NV7256 and NV7256-*Plus* Digital Audio Routers

User's Guide

Miranda Technologies Inc.
3499 Douglas B. Floreani
Montreal, Quebec
Canada H4S 2C6

- **Revision**: 2.5
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- **Part Number**: UG0001-05

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- E-Mail:

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  In China, asiatech@miranda.com
- Website: http://www.miranda.com
- Mail

  Miranda USA
  P.O. Box 1658
  Nevada City, CA 95959, USA

  Shipping

  Miranda USA
  125 Crown Point Court
  Grass Valley, CA 95945, USA

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

Change History

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

- User's Guide Part # UG0001-05
- Software version: -none-

Rev	Date	ECO	Description	Approved By
2.0	04 Jan 07	12440	User's guide rewritten. Older manuals, UG7256-00 and UG7256-01 are now obsolete.	D.Mueller
2.1	03 Aug 07	13430	Updated configuration chapter. Updated specifications	D.Mueller
2.2	22 Jan 08	14014	Added pinouts for Phoenix STP connectors (AES reference, p.51, STP monitor outputs, p.55, and power supply alarms, p.58).	D. Cox
2.3	22 Oct 08	14426	Updated formats. Some reorganization.	D.Mueller
2.4	31 Mar 09	15703	Format change.	D.Mueller
2.5	10 Oct 09	16114	Corrected contact information.	D.Mueller

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.

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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.

Table of Contents

Table of Contents

1. Preface

Chapter 1 provides an introduction to the NV7256 and NV7256-*Plus* Digital Audio Routers User's Guide. The following topics are discussed:

Chapter Structure

The following chapters provide detailed instructions for all aspects of NV7256 and NV7256-*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 a functional description of the product.
- Chapter 3, Installation, provides installation and connection instructions.
- Chapter 4, Configuration, provides configuration instructions.
- Chapter 5, Maintenance, provides maintenance and trouble-shooting instructions.
- Chapter 6, Technical Details, provides electrical, video, audio, mechanical, and environmental specifications, product drawings, and default settings.
- Chapter 7, Glossary, provides a glossary.
- Appendix A, Part Numbers, lists relevant part numbers.
- 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.
- Entries written in bold-face or Capital Letters denote physical control panel buttons or GUI buttons.

  Click **Apply** to ...

  Press the SRC 12 button.

2. Introduction

The NV7256 and NV7256-*Plus* routers manage audio signals, both synchronous and asynchronous; balanced and unbalanced. This section discusses the general features of the router, the power supply, signals supported, a description of all active cards, and expandablity when using the NV7256-*Plus*. It is recommended that you read this section to familiarize yourself with the router before starting any installation tasks.

Overview

The NV7256 and the NV7256-*Plus* can manage up to 256 inputs and 256 outputs. Both routers can switch AES synchronous audio, AES asynchronous audio (balanced and unbalanced) and time code signals. In addition, the NV7256-*Plus* can switch stereo analog audio signals. Two AES audio references and two analog video references ensure reliable redundant phase alignment and clock generation. All modules are "hot swappable."

There are two crosspoint architectures available: X-Y or Time-domain multiplexing (TDM).Using either crosspoint, in a fully loaded frame (i.e., all crosspoint cards installed) a single router can switch up to 256 inputs and 256 outputs (AES audio channels; 512×512 mono). Both the X-Y and the TDM crosspoint support AES synchronous and asynchronous audio, and time code signals. In addition, the TDM supports analog signals and single channel (mono) routing within AES channel pairs. For more information on crosspoints modules, see Crosspoints on page 25.

Using TDM crosspoint cards, up to four NV7256-*Plus* frames can be connected together creating a maximum switching matrix of 1024 inputs and 1024 outputs (for AES channels, time code or analog; 2048×2048 for mono channels). For AES/time code signals, a router can start as small as a 16 inputs × 16 outputs matrix expanding in increments of 16 inputs and 16 outputs. The sample rate between linked TDM crosspoints cards is limited to 48 kHz.

The NV7256-*Plus* also features a unique chassis with a flexible back plate composed of interchangeable backplanes that may be intermixed allowing for customized I/O audio configurations. Each backplane features connectors specific to a signal type. By swapping out backplane types, and the associated I/O card, you can change the type and number of signals managed.

System Overview

Input signals enter the router through connectors and are sent to as many as 16 input cards. The input cards are responsible for processing up to 256 digital (AES) incoming signals. From the input cards, the signals are sent to a crosspoint card. The crosspoint card is responsible for switching the selected input signals to selected output cards. The output cards are responsible for processing the signal, performing automatic re-clocking as needed, and forwarding the signal to the motherboard. The motherboard distributes the output signals to passive output modules. These modules contain the rear signal output connectors, which are located on the rear of the router.

The control card serves as the control interface between the external control system and the router. The control card processes commands and updates the switching matrix (crosspoint card functions) as needed. The control card also processes the video reference and AES reference to synchronize switching during a video vertical interval, and to provide stable clock sources for timing and re-clocking of outputs. An optional reserve control card can be installed as a back up in case the main card fails.

Figure 2-1 illustrates the flow of signals through the router.

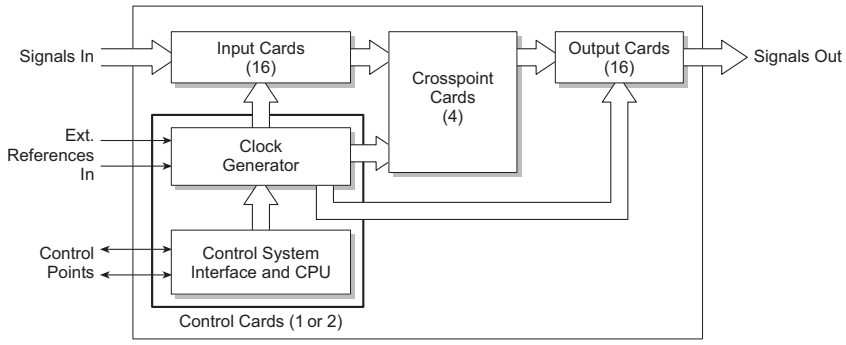


Figure 2-1. Block Diagram of System Overview

Mounting

The NV7256 and the NV7256-*Plus* mount in a 19” (482.6 mm) EIA compliant rack with minimum dimensions of 14 RU (24.5 inches, 622.3 mm) high, and 16” (406.4 mm) deep. When placing the 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 31.

Fuses

There are serviceable fuses located on different modules within the router. For more information, see Fuse Replacement on page 75.

Cooling

The NV7256 has two fan trays and the NV7256-*Plus* has three fan trays. Each fan try houses two fans each and are easily accessed from the front of the frame. The fans draw cooling air from the center-front of the router, through the door, and exhaust it through the rear of the frame at the top and bottom. The router must have the door correctly installed and closed for proper airflow through the chassis.

Caution	If airflow is impeded, overheating may occur.

Each fan features two LEDs that indicate if the fan is receiving power and if there is a failure. For more information, see Indicator LEDs on page 75.

Filters

There is a removable air filter located on the inside of the door assembly. For more information, see Intake Filter Screen Cleaning on page 76.

Power Supply

The NV7256 and the NV7256-*Plus* use the PS6000 power supply module. The NV7256 houses the power supply modules within the router frame. The NV7256-*Plus* uses a separate frame, the NV6257 Power Supply to house the power supply modules. Each router requires one PS6000 module as a primary power supply. It is recommended that for each router an optional redundant PS6000 power supply module as be installed.

The PS6000 power supply module 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 each PS6000 power supply module. Under normal operation, all five LEDs are lit. For more information, see Indicator LEDs on page 75.

Power Supply Fuses

A fuse for the AC power inputs is located on the PS6000 power supply modules. When a NV7256 or NV7256-*Plus* is ordered, fuses appropriate for the 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. A T8A (HB0145-00) fuse is required for 90-130 VAC applications. For 180-250 VAC operation, a T6.3A (HB0031-00) fuse is required.

The fuses are “slow blow” and designed to blow if there is an ongoing power issue, but not if there is a single, minor spike in the power flow. For information on replacing fuses, see Fuse Replacement on page 75.

Power Supply Cooling

There are four low-speed fans located along the front edge of each PS6000 power supply module. Each fan pulls a small quantity of air across internal heat sinks.

Signals Types and Rates

The NV7256 and the NV7256-*Plus* support several types of signals. Both routers support AES synchronous and AES asynchronous signals–balanced and unbalanced–and Society of Motion Picture and Television Engineers (SMPTE) time code signals. In addition, the NV7256-*Plus* supports analog audio signals.

The following table lists the sample rates and how many signals at each rate a single input card or output card can support. Each signal type requires a specific input card or output card. For a description of each card and corresponding card part numbers, see Active Cards on page 20.

Supported signals include:

Router	Signal Type	Rates Supported	One Input Card Supports	One Output Card Supports
NV7256, NV7256-*Plus*	Audio AES synchronous (balanced or unbalanced)	Sample rate 48 kHz	16 stereo inputs 32 mono inputs	16 stereo outputs 32 mono outputs
NV7256, NV7256-*Plus*	Audio AES asynchronous (balanced or unbalanced)	Sample rates 32 to 96 kHz (passed through)	16 stereo inputs	16 stereo outputs
NV7256-*Plus* only	Audio Analog	Sample rate 48 kHz; 24 bits	16 stereo inputs 32 mono inputs Converts analog to internal digital format.	16 stereo outputs 32 mono outputs Converts internal digital format to analog.
NV7256, NV7256-*Plus*	Time Code	1/30th to 100 times normal	16 inputs	16 outputs

Analog/Digital Conversion

Using analog-to-digital (A/D) converters, NV7256-*Plus* converts incoming audio analog signals to digital with a sample rate of 48 kHz for internal routing and for distribution as digital audio outputs. Conversely, incoming digital audio signals can be converted and distributed externally as analog audio outputs. In addition, all stereo signals are separated into left and right channels for switching as mono signals. Mono channels can be recombined to create new stereo signals. This unique architecture allows for cross-conversion between analog and synchronous AES signals within the same router frame. For more information on converter cards, see Active Cards on page 20.

The following is a list of audio signal options and related delay times.

Input and Output Options	Delay
Analog audio input and Analog audio output	< 1.2 mS
Analog audio input and AES synchronous output	~ 658 µS
AES synchronous input and Analog audio output	~ 539 µS
AES synchronous input and AES synchronous output	83.2 µs (4 samples)
AES asynchronous input and AES asynchronous output	< 1 µS

Using Video and Audio References

References are required for proper switching. The following lists input signal formats and if a video or AES reference is required.

Input Signal Format	Video Ref.	AES Ref.
Analog Audio (Stereo)	**	*
Analog Audio (Mono)	**	*
Synchronous AES Digital Audio (Stereo)	**	Yes
Synchronous AES Digital Audio (Mono)	**	Yes

Input Signal Format	Video Ref.	AES Ref.
Mixed Analog and Synchronous AES Digital Audio	**	Yes
Asynchronous AES Digital Audio (Stereo)	**	No
Time Code (Linear)	Yes	No

** If possible, connect an external AES 48kHz reference signal.*
*** Video reference not required for operation, but ensures proper video switching where appropriate.*

Mono Channels

AES signals are composed of several parts, including a preamble, left channel, right channel, user bits, and channel status bits. When received, an AES signal is retained as an AES signal for internal routing. The crosspoint array on the output card breaks apart the signal, separating out the left and right channels to create two mono channels. The mono channels are then switched as separate signals, recombining left and right channels into new stereo signals. The channel status bit and user bits are passed through. When the signal is distributed as an AES output, the preamble, channel status bit and user bits are added back to the left and right channels to create a stereo signal.

Individual left or right channels can be combined with other individual channels and distributed as a new channel-pair combination (stereo signal). For example, a live news report may capture the news reporter's voice on the left channel and the background noises on the right channel. By splitting the AES signal into its left channel and right channel, the news reporter's voice (left channel) can be paired with a different background noise (right channel). If only one channel is present, the other channel is silent.

To perform mono switching, an external AES reference signal must be connected to maintain synchronization. (See Making Audio Reference Connections on page 64.) How mono signals are recombined and routed to outputs is determined by the router control system. For more information on mono signal switching, see Analog Audio Input Card Switches on page 72.

Synchronous and Asynchronous Switching

The design of theNV7256 and the NV7256-*Plus* lets you route both synchronous and asynchronous signals simultaneously. Synchronous signals must be at 48 kHz or 96 kHz and are synchronized using pulse codes. Asynchronous signals can be any speed, but are not synchronized with other signals. In planning your routing system, it may help to consider the advantages and disadvantages of synchronous and asynchronous operation. Please note that mono operation requires synchronous hardware and signals.

Synchronous

Synchronous routing provides noise-free audio switching making it ideal for live on-air operation or hot switching to videotape recorders while recording. The router input phase aligns all input signals to an AES reference and the crosspoints switch during the vertical interval of the video reference at AES frame boundaries. Because switching is synchronized to the reference points in the signals (e.g., pulse codes), synchronous routing provides clean transitions. There is no need to use devices that reframe the signal for error concealment.

However, synchronous systems require reference synchronization equipment. All signal sources must be clock-locked and must share a common sample rate. This type of system is more expen-

sive, but it provides more versatile performance—signals can be switched on air or in live edits. In addition, synchronous routers are expandable. Up to four NV7256-*Plus* routers can be connected together to create a switching matrix of 1024 inputs and 1024 outputs (AES signals).

Asynchronous

Asynchronous routing is useful for offline or preselect operations in which noise during switching does not pose a problem. The primary advantage of asynchronous routing is cost. Asynchronous routing does not require any synchronization equipment: no AES reference is required for asynchronous signals and a video reference is only required if line accurate switching is needed. A further advantage of asynchronous routing is that any digital audio signal within specifications passes through the router, including signals from vari-speed and off-speed videotape recorders.

The disadvantage of asynchronous routing is that switching can occur anywhere in the signal, which corrupts AES signal framing. For example, switching can occur in the middle of an AES channel and not at the end or beginning of a signal frame. This corruption results in noise during switching and requires the downstream receiver to reframe and re-clock the signal. In addition, mono routing and expansion beyond 256×256 are not possible using asynchronous I/O cards.

Time Code Routing

A time code is a digital representation of time information, often used in video signals. The primary advantage of time code routing in the NV7256 and the NV7256-*Plus* is the quality of the time code processing. The Proportional Rise Time Output Amplifier recovers an excellent quality signal even from a very poor quality input. This exclusive circuit design provides controlled signal amplitude and shape from 1/30 play speed to 100 times play speed and provides proportional rise times from 1/2 play speed to 60 times play speed. You can put a poor time code signal in and get a virtually perfect signal out. In addition, you can mix time code modules with AES input/output signal modules for maximum versatility.

Module Slots and Rear Connections

The NV7256 and the NV7256-*Plus* router frames feature slots for input, output, monitor, control and crosspoint cards. Cards are installed in slots from the front of the router frame. The rear of the router houses connections for receiving, distributing or monitoring signals, and for connecting to system functions, such as a control system, alarms or references.

Active circuitry is contained on the input cards, output cards, control cards, power supply modules and fan tray installed through the router's front. All cards and backplanes are "hot-swappable."

An internal motherboard spans the frame and distribute I/O signals, control signals, timing information and power. Cards, power supply modules and the fan tray plug into the motherboard from the front of the router and backplanes plug into the same motherboard from the rear. Each input card and output card has a corresponding backplane. For more information on each type of card, see Active Cards on page 20. For more information on backplanes, see Backplanes (NV7256-Plus Only) on page 11.

Front Slots

Both the NV7256 and the NV7256-*Plus* have identical I/O and crosspoint card slots. Figure 2-2 shows the front of the NV7256-*Plus* router frame with the door removed. From this view, you can see the modules inserted in the slots. The upper portion of the frame features 16 slots for output cards. Below those are four horizontal slots for crosspoint cards. In the lower portion, below the crosspoint cards, are 16 slots for input cards.

When facing the front of the router, to the far right of the output card slots are two additional slots for the control cards (one primary and one optional redundant), as shown in Figure 2-2. For more information on each type of card, see Active Cards on page 20.

From this view, the fan trays are also visible. In the NV7256, the fan trays are located at the very top of the router chassis, above the output card slots, and to the right of the crosspoint card and input card slots. In the NV7256-*Plus*, an additional fan tray is located at the very bottom of the frame. For more information on frame cooling, see Cooling on page 4.

In the NV7256, the power supply modules are located at the bottom of the router. For the NV7256-*Plus*, the power supply modules are housed in a separate frame, the NV6257 power supply. (See Power Supply on page 5.)

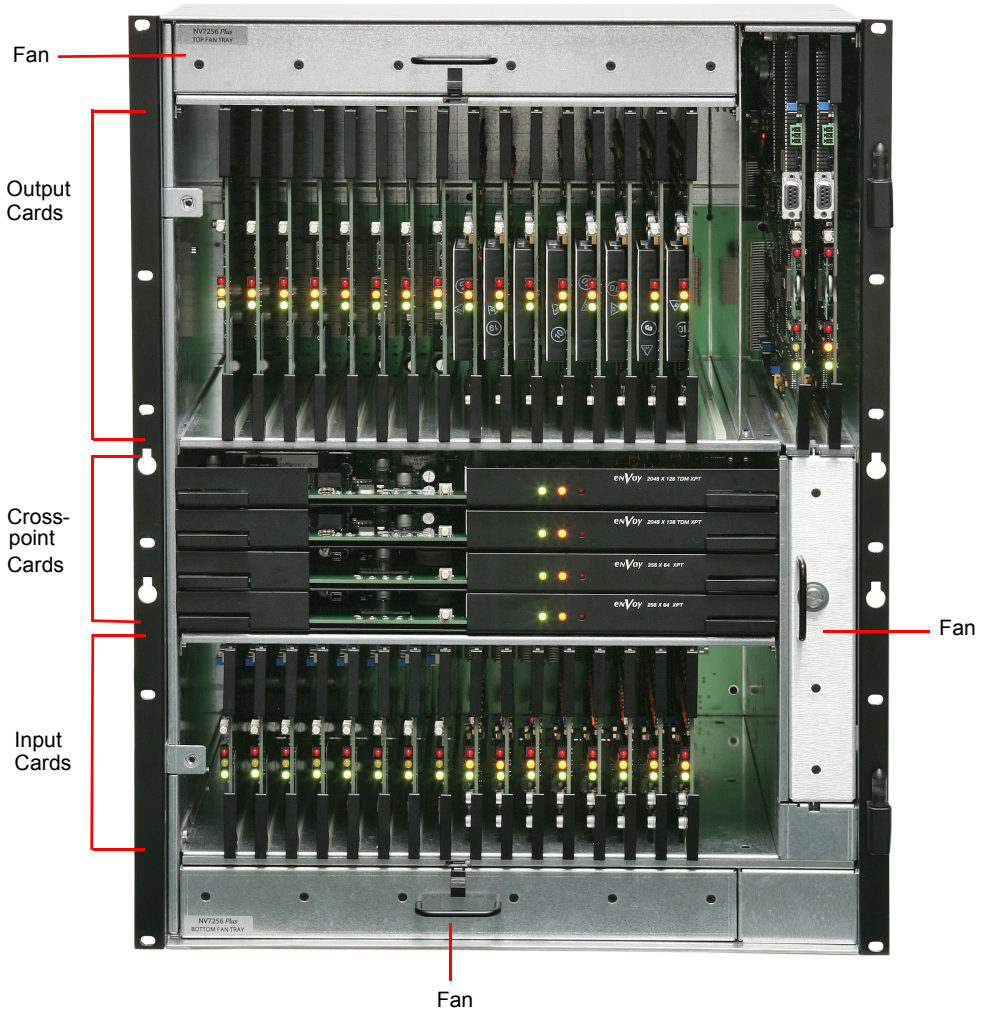


Figure 2-2. NV7256*Plus* with Door Removed (Front View)

Rear Connections

The rear of the NV7256 and the NV7256-*Plus* (Figure 2-3) is a single backplate. When facing the rear, the left side of the backplate contains several connections for system functions, including reference signals, the control system, and power to the frame. The rear also houses connectors for receiving and distributing inputs and outputs. In the upper area of the frame, the router features 16 columns of 16 connectors each for outputs. In the lower region, there are 16 additional columns of 16 connectors each for inputs. To the far left of the input connectors are four additional connectors for monitor signals.

The two router frames differ in how I/O connectors are presented on the backplate. For the NV7256, I/O connectors are either BNC or Phoenix and embedded directly into the backplate. The connectors cannot be changed. For the NV7256-*Plus*, the I/O connectors are housed on backplanes. Fore more information, see Backplanes (NV7256-Plus Only) on page 11.

The rear of the router also contains expansion connectors for connecting up to four routers together. These connectors are only active for the NV7256-*Plus*.

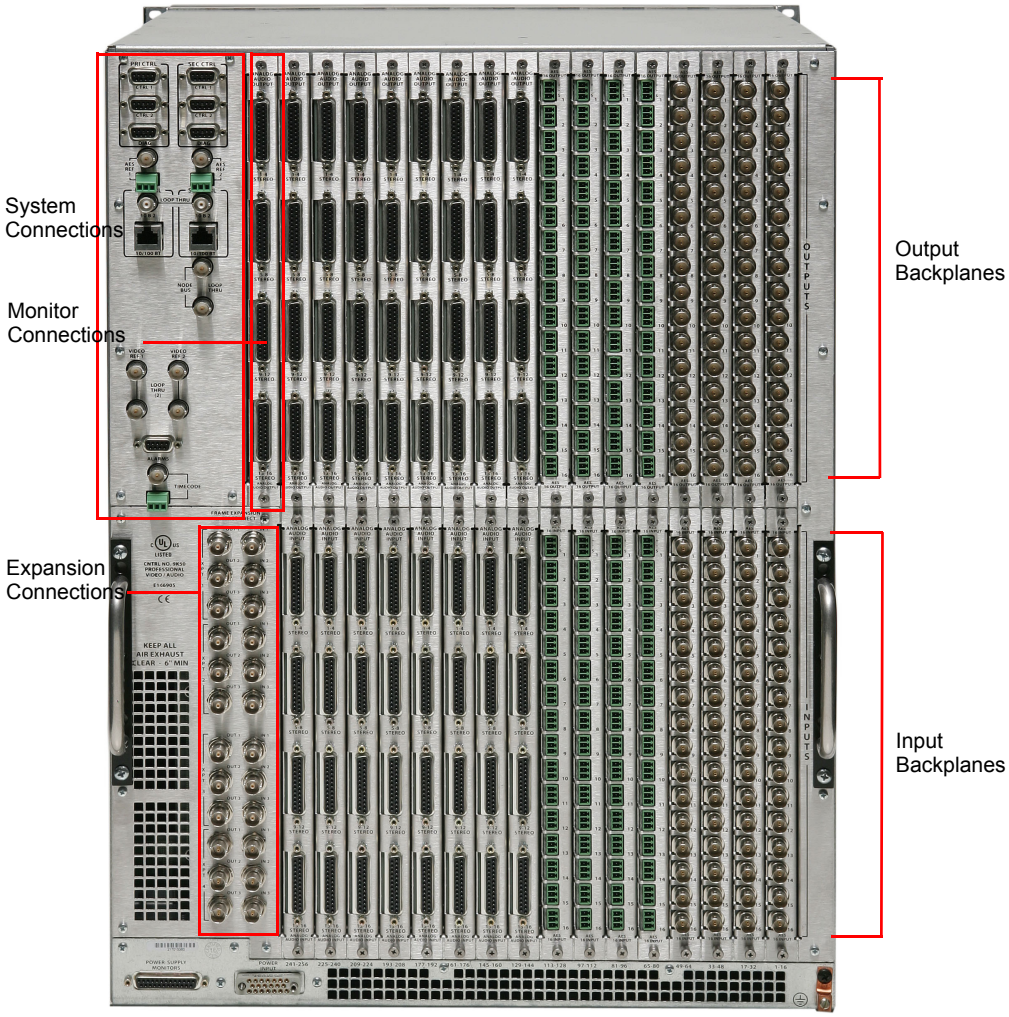


Figure 2-3. NV7256*Plus* Router (Rear View)

Backplanes (NV7256-*Plus* Only)

Figure 2-4. Backplanes: DB25, Phoenix and BNC Connectors

The NV7256-*Plus* features rear backplanes that can be intermixed in a single router frame, as shown in Figure 2-3. A backplane is a single column of identical connectors mounted on a plate that can be screwed into slots on the router back plate. A backplane can contain either BNC, Phoenix or DB25 connectors, and different backplanes can be intermixed within a single frame. Because different signals require different types of connectors, mixing different types of backplanes enable a single NV7256-*Plus* router to switch several different signal types. In contrast, the NV7256 can only have a single type of connector on the back plate, limiting switching to the signal types that can use that connector.

For each backplane installed in the rear of the router, a corresponding input card or output card must be installed in the front of the router that can manage the signal being received or distributed. For example, if a backplane housing BNC connectors is installed to receive AES unbalanced signals, then the input card capable of routing AES unbalanced signals must be installed in the corresponding card slot. (See Active Cards on page 20.) For information on installing backplanes, see Installing Backplanes (NV7256-Plus Only) on page 43.

Backplanes are available for the following types of signals and functions:

Type of Signals Managed	Backplane Name	Connector Type(s)	Connectors per Backplane	Signals Managed	Function
AES unbalanced, synchronous	AES	BNC	16	16 stereo 32 mono	Receives incoming signals and forwards signals to the crosspoint module. Or Receives signals from the crosspoint module and forwards as signals leaving router.
AES balanced, synchronous	AES/TC	Phoenix	16	16 stereo 32 mono	
AES unbalanced, asynchronous	AES	BNC	16	16 stereo	
AES balanced, asynchronous	AES/TC	Phoenix	16	16 stereo	
Analog Audio	ANALOG AUDIO	DB25	4 16 (4 stereo signals per connector)	16 stereo 32 mono	
Time Code	AES/TC	Phoenix	16	16	
Monitor	N/A	BNC	4	4	Monitors outgoing signals.

(See Figure 2-4 on page 11.)

System Connections

The NV7256 and the NV7256-*Plus* feature connections for managing system functions, located on the rear of the router. (See Figure 2-5.) These connections enable you to connect to:

A router control system.

A source of signals 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 or power supply malfunction.

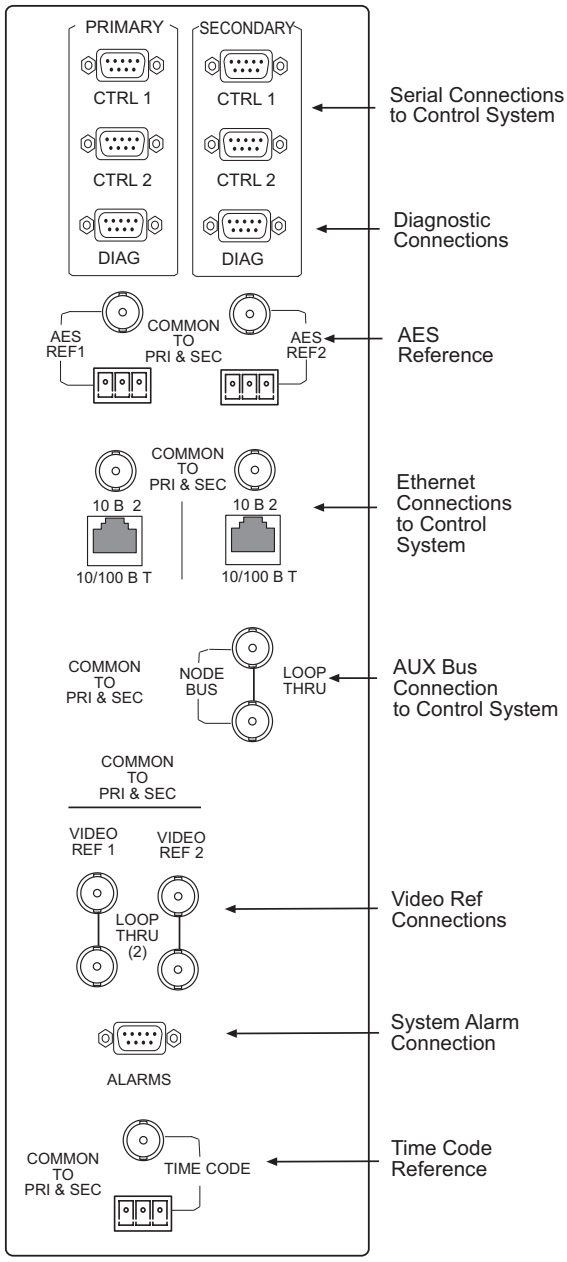


Figure 2-5. System Connections

Router Control System Connections

Router control systems are usually run on a separate PC, which is then connected to the router. The router provides three different ways to connect to a router control system: serial, Ethernet, or GSC Node Bus. 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 NV7256 and the NV7256-*Plus* have four serial ports, as shown in Figure 2-6. The ports are divided into two sets, one primary control ('PRIMARY) and one secondary control ('SECONDARY). 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 57.

Serial control ports implement SMPTE 207M tributary.

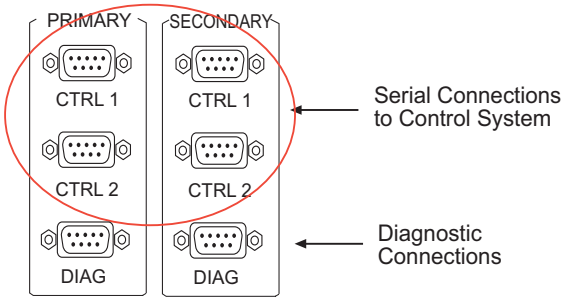


Figure 2-6. Serial Control Connections (Rear View)

Ethernet Control Connections

The router has two Ethernet ports labeled '10/100BT', as shown in Figure 2-7. Either port can be connected to the primary control card or the secondary (optional for redundancy) control card. 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 Connections on page 59.

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 UniConfig. 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 non-Ethernet form of connection: serial. (See Serial Control Connections on page 57.)

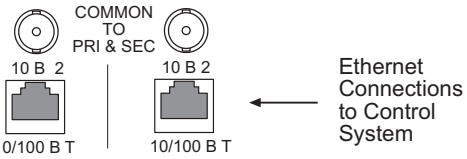


Figure 2-7. Ethernet Control Connections (Rear View)

GSC Node Bus Control Connections

Some third-party router control systems require a GSC Node Bus connection. The router has one GSC Node Bus connection, labeled 'NODE BUS', as shown in Figure 2-8. The connection is shared by both the primary and secondary control card. To use the GSC Node Bus connection, an optional module must be installed on each control card. For details, contact Miranda. For contact information, see Technical Support Contact Information on page iii. For installation instructions, see GSC Node Bus Control Connections on page 59.

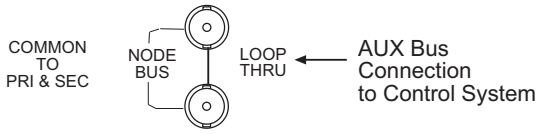


Figure 2-8. GSC Node Bus Control Connections (Rear View)

Control System Expansion Connections

In order to manage two or more connected NV7256-*Plus* routers, control system expansion connections need to be connected between the routers. When making control system connections, only one router is directly connected to the control system. This router acts as the *primary* router. Connections from the remaining routers, the *secondary* routers, are connected in a "daisy chain" to the *primary* router. This enables the router control system to communicate with all routers through the primary router.

For instructions on making control system expansion connections, see Control System Expansion Connections on page 60.

Diagnostic

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 Chapter 4, Configuration, on page 71.) For information about using UniConfig, see the UniConfig User's Guide.

Two diagnostic connections are located on the rear of the router, labeled 'DIAG'. The ports are divided into two sets: one primary ('PRIMARY') and one secondary ('SECONDARY'), as shown in Figure 2-9. 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 62.

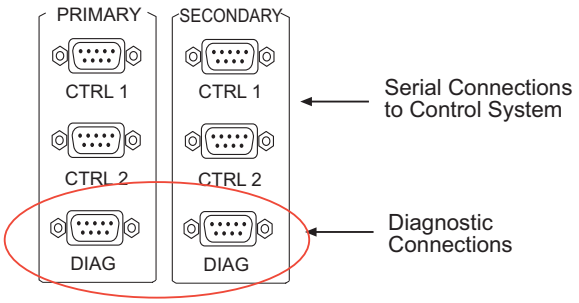


Figure 2-9. Permanent Diagnostic Connections (Rear View)

AES Reference Connections

The AES reference is used for clock generation, which provides a timing reference for AES synchronous signals and for timing circuits on the control card. Certain signals require an AES reference. For optimum audio output, signals must be clock-locked to the same reference. Input impedance is selected by setting jumpers on the control card. (See Control Card Jumpers on page 71.)

The router has two AES reference connections labeled 'AES REF1' and 'AES REF2', as shown in Figure 2-10. Both connections are shared by the primary control card and the secondary control

card. The AES reference connections are “redundant” and use the same reference type. When both reference connections are connected, if one reference fails, the control card automatically fails-over to the redundant reference.

Synchronous AES input cards can work with inputs that are not locked to a common AES reference. These inputs are treated as non-synchronous AES signals. Although possible, this is not recommended for high-quality program audio feeds because the audible effects may be unpredictable, depending on the program content and the degree of offset in the incoming data rate.

An AES reference is required when using synchronous AES output cards. (See AES Synchronous on page 22.) While it is possible to let the clock generator on the control card free-run, the synchronous AES outputs may contain ticks and pops, the severity of which depends on the difference in clock rate.

The AES reference connection requires a stable signal source of AES with a sample rate of 48 kHz. For instructions on making AES reference connections, see Making Audio Reference Connections on page 64.

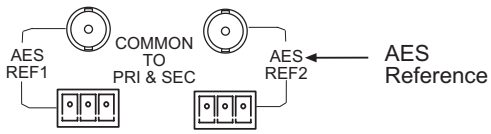


Figure 2-10. Connections to AES References (Rear View)

Video Reference Connections

The NV7256 and the NV7256-*Plus* provide timing reference connections for video signals, labeled ‘VIDEO REF 1’ and ‘VIDEO REF 2’, as shown in Figure 2-11. 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.

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 use which video reference on an output by output basis. (See the *UniConfig User’s Guide*.)

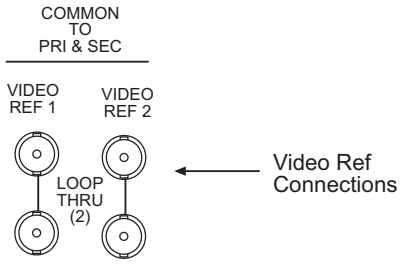


Figure 2-11. Connections to Video References (Rear View)

Time Code Reference Connections

The NV7256 and the NV7256-*Plus* have connections for a reference source for Time Code signals labeled ‘TIME CODE’, as shown in Figure 2-12. Time code references are not supported at this time.

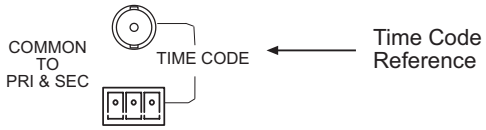


Figure 2-12. Time Code Reference Connection (Rear View)

System Alarm

The NV7256 and the NV7256-*Plus* provide a system alarm that sends notification of a malfunction, such as when a fan or power supply is not functioning properly. The NV6257 Power Supply (power supply), and the NV7256 and the NV7256-*Plus*, 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 monitoring is provided. See Alarm Indicator Equipment on page 69.

In addition to an alarm connection, the router is connected to a router control system that receives status information from the router’s control card(s). See Router Control System Connections on page 13. The control card reads the status of NV6257 Power Supply’s power supply and fans through the ‘Power Supply Monitors’ connection. (See Power Supply on page 5.) In addition, the control card monitors the router’s power supply, fans, and video reference connections. Both NV6257 Power Supply 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 ‘ALARMS’, as shown in Figure 2-13. For instructions on making alarm connections, see Making System Alarm Connections on page 68.

Figure 2-13. System Alarm Connection (Rear View)

Signal Flow

The NV7256 and the NV7256-*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 20.

NV7256

The NV7256 is a standalone router that can manage up to 256 inputs and 256 outputs (512×512 mono channels). All inputs go to all crosspoint cards. The frame houses up to four crosspoint cards in four horizontal slots numbered 1 through 4, from top to bottom. Each crosspoint card switches 256 inputs and 64 outputs. This means that every set of four output cards requires a crosspoint card. In a fully loaded frame (i.e., all active cards installed), all 256 inputs can be switched to any of the

256 outputs. Crosspoint card slot 1 feeds inputs to output cards managing outputs 1–64. Similarly, crosspoint card slot 2 feeds inputs to output cards managing outputs 65–128, and so on, as shown in Figure 2-14. For more information on crosspoint cards and the signals switched, see Crosspoint Slots and Signals Switched on page 20.

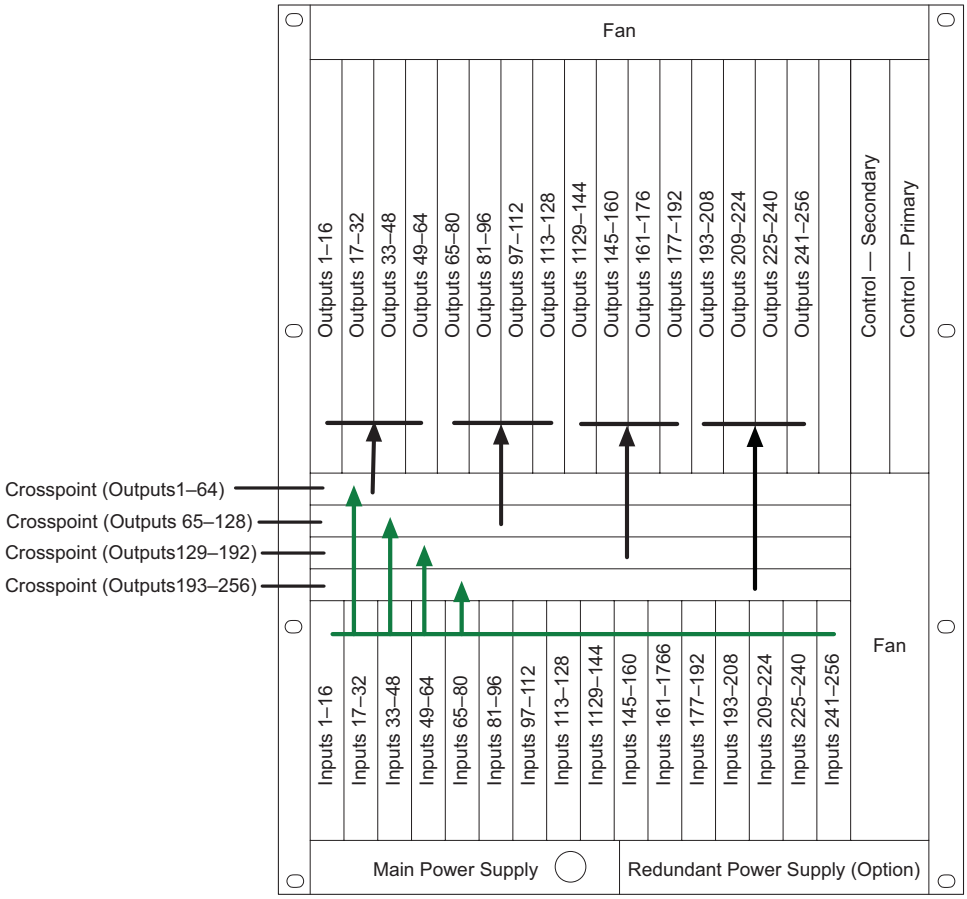


Figure 2-14. NV7256 Signal Flow (Front View)

NV7256-Plus

Each NV7256-*Plus* router can manage up to 256 inputs and 256 outputs. When four NV7256-*Plus* routers are connected together, the number of signals switched increases to a maximum of 1024 inputs and 1024 outputs.

The signal flow of inputs and outputs in the NV7256-*Plus* is identical to the NV7256, with one exception: additional signals are received from and distributed to connected routers. When two or more NV7256-*Plus* are connected, signals from one router are distributed to the second connected router, and vice versa, through expansion connections.

Every set of four output cards requires 1 crosspoint card. On the TDM crosspoint card, memory is divided into 4 segments, one for local inputs and outputs, and three for frame expansion. This means that up to three additional frames can be added, for a total matrix of four connected frames. For example, one segment of memory is used for Frame A, the current frame, the next segment is used for Frame B, the next segment for Frame C, and so on. Each expansion connection is associ-

ated with a specific segment of the TDM memory from each of the four crosspoint cards. For more information, see Frame Expansion on page 27.

Slots and Corresponding Signal Numbers

Each slot in the router frame houses an input card or output card for receiving or distributing signals. Each signal is assigned a number that corresponds to the physical input or output connector and to the slot in which an input card or output card is installed. In the NV7256 and the NV7256-*Plus*, connectors are organized into 16 columns of 16 connectors each. This means that Input card slot 1 corresponds to inputs 1–16, Input card slot 2 corresponds to inputs 17–32, and so on, up to 256, as shown in Figure 2-15. Output slots are similarly numbered with Output card slot 1 corresponding to outputs 1–16, Output card slot 2 to outputs 17–32, and so on.

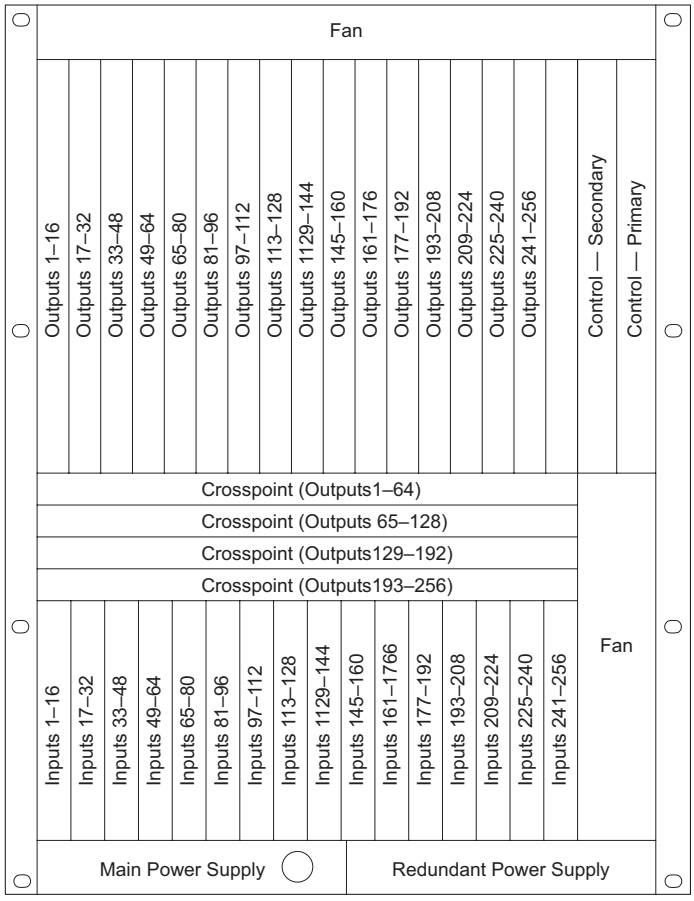


Figure 2-15. NV7256 Slots and Corresponding Signal Numbers (Front View)

When two or more NV7256-*Plus* routers are connected together, one router is designated as Frame A and the other, connected routers as Frame B, Frame C and Frame D. On each router, 256 inputs and 256 outputs are managed locally. In addition 256 outputs are forwarded to each connected router and 256 inputs received from each connected router. Because signals cannot have identical identifying numbers, when two or more routers are connected together, signals are numbered starting at one and continuing in sequence through all connected routers. For example, if four routers are connected together, Frame A has signals 1–256, whereas Frame B has signals 257–512, Frame C has signals 513–768 and Frame D has signals 769–1024.

Crosspoint Slots and Signals Switched

The crosspoint card manages signal switching with each card managing 256 inputs and 64 outputs. The router frame has four horizontal slots for housing crosspoint cards, number slots 1 through 4, from top to bottom. Depending on the slot in which it is installed, the crosspoint card switches different signals. Input and output card slots are numbered 1 through 16, from left to right, when facing the front of the router. To see which signals each crosspoint card manages, see Figure 2-15 on page 19.

Because the crosspoint cards installed in a specific slot manage specific outputs, depending on your configuration, not all crosspoint cards may need to be installed. For example, if you are only switching outputs 1 through 128, crosspoint cards are only required in crosspoint card slots 1 and 2. The other slots can remain empty.

Active Cards

The NV7256 and NV7256*Plus* features several active cards that manage incoming signals, forward commands from the router control system, perform signal switching, and distribute outgoing signals. Each card slides into a card guide through the front of the router frame.

There are:

- 2 control cards (one primary, one secondary; optional for redundancy)
- Up to 16 input cards
- Up to 16 output cards
- Up to 4 crosspoint cards
- 1 monitor card

Each input card and output card supports a specific signal type. (See Signals Types and Rates on page 5.) It is important to remember that for every four output cards (up to 64 outputs), there must be an associated crosspoint card installed. Up to 16 output cards can be included in a single router frame (256 outputs), requiring four crosspoint cards. The location of the output cards in the router frame determines which signal data is distributed to that card. (See Crosspoint Slots and Signals Switched on page 20.)

Card functions are described in the proceeding sections. For information on installing cards, see Installing Active Cards on page 45.

Control Cards

The router has two control cards (EM0374), one primary and one secondary (optional for redundancy). A control card receives commands from the router control system, and in turn, controls the input and output cards. In addition, the control card manages reference signals, supplies appropriate timing and control signals to the input cards and output cards, and sends alarm signals to the router control system.

Both the primary control card and the secondary control card receive router control system commands, but only the primary control card actively sends commands. Because both cards receive router control system commands, if the active (primary) control card fails, the back-up (secondary) control card automatically takes over processing without interruption. In addition, the primary con-

trol card and secondary control card communicate with each other. Should either control card fail, the now active control card communicates the failure to the router control system.

There are several jumpers on the control card which must be configured before putting the router into service. For more information, see Control Card Jumpers on page 71.

The control card receives power from the motherboard and 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 operating normally (Green). For more information, see Indicator LEDs on page 75.

Audio I/O Cards

Audio input cards and output cards support AES synchronous, AES asynchronous, and analog audio signals. Each type of signal requires a unique type of card. For example, to support AES synchronous signals, cards that specifically manage AES synchronous signals must be installed.

The NV7256-*Plus* router can convert between analog and digital within a single router frame. (See Signals Types and Rates on page 5.) In addition, analog or AES synchronous signals may be routed as stereo or mono signals, but not as AES asynchronous signals. AES asynchronous signals can only be routed as stereo signals.

The following is a list of the different audio input cards and output cards available. Each card is listed by the type of signal it manages:

Input Card/Output Card	Inputs and Outputs	Incoming Signals per Sample Rate	Input Card Part Number	Output Card Part Number
AES synchronous balanced and unbalanced	16 stereo 32 mono	16 stereo (32 mono) at 48 kHz	EM0313	EM0314
AES asynchronous balanced and unbalanced	16 stereo	16 stereo at 32 to 96 kHz (passed through)	EM0315	EM0316
Analog (NV7256-*Plus* only)	16 stereo 32 mono	16 stereo (rate N/A) 32 mono (rate N/A) Converts analog input to internal digital format locked to 48 kHz	EM0418	EM0588

Card Power and Fuses

Audio input cards and output cards receive power from the motherboard. Each card uses direct current converters (DC/DC) to convert the corresponding backplane's +48 VDC into the appropriate regulated supply voltage(s). The combination of pre-regulators and DC/DC converters and supply voltages varies from card type to card type, depending on the requirements of the associated circuitry. There is a non-serviceable, self-resetting 1A fuse located on each card. For more information, see Fuse Replacement on page 75.

Status Reporting

All audio input cards and output cards feature a circuit that performs status reporting and drives the card's functions. Two LEDs on the front of the card indicate the card's status: alarm (Red), power good (Green). Unique to the analog input card, three additional LEDs situated further back on the card indicate if software is loaded (Amber), and if there is good communication with the control

card (Green) or bad communication with the control card (Red). For more information, see Fuse Replacement on page 75.

The functions of each type of card are described in the proceeding sections. Cards are listed by the signal type supported.

AES Synchronous

Incoming and outgoing AES synchronous signals, balanced or unbalanced, are received or distributed through passive connectors housed on the rear of the router: BNC connectors for unbalanced signals or Phoenix connectors for balanced signals. The connector type must be appropriate for the type of signal being managed by the input card or output card.

Input Card

The AES synchronous input card (EM0313) receives up to 16 stereo signals through passive I/O connectors. Each signal is routed as an AES signal and is transformer coupled and forwarded to a receiver. At that time, the signal is synchronized to the system clock; adding and dropping samples as needed until the signal is synchronized.

The receiver forwards the signal to a buffer, which in turns sends the signal to the motherboard and onward to output cards for switching.

Note

Near-synchronous operation may cause minor disturbances in the audio signal. These effects are usually masked by the program audio, depending on the sample rate offset or magnitude and timing of the disturbance.

Output Card

The AES synchronous output card (EM0314) receives up to 128 stereo inputs from the motherboard. The signals are sent to receivers and then to a crosspoint array (128 inputs and 16 outputs stereo; 256 inputs and 32 outputs mono) for switching. The crosspoint splits the AES signal into a right channel, a left channel, and channel status bits for switching as mono signals. Each mono channel is then recombined with another mono channel to create a new AES signal. The outgoing AES signals are switched synchronously and sent to drivers and I/O connectors for distribution.

Figure 2-16 shows the synchronous AES signal path.

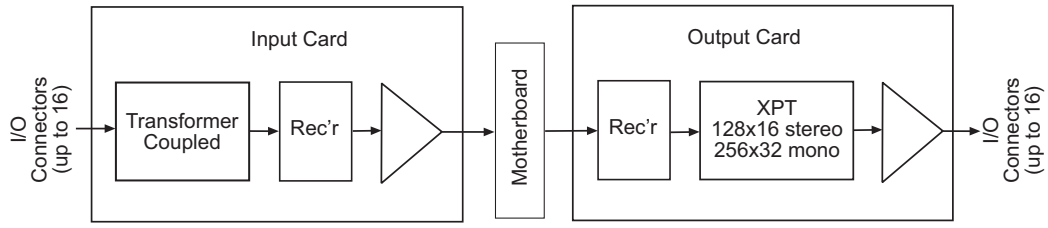


Figure 2-16. Synchronous AES Signal Flow (Balanced or Unbalanced)

AES Asynchronous

Incoming and outgoing AES asynchronous signals are received or distributed through passive I/O connectors: BNC connectors for unbalanced signals or Phoenix connectors for balanced signals. Asynchronous AES input signals can be routed only to asynchronous AES output cards; they cannot be routed to analog or AES synchronous output cards, nor can they be routed as mono channels.

Asynchronous AES operation is not intended for use with “live” or program audio feeds where glitches at switch boundaries are unacceptable. Instead, asynchronous input cards and output cards provide an economical way to select AES signal sources, even ones that are synchronous, for ongoing operations such as editing, monitoring or dubbing.

Input Card

The AES asynchronous input card (EM0315) receives up to 16 stereo signals through I/O connectors. The architecture of the input card is identical to that of the AES synchronous input card with one exception: the signals are not synchronized to the systems clock on the control card. (See AES Synchronous on page 22.)

Output Card

The AES asynchronous output card (EM0316) receives up to 128 stereo inputs from the motherboard. The signals are then sent to a crosspoint array (128 inputs and 16 outputs) for switching. The outgoing AES signals are switched asynchronously (i.e., not synchronous with a system clock) and then sent to balanced output drivers and I/O connectors for distribution. Be aware that this may cause possible problems in the output signal stream.

Figure 2-17 shows the asynchronous AES signal path.

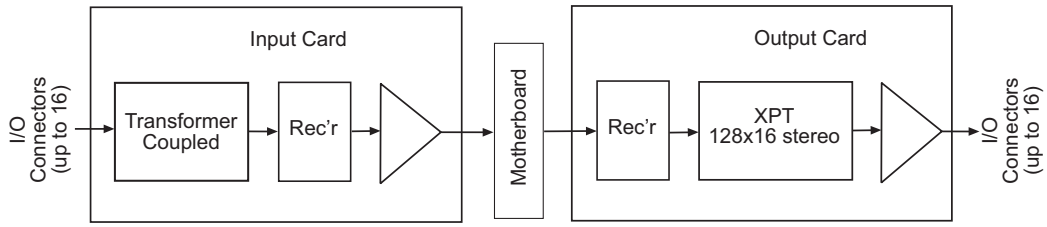


Figure 2-17. Asynchronous AES Signal Flow (Balanced or Unbalanced)

Analog Audio (NV7256Plus Only)

Incoming and outgoing analog audio signals are received or distributed through four DB25 connectors, housed on a backplane. (See Backplanes (NV7256-Plus Only) on page 11.)

The analog audio input card and output card feature DIP switches and a jumper that allow gain and mute detection to be set. In addition, using a separate DIP switch set, the operating level of the card can be set to match the operating level of the facility. By matching the incoming signal level, there is less degradation of the signal when it is converted to digital for internal routing in the router. For information on setting analog input card levels, see Analog Audio Input Card Switches on page 72.

Input Card

The analog audio input card (EM0418) receives up to 16 stereo signals (32 mono channels) through passive backplane I/O connectors. Inputs are forwarded to an analog-to-digital (A/D) converter. The A/D converter accepts two analog signals, either left and right channels of a stereo pair or two mono channels. The A/D converter is rate locked to the systems clock on the control card, converting the signals to a sample rate of 48 kHz and into AES compatible bit streams containing the sampled data. Setting the audio data to a common sample point ensures proper phase alignment of audio signals. The resulting synchronous AES signals are sent to the motherboard.

Output Card

The analog audio output card (EM0588) receives 128 stereo inputs from the motherboard. The signals are then sent to a crosspoint array of 128 inputs and 16 outputs (256 inputs and 32 outputs mono) for switching and then on to a digital-to-analog (D/A) converter which converts the signal from digital format to analog. From the D/A converters, the analog signals have low-pass filtering and gain correction applied and then forwarded to output cable drivers and backplane I/O connectors for distribution.

Note

The analog audio output card is designed to function in a voltage-matched system driving high impedance loads. The output drivers are not designed to drive 600 Ω loads continuously and may overheat if used in a 600 Ω environment.

Figure 2-18 shows the signal path for an analog signal.

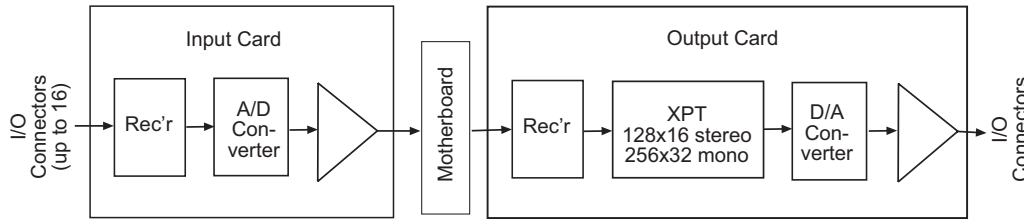


Figure 2-18. Simplified Analog Audio Signal Flow

Time Code Signals

The NV7256 and the NV7256-*Plus* support SMPTE time code signals. A time code is a sequence of numeric codes generated at regular intervals by a timing system. Time codes are usually used to synchronize a variety of signals to a specific start and end time, without regard to any other timing device. For example, a production plant may use a time code signal to which all signals distributed within the plant are synchronized. This ensures synchronization of signals to a single "master" clock instead of individual equipment clocks.

Input Card

The time code input card (116692) receives 16 time code signals through 16 Phoenix connectors. 16 differential input receivers accept time code input signals from the input connectors. The receivers send the single-ended outputs to Low Voltage Differential Signal (LVDS) buffers and then to the motherboard. The signal format on the motherboard is differential.

Output Card

The time code output card (EM0318) receives up to 16 inputs from the motherboard. Differential receivers buffer the inputs and forward them to a 128 inputs and 16 outputs crosspoint array for switching. The time code outputs are reformatted to comply with SMPTE standards and then sent to the output connectors through time code signal differential line drivers.

Figure 2-19, next page, shows the time code signal path.

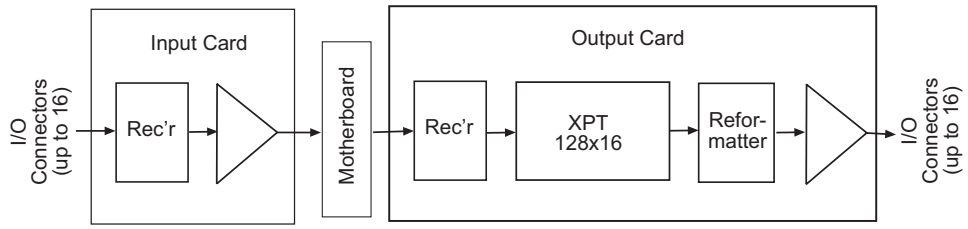


Figure 2-19. SMPTE Time Code Signal Flow

Crosspoints

Crosspoint cards are responsible for routing incoming signals to selected output cards. Two types of crosspoint cards are available: X-Y and TDM. Power to the crosspoint card is provided by on-board voltage regulators receiving +48 VDC from the frame power supply.

X-Y Cards (NV7256)

In a X-Y crosspoint card (EM0306) is used mainly by the NV7256, four groups of 64 incoming signals are sent from input modules to input receivers which buffer the signals. The signals are then sent to four 64 × 64 crosspoint integrated circuits. The crosspoints switch any of the 256 total inputs to any of 64 possible output destinations. Output drivers send the 64 output signals to the output cards, which are then sent to the output connectors. A Field Programmable Gate Array (FPGA) manages timing and crosspoint switching.

Figure 2-20 shows the X-Y crosspoint card signal path.

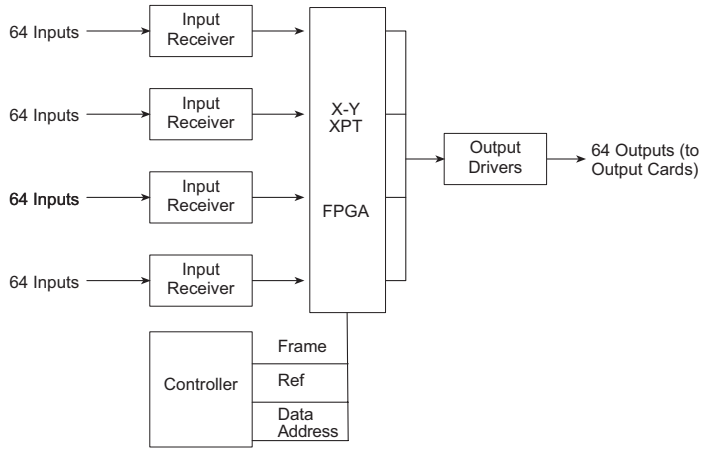


Figure 2-20. X-Y Crosspoint Simplified Block Diagram

TDM Cards (NV7256Plus)

Time Domain Multiplexing (TDM) technology enables multiple signals to travel on a single cable by placing the incoming signals in a continuous stream (e.g., a high speed parallel to serial signal converter). The TDM crosspoint card (EM0411) is mainly used by the NV7256-*Plus* and manages incoming signals from up to 256 connectors (one TDM crosspoint for four input cards, containing 16 signal inputs each, with four interconnected frames). The incoming signals are written to memory, requiring only one wire for all 256 connectors. The signals are then routed to outputs pursuant to instructions from the control system. The TDM crosspoint card contains enough memory to support a 1024×256 matrix for AES signals or a 2048×512 matrix for mono signals.

By using TDM in the crosspoint card, the router can send signals between input cards and output cards, and between frames, using a significantly fewer number of crosspoint connectors. Traditionally, each X-Y crosspoint requires a separate input and output connection. In a router array of 256×256 this would require 65,536 connectors. Because TDM crosspoints manage several signals at a single point, the same 256×256 array requires only 32 crosspoint connectors. This reduction in connectors reduces the physical space required to house the router, enabling you to connect several routers together in a smaller area.

In addition to space savings, TDM is able to store AES channels (i.e., one-half of a channel pair) separately, enabling mono switching.

In a TDM crosspoint card, four groups of 64 incoming signals are reformatted and sent to dual ports that supply the data to a high speed transmitter. The transmitter sends the data to expansion frames. A high speed receiver receives reformatted input signals from other expansion frames and supplies them to the output FPGAs. High speed MUXs receive the reformatted signal data where the FPGAs perform switching/multiplexing as needed to switch selected inputs to any of 64 output destinations. The multiplexed output signals pass through output buffers and are forwarded to the output cards.

Figure 2-21 shows the TDM crosspoint card signal path.

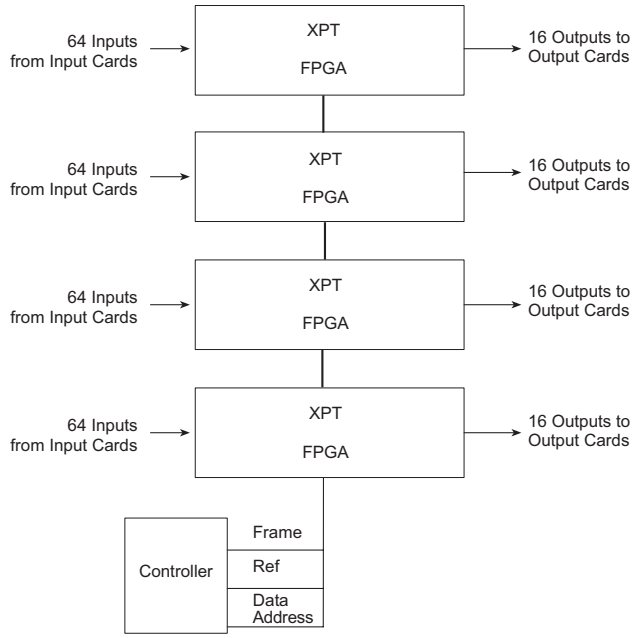


Figure 2-21. TDM Crosspoint Simplified Block Diagram

Monitor Cards

A monitor card (EM0468) receives one signal from each output card and then sends two copies to monitoring equipment for the purpose of monitoring outgoing signal quality.

When two or more NV7256-*Plus* routers are connected together, the monitor outputs from one router are forwarded to the monitor inputs on the second, connected router. This enables the monitoring of all outgoing signals from multiple connected routers through a single set of monitoring connections.

For information on making monitor connections, see Making Monitor Connections on page 66.

Frame Expansion

Using the NV7256-*Plus* router, you can connect up to four router frames together to create a switching matrix up to 1024 inputs and 1024outputs. The frames are linked by connecting several expansion connections on one router to expansion connections on the routers being connected.

How Frame Expansion Works

Each NV7256 and NV7256-*Plus* router frame can manage up to 256 inputs and 256 outputs (16×16 matrix). Every set of four 4 input modules and 4 output modules requires 1 crosspoint module. On the TDM crosspoint module, memory is divided into 4 segments, one for the direct set of input modules and output modules, and three for frame expansion. This means that up to three additional frames can be added, for a total matrix of four connected frames. For example, one segment of memory is used for Frame A, the current frame, the next segment is used for Frame B, the next segment for Frame C, and so on.

Each frame can contain up to 16 input modules and 16 output modules, and up to 4 TDM crosspoint modules. When another frame is added that also has a 256×256 matrix, each TDM crosspoint module has one expansion output wire and one expansion input wire connected from every frame to every other frame (200 ft./61m max cable length). This assumes that all frames are using TDM crosspoint modules. TDM crosspoints can be mixed with X-Y crosspoint modules, but X-Y crosspoint modules have some limitations, and cannot be used to connect frames. For more information, see Crosspoints on page 25.

The expansion connections are:

- I/O Signals—Each frame has 24 signal expansion connections. Connections are made between the four routers. All 24 connections on each router must be connected. See Signal Expansion Connections on page 54.
- 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 60.

Each router must have four TDM crosspoint cards installed. (See Crosspoints on page 25.)

3. Installation

When setting up the NV7256 or the NV7256-*Plus* for the first time, or reconfiguring an existing router configuration, 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 31.

2 Connect power being sure to install PS6000 modules *after* power is connected. See Power and Alarm Connections on page 32.

3 If setting up a NV7256-*Plus* router, install backplanes in the appropriate rear slots. If reconfiguring, remove backplanes and reinstall in the newly desired slots. See Installing Backplanes (NV7256-Plus Only) on page 43.

4 Install active cards in the appropriate front card slots. If reconfiguring, remove 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 45.

5 Make connections between the source of incoming signals, the destination of outgoing signals, and the router. If reconfiguring, change signal connections to match new active card configurations. See Making Signal Connections on page 49.

6 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 57.

7 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 62.

8 Make connections to signals acting as references for various types of signals. If reconfiguring, verify that all necessary reference connections are made for the signals being routed. See Making Audio Reference Connections on page 64, Making Video Reference Connections on page 65, and Time Code Reference Connections on page 66.

9 Make connections between monitoring equipment and the monitor equipment to monitor the quality of signals being switched. See Making Monitor Connections on page 66.

10 Connect the alarm connection on the router to an external indicator. If reconfiguring, skip this step if alarm connections are still adequate. See Making System Alarm Connections on page 68.

11 Install UniConfig. If reconfiguring, UniConfig does not need to be reinstalled. See the UniConfig User's Guide.

Package Contents

When your NV7256 or NV7256-*Plus* products from Miranda arrive, immediately inspect the shipping container for any obvious damage. If you find any container damage, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

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

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

Note

The NV7256 has power supplies built into the frame. The NV7256-*Plus* has a separate power supply frame (NV6257).

The rack used to house the NV7256 or NV7256-*Plus* is separate and not provided by Miranda.

This document does not address the shipment or installation of any other equipment or software that can be used in conjunction with Digital Audio Routerss (including the NV9000 server, NV96*xx* control panels and configuration programs such as UniConfig or the NV9000-SE Utilities).

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 Ω BNC connectors.
- ☐ Reference video source (BNC) at the line rate appropriate for your system.
- ☐ Frame rack suitable for mounting the router.

Rack Mount

The NV7256 or NV7256-*Plus* is designed to mount in a 19” (482.6 mm) EIA rack. This is not a requirement, but this manual assumes 19” for the sake of simplicity.

How to Rack Mount the Router

1 Determine the placement of the router frame in the rack, and the rack in the facility. When placing the frame and rack, keep in mind the following requirements:

The NV7256 or NV7256-*Plus* requires 14 RUs (24.5 inches, 622.30 mm) of vertical space.

If using the NV6257 Power Supply Power Supply (for the NV7256-*Plus*), be sure to leave 5 RUs (8.75 inches, 222.25 mm) of additional vertical space for the power supply frame.

Be sure to locate the rack near an accessible AC source power outlet so that the router can be disconnected quickly in an emergency.

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 NV6257 Power Supply power supply frame.

3 If the NV6257 Power Supply was shipped with the PS6000 power supply modules in the frame, remove them to make the frame lighter for installation.

Important Do not reinstall the PS6000 power supply modules. The modules are installed after power is connected. For more information, see Power and Alarm Connections on page 32.

4 Lift the NV6257 Power Supply power supply frame into position and attach the NV6257 Power Supply to the front of the rack with the appropriate screws. Be sure to leave room for the router frame to be mounted in the rack. Place screws in all frame mounting screw holes. Power supply frames are usually mounted below the router frame.

5 Locate the NV7256 or NV7256-*Plus* router frame.

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 will damage the door.

7 If the equipment was shipped to you with the circuit boards in the frame, consider removing them to make the frame lighter for installation.

Caution Handle all circuit boards with care. Be sure to use ESD protection and place the circuit boards in ESD bags or on an ESD surface.

8 Install the temporary installation handle on the front of the frame, as shown in Figure 3-1. The handle fits into the keyhole-shaped slots. Use these handles to lift the frame into position.

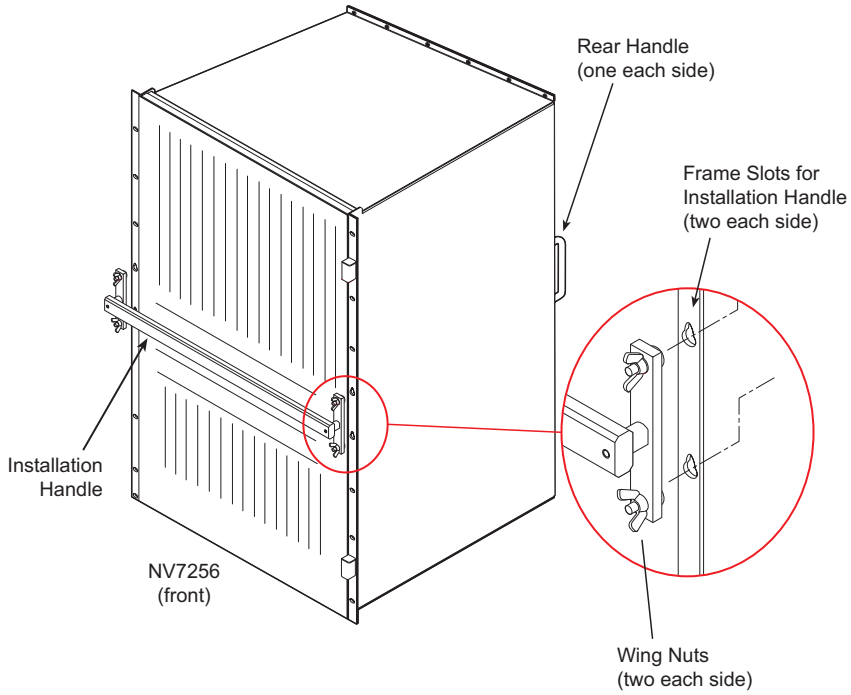


Figure 3-1. Frame Installation Handles, Front and Rear

9 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 NV7256 and the NV7256-*Plus* frames are considered too heavy for one person to lift and install in the rack.

10 Remove the temporary installation handles.

Power and Alarm Connections

The NV7256 and the NV7256-*Plus* both use the PS6000 power supply module. For the NV7256, the power supply module is installed in the router frame. For the NV7256-*Plus*, the power supply module is installed in a separate frame, the NV6257 Power Supply.

Each NV6257 Power Supply can house up to four primary PS6000 power supply modules and four secondary PS6000 power supply modules (optional for redundancy). Each NV7256-*Plus* frame requires two primary modules. It is recommended that two secondary modules also be installed for redundancy. That means that one NV6257 Power Supply can be used to supply power to two NV7256-*Plus* frames. Because up to four NV7256-*Plus* routers can be connected together, up to two NV6257 Power Supply power supply frames may be needed.

Depending on the router frame, the following number of PS6000 power supply modules are needed

Frame	Number of NV6257 Required	Number of PS8100 Modules Required	Installed in...
NV7256	None - installed directly in router frame	4 required, 4 optional for redundancy	NV7256
one NV7256-*Plus*	one	2 required, 2 optional for redundancy	one NV6257 Power Supply
two NV7256-*Plus*	one	4 required, 4 optional for redundancy	one NV6257 Power Supply
three NV7256-*Plus*	two	6 required, 6 optional for redundancy	two NV6257 Power Supply
four NV7256-*Plus*	two	8 required, 8 optional for redundancy	two NV6257 Power Supply

When connecting the NV6257 Power Supply power supply frame to a NV7256-*Plus* router, and the power supply frame to power, separate connections are made for power and monitoring. To create those connections, Miranda provides the following (one set is required per NV7256-*Plus* router):

- One WC0096-00 power supply cable
- One WC0046 monitor cable

The NV7256 and the NV7256-*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.

Power Supply Monitor and Alarms Connections

The NV6257 Power Supply has two DB25 connections, located on the rear. One connection, labeled ‘Power Supply Monitor’ carries alarm and temperature signals to the router. When two NV7256-*Plus* routers are connected together, each router is connected to the monitor connection on the associated power supply frame. When three or more NV7256-*Plus* routers are connected together, requiring two NV6257 Power Supply power supply frames, using a loop-thru connection, monitoring information can be passed between the NV6257 Power Supply power supplies. Monitor connections are made at the time power is connected.

The other connection, labeled ‘Alarms’ presents isolated alarm signals that can be connected to an external alarm indicator. For information on connecting NV6257 Power Supply alarms connections, see Making System Alarm Connections on page 68.

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 Power Supply power supply 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 following procedures include instructions to connect the ground lug on the back of the router. Whether to ground or not is up to you or your facilities manager. Failure to connect the ground does

not affect normal operation, but does protect you and your equipment in a power anomaly such as a lightening strike.

Caution

Do not drop, roughly handle, or stack power supply modules. If a module does not easily remove or insert easily, stop installation activities and contact Miranda Technical Support. (See Technical Support Contact Information on page iii.)

Power Supply for the NV7256

Power for the NV7256 router is provided through PS6000 power supply modules installed in the router frame. After the modules are installed, power is connected to the frame using a heavy-duty 20-pin GMCT shrouded male connectors and 48 V heavy-duty power cable. You will need a connector and cable for each power supply module installed. Usually two modules are installed: one as the main power supply and a second as an optional, redundant power supply.

Caution

Install PS6000 modules *after* connecting AC power.

Connecting to AC power before the router is connected, or after PS6000 modules are installed, may result in an electric shock.

How to Connect Power to the NV7256 Frame

1 Locate the power cord(s) and PS6000 power supply module(s).

2 Facing the rear of the router, connect the main power cord from an AC power source (90-230 VAC 50-60 kHz) to the *PS 1* connection, as shown in Figure 3-2.

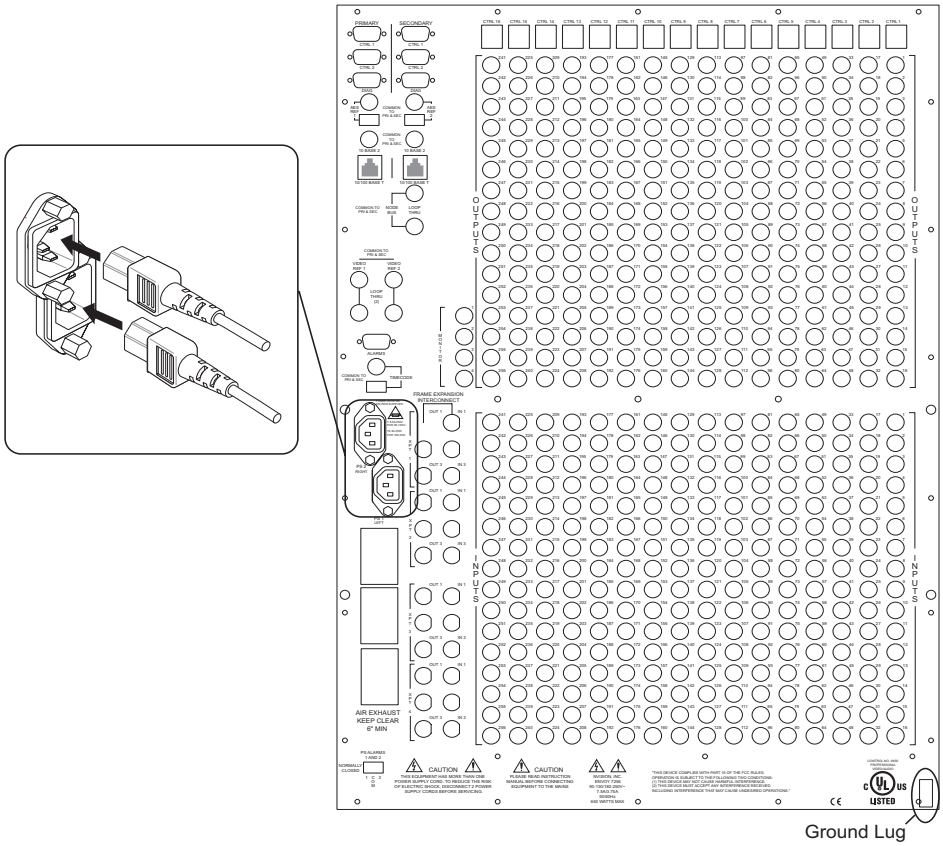


Figure 3-2. Example of AC Power Connections and Power Supply Connections (Rear View)

3 Facing the rear of the router, connect the redundant power cord from an AC power source (90-230 VAC 50-60 kHz) to the *PS 2* connector, as shown in Figure 3-2.

4 Facing the rear of the router, connect to the 'Power Supply Monitor' connection using a Phoenix connector (I positive, I negative and 1 ground) and a 110Ω cable, as shown in Figure 3-2.

5 Connect the other end of the cable to an alarm indicator box or similar monitoring equipment.

6 Install the primary PS6000 power supply module in the *main* power supply slot. When facing the front of the router, the slot is located in the lower, left area, as shown in Figure 3-3.

7 Install the redundant PS6000 power supply module in the *redundant* power supply slot. When facing the front of the router, the slot is located in the lower, right area, as shown in Figure 3-3.

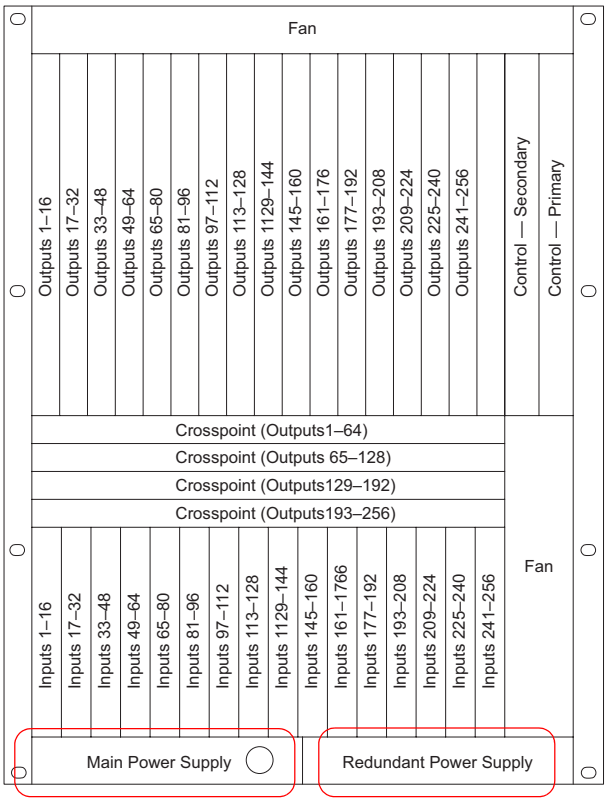


Figure 3-3. Power Supply Locations for NV7256 (Front View)

8 (Optional) Connect the ground lug to ground using a copper wire from 14 to 6 AWG. When facing the rear of the router, the ground lug is located in the farthest, lower, *right-hand* corner, as shown in Figure 3-2 on page 35.

Power Supply for the NV7256-*Plus*

The power supply for the NV7256-*Plus* router is an external, separate frame, the NV6257 Power Supply. PS6000 power supply modules are installed in the NV6257 Power Supply, which is then connected to the router frame using power cables.

If you are connecting a single NV6257 Power Supply to a single router frame, the power and monitor connections use the following cables and connectors:

- Power connections: Heavy-duty 20-pin GMCT shrouded male connectors and 48 V heavy-duty power cable.
- Monitor (alarm) connections: Standard DB25 male connectors and straight-thru cable.

If you are connecting two router frames to a single NV6257 Power Supply, in addition to the heavy-duty 20-pin GMCT shrouded male connectors and 48 V heavy-duty power cable provided by Miranda, you will need to create a "Y" cable. (See Creating a "Y" Cable on page 40.) The Y cable enables you to connect both output power connections on the NV6257 Power Supply to separate router frames.

When two routers are connected to a single NV6257 Power Supply, different slots in the NV6257 Power Supply provide power to each router (Router 1 and Router 2), as follows:

Power Supply Slots (PS)	Router	Primary or Redundant Power Source	Power Supply Output Driven by Power Supply Slots
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

Miranda provides both connector types and cables with the router and power supply frame.

How to Connect Power from a Single NV6257 Power Supply to a One or Two NV7256Plus Frames

1 Locate the power cords, power supply modules, and the cables supplied by Miranda.

Caution

Make power connections between the router and NV6257 Power Supply *before* connecting the NV6257 Power Supply to an AC power source. Insert PS6000 power supply modules *after* connecting the NV6257 Power Supply 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.

2 Facing the rear of the **NV6257**, connect power cords from an AC power source (90-230 VAC 50-60 kHz) into power connections *PS 1* through *PS 4*:

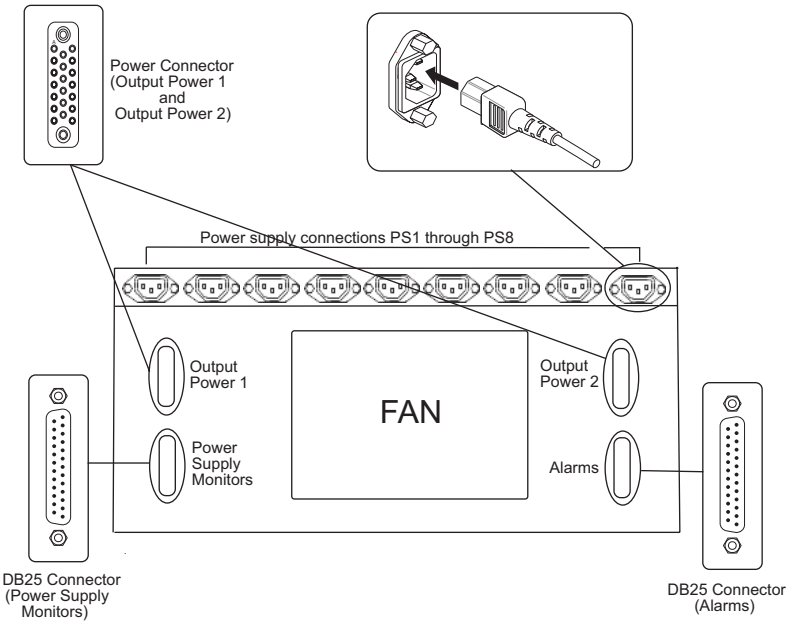


Figure 3-4. NV6257 Power Supply (Rear View)

3 Facing the rear of the **NV6257**, connect the provided 20-pin GMCT connector to ‘Output Power 1’, as shown in Figure 3-4.

4 Facing the rear of the **router**, connect the other end of the 20-pin GMCT connector to ‘Power Input’:

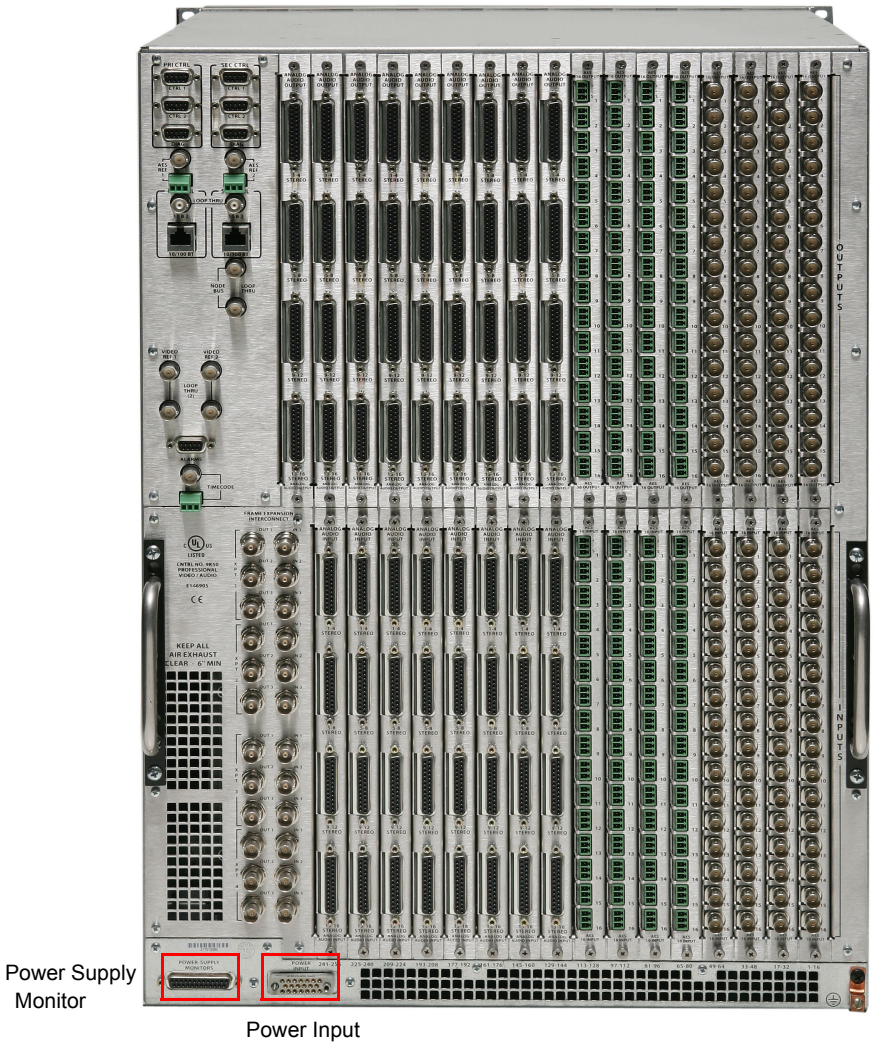


Figure 3-5. NV7256*Plus* Router (Rear View)

5 Facing the rear of the **NV6257**, connect the provided monitor cable and connector to ‘Power Supply Monitors’, as shown in Figure 3-4 on page 37.

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

7 Facing the front of the **NV6257**, install the primary power supply modules in slots *PS 1* and *PS 3,* as shown in Figure 3-6.

8 (Optional) Facing the front of the **NV6257**, install optional redundant power supply modules in slots *PS 2* and *PS4,* as shown in Figure 3-6.

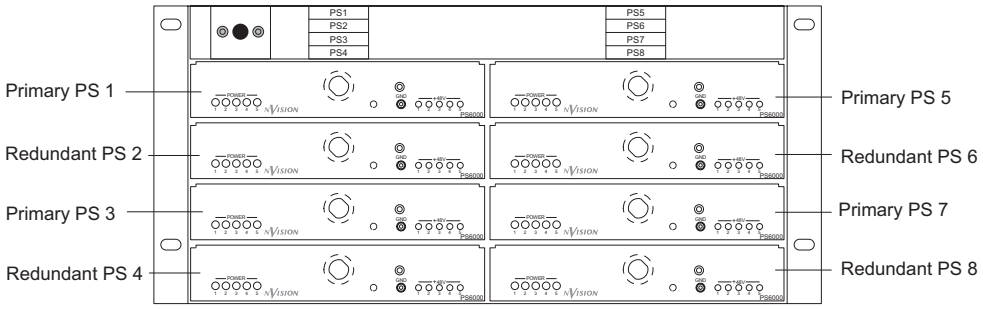


Figure 3-6. NV6257 Power Supply Power Supply Module Slots (Front View)

9 Facing the rear of the **NV7256-*Plus***, 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.

How to Connect a Single NV6257 Power Supply to Two NV7256-*Plus* Frames

1 Locate the power cords, power supply modules, and cables supplied by Miranda.

2 Facing the rear of the **NV6257**, connect a power cord from an AC power source (90-230 VAC 50-60 kHz) into power connections *PS 1* through *PS 8*:

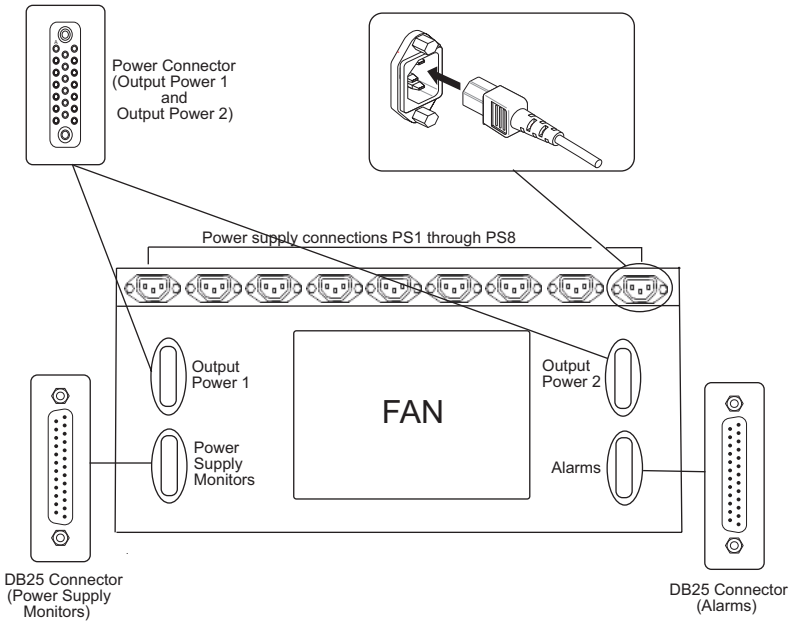


Figure 3-7. NV6257 Power Supply Power Supply (Rear View)

3 Facing the rear of the **NV6257**, connect the provided 20-pin GMCT connector to ‘Output Power 2’, as shown in Figure 3-7 on page 39.

4 Facing the rear of the first router (**router 1**), connect the other end of the 20-pin GMCT connector to ‘Power Input’ on the *first router only*. (See Figure 3-2 on page 35.)

5 Facing the rear of the **NV6257**, connect the provided 20-pin GMCT connector to ‘Output Power 1’, as shown in Figure 3-7 on page 39.

6 Facing the rear of the second router (**router 2**), connect the other end of the 20-pin GMCT connector to ‘Power Input’ on the *second router only*.

7 Facing the rear of the **NV6257**, connect the "Y" cable to 'Power Supply Monitors', as shown in Figure 3-7 on page 39.

Important

For steps 9, 10 and 11, be sure to use the connector wired for the connection you are making. (See Creating a "Y" Cable on page 40.)

8 Facing the rear of the first router (**router 1**), connect one of the two remaining "Y" cable connectors to 'Power Supply Monitor'.

9 Facing the rear of the second router (**router 2**), connect the remaining "Y" cable connector to 'Power Supply Monitor'.

10 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 3-8.

11 (Optional) Facing the front of the **NV6257**, install optional redundant PS6000 power supply modules in slots *PS 2, PS4, PS6* and *PS 8,* as shown in Figure 3-8.

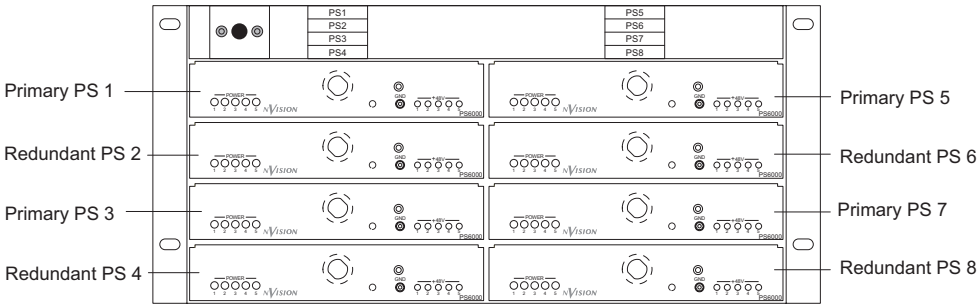


Figure 3-8. NV6257 Power Supply Power Supply Module Slots (Front View)

12 Facing the rear of each router (**router 1** and **router 2**), 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.

Creating a "Y" Cable

To connect two router frames to a single NV6257 Power Supply, you need to create a "Y" cable. A "Y" cable is a cable that has a single connector at one end and then splits and has two separate connectors on the other end.

To create a "Y" cable you need:

- Three male DB25 connectors
- Two standard PC printer cables (without pre-attached connectors)

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 you label each connector.

Pin	NV6257 Connector	Frame 1 Connector	Frame 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

Pin	NV6257 Connector	Frame 1 Connector	Frame 2 Connector
17	PS_ALARM4	PS_ALARM4	PS_ALARM8
16	PS_ALARM5	n.c.	n.c.
15	PS_ALARM6	n.c.	n.c.
23	PS_ALARM7	n.c.	n.c.
22	PS_ALARM8	n.c.	n.c.
8	TEMP1	TEMP1	TEMP5
6	TEMP2	TEMP2	TEMP6
5	TEMP3	TEMP3	TEMP7
4	TEMP4	TEMP4	TEMP8
3	TEMP5	n.c.	n.c.
2	TEMP6	n.c.	n.c.
10	TEMP7	n.c.	n.c.
1	TEMP8	n.c.	n.c.
11	GND	GND	GND
12	GND	GND	GND
13	GND	GND	GND
14	GND	GND	GND
25	GND	GND	GND

n.c. = no connect

Installing Fan Trays

The NV7256 and the NV7256-*Plus* have fan trays that contain two fans each. The fans ensure proper cooling of the router and should be installed before installing any active cards.

When facing the front of the router, the NV7256 has two fan trays, located at the top and on the right side of the router frame, whereas the NV7256-*Plus* has three fan trays, located at the top, right side, and bottom of the router frame.

How to Install the Fan Trays

1 Locate the fan trays. For the NV7256 there are two; for the NV7256-*Plus* there are three.

2 Insert fan trays into the fan tray slots. If horizontal, install the fan tray with the fans situated on top (facing upward). If vertical, install the fan tray with the fans facing outward:

For the **NV7256**, the two fan tray slots are located at the *top* and *right* when facing the front of the router, as shown in Figure 3-9.

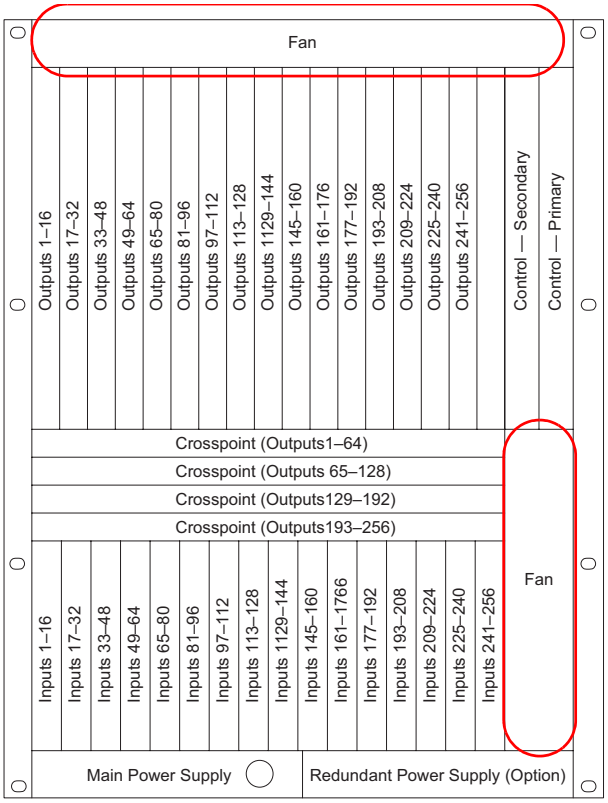


Figure 3-9. Location of Fan Trays for NV7256

For the **NV7256-*Plus***, the three fan tray slots are located at the *top*, *right*, and *bottom* when facing the front of the router, as shown in Figure 3-10.

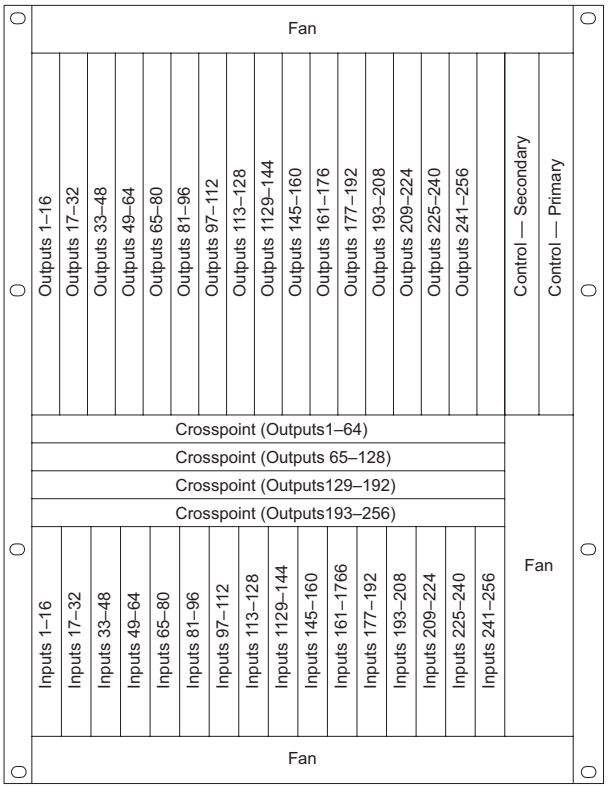


Figure 3-10. Location of Fan Trays for NV7256*Plus*

3 Close the router door. The router door must be closed to ensure proper air flow and cooling.

Installing Backplanes (NV7256-*Plus* Only)

The NV7256-*Plus* features a chassis with removable rear backplanes. (See Figure 3-11.) Backplanes are long metal strips that contain a single column of I/O connectors for receiving or distributing signals. Depending on the type of signal being carried, each backplane contains either BNC, Phoenix, or DB25 connectors.

For more information on backplanes and the types of backplanes available, see Backplanes (NV7256-Plus Only) on page 11.

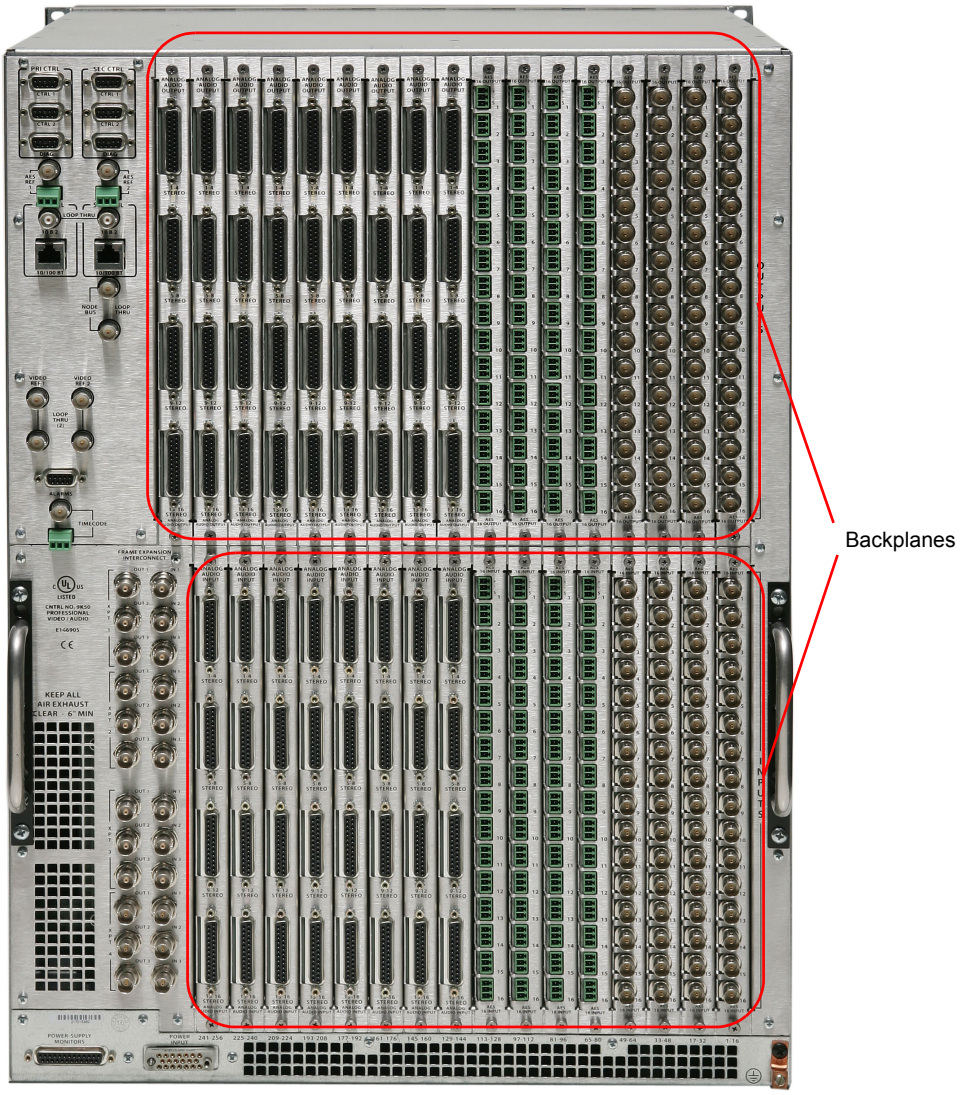


Figure 3-11. NV7256*Plus* Back Plate with DB25, Phoenix and BNC Backplanes (Rear View)

How to Install Backplanes

1 Remove the plate on the rear of the router that currently exists in the slot(s) into which you are installing a backplane. Use a #1 Philips screwdriver to loosen the spring-loaded card retention screws.

2 Using the screws, grip the plate, gently pulling it free of the frame. Use care to avoid damaging the connector pins.

3 Insert the backplane into the frame, applying gentle pressure at the top of the backplane to ensure the connector is fully mated with the motherboard. Use a #1 Philips screwdriver to tighten the two spring-loaded card retention screws (Figure 3-12).

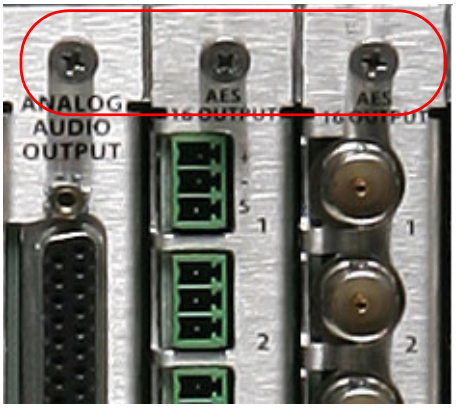


Figure 3-12. Retention Screws on Backplanes

Be sure to align the module with the stamped metal guides in the frame. A single connector at the top edge provides the electrical connection.

Note Before placing the router into service, be sure to verify the quantity and location of each backplane module.

4 To maintain proper airflow for cooling, and EMI compliance, make sure that any unused backplane slots are covered with a plate.

Installing Active Cards

Once the frame is rack mounted, power connected, and backplanes installed (NV7256-*Plus* only), you can install active cards. For more information about each card, see Active Cards on page 20.

The following tables lists each active card, where the card is located in the frame, and the function it performs. (See Figure 2-2 on page 9.)

Type of Card	Location and Function
Control	One primary control card and one secondary (reserve) control card may be installed in the two right-most slots of the upper bay slots.
Input	Up to 16 input cards, each processing 16 input signals, may be installed in the lower bay slots. Cards are available for AES synchronous, AES asynchronous, time code or analog audio (NV7256-*Plus* only) signals.
Output	Up to 16 output cards, each processing 16 output signals, may be installed in the upper bay slots. Cards are available for AES synchronous, AES asynchronous, time code or analog audio (NV7256-*Plus* only) signals.
Crosspoint	Up to 4 crosspoint modules may be installed in the center (horizontal) bay slots. Each crosspoint card manages up to 16 input and 4 output cards. Available crosspoint cards: X-Y: AES stereo (synchronous and asynchronous), AES mono, time code, and analog audio (NV7256-*Plus* only) TDM: AES stereo (synchronous only), AES mono, time code, and analog audio (NV7256-*Plus* only) For more information, see Crosspoints on page 25.

Card Combinations

Depending on the signal format, an X-Y, TDM, or a combination of both crosspoint cards may be used. A single crosspoint card can support up to 256 inputs and 64 outputs (4 input cards of 16 signal inputs each and up to 4 connected frames). Up to 16 input cards and 4 output cards can be used with a single crosspoint card.

Expansion to multiple router frames (greater than 256×256) requires AES synchronous or time code input cards and output cards, and TDM crosspoints. AES asynchronous signals cannot expand beyond one frame (256×256).

The location of an active card in the router frame determines the signals managed by that card. For more information, see Slots and Corresponding Signal Numbers on page 19.

The following table lists the card combinations to use for each available signal format. For more information on signal formats, see Signals Types and Rates on page 5:

Signal Format	Input Module	Crosspoint Module	Output Module
AES synchronous, stereo	AES synchronous	X-Y or TDM crosspoint	AES synchronous
AES synchronous, mono (subframe routing)	AES synchronous	TDM crosspoint	AES synchronous
AES asynchronous, stereo	AES asynchronous	X-Y crosspoint	AES asynchronous
Time code	Time Code	X-Y or TDM crosspoint	Time Code
Analog audio (NV7256-*Plus* only)	Analog Audio	X-Y or TDM crosspoint	Analog Audio

Because the NV7256-*Plus* router uses backplanes, different signal types can be switched within the same router frame. It is important that the input card or output card installed is appropriate for the backplane that corresponds to that I/O card slot. In addition, for each input card there must be a corresponding output card for the same signal type. For example, if you have 4 AES synchronous input cards, you must have AES synchronous output cards associated with the input cards.

All cards can be inserted and removed with the power on. When installing the active cards, all cards installed in vertical slots have the text on the card facing the right-hand side; all cards installed in horizontal slots have the text on the card facing upward.

How to Install Active Cards

1 Locate the control, input, crosspoint and output cards.

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

2 Facing the front of the router, insert the control card(s) in the two right-most slots of the upper region, as shown in Figure 3-13 and Figure 3-14 on page 48. If installing the optional System Clock module, install the single control card in the *primary* control card slot. (See Systems Clock Module (Optional) on page 48.)

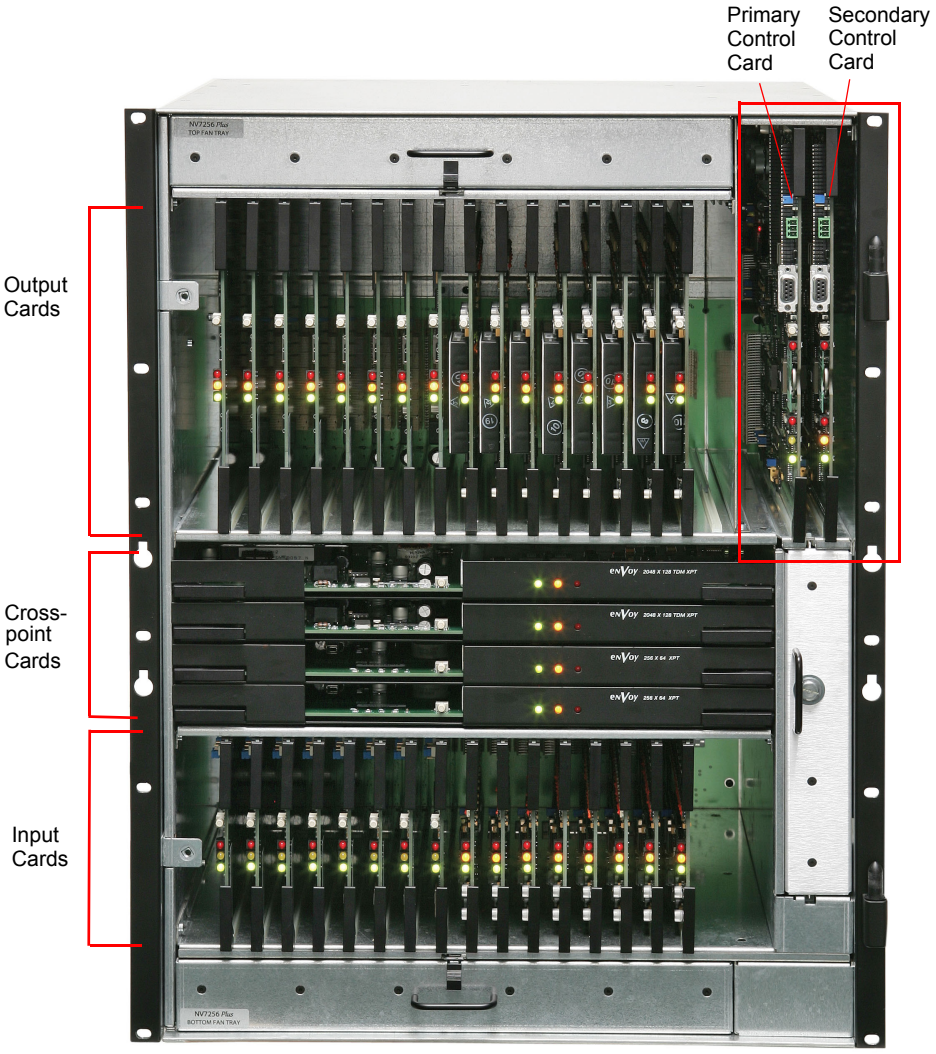


Figure 3-13. NV7256*Plus* Router with Modules Installed, Door Removed (Front View)

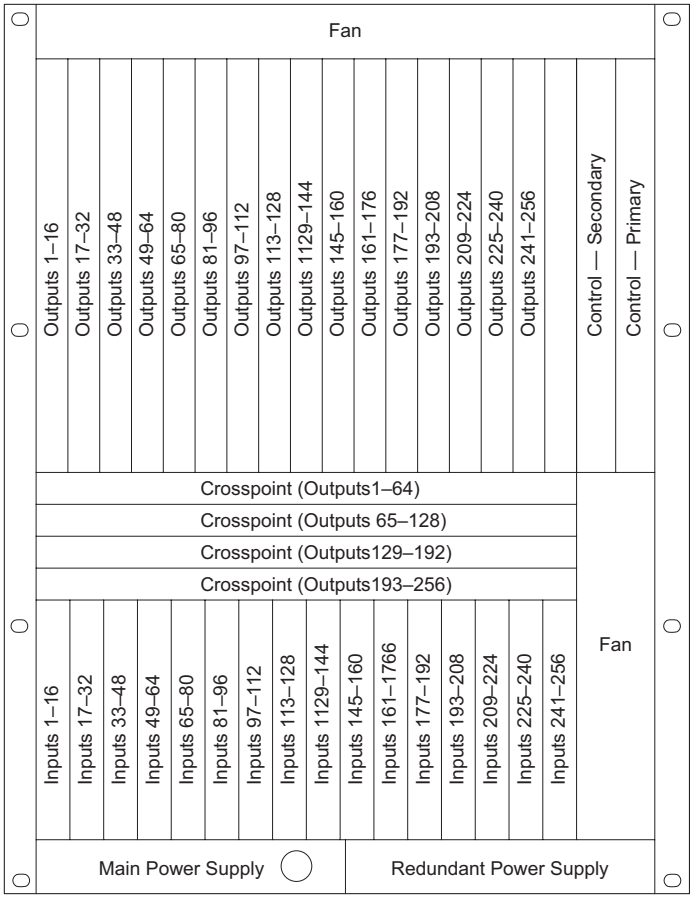


Figure 3-14. Location of Active Cards (Front View)

3 Facing the front of the router, insert the output cards in the upper, vertical slots, as shown in Figure 3-13 on page 47.

4 Facing the front of the router, insert the crosspoint cards in the middle, horizontal slots, as shown in Figure 3-13 on page 47.

5 Facing the front of the router, insert the input cards in the lower, vertical slots, as shown in Figure 3-13 on page 47.

6 Reinstall and close the frame front door after all cards have been installed. For proper cooling, the router must be operated with the door closed.

Systems Clock Module (Optional)

Systems using only a single control card may choose to install the optional Systems Clock module. The clock ensures that in the event of a primary control card failure the system continues to receive clock information. Depending upon configuration, a loss of clock information may cause router outputs to mute or contain continuous ticks and pops, until control card function is restored to a normal state.

How to Install the Systems Clock Module

1 Locate the secondary (redundant) control card slot, as shown in Figure 3-13 on page 47. The secondary control card slot is to the left of the primary control card slot.

2 Install the Systems Clock module into the slot.

3 Reinstall and close the frame front door after all the modules have been installed. For proper cooling, the frame must be operated with the door closed.

Making Signal Connections

In order for the NV7256 and the NV7256-*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. If using the NV7256, or the NV7256-*Plus* in standalone mode, up to 256 input and up to 256 output connections can be made. If connecting up to four NV7256-*Plus* routers together, additional signal expansion connections must also be connected to create a 1024 inputs and 1024 outputs switching matrix. These connections enable each router to both send and receive signals between the routers. (See Signal Expansion Connections on page 54.)

Local Signal Connections

The signals that can be received and distributed are:

- AES synchronous (both balanced and unbalanced). See How to Make I/O Connections for AES Signals on page 51.
- AES asynchronous (both balanced and unbalanced). See How to Make I/O Connections for AES Signals on page 51.
- Time code. See How to Make I/O Connections for Time Code Signals on page 52.
- Analog (NV7256-*Plus* only). See How to make I/O connections for analog signals on page 52.

Each type of signal format requires a specific type of connector. If using a NV7256, you are limited to one type of connector, and therefore, one signal type:

- NV7256 back plate consists of either BNC *or* Phoenix connectors, not both.
- NV7256-*Plus* back plate is comprised of BNC, Phoenix, or DB25 backplanes that can be inter-mixed together in a single back plate, as shown in Figure 3-15.

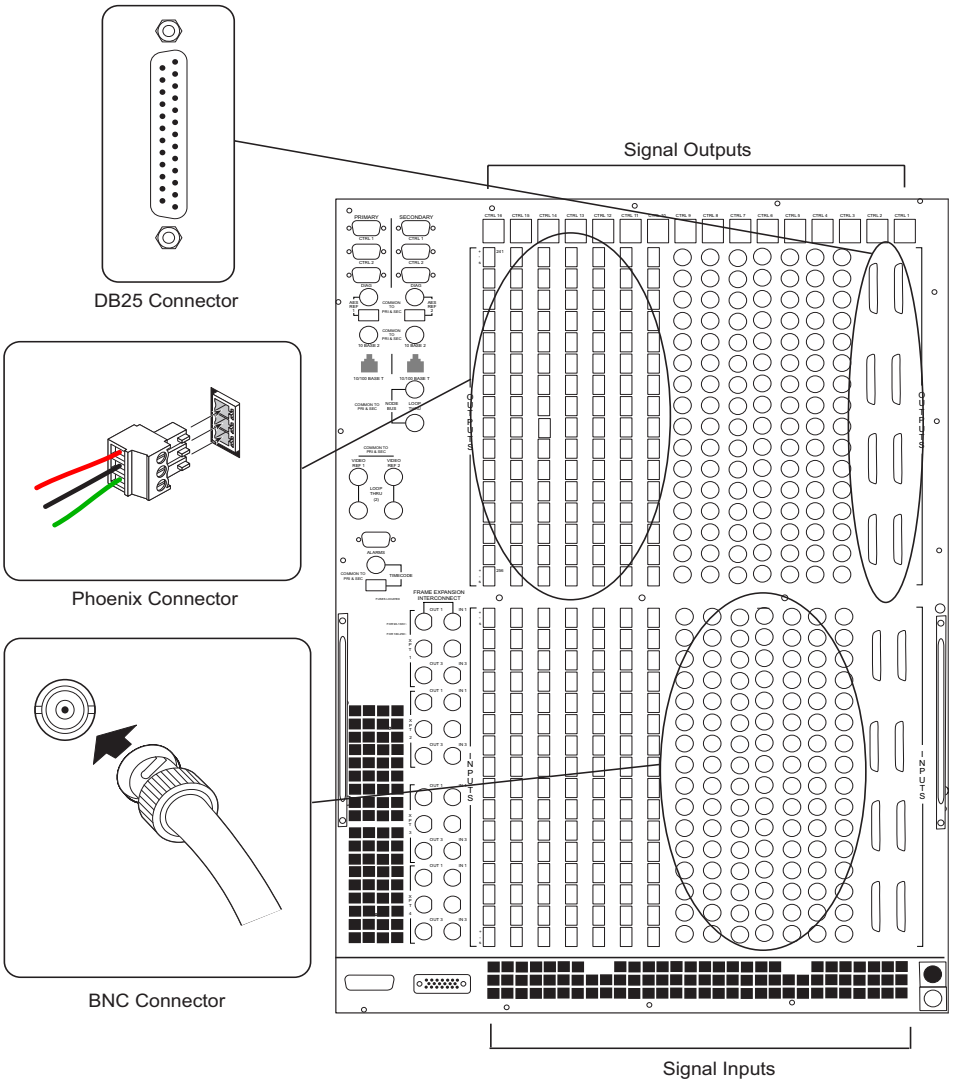


Figure 3-15. Example of Mixed Backplanes on a NV7256*Plus* (Rear View)

For the sake of simplicity, when procedures apply to both the NV7256 and the NV7256-*Plus* router, only one router back plate is illustrated.

Analog Audio Input/Output Signals (NV7256*Plus* Only)

The NV7256-*Plus* Digital Audio Routers can accommodate incoming and outgoing analog signals, both balanced and unbalanced. Analog signals require a DB25 connector.

Each connector supports either stereo or mono:

- Stereo—4 stereo channel pairs per connector, for a total of 16 stereo signals per card.
- Mono—8 mono inputs per connector, for a total of 32 mono signals per card.

Note

The analog audio output module is designed to function in a voltage-matched system driving high impedance loads. The output drivers are not designed to drive 600Ω loads continuously and may overheat if used in a 600Ω environment.

Analog audio signals are routed internally as digital signals. A/D and D/A converters on the analog input modules and analog output modules convert the signals to/from AES format. The sample rate used is 48 kHz with 24 bit sample values for a high quality signal path. For the converters to operate properly, the system AES reference connection must be set. The AES reference also permits seamless routing of mixed analog and digital sources. For instructions on connecting the AES reference, see Making Audio Reference Connections on page 64.

Unbalanced Signals

When connecting for receipt and distribution of unbalanced signals, a drop in level of 6dB occurs. This is due to one-half of the input signal being lost when the '-' input is grounded. This is normal. Using a switch located on the analog audio input card, you can add an additional 6dB of gain to compensate for the drop.

Mono Signals

How mono signals interface with the Digital Audio Routers depends upon the control system. Before setting up analog signals, make sure that your control system can manage mono signals.

All labeling on the router back planes refers to stereo signals, not mono signals. In order to successfully install and implement modules receiving and distributing mono signals, great care should be taken to avoid confusion. For example, in a stereo environment, an incoming signal is comprised of a left and right channel (an AES signal). Although two channels are present, the incoming data is treated as a single signal. This signal is received through input 1. In mono mode, the left and right channels are split into two distinct entities. The signals is received through input 1 for the left channel and input 2 for the right channel. To continue, the next incoming signal is received through input 3 for the left channel and input 4 for the right channel; 5 for the left channel and input 6 for the right channel, and so on.

These same rules apply to mono outputs. For more information on mono signals, see the UniConfig User's Guide.

How to Make I/O Connections for AES Signals

1 Locate the AES *input* connections on the rear of the router, as shown in Figure 2-3 on page 10.

2 Connect to the *input* connections using the connector appropriate for the type of incoming signal:

For **AES audio unbalanced** signals, use BNC connectors (1 wire and 1 ground) and 75Ω cable.

For **AES audio balanced** signals, use 3p Phoenix connectors (1 positive, 1 negative, and 1 ground) and 110Ω twisted pair cable.

3 Connect the other end of the cable to the source device providing the signal.

4 Locate the AES *output* connections on the rear of the router, as shown in Figure 2-3 on page 10.

5 Connect to the output connections using the connector appropriate for the type of outgoing signal:

For **AES audio unbalanced** signals, use BNC connectors (1 wire and 1 ground) and 75Ω cable.

For **AES audio balanced** signals, use 3p Phoenix connectors (1 positive, 1 negative, and 1 ground) and 110Ω twisted pair cable.

6 Connect the other end of the cable to the destination device for the outgoing signals.

7 Connect inputs and outputs for other signal types, as needed:

Time code signals. (See How to Make I/O Connections for Time Code Signals on page 52.)

Analog audio signals. (See How to make I/O connections for analog signals on page 52.)

8 For NV7256-*Plus* routers, make signal expansion connections. (See Signal Expansion Connections on this page.)

How to Make I/O Connections for Time Code Signals

1 Locate the time code *input* connections on the rear of the router, as shown in Figure 2-3 on page 10.

2 Connect to the input connections using Phoenix connectors (1 positive, 1 negative, and 1 ground) and 110Ω twisted pair cable or coaxial cable, whichever you prefer.

3 Connect the other end of the cable to the source device providing the signal.

4 Locate the time code *output* connections on the rear of the router, as shown in Figure 2-3 on page 10.

5 Connect to the output connections using Phoenix connectors (1 positive, 1 negative, and 1 ground) and 110Ω twisted pair cable or coaxial cable, whichever you prefer.

6 Connect the other end of the cable to the destination device for the outgoing signals.

7 Connect inputs and outputs for other signal types, as needed:

AES signals. (See How to Make I/O Connections for AES Signals on page 51.)

Analog audio signals. (See How to make I/O connections for analog signals on page 52.)

8 For NV7256-*Plus* routers, make signal expansion connections. (See Signal Expansion Connections on this page.)

How to make I/O connections for analog signals

1 Locate the analog audio *input* connections on the rear of the router, as shown in Figure 2-3 on page 10.

2 Connect to the input connections using DB25 connectors, wiring the connectors as appropriate for the type of incoming signal:

For **unbalanced** signals, use DB25 connectors and make connections as follows, using Figure 3-16 on page 53 as a reference:

a On the DB25 connector, connect the “hot” wire from the single-ended source to the balanced input ‘+’ connection.

b On the same DB25 connector, connect the “ground” wire from the single-ended source to the balanced input ‘–’ connection.

c On the same DB25 connector, bridge the balanced input ground pin to the ‘–’ pin, or single-ended ground.

Note

Many semi-professional devices that use single-ended audio operate at a nominal output level of –10dB. Operating at this level results in a small performance penalty in terms of S/N. External matching boxes for gain correction can be used to alleviate this issue if desired.

For **balanced** signals, use DB25 connectors and the Miranda breakout cable (NV5000-Cable1) or create custom wiring.

For *breakout cable wiring*, the following table lists which signal is associated with each wire:

Signal	Wire Number	Jacket Color
Left 1	1	Brown
Right 1	2	Red
Left 2	3	Orange
Right 2	4	Yellow
Left 3	5	Green
Right 3	6	Blue
Left 4	7	Violet
Right 4	8	Gray

For *custom wiring*, wire the DB25 connector as shown in Figure 3-16

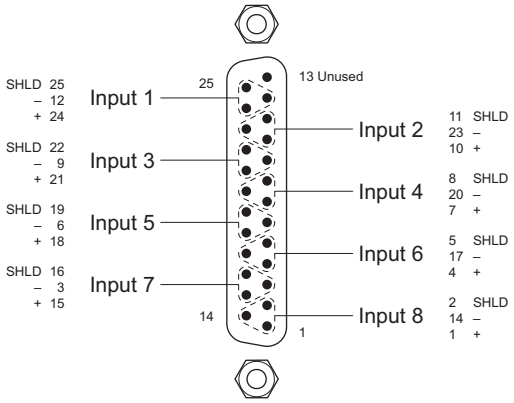


Figure 3-16. DB25 Pin Connections for Mono Signals

3 Connect the other end of the cable to the source device providing the signal.

4 Locate the audio analog *output* connections on the rear of the router, as shown in Figure 2-3 on page 10.

5 Connect to the output connections using DB25 connectors, wiring the connectors as described in Step 2.

6 Connect the other end of the cable to the destination device for the outgoing signals.

7 Connect inputs and outputs for other signal types, as needed:

AES signals. (See How to Make I/O Connections for AES Signals on page 51.)

Time code signals. (See How to Make I/O Connections for Time Code Signals on page 52.)

8 For NV7256-*Plus* routers, make signal expansion connections. (See Signal Expansion Connections on this page.)

Signal Expansion Connections

Using the NV7256-*Plus* signal expansion connectors up to four routers can be connected together increasing the number of signals managed up to 1024 inputs and 1024 outputs (2048×2048 mono). Connected routers must be situated physically next to each other, side to side. For more information on expansion connections, see Frame Expansion on page 27.

Note TDM crosspoint cards are required to enable this feature.

How to Make Signal Expansion Connections

1 Locate the frame expansion connections on the rear of the router:

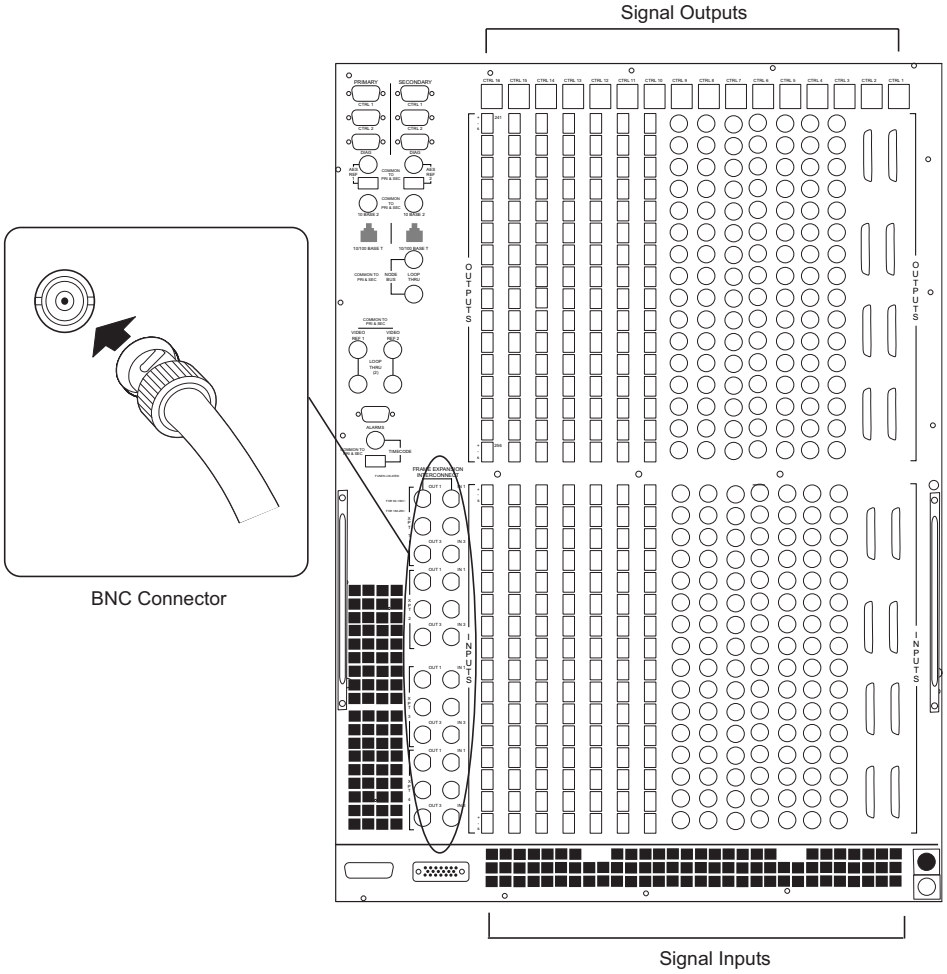


Figure 3-17. Example of Frame Expansion Connections on NV7256*Plus* (Rear View)

2 Connect between frames using two BNC connectors and 50Ω cables to the 10Base 2 connector on each frame, looping serially from one frame to the next, making connections as shown in Figure 3-18.

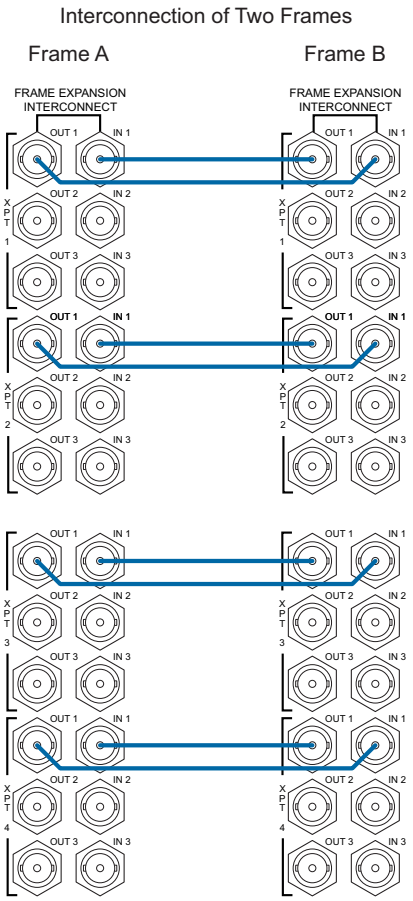


Figure 3-18. 10Base2 Ethernet Frame Expansion Connection

Use the following table as a reference when making frame expansion connections. The IN and OUT numbers correspond to the numbers listed next to each frame expansion connector, as show in Figure 3-18

Router 1 XPT	Router 2 XPT	Router 3 XPT	Router 4 XPT
IN 1-1	OUT 1-1		
IN 1-2		OUT 1-1	
IN 1-3			OUT 1-1
IN 2-1	OUT 2-1		
IN 2-2		OUT 2-1	
IN 2-3			OUT 2-1
IN 3-1	OUT 3-1		
IN 3-2		OUT 3-1	
IN 3-3			OUT 3-1
IN 4-1	OUT 4-1		
IN 4-2		OUT 4-1	
IN 4-3			OUT 4-1
OUT 1-1	IN 1-1		

Router 1 XPT	Router 2 XPT	Router 3 XPT	Router 4 XPT
	IN 1-2	OUT 1-2	
	IN 1-3		OUT 1-2
OUT 2-1	IN 2-1		
	IN 2-2	OUT 2-2	
	IN 2-3		OUT 2-2
OUT 3-1	IN 3-1		
	IN 3-2	OUT 3-2	
	IN 3-3		OUT 3-2
OUT 4-1	IN 4-1		
	IN 4-2	OUT 4-2	
	IN 4-3		OUT 4-2
OUT 1-2		IN 1-1	
	OUT 1-2	IN 1-2	
		IN 1-3	OUT 1-3
OUT 2-2		IN 2-1	
	OUT 2-2	IN 2-2	
		IN 2-3	OUT 2-3
OUT 3-2		IN 3-1	
	OUT 3-2	IN 3-2	
		IN 3-3	OUT 3-3
OUT 4-2		IN 4-1	
	OUT 4-2	IN 4-2	
		IN 4-3	OUT 4-3
OUT 1-3			IN 1-1
	OUT 1-3		IN 1-2
		OUT 1-3	IN 1-3
OUT 2-3			IN 2-1
	OUT 2-3		IN 2-2
		OUT 2-3	IN 2-3
OUT 3-3			IN 3-1
	OUT 3-3		IN 3-2
		OUT 3-3	IN 3-3
OUT 4-3			IN 4-1
	OUT 4-3		IN 4-2
		OUT 4-3	IN 4-3

3 After connecting multiple frames, terminate the unused looping 10Base2 connector on the last frame in the series using a 50Ω terminator.

Making Router Control System Connections

To manage signal switching in the NV7256 and the NV7256-*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 router control system requiring serial control connections.
- Ethernet Control — Use to connect to the NV9000 router control system and to create network connections.
- Node Bus — Use to connect to a third-party router control system requiring a GSC Node Bus connection.

If connecting two or more NV7256-*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 60.)

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 for maximum flexibility and speed when downloading. (See Ethernet Control Connections on page 59.)

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 57.

In order for the router to communicate with the router control system through a serial connection, Comm port and Baud rate settings need to be set in the control card. (See *UniConfig User's Guide*.)

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

How to make serial connections to the router control system

1 Locate the serial control connections on the rear of the router, as shown in Figure 3-19. Serial control connections are labeled 'PRIMARY' for the primary control card and 'SECONDARY' for the secondary control card.

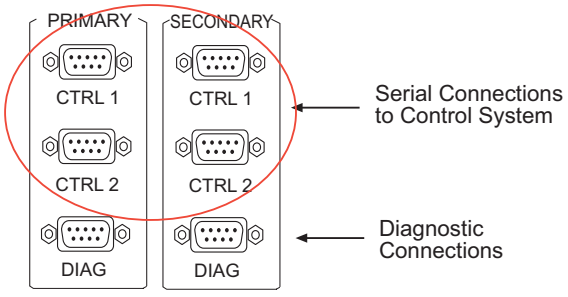


Figure 3-19. Serial Connections to Router Control System (Rear View)

2 Connect to the ‘CTRL 1’ connection in the ‘PRIMARY’ section using a DE9 connector and serial cable.

3 Connect the other end of the serial cable to the (primary) router control system using a DE9 connector.

The following lists the pin wiring for the DE9 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 control card (optional for redundancy) is installed, connect to the ‘CTRL 1’ connection in the ‘SECONDARY’ section as described in Step 2 and Step 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 ‘PRIMARY’ 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 Connect to the ‘CTRL 2’ connection in the ‘SECONDARY’ section using a DE9 connector and serial cable.

d 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.

6 If two or more NV7256-*Plus* routers are being connected together, connect the control system expansion connections. (See Control System Expansion Connections on page 60.)

Or

For the NV7256 router, on all unused control system expansion BNC connections install a 50 Ω BNC terminator (Miranda part 1211598).

Important Terminators must be installed on all unused BNC control system expansion connections.

Ethernet Control Connections

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

Each Ethernet port can communicate with the primary control card or the secondary control card. For a detailed description of the Ethernet connections, see Router Control System Connections on page 13. Unlike serial control connections, there is no separate 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. The IP address is set using UniConfig. (See the *UniConfig User's Guide*.)

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 router control system

1 Locate the Ethernet connections on the rear of the router, as shown in Figure 3-20. Ethernet control connections are labeled '10/100 BASE T'.

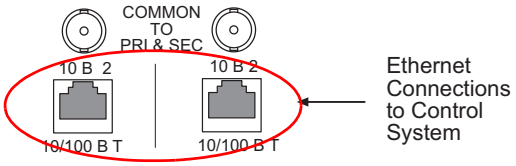


Figure 3-20. Ethernet Connections to Control System (Rear View)

2 Connect to either '10/100 BASE T' Ethernet connection 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 using a RJ45 connector.

4 If a secondary (optional for redundancy) control card is installed, connect to the remaining '10/100 BASE T' Ethernet connection as described in Step 2 and Step 3.

5 If two or more NV7256-*Plus* routers are being connected together, connect the control system expansion connections. (See Control System Expansion Connections on page 60.)

Or

For the NV7256 router, on all unused control system expansion BNC connections install a 50Ω BNC terminator (1211598).

Important Terminators must be installed on all unused BNC control system expansion connections.

GSC Node Bus Control Connections

Some third-party router control systems require a GSC Node Bus connection to connect the router to the router control system. The router has one GSC Node Bus connection, labeled 'NODE BUS'.

The connection is shared by both the primary and secondary control cards. For a detailed description of the GSC Node Bus connection, see Router Control System Connections on page 13.

To use the GSC Node Bus connection, an optional module must be installed on each control card. For details, contact Miranda. (See Technical Support Contact Information on page iii.)

The GSC Node Bus connection uses 75Ω BNC connectors and coaxial cable.

How to make a GSC Node Bus connection to the router control system

1 Locate the GSC Node Bus connection on the rear of the router, as shown in Figure 3-21. The GSC Node Bus connection is labeled 'NODE BUS'.

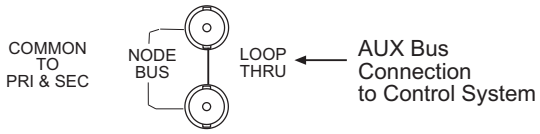


Figure 3-21. GSC Node Bus Connection to Control System (Rear View)

2 Connect to the 'NODE BUS' connection using a 75Ω BNC connector and a coaxial cable.

3 Connect the other end of the coaxial cable to the router control system.

4 On all unused 'NODE BUS' BNC connections, install a 50Ω BNC terminator (Miranda part 1211598).

Important Terminators must be installed on all unused BNC control system expansion connections.

5 If you are connecting two or more NV7256-*Plus* routers together, you need to connect the control system expansion connections. (See Control System Expansion Connections on this page.)

Or

For the NV7256 router, on all unused control system expansion BNC connections install a 50Ω BNC terminator (1211598).

Important Terminators must be installed on all unused BNC control system expansion connections.

Control System Expansion Connections

Control system expansion connections enable up to four connected NV7256-*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 the *primary* 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.

When connecting two or more routers together, any unused control system expansion connectors on the *final* router being connected must be terminated with a 50Ω BNC connector. The BNC terminator is supplied by Miranda (part 12115898).

The control system expansion connectors are 10Base2 ports using 50Ω BNC connectors and Cat3, or better, coaxial cable.

How to Make Router Control System Expansion Connections

Note Although this procedure describes connecting four routers, make connections only to those routers being connected for your system.

1 Locate the expansion control connection on the rear of the routers, as shown in Figure 3-22. The connections are labeled '10 BASE 2'.

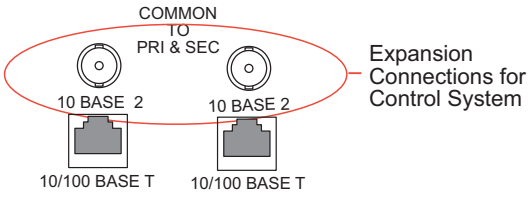


Figure 3-22. Ethernet Expansion Connections to Control System (Rear View)

2 On **Router 1** (the router directly connected to the control system), connect to the *left* '10 BASE 2' connection using a 50Ω BNC connector and coaxial cable:

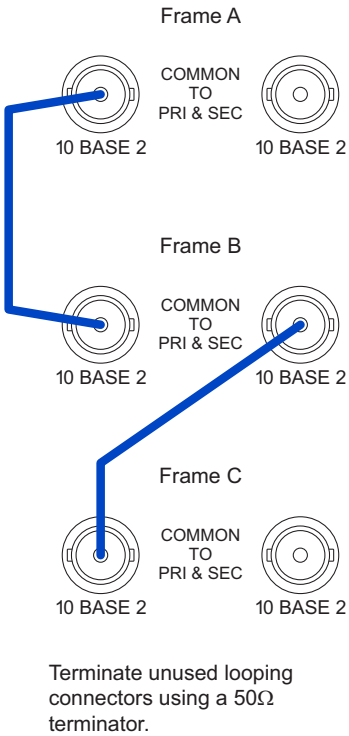


Figure 3-23. Control System Expansion Connections Between Routers

3 Connect the other end of the cable to the *left* '10 BASE 2' connection on **router 2**, using a 50Ω BNC connector, as shown in Figure 3-23.

4 On **router 2**, connect to the *right* '10 BASE 2' connection using a 50Ω BNC connector and coaxial cable, as shown in Figure 3-23.

5 Connect the other end of the cable to the *left* '10 BASE 2' connection on **router 3**, using a 50Ω BNC connector, as shown in Figure 3-23.

6 On **router 3**, connect to the *right* '10 BASE 2' connections using aa 50Ω BNC connector and coaxial cable, as shown in Figure 3-23.

7 Connect the other end of the cable to the *left* '10 BASE 2' connection on **router 4**, using a 50Ω BNC connector, as shown in Figure 3-23.

8 On **router 4**, connect to the *right* '10 BASE 2' connections using a 50Ω BNC terminator.

9 On all unused control system expansion BNC connections, install a 50Ω BNC terminator (Miranda part 1211598).

Important Terminators must be installed on all unused BNC control system expansion connections.

Making Diagnostic Connections

The diagnostic connections enable the NV7256 and the NV7256-*Plus* to communicate with the UniConfig application. UniConfig is installed on a unit, separate from the router (e.g., PC), and is used to perform system setup tasks, and configure and monitor the router. For information about using UniConfig, see the UniConfig User's Guide.

Diagnostic connections are made by connecting the router to the unit running the UniConfig application. There are two types of diagnostic connections: temporary and permanent. A temporary diagnostic serial connection is located on the front of each control card. Permanent diagnostic serial connections are located on the rear of the router, labeled 'DIAG'. For a detailed description of the serial connections, see Diagnostic on page 15.

Router IP Address

If you are using an Ethernet connection between the router and the router control system, an IP address for the router needs to be set on the control card. The IP address is set using UniConfig. (See the *UniConfig User's Guide*.) However, the PC running UniConfig cannot communicate with the router until an IP address for the router is entered. To solve this problem, a temporary diagnostic connection to UniConfig can be created, enabling you to enter the IP address before completing all router connections and configurations. (See Temporarily Connecting to UniConfig on page 62.) After an IP address is entered, the temporary diagnostic connection can be disconnected and a permanent diagnostic connection made. (See Permanently Connecting to UniConfig on page 63.)

Temporarily Connecting to UniConfig

A temporary connection is created through the DE9 port located on the front of the primary control card. The baud rate for this port is locked to 9600.

How to Make a Temporary Diagnostic Connection

1 Locate the primary control card slot, as shown in Figure 2-2 on page 9. When facing the front of the router, the control cards are located in the upper, right-hand section.

2 On the front of the control card, connect to the serial port using a DE9 connector and a serial cable.

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

3 Connect the other end of the cable to the PC running the UniConfig application using a DE9 connector.

4 Using UniConfig, enter the IP address for the Ethernet control system connection. For instructions on entering an IP address, see the UniConfig User's Guide.

5 When done configuring, remove the temporary connection and close the router door. The door must be closed to ensure proper frame cooling.

Permanently Connecting to UniConfig

There are two diagnostic ports located on the rear of the router. The diagnostic ports default to 38,400 baud, RS-232, but can be set to RS-422 using UniConfig. For more information, see the UniConfig User's Guide.

How to Make Permanent Diagnostic Connections

1 Locate the diagnostic connections on the rear of the router, as shown in Figure 3-24. The diagnostic connections are labeled 'DIAG'.

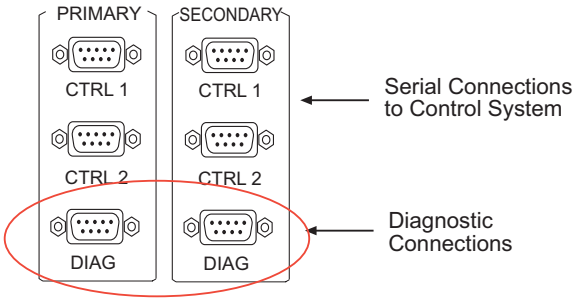


Figure 3-24. Diagnostic Connections (Rear View)

2 Connect to the 'DIAG' connection in the 'PRIMARY' section using a DE9 connector and a serial cable. The ports are set for RS-232, but you can also use RS-422:

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, 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+
Transmit Common	4 ----------4	Receive Common
N/C	5 ----------5	N/C
Receive Common	6 ----------6	Transmit 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.

4 If a secondary (optional for redundancy) control card is installed, connect to the 'DIAG' connection in the 'SECONDARY' section using a DE9 connector and a serial cable as described in Step 2 and Step 3.

Making Audio Reference Connections

The AES reference is used for clock generation and provides a timing reference for AES synchronous signals and for the control card's timing circuits. For optimum audio output, signals must be clock-locked to the same reference. Input impedance is selected by setting jumper located on the control card. (See Control Card Jumpers on page 71.)

The NV7256 and NV7256-*Plus* has two AES reference connections labeled 'AES REF 1' and 'AES REF 2'. Both connections are used by the primary and the secondary (optional for redundancy) control card. This provides a backup reference source should one of the sources fail. The

AES reference connection requires a stable signal source set at 48 kHz. For a detailed description of the AES reference connections, see AES Reference Connections on page 15.

An AES reference must be connected when using AES synchronous I/O cards. (See AES Synchronous on page 22.) When mixing analog audio and AES signals, an AES reference is not required because the clock generator on the control card provides all necessary clock signals. However, the AES reference makes it easier to inter-mix analog and AES audio formats.

The AES reference signals have two self-terminating inputs: one BNC and one Phoenix. Each input supports either balanced or unbalanced formats, but only one connector can be used at a time for any given input. The unused connection may not be used as a looping output.

How to make AES reference connections

1 Locate the AES reference connections on the rear of the router:

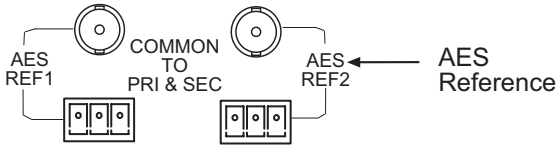


Figure 3-25. AES Reference Connections (Rear View)

2 Connect to the ‘AES REF 1’ connection using a connector appropriate for the reference signal:

For **AES audio unbalanced** signals, use BNC connectors and 75Ω cable.

For **AES audio balanced** signals, use 3-pijn Phoenix connectors and 110Ω twisted pair cable.

3 Connect the other end of the cable to a stable source of 48 kHz AES audio signals.

4 For redundancy, connect to the ‘AES REF 2’ connection as described in Step 2.

5 Connect the other end of the cable to a stable source of 48 kHz AES audio signals.

Making Video Reference Connections

The video reference provides a timing reference signal. This reference is used to synchronize internal router operations when switching during the vertical interval. The video reference connection requires a stable source of Analog PAL, NTSC Color Black or tri-level sync.

Note Tri-level sync is not supported by control card EM0374-00, EM0374-01or EM0374-02.

How to Make Video Reference Connections

1 Locate the video reference connections on the rear of the router, as shown in Figure 3-26.

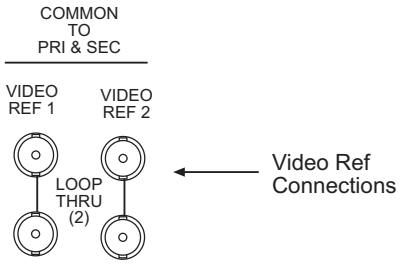


Figure 3-26. Video Reference Connections (Rear View)

2 Connect to the 'VIDEO REF 1' connection using BNC connectors (1 wire, 1 ground) and 75Ω coaxial cable.

3 Connect the other end of the cable to a stable signal source. The signals can be:

Analog PAL
NTSC Color Black
Tri-level sync

4 For redundancy, connect to the 'VIDEO REF 2' connection using BNC connectors (1 wire, 1 ground) and 75Ω coaxial cable.

5 Connect the other end of the cable to a stable signal source, as described in Step 3.

6 If you are using interconnected expansion frames, use loop-through BNC connectors to connect the same signal to downstream equipment.

Or

If you do not use loop-through BNC connectors, terminate using a 75Ω termination.

Time Code Reference Connections

The time code reference connections are not supported at this time.

Making Monitor Connections

The monitor connections on the rear of the router enable the monitoring of outgoing signals. The monitor connections forward signals from the monitor card, which receives one signal from each output card on the local router. By connecting monitoring equipment to the monitor connections, the quality of signals being distributed from the router can be verified. Monitoring only supports AES signals. For analog audio signals, only the output of the digital conversion of the analog signal is monitored.

There are four monitor connections. Each connection can be configured to match a level set up in the router control system. For more information on levels, see the UniConfig User's Guide. The monitor connections receive signals only from local output cards; no signals for monitoring purposes are received from connected router frames.

The type of router—NV7256 or NV7256-*Plus*—determines the type of connectors used to make the monitor connections. The NV7256 uses either BNC or Phoenix connectors, whichever matches the I/O signal connectors on the back plate. The NV7256-*Plus* uses BNC connectors.

How to Make Monitor Connections

1 Locate the monitor connections on the rear of the router, as shown in Figure 3-27. Monitor connections are labeled, ‘1’, ‘2’, ‘3’ and ‘4’.

2 Connect to monitor connection ‘1’. The NV7256 may use either BNC or Phoenix connectors, depending on the back plate. The NV7256-*Plus* only uses BNC connectors:

If BNC connections, connect using BNC connectors and 75Ω cable:

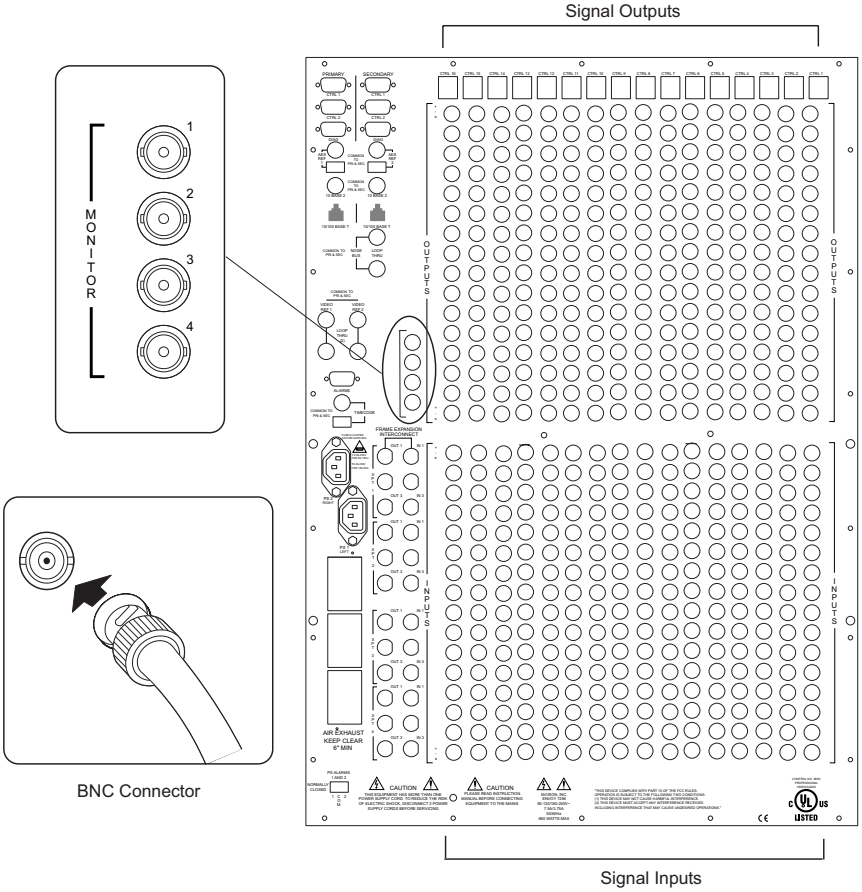


Figure 3-27. Example of Monitor Connections and BNC Connectors on NV7256 (Rear View)

If Phoenix connections, using Phoenix connectors (1 positive, 1 negative and 1 ground) and 110Ω cable, as shown in Figure 3-28.

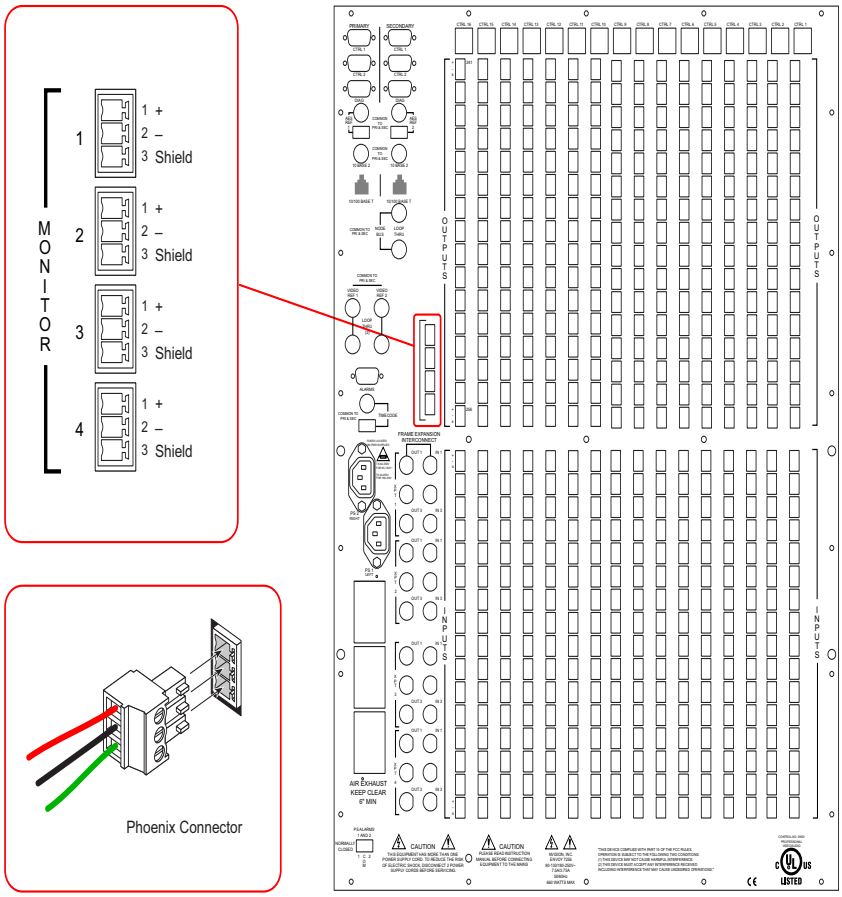


Figure 3-28. Example of Monitor Connections and Phoenix Connectors on NV7256 (Rear View)

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

4 Repeat Step 2 and Step 3 for monitor connections ‘2’, ‘3’ and ‘4’.

Making System Alarm Connections

The router provides alarms that send notification when a system malfunction occurs, such as when a fan or power supply is not functioning properly. Alarms can be connected to an external alarm indicator that displays visual cues when an alarm is activated. Miranda does not provide external indicator equipment, but does provide instructions on wiring the alarm connections. See Alarm Indicator Equipment on page 69. The router also sends status information to the router control system. For a detailed description of the router alarm connection, see System Alarm on page 17.

How to make alarm connections

1 On the rear of the router, locate the ‘ALARMS’ connection:

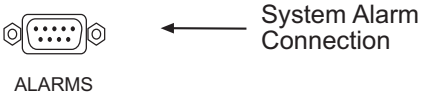


Figure 3-29. Alarms Connection (Rear View)

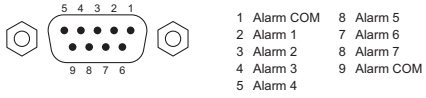
2 Connect to the ‘ALARMS’ connection using a DE9 connector and serial cable.

3 Connect the other end of the cable to an external alarm indicator. See Alarm Indicator Equipment on this page for information on wiring the DE9 connector.

Alarm Indicator Equipment

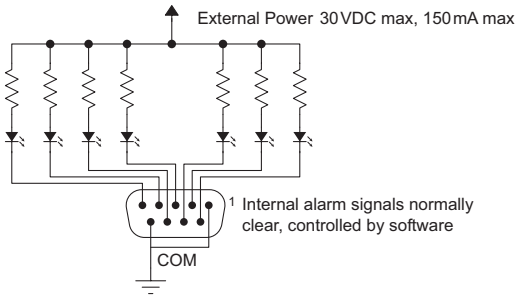
An external alarm indicator can be created to display visual cues when a failure has occurred on the router frame. The ‘ALARM’ connection on the rear of the NV7256 and NV7256-*Plus* uses a DE9 connector. LEDs can be wired to specific pins on a DE9 connector. Each LED indicates what specific router module 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.

To create an indicator box, connect to the ‘ALARM’ connection using a DE9 female connector, wiring as shown in Figure 3-30. Each pin monitors a specific function and activates a specific alarm.



Typical Circuit 1

Normally off, the LEDs turn on to indicate failure



Typical Circuit 2

Normally on, the LEDs turn off to indicate failure

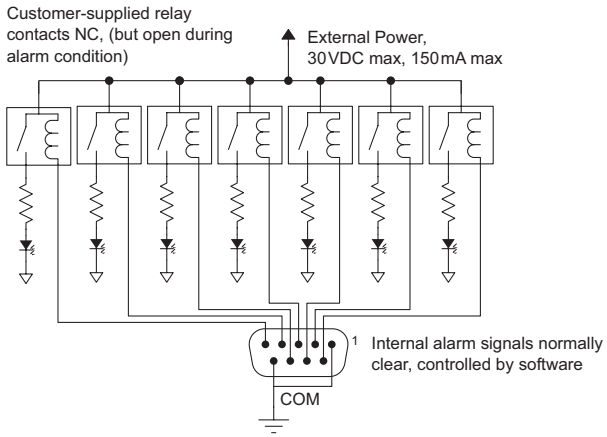


Figure 3-30. Alarm Connections and On/Off Switches

The following is a list of the DB9 pins and the associated alarm. The pin number listed corresponds to the pin numbers in Figure 3-30:

Pin	Signal	Description	Possible Conditions Causing the Alarm
1, 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, Alarm 4, Alarm 5, or Alarm 6.
4	Alarm 3	Power Supply	Missing power supply module.
5	Alarm 4	Video Ref	Missing Video Ref 1 or Video Ref 2.
6	Alarm 5	AES Ref	Missing one or both AES Ref inputs.
7	Alarm 6	Fans or Temperature	Indicates a fan failure or module over temperature.
8	Alarm 7	Control Card Health	Any control module not “healthy.”

Verification

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

- Check that all 5 green Power LEDs on the front of each PS6000 power supply module are lit. If any or all LEDs are off:
  - Check that the PS6000 power supply module is fully seated in its cell.
  - Check the AC fuse on the power supply.
  - Check for +48 volts at each of the 5 front test points.
- Check that the green and yellow LEDs on the *Primary* control card are lit.

  If the green or yellow LEDs are not properly lit, press the front edge reset button, or remove and reinsert the card. If the red LED is lit on either control card, check the reference input signals.
- Check that the green LED on the *Secondary* control card is lit, but the yellow LED is *not* lit.

  If the green or yellow LEDs are not properly lit, press the front edge reset button, or remove and reinsert the card. If the red LED is lit on either control card, check the reference input signals.
- Check LEDs on other card front edges. All green and yellow LEDs should be lit, indicating that the card is operating normally. If any green or yellow LEDs are not lit, or any red LEDs are lit, the card may have a problem. Unplug and reinsert the card.
- Check that the router door is closed and that the airflow is not impeded at the front or rear of the frame.

4. Configuration

Before being placed into service, the NV7256 or the NV7256-*Plus* router needs to 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 unit (e.g., PC) separate from the router. For detailed information on using UniConfig, see the UniConfig User's Guide.

Control Card Jumpers

The control card contains several jumpers. Jumpers are small, plastic sleeves that fit over a set of pins. The placement of the jumper either turns a function on or off, or reconfigures a function, such as AES3 reference inputs.

Each jumper connection is labeled with a jumper identification number. By default, jumpers are placed in the position most commonly used.

How to Set Control Card Jumpers

1 Locate the primary and secondary control cards:

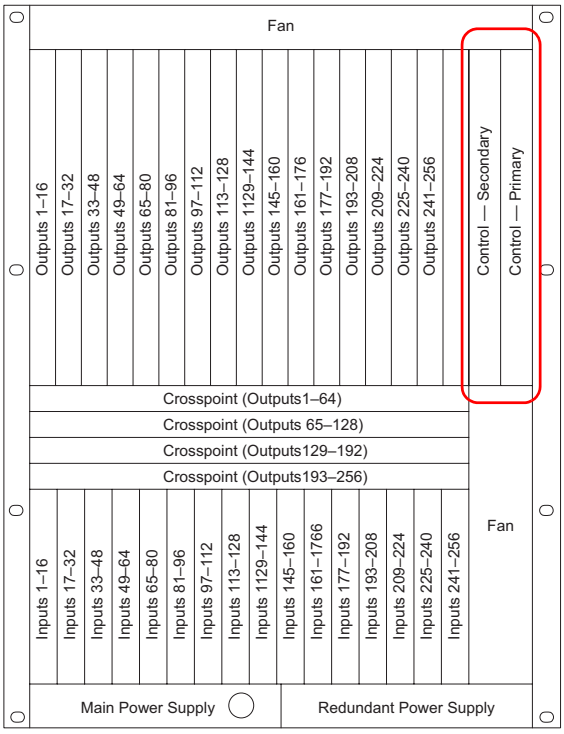


Figure 4-1. NV7256*Plus* Control Module Location (Front View)

2 Gently remove the primary control card.

3 On the card, locate each jumper by its label number, placing jumper sleeves as needed.

The following lists each jumper label number, function, and correct setting. Any jumpers not listed are unused and should be left in the factory position:

Jumper Label	Settings
J1 SBUS/10B2	Sets rear connectors labeled 10Base2 to be used for Ethernet or Sony S-Bus. Default set to lower 10Base2 position.
J2 SBUS/10B2	Sets rear connectors labeled 10Base2 to be used for Ethernet or Sony S-Bus. Default set to lower 10Base2 position.
J4 SMS7/SBUS	Sets rear Node Bus connectors to be used for SMS7000 GSC Node Bus or Sony S-Bus. Default set to upper SMS7000 position.
J6 SMS7/SBUS	Sets rear Node Bus connectors to be used for SMS7000 GSC Node Bus or Sony S-Bus. Default set to upper SMS7000 position.
J13 AES3 REF2	Sets the rear AES3 REF 2 input impedance to 110 ohms, 75 ohms, or HiZ (high impedance). Upper position selects 110 ohms for use with Phoenix rear connectors, the middle position selects 75 ohms for use with BNC rear connectors, or the lower position selects HiZ if this input is the last connection in an equipment chain.
J16 AES3 REF1	Sets the rear AES3 REF 1 input impedance to 110Ω, 75Ω, or high impedance (Hi-Z). Upper position selects 110Ω for use with Phoenix rear connectors, the middle position selects 75Ω for use with BNC rear connectors, or the lower position selects high impedance if this input is the last connection in an equipment chain.

4 When all jumpers are set, gently slide the control card back into place in the router frame.

5 Repeat Steps 2 through 4 for the secondary control card.

6 Close the router door.

Analog Audio Input Card Switches

The NV7256-*Plus* can switch analog audio signals using the analog audio card. The analog audio input card (EM0418) includes four, 8-position DIP style switches that allow the gain of each channel to be increased by 6 dB. These switches are labeled SW1 through SW4. With the switch in the OFF position, gain is normalized at 0 dB. With the switch in the ON position, the gain is increased by 6 dB. There are 32 switches, one for each channel. A channel is defined as a left or right input respectively.

These switches *only* affect input gain. The router output continues to operates with an effective FSD of +24dBu. When the Gain switch is set to ON, a +18dBu input generates a +24dBu output.

This card also contains a Mute Detect Enable jumper, J21. When the analog audio input level drops to –78dB or lower for more than 0.25 per second, the output sample values are replaced with digital silence. This jumper affects all inputs on the module, turning the mute function on or off for all inputs globally.

How to Set Analog Audio Input Card Switches

1 Locate the input analog audio card.

2 Gently remove the card from the router frame and locate the switches for analog audio signals:

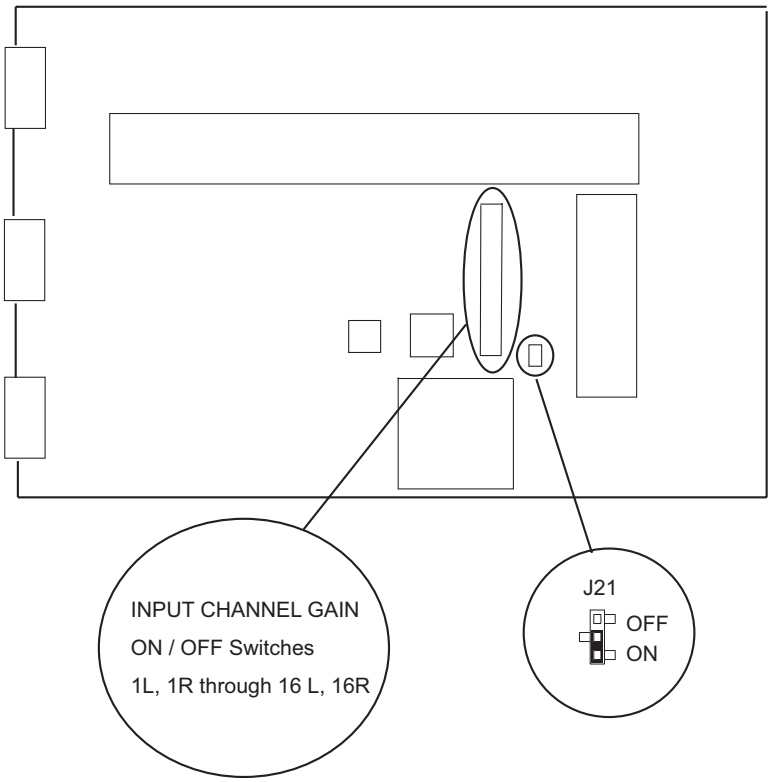


Figure 4-2. Analog Audio Input Module Switch and Jumper Locations

3 Using a small, pointed object, such as a ball point pen, slide the beige switch piece to ON or OFF as desired. Repeat this step for each of the 32 switches until all switches are set to ON or OFF as needed.

The following lists each switch position and the gain, maximum input level, and effective input cap for each:

Switch Position	System Gain	Maximum Input Level	Effective Input Cap
Off	0 dB	+24 dBu	+24 dBu
On	+6 dBu	+18 dBu	+18 dBu

4 Locate the ‘J21’ jumper labeled ‘MUTE DETECTION’.

5 Place jumper sleeves in the ‘ON’ position to activate mute detection, or in the ‘OFF’ position to deactivate mute detection.

6 When all switches and the jumper are set, gently slide the analog input card back into place in the router frame.

7 When all cards are inserted back in the router, close the router door.

8 Close the router door.

5. Maintenance

The NV7256 and NV7256*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.

You might want to check the system's Indicator LEDs (page 75) occasionally to ensure that the system is operating normally and to make sure that 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 frame module. 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, auto reset (not user serviceable)
crosspoint card	1 Amp, auto 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

LEDs indicate whether AC power is present and whether a module is operating normally.

Indicator LEDs on Power Supplies

The five green LEDs on the front of the PS6000 power supply modules indicate presence of the five +48 VDC outputs of the five branch circuits. 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.

Indicator LEDs on Control Cards

The LEDs on the front of the control cards can be monitored to determine whether the card is operating normally. The meanings of the LED indicators are as follows:

LED Indicator	indicator function
Red (alarm)	Indicates a problem or fault. Check the external reference signals; if this does not resolve the problem, call Miranda Technical Support.
Yellow (active)	Indicates the module is the active control module. On the reserve control card, this LED should be OFF.
Green (“health”)	Normally ON. Indicates the module is healthy and operating normally.
Red (low battery)	Indicates the battery needs replacing. See Battery Replacement on page 77.

Indicator LEDs on Input, Crosspoint, and Output Modules

The LEDs on the front of the input, output, and crosspoint cards can be monitored to determine whether the cards are operating normally. The LEDs indicate the following:

LED Indicator	Indicator Function
Red	This LED is normally OFF. If it is lit, it indicates a problem; replace the card or call Miranda Technical Support.
Yellow	This LED is normally ON. Indicates software has loaded and the card is operating normally.
Green	This LED is normally ON. Indicates the card is healthy and operating normally.

Fan Cleaning and Replacement

Each router frame contains either two or three fan trays containing two fans each. When facing the front of the router, the NV7256 has two fan trays: one located at the top and one located in the right-hand section of the frame. The NV7256 has three fan trays: one located at the top, one in the right-hand section, and one at the bottom of the router frame. You can remove, inspect, and clean the fans by opening the frame front door, turning the screws that hold the fan modules in place, and pulling the modules out of the frame. No special maintenance is required, but 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 three 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 NV7256 and NV7256*Plus* NV7256-*Plus*. To access the filter open the router door by releasing the two thumbscrew locks. Remove the upper module brace by loosening the two ¼ turn screws, then slide the filter up and to the right 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 of time. If the filter is only lightly contaminated with debris, a vacuum cleaner or compressed air may be used for cleaning purposes. Clean the filter 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 Low Battery indicator on the control module turns on, the battery located on the front edge of the module needs replacing. Grasp the exposed edge of the battery with your fingers and pull it towards you to remove it.

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 module's battery housing

Troubleshooting

Many system troubles are caused by easily-corrected errors, such as poor quality or missing input or reference signals, incorrect configuration, and so on. This section lists common problems and their solutions in the most likely order of occurrence. Refer also 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 as explained near the front of this manual.

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 at the AC mains. Check the AC line fuse on the Power Supply module. See Fuse Replacement on page 75.
One or a few modules not powering up or not operating properly.	Check that the module is fully seated in the frame. Reset the module by reseating it in the frame. Check that all five green LEDs on the front of the Power Supply module 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 75.

Symptom	Possible Causes and Solutions
Intermittent signal on one or two outputs.	Check input and output cable continuity. Check AES3 Reference. Check cable terminations. Possible bad module. Swap each module in the signal path with another module to see if the problem moves with the module. If so, replace the module. If all cables, terminations, and modules check out OK, the problem could be a motherboard or backplane. connector or trace. Call Technical Support. (See Technical Support Contact Information on page iii.)
Intermittent or missing signals on all outputs.	Problems with the AES3 reference inputs could cause all inputs to operate intermittently or not at all. Check the quality of the reference signals and their cable connections. Check the Control module, which processes the references to produce sync. A synchronous system requires an operational Control module in order to pass signals. An asynchronous system will operate in its last state even if the Control module is removed. Change over to the reserve Control module to see if the problem goes away. Possible low voltage on 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.

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.

2 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.

3 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.

6. Technical Details

Chapter 6 provides electrical, video, audio, and mechanical specifications for the NV7256 and NV7256-*Plus* Digital Audio Routers.

Power Specifications (Internal PS6000)

The following table provides power specifications for the NV7256 only with internal power supplies (PS6000):

Specification	Detail
AC Input	90–130/180–250 VAC, 50/60 Hz, Auto-ranging
AC Fuses	Power Supplies: T8A (HB0145-00), slow-blow; 90–130 V T6.3A (HB0031-00), slow-blow, 180–250 V
AC Connectors	2, IEC 320
AC Power	PS6000, 660 Watts, one IEC 320
AC Power Usage	Power based on PS6000 modules *Note:* Power consumption dependent on number of cards installed.
Regulatory	UL Listed and CE Compliant

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 NV7256-Plus:

Type	Parameter
AC Input	90–130/180–250 VAC, 50/60 Hz, Auto-ranging
AC Fuses	Power Supplies: T8A (HB0145-00), slow-blow; 90–130 V 6.3A (HB0031-00), slow-blow, 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	Power based on PS6000 modules; 4 primary (4 optional redundant): 475 Watts nominal (256 × 256 Sync AES), power factor corrected 900 Watts typical (256 × 256 Stereo analog audio), power factor corrected
Modules and Module Slots	Required minimum number of PS6000 modules: 2 primary (2 optional redundant). One NV6257 power supply frame can power two routers.
Dimensions	5RU high (8.75 inches, 222.2 mm) 19.0 inches (483 mm) wide 21.0 inches (533 mm) deep
Weight	55 lbs (25 kg); 105 lbs (47.5 kg) fully loaded
DC Power	Miranda connector and DC cable: WC0085
Power Supply Alarm Connection	DB25; reads each PS6000 status
Power Supply Monitor Connection	DB25
Environmental	Operating temperature: 0 to 40°C Relative humidity: 0 to 90%, non-condensing
Regulatory Compliance	UL Listed and CE Compliant

Physical Specifications

The following table provides physical specifications for the NV7256 and NV7256-*Plus*.

Specification	Detail
Dimensions	14RU (24.5 inches, 622 mm) high 19.0 inches (483 mm) wide 18.0 inches (457 mm) deep
Weight	102 lbs (46.2 kg); 167 lbs (75.9 kg) fully loaded
Mounting	EIA 310-C, 19.0 inches (483 mm)
Grounding terminal	Copper, accepts 14-6 AWG

Specification	Detail
Modules and Module Slots	16 Input cards, 16 signals each 16 Output cards, 16 signals each 4 Crosspoint cards 2 Control cards (1 primary, 1 optional secondary) 1 Monitor card 2 Fan modules 2 PS6000 modules (1 required, 1 optional redundant)
Diagnostic	Type: Serial port Standard: SMPTE 207M, EIA-422/EIA-232, configurable Connector: 2, DE9
Serial Control	Type: Serial port (2 per control card) Standard: SMPTE 207M, EIA-422 Connector: 4, DE9
Ethernet	Type: 10/100 Base T Standard: IEEE 802.3 Protocol: NVISION Ethernet protocol Connector: 2, RJ45
GSC Node Bus Control	Type: Serial Standard: Proprietary Connector: 2, BNC, loop-thru, non-terminating pair Impedance: 75 Ω
Output Signal Monitor	Type: Digital audio and AESid Standard: See related section of this specification for standard for each monitored signal type. Connector: BNC or Phoenix Impedance: 75 Ω or 110 Ω Signal Details: See related section of this specification for details for each monitored signal type, I/O levels and return loss.
I/O Expansion	Type: 10Base2 port Standard: See related section of this specification for standard for each signal type sent between routers. Connector: 24, BNC, loop-through Impedance: 75 Ω Signal Details: See related section of this specification for details for each signal type, I/O levels and return loss.
Control Expansion	Type: 10Base2 port Connector: 2, BNC, loop-through Impedance: 50 Ω
Power Supply Alarm	NV7256 only: Connector: Phoenix
Power Supply Monitor	NV7256-Plus only: Connector: DB25

Environmental Specifications

The following table provides environmental specifications for the NV7256 and NV7256-*Plus*.

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

Audio Specifications

The following table provides audio specifications for the NV7256 and NV7256-*Plus*.

Specification	Detail
Audio Reference Input	Type: serial digital audio Standard: AES3 or AES3-id Sample Rate: 48 kHz Connector: 2, BNC or Phoenix Impedance: 75 Ω or 110 Ω Input Level: 0.5 Vpp to 2.0 Vpp
AES Inputs/Outputs	Type: Balanced digital audio Standard: AES3 Sample Rate, Single Frame: synchronous 48 or 96 kHz; asynchronous 32 kHz to 96 kHz Sample Rate, Multiple Frames: synchronous 48 kHz Connector: Phoenix Impedance: 110 Ω Input Level: 200 mV to 10 Vpp Output Level: 2 Vpp
AES3-id Inputs/Outputs	Type: Unbalanced digital audio Standard: AES3-id Sample Rate, Single Frame: synchronous 48 or 96 kHz; asynchronous, 32 to 96 kHz Sample Rate, Multiple Frames: synchronous 48 kHz Connector: BNC Impedance: 75 Ω Input Level: 100 mV to 1.2 Vpp Output Level: 1 V ± 10%
Analog Audio Inputs/Outputs	(NV7256-Plus only) Type: Analog audio Standard: 24-bit at 48 ΩkHz Sample Rate: 48 ΩkHz Connector: DB25 Impedance: Input > 20 kΩ, output 50 Ω Input Level: FSD, +15, +18 and +24 dBu Output Level: FSD, +15, +18 and +24 dBu, selectable +6 dB gain via switch Frequency Response: 20 Hz to 20 kHz ±0.2 dB THD: < 0.02% at +4 dBu at 1 kHz IMD: < 0.5% (per SMPTE method using a 60 Hz +12 dBu wave and a 7 kHz 0 dBu sine wave) sine Noise: 95 dB below +24 dBu Inter-route Delay: < 1 µS Input to Output Delay: < 1.2 mS Crosstalk: -80 dB worst case Insertion Gain: ± 0.1 dB CMRR: > 75 dB from 60 Hz to 20 kHz Input CMRR: > 75 dB

Video Specifications

The following table provides video specifications for the NV7256 and NV7256-*Plus*.

Specification	Detail
Video Reference Input	Type: Analog video reference Standard: PAL, NTSC, or Tri-Level Sync Connector: Loop-thru, 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
SWB (SD and HD) Inputs/ Outputs	(NV5128, NV8256-Plus, CR Series) Type: High definition serial digital video Standard: SMPTE 259M, 344M and 292M Data Rate: Auto re-clocking at 143, 177, 270, 360, 540 Mb/s and 1.483 and 1.485 Gb/s or auto bypass Data Rate: Pass-through at 10 Mb/s to 1.5 Gb/s Connector: BNC 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 amplitude max Output Alignment Jitter: ≤ 0.2 UIpp from 100 kHz to 150 MHz Output Timing Jitter: ≤ 1.0 UIpp from 10 Hz to 100 kHz (NV8288, NV8288-Plus) Type: High definition serial digital video Standard: SMPTE 259M, 344M and 292M Data Rate: Auto re-clocking at 143, 177, 270, 360, 540 Mb/s and 1.483 and 1.485 Gb/s or auto bypass Data Rate: 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 amplitude max Output Alignment Jitter: ≤ 0.2 UIpp from 100 kHz to 150 MHz Output Timing Jitter: ≤ 1.0 UIpp from 10 Hz to 100 kHz

Time Code Specifications

The following table provides time code specifications for the NV7256 and NV7256-*Plus*.

Specification	Detail
Time Code Reference Input	Type: 1 BNC, 1 Phoenix Standard: SMPTE 12M Connector: BNC terminating, Phoenix Data Rates: 1/30th to 80 times normal Impedance: 75 Ω or 110 Ω
Time Code Inputs/Outputs	Type: Longitudinal time code Standard: SMPTE 12M Connector: Phoenix Data Rates: 1/30th to 100 times normal Impedance: 600 Ω or Hi-Z (>20,000 ohm), not selectable Input Level: 100 mV to 10 Vpp Output Level: 2.0 Vpp

7. Glossary

Chapter 7 provides a glossary.

Glossary

AC	Alternating current.
A/D	Analog to digital (conversion).
AES	Audio Engineering Society, Inc., New York, www.AES.org.
AES/EBU	Audio Engineering Society/European Broadcasting Union. A professional serial interface for transferring digital audio from CD and DVD players to amplifiers and TVs. AES/EBU is typically used to transmit PCM and Dolby Digital 5.1, but is not tied to any sampling rate or audio standard.
Analog Audio	A signal where the voltage level mimics (is an analog of) the audio waveforms.
ASIC	Application-specific integrated circuit. A circuit that is specific to a single application.
Asynchronous	A system where various signals are not synchronized. Switching between asynchronous signals leads to unpredictable results.
D/A	Digital to analog (conversion).
DC	Direct current.
dBu	Unit of audio level, where 0dBu is 0.775 Vrms.
EMI	Electronic Manufacturers Institute.
ESD	Electrostatic discharge.
FPGA	Field-programmable gate array. A logic device can be programmed and reprogrammed in the field.
IMD	Inter-modulation distortion.
I/O	Input and output.
LED	Light-emitting diode.
PROM	Programmable read-only memory. PROMs are manufactured as blank chips and written once with a special PROM programmer. Generally, PROMs are not field-programmable.
RAM	Random-access memory.
RU	Rack unit. A standard measure, or height, of rack-mounted frames (1RU being 1.75 inches).
Serial Control	Communication through the RS-422 or RS-485 serial ports.
SMPTE	Society of Motion Picture and Television Engineers
SMS7000	Competitor's control system, comparable to the NV9000 or NV910 router control system.

TDM	Time-domain multiplexing. A form of signal management that places multiple incoming signals onto a single carrier in sequence.
THD	Total harmonic distortion.
Time code	An AES signal that is data. It 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 kb/s) and spectral content varies with changes in tape speed.
Unbalanced signals	"Balanced" signals are defined in terms of the voltage of the two signal conductors with respect to a reference, which is usually ground. If these voltages are equal and of opposite sign — with respect to ground — the system is balanced. Unbalanced signals are where one line carries the signal — a voltage with respect to ground.
UniConfig	Application used to configure the NV9000 or NV915 control system.
VAC, VDC	Volts, alternating current; volts, direct current.

A. Part Numbers

This appendix provides part numbers for cards, backplanes and power supply modules used for the NV7256 and the NV7256-*Plus*, in addition to proprietary parts.

Cards and Backplanes

Audio

This table lists all of the analog and digital audio I/O cards and associated backplanes. The abbreviation "TP" in the table denotes Phoenix-type connectors used for twisted-pair cables when managing balanced signals. Unbalanced signals use BNC connectors:

Card Name and Function	Part No.	Backplane
AES Synchronous Input (balanced or unbalanced)	EM0313	EM0428 (BNC) EM0426 (TP)
AES Synchronous Output (balanced or unbalanced)	EM0314	EM0429 (BNC) EM0427 (TP)
AES Asynchronous Input (balanced or unbalanced)	EM0315	EM0428 (BNC) EM0426 (TP)
AES Asynchronous Output (balanced or unbalanced)	EM0316	EM0429 (BNC) EM0427 (TP)
Analog Audio Input	EM0418	EM0420 (DB25)
Analog Audio Output	EM0588	EM0421 (DB25)

Time Code

This table lists the port cards and associated backplanes for switching linear time code signals. The abbreviation "TP" in the table denotes Phoenix-type connectors used for twisted-pair cables:

Card Name and Function	Part No.	Backplane
Time Code Input	1166925	EM0426 (TP)
Time Code Output	EM0318	EM0427 (TP)

Control Cards

This table lists the control card. One card is required, but two may be installed for redundancy:

Card Name and Function	Part No.	Backplane
Matrix Control (Control card slots 1, 2 or both) **	EM0374	N/A

**Single controllers should be inserted in slot 1. Redundant (backup) modules should be inserted in slot 2.

Monitor Cards

This table lists the monitor card:

Card Name and Function	Part No.	Backplane
Monitor	EM0468	EM0468 (BNC)

**Single controllers should be inserted in slot 1. Redundant (backup) modules should be inserted in slot 2.

Crosspoint Cards

This table lists the crosspoint cards:

Card Name and Function	Part No.	Backplane
X-Y 256x64 Crosspoint	EM0306	N/A
TDM 2048x128 (mono) Crosspoint	EM0411	N/A

Power Supplies

This table lists the power supplies used in the NV7256 and NV7256-*Plus* frame. For the NV7256, power supply modules are installed in the router frame. For the NV7256-*Plus*, modules are installed in a separate power supply frame: the NV6257 Power Supply,

Part No.	Name and Function	Spaces
PS6000	Power supply module	2 power supply bays,: 1, 2, or both bays
WC0046	Power supply monitor cable	N/A
WC0085	Power supply cable for connecting one router to one NV6257 Power Supply power supply	N/A

Frames

This table lists the frames used for the NV7256 and the NV7256-*Plus* frame. For the NV7256, power supply modules are installed in the router frame. For the NV7256-*Plus*, modules are installed in a separate power supply frame: the NV6257 Power Supply,

Part No.	Name / Function
FR7100	NV7256 Frame (BNC connectors only)
FR7200	NV7256 Frame (TP connectors only)
FR7300	NV7256-Plus Frame (slots for backplanes)
FR6257	NV6257 Power Supply

Index

0–9

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

X