NV8288 and NV8288-Plus Digital Video Routers

User's Guide

NV8288 and NV8288-Plus Digital Video Routers—User's Guide

- **Revision**: 1.5

- **Software Version**: -none-

- **Part Number**: UG0003-05

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Note	Return Material Authorization (RMA) required for all returns.

Change History

The table below lists the changes to the Digital Video Routers User's Guide.

- User's Guide Part # UG0003-05
- Software version: -none-

Rev	Date	ECO	Description	Approved By
1.0	10 Apr 07	12960	New document.	DEM/Eng
1.1	07 Aug 07	13619	Format changes. Updated configuration information. Added NV8000 and PS8010 material. Removed UniConfig-related material. Updated specifications.	DEM
1.2	16 Jan 08	14014	Cosmetic repairs (pp 34–41).	D.Cox
1.3	21 Oct 08	14426	Updated format. Minor Changes.	DEM
1.4	31 Mar 09	15703	Format change.	DEM
1.5	10 Oct 09	16114	Corrected contact information	DEM

Restriction on Hazardous Substances (RoHS)

Miranda is in compliance with EU Directive RoHS 2002/95/EC governing the restricted use of certain hazardous substances and materials in products and in our manufacturing processes.

Miranda has a substantial program in place for RoHS compliance that includes significant investment in our manufacturing process, and a migration of Miranda product electronic components and structural materials to RoHS compliance.

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Important Safeguards and Notices

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

Warning

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

Symbols and Their Meanings

The lightning flash with arrowhead symbol within an equilateral triangle alerts the user to the presence of dangerous voltages within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance/service instructions.

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

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

The presence of this symbol in or on Miranda equipment means that it has been designed, tested and certified as complying with applicable Underwriter's Laboratory (USA) regulations and recommendations.

The presence of this symbol in or on Miranda equipment means that it has been designed, tested and certified as essentially complying with all applicable European Union (CE) regulations and recommendations.

General Warnings

A warning indicates a possible hazard to personnel which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Heed all warnings on the unit and in the operating instructions.

- Do not use this equipment in or near water.

- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting the equipment inputs or outputs.

- Route power cords and other cables so they are not likely to be damaged.

- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.

- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.

- Do not wear rings or wristwatches when troubleshooting high current circuits such as the power supplies.

- To avoid fire hazard, use only the specified fuse(s) with the correct type number, voltage and current ratings as referenced in the appropriate locations in the service instructions or on the equipment. Always refer fuse replacements to qualified service personnel.

- To avoid explosion, do not operate this equipment in an explosive atmosphere.

- Have qualified service personnel perform safety checks after any service.

General Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- When installing this equipment, do not attach the power cord to building surfaces.

- To prevent damage to equipment when replacing fuses, locate and correct the problem that caused the fuse to blow before re-applying power.

- Use only the specified replacement parts.

- Follow static precautions at all times when handling this equipment.

- This product should only be powered as described in the manual. To prevent equipment damage, select the proper line voltage on the power supply(ies) as described in the installation documentation.

- To prevent damage to the equipment, read the instructions in the equipment manual for proper input voltage range selection.

- Some products include a backup battery. There is a risk of explosion if the battery is replaced by a battery of an incorrect type. Dispose of batteries according to instructions.

- Products that have (1) no on/off switch and (2) use an external power supply must be installed in proximity to a main power output that is easily accessible.

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1. Preface

Chapter 1 provides an overview of the NV8288 and NV8288-Plus User's Guide. The following topics are discussed:

- Chapter Structure
- The PDF Document
- Terms, Conventions and Abbreviations

Chapter Structure

The following chapters provide detailed instructions for all aspects of NV8288 and NV8288-Plus operation:

- Chapter 1, Preface, (this chapter) outlines easy ways to use this guide; provides a list of terms and conventions.
- Chapter 2, Introduction, provides an introduction and general description of the router.
- Chapter 3, Installation, provides installation and connection instructions.
- Chapter 4, Configuration, is a pointer to the *UniConfig User's Guide*.
- Chapter 5, Operation, provides general operation information.
- Chapter 6, Maintenance, provides maintenance information.
- Chapter 7, Technical Details, provides electrical, video, audio, mechanical, and environmental specifications, product drawings, and default settings.
- Chapter 8, Glossary, presents a glossary.
- Appendix A, Part Numbers, presents a list of part numbers for Miranda cables, connectors and cards for the NV8288 and NV8288-Plus.
- An Index is also provided for your reference.

The PDF Document

This guide is provided in PDF format, allowing you to use Acrobat's "bookmarks" to navigate to any desired location. You can also print a hardcopy. Please note:

- Use the Table of Contents or the bookmarks page to jump to any desired section.
- Many hyperlinks are provided within the chapters.
- Use the Index to jump to specific topics within a chapter. Each page number in the index is a hyperlink.

- Use Acrobat's 'Go to Previous View' and 'Go to Next View' buttons to retrace your complete navigational path.

- Use the 'First Page', 'Previous Page', and 'Next Page', and 'Last Page' buttons to go to the first, previous, next, or last page within a PDF file.

Note	To display the navigation buttons, right-click the Tool Bar area, and check 'Navigation'.

- Use Acrobat's extensive search capabilities, such as the 'Find' tool and 'Search' tool to perform comprehensive searches as required.

Terms, Conventions and Abbreviations

The following conventions are used throughout this guide:

- The symbol ▲ denotes either an example or a special message.

- Notes, Cautions and Important messages are presented in note boxes.

- Entries written in bold-face or capital letters denote physical control panel buttons or GUI buttons.

  - Click **Apply** to ...

  - Press the **SRC 12** button.

- Entries in single quotes denote a field name, tab name or label.

  - The AES reference connection is labeled 'AES REF 1'.

2. Introduction

Chapter 2 provides an introduction to the NV8288 and the NV8288-Plus Digital Video Routers. It presents the following topics:

- Product Summary
- Signal Rates and Flow
- Power Supply
- Module Slots and Rear Connectors
- Active Cards
- Frame Expansion

Product Summary

The NV8288 and the NV8288-Plus are high-density digital video routers managing Standard Definition (SD-SDI) and High Definition (HD-SDI) signal routing. The routers can manage SD-SDI separately or SD-SDI and HD-SDI signals combined, referred to as Super Wide Band (SWB) throughout this manual. For signal rates, see Signal Rates and Flow on page 4.

Each router starts with a base configuration that can be increased incrementally, as follows:

- The NV8288 is a standalone router that can manage up to 288 inputs and 576 outputs. The router cannot be connected to other routers. The router allows for configurations as small as 12 inputs and 12 outputs, increasing in increments of 12. Inputs and outputs do not need to be identical in number.

- The NV8288-Plus, as a standalone router, can manage up to 288 inputs and 288 outputs. In addition, the NV8288-Plus has expansion connections enabling two router frames to be connected together to manage up to 576 inputs and 576 outputs. The router allows for configurations as small as 12 inputs and 6 outputs, increasing in increments of 12 inputs and 6 outputs.

The NV8288 and the NV8288-Plus have non-blocking architecture. This feature enables the distribution of incoming signals to none, one, many or all outputs as desired.

Frame Rack

Both the NV8288 and the NV8288-Plus have 10 RU frames, 19″ (482.6 mm) wide and 12″ (305 mm) deep. When placing the router in a rack in your facility, be sure to leave enough space for air flow through the front of the router and within easy access of an AC power source. For installation instructions, see Rack Mount on page 23.

Frame Cooling

The router has two fan trays housing three fans each. The fans draw cooling air from the front of the router, through the door, and exhaust it through the rear of the frame. The router must have the door correctly installed and closed for proper airflow through the chassis.

Caution	If airflow is impeded, overheating can occur.

The fan trays are accessed from the front of the frame: one is located at the top of the chassis and one at the bottom. There are also removable air filters located on the inside of the door assembly. It is recommended that you perform regular maintenance on the fan trays and filters. For more information, see Maintenance on page 57.

Signal Rates and Flow

Both the NV8288 and the NV8288-Plus support SD-SDI and HD-SDI signals. The routers can manage SD-SDI or SWB. The following table lists the SMPTE, re-clocking and pass through rates for each type of signal.

Type	SMPTE	Reclock At	Pass Through
Standard Definition (SD)	259M	143, 177, 270, and 360 Mb/s	10 Mb/s to 540 Mb/s
Standard Definition (SD)	344M	540 Mb/s	10 Mb/s to 540 Mb/s
Super Wide Band (SD and HD combined)	(SD and HD combined)	143, 177, 270, 360, and 540 Mb/s; 1.483 and 1.485 Gb/s	10 Mb/s to 1.5 Gb/s

Signal Flow

The NV8288 and the NV8288-Plus switch incoming signals to designated output connections. Switching is directed by settings configured in the router control system, which sends commands to the control card. In turn, the control card directs how switching occurs on the crosspoint card. For a description of control cards and crosspoint cards, see Active Cards on page 15.

NV8288

The NV8288 is a standalone router that can manage up to 288 inputs and 576 outputs. Figure 2-1 shows the flow of signals in the NV8288. Both top and bottom crosspoint cards receive all incoming signals, up to 288 inputs. The top crosspoint card feeds signals to output cards located in the upper half of the router frame: Outputs 1–144 and 145–288. The bottom crosspoint card feeds signals to output cards located in the bottom half of the router frame: outputs 289–432 and 433–576.
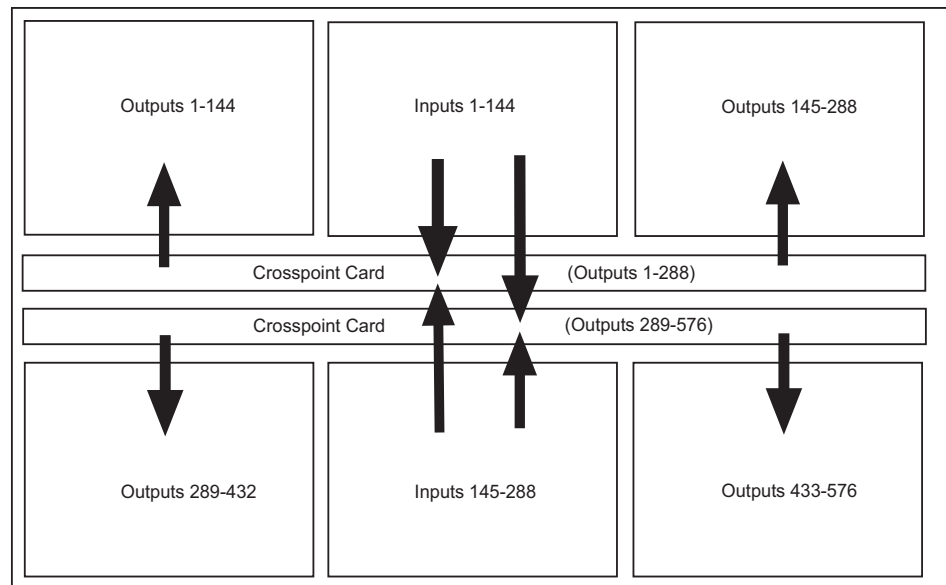
Figure 2-1. Signal Flow for NV8288 (288 inputs and 576 outputs)

NV8288-Plus

The NV8288-Plus may be used as a standalone router capable of managing up to 288 inputs and 288 outputs or be connected to another NV8288-Plus router to double the number of inputs and outputs managed to 576 inputs and 576 outputs.

As a standalone router, all incoming signals are sent to all installed crosspoint card(s). (Only one crosspoint card is required in standalone mode, installed in the top crosspoint slot.) The crosspoint card feeds outgoing signals to all output cards, up to 288 signals.

If two NV8288-Plus routers are connected together (Router 1, Router 2), each router must contain two crosspoint cards, installed in the top and bottom crosspoint slots. On each router, incoming signals are sent to both the top and bottom crosspoint cards. The top crosspoint card feeds signals to all output cards on the local router (router 1), up to 288 signals. The bottom crosspoint card feeds signals to the connected router (router 2), up to 288 signals. This means that both routers are managing up to 288 incoming signals and 288 outgoing signals for a combined total of up to 576 inputs and 576 outputs.

Figure 2-2 shows the flow of signals in the NV8288-Plus when connected to another NV8288-Plus router.
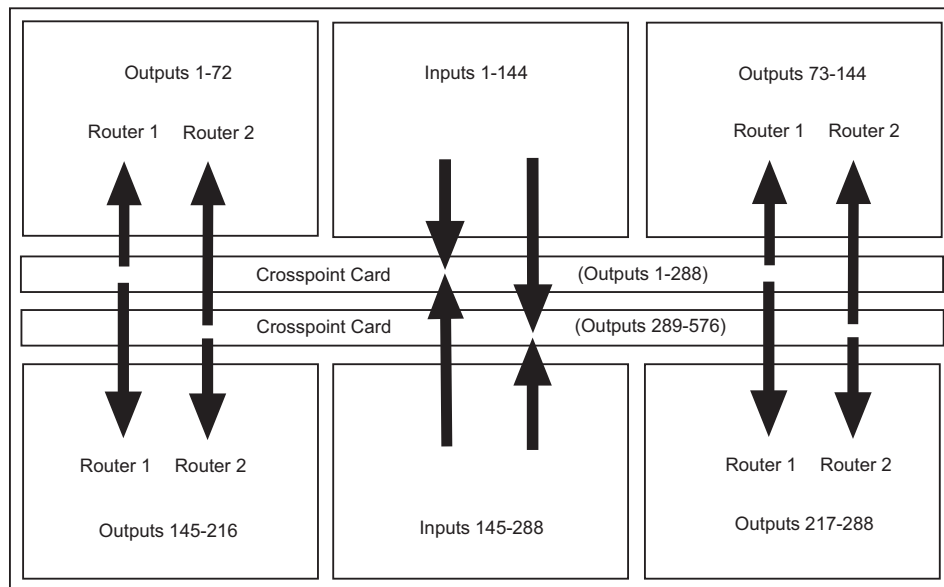

Figure 2-2. Signal Flow for NV8288-Plus (576 inputs and 576 outputs)

Power Supply

The power supply for the NV8288 and the NV8288-Plus is an external, separate frame. There are two external power frames available: the NV6257[1] and the NV8000. Each power supply frame uses a specific power supply module that supplies power to the router frame.

Each external power frame uses the following module:

- The NV6257 uses the PS6000 power supply module and can house up to 8 modules.
- The NV8000 uses the PS8010 power supply module and can house up to 4 modules.

The power supply modules differ in the amount of power produced: The PS6000 produces 660 Watts while the PS8010 produces 875 Watts. Because the PS8010 produces a greater amount of power, fewer modules are needed, reducing the frame size amount of facility space required.

The number of power supply modules required depends on which and how many routers are being used. For redundancy, additional (optional) power supply modules can be installed.

The minimum number of required power supply modules are as follows:

Power Supply	One NV8288	One NV8288-Plus	Two NV8288-Plus Connected
PS6000	4 required, 4 optional	2 required, 2 optional	4 required, 4 optional
PS8010	2 required, 2 optional	2 required, 2 optional	4 required, 4 optional

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1. The NV6257 is older. Newer NV8288 and NV8288-Plus routers ship with the NV8000 power supply.

The PS6000 and PS8010 power supply modules accepts a wide range of AC input voltages and produces five +48 VDC outputs. The power supply automatically senses the AC input voltage (90–130 and 180–250 VAC) and adjusts to maintain a relatively constant DC output; no voltage selection is required.

The five regulated outputs are directed to modules in the router where on-board regulators produce the DC voltages required by the local circuits. Each +48 VDC output powers one of the five green LEDs and output test points located on the front of the PS6000 and PS8010 power supply modules. Under normal operation, all five LEDs are lit. For more information on LEDs, see Indicator LEDs on page 58.

Figure 2-3 shows the PS6000 and the PS8010 power supply module architecture.
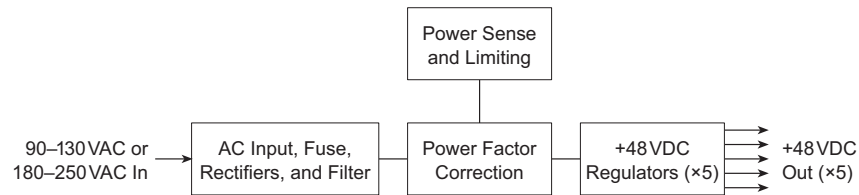

Figure 2-3. Power Supply Module Diagram

For information on making power supply connections, see Making Power Connections on page 24.

Fuses

Fuses for AC power inputs are located on the PS6000 power supply modules. When an NV6257 is ordered, fuses appropriate for line voltage in use at the country of destination are installed on the PS6000 power supply modules. Be sure to check the fuse ratings for compliance with specific requirements in your area. For information on replacing fuses, see Fuse Replacement on page 57.

The PS8010 power supply module has no serviceable fuses.

Power Supply Cooling

There are four low-speed fans located along the front edge of each PS6000 and PS8010 power supply module. They are intended to pull a small quantity of air across the internal heat sinks.

Module Slots and Rear Connectors

The NV8288 and the NV8288-Plus share common hardware features. Both provide slots for housing input, output, monitor, control and crosspoint cards. Similarly, both feature non-interchangeable backplanes that house connectors for incoming and outgoing signals. Both also share common system connections. However, the NV8288-Plus has unique output cards and output signal connections that enable two NV8288-Plus routers to be connected together to create a system capable of managing 576 inputs and 576 outputs.

NV8288

Figure 2-4, next page, shows the front of the NV8288 with the door removed. From this view—in the slots that do not have an active card installed—the backside of installed backplanes and the motherboard connectors are visible. The router features 36 upper bay slots and 36 lower bay slots

for input cards and output cards. In the upper bay are two additional slots for two control cards. In the lower bay are two additional slots for one monitor cardset (composed of two monitor cards). Slots contain color-coded card guides that match the color of the ejector lever on the card that is installed in that slot. For more information, see Active Cards on page 15.

Located in the center of the router are two horizontal slots housing two crosspoint cards. At the top and bottom of the router frame are two removable fan trays.

Each input card slot and output card slot, and the card it holds, manages signals received or distributed through 12 connectors. Each signal is assigned a number that corresponds to the physical input or output connection. This means that Output Slot 1 corresponds to outputs 1-12, Output Slot 2 corresponds to outputs 13-24, and so on, up to 576. Similarly, Input Slot 1 corresponds to inputs 1-12, Input Slot 2 corresponds to inputs 13-24, and so on, up to 288.
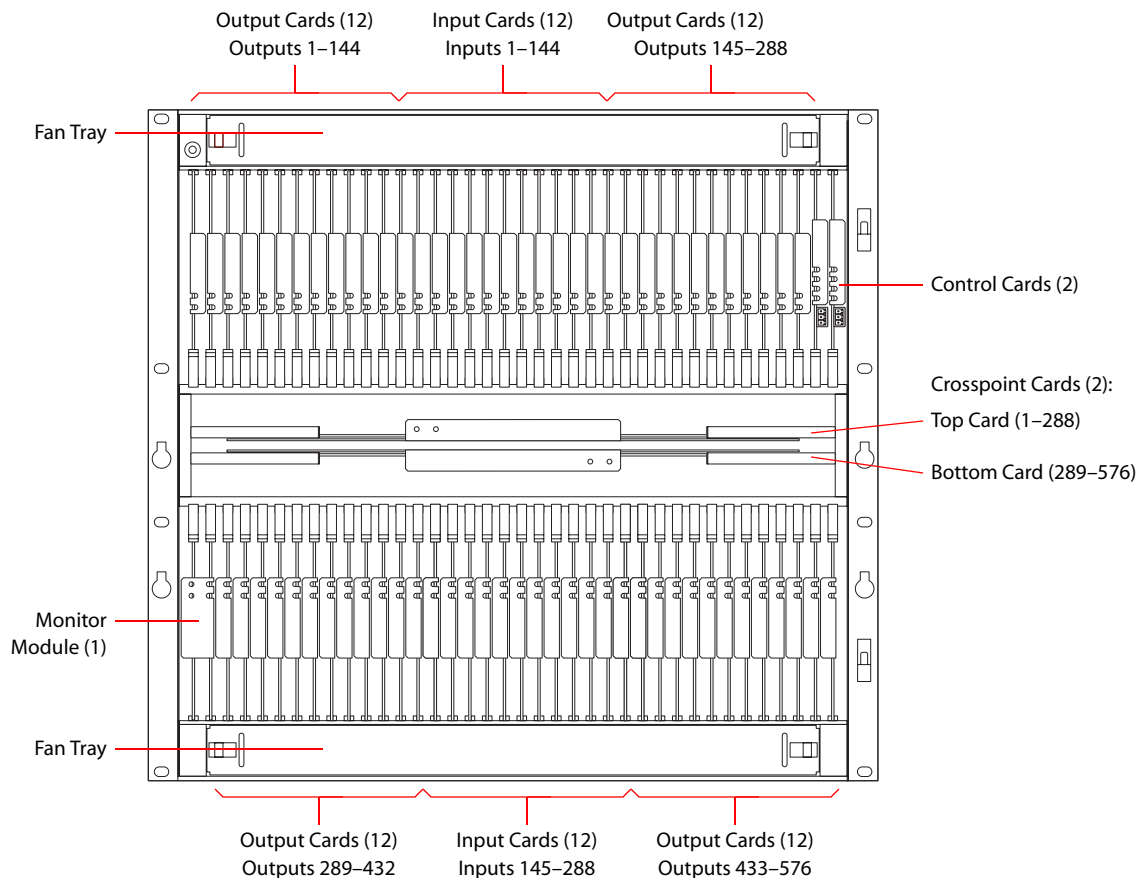

Figure 2-4. NV8288 Router with Door Removed (Front View)

For information on installing cards in module slots, see Installing Active Cards on page 33.

Figure 2-5 shows the rear of the NV8288. The rear contains non-interchangeable backplanes containing 864 I/O DIN 1.0/2.3 connections: 288 for receiving signals and 576 for distributing signals. Note that the outputs and inputs are numbered from right to left because the router is being viewed from the rear.

An additional set of four DIN 1.0/2.3 connections, located in the lower, right quadrant, monitor signals. In the center region are connections for system and power functions, as shown in Figure 2-8 on page 12.
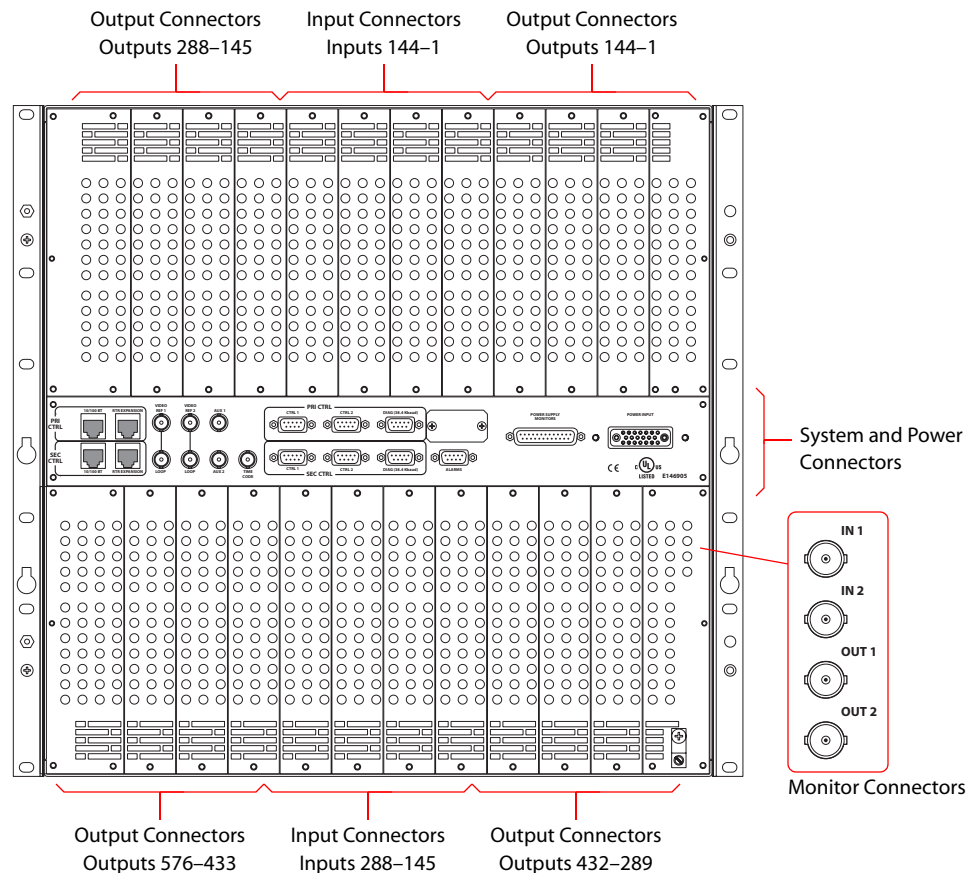
Figure 2-5. NV8288 Router (Rear View)

NV8288-Plus

Figure 2-6 on page 10 shows the front of the NV8288-Plus with the door removed. From this view, in the slots that do not have an active card installed, the backside of installed backplanes and the motherboard connectors are visible. The router features 36 upper bay slots and 36 lower bay slots for input cards and output cards. In the upper bay are two additional slots for two control cards. In the lower bay are two additional slots for one monitor cardset (composed of two monitor cards). Slots have colored guides that match the color of the ejector lever on the card that is installed in that slot. For more information, see Active Cards on page 15.

Located in the center of the router are two horizontal slots housing two crosspoint cards. At the top and bottom of the router frame are two removable fan trays.

Inputs are numbered 1–288 with each card slot, and the card it holds, corresponding to 12 input connections. This means that input slot 1 corresponds to inputs 1–12, input slot 2 corresponds to inputs 13–24, and so on, up to 288.

Outputs are numbered 1–288 also, but each card slot contains two types of output connections: 6 connections for outgoing signals for the local router and one expansion connection for outputs to a connected NV8288-Plus router. This means that output slot 1 corresponds to outputs 1–6, output slot 2 corresponds to outputs 7–12, and so on, up to 288.

If the NV8288-Plus router is used as a standalone router, only the 6 local outgoing signal connections are used. If the router is connected to another NV8288-Plus router, each expansion connection send signals to the connected router, as follows: output slot 1 sends outputs 289–294 to the connected router, output slot 2 sends outputs 295–300 to the connected router, and so on, up to 576. Similarly, the connected router sends outputs to the local router in the same manner, doubling outputs. Inputs are also doubled, so that the two routers have a combined total of 576 inputs and 576 outputs.
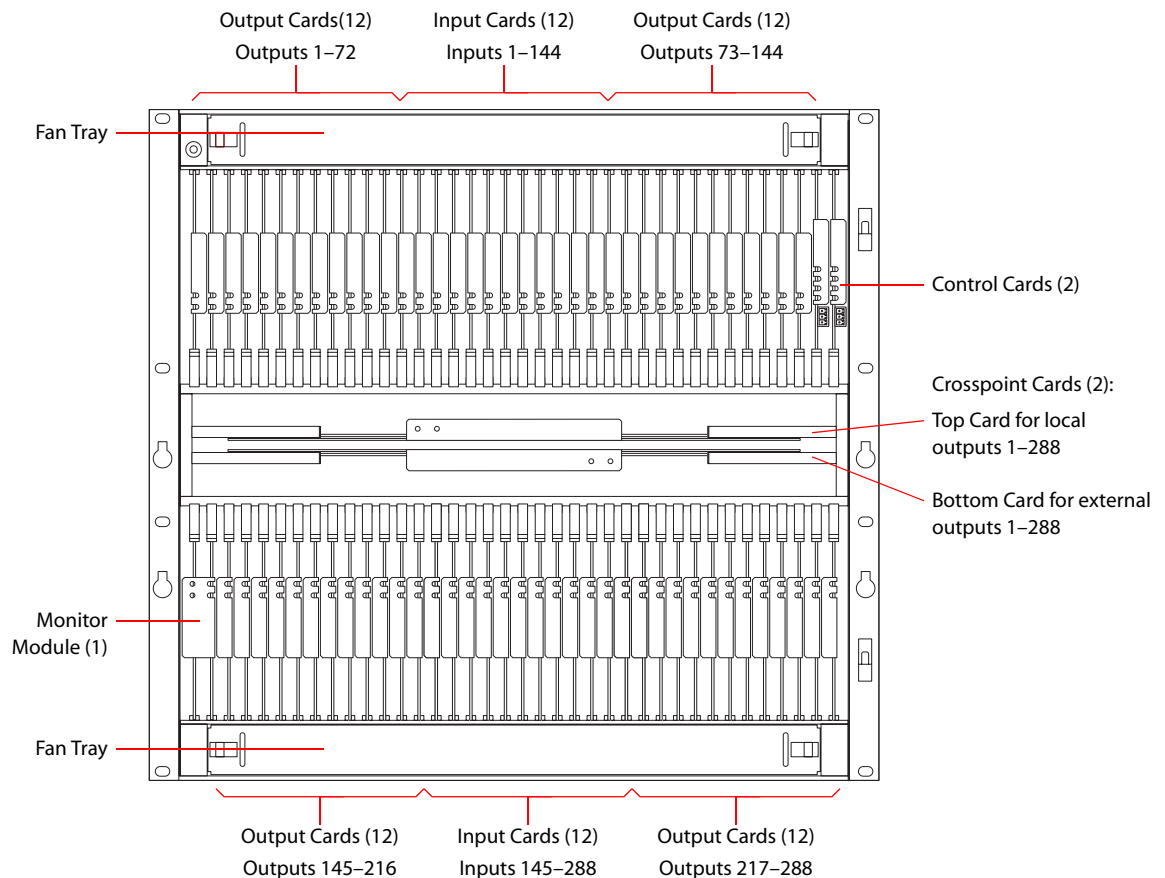

Figure 2-6. NV8288-Plus Router with Door Removed (Front View)

For information on installing cards in modules slots, see Installing Active Cards on page 33.

The rear of the NV8288-Plus (Figure 2-7, next page) features non-interchangeable backplanes containing 288 I/O DIN 1.0/2.3 connections for receiving signals and 288 DIN 1.0/2.3 connections for distributing signals, plus 48 expansion connections for sending signals between two connected NV8288-Plus routers. By connecting two routers you can receive and distribute up to 576 signals. Note that the outputs and inputs are numbered from right to left because the router is being viewed from the rear.
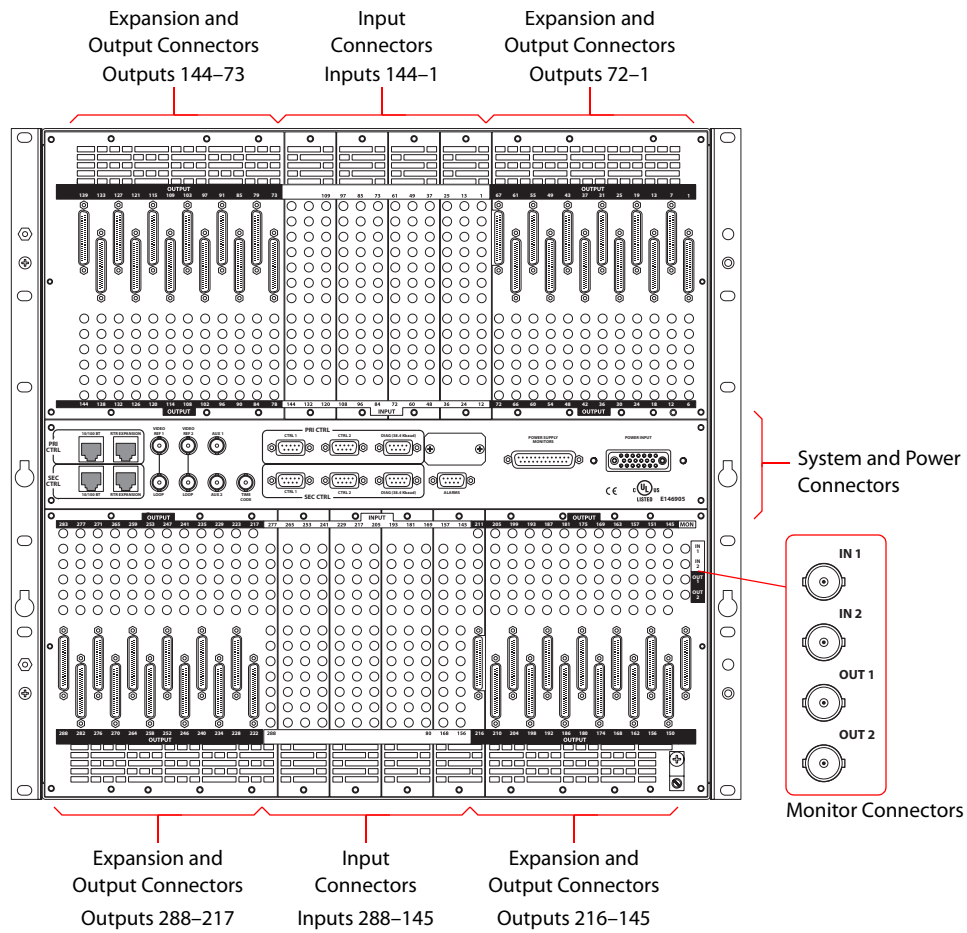
Figure 2-7. NV8288-Plus Router (Rear View)

System Connections

Both the NV8288 and the NV8288-Plus feature connections for managing system functions. These connections enable you to connect to:

- A router control system using either Ethernet or serial connectors.
- A stable source of video signal for reference purposes.
- The UniConfig application, installed on a PC, used to perform configuration tasks.
- The system alarm that sends notification of a system failure, such as a fan malfunction or power supply failure.
- The NV6257 or the NV8000 power supply. (See Making Power Connections on page 24.)

Figure 2-8 shows the system and power connections. The 'AUX' and 'TIME CODE' connections are not used at this time and not discussed in this manual.

2. Introduction

Ethernet, to control system — Video Ref. — Serial Control (to Control System — Power Supply Monitor (from NV6257)

Expansion port, to other router (NV8288-Plus only) — Aux, Time Code Ref. (Not Used) — Diagnostic Ports — System Alarms — Power Connection (from NV6257)
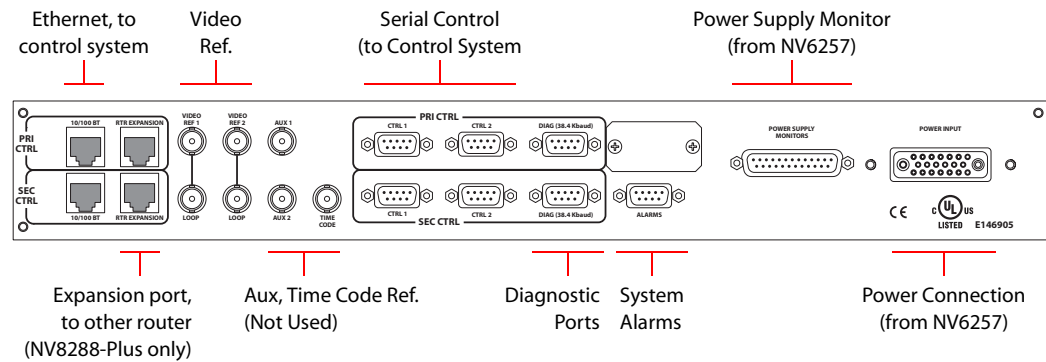
Figure 2-8. System and Power Connections for the NV8288 and the NV8288-Plus (Rear View)

Router Control System Connections

Router control systems are usually run on a separate PC, which is then connected to the router. The router provides two different ways to connect to a router control system: serial or Ethernet. The router control system being used determines which connection is used. For example, to connect to the NV9000 control system an Ethernet connection is preferred.

Serial Control Connections

The router has four serial ports, as shown in Figure 2-9. The ports are divided into two sets, one primary ('PRI CTRL') and one secondary ('SEC CTRL'). Primary control is the connection to the primary control card. Secondary control is the connection to the secondary (optional for redundancy) control card. Each set is further divided into connections that correspond to router control systems: 'CTRL 1' corresponds to the primary control system and 'CTRL 2' corresponds to an alternate control system. Using 'CTRL 2' connections, you can connect to an alternate control system (i.e., backup system) or set up dual control, if desired. For installation instructions, see Serial Control Connections on page 38.
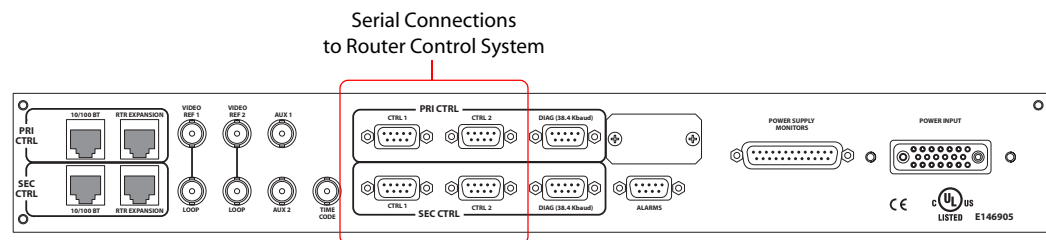

Serial Connections to Router Control System

Figure 2-9. Serial Connections to Router Control System (Rear View)

Ethernet Control Connections

The router has two Ethernet ports labeled '10/100BT', as shown in Figure 2-10 on page 13. The ports are divided into two sets, one primary ('PRI CTRL') and one secondary ('SEC CTRL'). Primary control is the connection to the primary control card. Secondary control is the connection to the secondary (optional for redundancy) control card. One port is for *primary* control ('PRI CTRL'), connecting the local router to the control system. Unlike serial connections, there are no connections to alternate control systems because you can connect to alternate control systems using Ethernet network connections. For installation instructions, see Ethernet Control System Connections on page 40.

In order for the router to communicate with the router control system through an Ethernet connection, an IP address for the router needs to be set in the control card. The IP address is set using Uni-

Config. However, UniConfig is also run on a PC and similarly cannot communicate with the router until an IP address is entered. Therefore, a connection to the PC running UniConfig needs to be created using a serial connection: serial. (See Serial Control Connections on page 38.)
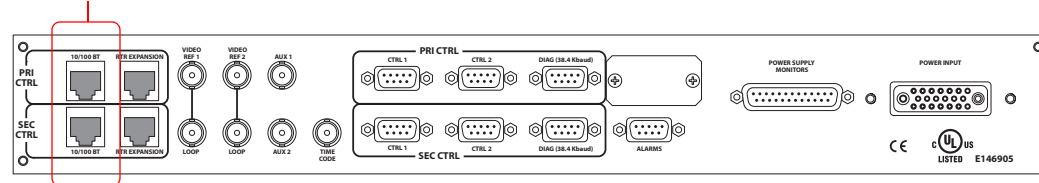
Ethernet Connections
to Router Control System

Figure 2-10. Ethernet Connections to Router Control System (Rear View)

Control System Expansion Connections

In order to manage two connected NV8288-Plus routers, control system expansion connections need to be connected between the routers. Expansion control system connections are located on the rear of the router, as shown in Figure 2-11.

When making control system connections, only one router is directly to the control system. This router acts as the *primary* router. When making control system expansion connections, connections from the remaining router, the *secondary* router, are made to the *primary* router. This enables the router control system to communicate with both routers through the primary router.

There are two control system expansion connections, labeled 'RTR Expansion'. The ports are divided into two sets, one primary ('PRI CTRL') and one secondary ('SEC CTRL'). Primary control is the connection to the primary control card. Secondary control is the connection to the secondary (optional for redundancy) control card. One port is for *primary* control ('PRI CTRL'), connecting the local router to the control system.

For instructions on making control system expansion connections, see Control System Expansion Connections on page 40.
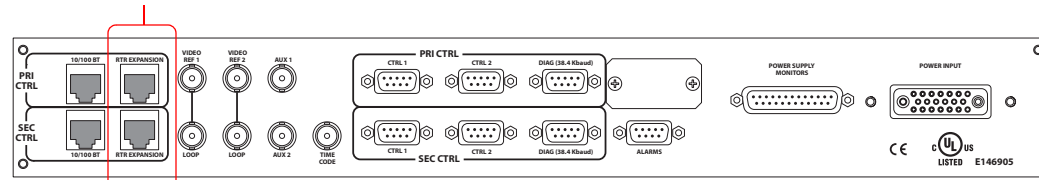
Expansion Connections
to Other Router

Figure 2-11. Expansion Control System Connections (Rear View)

Diagnostic Connections

The diagnostic connections enable the router to communicate with the UniConfig application. UniConfig runs on a PC separate from the router and is used to perform system setup tasks, and configure and monitor the router. (See Configuration on page 53.) For information about using UniConfig, see the UniConfig User's Guide.

Diagnostic connections connect the router to the PC running the UniConfig application. Two diagnostic connections are located on the rear of the router, labeled 'DIAG'. The ports are divided into two sets: one primary ('PRI CTRL') and one secondary ('SEC CTRL'), as shown in Figure 2-12. The primary control connects to the primary control card. The secondary control connects to the secondary (optional for redundancy) control card.

For instructions on making diagnostic connections, see Making Diagnostic Connections on page 41.
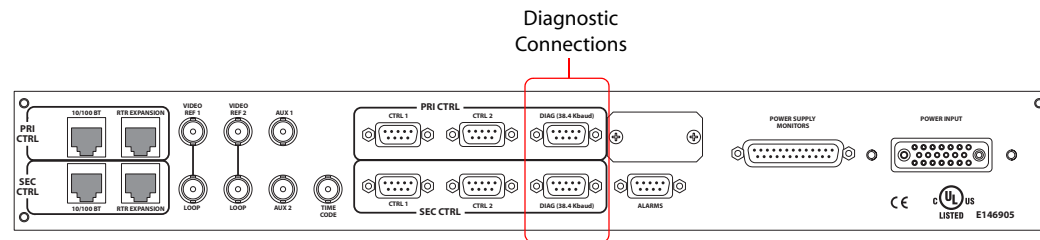

Figure 2-12. Permanent Diagnostic Connections (Rear View)

Video Reference

The NV8288 and the NV8288-Plus provide timing reference connections for video signals, labeled 'VIDEO REF 1' and 'VIDEO REF 2', as shown in Figure 2-13 on page 14. Located on the rear of the router, these connections provide a reference input for determining the router's video frame switch point. The video reference connections require a stable source of PAL, NTSC or Tri-level sync.

If a video reference is present, signals switch at the defined frame and line switch points. If a video reference is not present, the router still performs the switch, but to an internal reference. If a video reference is not connected, the control card displays a lit red LED. (See Indicator LEDs on page 58.) For instructions on making video reference connections, see Making Video Reference Connections on page 43.

Redundant and Dual References

There are two video reference connections. The same reference can be used for both connections or a different reference for each connection. When using the same, or "redundant," references for both connections, if one reference fails, the control card fails-over to the redundant reference. When using different references, or "dual" references, switch takes can occur based on one or the other reference. For example, if 'VIDEO REF 1' uses NTSC as a reference and 'VIDEO REF 2' uses PAL as a reference. Using UniConfig, the type of setting is selected: redundant or dual, and if dual, which outputs reference which video reference on an output by output basis. (See the *UniConfig User's Guide*.)
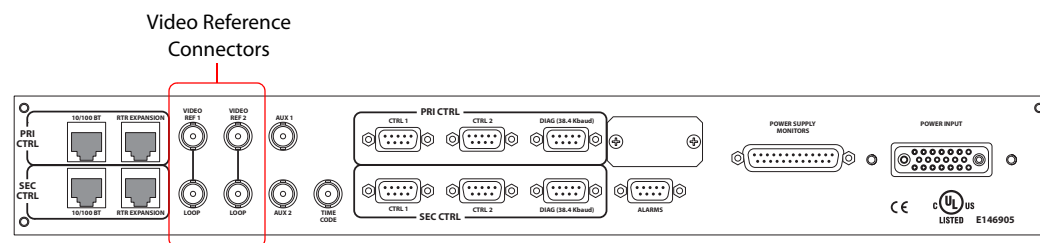

Figure 2-13. Connections to Video References (Rear View)

System Alarm

The NV8288 and the NV8288-Plus provide a system alarm that sends notification a malfunction, such as when a fan or power supply is not functioning properly. The NV6257 (power supply) and the NV8288 each have alarm connections that can be connected to external equipment that display visual signals when an alarm is activated. Creation of an external alarm indicator is outside the

scope of this manual, however basic instructions on wiring the alarm connection for external moni-toring is provided. See External Alarm Indicators on page 48.

In addition to an alarm connection, the NV8288 is connected to a router control system that receives status information from the router's control card(s). (See Router Control System Connec-tions on page 12.) The control card reads the status of NV6257's power supply and fans through the 'Power Supply Monitors' connection. (See Power Supply on page 6.) In addition, the control card monitors the router's power supply, fans, and video reference connections. Both NV6257 and router information is communicated to the router control system and viewable using UniConfig. (See the *UniConfig User's Guide*.)

The alarm connection is labeled 'ALARM' and is located on the rear of the router, as shown in Figure 2-14. For instructions on making alarm connections, see Making Alarm Connections on page 47.
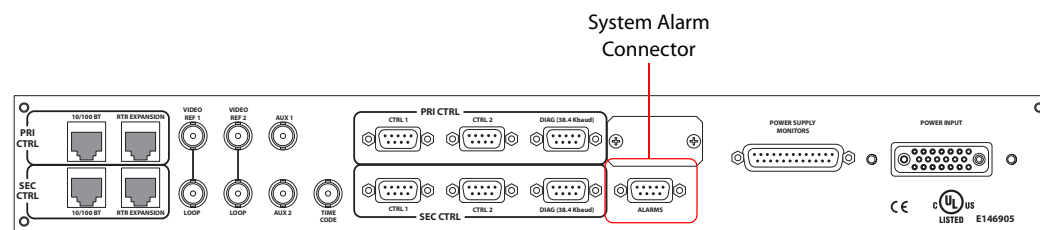

Figure 2-14. System Alarm Connection (Rear View)

Active Cards

The NV8288 and the NV8288-Plus feature several active cards that manage incoming signals, for-warding of commands from the control system, perform signal switching, and distribute outgoing signals. Each card has a colored ejector lever that matches the colored card guide on the slot into which the card is installed.

The NV8288 and the NV8288-Plus both feature:

- 1 or 2 control cards (one optional for redundancy)

- 24 input cards

- 48 output cards

- 1 or 2 crosspoint cards (depending on configuration)

- 1 monitor cardset (composed of 2 cards)

Each card and function is described in the following section. For information on installing cards, see Installing Active Cards on page 33.

Control Cards

The router has two control cards (EM0529), one primary and one secondary (optional for redun-dancy). Each card receives commands from the control system (e.g., NV9000), and in turn, controls the input, output, crosspoint and monitor cards. Only one control card is active at a time, with the active card updating the stand-by card.

The control card includes a status reporting circuit. Four LEDs on the front of the control card indicate the card's status: low battery (Red), alarm (Red), active (Amber) and "healthy" (Green). For more information, see Indicator LEDs on page 58.

Input Cards

The router frame can house up to 24 standard input cards, each processing up to 12 SD-SDI or 12 SWB signals. Input cards receive incoming signals through connections on I/O backplanes and feed outputs to the crosspoint cards.

There are two types of input cards available, one for incoming SD-SDI signals and one for incoming SWB signal. Both the NV8288 and the NV8288-Plus can have either input card installed. Each card is listed by the type of signal it manages — SD or SWB. For your convenience, the part number for each card has been included. For a detailed description of a card's function, see Input Card Functions, following.

Input Card Category	Signal Type	Standard (SMPTE)	Rates	Part Number
Standard	SD	259M 344M	143, 177, 270, 360, and 540 Mb/s	EM0530
Standard	SWB	259M 344M 292M	143, 177, 270, 360 and 540 Mb/s; 1.483 and 1.485 Gb/s	EM0531

Input Card Functions

Both input cards contain 12 cable equalizers. Each cable equalizer equalizes the signal and distributes two copies of the signal to the motherboard. The motherboard forwards copies to all installed crosspoint cards. Because all incoming signals are sent to all crosspoint cards, an incoming signal can be distributed to any or every output card.

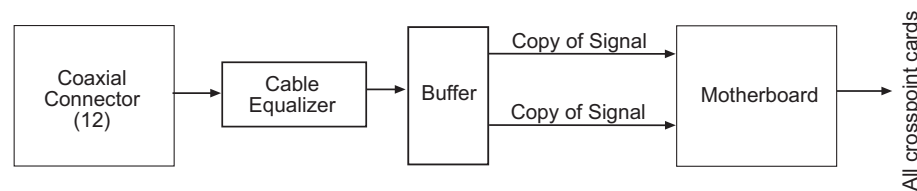Figure 2-15 shows the flow of a signal through the SD-SDI and SWB input card.

Figure 2-15. Input Card Block Diagram

Status Reporting

All input cards feature a circuit that performs status reporting and drives the card's functions. Two LEDs on the front of the input card indicate the card's status: alarm (Red), power good (Green). Three additional LEDs situated further back on the card indicate if software is loaded (Amber), if there is good communication with the control card (Green) or bad communication with the control card (Red). For more information, see Indicator LEDs on page 58.

Crosspoint Cards

Crosspoint cards (EM0534) receive signals from the input cards (via the motherboard) and commands from the control card. The crosspoint card then performs switching as directed, sending sig-

nals to the output cards (via the motherboard). Each crosspoint card can receive and distribute up to 288 signals.

The router can house up to two crosspoint cards. A second crosspoint card is only required to support outputs greater than 288. All installed crosspoint cards receive all incoming signals. (See Input Cards on page 16.)

Depending on the router being used, crosspoint cards send signals to output cards, as follows:

• NV8288—The top crosspoint card feeds signals to the output cards located in the upper half of the frame (outputs 1–288). The bottom crosspoint card feeds signals to the output cards located in the lower half of the frame (outputs 289–576). See Figure 2-1 on page 5.

• NV8288-Plus—If two routers are connected, the top crosspoint card feeds signals to all output cards on the local router (Outputs 1-288). The bottom crosspoint card feeds signals to the connected router (Outputs 289-576). If the router is not connected to a second router, the router only manages local Outputs 1-288. See Figure 2-2 on page 6.

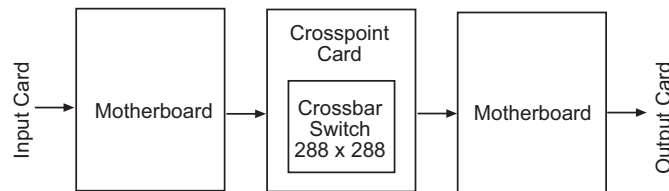Figure 2-16 shows the flow of signals through the crosspoint card:

Figure 2-16. Crosspoint Card Block Diagram

The crosspoint card includes a status reporting circuit. Five LEDs on the front of the crosspoint card indicate the card's status: alarm (Red), power good (Green), FPGA loaded (Amber), good communication with the control card (Green) and bad communication with the control card (Red). For more information, see Indicator LEDs on page 58.

Output Cards

The router frame can house up to 48 output cards, each processing up to 12 SD or 12 SWB signals. There are two types of output cards: standard and filler. The NV8288 uses the filler output card only. The NV8288-Plus uses the standard output card only.

The filler output card manages signals distributed to the coaxial connections. The standard output card manages signals distributed to the coaxial connections and to the expansion connections when two NV8288-Plus routers are connected together.

The following is a list of the different output cards available. Each card is listed by the function it performs (category)—filler or standard—and the type of signal it manages—SD-SD or SWB. For your convenience, the part number for each card has been included. For a detailed description of a card's function, see Output Card Functions on page 18.

Input Card	Signal Type	Standard (SMPTE)	Rates	Part
Filler	SD	259M 344M	143, 177, 270, 360, and 540 Mb/s	EM0532
Filler	SWB	259M 344M 292M	143, 177, 270, 360, and 540 Mb/s; 1.483 and 1.485 Gb/s	EM0533

Input Card	Signal Type	Standard (SMPTE)	Rates	Part
Standard	SD	259M 344M	143, 177, 270, 360, and 540 Mb/s	EM0540
Standard	SWB	259M 344M 292M	143, 177, 270, 360, and 540 Mb/s; 1.483 and 1.485 Gb/s	EM0541

Output Card Functions

Output cards process up to 12 incoming signals. The functions of each type of card are described in the following sections. Outputs cards are organized by category — filler or standard.

Filler

The NV8288 uses filler output cards. There are two types of filler output cards: one for outgoing SD-SDI signals (EM0532) and one for outgoing SWB signals (EM0533). Both types of cards receive 12 inputs from the crosspoint card and contain 12 re-clockers. The re-clocker creates two copies of the input, feeding one output to a cable driver and one output to a 12×1 MUX. The cable driver forwards the output to the coaxial connector to distribute outgoing signals. The Mux sends the output to the motherboard, which in turns forwards the output to the monitor cardset for monitoring.

Figure 2-17 shows the flow of a signal through the filler output card. For signal re-clocking rates, see [Signal Rates and Flow](#) on page 4.
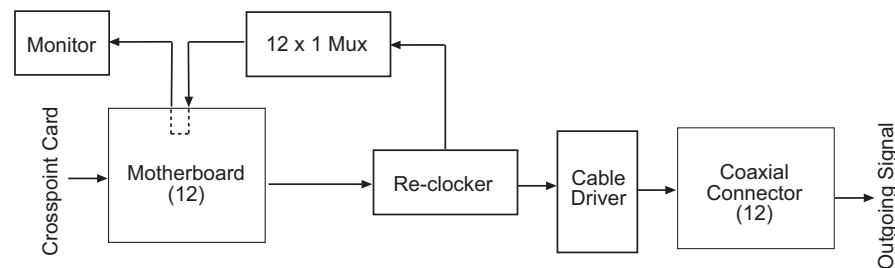

Figure 2-17. Filler Output Card Block Diagram

Standard

The NV8288-Plus uses standard output cards. There are two types of standard output cards: one for SD signals (EM0540) and one for SWB signals (EM0541). Each card receives 6 inputs from the top crosspoint card (via the motherboard). The inputs are fed to a 2×1 MUX, which forwards the input to one of 6 re-clockers. The re-clocker creates two copies of the input, feeding one output to a cable driver and one output to a 6×1 MUX. The cable driver forwards the output to the coaxial connector to distribute the outgoing signals. The Mux sends the output to the motherboard, which in turns forwards the signal to the monitor cardset for monitoring.

When two NV8288-Plus routers are connected together, the top crosspoint card distributes 6 signals as described above, sending one copy to the local coaxial connectors and one copy to the local monitor cardset. In addition, the bottom crosspoint card on the local router forwards 6 signals to a cable driver. The cable driver feeds the outputs to the expansion connection for distribution to the connected router. At the same time, the connected router sends 6 signals to the local router through the expansion connections. Signals arriving from the connected router through the expansion connections are forwarded to one of 6 cable receivers. The cable receivers forward the signal to the

local 2×1 Mux, which in turn feeds the signals to one of 6 reclockers. The reclocker creates two copies of the input, feeding one output to a cable driver and one output to a 6×1 MUX. The cable driver forwards the output to the coaxial connector to distribute outgoing signals. The Mux sends the output to the motherboard, which in turns forwards the signal to the monitor cardset for monitoring.

Standard output cards on the local router and standard output cards on the connected router "mirror" each other, performing identical tasks. To illustrate, the standard output cards receive and distribute signals as follows, where Router 1 is the local router and Router 2 is the connected router:

- Router 1 receives 6 signals from the top crosspoint card (one copy of the local input). These signals are sent to both the monitor cardset and to coaxial connectors as outgoing signals

- Router 1 receives 6 signals from the bottom crosspoint card (one copy of the local input). These signals are sent to the expansion connections and forwarded to Router 2.

- Router 1 receives 6 signals from Router 2 through the expansion connections.

- At the same time, Router 2 performs the exact same tasks Router 1 is performing.

Figure 2-18 shows the flow of a signal through the standard output card. For signal re-clocking rates, see Signal Rates and Flow on page 4.
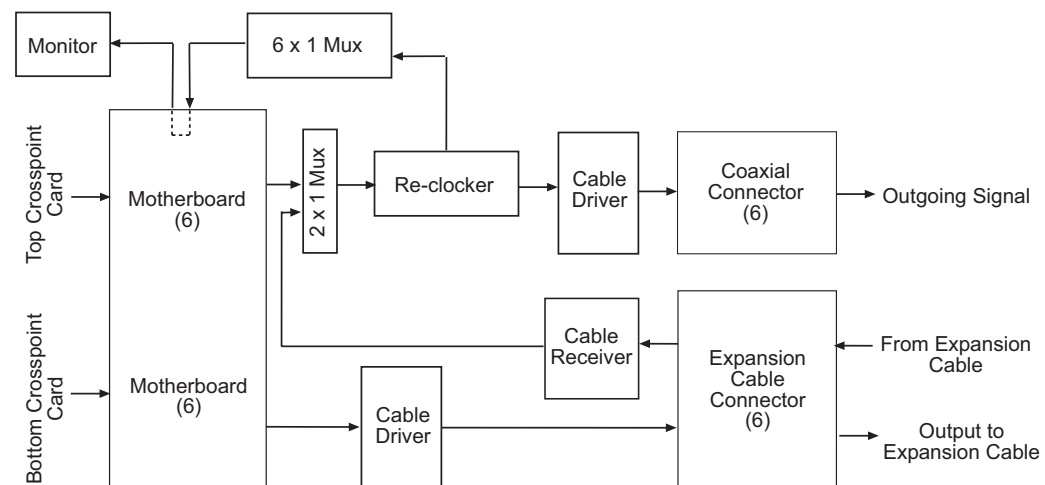

Figure 2-18. Standard Output Card Block Diagram

Status Reporting

All output cards feature a circuit that performs status reporting and drives the card's functions. Five LEDs on the front of the output card indicate the card's status: alarm (Red), power good (Green), FPGA loaded (Amber), good communication with the control card (Green) and bad communication with the control card (Red). For more information, see Indicator LEDs on page 58.

Monitor Card Set

A monitor cardset (EM0546), composed of two cards, receives one signal from each output card and then sends two outgoing signals. These outgoing signals can be sent to monitoring equipment for the purpose of monitoring outgoing signal quality.

There are two monitor connections: one for SD signals and one for SWB signals. Using UniConfig, you can set up a SD level and a SWB level and monitor both simultaneously through the control system. For more information on setting up levels, see the UniConfig User's Guide.

When two NV8288-Plus routers are connected together, the two monitor outputs from one router are forwarded to the two monitor inputs on the second, connected router through monitor expansion connections. This enables the monitoring of all outgoing signals from both routers through a single set of monitoring connections.

For information on making monitor connections, see Making Monitor Connections on page 44.

Frame Expansion

Using the NV8288-Plus router, you can connect two router frames together to create a switching matrix up to 576 inputs and 576 outputs. The two frames are linked by connecting several expansion connections on one router to expansion connections on the second router.

The expansion connections are:

- I/O Signals—Each frame has 48 signal expansion connections. Connections are made between the two routers. All 48 connections must be connected. See Signal Expansion Connections on page 35.

- Control System—One router is connected directly to the router control system. Using control system expansion connections, control system connections are also made between the two routers. This enables the control system to see both routers through one control system connection. See Control System Expansion Connections on page 40.

- Monitoring Equipment—One router is connected directly to the monitoring equipment. Using monitor expansion connections, monitor connections are also made between the two routers. This enables the monitoring equipment to see both routers through one monitor connection. See Monitor Expansion Connections on page 45.

Each router must have two crosspoint cards installed. (See Crosspoint Cards on page 16.) When two frames are connected together, the top crosspoint card on each router sends output signals to all distributing I/O connections. The bottom crosspoint card on each router sends output signals to the connected router (i.e., Router 1 sends signals to Router 2; Router 2 sends signals to Router 1). For more information on how signals flow within and between connected routers, see NV8288-Plus on page 5.

Figure 2-19 shows the flow of signals between two connected routers. The signals are forwarded to the connected router through the expansion output cards. For details on how the expansion output cards manage inputs from the expansion connections, see Standard on page 18.
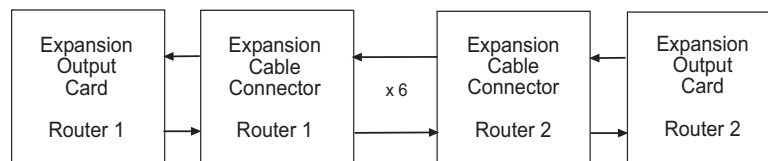

Figure 2-19. Frame Expansion Diagram

3. Installation

Chapter 3 provides installation and connection instructions. It presents the following topics:

Summary

When setting up the NV8288 or the NV8288-Plus for the first time, or reconfiguring, there are certain steps that must be performed. It is recommended that initial installation and later reconfiguration tasks be performed in a specific order to avoid possible complications.

Perform installation and reconfiguration tasks in the following order:

1 Mount the router in a rack. If reconfiguring, skip this step if the router is already rack mounted and not being remounted. See Rack Mount on page 23.

2 Connect power, being sure to install PS6000 modules *after* power is connected. See Making Power Connections on page 24.

3 Install active cards in the appropriate front card slots. If reconfiguring, removed cards and reinstall in the newly desired slots. Make sure that the appropriate backplane is installed for each active card. See Installing Active Cards on page 33.

4 Make connections between the source of incoming signals and the destination of outgoing signals, and the router. If reconfiguring, change signal connections to match new backplane and active card configuration. See Making Signal Connections on page 34.

5 Make connections between the router and the router control system. If reconfiguring, skip this step if all necessary router control system connections are still adequate. See Making Router Control System Connections on page 38.

6 Make permanent or temporary diagnostic connections. Diagnostic connections enable the router and UniConfig to communicate. This is important when initially configuring the router and any time the router is reconfigured. See Making Diagnostic Connections on page 41.

7 Make connections to signals acting as references for video signals. If reconfiguring, verify that all necessary reference connections are made for the signals being routed. See Making Video Reference Connections on page 43.

8 Make connections to monitoring equipment so that outgoing signals can be monitored for quality and consistency. See Making Monitor Connections on page 44.

9 Connect the alarm connection on the router to an external indicator. If reconfiguring, skip this step if alarm connections are still adequate. See Making Alarm Connections on page 47.

10 Install UniConfig. If you are reconfiguring, you do not have to reinstall UniConfig. Please refer to the *UniConfig User's Guide*.

Package Contents

When your NV8288 or NV8288-Plus products from Miranda arrive, immediately inspect the shipping container for any obvious damage. If there is any container damage, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

As the shipping container is unpacked, look for the packing slip and compare it against the contents to verify that everything ordered was received. If anything is missing (or if you find equipment damage unrelated to shipping), please contact Miranda. For Technical Support contact information, see Technical Support Contact Information on page iii.

The package does not contain the mounting rack, network cables, video cables, mounting screws, or grounding wire.

Note	The NV8288 and the NV8288-Plus use a separate power supply frame (NV6257 or NV8000).

This document does not address the shipment or installation of any other equipment or software that can be used in conjunction with the routers, including control systems or configuration software.

Preparing for Installation

You will need the following items before getting started:

□ A PC running Windows® 2000 or higher, or Windows XP Professional.® This PC is required for system configuration.

PC hardware requirements:

□ CD drive.

□ EIA-232 serial COM port (DE9) capable of operating at 38.4kbps.

□ 10BaseT or 10/100BaseT (preferred) Ethernet port.

☐ 100 MB/s Ethernet switch with at least 4 ports.

☐ Ethernet cables (category 5) with RJ-45 connectors.

☐ EIA-232 serial cable with DE9 connectors, wired straight-through, male to female.

☐ Coaxial cable and 75 ohm BNC connectors.

☐ Belden 1855a, or equivalent, cable and DIN 1.0/2.3 connectors.

☐ Reference video source (BNC) at the line rate appropriate for your system.

☐ (Optional) Tool for connecting DIN 1.0/2.3 connectors.

☐ Frame rack suitable for mounting the router.

Depending on the nature of your usage, you will also need an assortment of video cables, video sources, video monitors, and tools.

Rack Mount

The NV8288 router, the NV8288-Plus router, and the NV6257[1] and the NV8000 power supply, which provides power to the router, are designed to mount in a 19″ (482.6 mm) EIA rack. Although it is not required that both the router and power supply be mounted in the same rate, for simplicity this manual assumes only one rack frame is being used.

How to Rack Mount the Router and the Power Supply

1 Determine the placement of the router frame and power supply frame in the rack, and the rack in the facility. When placing the frames and rack, keep in mind the following requirements (For details, see Frame Rack on page 3):

The router requires 22 RUs of vertical space.

The power supply requires additional vertical space: the NV6257 requires 5 RUs and the NV8000 requires 3 RUs.

Be sure to locate the rack near an accessible AC source power outlet. The AC source is used to power the power supply, which supplies power to the router.

To ensure proper cooling, leave space for unrestricted air flow through the front of the router, and a minimum of six inches clearance at the rear where the cooling fans are located.

2 Locate the power supply frame, NV6257 or NV8000, whichever you are using.

3 If the power supply frame was shipped with the power supply modules in the frame , remove the modules (PS6000 or PS8010).

Important	Do not reinstall the power supply modules until *after* power is connected. See Making Power Connections on page 24.

4 Lift the power supply frame into position and attach the power supply frame to the front of the rack with the appropriate screws. Be sure to place screws in all frame mounting screw holes.

5 Locate the router frame.

---

1. The NV6257 is older. The NV8288 and NV8288-Plus routers now ship with NV8000 power supplies.

6 Remove the front door by turning the retaining screws counter clockwise, opening the door, and lifting it free of the hinges.

Caution	Do **not** use the front door handle to lift the entire frame. Doing so may damage the door.

7 If the router was shipped with the circuit boards and fan trays in the frame, consider removing them to make the frame lighter for installation. If removing circuit boards, be sure to make a note of which card was installed in which slot for later reinstallation.

Caution	Handle all circuit boards with care. Be sure to use electrostatic discharge (ESDI) protection and place the circuit boards in ESDI bags or on an ESDI surface.

8 Lift the frame into position and attach the router frame to the front of the rack with the appropriate screws. Be sure to place screws in all frame mounting screw holes.

Caution	An equipment jack or two people are required to lift and install the router frame. The router frame is considered too heavy for one person to lift and install in the rack.

9 If removed, reinstall the fan trays in the fan slots at the top and bottom of the router. The tray is inserted right-side up.

10 If removed, reinstall circuit boards. Be sure to install them in the correct location. For installation instructions, see Installing Active Cards on page 33.

11 Reinstall the front door.

Making Power Connections

The power supply for the NV8288 and the NV8288-Plus router is a separate external frame: either the NV6257 or the NV8000. The NV6257 uses the PS6000 power supply module (660 Watts; the NV8000 uses the PS8010 power supply module (875 Watts). For the NV6257, the number of power supply modules installed in the power supply frame depends on the type of router and if two routers are being connected together. For the NV8000, one power supply frame is required for each router and each router requires two PS8010 power supply modules (plus two modules for redundancy). For a list of how many power supply frames and modules are required, see Power Supply on page 6.

When you are connecting either the NV6257 or NV8000 to a router, and the power supply frame to power, two types of connections are made between the router and the power supply frame: (1) power and (2) monitoring. The specific cables to use depend on which router is being connected to the power supply, and whether two routers are being connected together.

All connectors and cables are provided by Miranda except for the "Y" monitoring cable. The following is a list of cables and connectors and the corresponding part name/number:

Power Supply Frame	One NV8288	One NV8288-Plus	Two NV8288-Pluses Connected
NV6257	One WC0087 power supply ("Y") cable and one WC0046 monitor cable.	One WC0085 power supply cable and one WC0046 monitor cable.	Two WC0085 power supply cables and a "Y" monitor cable.[1]
NV8000	One WC0096-00 power supply cable, one WC0097 adapter cable, and one WC0046 monitor cable. One set for each router.		

1. Miranda does not supply the "Y" monitor cable at this time. For instructions on creating a "Y" cable, see Creating a "Y" Monitor Cable on page 32.

Power Supply Monitor and Alarm Connections

The NV6257 and the NV8000 have DB25 connections, located on the rear, that carry alarm and temperature signals to the router for monitoring purposes. When two NV8288-Plus are connected together, this monitoring information needs to be communicated to each router. Because one NV6257 can power two routers, each router is connected to the single NV6257 monitor connection using a "Y" cable. (See How to Connect a Single NV6257 to Two NV8288-Plus Frames on page 29.)

For the NV8000, one router is powered by one NV8000 and each router is connected to the monitor connection on its own NV8000 power supply. Using a loop-through connection, monitoring information can be passed between the two NV8000 power supplies. (See Connecting Two NV8000s for Power Supply Monitoring on page 31.) Monitor connections are made at the time power is connected.

The NV6257 and the NV8000 also have a connection, labeled 'Alarms', that presents isolated alarm signals that can be connected to GPI circuits or external alarm indicators. For information on connecting NV6257 or NV8000 alarms connections, see Making Alarm Connections on page 47.

Power Cords and Branch Circuits

For added protection in the event of a mains power failure, it is recommended that each power cord connected to the NV6257 or the NV8000 be connected to a separate branch circuit. A wire bail can be used to hold the power cable in place to reduce the possibility of an accidental disconnect.

The power cords are the only means of disconnecting AC power. Clearly mark the line side power connection with its function so that in the event of an emergency, power can be disconnected quickly.

Making Power Connections

The NV8288 and the NV8288-Plus have a ground lug on the back of the router. Whether to ground or not is optional and failure to connect the ground does not affect normal operation. However, grounding helps protect you and your equipment in case of a power anomaly such as a lightning strike.

Connecting One NV6257 to One NV8288 Router

The NV8288 uses both power connections on the NV6257. To make this connection, use the special "Y" power cable (WC0087). The cable has two connectors on one end for connecting to the two NV6257 power supplies, and a single power connector on the other end for connecting to the router.

Caution	Make power connections between the router and NV6257 *before* connecting the NV6257 to an AC power source. Insert PS6000 power supply modules *after* connecting the NV6257 to an AC power source. Connecting to AC power before the router is connected, or after PS6000 modules are installed, may result in an electric shock.

Connecting One NV6257 to Two NV8288-Plus Routers

If you are powering two NV8288-Plus routers, different PS6000 power supply module slots on the NV6257 provide power to the two routers (router 1, router 2), as follows:

Power Supply Module Slots (PS)	Router	Power Source	Power Supply Output Driven
PS 1 and PS 3	Router 1	Primary	Output 2
PS 2 and PS 4	Router 1	Redundant	Output 2
PS 5 and PS 7	Router 2	Primary	Output 1
PS 6 and PS 8	Router 2	Redundant	Output 1

See Figure 3-3 on page 28. Two power supply cables (WC0085), provided by Miranda, are needed to connect a single NV6257 to the two routers.

To make monitor connections between one NV6257 and two NV8288-Plus routers, a "Y" monitor cable is required. A "Y" cable has one central cable that branches into two cables, enabling connections from one source to be made to two destinations. Miranda does not provide this cable, however instructions for creating a "Y" cable are included in this manual. See Creating a "Y" Monitor Cable on page 32.

Connecting One NV8000 to One NV8288 or NV8288-Plus Router

The NV8288 and the NV8288-Plus are connected directly to the NV6257 power supply. One NV8000 powers one router frame. To make this connection, use a special power cable (WC0096) and an adapter cable (WC0097). The adapter mates the power cable with the power supply input connection on the router.\

Caution	Make power connections between the router and NV8000 *before* connecting the NV8000 to an AC power source. Insert PS8010 power supply modules *after* connecting the NV8000 to an AC power source. Connecting to AC power before the router is connected, or after PS8010 modules are installed, may result in an electric shock.

How to Connect a Single NV6257 to an NV8288 Frame

1 Locate the power cords, PS6000 power supply modules, and cables.

2 Facing the rear of the **NV6257**, using the "Y" power cable (WC0087), connect one power connector to 'Output Power 1' and one power connector to 'Output Power 2':
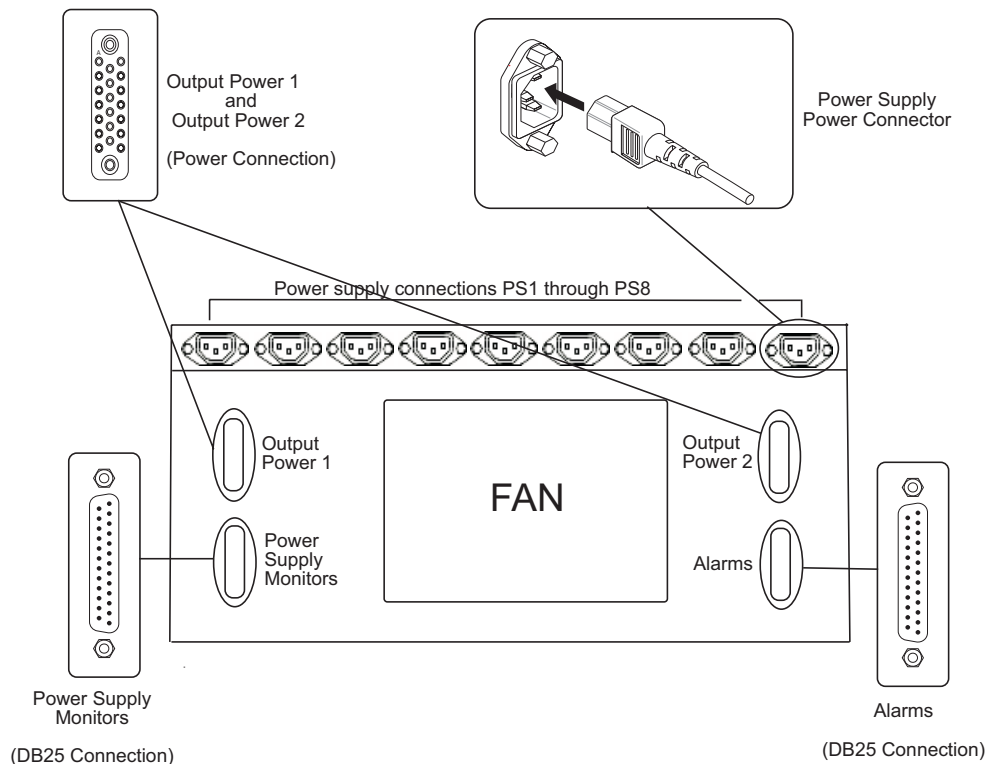

Figure 3-1. NV6257 Power Supply (Rear View)

3 Facing the rear of the **router**, connect the remaining power connector on the "Y" power cable to 'Power Input', as shown in Figure 3-2.
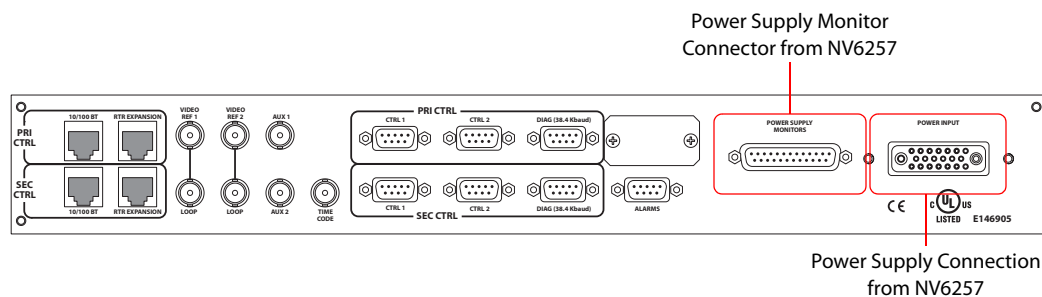

Figure 3-2. Power Supply Monitor Connection and Power Supply Connection on Router (Rear View)

4 Facing the rear of the **NV6257**, connect one end of the monitor cable (WC0046) to the 'Power Supply Monitors' DB25 connection, as shown in Figure 3-1.

5 Facing the rear of the **router**, connect the other end of the monitor cable to 'Power Supply Monitor', as shown in Figure 3-2.

6 Facing the rear of the **NV6257**, connect power cords from an AC power source (90–230 VAC, 50–60 Hz) into power supply connections *PS 1* through *PS 8*, as shown in Figure 3-1. Connect one power cord for each PS6000 power supply module installed. (See step 7.)

7 Install the PS6000 power supply modules as follows:

a Facing the front of the **NV6257**, install the primary PS6000 power supply modules in slots *PS 1*, *PS 3*, *PS 5* and *PS 7*, as shown in Figure 3-3.

b (Optional) Facing the front of the **NV6257**, install the redundant PS6000 power supply modules in slots *PS 2, PS 4, PS 6* and *PS 8*, as shown in Figure 3-3.
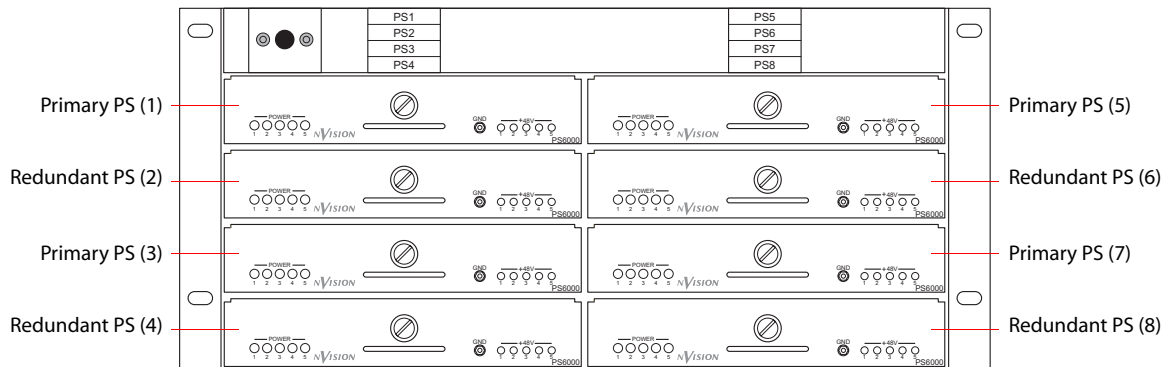
Figure 3-3. NV6257 Power Supply (Front View)

8 Facing the rear of the **router**, connect the ground lug to ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower, right-hand corner of the frame.

How to Connect a Single NV6257 to a Single *NV8288-Plus* Frame

1 Locate the power cords, PS6000 power supply modules, and cables.

2 Facing the rear of the **NV6257**, connect one end of the power supply cable (WC0085) to 'Output Power 2', as shown in Figure 3-1 on page 27.

3 Facing the rear of the **router**, connect the other end of the power supply cable to 'Power Input', as shown in Figure 3-2 on page 27.

4 Facing the rear of the **NV6257**, connect one end of the monitor cable (WC0046) to the 'Power Supply Monitors' DB25 connection, as shown in Figure 3-1 on page 27.

5 Facing the rear of the **router**, connect the other end of the monitor cable to 'Power Supply Monitor', as shown in Figure 3-2 on page 27.

6 Facing the rear of the **NV6257**, connect power cords from an AC power source (90–230 VAC, 50–60 Hz) into power supply connections *PS 1* through *PS 4*, as shown in Figure 3-1 on page 27. Connect one power cord for each PS6000 power supply module installed. (See step 7.)

7 Install the PS6000 power supply modules as follows:

a Facing the front of the **NV6257**, install the primary PS6000 power supply modules in slots *PS 1* and *PS 3*, as shown in Figure 3-3 on page 28.

b (Optional) Facing the front of the **NV6257**, install the redundant PS6000 power supply modules in slots *PS 2* and *PS 4*, as shown in Figure 3-3.

8 Facing the rear of the **router**, connect the ground lug to ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower, right-hand corner of the frame.

How to Connect a Single NV6257 to Two NV8288-Plus Frames

1 Locate the power cords, PS6000 power supply modules, and cables.

Note	Because your are connecting two routers, you will need two WC0085 power supply cables.

2 Fabricate a monitor "Y" cable. For instructions, see Creating a "Y" Monitor Cable on page 32.

3 Facing the rear of the **NV6257**, connect one end of the power supply cable (WC0085) to 'Output Power 2', as shown in Figure 3-1 on page 27.

4 Facing the rear of the **first router** (router 1), connect the other end of the power supply cable to 'Power Input', as shown in Figure 3-2 on page 27.

5 Facing the rear of the **NV6257**, connect one end of a second power supply cable (WC0085) to 'Output Power 1', as shown in Figure 3-1 on page 27.

6 Facing the rear of the **second router** (router 2), connect the other end of the power supply cable to 'Power Input', as shown in Figure 3-2 on page 27.

7 Facing the rear of the **NV6257**, connect one end of the monitor "Y" cable to 'Power Supply Monitors', as shown in Figure 3-4.

Important	For steps 7, 8 and 9, be sure to use the connector wired for the connection you are making. (See Creating a "Y" Monitor Cable on page 32.)

Router 1   Router 2
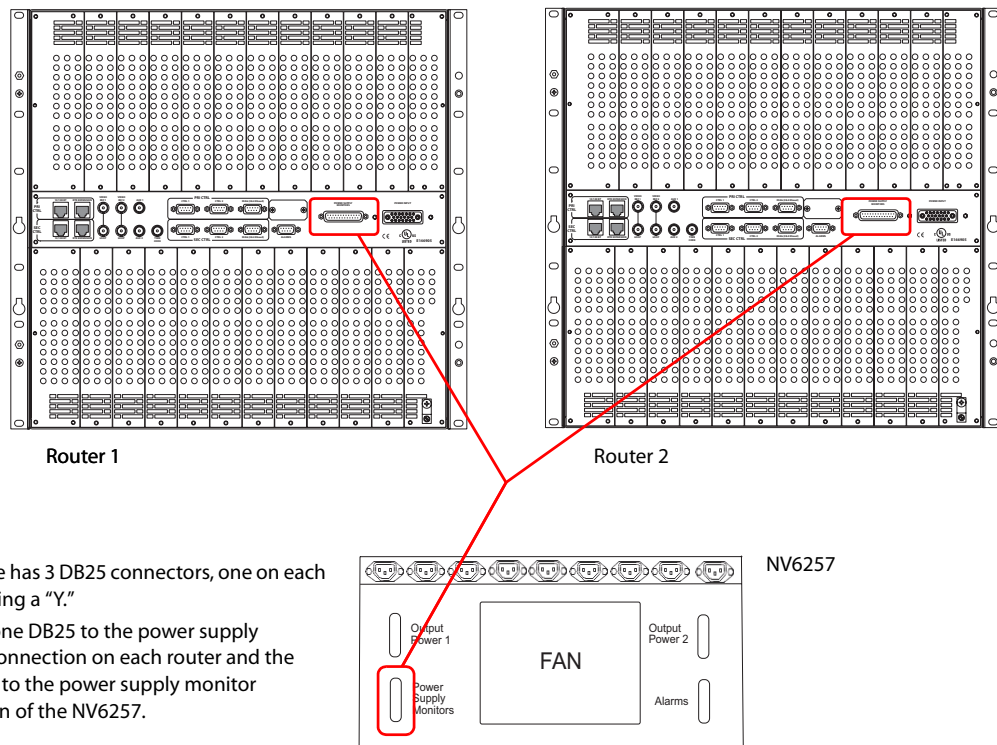
A "Y" cable has 3 DB25 connectors, one on each end, creating a "Y."

Connect one DB25 to the power supply monitor connection on each router and the other end to the power supply monitor connection of the NV6257.

NV6257

Output Power 1   Output Power 2

FAN

Power Supply Monitors   Alarms

Figure 3-4. "Y" Cable Connections Between Two Routers and a Single NV6257

8 Facing the rear of the **first router** (router 1), connect one of the two remaining monitor "Y" cable connectors to 'Power Supply Monitor', as shown in Figure 3-4.

9 Facing the rear of the **second router** (router 2), connect the remaining monitor "Y" cable connector to 'Power Supply Monitor', as shown in Figure 3-4.

10 Facing the rear of the **NV6257**, connect a power cord from an AC power source (90–230 VAC, 50–60 Hz) into power supply connections *PS 1* through *PS 8*, as shown in Figure 3-1 on page 27. Connect one power cord for each PS6000 power supply module installed. (See step 11.)

11 Install the PS6000 power supply modules as follows:

   a Facing the front of the **NV6257**, install the primary PS6000 power supply modules in slots *PS 1*, *PS 3*, *PS 5* and *PS 7*, as shown in Figure 3-3 on page 28.

   b (Optional) Facing the front of the **NV6257**, install the redundant PS6000 power supply modules in slots *PS 2, PS 4, PS 6* and *PS 8*, as shown in Figure 3-3 on page 28.
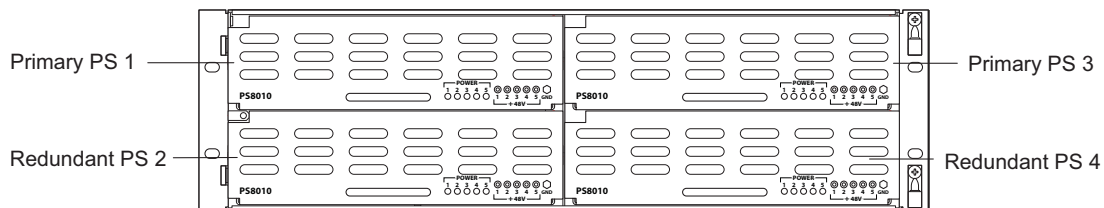
12 Facing the rear of each **router**, connect the ground lug to ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower, right-hand corner of the frame.

How to Connect a Single NV8000 to an NV8288 or NV8288-Plus

1 Locate the power cords, PS8010 power supply modules, and cables.

2 Facing the rear of the **NV8000**, using the power cable (WC0096), connect one power connector to 'DC Output', as shown in Figure 3-5.
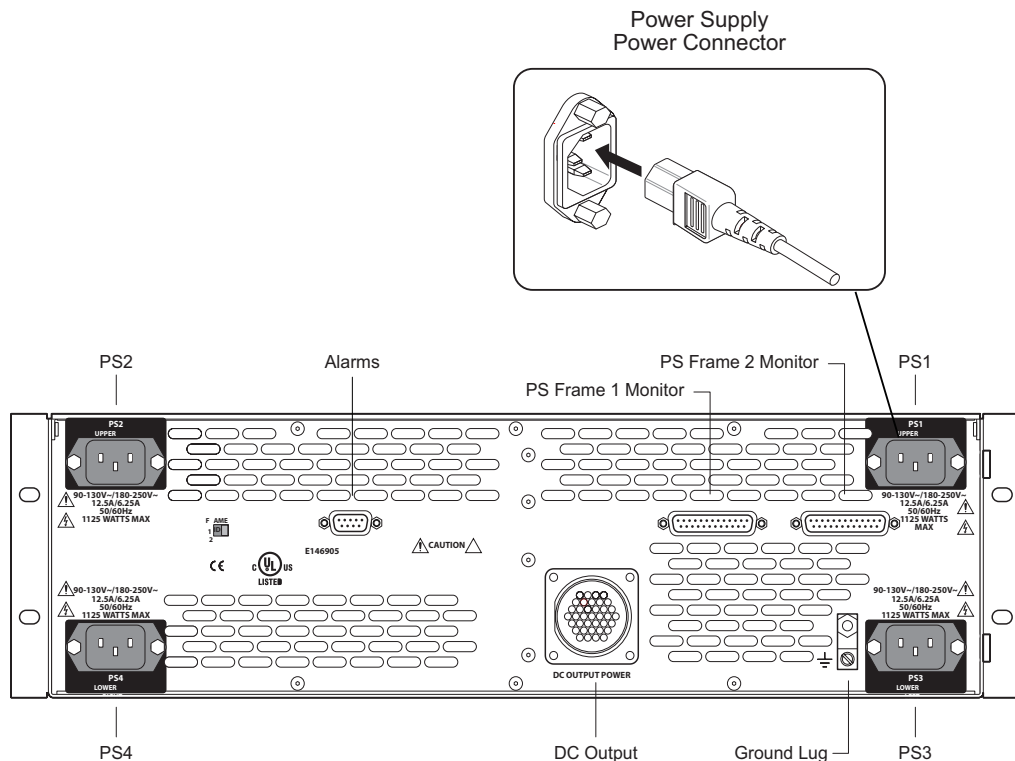
Figure 3-5. NV8000 Power Supply (Rear View)

3 Connect the other end of the power cable (WC0096) to the adapter (WC0097). The power cable easily connects to one end of the adapter. Do not force the connection.

4 Facing the rear of the **router**, connect the other end of the adapter to 'Power Input', as shown in Figure 3-6.
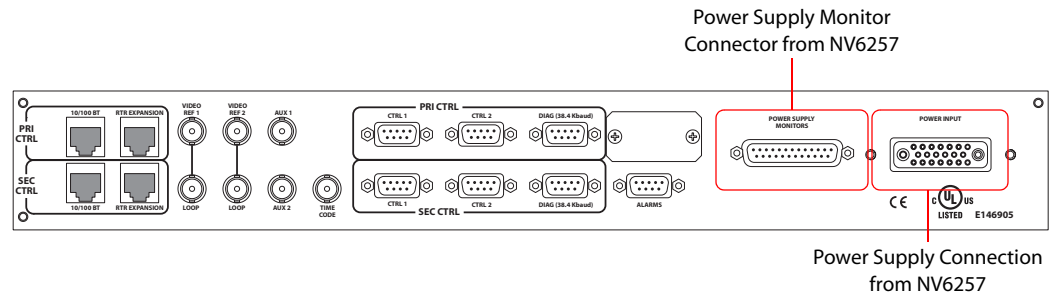
Power Supply Monitor
Connector from NV6257

Power Supply Connection
from NV6257

Figure 3-6. Power Supply Monitor Connection and Power Supply Connection on Router (Rear View)

5 Facing the rear of the **NV8000**, connect one end of the monitor cable (WC0046) to the 'PS Frame 1 Monitor' DB25 connection, as shown in Figure 3-5 on page 30.

6 Facing the rear of the **router**, connect the other end of the monitor cable to 'Power Supply Monitor', as shown in Figure 3-6.

7 Facing the rear of the **NV8000**, connect power cords from an AC power source (90–230 VAC, 50–60 Hz) into power supply connections *PS 1* through *PS 4*, as shown in Figure 3-5 on page 30. Connect one power cord for each PS8010 power supply module installed. (See step 8.)

8 Install the PS8010 power supply modules as follows:

   c Facing the front of the **NV8000**, install the primary PS8010 power supply modules in slots *PS 1* and *PS 3*, as shown in Figure 3-7.

   d (Optional) Facing the front of the **NV8000**, install the redundant PS8010 power supply modules in slots *PS 2* and *PS 4*, as shown in Figure 3-7.

Figure 3-7. NV8000 Power Supply (Front View)

9 Facing the rear of the **router**, connect the ground lug to ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower, right-hand corner of the frame.

10 (Optional) If you are connecting two NV8288-Plus routers together, make loop-through monitor connections between the NV8000 power supplies. See Connecting Two NV8000s for Power Supply Monitoring, following.

Connecting Two NV8000s for Power Supply Monitoring

One NV8000 powers one router frame. When two NV8288-Plus routers are connected, each with its own NV8000 power supply, monitor information must be communicated between the power supplies. Make a second monitor connection on the rear of the NV8000 labeled 'PS Frame 2 Monitor'.

For instructions on making monitor connections between the NV8000 and the router, see How to Connect a Single NV8000 to an NV8288 or NV8288-Plus on page 30.

How to Connect Two NV8000 Power Supplies for Monitoring

1 Facing the rear of one of the two **NV8000**, connect one end of the monitor cable (WC0046) to the 'PS Frame 2 Monitor' DB25 connection, as shown in Figure 3-5 on page 30.

2 Facing the rear of the remaining **NV8000**, make a loop-through connection using the other end of the monitor cable (WC0046) to the 'PS Frame 2 Monitor' DB25 connection, as shown in Figure 3-5 on page 30.

Creating a "Y" Monitor Cable

A "Y" monitor cable is required when connecting two routers to a single NV6257. A "Y" cable has one connector at one end and then splits into two separate connectors on the other end, creating a "Y." To create a monitor "Y" cable you need:

• Three male DB25 connectors

• Two standard DB25 straight-through cables with 25 circuits

Wire the pins on the DB25 connectors as listed in the following table. To ensure that the correct connector is inserted in the corresponding connection, it is recommended that each connector be labeled.

DB25 Pin	NV6257 Connector	Router 1 Connector	Router 2 Connector
20	PS_TACH	PS_TACH	PS_TACH
21	PS_ALARM1	PS_ALARM1	PS_ALARM5
19	PS_ALARM2	PS_ALARM2	PS_ALARM6
18	PS_ALARM3	PS_ALARM3	PS_ALARM7
17	PS_ALARM4	PS_ALARM4	PS_ALARM8
16	PS_ALARM5	NC	NC
15	PS_ALARM6	NC	NC
23	PS_ALARM7	NC	NC
22	PS_ALARM8	NC	NC
8	TEMP1	TEMP1	TEMP5
6	TEMP2	TEMP2	TEMP6
5	TEMP3	TEMP3	TEMP7
4	TEMP4	TEMP4	TEMP8
3	TEMP5	NC	NC
2	TEMP6	NC	NC
10	TEMP7	NC	NC
9	TEMP8	NC	NC
11	GND	GND	GND
12	GND	GND	GND
13	GND	GND	GND
14	GND	GND	GND

DB25 Pin	NV6257 Connector	Router 1 Connector	Router 2 Connector
25	GND	GND	GND
1	GND	GND	GND

NC = No Connect

Installing Active Cards

The NV8288 and the NV8288-Plus feature several active cards that manage incoming signals, forwarding of commands from the control system, signal switching, and the distribution of outgoing signals. Each card is color-coded with an ejector lever that matches the color of the card guide into which the card is installed in the router frame. For a description of each card, see Active Cards on page 15.

All cards can be inserted and removed with the power on.

How to Install Active Cards:

Important	Cards in the top bay slots have ejector levers located on the bottom. Cards in the bottom bay slots have ejector levers located on the top.

Caution	Do not drop, roughly handle, or stack circuit boards. If a board does not easily remove or insert, stop installation activities and contact Miranda Technical Support. (See page iii.)

1 Locate the slots for the control, input, output, crosspoint and monitor cards, as shown in Figure 2-4 on page 8 for the NV8288 or Figure 2-6 on page 10 for the NV8288-Plus.

2 Insert the cards into the frame by sliding them into card guides from the front of the router. Insert the card in designated card guides only, as follows. (See Figure 3-8.)

- Control cards—Insert in yellow card guides. The yellow ejector lever is located at the bottom of the card.

- Input cards—Insert in red card guides.

  In upper bay, the red ejector lever is located at the bottom of the card.

  In lower bay, *card is inverted*, and the red ejector lever is located at the *top* of the card.

- Output cards—Insert in white card guides.

  In upper bay, the white ejector lever is located at the bottom of the card.

  In lower bay, *card is inverted*, and the white ejector lever is located at the *top* of the card.

- Crosspoint cards—Insert in center bay in the horizontal slots.

  In the top slot (outputs 1–288), the card is inserted with components facing up.

  In the bottom slot (outputs 289–576), the card is *inverted* with components facing down.

- Monitor cardset—Insert in grey card guides. The grey ejector lever is located at top of the card.

In the upper bay, ejector of input and output cards is at the bottom

Ejector of control cards is at the bottom

Top crosspoint card faces up

Bottom crosspoint card faces down

In the lower bay, ejector of monitor cards is at the top

In the lower bay, ejector of input and output cards is at the top
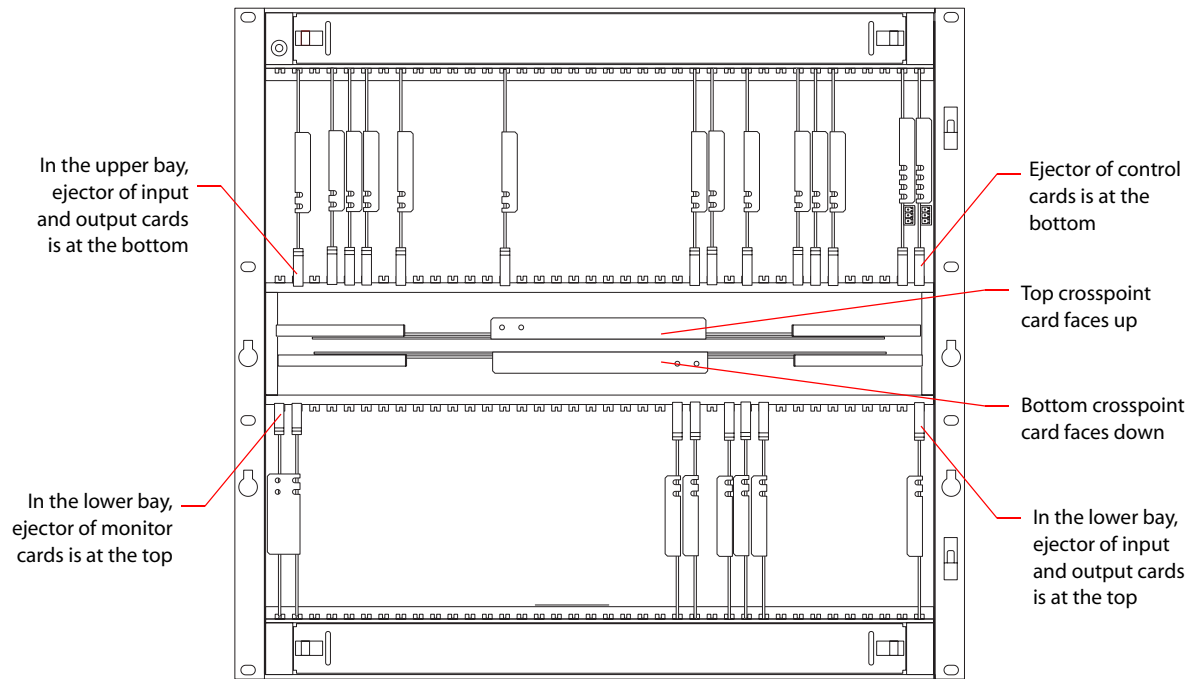
Figure 3-8. How Cards are Inserted in Router Frame

3 Verify that each card is fully inserted in the appropriate card guide.

4 Reinstall and close the frame front door after all cards have been installed. The door must be closed for the router cooling system to work properly.

Making Signal Connections

In order for the NV8288 or the NV8288-Plus to properly manage incoming and outgoing signals, the I/O connections on the rear of the router must be connected to cables that receive and distribute the signals. The NV8288 contains up to 288 input connections and up to 576 output connections. The NV8288-Plus in standalone mode contains up to 288 input and 288 output connections.

If connecting two NV8288-Plus routers together, additional signal expansion connections must also be connected. These connections enable each router to both send and receive signals between the routers. (See Signal Expansion Connections on page 35.)

Local Signal Connections

Cables are connected to the I/O connections using DIN 1.0/2.3 connectors and Belden 1855A cable, or an equivalent. For installation, it is recommended that you use a connector tool designed for tightly spaced connectors.

Note	There are several DIN 1.0/2.3 coax connectors and cables suitable for use with the router. For a complete list of connectors and cables, contact Technical Support. For contact information, see page iii.

How to Make Signal Connections

1 Locate the *input* connections at the rear of the router, as shown in Figure 3-9 on page 35. Only the NV8288-Plus is illustrated, however the DIN 1.0/2.3 connectors and connections are the identical for the NV8288.

2 For inputs, both the NV8288 and the NV8288-Plus have 24 columns of 12 DIN 1.0/2.3 connections each.

Outputs 144–73   Inputs 144–1   Outputs 72–1

Outputs
288–217   Inputs 288–145   Outputs
216–145
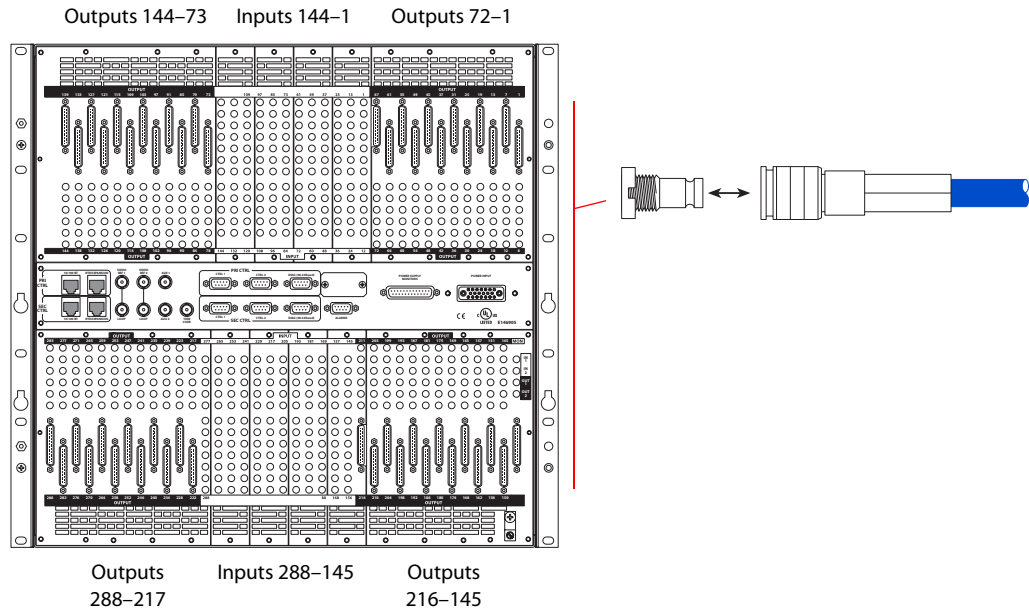
Figure 3-9. DIN 1.0/2.3 Connectors and Signal Connections on the NV8288-Plus

3 For each input, connect to an input connection using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent.

4 Connect the other end of the cable to the source of the incoming signal.

5 Locate the *output* connections on the rear of the router, as shown in Figure 3-9.

For outputs, each type of router contains the following connections:

• The NV8288 has a maximum of 576 output connections: 48 columns of 12 DIN 1.0/2.3 connectors each.

• The NV8288-Plus has a maximum of 288 output connections: 48 columns of 6 DIN 1.0/2.3 connectors each.

6 For each output, connect to each output connection using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent.

7 Connect the other end of the cable to the distribution destination for the outgoing signal.

8 If connecting two NV8288-Plus routers together, connect the signal expansion connections. (See Signal Expansion Connections, following.)

Signal Expansion Connections

As a standalone router, the NV8288-Plus can manage up to 288 inputs and 288 outputs. Using the NV8288-Plus expansion connections, inputs and outputs can be doubled to 576 inputs and 576 out-

puts. Connected routers must be situated physically next to each other, either top to bottom or side to side.

The NV8288-Plus contains 48 expansion connections, located on the rear of the router. All 48 expansion connections must be connected to properly connect two frames together. Each signal expansion connection corresponds to six output signals. For example, the expansion connection in the upper, right corner corresponds to Outputs 1–6. (See Figure 2-6 on page 10.)

The signal expansion connections use a proprietary expansion cable provided by Miranda (WC0089). The expansion connectors on the cable are colored-coded (one side black; one side silver) to ensure that they are installed correctly. The connector pins are fragile and can easily bend or break if forced.

How to Make Signal Expansion Connections between Two Routers

1 Locate the signal expansion connections on the rear of the two router frames you are connecting, as shown in Figure 3-10. The routers should be situated close together.
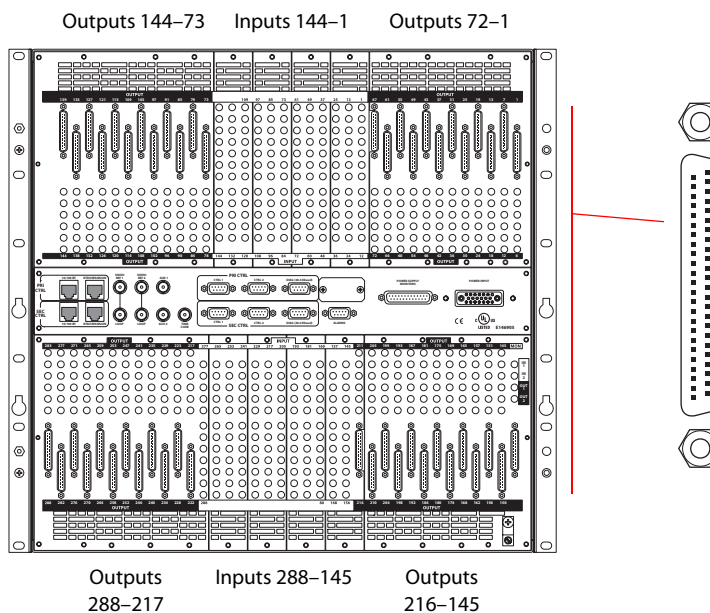
Figure 3-10. Expansion Connections for Connecting Two NV8288-Plus Routers

2 Facing the rear of the **first router** (router 1), locate the expansion connections in the *upper* half of the frame.

Caution	The connector pins are fragile. Forcing the connector can cause damage. The connectors are color-coded to ensure that they are attached correctly.

Connect one end of the expansion connector cable (WC0089) to the expansion connection making sure that the connector is positioned as follows. (See Figure 3-11.)

• Black side of connector faces *right*.

• Silver side of connector faces *left*.

Outputs 144–73   Inputs 144–1   Outputs 72–1

Upper half: Black side faces right

Lower half: Black side faces left

Outputs 288–217   Inputs 288–145   Outputs 216–145
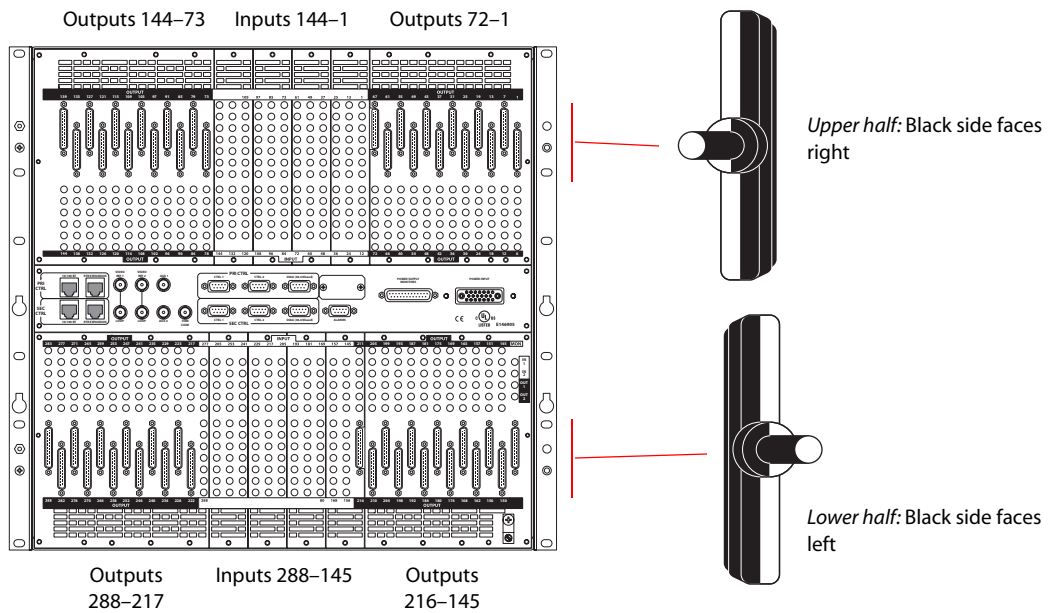
Figure 3-11. Expansion Connectors are Inverted in the Upper and Lower Halves of the Frame.

3 Facing the rear of the **second router** (router 2), locate the corresponding expansion connections in the *upper* half of the frame. For example, if you connected to the expansion connection for outputs 1–6 on router 1, connect the other end of the cable to the expansion connection for outputs 1–6 on router 2, as shown in Figure 3-12.

Connect the other end of the expansion connector cable to the expansion connection making sure that the connector is positioned as follows. (See Figure 3-11.)

• Black side of connector faces *right.*

• Silver side of connector faces *left.*
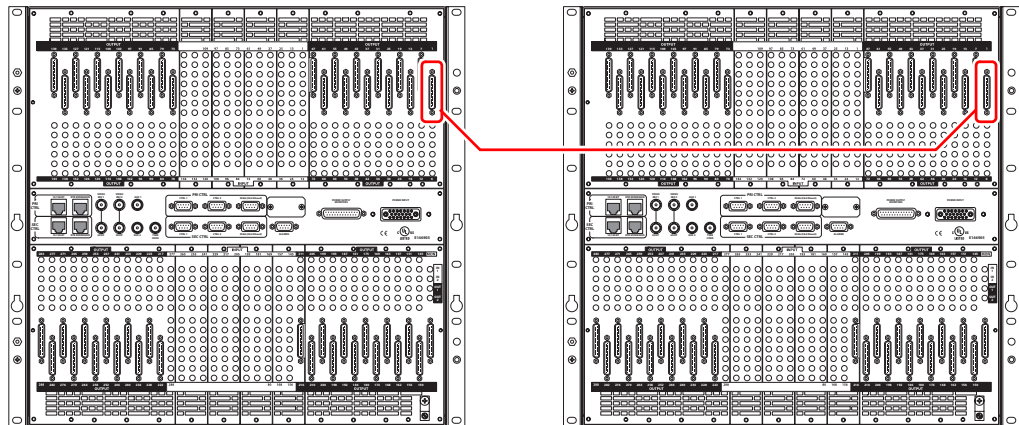
This expansion connection corresponds to signal outputs 1–6. Connect the corresponding expansion connectors to each other using an expansion cable (WC0089).

Figure 3-12. Expansion Connections on NV8288-Plus Routers (Rear View)

4 Repeat steps 2 and 3 until all expansion connections located in the *upper* halves of router 1 and router 2 are connected.

    5 Facing the rear of the first router (router 1), locate the expansion connections in the *lower* half of the frame.

       Connect one end of the expansion connector cable (WC0089) to the expansion connection making sure that the connector is positioned as follows. (See Figure 3-11.)

- Black side of connector faces *left.*

- Silver side of connector faces *right.*

    6 Facing the rear of the second router (router 2), locate the corresponding expansion connections in the *lower* half of the frame.

       Connect the other end of the expansion connector cable to the expansion connection making sure that the connector is positioned as follows. (See Figure 3-11.)

- Black side of connector faces *left.*

- Silver side of connector faces *right.*

    7 Repeat steps 5 and 6 until all expansion connections located in the *lower* halves of router 1 and router 2 are connected.

Making Router Control System Connections

To manage signal switching in the NV8288 and the NV8288-Plus, connections need to be created between the router control system and the router.

Connections are as follows:

- Serial Control—Use to connect to a third-party control system requiring serial control connections.

- Ethernet—Use to connect to the NV9000 router control system and to create network connections.

When connecting two NV8288-Plus routers together, only one router is directly connected to the router control system. This router acts as the *primary* router. Additional control system expansion connections are then made between the primary router and the secondary, connected router. This enables the router control system to communicate with both routers. (See Control System Expansion Connections on page 40.)

Note	Before you can use an Ethernet connection, the IP address for the connection must be set in the control card(s). See the *UniConfig User's Guide*.

Serial Control Connections

Serial control connections are used to connect a router to the router control system. Serial connections are often used for third-party control systems. Although serial connections can be used for the NV9000 control system, it is recommended that an Ethernet connection is used instead. (See Ethernet Control System Connections on page 40.)

The serial control ports are divided into two sets that communicate with the primary control card or the secondary control card. Additional ports enable you to connect to an alternate control system

(i.e., backup system) or to set up dual control, if desired. For a detailed description of the serial control connections, see Serial Control Connections on page 12.

Serial control connections use SMPTE 207M DE9 connectors (RS-422/489) and serial cable.

How to Make Serial Control Connections

1 Locate the serial control connections on the rear of the router, as shown in Figure 3-13. Serial control connections are labeled 'PRI CTRL' and 'SEC CTRL'.

Serial Connections
to Router Control System
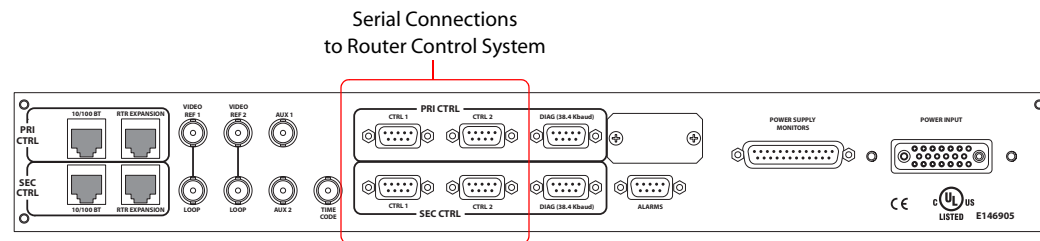
Figure 3-13. Serial Control Connections to Control System (Rear View)

2 Connect to the 'CTRL 1' connection in the 'PRI CTRL' section using a DE9 connector and serial cable.

3 Connect the other end of the cable to the (*primary*) router control system using a DE9 connector. The following is a list of DE9 wiring for the connectors:

Control End	Pins	Router End
Ground	1 ------------1	Ground
Rx–	2 ------------2	Tx–
Tx+	3 ------------3	Rx+
Tx Common	4 ------------4	Rx Common
N/C	5 ------------5	N/C
Rx Common	6 ------------6	Tx Common
Rx+	7 ------------7	Tx+
Tx –	8 ------------8	Rx–
Ground	9 ------------9	Ground

4 If a secondary (optional for redundancy, see Control Cards on page 15) control card is installed, connect to the 'CTRL 1' connection in the 'SEC CTRL' section as described in steps 2 and 3.

5 If an alternate control system (e.g., for redundancy or dual control) is being used, make connections as follows:

a Connect to the 'CTRL 2' connection in the 'PRI CTRL' section using a DE9 connector and serial cable.

b Connect the other end of the serial cable to the *secondary* router control system using a DE9 connector. Wire connectors as described in Step 3.

c If a secondary (optional for redundancy; see Control Cards on page 15) control card is installed, connect to the 'CTRL 2' connection in the 'SEC CTRL' section using a DE9 connector and serial cable as described in steps 5a and 5b.

6 If connecting two NV8288-Plus routers together, connect the control system expansion connections. (See Control System Expansion Connections on page 40.)

Ethernet Control System Connections

Ethernet control connections connect the router to the router control system using Ethernet connectors. An Ethernet connection is recommended for the NV9000 router control system. Ethernet connections are especially helpful the PC running the router control system is on a network.

The Ethernet ports are divided into two sets that communicate with the primary control card or the secondary control card. For a detailed description of the Ethernet connections, see Ethernet Control Connections on page 12. Unlike serial control connections, there are no Ethernet connections to redundant control systems because redundant control systems can be connected through Ethernet network connections.

In order for the router to communicate with the router control system through an Ethernet connection, an IP address for the router needs to be set in the control card. For more information, see Ethernet Control Connections on page 12.

The Ethernet control system connections use RJ45 connectors and Cat5, or better, cable. The Ethernet port is 10/100BT.

How to Make an Ethernet Connection to the Control System

1 Locate the Ethernet connections on the rear of the router, as shown in Figure 3-14. The Ethernet connections are labeled '10/100BT'.

Ethernet Connections
to Router Control System
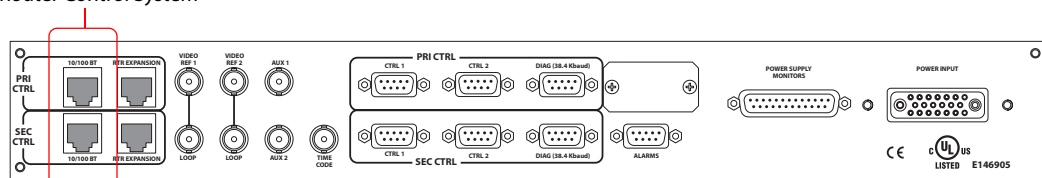
Figure 3-14. Ethernet Connections to Control System (Rear View)

2 Connect to the '10/100 BASE T' Ethernet connection in the 'PRI CTRL' section using a RJ45 connector and Cat5, or better, cable.

3 Connect the other end of the cable to an Ethernet hub or switch on the router control system PC.

4 If a secondary (optional for redundancy; see Control Cards on page 15) control card is installed, connect to the '10/100 BASE T' Ethernet connection in the 'SEC CTRL' section as described in Step 2 and Step 3.

5 If connecting two NV8288-Plus routers together, connect the control system expansion connections. (See Control System Expansion Connections, following,)

Control System Expansion Connections

Control system expansion connections enable two connected NV8288-Plus routers to communicate with the router control system. When making control system connections, only one router is connected directly to the router control system. This router acts as the *primary* router. When making control system expansion connections, a separate connection is made from that router to the *secondary* router. This enables the router control system to manage both routers through the primary router connection. For simplicity, this procedure refers to each router as the primary or secondary router.

The control system expansion connections are serial ports that use a standard CAT3 (or better) straight-through Ethernet cable and one Miranda-supplied terminator (WC0084).

How to Make Control System Expansion Connections between Two Routers

1 Locate the Ethernet (RJ-45) expansion control connections at the rear of the router, as shown in Figure 3-15. The connections are labeled 'RTR Expansion'.

Expansion Connections
to Other Router
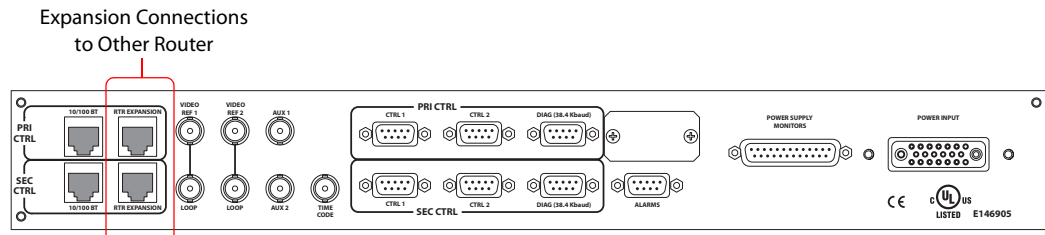
Figure 3-15. Ethernet Connections to Control System (Rear View)

2 On the *primary* router (the router directly connected to the control system), connect to the 'RTR Expansion' connection in the 'PRI CTRL' section using the standard CAT3 (or better) straight-through Ethernet cable and one Miranda-supplied termination (WC0084-00):
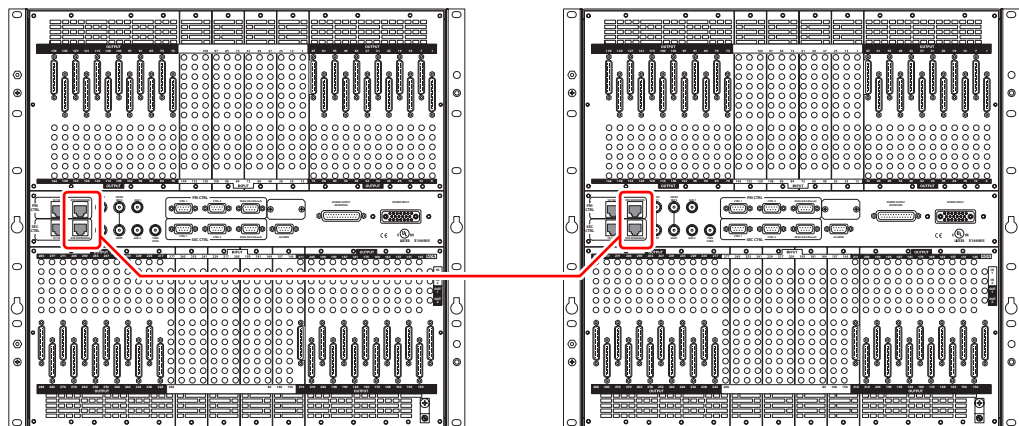
Connect the corresponding RJ-45 expansion ports using a CAT3 (or better) Ethernet cable. Place one WC0084 terminator at each end of the connection.

Figure 3-16. Ethernet Connections Between Two NV8288-Plus Routers (Rear View)

Connect the other end of the cable to the 'RTR Expansion' connection in the 'PRI CTRL' section on the *secondary* router, with similar termination. Each end of the connection must be terminated.

3 If a secondary control card (optional for redundancy) is installed, connect to the 'RTR Expansion' connection in the 'SEC CTRL' connection, as described in steps 2 and 3. (See Control Cards on page 15.)

Making Diagnostic Connections

The diagnostic connections enable the NV8288 and the NV8288-Plus to communicate with the UniConfig application. UniConfig is installed on a PC, separate from the router, and is used to per-

form system setup tasks, and configure and monitor the router. (See Configuration on page 53.) For information about using UniConfig, see the UniConfig User's Guide.

Diagnostic connections are made by connecting the router to the PC running the UniConfig application. The diagnostic serial connections are located on the rear of the router, labeled 'DIAG'. For a detailed description of the diagnostic connections, see Diagnostic Connections on page 13.

Router IP Address

If an Ethernet connection is being used between the router and the router control system, an IP address for the router needs to be set on the control card. (See Ethernet Control System Connections on page 40.) The IP address is set using UniConfig. However, the PC running UniConfig cannot communicate with the router until an IP address for the router is entered. To solve this problem, you can connect to the control system using a serial connection, enter the IP address, and then replace the serial connection with an Ethernet connection. (See Serial Control Connections on page 38 and Ethernet Control System Connections on page 40.)

How to Make a Diagnostic Connection

1 Locate the diagnostic connections on the rear of the router, as shown in Figure 3-17. The diagnostic connections are labeled 'DIAG'.
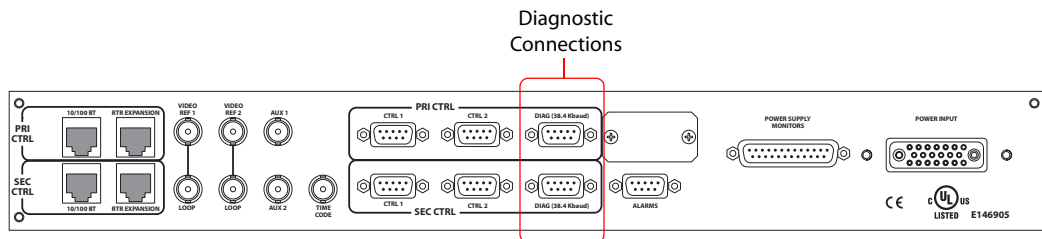
Figure 3-17. Diagnostic Connections (Rear View)

2 Connect to one of the two 'DIAG' connections using a DE9 connector and a serial cable. The ports are set for RS-232. For the NV8288 only, RS-422 may also be used:

• The following lists the DE9 pin connectors for RS-232:

PC End (DCE)	Pins	Router End (DTE)
DCD	1 ------------1	Ground
RXD	2 ------------2	TXD
TXD	3 ------------3	RXD
DTR	4 ------------4	DSR
Signal Ground	5 ------------5	Signal Ground
DSR	6 ------------6	DTR
RTS	7 ------------7	CTS
CTS	8 ------------8	RTS
Ground	9 ------------9	Ground

• The DE9 connector can be set for RS-422 for the NV8288 router, but adjustments will need to be made in UniConfig. For more information, see the *UniConfig User's Guide*.

The following lists the DE9 pin connectors for RS-422:

PC End	Pins	Router End
Ground	1 ------------1	Ground
Rx–	2 ------------2	Tx–
Tx+	3 ------------3	Rx+
Tx Common	4 ------------4	Rx Common
N/C	5 ------------5	N/C
Rx Common	6 ------------6	Tx Common
Rx+	7 ------------7	Tx+
Tx–	8 ------------8	Rx–
Ground	9 ------------9	Ground

3 Connect the other end of the cable to the PC running the UniConfig application.

Making Video Reference Connections

The NV8288 and the NV8288-Plus provide timing reference connections for analog video signals, labeled 'VIDEO REF 1' and 'VIDEO REF 2'. The control card uses these references to perform takes at the proper point in time (per SMPTE RP168), determining the router's video frame switch points. The video reference connections require a stable source of PAL, NTSC or Tri-level sync. Both video reference connections use 75 ohm BNC connectors and coaxial cable. For a detailed description of the video reference connections, see Video Reference on page 14.

Each 'VIDEO REF' connection can be use the same reference source (redundant) or two unique reference sources (dual). For more information, see Redundant and Dual References on page 14.

If a video reference is present, signals switch at the defined frame and line switch points. If a video reference is not present, the router still performs takes using an internally generated reference signal. If a video reference is not connected, the control card displays a lit red LED. (See Indicator LEDs on page 58.)

How to Make Connections to the Video References

1 Locate the video reference connections on the rear of the router, as shown in Figure 3-18. The video reference connections are labeled 'VIDEO REF1' and 'VIDEO REF2'.
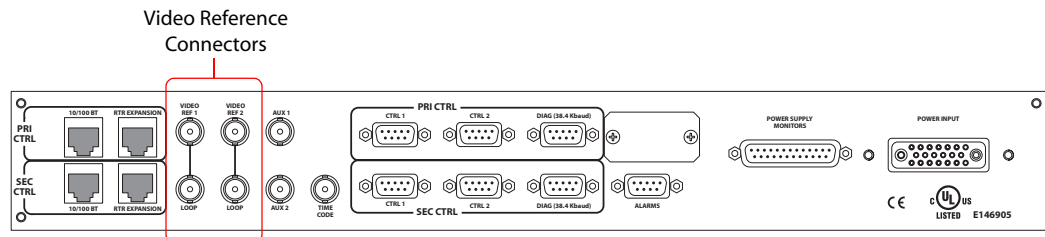
Figure 3-18. Video Reference Connections and BNC Connector (Rear View)

2 Connect to the 'VIDEO REF 1' connection using a 75 ohm BNC connector and coaxial cable.

3 Connect the other end of the cable to a reference signal. Be sure the incoming signal is from a stable source. The signals can be:

PAL
NTSC
Tri-level sync (1080i 50/59.94/60 and 720p 50/59.94/60)

4 On all unused video reference connections, be sure to terminate the loop-through by installing a 75 Ω BNC terminator.

5 Connect to the 'VIDEO REF 2' input connection, as described in Steps 2 through 4.

Making Monitor Connections

The monitor connections on the rear of the NV8288 and the NV8288-Plus enable the monitoring of outgoing signals. The monitor connections forward signals from the monitor card, which receives one signal from each output card in the router. By connecting monitoring equipment to the monitor connections, the quality of signals being distributed from the router can be verified.

If connecting two NV8288-Plus routers together, only one router is connected directly to the monitoring equipment. Monitor expansion connections are then made between the primary router and the secondary, connected router. This enables the monitoring equipment to see both routers through the monitor connections on the primary router. (See Monitor Expansion Connections on page 45.)

Local Monitor Connections

There are two monitor connections: 'OUT 1' and 'OUT 2', located on the rear of the router. Each connection can be configured to match a level set up in the router control system. Depending on how your levels are configured, 'OUT 1' and 'OUT 2' can each monitor one signal type: SD-SDI or SWB. For more information on levels, see the UniConfig User's Guide.

How to Make Monitor Connections

1 Locate the monitor connections on the rear of the router, as shown in Figure 3-19.
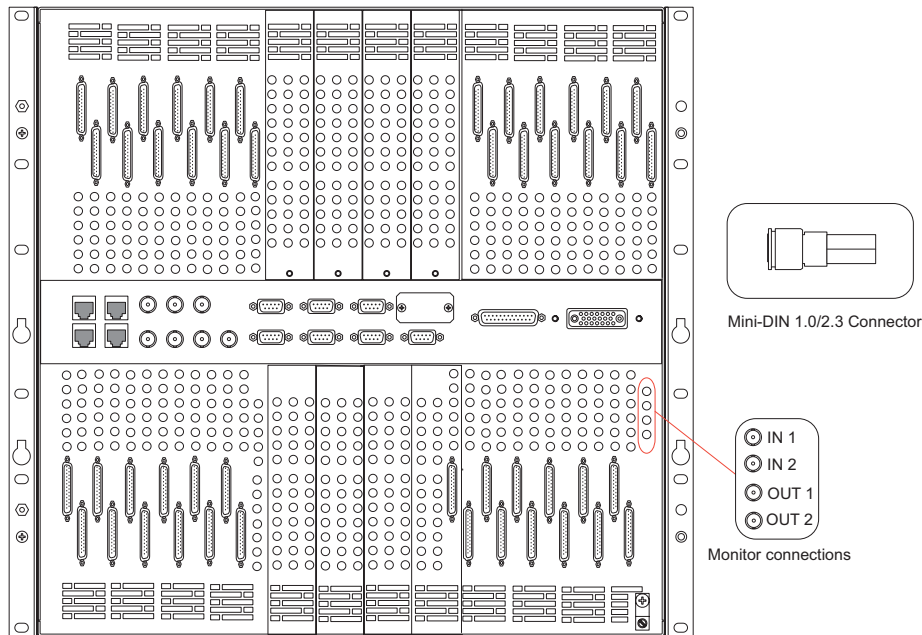
Figure 3-19. Monitor Connections and DIN 1.0/2.3 Connectors (Rear View) on the NV8288-Plus

2 Connect to the 'OUT 1' monitor connection using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent.

Note	There are several DIN 1.0/2.3 connectors and cables suitable for use with the router. For a complete list of connectors and cables, contact Technical Support. For contact information, see page iii.

3 Connect the other end of the cable to the monitoring equipment being used to monitor outgoing signals.

4 Connect to the 'OUT 2' monitor connection using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent.

5 Connect the other end of the cable to the monitoring equipment being used to monitor outgoing signals.

6 If connecting two NV8288-Plus routers together, connect the monitor expansion connections. (See Monitor Expansion Connections on page 45.)

Monitor Expansion Connections

The monitor connections are housed on a backplane containing 4 DIN 1.0/2.3 connectors. If two NV8288-Plus routers are connected together, additional monitor expansion connections between the routers must be connected. One router acts as the *primary* router. This is the router that is directly connected to the monitoring equipment. The *secondary*, connected router is connected to the primary router's monitor expansion connections. (See Making Monitor Connections on page 44.) This enables the monitoring of outgoing signals for both routers through the primary

router's connection to the monitoring equipment. For simplicity, this procedure refers to each router as the *primary* or *secondary* router.

How to Make Monitor Expansion Connections

1 Locate the monitor connections on the rear of the router, as shown in Figure 3-20.

Mini-DIN 1.0/2.3 Connector

IN 1
IN 2
OUT 1
OUT 2

Monitor connections
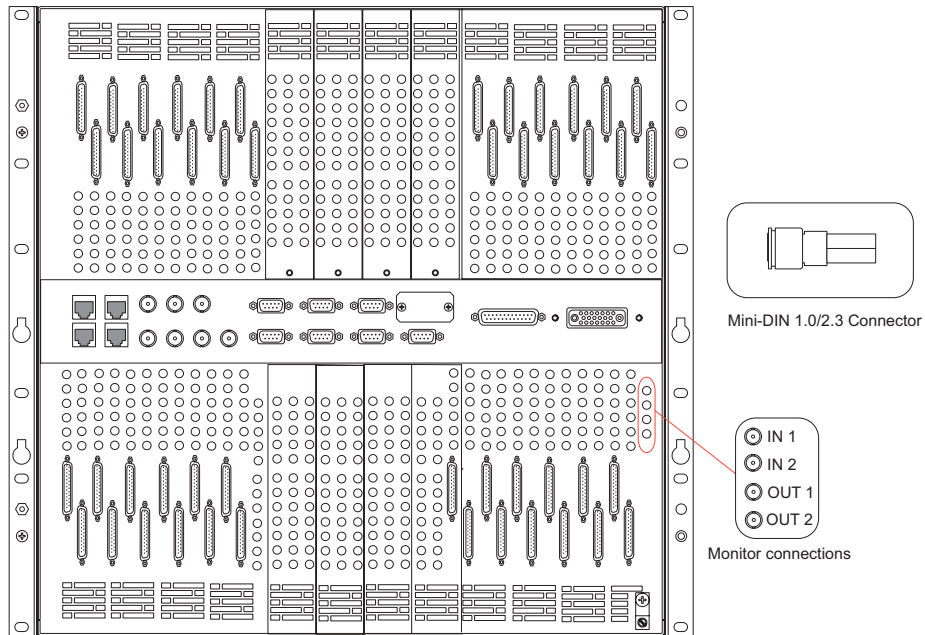
Figure 3-20. Monitor Expansion Connections and DIN 1.0/2.3 Connectors (Rear View) on the NV8288-Plus

2 On the *secondary* router (the router that does *not* have direct connections to the monitoring equipment), connect to the 'OUT 1' monitor connection using a DIN 1.0/2.3 connector and Belden 1855A cable, or an equivalent.

3 Connect the other end of the cable to the 'IN 1' monitor connection on the *primary* router (the router with direct connections to the monitoring equipment), as shown in Figure 3-21.

Connect the 'OUT' monitor connections on the *secondary* router to the 'IN' monitor connections on the *primary* router.
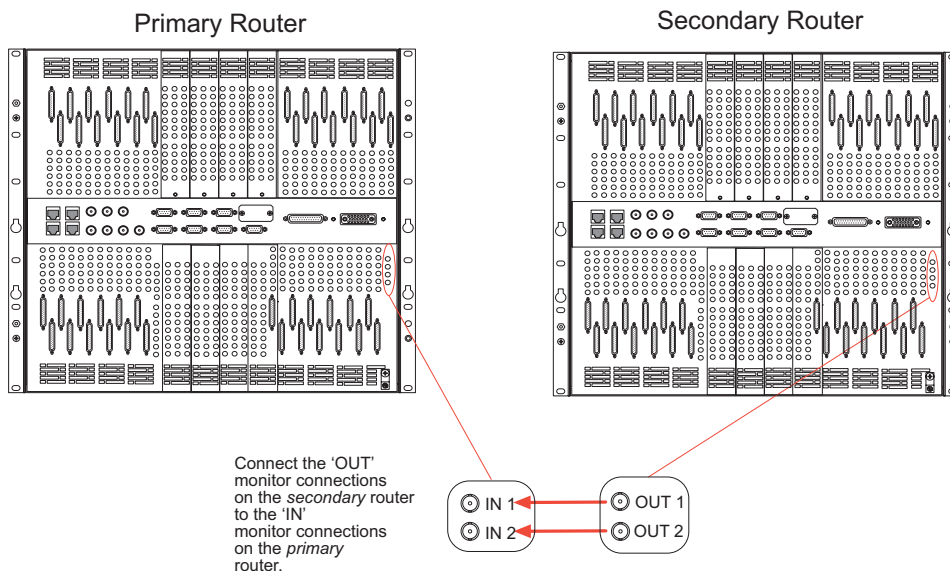
Figure 3-21. Monitor Connections Between Two NV8288-Plus Routers (Rear View)

4 On the *secondary* router, connect to the 'OUT 2' monitor connection using a DIN 1.0/2.3 connector and Belden 1855A cable, or an equivalent.

5 Connect the other end of the cable to the 'IN 2' monitor connection on the *primary* router, as shown in Figure 3-21.

Making Alarm Connections

The router provides system alarms that notify you of a malfunction, such as when a fan or power supply is not functioning properly. Alarms can be connected to an external alarm indicator that display visual signals when an alarm is activated. The NV6257 power supply, the NV8000 power supply, and the router each have alarm connections. Miranda does not provide external indicator equipment, however this manual provides instruction on wiring the alarm connection. See External Alarm Indicators on page 48.

Both the NV6257, NV8000, and the router send status information to the router control system. For more information on the alarm connections, see System Alarm on page 14.

How to Make Alarm Connections

1 On the rear of the NV6257 (Figure 3-1) or the NV8000 (Figure 3-5), locate the 'Alarms' connection.

2 Connect to the 'Alarms' connection using a DB25 connector and cable.

3 Connect the other end of the cable to an external alarm indicator. See External Alarm Indicators on page 48 for information on wiring the DB25 connector.

4 On the rear of the router, locate the 'ALARMS' connection, as shown in Figure 3-22.

System Alarm
Connector
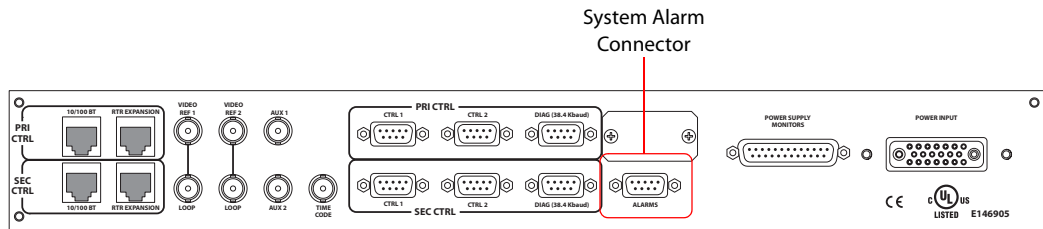
Figure 3-22. System Alarm Connection on Router (Rear View)

5 Connect to the 'ALARMS' connection using a DE9 connector and cable.

6 Connect the other end of the cable to an external alarm indicator. See Router on page 50 for information on wiring the DE9 connector.

External Alarm Indicators

An external alarm indicator can be created to display visual cues when a failure has occurred on the power supply or on the router frame. The indicator usually contains different LEDs that indicates what specific router module has failed with each LED wired to specific pins on a DE9 connector. Each LED indicates what specific router module has failed. An "alarm" or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again.

NV6257

The 'Alarms' connection on the rear of the NV6257 uses a DB25 connector. An "alarm" or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again. If a PS6000 power supply module is removed, the alarm circuit remains open.

For an external alarm indicator box, connect to the 'Alarms' connection using a DB25 female connector, wiring as shown in Figure 3-23. Each pin monitors a specific function and activates a specific alarm.

NV6257 External Power Supply Alarm, DB25, Female
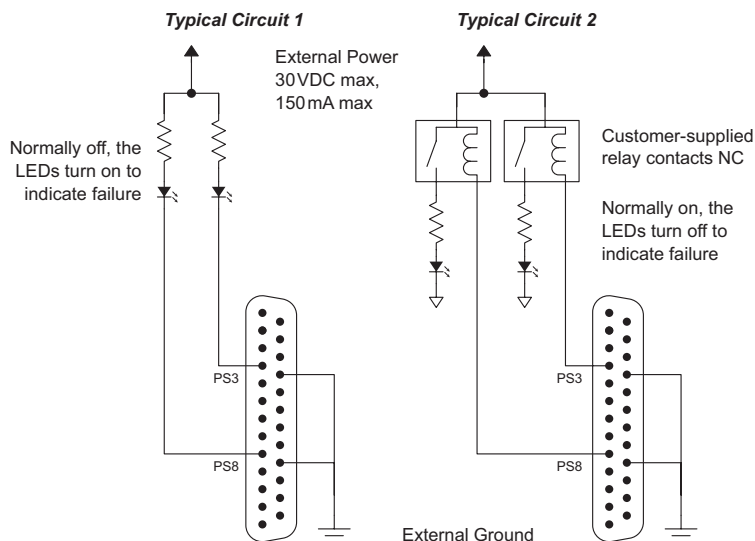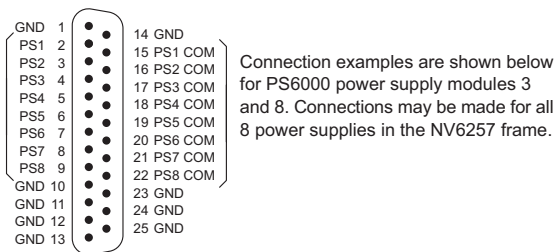
Figure 3-23. NV6257 Power Supply Alarms Connection

Caution	The power supply for the alarm circuit must not exceed 30 VDC. Load resistor value depends on power supply voltage.

NV8000

The 'Alarms' connection on the rear of the NV8000 uses a DE9 connector. Similar to the NV6257, an "alarm" or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again. If a PS8010 power supply module is removed, the alarm circuit remains open.

For an external alarm indicator box, connect to the 'Alarms' connection using a DE9 female connector, wiring as shown in Figure 3-24. Each pin monitors a specific function and activates a specific alarm.
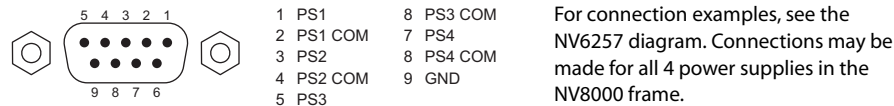
Figure 3-24. NV8000 Power Supply Alarms Connection, DE9, Female

Router

The 'ALARM' connection on the rear of the router uses a DE9 connector. An "alarm" or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again.

For an external alarm indicator box, connect to the 'ALARM' connection using a DE9 female connector, wiring as shown in Figure 3-25. Each pin monitors a specific function and activates a specific alarm.

1	Alarm COM	8	Alarm 5
2	Alarm 1	7	Alarm 6
3	Alarm 2	8	Alarm 7
4	Alarm 3	9	Alarm COM
5	Alarm 4		
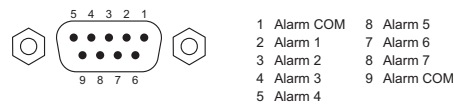
Typical Circuit 1
Normally ON, the LEDs turn off to indicate failure

External Power 30 VDC max, 150 mA max

COM
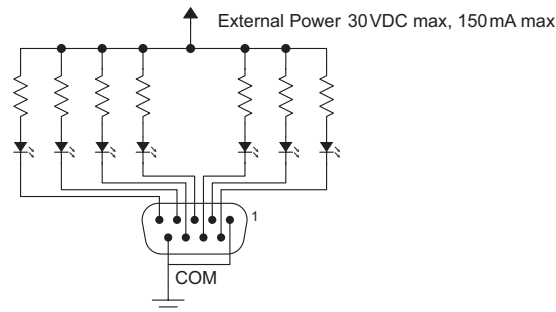
Typical Circuit 2
Normally OFF, the LEDs turn on to indicate failure

Customer-supplied relay contacts NC, (but open during alarm condition)

External Power, 30 VDC max, 150 mA max

COM
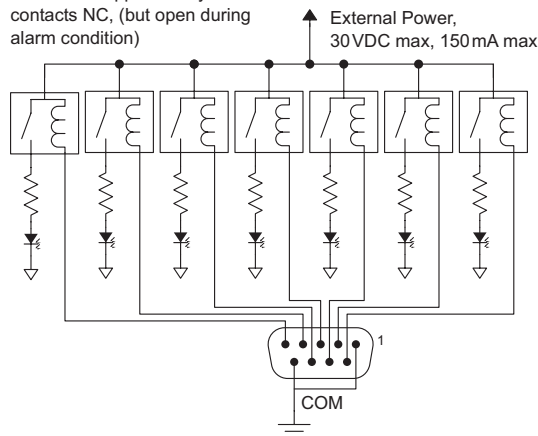
Figure 3-25. Alarm Connections and On/Off Switches

The following table lists each DE9 pin and the associated alarm. The pin number listed corresponds to the pin numbers in Figure 3-25 on page 50:

Pin	Signal	Description	Possible Conditions Causing the Alarm
1 and 9	Alarm_COM	Common	Common connection for all alarm pins.
2	Alarm_1	Major alarm	Indicates missing reference inputs, or missing power supplies.
3	Alarm_2	Minor alarm	Alarm_3, or Alarm_4, or Alarm_5, or Alarm_6
4	Alarm_3	Power supply	Missing power supply module.
5	Alarm_4	Video reference	Missing video reference 1 or video reference 2.
6	Alarm_5	AES3 reference	Not used in the NV8288.
7	Alarm_6	Fans or temperature	Indicates a fan failure or module over temperature.
8	Alarm_7	Control module health	Any control module not "healthy."

Verification

When installation is complete, perform the following checks to make sure the router is operating properly:

- On the NV6257 power supply or the NCV8000 power supply, check that all 5 green power LEDs on the front of each power supply module are lit. If any or all LEDs are off:

  Check that the power supply module is fully seated in its slot.

  Check the AC fuse on the PS6000 or the PS8010 power supply modules.

  Check for +48 volts at each of the 5 front test points.

- On the NV8288 or the NV8288-Plus, check that the LEDs on the input cards, crosspoint cards, control cards, and output cards are lit and indicating a "healthy" system. See Indicator LEDs on page 58 for a list of normal and alert LED states.

- Make sure that the flow of air through the front of the router is unimpeded and the door is properly installed and closed. For more information, see Air Flow on page 59.

3. Installation

Verification

4. Configuration

Chapter 4 is a pointer to the *UniConfig User's Guide*.

Summary

Before being placed into service, the NV8288 and the NV8288-Plus routers must be configured for your particular routing needs, router control system, and settings. Configuration includes initializing ports so that the router and UniConfig can communicate, setting up partitions, switch point settings, and testing switching configurations. Configuration tasks are performed using the UniConfig application, which resides on a PC. For detailed information on using UniConfig, see the *UniConfig User's Guide*.

4. Configuration

Summary

5. Operation

Chapter 5 provides general operating information for the NV8288 and the NV8288-Plus. It presents the following topics:

- Overview
- NV9000 Control Systems
- Third-Party Control Systems

Overview

To use the NV8288 or the NV8288-Plus router, you need a control system. The control system provides an interface for operations and maintenance personnel. Through the control system, signal switching can be actively controlled and certain system functions monitored.

The NV8288 and the NV8288-Plus were designed to work with the NV9000 or NV915 control system. However, routers are flexible and can be used with certain third-party control systems. For detailed information on using the NV9000 or NV915 control system, see the associated User's Guide. For information on using third-party control systems, see the third-party vendor literature. You can also contact Miranda for more information on compatible control systems. For contact information, see Technical Support Contact Information on page iii.

NV9000 Control Systems

Most facilities require multi-level switching capability (audio follow video, for example) and intuitive device naming capabilities. The control system used dramatically affects how operators use the NV8288 or NV8288-Plus and the ease with which devices are accessed.

Miranda's router control systems (NV9000, NV915) are composed of software and hardware. The control system applications run on a Windows-based server. The application can be loaded on a primary server only, or on both primary and secondary (redundant) servers, creating a fail-over backup. The control system hardware provides control panels for managing routers.

Miranda's router control systems offer a variety of control surfaces, support redundancy, and facilitate expansion as routing needs change. The control system is also capable of interfacing with third-party signal routing equipment.

Third-Party Control Systems

Miranda provides users with the ability to configure Miranda routers to function with third-party control systems. However, because Miranda does not manufacture or warrant control systems from

other vendors, we cannot guarantee overall performance or answer all possible configuration-related questions. For assistance, contact the manufacturer of the control system in use.

In many cases, router features and functionality are limited when using a third-party control system. For example, the third-party system may not optimally manage mono routing, while the NV9000 control system easily manages this function.

Please consult with Miranda if you are considering using a third-party interface to control an NV8288 or NV8288-Plus router. For contact information, see Technical Support Contact Information on page iii.

6. Maintenance

Chapter 6 provides maintenance instructions. It discusses the following topics:

- General Maintenance
- Fuse Replacement
- Indicator LEDs
- Air Flow
- Battery Replacement
- Troubleshooting
- Obtaining Service

General Maintenance

The NV8288 and the NV8288-Plus do not require any periodic electrical or physical maintenance. Other than cleaning the fan air intake filter, all that is required is periodic inspection of the system to make sure no failures have occurred.

It is recommended that you check the system's Indicator LEDs on page 58 occasionally to ensure that the system is operating normally and to make sure cooling air flow to the power supply fans is unobstructed.

Caution | Only qualified service personnel should perform procedures in this section.

Fuse Replacement

Fuses are located on each of the frame modules. If a problem occurs on a module, the first thing to do is check the fuses. The following table lists the fuses on each module:

Location	Fuse Value
Power supply AC line fuse	8 Amp, 5 × 20 mm, slow-blow
Control card DC fuse	1 Amp, automatic reset (not user serviceable)
Crosspoint card	1 Amp, automatic reset (not user serviceable)

Warning | Dangerous voltages are present at the rear AC power connector and on the power supply module. Take precautions to prevent electric shock; do not touch exposed wires or connecting pins.

Indicator LEDs

Indicator LEDs indicate whether AC power is present and if a card is operating normally. LEDs are visible when the router front door is closed. In the following sections, LEDs are listed in the order they appear on the cards, from top to bottom.

Power Supplies

The NV6257 contains up to eight PS6000 power supply modules and the NV8000 contains up to four PS8010 power supply modules. Each power supply module has five green LEDs on the front. The LEDs indicate that the five +48 VDC outputs of the five branch circuits are present. All five LEDs should be lit at all times when AC power is present. If any LED is off, either the power supply has failed or the branch circuit is shorted. If any are not, it is likely that the corresponding branch circuit has failed. When the power supply output voltages are measured at the test points, the voltage should be approximately +48 VDC under a full load. If modules have been removed from the frame or options are not installed, some or all of the test point voltages could be somewhat higher than +48 VDC.

Control Cards

The LEDs on the control card(s) can be monitored to determine whether the card is operating normally. The LEDs are listed in the order they appear on the card:

LED Indicator	Indicator Function
Red (low battery)	Normally OFF. If lit, indicates that the battery needs replacing. See Battery Replacement on page 59.
Red (alarm)	Normally OFF. If lit, indicates a problem or fault. Check the external reference signals. If that does not resolve the problem, refer to the system status window in UniConfig for additional information. If you cannot resolve the problem, call Miranda Technical Support. For contact information, see page iii.
Amber (active)	Normally ON. Indicates the card is the active control card. On the standby control card, this LED should be OFF.
Green (health)	Normally ON. Indicates the card has power and is operating normally.

Input, Crosspoint, and Output Cards

The LEDs on the input, output, and crosspoint cards can be monitored to determine whether the cards are operating normally. The LEDs are listed in the order they appear on the cards:

LED Indicator	Indicator Function
Red (alarm)	Normally OFF. If lit, it indicates a problem. Replace the card or call Miranda Technical Support. For contact information, see page iii.
Green (Power)	Normally ON. Indicates the card has power and is operating normally.
Amber	Normally ON. Indicates the card is operating normally.
Green	Normally ON. Indicates good communication with the control card.
Red	Normally OFF. If lit, indicates that communication is not working properly; the communication with the control card is "bad."

Air Flow

The NV8288 and the NV8288-Plus draw cooling air from the front of the router, through the door, and exhausts heated air through the rear of the frame. The router must have the door properly installed and closed for proper airflow through the chassis. For maximum air flow, regularly inspect router fans and filters.

Caution | If airflow is impeded overheating may occur.

Fan Cleaning and Replacement

Two plug-in fan modules, each containing three cooling fans, are located at the top and bottom of the router frame. You can remove, inspect, and clean the fans by opening the frame front door, slide the latches that hold the fan modules in place, and pulling the modules out of the frame. If the fans become dusty or clogged with lint, use a vacuum or compressed air to clean the dust off. Also check the openings at the back of the frame where air enters and exits to be sure dust and lint have not accumulated.

The fan modules are easily replaced simply by sliding them out of the front of the frame and inserting new modules. The fans on the modules are held in place by four screws and a pluggable connector. To replace the fans, remove the screws and unplug the connector.

Intake Filter Screen Cleaning

The intake filter is located on the front door assembly of the NV8288 and the NV8288-Plus. To access the filter, open the router door by releasing the two thumbscrew locks, then slide the filter up to remove it. This process may be easier if the entire door is removed by lifting it straight up while open.

The system can be operated safely with the door removed for short periods. If the filter is only lightly contaminated with debris, clean it by vacuuming up loose debris or by blowing air from the clean side to the dirty side. For filters badly loaded with debris, rinse with cold water or wash with warm water and mild detergent. Be sure the filter is completely dry before re-installing it.

Battery Replacement

If the red LED low battery indicator on the control card turns on, the battery located on the front edge of the card needs replacing. Grasp the exposed edge of the battery with your fingers and pull it towards you to remove it (Do not use a metallic tool.). Call Miranda for replacement battery information. For contact information, see Technical Support Contact Information on page iii.

When you insert the new battery, be careful to observe the correct polarity.

Caution | To prevent explosion of the battery and possible equipment damage or harm to personnel, be sure the battery is oriented with the correct polarity. Polarity markings are visible on the card's battery housing.

Troubleshooting

Many system troubles are caused by easily corrected errors. This section lists common problems and their solutions in the most likely order of occurrence. Refer to Chapter 2, Introduction, on page 3, for an overview of the system and its major components. Try troubleshooting the system yourself, and if you are not successful, call Miranda Technical Support. For contact information, see Technical Support Contact Information on page iii.

In the event that a problem is caused by a bad circuit board, swapping the bad board with a replacement circuit board is the quickest solution. If you need to order replacement boards or other components, see Technical Support Contact Information on page iii.

Symptom	Possible Causes and Solutions
System not powering up.	Verify that the power cord(s) are plugged into the frame and the AC power source. Use a voltmeter to verify the presence of power. Check the AC line fuse on the power supply module. See Fuse Replacement on page 57.
One or a few cards or PS6000 modules (i.e., input card) not powering up or not operating properly.	Check that the card is fully seated in the frame. Reset the card by reseating it in the frame. Check that all five green LEDs on the front of the PS6000 power supply modules are lit. If an LED is not lit, it indicates a branch circuit may be faulty, which could affect only certain modules in the frame. Replace the power supply. Check module fuses. See Fuse Replacement on page 57.
Intermittent signal on one or two outputs.	Check the input and output cables and cable terminations and verify they are properly connected. Check the reference connections and verify that they are properly connected. Check to make sure that the card is not "bad." Swap each card in the signal path with another card to see if the problem moves with the card. If so, replace the card. If all cables, terminations, and cards are OK, call Technical Support. (See page iii.)
Intermittent or missing signals on all outputs.	Check the quality of the reference signals and their cable connections. Possible low voltage on PS6000 power supply module. Check power test points on power supply. Voltages at power supply test points may be slightly high in lightly loaded systems. Replace the power supply if any test points indicate low voltage.

Obtaining Service

For service advice, warranty exchange, warranty repair, or out-of-warranty repair:

1 Call Miranda Customer Support at the telephone number in the front of this manual under the heading Technical Support Contact Information on page iii. Our Customer Service Personnel will help you resolve any service issues.

2 If you need an exchange or repair, Miranda will assign you a Return Material Authorization (RMA) number. **Do not return equipment without first receiving an RMA number.** Miranda uses the RMA to track receipt of the equipment and to record repair or replacement information.

For out-of-warranty equipment, the Miranda Technical Support Engineer estimates the cost of repair when you call and requests a purchase order payable to Miranda.

If repair or exchange is required, package the assembly in an antistatic bag and place it in a shipping box with plenty of padding to prevent damage.

3 Address the package using the Shipping Address listed in the front of this manual under the heading Technical Support Contact Information on page iii, and ship the equipment to Miranda at your company's expense.

4 When repair or replacement of in-warranty equipment is complete, Miranda return ships the items at our expense. For out-of-warranty equipment Miranda charges a shipping and handling fee. The standard shipping method is Second Day.

For out-of-warranty service, Miranda will send your company an invoice following the repair or replacement.

7. Technical Details

Chapter 7 provides technical specifications for the NV8288 and the NV8288-Plus.

Power Specifications (NV6257, PS6000)

Power is supplied through a separate frame, the NV6257 power supply. The following table provides power specifications for the NV6257 for powering the NV8288 or the NV8288-Plus:

Parameter	Details
AC input	90–130 or 180–250 VAC, 50 or 60 Hz, automatic ranging.
AC fuses	Power supplies: 8A (part number HB0145-00), slow-blow; for 90–130 V. 6.3A (part number HB0031-00), slow-blow, for 180–250 V.
AC connectors	8, IEC 320 (one for each PS6000 module installed)
AC power	PS6000, 660 Watts, one IEC 320.
AC power usage	**NV8288:** 1300 Watts nominal (288×576), power factor corrected. **NV8288-Plus:** 1150 Watts nominal (288×288), power factor corrected.
Modules and slots	Required minimum number of PS6000 modules: 4 primary (4 optional redundant). One NV6257 power supply frame can power one router.
Dimensions	5RU high (8.72 inches, 221.5 mm), 19.0 inches (482.6 mm) wide, 21.0 inches (533.4 mm) deep.
Weight	55 lbs (25 kg); 105 lbs (47.6 kg) fully loaded.
DC power	Miranda connector and DC cable (WC0085).
Power supply alarm connection	DB25. Reads status from each PS6000.
Power supply monitor connection	DB25.
Environmental	Operating temperature: 0 to 40°C. Relative humidity: 0–90%, non-condensing.
Regulatory compliance	UL listed and CE compliant.

Power Specifications (NV8000, PS8010)

Power is supplied through a separate frame, the NV8000 power supply. The following table provides power specifications for the NV8000 for powering the NV8288 or the NV8288-Plus:

Parameter	Details
AC input	90–130 or 180–250 VAC, 50 or 60 Hz, automatic ranging.
AC fuses	No user-serviceable fuses.
AC connectors	4, IEC 320 (one for each PS8010 module installed).
AC power	PS8010, 875 Watts, one IEC 320.
AC power usage	**NV8288:** 1300 Watts nominal (288×576), power factor corrected. **NV8288-Plus:** 1150 Watts nominal (288×288), power factor corrected.
Modules and slots	Required minimum number of PS8010 modules: 2 primary (2 optional redundant).
Dimensions	3RU high (5.22 inches, 132.6 mm), 19.0 inches (482.6 mm) wide, 16.0 inches (406.4 mm) deep.
Weight	24 lbs (10.9 kg); 50 lbs (22.7 kg) fully loaded.
DC power	Miranda connector to NV8000, DC cable (WC0096). Miranda adaptor connector to router (WC0097).
Power supply alarm connection	DE9. Reads status from each PS8010.
Power supply monitor connection	DB25, loop-through possible.
Environmental	Operating temperature: 0 to 40°C. Relative humidity: 0–90%, non-condensing.
Regulatory compliance	UL listed and CE compliant.

Physical Specifications

The following table provides physical specifications for the NV8288 and the NV8288-Plus.

Parameter	Detail
Dimensions	10RU (17.5 inches, 445 mm) high 19.0 inches (483 mm) wide 12.0 inches (305 mm) deep
Weight	58 lbs (26.4 kg); 130 lbs (59.1 kg) fully loaded
Mounting	EIA 310-C, 19.0 inches (483 mm)
Grounding terminal	Copper, accepts 14-6 AWG

Parameter	Detail
Modules and slots	NV8288 24 Input cards, 12 signals each, 48 Output cards, 12 signals each, 2 Crosspoint cards, 2 Control cards (1 primary, 1 optional secondary), 1 Monitor card set, 2 Fan modules NV8288-Plus 24 Input cards, 12 signals each, 48 Output cards, 6 output signals plus 6 expansion signals, 48 Output filler cards, 6 expansion signals, 2 Crosspoint cards, 2 Control cards (1 primary, 1 optional secondary), 1 Monitor card set, 2 Fan modules
Diagnostic	Type: serial port, 38.4 baud, 8-N-1. Standard: SMPTE 207M, EIA-232, non-configurable. Connector: 2, DE9.
Serial control	Type: Serial port (2 per control card). Standard: SMPTE 207M, EIA-422. Connectors: 4, DE9.
Ethernet	Type: 10/100baseT. Standard: IEEE 802.3. Protocol: Miranda Ethernet protocol. Connectors: 2, RJ45.
Output signal monitor	Type: standard definition and high definition digital video. Standard: see related section of this specification for standard for each monitored signal type. Connector: DIN 1.0/2.3. Impedance: $75\,\Omega$. Signal details: See related section of this specification for details for each monitored signal type, including jitter, I/O levels and return loss.
I/O expansion	NV8288-Plus Type: proprietary. Standard: see related section of this specification for standard for each signal type sent between routers. Connectors: 48, proprietary, Miranda cable WC0089-00. Signal details: See related section of this specification for details for each signal type, I/O levels and return loss.
Control expansion	NV8288-Plus Type: 10/100baseT. Standard: IEEE 802.3. Connectors: 2, RJ45.
Power supply monitor	Connector: DB25.

Video Specifications

The following table provides video specifications for the NV8288 and the NV8288-Plus.

Specification	Detail
Video reference input	Type: analog video reference. Standard: PAL, NTSC, or tri-level sync. Connector: loop-through, BNC. Impedance: 75 Ω or Hi-Z (> 20 kΩ), not selectable. Input level: 0.5 Vpp to 2.0 Vpp. Input return loss: ≥ 30 dB, to 5 MHz.
SD inputs and outputs	Type: standard definition serial digital video. Standard: SMPTE 259M and 344M. Data rates: automatic reclocking at 143, 177, 270, 360, or 540 Mb/s or automatic bypass. Data rates: pass-through, 10 Mb/s to 540 Mb/s. Connectors: DIN1.0/2.3. Impedance: 75 Ω Cable equalization: 350 m Belden 1694A, 200 m Belden 1855A, or equivalent cable, at 270 Mb/s. Router path: non-inverting. Input and output return loss: > 15 dB, 5 to 540 MHz. Output level: 800 mVpp ± 10%. Output rise/fall time: 600 ps ± 10%. Output overshoot: ≤ 10% of maximum amplitude. Output alignment jitter: ≤ 0.2 UIpp, from 1.0 kHz to 27 MHz. Output timing jitter: ≤ 0.2 UIpp, from 10 Hz to 1.0 kHz.
SWB (SD and HD) inputs and outputs	Type: high definition serial digital video. Standard: SMPTE 259M, 344M and 292M. Data rate: automatic reclocking at 143, 177, 270, 360, 540 Mb/s, and 1.483 and 1.485 Gb/s or automatic bypass. Pass-through at 10 Mb/s to 1.5 Gb/s. Connector: DIN1.0/2.3. Impedance: 75 Ω. Cable equalization: 150m Belden 1694A, 85m Belden 1855A, or equivalent cable, at 1.5 Gb/s. Router path: non-inverting. Output level: 800 mVpp ± 10%. Input and output return loss: > 15 dB, 5 MHz to 1.5 GHz. Output rise/fall time: ≤ 270 ps. Output overshoot: ≤ 10% of maximum amplitude. Output alignment jitter: ≤ 0.2 UIpp, from 100 kHz to 150 MHz. Output timing jitter: ≤ 1.0 UIpp, from 10 Hz to 100 kHz.

Specification	Detail
3Gig (3.0 Gb/s, HD and SD) inputs and outputs	Type: high definition serial digital video. Standard: SMPTE 259M-C, 292M and 424M. Data rate: automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.996, 2.970 Gb/s or automatic bypass. Pass-through at 10 Mb/s to 3.0 Gb/s. Connector: DIN1.0/2.3. Impedance: 75 Ω. Cable equalization (for cables listed or equivalent cable): 400 m Belden 1694A, 250 m Belden 1855A at 270 Mb/s, 150 m Belden 1694A, 100 m Belden 1855A at 1.5 Gb/s, 100 m Belden 1694A, 45 m Belden 1855A at 3.0 Gb/s. Router path: non-inverting. Output level: 800 mVpp ± 10%. Input and output return loss: > 15 dB, 5 MHz to 1.5 GHz; >10 dB, 1.5 GHz to 3.0 GHz. Output rise/fall time: ≤ 135 ps. Output Overshoot: ≤ 10% of maximum amplitude. Output Alignment Jitter: ≤ 0.3 UIpp, from 100 kHz to 300 MHz. Output Timing Jitter: ≤ 2.0 UIpp, from 10 Hz to 100 kHz.

Time Code Specifications

The following table provides time code specifications for the NV8288 and the NV8288-Plus.

Specification	Detail
Time code reference input	Type: 1, BNC. Standard: SMPTE 12M. Connectors: BNC, terminating. Data rates: 1/30th to 80 times normal. Impedance: 75 Ω.

Environmental Specifications

The following table provides environmental specifications for the NV8288 and the NV8288-Plus.

Specification	Detail
Operating temperature	0 to 40°C.
Relative humidity	0–90%, non-condensing.

7. Technical Details

Environmental Specifications

8. Glossary

AC	Alternating Current
CE	Conformité Européenne. European health and safety product label.
dBu	Unit of audio level where 0dBu is 0.775 V rms.
DC	Direct Current
DIN 1.0/2.3	Connector for 1.0/2.3 BNC connections
EIA	Electronic Industries Alliance. A trade organization for electronics manufacturers in the United States. The organization helps develop standards on electronic components, consumer electronics, electronic information, telecommunications, and Internet security.
ESD	Electrostatic discharge
HD-SDI	High Definition. Video signal rates: SMPTE 259M at 1.483 and 1.485 Gb/s.
IEC	International Electrotechnical Commission. An international standards organization dealing with electrical, electronic and related technologies.
IEEE	Institute of Electrical & Electronics Engineers. An international non-profit, professional organization for the advancement of technology related to electricity.
IMD	Inter-modulation distortion
I/O	Input / Output
LED	Light Emitting Diode
Re-clocking	The resampling of a signal's data clocked to a reference. Also known as, Clock and Data Recovery (CDR).
RU	Rack Units. A standard measure or size for frames (1.75 inches).
SD-SDI	Standard Definition. Video signal rates: SMPTE 259M at 143, 177, 270 and 360 Mb/s and SMPTE 344 M at 540 Mb/s.
SMPTE	Society of Motion Picture and Television Engineers. www.smpte.org. An international professional association, based in the United States of America, of engineers working in the motion imaging industries.
SWB	Super Wide Band. The combination of SD-SDI and HD-SDI signal rates up to 1.5 Gb/s.
Time code	An AES signal that is data; contains a time stamp of hours and minutes, usually associated with film and video frames, established by the SMPTE. Time codes provide a time reference for editing, synchronization, and identification. The time code is usually a low speed data signal, whose bit rate (nominally about 2.4 Kbs) and spectral content varies with changes in tape speed.
UL	Underwriters Laboratory Incorporated. Develops standards and test procedures for materials, components, assemblies, tools, equipment and procedures, chiefly dealing with product safety and utility.

8. Glossary

UniConfig   Application used to configure the router for use by router control system.

VAC   Volts of Alternating Current

VDC   Volts of Direct Current

A. Part Numbers

Appendix A provides a list of parts provided by Miranda for the NV8288 router and NV6257 power supply:

- Power Supply

- Cards

- Frame Expansion

Power Supply

PS6000	Power supply module for the NV6257.
PS8010	Power supply module for the NV8000.
WC0046	Power supply monitor cable.
WC0085	Power supply "straight" cable for connecting one router to one NV6257 power supply.
WC0087	Power supply "Y" cable for connecting two routers to one NV6257 power supply.
WC0096	Power supply cable for connecting two routers to one NV8000 power supply.
WC0097	Adapter for the power supply cable for connecting the NV8000 to a router.

Cards

EM0529	Control card.
EM0530	Input card for SD signals.
EM0531	Input card for SWB signals.
EM0532	Output card—Standard for SD signals.
EM0533	Output card—Standard for SWB signals.
EM0534	Crosspoint card.
EM0540	Output card—Expansion ("filler card") for SD signals
EM0541	Output card—Expansion ("filler card") for SWB signals
EM0546	Monitor (cardset)

Frame Expansion

WC0084	Expansion cable for transmitting control system commands between two connected routers.
WC0089	Expansion cable for connecting two routers together and transmitting signals between routers.

A. Part Numbers

Frame Expansion

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