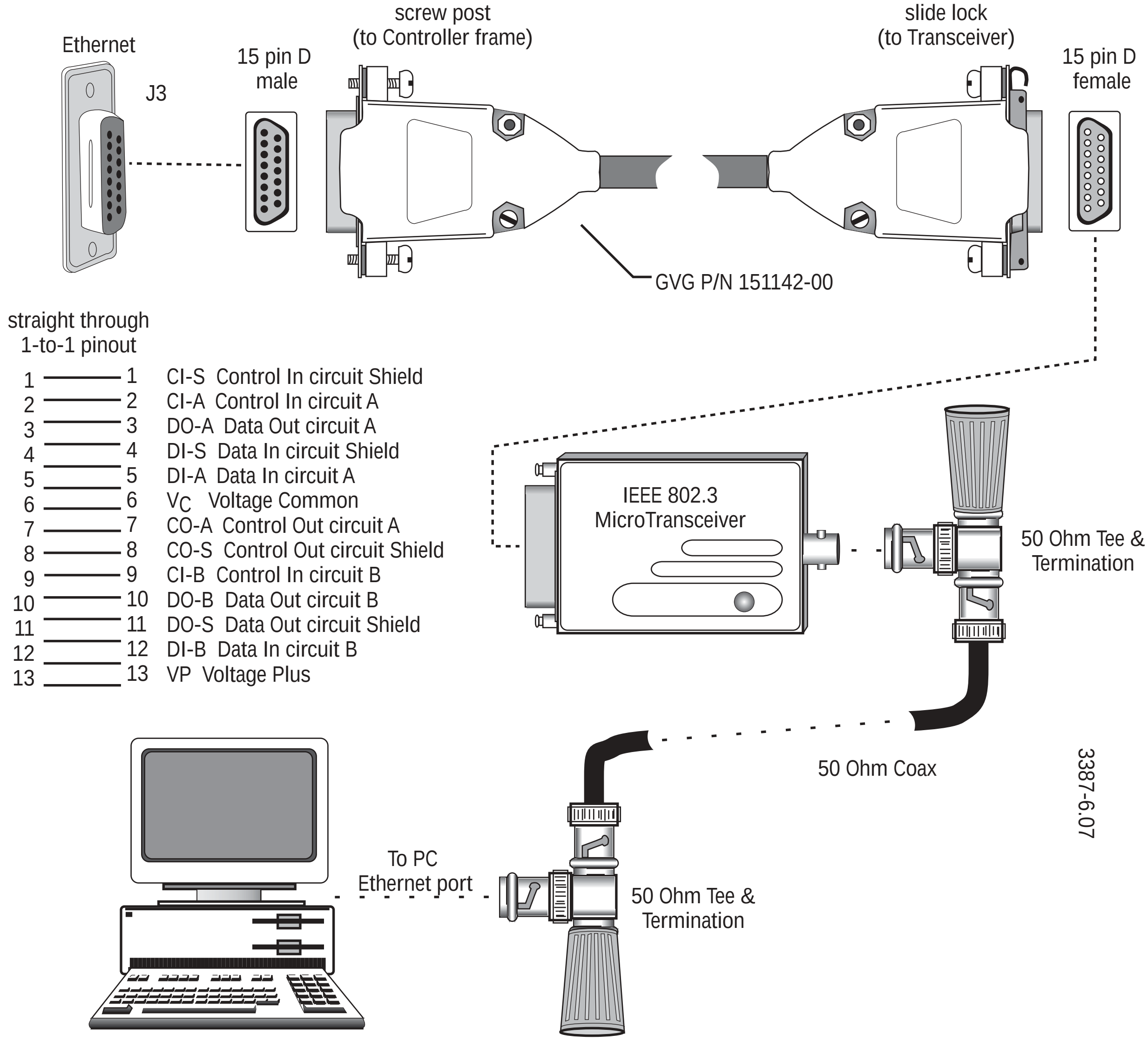
  SLIP requires a serial interface cable. SLIP is only used by SMS-64Vcompact frames

Cable Connections

Ethernet

Figure 6-2 shows an Ethernet connection between the router and a GUI PC.

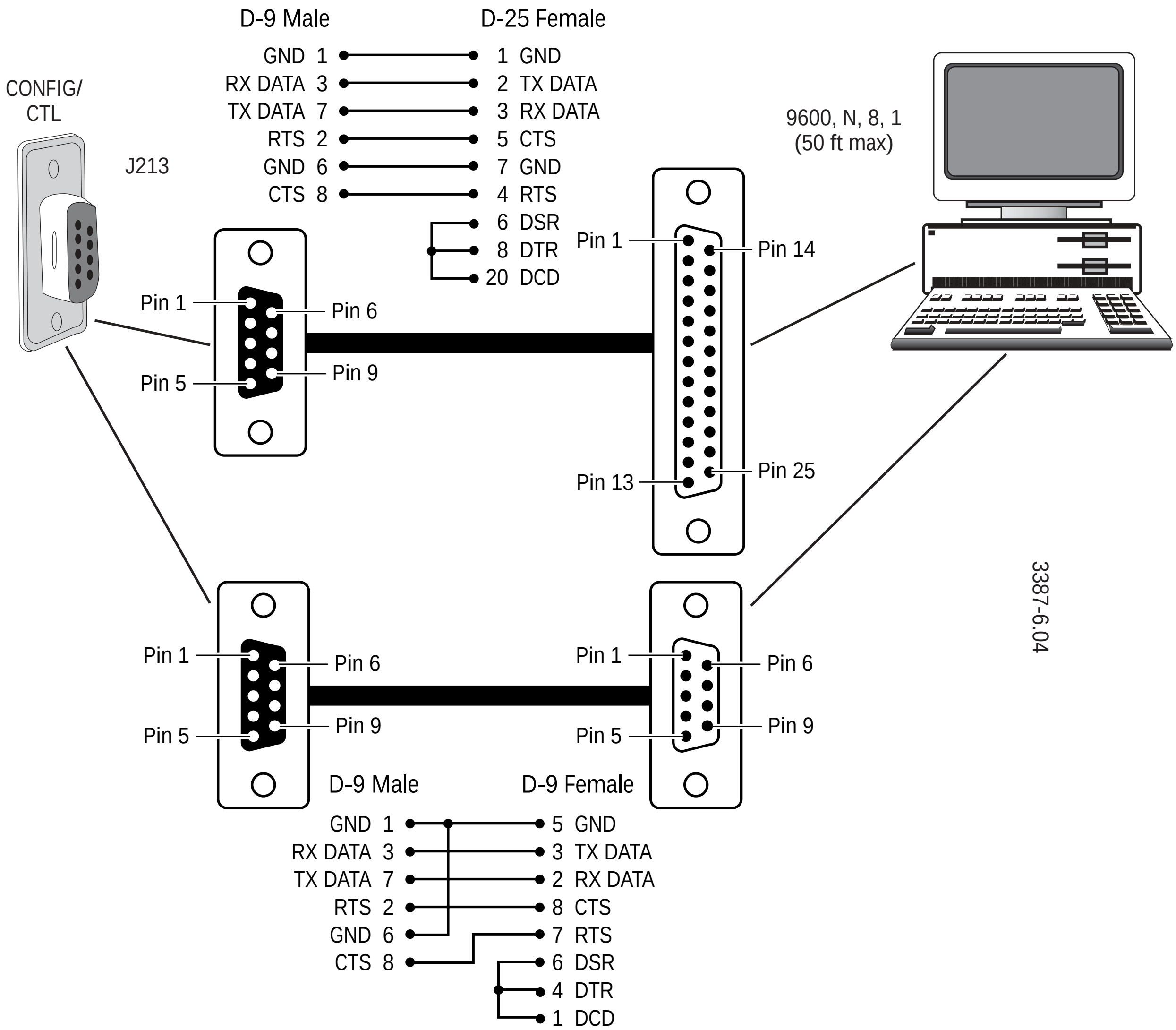
Figure 6-2. Ethernet Connector



SLIP

Figure 6-3 shows an SLIP connection between the router and a GUI PC.

Figure 6-3. SLIP Connector



Create the Connection Between the PC-Compatible and Router

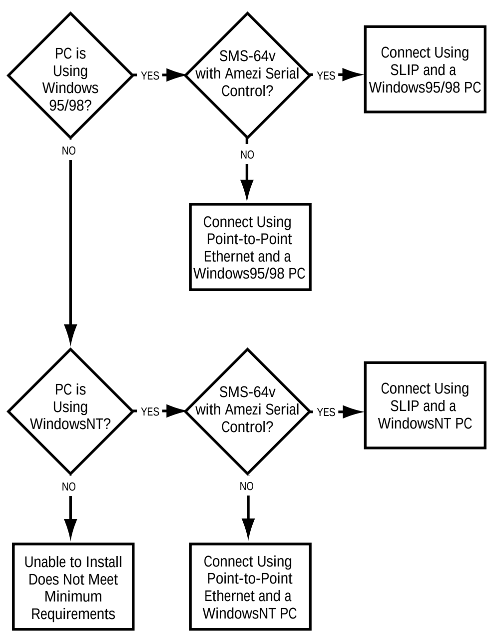
Using Table 6-2 select the procedure needed to create the connection between the PC-Compatible and router.

In an effort to simplify the procedure, defaults have been assigned and it is strongly recommended not to deviate from these defaults. The Series 7000 Signal Management System is designed to operate on a point-to-point (closed) network with dedicated hardware components including the PC-compatible and dumb terminals.

CAUTION Deviating from the assigned defaults or trying to use a PC-compatible on an open network to operate the Series 7000 can cause possible IP address and/or system conflicts leading to system failures.

All procedures required for software installation must be completed in their entirety. Incomplete installation can cause system conflicts and failures.

Table 6-2. Create Connection Flowchart and Sub-Procedures

Flowchart	Procedures			
	Windows95/98		WindowsNT	
	*Connect Using Slip and a Windows95/98 PC-Compatible* (page 6-8) (SMS-64V with Amezi Serial Control only)	*Connect Using Point-to-Point Ethernet and a Windows95/98 PC* (page 6-15)	*Connect Using SLIP and a Windows NT PC* (page 6-16) (SMS-64v with Amezi Serial Control only)	*Connect Using Point-to-Point Ethernet and a WindowsNT PC* (page 6-20)

Connect Using Slip and a Windows95/98 PC-Compatible

SLIP connections are only used by SMS-64Vwith Amezi serial control Compact Frames. All other frames use Ethernet connections. Some steps in the following procedures require the Windows install disks or CD and a dial-up networking connection must be running to use SLIP.

Install the Null Modem:

1. Insert Windows95/98 operating system install disk or CD.
2. Open the Control Panel window.

   From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.
3. Double click on the **MODEMS** icon.

   (If given a choice between installing a PCMCIA modem card and **OTHER**, choose **OTHER**.)
4. Click on **ADD...**

   This will not appear if the modem list is empty.
5. Check the box that says **DON'T DETECT MY MODEM I'LL SELECT IT FROM A LIST**, then click **NEXT**.
6. Click on the **HAVE DISK...** button located in the lower right of the dialog box.
7. Enter `C:\sms7000` in the **COPY MANUFACTURER'S FILES FROM** text box, and click **OK**.
8. Highlight **VIRGINIA TECH** in the Manufacturers list and **DIRECT CONNECTION** in the Models list. Click on the **NEXT>** button.
9. Select the communications port used by the modem in the **SELECTED PORTS** list. Click **NEXT>.**

   If the computer asks for location information enter anything as the system won't use it.
10. Click the **FINISHED** button.

    A modem called **DIRECT CONNECTION** (Windows95/98) will now appear in the modems box.
11. Close the dialog box.

Install Dial-up Networking:

12. Open the Control Panel window.

    From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.
13. Double-click the **ADD/REMOVE PROGRAMS** icon.
14. Select the **WINDOWS SETUP** tab.
15. Click on the **COMMUNICATIONS** option and click **DETAILS....**

If Dial-up Networking is not installed:

- Select the Dial-up Networking option and Click **OK**. Windows95/98 will install the needed drivers from the install disks or CD.

Install Dial-up Adaptor and TCP/IP:

16. Open the Control Panel window.

From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

17. Double-click the **NETWORK** icon.

18. Select the Configuration tab.

If Dial-up Adaptor and TCP/IP are not Present:

a. Click the **ADD**... button.

b. Double-click **ADAPTER**.

c. Select **MICROSOFT**.

d. Highlight the **DIAL-UP ADAPTER** and click **OK**.

If TCP/IP is not Present:

a. Double-click **PROTOCOL**.

b. Select **MICROSOFT**.

c. Highlight **TCP/IP**, and click **OK**.

19. Double-click **DIAL-UP ADAPTER**.

20. Click **PROPERTIES...**, then **BINDINGS**, and check the **TCP/IP** box, and click **OK**.

21. Click **OK** on the Network dialog box.

The PC-compatible may prompt a reboot if the settings have changed. If the PC-compatible is rebooted remove the WindowsNT operating install disk or CD before rebooting. After the PC-compatible completes the reboot, insert the WindowsNT operating install disk or CD.

Install SLIP Drivers:

22. Open the Control Panel window.

From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

23. Double-click the **ADD/REMOVE PROGRAMS** icon.

24. Select the **INSTALL/UNINSTALL** tab, verify that the **SLIP AND SCRIPTING FOR DIAL-UP NETWORKING** is included in the list.

If it is, then the drivers are installed proceed to *Configure TCP/IP Protocol:* (page 6-12). The Windows95/98 operating system install disk or CD should still be inserted in the PC.

25. Open the Control Panel window.

26. Double-click the **ADD/REMOVE PROGRAMS** icon.

27. Select the **WINDOWS SETUP** tab. Click the **HAVE DISK…** button to get the Install From Disk dialog box.

28. Click **BROWSE.**

From the **INSTALL FROM DISK** dialog box to browse the Windows95/98 operating system install disk or CD for the **\ADMIN\APPTOOLS\DSCRIPT** directory.

If this directory exists, check the **SLIP AND SCRIPTING FOR DIAL-UP NETWORKING** box and click **OK**.

If this directory does not exists on the Windows95/98 operating system install disk or CD go to the next step.

If the directory is present:

a. Click **OK** to get the **HAVE DISK** dialog box.

b. Check the **SLIP AND SCRIPTING FOR DIAL-UP NETWORKING** box.

c. Click **INSTALL**.

Windows95/98 will copy the files to the hard drive. Windows95/98 installs the Dial-up scripting tools at the same time it installs the Slip drivers.

d. Close the **ADD/REMOVE PROGRAMS** dialog box.

Proceed to *Configure TCP/IP Protocol:* (page 6-12).

29. Click **CANCEL**.

From the **INSTALL FROM DISK** dialog box.

30. Click **CANCEL**.

To close the **ADD/REMOVE PROGRAMS** dialog box.

31. Double-click **MY COMPUTER**.

32. Double-click **DIAL-UP NETWORKING**.

If there is not a connection create a dummy connection using *Set Up Connection Icon:* (page 6-13) before proceeding. This connection is only used to verify that **SLIP:UNIX CONNECTION** is available in the **SERVER TYPE** tab.

If there is a connection in this folder:

a. Highlight a connection and right click on it to bring up a menu dialog box.

b. Select **PROPERTIES**.

c. Click on the **SERVER TYPE** tab and see if **SLIP:UNIX CONNECTION** is in the **TYPE OF DIAL-UP SERVER** list.

If it is the SLIP drivers are installed go to *Configure TCP/IP Protocol:* (page 6-12).

If **SLIP:UNIX CONNECTION** is not in the list and the Windows95/98 CD does not contain the **DSCRIPT** folder, then download this file directly from Microsoft at the following URL:
http://www.microsoft.com/windows/downloads/default.asp

Configure TCP/IP Protocol:

33. Open the Control Panel window.

From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

34. Double-click the **NETWORK** icon.

35. Click on the **TCP/IP PROTOCOL FOR DIAL-UP NETWORKING**

36. Click the **PROPERTIES...** button to get the **TCP/IP PROPERTIES** box.

37. Select the **SPECIFY AN IP ADDRESS** option on the IP Address tab.

38. Type in the IP address (usually 192.0.2.1).

The text box should be blank or have this number. If this number is in the text box proceed to the next step. If the text box is blank enter this number. If a number other than this one appears, there is an IP Address conflict which must be resolved before proceeding with the installation.

CAUTION Trying to use a PC-compatible on an open network to operate the Series 7000 can cause possible IP address and/or system conflicts leading to system failures.

39. Set Subnet Mask text area to 255.255.255.0.

40. Select the **DISABLE WINS RESOLUTION** option on the WINS Configuration tab.

41. Set the gateway to 0.0.0.0 on the Gateway tab, then click the **ADD** button.

42. Check the Client for Microsoft Networks option on the Bindings tab.

43. Skip the Advanced tab.

44. Select **DISABLE DNS** on the DNS Configuration (Name Resolution) tab

45. Click **OK**.

To return to the Network dialog box.

46. Click **OK** in the Network dialog box.

47. Windows95/98 will ask you to reboot. Click **YES**.

The Windows95/98 operating system install disk or CD should be removed before rebooting. It is no longer needed.

Set Up Connection Icon:

48. Open the Make New Connection Wizard.

From the Windows desktop, double-click **MY COMPUTER.** Double-click the **DIAL-UP NETWORKING** icon. Double-click the **MAKE NEW CONNECTION** icon.

49. Type in the name of the icon to create to connect to the SMS7000.

50. Click the **CONFIGURE** button.

51. Set the modem speed to **9600**, and select **ONLY CONNECT AT THIS SPEED** on the General tab.

52. Skip the Connection and Options tabs.

53. Click **OK**.

54. Click **NEXT >** in the Make New Connection wizard.

For the phone number, enter any 7 digits (they won't be used).

55. Click **OK**.

56. Click **FINISH** to create the icon.

The Dial-Up Networking folder should now contain the icon.

Set Dial-up Properties:

57. Double-click **MY COMPUTER.**

From the Windows desktop

58. Double-click the **DIAL-UP NETWORKING** icon.

59. Select the newly-created connection icon and click the right mouse button.

60. Choose **PROPERTIES…**

To get a dialog box with the name of the icon.

61. Select the General tab, ensure that **DIRECT CONNECTION** is selected in the **CONNECT USING** text box.

62. Select **CONFIGURE**.

63. Uncheck the **WAIT FOR DIAL TONE BEFORE DIALING** box under Connection.

64. Check the **USE FIFO IN** and **DEFAULT SETTINGS** boxes in Port Settings.

65. Uncheck **ERROR CONTROL** and **FLOW CONTROL** boxes under Advanced.

66. Set the **CANCEL IF NOT CONNECTED WITHIN X SECONDS** value to **0.**

67. Click the **SERVER TYPES…** button to get the Server Types dialog box.

68. Click the down arrow to drop down the list box in the **TYPE OF DIAL-UP SERVER** section.

69. Choose **SLIP: UNIX CONNECTION**.

70. Uncheck **LOG ON TO NETWORK** in the Advanced options.

71. Verify that TCP/IP in the **ALLOWED NETWORK PROTOCOLS:** section is checked.

72. Click on **TCP/IP SETTINGS;** specify the PC's IP address, and uncheck **IP HEADER COMPRESSION**.

73. Click **OK**.

74. Click **OK** in the remaining dialog box.

Dial-in and Connect:

75. Open the **CONNECT TO** dialog box.

    From the Windows desktop double-click **MY COMPUTER.** Double-click the **DIAL-UP NETWORKING** icon. Double-click the **CONNECTION** icon. The name and password don't matter.

76. Click the **CONNECT** button.

    The PC-compatible should start attempting to connect. The Windows95/98 setup connection takes about 15 seconds.

77. Click **OK** or **CONTINUE** if a terminal screen appears.

    A **CONNECTED TO DIAL-UP SLIP** dialog box appears.

To Disconnect:

78. Click on the network icon at the lower right corner of the taskbar.

    To bring up the **CONNECTION** dialog box.

79. Click **DISCONNECT**

To Verify Router and Telnet Communication:

80. Get a DOS Prompt.

From the Windows desktop, click **START**, select **PROGRAMS**, then **MS-DOS** to get a prompt.

81. Type **`ping 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU) (the router's IP address) and verify that the router replies.

If ping does not work see *Can't Ping* (page 6-42).

82. Type **`telnet 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU)

If it connects a Telnet window will open. If Telnet does not work see *Can Ping, But Can't Telnet* (page 6-42).

83. Select **CONNECTION** the **TELNET** window, then **EXIT**.

If both ping and telnet work the SLIP connection is ready to use.

Connect Using Point-to-Point Ethernet and a Windows95/98 PC

1. Connect the Ethernet port on the PC-compatible to the Ethernet port on the MCPU frame using a null modem (peer-to-peer) Ethernet cable.

These cables are usually orange in color, indicating that the Rx and Tx pairs are reversed at one end. If the PC-compatible is connected to the Ethernet via an Ethernet hub, use a standard Ethernet cable on the PC.

2. Open the Ethernet Properties window.

From the Windows desktop, select **START**, then **SETTINGS**, then **CONTROL PANEL,** then **NETWORK,** Then **CONFIGURATION,** then highlight the name of the Ethernet card**,** then **PROPERTIES**.

3. Check TCP/IP in Bindings.

Don't change the Driver Type

4. Open the TCP/IP Properties window.

From the Windows desktop, select **START**, then **SETTINGS**, then **CONTROL PANEL,** then **NETWORK,** Then **CONFIGURATION,** then **TCP/IP,** then **PROPERTIES**.

5. Enter the following settings:
   Gateway -- none
   WINS -- disable
   IP Address-- 192.0.2.1, subnet mask 255.255.255.0
   Bindings -- don't change
   Advanced -- none
   DNS -- disable

To Verify Router and Telnet Communication:

6. Get a DOS Prompt.

   From the Windows desktop, click **START**, select **PROGRAMS**, then **MS-DOS** to get a prompt.

7. Type **`ping 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU) (the router's IP address) and verify that the router replies.

   If ping does not work see *Can't Ping* (page 6-42).

8. Type **`telnet 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU)

   If it connects a Telnet window will open. If Telnet does not work see *Can Ping, But Can't Telnet* (page 6-42).

9. Select **CONNECTION** the **TELNET** window, then **EXIT**.

If both ping and telnet work the Ethernet connection is ready to use.

Connect Using SLIP and a Windows NT PC

SLIP connections are only used by SMS-64V with Amezi serial control Compact Frames. All other frames use Ethernet connections. Some steps in the following procedures require the Windows install disks or CD. A dial-up networking connection must be running to use SLIP.

Install the Null Modem:

1. Insert WindowsNT operating system install disk or CD.

2. Open the Control Panel window.

   From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

3. Double click on the **MODEMS** icon.

   If given a choice between installing a PCMCIA modem card and **OTHER**, choose **OTHER**.

4. Click **ADD...**

   This will not appear if the modem list is empty.

5. Check the box that says **DON'T DETECT MY MODEM I'LL SELECT IT FROM A LIST**, then click **NEXT**.

6. Click **HAVE DISK...** located in the lower right of the dialog box.

7. Enter `C:\sms7000` in the **COPY MANUFACTURER'S FILES FROM** text box, and click **OK**.

8. Highlight a modem called **GENERIC NULL MODEM**. Click **NEXT>**.

9. Select the communications port used by the modem in the **SELECTED PORTS** list. Click **NEXT>.**

   If the computer asks for location information enter anything as the system won't use it.

10. Click the **FINISHED** button.

    A modem called **GENERIC NULL MODEM** will now appear in the modems box.

11. Close the dialog box.

Enable FIFO buffers for the null modem port:

12. Open the Control Panel window.

    From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

13. Select **PORTS**, then **SETTINGS**, then **ADVANCED**, check **FIFO ENABLED**.

    Settings are 9600, 8 databits, 1 stop bit, no parity.

14. Click **OK**, then **CLOSE**, then **CLOSE**.

Install Remote Access Service:

15. Open the Control Panel window.

    From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

16. Double-click **NETWORK**.

17. Select **TCP/IP** in the Protocols tab. Click on **PROPERTIES**.

18. Verify that the IP address is different if bound to an Ethernet adapter, in the **IP ADDR** tab.

    If an adaptor is selected in the **ADAPTOR** list, then the **IP ADDRESS** field must contain an address that is different from the one used for communicating with the Series 7000 using SLIP.

19. Verify the subnet for the SLIP connection is 255.255.255.0 in the Subnet text box.

20. Do not set or change anything in the **DNS**, **WINS**, and **ROUTING** text boxes.

In PCs using a network and connecting to the Series 7000 system via serial port (SLIP) these items are used and could have entries.

21. Verify that Remote Access is listed in the Network Services list.

If Remote Access Service isn't listed in the Network Services list:

a. Click **ADD**.

b. Choose **REMOTE ACCESS SERVICE**, in the select network service dialog box. Click **OK**.

c. Click **OK**, If an **ADD RAS DEVICE?** window appears listing the Generic Null Modem. Now the RAS Setup dialog box appears.

If Remote Access Service is listed in the Network Services list:

a. Choose **REMOTE ACCESS SERVICE**, then **PROPERTIES**.

b. Choose the **CONFIGURE** button, then **DIAL OUT ONLY,** then **OK**.

c. Choose the **NETWORK** button, Check **TCP/IP** only**.** Click **OK**

22. Choose **FOR ALL SERVICES**.

In the Bindings tab of the Network dialog box.

23. Verify that **REMOTE ACCESS SERVER SERVICE**, **SERVER**, and **WORKSTATION** all have **WINS CLIENT(TCP/IP)** bound.

Click on the **+** next to each one to see this information.

24. Close the dialog box.

25. Reboot the PC-compatible if a dialog box indicates it is necessary.

The Windows95/98 operating system install disk or CD should be removed before rebooting. It is no longer needed.

Set up the Dial-up Connection

26. Open My Computer from the desktop and double-click the **DIAL-UP NETWORKING** icon.

If a dialog box asks if you want to add an entry:

a. Click **OK.**

b. Select **I KNOW ALL ABOUT…**,

c. Click **FINISH**, to access the Phonebook entry box.

Otherwise:

a. Select **NEW**, or click **MORE** and then **EDIT ENTRY AND MODEM PROPERTIES** to access the Phonebook entry dialog box.

27. Set parameters for the different tabs on the Phonebook entry box

Table 6-3. Phonebook Entries

Tab	Field	Entry	Sub Entry
Basic	Entry Name	SLIP to MCPU, or similar	
	Dial Using	Generic Null Modem	
	Configure Button	Speed 9600: No Flow Control, Error Control or Compression	
	All Other Fields	Blank	
Server	Dial-up Server Type	SLIP: Internet	
	Network Protocol	TCP/IP	
	TCP/IP Settings	Name Server Addresses	0.0.0.0
		IP Address	The Address Assigned To The PC Is Usually 192.0.2.1
		Force IP Header Compression	No
		Use Default Gateway	No
		Frame Size	1006
Script	Before Dialing	None	
	After Dialing	None	
Security	Authentication Policy	Accepts any authentication including clear text	
X25	All Fields	Blank	

28. Close the dialog box.

To Start a SLIP Session

29. Open Dial-up Networking.

30. Highlight the right connection.

31. Click **DIAL**, then **OK**.

The name and pass word don’t matter. It takes over a minute to get connected.When connected, a dialog box will appear.

32. Click **OK**.

To Verify Router and Telnet Communication:

33. Get a DOS Prompt.

From the Windows desktop, click **START**, select **PROGRAMS**, then **MS-DOS** to get a prompt.

34. Type **`ping 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU) (the router's IP address) and verify that the router replies.

If ping does not work see *Can't Ping* (page 6-42).

35. Type **`telnet 192.0.2.2`** (primary MCPU) or **`192.0.2.3`** (backup MCPU)

If it connects a Telnet window will open. If Telnet does not work see *Can Ping, But Can't Telnet* (page 6-42).

36. Select **CONNECTION** the **TELNET** window, then **EXIT**.

If both ping and telnet work the SLIP connection is ready to use.

Connect Using Point-to-Point Ethernet and a WindowsNT PC

1. Connect the Ethernet port on the PC-compatible to the Ethernet port on the MCPU frame using a null modem (peer-to-peer) Ethernet cable.

These cables are usually orange in color, indicating that the Rx and Tx pairs are reversed at one end. If the PC-compatible is connected to the Ethernet via an Ethernet hub, use a standard Ethernet cable on the PC.

2. Open the TCP / IP Properties window.

From the Windows desktop, select **START**, then **SETTINGS**, then **CONTROL PANEL,** then **NETWORK,** Then **PROTOCOLS,** then **TCP/IP,** then **PROPERTIES**.

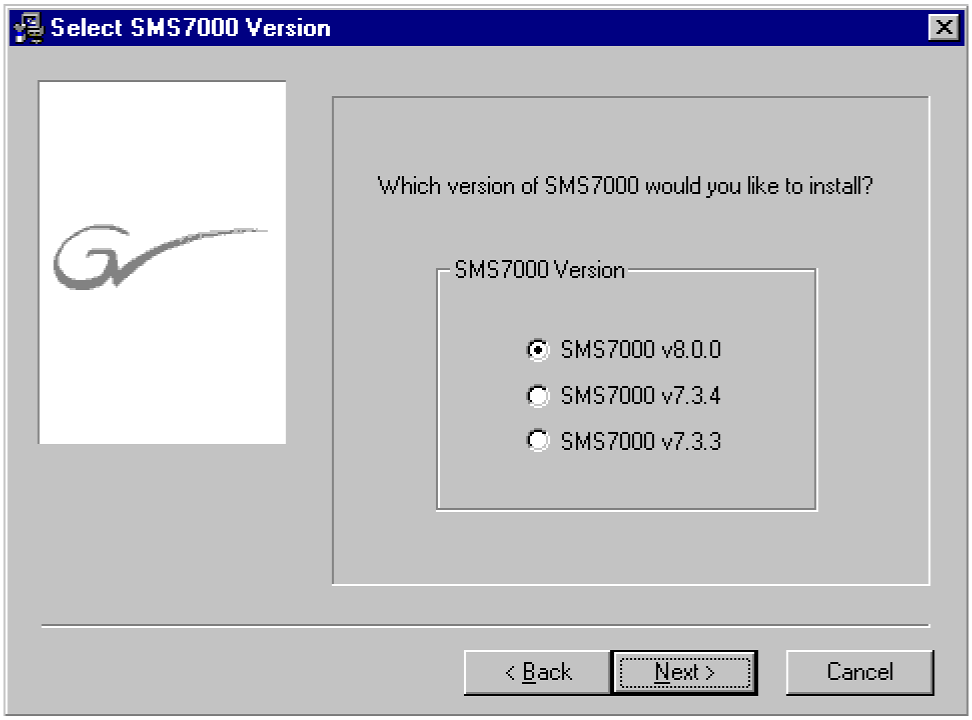
3. Enter the following settings:
WINS - disable, if the message **AT LEAST ONE OF THE ADAPTOR CARDS HAS AN EMPTY PRIMARY WINS ADDRESS - CONTINUE?** Click **YES**.
IP Address -192.0.2.1, subnet mask 255.255.255.0
DNS - set hostname to PC, leave the rest blank
Routing - don't enable IP forwarding.

Software Installation

To Install Series 7000 Software

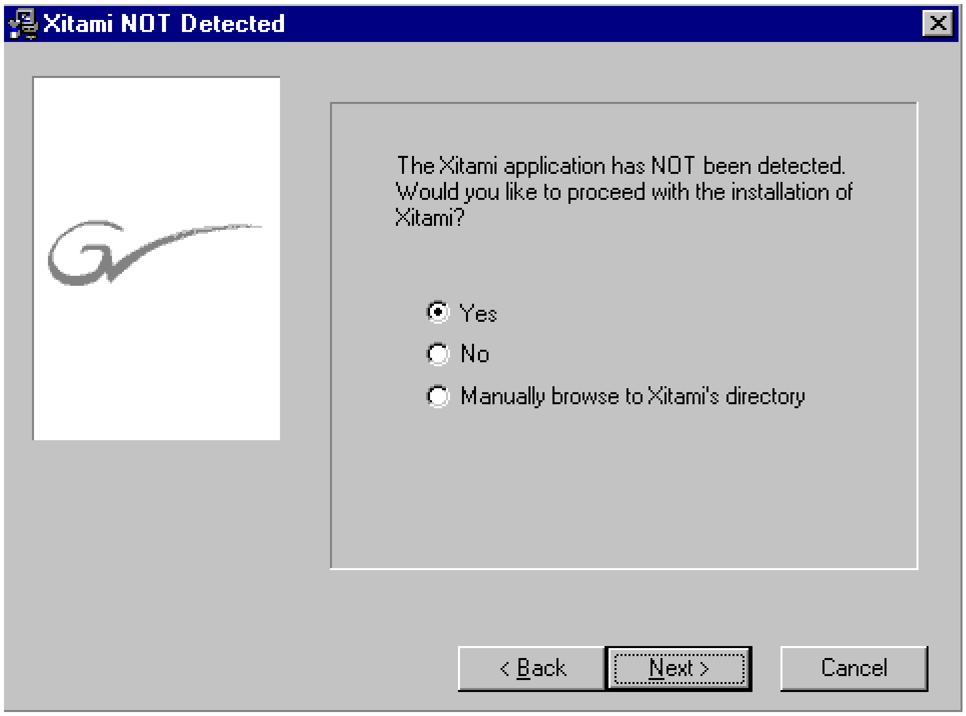
1. Insert the Software CD-ROM into the computer and the installation procedure will autostart. If autostart fails then select **Run** from the **Start** menu and type **`d:\setup.exe`** (where **d** is the drive letter of the CD-ROM).
2. Read and accept the Software License Agreement.
3. Ensure that you've exited all other running applications then click **Next** to proceed with the SMS7000 software installation.
4. When prompted, choose the software version you want to install and click **Next.**

Figure 6-4. Version Selection Window



5. An FTP Daemon application is required. Choose whether you want to install the default Xitami FTPD (strongly recommended) or another application, then click **Next.**
6. If you chose to install Xitami, the installation application searches for Xitami on your disk. If it can't find it (which it shouldn't for a new installation), you'll be asked whether you want to install Xitami or not, or whether you want to browse for it manually.

Figure 6-5. Xitami Detection Window

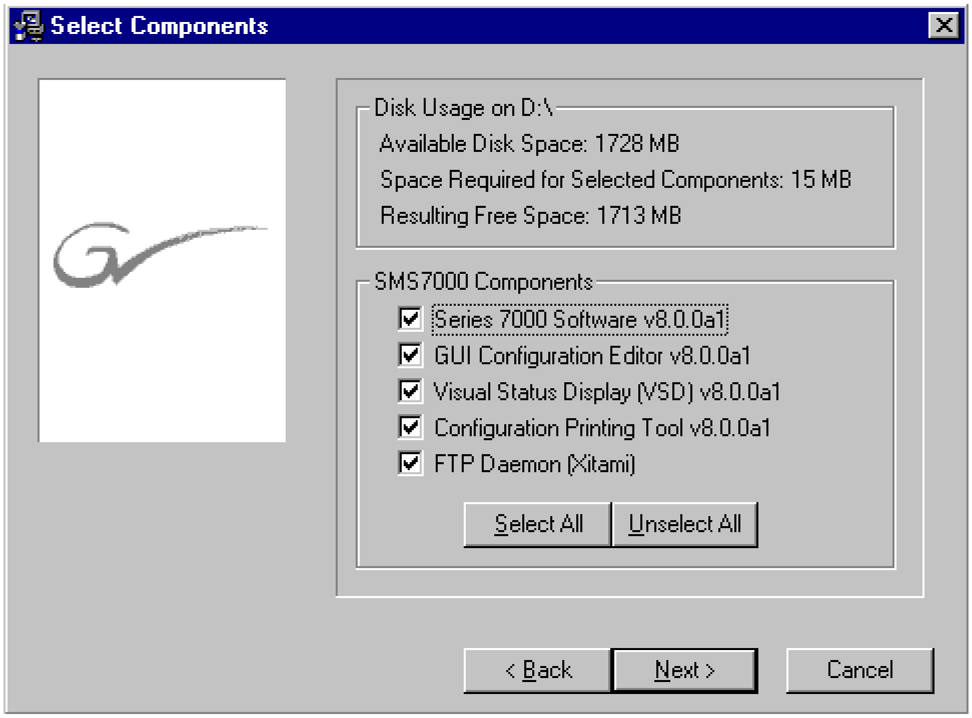


7. Assuming this is a new installation, choose **Yes** to have Xitami installed and click **Next**.

8. When prompted, accept the default installation destination folder or specify a different one, then click **Next**.

9. In the component selection window which appears (See Figure 6-6), choose the SMS components you want to install — we recommend that you install all of them — then click **Next**.

Figure 6-6. Component Selection Window



10. In the Shortcuts screen, choose whether you want shortcuts installed in the **Start Menu**, then click **Next.**

11. Now accept the default Program Manager Group for SMS7000 application icons and shortcuts or specify a different group name, then click **Next.** (This will appear as a sub group of Grass Valley Group on your **Start** > **Programs** menu.)

12. In the Backup window, choose whether you want older SMS7000 files backed up, and if so, where you want to put them. It is prudent to backup older files during upgrades, but presuming this is a new installation, choose **No** and click **Next.**

13. In the screen which appears, carefully review the requirements and any other late-breaking news to confirm that you can proceed. If you meet all requirements, click **Next.**

This readme.txt file can be accessed at any time from the directory where you install the SMS7000 software.

14. When you're notified that you're ready to install the SMS7000 software, click **Next** to begin copying it to your disk.

15. Click **Next** when you're notified that the SMS7000 software installation is complete and prompted to install the FTP Daemon software.

Note The same CD-ROM is used to install new software and to update existing software. If this were an update, the FTP Daemon might be updated at this point or if you had chosen not to install it, the installation procedure would be complete. However in a new software installation, we recommend that the FTP Daemon is installed after the system software installation is complete. Instructions for that procedure follow.

CAUTION All procedures required for software installation must be completed in their entirety. Deviating from the assigned defaults or incomplete installation can cause system conflicts and failures.

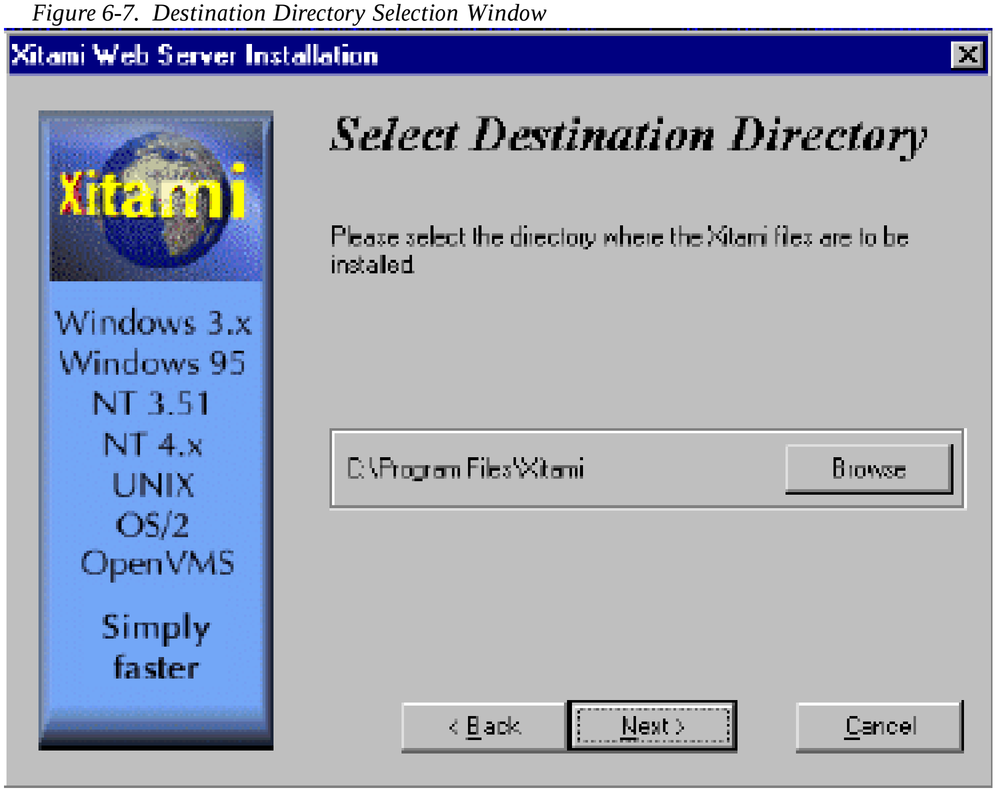
To Install and Configure the FTP Daemon

16. Read the welcome notes, then click **Next>**.

17. Read the Xitami installation notes and click **Next>**.

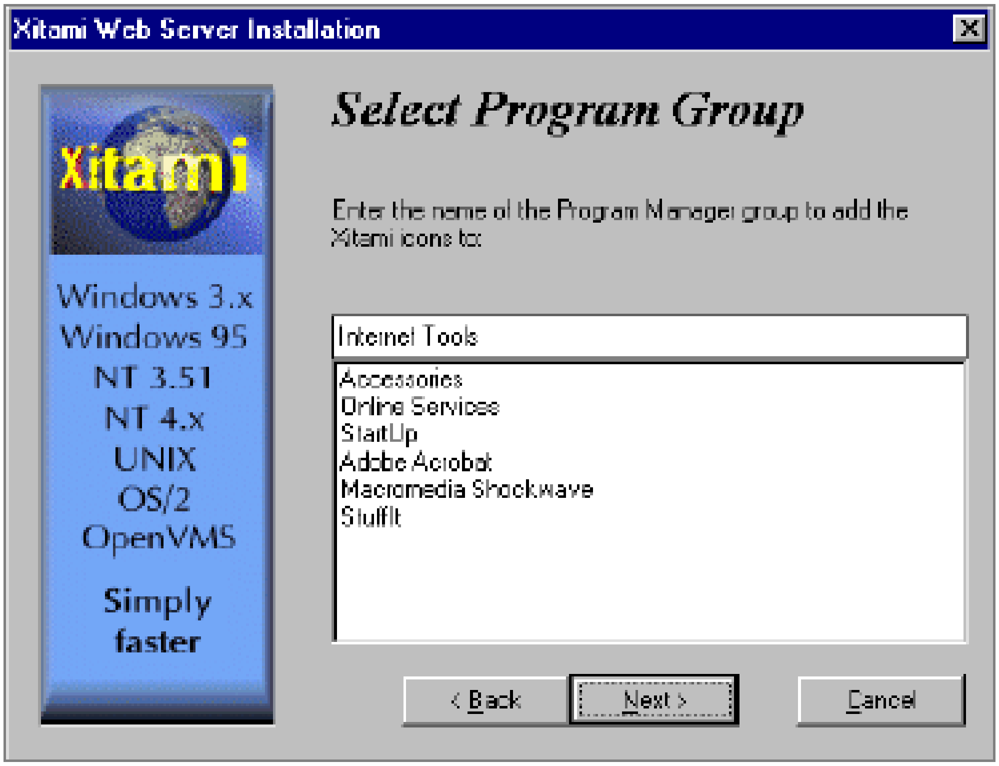
18. When the Installation window appears (Figure 6-7) accept the default installation destination or specify your preference, then click **Next>**.

Figure 6-7. Destination Directory Selection Window



19. Accept the default program group — don't change this — and click **Next>**.

Figure 6-8. Program Group Selection Window

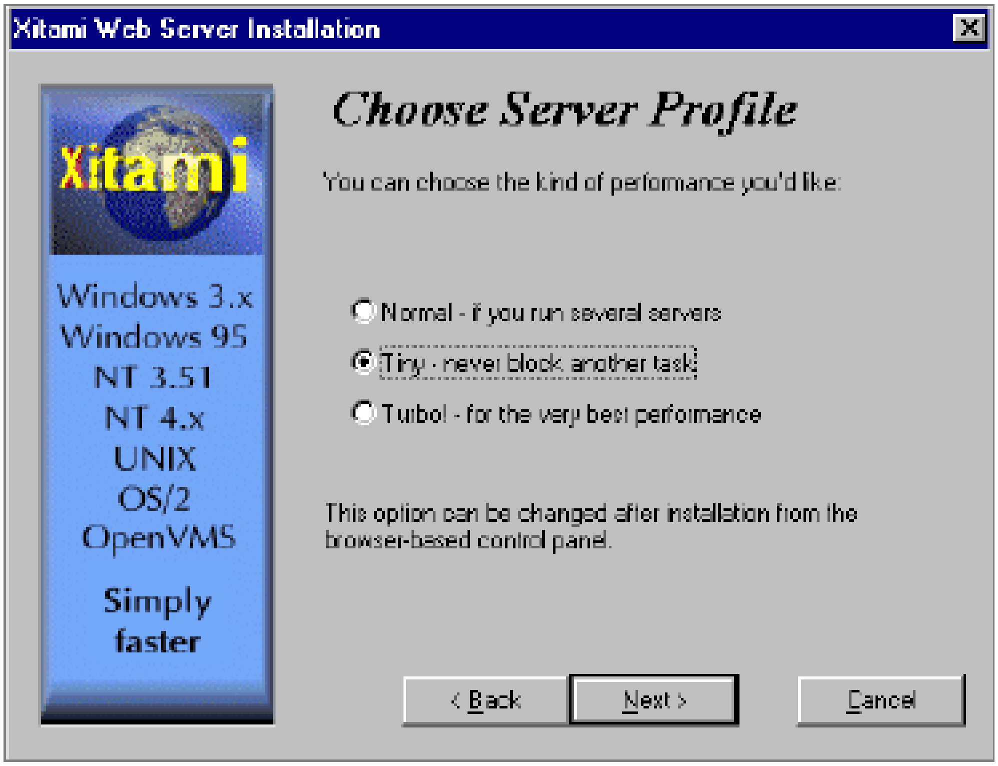


20. When asked whether you want to start Xitami automatically, select **No** (don't start Xitami automatically) and click **Next>**.

Xitami can be started whenever it is needed.

21. For the server profile, select **Tiny - never block another task** (see Figure 6-9), then click **Next>**.

Figure 6-9. Server Profile Selection Window



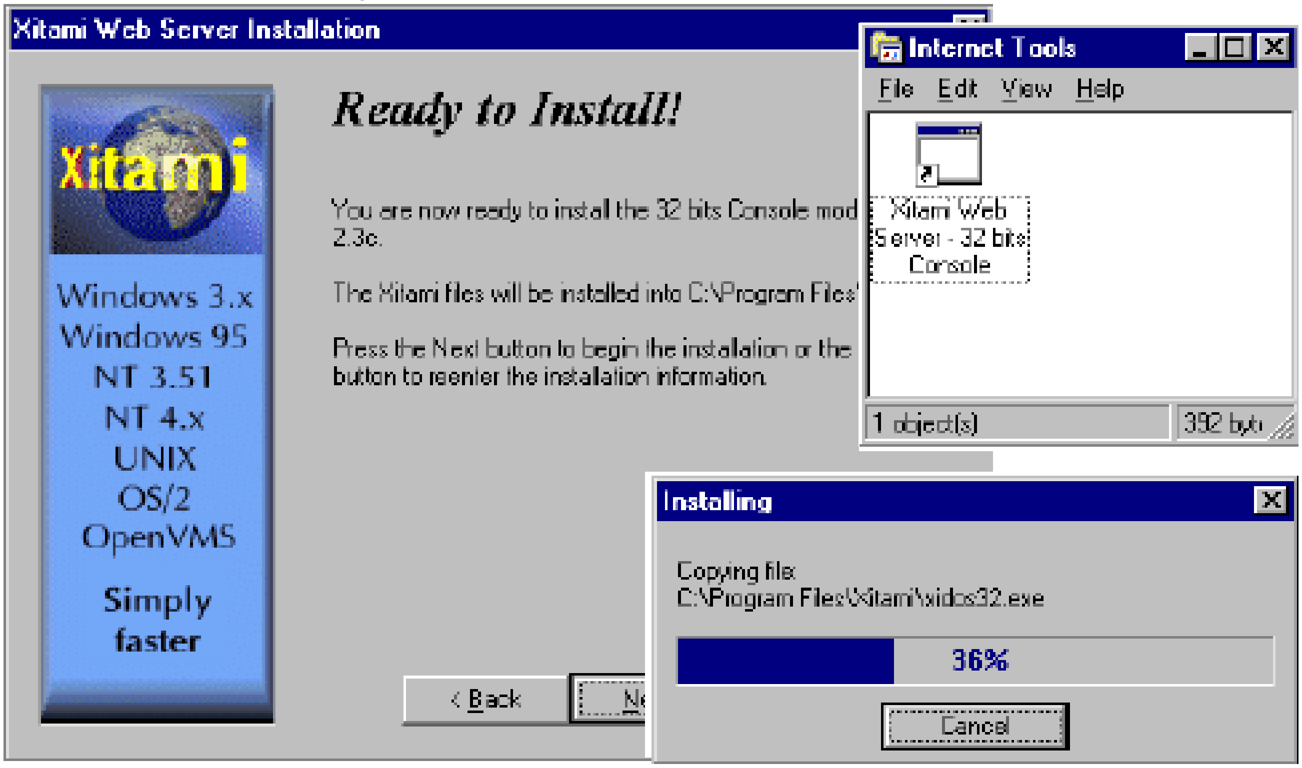
22. We recommend that you enter neither a user name nor password when prompted to choose an admin password. Click **Next>**.

Figure 6-10. User Name and Password Selection Window

23. When notified that you're ready to install Xitami, click **Next>**.

    An Installation Meter will appear, and an Icon will be created in the Program Group window that was selected earlier.

Figure 6-11. Install Windows



24. Click **Finish** when you're notified that the installation has been completed.

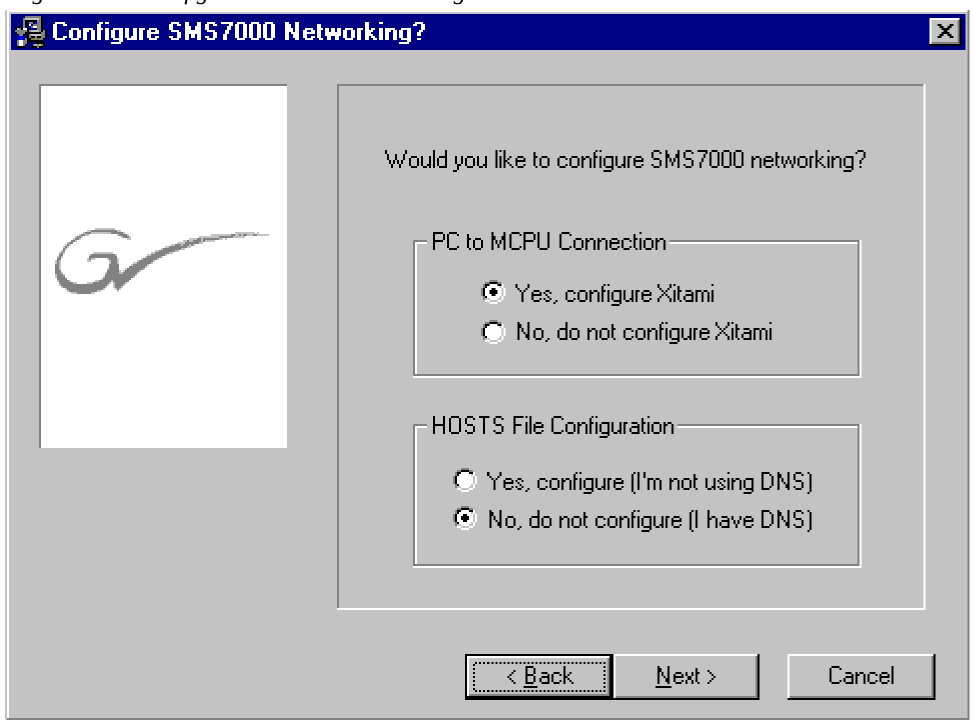
    You're almost finished. Even though the FTP Daemon has been installed, it must be configured before it can be used. The CD-ROM contains two configuration files (defaults.cfg and ftpusers.sms) located in the /ftpd/config directory. These files must be installed from the CD-ROM to the Xitami program folder before running FTP Daemon. Configuration performs this task.

25. In the configuration window (Figure 6-12) which appears, select **Yes, configure Xitami** in the **PC to MCPU Connection** (first) section. Your choice in the (second) **HOSTS File Configuration** section is dictated by your environment.

- If you're not using DNS, you'll need to do some configuration here, so choose **Yes, configure (I'm not using DNS)**.
- If you are using DNS (Domain Name Server or Service), your job here is almost done; choose **No, do not configure (I have DNS)**.

Once you've made the appropriate selections for your environment, click **Next>**.

Figure 6-12. Configure SMS7000 Networking Window



If you chose No in the **Host File Configuration** section, proceed to Step 27. If you chose Yes, the HOSTS File Configuration window (Figure 6-13) will appear and you'll need to continue to the next step.

26. Using the HOSTS File Configuration (Figure 6-13) and HOSTS File Conformation (Figure 6-14) windows, confirm or change the IP address assignments as needed, then click **Next**.

Note The HOSTS file is used as a lookup table by Windows for associating a Host name to a Host IP address. The HOSTS file is in the Windows directory on Windows95 or in /Winnt/System 32/drivers/etc. directory for WindowsNT.

Figure 6-13. HOSTS File Configuration Window

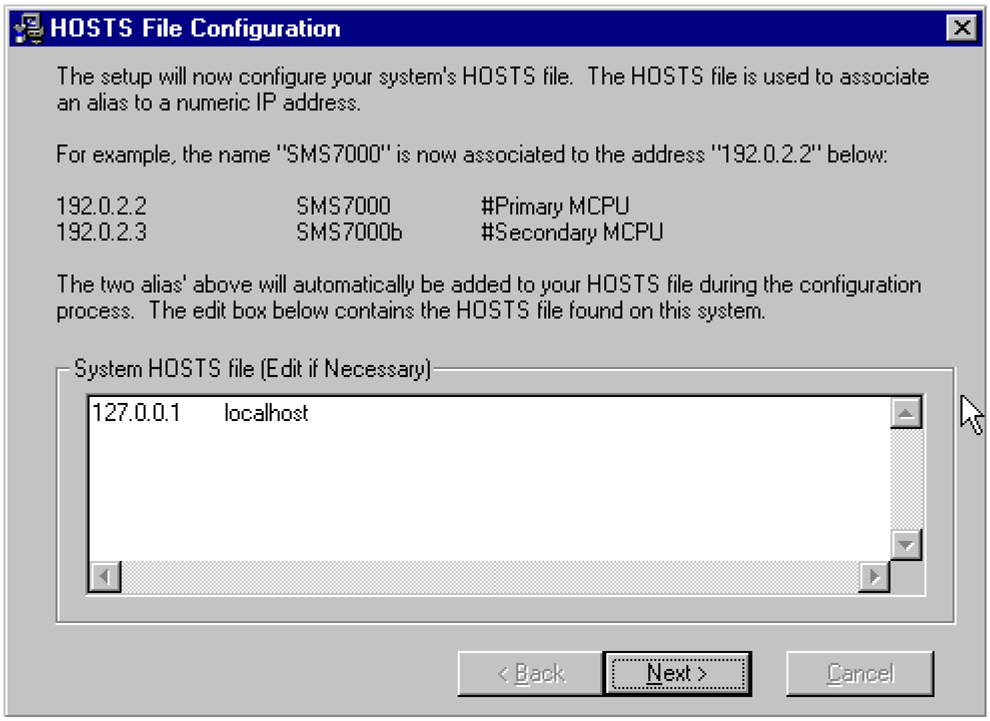
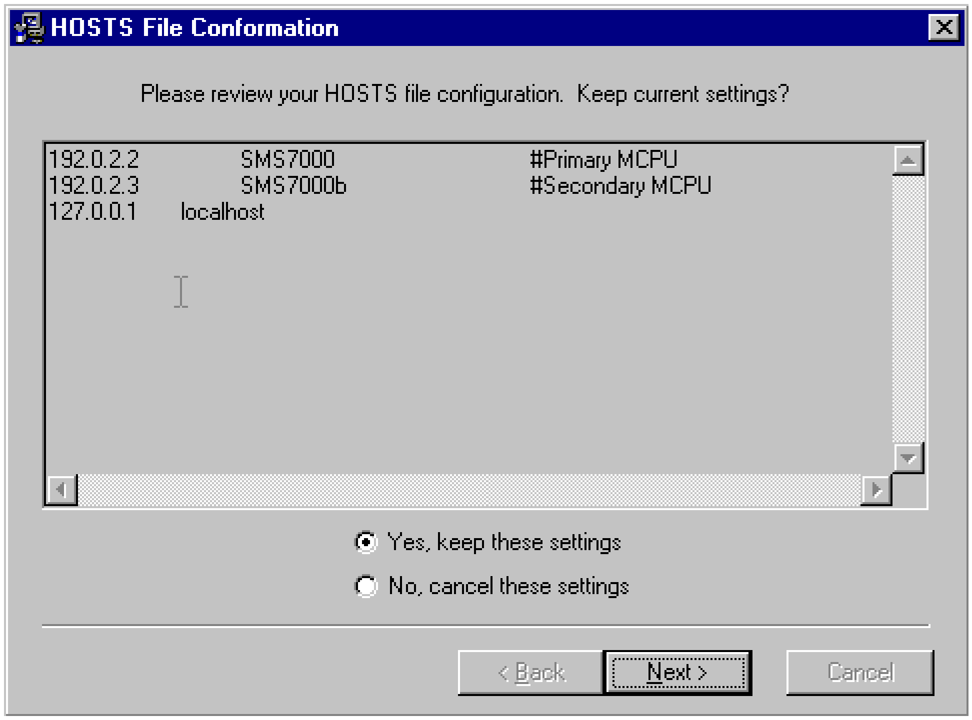


Figure 6-14. HOSTS File Conformation Windows



CAUTION These are the default host names and IP addresses. If there are additional host names and IP addresses the HOSTS file can be modified manually. When the HOSTS file is modified manually, the text editor (Notepad, for example) will usually add the txt extension to the file name. If the file has an extension it must be renamed to HOSTS.

27. Once Xitami has been configured, you'll be notified that the installation is complete. At this point reboot your PC-compatible to fully enable the Series 7000 software, the Configuration Editor (GUI), the VSD, the Printconfig, and the FTP Daemon.

Documentation Installation

Documentation for most SMS7000 software and related products is available in both print and electronic form. The SMS7000 (electronic) documentation has its own CD-ROM, separate from that of the SMS7000 software. You can choose to install the documentation on your server or hard disk or to use the documentation from the CD-ROM. If you choose to install any or all of the documentation, the amount of space it requires is dictated by the amount of documentation you choose to install.

Acrobat Reader

We recommend that you use the version of Acrobat Reader supplied on this CD or a newer version supporting Search. Some features of our documentation are not available in other versions of Acrobat Reader and versions older than 3.0 can't be used at all. Please note that Acrobat's Search feature is considerably more advanced than Find. Among other things, Find is limited to a single document, whereas Search can be used across multiple documents.

Installation software on our documentation CD-ROM only checks to see whether Acrobat Reader is installed on your PC-compatible. This verification occurs whether you browse our documentation CD-ROM or choose to install some or all of the files on your server or hard disk. If Reader does not appear to be installed on your system, we'll ask whether you want to install the documentation-compliant version from our CD-ROM. If Reader does appear to be installed on your system, we do not verify whether it is fully compliant with our documentation. For that reason, we strongly suggest that you follow the procedures documented in *To Manually Check the Acrobat Version* and possibly *To Manually Install Acrobat Reader* to ensure full documentation functionality.

Adobe strongly recommends uninstalling any older versions of Acrobat Reader before installing newer versions, just as we document here and in the Readme.txt file

To Manually Check the Acrobat Version

If you already have Reader installed you can manually check the version like this:

1. Launch Reader and open any PDF document.
2. Choose **About Acrobat Reader** on the **Help** menu.

   The version appears in the resultant screen, near the Adobe logo. You should be using version 4.05 or newer.

3. With a PDF document open in the Reader, look in the Reader toolbar for an icon with binoculars and a document.

If you have that icon and the proper version, you ought to be able to read and use our documentation.

To Manually Install Acrobat Reader

If you don't have the correct version of Acrobat Reader plus Search, we strongly recommend that you use proper Windows procedures to uninstall your copy of Reader. Then follow these instructions to install the version we've provided on the CD-ROM.

Note If you're running Windows NT, you must have Administrator-level privileges to install Acrobat Reader. Contact your system administrator if you need help with this.

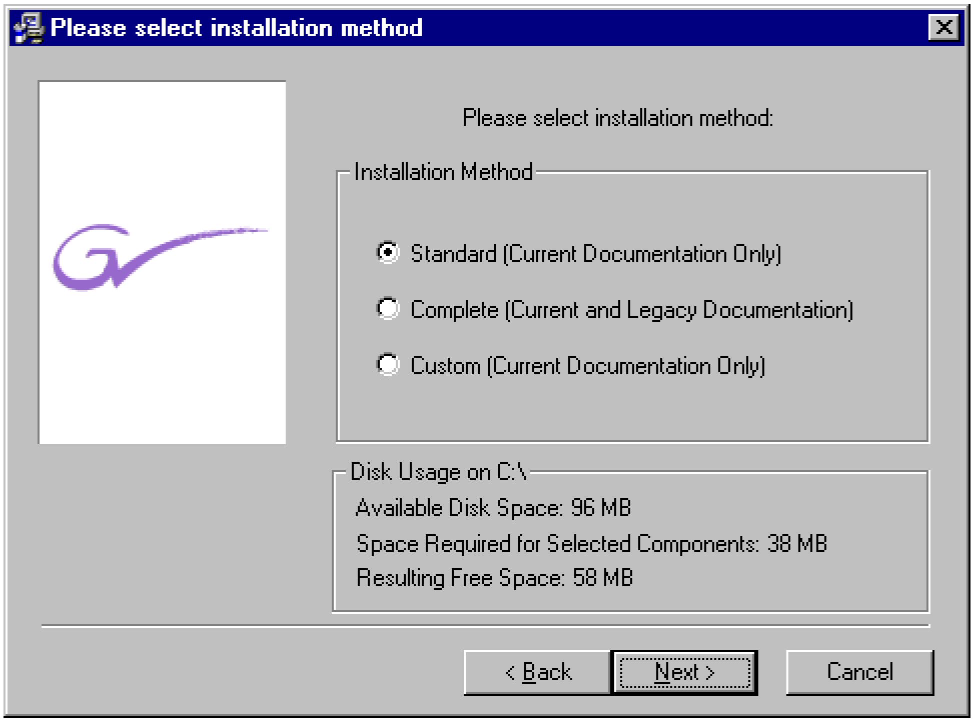
1. Insert the documentation CD-ROM.
2. Close all applications on your computer.
3. Open the Acrobat subdirectory and double-click the setup application.
4. Follow the prompts to complete the installation process.

To Install the Documentation

Follow these steps to install the SMS7000 documentation on your server or hard disk.

1. Insert the Documentation CD-ROM in the computer and the installation procedure will autostart. If autostart fails then select **Run** from the **Start** menu and type **`d:\setup.exe`** (where **`d`** is the drive letter of the CD-ROM).
2. Choose to install the documentation.
3. Step through the windows until a window like Figure 6-15 prompts you to specify your desired document installation method, choose one, and click **Next**.

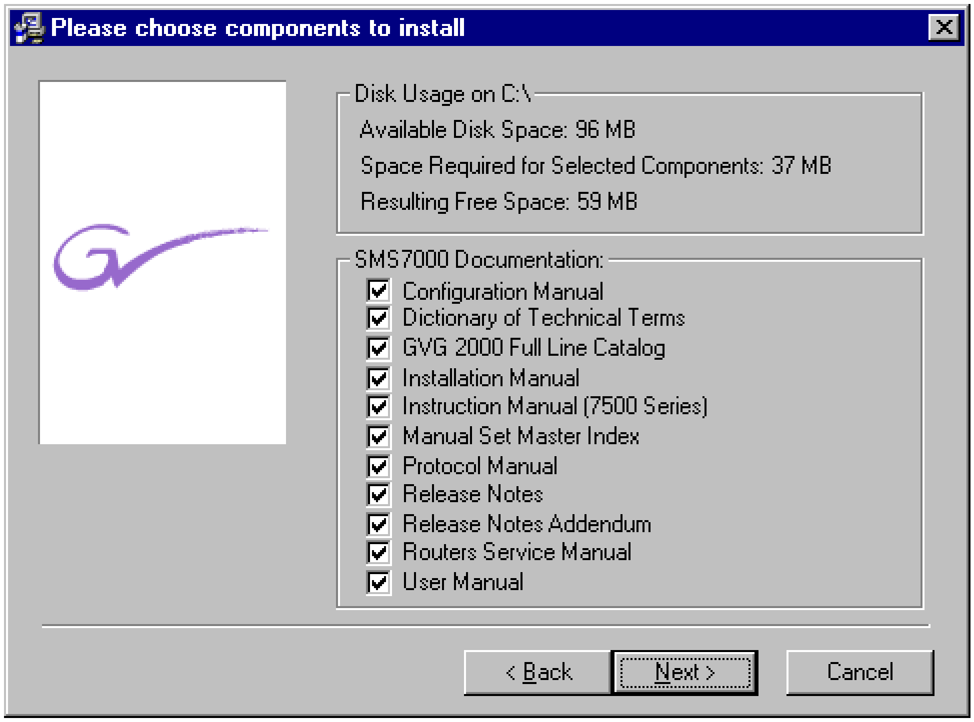
Figure 6-15. Installation Method Selection Window



- **Standard** installs all current documentation.
- **Complete** installs all documentation — current and legacy — and consumes significant disk space.
- **Custom** allows you to choose which components of the current documentation you want to install on your server or hard disk. If you choose a custom installation you'll be offered the options in Figure 6-16.

4. If you're prompted to choose documents (only if you chose **Custom** in the previous step), ensure that there is a check mark opposite each document you want, that you have enough room on your server or hard disk, and then click **Next** to continue the documentation installation.

Figure 6-16. Component Choice Window



Before finalizing your installation, our installer checks to see whether Acrobat Reader is installed on your PC-compatible. If Reader does not appear to be installed on your system, we'll ask whether you want to install the documentation-compliant version from our CD-ROM. If Reader does appear to be installed on your system, we do not verify whether it is fully compliant with our documentation. We simply proceed with the document installation. After the documentation is installed, we strongly suggest that you follow the procedures documented in *To Manually Check the Acrobat Version* and possibly *To Manually Install Acrobat Reader* to ensure full documentation functionality.

Third-Party Alien Matrix Enable Software Option

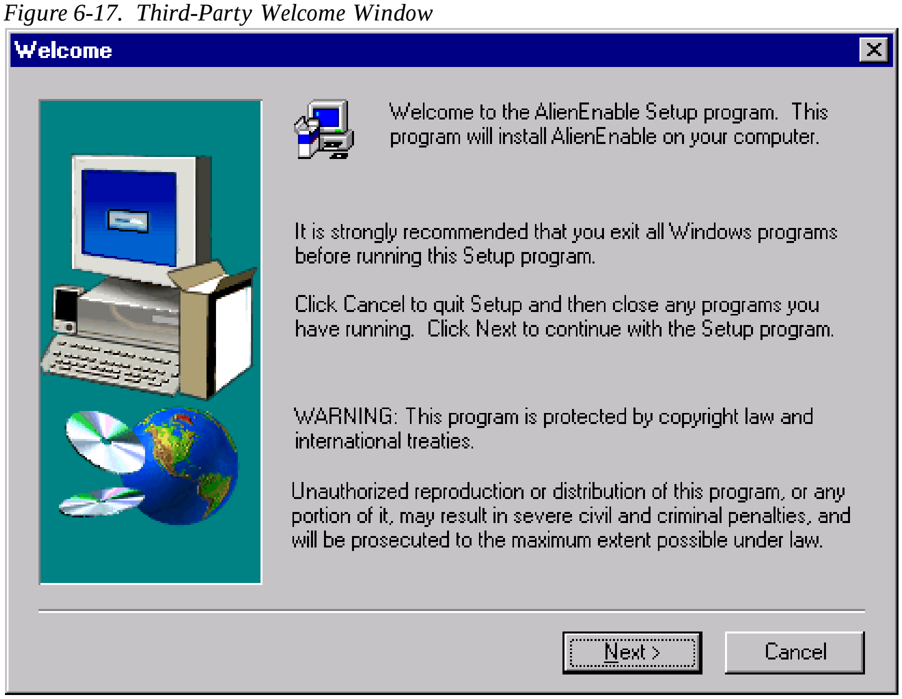
The Third-Party Enable Software Option allows configuration files containing third-party configuration information to be loaded into the MCPU. Matrices identified as third-party include any matrix that uses Datatek, ProBel, MGrid, or McCurdy as a protocol selection when configuring an Amezi.

To Install the Third-Party Alien Matrix Enable Software

1. Insert the Third-Party Alien Matrix Enable Software CD-ROM into the computer and it will autostart. If autostart fails then select run from the start menu and type **`d:\setup.bat`** (where **`d`** is the drive letter of the CD-ROM drive).

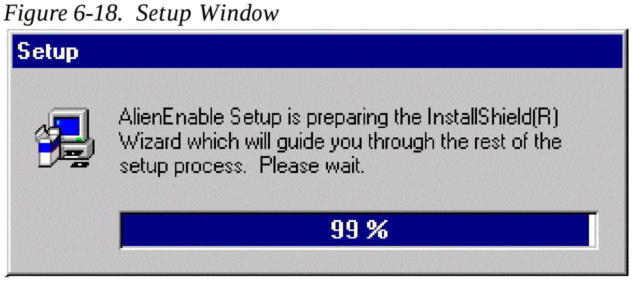
2. Select **NEXT**.

Figure 6-17. Third-Party Welcome Window



The following box will appear.

Figure 6-18. Setup Window



3. Select **FINISH**.

Figure 6-19. Third-Party Complete Window

To Remove the Third-Party Alien Matrix Enable Software

1. Open the Control Panel window.

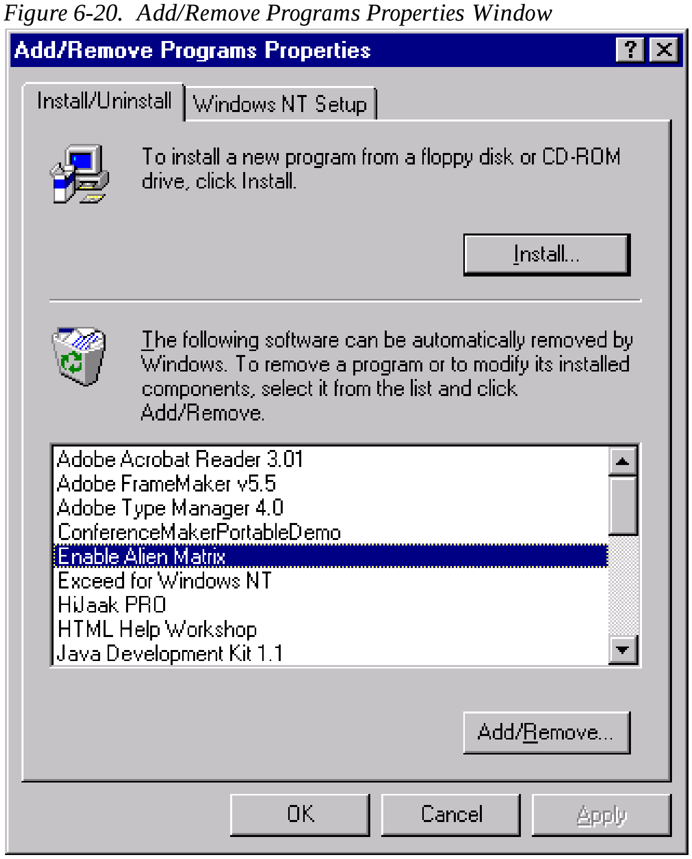
   From the Windows desktop, click **START**, select **SETTINGS...**, then **CONTROL PANEL**.

2. Double-click the **ADD/REMOVE PROGRAMS** icon.

3. Select **INSTALL/UNINSTALL**.

   Figure 6-20 is from a Windows NT system. Windows95/98 also has an Install/Uninstall tab that appears the same as shown in Figure 6-20.

Figure 6-20. Add/Remove Programs Properties Window



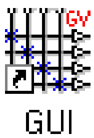
4. Select **YES** in the **CONFIRM FILE DELETION** warning window.

Figure 6-21. Third-Party Warning Window

Connect to MCPU and Save Default Configuration

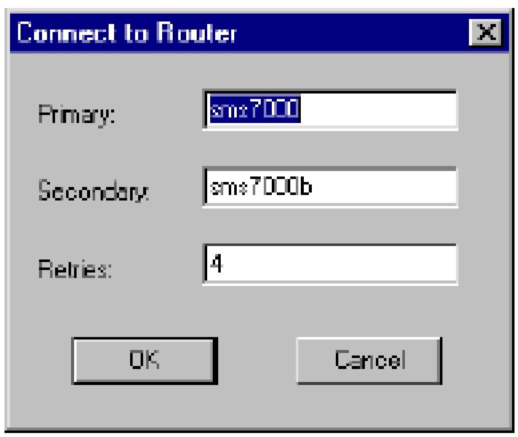
The first time you connect to a SMS 7000 router using the GUI, you should save the factory default configuration file. This file which uses default names and settings can be used to assist in troubleshooting configuration items and contains the default names and settings of the Coprocessors and Node Controllers. It is recommended that you start building a custom configuration file using a new blank configuration file with custom names and settings to better fit the design of the installation.

To Save the Default Configuration File



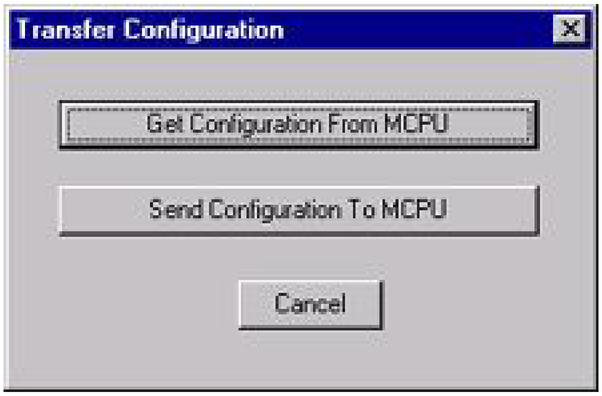
1. Open Windows.
2. Double-click on the SMS 7000 icon
3. Click on **OK** in the Connect to Router window to connect to the router and establish communications with the MCPU.

Figure 6-22. Connect to Router Window



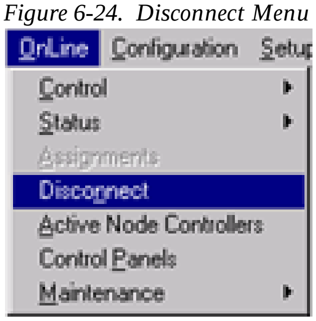
4. Click on **GET CONFIGURATION FROM MCPU** in the Transfer Configuration window to transfer default configuration file to the GUI PC.

Figure 6-23. Transfer Configuration Window



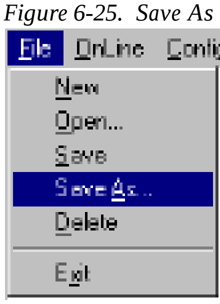
5. Under the **ONLINE** menu, select **DISCONNECT** to go OffLine.

Figure 6-24. Disconnect Menu



6. Under the **FILE** menu, select **SAVE AS** to save a copy of the factory default configuration as a fall-back configuration to the GUI PC-compatible hard drive or to other media such as a floppy diskette.

Figure 6-25. Save As Menu



Series 7000 Applications

Information on using the GUI to build and edit configurations, using the GUI for online functions, using Printconfig, and customizing the Visual Status Display are in the *Configuration Manual*.

Information on control panels and normal operation of the Visual Status Display are in the *User Manual*.

Setting GUI Security

The SMS7000 GUI can be set up so as to restrict the user's abilities to change the configuration, change and override assignments, and override Protects set by other devices.

To restrict the operations that can be performed from the GUI, use a text editor to edit the gui.ini file, and add the following section:

```
[Restrictions]
limitUserPowers=1
DontAllowUserToAssign=1
```

To subsequently allow changes to be made, change the =1s to =0.

If **limitUserPowers** is set to **1**, the GUI user cannot read a configuration in from disk, change the configuration, send it to the router, or save it. The user also cannot override Protects or override the Tieline Reservation scheme.

If **DontAllowUserToAssign** is set to **1**, the GUI user cannot change Assignments.

Troubleshooting

Can't Ping

Verify that the proper cable is used between the PC-compatible and MCPU.

Can Ping, But Can't Telnet

Verify **FORCE IP HEADER COMPRESSION** is not checked**.** Under **DIAL-UP NETWORKING**, then **SERVER**, then **NETWORK PROTOCOL**, **TCP/IP** settings.

Can't Send Or Retrieve A Configuration

Verify that the FIFO buffers are enabled. See *Enable FIFO buffers for the null modem port:* (page 6-17).

Can't Download Files to MCPU

Verify that the two configuration files (defaults.cfg and ftpusers.sms) are located in the /ftpd/config directory. These files must be installed from the CD-ROM to the Xitami program folder before running FTP Daemon. **CONFIGURE FTP DAEMON** performs this task.

To Verify Configuration Files:

1. Open Windows Explorer.
2. Open the **XITAMI** folder on the PC-compatible Hard Drive.
3. Look for defaults.cfg and ftpusers.sms.

To Load Configuration Files:

1. Insert Series 7000 CD-ROM and select **EXIT** to close install program.
2. Open Windows Explorer and copy **`defaults.cfg`** and **`ftpusers.sms`** from the CD-ROM to the \Xitami folder on the PC-compatible hard drive.
3. Remove the CD-ROM and reboot the PC.
4. Run Xitami Application.
5. Reset the SMS MCPU. Use the reset button on the front of the MCPU module. File transfer will begin.

Section 7

Matrix Cabling

Introduction

This section discusses signal input and output cabling. First, general input and output characteristics and cabling considerations are described for all signal types. Then, connector numbering schemes are presented for each Series 7000 frame type and size. Output monitor cabling for video is addressed in Section 4, Options. Audio output monitor cabling is addressed in this section along with input and output cabling.

This section is divided into three main subsections:

- *Video Matrices* (page 7-1)
- *Audio Matrices* (page 7-16)
- *Data Router Connections* (page 7-50)

CAUTION Cable bundle weight must be properly supported by the equipment rack to avoid undue stress on the matrix connectors.

Video Matrices

The Video frames described in this section apply to either analog or digital video modules. Cabling connections for the two are identical. Input and Output characteristics are provided for both signal types.

Video Input and Output Characteristics

This section provides an overview of the input and output characteristics of analog and digital video matrices—connector types and wiring tips, suggested cable types, impedances, equalization options, and signal coupling options.

Analog Video (Wideband)

- Connectors: 75 Ohm BNCs
- Recommended cable: Belden 8281 or equivalent

Inputs

- Impedance: 75 Ohms
- Cable equalizers: Optional plug-in hybrids available
- Signal coupling: DC-coupled or DC-restored

Outputs

- Two identical feeds for each output
- Impedance: 75 Ohms
- Internal bus equalizers (plug-in hybrids) are provided for the specific frame size in which the output module resides. (These are internal equalizers, not output equalizers.) They are changed when an output module is transferred to a different size frame or when a frame is expanded. (For details, see Circuit Details in the Series 7000 *Service* Manual.)

Digital Video

- Connectors: 75 Ohm BNCs
- Required cable: Belden 8281 or equivalent

Inputs

- Impedance: 75 Ohms

Outputs

- Two identical feeds for each output
- Impedance: 75 Ohms

Video Connector Locations

Input and output connectors are assigned to Source and Destination names during System Configuration. A Source may consist of one input on each of one or more system levels (Source 1 might consist of a video input on level 1, a left audio input on level 2, and a right audio input on level 3). A Destination may consist of one output on each of one or more system levels (Destination 1 might consist of a video output on level 1, a left audio output on level 2, and a right audio output on level 3).

Compact Video Systems

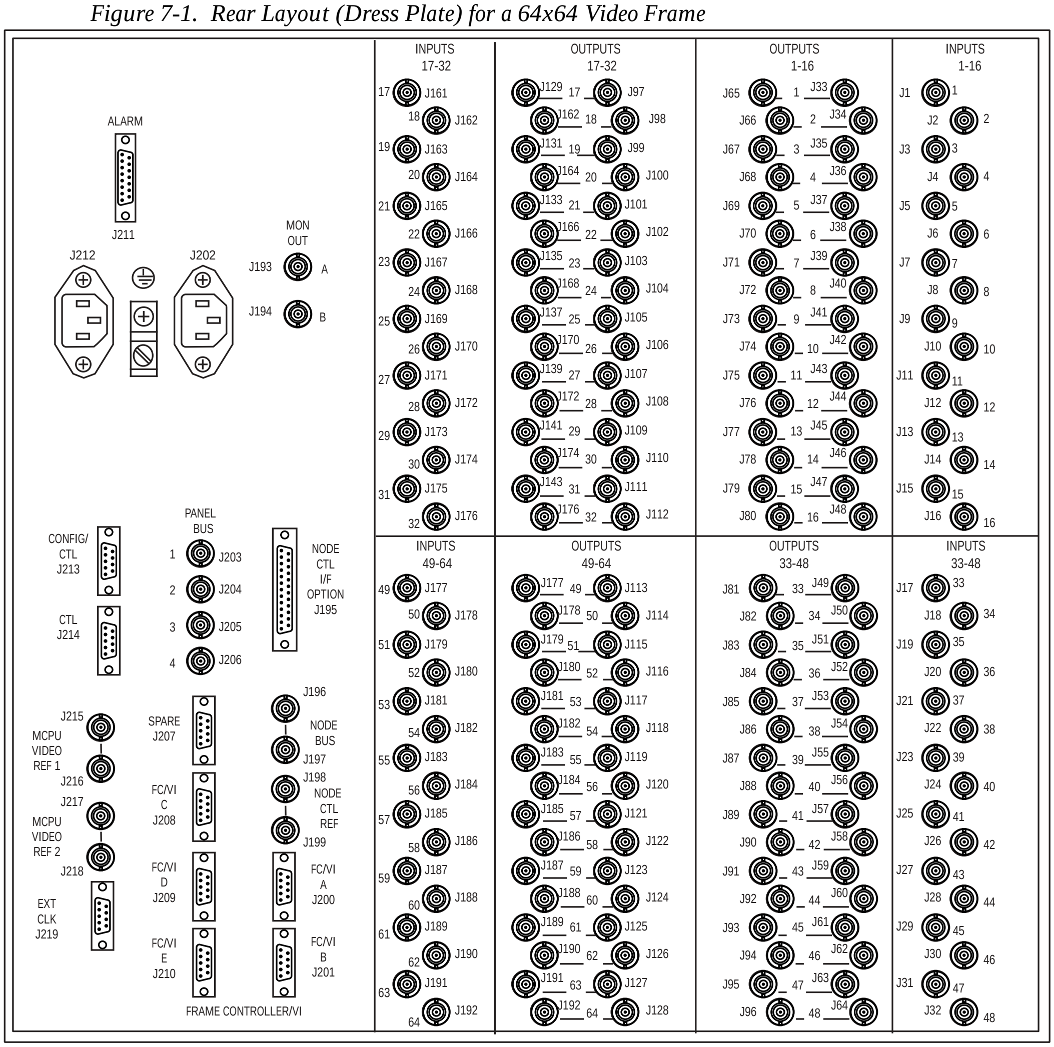
The video connector locations for the SMS-V64x64 are the same for both wideband analog and serial digital video. There are duplicate feeds for each output number.

The 64x64 Video Frame

The 64x64 video frame allows one matrix in a 12 rack-unit frame. The matrix can be sized from 16x16 up to 64x64. The frame accepts MCPU and Node Control Modules (both main and redundant). It also accepts the optional Video Output Monitor (VOM) module. Control connections are covered in Section 3, Frame Installation in this manual.

Only the video input and output connections are covered here. See Figure 7-1 for an illustration of input and output connector locations on the back of the 64x64 video frame.

Figure 7-1. Rear Layout (Dress Plate) for a 64x64 Video Frame



Expanded Video Systems

On the following pages are illustrations of the video connector locations for these matrix frames:

- 128x64 V
- 128x96 V
- 128x128 V

These connector locations are the same for both wideband analog and serial digital video. There are duplicate feeds for each output number.

The 128x64 Video Frame

The 128x64 video frame allows one matrix in an 18 rack-unit frame. The matrix can be sized from 16x16 up to 128x64. This system receives DC power from a supply in a separate three rack-unit frame (6.5 feet or 2 meters maximum cable run). Power supply and control connections are covered in Section 3, Frame Installation in this manual.

Only the video input and output connections are covered here. See Figure 7-2 through Figure 7-5 on the following pages for illustrations of input and output connector locations on the back of the 128x64 video frame.

Figure 7-2. Rear Layout (Dress Plates) for a 128x64 Video Frame

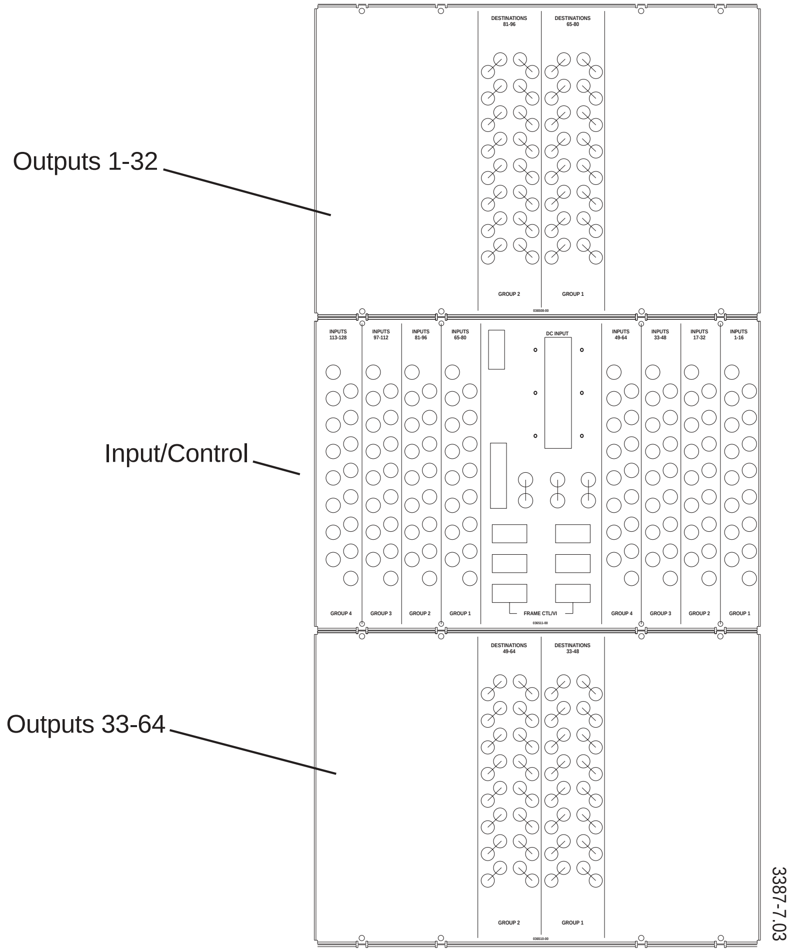


Figure 7-3. Video Matrix Output Assignment for the 128x64 V (top frame)

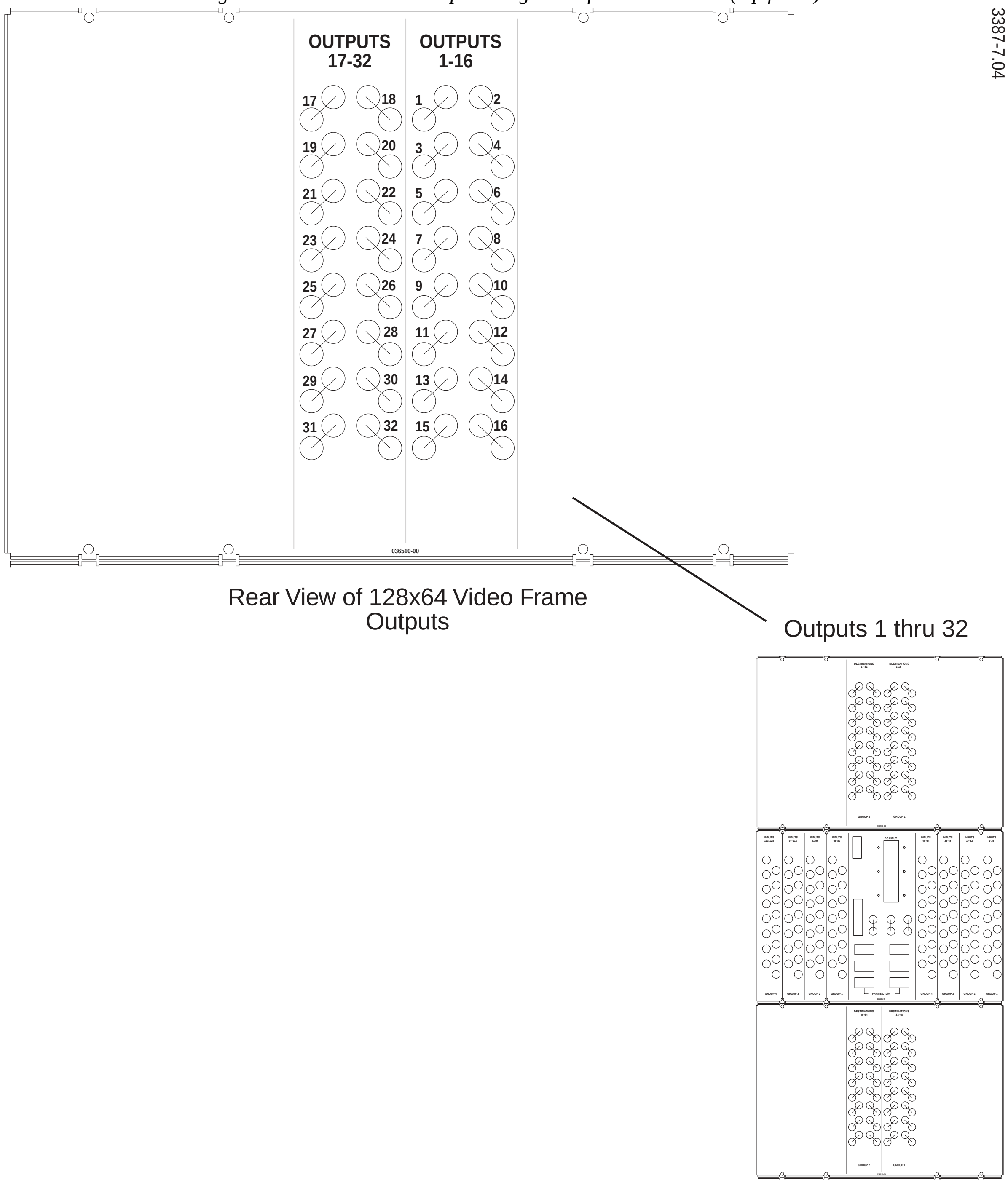


Figure 7-4. Video Matrix Input Assignment for the 128x64 V

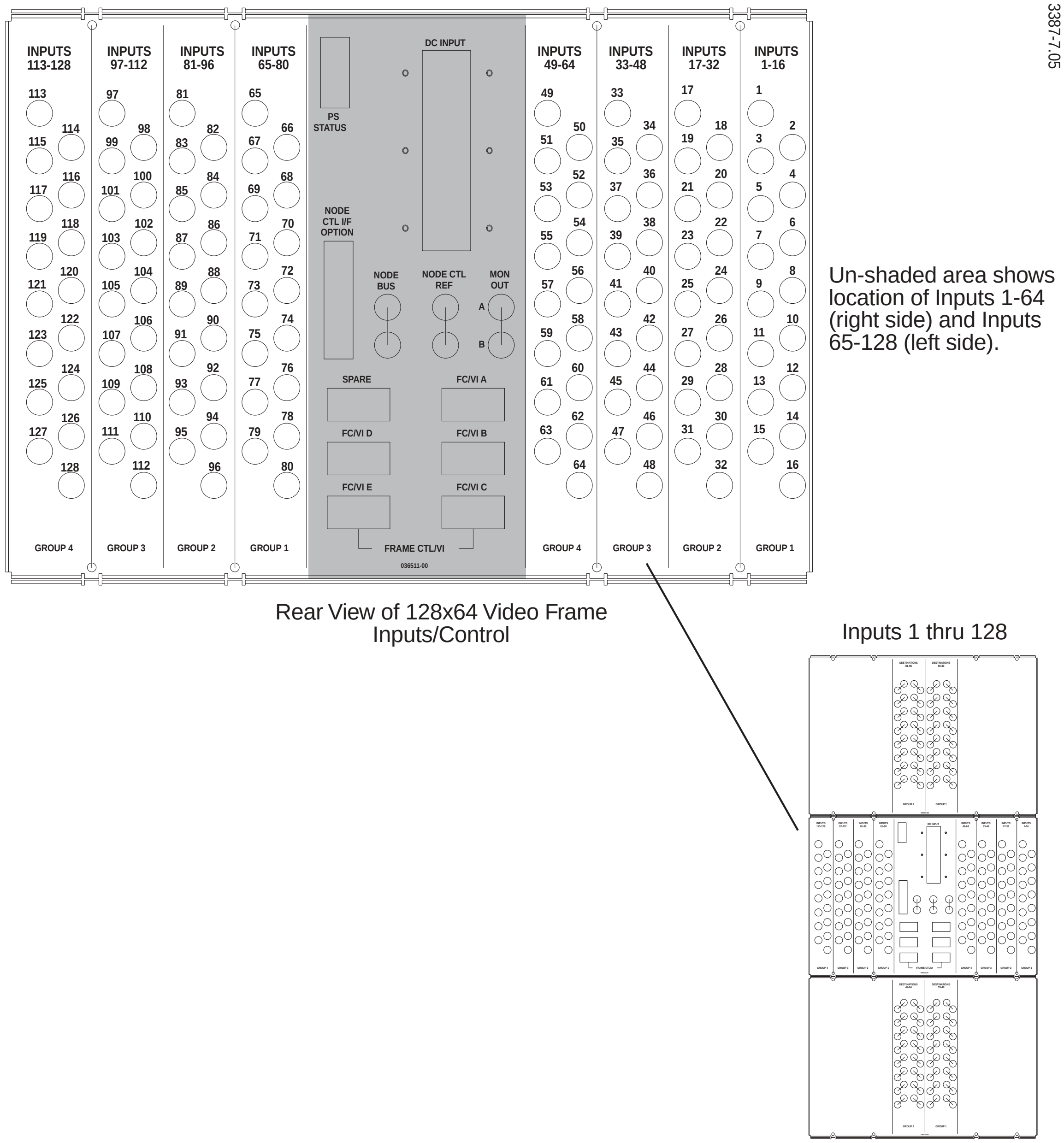
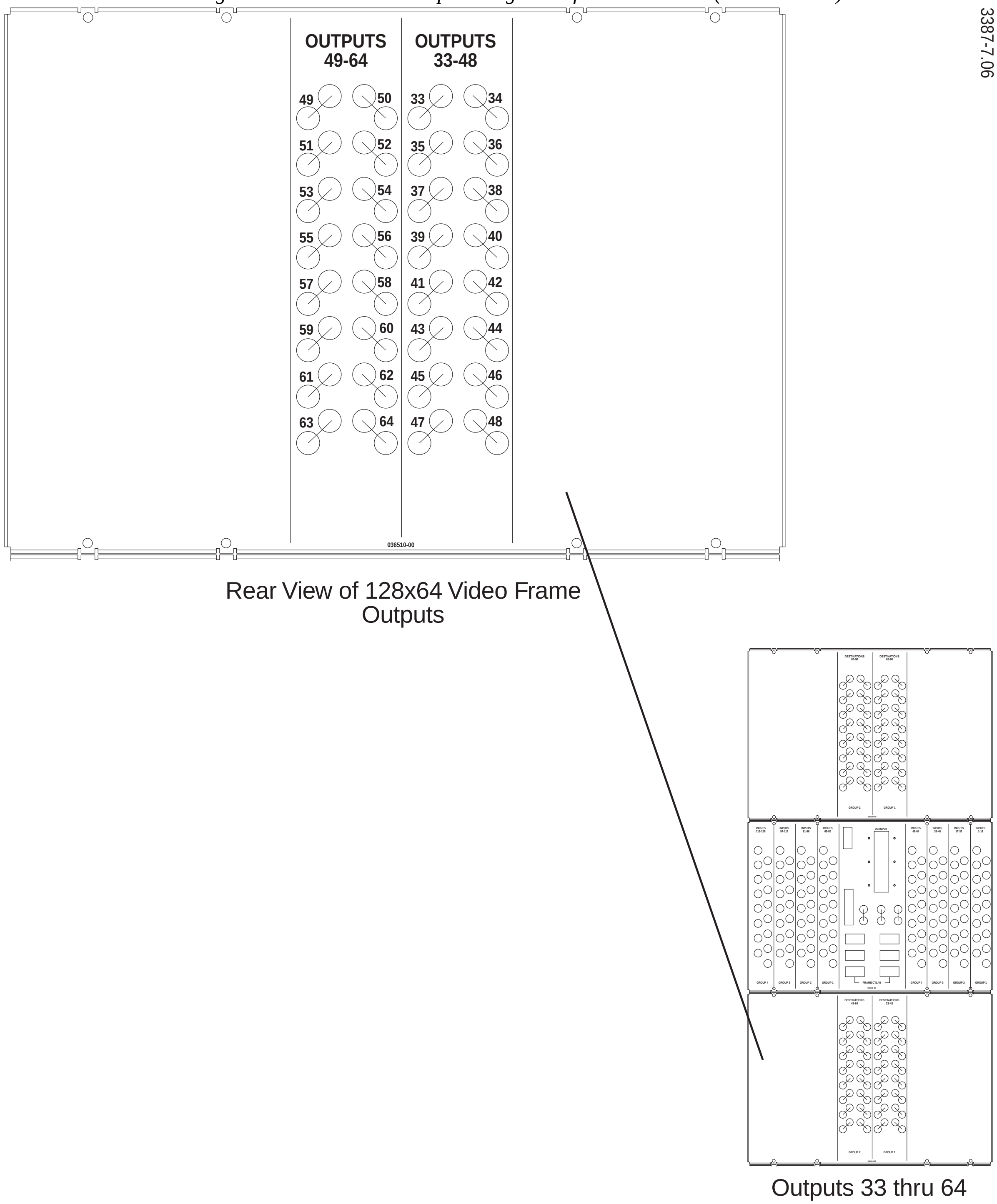


Figure 7-5. Video Matix Output Assignment for the 128x64 V (Bottom Frame)



The 128x96 Video Frame

The 128x96 video frame allows one matrix in a 24 rack-unit frame. The expanded system architecture adds a six rack-unit frame section for outputs 65-96 to an existing 128x64 frame. A separate power supply in a three rack-unit frame (6.5 feet or 2 meters maximum cable run) is included in this system. Power supply and control connections are covered in Section 3, Frame Installation in this manual.

Only the video output connections 65 through 96 are covered here. See Figure 7-6 and Figure 7-7 for illustrations of these output connectors on the back of the 128x96 video frame. See the 128x64 Video Frame, if you need information about the other connections.

Figure 7-6. Rear Layout (Dress Plate) for a 128x96 Video Frame

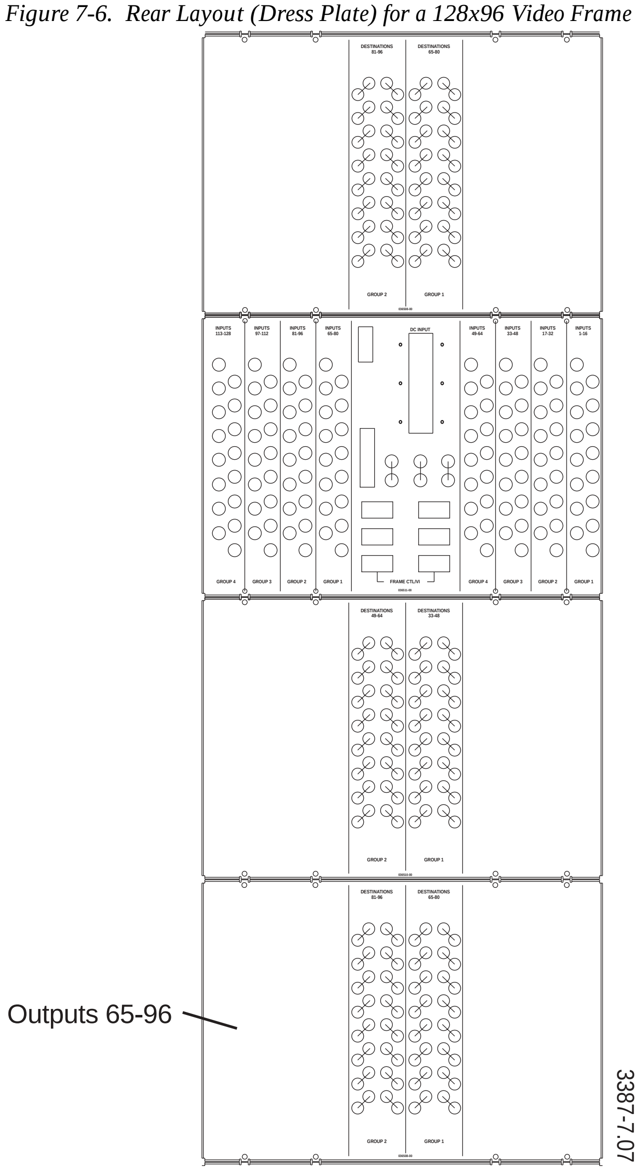
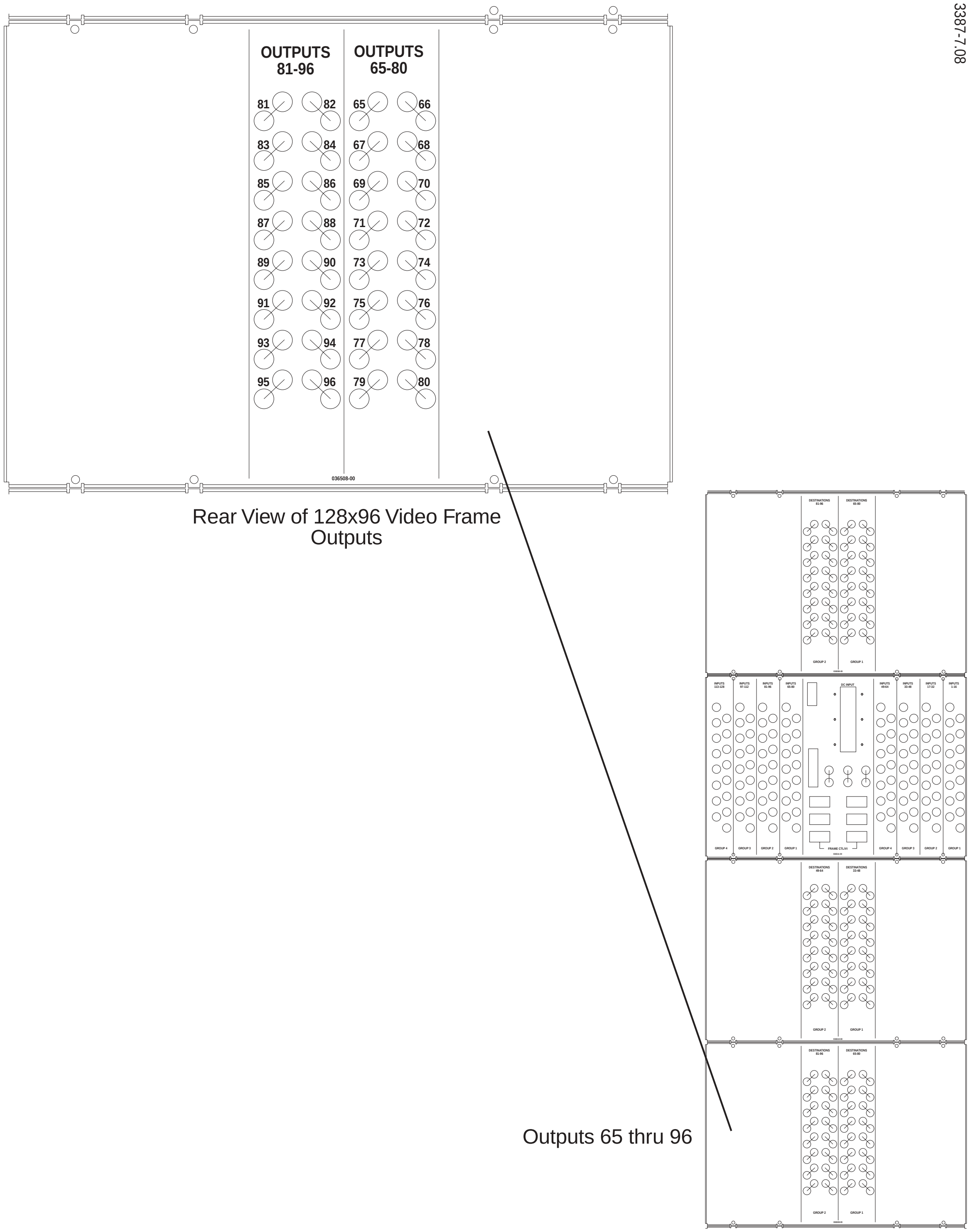


Figure 7-7. Video Matrix Output Assignment for the 128x96 V (bottom frame)

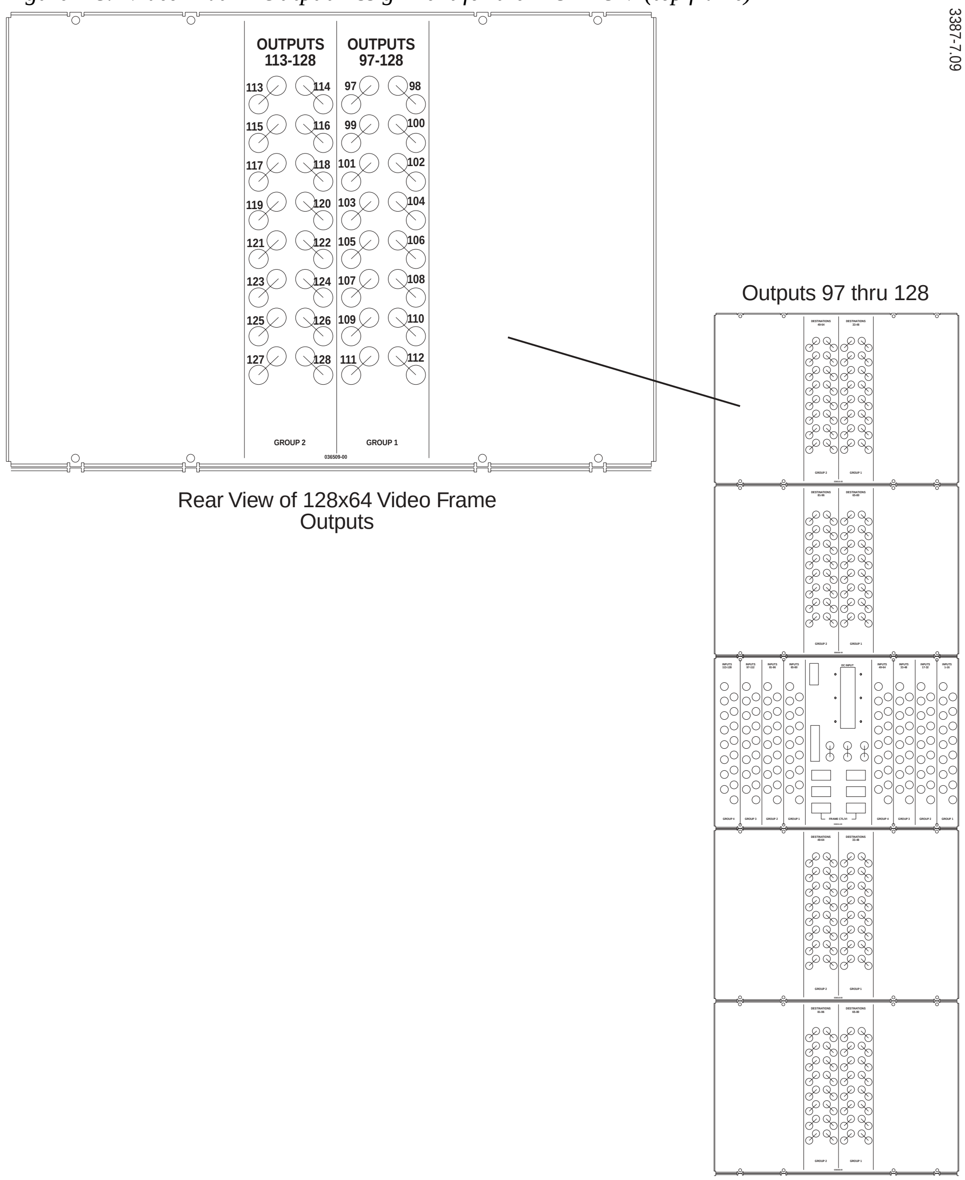


The 128x128 Video Frame

The 128x128 video frame allows one matrix in a 30 rack-unit frame. The expanded system architecture adds a six rack-unit frame section for outputs 97-128 to an existing 128x96 frame. A separate power supply in a three rack-unit frame (6.5 feet or 2 meters maximum distance) is included in this system. Power supply and control connections are covered in Section 3, Frame Installation in this manual.

Only video output connections 97 through 128 are covered here. See Figure 7-8 for an illustration of these output connectors on the back of the 128x128 video frame. See the 128x64 Video Frame, and the 128x96 Video Frame, if you need information about the other connections.

Figure 7-8. Video Matrix Output Assignment for the 128x128 V (top frame)



High Density Video Systems

On the following pages are illustrations of the video connector locations for these matrix frames:

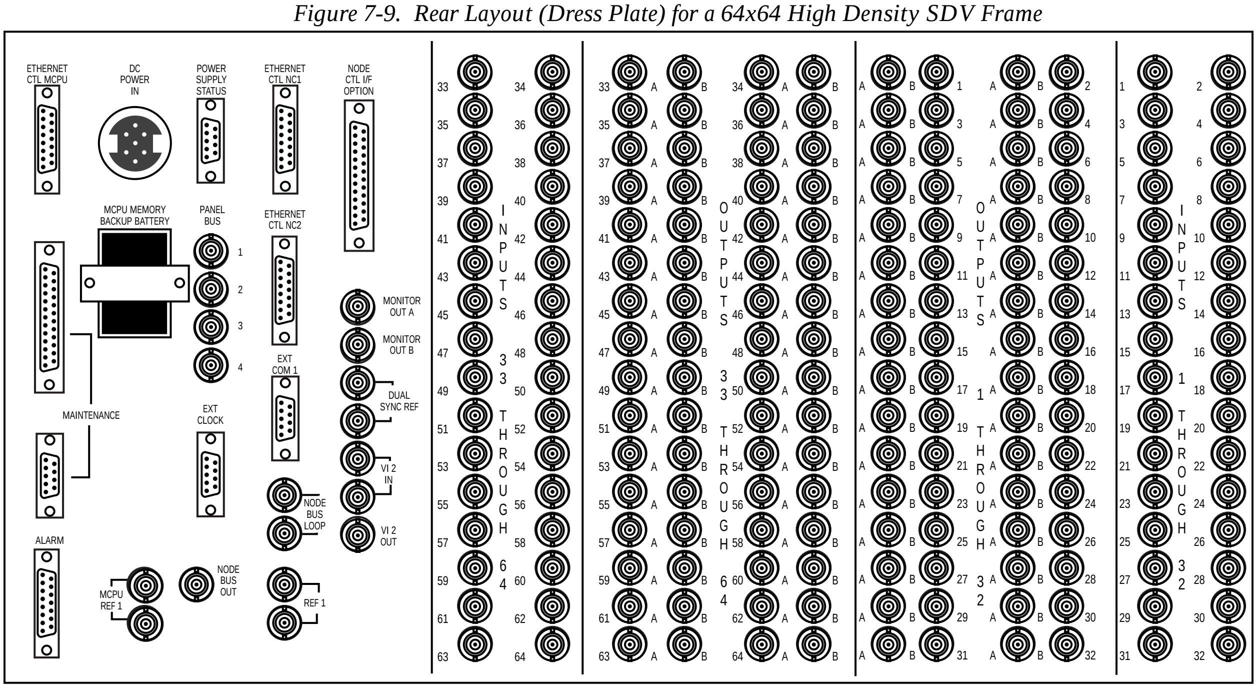
- 64x64 SDV
- 128x128 SDV
- 256x128 SDV

These connector locations are for serial digital video. There are duplicate feeds for each output number.

64x64 Serial Digital Video Frame

The 64x64 serial digital video frame has one matrix in a six rack-unit frame. This system receives DC power from a supply in a separate three rack-unit frame (6.5 feet or 2 meters maximum cable run). Power supply and control connections are covered in Section 3, Frame Installation in this manual.

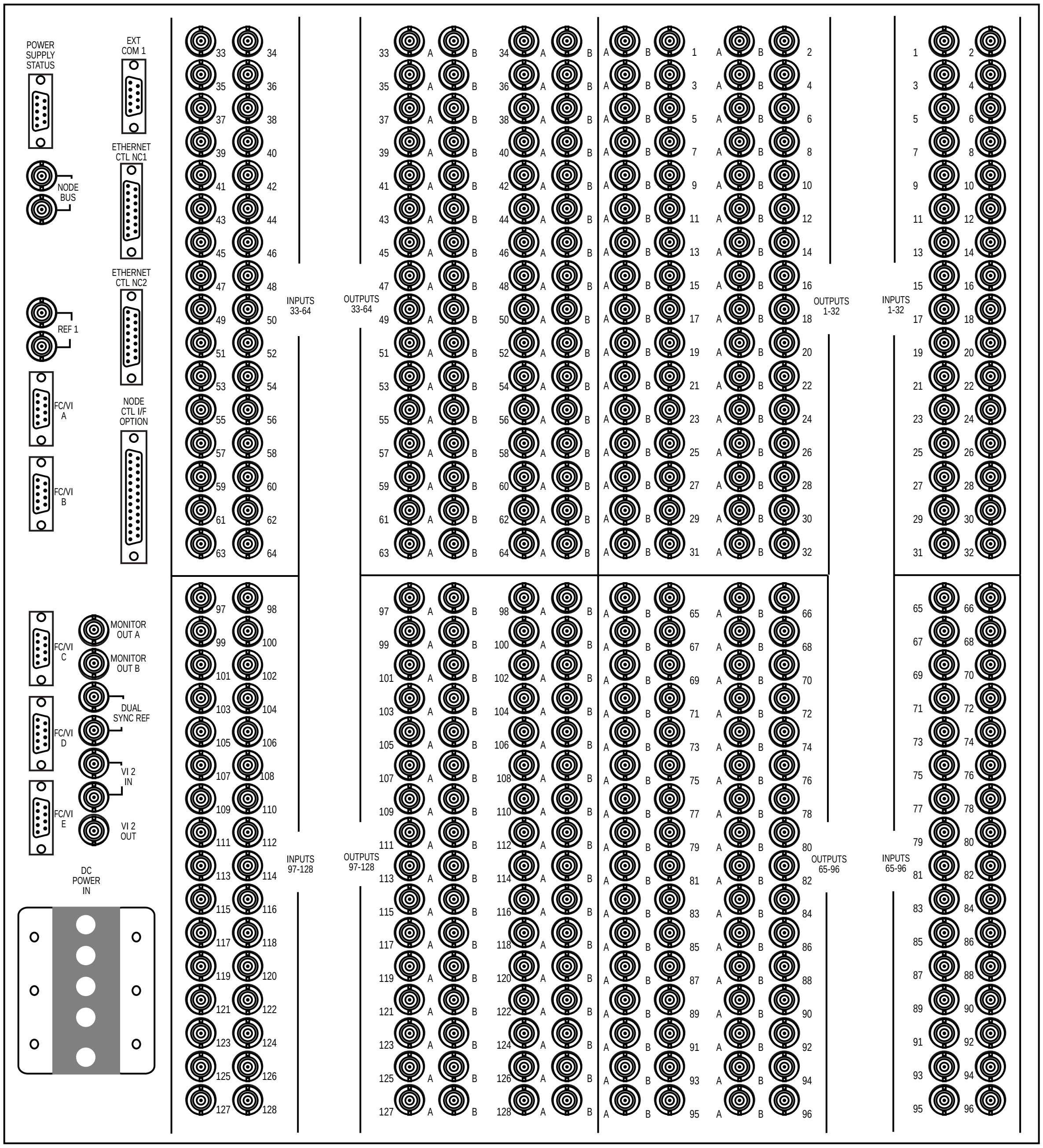
Figure 7-9. Rear Layout (Dress Plate) for a 64x64 High Density SDV Frame



128x128 Serial Digital Video Frame

The 128x128 serial digital video frame has one matrix in a twelve rack-unit frame. The matrix can be sized from 16x16 up to 128x128. This system receives DC power from a supply in a separate three rack-unit frame (6.5 feet or 2 meters maximum cable run). Power supply and control connections are covered in Section 3, Frame Installation in this manual.

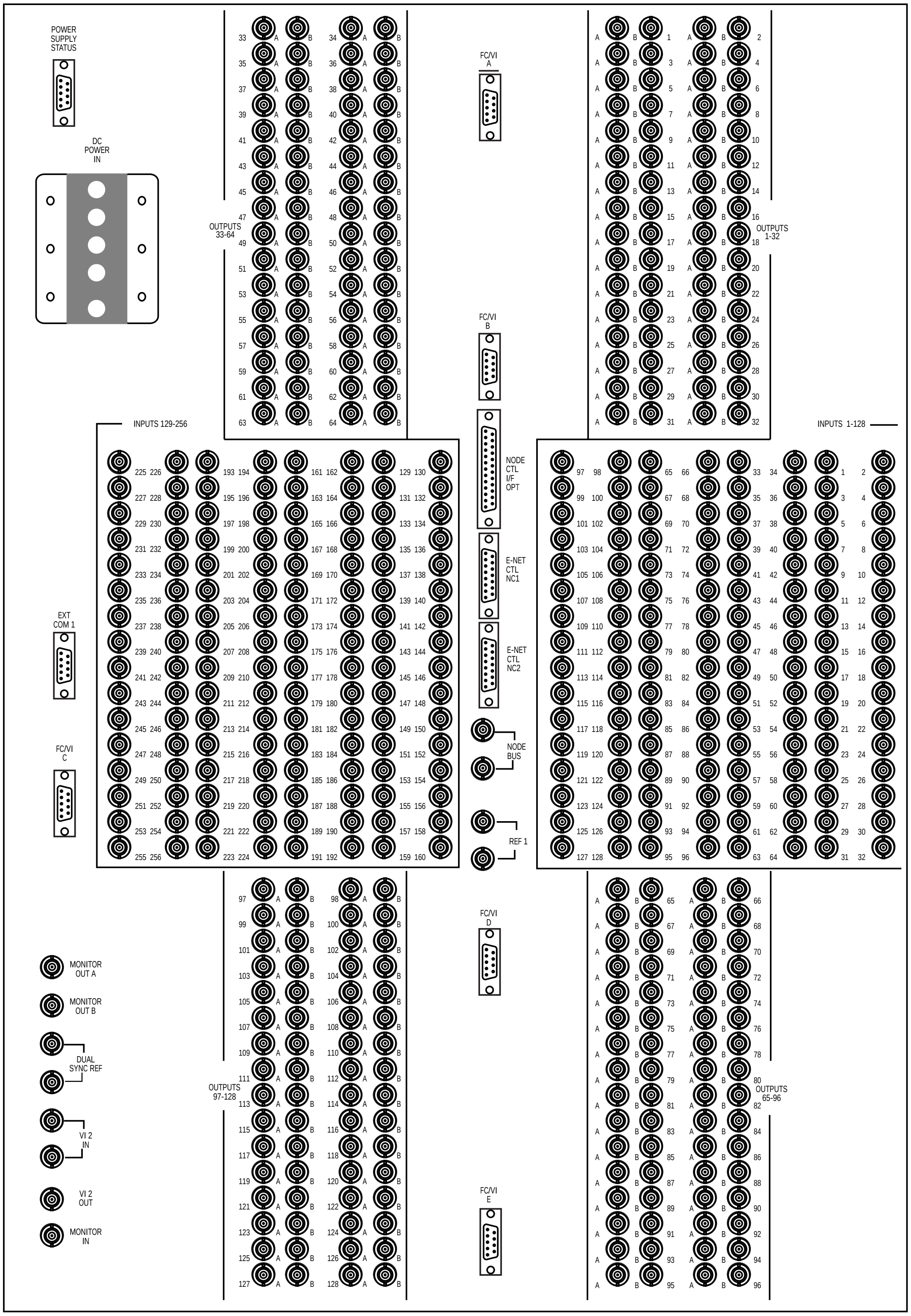
Figure 7-10. Rear Layout (Dress Plate) for a 128x128 High Density SDV Frame



256x128 Serial Digital Video Frame

The 256x128 serial digital video frame has one matrix in a eighteen rack-unit frame. The matrix can be sized from 64x64 up to 256x128. This system receives DC power from a supply in a separate three rack-unit frame (6.5 feet or 2 meters maximum cable run). Power supply and control connections are covered in Section 3, Frame Installation in this manual. See Figure 7-11.

Figure 7-11. Rear Layout (Dress Plate) for a 256x128 High Density SDV Frame



Secondary Matrix Interconnect Cabling

Secondary systems using secondary switches and / or distribution amplifiers require coax cabling from DA frames to primary matrices and from primary matrices to secondary frames. This section illustrates the connectors on the various frames in the system.

Secondary Video Systems (2x1/1x2)

Each 2x1 switch is labeled with an SWxx number. Connectors are arranged in groups of four—two inputs (1 & 2) and two outputs (A & B), each with a discrete J-number (jack number). The diagonal line between output connectors (A to B) indicates that they are duplicate feeds of a single output signal.

Each 1x2 channel is labeled with a DAxx number. Connectors are arranged in groups of three—one input (IN) and two outputs (A & B), each with a discrete J-number (jack number). The diagonal line between output connectors (A to B) indicates that they are duplicate feeds of a single output signal.

Figure 7-12. Connector Layout for the Secondary Switch Frame

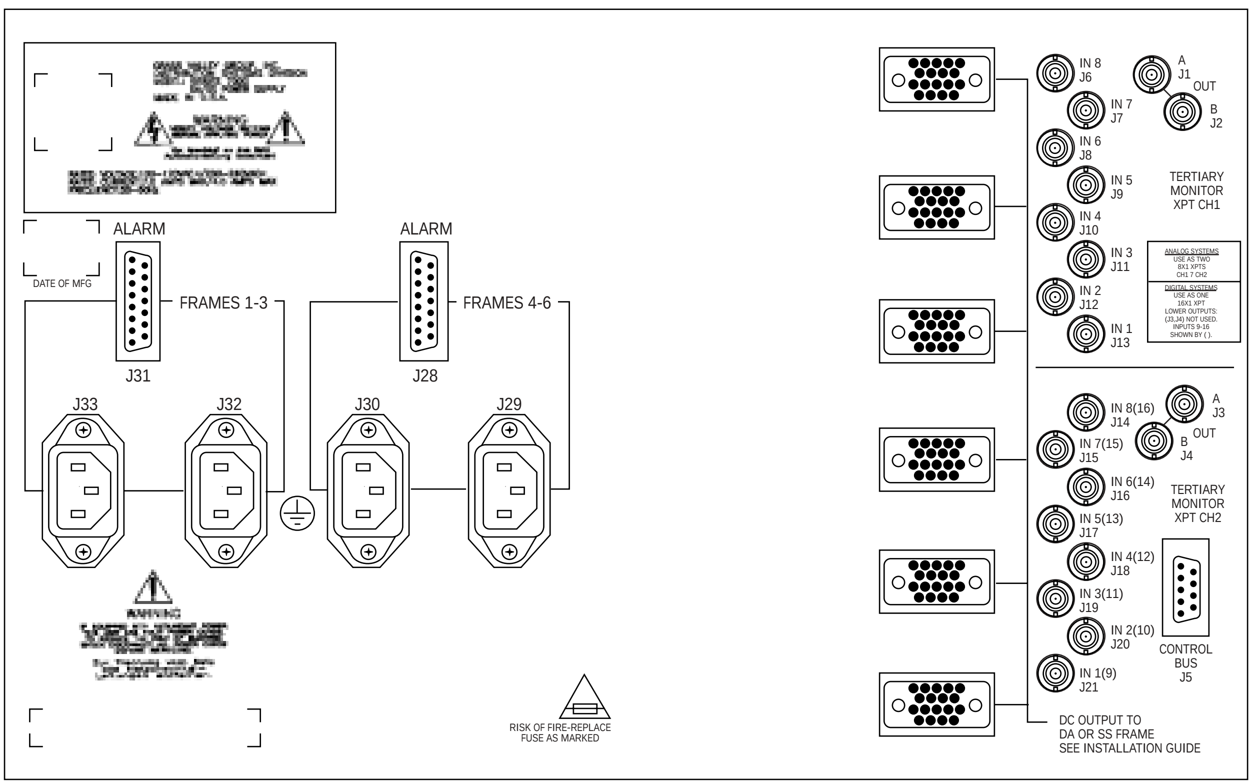
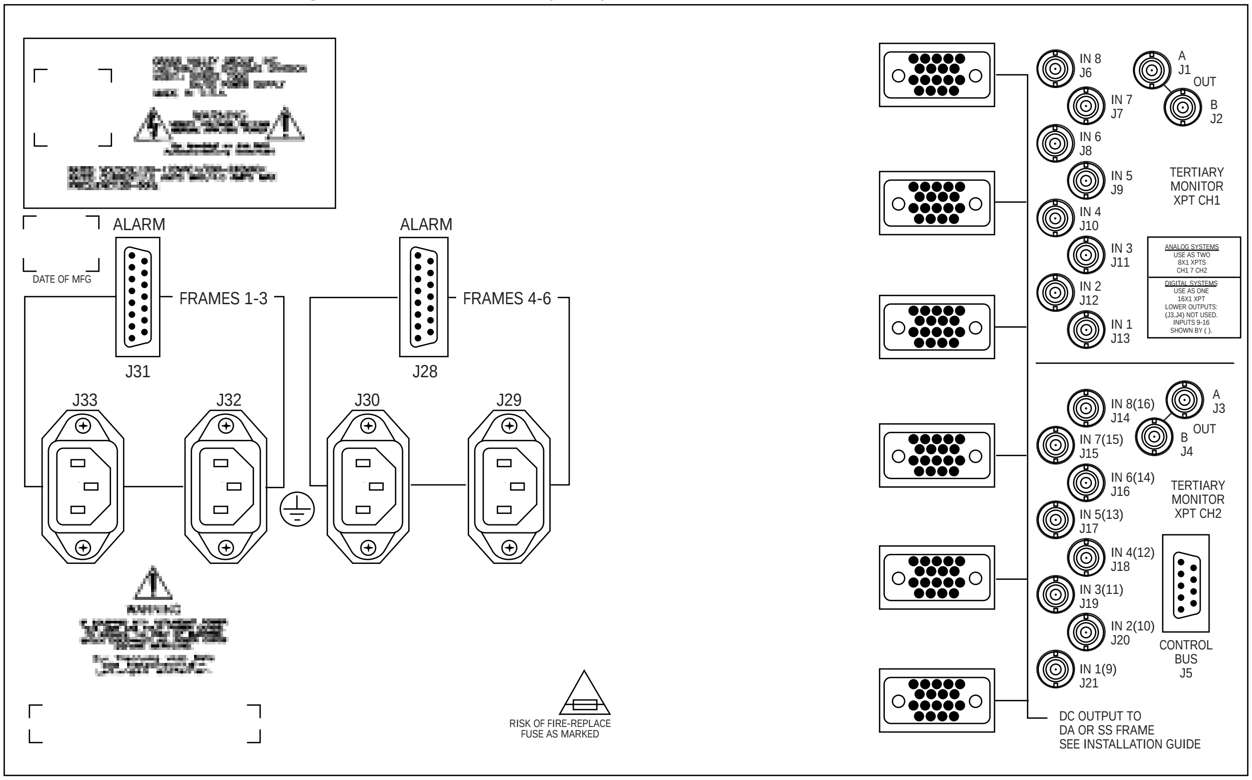


Figure 7-13. Connector Layout for the DA/PS Frame



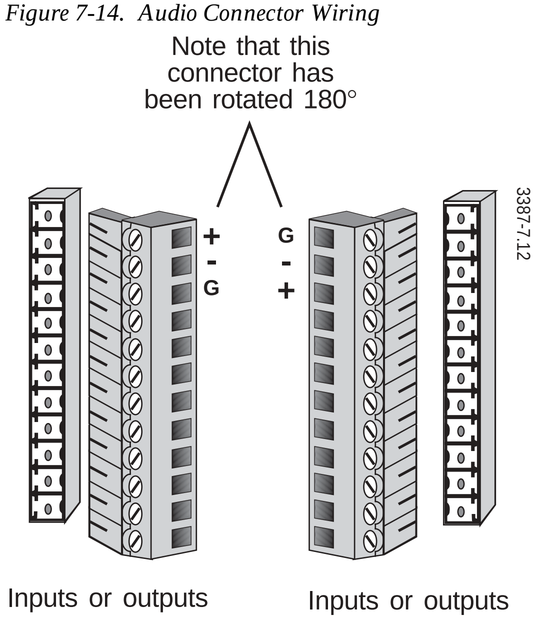
Audio Matrices

Audio matrix frames are available in either Analog or Digital versions. If you intend, in the future, to migrate from analog to digital audio, consider using Digital frames stuffed with analog modules. This simplifies your future upgrade to a simple module swap. This manual sub-section addresses first Analog, then Digital frames.

Analog Audio Input and Output Characteristics

- Connectors: compression-sleeve terminal blocks.
- Recommended cable: Belden 8450 / 51 or equivalent for up to 500 ft. (152 m.)
- When wiring audio connectors, keep the dress-back (exposed conductor) of each wire to a minimum for crosstalk protection. Leave the cable shields for input cables disconnected to eliminate ground current from source machines. Connect output cable shields only at the Series 7000 end, not at the destination machine.
- Some connectors are reversed to make efficient use of space on the back of the frame and that the order of polarity of their connections (–, +) is also reversed. This is illustrated in Figure 7-14 below.

Figure 7-14. Audio Connector Wiring



Inputs

- Impedance:
  - 32 outputs = 64K Ohms
  - 64 outputs = 32K Ohms
  - 128 outputs = 16K Ohms

Outputs

- Impedance: 36 Ohms

Analog Audio Connections

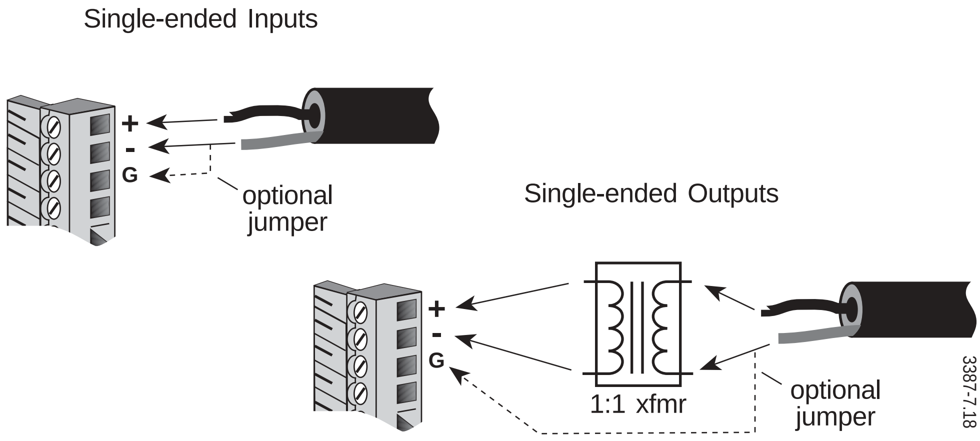
Input and output connectors are assigned to Source and Destination names during System Configuration. A Source may consist of an input on one or more levels (Source 1 might consist of a video input on level 1, a left audio input on level 2, and a right audio input on level 3). A Destination may consist of an output on one or more levels (Destination 1 might consist of a video output on level 1, a left audio output on level 2, and a right audio output on level 3).

Input and Output J-Numbers

Each signal input and output connector on each type of system is uniquely identified with its own J-Number (J = Jack). J-Numbers help you label and connect cables. Four audio signals share each terminal block connector.

Note Series 7000 audio is designed for differential signal inputs and outputs. Single-ended signals are NOT recommended due to noise and cross-talk considerations. Single-ended Input and Output connections are shown in Figure 7-15. (When making connections, remember that some of the terminal connectors are turned 180°.)

Figure 7-15. Wiring Single-ended Audio Inputs and Outputs



Compact Analog Systems

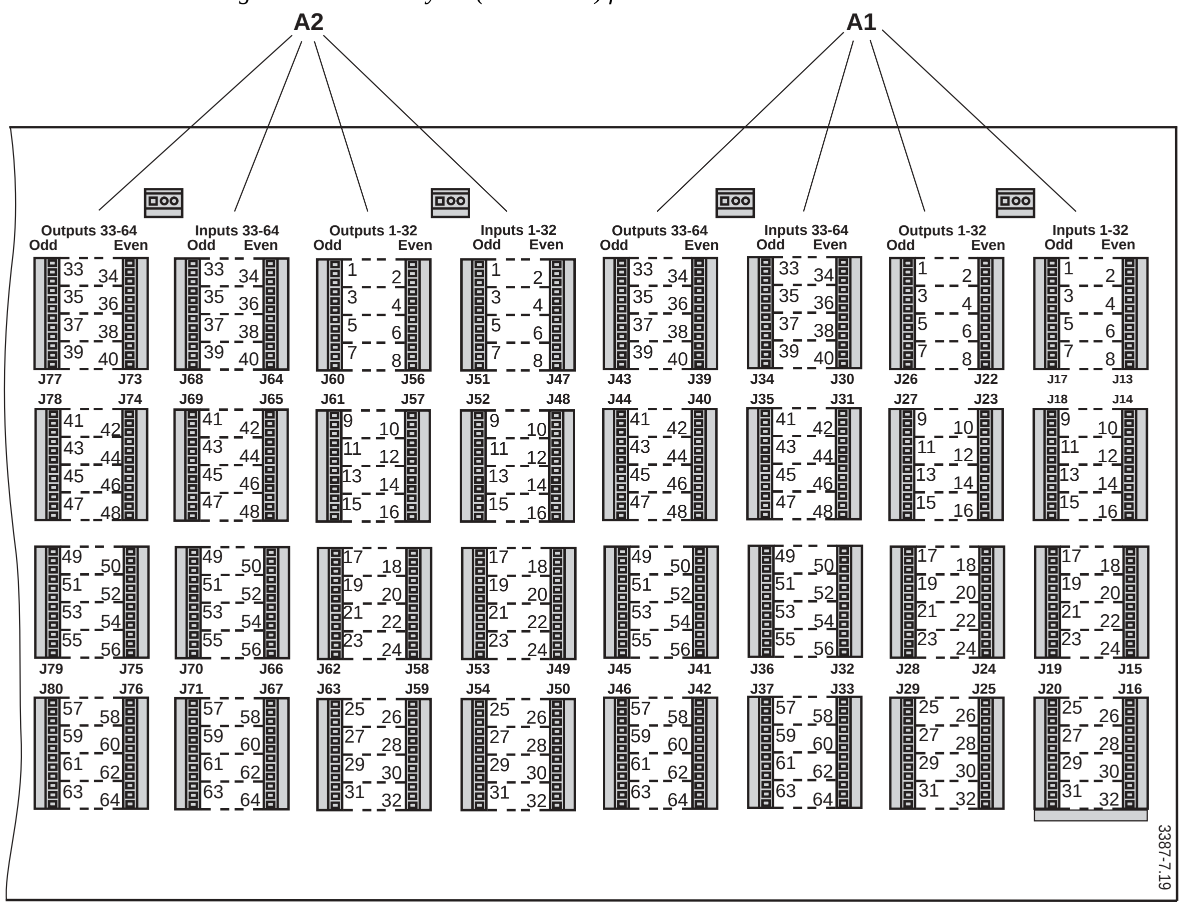
On the following pages are illustrations of and tables for the analog audio connector locations and J-Numbers for these matrices:

- 64x64 AA
- 128x64 A
- 128x128 A

Dual 64x64 Analog Audio Frame

The dual 64x64 analog audio frame is six rack units in height. There is no MCPU in the frame, instead, it must be controlled by a Stand-alone Controller Frame or a video frame with MCPU. Making control connections is covered in Section 3, Frame Installation in this manual. Only the audio input and output connections are covered here. See Figure 7-16 for an illustration of input and output connectors on the frame.

Figure 7-16. Rear Layout (Dress Plate) for a 64x64 AA



Dual 64x64 AA Assigned J-Number Tables

The tables on the following pages provide J-Numbers assigned to each of the input and output connectors for this frame. Refer to Table 7-1 and Figure 7-17.

Table 7-1. Audio Matrix # 1 J-Number Assignment for 64x64 AA

Outputs				**Inputs**			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
1	J26	2	J22	1	J17	2	J13
3		4		3		4	
5		6		5		6	
7		8		7		8	
9	J27	10	J23	9	J18	10	J14
11		12		11		12	
13		14		13		14	
15		16		15		16	
17	J28	18	J24	17	J19	18	J15
19		20		19		20	
21		22		21		22	
23		24		23		24	
25	J29	26	J25	25	J20	26	J16
27		28		27		28	
29		30		29		30	
31		32		31		32	
33	J43	34	J39	33	J34	34	J30
35		36		35		36	
37		38		37		38	
39		40		39		40	
41	J44	42	J40	41	J35	42	J31
43		44		43		44	
45		46		45		46	
47		48		47		48	
49	J45	50	J41	49	J36	50	J32
51		52		51		52	
53		54		53		54	
55		56		55		56	
57	J46	58	J42	57	J37	58	J33
59		60		59		60	
61		62		61		62	
63		64		63		64	

Figure 7-17. 64x64 Audio Frame (Rear View)

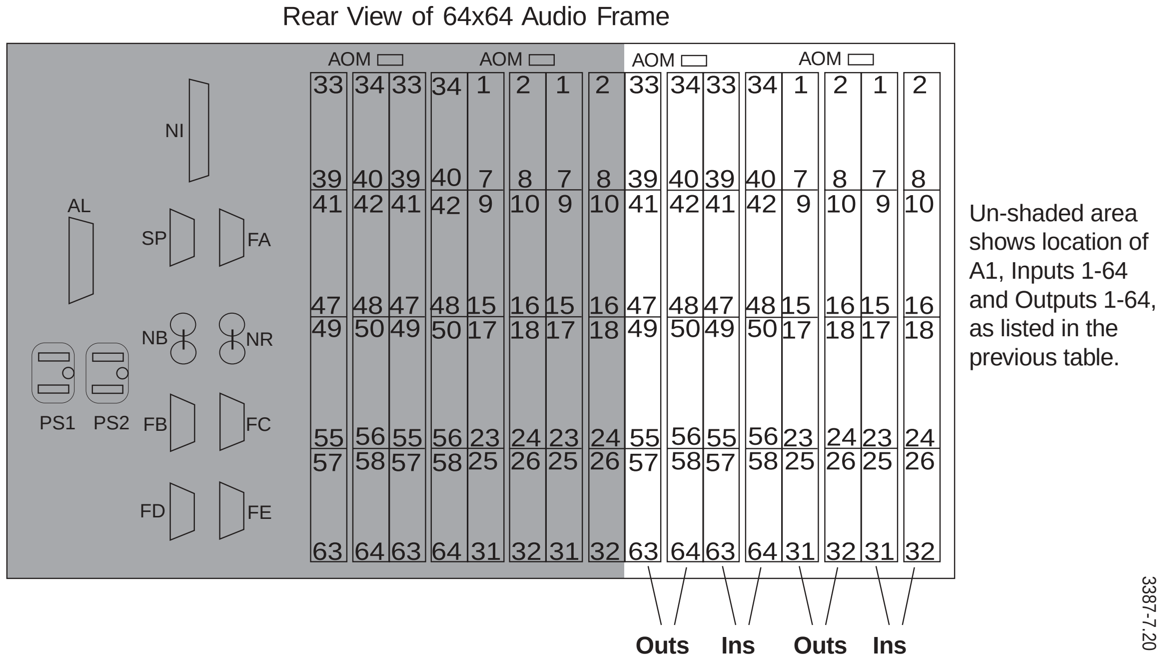


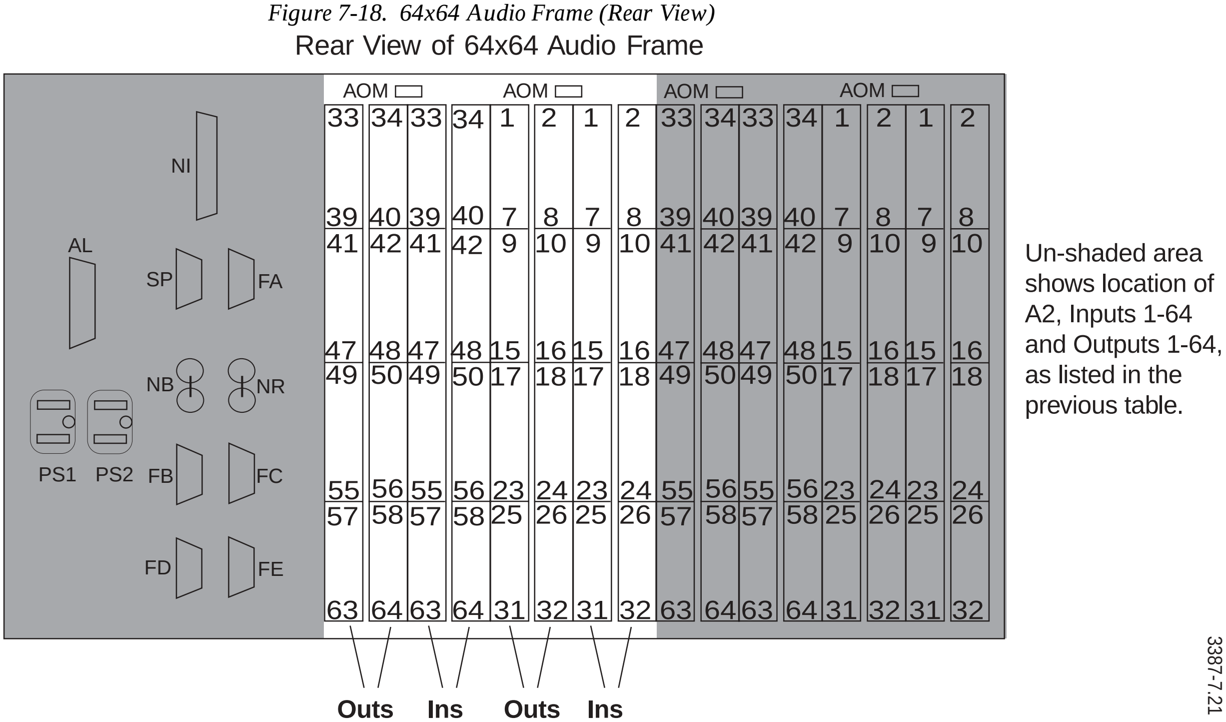
Table 7-2. Audio Matrix # 2 J-Number Assignment for 64x64 AA

Outputs				Inputs			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
1	J60	2	J56	1	J51	2	J47
3		4		3		4	
5		6		5		6	
7		8		7		8	
9	J61	10	J57	9	J52	10	J48
11		12		11		12	
13		14		13		14	
15		16		15		16	
17	J62	18	J58	17	J53	18	J49
19		20		19		20	
21		22		21		22	
23		24		23		24	
25	J63	26	J59	25	J54	26	J50
27		28		27		28	
29		30		29		30	
31		32		31		32	
33	J77	34	J73	33	J68	34	J64
35		36		35		36	
37		38		37		38	

Table 7-2. Audio Matrix # 2 J-Number Assignment for 64x64 AA - (continued)

Outputs				**Inputs**			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
39		40		39		40	
41	J78	42	J74	41	J69	42	J65
43		44		43		44	
45		46		45		46	
47		48		47		48	
49	J79	50	J75	49	J70	50	J66
51		52		51		52	
53		54		53		54	
55		56		55		56	
57	J80	58	J76	57	J71	58	J67
59		60		59		60	
61		62		61		62	
63		64		63		64	

Figure 7-18. 64x64 Audio Frame (Rear View)

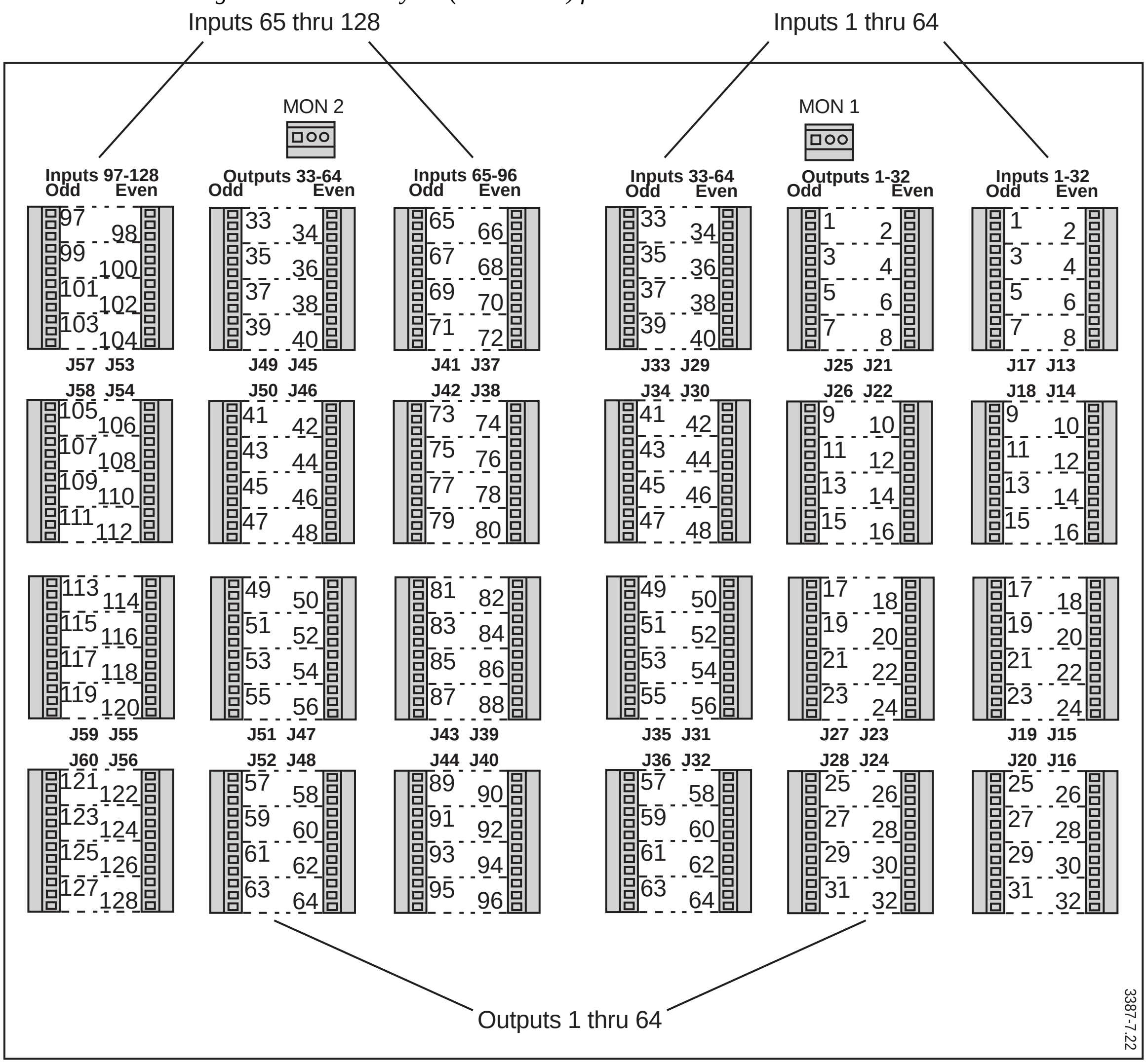


The 128x64 Analog Audio Frame

The 128x64 analog audio frame is six rack units in height. Each Physical Matrix can be sized from 32x32 up to 128x64. The frame contains no MCPU and must be connected to a Stand-alone Controller Frame or to a video frame with MCPU. Control connections are covered in Section 3, Frame Installation in this manual.

Audio input and output connections are covered here. See Figure 7-19 for an illustration of input and output connectors on the back of the frame.

Figure 7-19. Rear Layout (Dress Plate) for a 128x64 A



128x64 A Assigned J-Numbers Tables

The tables on this and the following pages provide the J-Numbers assigned to each of the input and output connections for this frame.

Table 7-3. Audio Matrix J-Number Assignment for 128x64 A (1-32)

Outputs				Inputs			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
1	J25	2	J21	1	J17	2	J13
3		4		3		4	
5		6		5		6	
7		8		7		8	
9	J26	10	J22	9	J18	10	J14
11		12		11		12	
13		14		13		14	
15		16		15		16	
17	J27	18	J23	17	J19	18	J15
19		20		19		20	
21		22		21		22	
23		24		23		24	
25	J28	26	J24	25	J20	26	J16
27		28		27		28	
29		30		29		30	
31		32		31		32	

Figure 7-20. 128x64 Audio Frame (Rear View)

Rear View of 128x64 Audio Frame

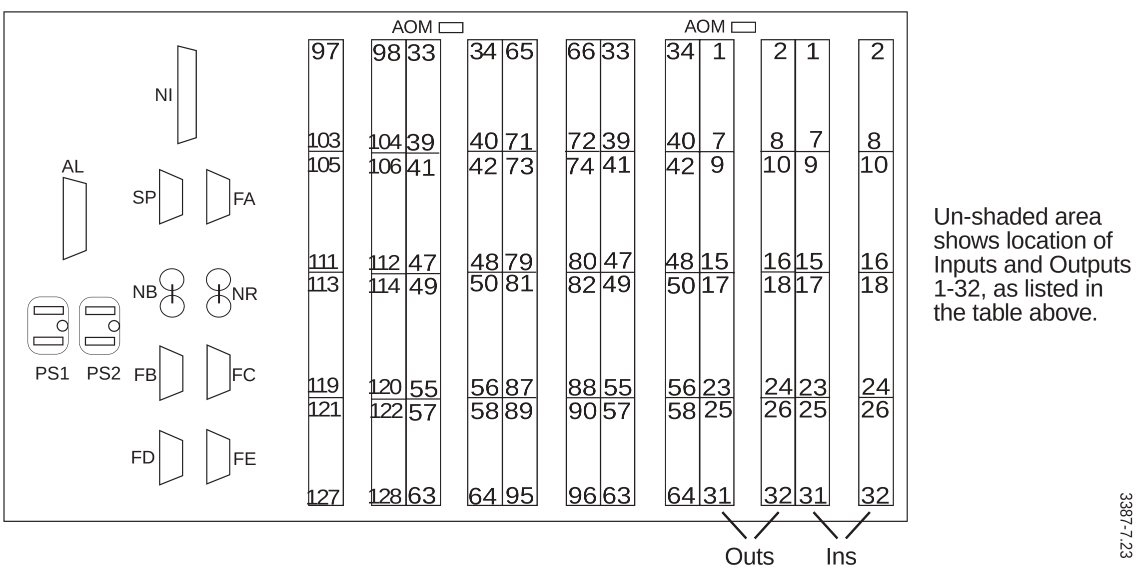


Table 7-4. Audio Matrix J-Number Assignment for 128x64 A (65-96)

Outputs				**Inputs**			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
65	J41	66	J37	65	J33	66	J29
67		68		67		68	
69		70		69		70	
71		72		71		72	
73	J42	74	J38	73	J34	74	J30
75		76		75		76	
77		78		77		78	
79		80		79		80	
81	J43	82	J39	81	J35	82	J31
83		84		83		84	
85		86		85		86	
87		88		87		88	
89	J44	90	J40	89	J36	90	J32
91		92		91		92	
93		94		93		94	
95		96		95		96	

Figure 7-21. 128x64 Audio Frame (Rear View)

Rear View of 128x64 Audio Frame

Un-shaded area shows location of Inputs 33-96, as listed in the table above.

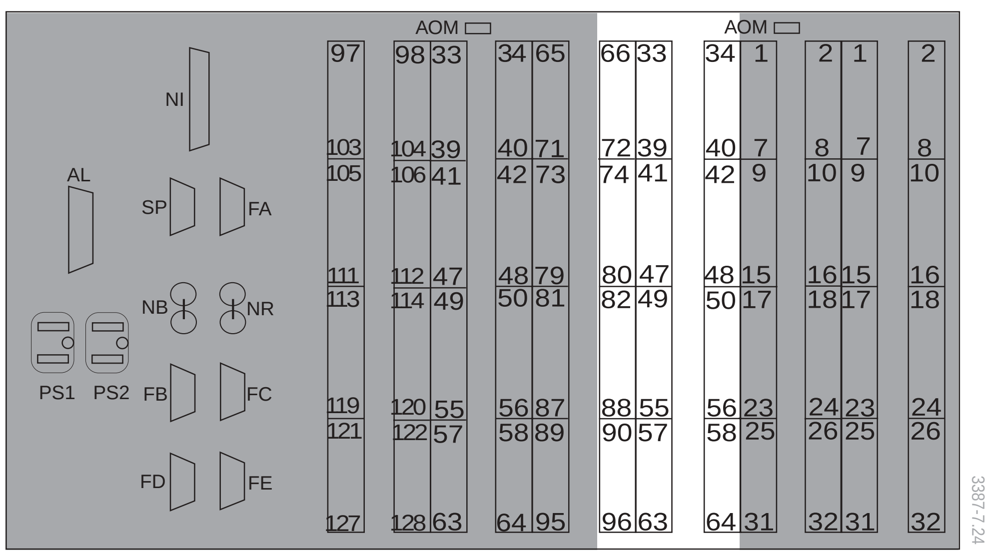
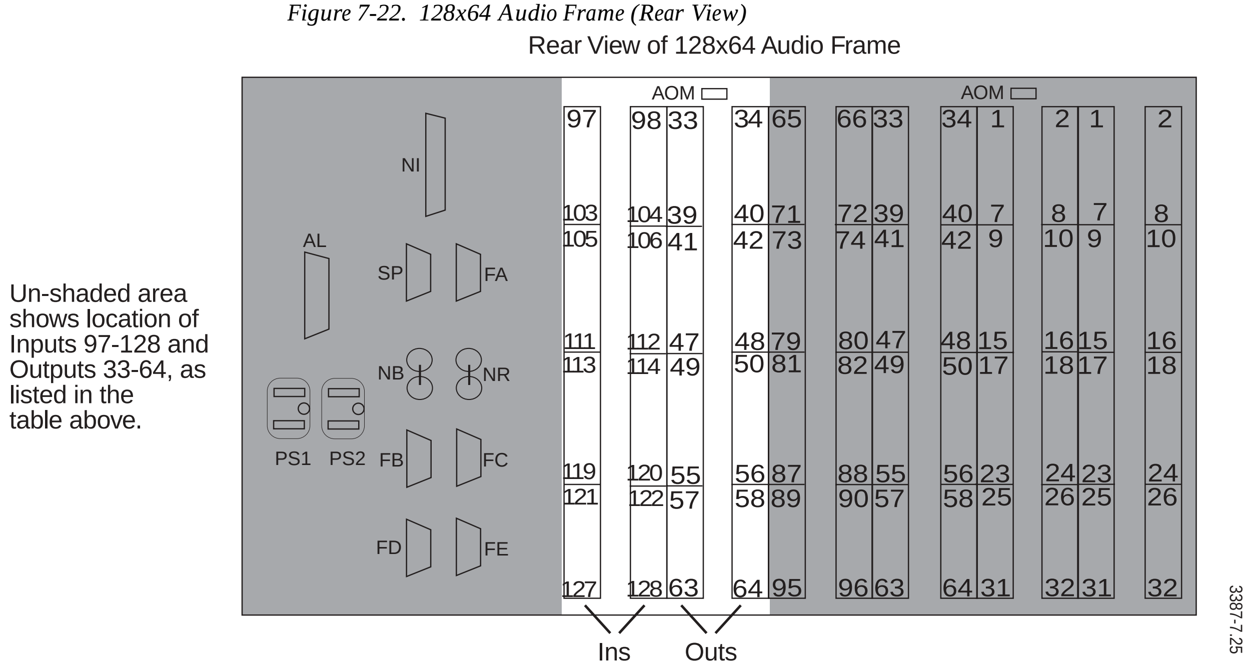


Table 7-5. Audio Matrix J-Number Assignment for 128x64 A (97-128)

Outputs				**Inputs**			
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
97	J57	98	J53	97	J49	98	J45
99		100		99		100	
101		102		101		102	
103		104		103		104	
105	J58	106	J54	105	J50	106	J46
107		108		107		108	
109		110		109		110	
111		112		111		112	
113	J59	114	J55	113	J51	114	J47
115		116		115		116	
117		118		117		118	
119		120		119		120	
121	J60	122	J56	121	J52	122	J48
123		124		123		124	
125		126		125		126	
127		128		127		128	

Figure 7-22. 128x64 Audio Frame (Rear View)



Expanded Analog Audio Systems

On the following pages are illustrations of and tables for the analog audio connector locations and J-Numbers for this matrix frame:

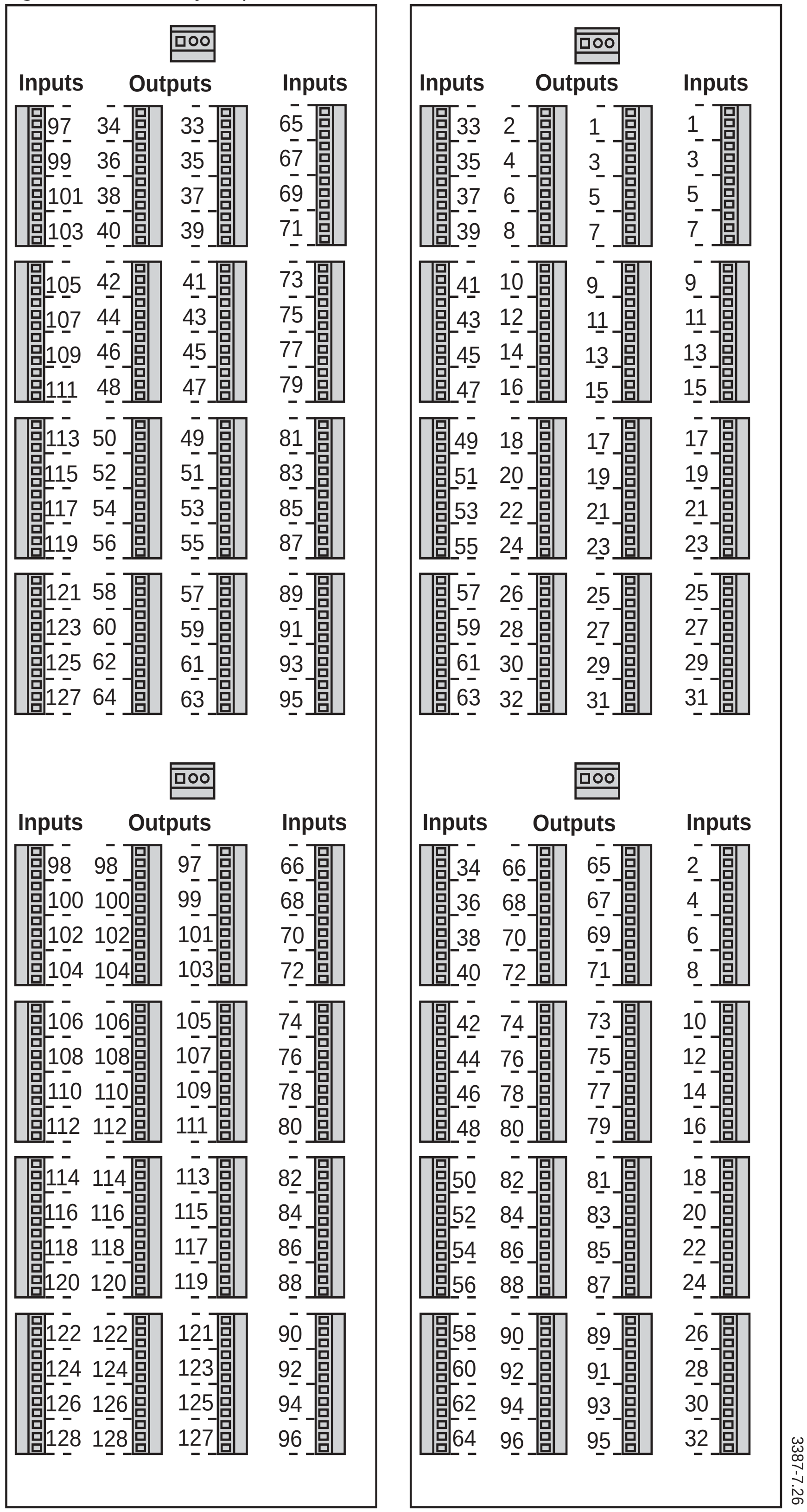
- 128x128 V

The 128x128 Analog Frame

The 128x128 analog audio frame is twelve rack units in height. Each matrix can be sized from 32x32 up to 128x128. This frame must be connected to a control frame or video frame with MCPU. The control connections are covered in Section 3, Frame Installation in this manual.

Audio input and output connections are covered here. See Figure 7-23 for an illustration of input and output connectors on the frames.

Figure 7-23. Rear Layout for a 128x128 A



128x128 A Assigned J-Numbers Tables

The tables on this and the following pages provide J-Numbers assigned to each of the input and output connector locations for this system.

Table 7-6. Audio Matrix J-Number Assignment for 128x128 A (Board 1, Top frame)

Inputs		Outputs				Inputs	
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Odd**	**J #**
33	J39	2	J31	1	J22	1	J13
35		4		3		3	
37		6		5		5	
39		8		7		7	
41	J40	10	J32	9	J23	9	J14
43		12		11		11	
45		14		13		13	
47		16		15		15	
49	J41	18	J33	17	J24	17	J15
51		20		19		19	
53		22		21		21	
55		24		23		23	
57	J42	26	J34	25	J25	25	J16
59		28		27		27	
61		30		29		29	
63		32		31		31	

Figure 7-24. 128x128 Audio Frame (Rear View)

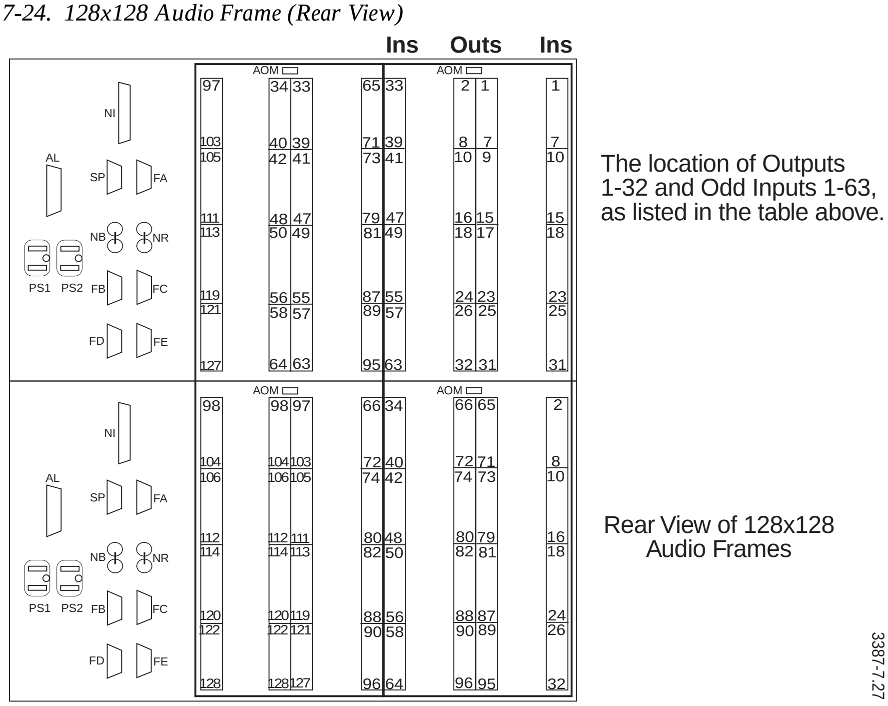


Table 7-7. Audio Matrix J-Number Assignment for 128x128 A (Board 1, Bottom Frame)

Inputs		Outputs				Inputs	
Even	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
34	J43	66	J35	65	J27	2	J17
36		68		67		4	
38		70		69		6	
40		72		71		8	
42	J44	74	J36	73	J28	10	J18
44		76		75		12	
46		78		77		14	
48		80		79		16	
50	J45	82	J37	81	J29	18	J19
52		84		83		20	
54		86		85		22	
56		88		87		24	
58	J46	90	J38	89	J30	26	J20
60		92		91		28	
62		94		93		30	
64		96		95		32	

Figure 7-25. 128x128 Audio Frame (Rear View)

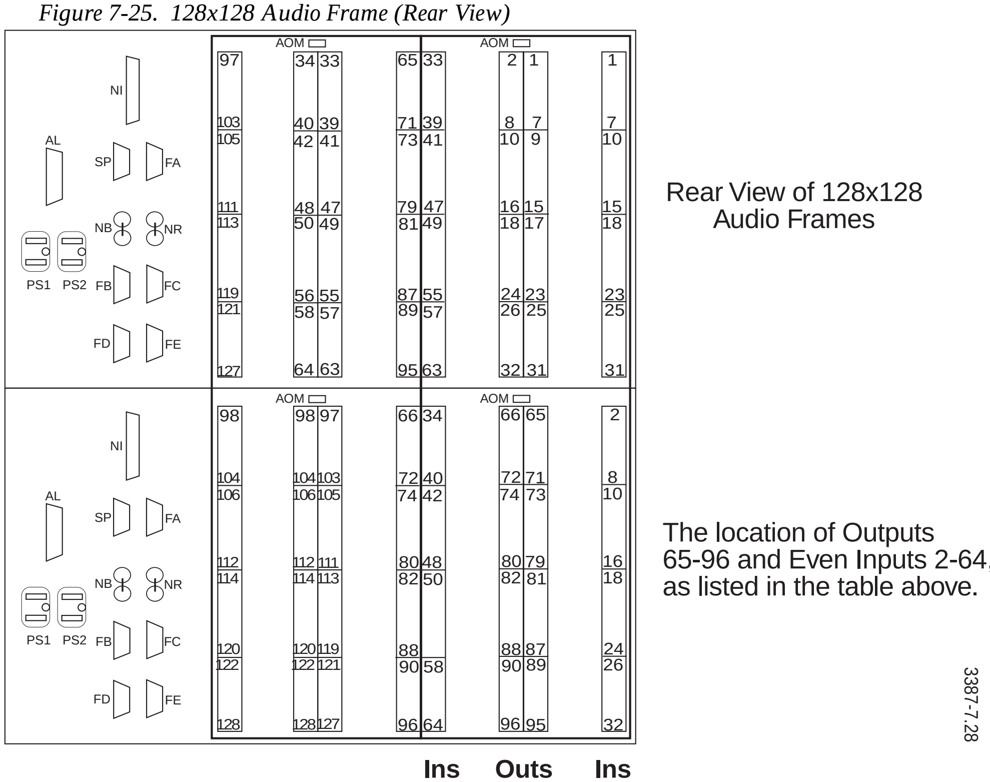


Table 7-8. Audio Matrix J-Number Assignment for 128x128 A (Board 2, Top Frame)

Inputs		Outputs				Inputs	
Odd	**J #**	**Even**	**J #**	**Odd**	**J #**	**Odd**	**J #**
97	J73	34	J65	33	J56	65	J47
99		36		35		67	
101		38		37		69	
103		40		39		71	
105	J74	42	J66	41	J57	73	J48
107		44		43		75	
109		46		45		77	
111		48		47		79	
113	J75	50	J67	49	J58	81	J49
115		52		51		83	
117		54		53		85	
119		56		55		87	
121	J76	58	J68	57	J59	89	J50
123		60		59		91	
125		62		61		93	
127		64		63		95	

Figure 7-26. 128x128 Audio Frame (Rear View)

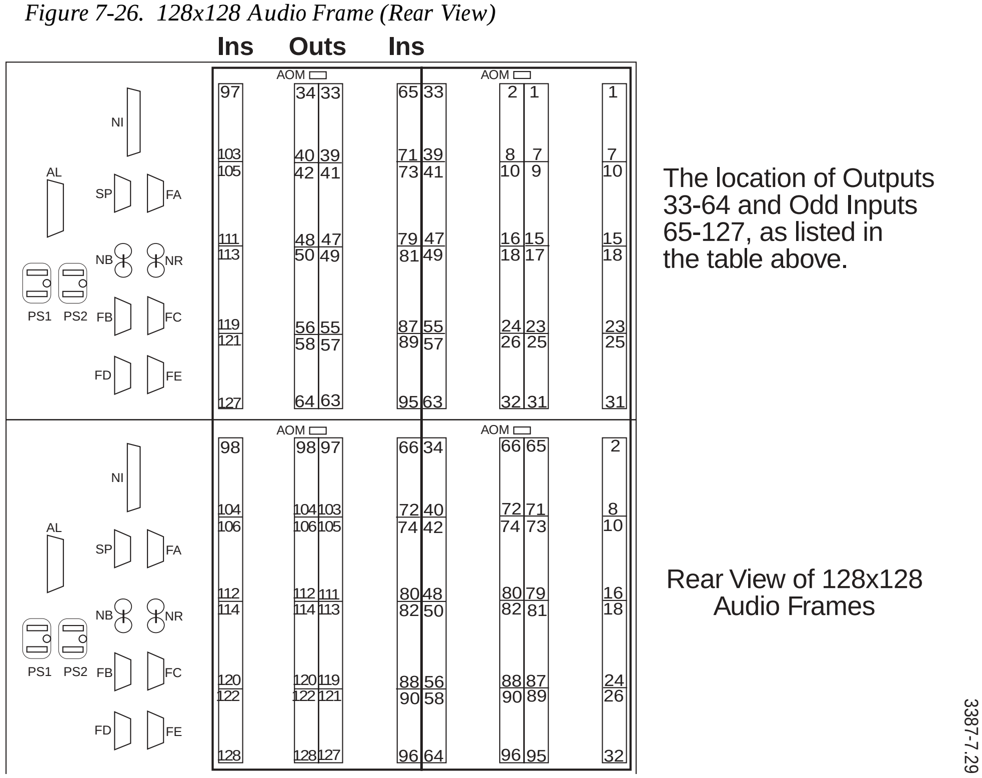
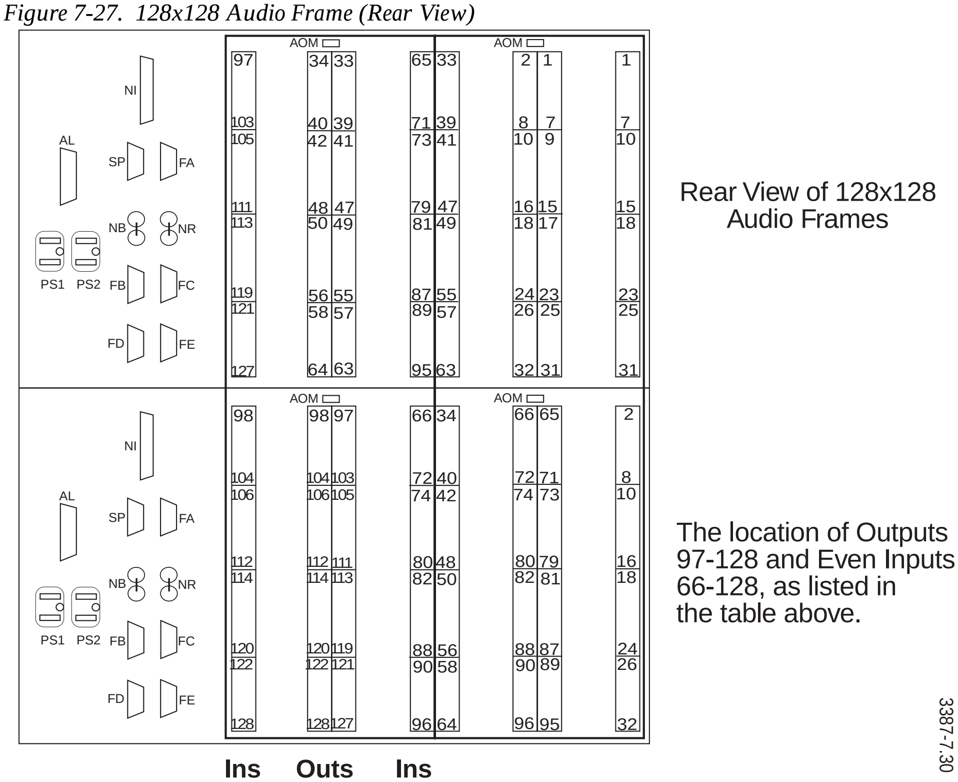


Table 7-9. Audio Matrix J-Number Assignment for 128x128 A (Board 2, Bottom Frame)

Inputs		Outputs				Inputs	
Even	**J #**	**Even**	**J #**	**Odd**	**J #**	**Even**	**J #**
98	J77	98	J69	97	J61	66	J51
100		100		99		68	
102		102		101		70	
104		104		103		72	
106	J78	106	J70	105	J62	74	J52
108		108		107		76	
110		110		109		78	
112		112		111		80	
114	J79	114	J71	113	J63	82	J53
116		116		115		84	
118		118		117		86	
120		120		119		88	
122	J80	122	J72	121	J64	90	J54
124		124		123		92	
126		126		125		94	
128		128		127		96	

Figure 7-27. 128x128 Audio Frame (Rear View)



Digital Audio Connections

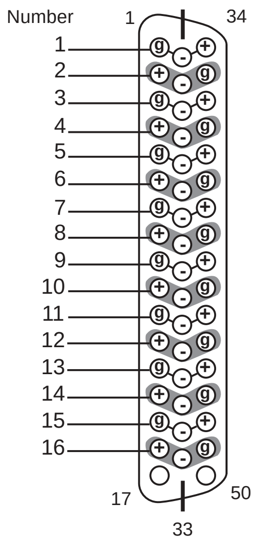
Digital Audio matrices are built of six-rack unit (RU) frames. The various matrix sizes use different backplane modules to create matrix sizes from Quad 64x64 in six RU, to 128x128 in twelve RU. The 128x128 system is contained in two six-RU frames with an interconnect backplane module. Larger systems, up to 384x384, are constructed of these 128x128 blocks with looped inputs and outputs.

Direct Matrix Cabling

If you are not using breakout panels but are wiring directly to the matrix frame, the wiring pattern for signal connections is shown in Table 7-10 on page 7-34. Each 50-pin input or output connector accepts 16 three-wire connections as shown. Silkscreened designations on the backpanel will indicate the specific input or output group this connector serves.

The 50-pin mating connectors provided with the Series 7000 are designed for use with Gepco 80316 cable (GVP part # CA4216-00) with 0.495 outside diameter. If you purchase Single-connector cables from Grass Valley (GVP part #151161) you will need to wire your connectors using the color code table provided.

Table 7-10. Digital Audio Input/Output Connector Pinout and Color Codes

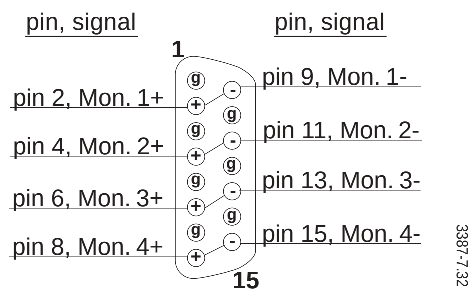


50-Pin D Connector	Pin	Wire Triad	Color	Pin	Wire Triad	Color
	18	1	WHITE	26	9	GREEN
	34	1	RED	42	9	BROWN
	1	1	DRAIN	9	9	DRAIN
	2	2	RED	10	10	RED
	19	2	GREEN	27	10	BLACK
	35	2	DRAIN	43	10	DRAIN
	20	3	WHITE	28	11	BLACK
	36	3	BLUE	44	11	GREEN
	3	3	DRAIN	11	11	DRAIN
	4	4	RED	12	12	ORANGE
	21	4	BLUE	29	12	BLACK
	37	4	DRAIN	45	12	DRAIN
	22	5	GREEN	30	13	GREEN
	38	5	ORANGE	46	13	YELLOW
	5	5	DRAIN	13	13	DRAIN
	6	6	YELLOW	14	14	RED
	23	6	BLACK	31	14	ORANGE
	39	6	DRAIN	47	14	DRAIN
	24	7	BLACK	32	15	BLACK
	40	7	BLUE	48	15	WHITE
	7	7	DRAIN	15	15	DRAIN
	8	8	BROWN	16	16	RED
	25	8	BLACK	33	16	BROWN
	41	8	DRAIN	49	16	DRAIN
	17	N/A	NOT USED	50	N/A	NOT USED

Output Monitor Connector

The Digital Audio Output monitor connector pinout (see Figure 7-28) is identical on all Digital Audio frames. The connector provides four outputs of the selected Monitor signal.

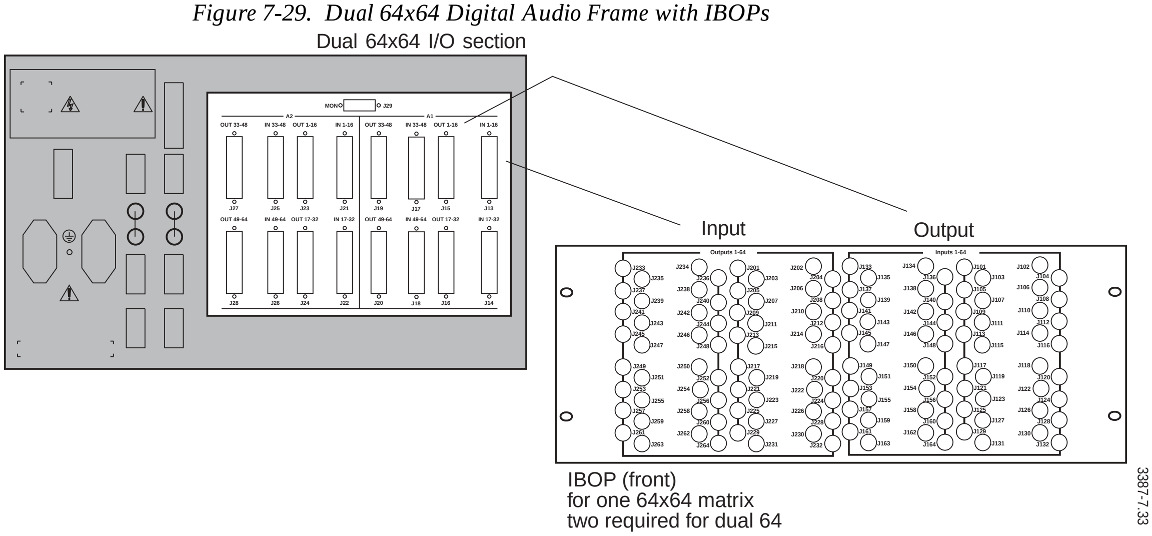
Figure 7-28. Digital Audio Output Monitor Connector Pinout



Break Out Panel Cabling

Series 7000 offers Interconnect / Break Out Panels (IBOPs) to provide BNC I / O connector arrays. (For other available IBOP connector types, contact your Grass Valley representative). Fifty-conductor cables are provided to connect the I / O section of the matrix frame to the IBOP. Figure 7-29 illustrates the Dual 64x64 frame I / O section and a single IBOP for one of the two 64x64 matrices.

Figure 7-29. Dual 64x64 Digital Audio Frame with IBOPs



IBOPs provide individual input and output signal connections that are routed to the matrix frame over eight 50-conductor cables (16 signals per cable). The Dual 64 IBOP is labeled for one group of inputs and outputs—

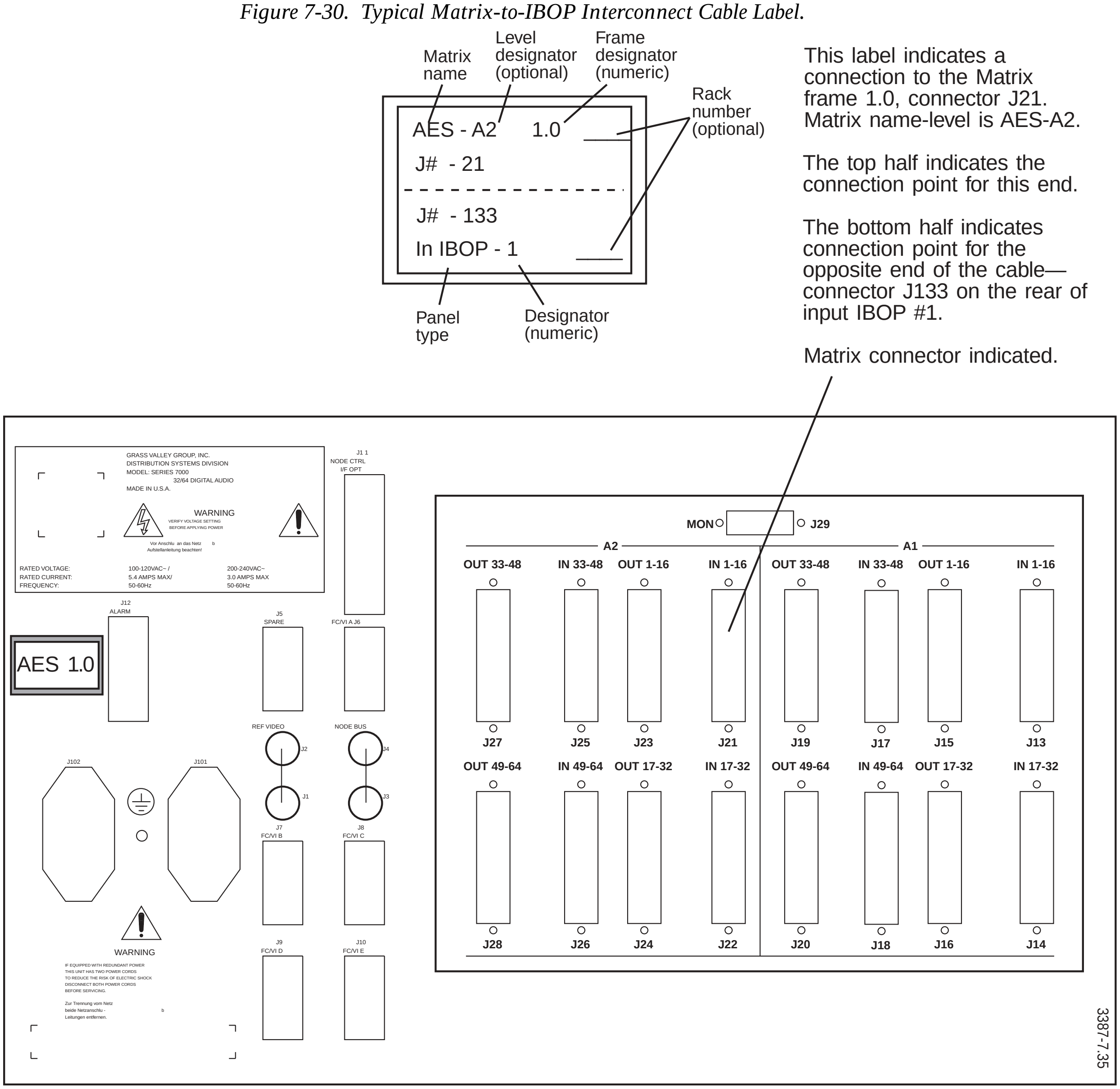
for matrix A1 or A2. Each cable is labeled with a matrix frame and IBOP designator, and a J-number (jack number) for the connector to which it attaches.

Input and Output J-Numbers

The individual input and output connectors on the front of IBOPs are numbered with J-numbers reflecting the specific input or output number of the connector. On the 128 Input IBOP, for example, J107=input #107.

Figure 7-30 illustrates a typical cable label on interconnect cables between the Digital Audio Matrix and an Input IBOP.

Figure 7-30. Typical Matrix-to-IBOP Interconnect Cable Label.



Dual 64x64 Matrix-to-IBOP Cabling

On the back of the IBOP panels are 50-pin router connectors labeled as shown in Figure 7-31.

Figure 7-31. Rear View of 64x64 IBOP Showing 50-pin Connectors

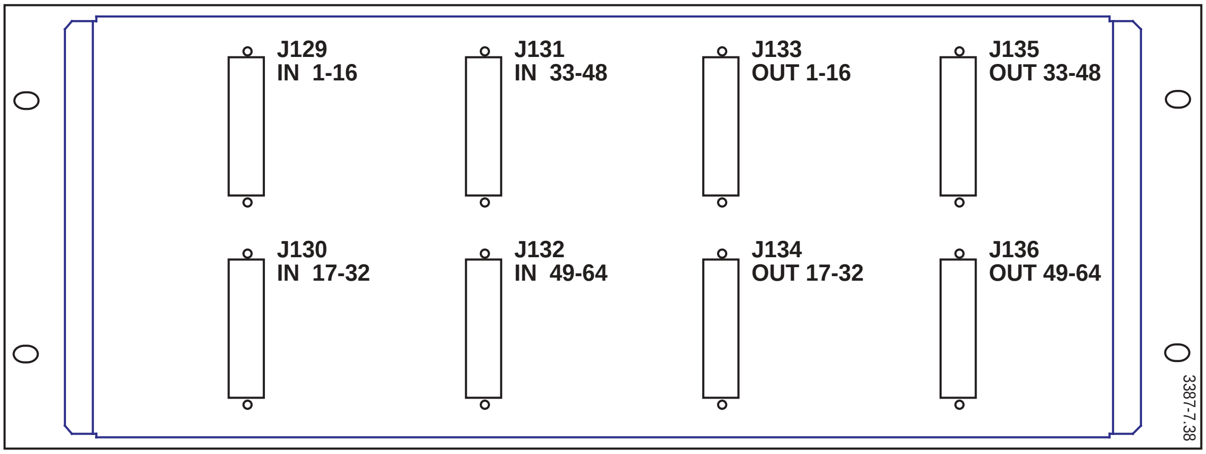


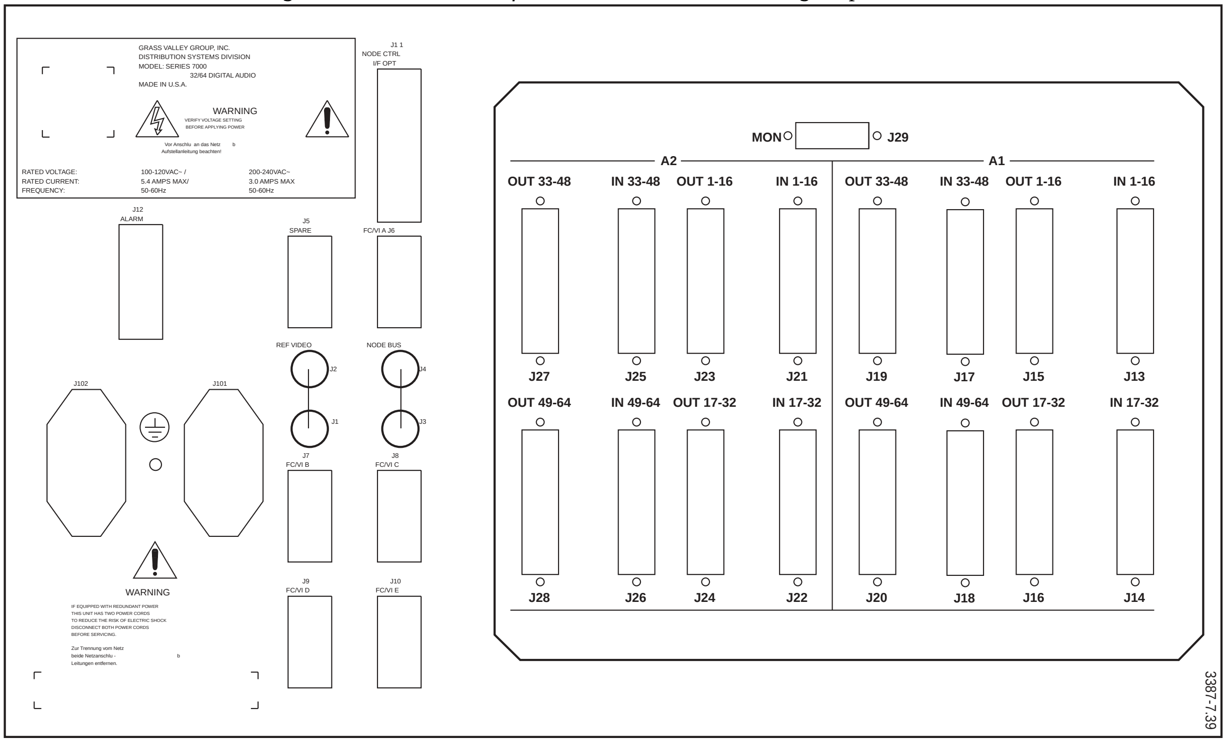
Table 7-11, below, indicates the Matrix-to-IBOP connections for the Dual 64 Digital Audio matrix.

Table 7-11. Dual 64x64 Digital Audio Matrix /IBOP Cabling

Inputs			**Outputs**		
A1	Matrix J #	IBOB J #	A1	Matrix J #	IBOB J #
1-16	J13	J129	1-16	J15	J133
17-32	J14	J130	17-32	J16	J134
33-48	J17	J131	33-48	J19	J135
49-64	J18	J132	49-64	J20	J136
A2	Matrix J #	IBOB J #	A2	Matrix J #	IBOB J #
1-16	J21	J129	1-16	J15	J133
17-32	J22	J130	17-32	J16	J134
33-48	J25	J131	33-48	J19	J135
49-64	J26	J132	49-64	J20	J136

On the back of the Dual 64 Matrix are 50-pin I/O connectors labeled as shown in Figure 7-32.

Figure 7-32. Rear View of Dual 64 I/O Section Showing 50-pin Connectors



128x64 Matrix-to-IBOP Cabling

The 128x64 matrix (Figure 7-33) provides 64 outputs and uses only four of the 50-pin output connectors as indicated in Table 7-12, below.

Figure 7-33. Rear View of 128x64 IBOPs Showing 50-pin Connectors

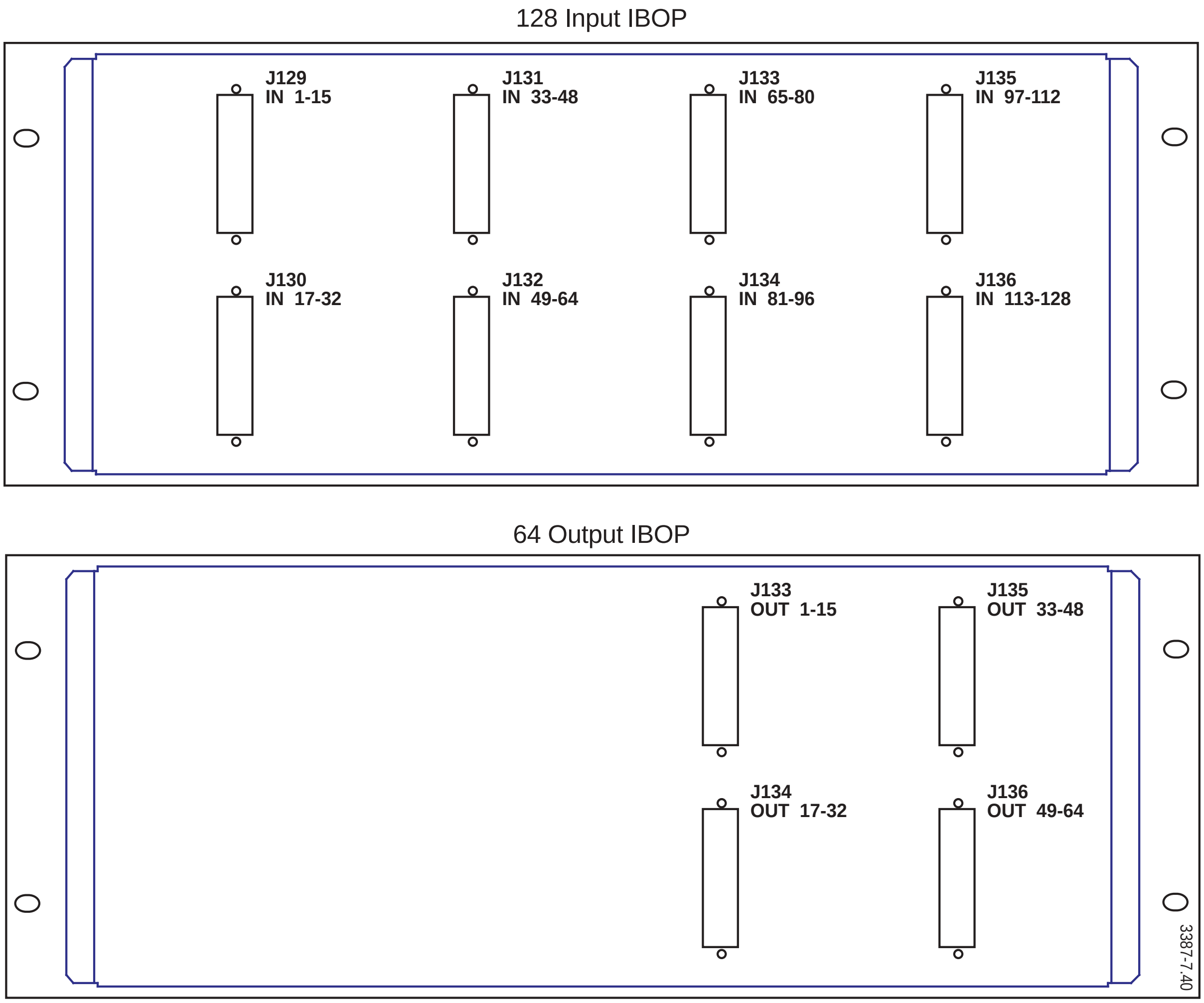
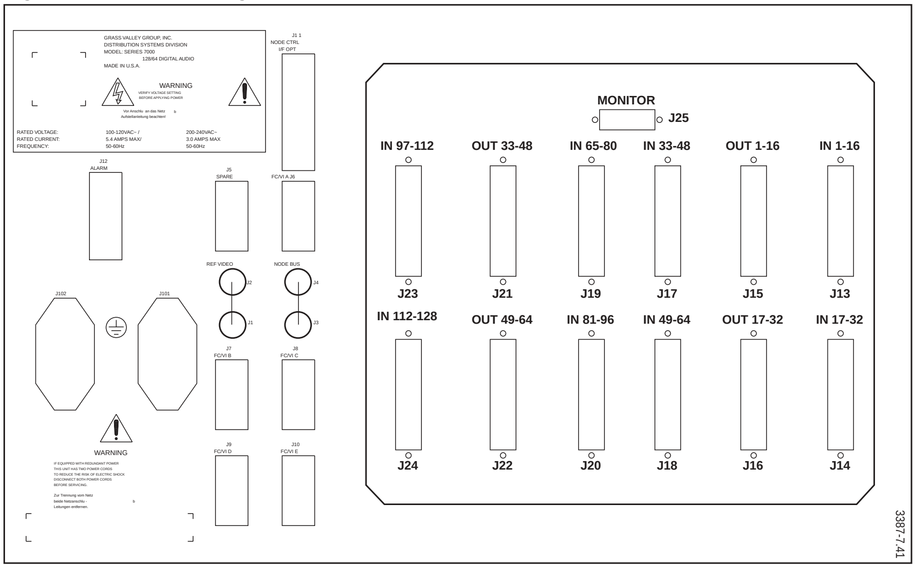


Table 7-12. 28x64 Digital Audio Matrix/IBOP Cabling

Inputs			**Outputs**		
A1	Matrix J #	IBOP J #	A1	Matrix J #	IBOP J #
1-16	J13	J129	1-16	J15/J17	J133
17-32	J14	J130	17-32	J16/J18	J134
33-48	J19	J131	33-48	J23/J25	J135
49-64	J20	J132	49-64	J24/J26	J136
65-80	J21	J133			
81-96	J22	J134			
97-112	J27	J135			
113-128	J28	J136			

On the back of the 128x64 Matrix are 50-pin I/O connectors labeled as shown in Figure 7-34.

Figure 7-34. 128x64 Digital Audio Matrix Frame I/O Connectors



128x128 Matrix-to-IBOP Cabling

The 128x128 matrix (Figure 7-35) uses a 12-rack unit interconnect back-plane to loop inputs and outputs between frame sections. There are two connectors (looping) for each input and output signal group to allow this frame size to be used as the building block of larger systems. Table 7-13 indicates Matrix-to-IBOP connections. Where two J-numbers are provided, either may be used for cable connection. The other connection should be terminated with a termination block (provided).

Figure 7-35. 128x128 Digital Audio Matrix Frame Connectors

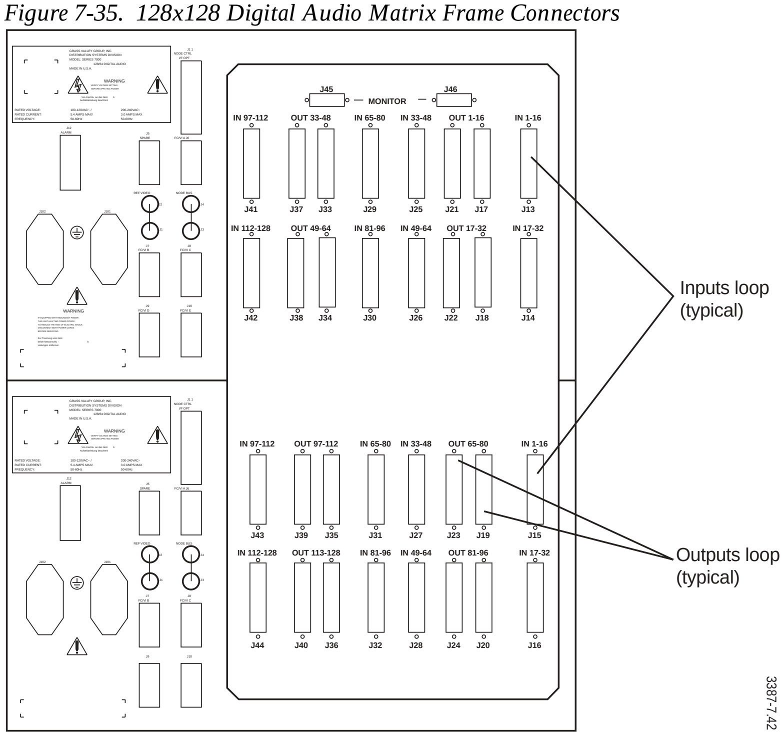
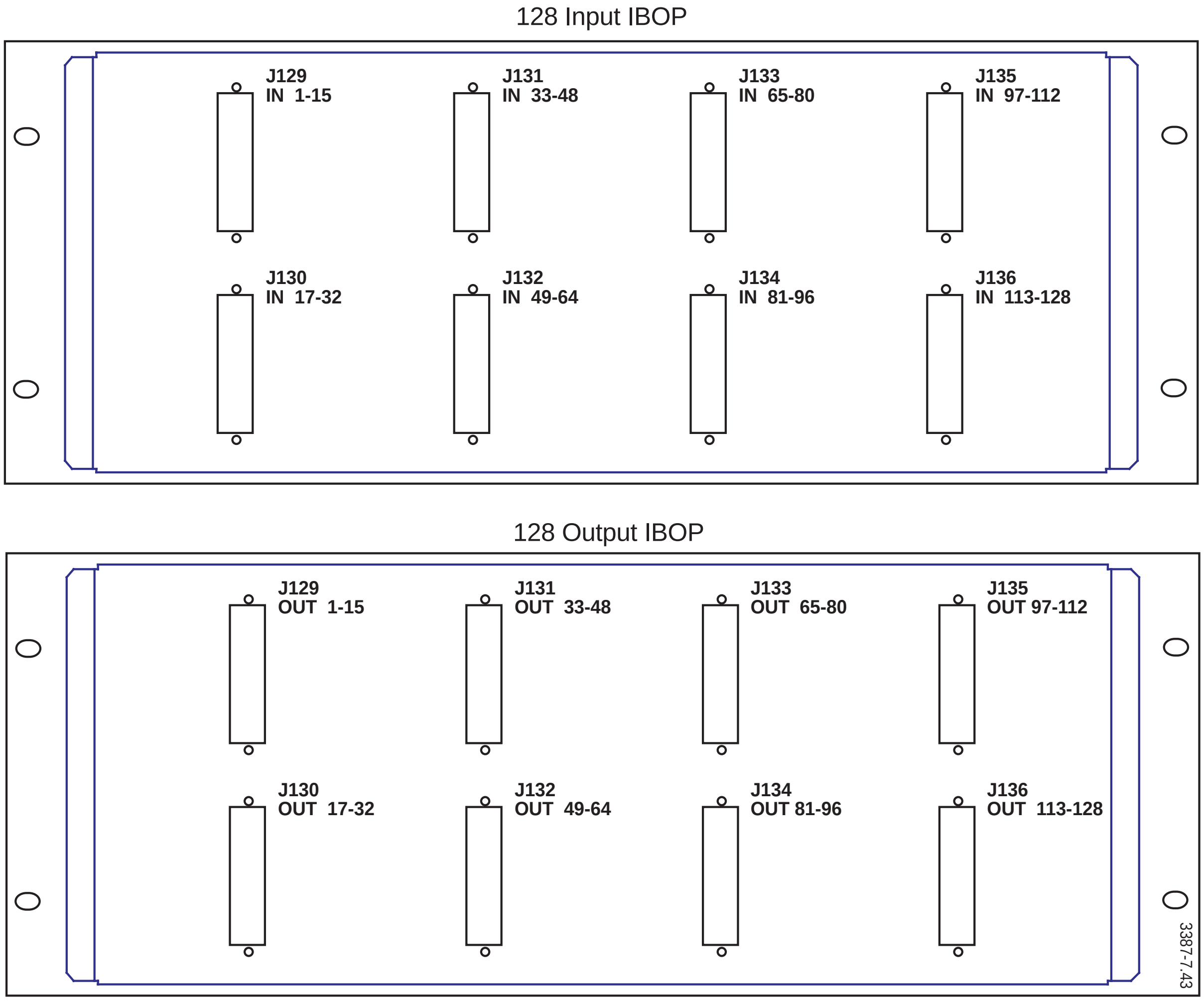


Table 7-13. 128x128 Digital Audio Matrix/IBOP Cabling

Inputs			**Outputs**		
A1	Matrix J #	IBOP J #	A1	Matrix J #	IBOP J #
1-16	J13/J15	J129	1-16	J17/J21	J129
17-32	J14/J16	J130	17-32	J18/J22	J130
33-48	J25/J27	J131	33-48	J33/J37	J131
49-64	J26/J28	J132	49-64	J34/J38	J132
65-80	J29/J31	J133	65-80	J19/J23	J133
81-96	J30/J32	J134	81-96	J20/J24	J134
97-112	J41/J43	J135	97-112	J35/J39	J135
113-128	J42/J44	J136	113-128	J36/J40	J136

On the back of the IBOP panels are 50-pin router connectors labeled as shown in Figure 7-36.

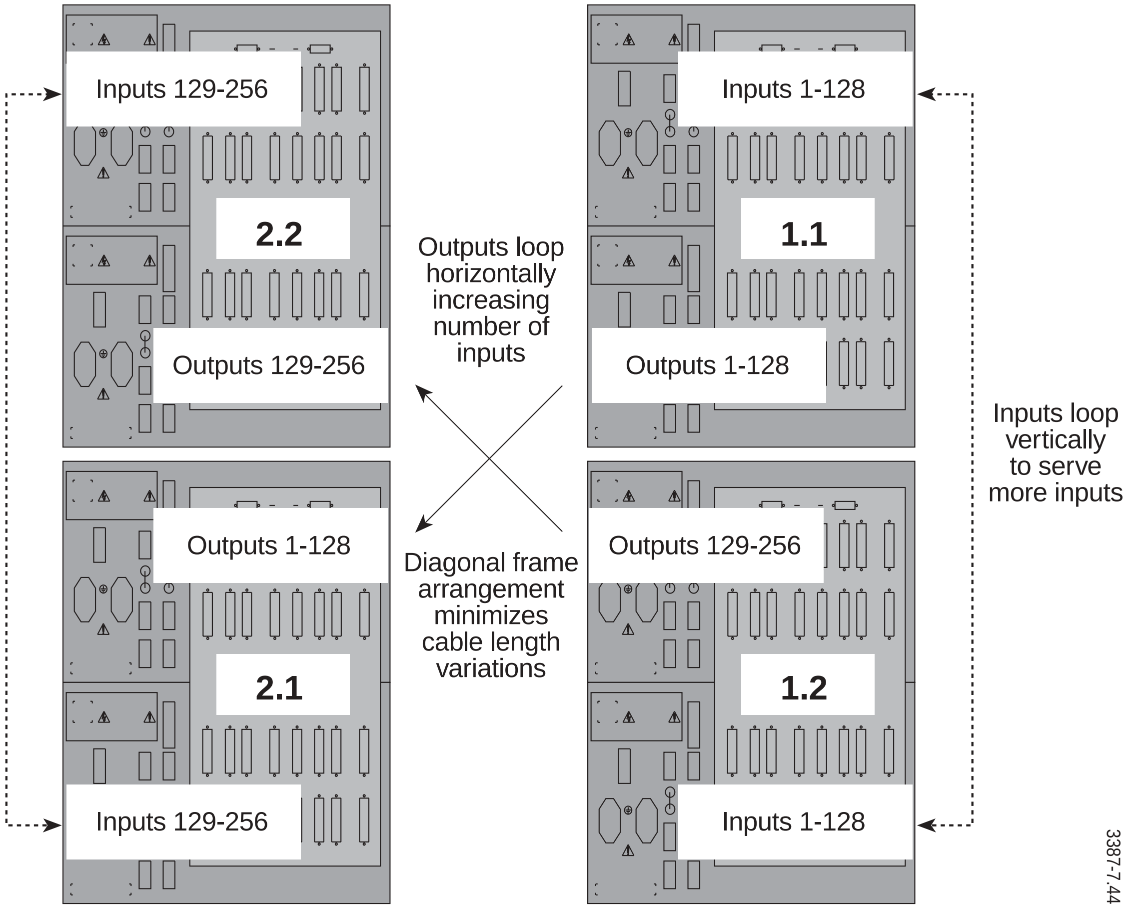
Figure 7-36. 128x128 Input and Output IBOP 50-pin Connectors



Digital Audio Systems Beyond 128x128

Large systems are built of 128x128 blocks. Figure 7-37 illustrates a 256x256 matrix in the typical racking order for optimum cabling. Note that looping outputs provide input expansion, and looping inputs provide output expansion. Frames are labeled 1.1, 1.2, 2.1, 2.2, etc. The first digit indicates the group of 128 inputs received by that frame (1=1-128, 2=129-256). The second digit indicates the group of 128 outputs served (1=1-128, 2=129-256).

Figure 7-37. Looping Inputs and Outputs to Build a 256x256 System



Cabling a 256x256 Matrix

Table 7-14 provides the cable connections for a 256x256 system. Frames are named as previously described (X.X), while IBOPs will be labeled IN or OUT and numbered according to which group of 128 connectors it contains (1=1-128, 2=129-256, 3=257-384). IN 1, for example, will accept inputs 1-128.

Table 7-14. 256x256 Digital Audio Matrix and IBOP Cabling

Inputs						**Outputs**					
Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#	Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#
1-16	In 1	J129	—	1.1	J13	1-16	Out 1	J129	—	1.1	J17
	1.1	J15	—	1.2	J13		1.1	J21	—	2.1	J17
	1.2	J15 - (terminated)					2.1	J21 - (terminated)			
17-32	In 1	J130	—	1.1	J14	17-32	Out 1	J130	—	1.1	J18
	1.1	J16	—	1.2	J14		1.1	J22	—	2.1	J18
	1.2	J16 - (terminated)					2.1	J22 - (terminated)			
33-48	In 1	J131	—	1.1	J25	33-48	Out 1	J131	—	1.1	J33
	1.1	J27	—	1.2	J25		1.1	J37	—	2.1	J33
	1.2	J27 - (terminated)					2.1	J37 - (terminated)			
49-64	In 1	J132	—	1.1	J26	49-64	Out 1	J132	—	1.1	J34
	1.1	J28	—	1.2	J26		1.1	J38	—	2.1	J34
	1.2	J31 - (terminated)					2.1	J23 - (terminated)			
65-80	In 1	J133	—	1.1	J29	65-80	Out 1	J133	—	1.1	J19
	1.1	J31	—	1.2	J29		1.1	J23	—	2.1	J19
	1.2	J31 - (terminated)					2.1	J23 - (terminated)			
81-96	In 1	J134	—	1.1	J30	81-96	Out 1	J134	—	1.1	J20
	1.1	J32	—	1.2	J30		1.1	J24	—	2.1	J20
	1.2	J32 - (terminated)					2.1	J24 - (terminated)			
97-112	In 1	J135	—	1.1	J41	97-112	Out 1	J135	—	1.1	J35
	1.1	J43	—	1.2	J41		1.1	J39	—	2.1	J35
	1.2	J43 - (terminated)					2.1	J39 - (terminated)			
113-128	In 1	J136	—	1.1	J42	113-128	Out 1	J136	—	1.1	J36
	1.1	J44	—	1.2	J42		1.1	J40	—	2.1	J36
	1.2	J44 - (terminated)					2.1	J40 - (terminated)			
129-144	In 2	J129	—	2.1	J13	129-144	Out 2	J129	—	1.2	J17
	2.1	J15	—	2.2	J13		1.2	J21	—	2.2	J17
	2.2	J15 - (terminated)					2.2	J21 - (terminated)			
145-160	In 2	J130	—	2.1	J14	145-160	Out 2	J130	—	1.2	J18
	2.1	J16	—	2.2	J14		1.2	J22	—	2.2	J18
	2.2	J16 - (terminated)					2.2	J22 - (terminated)			
161-176	In 2	J131	—	2.1	J25	161-176	Out 2	J131	—	1.2	J33
	2.1	J27	—	2.2	J25		1.2	J37	—	2.2	J33
	2.2	J27 - (terminated)					2.2	J37 - (terminated)			
177-192	In 2	J132	—	2.1	J26	117-192	Out 2	J132	—	1.2	J34
	2.1	J28	—	2.2	J26		1.2	J38	—	2.2	J34
	2.2	J28 - (terminated)					2.2	J38 - (terminated)			
193-208	In 2	J133	—	2.1	J29	193-208	Out 2	J133	—	1.2	J19

Table 7-14. 256x256 Digital Audio Matrix and IBOP Cabling - (continued)

Inputs						Outputs					
	2.1	J31	—	2.2	J29		1.2	J23	—	2.2	J19
	2.2	J31 - (terminated)					2.2	J23 - (terminated)			
209-224	In 2	J134	—	2.1	J30	209-224	Out 2	J134	—	1.2	J20
	2.1	J32	—	2.2	J30		1.2	J24	—	2.2	J20
	2.2	J32 - (terminated)					2.2	J24 - (terminated)			
225-240	In 2	J135	—	2.1	J41	225-240	Out 2	J135	—	1.2	J35
	2.1	J43	—	2.2	J41		1.2	J39	—	2.2	J35
	2.2	J43 - (terminated)					2.2	J39 - (terminated)			
241-256	In 2	J136	—	2.1	J42	241-256	Out 2	J136	—	1.2	J36
	2.1	J44	—	2.2	J42		1.2	J40	—	2.2	J36
	2.2	J44 - (terminated)					2.2	J40 - (terminated)			

Cabling a 384x384 Matrix

The 384x384 matrix uses the same frame placement and labeling conventions as described for the 256x256 matrix. Figure 7-38 illustrates the resultant frame layout for the 384x384 matrix. Refer to Table 7-15 for cabling information.

Figure 7-38. 384x384 Matrix Frame Layout

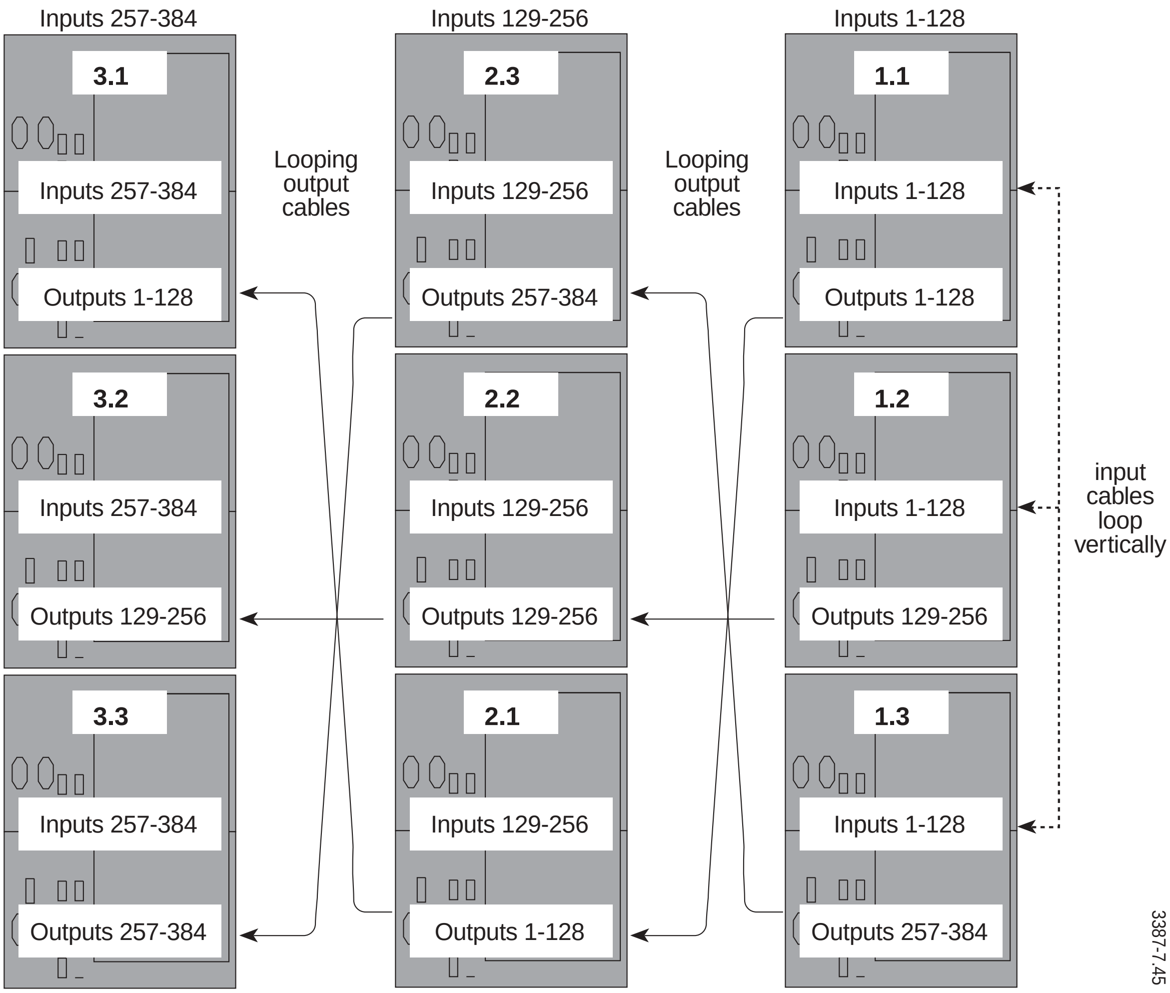


Table 7-15. Cabling Connections for a 384x384 Matrix

Inputs						**Outputs**					
Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#	Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#
1-16	In 1	J129	—	1.1	J13	1-16	Out 1	J129	—	1.1	J17
	1.1	J15	—	1.2	J13		1.1	J21	—	2.1	J17
	1.2	J15	—	1.3	J13		2.1	J21	—	3.1	J17
	1.3	J15 - (terminated)					3.1	J21 - (terminated)			
17-32	In 1	J130	—	1.1	J14	17-32	Out 1	J130	—	1.1	J18
	1.1	J16	—	1.2	J14		1.1	J22	—	2.1	J18

Table 7-15. Cabling Connections for a 384x384 Matrix - (continued)

Inputs						**Outputs**					
	1.2	J16	—	1.3	J14		2.1	J22	—	3.1	J18
	1.3	J16 - (terminated)					3.1	J22 - (terminated)			
33-48	In 1	J131	—	1.1	J25	33-48	Out 1	J131	—	1.1	J33
	1.1	J27	—	1.2	J25		1.1	J37	—	2.1	J33
	1.2	J27	—	1.3	J25		2.1	J37	—	2.1	J33
	1.3	J27 - (terminated)					3.1	J37 - (terminated)			
49-64	In 1	J132	—	1.1	J26	49-64	Out 1	J132	—	1.1	J34
	1.1	J28	—	1.2	J26		1.1	J38	—	2.1	J34
	1.2	J28	—	1.3	J26		2.1	J38	—	3.1	J34
	1.3	J31 - (terminated)					3.1	J23 - (terminated)			
65-80	In 1	J133	—	1.1	J29	65-80	Out 1	J133	—	1.1	J19
	1.1	J31	—	1.2	J29		1.1	J23	—	2.1	J19
	1.2	J31	—	1.3	J29		2.1	J23	—	3.1	J19
	1.3	J31 - (terminated)					3.1	J23 - (terminated)			
81-96	In 1	J134	—	1.1	J30	81-96	Out 1	J134	—	1.1	J20
	1.1	J32	—	1.2	J30		1.1	J24	—	2.1	J20
	1.2	J32	—	1.3	J30		2.1	J24	—	3.1	J20
	1.3	J32 - (terminated)					3.1	J24 - (terminated)			
97-112	In 1	J135	—	1.1	J41	97-112	Out 1	J135	—	1.1	J35
	1.1	J43	—	1.2	J41		1.1	J39	—	2.1	J35
	1.2	J43	—	1.3	J41		2.1	J39	—	3.1	J35
	1.3	J43 - (terminated)					3.1	J39 - (terminated)			
113-128	In 1	J136	—	1.1	J42	113-128	Out 1	J136	—	1.1	J36
	1.1	J44	—	1.2	J42		1.1	J40	—	2.1	J36
	1.2	J44	—	1.3	J42		2.1	J40	—	3.1	J36
	1.3	J44 - (terminated)					3.1	J40 - (terminated)			
129-144	In 2	J129	—	2.1	J13	129-144	Out 2	J129	—	1.2	J17
	2.1	J15	—	2.2	J13		1.2	J21	—	2.2	J17
	2.2	J15	—	2.3	J13		2.2	J21	—	3.2	J17
	2.3	J15 - (terminated)					3.2	J21 - (terminated)			
145-160	In 2	J130	—	2.1	J14	145-160	Out 2	J130	—	1.2	J18
	2.1	J16	—	2.2	J14		1.2	J22	—	2.2	J18
	2.2	J16	—	2.3	J14		2.2	J22	—	3.2	J18
	2.3	J16 - (terminated)					3.2	J22 - (terminated)			
161-176	In 2	J131	—	2.1	J25	161-176	Out 2	J131	—	1.2	J33
	2.1	J27	—	2.2	J25		1.2	J37	—	2.2	J33
	2.2	J27	—	2.3	J25		2.2	J37	—	3.2	J33
	2.3	J27 - (terminated)					3.2	J37 - (terminated)			
177-192	In 2	J132	—	2.1	J26	117-192	Out 2	J132	—	1.2	J34
	2.1	J28	—	2.2	J26		1.2	J38	—	2.2	J34
	2.2	J28	—	2.3	J26		2.2	J38	—	3.2	J34

Table 7-15. Cabling Connections for a 384x384 Matrix - (continued)

Inputs						**Outputs**					
	2.3	J28 - (terminated)					3.2	J38 - (terminated)			
Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#	Signal Group	IBOP or Frame	Conn. J#	to	Frame	Conn.J#
193-208	In 2	J133	—	2.1	J29	193-208	Out 2	J133	—	1.2	J19
	2.1	J31	—	2.2	J29		1.2	J23	—	2.2	J19
	2.2	J31	—	2.3	J29		2.2	J23	—	3.2	J19
	2.2	J31 - (terminated)					3.2	J23 - (terminated)			
209-224	In 2	J134	—	2.1	J30	209-224	Out 2	J134	—	1.2	J20
	2.1	J32	—	2.2	J30		1.2	J24	—	2.2	J20
	2.2	J32	—	3.2	J30		2.2	J24	—	3.2	J20
	2.3	J32 - (terminated)					3.2	J24 - (terminated)			
225-240	In 2	J135	—	2.1	J41	225-240	Out 2	J135	—	1.2	J35
	2.1	J43	—	2.2	J41		1.2	J39	—	2.2	J35
	2.2	J43	—	3.2	J41		2.2	J39	—	3.2	J35
	2.3	J43 - (terminated)					3.2	J39 - (terminated)			
241-256	In 2	J136	—	2.1	J42	241-256	Out 2	J136	—	1.2	J36
	2.1	J44	—	2.2	J42		1.2	J40	—	2.2	J36
	2.2	J44	—	2.3	J42		2.2	J40	—	3.2	J36
	2.3	J44 - (terminated)			J42		3.2	J40 - (terminated)			
257-272	In 3	J129	—	3.1	J13	257-272	Out 3	J129	—	1.3	J17
	3.1	J15	—	3.2	J13		3.1	J21	—	2.3	J17
	3.2	J15	—	3.3	J13		3.1	J21	—	3.3	J17
	3.3	J15 - (terminated)					3.1	J21 - (terminated)			
273-288	In 3	J130	—	3.1	J14	273-288	Out 3	J130	—	1.3	J18
	3.1	J16	—	3.2	J14		1.3	J22	—	2.3	J18
	3.2	J16	—	3.3	J14		2.3	J22	—	3.3	J18
	3.3	J16 - (terminated)					3.3	J22 - (terminated)			
289-304	In 3	J131	—	3.1	J25	33-48	Out 3	J131	—	1.3	J33
	3.1	J27	—	3.2	J25		1.3	J37	—	2.3	J33
	3.2	J27	—	3.3	J25		2.3	J37	—	3.3	J33
	3.3	J27 - (terminated)					3.3	J37 - (terminated)			
305-320	In 3	J132	—	3.1	J26	305-320	Out 3	J132	—	1.3	J34
	3.1	J28	—	3.2	J26		1.3	J38	—	2.3	J34
	3.2	J28	—	3.3	J26		2.3	J38	—	3.3	J34
	3.3	J31 - (terminated)					3.3	J23 - (terminated)			
321-336	In 3	J133	—	3.1	J29	321-336	Out 3	J133	—	1.3	J19
	3.1	J31	—	3.2	J29		1.3	J23	—	2.3	J19
	3.2	J31	—	3.3	J29		2.3	J23	—	3.3	J19
	3.3	J31 - (terminated)					3.3	J23 - (terminated)			
337-352	In 3	J134	—	3.1	J30	337-352	Out 3	J134	—	1.3	J20
	3.1	J32	—	3.2	J30		1.3	J24	—	2.3	J20

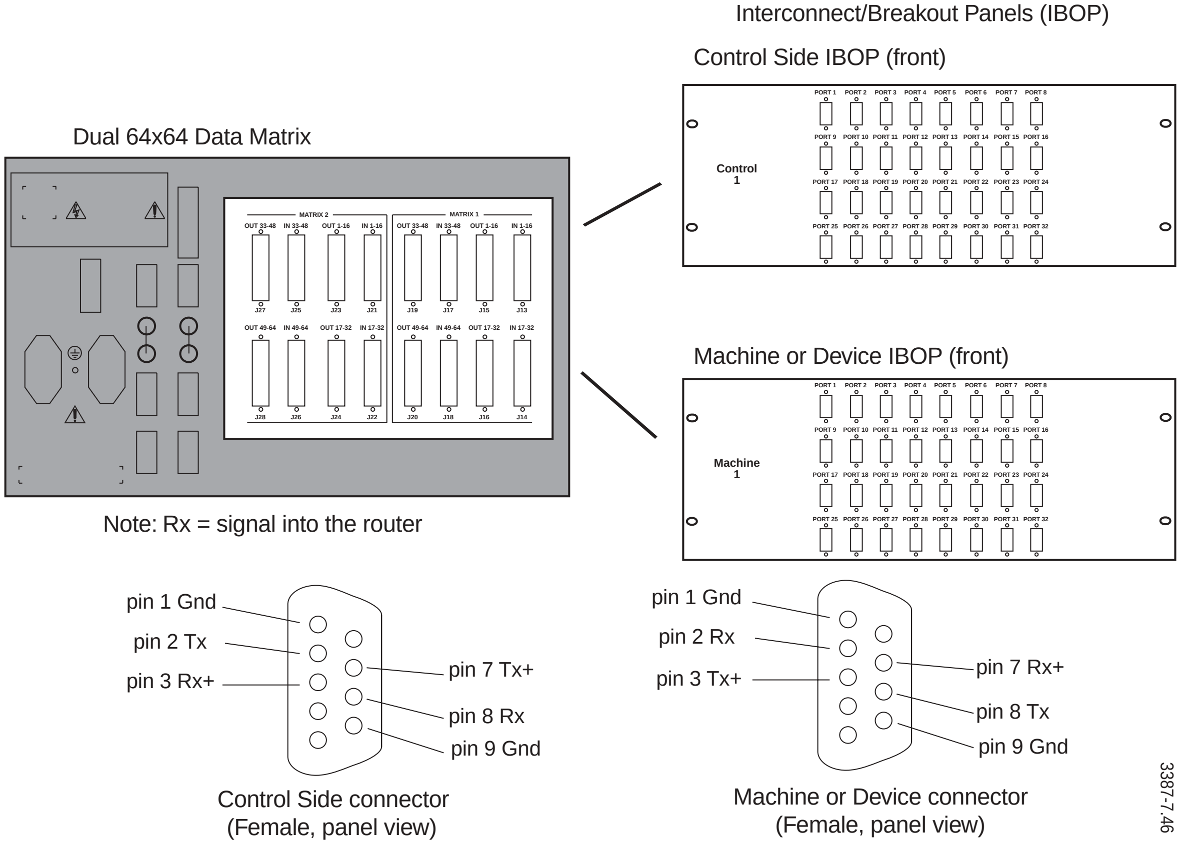
Table 7-15. Cabling Connections for a 384x384 Matrix - (continued)

Inputs						Outputs					
	3.2	J32	—	3.3	J30		2.3	J24	—	3.3	J20
	3.3	J32 - (terminated)					3.3	J24 - (terminated)			
353-368	In 3	J135	—	3.1	J41	353-368	Out 3	J135	—	1.3	J35
	3.1	J43	—	3.2	J41		1.3	J39	—	2.3	J35
	3.2	J43	—	3.3	J41		2.3	J39	—	3.3	J35
	3.3	J43 - (terminated)					3.3	J39 - (terminated)			
369-384	In 3	J136	—	3.1	J42	369-384	Out 3	J134	—	1.3	J36
	3.1	J44	—	3.2	J42		1.3	J40	—	2.3	J36
	3.2	J44	—	3.3	J42		2.3	J40	—	3.3	J36
	3.3	J44 - (terminated)					3.3	J40 - (terminated)			

Data Router Connections

The Series 7000 Data Router, like the Digital Audio system, uses a six-rack unit frame building block and Interconnect / Break Out Panels (IBOPs) to construct systems from 32x32 to 256x256 (see Figure 7-39 below). The IBOPs provide 9-pin connectors for standard RS-485 and RS-422 connections (up to 200K baud). This section discusses general connection characteristics and specific instructions for matrix-to-IBOP cabling.

Figure 7-39. Data Router Matrix with Control and Machine IBOP panels

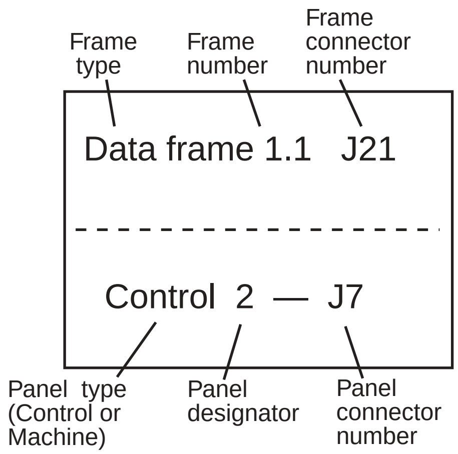


Fifty-conductor cables are used to connect the Data Router Matrix to the IBOP panels. Each IBOP panel accepts cables from up to four matrices allowing for system expansion up to 256x256 (4x64 by 4x64). When the IBOP panel is connected to the matrix do not attempt to monitor or tap the matrix (or source) end of the cable for a usable data signal (no T-connections are allowed).

Matrix to IBOP Cabling

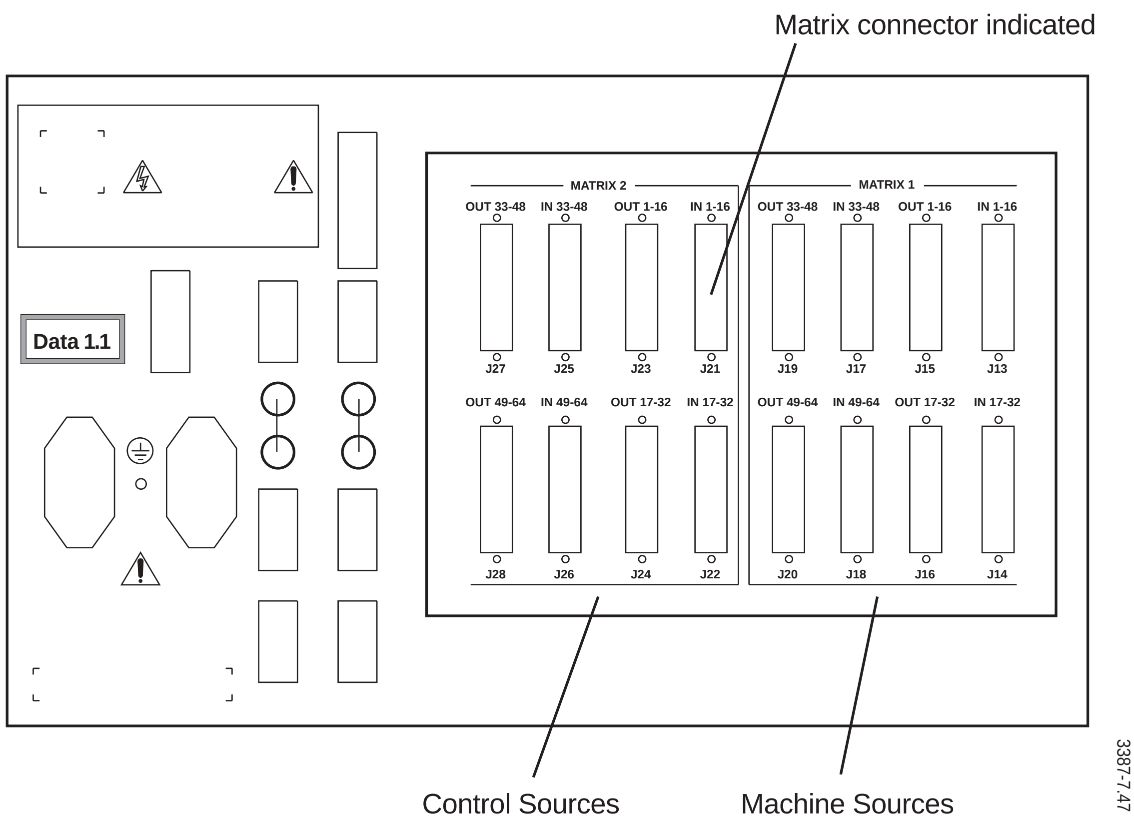
Figure 7-40 illustrates a typical cable label on interconnect cables between the Data Matrix and a Control IBOP.

Figure 7-40. Typical Data Matrix-to-IBOP Interconnect Cable Label.



This label indicates a connection to the Matrix frame 1.1, connector J21. Frame type is Data.

The bottom half indicates connection point for the IBOP connector J7 on rear of Control IBOP panel #2.



Each IBOP provides 32 nine-pin D connectors for Control (C) or Machine (M) ports (equipment connections). On the back of the IBOP panels are 50-pin connectors labeled as shown in Figure 7-41 (router connections).

Connector J-numbers are the same for Control or Machine IBOPs. Individual control-side IBOPS are labeled with a C and a number 1-8 representing the group of 32 ports supported by the panel.

Table 7-16. IBOP C label Number to Ports

Label	Ports	Label	Ports	Label	Ports	Label	Ports
C1	1-32	C3	65-96	C5	129-160	C7	193-224
C2	33-64	C4	97-128	C6	161-192	C8	225-256

Machine IBOPs are similarly labeled with an M and the appropriate numeral.

Figure 7-41. Rear View of IBOPs Showing 50-pin Connectors

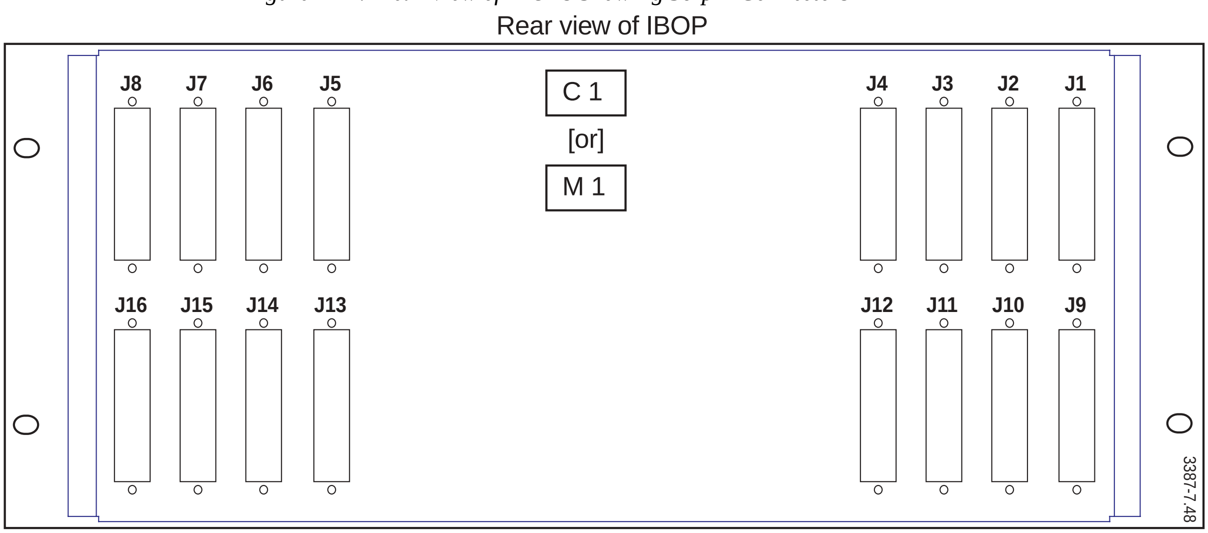


Table 7-17, below, indicates the frame-to-IBOP connections for a 64x64 Data matrix.

Table 7-17. Dual 64x64 Digital Audio Matrix /IBOP Cabling

MATRIX 2			MATRIX 1		
Inputs	Matrix J #	IBOP /J #	Inputs	Matrix J #	IBOP /J #
1-16	J21	C1/J8	1-16	J13	M1/J1
17-32	J22	C1/J16	17-32	J14	M1/J9
33-48	J25	C2/J8	33-48	J17	M2/J1
49-64	J26	C2/J16	49-64	J18	M2/J9

Table 7-17. Dual 64x64 Digital Audio Matrix /IBOP Cabling - (continued)

MATRIX 2			**MATRIX 1**		
Outputs	Matrix J #	IBOB /J #	Outputs	Matrix J #	IBOB /J #
1-16	J23	M1/J8	1-16	J15	C1/J1
17-32	J24	M1/J16	17-32	J16	C1/J9
33-48	J27	M2/J8	33-48	J19	C2/J1
49-64	J28	M2/J16	49-64	J20	C2/J9

Cabling Large Data Router Systems

Figure 7-42 illustrates a typical rack layout for a 128x128 system with frame numbers. Smaller systems will be a subset of this configuration. The right-to-left orientation of frame numbering reflects a typical rack-layout rear view.

Figure 7-42. Frame Numbering for a 128x128 Data Matrix

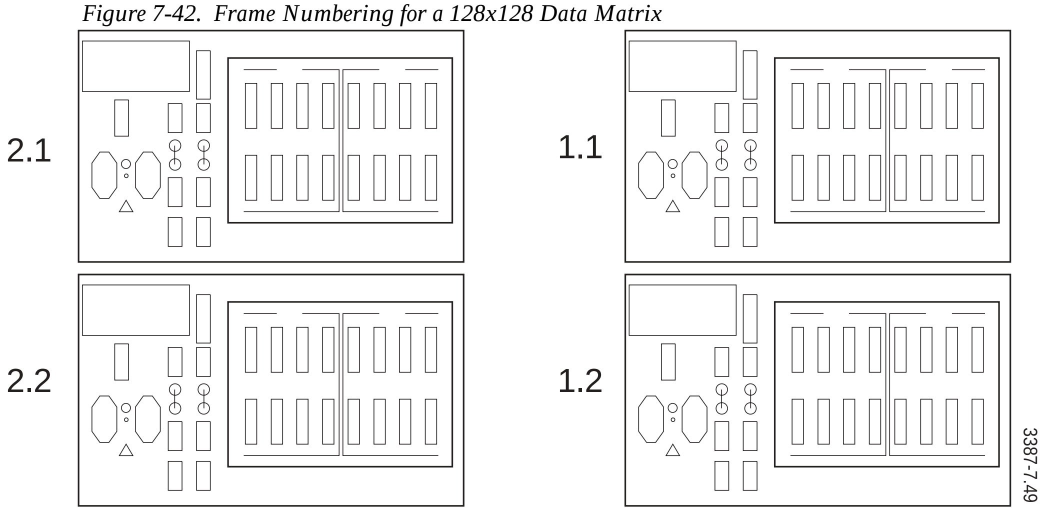


Table 7-18 provides the Input and Output ranges served by each frame shown in Figure 7-42.

Table 7-18. Frame Numbering and Input/Output Ranges for a 128x128 Data Matrix

Frame #	**Matrix**	**Input Type**	**Source**	**Output Type**	**Destinations**
1.1	Mtx 2	Control	1-64	Machine	1-64
	Mtx 1	Machine	1-64	Control	1-64
1.2	Mtx 2	Control	1-64	Machine	65-128
	Mtx 1	Machine	65-128	Control	1-64
2.1	Mtx 2	Control	65-128	Machine	1-64
	Mtx 1	Machine	1-64	Control	65-128
2.2	Mtx 2	Control	65-128	Machine	65-128
	Mtx 1	Machine	65-128	Control	65-128

Figure 7-43 illustrates a typical rack layout for the maximum 256x256 system with frame numbers. Smaller systems will be a subset of this configuration. The right-to-left orientation of frame numbering reflects a typical rack-layout rear view.

Figure 7-43. Frame Numbering for a 256x256 Data Matrix (Rear View)

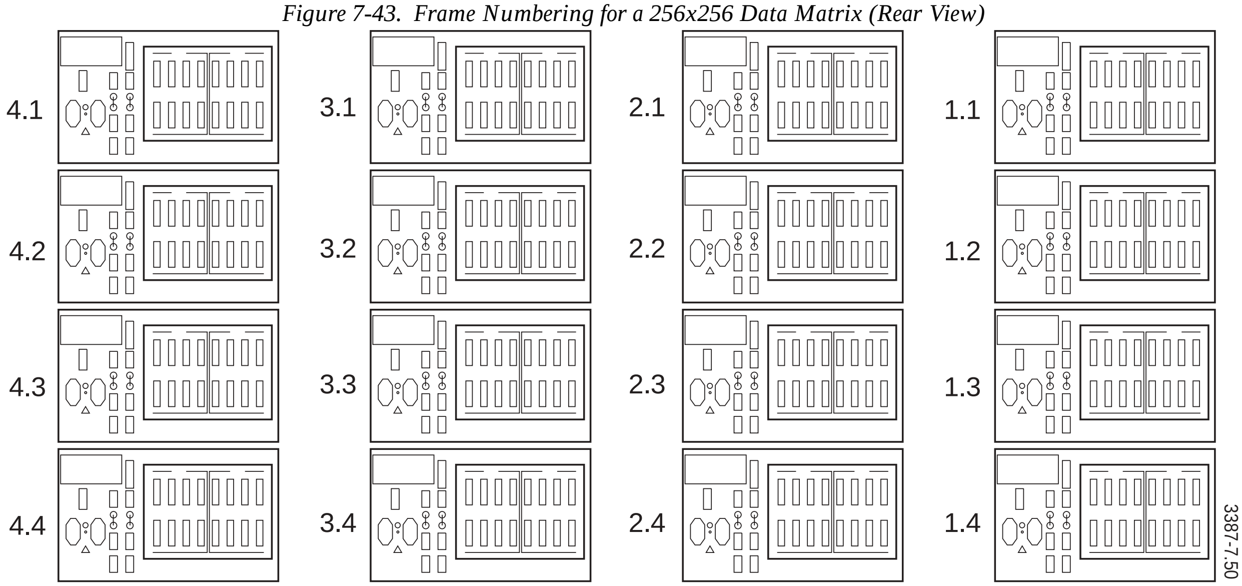


Table 7-19 provides the Input and Output ranges for a 256x256 Data Matrix frame shown in Figure 7-43.

Table 7-19. Frame Numbering and Input/Output Ranges for a 256x256 Data Matrix

Frame #	Matrix	Input Type	Source	Output Type	Destinations
1.1	Mtx 2	Control	1-64	Machine	1-64
	Mtx 1	Machine	1-64	Control	1-64
1.2	Mtx 2	Control	1-64	Machine	65-128
	Mtx 1	Machine	65-128	Control	1-64
1.3	Mtx 2	Control	1-64	Machine	129-192
	Mtx 1	Machine	129-192	Control	1-64
1.4	Mtx 2	Control	1-64	Machine	193-256
	Mtx 1	Machine	193-256	Control	1-64
2.1	Mtx 2	Control	65-128	Machine	1-64
	Mtx 1	Machine	1-64	Control	65-128
2.2	Mtx 2	Control	65-128	Machine	65-128
	Mtx 1	Machine	65-128	Control	65-128
2.3	Mtx 2	Control	65-128	Machine	129-192
	Mtx 1	Machine	129-192	Control	65-128
2.4	Mtx 2	Control	65-128	Machine	193-256
	Mtx 1	Machine	193-256	Control	65-128
3.1	Mtx 2	Control	129-192	Machine	1-64

Table 7-19. Frame Numbering and Input/Output Ranges for a 256x256 Data Matrix - (continued)

Frame #	Matrix	Input Type	Source	Output Type	Destinations
	Mtx 1	Machine	1-64	Control	129-192
3.2	Mtx 2	Control	129-192	Machine	65-128
	Mtx 1	Machine	65-128	Control	129-192
3.3	Mtx 2	Control	129-192	Machine	129-192
	Mtx 1	Machine	129-192	Control	129-192
3.4	Mtx 2	Control	129-192	Machine	193-256
	Mtx 1	Machine	193-256	Control	129-192
4.1	Mtx 2	Control	193-256	Machine	1-64
	Mtx 1	Machine	1-64	Control	193-256
4.2	Mtx 2	Control	193-256	Machine	65-128
	Mtx 1	Machine	65-128	Control	193-256
4.3	Mtx 2	Control	193-256	Machine	129-192
	Mtx 1	Machine	129-192	Control	193-256
4.4	Mtx 2	Control	193-256	Machine	193-256
	Mtx 1	Machine	193-256	Control	193-256

Use the following cabling table (Table 7-20) to make IBOP-to-matrix connections for the frame numbers that are applicable to your system configuration.

Table 7-20. 256x256 Data Matrix /IBOP Cabling

Frame #	Matrix 2			Matrix 1		
Frame 1.1	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
		J21	C1/J8		J13	M1/J1
		J22	C1/J16		J14	M1/J9
		J25	C2/J8		J17	M2/J1
		J26	C2/J16		J18	M2/J9
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
		J23	M1/J8		J15	C1/J1
		J24	M1/J16		J16	C1/J9
		J27	M2/J8		J19	C2/J1
		J28	M2/J16		J20	C2/J9
Frame 2.1	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
		J21	C3/J8		J13	M1/J2
		J22	C3/J16		J14	M1/J10
		J25	C4/J8		J17	M2/J2
		J26	C4/J16		J18	M2/J10
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
		J23	M1/J7		J15	C3/J1
		J24	M1/J15		J16	C3/J9

Table 7-20. 256x256 Data Matrix /IBOP Cabling - (continued)

Frame #	**Matrix 2**			**Matrix 1**		
		J27	M2/J7		J19	C4/J1
		J28	M2/J15		J20	C4/J9
Frame 3.1	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
		J21	C5/J8		J13	M1/J3
		J22	C5/J16		J14	M1/J11
		J25	C6/J8		J17	M2/J3
		J26	C6/J16		J18	M2/J11
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
		J23	M1/J6		J15	C5/J1
		J24	M1/J14		J16	C5/J9
		J27	M2/J6		J19	C6/J1
		J28	M2/J14		J20	C6/J9
Frame 4.1	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C5/J8		J13	M1/J3
	17-32	J22	C5/J16		J14	M1/J11
	33-48	J25	C6/J8		J17	M2/J3
	49-64	J26	C6/J16		J18	M2/J11
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
		J23	M1/J6		J15	C5/J1
		J24	M1/J14		J16	C5/J9
		J27	M2/J6		J19	C6/J1
		J28	M2/J14		J20	C6/J9
Frame 1.2	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C1/J7	1-16	J13	M1/J1
	17-32	J22	C1/J15	17-32	J14	M1/J9
	33-48	J25	C2/J7	33-48	J17	M2/J1
	49-64	J26	C2/J15	49-64	J18	M2/J9
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M3/J8	1-16	J15	C1/J2
	17-32	J24	M3/J16	17-32	J16	C1/J10
	33-48	J27	M4/J8	33-48	J19	C2/J2
	49-64	J28	M4/J16	49-64	J20	C2/J10
Frame 2.2	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C3/J7	1-16	J13	M3/J2
	17-32	J22	C3/J15	17-32	J14	M3/J10
	33-48	J25	C4/J7	33-48	J17	M4/J2
	49-64	J26	C4/J15	49-64	J18	M4/J10
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M3/J7	1-16	J15	C3/J2
	17-32	J24	M3/J15	17-32	J16	C3/J10
	33-48	J27	M4/J7	33-48	J19	C4/J2

Table 7-20. 256x256 Data Matrix /IBOP Cabling - (continued)

Frame #	**Matrix 2**			**Matrix 1**		
	49-64	J28	M4/J15	49-64	J20	C4/J10
Frame 3.2	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C5/J7	1-16	J13	M3/J3
	17-32	J22	C5/J15	17-32	J14	M3/J11
	33-48	J25	C6/J7	33-48	J17	M3/J3
	49-64	J26	C6/J15	49-64	J18	M3/J11
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M3/J6	1-16	J15	C5/J2
	17-32	J24	M3/J14	17-32	J16	C5/J10
	33-48	J27	M4/J6	33-48	J19	C6/J2
	49-64	J28	M4/J14	49-64	J20	C6/J10
Frame 4.2	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C7/J7	1-16	J13	M3/J4
	17-32	J22	C7/J15	17-32	J14	M3/J12
	33-48	J25	C8/J7	33-48	J17	M3/J4
	49-64	J26	C8/J15	49-64	J18	M3/J12
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M3/J5	1-16	J15	C7/J2
	17-32	J24	M3/J13	17-32	J16	C7/J10
	33-48	J27	M4/J5	33-48	J19	C8/J2
	49-64	J28	M4/J13	49-64	J20	C8/J10
Frame 1.3	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C1/J6	1-16	J13	M5/J1
	17-32	J22	C1/J14	17-32	J14	M5/J9
	33-48	J25	C2/J6	33-48	J17	M6/J1
	49-64	J26	C2/J14	49-64	J18	M6/J9
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M5/J8	1-16	J15	C1/J3
	17-32	J24	M5/J16	17-32	J16	C1/J11
	33-48	J27	M6/J8	33-48	J19	C2/J3
	49-64	J28	M6/J16	49-64	J20	C2/J11
Frame 2.3	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C3/J6	1-16	J13	M5/J2
	17-32	J22	C3/J14	17-32	J14	M5/J10
	33-48	J25	C4/J6	33-48	J17	M6/J2
	49-64	J26	C4/J14	49-64	J18	M6/J10
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M5/J7	1-16	J15	C3/J3
	17-32	J24	M5/J15	17-32	J16	C3/J11
	33-48	J27	M6/J7	33-48	J19	C4/J3
	49-64	J28	M6/J15	49-64	J20	C4/J11

Table 7-20. 256x256 Data Matrix /IBOP Cabling - (continued)

Frame #	**Matrix 2**			**Matrix 1**		
Frame 3.3	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C5/J6	1-16	J13	M5/J3
	17-32	J22	C5/J14	17-32	J14	M5/J11
	33-48	J25	C6/J5	33-48	J17	M6/J3
	49-64	J26	C6/J14	49-64	J18	M6/J11
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M5/J6	1-16	J15	C5/J3
	17-32	J24	M5/J14	17-32	J16	C5/J11
	33-48	J27	M6/J6	33-48	J19	C6/J3
	49-64	J28	M6/J14	49-64	J20	C6/J11
Frame 4.3	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C7/J6	1-16	J13	M5/J4
	17-32	J22	C7/J14	17-32	J14	M5/J12
	33-48	J25	C8/J6	33-48	J17	M6/J4
	49-64	J26	C8/J14	49-64	J18	M6/J12
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M5/J5	1-16	J15	C7/J3
	17-32	J24	M5/J13	17-32	J16	C7/J11
	33-48	J27	M6/J5	33-48	J19	C8/J3
	49-64	J28	M6/J13	49-64	J20	C8/J11
Frame 1.4	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C1/J5	1-16	J13	M7/J1
	17-32	J22	C1/J13	17-32	J14	M7/J9
	33-48	J25	C2/J5	33-48	J17	M8/J1
	49-64	J26	C2/J13	49-64	J18	M8/J9
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M7/J8	1-16	J15	C1/J4
	17-32	J24	M7/J16	17-32	J16	C1/J12
	33-48	J27	M8/J8	33-48	J19	C2/J4
	49-64	J28	M8/J16	49-64	J20	C2/J12
Frame 2.4	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C3/J5	1-16	J13	M7/J2
	17-32	J22	C3/J13	17-32	J14	M7/J10
	33-48	J25	C4/J5	33-48	J17	M8/J2
	49-64	J26	C4/J13	49-64	J18	M8/J10
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M7/J7	1-16	J15	C3/J4
	17-32	J24	M7/J15	17-32	J16	C3/J12
	33-48	J27	M8/J7	33-48	J19	C4/J4
	49-64	J28	M8/J15	49-64	J20	C4/J12
Frame 3.4	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J

Table 7-20. 256x256 Data Matrix /IBOP Cabling - (continued)

Frame #	**Matrix 2**			**Matrix 1**		
	1-16	J21	C5/J5	1-16	J13	M7/J3
	17-32	J22	C5/J13	17-32	J14	M7/J11
	33-48	J25	C6/J5	33-48	J17	M8/J3
	49-64	J26	C6/J13	49-64	J18	M8/J11
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M7/J6	1-16	J15	C5/J4
	17-32	J24	M7/J14	17-32	J16	C5/J12
	33-48	J27	M8/J6	33-48	J19	C6/J4
	49-64	J28	M8/J14	49-64	J20	C6/J12
Frame 4.4	Inputs	Matrix J #	IBOP /J	Inputs	Matrix J #	IBOP /J
	1-16	J21	C7/J5	1-16	J13	M7/J4
	17-32	J22	C7/J13	17-32	J14	M7/J12
	33-48	J25	C8/J5	33-48	J17	M8/J4
	49-64	J26	C8/J13	49-64	J18	M8/J12
	Outputs	Matrix J #	IBOP /J	Outputs	Matrix J #	IBOP /J
	1-16	J23	M7/J5	1-16	J15	C7/J4
	17-32	J24	M7/J13	17-32	J16	C7/J12
	33-48	J27	M8/J5	33-48	J19	C8/J4
	49-64	J28	M8/J13	49-64	J20	C8/J12

Section 8

Control Panels

Introduction

Series 7000 Control Panels are designed for simple installation and removal. The panels communicate over a 1 MBit coaxial bus. Connections to the bus are through BNC T-connectors. The T connection enables you to remove and reinstall a panel without interrupting operation of other panels or devices on the bus. This section describes installing control panels and connecting the Control Panel Bus (CP Bus).

Mounting Control Panels

Series 7000 Control Panels are mounted in one of two ways:

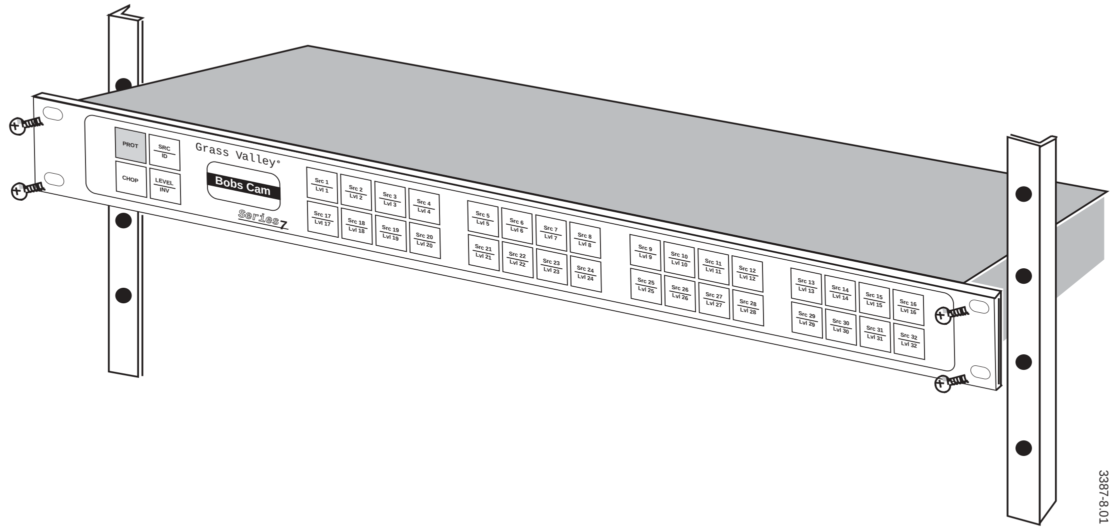
- 19-inch rack mount
- 1/2 rack width adaptors

19-inch Rack Mount

Rack mounting is straightforward and requires no special tools or adaptors. Simply position the control panel in the rack and, using rack screws or bolts and nuts (depending upon your equipment racks), secure the panel in place. Refer to Figure 8-1.

CAUTION Do not position rack-mount control panels between matrix frames and their fan and exhaust units. This will break the chimney air flow and create open areas for EMI emissions.

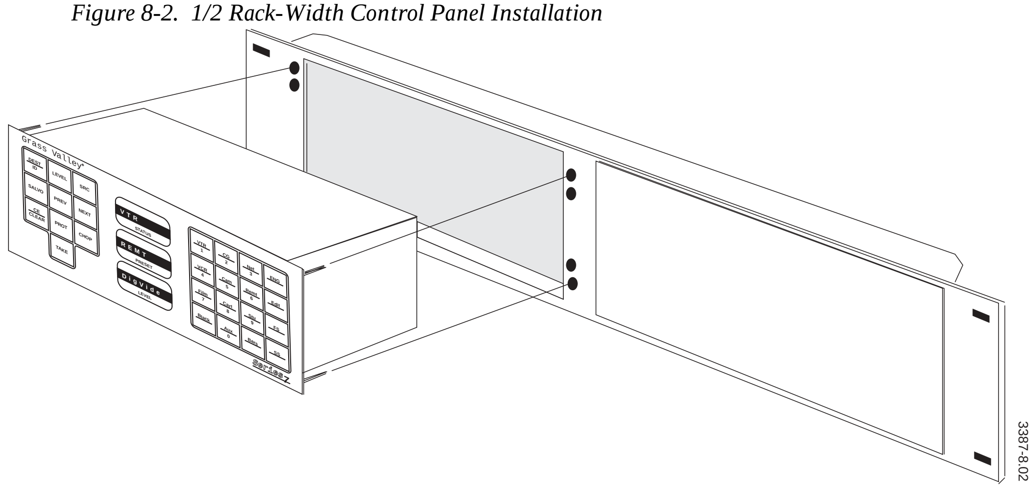
Figure 8-1. Rack Mount (BPS) Control Panel Installation



1/2 Rack Width

The Series 7000 UCP-XY panel is 2 rack-units tall and mounts in the 1/2 rack-width adapter for 19” equipment racks. The adaptor is optional and is available by ordering model HX-RMK, assembly # 092629. Nuts and star washers are provided with the 1/2 rack-width adaptor, as is a block-off plate for the unused half. The rack mount adaptor is shown in Figure 8-2.

Figure 8-2. 1/2 Rack-Width Control Panel Installation



Control Panel Dimensions

Control panels are either a full-width 1 rack-unit or 2 rack-units, or half-width 2 rack-units.

The dimensions of the different control panel sizes are:

- 1 rack-unit — 44.40 x 48.30 x 17.78 cm (1.75”H x 19”W x 7”D)
- 2 rack-units — 8.89 x 48.30 x 7.62 cm (3.5”H x 19”W x 3”D)
- 2 half-width rack-units— 8.89 x 20.32 x 7.62 cm (3.5”H x 8”W x 3”D) or 8.89 x 20.32 x 8.89 cm (3.5”H x 8”W x 3.5”D)

Note The depth measurement is only for the actual casing and attached connectors. Cabling and power cords will require an additional 2-3” depth clearance.

The sizes of the different control panels are identified in Table 8-1.

Table 8-1. Control Panel Sizes

Panel	Size
P32	1 Full Rack-Unit
P48	1 Full Rack-Unit
PXS	1 Full Rack-Unit
PXD	1 Full Rack-Unit
PXYE	1 Full Rack-Unit
SCP	1 Full Rack-Unit
SID[a]	1 Full Rack-Unit
UMD 1,2 &3	1 Full Rack-Unit

Panel	Size
COS*	2 Full Rack-Units
EPD	2 Full Rack-Units
SDP	2 Full Rack-Units
MB8	2 Full Rack-Units
MB4	2 Full Rack-Units
MCO*	2 Full Rack-Units
CLN	2 Half-Width Rack-Units
SVR	2 Half-Width Rack-Units
UCP	2 Half-Width Rack-Units

[a] These are custom panels.

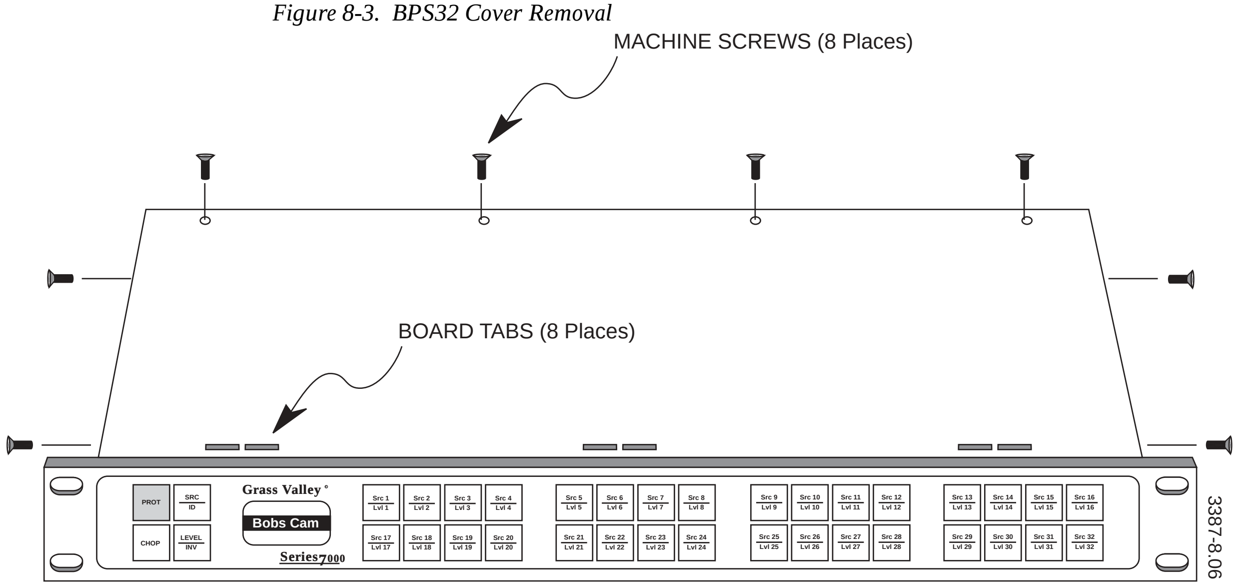
Joystick Override

The Joystick Override is an optional feature of the P32 and P48 control panel and can accept up to 24 remote inputs, via opto-isolators. The option consists of a ribbon cable, and a board and connector assembly that are installed from the top of the panel as described below. Operation of the Joystick Override is discussed in the Series 7000 *User Manual*.

Installation

1. Turn off the power to the P32 or P48 control panel and disconnect the power cord.
2. Remove the control panel cover (see Figure 8-3).

Figure 8-3. BPS32 Cover Removal

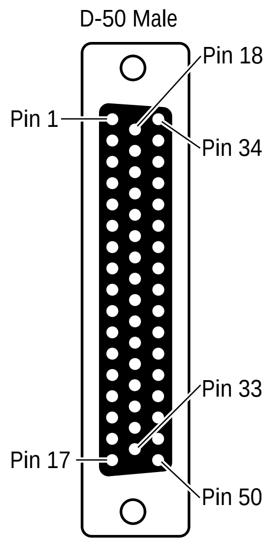


3. Remove the blank connector plate on the rear of the control panel.
4. Slide the Joystick Override board into position.
5. Secure the Joystick Override board to the control panel using four screws.
6. Connect the ribbon cable from the JA connection on the General Purpose Controller to the P2 connection on the Joystick Override board.
7. Replace the control panel cover.
8. Connect the power cord and turn on the power.

Joystick Override Connector

The installation of the Joystick Override requires shielded cable and a 50-pin D connector. The pin out for the 50-pin D connector is in Table 8-2.

Table 8-2. 50-Pin D Connector



Pin #	Signal	Pin #	Signal
1	Input 1	26	Input 13
2	Input 1	27	Input 14
3	Input 2	28	Input 14
4	Input 2	29	Input 15
5	Input 3	30	Input 15
6	Input 3	31	Input 16
7	Input 4	32	Input 16
8	Input 4	33	Input 17
9	Input 5	34	Input 17
10	Input 5	35	Input 18
11	Input 6	36	Input 18
12	Input 6	37	Input 19
13	Input 7	83	Input 19
14	Input 7	39	Input 20
15	Input 8	40	Input 20
16	Input 8	41	Input 21
17	Input 9	42	Input 21
18	Input 9	43	Input 22
19	Input 10	44	Input 22
20	Input 10	45	Input 23
21	Input 11	46	Input 23
22	Input 11	47	Input 24
23	Input 12	48	Input 24
24	Input 12	49	not used
25	Input 13	50	not used

The current limiting range for the opto-isolators gives the widest range of acceptable voltage values. The pads of the Current Limiting resistors are larger than normal to allow non-destructive modification of their resistance values. See Table 8-3.

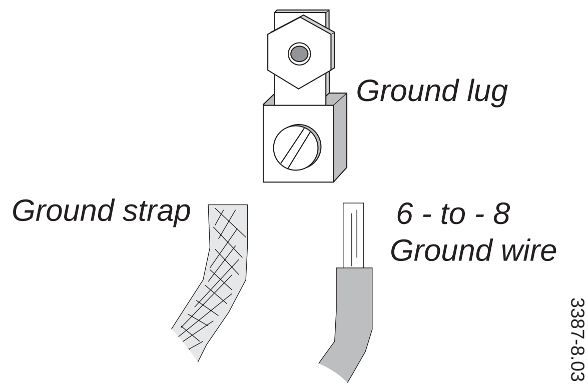
Table 8-3. Opto-Isolator Current Limiting Resistors

Input Voltage Range	Resistor Value, 1/2 W
+2V to 10.5V	470 Ohm (minimum)
+3V to 121.5V	1000 Ohm
+5V to 34.5V	2200 Ohm (default)

Ground Connections

It is essential that the control panels be properly grounded before connecting AC power. Series 7000 systems use a ground lug which is located on the rear of each independent frame. Use either a grounding strap or appropriately sized (recommend 6-to-8 gauge) insulated wire to ground the frames to the equipment racks or station ground. A ground lug is illustrated in Figure 8-4.

Figure 8-4. Ground Lug



Connecting the CP Bus

The CP (Control Panel) Bus port supports a maximum of 16 control panels (or devices) on each coaxial cable branch. The coax must be 75 Ohm (Belden 8281 or equivalent) terminated into 75 Ohms at the last device. The maximum length of a CP Bus is 1500 ft. (300 m.).

Client / Server panels require the Server and its associated Client panels be installed on the same CP Bus branch. Client / Server panels configured to work together are called a Client / Server Group." Each Client / Server Group must have one, and only one, Server Panel and at least one, but not more than 15, Client Panels (16 panels per port, maximum).

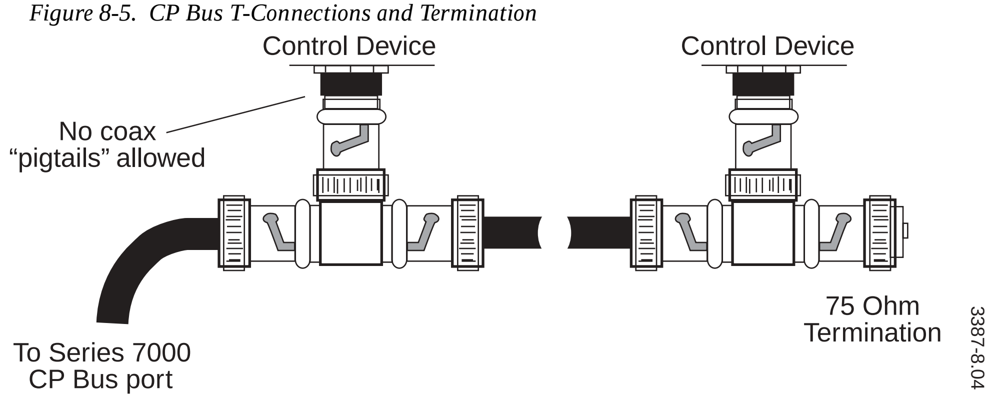
PXS / PXD / PXYE panels also require the PXS and its associated PXD and PXYE panels be installed on the same CP bus branch. PXY family panels configured to work together are called a PXY Group Each PXY Group must have one and only one PXS panel, and at least one but not more than 15 PXD or PXYE panels (16 panels per port maximum).

Note For optimum performance, it is recommended that a maximum of 8 panels per port are used for either Client/Server or PXY groups.

When bringing Client/Server panels on line, power or connect the Server panel last. This minimizes the communication traffic load during initialization of the panels.

The CP Bus is a 1 MBit data bus and will not allow pigtail extensions between the BNC T-connector and the control device (see Figure 8-5).

Figure 8-5. CP Bus T-Connections and Termination

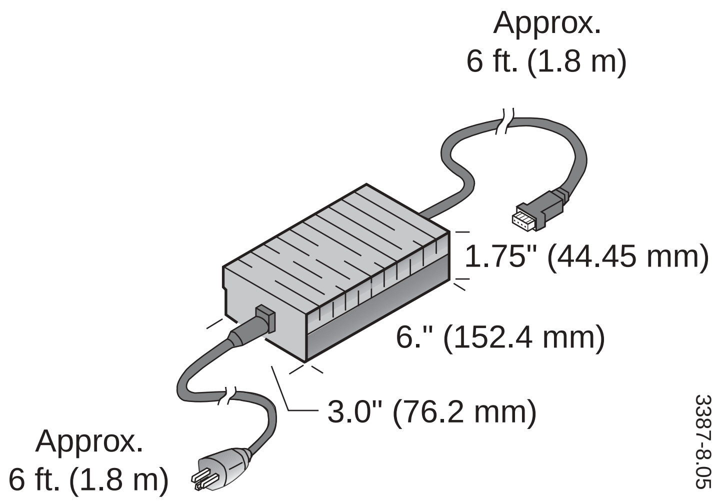


Power-up and Operation Check

Series 7000 Control Panels use brick power transformers as shown in Figure 8-6. The line and DC power cords on each side of the power transformer are approximately 5 ft. (1.5 m) in length.

CAUTION Always connect the control panels to the transformer before applying power. Failure to remove AC transformer power will cause early failures of panel Flash programming memory. The **BAD FLASH** indication is the panel display is usually due to incorrect power application.

Figure 8-6. Series 7000 Control Panel Power Transformer



Initial Operation

Upon power-up, the control panel performs a series of tests of the operating system and the control panel application (software specific to the panel type). If an error is detected, a message will be displayed on the panel. A list of error messages and their meanings is provided for each control panel type in the Operations Guide and in the Service Manual.

Upon completion of a successful initial test, the panel checks for communication with the MCPU module. If the panel displays **NO COMM**, check the following:

- Is the MCPU present and functioning?
- Is the CP Bus coax properly connected and terminated?
- Does the number of control devices on this bus exceed the allowed maximum of 16?

If communication with the MCPU is not established use the information located on the back of the title page to contact Customer Service.

Appendix **A**

Specifications

Power Requirements and Mechanical Specifications

Note None of the dimensions include fan or exhaust units.

Table 4. Series 7000 Mechanical and Power Specifications

Model	Depth	Width	Height	Weight	Rack Units	Voltage Input	Power Comsumption (Maximum)
SMS-V64x64	559 mm 22 in.	483 mm 19 in.	533 mm 21 in.	51.71 kg. 114 lbs.	12	95-130 VAC or 200-250 VAC, 47-63 Hz	600W Analog or Digital
SMS-128x64V	597 mm 23.5 in.	483 mm 19 in	800 mm 31.5 in.	[a]101.15 kg. 223 lbs.	18	95-130 VAC or 200-250 VAC, 47-63 Hz	545W Analog 580W Digital
SMS-VEF1	597 mm 23.5 in.	483 mm 19 in	267 mm 10.5 in.	12.93 kg. 28.5 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	600W Analog or Digital
SMS-VER2	597 mm 23.5 in.	483 mm 19 in	267 mm 10.5 in.	12.93 kg. 28.5 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	600W Analog or Digital
SMS-128x96V	597 mm 23.5 in.	483 mm 19 in	1067 mm 42 in.	[a]127.01 kg. 280 lbs.	24	95-130 VAC or 200-250 VAC, 47-63 Hz	755W Analog 810W Digital
SMS-V128x128	597 mm 23.5 in.	483 mm 19 in	1334 mm 52.5 in.	[a]152.86 kg. 337 lbs.	30	95-130 VAC or 200-250 VAC, 47-63 Hz	880W Analog 980W Digital
PSF 117/230	597 mm 23.5 in.	483 mm 19 in	134 mm 5.25 in.	N/A kg. N/A lbs.	3	N/A	N/A
SMS-AA64x64	457 mm 18 in.	483 mm 19 in	267 mm 10.5 in.	27.22 kg. 60 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	300W Analog 150W Digital
SMS-DA64x64	457 mm 18 in.	483 mm 19 in	267 mm 10.5 in.	27.22 kg. 60 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	300W Analog 150W Digital
SMS-128X64A (Analog)	457 mm 18 in.	483 mm 19 in	267 mm 10.5 in.	27.22 kg. 60 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	300W Analog 150W Digital
SMS-128X64A Digital	457 mm 18 in.	483 mm 19 in	267 mm 10.5 in.	27.22 kg. 60 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	300W Analog 150W Digital
SMS-AA128X128	470 mm 18.5 in.	483 mm 19 in	533 mm 21 in.	54.43 kg. 120 lbs.	12	95-130 VAC or 200-250 VAC, 47-63 Hz	600W Analog 300W Digital
SMS-DA128X128	470 mm 18.5 in.	483 mm 19 in	533 mm 21 in.	54.43 kg. 120 lbs.	12	95-130 VAC or 200-250 VAC, 47-63 Hz	600W Analog 300W Digital
SMS-DV64X64	470 mm 18.5 in.	483 mm 19 in	267 mm 10.5 in.	22.2 kg. 48.9 lbs.	6	100-240 VAC, 47-500 Hz	300W
SMS-DV128X128	470 mm 18.5 in.	483 mm 19 in	534 mm 21 in.	424 kg. 93.4 lbs.	12	100-240 VAC, 47-500 Hz	520W
SMS-DV256X128	470 mm 18.5 in.	483 mm 19 in	800 mm 31.5 in.	697 kg. 153.6 lbs.	18	100-240 VAC, 47-500 Hz	780W
DV PSF 1200W	483 mm 19 in.	483 mm 19 in	800 mm 31.5 in.	N/A kg. N/A lbs.	3	N/A	N/A

Table 4. Series 7000 Mechanical and Power Specifications - (continued)

Model	Depth	Width	Height	Weight	Rack Units	Voltage Input	Power Comsumption (Maximum)
SMS-CTL-FRM-117/230 SMS-UPG-CTL-117/230	559 mm 22 in.	483 mm 19 in	267 mm 10.5 in.	24.49 kg. 54 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	300W
SMS-SEC-FRM	559 mm 22 in.	483 mm 19 in	267 mm 10.5 in.	181 kg. 40 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	140W
SMS-DA/SEC-PSF	559 mm 22 in.	483 mm 19 in	267 mm 10.5 in.	181 kg. 40 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	140W per attached frame 600W
NC Expansion Frame	559 mm 22 in.	483 mm 19 in	267 mm 10.5 in.	24.49 kg. 54 lbs.	6	95-130 VAC or 200-250 VAC, 47-63 Hz	120W
SMS-4FAN-117/230	457 mm 18 in.	483 mm 19 in	178 mm 7 in.	N/A kg. N/A lbs.	4	N/A	N/A
SMS-6FAN-117/230	470 mm 18.5 in.	483 mm 19 in	267 mm 10.5 in.	N/A kg. N/A lbs.	6	N/A	N/A

[a] Includes weight of 3 rack unit Power Supply Frame

Performance and Environmental Specifications

Specifications are subject to change without prior notice.

Analog Video

Table 5. Analog Video (SMS-V64x64, -128x64V, -128x96V, & -V128x128)

Inputs	
Connector	75 Ohm BNC
Impedance	75 Ohms
Return Loss (75 Ohms)	DC to 5MHz: > 40dB; 5MHz to 30 MHz: > 30dB
Nominal Level	1V p-p
Maximum Level	3V p-p
Common Mode Rejection (50/60Hz)	> 60dB
Common Mode Range	+3V
Differential DC	DC Restored Inputs: +2V; DC Coupled Inputs: +50mV
Input Cable Equalization	Up to 500' (Contact Customer Service for details)
Outputs	
Connector	75 Ohm BNC
Impedance	75 Ohms
Return Loss (75 Ohms)	DC to 5MHz: > 40dB; 5MHz to 30 MHz: > 30dB
Output to Output Isolation	DC to 5MHz: > 40dB; 5MHz to 30 MHz: > 30dB
Nominal Level (full specs)	1V p-p
Maximum Level	3V p-p
Output DC Level	DC Restored Inputs: < 50 mV; Switching transients: < 50mV
Slew Rate	>180V/µs

Table 5. Analog Video (SMS-V64x64, -128x64V, -128x96V, & -V128x128) - (continued)

Electrical Length		≤ 128x128: Approx. 40 ns; > 128x128: Approx. 80 ns
Performance		
Frequency Response	100kHz to 10MHz	+0.10db; 10MHz to 30MHz: +0.50dB.
	30MHz to 60MHz	+0.50dB-3.0dB; Above 60MHz: Smooth Roll-off
Differential Phase		< 0.15°, 3.58MHz & 4.43MHz, 10-90% APL, 1V p-p Output
Differential Gain		< 0.15%, 3.58MHz & 4.43MHz, 10-90% APL, 1V p-p Output
K-Factor 2T Pulse (Kp)		< 0.25%
K-Factor Bar (Kb)		< 0.25%
K-Factor 2T Pulse to Bar (Kpb)		< 0.25%
Line or Field Tilt		< 0.50%
Signal to Noise Ratio		> 75dB, weighted CCIR 567-1, 5MHz
Crosstalk		4.43MHz: < -60db; 30MHz: < -35dB
Environmental		
Temperature		0-to-40° C ambient
Humidity		10-90%, non-condensing

Digital Video

Table 6. Digital Video (SMS-V64x64, -128x64V, -128x96V, & -V128x128)

Inputs	
Type	Automatic ≤ 100 m ≈ Belden 8281 for data rates >270 Mbit/s and ≥360 Mbit/s
Input Control	Each independently software controllable as 143 Mbit/s,177 Mbit/s, 270 Mbit/s, or 360 Mbit/s
Connector	75 Ohm BNC
Impedance	75 Ohms
Return Loss (1MHz to 360MHz)	15dB typical
Cable Equalization	Automatic ≤ 200 m = Belden 8281 for data rates ≤ 270Mbit/s Automatic ≤ 100 m = Belden 8281 for data rates >270 Mbit/s and ≥360 Mbit/s
Outputs	
Signal Type	Conforms to SMPTE 259M,EBU Tech 3267
Output Control	Each independently software controllable as 143 Mbit/s, 177 Mbit/s, 270 Mbit/s, or 360 Mbit/s
Connector	75 Ohm BNC
Impedance	75 Ohms
Return Loss (1MHz to 360MHz)	15dB typical
Signal Amplitude	800mV +10% when terminated into 75 Ohms
DC Offset	+0.5V 75 Ohm termination
Rise/Fall Times	0.75 ns (20% to 80%) 75 Ohm termination
Environmental	
Temperature	0-to-40° C ambient
Humidity	10-90%, non-condensing

Table 7. Digital Video (SMS-DV64x64, SMS-DV128x128, & SMS-DV256x128)

Video/Data Inputs		
Type		Conforms to SMPTE 259M
Connector		75 Ohm BNC
Quantity	64x64DV	64
	128x128DV	128
	256x128DV	256
Return Loss (1MHz to 360MHz)		15dB minimum
Cable Equalization	64x64DV	Automatic ≤ 300 m ≈ Belden 8281 for data rates ≤ 270Mbit/s; Automatic ≤ 100 m ≈ Belden 8281 for data rates >270 Mbit/s and ≥360 Mbit/s.
	128x128DV	
	256x128DV	Automatic ≤ 300 m ≈ Belden 8281 for data rates ≤ 270Mbit/s;
Video/Data Outputs		
Type		Conforms to SMPTE 259M.
Connector		75 Ohm BNC
Quantity	64x64DV	64-Dual
	128x128DV	128-Dual
	256x128DV	
Return Loss (1MHz to 360MHz)		15dB minimum; 19dB typical
Signal Amplitude		800mV ±10% when terminated into 75 Ohms.
DC Offset		±0.5V 75 Ohm termination.
Operational Modes		
Reclocking – Automatic	64x64DV	Automatic selection of 143, 177, 270 Mbit/s,or 360 Mbit/s.
	128x128DV	
	256x128DV	Automatic selection of 143, 177, or 270 Mbit/s.
Reclocking – Software Selected	64x64DV	Fixed selection of 143, 177, 270 Mbit/s,or 360 Mbit/s; outputs individually set.
	128x128DV	
	256x128DV	Fixed selection of 143, 177, or 270 Mbit/s; outputs individually set
Non Reclocked		Operation from 40-100Mbit/s with max.signals =1s/0s ratio of 20:1.
Dual Sync – Software Selected		Vertical interval switch referenced to pre-selected reference. Each output independently set.
Performance		
Input to Output delay	64x64DV	27.5 ns ±2.5 ns, non-reclocked; 30.75 ns ±2.5 ns, reclocked.
	128x128DV	
	256x128DV	29.96 ns ±2.07 ns, reclocked.
Vertical Interval Switch, VI1 – Normal switching		525 Line Standard Field switching – Line 10 and Line 273.Middle of line ±5µsec.
		625 Line Standard Field switching – Line 6 and Line 319. Middle of line ±5µsec.
Dual Sync – Software Selected		Vertical interval switch referenced to pre-selected reference. Each output independently set.
Monitor Input		
Type		Conforms to SMPTE 259M
Connector		75 Ohm BNC
Quantity		1
Return Loss (1MHz to 360MHz)		15dB minimum

Table 7. Digital Video (SMS-DV64x64, SMS-DV128x128, & SMS-DV256x128) - (continued)

Cable Equalization	64x64DV	Automatic ≤ 300 m ≈ Belden 8281 for data rates ≤ 270Mbit/s; Automatic ≤ 100 m ≈ Belden 8281 for data rates >270 Mbit/s and ≥360 Mbit/s.
	128x128DV	
	256x128DV	Automatic ≤ 300 m ≈ Belden 8281 for data rates ≤ 270Mbit/s;
Monitor Outputs		
Type		Conforms to SMPTE 259M.
Connector		75 Ohm BNC
Quantity		2
Return Loss (1MHz to 360MHz)		15dB minimum
Signal Amplitude		800mV ±10% when terminated into 75 Ohms.
DC Offset		±0.5V 75 Ohm termination.
Rise/Fall Times		0.75 ns (measured from 20-80%) 75 Ohm termination.
Reference Inputs (Ref 1 and Dual Sync Ref)		
Type		Analog PAL or NTSC Color Black.
Connectors		2 BNCs configured as Loop-Through.
Level		300mV ±100mV Sync Amplitude 75 Ohm termination.
Return Loss		>40dB to 5MHz
Vertical Interval Reference Input (VI2 IN)		
Type		Vertical Interval Pulse
Connectors		2 BNCs configured as Loop-Through.
Level		400mV to 8V Pulse Amplitude.
Return Loss		40dB to 5MHz
Vertical Interval Reference Output (VI2 OUT)		
Type		Vertical Interval Pulse
Connector		BNC
Quantity		1
Level		1.2V Pulse
Return Loss		>40dB to 5MHz
Node Control (Node Bus)		
Type		1Mbit/s Serial Bus
Connector		BNC
Quantity		1 high impedance loop through
Level		1V p-p to 8V p-p pulse amplitude
Return Loss		>20dB to 1MHz
Node Control Interface Option (NODE CTL I/F OPT)		
Type		General purpose parallel interface, capable of interfacing KScope.
Connector		D type
Quantity		1
Frame Control (FC/VI A, FC/VI B, FC/VI C, FC/VI D, FC/VI E)		
Type		Node Control Expansion access, RS-485 serial interface
Connector		D type
Quantity		5 (A, B, C, D, E)

Table 7. Digital Video (SMS-DV64x64, SMS-DV128x128, & SMS-DV256x128) - (continued)

Spare (EXT CTL 1)		
Type		RS-485 serial interface
Connector		D type
Quantity		1
Power Supply Status		
Type		Health status from Power Supply to Node Controller.
Connector		D type
Quantity		1
Frame Power		
Connector	64x64 DV	7 pin power connector
	128x128DV	5 pin power connector
	256x128DV	
Quantity		1
Voltages	64x64DV	+5V @ 50W, ±8V @ 250W
	128x128DV	+5V @ 50W, ±8V @ 470W
	256x128DV	+5V @ 80W, ±8V @ 700W
Frame Power Consumption (from a SMS 7000 supply)	64x64DV	300 watts total.
	128x128DV	520 watts total.
	256x128DV	780 watts total.
Environmental		
Operating Temperature		0-to-40° C ambient
Relative Humidity		0-90%, non-condensing

Analog Audio

Table 8. Analog Audio (SMSAA64x64, -128x64A (Analog), & -AA128x128)

Inputs		
Maximum Input Level (balanced or unbalanced)		+24dBu
Input Impedance (nominal, balanced)	< 32 Outputs	64k Ohms in parallel with 50pF;
	< 128 Outputs	16k Ohms in parallel with 200pF;
	< 256 Outputs	8k Ohms in parallel with 400pF;
	< 1024 Outputs	2k Ohms in parallel with 1.6nF
Input CMRR (50/60Hz)		70dB CMRR @ 20kHz ≥ 55dB SMPTE IM ≤ 0.05% (+24dBu input and output)
Common Mode Voltage Range		+40V peak W/+24dBu signal
Outputs		
Maximum Output Level (balanced)		+24dBu
Max Load at Rated Spec (balanced)		600 Ohms in parallel with 0.015µF
Output Impedance (balanced)		36 Ohms (Nominal)
Power		
Full 6RU frame		370 W (Nominal)
Performance		

Table 8. Analog Audio (SMSAA64x64, -128x64A (Analog), & -AA128x128) - (continued)

Frequency Response	20-20kHz: +0.1dB; 200kHz: -3.0dB (Nominal)
Gain Adjustment Range	+1.5dB
Noise (22kHz unweighted, RMS)	-85dBu
Switching Noise (transient, any configuration)	-65dBq
Crosstalk (all inputs and outputs hostile, 20-20kHz)	-100dB
Total Harmonic Distortion (+24dBu, 20-20kHz)	0.015% Static Withstanding Voltage 10kV @ 330 Ohms, 150 pF (input or output)
Environment	
Temperature	0-to-40° C ambient
Humidity	10-90%, non-condensing

Digital Audio

Table 9. Digital Audio (SMSDA64x64, -128x64A (Digital), & -DA128x128)

Inputs		
Impedance (nominal, balanced)		110 Ohms, ±20%
Differential Voltage Range		±200mV - 12V p-p BNC vers. 75 Ohms ±10%
Voltage Range		100mV - 10V
Hysteresis		50mV
Sampling Rates		25kHz - 55kHz
Reclocking		yes
Synchronizing		no
Common Mode Voltage Range		±200V
Outputs		
Rise Time		15 ns typical, 25 ns max
Common Mode Range		+12V, -7V
Impedance		110 Ohms diff. ±20%, BNC vers. 75 Ohms ±10%
Output Voltage	Differential Version	4V p-p into 110 Ohms;
	BNC Version	2V p-p, open circuit or 1V p-p, 75 Ohms.
Monitor Output		
Rise Time		15 ns typical, 25 ns max
Differential Output Voltage		4V p-p, 110 Ohm Termination
General		
Matrix Size		64x64
Interface Standard AES/EBU	Inputs	Transformer coupled
	Outputs	Capacitively coupled; BNC version is transformer coupled
Crosspoint Switching		Async 4ms max discontinuity
Environment		
Temperature		0-to-40° C ambient
Humidity		10-90%, non-condensing

Input to Output Signal Inversion Tables

Table A-1. SMS DV Matrices

<table>
<tr><th>Router</th><th colspan="3">Outputs</th><th>Reclocked</th><th>Bypass</th></tr>
<tr><td rowspan="2">256x128 DV</td><td colspan="3">A</td><td>Non-inverting</td><td>Inverting</td></tr>
<tr><td colspan="3">B</td><td>Inverting</td><td>Non-inverting</td></tr>
<tr><td rowspan="4">128x128 DV</td><td rowspan="2">A</td><td>1-32</td><td>65-96</td><td>Inverting</td><td>Non-inverting</td></tr>
<tr><td>33-64</td><td>97-128</td><td>Non-inverting</td><td>Inverting</td></tr>
<tr><td rowspan="2">B</td><td>1-32</td><td>65-96</td><td>Non-inverting</td><td>Inverting</td></tr>
<tr><td>33-64</td><td>97-128</td><td>Inverting</td><td>Non-inverting</td></tr>
<tr><td rowspan="2">64x64 DV</td><td colspan="3">A</td><td>Non-inverting</td><td>Inverting</td></tr>
<tr><td colspan="3">B</td><td>Inverting</td><td>Non-inverting</td></tr>
</table>

Table A-2. Classic Matrices

<table>
<tr><th>Router</th><th colspan="2">Outputs</th><th>Reclocked</th><th>Non-reclocked Input Board</th></tr>
<tr><td rowspan="2">64x64 Classic</td><td colspan="2">Right</td><td colspan="2">Non-inverting</td></tr>
<tr><td colspan="2">Left</td><td colspan="2">Inverting</td></tr>
<tr><td rowspan="4">128x128 Classic</td><td rowspan="2">Right</td><td>1-64</td><td colspan="2">Non-inverting</td></tr>
<tr><td>65-128</td><td>Non-inverting</td><td>Inverting</td></tr>
<tr><td rowspan="2">Left</td><td>1-64</td><td colspan="2">Inverting</td></tr>
<tr><td>65-128</td><td>Inverting</td><td>Non-inverting</td></tr>
</table>

Table A-3. 2x1 Switcher

Router	Outputs	Reclocked
2x1 Switch	A	Non-inverting
	B	Inverting

Appendix **B**

Matrix Interfaces

Introduction

This section discusses specific operational considerations and performance specifications for the following matrices controlled by the Series 7000:

Note If you are installing an interface to any of the Grass Valley routing systems, you must use the Configuration manual to configure the Asynchronous Mezzanine (Amezi) card on the Series 7000 CIF module. This procedure uses the Series 7000 maintenance terminal interface to download appropriate software to the coprocessor on the 7000 Amezi.

Grass Valley Horizon/TCI (GPI) Interface

Through a Serial Mezzanine (SMS-SER-MZ, herein referred to as Amezi) on a Communications Interface (CIF) module, the Series 7000 can interface with a standard Horizon GPI system running Terminal Computer Interface (TCI) software. The HX-GPI resides in a one rack-unit frame. Its serial ports are configured via the Horizon Maintenance terminal. The CIF module resides in a Series 7000 Controller frame. The equipment required for this interface is listed below:

- HX-GPI and maintenance terminal
- *Horizon General Purpose Interface* manual
- RS-422 interconnect cable
- Series 7000 Controller frame with CIF module
- Series 7000 PC GUI 5.0 or later
- SMS-SER-MZ (Amezi) asynchronous mezzanine card
- Appropriate CIF Rear Panel (RP) for RS-422 connection (see the topic General CIF Interface Hardware in Section 4)

Installation Procedure Overview

To install the Series 7000 / HX GPI interface you will need to use the Horizon GPI manual to configure the selected HX-GPI port for RS-422.

Refer to the External Interfaces subsection in Section 4 to:

- Install the 7000 CIF, Amezi card, and RP according to CIF option instructions.
- Cable the HX-GPI serial port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame.
- Determine the coprocessor name of the 7000 Amezi card.

Refer to the *Configuration Manual* to:

- Build the appropriate configurations. Use **Coprocessor** and **Cfgd Amezi** found under the **Setup** menu on the GUI.
- Check system Limits and configure a Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the Horizon control level(s).
- Test the interface.

Note Please read through, and become familiar with the entire procedure before beginning the Installation.

Installation Procedure

1. Configure the HX-GPI port.

Note This procedure describes an RS-422 connection between the HX-GPI and the Series 7000 Amezi. If you decide to use an RS-232 connection, be sure the HX-GPI and Amezi are configured to match.

Use the Horizon General Purpose Interface manual to set up one of the serial ports for RS-422 communication (either J6 or J7).

Recommended communication parameters are:

- RS-422
- Baud: 38400
- Data bits: 7
- Parity: odd
- Stop bits: 1
- Protocol: none

Controlled outputs: All Horizon outputs you wish to have controlled by the Series 7000.

CAUTION Do not run more than one control device on the GPI used for the Series 7000/HX-GPI Interface. All devices on the HX GPI share a common system address which can cause confusion in system operations.

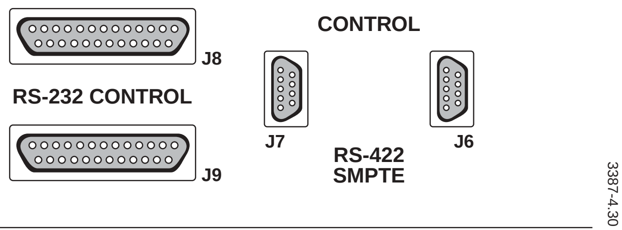
2. The CIF, Amezi (SMS-SER-MZ) card, and Rear Panel (RP) must be properly installed in the Controller frame.

Refer to the instructions in the General CIF Interface Hardware description (Section 4) as you read this instruction. The Amezi card must reside in the correct position (1 through 4) on the CIF module to match the Rear Panel RS-422 connector location. If there is a redundant CIF module, it must be configured the same as the main module.

3. Connect the CIF to GPI cable.

Connect a control cable from the configured HX-GPI port, 9-pin connector (either J6 or J7) to the Series 7000 CIF Rear Panel connector for the Amezi card.

Figure B-1. HX-GPI Serial Port Connectors



Depending on the type of rear panel used, the Series 7000 connector could be a 25-pin or 9-pin connector. Wiring for the two possible cables is illustrated in Section 4 of this manual.

CAUTION If this cable is removed and replaced after the interface is up and running, a reset of the HX-GPI module is required to restore communication.

4. Configuration using the GUI.

Use the Series 7000 *Configuration Manual* to configure the Co-processor, Cfgd Amezi, and Alien Node Controller.

Redundancy

The following is a description of the Series 7000 / Horizon GPI redundancy mechanism.

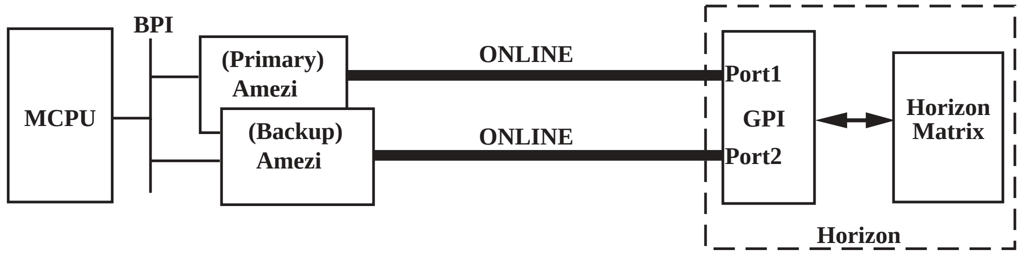
Definitions

- **Alien Node Controller** (ANC)—the Amezi (Asynchronous Mezzanine Interface) function of controlling a matrix other than the native Series 7000 (such as the Grass Valley Horizon router).
- **Amezi** —an Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices. This term will be used to describe the communications path along the wire(s) between an Amezi (or Amezi pair) and the external device port (or pair of ports).
- **General Purpose Interface** (GPI)—the hardware interface between the Horizon matrix and the Amezi.
- **Terminal Control Interface** (TCI)—the software communications protocol which runs on the GPI hardware.

Horizon Dual-Wire/Dual-Port Interface

Protects are allowed within this redundancy configuration. Refer to Figure B-2.

Figure B-2. Two-Wire Dual Primary Configuration



Two wires connect two Amezis to two GPI ports. Both communications channels are capable of concurrent, full functionality.

Primary Amezi to Port1 is one communications channel and Backup Amezi to Port2 is the other communications channel. Primary will issue heartbeats, connects, and all-level tallies to Port1. Primary maintains a current image of the Horizon's Source-Destination map within its own memory.

Backup will issue heartbeats and all-level tallies to Port2, but NO connects. The heartbeat allows the Series 7000 continuous verification that the backup communications channel is ready if needed. The background tally of all controlled Destinations is maintained by Backup, at a slightly slower rate than the Primary tally rate. This allows the Backup Amezi to have a current Source-Destination database within its own Amezi memory in the event of a switchover from the Primary Amezi.

Switchovers—Series 7000 Directed

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi.
- No communications are being received back from Port1.

The Amezi is responsible for a heartbeat message to the GPI. Should this heartbeat fail to receive a response, the communications channel is considered down.

Note If the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, the Backup should first be taken off-line.

The Series 7000 will not automatically switch back from a Backup Amezi to a Primary Amezi, even when errors are determined on the Backup after the switchover. This is to prevent “ping ponging.” Only an alarm from the MCPU will be issued. Operator intervention will be required to reset the communications channel to Primary.

In the event of a Backup Amezi / communications channel failure while the Primary communication channel is operating properly, an alarm will be issued by the MCPU.

Redundancy is carried through between the Amezis and the GPI. Recognition by Amezis of failures between a GPI and the attached Horizon matrix is not supported. The link between a GPI and the Horizon matrix represents a single point-of-failure.

Switchovers—Horizon GPI Directed

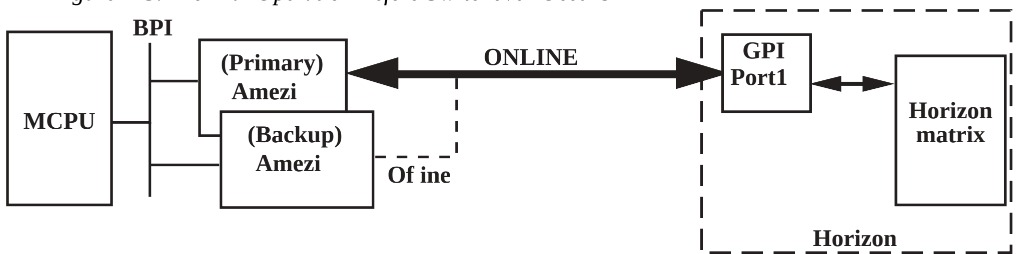
Since both Horizon GPI Ports 1 and 2 are concurrently fully functional, no actual switchover occurs.

Horizon GPI Single-Wire Interface

Single-wire redundancy is NOT the suggested redundancy configuration but is presented here for completeness.

Protects are allowed within this redundancy configuration. Refer to Figure B-3.

Figure B-3. Normal Operation Before Switchover Occurs



A single wire connects the two Amezis to one GPI port.

One Amezi (the primary) will be fully functioning—issuing commands and receiving responses from the GPI Port1. The other Amezi (the backup) will have its communications drivers tri-stated, effectively taking this Amezi off the communications channel—the RS-422 or RS-232 cable.

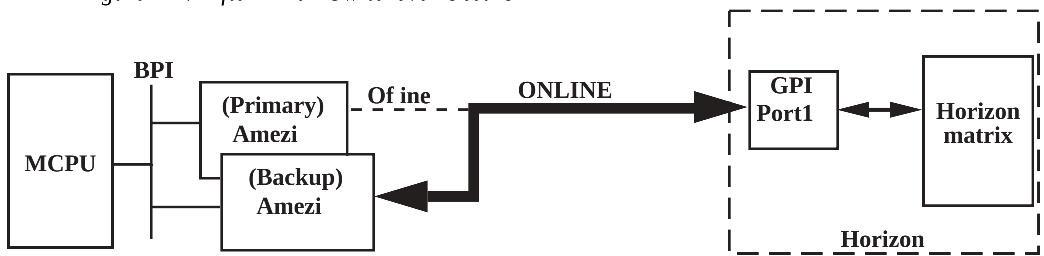
The GPI Port1 will be fully functioning—receiving commands (takes, tallies, heartbeats) and issuing responses to the Amezi.

Switchovers—Series 7000 Directed

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi
- No communications are being received back from Port1.

Figure B-4. After Amezi Switchover Occurs



The Amezi is responsible for a heartbeat message to the GPI. Should this heartbeat fail to receive a response, the communications channel is considered down.

Note If the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

The MCPU is capable of monitoring the health of the Backup Amezi, but NOT capable of determining the viability of the Backup communications channel.

The Backup Amezi will NOT be able to maintain an image of the alien matrix concurrent with the Primary. After switchover occurs, the Backup Amezi will have to acquire the status from the alien matrix. Crosspoint acquisition will not exceed 20 to 30 crosspoints per second.

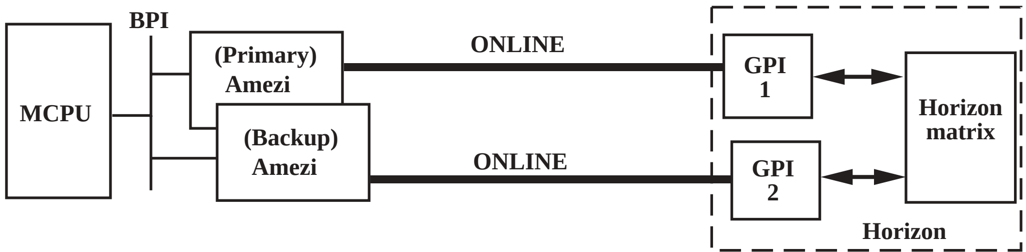
The Series 7000 will not switch back from a Backup Amezi to the Primary Amezi, even if identical or different errors are determined after the switchover has occurred. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel to the Primary Amezi.

Redundancy is carried between the Amezis and the GPI. Recognition by Amezis of failures between a GPI and the attached Horizon matrix is not supported. The link between a GPI and the Horizon matrix represents a single point-of-failure.

Horizon Dual GPI Interface

CAUTION The Dual GPI configuration is the most robust form of Horizon redundancy. However, since each GPI has its own separate and distinct C-bus address, the Protect Destination feature is not compatible. All Destinations must be configured as **NOT CONTROLLED** or **SHARED**—NOT **EXCLUSIVE**.

Figure B-5. Two-wire Dual Primary Configuration



Two wires connect two Amezis to two GPIs.

Both communications channels are capable of concurrent full functionality.

Primary Amezi to GPI1 is one communications channel and Backup Amezi to GPI2 is the other communications channel. Primary will issue heartbeats, connects, and all-level tallies to GPI1. Primary maintains a current image of the Horizon's Source-Destination map within its own memory.

Backup will issue heartbeats and all-level tallies to GPI2, but NO connects. The heartbeat allows the Series 7000 continuous verification that the backup communications channel is ready if needed. The background tally of all controlled Destinations is maintained by Backup, at a slightly slower rate than the Primary tally rate. This allows the Backup Amezi to have a current Source-Destination database within its own Amezi memory in the event of a switchover from the Primary Amezi.

Switchovers—Series 7000 Directed

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi.
- No communications are being received back from GPI1.

The Amezi is responsible for a heartbeat message to the GPI. Should this heartbeat fail to receive a response, the communications channel is considered down.

Note If the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

The Series 7000 will not automatically switch back from a Backup Amezi to a Primary Amezi, even when errors are determined on the Backup after the switchover. This is to prevent “ping ponging.” Only an alarm from the MCPU will be issued. Operator intervention will be required to reset the communications channel back to Primary.

In the event of a Backup Amezi / communications channel failure while the Primary communication channel is operating properly, an alarm will be issued by the MCPU.

Redundancy is carried through the Amezis and the GPI. Recognition by Amezis of failures between a GPI and the attached Horizon matrix is not supported.

Switchovers—Horizon GPI Directed

Since both Horizon GPI 1 and 2 are concurrently fully functional, no actual switchover occurs.

Notes on Setting Protects

CAUTION Protects issued from the Horizon GPI can be lost temporarily when GPI power is lost. The 7000 can take from up to two to four minutes to automatically reset the Horizon Protect condition. To avoid this possibility, place the GPI on an un-interruptible power supply (UPS).

The following discussion is specific to Horizon / TCI Protect performance, but demonstrates performance issues for any third-party matrix employing an All-Level Protect scheme. The Series 7000 can protect-by-level. Many third-party systems, including Horizon, protect on all levels whenever a Protect is set.

CAUTION When building the Configured Node Controller record for the Horizon matrix, set control flags the same for all levels of each controlled Horizon Destination. For example, if Horizon Destination 0 (remember zero-based offset) is to be controlled only by Series 7000, the control flag for Destination 1 in each of the (up to) four Configured Node Controller slices should be set to "E" (Exclusive).

Exclusive Control Flag Set

Setting the Exclusive flag causes the Horizon Destination to become protected against Source-changes by other Horizon control devices (providing those devices are not set for the same polling address used by the HX-GPI linking Horizon and Series 7000).

Destination protection in Horizon is polling-address related. Any Horizon control device having the same polling address as the HX-GPI linking Horizon and Series 7000, is able to make Source-changes to exclusive Destinations (not a recommended configuration). Such a Source-change temporarily removes protection from the Destination but is quickly re-asserted by the HX-GPI. If such a device attempts to protect an exclusive Destination, it cannot succeed since the bus is already protected.

Though a Series 7000 panel may protect a Horizon Destination, that protection is valid only against other Series 7000 panels. Protection established by Series 7000 panels is entirely internal to the Series 7000 and is not carried into the Horizon system.

If a Horizon Destination becomes Protected by a device other than the HX-GPI, no Series 7000 panel is able to make a new selection to that Destination until the Protect is removed. Such a condition tends to self-correct since the Series 7000 periodically refreshes Protection for **EXCLUSIVE** Horizon Destinations. At some point, when the original Protect is relinquished, a new Series 7000 Protection is initiated.

Horizon control devices with polling addresses that do not match the HX-GPI, are prevented from making Source-changes or Protecting / un-Protecting “exclusive” Destinations.

Horizon Full-Function X-Y control panels are not able to make Source-selections to Exclusive Horizon Destinations unless placed in Maintenance Mode. In the HX-FF-XY Maintenance Mode it is possible to make Source-changes despite the presence of the Series 7000 originated Protection, though such changes do not remove Protects. It is not possible for an HX-FF-XY to protect an exclusive Destination that is already protected by Series 7000.

Shared Control Flag Set

When setting up a Configured Node Controller record for the Horizon, it is possible to specify that Horizon Destination control is to be Shared. In this case, Horizon control devices, regardless of polling address setting, are able to make Source-selections to Shared Destinations and are able to protect / un-protect them at all times (subject to normal Horizon operating principles).

Series 7000 control panels can select Sources to shared Horizon Destinations provided the Destination is not protected by a Horizon control device. An attempt to select a new Source to a Horizon protected Destination will fail, though the Series 7000 panel making the attempt will initially display the change as though it had happened. It will do so because the Series 7000 control system is not immediately aware that the change has been rejected. As Series 7000 continuously polls it will determine that the status of the Horizon and its ma” in Series 7000 do not agree. The map, and, therefore, all Series 7000 displays, will be updated.

Horizon Destinations are not protected automatically by Series 7000. Series 7000 control panels cannot issue protection to Horizon systems. Attempts to protect Horizon Destinations from Series 7000 panels will establish protection against other Series 7000 panels only. That protection does not extend into the Horizon control system. It is entirely possible for a Horizon control device to make a new Source-selection for such a Destination. The operator at the Series 7000 panel, unless carefully instructed, is not aware that his Destination is vulnerable to a Horizon-originated Source-change. The operator will not be immediately notified of the change. However, ongoing polling by Series 7000 of the Horizon, after a period of seconds or minutes, will update the Series 7000 control panel display.

Horizon Full-Function X-Y control panels are able to make Source-selections to any Horizon Destination which is shared. They are able to protect these Destinations and, when in Maintenance Mode, can make new Source-selections to Destination protected by other Horizon devices, though they cannot remove such protection.

Not Controlled

When setting up a Configured Node Controller record for the Horizon, it is possible to specify that specified Horizon Destinations will not be controlled by Series 7000. Horizon Destinations designated Not Controlled by Series 7000 are totally unaffected; they continue to operate according to normal Horizon principles. It is not possible for a Series 7000 control panel to make a Source-selection to such a Horizon Destination and the Series 7000 MCPU does not monitor that Destination. Limiting the number of monitored Destinations improves system performance.

Horizon All-Level Protect Issues

Exclusive control of Horizon Destinations is established by Series 7000 issuing "Protect" messages to the HX-GPI. A Protect, in Horizon, applies to all levels; it is not possible to selectively protect or not protect individual levels of any Destination.

If Configured Node Controller control flags are not uniformly set across Levels for each Destination, these conditions will result:

1. If any Destination in any slice is configured "E," all levels of that Horizon Destination are protected.
    a. If a subsequent slice is configured "S" (Shared control) for the same Destination, the Destination will become unprotected as the slice information is transferred to the HX-GPI. Protection will restore momentarily when Series 7000 later polls the HX-GPI and the cycle will repeat. If the first slice had been set to "S" for a given Destination and a subsequent slice were set to "E," the same cycle would result.

b. If a subsequent slice is configured "-" (Not Controlled) for the same Destination, the Destination will be protected fully as noted above, though the Level represented by the "-" slice will not be controllable from Series 7000. In addition, since it is protected by Series 7000, no Horizon control panel will be able to select Sources to it either.

2. If any Horizon Destination were configured "E" and it later were desired to relinquish control, it is essential that the Protect set by the "E" designation be cleared before changing status to "-." That can only be accomplished by first configuring all (slices) for that Destination to "S" status. This requires that the change be fully completed, including clicking on "OK" and "Close" as necessary to return to the main Series 7000 GUI screen. This is necessary because "S" status is the ONLY flag which CLEARS Series 7000 originated Protects in the HX-GPI. The "-" flag DOES NOT clear existing Protects, it only renders the Destination uncontrollable. If you do not exercise this step, the newly uncontrolled Destination will be uncontrollable by Horizon panels as well, since the Series 7000 originated Protect remains in effect. Only after having cleared Protects through the use of the "S" flag is it safe to reconfigure a Destination as Not Controlled.

CAUTION Some exceptions to typical Horizon and Series 7000 operations are listed below:

- Series 7000 control devices will not report Horizon errors, protect status, or missing crosspoints.
- Horizon system Takes are not immediately reported to Series 7000. Status is reported periodically as 7000 does Status updates.

Protect Performance

This section describes the requirements/capabilities of the Amezi Alien Node Controller-to-Horizon TCI protection mechanisms.

Definitions

- Alien Node Controller (ANC)— The Amezi function of controlling a matrix other than the native Series 7000 matrices, for example, Horizon, Datatek, CDL, Pro-Bel, etc.
- General Purpose Interface (GPI)—A general purpose box offering many additional features. Only one of which is the Terminal Control Interface.
- Terminal Control Interface (TCI)—The port and software protocol provided by the GPI which allows serial control of an Horizon matrix.

Features and Capabilities

The following is a description of how Series 7000 / Horizon matrix Protects work.

Horizon Destination Protects need refreshing. The Horizon General Purpose Interface (GPI), which provides the serial control (port) to the Series 7000, is designed to automatically refresh a Protect to a Horizon matrix Destination Protect once the Protect has been issued to the GPI by the controlling device attached to the serial port (in this case, the Series 7000).

Horizon Protects are not level specific. When a Protect (or unprotect) is issued to an Horizon Destination, all levels which are defined (for example, present in hardware) are protected (unprotected). It is important that all levels of each Horizon Destination are configured exactly the same in terms of Exclusive / Shared / Not Controlled setup in the Series 7000 Node Controller. A Protect for ANY Level of a Horizon Destination is for ALL Levels. If you set the control flags differently in the several Slices for Horizon Levels, Protect and un-Protect messages can conflict with, and cancel, each other.

The device which issues the protect on a Destination now owns that Destination. While no other device is capable of Taking to that protected Destination, the protecting device can Take to that Destination without first unprotecting the Destination (issuing a Clear Protect).

An HX-GPI offers serial control of a Horizon matrix. The GPI has two serial ports for input, but presents only one C-bus address to the Horizon to which it is connected. Therefore, if two devices are connected to an HX-GPI, they share the same C-bus address in the Horizon control system. Since their C-bus addresses are the same, one or the other can alter the Protect status of a Destination protected by the other device.

In addition, if a device using the second HX-GPI control port performs a Take to a Destination that the primary device had protected, the Take occurs, and the protection for that Destination is lost.

Only through the use of Exclusive / Shared / Not Controlled selection (Node Controller setup) via the HX-TCI / Amezi interface, are Series 7000 users able to protect or unprotect individual Destinations within a Horizon matrix. Protects issued will be all-level Protects. No level-specific Protects are performed, or even possible. When a Protect (or unprotect) is issued to a Horizon Destination, all Levels which are defined (meaning they are present in hardware) are protected (or unprotected). The Series 7000 protection mechanism is limited to the capability of the Horizon.

Since Horizon Protects do not need software refreshing from the Series 7000, only one Protect is issued upon configuration for each **EXCLUSIVE** Destination setting selected, and this protection is maintained by the Horizon until a new node controller configuration is downloaded by the GUI, or the Horizon GPI powers down. Likewise, one unprotect (clear Destination protection) is issued for each Destination selected as **SHARED**.

Manual on-line changes of Protect status is allowed from the GUI at the discretion of the user. Should a user wish to add or delete one or more Protects covering particular Destinations, then a manual change at the GUI Exclusive, Shared, Not Controlled definition menu is required (within Node Controller configuration). Remember to make all Slices match. When all the changes are completed, an **OK** at exit of this menu causes a new MCPU-to-Amezi node controller download, which then protects or unprotects the matrix Destinations according to the new configuration. Please note that a real change of configuration is not necessary to cause a configuration download. Clicking the **OK**, to exit the menu, will cause a configuration download.

Setting Cntrl Flags - By Selecting

- "E” sets Destination to Exclusive (protected).
- "S” sets Destination to Shared (unprotected).
- "-” signals the Amezi to not control (not protect) this Destination.

A Destination selected as **EXCLUSIVE** is issued a Set Protected Output (SPO) upon Amezi ANC reception of the configuration. A Destination selected as **SHARED** is issued a Clear Protected Outputs (CPO) upon Amezi ANC reception of the configuration. A Destination selected as **NOT CONTROLLED** is ignored.

Protects (SPO) and Unprotects (CPO) are issued from the Amezi ANC to the external Horizon matrix immediately following the MCPU issuing a node controller configuration to the Amezi controlling that Horizon matrix. The MCPU issues (downloads) node controller configuration to Amezi ANCs:

- Upon cold or warm boot of the Series 7000.
- When a new protocol is downloaded to an Amezi ANC. The Horizon (external) device is recognized as present and communication to the Amezi passes this information to the MCPU / Series 7000 as an ADD_DEVICE message. This includes when a device initially establishes communication to its Amezi controller, or when device communication is lost, then reestablished to the Amezi controller. For example, if the Horizon GPI powers down while connected to an Series 7000, the communications is lost between the GPI and the Amezi ANC, the device is deleted at the MCPU. When power is restored to the Horizon and communication is re-established, the device is added at the MCPU and the Horizon configuration is downloaded again to the Amezi by the MCPU. This causes the Amezi ANC to reissue the protects to the Horizon matrix.

- At the discretion of the GUI operator. Note that this ability for user discretionary reconfigurations adds an necessary and useful capability to this design. With this ability, the user can protect or unprotect a single or multiple Destinations, or operate upon the entire matrix on demand.

In addition to the above cases of MCPU to Amezi node controller configuration downloads, the Amezi ANC also issues periodic SPO's and CPO's. The exact timing between the reissuing of Protects (SPOs) to a particular Destination is a function of the Tally rate selected at the GUI, and the size (number of outputs times levels) of the Horizon matrix. A full-size Horizon matrix (128 outputs by 4 levels) will re-Protect / re-Clear (re-Unprotect) within the approximate interval of once every two to four minutes.

CAUTION The Series 7000 takes about 20 seconds to detect lost communications to a Horizon GPI. At greater than 20 seconds, the scenario above executes as stated. However, if the Horizon GPI loses power for less than 20 seconds, and begins responding to Series 7000 communications before the Series 7000 recognizes the lost communications, the Series 7000 will NOT know it needs to reload the protects to the Horizon GPI immediately upon GPI power up. The Horizon GPI has lost its protects. However, this window of unprotected status will last from only a few seconds to 2–4 minutes (depending upon the tally rate and the size of the Horizon matrix) until the Amezi once again re-issues its Protects (SPOs). This can be prevented by placing the Horizon GPI on an Un-interruptible Power Source (UPS).

Overriding Series 7000 Originated Protects

If communication is lost between the HX-GPI and Series 7000, Series 7000 originated Protects (exclusive mode) can be overridden by the following:

1. Remove power from the HX-GPI. It will take several minutes for the Protects to clear from the Horizon CPU. Turn off the battery on the HX-GPI. The HX-GPI has battery-backed up memory. (If you don't, within seconds after you re-apply power to the HX-GPI it will reinstitute the Protects it "remembers" from the last Series 7000 communication.) The battery switch on the HX-GPI must be off for at least several seconds before re-applying power. This will clear the Protect map which is stored in RAM on the HX-GPI processor module.

2. Using a terminal connected to the second port of the HX-GPI, perform Takes to each Horizon Destination you wish to Unprotect. Since both ports of the HX-GPI share a polling address, this will effectively remove Destination protection. Attempting to clear Protects using the HX-GPI CPO (Clear Protected Output) command works only for Protects set by the same port which established them.

CAUTION Another Horizon control panel on the same polling address as the HX-GPI appears to be capable of removing Protects; however, they will not remain cleared for more than a few seconds. The HX-GPI periodically refreshes the protect map in the Horizon CPU, so the Protects will be reasserted.

Grass Valley 440 Router Interface

Through a Serial Mezzanine (SMS-SER-MZ) on a Communications Interface (CIF) module, the Series 7000 can be interfaced to a Grass Valley 440 routing switcher. The interface allows the Series 7000 MCPU to control a 440 matrix as if it were one of the Series 7000 native matrices.

Note Throughput, or bandwidth, of the control interface cannot reproduce that of the Series 7000 due to the structure and performance of 440 control architecture.

The interface software resides solely on the Grass Valley Serial Mezzanine (Amezi) card. The equipment required for this interface follows (refer to General CIF Interface Hardware in Section 4, for more hardware details):

- RS-422 interconnect cable
- Series 7000 Controller frame with CIF module with Amezi Board
- Appropriate CIF Rear Panel (CIF-RP) for RS-422 connection
- Series 7000 PC GUI
- SMS-SER-MZ (Amezi) asynchronous mezzanine card

Installation Procedure Overview

To install the Series 7000 / 440 Interface you will need to refer to Section 4, External Interfaces to:

- Install the 7000 CIF, Amezi card, and RP according to CIF Option instructions.
- Cable the 440 X-Y Control port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame.
- Determine the Coprocessor name of the 7000 Amezi card.

Refer to the *Configuration Manual* Appendix A to:

- Build the appropriate Coprocessor and Cfgd Amezi configurations. You must set the destination status query rate for the 440 during Amezi configuration.
- Check system Limits and configure a Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the Horizon control level(s).
- Test the interface.

Note Please read through, and become familiar with the entire procedure before beginning the Installation.

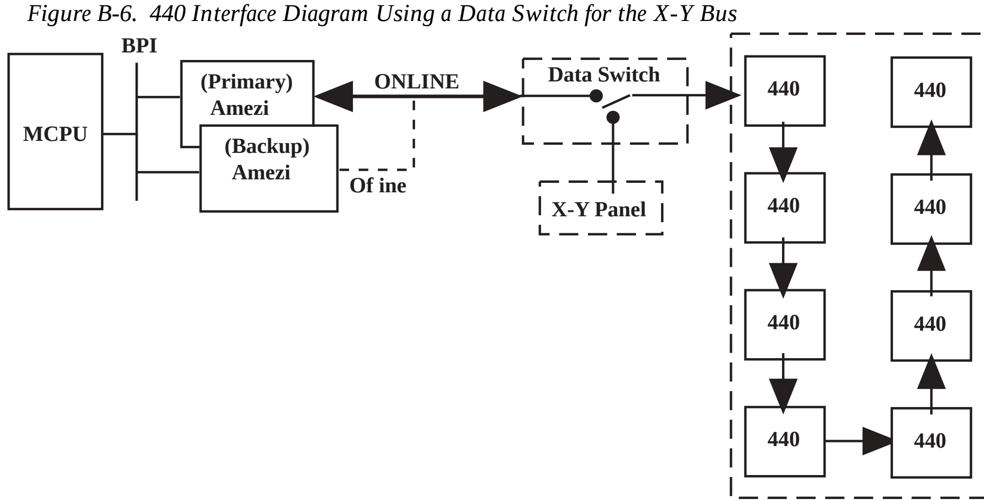
Installation Procedure

Connect the 440 to the Series 7000 CIF Port

In the Series 7000 Controller frame you have designated an Async RS-422 port to connect to the 440 X-Y Control port. The External Interfaces subsection in Section 4, provides the pinout for the required cable and a cable adaptor that provides pull up resistance on the data lines.

Figure B-6 represents the Series 7000-to-440 Interface. Note that if you wish to use a 440 X-Y panel on the same bus to which the Interface connects, you must use a data switch to arbitrate the bus between the panel and the Series 7000 Interface. Only one device can be actively connected to the bus at one time. The data switch should be located with the X-Y panel and used to select the panel for diagnostic or maintenance purposes only.

Figure B-6. 440 Interface Diagram Using a Data Switch for the X-Y Bus



Features

Following is a list of the fundamental features implemented in the interface.

1. Multi-level or all-level Takes issued by the MCPU are sent as single-level Takes issued sequentially (one for each level) to the Amezi. These single-level Take commands received by the Amezi from the MCPU are processed by the Amezi and translated first-in-first-out. This results in single-level connects issued sequentially to the 440. This may result in multi-level or all-level connects not occurring in unison at the 440.

2. The interface does not provide deterministic switching.

3. A background destination status query is needed as the 440 in this application is not exclusively controlled by the Series 7000. A background destination status query rate is set during configuration of the Series 7000 Amezi card (see Section 4 in this manual).

4. Destination protects are not supported within the 440.

5. The Series 7000 monitors the state of the link to the 440. A heartbeat message is transmitted by the Series 7000 to the 440 approximately once every five seconds if no other traffic has existed on the bus during that interval.

6. Diagnostic reporting to the MCPU is limited to alarms / conditions which are currently implemented between the MCPU and its Alien Node Controllers in the Series 7000 release 5.37 or later software.

7. Upon warm / cold boot of the Series 7000, it requests destination status from the 440 for each crosspoint configured and uses the returned values to fill in the MCPU's crosspoint database.

8. Series 7000 to 440 communications utilize the 440 X-Y, RS-422 port, and support the range of baud rates implemented in the 440. Bus arbitration upon the X-Y port (a slave X-Y panel on the bus for example) is not supported on a single-level 440 system. An X-Y panel may be used on another X-Y port for a different level of the 440. However, if performance problems occur, remove the X-Y panel from the 440.

9. The maximum control capability of the 440 is 512 sources by 512 destinations by up to eight levels. This system size is fully supported under Series 7000 control.

Performance

The throughput of the interface is most limited by the serial baud rate and turn-around time (response time of the 440 matrix). When computer generated Takes are issued to the 440 from the Series 7000, the interface will be able to complete approximately ten single-level Takes per second. This is only an approximation and is not a guaranteed rate. Average completed Takes / second could range from as little as five or six (for a multi-level 440 at 2400 Baud X-Y port) to as much as 20 per second (for a single-level, sixteen-output 440 at 19200 Baud).

The 440 Interface has the capacity to queue up to 1,000 single-level Takes. If this amount is exceeded due to the higher speed of the Series 7000 MCPU / Amezi parallel interface (compared to the Amezi / 440 serial link), the excess Takes are discarded. In real operation only an extremely large Salvo Take could create this condition.

Grass Valley Performer Router Interface

Through a Serial Mezzanine (SMS-SER-MZ, herein referred to as Amezi) on a Communications Interface (CIF) module, the Series 7000 can be interfaced to a Grass Valley Performer 10 x 1 routing switcher or to multiple Performers whose inputs have been paralleled so as to function as a 10 x n system, where n represents the total number of outputs, not to exceed 16.

Performer routing switchers (analog and digital) are equipped with internal serial interfaces. Configuration is by means of a series of DIP switches located on the main Performer circuit module. Equipment required for this interface is listed below:

- One or more Performer routing switchers (analog or digital)
- Performer manual (*Performer Analog Installation/Operation*; or *Performer Digital Installation/Operation*)
- RS-422 interconnect cable
- If your Performer router consists of multiple Performer frames, you will need either to install looping RS-422 cables between the frames (requires Performer PLCK loop-through kit), or build a multi-connector looping cable as described in this installation procedure. Looping RS-422 cables can be used only if you have the looping option connecting the OPTION and REMOTE serial port connectors in the Performer frames.
- Series 7000 Controller frame with CIF module
- Series 7000 PC GUI 5.37 or later
- SMS-SER-MZ (Amezi) asynchronous mezzanine card
- Appropriate CIF Rear Panel (RP) for RS-422 connection (see General CIF Interface Hardware in Section 4 of this manual).

Installation Procedure Overview

To install the Series 7000 / Performer interface, you will need to use the Performer manual to:

- Configure the Performer interface(s) for RS-422 operation
- Establish proper addresses for each Performer to be controlled

Refer to the subsection, External Interfaces, in Section 4 of this manual, to:

- Install the 7000 CIF, Amezi card, and RP according to CIF Option instructions
- Cable the HX-GPI serial port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame
- Determine the coprocessor name of the 7000 Amezi card

Refer to the *Configuration Manual* Appendix A to:

- Build the appropriate coprocessor and Cfgd Amezi configurations
- Check system limits and configure a Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the Horizon control level(s).
- Test the interface.

Note Please read through, and become familiar with, the entire procedure before beginning the Installation.

Installation Procedure

Perform the following steps to install the Performer interface.

1. Configure the Performer(s).

Note This procedure describes an RS-422 connection between the Performer(s) and the Series 7000 Amezi. If you decide to use an RS-232 connection, be sure the Performer(s) and Amezi are configured to match.

Use the Performer manual to set up the serial interface ports for RS-422 communication. Recommended communication parameters are:

- RS-422
- Baud: 38400
- Data bits: 8
- Parity: none
- Stop bits: 1
- Protocol: none

General Performer parameters:

- Protocol: Performer ASCII
- Address: First unit must be configured to address 0 (corresponds to Destination 1) with each additional Performer incremented by 1 (1, 2, 3, etc. to a maximum of 15).

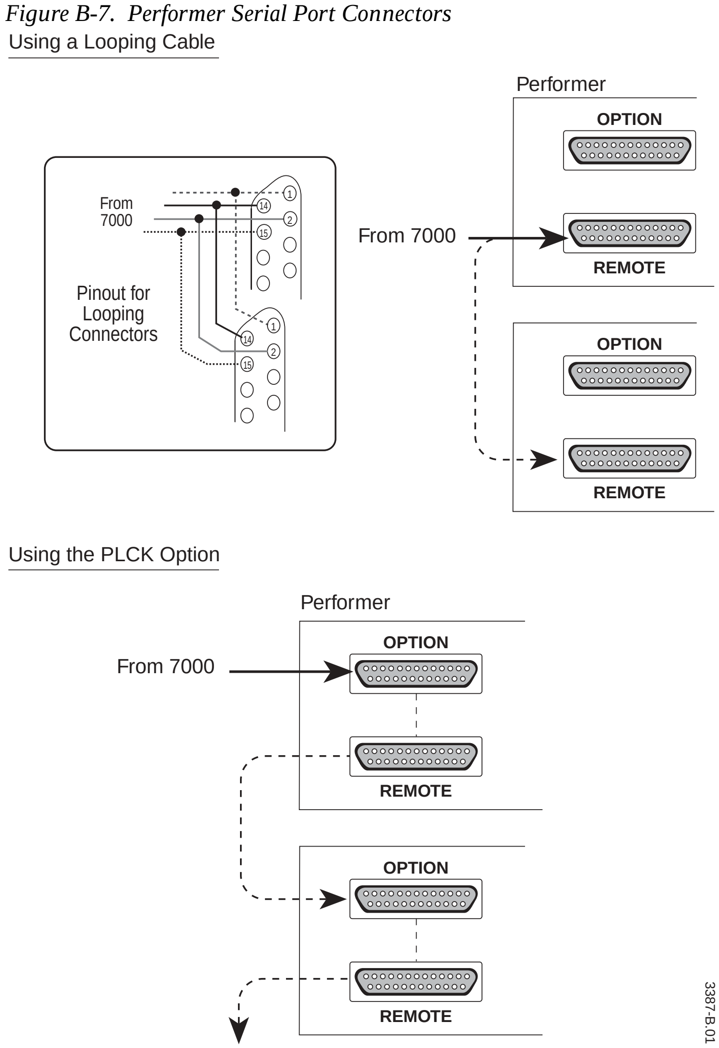
2. Install the CIF, Amezi (SMS-SER-MZ) Card, and Rear Panel (RP) properly in the Controller frame.

Refer to the instructions in the General CIF Interface Hardware description in Section 4 of this manual, as you read this instruction. The Amezi card must reside in the correct position (1 through 4) on the CIF module to match the Rear Panel RS-422 connector location. If there is a redundant CIF module, it must be configured the same as the main module.

3. Connect the CIF-to-Performer Cable.

Connect a control cable from the Performer **REMOTE** port (25-pin connector) to the Series 7000 CIF Rear Panel (RP) connector for the proper Amezi card. If the Performer system consists of multiple Performer frames, you must either build a cable with looping connectors wired as shown in Figure B-7 or you may use the Performer Option **PLCK** (Part #052781-00) that provides an internal looping cable between the **OPTION** and the **REMOTE** port. With this option you can connect the 7000 to the **OPTION** port of the initial Performer frame and interconnect the other frames with separate cables from the **REMOTE** port to the **OPTION** port as shown in Figure B-7.

Figure B-7. Performer Serial Port Connectors



Wiring pinout for the Series 7000-to-Performer cable is illustrated in Section 4 of this manual.

CAUTION If this cable is removed and replaced after the interface is up and running, communication may cease, requiring a reset of the Performer from which the cable was removed.

4. Configuration using the GUI.

Use Section 4 of the *Configuration Manual* to configure the coprocessor, Cfgd Amezi, and Alien Node Controller.

Note When defining the Alien Node Controller, you may set up a disconnect Source name that, when taken, will open all analog Performer crosspoints. This is done by adding to the Node Controller configuration a phantom input (for example, input #11 to a 10-input Performer).

Redundancy

The following is a description of the Series 7000 / Performer redundancy mechanism.

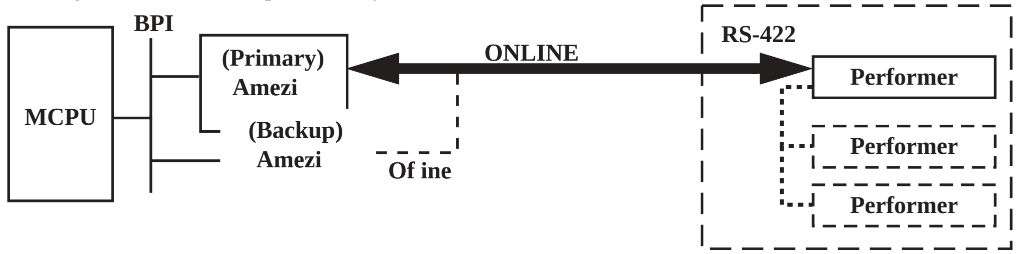
Definitions

- **Alien Node Controller** (ANC) – the Amezi (Asynchronous Mezzanine Interface) function of controlling a matrix other than the native Series 7000 matrices, for example Horizon.
- **Amez**i – An Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices. This term will be used to describe the communications path along the wire(s) between an Amezi or Amezi pair and the external device port or pair of ports.
- **Performer Serial Interface** – a standard feature internal to the Performer routing switcher providing translation of ASCII, RS-422 or RS-232 protocol to Performer RS-485 bus. The input protocol accepted is selectable via DIP switch settings in the Performer.

Performer Serial Interface Single-Wire Interface

Since Performer provides only a single serial interface port, it is possible to provide protection against a failure only at the Series 7000-end of the connection.

Figure B-8. Normal operation before switchover occurs



A single wire connects the two Amezi cards to the Performer.

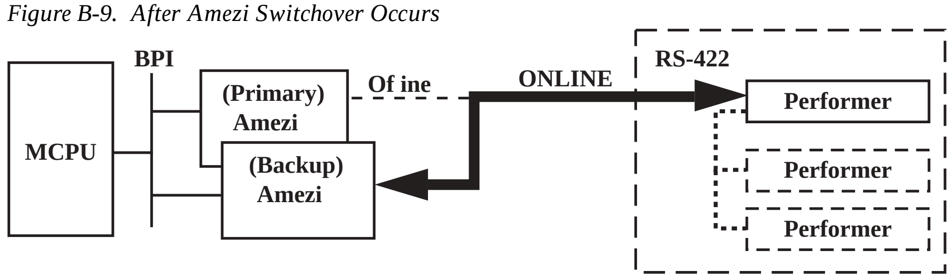
One Amezi (the primary) will be fully functioning, i.e., issuing commands and receiving responses from the Performer Serial Interface port. The other Amezi (the backup) will have its communications drivers tri-stated, effectively taking this Amezi off the communications channel.

The Performer Serial Interface Port(s) will be fully functioning—receiving commands (takes, tallies, and heartbeats) and issuing responses to the Amezi.

Switchovers are generated only from Series 7000. The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the backplane interface of the Primary Amezi
- No communications are being received back from the Performer

Figure B-9. After Amezi Switchover Occurs



The Amezi is responsible for a heartbeat message to the Performer. Should this heartbeat fail to receive a response, the communications channel is considered down. Note that if the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

The MCPU is capable of monitoring the health of the Backup Amezi, but NOT capable of determining the viability of the Backup communications channel.

The Backup Amezi will NOT be able to maintain an image of the alien matrix concurrent with the Primary. After switchover occurs, the Backup Amezi will have to acquire the status from the alien matrix. Crosspoint acquisition will not exceed 20 to 30 crosspoints per second.

The Series 7000 will not switch back from a Backup Amezi to the Primary Amezi, even if identical or different errors are determined after the switchover has occurred. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel to the Primary Amezi.

Notes on Setting Protects

CAUTION Protects in Performer apply equally to all levels. When building the Configured Node Controller record for the Performer matrix, set control flags the same for the three levels of each Performer Destination. For example, if Performer Destination 1 is to be controlled only by Series 7000, the control flag for Destination 1 in each of the three (Performer always has 3 levels) Configured Node Controller slices should be set to "E" (Exclusive).

Exclusive Control Flag Set

Setting the Exclusive flag causes the Performer Destination to become protected against Source-changes by the local Performer control panel under normal conditions.

CAUTION The nature of Performer remote control protocol makes it possible for an operator to override remote protection, make a local source change, and institute local protection which cannot be overridden by a remote device such as the Series 7000 interface! This is not easily done at the recommended 38400 baud data rate but becomes increasingly less difficult at lower data rates. Should this abnormal condition be created, the Series 7000/Performer Amezi will attempt to restore the source remembered in its database and, upon failing because of the local Protect, will generate repeated alarms. Further Performer operations may become unreliable until the offending local Protect is removed.

Shared Control Flag Set

When setting up a Configured Node Controller record for the Performer(s), it is possible to specify that Performer destination control is to be Shared. In this case, each local Performer control panel is able to make source selections to shared destinations and is able to protect / un-protect them at all times.

Series 7000 control panels can select Sources to shared Performer destinations provided the Destination is not locally protected. An attempt to select a new Source to a Performer protected destination will fail, though the Series 7000 panel making the attempt will initially display the change as though it had happened. It will do so because the Series 7000 control system is not immediately aware that the change has been rejected. As Series 7000 queries Performer, it will determine that the status of the Performer and its map in Series 7000 disagree. The map, and all Series 7000 displays, will be updated. The time required for updating will vary according to data rate, refresh rate, and the number of Performers utilized.

Performer Destinations are not protected automatically by Series 7000. Series 7000 control panels cannot issue protection to Performer systems. Attempts to protect Performer Destinations from Series 7000 panels will establish protection against other Series 7000 panels only. This protection does not extend to Performer local control panels. It is entirely possible for a local Performer control panel to make a new Source selection for such a destination. Operators observing the display on a Series 7000 control panel assigned to the Performer destination are not made immediately aware of a locally-originated change. However, ongoing polling by Series 7000 of Performer will, after a period of time, update the Series 7000 control panel display.

Not Controlled

When setting up a Configured Node Controller record for the Performer(s), it is possible to specify that certain Performer Destinations are not to be controlled by Series 7000. Such Performer destinations are totally unaffected; they continue to operate according to Performer principles. No Series 7000 control panel can make a source selection to such a destination and there is no Series 7000 monitoring of the status of such a destination.

Performer All-Level Protect Issues

Exclusive control of Performer destinations is established by Series 7000 issuing Protect messages to the Performer Serial Interface Port(s). Protect in Performer applies to all levels; it is not possible selectively Protect or not Protect individual levels of any destination.

The packaging of messages sent to Performer from Series 7000 is such that the designation of any level as **EXCLUSIVE** has the effect of Protecting the entire destination. It is still recommended that when **EXCLUSIVE** operation of any performer destination is intended all Configured Node Controller slices be configured as **E** (Exclusive) for that destination.

Because Protects in Performer must periodically be refreshed by Series 7000 to remain in effect, there is no limitation on changing the Configured Node Controller slice designation from **E** to **SHARED** or **NOT CONTROLLED** as may be required by other alien matrices.

Some exceptions to typical Series 7000 operations are provided in the following list:

- Series 7000 control devices will not report Performer errors, protect status, or missing crosspoints.
- Locally-originating Performer Takes are not immediately reported to Series 7000. Status is reported periodically as Series 7000 does Status updates.
- When multiple Performers (with paralleled inputs) are used, each has its own internal serial interface. Should any Performer, other than the one assigned address 0, go off-line, it will not be reported to Series 7000 status displays.
- Attempts to Take a new source to an off-line Performer will result in the temporary display of the new source name on Series 7000 status displays assigned to the particular Performer destination. After a short time, displays will revert to the status last remembered by the Series 7000-maintained map.

Grass Valley 20-TEN Router Interface

Through a Serial Mezzanine (SMS-SER-MZ, herein referred to as Amezi) on a Communications Interface (CIF) module, the Series 7000 can be interfaced to a Grass Valley 20-TEN routing switcher equipped with one or more optional Serial Interface modules (SERIM or SERIM-2). The 20-TEN SERIM is a one rack-unit frame which supports a single RS-232 or RS-422 communications port and connects to the 20-TEN, RS-485 control panel communication bus. Configuration is by means of a series of DIP switches located on the rear of the SERIM frame. The 20-TEN supports the use of multiple SERIM units, thereby permitting dual-wire redundancy when used in conjunction with a Series 7000 routing system.

Equipment required for this interface is listed below:

- 20-TEN routing switchers (any combination of available matrices)
- Minimum one 20-TEN SERIM Serial Interface Option
- 20-TEN manual
- RS-422 interconnect cable
- Series 7000 Controller frame with CIF module
- Series 7000 PC GUI 5.37 or later
- SMS-SER-MZ (Amezi) asynchronous mezzanine card
- Appropriate CIF Rear Panel (RP) for RS-422 connection (see General CIF Interface Hardware in Section 4 of this manual).

Installation Procedure Overview

To install the Series 7000 / 20-TEN interface you will need to use the 20-TEN manual to:

- Properly connect the SERIM Serial Interface Option to the 20-TEN
- Configure the SERIM for RS-422 operation

You will also need to refer to the External Interfaces subsection in Section 4 of this manual, to:

- Install the 7000 CIF, Amezi card, and RP according to CIF option instructions.
- Cable the SERIM RS-422 control port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame.
- Determine the coprocessor name of the 7000 Amezi card.
- Build the appropriate coprocessor and Cfgd Amezi configurations. You must set the destination status query rate for the 20-TEN during Amezi configuration.
- Check system limits and configure a Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the Horizon control level(s).
- Test the interface.

Note Please read through, and become familiar with, the entire procedure before beginning the Installation.

Installation Procedure

Note This procedure describes an RS-422 connection between the 20-TEN/SERIM and the Series 7000 Amezi. If you decide to use an RS-232 connection, be sure the 20-TEN/SERIM and Amezi are configured to match.

1. Configure the 20-TEN SERIM Serial Interface Option.

   Use the 20-TEN manual to set up the serial interface ports for RS-422 communication. Recommended communication parameters are:

   - RS-422
   - Baud: 38400
   - Data bits: 8
   - Parity: none
   - Stop bits: 1
   - Protocol: none
   - SERIM control panel address:

   Configure according to 20-TEN manual, avoiding reuse of address utilized for any other 20-TEN device. When two SERIMs are used (for dual-wire redundancy), set each to a unique control panel address.

2. The CIF, Amezi (SMS-SER-MZ) card, and Rear Panel (RP) must be properly installed in the Controller frame.

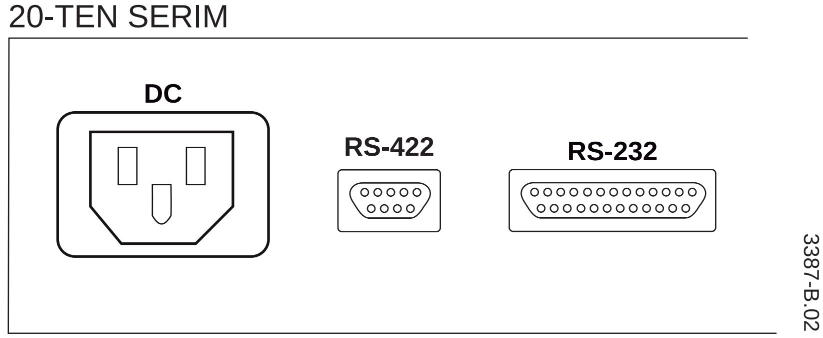
   Refer to the instructions in the General CIF Interface Hardware description in Section 4 of this manual, as you read this instruction. The Amezi card must reside in the correct position (1 through 4) on the CIF module to match the Rear Panel RS-422 connector location. If there is a redundant CIF module, it must be configured the same as the main module.

3. Connect the 20-TEN to the Series 7000 CIF port.

   In the Series 7000 control frame you have designated an Async RS-422 port to connect to the 20-TEN port. Connect a control cable from the 20-TEN, RS-422 port 9-pin connector to the Series 7000 CIF Rear Panel (RP) connector for the proper Amezi card.

The pinout for the 20-TEN Interface cable is shown in Section 4 of this manual. The 20-TEN serial interface unit (SERIM) RS-422 port is illustrated in Figure B-10.

Figure B-10. 20-TEN SERIM (Serial Interface) RS-422 and RS-232 Ports



CAUTION If this cable is removed and replaced after the interface is up and running, communication may cease, requiring a reset of the 20-TEN from which the cable was removed.

Redundancy

The following is a description of the Series 7000 / 20-TEN redundancy mechanism.

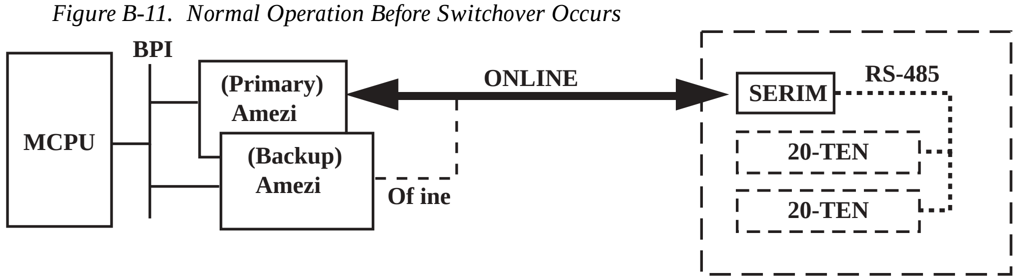
Definitions

- Alien Node Controller (ANC) – the Amezi (Asynchronous Mezzanine Interface) function of controlling a matrix other than the native Series 7000 matrices, for example, Horizon.
- Amezi – An Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices. This term will be used to describe the communications path along the wire(s) between an Amezi or Amezi pair and the external device port or pair of ports.
- 20-TEN SERIM (Serial Interface Option) – an option available for the 20-TEN router that allows router control over RS-422 or RS-232 serial communication lines (not a standard 20-TEN feature).

Single-wire interface

20-TEN SERIM provides a single serial interface port and protection against a failure is provided at the Series 7000-end of the connection. Refer to Figure B-11.

Figure B-11. Normal Operation Before Switchover Occurs



A single wire connects the two Amezi cards to the 20-TEN SERIM.

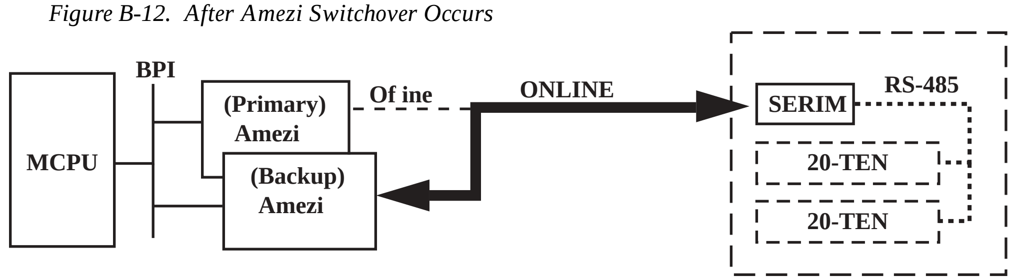
One Amezi (the primary) will be fully functioning—issuing commands and receiving responses from the SERIM Serial Interface port. The other Amezi (the backup) will have its communications drivers tri-stated, effectively taking this Amezi off the communications channel.

The 20-TEN SERIM will be fully functioning—receiving commands (takes, tallies, and heartbeats) and issuing responses to the Amezi.

Switchovers are generated only from Series 7000. The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the backplane interface of the Primary Amezi
- No communications are being received back from the 20-TEN

Figure B-12. After Amezi Switchover Occurs



The Amezi is responsible for a heartbeat message to the 20-TEN. Should this heartbeat fail to receive a response, the communications channel is considered down. Note that if the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

The MCPU is capable of monitoring the health of the Backup Amezi, but NOT capable of determining the viability of the Backup communications channel.

The Backup Amezi will NOT be able to maintain an image of the alien matrix concurrent with the Primary. After switchover occurs, the Backup Amezi will have to acquire the status from the alien matrix. Crosspoint acquisition will not exceed 20 to 30 crosspoints per second.

The Series 7000 will not switch back from a Backup Amezi to the Primary Amezi, even if identical or different errors are determined after the switchover has occurred. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel to the Primary Amezi.

Redundancy is carried through between the Amezis and SERIM. The single SERIM and the control panel bus which links it to the 20-TEN represent potential for single-point failure.

Notes on Setting Protects

CAUTION Protects in 20-TEN apply equally to all levels. When building the Configured Node Controller record for the 20-TEN matrix, set control flags the same for each level of each destination. For example, if 20-TEN Destination 1 is to be controlled only by Series 7000, the control flag for Destination 1 in each level Configured Node Controller slices should be set to E (Exclusive).

Exclusive Control Flag Set

Setting the Exclusive flag causes the 20-TEN Destination to become protected against Source-changes by 20-TEN control panels (or additional SERIMs) under normal conditions.

Shared Control Flag Set

When setting up a Configured Node Controller record for the 20-TEN, it is possible to specify that 20-TEN Destination control is to be Shared. In this case, all 20-TEN control panels are able to make source selections to shared Destinations and each able to protect / un-protect them at all times according to normal 20-TEN operating procedures.

Series 7000 control panels can select Sources to shared 20-TEN Destinations provided the Destination is not locally protected. An attempt to select a new Source to a

20-TEN protected Destination will fail, though the Series 7000 panel making the attempt will initially display the change as though it had happened. It will do so because the Series 7000 control system is not immediately aware that the change has been rejected. As Series 7000 queries 20-TEN, it will determine that the status of the matrix and its map in Series 7000 disagree. The map, and all Series 7000 displays, will be updated. The time required for updating will vary according to data rate, refresh rate, and the number of 20-TEN levels utilized.

20-TEN Destinations are NOT protected automatically by Series 7000. Series 7000 control panels CANNOT issue protection to 20-TEN systems. Attempts to protect 20-TEN Destinations from Series 7000 panels will establish protection against other Series 7000 panels only. This protection does not extend to 20-TEN control panels. It is entirely possible for a 20-TEN control panel to make a new Source selection for such a Destination. Operators observing the display on a Series 7000 control panel assigned to the 20-TEN Destination are not made immediately aware of a locally-originated change. However, ongoing polling by Series 7000 of 20-TEN will, after a period of time, update the Series 7000 control panel display.

Not Controlled

When setting up a Configured Node Controller record for the 20-TEN, it is possible to specify that certain Destinations are not to be controlled by Series 7000. Such 20-TEN destinations are totally unaffected; they continue to operate according to 20-TEN principles. No Series 7000 control panel can make a source selection to such a Destination, and there is no Series 7000 monitoring of the status of such a Destination.

20-TEN All-Level Protects

Exclusive control of 20-TEN destinations is established by Series 7000 issuing Protect messages to the 20-TEN SERIM. Protect in 20-TEN applies to all levels; it is not possible to selectively Protect or not Protect individual levels of any destination.

The "packaging" of messages sent to 20-TEN from Series 7000 is such that the designation of any level as Exclusive has the effect of Protecting the entire Destination. Still, it is recommended that when Exclusive operation of any 20-TEN

Destination is intended all Configured Node Controller slices be configured as **E** (Exclusive) for that Destination.

Because Protects in 20-TEN must periodically be refreshed by Series 7000 to remain in effect, there is no limitation on changing the Configured Node Controller slice designation from **E** to **SHARED** or **NOT CONTROLLED**, as may be required by other alien matrices.

CAUTION Some exceptions to typical Series 7000 operations are listed below.

- Series 7000 control devices will not report 20-TEN errors, protect status, or missing crosspoints.
- Locally-originating 20-TEN Takes are not immediately reported to Series 7000. Status is reported periodically as Series 7000 does Status updates.
- 20-TEN stereo audio matrices and component video matrices are equipped with a single controller / power supply (plus "power only" supplies as required). Therefore, though two or three matrices may exist, they appear to the entire system as a single element. Failure of any one matrix within such a sub-system is not reported to the 20-TEN control system and accordingly cannot be reported to Series 7000.
- Attempts to Take a new source to a 20-TEN matrix whose controller has been disabled will cause an initial display of the requested Source name, followed by the NO XPT message at Series 7000 control panels. This is the tally response when the disabled controller is the controller of the designated Tally Level.
- Attempts to Take a new source to a NON-Tally Level 20-TEN matrix whose controller has been disabled, will cause the requested Source name to be displayed, followed by an asterisk (*) at Series 7000 control panels. If you query the inactive level the panel will report **NO XPT**.
- For the two cases just described, the Series 7000 Visual Status Display will show the Source name taken on all levels and then the tally for the missing level will revert to the last-reported Source name.

DataTek Interface

Through a Serial Mezzanine (SMS-SER-MZ) on a Communications Interface (CIF) Module, the Series 7000 can be interfaced to a DataTek Routing Switcher equipped for RS-232 / RS-422 remote control. The interface allows the Series 7000 MCPU to control a DataTek matrix as if it were one of the Series 7000 native matrices. The interface software resides solely upon the Grass Valley Serial Mezzanine (Amezi) card. The equipment required for this interface is listed below:

- RS-422 interconnect cable
- Series 7000 Controller frame with CIF module with Amezi Board
- Appropriate CIF Rear Panel (CIF-RP) for RS-422 connection (see General CIF)
- Series 7000 PC GUI
- SMS-SER-MZ (Amezi) asynchronous mezzanine card

Installation Procedure

Use this information along with Section 4 to install the Series 7000 / DataTek Interface. You will need to:

- Install the 7000 CIF, Amezi card, and RP according to CIF Option instructions
- Cable the DataTek serial port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame (refer to Redundancy Issues which follows in this section).
- Determine the Coprocessor name of the Series 7000 Amezi card.
- Edit the Coprocessor configuration and program the Amezi.
- Check system Limits and configure an Alien Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the DataTek control level(s).
- Test the interface.

Redundancy

The following is a description of the Series 7000 / Datatek redundancy mechanism.

Definitions

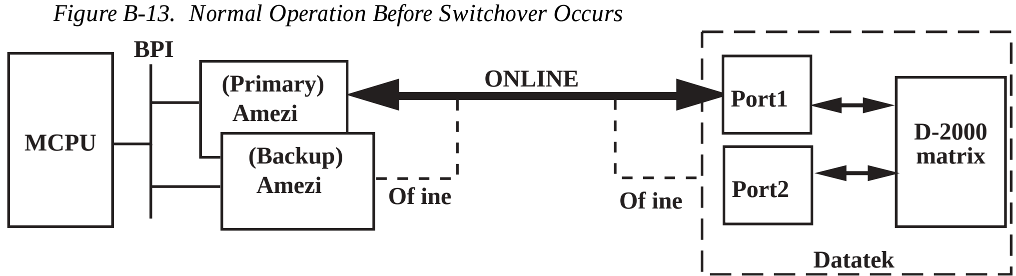
- **Alien Node Controller** (ANC) refers to a non-Grass Valley matrix or non-Grass Valley matrix controller which is interfaced to / from Series 7000 via an Asynchronous Mezzanine Interface (Amezi).
- **Amezi** An Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices
- **BPI** The Backplane Interface used to connect Mezzanines (e.g. Amezis) to the primary database and routing Series 7000 CPU.
- **Communications Channel** This term will be used to describe the communications path along the wire(s) between an Amezi or Amezi pair and the external device port or pair of ports.
- **MCPU** The main controller board of the Series 7000.

Datatek D-2000 Interface

A single wire will connect the 2 Amezis to one or two Datatek ports.

One Amezi (the primary) will be fully functioning, i.e., issuing commands and receiving responses from the active Datatek port (Port1 or Port2).

Figure B-13. Normal Operation Before Switchover Occurs



The other Amezi (the backup) will be have its communications drivers tri-stated, effectively taking this Amezi of the communications channel (i.e., the RS-422 or RS-232 cable).

One of the DataTek's ports (normally Port1) will be fully functioning, i.e., receiving commands (takes, tallies, heartbeats) and issuing responses to the Amezi.

The second Datatek port will be off the communications channel via an internal Datatek relay which isolates the drivers from the cable.

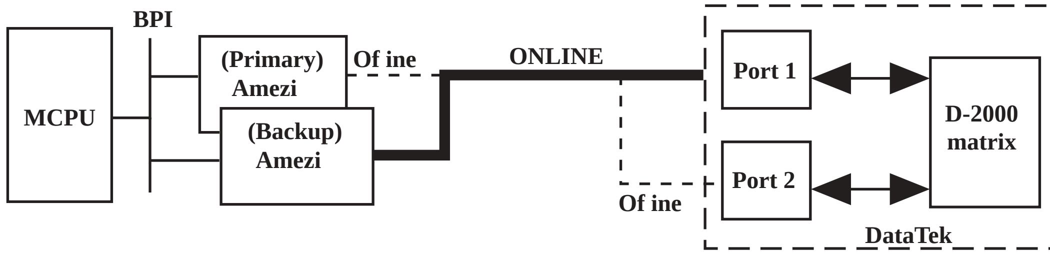
Conditions Causing Switchovers - Series 7000 Directed

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

The MCPU detects a problem via the BPI of the Primary Amezi

No communications are being received back from Datatek Port1. The Amezi is responsible for a heartbeat message to the Datatek. Should this heartbeat fail to receive a response, the communications channel is considered down. Note that if the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

Figure B-14. After Amezi Switchover Occurs



The MCPU is capable of monitoring the health of the Backup Amezi, but NOT capable of determining the viability of the Backup communications channel.

The Series 7000 will not switch back from a Backup Amezi to the Primary Amezi, even if identical or different errors are determined after the switchover has occurred. This is to prevent ping ponging. An alarm only will be issued by the MCPU. Operator intervention will be required to reset the communications channel back to the Primary Amezi.

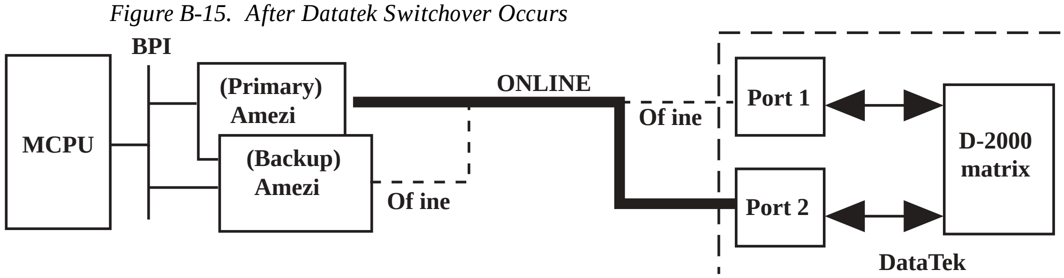
The Backup Amezi will not be able to maintain an image of the alien matrix concurrent with the Primary. After switchover occurs, the Backup Amezi will have to acquire the status from the alien matrix. Crosspoints rate of acquisition will not exceed 20 to 30 crosspoints per second.

Conditions Causing Switchovers - Datatek D-D2000 Directed

The Datatek D-2000 will switch from its Primary Port (Port1) to its Backup Port (Port2) when:

The DataTek's communications processor detects a failure between it and the Datatek matrix.

Figure B-15. After Datatek Switchover Occurs



The D-2000 will not switch back from Port2 to Port1 even if a failure is detected after the switchover has occurred. Operator intervention will be required to reset the communications channel back to Port1.

It is outside the scope of this document to list the exact methods, alarms, displays that may be utilized by Datatek.

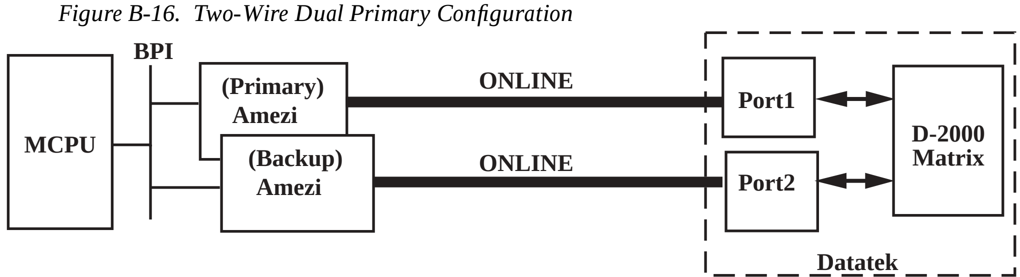
2400 /2800 Redundancy

The following is a description of the Series 7000 / Datatek 2400 / 2800 redundancy mechanism.

Datatek Dual-Wire Interface

Two wires will connect two Amezis to two Datatek ports.

Figure B-16. Two-Wire Dual Primary Configuration



Both communications channels are capable of concurrent full functionality.

Primary Amezi to Datatek Port1 is one communications channel and Backup Amezi to Datatek Port2 is the other communications channel.

Primary will issue heartbeats, connects, and all-level tallies to Port1. Primary maintains a current image of the DataTek's Source-Destination map within its own memory.

Backup will issue heartbeats and all-level tallies to Port2, but NO connects. The heartbeat allows the Series 7000 continuous verification that the backup communications channel is ready if needed. The background tally of all controlled Destinations is maintained by Backup, at a slightly slower rate than the Primary tally rate. This allows the Backup Amezi to have a current Source-Destination database within its own Amezi memory in the event of a switchover from the Primary Amezi.

Switchovers - Series 7000 Directed

The Series 7000 will generate an alarm and switch from a Primary to a Backup Amezi when:

- The MCPU detects a problem (Amezi board failure) via the BPI of the Primary Amezi.
- No communications are being received back from Datatek Port1. The Amezi is responsible for a heartbeat message to the Datatek. Should this heartbeat fail to receive a response, the communications channel is considered down. Note that if the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, then Backup should first be taken off-line.

The Series 7000 will not automatically switch back from a Backup Amezi to a Primary Amezi, even when errors are determined on the Backup after the switchover. This is to prevent ping ponging. Only an alarm will be issued by the MCPU. Operator intervention will be required to reset the communications channel back to Primary.

In the event of a Backup Amezi / communications channel failure while the Primary communication channel is operating properly, an alarm will be issued by the MCPU.

Switchovers - Datatek D-2400/2800 Directed

Since both Datatek ports 1 and 2 are concurrently fully functional, no actual switchover occurs. Should a problem be detected by the Datatek on one of its internal communications paths, that Port on that path will cease responding to any incoming messages, including the heartbeat, from the attached Amezi. Once the heartbeat is lost to the Amezi, the MCPU will be notified and the appropriate actions will be initiated.

Note that if an internal Datatek switchover (of controller boards) takes place, a few seconds may pass while neither port responds to Amezi queries as the switch takes place.

It is outside the scope of this document to list the exact methods, alarms, displays that may be utilized by Datatek.

Protects

Datatek 2000

Series 7000 will not issue Protects to DataTek 2000 Destinations.

Datatek 2400 and 2800

Protects for the newer series of Datatek matrices (D-2400, D-2800) are implemented similarly to the Horizon implementation. The protect mechanism described for the Horizon TCI is also utilized in Datatek 2400 or 2800 alien node controlling.

The Datatek Protect method uses the Lock command to protect a Destination, and the Unlock command to unprotect a Destination.

Datatek Destination protects do not need to be refreshed.

Datatek routers define priorities in two groups

- Control panel priority
- The higher control port priority

Priorities are coded in EEPROM. There are two concurrent full function control ports of equal priority on 2400, 2800 control modules.

Any device of equal or higher priority can complete a crosspoint Take to a 2400, 2800 Datatek Destination by simply commanding the Take. No preceding Unlock command is needed.

Pro-Bel System 3 Interface

Through a Serial Mezzanine (SMS-SER-MZ) on a Communications Interface (CIF) Module, the Series 7000 can be interfaced to a Pro-Bel System 3 Routing Switcher equipped for RS-422 remote control. The interface allows the Series 7000 MCPU to control a ProBel matrix as if it were one of the Series 7000 native matrices. The interface software resides solely upon the Grass Valley Serial Mezzanine (Amezi) card. The equipment required for this interface is listed below:

- RS-422 interconnect cable
- Series 7000 Controller frame with CIF module with Amezi Board
- Appropriate CIF Rear Panel (CIF-RP) for RS-422 connection (see General CIF)
- Series 7000 PC GUI
- VT-100 compatible terminal connected to the Series 7000 Diagnostic Interface
- SMS-SER-MZ (Amezi) asynchronous mezzanine card

Installation Procedure

Use this information along with Section 4 to install the Series 7000 / ProBel Interface. You will need to:

- Install the 7000 CIF, Amezi card, and RP according to CIF Option instructions
- Cable the ProBel serial port to the Series 7000 CIF Rear Panel port on the 7000 Controller frame (refer to Redundancy Issues which follows in this section).
- Determine the Coprocessor name of the 7000 Amezi card.
- Edit the Coprocessor configuration and program the Amezi.
- Check system Limits and configure an Alien Node Controller, Physical Matrices, Virtual Matrices, Levels, Sources, and Destinations for the ProBel control level(s).
- Test the interface.

Performance Issues

Both the interface software and hardware will be referred to within this document as the Amezi, or Amezi interface, or ProBel interface.

The Amezi interface presents to the Series 7000 MCPU, the exact look (command and response) of an Series 7000 node controller, while the other side of the Amezi interface will control a ProBel System 3 controller per the ProBel specification SW-P-08, Issue 4, of June 12, 1990 (which itself references SW-P-02, Issue 4, of July 1, 1991) subject to the qualifications and limitations specified within this appendix.

A complete simulation of a Series 7000 Node Controller is not required or specified, but only a subset of those commands and responses needed to satisfy both the customer and Grass Valley requirements. A definitive list of the Series 7000 to Pro-Bel Series 3 Controller message traffic needed to fulfill the requirements are found in Message layer - Commands issued from the Series 7000 and Message layer - Responses processed by the Series 7000 following, and nothing other than what is directly within this list is implied.

Features and Capabilities

Following is an unordered list of the fundamental features implemented.

- Multi-level Takes issued by the MCPU are single level takes issued sequentially. Takes received by the Amezi from the MCPU are processed by the Amezi and translated FIFO (first in, first out) which results in single level Connects issued sequentially to the ProBel. This may result in multi-level connects not occurring in unison.
- No background tally is needed as the ProBel offers unsolicited Connect Responses to all ports as per 08: pp. 10, sec. 3.2.2. However, an infrequent background tally rate (specified in the Refresh Rate field of the Configured Amezi dialog), on the order of 1 Destination per second should at least be considered by the customer. Background tally rates up to approximately 15 per second should be possible.
- No facility for Destination protects are featured within the System 3.
- A heartbeat message is transmitted by the Series 7000 to the ProBel System 3 approximately once every three (3) seconds, assuming no other traffic has existed on the Series 7000 / System 3 link in that interval of time. This heartbeat allows the Series 7000 to monitor the state of the link to the System 3.
- Diagnostic reporting to the MCPU is limited to:

1. Alarms / conditions which are currently implemented between the MCPU and its node controllers / matrices

2. Those diagnostics which can be requested from the ProBel which do not require any knowledge (addresses, number of cards, etc.) not already contained in GUI configuration menus

   Upon warm / cold boot of the Series 7000, the Series 7000 requests status (tally information) from the ProBel System 3 controller for each crosspoint configured and uses the returned values to fill in the MCPU's ProBel crosspoint database.

- ProBel matrices can be configured up to 16 levels. Series 7000 levels in the current release are limited to 8.
- Series 7000 can control 1024 inputs by 1024 outputs. This is compatible with the Pro-Bel router.

Protocol Specifications

Electrical

Parameters as described per 08: pp. 5, sec. 2.1.1.

Link Layer

As per 08: pp. 5, sec. 2.2, 2.2.1, 2.2.2.

Message Layer - Commands Issued From the Series 7000

`Take message:` Take messages issued by the Series 7000 contain Source (0-1023), Destination (0-1023), and level (0-16). The interface will convert the information within these three fields to fill in the ProBel Connect message fields as per the format in 08: pp. 9, sec. 3.1.2. Information, if any, within the ProBel Connect message that cannot be determined from a simple translation of the Series 7000 Connect message will be zeroed within the ProBel Connect message.

`Status (tally) message:` Status (tally) messages issued by the Series 7000 contain Destination (0-1023), and level (0-16). The interface will convert the information within these two fields to fill in the ProBel Interrogate message fields as per the format in 08: pp. 8, sec. 3.1.1. Information, if any, within the ProBel Interrogate message that cannot be determined from a simple translation of the Series 7000 Status message will be zeroed within the ProBel Interrogate message.

`Diagnostic request:` Diagnostic Request as per 08: pp. 9, sec. 3.1.4 is NOT issued to the System 3 in the release 5.0 version. If and when it is implemented, the Diagnostic Request will be issued to request Secondary Matrix Status only (Byte 1 = 12) while Byte 2 field values will be cycled through know port number as per 08: pp. 9, sec. 3.1.4 in order that a complete picture of the condition of the switcher can be realized by the Amezi. Caveat: any fields which require configuration knowledge, (e.g. Secondary Matrix Port numbers, etc.) which may not be discernible from normal GUI / MCPU configuration fields and parameters are not implemented. This may affect all Secondary Matrix diagnostic responses as related in 08: pp. 12, sec. 3.2.5.3.

Message Layer - Responses Processed by the Series 7000

`Take response:` The Connected message, 08: pp. 10, sec. 3.2.2

`Status (tally) response:` The Tally message, 08: pp. 10, sec 3.2.1.

`Status (diagnostic) response:` Status Response as per 02: pp. 6, sec. 3.9 is NOT processed by the Amezi. Refer to the Diagnostic Request section for explanation.

If and when Status Response is processed, it will only be to the extent that the errors / conditions reported within the Diagnostic Message are in agreement with currently reported errors / conditions from Grass Valley's own node controller / matrices. A table of Series 7000 node controller / matrix errors / alarms / conditions currently reported to the MCPU is contained later in this document, along with the corresponding Pro-Bel reported condition.

Pro-Bel Matrix Addressing

In addition to input, output, and level crosspoint specifiers, the Pro-Bel System 3 requires a matrix address within the range of 0-15.

To avoid requiring changes to the Series 7000 GUI, the Which Outputs field within the Node Controller slice configuration menu are used to supply each slice configured with a particular matrix number; i.e., for each slice, range 0-7, there is a matrix number assigned to it, also in the range 0-7.

Alarms/Error/Status Reports

A list of current Series 7000 alarms / error / status reports matched to available Pro-Bel returned status (diagnostics) is provide below. Those not implemented are not implemented for reasons given in the previous section describing the Diagnostic request.

Table B-1. Series 7000 to ProBel Message Matching

Series 7000	ProBel
Serial Link Down	n/a
CIF Switchover	n/a
Overtemp	Overtemp
TBD	Active/Idle system
TBD	Bus Fault
Crosspoint Connect Failure	Crosspoint Connect Failure

Redundancy Issues

The following is a description of the Series 7000 Pro-Bel System 3 redundancy mechanism.

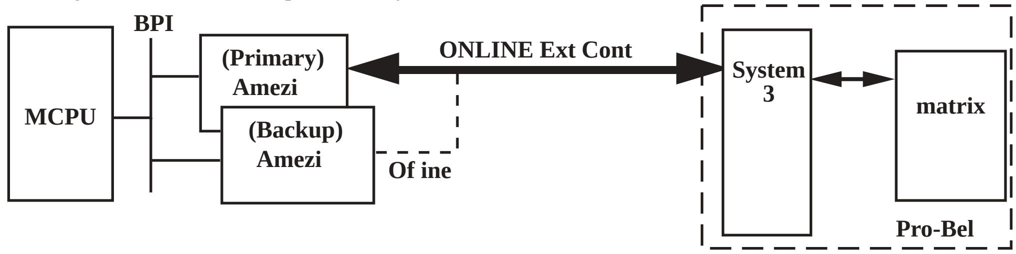
Definitions

- **Alien Node Controller** (ANC) - refers to a non-Grass Valley matrix or non-Grass Valley matrix controller which is interfaced to / from Series 7000 via an Asynchronous Mezzanine Interface (Amezi).
- **Amezi** - An Asynchronous Mezzanine Interface card manufactured by Grass Valley and used to interface the Series 7000 to both controlled and controlling external devices.
- **BPI** - The Backplane Interface used to connect Mezzanines (e.g. Amezis) to the primary database and routing Series 7000 CPU.
- **Communications Channel** - This term will be used to describe the communications path along the wire(s) between an Amezi or Amezi pair and the external device port or pair of ports.
- **MCPU** - The main controller board of the Series 7000.

System 3: Single-Wire Interface

One wire connects two Amezis to the System 3 port External Control (EXT CONT) Port. Primary Amezi to the System 3 Control Port is the primary communications channel. Backup Amezi to the System 3 Control Port is the Backup communications channel.

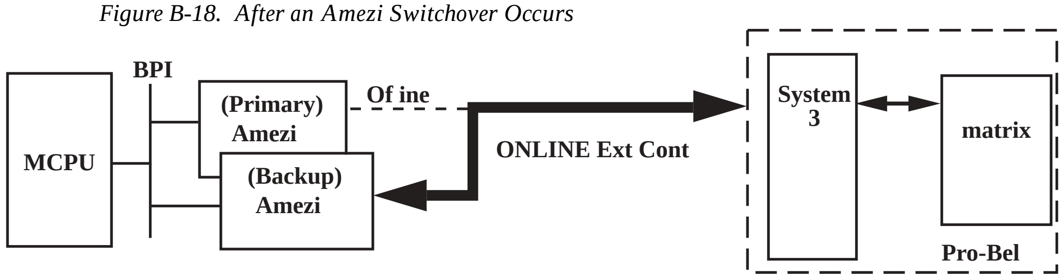
Figure B-17. Normal Operation Before Switchover Occurs



Switchovers - Series 7000 directed

A switchover from the Primary to the Backup Amezi is transparent to the System 3 Controller.

Figure B-18. After an Amezi Switchover Occurs



The Series 7000 generates an alarm and switches from Primary to the Backup Amezi when:

- The MCPU detects a problem via the BPI of the Primary Amezi.
- No communications are being received back from Port1. The Amezi is responsible for a heartbeat message to the GPI. Should this heartbeat fail to receive a response, the communications channel is considered down. Note that if the Primary cable is to be disconnected for maintenance, but a switchover to Backup is not desired, the Backup should first be taken off-line.

The MCPU is capable of monitoring the health of the Backup Amezi, but is NOT capable of determining the viability of the Backup communications channel.

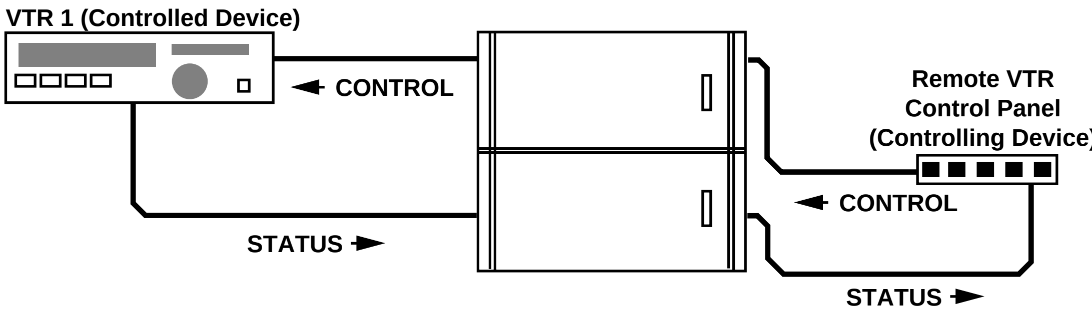
The Backup Amezi is NOT able to maintain an image of the alien matrix concurrent with the Primary. After switchover occurs, the Backup Amezi has to acquire the status from the alien matrix.

The Series 7000 does not automatically switch back from a Backup Amezi to a Primary Amezi, even if identical or different errors are determined after the switchover. This is to prevent ping ponging. Only an alarm from the MCPU will be issued. Operator intervention is required to reset the communications channel to the Primary Amezi.

Port Router

Port Router (NVision Models NV3128 & NV3256)

Figure B-19. Example of Port Router Control



A Port Router is designed for Source-to-Destination connection (one to one), rather that Distributive connection (one to many) typical of routing switchers. A Port connection, from a remote control device to a machine, is not shared with other devices as is an audio or video Source connection.

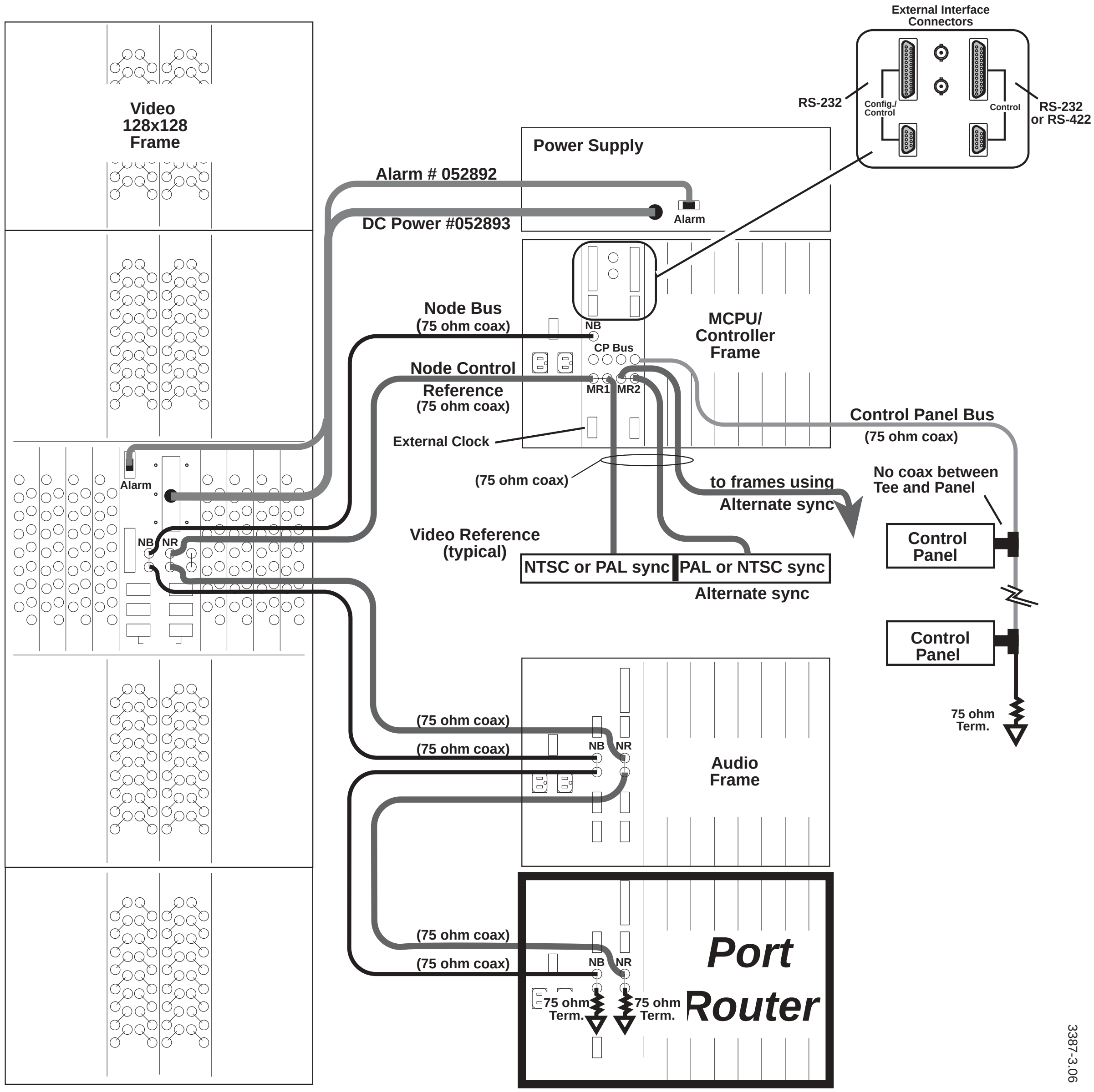
When using a Port Router with the SMS 7000 system, you should observe the following limitations:

No Port Routers over Tielines.
No Chopping on Port Router Levels.
A Remote MCPU Physical Matrix can't be configured to be a Port Router.
A Port Router Level can't have married virtual matrices.
A Port Router Physical Matrix can't be divided into more than one virtual matrix.
Sources can't share inputs on a Port Router Level.
No **ONE TO MANY** connections.
No monitoring output.
No time stamping: a Take will change the port connections 2 to 3 fields before changing any local SMS 7000 matrix crosspoints.
The Visual Status Display may only show that two devices are connected, not which device is the controller or which device is being controlled.

Port Router Interconnect Cabling

A possible system configuration including a Port Router is shown below.

Figure B-20. Possible System Interconnects Using a Port Router



Glossary

AES

Audio Engineering Society. AES represents any of the digital audio standards established by the Audio Engineering Society.

AES/EBU

Name for a digital audio standards established jointly by the Audio Engineering Society and European Broadcasting Union. The sampling frequencies for this standard vary depending on the format being used.

Alarm

A signal indicating major or minor alarm conditions.

Alien Matrices

Any matrix which is not a part of the Series 7000 router product line.

All-level Takes

Switch the same input number on all Levels, to the controlled Destination.

Amezi

Asynchronous Mezzanine board. An RS-422 / RS-232 communications board which mounts on the 7000 MCPU or a 7000 Communications Interface (CIF) module and provides RS-422 and RS-232 ports. The Asynchronous Mezzanine board is one of several mezzanine boards of differing functionality.

ANC

Active Node Controller. An ANC is communicating with the MCPU and will appear in a list of Active Node Controllers when polled by the GUI. The Enhanced Node Controller and the Matrix Controller modules also appear in the list. ANCs include both the primary and backup Controller modules.

ANSI

American National Standards Institute.

Assignment

Assignment is an action that grants permission for exclusive control of a resource. Multiple devices may be assigned permission for exclusive control of a single device, however only one may exercise control at a specific point in time.

Control of particular sources and TieLines can be Assigned to destinations on a case-by-case basis. The Assignment system is enabled (Machine and TieLine Assignment) through the GUI Enables menu. Active Assignments are controlled through the GUI (on-line, OnLine menu, Assignments submenu) or may be handled by an external automation or scheduling system.

Backplane (Rear connector channel, Motherboard)

The circuit board at the back of an electronics frame where modules (from the front) and cables (from the rear) are plugged-in.

BNC

Bayonet Neill-Concelman (BNC) connector. (Named for its inventors). A type of coaxial cable connector.

BPI

Backplane Interface. This is required for a Communications Interface module to communicate with a MCPU module.

BPS

Button Per Source. Name given to a panel feature that performs a source take with the single push of a button.

Breakaway

A Take operation which is performed by accessing the control Levels of a Destination individually and selecting a different Source on at least one Level than that selected on the others. Breakaways allow a Destination to selectively utilize video and audio from different Sources.

BSY

Busy. This is commonly found on the modules to identify the yellow busy LED.

Bus

A signal path to which a number of inputs may be connected to feed one or more outputs. Also, a signal path used to communicate between devices such as the node bus or the Control Panel bus. the node bus is used to communicate between the MCPU and the Controller modules. The Control Panel bus is used to communicate between the MCPU and Control Panels.

Chop

A variation of a Take command that alternately connects each of two different Sources to a single Destination (flip-flopping) at a designated switching rate (the chop rate).

CIF

Communication Interface. A Series 7000 optional CIF module is a general purpose communications interface module used to augment the capability of the Series 7000 MCPU when the MCPU is housed in a standalone Control Frame. Each CIF module will support four mezzanine submodules; mezzanine submodules in turn provide a particular communications capability.

CLN

Client Control Panel. A companion panel used with the Server panel to expand Source and Destination selection. Each Client controls three Destinations.

Coaxial Cable (coax)

A cable which has a metallic noise shield surrounding a signal-carrying conductor. In video, the cable impedance is typically 75 ohms. Ethernet coax is typically 50Ω impedance.

Cold Start

A boot from power off.

Component Video

The un-encoded output of a camera, videotape recorder, etc., consisting of 3 primary color signals: Red, Green, and Blue (RGB) that together convey all necessary picture information. In some component video formats, these three components have been translated into a luminance signal and two color difference signals, e.g. Y, R-Y, B-Y.

Composite Video

An encoded video signal, such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

Control Device

Panel, computer, or other device that controls router crosspoint selections.

Control Panel Bus (CP bus)

Communications path between control panels or devices and the MCPU which controls the routing matrices.

Controllers

Part of the control system, Controllers are circuit modules which interface between the MCPU and signal processing modules.

COS

Cubicle or Studio. A custom configuration set.

CPO

Clear Protected Output.

Crosspoint (XPT)

An electronic switch that allows a signal to pass from an input to an output when the switch is closed.

DA

Distribution Amplifier. The Series 7000 uses DAs to expand outputs.

Data Matrix

A signal processing matrix containing modules that route RS-422 or RS-485 data.

Default

The setup condition existing when a device is first powered-up or after a system restart.

Destination (DEST or DST)

The point to which Source signals are routed. In Series 7000, a Destination may include one or more outputs, across multiple Levels, with any connector number offset (user-defined in system configuration). (See Multilevel Switching in Section 1.)

Destination Exclusion Set (DXS)

User-determined set of Destinations excluded from control by a particular panel. If used, Destination Exclusion Sets are included in a Panel Template before the template is downloaded to a particular control panel. A specific Destination Exclusion Set may be shared by more than one panel template.

DGND

Digital Ground.

DST

See *Destination (DEST or DST)*.

DSVOM

Dual Sync Video Output Monitor. Part of the DV Series.

Dumb Terminal

A conversational slave to a host computer.

EC I/F

External Control Interface.

EDP

Eight Destination Paging control panel.

EMI

Electromagnetic interference.

ENC

Enhanced Node Controller. Designed to replace the Node Controller it can be used in all Classic and DV Series matrices. The ENC is required for Dual Control of a matrix by the Series 7000 Control System and an external device such as a PC. The ENC does not support the Kscope Interface Mezzanine.

EPROM

Erasable Programmable Read Only Memory. EPROMs are non-volatile memory chips. They are commonly called Flash memory chips.

ERR

Error. This is commonly found on the modules to identify the red error LED.

Ethernet

A local area network (LAN) technology capable of transmitting information between computers at speeds of 10 and 100 Mbps.

Exclusion

User-determined Sources excluded from routing to a particular Destination.

FC

Frame Controller.

FET

Field Effect Transistor.

First Come First Served (FCFS)

Tieline status where it is not necessary to create a reservation to use the specified Tieline.

Flag

A parameter that can be set in a control panel template to control how the panel operates.

Flash Memory

See: *EPROM*.

Flip-Flopping

Alternately connecting each of two different Sources to a single Destination (at a designated switching rate (See: *Chop*).

GBR (Green, Blue & Red)

The three primary colors used in video processing, often referring to the three un-encoded outputs of a color camera. The sequence of GBR indicates the mechanical sequence of the connectors in the SMPTE standard. *Also see: RGB.*

GPI

General Purpose Interface. Refers to the HX-GPI or Horizon General Purpose Interface used to connect a Horizon Routing Switcher to a Series 7000 System.

GSC

Global Serial Channel. Refers to the GSC Mezzanine which provides additional BNC, serial communications ports for the Series 7000 MCPU. The four additional BNCs provided per mezzanine can be used as additional control panel bus or Tally System ports. The GSC can also be used to provide Node Control Bus expansion. In this capacity, only one of the four BNCs can be used because traffic density is too great for all four BNCs to be serviced by a single communications controller.

GUI

Graphical User Interface. Refers to the Configuration Editor software program used to configure the Series 7000 System.

Hardware

1. Electrical devices connected through physical wiring. 2. Electronic programming technique using physical connections and therefore essentially unalterable.

HDTV

Television with a resolution approximately four times that of Conventional Definition Television and a 16:9 (H x V) picture aspect ratio.

Heartbeat

A health status message provided by networked frames that are polled by MCPUs.

Horizon

A Grass Valley line of routing switchers.

HX

Grass Valley Horizon Series Crosspoint Routing System.

IBOP

Interconnect /Break Out Panel. An option panel used to add BNC connectors to an audio matrix using 50-pin D connectors.

ID or IDENT

A software routine that identifies a device (e.g. a control panel). Includes such information as:

- controlled Destination
- active tally level
- panel name
- software version
- system name

I/O

Abbreviation for input/output. Typically refers to sending information or data signals to and from devices.

Input

A single physical, numerically designated connection point of an in-coming signal to a matrix. One or more Series 7000 inputs can be assigned to a Source name during System Configuration.

Input Offset

Unlike traditional multi-level systems, Series 7000 Sources do not have to use the same input connector number on each matrix Level (i.e. RGB inputs for one Source can use input #1 in one matrix for R, input #4 in another matrix for G, etc.) The offset of the input numbers used is logged in the System Configuration.

J Number

Jack Number.

Jumper

A short conductor used to manually bridge two contact points. Used in Series 7000 Alarm system. Also called a strap.

Kadenza

A Grass Valley Group digital video effects system that can be used in an integrated environment with the Series 7000.

Kaleidoscope

A Grass Valley Group digital video effects system that can be used in an integrated environment with the Series 7000.

KISS

Key Input Source Select. Used in configuring the Kscope Key Sources.

KScope

The collective name for Kadenza and Kaleidoscope.

Krystal

A Grass Valley Group digital video effects system.

LED

Light emitting Diode. In Grass Valley products, LEDs illuminate to indicate a specific state (such as normal, error, on-line, and so on).

Level

Level is a name given to a group of signals that have something in common such as video, audio right, audio left, R, G, or B. This grouping becomes an independently controllable stratum of signals or crosspoints within a Physical Matrix or routing system. A Level may include more than one Virtual matrix as a slaved set. All elements in a Level respond to commands addressed to that Level.

Local

Local is used during configuration to identify local Sources and Destinations. Local Sources and Destinations are inputs and outputs physically connected to the Series 7000 System using the related configuration file.

Master

A module that controls a subordinate (slave) module.

Matrices

Plural of matrix.

Matrix

A configuration of potentially intersecting inputs and outputs. In routing switchers, signal switching hardware configured such that any input may be switched to any output.

MB4

Programmable Multibus 4 Control Panel.

MB8

Programmable Multibus 8 Control Panel.

MC

Matrix Controller. Controller module used in 7500 Series matrices.

MCO

Machine Control Only Control Panel.

MCPU

Master Control Processing Unit. This module provides:

- Overall system control
- Node manager interface to Series 7000 matrices
- Direct control panel support for up to 64 control panels
- Programmable real-time clock, date and time stamping for logged events
- Redundant controller interface (allows primary and backup MCPU pairs)
- Static RAM sizes (ranging from 128k bytes to 4M bytes) are supported
- Flash ROM sizes (ranging from 128k bytes to 4M bytes) are supported

MEC

Matrix Element Control. The MEC bus connects the control circuits of the various matrix modules in a frame section to the Node Controller. In some cases, when the MCPU and Node Controller reside in the same frame, these connections are all internal to the frame. More often, there are multiple Node Controllers in a system and a coaxial cable is run between Node Bus ports of each frame in the system. Only secondary systems and a particular compact configuration run external MEC buses.

MEDIC

Matrix Element Decode Integrated Circuit. Used as a communications bus between the MCPU and Controllers.

Mezzanine

A secondary printed circuit module consisting of a flat circuit board of insulating material with conductive circuits etched on and / or components mounted on its surface. These submodules generally plug into a primary module. Sometimes referred to as a submodule or daughter board.

Module

A single circuit board or assembly of circuit boards that can be readily removed from an electronics frame without first having to remove screws or other mounting hardware.

Multiformat

Ability to pass multiple signal types, such as serial digital, analog component, and analog composite.

Name(s)

Sources, Destinations, Levels, Salvos, Control Panels, Node Controllers, MCPUs, Mezzanine Boards, Tally Modules, and other components of the Series 7000 system all have names. When system software sets out to perform a function, a Take for instance, it looks for the source name, determines the inputs involved, and Takes the Source to the Destination specified (by name). Naming conventions are discussed in Section 1 of the *Configuration* manual. Names are important to operation and equally so to configuration.

NB (Node Bus)

Node Bus. A name for the communications bus between the MCPU and Controllers.

NB (Narrow Band)

Identifies the 7500 Series AES Audio Matrices.

NC

Node Controller. Controller used by Classic and DV Series matrices. The controller collects information from the modules in a matrix, sends the information to the system MCPU, and receives instructions from the MCPU.

Node Controller

See *NC*.

NTSC

Standard for scanning television signals. Used in the U.S., Canada, and Japan.

Output

A single physical, numerically designated connection point of an out-going signal from a matrix. One or more Series 7000 outputs can be assigned to a Destination name during System Configuration.

P32

32 Button-per-source Control Panel.

P48

48 Button-per-source Control Panel.

PAL

Standard for scanning television signals. Used in most European countries.

Panel Prefixes

A set of 1-to-8 printable ASCII character strings assigned to the 16-button or 24-button keypads on control panels. Used with suffixes to comprise a complete Source or Destination name. (Prefixes and 1-character suffixes are assigned to panel Keypad sets.)

Panel Suffix Set

A set of single printable ASCII characters usually the numbers 0-9 assigned to 10 buttons of a control panel 16-button or 24-button keypad. Pre-configured defaults exist for Telephone and Calculator style suffix sets.

Panel Template

Configuration data specifying control panel configuration; which includes items such as Tally Level, Destination, button assignments, and Flags restricting or allowing certain actions. Completed templates are downloaded to specific control panels.

Physical Matrix

Defines the total Input / Output size of a like signal type matrix. A Physical Matrix may be sized from 16x16 to 1,024x1,024 in increments of 16. Physical Matrices may be used to unite discrete frames in a large matrix or to fragment a single frame into smaller matrices. Every system must have at least one Physical Matrix and one Controller slice.

PLD

Programmable Logic Device.

Port

A connector, usually bidirectional, through which one device communicates with others.

Preset

Selecting a Source in preparation to taking it to air; a tentative change to one or more crospoints which has not yet been executed.

Protect (PROT)

A control function which prevents control panels or devices from changing the current Source selection for the specified Destination.

PROTOVRD

Protect Override.

PWR

Power. This is commonly found on the modules to identify the green power LED.

PXD

X-Y Destination Control Panel.

PXS

Programmable X-Y Source Control Panel.

PXY

Programmable X-Y. Used to identify a group of control panels consisting of a PXS, and one or more PXYE and PXD panels.

PXYE

Programmable X-Y Expansion Control Panel.

Rack

An equipment rack. A standard EIA equipment rack is 19 inches (48.26 am) wide.

Rack Unit (RU)

Unit of measure of vertical space in an equipment rack. One rack unit is equal to 1.75 inches (445 mm). The height of a GVG electronics frame is typically specified in rack units.

RAM

Random access memory.

RAS

Remote Access Service.

Rear Connector Channel

See *Backplane (Rear connector channel, Motherboard)*.

Reboot (Reset)

To restart a computer, reloading the software.

Redundant Power Supply

Backup power supply which takes over immediately if the primary power supply fails.

Remote

Remote is used during configuration to identify remote Sources and Destinations. Remote Sources and Destinations are inputs and outputs not physically connected to the Series 7000 System using the related configuration file. These remote Sources and Destinations are controlled over a network.

Reserved

Tieline status where a reservation is required to use a specified Tieline. See *First Come First Served (FCFS)*.

Reset

See reboot.

Resource Group

A resource group is an association of machine control devices all within a single work area.

RGB (Red, Green & Blue)

The three primary colors used in video processing, often referring to the three un-encoded outputs of a color camera. *See GBR (Green, Blue & Red)*.

ROM

Read Only Memory.

Room

A group of Destinations (usually a physical studio or control room within a facility) to which machine control and tally assignments can be made by an automated facility control system or the GUI Assignments menu. An assignment made to one Destination in a room allows control by any of the Destinations in that room.

RP

Rear Panel. RPs are special connector channels that support the various mezzanine boards. They are attached to the back of the stand-alone Control Frame according to which mezzanines are on the associated CIF module.

RS-232 or RS-232C

A serial data communications standard. RS-232C is a low-speed serial interface which uses a single-ended (unbalanced) interconnection scheme. Commonly used in telecommunications to connect computers and terminals to modems and other devices. The C suffix refers to the version of the RS-232 standard.

RS-485

A high-speed serial interface connection between data communications equipment. RS-485 specifies the characteristics of a balanced (differential) multipoint transceiver / receiver interface.

RU

Rack Unit. See *Rack Unit (RU)*.

Salvo (SVO)

A named, system-wide Preset which, when executed, may change crosspoints on one or more Destinations at the same time.

Salvo Elements

The individual take commands (Source to Destination connections) which comprise a Salvo.

Salvo Permission Set

User-determined set of Salvos permitted to be controlled by a specific panel. If used, Salvo Permission Sets are included in a Panel Template before the template is downloaded to a particular control panel. A single Salvo Permission Set may be used by more than one panel template.

SCP

Simple Control Panel.

SDP

Single Destination Paging control panel.

SDV

Serial Digital Video.

SERIM

Serial Interface Module.

SID

Source Identification panel.

Slave

Component in a system that does not act independently, but only under the control of another component.

Slice

A group of inputs and outputs assigned to a Controller.

SLIP

Serial Line Internet Protocol. Used only in SMS-V64x64 Systems to communicate with the GUI.

SMS

Signal Management System.

Source

Software defined, can be made up of one or more inputs on one or more Levels (i.e., a Source may consist of one input on the video Level and two inputs [left and right] on the audio Level). Two different Sources may share one or more inputs on one or more Levels. For example, if the Source **BARSTONE** (Bars, Tone) consists of a video and an audio input connected to a Color bar generator, BarsSil (Bars, Silent) can use the same video input.

Source Exclusion

This provides a means for limiting system access to specified sources on a Destination by Destination basis. Also, it prevents the inadvertent transmission of material that might be inappropriate for a specified Destination. Source Exclusion is applicable to all Levels on which a specified Source appears. Multiple Sources shall be excluded for single or multiple Destinations.

SMPTE

Society of Motion Picture and Television Engineers.

SRC

Source. See *Source*.

SS

Secondary Switch. The Series 7000 uses SSs to expand inputs.

Status

The current Source connected to a given Destination on a specific Level (usually the Tally level); sometimes referred to as the on air signal.

STB

Strobe.

Strap

A short conductor used to manually bridge two contact points. Used in Series 7000 Alarm system. Also called a jumper.

STROPCHS

Store Operator Changes.

Submodule

A small circuit board designed to mount on a larger module. Also known as a mezzanine board.

SVO

See *Salvo (SVO)*.

SVR

Server.

System Controller

Another term for the MCPU.

Take

Direct, immediate switching from one Source to another, occurring during the vertical interval for clean transition. The control operation which switches a Source or Sources to a Destination.

Tally

An acknowledgment returned to a control panel or terminal that an operation has been executed.

Tally Level, Active

Initially set to the default tally level, the active tally level will tally if the default tally level is not defined for the Destination assigned to a bus. In the UCP,MB8, and Client panels, the name(s) of this / these Level(s) appear(s) in the status display(s) at the start of the IDENT function.

Tally Level, Default

Set during Configuration, this level is the default Level that will tally in panel displays if no other Level tally is activated by control panel operation. In the UCP, MB8, and Server panels, the name of this Level appears in the Preset display at the start of the IDENT function.

Tally Modules

Circuit modules, housed in Grass Valley MAX Series frames, which use opto-isolated inputs and relay closure outputs to facilitate visual or aural tally indicators within a facility. For example, when a Source machine is selected on a Destination, the returned tally could light a lamp to let the machine operator know that a machine was in use.

TCI

Terminal Computer Interface.

Terminate, Termination

To complete a circuit by connecting a resistive load to it. A video termination is typically a male BNC connector which contains a 75-ohm resistive load.

TieLine

A physical connection used to give a Destination connected to the output of one matrix access to Source equipment connected to the input of another matrix. A signal which passes through 2 or more matrices; more specifically the path (consisting of 1 or more Tie Wires) which links a Destination of one matrix to a Source of another matrix. Tielines are established during system configuration.

TieLine Type

Is the Level created to be assigned to one end of a TieLine. Each TieLine must have two TieLine Types, one for each end.

Tie Wire

A physical cable which links the output of one matrix to the input of another matrix. One or more tie wires comprise a tie line.

Time Code

Timing code laid down on video tape to give each frame a unique number to ensure exact transitions during editing.

Timing Scatter

The temporal range of the different electrical lengths of router paths.

TLYLVL

Tally Level.

TM

Tally Module.

Toggle

To switch back and forth between two settings.

Twisted Pair

A cable composed of two small insulated conductors twisted together without a common covering.

UART

Universal Asynchronous Receiver Transmitter.

UCP

Universal Control Panel.

UMD

Under Monitor Display.

VI

Vertical Interval.

Virtual Matrix

Virtual Matrices can be used to fragment a Physical Matrix. Inputs and Outputs within a Virtual Matrix need not be contiguous. Only Destinations with Outputs in a given Virtual Matrix will be able to directly, without using a TieLine, access the Sources within that Virtual Matrix. As an example of their functionality, Virtual Matrices, working with control Levels, allow you set up selected Inputs and Outputs to handle R, G, B video signals by assigning each component to its own Virtual Matrix. Extending this example, if you assign the R, G, and B Virtual Matrices to the same control Level, they will always switch together as a married block; if you assign the R component Virtual Matrix to one Level, and the G and B Virtual Matrices to a second Level, you would then be able to break the R component away from the other two by selecting to control only the R Virtual Matrix associated Level at the control panel.

VISS

Video Input Source Select.

VITC

Vertical Interval Time Code.

VOM

Video Output Monitor

VSD

Visual Status Display.

VT100

A standard protocol for dumb terminals. VT100 terminals may be used for router dignostics.

Warm Start

A boot from power on, where the CPU and peripherals are already powered up (warm).

A warm boot might be performed after a software crash or a hardware reset.‘

WO

Which block of Outputs.

XPT

See Crosspoint.

YUV

A type of video which employs luminance (Y) and two color components (U [B-Y] and V [R-Y]).

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