grass valley

TRINIX™

DIGITAL VIDEO ROUTER

Units with Broadlinx 1.1
See Section 2 for equipment part numbers

Installation Manual

Manual part no. 04-052075-004 Rev. E
March 12, 2003

the most watched worldwide

A THOMSON BRAND

Contacting Thomson

Region	Voice	Fax	Address	Web Site
North America	(800) 547-8949 Support: 530-478-4148	Sales: (530) 478-3347 Support: (530) 478-3181	Thomson Broadcast and Media Solutions, Inc. P.O. Box 599000 Nevada City, CA 95959-7900 USA	www.thomsongrassvalley.com
Pacific Operations	+852-2585-6688 Support: 852-2585-6579	+852-2802-2996		
U.K., Europe, Asia, Middle East	+44 1753 218 777	+44 1753 218 757		
France	+33 1 45 29 73 00			
Germany	+49 221 1791 234	+49 221 1791 235		

Thomson Web Site

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Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Software updates, drivers, and patches can be downloaded.

Contents

Regulatory Compliance Notices

US FCC Rules

Reference: Part 15 Subparts A and B.

Notice: interference to radio communications in a domestic 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 interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. **Operation of this equipment in a residential area is likely to cause interference** in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

EEC EMC (EN series)

Refer to the Declaration of Conformity in the shipping container.

Note: Compliance with the EEC EMC standards listed in Declaration of Conformity qualifies the listed products for CE Mark certification at the time of publication.

UL

UL - 1950

CSA

CSA - C22.2 No. 950-M89

For additional safety information, see the following page.

Safety Notices

Caution: Electric shock danger. To reduce risk of electric shock, do not perform any servicing other than that contained in the manual unless you are qualified to do so.

Attention: Danger de choc électrique. Pour réduire tout risque de choc électrique, veuillez ne faire aucun entretien à l'appareil autre que ce qui est indiqué dans le manuel, à moins d'être un technicien qualifié.

Caution: No power switch. This equipment relies on the power cord as a disconnect device.

Attention: Pas d'interrupteur. Il faut débrancher l'appareil pour couper le courant.

Caution: This unit has two power cords. To prevent electric shock disconnect both power cords before servicing.

Attention: Cet appareil comporte deux cordons d'alimentation. Afin d'éviter un chock électrique, débranchez les deux cordons d'alimentation avant de faire une réparation.

Caution: No main fuse. This equipment relies on circuit breakers in the building for electrical protection.

Attention: Pas de fusible coupe circuit. Cet equipement doit être installé avec une protection electrique externe.

Electrical code: Equipment used in the USA must be installed in accordance with NEC and local code. Equipment used in Canada must be installed in accordance with the CEC code.

Warranty / Software License

For warranty and software license information, please contact Thomson.

Parts and Service

Thomson maintains a full stock of replacement parts available for immediate shipment.

NORTH AMERICA PARTS AND SERVICE

Please call toll-free **1-800-547-8949**.
You will be switched automatically to the parts and service representative nearest you.

For email correspondence: broadcast-support@thmulti.com

INTERNATIONAL PARTS AND SERVICE

Contact your local Thomson representative.

Related Documents

Jupiter Getting Started Guide **04-045707-003**

Describes simplified software configuration procedures for quick system startup.

Multimedia Courses:

Setting Up, Configuring, and Operating a Basic Jupiter Control System **071-8189-00**
Building a Jupiter Tally System from the Ground Up **071-8188-00**
Finding Your Path through Path Finding **071-8187-00**

Jupiter Facility Control System Installation and Operation Manual **04-045707-002**

Includes hardware installation of VM-3000, SI-3000, VG-3000; MPK control panels; PC file server and LAN board. Describes software installation and configuration.

Technical Publications Library CD-ROM **46-050812-001**

Contains Field Engineering Bulletins, manuals, and assembly drawings for most Thomson broadcast products developed in the Salt Lake City design center.

CP 3008 (FCS 3357) 8-Character Control Panel Installation/Operating Manual **04-883357-002**

CP 3030 Control Panel Installation and Operating Manual **04-046299-002**

BSD 2000 Under Monitor Status Displays Technical Manual **04-041602-001**

Section 1

Introduction

General

The Trinix family of routing switchers represents a revolutionary new approach to digital signal distribution that builds on the success of Venus--the best selling routing switcher ever. Trinix is a high-quality and fully featured digital video routing switcher offering a large number of crosspoints in one of the smallest physical frames available. Three fixed frame sizes are available: a 128 x 128 router in eight rack units, a 256 x 256 router in 15 RUs, and a 512 x 512 router in 32 RUs. Fixed frame designs offer optimal solutions for customers who have minimum space requirements yet still need a large number of crosspoints. Features of the Trinix routing switcher architecture include:

- Fourth generation based on Venus
- Standard Definition (SD and High Definition (HD) in the same frame
- Easy to upgrade
- High density in minimal space
- Each I/O card supports 32 signals
- Same crosspoint bus control as Venus, providing easy integration with Jupiter Facility Control Systems. Jupiter can in turn process switch commands from Encore Control System
- Software for direct (Ethernet) integration with Encore and Series 7000 control systems now in development
- Mission critical components are front loading and hot swappable
- Extensive alarm notification/status
- Load sharing power supplies
- Redundant fans
- Redundant Broadlinx, Sync options
- Passive expanders for input/output expansion, dual/quad outputs
- Chassis design maximizes air flow
- Network connectivity for status monitoring via web browser

SD and HD in the same frame

Trinix supports both SD and HD video in all configurations. The matrix cards and high-speed backplane are designed for both SD and HD signals. The only difference between SD and HD implementations is the I/O cards. This makes upgrading easy on both budgets and implementation, thus solving the problem of deciding when to prepare for HD in a facility.

Easy to create very large routers

Creating very large routers in the Trinix design is accomplished by using special circuitry for simple and cost effective expansion. Using passive port expansion modules, a 1024 x 1024 router can be built in four equipment racks using four 512 x 512 frames coupled together with expanders. These expanders can also be used to provide dual or quad non-inverting outputs.

Control system

The Jupiter Facility Control System can be used to control the Trinix router using a crosspoint bus connection (see Glossary) to a VM 3000 Control Processor or CM 4000 Control Module. The VM/CM can receive switching commands from a variety of sources, including Jupiter control panels, a Grass Valley Encore control system, or an automation computer.

The Trinix frame

- High-density crosspoints in compact frames
- Fixed matrix sizes can be combined to form larger routers
- Modular design allows for both HD and SD within the same frame

Trinix is optimized for crosspoint density, with reliability and serviceability in mind. Each frame has redundant power supplies, redundant fans, and a physical topology designed to maximize cooling. Mission critical modules are front loading and hot swappable.

All Trinix frames accommodate two load-sharing power supplies and have two AC inputs. This allows for full redundant operations. They are front loading and hot swappable and each power supply has its own fan for cooling. The 128 x 128 frame runs on 600W power supply, the 256 x 256 frame runs on a 1250 W power supply, and the 512 x 512 runs on two 1250 W power supplies—all with plenty of power to spare.

All frames use a two-power-supply system (one for redundancy). The 128 x 128 chassis includes two fan modules; the 256 x 256 chassis includes three, and the 512 x 512 includes six. Both power supplies and fan modules are front loading and hot swappable.

Trinix architecture

The architecture of the Trinix signal flow is organized into three cards: input card, matrix card, and output card. These are connected to a passive backplane circuit card. Each input and output card accommodates 32 signals, which allows the routers to be built in increments of 32 as well a mixed population of SD and HD cards in increments of 32. The SDI path is non-reclocked; the HD path is selectively reclocked.

The BL-33000 Broadlinx option combines network interface, sync input, and output monitor circuitry. Each card has two sync inputs and two monitor outputs. Two cards can be installed for a total of four ports for each. The sync reference supports generation of Vertical Interval Switch Timing strobe from standard NTSC or PAL Black Burst or HDTV Tri-level sync defined in the SMPTE 274M-1998 standard (see Glossary). Sync reference granularity is 32 outputs. An internal DIP switch is used to select one of the available references for the respective 32-output blocks. Trinix can also operate without a sync reference.

The Trinix fixed-frame routers all come standard as pre-wired single-output units. The dual output option is implemented by adding physical expanders in increments of 16 up to 256. Both outputs are non-inverting and fully meet DVB-ASI (see Glossary) specifications.

Serviceability and reliability

Trinix routing switchers are engineered by the same team that developed the Venus and Venus2001 family of routing switchers and use many of the same proven circuit designs that made the Venus line the best selling routers in the world. In addition, Trinix employs cutting-edge technology to reduce the number of components, increase the reliability of individual parts, enhance air movement throughout the chassis, and identify potential system problems in time to take preventive measures.

Trinix also offers Broadlinx technology, which aids serviceability by providing status displays and monitoring functions through a network connection.

Section 2

Planning Guide

Introduction

The following discussion is intended to provide both an overview and an in-depth understanding of the configuration possibilities of the Trinix Digital Video Routing Switcher.

Included in this document are the details necessary for the planning and designing of your facility with the Trinix router in mind.

The beginning of this section includes conceptual descriptions and drawings for those who need a basic understanding of the product and the configuration options. Later sections provide additional detail such as part numbers, part descriptions, and connection diagrams.

Product overview

The Trinix product is a family of high quality, full-featured SD/HD digital video routing switchers which offer a large number of crosspoints in the smallest physical frames, front servicing, and highly reliable operation.Trinix is the industry leader for density and large-scale routing from 32 x 32 to 2048 x 2048.

Realizing the very large routers in the Trinix design is accomplished by utilizing special circuitry to allow for simple and cost effective expansion. Expanders can also be used to provide dual or quad outputs (non-inverting).

Trinix supports both SD and HD video in all of the configurations listed above. The only difference between SD and HD implementations is the I/O cards. This helps solve the problem of deciding when to prepare for HD in a facility.

Trinix uses the Thomson “crosspoint bus” connection to the Jupiter Facility Control System. If desired, the Jupiter system can be connected to a Grass Valley Encore control system or to an automation computer.

Finally, the history behind Trinix is superb. The same design team that has delivered four previous video switcher designs designed Trinix. Trinix is part of the Thomson routing family of products including Venus, the most successful routing switcher ever.

Broadlinx

The Broadlinx product allows the Trinix router to be easily and extensively monitored via a standard network connection. It can also be used to download software upgrades to the NR and SR control boards.

The network consists of a Windows PC and network interface connection (NIC) circuitry on the NR-33000 Broadlinx board, as well as microprocessors on each circuit board in the system. All of the processors are inter connected via a communications bus (Com Bus)

Broadlinx uses HTTP (Hypertext Transport Protocol) to deliver information through the network to a PC with Microsoft Internet Explorer 5.0 or newer (Internet Explorer 6 or newer is recommended for best performance).

In its full implementation, Broadlinx will include SNMP (Simple Network Management Protocol) agent/client software to provide compatibility with network management tools such as NetCentral, HP OpenView, and others.

Typical aspects that can be monitored as "warnings" or alarms are all the voltages on each circuit board, input signal presence, and output reclocking status. Also, information on the current version of firmware that is being used is available.

Future versions of Broadlinx will also provide the capability to control the Trinix router as a "stand-alone" device (when a Jupiter or other control system is not involved.) Additionally, the Broadlinx board will be used to integrate the Grass Valley Encore control system with the Trinix.

For additional information regarding the Broadlinx development schedule, please contact your Thomson representative.

Chassis

Trinix routers are available in three fixed frame sizes:

- DV-33128: 128 x 128 in 8 rack units (RU). See page 17 and page 18.
- DV-33256: 256 x 256 in 15 RUs. See page 19 and page 20.
- DV-33512: 512 x 512 in 32 RUs. See page 21 and page 22.

Figure 1. DV-33128 front view (door removed).

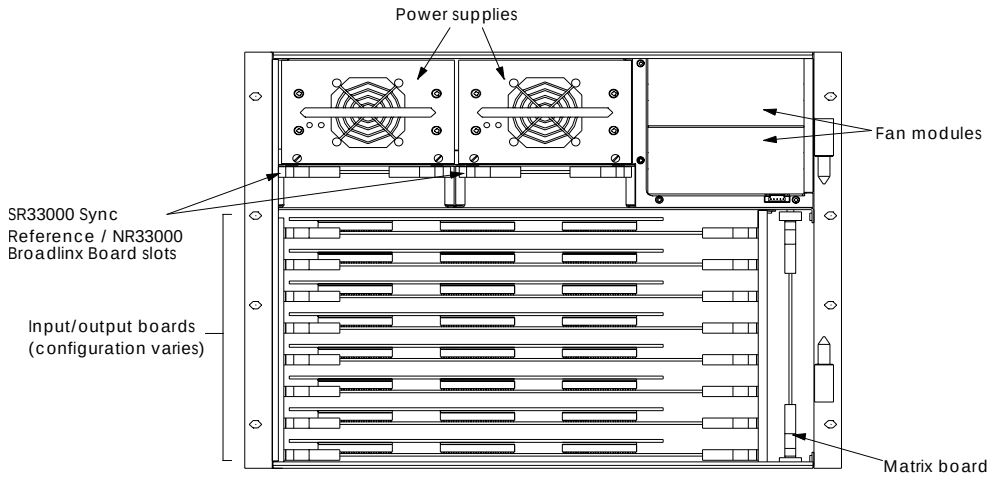


Figure 2. DV-33128 rear panel.

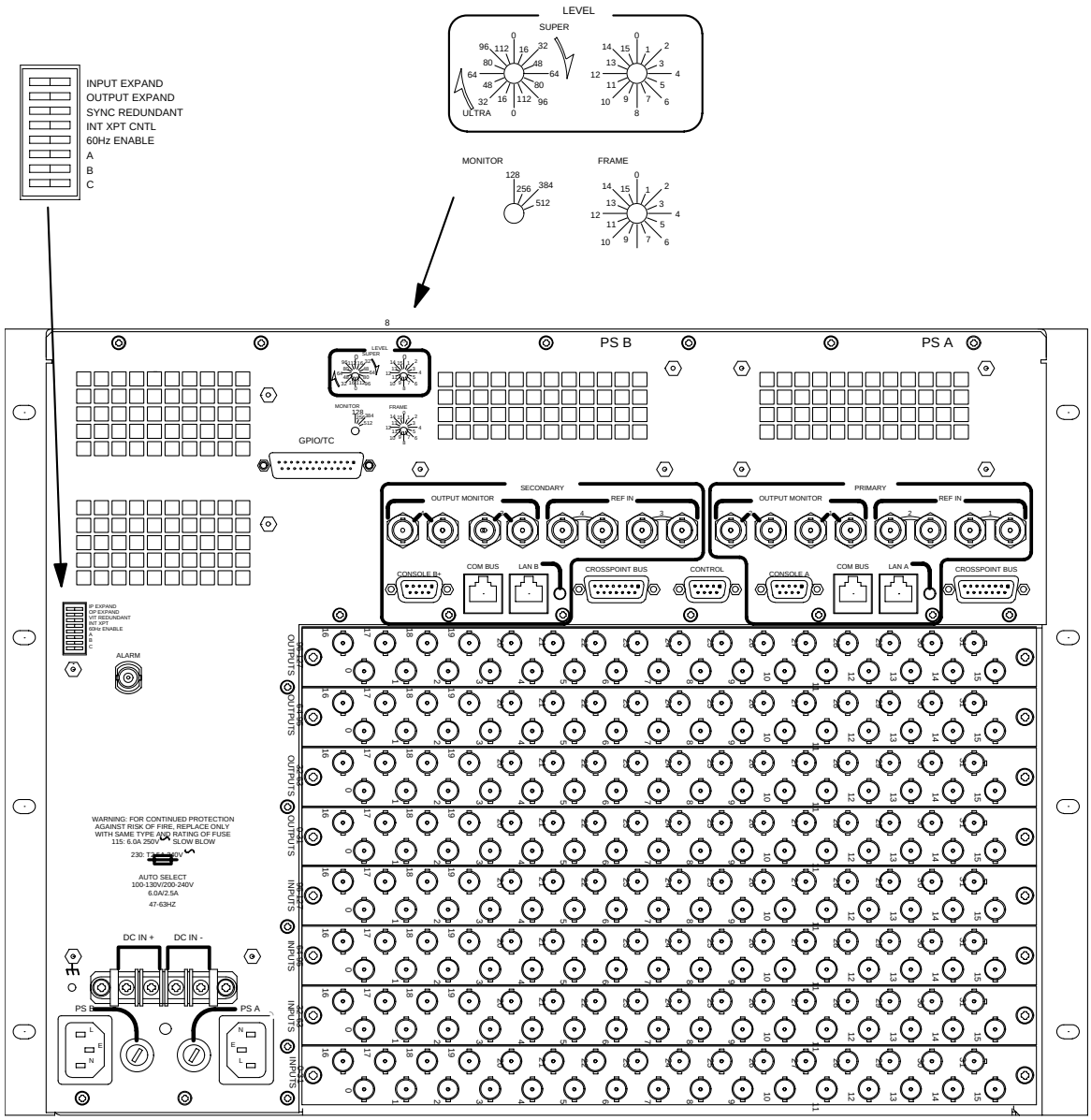


Figure 3. DV-33256 front view (door removed).

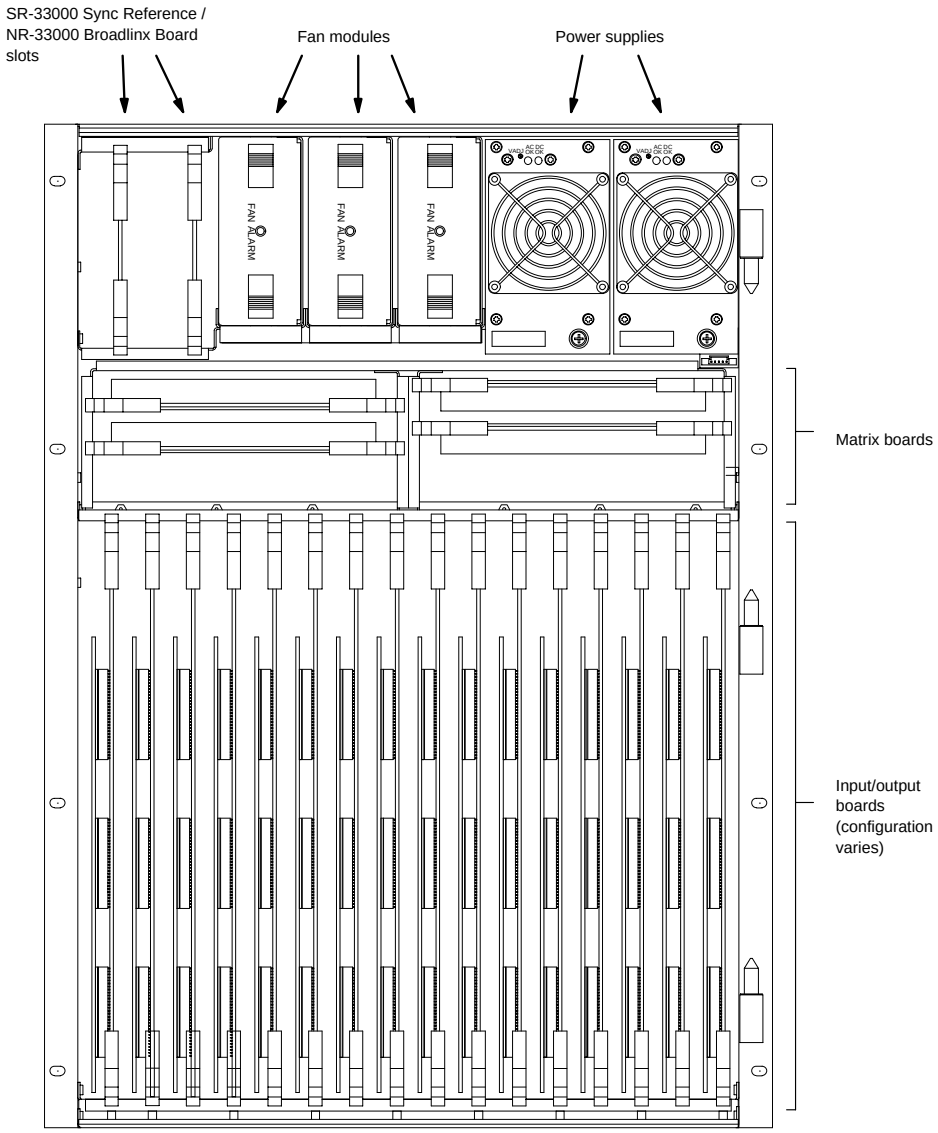


Figure 4. DV-33256 rear panel

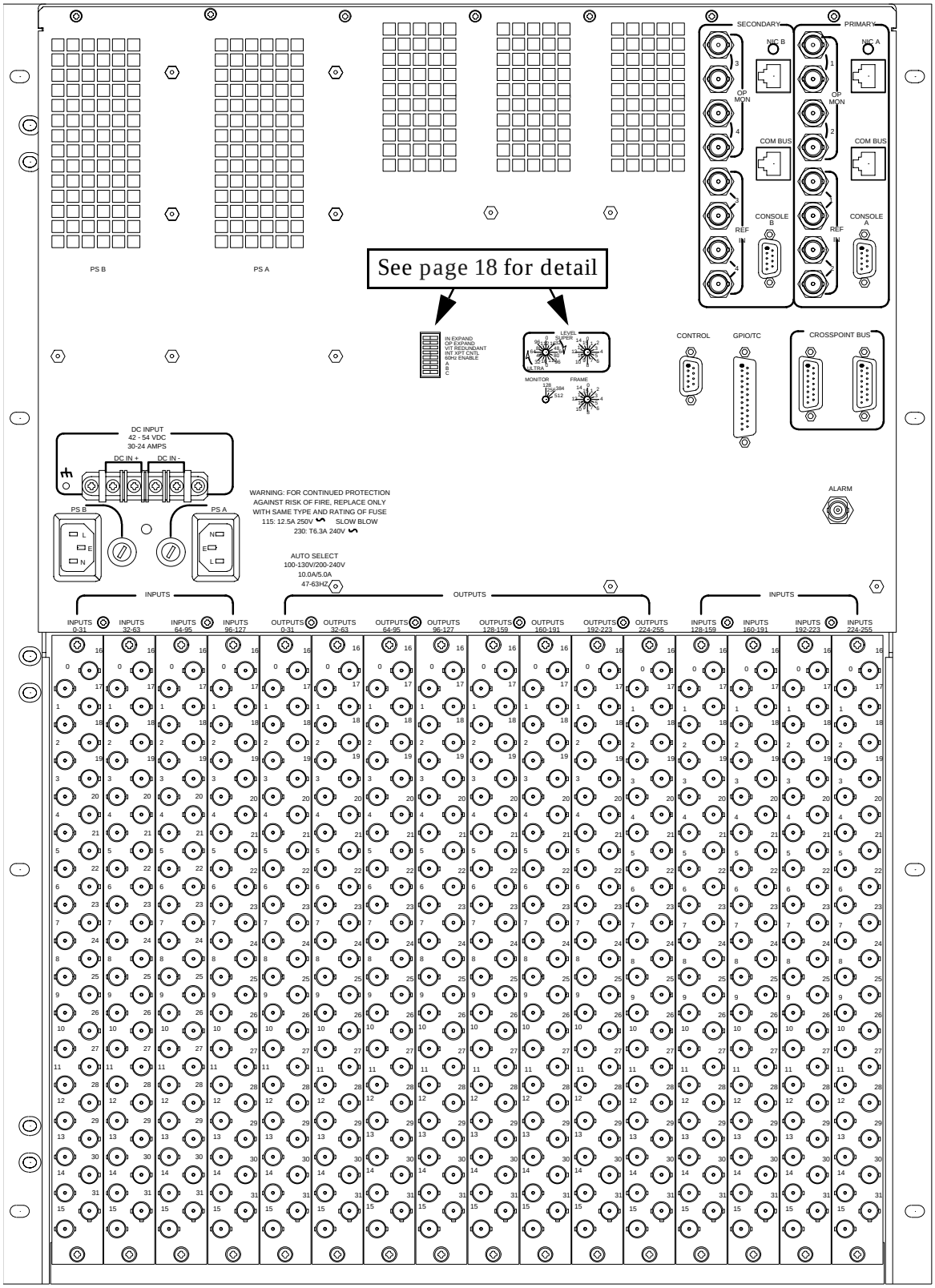


Figure 5. DV-33512 main chassis and associated power supply unit.

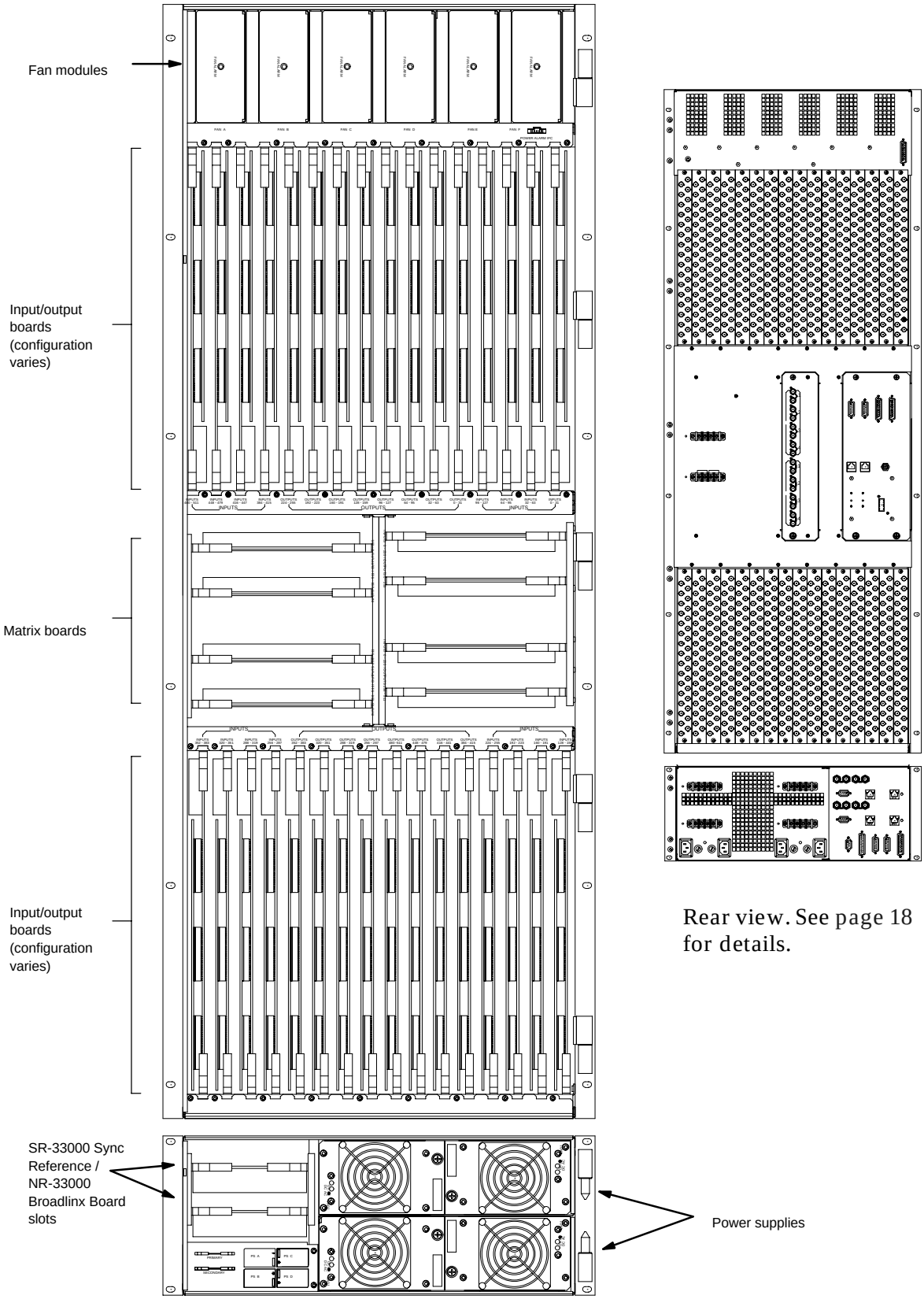


Figure 6. DV-33512 main chassis and power supply chassis.

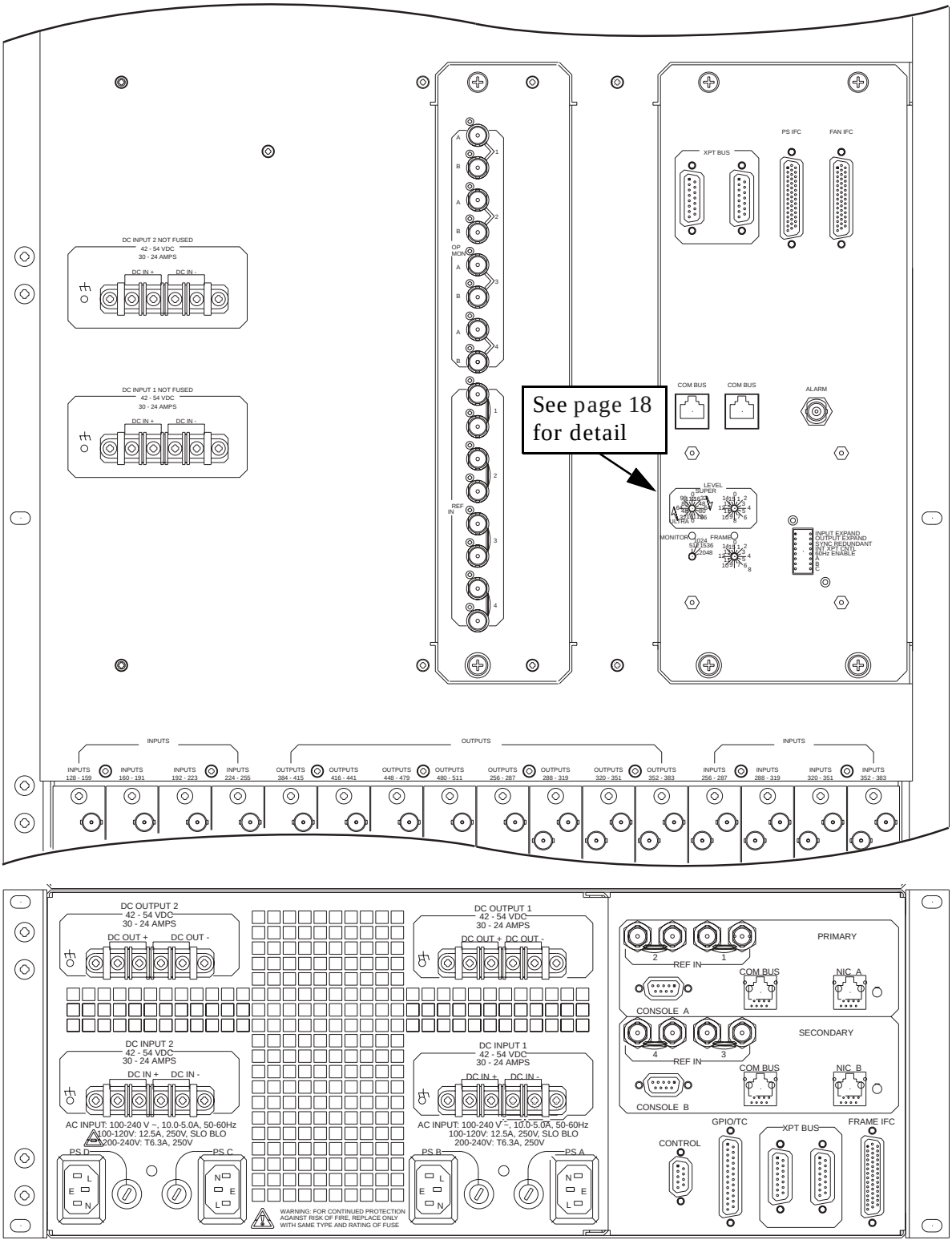
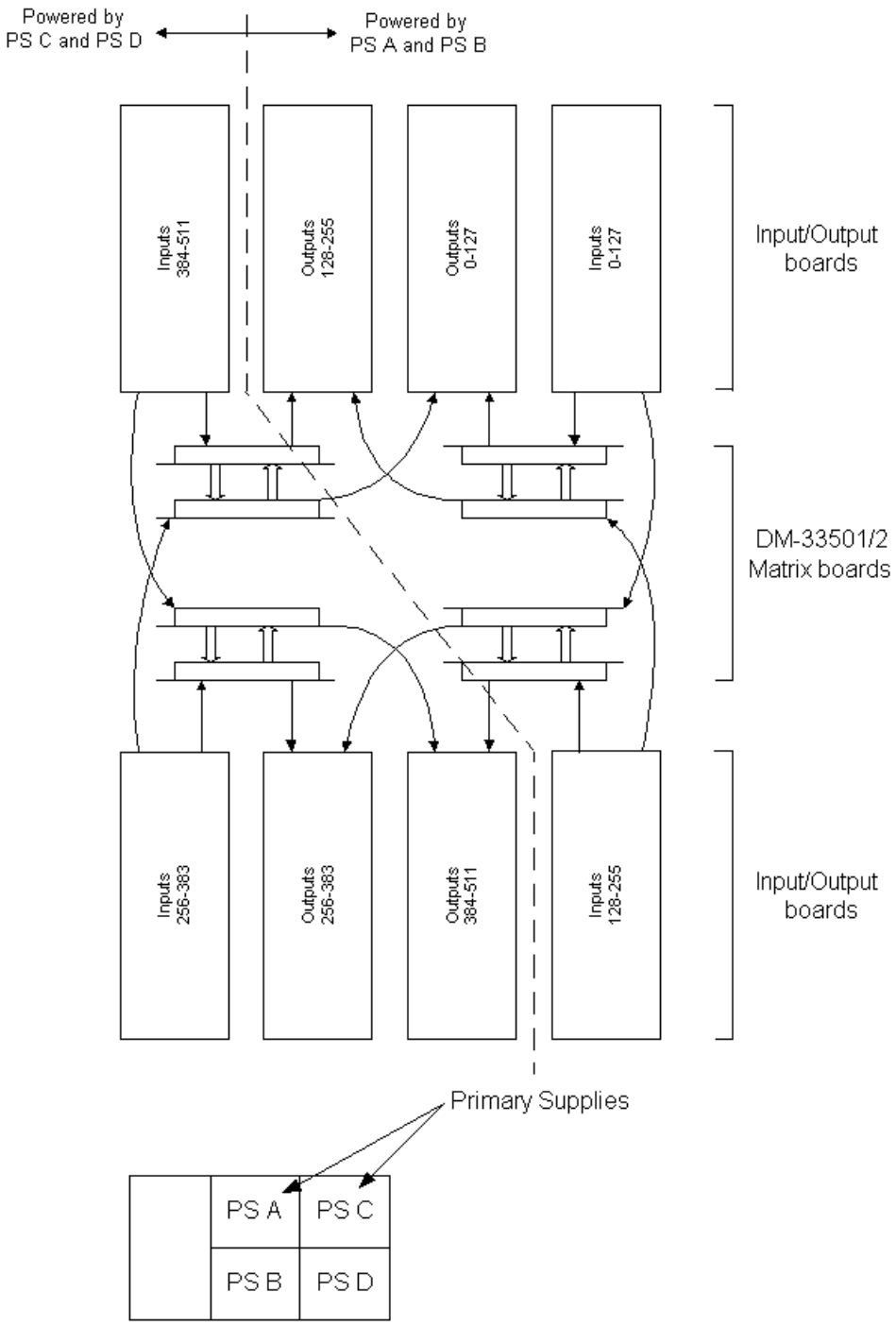


Figure 7. Signal flow and power supply system for CV-33512 router.



Power supplies

Two power supply types are used in the Trinix routing family, one type for the 128 chassis and another for the 256 and 512 chassis. Both types, which share the same feature set, are OEM products with a track record of outstanding reliability. The power supplies differ primarily in power delivered, size, and weight.

The 128 and 256 chassis are designed for two power supplies, with the standard configuration offering one supply. The optional second supply provides redundancy and increased reliability due to "load sharing" - both supplies work less, creating less strain and decreasing the likelihood of failure of either unit.

In AC power applications, the 512 chassis is equipped with two power supplies mounted in a separate chassis, each with a backup supply, for a total of four supplies.

All power supplies are front loading and hot swappable and each has its own fan for cooling. Automatic line sensing technology is used to adapt the supply to all major power standards throughout the world. The back panel of the chassis provides a separate AC connector for each supply and a third connection for a 48 VDC input.

The power supplies each deliver 48 volts to all components and the individual components convert down the voltages for their particular need.

For additional redundancy, it is possible to connect the router to an external AC power source and a external DC power source at the same time.

Central cooling system

The Trinix uses *fan modules* (FM-33000) for cooling the main chamber of the chassis. A fan module consists of two blower-type fans that are housed in a mechanical assembly. The 128 x 128 chassis uses two modules, the 256 x 256 chassis uses three, and the 512 uses six. The fan modules are front-loading and hot-swappable.

For the 128 chassis, air is taken in from the sides of the chassis (primarily the left side), where the air is drawn across the I/O cards, past the matrix card, and up near the rear of the chassis where it is expelled. A small amount of air is drawn from the right side of the chassis as well to help cool the matrix board.

For the 256 and 512 chassis, air is taken in from the bottom of the chassis (cut-outs are located on the very bottom of the sides). This air is then drawn up through all of the I/O cards as well as the matrix boards to the rear of the chassis and expelled out the back.

Using a central set of fan modules to cool the main chamber eliminates the possibility of cooling loss in one area due to failure of a single fan. If a fan does fail, the system will continue to operate, providing a safe interval during which the failed fan can be replaced and the system returned to normal redundant operation.

Sync reference

The Trinix family of routers can operate using NTSC or PAL black burst, or tri-level sync.

Two sync inputs are standard for each Trinix configuration. Using the two sync inputs independently allows SD and HD switching in the same frame.

Adding a second SR/NR-33000 board as an option provides two more sync inputs.

With the DV-33512 chassis, a SR-33500 Sync/OPM board can be used to provide four sync inputs.

Note For all three Trinix chassis types, the maximum number of sync inputs is four.

Each sync input uses looping 75 ohm BNC connectors.

Output monitoring

With the DV-33128 and DV-33256 chassis, two pairs of output monitor ports are provided (one side of each pair is inverted). Two additional dual ports are optionally available when a second SR/ NR-33000 board is added; this would provide a total of four monitor ports.

With the DV-33512 chassis, the SR-33500 Sync/OPM board must be installed to provide output monitoring. The SR-33500 provides four monitoring ports.

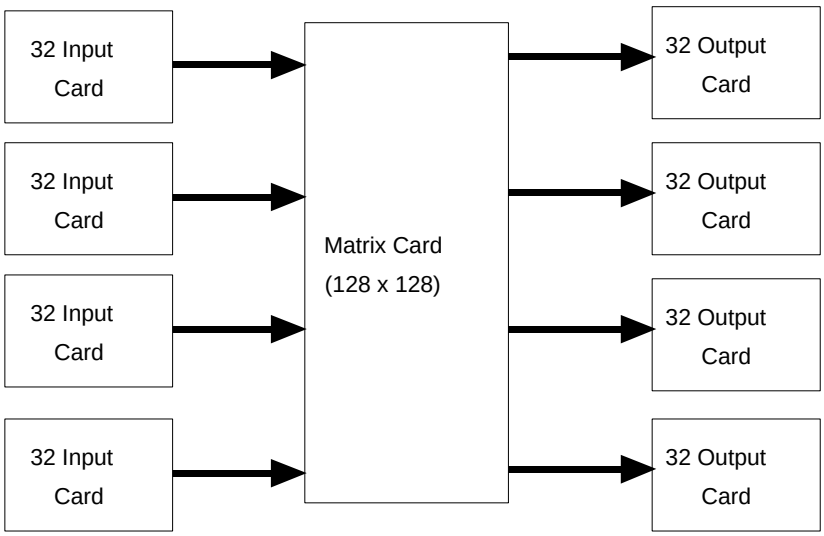
For configurations that require multiple chassis, the monitor signals are brought through a PE-33016 Port Expander used as a combiner (see page 37).

Signal flow

Trinix is a “three-board” routing system, where the input board, output board, and matrix board are the basic modules.

Shown below is the signal flow through a 128 x 128 routing system. Inputs are received and outputs are delivered to the rear of the chassis directly with a connection to the rear panels (no cabling).

Figure 8. Input and output routing through matrix board for 128 x 128 switcher.



Pre-wiring

All Trinix switchers are pre-wired to the size of the chassis. That is, a 128-chassis is essentially pre-wired to 128 x 128 with all rear panels and BNCs in place. The 256-chassis is pre-wired to 256 x 256. By convention, switcher sizes are shown as:

M x N (P x Q)

This indicates that the functional router size is M x N and is pre-wired to (P x Q). For Trinix pre-wiring is only possible in multiples of 128 x 128, as that is the smallest chassis size increment.

Crosspoint bus connections

The Trinix routing family uses the proprietary crosspoint bus control protocol. Interconnection from a Jupiter VM 3000 or CM 4000 control board is via crosspoint bus cable, which can be supplied in 3, 10, 25, or 50 foot lengths. The crosspoint bus connector (15-pin D-connector) is looped out in order to connect the bus to the next item under crosspoint control.

The crosspoint bus can be looped through multiple frames; however, depending on the size of the switcher this bus may require intermediate buffering through a CB 3000 Control Buffer. A CB 3000 is required in the following cases:

DV-33128 - eight or more chassis
DV-33256 - four or more chassis
DV-33512 - two or more chassis

The CB 3000 is described in detail in the Jupiter Installation and Operating manual.

In Trinix applications, the crosspoint bus **must be terminated** at the point farthest from the control processor using a Crosspoint Bus Terminator, part number 01-053050-001. (The terminator is included with all Trinix systems.)

Alarm information

The alarm system for Trinix is a wired-OR configuration in which the power supplies, fans, and other major components can trigger the alarm in the event of failure. The alarm indicator is a bi-color LED on the front panel ("power/alarm") which glows red when an alarm occurs. Additionally, each major component has a corresponding LED to indicate an alarm, and a relay contact is closed when alarm condition occurs. The relay connector is a BNC type and meets SMPTE 269M-1999.

All of the alarm and status information is also gathered by the Broadlinx technology to make it available to the user via web page or SNMP network management system. For more information, see page 16.

Configuration

Quick look

Building block size: 32 Inputs or 32 Outputs

Options: SD or HD rate I/O modules
Dual outputs, quad outputs
Additional monitor outputs (2)
Redundant sync inputs (2)
Redundant monitor/status/control
Redundant power supplies

Standards supported: SMPTE 259M-1997, SMPTE 292M-1998

Standard connectors: 75-Ohm BNC

Output monitor: Yes, 2 standard

Sync reference input: Yes, 2. Granularity: per 32 outputs

Control options: Jupiter, Encore, SNMP (availability TBD)

Chassis, board, weight and power summary for select square matrix sizes

Table 1.

Square Matrix Size	32	64	96	128	160	192	224	256
	128 Chassis				256 Chassis			
# of Chassis	1	1	1	1	1	1	1	1
# Input Boards	1	2	3	4	5	6	7	8
# Output Boards	1	2	3	4	5	6	7	8
# of Matrix Boards	1	1	1	1	4	4	4	4
Weight (pounds)	75	81	88	94	163	169	176	182
Power Consumption* (W)				~480				~1000

Table 2.

Square Matrix Size	256			512	1024			2048
	512 Chassis				512 Chassis			
# of Chassis	1			1	4			16
# Input Boards	8			16	64			256
# Output Boards	8			16	64			256
# of Matrix Boards	1			4	16			64
Weight (pounds)	300			400	1600			6400
# of RUs	32			32	192			~768
Power Consumption* (W)	~1000			~2000	~8000			~32000

*Power Consumption is Estimated.

Specifications

Electrical

General

Input cards: SI-33110 (SD) and HI-33110 (HD). 32 inputs each.

Matrix card: DM-33100 (SD and HD). 128 inputs x 128 outputs. Crosspoint type: 32 each, 32 x 16 crosspoint ICs.

Output cards: SO-33110 (SD) and HO-33110 (HD). 32 inputs each. The HO-33110 provides individual selection of reclocking for 1.5 Gbps or non-reclocking for all data rates. The SO-33110 is non-reclocking.

Connectors: 75 ohm BNC

Video inputs

Level: 800 mV p-p (+/-10%) 75 ohm terminating

Return loss: HD: >/=15 dB from 5 MHz to 1.5 GHz
SD: >/=15 dB from 5 MHz to 540 MHz

Sync inputs

Level: Nominal 1 Vp-p (+/-6 dB) video

Return loss: >/=40 dB from 100 kHz to 20 MHz
>/=30 dB from 20 MHz to 30 MHz

Video outputs

Level: 800 mV p-p +/-10% 75 ohm

Return loss: >/=15 dB from 5 MHz to 1.5 GHz (except Monitor outputs)

Performance characteristics

Maximum data rate: 1.5 Gbps

Minimum data rate: 3.072 Mbps

Signal standards: SMPTE 292M-1998,[1] SMPTE 259M-1997[1]
(Output rise and fall times correspond to SMPTE 292M)

Equalization: HD: automatic up to 100 meters of Belden 1694A or equivalent coax cable.

SD: automatic up to 300 meters of Belden 1694A, 250meters of Belden 8281 or equivalent coax cable for SD equalizerat 270 Mbps. Reducing to 150 meters at 540 Mbps. For more information, see page 74.

Data reclocking: Switch selectable on an output-by-output basis. Reclocking is functional only for 1.485 Gbps HD-SDI signals.

Output jitter: </= 0.2 unit interval

AC power input

Mains connection: IEC Connector, separate mains input for each power supplymodule

Voltage range: 100-240 VAC 50-60 Hz, universal, auto-ranging (fuses must be selected and installed as appropriate for mains voltage)

Operating current 128 x 128 frame: approx. 5.36 A @ 100 VAC,approx. 2.23 A @ 240 VAC.
256 x 256 frame: approx. 9.36 A @ 100 VAC,approx. 3.90 A @ 240 VAC.
512 x 512 frame: approx. 19.08 A @ 100 VAC (9.54 A per supply); approx. 7.63 A @ 250 VAC (3.82 A per supply).

Inrush current 128 x 128 frame: 49.05 A
256 x 256 frame: 55.0 A
512 x 512 frame: 45 A per supply

Hold-up time: Minimum 20 msec at full load

Conducted emissions: per FCC Class B, EN55022 Class B

Power supply DC output

Voltage: +48 (+/-0.5) VDC

Current: 128 x 128 frame: 12.5 A/supply (full redundancy).
256 x 256 frame: 26 A/supply (full redundancy).
512 x 512 frame: approx. 26 A/supply (full redundancy).

Current sharing: Yes, maximum 20% differential unbalance

[1] See Glossary

Ripple/noise: <200 mVp-p

DC power input

Input voltage range	42-54 VDC
Operating current	128 x 128 frame: approx. 9.5 A @ 48 VDC. 256 x 256 frame: approx. 16 A @ 48 VDC. 512 x 512 frame: approx. 34 A @ 48 VDC.
Inrush current	128 x 128 frame: 15 A. 256 x 256 frame: 21 A. 512 x 512 frame: approx. 25 A.

Alarm

The relay connector is a BNC type and meets SMPTE 269M-1999 (see Glossary).

Environmental

0 to +35 degrees C (+32 to +95 F)

Physical

512 x 512 frame dimensions

Main chassis: 49 inches (28 RU) high x 19 in. wide x 17.5 in. deep (1245 x 483 x 445 mm)
Power supply chassis: 7 inches (4 RU) high x 19 in. wide x 21 in. deep (178 x 483 x 533 mm)

256 x 256 frame dimensions

26.25 inches (15 RU) high x 19 in. wide x 17.5 in. deep (667 x 483 x 445 mm)

128 x 128 frame dimensions

14 inches (8 RU) high x 19 in. wide x 17.50 in. deep (356 x 483 x 445 mm)

MK-33000 Mounting Kit (for port expansion)

14 inches (8 RU) high x 19 in. wide x approximately 4 in. deep (356 x 483 x 100 mm)

Dual output systems

The PE-33016 Port Expander can be used to provide dual outputs in groups of 16 outputs. All outputs are non-inverting. For example, a 128 x 128 switcher could be arranged as follows:

128 inputs with 112 single outputs and 16 dual outputs - uses 1 PE-33016
128 inputs with 96 single outputs and 32 dual outputs - uses 2 PE-33016s
128 inputs with 80 single outputs and 48 dual outputs - uses 3 PE-33016s... etc.

In this application, 16 of the PE-33016 rear BNCs can be used for inputs (outputs from the router) and all 32 of the front BNCs can be used for outputs.[1] Up to 16 PE-33016 modules can be mounted in the MK-33000 Mounting Kit, which is eight rack units high and approximately four inches deep. Figure 9 shows a 128 input router with a single PE-33016 mounted in an MK-33000; this provides 112 single outputs and 16 dual outputs. Figure 10 shows a 256 input router with 256 dual outputs; this arrangement requires 16 PE-33016 Port Expanders.

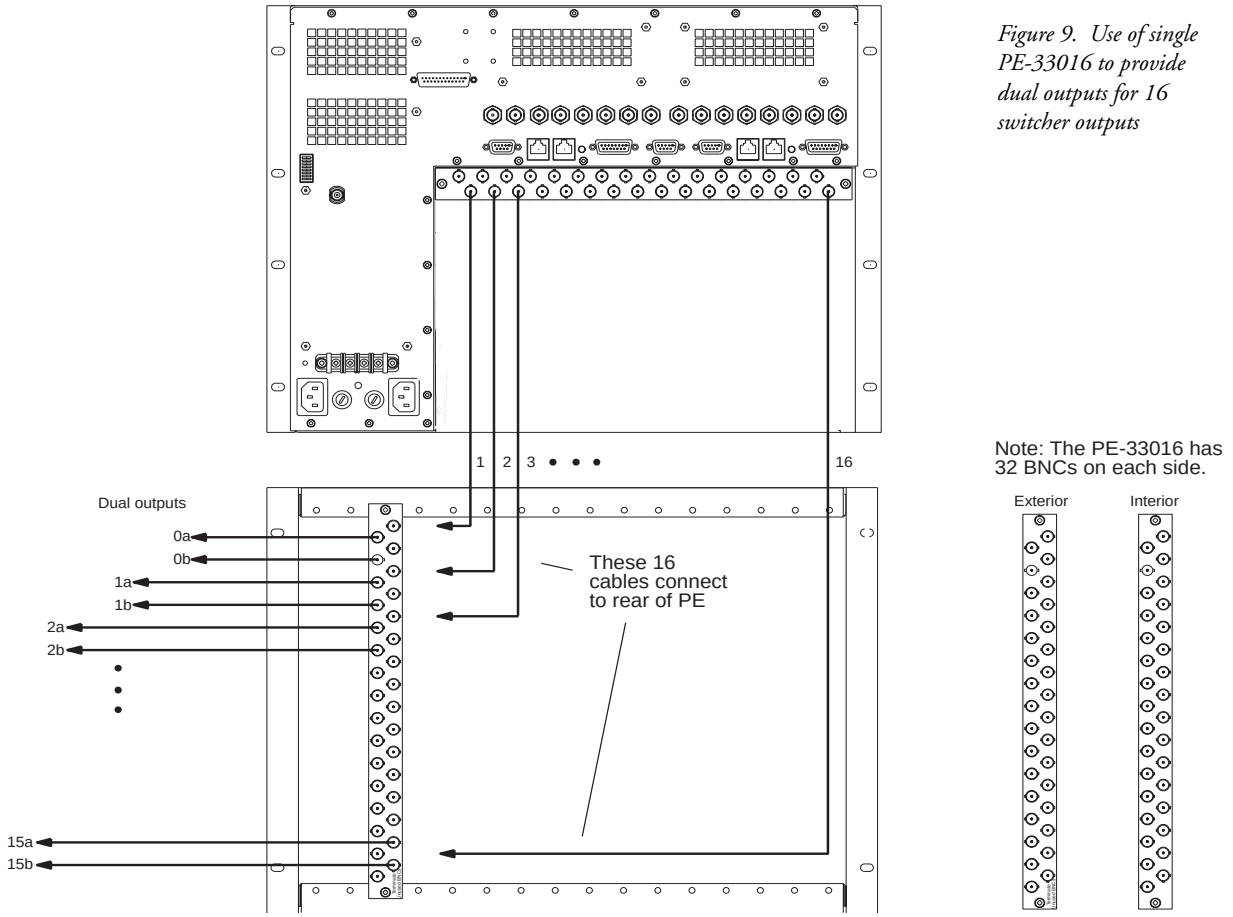
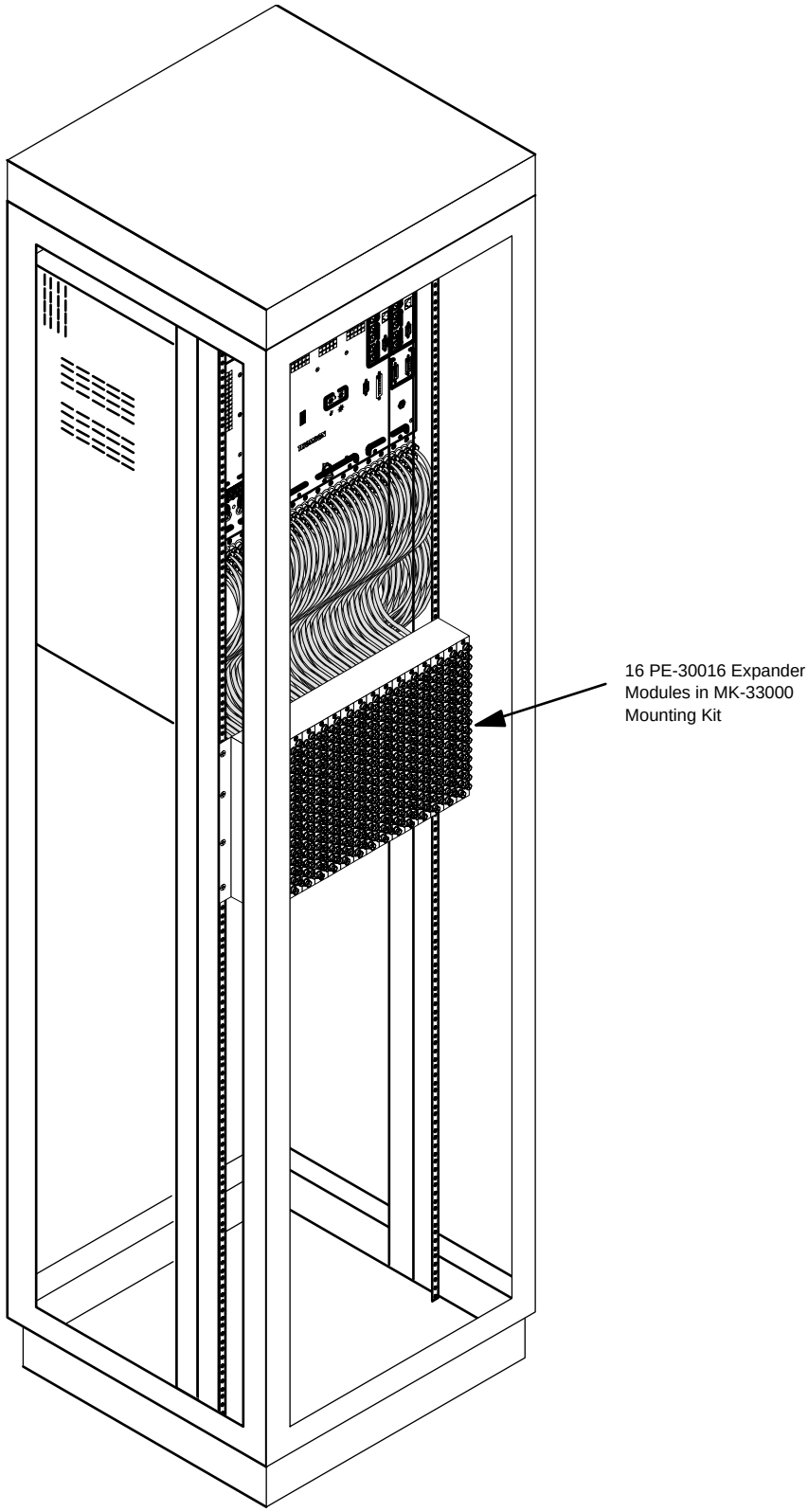


Figure 9. Use of single PE-33016 to provide dual outputs for 16 switcher outputs

1. All unused connectors must be terminated. 16 terminators are supplied with each PE-33016. See page 44.

Figure 10. Port expanders used to provide 256 dual outputs for 256 input switcher.



Quad output systems

The PE-33008 Port Expander can be used to provide quad outputs in groups of 16 outputs. All outputs are non-inverting. A 128 x 128 switcher could be arranged as follows:

128 inputs with 112 single outputs and 16 quad outputs - uses 2 PE-33008s
128 inputs with 96 single outputs and 32 quad outputs - uses 4 PE-33008s
128 inputs with 80 single outputs and 48 dual outputs - uses 6 PE-33008s... etc.

In this application, the eight PE-33008 rear BNCs are used for inputs (outputs from the router) and all 32 of the front BNCs are used for outputs.[1] Up to 16 PE-33008 modules can be mounted in an MK-33000 Mounting Kit, which is 8 RU high and approximately 4 inches (100 mm) deep.

Figure 11 shows a 128 input router with two PE-33008 mounted in an MK-33000; this provides 112 single outputs and 16 quad outputs. A 256 input router with 128 single outputs and 128 quad outputs would appear similar to the system shown in Figure 10; this arrangement requires 16 PE-33008 Port Expanders.

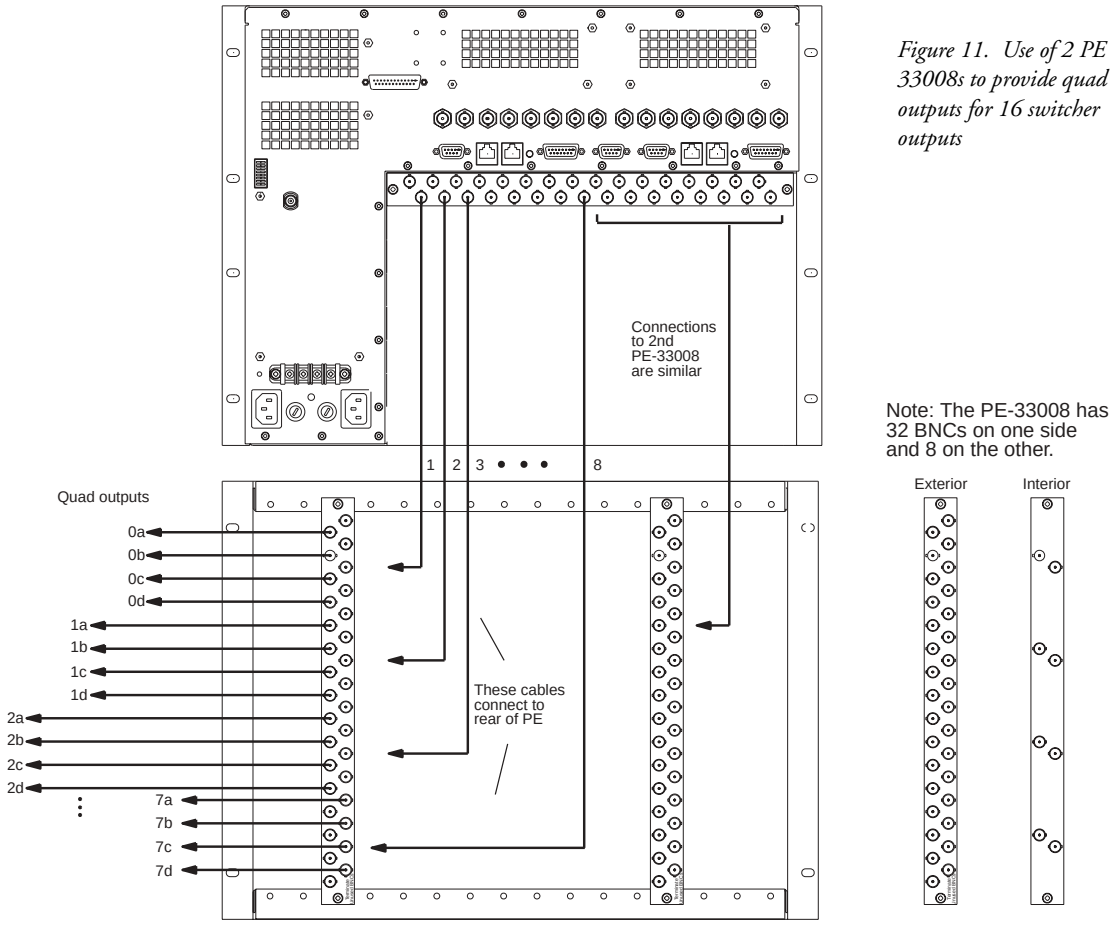


Figure 11. Use of 2 PE 33008s to provide quad outputs for 16 switcher outputs

1. All unused connectors must be terminated with 75 ohm terminators; for PE-33008 applications terminators must be supplied by end-user.

Expanded systems

The Trinix design realizes large routing systems without external, powered DAs. Passive port expanders are used to increase the number of inputs and outputs. Expanded configurations include:

1024 inputs x 512 dual outputs
512 inputs x 1024 outputs
1024 inputs x 1024 outputs
1024 inputs x 1024 dual outputs
2048 inputs x 2048 outputs

Some of these configurations are shown below. Notice that the same PE-30016 module type is used for both downstream combining (for input expansion) and upstream splitting (for output expansion). All outputs are non-inverting.

Figure 12. Examples of input and output expansion.

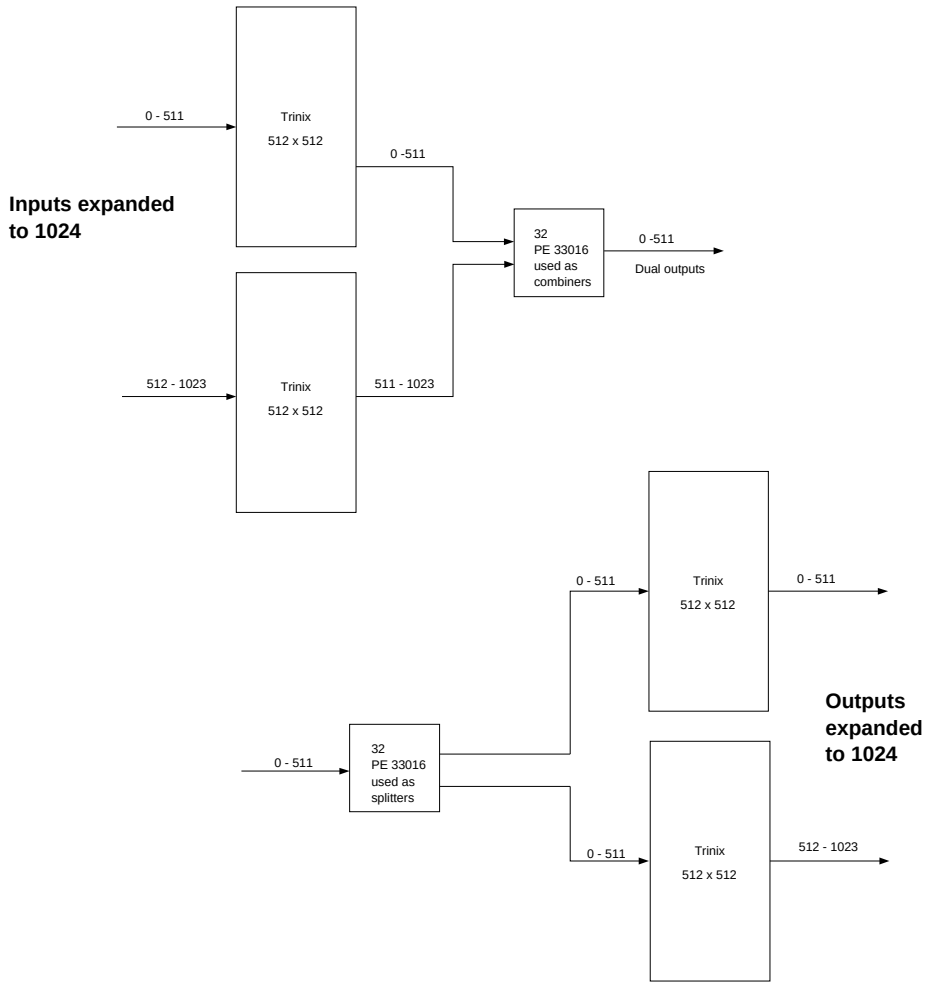
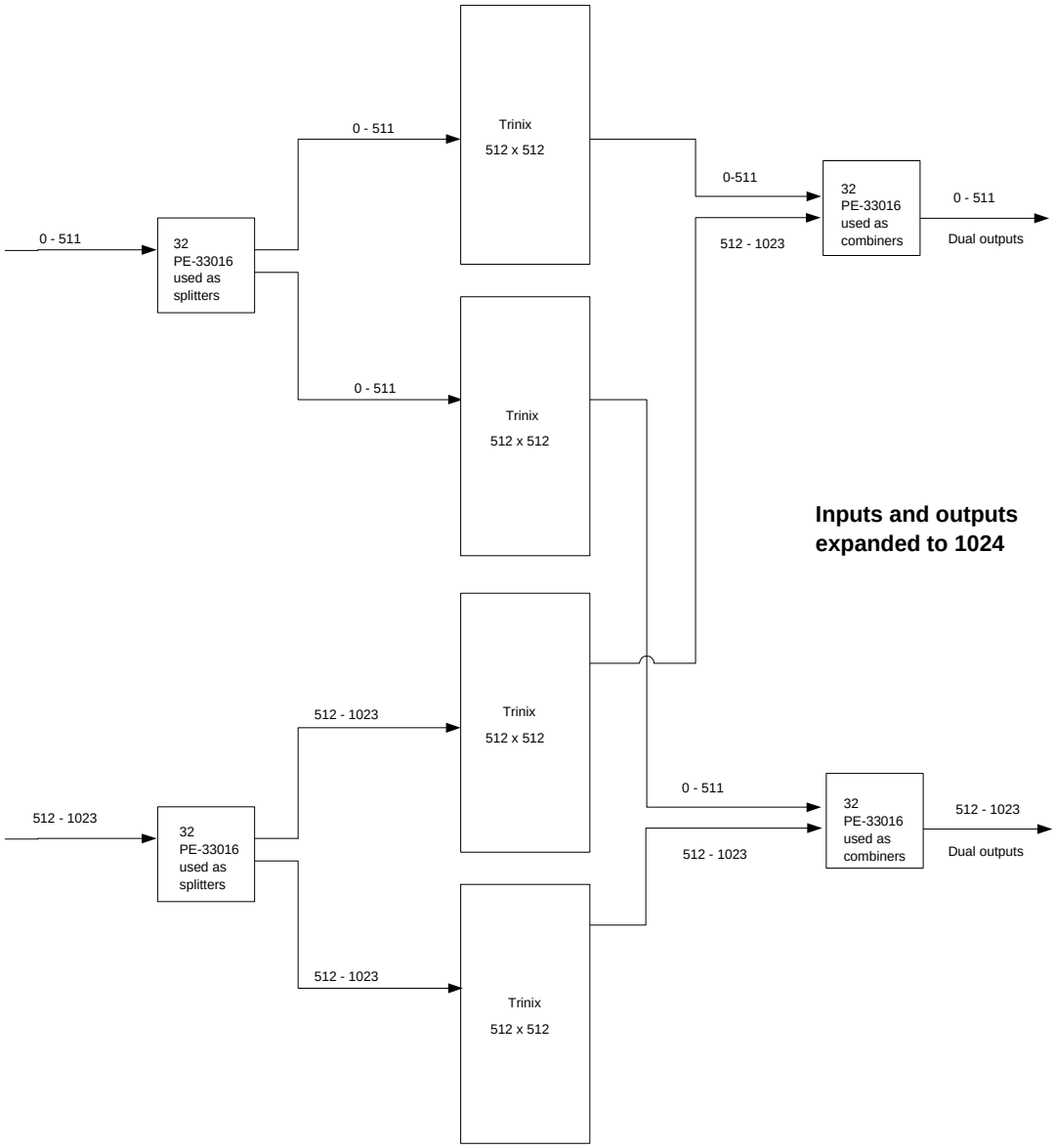


Figure 13. Input and output expansion to 1024.

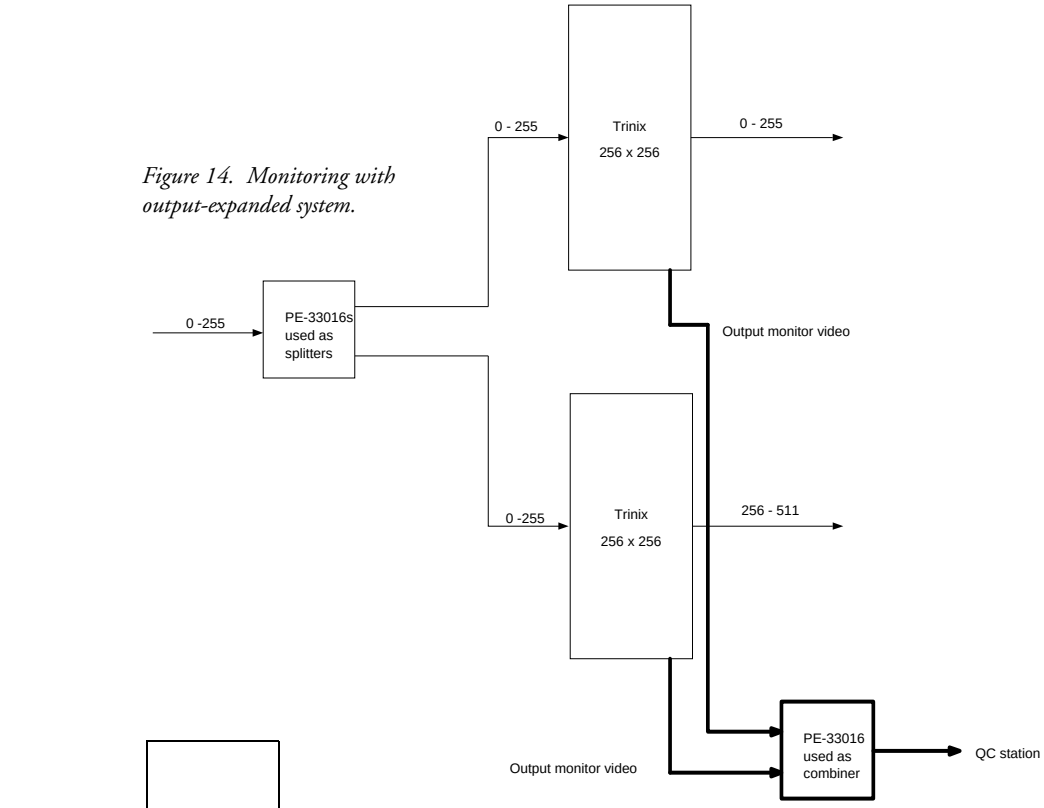


Monitoring with expanded systems

In expanded systems, output monitor signals must be brought through a combiner. An example of an output-expanded system in shown in Figure 14; an input-expanded system is shown in Figure 15.

Note Output monitoring is not available for input-expanded systems controlled by an SR-33000 Sync/OPM board

Figure 14. Monitoring with output-expanded system.



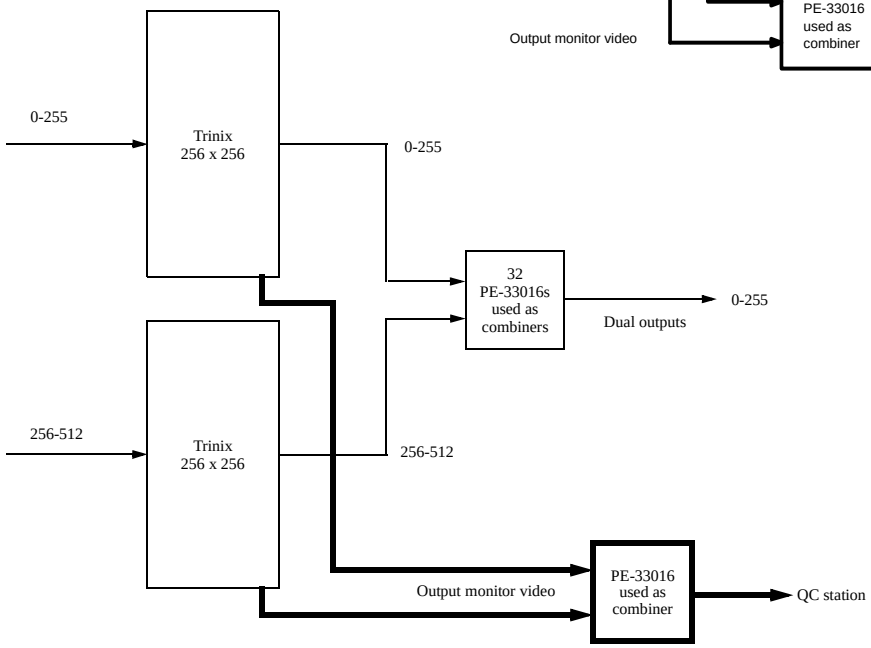


Figure 15. Monitoring with input-expanded systems.

Ordering information

Trinix routing systems are ordered as a base configuration, plus options. The following pages show the part numbers for ordering the base systems. The base systems are grouped together by chassis size: 128, 256 or 512. Also they are partitioned into SD and HD systems.

Order a base configuration by selecting a router matrix chassis size and its filled level. As an example, a 128 x 192 (256 x 256) SD system is F7-026020-030. From this point, you add to your order, the options desired.

Additional Video Signal Cards: Select the additional input, output, and matrix cards for spares or an additional level of signal routing. For example, you could add an HD input and output card for a level of HD to the example base configuration. (In the event that the original base configuration was a majority of HD signals, then you could select F7-026025-030 and then add additional SD input and output cards as options.)

Power Supplies: Add a redundant power supply and spare to your system configuration.

BL-33000 Broadlinx option (NR-33000 NIC/Sync/OPM board with software) - see page 43.

Additional SR-33000 Sync/OPM board - see page 43.

SR-33500 Sync/OPM board (DV-33512 units only) - see page 44.

Port Expanders: Add port expanders for dual and quad outputs as needed in groups of 16. One PE-33016 will provide dual outputs for 16 signals. Two PE-33008s will provide quad outputs for 16 signals.

Table 3. 128 chassis systems (SD).

SD matrix		**Single outputs**			
		32	64	96	128
	32	F7-026010-001	F7-026010-002	F7-026010-003	F7-026010-004
	64	F7-026010-005	F7-026010-006	F7-026010-007	F7-026010-008
Inputs	96	F7-026010-009	F7-026010-010	F7-026010-011	F7-026010-012
	128	F7-026010-013	F7-026010-014	F7-026010-015	F7-026010-016
	Size ->	**8 RU**	**8 RU**	**8 RU**	**8 RU**

Table 4. 128 chassis systems (HD)

HD matrix		Single outputs			
		32	64	96	128
	32	F7-026015-001	F7-026015-002	F7-026015-003	F7-026015-004
	64	F7-026015-005	F7-026015-006	F7-026015-007	F7-026015-008
Inputs	96	F7-026015-009	F7-026015-010	F7-026015-011	F7-026015-012
	128	F7-026015-013	F7-026015-014	F7-026015-015	F7-026015-016
	Size ->	**8 RU**	**8 RU**	**8 RU**	**8 RU**

Table 5. 256 chassis systems (SD).

SD matrix		Single outputs							
		32	64	96	128	160	192	224	256
	32	F7-026020-001	F7-026020-002	F7-026020-003	F7-026020-004	F7-026020-005	F7-026020-006	F7-026020-007	F7-026020-008
	64	F7-026020-009	F7-026020-010	F7-026020-011	F7-026020-012	F7-026020-013	F7-026020-014	F7-026020-015	F7-026020-016
	96	F7-026020-017	F7-026020-018	F7-026020-019	F7-026020-020	F7-026020-021	F7-026020-022	F7-026020-023	F7-026020-024
	128	F7-026020-025	F7-026020-026	F7-026020-027	F7-026020-028	F7-026020-029	F7-026020-030	F7-026020-031	F7-026020-032
Inputs	160	F7-026020-033	F7-026020-034	F7-026020-035	F7-026020-036	F7-026020-037	F7-026020-038	F7-026020-039	F7-026020-040
	192	F7-026020-041	F7-026020-042	F7-026020-043	F7-026020-044	F7-026020-045	F7-026020-046	F7-026020-047	F7-026020-048
	224	F7-026020-049	F7-026020-050	F7-026020-051	F7-026020-052	F7-026020-053	F7-026020-054	F7-026020-055	F7-026020-056
	256	F7-026020-057	F7-026020-058	F7-026020-059	F7-026020-060	F7-026020-061	F7-026020-062	F7-026020-063	F7-026020-064
	Size ->	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**

Table 6. 256 chassis systems, (HD).

HD matrix		Single outputs							
		32	64	96	128	160	192	224	256
	32	F7-026025-001	F7-026025-002	F7-026025-003	F7-026025-004	F7-026025-005	F7-026025-006	F7-026025-007	F7-026025-008
	64	F7-026025-009	F7-026025-010	F7-026025-011	F7-026025-012	F7-026025-013	F7-026025-014	F7-026025-015	F7-026025-016
	96	F7-026025-017	F7-026025-018	F7-026025-019	F7-026025-020	F7-026025-021	F7-026025-022	F7-026025-023	F7-026025-024
	128	F7-026025-025	F7-026025-026	F7-026025-027	F7-026025-028	F7-026025-029	F7-026025-030	F7-026025-031	F7-026025-032
Inputs	160	F7-026025-033	F7-026025-034	F7-026025-035	F7-026025-036	F7-026025-037	F7-026025-038	F7-026025-039	F7-026025-040
	192	F7-026025-041	F7-026025-042	F7-026025-043	F7-026025-044	F7-026025-045	F7-026025-046	F7-026025-047	F7-026025-048
	224	F7-026025-049	F7-026025-050	F7-026025-051	F7-026025-052	F7-026025-053	F7-026025-054	F7-026025-055	F7-026025-056
	256	F7-026025-057	F7-026025-058	F7-026025-059	F7-026025-060	F7-026025-061	F7-026025-062	F7-026025-063	F7-026025-064
	Size ->	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**	**15 RU**

Table 7. 512 chassis systems (SD).

SD matrix		Single outputs								
		256 (512)	288 (512)	320 (512)	352 (512)	384 (512)	416 (512)	448 (512)	480 (512)	512
	256 (512)	F7-026050-001	F7-026050-002	F7-026050-003	F7-026050-004	F7-026050-005	F7-026050-006	F7-026050-007	F7-026050-008	F7-026050-009
	288 (512)	F7-026050-010	F7-026050-011	F7-026050-012	F7-026050-013	F7-026050-014	F7-026050-015	F7-026050-016	F7-026050-017	F7-026050-018
	320 (512)	F7-026050-019	F7-026050-020	F7-026050-021	F7-026050-022	F7-026050-023	F7-026050-024	F7-026050-025	F7-026050-026	F7-026050-027
	352 (512)	F7-026050-028	F7-026050-029	F7-026050-030	F7-026050-031	F7-026050-032	F7-026050-033	F7-026050-034	F7-026050-035	F7-026050-036
Inputs	384 (512)	F7-026050-037	F7-026050-038	F7-026050-039	F7-026050-040	F7-026050-041	F7-026050-042	F7-026050-043	F7-026050-044	F7-026050-045
	416 (512)	F7-026050-046	F7-026050-047	F7-026050-048	F7-026050-049	F7-026050-050	F7-026050-051	F7-026050-052	F7-026050-053	F7-026050-054
	448 (512)	F7-026050-055	F7-026050-056	F7-026050-057	F7-026050-058	F7-026050-059	F7-026050-060	F7-026050-061	F7-026050-062	F7-026050-063
	480 (512)	F7-026050-064	F7-026050-065	F7-026050-066	F7-026050-067	F7-026050-068	F7-026050-069	F7-026050-070	F7-026050-071	F7-026050-072
	512	F7-026050-073	F7-026050-074	F7-026050-075	F7-026050-076	F7-026050-077	F7-026050-078	F7-026050-079	F7-026050-080	F7-026050-081
	Size ->	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**

Table 8. 512 chassis systems (HD)

HD matrix		Single outputs								
		256 (512)	288 (512)	320 (512)	352 (512)	384 (512)	416 (512)	448 (512)	480 (512)	512
	256 (512)	F7-026055-001	F7-026055-002	F7-026055-003	F7-026055-004	F7-026055-005	F7-026055-006	F7-026055-007	F7-026055-008	F7-026055-009
	288 (512)	F7-026055-010	F7-026055-011	F7-026055-012	F7-026055-013	F7-026055-014	F7-026055-015	F7-026055-016	F7-026055-017	F7-026055-018
	320 (512)	F7-026055-019	F7-026055-020	F7-026055-021	F7-026055-022	F7-026055-023	F7-026055-024	F7-026055-025	F7-026055-026	F7-026055-027
	352 (512)	F7-026055-028	F7-026055-029	F7-026055-030	F7-026055-031	F7-026055-032	F7-026055-033	F7-026055-034	F7-026055-035	F7-026055-036
Inputs	384 (512)	F7-026055-037	F7-026055-038	F7-026055-039	F7-026055-040	F7-026055-041	F7-026055-042	F7-026055-043	F7-026055-044	F7-026055-045
	416 (512)	F7-026055-046	F7-026055-047	F7-026055-048	F7-026055-049	F7-026055-050	F7-026055-051	F7-026055-052	F7-026055-053	F7-026055-054
	448 (512)	F7-026055-055	F7-026055-056	F7-026055-057	F7-026055-058	F7-026055-059	F7-026055-060	F7-026055-061	F7-026055-062	F7-026055-063
	480 (512)	F7-026055-064	F7-026055-065	F7-026055-066	F7-026055-067	F7-026055-068	F7-026055-069	F7-026055-070	F7-026055-071	F7-026055-072
	512	F7-026055-073	F7-026055-074	F7-026055-075	F7-026055-076	F7-026055-077	F7-026055-078	F7-026055-079	F7-026055-080	F7-026055-081
	Size ->	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**	**32 RU**

Ordering additional components

All circuit boards contain some common circuitry for hot swapping, circuitry for DC to DC conversion, and a micro-controller as part of the Broadlinx technology.

Hot swap circuitry is used to simplify field servicing and upgrades.

The DC to DC conversion is necessary because the chassis design distributes one voltage, 48 volts, to all cards leaving the responsibility to each card to convert down to the needed voltage level.

Each board has a micro-controller that is part of an overall communications bus which is part of the hardware for the Broadlinx technology. This hardware is what gathers all of the particular board information (voltages, signal presence, reclocking settings, etc.) as well as enables the firmware updates via network connection.

Input boards

SI-33110 **F7-026000-012**

The SI-33110 is a 32-input board supporting data rates of 3 to 540 Mbps with input equalization of 300 m for Belden 8281 or equivalent cable. A "gain cell" is included on this board to be used in conjunction with the port expanders in order to create multi-chassis routers.

HI-33110 **F7-026000-011**

The HI-33110 is a 32-input board supporting data rates of 3 Mbps to 1.485 Gbps with in put equalization of 100 m for Belden 1694A or equivalent cable. A "gain cell" is included on this board to be used in conjunction with the port expanders in order to create multi-chassis routers.

Output boards

SO- 33110 **F7-026000-014**

The SO-33110 is a 32-output board with no reclocking. A "gain cell" is included on this board to be used in conjunction with the port expanders in order to create multi-chassis routers as well as dual or quad outputs. A switch is included to select one of four synchronizing inputs.

HO- 33110 **F7-026000-013**

The HO-33110 is a 32-output board with selectable reclocking. Each output can be set for Auto Detect "ON" or "OFF." When Auto Detect is ON the signal will be checked to see if it is HD or SD; if HD, the signal will be reclocked; if SD, it will be bypassed. When Auto Detect is OFF the output signal is never reclocked. A "gain cell" is included on this board to be used in conjunction with the port expanders in order to create multi-chassis routers as well as dual or quad outputs. A switch is included to select one of four synchronizing inputs.

Matrix boards

DM-33100 **F7-026000-007**

The DM-33100 128 x 128 Data Matrix board contains 32 instantiations of a 32 x 16 cross point IC. It handles both SD and HD data rates and is used in both the 128 and 256 chassis. It has a memory refresh circuit which is used to keep the configuration of the crosspoints in the event of some power interruption to the controlling element. One card is needed for all configurations in the 128 chassis and 1, 2, or 4 are needed for the 256 chassis depending on the needed matrix size.

DM-33500 **F7-026000-032**

The DM-33500, a 256 x 256 matrix board used in the Trinix 512 chassis, features a low power, compact, highly reliable design. This module consists of two circuit boards interconnected, each with a 256 x 128 matrix function. The matrix board uses redundant power-conditioning circuitry and 144 x 144 crosspoint ICs (used as 128 x 128) each with its own control circuit. A 512-chassis, fully stuffed to 512 x 512 inputs and outputs, requires four of these modules.

NR-33000 NIC/Sync/OPM board

See BL-33000 Broadlinx option.

BL-33000 Broadlinx option

BL-33000 F7-026000-043

The BL-33000 Broadlinx option, which consists of one NR-33000 NIC/Sync/OPM board and associated software, combines synchronization, network interface, and output monitoring functions.

Sync Functions: The BL-33000 includes two sync-reference inputs, which can be NTSC, PAL or Tri-level inputs.

NIC Functions: The NIC (Network Interface Controller) functions include the network connection as well as a powerful computing element that is the heart of the Broadlinx hardware. This controller communicates with the internal micro-controllers within the Trinix chassis as well as with the outside world via the network connection. The NIC is a 10/100 connection that will communicate via HTTP or (in future) SNMP protocols.

Output Monitor: The BL-33000 provides output monitoring for DV-33128 and DV-33256 systems. Two output monitor ports are included, each with an inverted and non-inverted output. (These output monitor ports are not available when the NR-33000 is installed in a DV-33512 chassis. DV-33512 monitoring is provided by the SR-33500 board, described below.)

Adding a second BL-33000 provides two extra sync inputs,[1] two extra output monitor ports, and redundant Broadlinx functionality.

SR-33000 Sync Reference / Output Monitor (OPM) board

SR-33000 F7-026000-024

Sync functions: This board includes two looping sync-reference 75 ohm BNC inputs which can be NTSC, PAL or Tri-level inputs.

[1.] Although a DV-33512 chassis may include SR-33000 and NR-33000 boards (each with two sync inputs), and an SR-33500 board (with four sync inputs), the maximum number of usable sync inputs for any Trinix chassis remains four.

Output monitor: The SR-33000 provides output monitoring for DV-33128 and DV-33256 systems. Two output monitor ports are included, each with an inverted and non-inverted output.(These output monitor ports are not available when the SR-33000 is installed in a DV-33512 chassis. DV-33512 monitoring is provided by the SR-33500 board.)

Adding a second sync reference board provides two extra sync inputs[1] and two extra output monitor ports. Although it can be used in the primary or secondary reference card slot, the SR-33000 is generally used in the secondary slot to provide additional sync sources, and/or provide additional monitor outputs beyond those provided by an NR-33000 NIC/Sync/OPM board.

SR-33500 Sync Reference / Output Monitor (OPM) board

SR-33500 F7-026000-031

This board is used in DV-33512 units only.

Sync functions: The SR-33500 includes four looping sync-reference 75 ohm BNC inputs which can be NTSC, PAL or Tri-level inputs.

Output monitor: Four output monitor ports are included, each with an inverted and non-inverted output.

Broadlinx capability can be added by installing an BL-33000 Broadlinx option in the associated power supply chassis.[1]

Port expanders

MK-33000 F7-026000-028

The MK-33000 Mounting Kit, which accommodates up to 16 port expander modules, is eight rack units high and approximately 4 inches deep.

PE-33008 F7-026000-027

The PE-33008 is a 4 x 1 expander module that has eight BNC connectors on one side and 32 on the other. This unit is bi-directional and can be used as a 4 to 1 combiner or a 1 to 4 splitter. One or many of these can be installed as the need requires. Using this as an output splitter makes quad outputs for eight outputs at a time. A fully stuffed mounting kit holds 16 of these modules to give 128 to 512 BNC connections. All unused connectors must be terminated with 75 ohm BNC terminators (not supplied by Thomson).

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1. Although a DV-33512 chassis may include SR-33000 and NR-33000 boards (each with two sync inputs), and an SR-33500 board (with four sync inputs), the maximum number of usable sync inputs for any Trinix chassis remains four.

PE- 33016 F7-026000-026

The PE-33016 is a expander module that has 32 connectors on one side and 32 on the other. This unit is bi-directional and can be used as a 2 to 1 combiner (with dual outputs) or a 1 to 2 splitter. One or many of these can be installed as the need requires. Using this as an out put splitter provides dual outputs (non-inverting) for 16 outputs at a time. A fully stuffed MK-33000 Mounting Kit holds 16 of these modules to give 256 to 512 BNC connections. Since no application uses more than 48 connectors, each PE-33016 is supplied with 16 BNC 75 ohm terminators. Additional connectors, if needed, must be provided by the end-user.

Crosspoint Bus Buffer

CB 3000B F7-029500-508

Provides eight additional crosspoint bus outputs. 1 RU. 110/220 VAC. A CB 3000 is required in the following cases:

- DV-33128 systems with eight or more chassis
- DV-33256 systems with four or more chassis
- DV-33512 systems with two or more chassis

Crosspoint Bus Terminator

Included with all systems. Part number: 01-053050-001.

Section 3

Installation

Summary of installation procedure

The following is a summary of the steps needed for installation of the Trinix Routing Switcher System. Additional details may be found elsewhere in this manual as indicated.

1. Before unpacking the equipment, inspect the shipping carton for evidence of freight damage. After unpacking carefully inspect all equipment for freight damage.

   If the contents have been damaged, notify the carrier and Thomson (see page 9 for contact information). Retain all shipping cartons and padding material for inspection by the carrier.

   Do not return damaged merchandise to Thomson until an appropriate claim has been filed with the carrier and a material return authorization number has been received from Thomson.

2. If the switcher is received without a rack, it should be mounted in a 19-inch wide frame or other suitable enclosure that provides power and cooling facilities for the equipment.

   a. It may be necessary to install special rack spacers so that the switcher's access door can be opened far enough to permit removal of components on the right side of the chassis (such as power supply modules). The spacers, which are available on request, should only be installed when the rack's mounting holes are recessed more than 0.6 inch (15.2 mm) from the front surface of the rack. For more information, see page 51.

   b. Some switchers are supplied with PE-33016 Port Expanders, which depending on the configuration can be used to provide dual outputs, quad outputs, input expansion, output expansion, and multi-chassis output monitoring. For illustrations of port expander applications, see page 32.

   c. Power requirements are shown on page 30.

   d. Environmental limits are shown on page 31.

3. Power supplies are factory-installed and auto-sensing. No field adjustment should be necessary.

   Power supplies for 512 x 512 (DV-33512) switchers are mounted in a separate chassis and require cabling (supplied) from the "DC Output" connector of the power supply chassis to the "DC Input" connector of the switcher chassis.

   For additional power supply information, see page 59.

4. For 512 x 512 (DV-33512) switchers:

CAUTION In order to avoid damaging the switcher, power must be Off before installing the "IFC" cables as described in the following step.

   a. Install the "IFC" cables (supplied) between (1) the power supply chassis and main chassis, and (2) between the main chassis center section and the fan module section.

      For an illustration, see page 56.

   b. If the power supply chassis is equipped with an NR-33000 Broadlinx board, install a Cat 5E twisted pair enhanced LAN cable between the power supply chassis Com Bus connector associated with the NR board and one of the main chassis Com Bus connectors.

      For an illustration, see page 57.

5. If the system is supplied with PE-33016 Port Expanders, check the input/output expansion DIP switches and jumpers for correct position.

   These switches and jumpers are normally set at the factory based on the configuration shown in the sales order. For more information, see page 70.

6. On High Definition switchers, signal reclocking can be set to "Auto On/Off" or "Off" for each of the 32 outputs. The factory default setting is "Auto On/Off," meaning that signals will be auto-sensed; HD signals will be reclocked and Standard Definition signals will not. See page 74 for details.

   SD switchers do not include reclocking.

7. Make sure all cards are all seated in their backplane sockets.

   This should not normally be an issue since the boards are held in place with locking extractors.

8. Connect the desired input and output video cables.

   To permit proper vertical interval switching, the inputs must be aligned within plus/ minus 1/4 line with respect to the reference signal.

   The use of 75 ohm BNC connectors (rather than 50 ohm) is recommended for HDTV applications.

   If the system includes port expanders, all unused BNC connectors must be terminated with 75 ohm terminators.

9. Connect the appropriate house reference signal(s).

DV-33128 and DV-33256 switchers can be equipped with an BL-33000 Broadlinx option (NR-33000 NIC/Sync/OPM board plus software) or an SR-33000 Sync Reference / Output Monitor (OPM) board. The SR-33000 is similar in functionality to the NR-33000 but does not provide network connectivity for status monitoring via BroadLinx software. In addition to the primary SR/NR a secondary SR/NR board can be installed as an option; this will provide two additional sync inputs and an additional two monitor outputs. The two additional sync inputs can be used to provide two additional independent sync inputs to the system.

DV-33512 switchers include a dedicated sync/OPM board, model SR-33500, that is mounted within the main chassis (accessible from the rear). The SR-33500 provides four looping sync inputs and four dual monitoring ports. An NR-33000 board can be added as an option to the power supply chassis in order to provide Broadlinx network functionality; however, when both an NR-33000 and an SR-33500 are installed the NR-33000 will have priority with respect to sync reference. If the NR-33500 is installed in the primary slot (and there is no board in the secondary slot) then the NR-33000 will provide sync reference 1 and 2 and the SR-33500 will provide sync reference 3 and 4. If the NR-33000 is installed in the secondary slot, (and there is no board in the primary slot), then the NR-33000 will provide sync reference 3 and 4 and the SR-33500 will provide sync reference 1 and 2. If there are 2 NR-33000s installed (for Broadlinx redundancy) then all four sync references will come from the NR-33000s. In all cases the system is limited to no more than four sync sources. Monitor outputs will always come from the SR-33500 if one is present.

All versions of the SR/NR boards can use a reference signal to provide vertical interval switching between synchronous inputs. The reference signal is connected to the “Ref In” connector on the rear panel. In most cases, the reference should be connected to the “Primary Ref In 1” input. For an illustration of the rear panel connectors, see page 53 (128 x 128); page 55 (256 x 256); or page 57 (512 x 512).

Video standard (NTSC/PAL/HDTV) operation is auto-detected by the system.

The switch point is factory-set to the recommended video line for the standard being used. A V-phasing feature, available with the NR-33000, SR-33000 with Rev B FPGA Software Update, and SR-33500 allows the user to adjust the switch point from -1 line to +2.5 lines if necessary. For more information, see “V-Phasing” on page 63.

The SR/NR accepts standard video, black burst, 2 V Composite Sync or 4 V Composite Sync as its input signal. If a loop through is not used, the loop BNC must have a 75 ohm termination.

Up to four separate sync sources can be selected on the video output boards with on-board DIP switches. In most cases, they will be factory-set to use the “Sync 1” bus, which corresponds to the “Primary Ref IN 1” connector on the rear panel.

For additional information concerning the SR/NR modules and other sync issues, see page 62 and following.

10. If output monitoring is required, refer to the installation instructions starting on page 76.

11. For information about control system connections, Level settings, and Frame settings, see page 83.

12. Connections for the BroadLinx system are shown on page 92.

Note The Broadlinx board should be powered up (or rebooted) after all network connections have been made. Otherwise the board may fail to boot properly.

13. The alarm system monitors each of the power supply outputs, the cooling fan operation, and the Board Alarm line.

A fault at any of these points causes the front panel indicator to turn red and activates the rear panel SMPTE 269M-1999 alarm BNC connector.

14. Power up the system by connecting the AC power cords. If the LED on the front panel turns to green after the first few seconds of operation, the system is operating properly. If the LED continues to glow red, remove power and diagnose the problem before powering up the system again. For an explanation of LED alarm lights, see page 109.

CAUTION For DV-33512 switchers: In order to avoid damage, power must be Off before removing/installing the “IFC” cables.

15. Keep the front door closed as much as possible when the system is running.

Note The front door should be closed during normal operation. Although the Trinix switcher will function properly with the door open, leaving the chassis open on a consistent basis will result in shortened product life.

Figure 16. Installation of rack spacers (when needed).

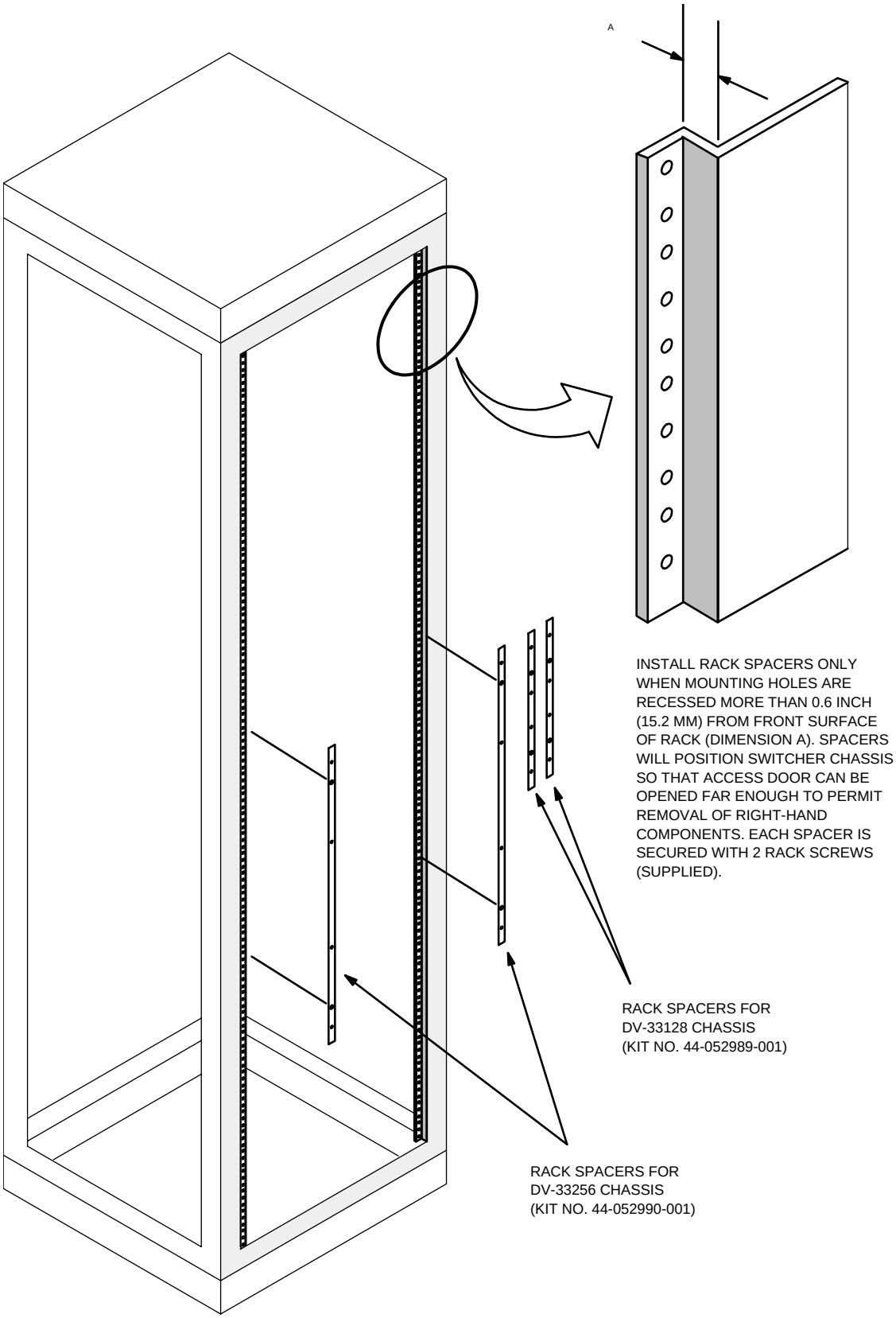


Figure 17. DV-33128 front view (door removed).

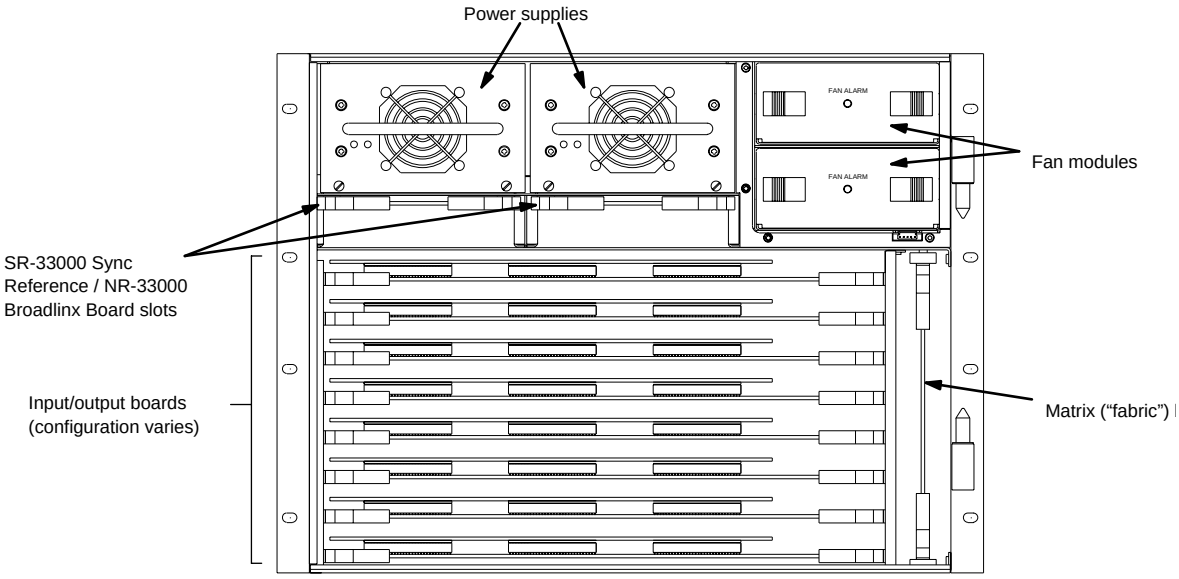


Figure 18. DV-33128 rear panel

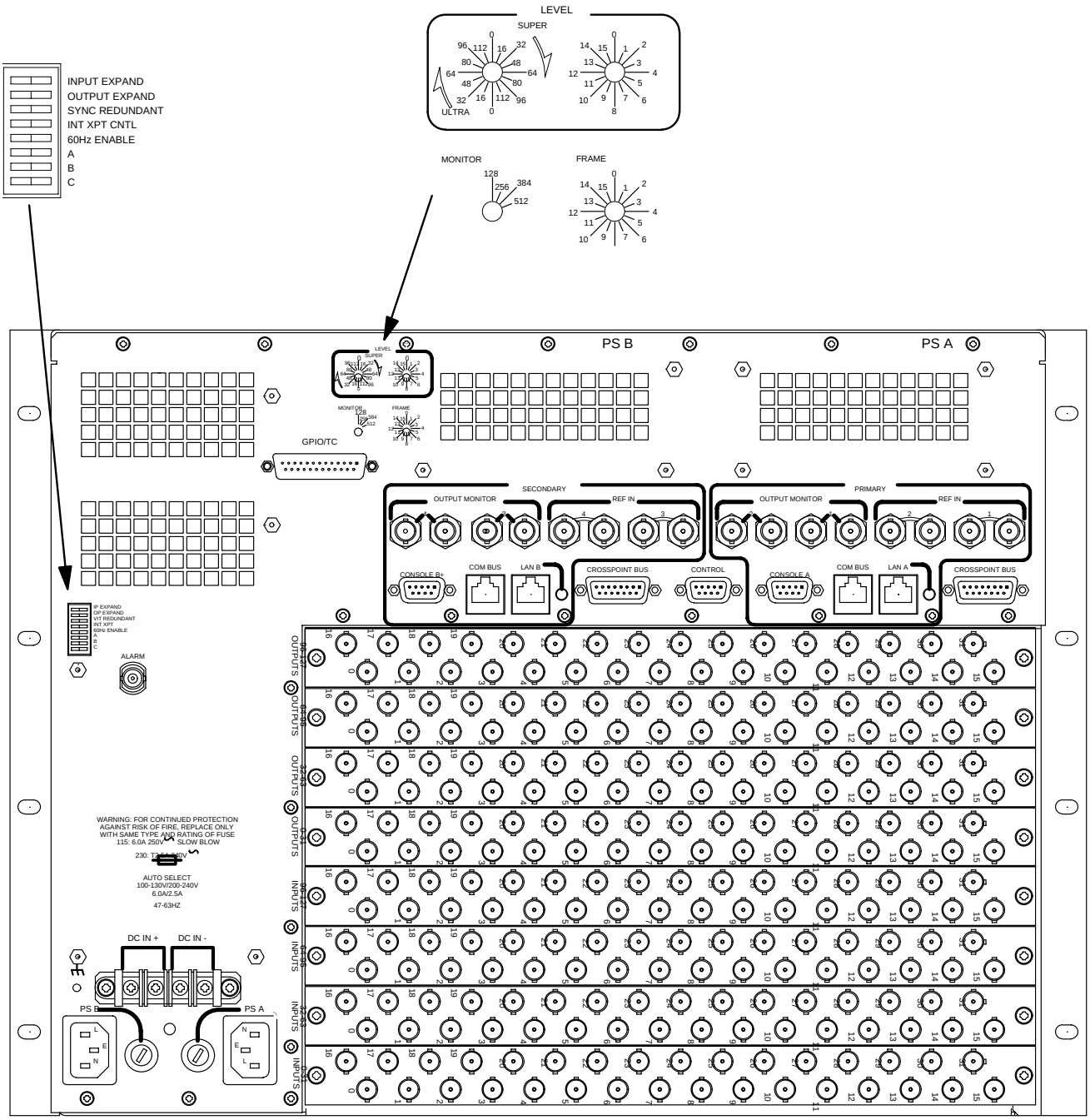


Figure 19. DV-33256 front view (door removed).

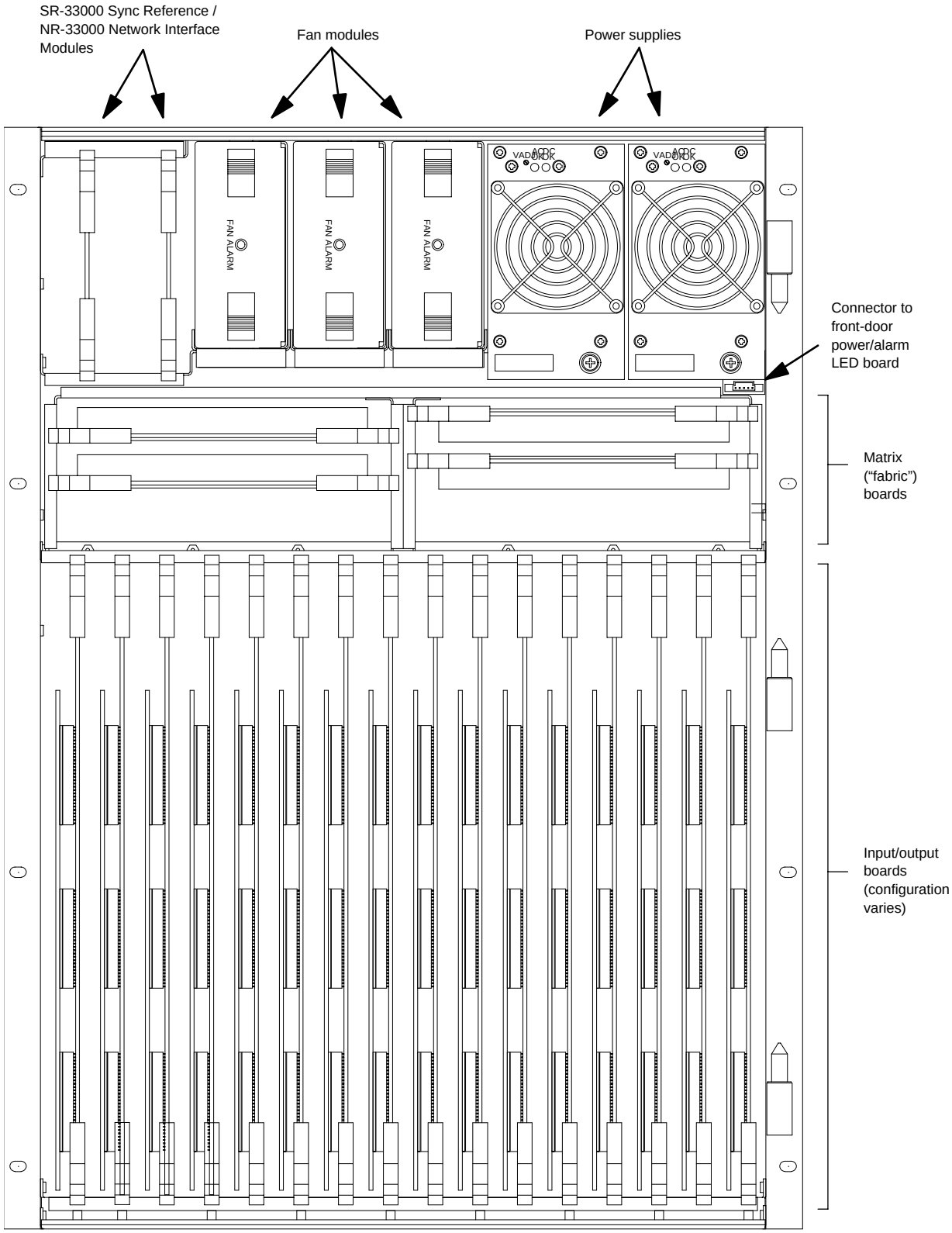


Figure 20. DV-33256 rear panel

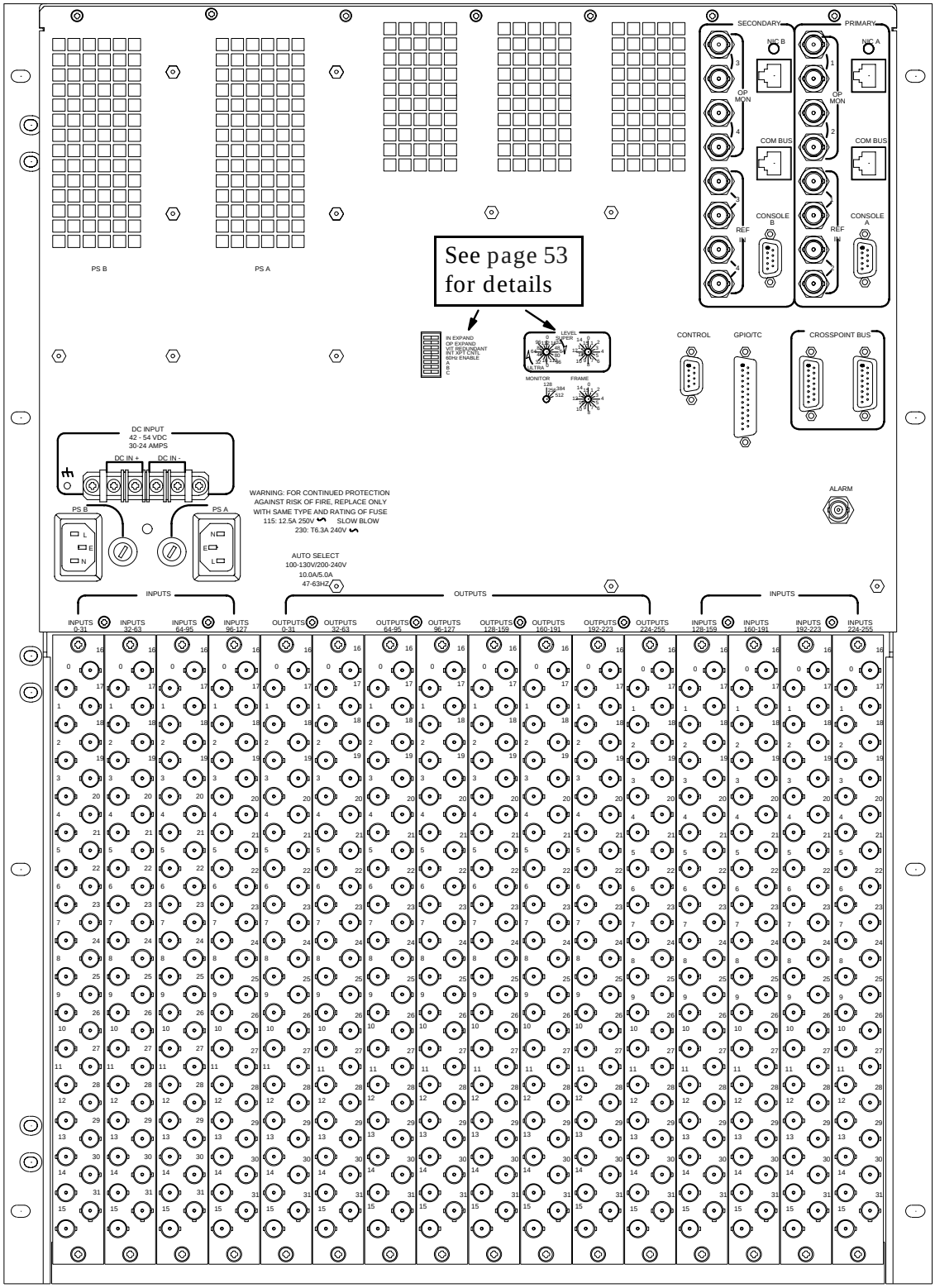


Figure 21. DV-33512 main chassis and associated power supply unit

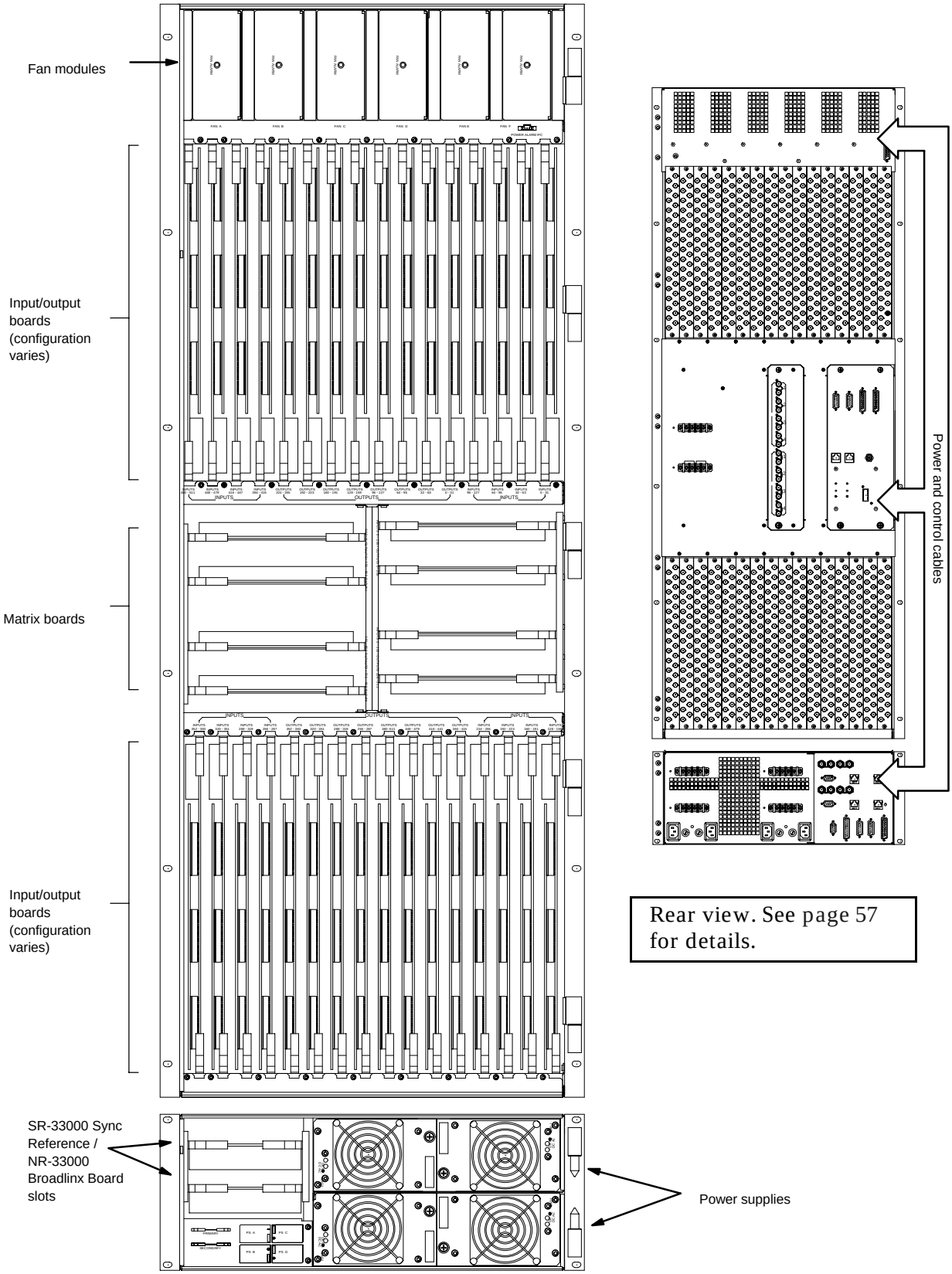
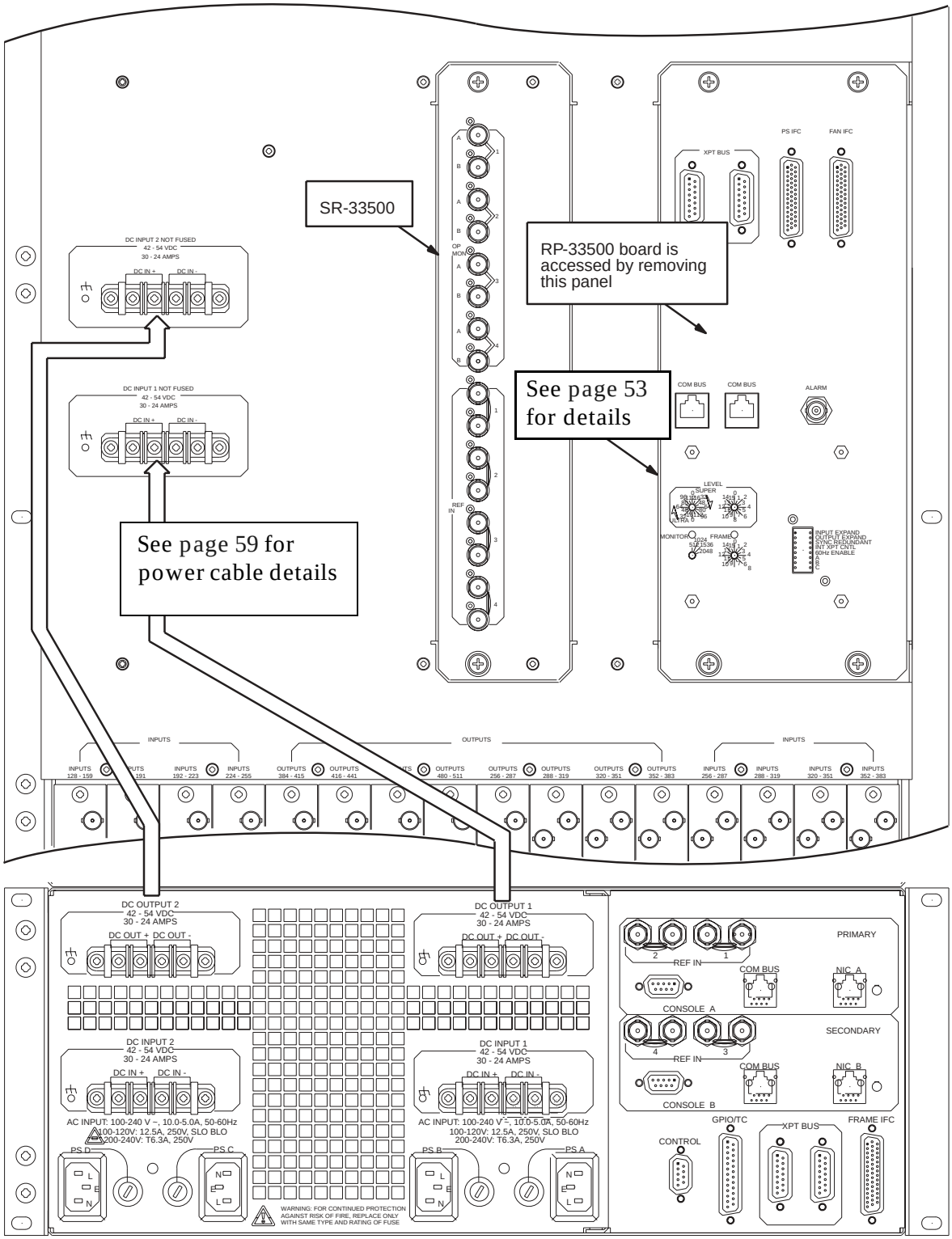
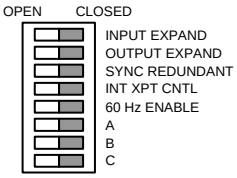


Figure 22. DV-33512 main chassis and power supply chassis connections.



Rear panel dip switch settings



Input/Output expand

See page 70.

Sync redundant

This switch is reserved for future use.

Internal xpt (crosspoint) control

This switch enables the NR-33000 board to drive the crosspoint bus.

60 Hz Enable switch

This switch is reserved for future use.

A B C switches

The “B” switch is used for output-monitor-expanded systems where output monitor signals are brought through a combiner. See page 82.

The “A” and “C” switches are reserved for future use.

Miscellaneous rear panel connectors

GPIO/TC - General Purpose / Time Code connector

This connector is reserved for future use.

Console A & B connectors

The Console A connector is presently used to download software upgrades to the NR/SR control boards (see page 89). The Console B connector is reserved for future use.

Control connector

This connector is reserved for future use.

Power supply notes

Power supply specifications are shown on page 30.

Ventilation is critical for Trinix power supplies, which should not be run with the fan not working. (If the supply begins to overheat it will shut itself off automatically to prevent damage.) The use of redundant power supplies is highly recommended.

DV-33128 and DV-33256 chassis installations

AC applications

Power supplies are factory-installed and designed to be hot-swappable.

Note Fuses must be selected and installed as appropriate for mains voltage.

For systems with only one power supply, SR/NR-33000 sync card(s) jumper JN2 must be set to "DC," otherwise the red "PALARM" LED on the front edge of the SR/NR(s) will remain on. If a redundant power supply is installed at a later time, JN2 must be moved to "AC." See page 68.

DC applications

Connect the DC Input connector to a DC source.

Note **For DC applications fusing *must* be provided externally, in accordance with local electrical regulations.** DC input specifications and characteristics for the Trinix are shown on page 31.

Check to see that the SR/NR-33000 sync card(s) have jumper JN2 set to "DC." See page 68.

Simultaneous AC and DC applications

It is possible to connect both AC and DC power sources as part of a system redundancy scheme. In this case, refer to the AC and DC notes above. SR/NR-33000 jumper JN2 should be set to "AC."

DV-33512 chassis installation

AC applications

Power supply modules for 512 x 512 switchers are mounted in a separate chassis and re quire cabling (supplied) from the "DC Output 1" connector of the power supply chassis to the "DC Input 1" connector of the switcher chassis; and from "DC Output 2" to "DC Input 2."

CAUTION Do not cross these cables. Output 1 *must* go to Input 1 and Output 2 to Input 2 in order for the alarm system to operate properly.

Pinouts are shown on.page 61. An illustration of the power connectors is shown on page 57.

The power supply modules are factory-installed and designed to be hot-swappable.

Note Fuses must be selected and installed as appropriate for mains voltage.

For systems with only one power supply, RP-33500 rear panel card jumper JN1 must be set to "DC," otherwise the Alarm LED on the chassis front panel will remain on. If a redundant power supply is installed at a later time, JN1 must be moved to "AC." For the location of the RP-33500 board, see page 57.

DC applications

In DC applications, the DV-33512 may or may not include a separate power supply chassis.

When a separate power supply chassis is used:

1. Connect the DC source to the DC Input 1 and DC Input 2 connectors of the PS chassis.
2. Use the supplied cables to connect the DC Output 1 and 2 connectors of the PS chassis to the DC Input 1 and DC Input 2 connectors of the main chassis. Pinouts are shown on page 61.

CAUTION Do not cross these cables. Output 1 *must* go to Input 1 and Output 2 to Input 2 in order for the alarm system to operate properly.

When there is no PS chassis, connect the DC source directly to the DC Input 1 and DC Input 2 connectors of the main chassis.

Note **For DC applications fusing *must* be provided externally, in accordance with local electrical regulations.** DC input specifications and characteristics for the Trinix are shown on page 31.

An illustration of the power connectors is shown on page 57.

Check to see that the RP-33500 rear panel card has jumper JN1 set to "DC." For the location of the RP-33500 board, see page 57.

Simultaneous AC and DC applications

It is possible to connect both AC and DC power sources as part of a system redundancy scheme. In this case, refer to the AC and DC notes above. RP-33500 jumper JN1 should be set to "AC."

Table 9. DV-33512 DC power cord pinouts.

Power supply connector	Cable description	Main chassis connector
⏚ (Ground)	Yellow/green	⏚ (Ground)
	Plain black	
DC Out + (left)	1 (red)	DC In + (left)
DC Out + (right)	2 (blue)	DC In + (right)
DC Out - (left)	3 (white)	DC In - (left)
DC Out - (right)	4 (yellow)	DC In - (right)

NR/SR-33000 / SR-33500 Sync modules

The SR-33000 Sync Reference / OPM board, the NR-33000 NIC/Sync/OPM board, or (in DV-33512 units) the SR-33500 Sync Reference board can be used to lock the system to reference sync. The modules accept standard video, black burst, 2 V Composite Sync or 4 V Composite Sync as the input signal.

NR/SR-33000 Single sync module installation

Each NR/SR-33000 module has two completely independent channels, which may be used to provide two different standards such as NTSC and PAL. As another example, they could provide a nominally timed and an advanced or delayed switch point from the same sync input looped through both channels.

Reference sync or video is looped through the REF IN connections on the module. If a loop through is not used, the loop BNC should have a 75 ohm termination. For an illustration of the rear panel connectors, see page 53 (128 x 128); page 55 (256 x 256); or page 57 (512 x 512).

DIP switch S5 on the Output cards select which Sync line a group of outputs will use:

Figure 23.

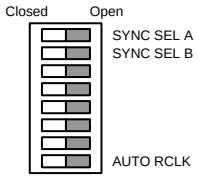


Table 10.

Sync line	Sync Sel A switch	Sync Sel B switch
1	Closed	Closed
2	Open	Closed

NR/SR-33000 Dual sync module installation

Two NR/SR-33000 modules can be installed in one chassis, providing a total of four sync sources. DIP switch S5 on the Output cards select which Sync line a group of outputs will use:

Table 11.

Sync line	Sync Sel A switch	Sync Sel B switch
1	Closed	Closed
2	Open	Closed
3	Closed	Open
4	Open	Open

SR-33500 Installation

With the DV-33512 chassis, a SR-33500 Sync/OPM board can be used to provide four sync inputs and four monitor outputs. DIP switch S5 on the Output cards select which Sync line a group of outputs will use. See Table 11.

Note For all three Trinix chassis types, the maximum number of sync inputs is four.

V-phasing

A V-phasing feature, available with the NR-33000, SR-33000 with Rev B FPGA Software Update, and SR-33500 allows the user to adjust the switch point from -1 line to +2.5 lines relative to the nominal switch point for the video standard being used. This is accomplished with NR-33000 DIP switch S3 (shown on page 67), SR-33000 DIP switch S2 (shown on page 68), or SR-33500 DIP switches S102/S103 (shown on page 69).

The switches that provide adjustment relative to Reference A ("Reference 1" on SR-33500) are shown in Table 12. For SR-33000, "On" = switch closed.

Table 12. Switch point shift for signals referenced to Ref A / Ref 1

Switch point relative to Ref. A ("Ref 1" on SR-33500)	NR: S3-1 SR-33000: S2-1 SR-33500: S101-1	NR: S3-2 SR-33000: S2-2 SR-33500: S101-2	NR: S3-3 SR-33000: S2-3 SR-33500: S101-3
-1.0 line	On	On	On
-0.5 line	Off	On	On

Coincident **(default)**	On	Off	On
+0.5 line	Off	Off	On
+1.0 line	On	On	Off
+1.5 line	Off	On	Off
+2.0 line	On	Off	Off
+2.5 line	Off	Off	Off

The switches that provide adjustment relative to Reference B (“Reference 2” on SR-33500) are shown in Table 13. For SR-33000, “On” = switch closed.

Table 13. Switch point shift for signals referenced to Ref B / Ref2

Switch point relative to Ref. B (“Ref 2” on SR-33500)	**NR: S3-4 SR-33000: S2-4 SR-33500: S101-4**	**NR: S3-5 SR-33000: S2-5 SR-33500: S101-5**	**NR: S3-6 SR-33000: S2-6 SR-33500: S101-6**
-1.0 line	On	On	On
-0.5 line	Off	On	On
Coincident **(default)**	On	Off	On
+0.5 line	Off	Off	On
+1.0 line	On	On	Off
+1.5 line	Off	On	Off
+2.0 line	On	Off	Off
+2.5 line	Off	Off	Off

The switches that provide adjustment relative to SR-33500 Reference 3 are shown in Table 14.

Table 14. Switch point shift for signals referenced to Ref 3.

Switch point relative to Ref. 3	SR-33500: S102-1	SR-33500: S102-2	SR-33500: S102-3
-1.0 line	On	On	On
-0.5 line	Off	On	On
Coincident **(default)**	On	Off	On
+0.5 line	Off	Off	On
+1.0 line	On	On	Off
+1.5 line	Off	On	Off
+2.0 line	On	Off	Off
+2.5 line	Off	Off	Off

The switches that provide adjustment relative to SR-33500 Reference 4 are shown in Table 15.

Table 15. Switch point shift for signals referenced to Ref 4.

Switch point relative to Ref. 4	SR-33500: S102-4	SR-33500: S102-4	SR-33500: S102-4
-1.0 line	On	On	On
-0.5 line	Off	On	On
Coincident **(default)**	On	Off	On
+0.5 line	Off	Off	On
+1.0 line	On	On	Off
+1.5 line	Off	On	Off
+2.0 line	On	Off	Off
+2.5 line	Off	Off	Off

Figure 24. NR-33000 NIC/Sync/OPM board

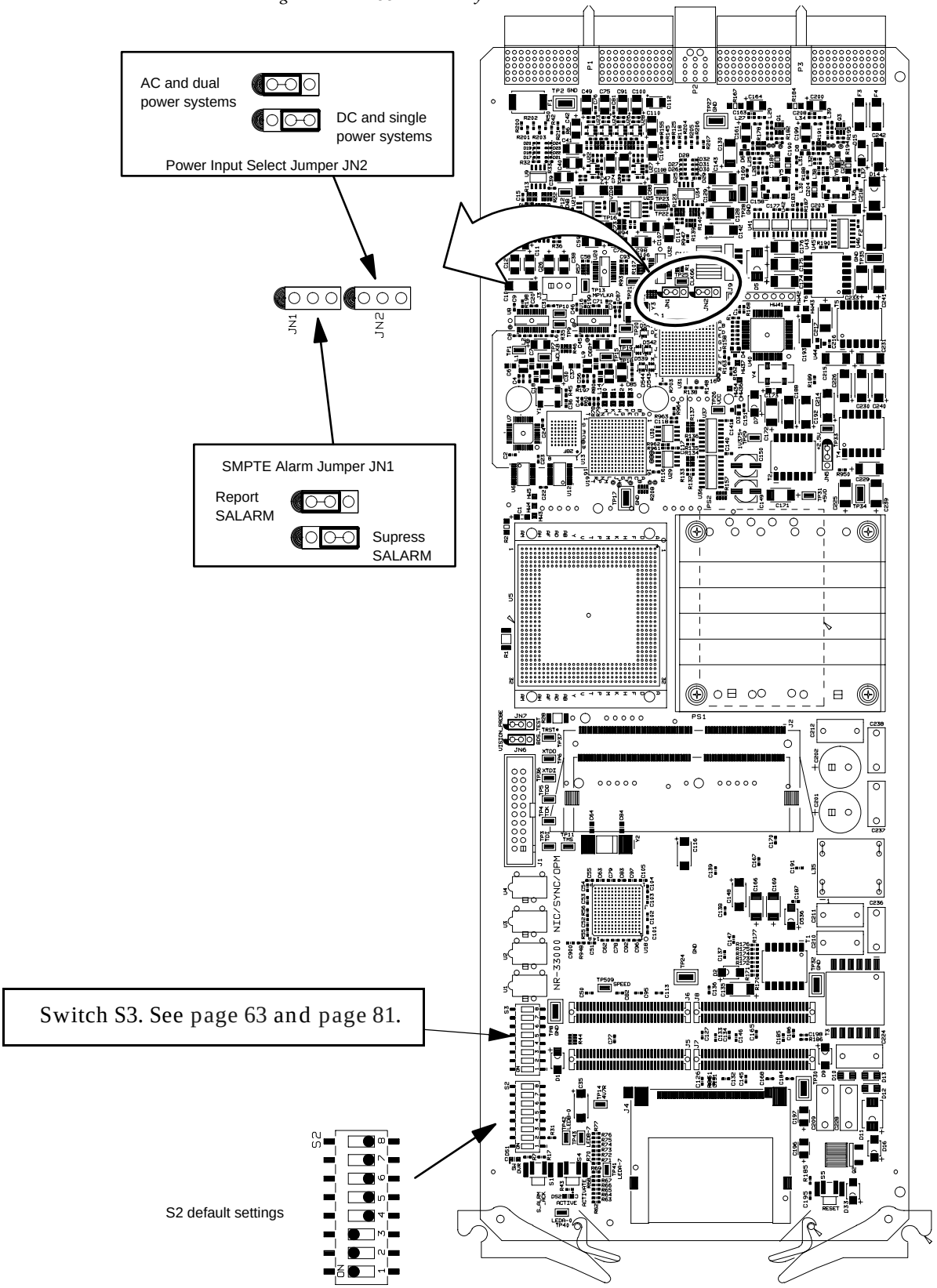


Figure 25. SR-33000 Sync/OPM reference card

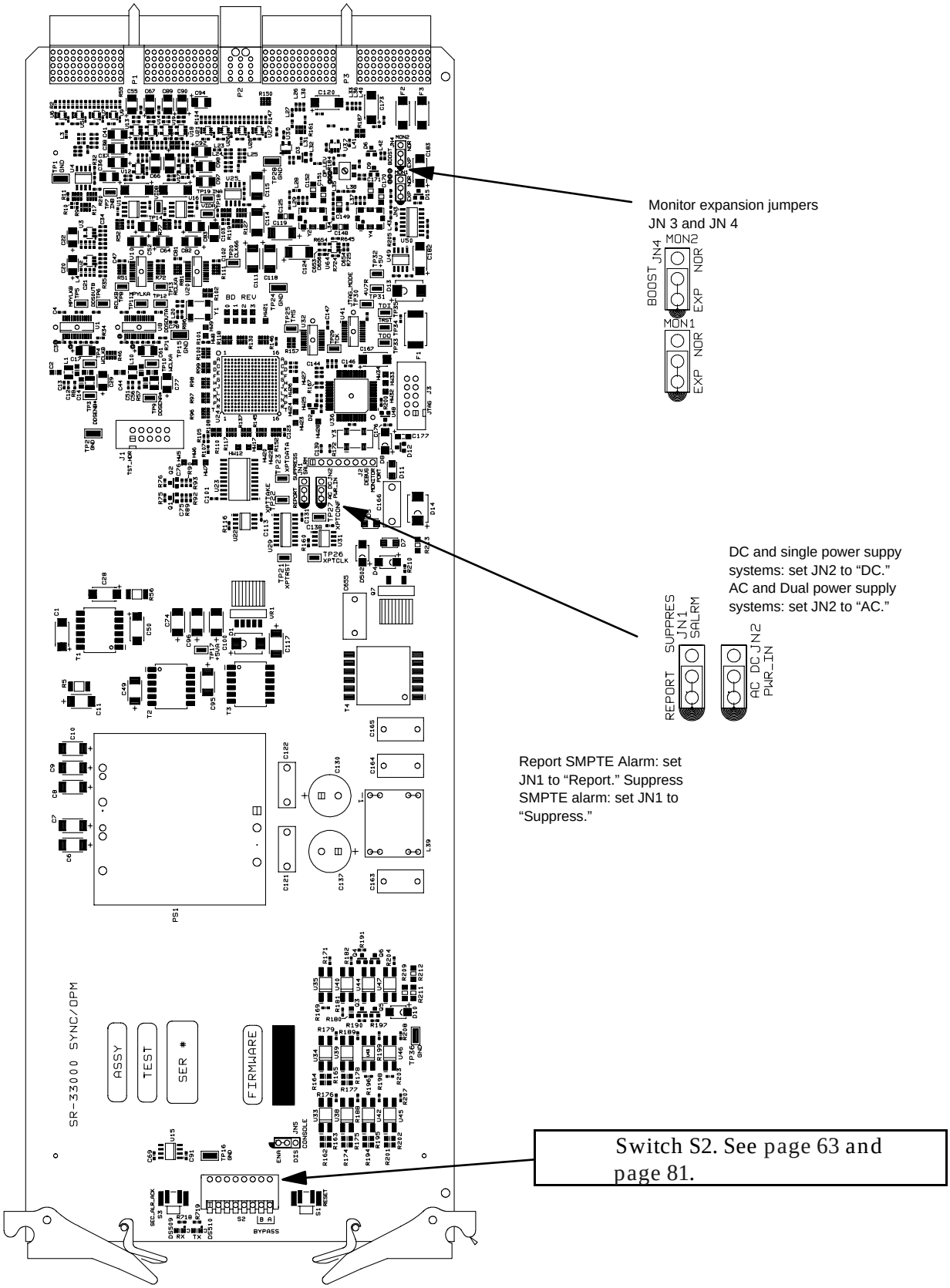
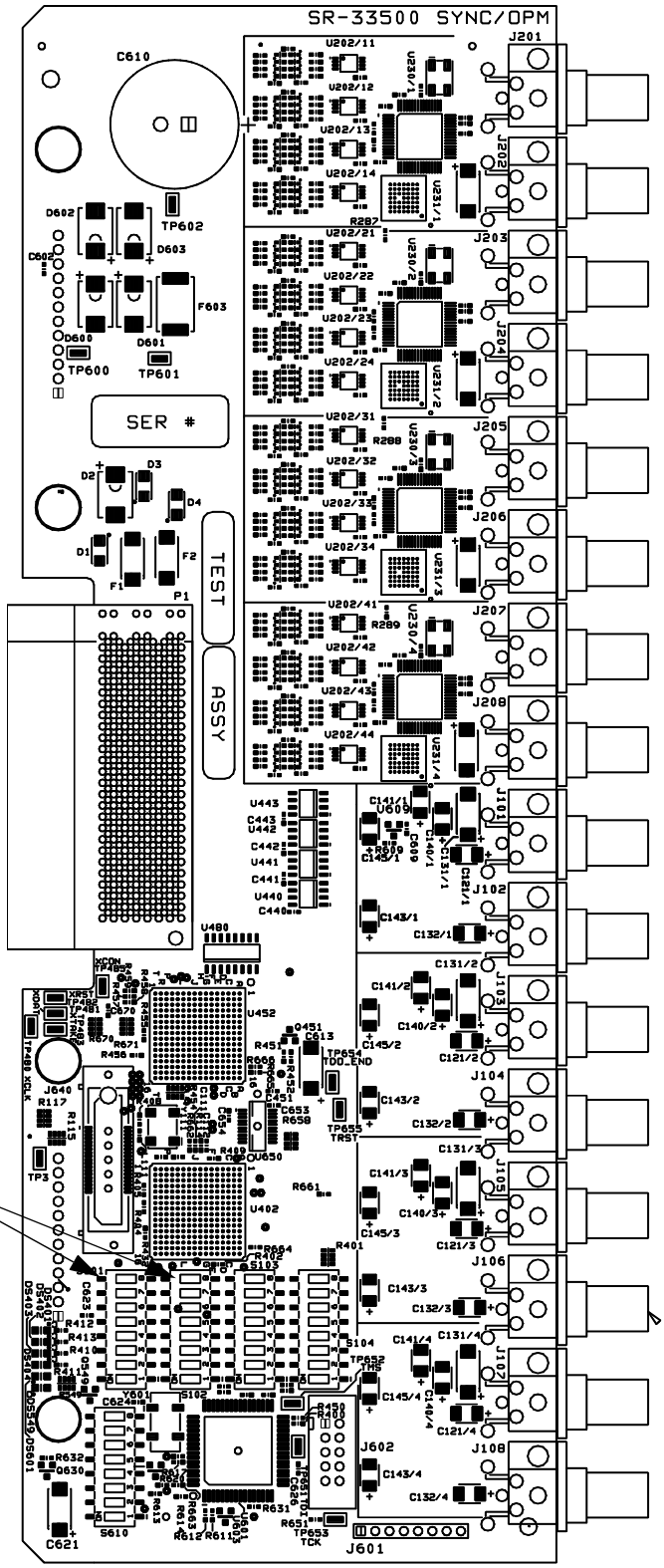


Figure 26. SR-33500 Sync/OPM reference card



Switches S101 and S102. See page 63 and page 81.

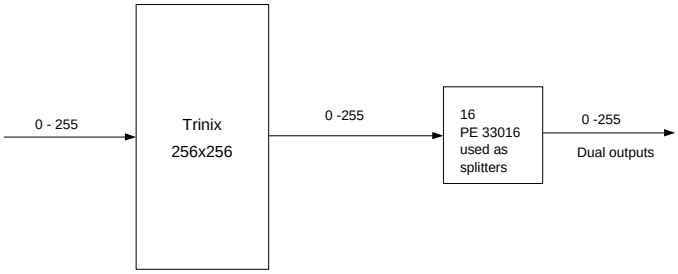
DIP switches S103, S104, and S610 are reserved for future use. The default setting for these switches is “Open.”

Input (IN) expansion and output (OP) expansion

Trinix routers are designed to expand inputs and outputs using passive splitter/combiner expansion panels. Whenever an expansion panel is connected, signal gain must be increased from 800 mV to 1.6 V to compensate for the added circuitry.

1. **Output duplication** (dual/quad outputs) requires output splitters and output gain increase. See Figure 27 for an example.

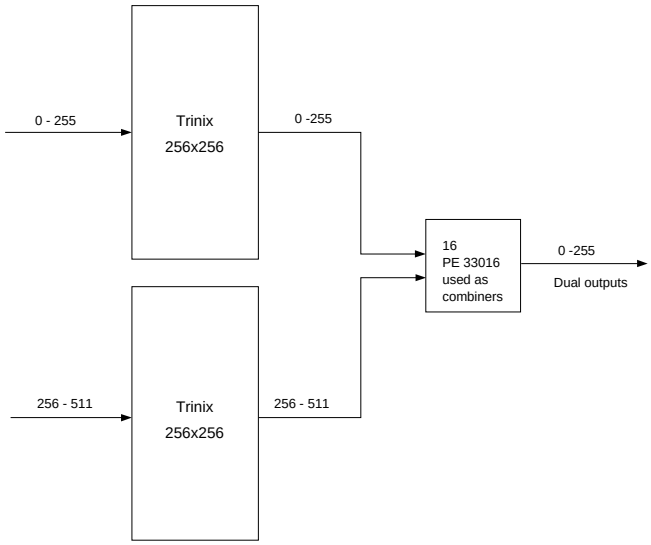
Figure 27.



The necessary gain increase is accomplished by closing the rear-panel *Input Expand* DIP switch (for the location of this switch, see page 53 (128 x 128); page 55 (256 x 256); or page 57 (512 x 512). This will provide the proper gain increase for all output boards in the chassis (unless overridden by on-board jumpers, as described below).

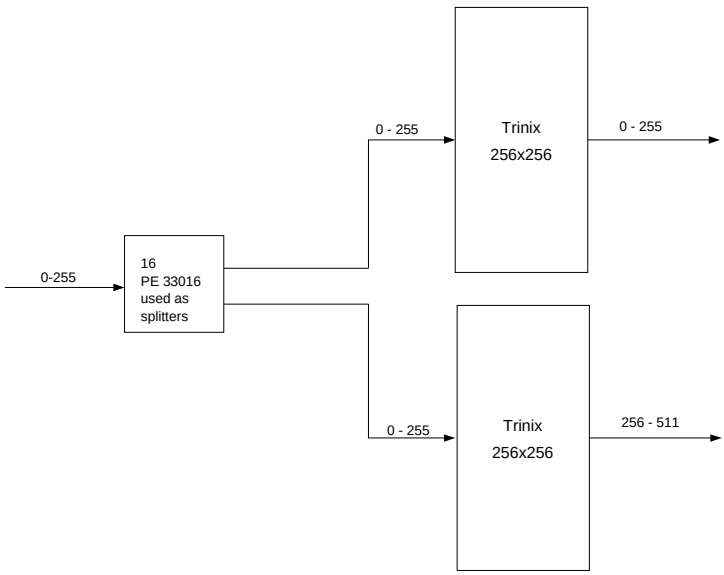
2. **Input expansion** requires *output* combiners and *output* gain increase. See Figure 3-13 for an example. The necessary gain increase is accomplished by closing the rear-panel *Input Expand* DIP switch. This will provide the proper gain increase for all output boards in the chassis (unless overridden by on-board jumpers, as described below).

Figure 28.



3. **Output expansion** requires *input* splitters and *input* gain adjustment. See Figure 29 for an example. The gain increase is accomplished by closing the rear-panel *Output Expand* DIP switch. This will provide the proper gain increase for all input boards in the chassis (unless overridden by on-board jumpers, as described below).

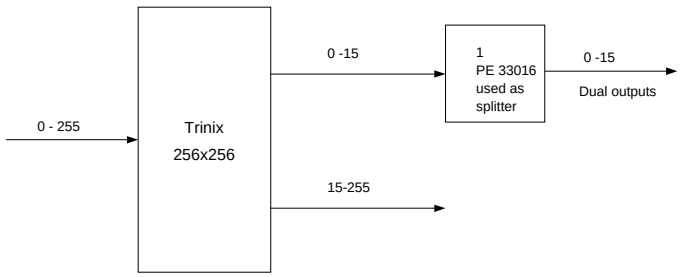
Figure 29.



Dual/quad outputs for partial chassis

As previously described (starting on page 32), the PE-33016 Port Expander can be used to provide dual outputs in groups of 16 outputs, while the PE-33008 Port Expander can be used to provide quad outputs in groups of 16 outputs. For example, Figure 30 shows outputs 0-15 with dual outputs and the remainder with single outputs.

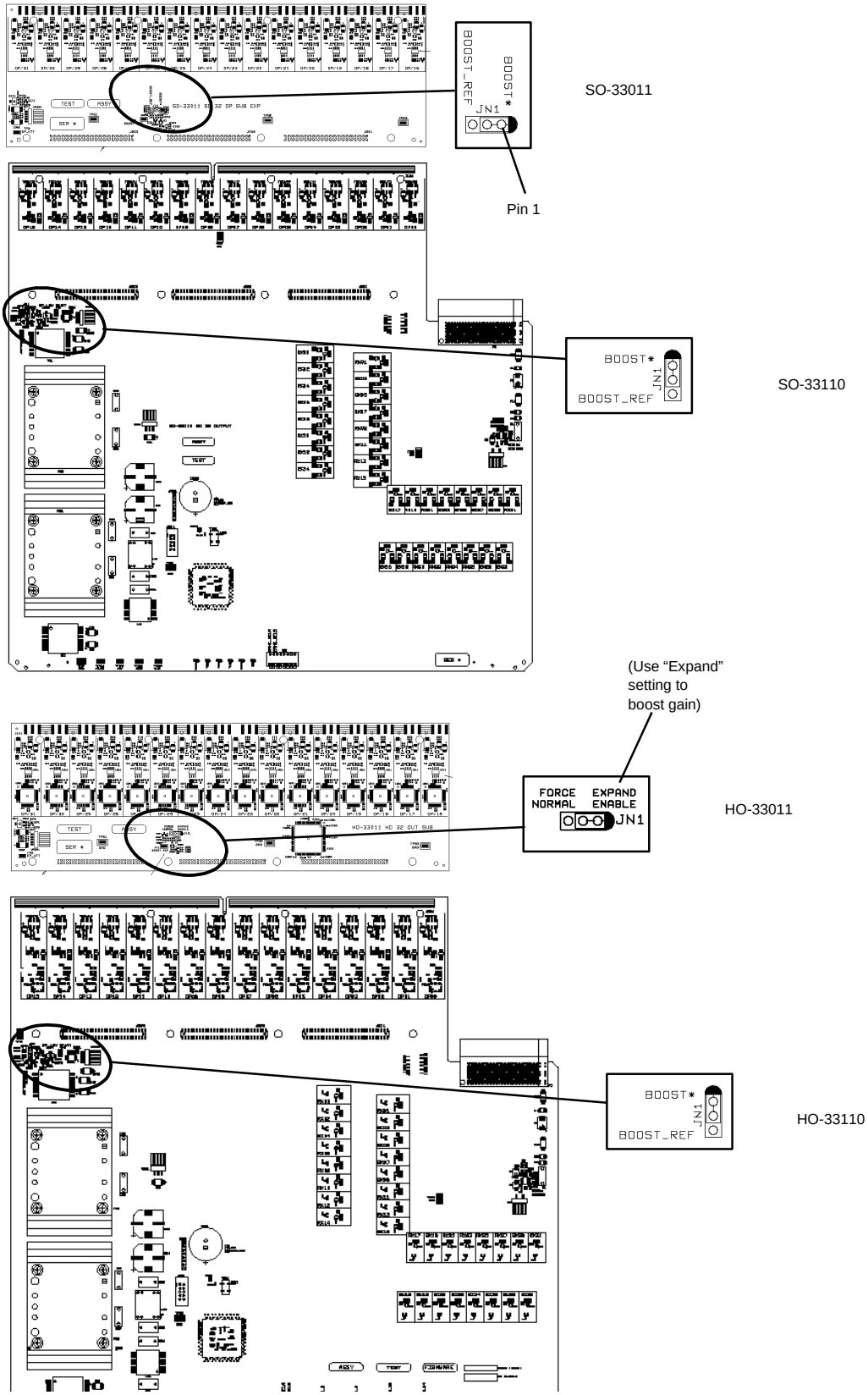
Figure 30.



The gain for outputs 15-255 is held at unity by opening the rear-panel *Input Expand* DIP switch. The necessary gain increase for outputs 0-15 is accomplished by moving the **on-board jumper** for that set of outputs to the "Boost" position. This will override the DIP switch setting for these outputs only. The location of the boost jumper on the

various output boards is shown on page 73. Note that the labels on these jumpers may vary--in all cases, pins 1 and 2 are jumpered to increase gain (pin 1 corresponds to the dark rounded end of the label).

Figure 31. Location of gain boost jumpers on output boards



Output reclocker bypass settings (HD units only)

Front edge DIP switches S5-8 and S1 through S4 on the output board are used to control reclocking as follows:

Table 16.

	S5-8 "AUTO RCLK"	Switch on S1 through S4
Auto Detect ON for all outputs (default setting)	Closed	don't care
Auto Detect ON for selected output	Open	Closed for selected output
Force bypass for selected output (do not reclock)	Open	Open for selected output

"Auto Detect ON" means the signal will be checked to see if it is HD or SD. If HD, the signal will be reclocked. If the signal is SD, it will be bypassed. This is the default setting.

To enable Auto Detect (or force bypass) on a particular output, S5-8 is switched Open; this allows the selection to be made for individual outputs using the switches on S1 through S4.

Figure 32.

Sync selection switch S5

See page 62.

Output monitoring

Output monitoring allows verification of switcher performance without interrupting normal operations. A separate internal switching system is used to switch the Monitor Output to any output of the switcher.

Using a control panel, the operator picks an output as usual—in this case, the Monitor Output. The operator then selects an *input*, but this input is actually one of the switcher *outputs*.

Examples of basic monitoring connections are shown below.

Figure 33. Example of output monitor connection for 128 x 128 all-NTSC switcher.

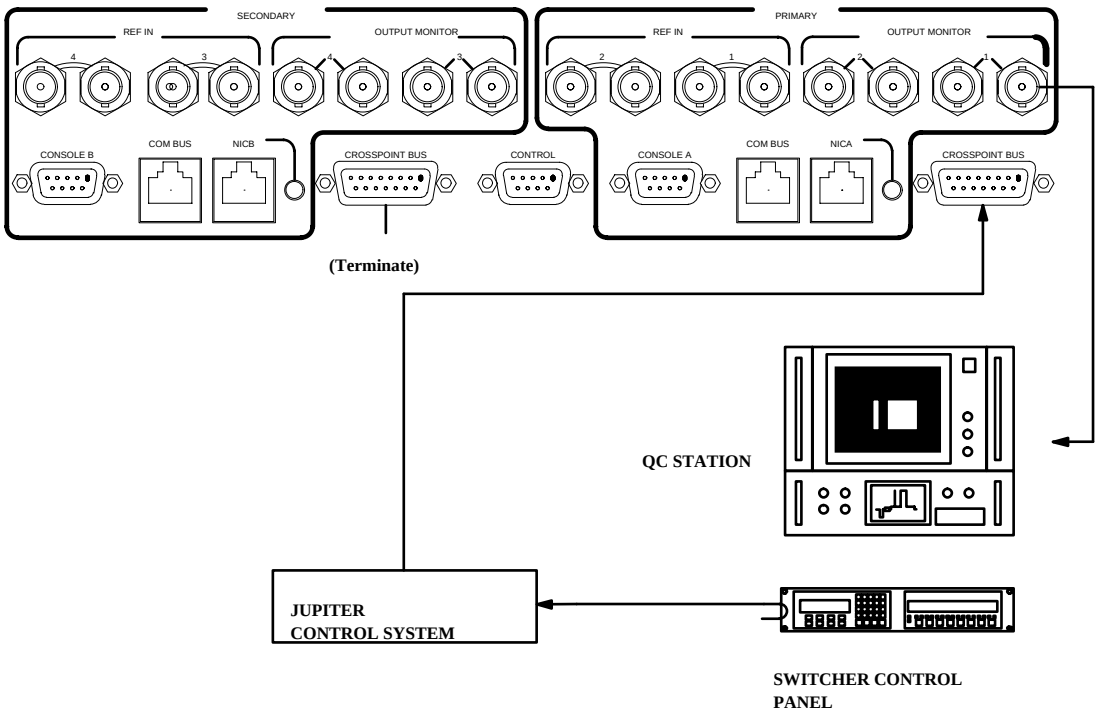


Figure 34. Example of output monitor connection for 256 x 256 all-NTSC switcher.

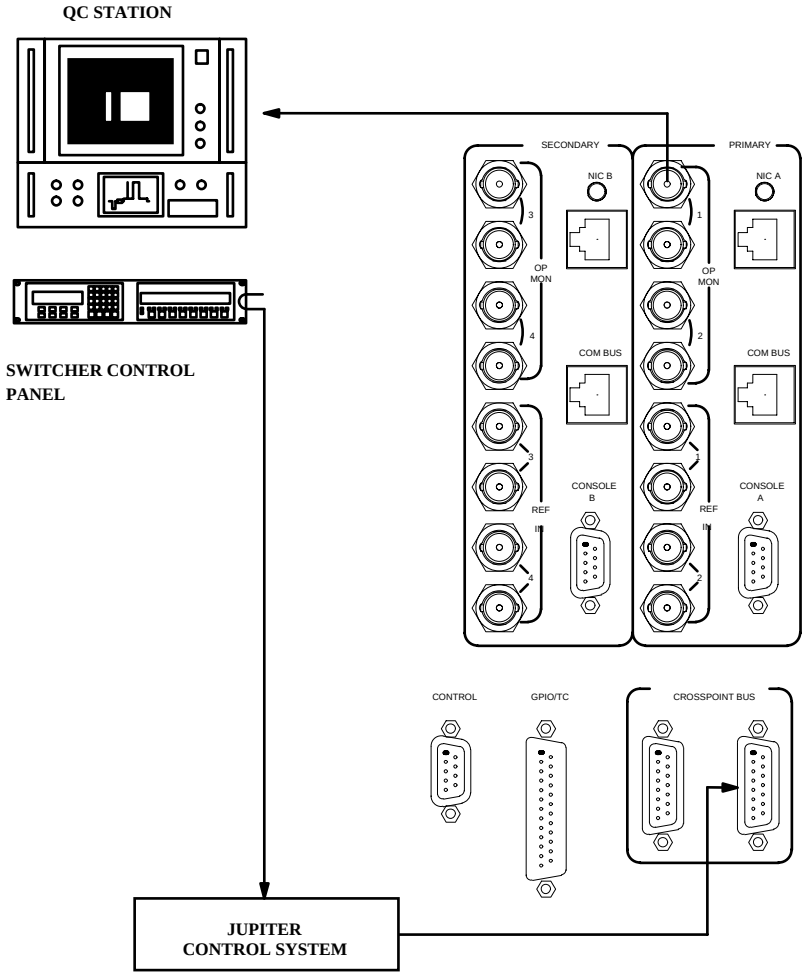
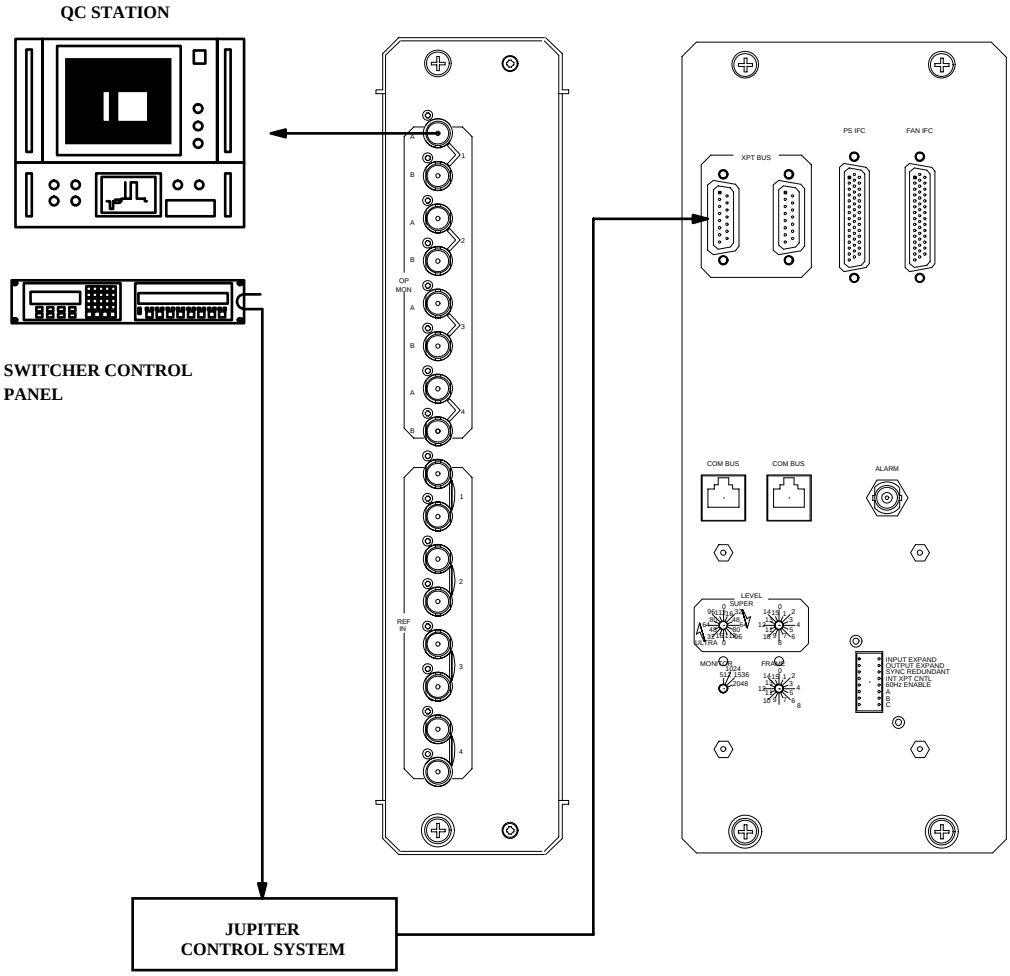
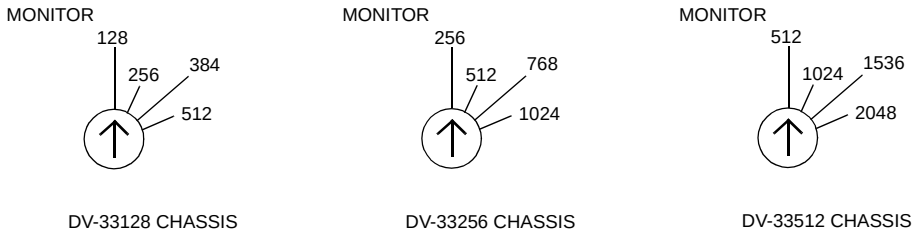


Figure 35. Example of output monitor connection for 512 x 512 all-NTSC switcher.



Setting the output monitor address

Figure 36.



Each Trinix chassis can provide up to four monitor outputs, i.e., one for each of the four possible "channels" (the four possible groups of separately synchronized blocks of outputs). The output blocks are defined by DIP switch S5 on the output boards (as described on page 62). Monitor Output 1 always monitors the block of outputs assigned to Sync Line 1; Monitor Output 2 monitors the block of outputs assigned to Sync Line 2, etc. For example, a DV-33128 router could be configured with outputs 0-63 operating on Sync Line 1 (which might be NTSC sync), while outputs 64-127 are operating on Sync Line 2 (PAL); in this case Monitor Output 1 would monitor outputs 0-63 and Monitor Output 2 would monitor outputs 64-127.

The "Monitor" rotary switch on the back panel is used to set the control address for the available monitor outputs. For example, with a 128 x 128 NTSC-only switcher, the quality control monitor should be connected to "Primary Output Monitor 1," and the monitor switch set to "128"; the control system would then select Output 128 for monitoring purposes. See Table 17 on page 80.

If the DV-33128 has been output-expanded to 128 x 256 (as described on page 82), then the Monitor switch would be set to "128" on the chassis with outputs 0-127; the monitor switch would be set to "256" on the chassis with outputs 128-255.

If there are separately synchronized blocks of outputs (as described above), then Monitor Output 2 would be used to monitor the outputs using Sync Line 2; this block would be accessed by the control system as Output 129, etc.

The second BNC connector of each pair provides an inverted output signal.

Table 17.

DV-33128 (128 X 128)						DV-33256 (256 X 256)				
Monitor Switch	**Output Number and Address**					**Monitor Switch**	**Output Number and Address**			
	1	**2**	**3**	**4**			**1**	**2**	**3**	**4**
128	128	129	130	131		256	256	257	258	259
256	256	257	258	259		512	512	513	514	515
384	384	385	386	387		768	768	769	770	771
512	512	513	514	515		1024	1024	1025	1026	1027

Table 18.

DV-33512 (512 X 512)				
Monitor Switch	**Output Number and Address**			
	1	**2**	**3**	**4**
512	512	513	514	515
1024	1024	1025	1026	1027
1536	1536	1537	1538	1539
2048	2048	2049	2050	2051

Output monitor Reclock / Force Bypass settings

DV-33128 and DV-33256

For these models, "Auto detect on" means the signal will be checked to see if it is HD or SD. If HD, the signal will be reclocked. If the signal is SD, it will be bypassed.

NR-33000 Monitor Output switches "Bypass B" S3-7 and "Bypass A" S3-8 select "auto detect on" or "force bypass" for the Monitor outputs. "Auto Detect" (open) is the default setting. DIP switch S3 is shown on page 67.

– If the NR board is in the Primary slot, S3-8 (labelled "A") applies to Monitor Output 1; S3-7 (labelled "B") applies to Monitor Output 2.

– If the NR board is in the Secondary slot, S3-8 (labelled "A") applies to Monitor Output 3; S3-7 (labelled "B") applies to Monitor Output 4.

SR-33000 Monitor Output switches "Bypass B" S2-7 and "Bypass A" S2-8 select "auto detect on" or "force bypass" for the Monitor outputs. "Auto Detect" (open) is the default setting. Open = switch away from the board. The location of DIP switch S2 is shown on page 68.

– If the SR board is in the Primary slot, S2-8 (labelled "A") applies to Monitor Output 1; S2-7 (labelled "B") applies to Monitor Output 2.

–If the SR board is in the Secondary slot, S2-8 (labelled "A") applies to Monitor Output 3; S2-7 (labelled "B") applies to Monitor Output 4.

DV-33512

For this model, "Auto detect on" means the signal (both HD and SD types) will be reclocked if possible. If the signal is not within reclocking limits, it will be bypassed.

SR-33500 Monitor Output switches S101 and S102 select "auto detect on" or "force bypass" for the four Monitor outputs. "Auto detect on" (open) is the default setting. See Table 19. (The location of DIP switches S101 and S102 is shown on page 69.)

Table 19. SR-33500 Reclock/Bypass Settings for Monitor Outputs.

	Monitor 1 S101-7	Monitor 2 S101-8	Monitor 3 S102-7	Monitor 4 S102-8
Auto detect ON	Open	Open	Open	Open
Force bypass (do not reclock)	Closed	Closed	Closed	Closed

Monitoring with expanded systems

In expanded systems, output monitor signals must be brought through a combiner. An example of an output-expanded system in shown in Figure 37; an input-expanded system is shown in Figure 38.

Figure 37. Monitoring with output-expanded system.

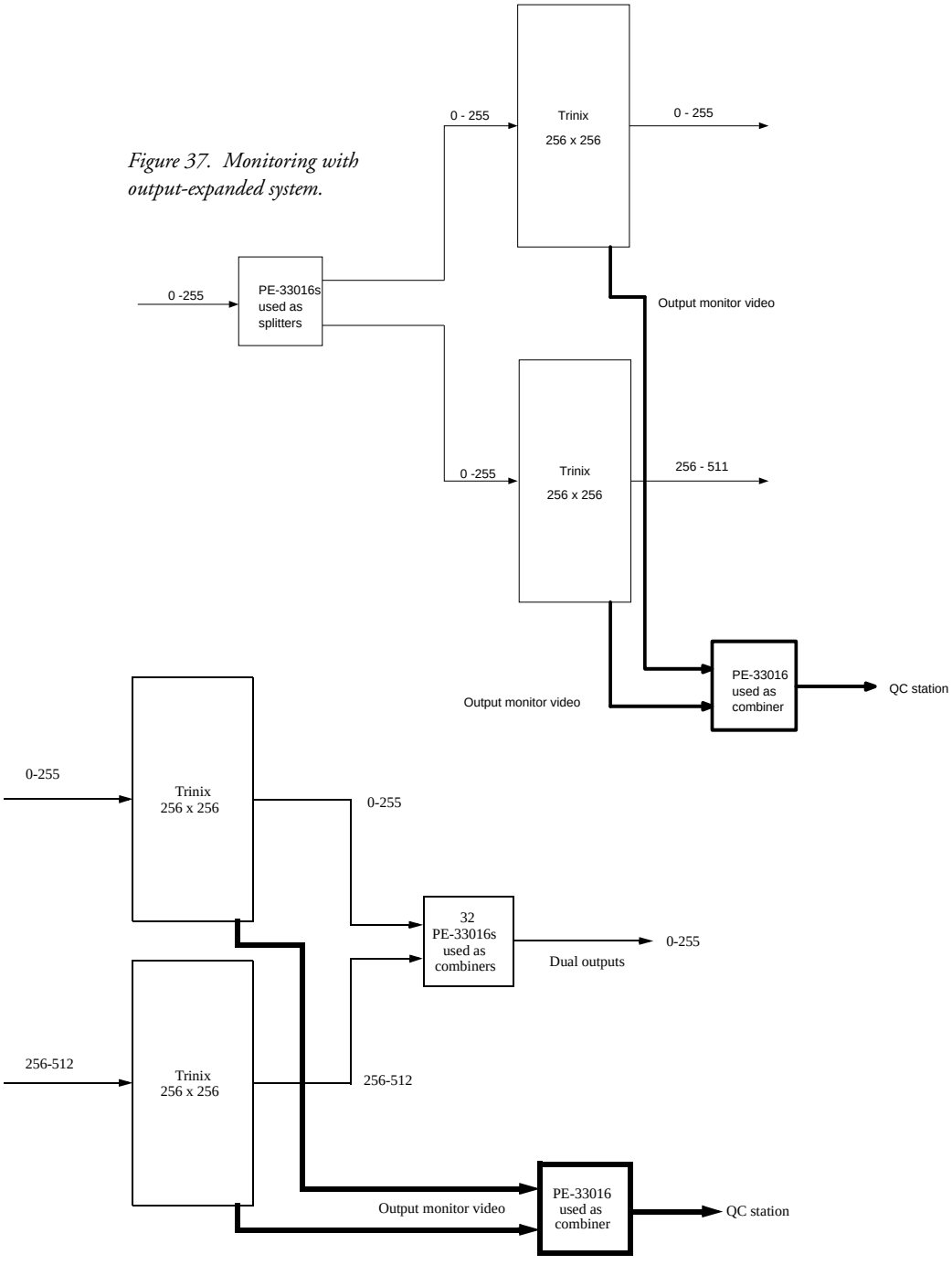


Figure 38. Monitoring with input-expanded systems.

For all expanded systems with Monitoring, the "B" switch on the rear of the chassis must be set to ON. See page 53 (128 x 128); page 55 (256 x 256); or page 57 (512 x 512).

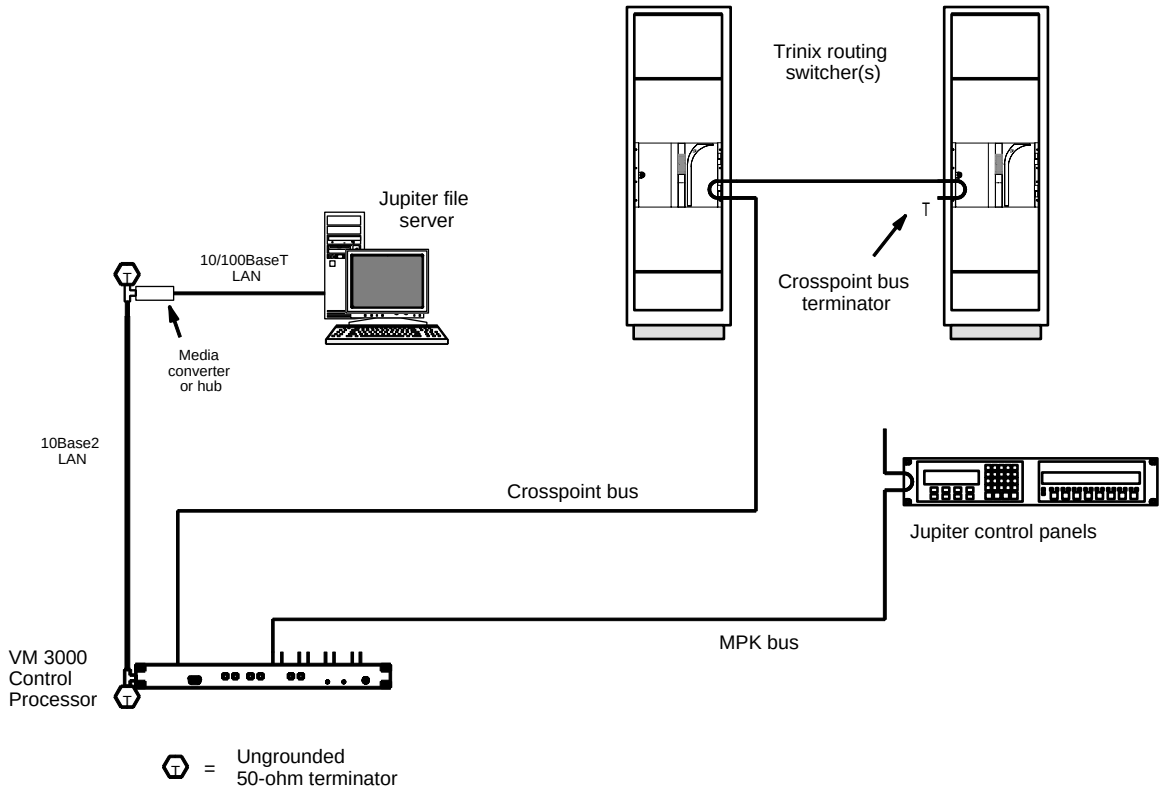
The "Monitor" switch must also be set to identify the output block provided by each chassis (see page 79).

In systems controlled by SR-33000 boards, Monitor Expansion jumpers JN3 and JN4 on the SR-33000 boards must be set to "Exp." See page 68.

Note Output monitoring is not available for input-expanded systems controlled by an SR-33000 Sync/OPM board.

Control system

Figure 39. Jupiter Facility Control System (example).



The Jupiter Facility Control System can be used to control the Trinix router using a VM 3000 Control Processor (Figure 39). The VM can receive switching commands from a variety of sources, including Jupiter control panels, a Grass Valley Encore control system, or an automation computer.When an Encore system is used, the associated VM serial port should be set to “ESswitch” protocol.

The new CM 4000 Control Module is also available as a control interface.

The *Jupiter Installation and Operating Manual* (04-045707-002) describes hardware installation, software configuration, and control panel operation of this system.

CC-2010 Matrix (crosspoint bus) cable

The crosspoint bus cable is used to connect the control system to the Trinix switcher.

The crosspoint bus can be looped through multiple frames; however, depending on the size of the switcher, this bus may require intermediate buffering through a CB 3000 Control Buffer. For more information, see page 26.

In Trinix applications, the crosspoint bus **must be terminated** at the point farthest from the control processor using a Crosspoint Bus Terminator, part number 01-053050-001.

The CC-2010 is a 10-conductor (plus ground) cable. The following ready-made cables, with installed 15-pin D male connectors, are available from Thomson (VDE*[1] cables include ferrite cores):

Table 20.

Length	Part. No. for standard cable	Part no. for VDE cable
3 feet (0.91 m)	01-032707-003	01-041601-003
10 feet (3 m)	01-032707-010	01-041601-010
25 feet (7.6 m)	01-032707-025	01-041601-025
50 feet (15.2 m)	01-032707-050	01-041601-050

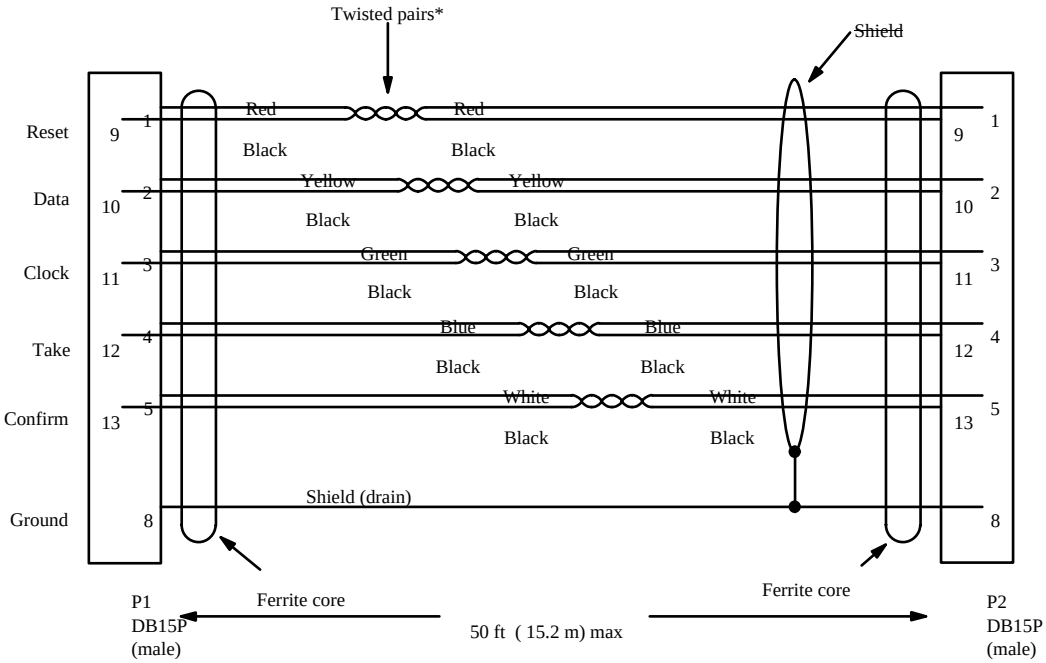
All rear-panel crosspoint bus connectors are 15-pin D, female.

For specific wiring instructions concerning CC-2010 Crosspoint Bus Cables, please refer to the installation diagrams supplied with your switcher.

For those who wish to prepare their own cables, pin-outs are shown in Figure 40. The cable itself should be Belden 9505 or equivalent. Details concerning ferrite cores are given in Figure 3-21.

1. *Terms marked with an asterisk are defined in Glossary at the back of the manual.

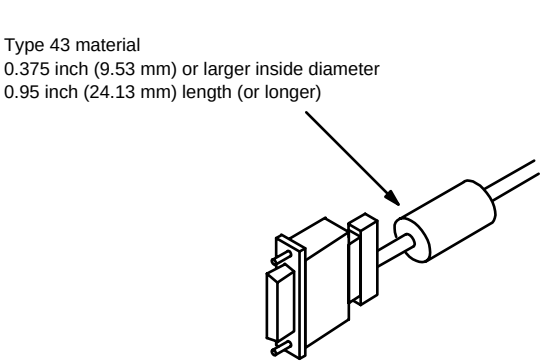
Figure 40. CC-2010 wiring. Reference: Assembly, CC-2010 Matrix Cable," Thomson drawing no. 01-032707-TAB



VDE EMI/RFI modifications to matrix cables

User-supplied matrix cables for VDE installations require a ferrite core over each end of the cable, adjacent to the connector.

Figure 41. Matrix cable VDE modifications.



Type 43* material sources

Fair-Rite*, part no. 2643625102

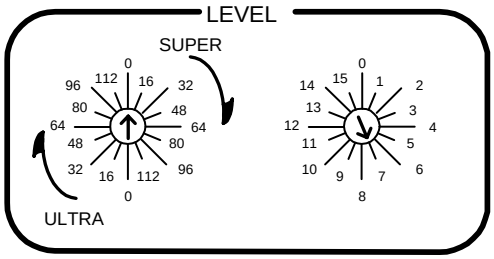
Fair-Rite Products Corp., P.O.Box J, Commercial Row, Wallkill, NY 12589, USA; Tel. (914) 895-2055.

Chomerics*, part no. 83-10-A637-1000

Chomerics Inc., 77 Dragon Ct., Woburn, MA 01888 USA; Tel. (617) 935-4850.

Setting the Trinix levels

Figure 42.

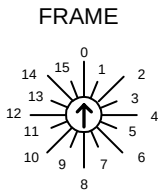


Two back-panel rotary switches are used to set the level address of the router. For Super Crosspoint applications (i.e., all present systems), the left-hand switch is turned to the appropriate most significant bit on the "Super" side of the switch. The lease significant bit is set on the right switch. For example, to set the switcher level at "7" (the factory default for serial digital video) the left switch would be set at "Super 0" (straight up) and the right switch set to "7."

The ULTRA settings are reserved for future use.

Setting the frame number for input/output blocks

Figure 43.



Up to 16 Trinix chassis can be configured to operate as a single router. The FRAME rotary switch is used to indicate the relative position of each individual chassis to the input-output matrix.

The FRAME bits (4) are decoded to determine which inputs and outputs correspond to the chassis. Refer to the following tables for input and output relation to the FRAME bits.

Table 21.

DV-33128 (128 X 128)						DV-33256 (256 X 256)				
	FRAME NUMBER						FRAME NUMBER			
INPUTS						**INPUTS**				
384-511	5	7	13	15		768-1023	5	7	13	15
256-386	4	6	12	14		512-767	4	6	12	14
128-255	1	3	9	11		256-511	1	3	9	11
0-127	0	2	8	10		0-255	0	2	8	10
OUT-PUTS	0-127	128-255	256-386	384-511		OUT-PUTS	0-255	256-511	512-767	768-1023

Table 22.

DV-33512 (512 X 512)				
	FRAME NUMBER			
INPUTS				
1536-2047	5	7	13	15
1024-1535	4	6	12	14
512-1023	1	3	9	11
0-511	0	2	8	10
OUT-PUTS	0-511	512-1023	1024-1535	1536-2047

Broadlinx connections

Broadlinx connections are described beginning on page 92.

Section 4

Broadlinx

The Broadlinx product allows a Trinix router equipped with an NR-33000 Sync/NIC/OPM board to be monitored with a Windows PC via a standard LAN connection. It can also be used to download software upgrades to the various boards in the system.

For an overview of Broadlinx functions, please see page 16.

The PC must be on the same network as the Broadlinx board, or else be connected to the Broadlinx through a network router. In most cases, it will be necessary to connect the PC and the Broadlinx board in an isolated network environment (as shown on page 92), change the PC network address to be compatible with the Broadlinx default setting, then browse to and configure the Broadlinx board as appropriate.

Hardware installation

Broadlinx LAN

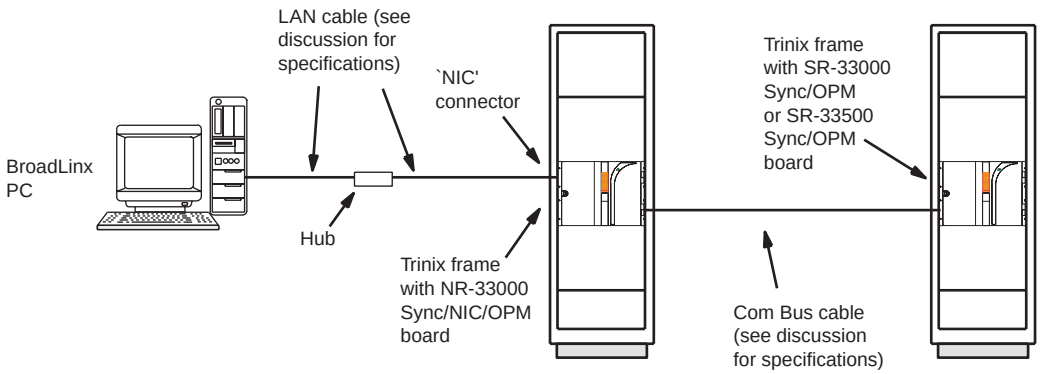
The PC-to-Trinix connection uses a standard 10/100BaseT (Cat 5E twisted pair enhanced) network cable with RJ-45 connectors.

Shielded cable is recommended, maximum length 60 meters.[1] Maximum length for unshielded cable is 100 meters. See Figure 44.

In multi-frame systems, a "Com Bus" is used to connect each frame, up to a maximum of four. The Com Bus is intended to provide Broadlinx switcher monitoring of multiple frames. The Com Bus uses a 10/100BaseT (Cat 5 twisted pair) cable with RJ-45 connectors.

If the Trinix LAN is connected to non-Trinix equipment the connection should be made through a 10/100 network switch. If the Trinix LAN is connected to the Internet the connection should be made through a firewall.

Figure 44.



Basic cable installation

1. Connect the network cable between the PC and an Ethernet hub or switch.

[1] Compliance with EEC, EMC, EN series, UL- 1950, and CSA C22.2 No. 950-M89 standards requires use of a shielded cable.

2. Connect the hub or switch to the Trinix. For the primary Broadlinx board connect an Ethernet cable to the RJ45 jack labelled “NIC A.”

   If you plan on using a secondary Broadlinx board connect another Ethernet cable from the hub to the RJ45 jack labelled “NIC B.”

3. Apply power to the hub or switch.

4. If the network consists only of a PC, hub/switch, and one Broadlinx board, proceed to Step 5 below. Otherwise skip to “Complex Network” on page 94.

Network configuration

Simple network

5. Make the PC’s network settings compatible with the Broadlinx board’s default values:

   a. Use the PC's Network Settings dialog to set the TCP/IP address to 192.168.253.201 and the subnet mask to 255.255.255.0. All other TCP/IP network settings are irrelevant at this point.

   b. Reboot the PC to apply the changes.

      If desired, you can use the MS-DOS **`ipconfig`** command to verify the settings.

      If desired, these settings can be restored to their previous values once the Broadlinx board has been configured.

      You must have admin privileges to change Internet settings on a Windows 2000 PC.

6. The Broadlinx board should be booted (or rebooted) at this time. One way to do this is to unseat and reseat the board:

   a. The Broadlinx board can be unseated without turning off power.

   b. To re-insert the board, keep the ejector levers spread apart and slide the board in until the levers make contact. Then fold the levers toward each other to seat the board.

   c. Wait for the board to boot up fully (as indicated by the “spinning” pattern of the LEDs on the front edge of the board).

Note The Broadlinx board should be powered up (or rebooted) after all network connections have been made. Otherwise the board may fail to boot properly.

7. At the PC, start Microsoft Internet Explorer.

8. The Explorer Proxy setting must be turned off.

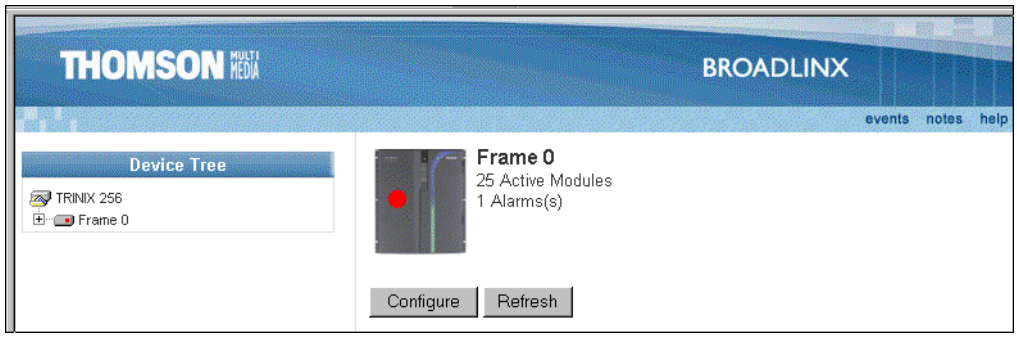
   To check the Proxy setting, go to Tools > Internet Options > Connections > LAN Settings.

9. Enter the factory default URL (Broadlinx board IP address):

   http://192.168.253.200

   You should see the main Broadlinx web page:

Figure 45.



10. Proceed to *Software installation* on page 96.

Complex network

If the network includes additional PCs, connections to additional networks, etc., or if there is more than one Broadlinx board, then the factory default network settings of the Broadlinx board(s) will need to be adjusted to avoid conflicts.

1. Make the PC's network settings compatible with the Broadlinx board's default values:

   a. Set the PC's network TCP/IP address to 192.168.253.201 and the subnet mask to 255.255.255.0. All other TCP/IP network settings are irrelevant at this point.

   b. Reboot the PC to apply the changes.

      If desired, you can use the MS-DOS **`ipconfig`** command to verify the settings.

      These PC settings can be changed back to their previous values after the Broadlinx board has been configured.

      You must have admin privileges to change Internet settings on a Windows 2000 PC.

2. If there is a secondary Broadlinx board installed, unseat the board.

3. The primary Broadlinx board should be booted (or rebooted) at this time. One way to do this is to unseat and reseat the board:

   a. To re-insert the board, keep the ejector levers spread apart and slide the board in until the levers make contact.Then fold the levers toward each other to seat the board.

   b. Wait for the board to boot up fully (as indicated by the "spinning" pattern of the LEDs on the front edge of the board).

4. At the PC, start Microsoft Internet Explorer.

5. The Explorer Proxy setting must be turned off.

   To check the Proxy setting, go to Tools > Internet Options > Connections > LAN Settings.

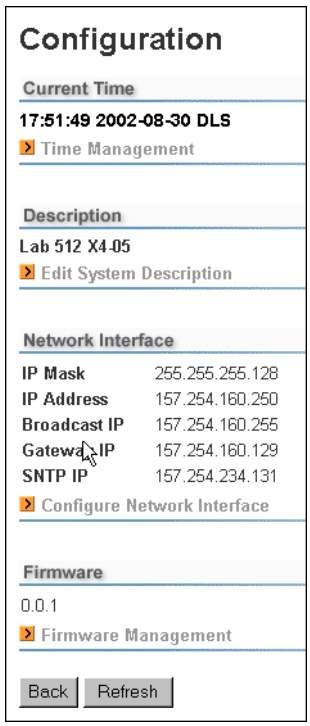
6. Enter the factory default URL (board IP address):

   http://192.168.253.200

   You should see the main Broadlinx web page (as shown on page 94).

7. Press the "Configure" button to navigate to the Configuration page (Figure 46). You should see the current Network Interface parameters. Your parameters will differ from those of the figure.

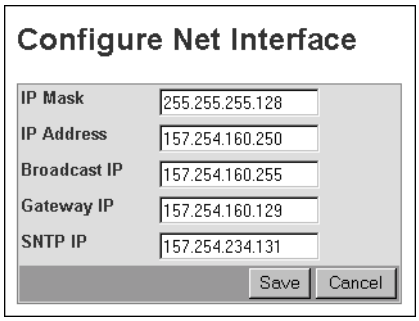
Figure 46.



8. Press the “Configure Network Interface” button (orange box with > in it) to navigate to the Network Configuration page. You will be prompted to enter a User Name and Password. Enter “admin” for the User Name, “admin” for the Password, and press the Log On button to continue.

9. On the network configuration page (Figure 47) you must enter IP Mask, IP Address, Broadcast IP (optional), and SNTP IP (optional, network time server). If you don't know what values to enter consult your network administrator. Your parameters will differ from those of the figure.

Figure 47.



10. If you change the Broadlinx board to another network you will lose the connection at this point.

11. If more than one Broadlinx board has been supplied for this frame, re-seat the secondary board at this time and wait for the board to boot up. Repeat the above procedure starting with Step 6 on page 95. The secondary board must be given an IP address that is unique on the network.

Software installation

NR-33000 boards are shipped with all current software installed.

The PC used in connection with Broadlinx requires Microsoft Internet Explorer 5.0 or newer; version 6 or newer is recommended for best performance.

Operation

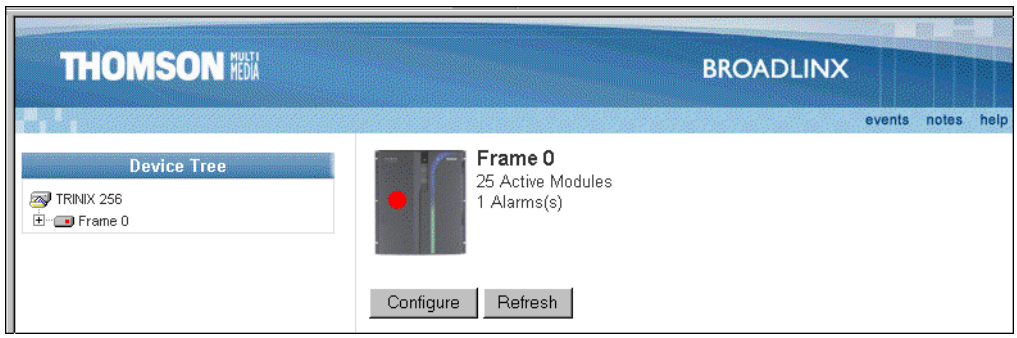
Normal connection procedure following network address configuration

1. Launch Internet Explorer.

2. Enter the URL for the NR-33000 board installed in the system to be monitored.

3. When connection is established, you will see the Broadlinx top-level page (similar to the following):

Figure 48.



In this example, “Device Tree” is the System Description. This name can be modified if desired (as described on page 103). The list below the System Description can be expanded to show all system PC boards and modules available for Broadlinx communication.

The graphic of the router front panel shows the status of the master alarm (green or red dot).

For a discussion of Frame Numbers, see page 87.

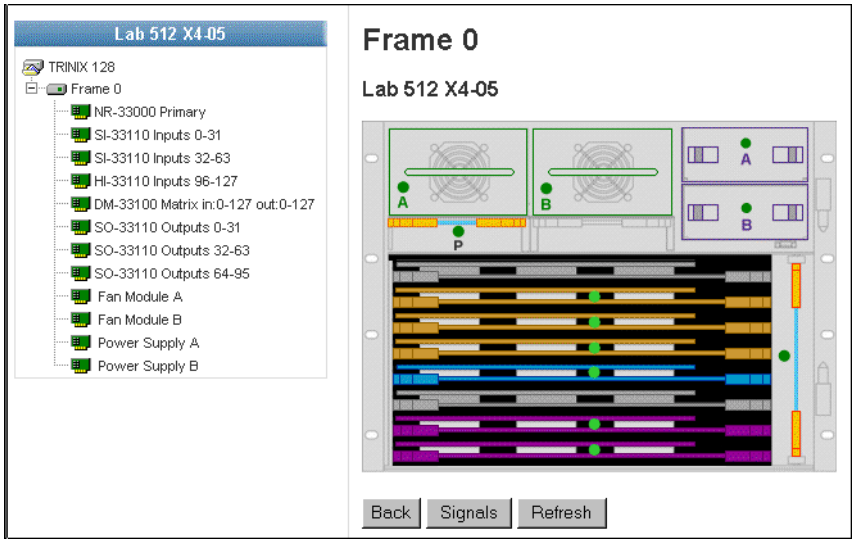
Note The Broadlinx displays do not update themselves automatically. Use the “Refresh” button in the Broadlinx window to update screens. You may be asked “Repost Form data?”; answer Yes.

To return to this page at any time, use the Internet Explorer “Refresh” button.

Checking hardware status

1. Connect to the router following the procedure just described.
2. Click on the graphic of the router front panel. A line drawing of the Trinix chassis will appear (similar to Figure 49).

Figure 49.



In this example, all modules and boards show a green dot meaning that operation is normal.

3. Click on a module or board to check its condition.

   You can click either on the name in the list or on the graphic.

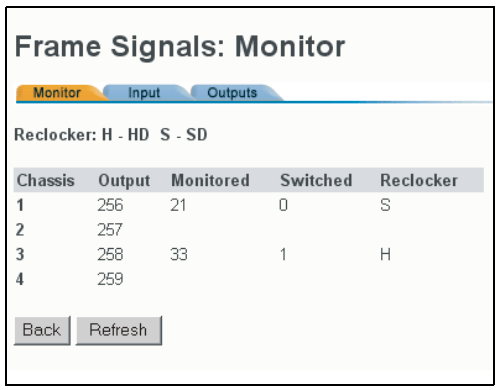
   For DV-33512 routers, the SR-33500 Sync Reference board and the RP-33500 Rear Panel must be selected from the list (because these boards on located on the rear panel).

Checking switcher signal status

1. Connect to the router following the procedure described on page 96.
2. Click on the graphic of the router front panel.
3. Select "Signals."

   A menu similar to Figure 50 will appear.

Figure 50. Monitor Window (DV-33128 and DV-33256).



The **Monitor** tab displays the following:

- "Chassis" - this column lists the monitor output ports labelled "1" through "4" on the back of the chassis.
- "Output"- numbers that are entered in the control system (e.g., Jupiter) to identify the Trinix monitor outputs. In this example, which shows a 256 x 256 router, the four monitor output numbers are 256, 257, 258, and 259 (in the Jupiter environment these are referred to as "physical" output numbers). These numbers correspond to monitor output ports labelled 1 through 4 on the rear of the chassis (as shown on page 77).
- "Monitored" - the number of the output that is being monitored by the control system. In this example, output 21 is being sent to monitor output port 2.
- "Switched" - the number of the input that is being switched to this monitor output.
- "Reclocker" (DV-33128 and DV-33256) - "H" = monitor output board is locked to (and is reclocking) an HD signal. "S" = monitor output board is not reclocking this signal (because the signal is either SD or Force Bypass mode is selected). For more information about output monitor reclocking see page 81.
- "Reclocker" (DV-33512) - "L" = monitor output board is locked to (and is reclocking) the signal. "B" = monitor output board is bypassing (and not reclocking) this signal For more information about output monitor reclocking, see page 81.

For more information about output monitoring, refer to the manual supplied with the control system.

Note The Monitor display has not been fully defined for expanded systems.

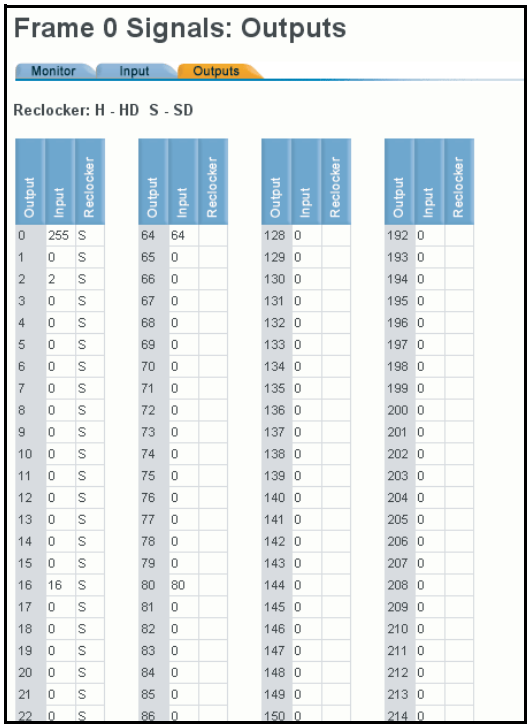
Selecting the **Input** tab will display a menu similar to that shown in Figure 51. This table shows the following for each input:

- Input signal presence (yes or no)
- Whether or not the input is in use (i.e., whether or not it is currently switched to an output).
- If a proper input signal was present but has since been lost

Figure 51.

Selecting the **Outputs tab** will display a menu similar to that shown in Figure 52. This table shows the status of each physical output (i.e., the number of the physical input switched to the output) and whether or not the reclocking circuit is enabled for the output. For more information about reclocking see page 74.

Figure 52.

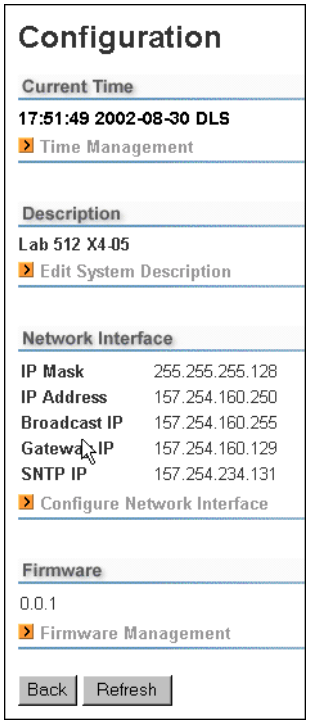


Output	Input	Reclocker	Output	Input	Reclocker	Output	Input	Reclocker	Output	Input	Reclocker
0	255	S	64	64		128	0		192	0	
1	0	S	65	0		129	0		193	0	
2	2	S	66	0		130	0		194	0	
3	0	S	67	0		131	0		195	0	
4	0	S	68	0		132	0		196	0	
5	0	S	69	0		133	0		197	0	
6	0	S	70	0		134	0		198	0	
7	0	S	71	0		135	0		199	0	
8	0	S	72	0		136	0		200	0	
9	0	S	73	0		137	0		201	0	
10	0	S	74	0		138	0		202	0	
11	0	S	75	0		139	0		203	0	
12	0	S	76	0		140	0		204	0	
13	0	S	77	0		141	0		205	0	
14	0	S	78	0		142	0		206	0	
15	0	S	79	0		143	0		207	0	
16	16	S	80	80		144	0		208	0	
17	0	S	81	0		145	0		209	0	
18	0	S	82	0		146	0		210	0	
19	0	S	83	0		147	0		211	0	
20	0	S	84	0		148	0		212	0	
21	0	S	85	0		149	0		213	0	
22	0	S	86	0		150	0		214	0	

Configuration

1. Connect to the router following the procedure described on page 96.
2. Select "Configuration." This will display a menu similar to that shown in Figure 53.

Figure 53.



The "Firmware" field shows the version number of the last-activated top-level software package. In most cases, this will be the version that is currently running in the system. However, if a PC board (such as an input board or output board) has been replaced, and the new board contains different firmware, then the version indicated here will no longer be accurate. For more information, see page 105.

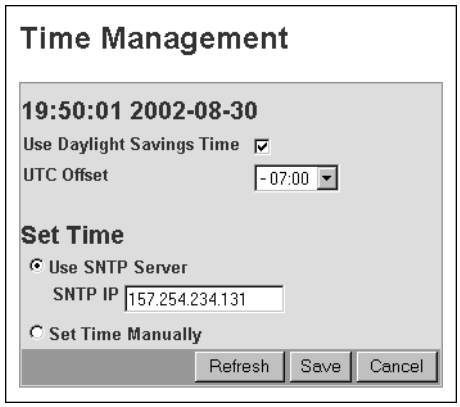
Opening any of these menus will require entry of the logon user name "admin" and password "admin." (The present version of software does not allow changing the user name and password.)

Note More than one "admin" user can be logged on at the same time. There is no indication when this is the case.

Time Management

Broadlinx time settings are used only to timestamp the "Events" log entries. The menu is shown in Figure 54.

Figure 54.



The Daylight Savings Time box must be checked or unchecked manually at the appropriate time during the year.

The UTC Offset is the number of hours that standard time at the customer location is ahead or behind Universal Time Coordinated (Greenwich Mean Time). For example, for the U.S. Eastern time zone the entry would always be "-5:00."

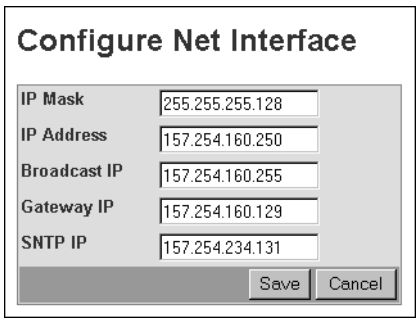
If a SNTP (Simple Network Time Protocol) server will be used as a time source, select the SNTP radio button and enter the IP address of the server. Otherwise, click the "Manual" button and enter the appropriate values. The SNTP address can also be changed on the Configure Net Interface menu. If the SNTP server is on another network you may need to enter the IP address of the gateway to that network (see page 104).

System Description

This is the source of the system name that appears on the left side of the top-level Broadlinx page (Figure 48 on page 97).

Network Interface

Figure 55.

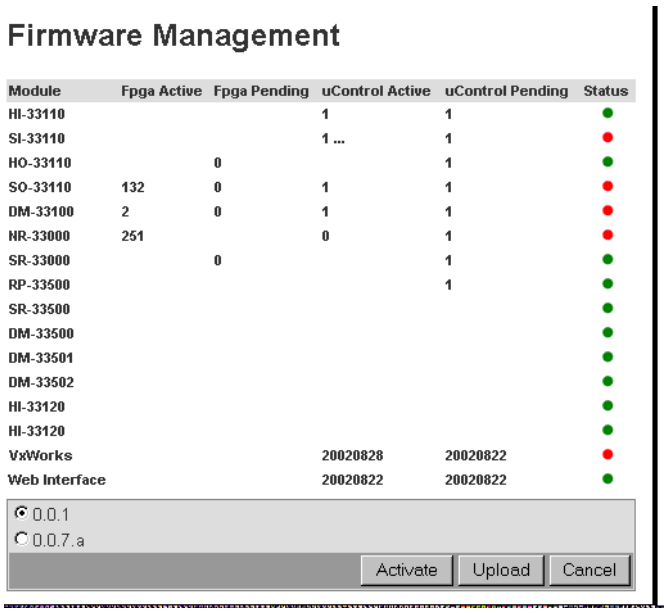


Use of this menu during initial configuration has already been described (page 93.). The menu can later be used by network administrators to adapt the system to changing network requirements. The following fields are provided:

- **IP Mask** - this entry will vary according to the configuration of the user's network. The factory default is "255.255.255.0."
- **IP Address** - the factory default for this address is "192.168.1.200." This address should be changed to integrate properly with other devices on the network (i.e., it must be unique).
- **Broadcast IP** - this address is set automatically by the system based on the IP Mask value. It can also be set manually.
- **Gateway IP** - enter the IP address of the gateway computer used to connect the Trinix LAN to other LANs (if any).
- **SNTP IP** - enter the IP address of the Simple Network Time Protocol server (if any). The SNTP address can also be changed on the Time Management menu.

Firmware management

Figure 56.



The firmware used in the Trinix system consists of a collection of programs operating within the various PC boards. These programs are identified either by a sub-level revision number from 1 to 255 or by a date. Since these programs must be compatible with each other, they are managed as a package with a top-level revision number.

The Firmware Management table displays the types of possible PC boards, the version of sub-level software that is presently associated with each type that is installed, the versions of top-level software packages present in the NR-33000 board, and the compatibility Status of these software elements.

Not all PC board types will always be present in a given system. The possible boards are as follows:

HI - High Definition Input board
SI - Standard Definition Input board
HO - High Definition Output board
SO - Standard Definition Output board
DM - Data Matrix board
NR - Broadlinx board (Sync/NIC/OPM board)
SR - Sync/OPM board
RP - interface board (used only on DV-33512 chassis)

Also listed on this menu:
VxWorks - operating system (used only on NR board)
Web Interface - software used to communicate with the PC (used only on NR board)

Each Trinix circuit board typically has a program active in one or more FPGA (Field Programmable Gate Array) ICs and another program active in a microcontroller IC. The FPGA controls the board's switcher functions, while the microcontroller allows Broadlinx communication to and from the FPGA and other board components.

In most cases there will be more than one PC board of a given type in the system (multiple output boards, for example). If there is a difference in FPGA or microcontroller firmware version from one board to the next, the version running on the first board will be shown and the fact that a difference exists will be indicated by three dots. For example, if there are four SO-33110 output boards, three with firmware version "2" and one with firmware version "1," the table will show "1..."

The NR-33000 board contains at least one, and usually two versions of the top-level software package used in the system. These two versions are kept in separate parts of the NR-33000 memory and listed along the bottom of the Firmware Management menu with the last-activated version shown first. In Figure 56, package "0.0.1" was the last-activated version; package "0.0.7.a" is not active.

The radio buttons are used to select which top-level software package in the NR-33000 is being compared to the sub-level programs currently running on the PC boards. In the example above, software package "0.0.1" has been selected. The sub-level programs in package 0.0.1 are identified in the "FPGA Pending" column and the "uControl Pending" column. The system compares the version numbers of each sub-level software pair; if there is a mismatch the Status light will be red.

General guidelines for firmware management

- There should be no red lights in the Status column. If there are, it may be that a board has been replaced by another with an older version of software. The solution is to check the radio button on the bottom of the menu that is next to the latest top-level software package, then follow the *Activating and Executing New Software* procedure on page 107.
- In most cases the latest software should be used. The two top-level software packages shown along the bottom of the menu should have the newest package listed first, indicating that the newest package was the last one activated. Otherwise, check the radio button for the newest package, then follow the *Activating and Executing New Software* procedure on page 107.
- If you receive a new software package from the factory, follow the *Uploading New Software* procedure shown on page 107.

Uploading New Software

1. The new software package (usually a file with the extension ".ar") should be copied to the PC having a Broadlinx connection to the router.
2. At the Firmware Management menu, select "Upload."
3. Browse to the new software file and initiate the upload.

Note Do not click on the "Upload" button more than once. Doing so may cause the download to fail.

4. The upload process takes several minutes, at the end of which a message will appear. The version number of the new software should then appear as the second item in the list along the bottom of the Firmware Management menu.
5. Proceed to *Activating and Executing New Software* below.

Activating and Executing New Software

1. Select the radio button next to the new software version number.
2. Observe the differences, if any, between the "FPGA Active" and "FPGA Pending" columns. If there are differences, note the module(s) where the difference exist. Such modules will require the "execute" step described below.
3. Select "Activate."

   This will copy the software from the NR-33000 to each board that requires update. This process can take from several minutes to a half hour or more, during which time browser access to the system will be interrupted.

CAUTION The following step will cause a momentary interruption to video signals passing through the system. All signals will be interrupted if chassis power is cycled, but the interruption will be very brief (a few seconds at most). In contrast, re-seating a board will interrupt only those signals using the board, but this interruption may (in large complex systems) last for several minutes.

4. To execute the new software, either cycle the power to the chassis or pull and re-seat the appropriate circuit board(s).

All crosspoints will return to their previous state and switching operations will return to normal.

Section 5

Troubleshooting

LEDs

Front panel

	Display	Meaning
POWER/ALARM	Red	Master alarm for this chassis: check internal alarm LEDs
	Green	Power on, chassis OK
	Off	System is not powered

Power supplies

	Display	Meaning
AC OK	Green	AC Power OK
	Off	Supply is not powered (or is not operating)
DC OK	Green	DC power OK
	Off	Supply is not powered (or is not operating)

Fans

	Display	Meaning
FAN ALARM	Red	Check fan
	Off	Fan OK

Input boards - SI-33110 SD and HI-33110 HD

Part side

	Ref	Display	Meaning
ALARM	DS601	Red	Master alarm for this board. A DC supply has failed to turn on
		Off	Board OK
-5VAOK	DS31	Green	-5 VA supply OK
		Off	Check -5 VA supply
IN_USE	DS602		Reserved for future use

Matrix board - DM-33100

Part side

	Ref	Display	Meaning
PALARM	DS952	Red	Primary alarm for this board. A DC supply has failed on the board or the microcon-troller
		Off	Board OK
3V3	DS951	Green	3V3 is OK
		Off	Check 3V3
INUSE	DS901	Yellow	1 or more crosspoints now in use on this board
		Off	No crosspoints in use on this board
-3V3	DS31	Green	-3V3 is OK
		Off	Check -3V3
DONE	DS950	Green	The Xilinx FPGAs are properly configured
		Off	FPGAs failed to configure

512 Matrix board - DM-33501/33502

Part side

	Ref	Display	Meaning
IN USE A	DS201_1	Yellow	A crosspoint is active in XPT_A IC
		Off	No crosspoints are active in XPT_A IC
P2V5A OK	DS204_1	Green	P2V5A converter is OK (for XPT_A side)
		Off	P2V5A converter has failed
IN USE B	DS201_2	Yellow	A crosspoint is active in XPT_B IC
		Off	No crosspoints are active in XPT_B IC
XC DONE	DS402	Green	FPGAs are configured
		Off	FPGAs are not configured
ALARM	DS401	Red	One or more fault conditions exist
		Off	Normal operation
P2V5B OK	DS204_2	Green	P2V5B converter is OK (for XPT_B side)
		Off	P2V5B converter has failed
P5V	DS901	Green	Logic supply is OK
		Off	Logic supply has failed
PS1 OK	-	Green	Main DC-DC Converter 1 is OK
		Off	Main DC-DC Converter 1 has failed
PS2 OK	-	Green	Main DC-DC Converter 2 is OK
		Off	Main DC-DC Converter 2 has failed

Output boards - SO-33110 SD and HO-33110 HD

Part side

	Ref	Display	Meaning
INUSE	DS3	Yellow	1 or more crosspoints now in use on this board
		Off	No crosspoints in use on this board
DONE	DS501	Green	The Xilinx FPGAs are properly configured
		Off	FPGAs failed to configure
+10V	DS41	Green	+10 V supply OK
		Off	Check +10 V supply
+5VA	DS31	Green	+5VA supply OK
		Off	Check +5VA supply
3.3V	DS51	Green	3.3 V supply OK
		Off	Check 3.3 V supply
ALARM	DS601	Red	Master alarm for this board
		Off	Board OK

SR-33000 Sync Reference / Output Monitor (OPM) board

Part side

	Ref	Display	Meaning
RX	DS509	Green	Receive COM bus activity
TX	DS510	Green	Send COM bus activity

Dip side

IN_USE	DS	Yellow	Output Monitor is active
XLD		Green	Xilinx load done
3V3+OK		Green	3V3 supply OK
5V+OK		Green	5V+ supply OK
10VOK		Green	10 V supply OK
REF_ALRM B		Yellow	Reference B alarm
REF_ALRM A		Yellow	Reference A alarm
PALRM		Red	Primary alarm
SALRM		Yellow	Secondary alarm (single fan failure)

NR-33000 NIC/Sync/OPM board

Part side

	Ref	Display	Meaning
SW OVR	DS1	Yellow	Software override switches
ACTIVE	DS2	Solid yellow	This card has control of Com Bus and/or Crosspoint Bus. Crosspoint bus active. Internal XPT control.
ACTIVE	DS2	Dim or blinking yellow	This card has control of Com Bus. Com bus activity. External XPT control.

Dip side

	Ref	Display	Meaning
USE7	DS	Yellow	Output monitor is active
XOK		Green	Xilinx load done
3V3		Green	3V3 supply OK
		Off	Check 3V3 supply
5VA		Green	5 VA supply OK
		Off	Check 5 VA supply
10V		Green	10 V (A and B) supplies OK
		Off	10 V (A and/or B) supply alarm. Failure of both A and B will also trigger PALARM.
A REF		Yellow	Reference A alarm
B REF		Yellow	Reference B alarm
PALR		Red	Primary alarm
SALR		Off	Secondary alarm (single fan)
LAN		Flashing green	LAN activity
LINK		Green	LAN link OK
Dual 7-segment LEDs		Numeric pattern	CPU codes. See below
		Flashing decimal points	Broadlinx code is loading (faster flashing indicates increase in interrupt rate)
		Spinning pattern	CPU running with Broadlinx code loaded (faster spinning indicates increase in interrupt rate)

NR-33000 dual 7-segment LED CPU codes

S.0 End of bus 0 first access to segment display if the start type is BOOT_COLD

S.1 End of bus 1

B.C If there is a memory check sum error in the EEPROM.

1.C If there is an I2C timeout while communicating with the SDRAM module.

B r If there is a DRAM error (unable to determine the memory size,
Not a 32,64,128,256 MB memory bank).

3 2 If a 32 MB memory bank.

6 4 If a 64 MB memory bank.

2 8 If a 128 MB memory bank.

5 6 If a 256 MB memory bank.

1 2 If a 521 MB memory bank.

S.2 End of Bus 2

S.3 End of Bus 3

S.4 End of Bus 4

S.5 End of Bus 5

S.6 End of Bus 6

S.7 End of Bus 7

Start VxWorks Boot process:

sysPhysMemSize() Retrieve auto-sized memory.

B r Bad Ram

3 2 32 MB ram

6 4 64

2 8 128

5 6 256

1 2 512

PCI bus

P.0 When the pci system is initialized and the switch is in position 7 PC-BP
The lsd increments while the PC BIOS is configuring the bus.

P.P. When the secondary bus, atu and bridge initialization is done.

P.P After the private PCI bus devices have been initialized and PCI init is done.

E.1. If unable to do a configuration read on the secondary PCI bridge. Dev 7

E.2. If unable to do a configuration read on the secondary PCI bridge. Dev 0
While initializing the Ethernet chip.

Signal flow

Signal flow for a 256 x 256 router, which requires four matrix cards, is shown below.

Figure 57.

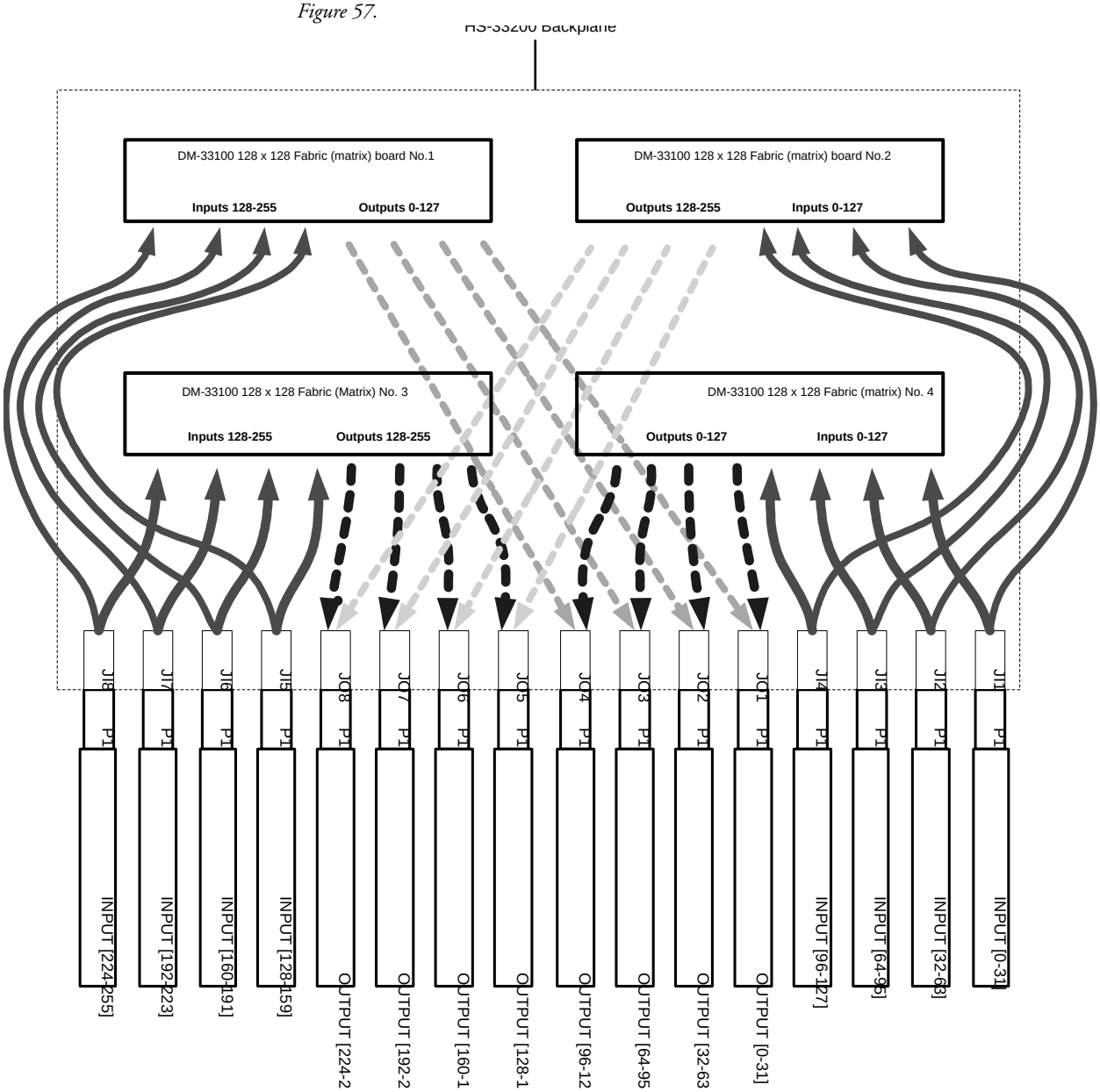
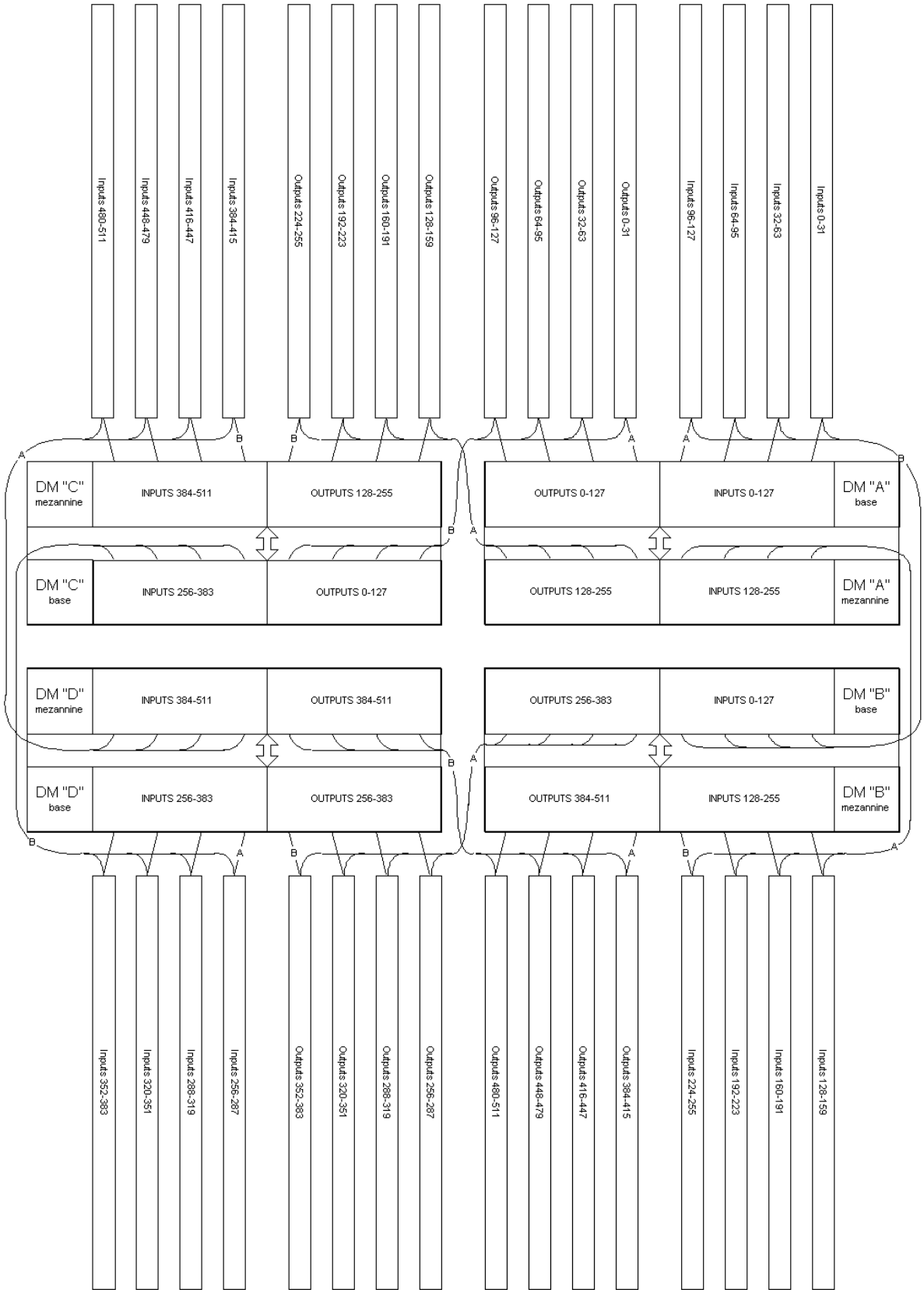


Figure 58. Signal flow for a 512 x 512 router, which requires four DM-33500 modules.



Glossary

Note: terms set in SMALL CAPS are defined within this glossary.

10Base2 - a coax version of ETHERNET. Uses a 4.9 mm (0.19 inch) diameter, 50-ohm coaxial cable (RG-58) and BNC connectors, but runs at the same speed (10Mb/s) as ETHERNET. The Jupiter system uses this standard between VM/SI controllers and Saturn. It is also used by the original BCS 3000 controllers.

10/100BaseT - an ETHERNET configuration that uses twisted pair wiring (typically Cat 5 UTP unshielded twisted pair cable with RJ45 8-pin connectors) to transmit data up to 100 Mbps.

4000 series - these products are very similar to the 3000 and 3500 series products but have the "crescent" style front panel.

A board - ES-3000 used for Thomson Broadcast Automation applications.

AA board - analog audio processor for Saturn Master Control switcher.

AccuSwitch - control application for CM 4000. Provides interface between Thomson Crosspoint Bus routers and certain automation systems, including Thomson Broadcast Automation.

AES - Audio Engineering Society. Internet address: http://www.aes.org.

AES3-1992 - AES Recommended Practice for Digital Audio Engineering -- Serial transmission format for two-channel linearly represented digital audio data.

AES11 - AES Recommended Practice for digital audio engineering -- Synchronization of digital audio equipment in studio operations.

AFV - Audio-Follow-Video. Normal operation of a distribution switcher where selection of a video source automatically selects audio from that source. Example: selection of VTR1 video automatically selects VTR1 Audio 1 and VTR1 Audio 2 as well.

Alamar - manufacturer of broadcast automation systems. Now the Broadcast Automation unit of Thomson Broadcast and Media Solutions, Inc.

Ampex bus - see SERIAL BUS.

Andromeda - logical signal processing system developed by Systems LOB Griesheim. Functions include evaluation of GPIs, tally light control, evaluation of contact closure failure indications from devices such as master control switchers and video servers, and automatic, emergency switching.

AV board - analog video processor for Saturn Master Control switcher.

BCS 3000 - Bosch Control System. Predecessor of Jupiter Facility Control System, originally developed by Bosch

Video Systems Division (now part of Thomson Broadcast and Media Solutions). Uses Hewlett-Packard UNIX-based file server. BCS-3000 controller boards include the CE 3000 Matrix Controller, the SC 3000 Serial Control Interface, the PL 3000 Party Line Interface, and the VG 3000 Dual Video Display Status Generator. Most of the functions of these controllers are combined in the VM 3000 Control Processor. Some facility control systems built by BTS combined BCS controller boards with a Jupiter PC file server.

binary super crosspoint bus - similar to super crosspoint bus, but the units digits are allowed to cover the range of 0 to F, rather than 0-9 as in previous switcher systems. Generated only by the Jupiter, CE-2500, and BCS 3000 control systems.

breakaway - independent operation of a switcher level. Same as "split." Contrasts with normal AFV operation. Example: selecting video from VTR1 but audio from Announce Booth 2.

BTS - Broadcast Television Systems. A joint venture of Bosch and Philips. Now part of Thomson Broadcast and Media Solutions.

bus - in distribution switching, a channel leading to an output or destination. Example: "controls 20 buses" means being able to select sources for 20 destinations.

button-per-input/output control panel - buttons are dedicated to a particular source or destination. As opposed to CATEGORY/NUMBER control.

category/number selection method - operator first picks category (example: VTR); then unit within category.

CE 3000 - Matrix Controller. Interface between LAN and CROSSPOINT BUS.

chop - rapid, back-and-forth switching between two inputs.

CM 4000 - hardware platform developed as follow-on to VM 3000. Presently available for use with ACCU SWITCH and JUPITER XPRESS applications.

configuration set - a file server directory containing files that are downloaded to CONTROLLER BOARDS. These files are used to establish network addresses, switcher input and output names, types of VTRs in system, etc.

controller board - term used in this manual for interface between Jupiter LAN and the RS-422 bus. Includes VM 3000 Control Processor, SI 3000 Control Processor, and VG 3000 Video Display/Status Generator. Also refers to BCS 3000 boards: SC 3000 Serial Control Interface, CE 3000 Matrix Control, and PL 3000 PARTY LINE Interface. In ESBUS terminology, each of these boards functions as a coupler, gateway, and bus controller.

CP 3300 - an X-Y panel, developed by BTS in Germany, with soft keys displaying configured names. The hardware contains 2 lines of 20 characters and displays four character and eight character source and destination names.

CP 3310 - an X-Y panel similar to the CP 3300 that can display status for either five or eight outputs.

CP 3320 - a control panel developed by the BTS Systems unit in Germany.

CP board - control panel for Saturn Master Control switcher.

crosspoint - distribution switcher circuit where input signal can be connected to output bus. A 10 x 10 crosspoint

board has 100 crosspoints.

crosspoint bus - Also called the *matrix bus.* A five-pair bus that carries switching and status commands between the crosspoint (matrix) cards and the control device.

The control device could be any one of a large number of devices, including a CE-300A Control Board (internal to Mars), a SC 400 Control Board (internal to Venus), a CE 3000 Matrix Controller (BCS 3000 control system), a CE 2500 Control Electronics chassis, a VM 3000 Control Processor (Jupiter), or a CE 2200 (PARTY LINE system).

The protocol for this bus has changed through the years to accommodate larger and larger switchers with increasing numbers of levels, being identified as "standard," "extended," "super," and "binary." For example, the binary protocol uses binary (rather than BCD) coding to increase maximum control size to 1024 x 1024 on 127 levels.

The "octal" protocol type is used only for Mars switchers.

For additional information, refer to the "Switcher Control Rulebook" appendix of the *Party Line Control Maintenance Manual*, Thomson part no. 04-043473-010.

DA board - digital audio processor for Saturn Master Control switcher.

DDE - Dynamic Data Exchange. A form of interprotocol communication that uses shared memory to ex change data between applications.

delegation - use of a special control panel or supervisory display to restrict control of a specific VTR to a particular control panel or panels. The delegation process does not actually connect a control panel to a machine; rather, it allows the connection to be made using the normal machine linkage procedures. See also Linkage.

DHCP - Dynamic Host Configuration Protocol. Provides automatic TCP/IP configuration when a DHCP server is present on the network.

Doc Pack - packet of information custom-prepared for one switcher.

DVB-ASI - Digital Video Broadcasting - Asynchronous Serial Interface.

downloadable panel - term used with older systems (CE 2200/PARTY LINE technology). Downloadable panels have the ability to change display mnemonics and/or category/number button assignments, from a central computer. This a standard feature with Jupiter.

DSP - digital signal processor.

DV board - digital video processor for Saturn Master Control switcher.

DVS - (Philips) Digital Video Systems. Successor to BTS. Now part of Thomson Broadcast and Media Solutions.

EBU - European Broadcasting Union. Internet address: http://www.ebu.ch/.

ES 400 - A term used in Thomson technical publications to denote the original asynchronous (non-reclocking) version of the Venus digital audio switcher matrix board and associated components.

ES 401 - A term used in Thomson technical publications to denote the new AES11 synchronous/asynchronous version of the Venus digital audio switcher matrix board and its associated components.

ES 3000 ESnet Interface Circuit Card - Ethernet board used in PC compatible computers. No longer available.

ESbus - nickname for EBU/SMPTE RS-422 bus protocol for remote control of television production equipment using a full-duplex four-wire, asynchronous serial, 38.4 kbits/s digital channel. Connectors are 9-pin D. Incorporates ANSI-SMPTE 207M and Recommended Practice 113. The Jupiter Serial bus is designed to be compatible with ESbus; however, the serial data cable supplied by Thomson uses only 5 conductors. (In Jupiter systems, "ESbus" usually refers to VTR control.)

EScontrol - control of a "remote" (non-Thomson manufactured) routing switcher using proposed ESBUS routing switcher dialect. Also referred to as "**ESbus Router**" protocol.

ESnet - nickname for EBU/SMPTE proposed protocol for remote control of television production equipment based on THIN NET.

ESswitch - control of a routing switcher using a third-party computer operating according to the proposed ESBUS routing switcher dialect. Also referred to as "ESBUS TRIBUTARY" protocol.

ESswitch protocol - (a.k.a. "ESW"). Protocol used for control of a routing switcher by a third-party computer. It is described in Thomson document "ESswitch Serial Routing Switcher Control Protocol, Enhanced Version." This is a simplified version of the ESBUS TRIBUTARY PROTOCOL.

ESbus Tributary protocol - (a.k.a. "ESTR" and "ES-trib"). Full tributary ESBus automation protocol, compliant with SMPTE EG 29-1993, and all associated normative references. The protocol supports all standard bit rates from 300 to 115.2 kBPS. Flow control is an advantage with this protocol.

exclusion - lockout of selected inputs from selected outputs. Example: lockout of a test signal from bus leading to transmitter.

extended party line - see PARTY LINE.

extended crosspoint bus - see CROSSPOINT BUS.

fabric board - DM-33100 matrix board used in Trinix router.

file server - a computer dedicated to providing access to a hard disk on a LAN. In Jupiter systems, the PC that holds the Jupiter installation with the active set.

follow switch - a switch made automatically on one level in response to a switch made by the operator on another level. See also AFV, REVERSE SWITCHING.

force unprotect/unlock - a system management function that allows a new source to be selected for a protected or locked destination. See LOCK, and PROTECT.

FPGA - Field Programmable Gate Array.

full-matrix control - ability to select any source for any destination.

gateway - a device for connecting two dissimilar networks.

GUI -Graphical User Interface. In Jupiter systems, a "software" control panel that exists only as a CRT display.

hardware address -another name for the link level address, a unique identifier required for every device that operates on a network (for example, 08000090acf6 [hex]). Compare with TCP/IP ADDRESS.

HTTP - Hypertext Transport Protocol.

ICS - Integrated Control System. Original name of BCS 3000 and Jupiter Control Systems. "ICS" also refers to a control system developed by BTS Darmstadt.

indirect status instruction - see PRIMARY STATUS INSTRUCTION.

interface bus - an ESBUS term for the channel that connects VTRs, control panels, bus controllers, etc. Uses 9-pin D connectors (but Thomson version uses only 5-conductor cable). See SERIAL BUS.

IP - see TCP/IP.

JNIA - Jupiter Network Interface Application. A program that supports operation of a Logger, Log Viewer, Party Line Download software, Physical Control (Switching), CP 3200, and Force Unprotect/Unlock.

JNS - Jupiter Network Suite. A collection of many programs designed as a replacement and enhancement to the JNIA software. Includes the Router Save/Restore Utility, Physical Diagnostic Utility, Physical Remap ping Utility (PRU) and the I/O Editor. The JNS also includes all the JNS SERVERs, Board Status Display, Router Control Utility, JNS Logger, JNS Log Viewer, Force Unlock, Physical Control, and Party Line Download.

JNS Servers - JNS programs that provide data to Jupiter client programs in the same or other computers.

Jupiter - compact, follow-on version of BCS 3000 CONTROL SYSTEM. A PC-type computer is used as the file server.

Jupiter XPress - Provides a limited set of Jupiter switching and machine control functions using the CM 4000 as the interface between Thomson Crosspoint Bus routers and certain control devices.

level - historically, a switcher matrix that carries one type of signal, as determined by DIP switch settings on crosspoint boards. Example: level 1 for video, levels 2 and 4 for left and right audio, etc. However, in 3-stage switching systems this switch-set level is referred to as the "physical" level; and large systems may require more than one physical level to provide enough hardware for an entire "logical" level (such as video). The Jupiter Physical Switching menu refers to a "logical level" that is actually the logical level *number,* this being the row number on which the level is identified on the Switcher Level Descriptions table. The logical level *name* also appears on this table.

linkage - the Jupiter machine assignment function, whereby control of a VTR is passed to a remote panel. The system can be configured so that linkage will occur automatically, based on the signal from the VTR being switched to a destination associated with that panel; this function is sometimes described as "ma chine control following the router." Linkage can also be accomplished manually, using the MC-3020L Linkage panel. See also DELEGATION.

lock - 1. on Jupiter control panels equipped with a LOCK button (except MC 3020L): after a given source has been switched to a given destination, and LOCK is pressed, the source for that destination can then be changed only at the panel which set the lock; *and* only after LOCK is pressed again. Note that a panel can only lock LEVELS that are assigned to the panel during configuration. See PROTECT, and FORCE UNPROTECT/UNLOCK. 2. on the MC 3020L Linkage panel, the LOCK button is used to prevent any interruption in the assignment of a machine to a control panel.

logical level mapping - in these systems, the same physical level number can be used on more than one logical level. For example, you could have a switcher with Left Audio on level 2, and with Right Audio **also** on level 2. This technique can sometimes help reduce overall switcher size, but it requires special entries to control system tables.

logical level name - see LEVEL.

logical level number - see LEVEL.

logging - maintaining a disk file of Jupiter LAN activity, including switches, machine control commands, configuration set downloads, error messages, etc. Each file covers a twenty-four hour period.

LOS - Loss of Signal.

MADI - Multiplexed Audio Digital Interface. Interface bus used in Dune switchers.

matrix bus - see CROSSPOINT BUS.

M board - CE 3000 Matrix Controller.

MDI - Multiple Document Interface.

MIDI - Musical Instrument Digital Interface. Serial interface bus used in Triton switchers.

MNC - Media, Networking, and Control. A Thomson business unit that includes matrix router products.

mnemonic - abbreviation, usually four characters long, for a particular input or output. Mnemonics appear in the LED status windows of the control panels. However, the term is sometimes used to define an input or output in the sense of a logical device name.

MPK - message-per-keystroke. Protocol developed by Thomson for control panels and devices connected to the Jupiter Serial bus. Baud rate is variable, with 8 data bits, 1 start bit, 1 stop bit, and even parity; time out is 6 characters (1.72 msec). See also SERIAL BUS.

NetBEUI - NETBIOS Extended User Interface. Windows for Workgroups ships with the NetBEUI protocol to interconnect computers running Windows for Workgroups, MS-DOS, Windows NT, and Microsoft LAN Manager-compatible networks, in a local area network environment. NetBEUI is a small, efficient protocol designed for use on a departmental LAN of 20 to 200 workstations. For enterprise-wide networks where a routable protocol is required, TCP/IP or IPX should be used.

NetBIOS - Network Basic Input/Output System. An operating system interface for application programs used on IBM personal computers that are attached to a LAN.

node - a device on a network, such as a controller board, control panel, file server, or VTR.

numeric mode - switcher selection method using input and output numbers only (as opposed to category/number mode).

numeric set - a factory-supplied configuration set used to set up and operate the routing switcher in the minimum possible time.

OPM - OUTPUT MONITOR.

override - one-button selection of an input. Override button of a control panel is programmed to select a particular input that is used heavily.

output monitoring - feature of routing switcher which allows control system to verify switcher performance without interrupting normal operations. A separate, internal switching system is used to switch the Monitor Output to any *output* of the switcher.

party line - proprietary network technology originally developed by TELEMATION, Inc. to control distribution switchers. Uses unterminated 75-ohm coaxial cable from CE 2200 or PL 3000 looped through all control panels. Not to be confused with 50-ohm THIN NET technology used in Jupiter. Two types are commonly in use: the *extended* party line, which allows control of 250 inputs and 150 outputs; and the *super* party line, which allows control of 250 inputs and 250 outputs.

path finding - a switching technique allowing two or more TVS/TAS-2000 or later routing switchers to operate as a system, where each switcher can access the other's inputs through a number of *tie lines*. Be cause the tie lines are limited, the path will be *blocked* when all lines are busy. Not to be confused with THREE-STAGE SWITCHING.

PCI - Peripheral Component Interconnect, a local computer bus standard developed by Intel Corporation. Most PCs include a PCI bus in addition to a more general ISA expansion bus.

Philips Broadcast - successor to Philips Digital Video Systems (DVS). Now part of Thomson Broadcast and Media Solutions.

physical level - see LEVEL.

PL board - PL 3000 Party Line Interface.

Pmem - battery-protected memory.

polling - communication technique where central controller polls (addresses) each device on a party line in turn. When so addressed, a particular device can then send or receive data without being interrupted.

polling name - a unique address assigned to a switcher control panel. When transmitted by the polling and control card, allows communication between that panel and the switcher matrix.

PPM - peak program meter.

protect - on Jupiter control panels with a PROTECT button: after a given source has been switched to a given destination, and PROTECT is pressed, the source for that destination can then be changed only at the panel

which protected the output. Note that a panel can only protect LEVELS that are assigned to the panel during configuration. See also LOCK, and FORCE UNPROTECT/UNLOCK.

primary status instruction - in Jupiter systems, a configuration technique used in the CP Input set for display of SPLIT MNEMONICS. Indirect ("I") entries are used to point to a primary ("P") entry. The primary entry in turn points to the desired mnemonic for that level.

RCMC - Routers, Control, and Master Control LOB. Now referred to as MNC.

refresh - continuous repetition of switching instructions and confirmation of crosspoint status. Reports any interruption of service – for example, if crosspoint board is removed. When board is replaced, automatically restores previous switch instructions.

repeater - a device for connecting two LAN segments.

remote PC -a PC on a Jupiter LAN in addition to the PC used as the file server. Can be used for auxiliary tasks such as remote LOGGING.

remote switcher -a non-Thomson distribution switcher under Jupiter control.

retained level - see STICKY LEVEL.

reverse switching -reverse switching is used in RS-232/422/423 data switchers where one level is used to switch data from a controlling device (such as an editor) to a controlled device (such as a VTR); a second level is used to return data to the controller. The return path is switched automatically by the control system.

RS-422 - EIA standard which defines the electrical characteristics of balanced voltage digital interface circuits. More rugged than the earlier RS-232 standard, which employs unbalanced voltages. This standard does *not* specify a connector type. While the Jupiter VTR / control panel bus and CC 2010 matrix (crosspoint) bus are both based on the RS-422 standard, the VTR / control panel bus uses 9-pin D connectors and the CC-2010 matrix bus uses 15-pin D connectors.

RS-422 bus - see SERIAL BUS.

S board - SC 3000 Serial Control Interface.

salvo - single-command switching of source(s) to multiple destinations.

SCP - Software Control Panel.

segment - a portion of a LAN. In 10BASE2 systems, a segment is limited to 185 meters and 30 nodes. However, segments can be joined by repeaters.

sequencing - term used in connection with Jupiter for single-command switching of one or more sources to one or more destinations. With a CP 3000 switcher control panel, each named sequence can contain up to 25 switching events.

serial bus - term used in connection with Jupiter for the interface bus that connects VTRs and control panels to a controller board such as a VM 3000. Depending on how the bus is configured by software, may also be referred to as Sony bus, Ampex bus, ESBUS, MPK bus, RS-422 bus, etc.

server - 1. Hardware: a computer that provides shared services to other computers over a network; e.g., a file server. 2. Software: a program that provides data to client programs in the same or other computers. In Jupiter systems, a "JNS server" (software) is said to run on a "file server" (hardware).

set - see CONFIGURATION SET.

single-bus control panel - selects any source for 1 destination.

SMPTE - Society of Motion Picture and Television Engineers. URL: http://www.smpte.org.

SMPTE 259M-1997 - Television standard: "10-Bit 4:2:2 Component and 4fsc Composite Digital Signals - Serial Digital Interface."

SMPTE 269M-1999 - Television standard - "Fault Reporting in Television Systems."

SMPTE 274M-1998 - Television standard: "1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates."

SMPTE 292M-1998 - Television standard: "Bit-Serial Digital Interface for High-Definition Television Systems."

SNMP - Simple Network Management Protocol.

Sony bus - see SERIAL BUS.

SPD - signal presence detector.

SPDIF - Sony/Philips digital interface.

split - see BREAKAWAY.

stand-alone VM 3000 - system with VM 3000 connected to PC through serial line, i.e., a non-LAN system.

status - in a distribution switcher, a display indicating what source is currently switched to a given destination.

sticky levels - control panel BREAKAWAY operation during which the selected LEVELS remain selected after a Take.

Sundance - internal project name for CM 4000/ACCUSWITCH.

super crosspoint bus - see CROSSPOINT BUS.

super party line - see PARTY LINE.

TCP/IP - a protocol suite allowing error-free communication over an arbitrary network. TCP/IP is an abbreviation for `Transmission Control Protocol / Internet Protocol.' This set of protocols is more properly called "the Internet Protocol Suite," but is commonly named TCP/IP since TCP and IP are the two main protocols used by Internet network services.

TCP/IP address - a computer address consisting of four decimal integers separated by periods. Each integer represents eight bits of an IP address. Compare with HARDWARE ADDRESS.

TCS 1 -TELEMATION Control System. Predecessor to BCS 3000 and Jupiter. TCS 1 provides machine control only (no switcher control).

TCS 2 - control panel protocol used with the MCS 2000 Master Control Switcher. Contains byte counts, check sums, and error detection. Replaces the TCS CP interface but not the TCS MI interface. TCS2 can only be used with the MCS 2000, which must be equipped with updated PROMs.

TeleMation - Salt Lake City manufacturer of CATV and broadcast equipment founded by Lyle O. Keys and associates. Now part of Thomson Broadcast and Media Solutions.

three-stage switching - architecture used for very large switchers as a means of reducing crosspoints needed for a given number of inputs/outputs. An array of relatively small matrixes is arranged in an input stage, an intermediate stage, and an output stage. The path taken by a given signal through these stages is determined by software and will vary according to which circuits are already in use. Unlike PATH FINDING between two discrete switchers, three-stage switchers are carefully designed so that all inputs are always available at all outputs; i.e., the switcher cannot be *blocked.*

tie line - see PATH FINDING.

tributary - term used in ESBUS documentation for an intelligent device (such as a VTR or control panel) connected to an ESBUS.

VDE - Verband Deutscher Electrotechniker e.V. (Union of German Electrical Engineers). Professional organization in Germany authorized to conduct product safety tests.

VITC - Vertical Interval Time Code, embedded in the vertical interval of the video signal.

VGA Status Display - built-in switcher and machine control status display feature of the VM 3000. Can be controlled by front-panel buttons or with optional VC 3020 panel.

VM 3000B - VM 3000 with minor electrical changes and “crescent” style front panel. Functionally identical to VM 3000.

X-Y selection method - full-matrix control of switcher, where source is described as (x) and destination is described as (y).

Y line - in an editing environment, some VTRs can act as controllers *or* tributaries. These can be connected with a “Y” cable to two switcher ports– one for use when the VTR is a controller, the other when the VTR is used as a tributary. If the VTR is operated only as a controller, or only as a tributary, then a “Y” cable will not be needed.

ZIF - zero insertion force. “ZIF boards” (a/k/a “configuration boards”) are used in Venus systems for interconnection of crosspoint boards and output boards.

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