

NV7512

Audio Router

User's Guide



NVISION[®]

NV7512 Audio Router—User's Guide

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Note

Return Material Authorization (RMA) required for all returns.

Change History

The table below lists the changes to the NV7512 Audio Router User's Guide.

- User's Guide Part # UG0002-03
- Software version: -none-

Rev #	Date	ECO #	Description	Approved By
1.0	15 Nov 06	—	Manual created; first version.	DEM/Eng
1.1	11 Jan 07	—	Revised for uniformity with other router manuals. Addition of Quad Mix card and backplane, selectable analog I/O card, revised power connection procedures, and frame expansion.	DEM/Eng
1.2	16 Jul 07	—	Added new analog cards and Quad Mix control panel; removed UniConfig material.	DEM/Eng
1.3	10 Oct 08	14426	Online Help system generated. NV7512 images regenerated. Corrections regarding analog signals. Other small corrections.	DEM/D.Cox

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NVISION 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.

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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.

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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.



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- 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

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- 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.



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1. Introduction

The NV7512 router manages AES,¹ MADI and analog audio signal routing. This section discusses the general features of the router, the power supply, signals supported, a description of all active cards, and expandability when using the router connected to other NV7512 routers. It is recommended that you read this section to familiarize yourself with the router before starting any installation tasks.

Overview

The NV7512 Audio Router manages AES, MADI and analog audio signal routing. (See [Signal Types and Rates](#) on page 4.) Each signal type is received and distributed through individual I/O backplanes, allowing for the implementation of a wide range of audio signal switching configurations. Due to NV7512's architecture, AES synchronous stereo signals are separated into individual channels, enabling the switching of mono channels independently within the router. Individual mono channels can be recombined for distribution as new stereo signals.

The router can operate as a standalone router or interact with up to three additional connected frames. A single NV7512 can route as few as 8 inputs and 8 outputs (AES synchronous signals at 192kHz) increasing to a maximum of 512 inputs and 512 outputs (AES synchronous signals at 48kHz). Using expansion ports, up to four routers can be connected together for a maximum routing capacity of 2,048 inputs and 2,048 outputs stereo (4,096 inputs and 4,096 outputs mono). Because of the router's extreme density, four connected frames take up less space than two industry standard equipment racks.

In addition to routing several audio signal types, the NV7512 features an optional DSP sub-module that performs input gain adjustment, phase inversion, crossfade and channel summing.

Mounting

The NV7512 mounts in a standard EIA rack at 14 RUs, 19 inches (482.6 mm) wide, and approximately 19 inches deep. Because of the router's compact size, two routers can be mounted in a single rack, saving facility space. For installation instructions, see [Rack Mount](#) on page 33.

Fuses

Active cards feature a “fast blow” or resettable fuse. If the card requires a large amount of power, the fuse is “fast blow” and must be replaced if blown. If the fuses are resettable, the fuses can be reset by removing the card from the frame. For more information on fuses, see [Fuse Replacement](#) on page 100.

1. AES3-id.

1. Introduction

Power Supply

Cooling

The NV7512 frame has three fan trays. The top tray contains three fans; the side and bottom trays contain two fans each. The fans draw cooling air from the front of the router, through the door, and exhaust it through the rear of the frame. The router must have the door installed and closed for proper airflow through the chassis.

Caution If airflow is impeded, overheating may occur.

Each fan features speed control so that the fan spins only fast enough to keep the temperature constant within the router. Temperature sensors on the fans sense the ambient temperature and speed up or slow down the spinning of the fan as required. By maintaining a constant temperature, circuitry life span is increased.

Each fan features two LEDs that indicate if the fan is spinning and receiving power. For more information, see [Indicator LEDs](#) on page 100.

The fan trays are located at the top, bottom, and on the right side of the chassis when facing the front of the router frame. Fan trays are readily accessed through the front of the router frame.

Filters

There are also removable air filters located on the inside of the door assembly. It is recommended that maintenance of the fan tray and filters be performed on a regular basis. For more information, see [Maintenance](#) on page 99.

Power Supply

The power supply for the NV7512 is an external separate frame, the NV6257. The NV6257 uses the NVISION PS6000 series power supply module, housing up to four primary modules and four optional modules for redundancy. The number of PS6000 modules required depends on how many routers are being used and the number of active cards installed.

The following lists the number of PS6000 modules required for a router with a full complement of cards installed:

- One NV7512—two PS6000 power supply modules (and two optional power supply modules).
- Two NV7512 routers connected together—four PS6000 power supply modules (and four optional power supply modules).
- Three NV7512 routers connected together—two NV6257 power supply frames with one frame containing four PS6000 power supply modules (and four optional power supply modules) and the other frame containing two PS6000 power supply modules (and two optional power supply modules).
- Four NV7512 routers connected together—two NV6257 power supply frames each containing four PS6000 power supply modules (and four optional power supply modules).

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 [Module Slots and Rear Connectors](#) on page 9.

[Figure 1-1](#) shows the power supply architecture.

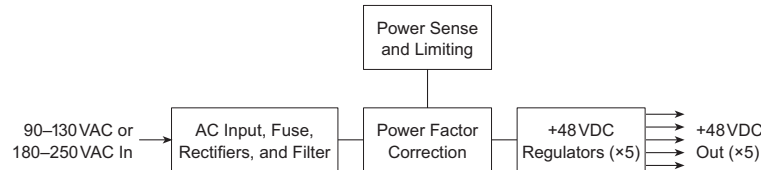


Figure 1-1. PS6000 Power Supply Module Diagram

Redundancy

The NV6257 can have a maximum of 8 AC power cords connected: up to four primary and four optional for redundancy, creating a resilient power supply system. Each power cord connected corresponds to an installed PS6000 power supply module. Because there are multiple primary power cords, if one becomes detached or fails, only power to the corresponding individual PS6000 module is interrupted. If the optional power cords are connected, there is no interruption in power should a primary power cord fail.

Fuses

Fuses for AC power inputs are located on the PS6000 power supply modules. When a NV6257 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 7.5A fuse is required for 90-130 VAC applications. For 180-250 VAC operation, a 3.75A 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 100.

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 the internal heat sinks. In addition, the NV6257 has a single fan that draws air through the power supply chassis. The frame fan is powered by PS6000 power supply modules installed in either slot *PS1* or slot *PS2* (see [Making Power Connections](#) on page 35).

Signal Types and Rates

The NV7512 supports AES, MADI and analog signals. Analog signals are converted to digital with a sample rate of 48kHz for internal routing. Outgoing digital audio signals can be converted to analog for distribution. In addition, all stereo signals are separated into left and right channels for routing as mono signals. Mono channels can be recombined to create new stereo signals.

The following table lists the sample rates and how many signals at each rate an input card or output card can support. Each signal type requires a specific input or output card. For a description of each card and corresponding card part numbers, see [Input Cards](#) on page 20 and [Output Cards](#) on page 26.

Signal Type	Sample Rates Supported	One Input Card Supports	One Output Card Supports
AES synchronous (balanced and unbalanced)	48kHz 96kHz 192kHz	32 stereo sources at 48kHz 16 stereo sources at 96kHz 8 stereo sources at 192kHz	32 stereo destinations at 48kHz, 96kHz or 192kHz (any combination of rates)
MADI synchronous streams (unbalanced)	48kHz 96kHz	2 streams totaling: 64 channels, 24 bits at 48kHz 32 channels, 24 bits at 96kHz Note: One stream may contain all 64 or 32 channels.	2 streams; 2 optional AES reference outputs, timed to the output data sampling rate. Note: Reference not used for inputs because signals converted to 48kHz for internal routing.
Analog	48kHz; 25 bits	16 stereo sources Converts analog to internal digital format.	16 stereo destinations Converts internal digital format to analog.

For MADI signals, an optional MADI reference can be used for signals arriving at sample rates other than 48kHz. (See [MADI Reference](#) on page 67.) In addition, a Sample Rate Converter submodule can be installed to support asynchronous signals. (See [MADI Asynchronous Sample Rate Converter Sub-Module](#) on page 23.)

Each signal requires a specific type of connector. Connectors are housed on backplanes installed on the back plate. For a list of signals and corresponding connector types and backplanes, see [Backplanes](#) on page 12.

Mixing AES Signal Sample Rates

The NV7512 can support three incoming sample rates for AES synchronous signals: 48kHz, 96kHz or 192kHz. The rate of the signal determines how many signals are supported and through which connectors the signal may be received.

The router receives a maximum of 32 stereo signals through coaxial connectors housed on I/O backplanes. (See [Backplanes](#) on page 12.) The 32 signals are divided into four sets of 8 signals each. Each of the four sets can have a different sample rate totalling up to 192kHz for all four sets. The faster the sample rate, the fewer the number of signals the input card can support. Similarly, the sample rate determines how many and which connectors on the backplane are used to receive the signals.

1. Introduction

Signal Types and Rates

Output sample rates will be identical to the input sample rate. For example, if the input sample rate is 96kHz, the output sample rate will be 96kHz.

Because unbalanced and balanced signals use different I/O connectors, the connectors used to receive and distribute signals differ depending on the signal type.

For AES unbalanced signals, the I/O backplane passes signals through 32 individually numbered connectors, starting at 1 and continuing sequentially up to 32. The sample rate of the signal determines how many signals a single input card supports and which coaxial connectors are used, as follows:

- If the rate is 48kHz, all 32 connectors may be used.
- If the rate is 96kHz, every other connector may be used, starting at 1 and leaving the next disconnected (1, 3, 5, 7, etc.). A total of 16 inputs may be used.
- If the rate is 192kHz, every fourth input may be used, starting at 1 and leaving the next three disconnected (1, 5, 9, 13, etc.). A total of 8 inputs may be used.

For AES balanced signals, the I/O backplane passes signals through four DB25 connectors numbered 1-8, 9-16, 17-24 and 25-32, respectively.

The following lists the different combinations for different incoming sample rates, and the related connector numbers used on the I/O backplane:

	Input 1, 5, 9, 13, 17, 21, 25, 29	Input 2, 6, 10, 14, 18, 22, 26, 30	Input 3, 7, 11, 15, 19, 23, 27, 31	Input 4, 8, 12, 16, 20, 24, 28, 32
Sample rate of incoming signals for each input. "X" denotes input connector not used.	192	X	X	X
	96	X	96	X
	96	X	48	48
	48	48	96	X
	48	48	48	48

Sample rates between connected router frames can be 48kHz, 96kHz or 192kHz.

Mixing Analog and Digital

The NV7512 frame can mix analog and digital audio signals within a single routing system. For example, a digital input can be routed to an analog output. Using analog-to-digital and digital-to-analog convertors on the analog input cards and analog output cards, the router converts analog signals to digital or digital to analog. (See [Active Cards](#) on page 20.) This feature can dramatically lower overall conversion costs when integrating existing analog devices into an existing plant.

1. Introduction

Signal Types and Rates

The following is a list of signal types and inter-mix options. In all cases, audio path delay does not introduce any “lip sync” issues and can safely be ignored.

Input Type	Output Type	Mix Options	Delay
Analog	Analog	Analog input and analog output	< 1.2 mS
Analog	Digital	Analog input or AES synchronous input and AES synchronous output	~658 μ S
Digital	Analog	AES synchronous input and Analog output	~539 μ S
Digital	Digital	AES synchronous input and AES synchronous output	104.2 μ S

Mono Channels

The NV7512 routes AES signals internally as mono channels. The router can route individual channels independently or recombine channels to create new stereo signals. To perform switching, an external AES reference signal must be connected to maintain synchronization.

AES signals are comprised of five parts: a preamble, left channel, channel status bits and right channel. When received as a stereo signal, the signal is broken apart, separating out the left and right channels to create two mono channels. The mono channels are then managed as separate signals within the router. The channel status bit and user bits are passed through. When the signal is distributed as output, the preamble, channel status bit and user bits are added back to the left and right channels to create a stereo signal.

When routed as a mono 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). There must be two channels for the signal to be regenerated as a single stereo output.

How mono signals are recombined and routed to outputs is determined by the router control system.

Switching Configurations

The NV7512 is designed to be highly flexible, allowing the creation of a wide variety of configurations for routing incoming and outgoing signals. A single router can route a maximum of 512 inputs and 512 outputs (AES synchronous stereo). By connecting two routers together, the number of signals managed can be doubled to a maximum of 1,024 inputs and 1,024 outputs, increasing to 2,048 inputs and 2,048 outputs if the maximum of four routers are connected together (AES synchronous stereo). Depending on the signal type and the corresponding input card or output card, each card supports a minimum of 8 signals (AES synchronous at 192kHz) up to a maximum of 32 signals (AES synchronous at 48kHz). Switching configurations can be created based on 8 up to the maximum number of inputs and outputs allowed: 512 inputs and 512 outputs (1,024 inputs and 1,024 outputs mono).

Crosspoint Card Slots and Outputs

A single NV7512 can have up to four crosspoint cards, 16 input cards, and 16 output cards installed. Each input card sends incoming signal information to all other crosspoint cards. This enables each crosspoint card to route any incoming signal from any input card. However, each crosspoint card manages a maximum of four output cards. In other words, a single crosspoint card can support a maximum of 512 inputs x 128 outputs (AES synchronous). Because a router frame can house up to 16 output cards, to manage all 16 output cards, four crosspoint cards must be installed.

The router frame has four crosspoint card slots. (See Figure 1-2 on page 8.) The slot in which the crosspoint card is installed determines which outputs are managed.

Figure 1-2 shows each crosspoint card slot. For clarity, the slots have been labeled A through D. The crosspoint card installed in each slot manages signals as follows:

- Slot A—Routes all inputs and local outputs 1–128. Card is installed in the *top* slot.
- Slot B—Routes all inputs and local outputs 129–256. Card is installed in the *center-top* slot.
- Slot C—Routes all inputs and local outputs 257–384. Card is installed in the *center-bottom* slot.
- Slot D—Routes all inputs and local outputs 385–512. Card is installed in the *bottom* slot.

Because each crosspoint card forwards signals to four output cards, only those crosspoint cards routing outputs need to be installed. For example, if output cards for outputs 1–256 are installed, then crosspoint cards only need to be installed in slots A and B; the C and D slots can remain empty.

1. Introduction

Switching Configurations

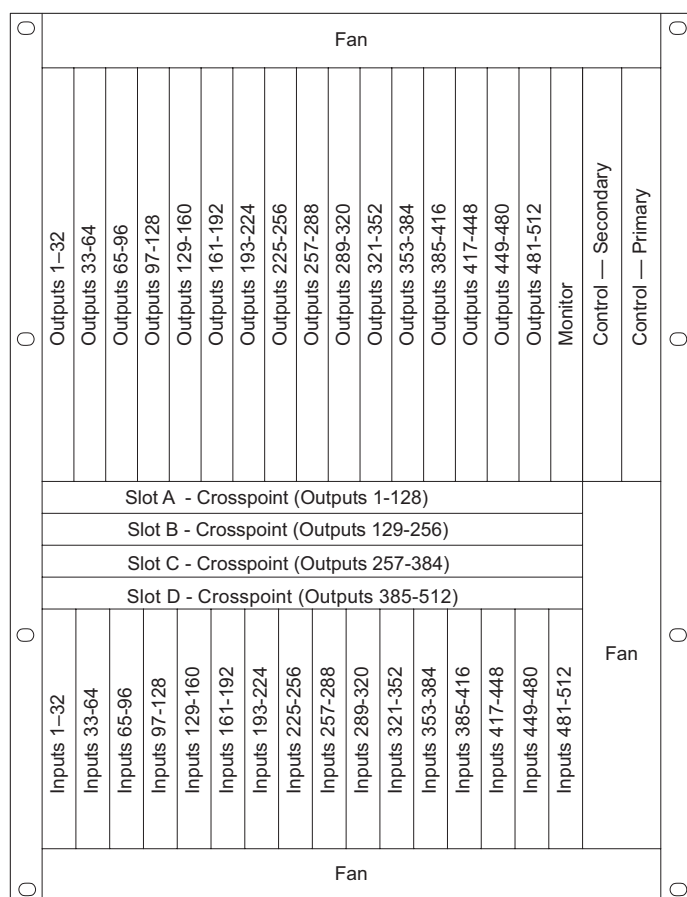


Figure 1-2. Crosspoint Card Slot Locations (Front View)

For more information on inputs and outputs and assigned signal numbers, see [Slots and Corresponding Signal Numbers](#) on page 10.

Minimum Number of Crosspoint Cards and Output Cards

Because each crosspoint card manages four output cards, the number of crosspoint cards installed, and where installed, is determined by the number and location of output cards installed. Crosspoint cards send input information to all other crosspoint cards, so where input cards are installed is not a factor. Output cards manage outgoing signals. Only the number of cards required to support the signals being distributed need to be installed.

The following table lists possible crosspoint card installation configurations when the NV7512 is used as a standalone router. The table lists in which slot crosspoint cards and output cards are installed and the minimum number required (see [Figure 1-2 on page 8](#)). For a description of each type of card, see [Active Cards](#) on page 20. This list is not exhaustive, but shows a sampling of the wide variety of configurations that can be created. Although the examples list a full complement of input cards (512 stereo inputs) and output cards for managing the maximum number of signals listed (32 outputs per card), only the specific number of cards required for the number of inputs

being supported need to be installed. For more information on input and output signal numbers, see [Slots and Corresponding Signal Numbers](#) on page 10.

Total Number of Inputs x Outputs	Output Signal Numbers	Total Number of Output Cards	Total Number of Crosspoint Cards	Crosspoint Card Slot
512 × 512	1–512	16	4	A, B, C, D
512 × 384	1–384	12	3	A, B, C
512 × 384	129–512	12	3	B, C, D
512 × 384	1–128, 257–512	12	3	A, C, D
512 × 256	1–256	8	2	A, B
512 × 256	129–384	8	2	B, C
512 × 256	257–512	8	2	C, D
512 × 256	1–128, 257–384	8	2	A, C
512 × 128	129–256	4	1	B
512 × 128	385–512	4	1	D

Connecting Multiple Routers

Each router can have up to four crosspoint cards installed. When two or more routers are connected together, the crosspoint cards can route all local inputs *plus* all inputs received through the signal expansion connections. (See [Signal Expansion Connections](#) on page 53.) If two routers are connected together, each with 512 inputs, the combined signals routed by the router is 1024 inputs. Up to four NV7512 routers can be connected together to route a maximum of 2048 inputs and 2048 outputs (AES synchronous stereo). For more information, see [Frame Expansion](#) on page 29.

Module Slots and Rear Connectors

The NV7512 has slots for input, output, crosspoint, control and monitor cards. Cards are installed in slots readily accessed through the front of the router frame. The rear of the router is a back plate into which backplanes housing coaxial connections for receiving and distributing signals are installed. The back plate also contains connections to system functions, such as a router control system, alarms or references.

Front Slots

Figure 1-3 on page 10 shows the front of the NV7512 with the door removed. From this view, the 16 upper bay slots for output cards and 16 lower bay slots for input cards are visible. In the center of the router are four horizontal slots for crosspoint cards. In the right-hand section of the upper bay are two more slots for the primary and secondary (optional for redundancy) control cards. A slot for the monitor card is also located in the right-hand section of the upper bay, between the output card slots and the control card slots. For more information on each type of card, see [Active Cards](#) on page 20.

A fan tray is located at the top, bottom, and right side of the router chassis. For more information on frame cooling, see [Cooling](#) on page 2.

1. Introduction

Module Slots and Rear Connectors

Figure 1-3 shows where different cards and the fan trays are located in the frame, as viewed from the front. The monitor card is optional and not shown as installed.

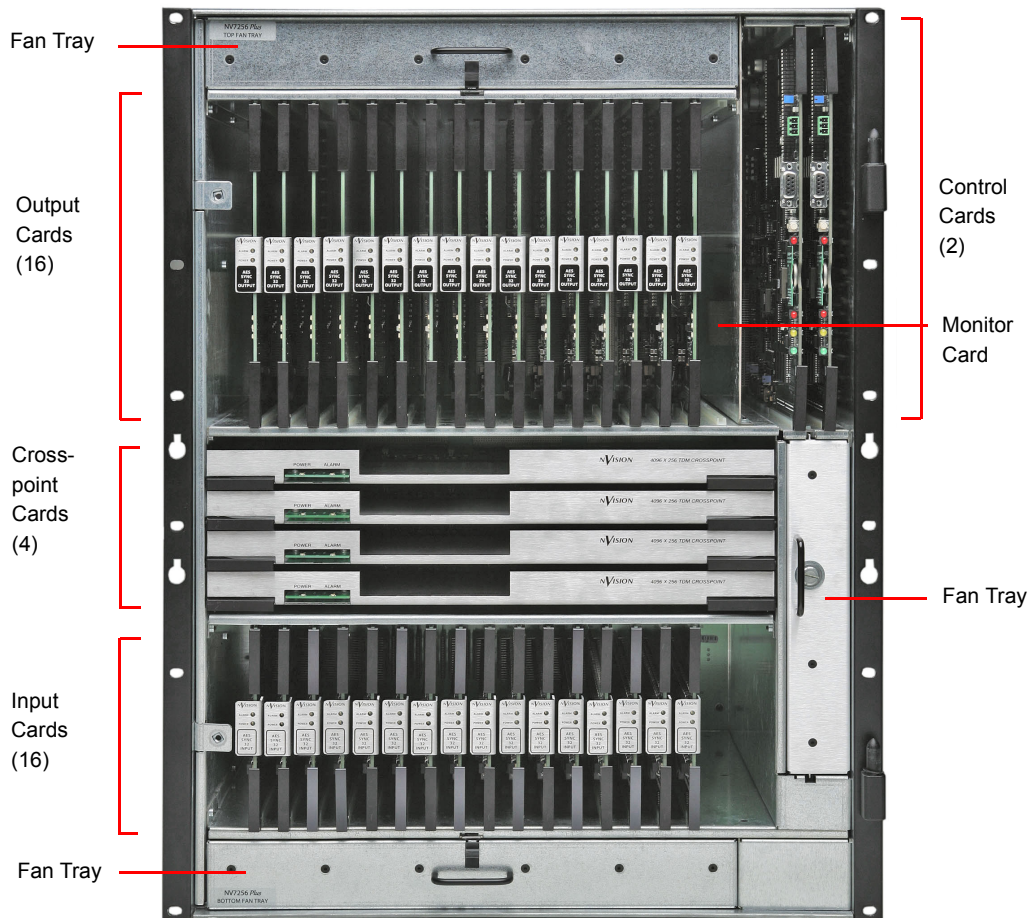


Figure 1-3. NV7512 Router with Cards Installed, Door Removed (Front View)

For information on installing cards, see [Installing Active Cards](#) on page 42.

Slots and Corresponding Signal Numbers

The router has 16 slots for input cards and 16 slots for output cards. Slots are numbered 1, 2, and so on, from left to right, when facing the front of the router. Each input card slot and output card slot, and the card it holds, receives or distributes signals through coaxial connectors housed on a back-plane. Each signal is assigned a number that corresponds to the physical input or output connection up to the maximum number of signals allowed (32). The signal numbers correspond to the slot in which an input card or output card is installed: Input slot 1 corresponds to inputs 1–32, input slot 2 corresponds to inputs 33–64, and so on, up to 512, as shown in Figure 1-4 on page 11. Output slots are similarly numbered, such that output slot 1 corresponds to outputs 1–32, output slot 2 corresponds to outputs 33–64, and so on, up to 512, as shown in Figure 1-4 on page 11.

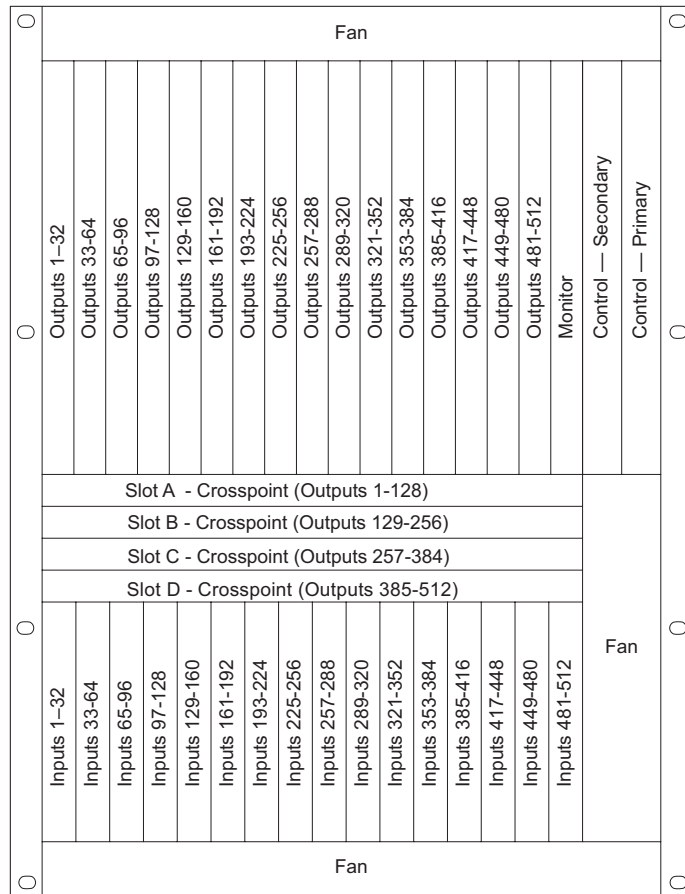


Figure 1-4. Inputs and Outputs, Numbers Assigned (Front View)

Analog Signals and Signal Numbers

The router frame slots have printed labels that list signal numbers corresponding to AES synchronous stereo signals, numbers 1 through 32. This numbering scheme does not correspond to analog signals.

For AES stereo signals, 32 signals can be supported, matching the labeling for signal numbers on the router frame. For analog signals, only 16 analog stereo signals are supported, so signals do not match the 32 signal number labels. The stereo signal is received through input 1, then input 3, then input 5, and so on, up to 32, skipping every other signal label number in sequence. However, 32 mono signals can be received, matching the router label number scheme.

When routing mono and analog signals, it is recommended that a labeling convention be adopted and rigorously followed for all mono switching configurations.

Rear Connections

The rear of the NV7512 (Figure 1-5 on page 12) features a back plate containing backplanes for receiving and distributing signals. Each backplane contains passive connectors that pass the signals through to active, receiving connections on the input cards and output cards.

An additional backplane, located in the left-hand section of the upper bay, contains four BNC connectors for the monitor card. In the left-hand region and lower, left-hand corner of the frame are

1. Introduction

Module Slots and Rear Connectors

connections for system and power functions, as shown in Figure 1-7 on page 15. In the lower region of the frame, near the left-hand side, are expansion connections used to send signals between connected NV7512 router frames. (See [Frame Expansion](#) on page 29.)

Each of the four crosspoint card slots manage up to 128 outputs, or four output cards managing up to 32 outputs each. For information on crosspoint cards and the signals managed, see [Crosspoint Card Slots and Outputs](#) on page 7.

[Figure 1-5](#) shows the rear of the router frame with backplanes installed. Backplanes plug into connectors located on the inner motherboard (see [Backplanes](#) on page 12). Active cards, shown in [Figure 1-3](#) on page 10, plug into the same motherboard from the front.

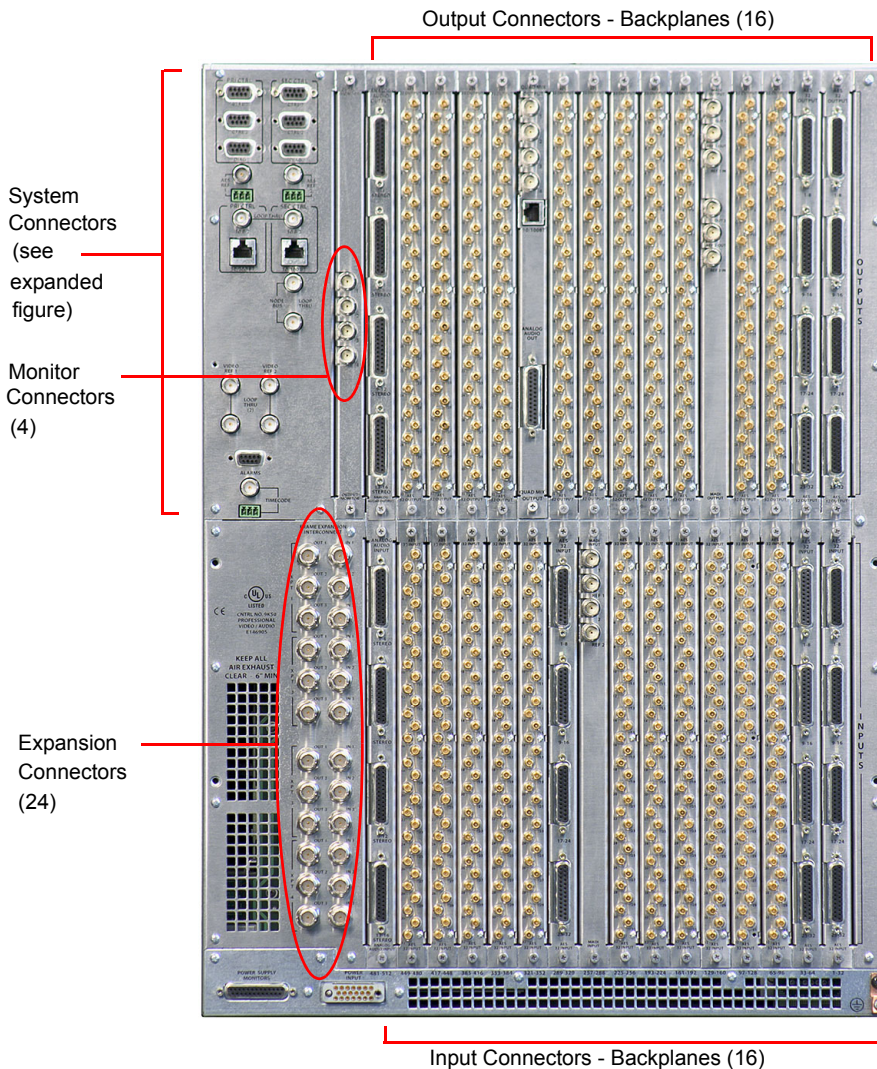


Figure 1-5. NV7512 Router with MADI and AES Backplanes (Rear View)

Backplanes

The NV7512 features rear backplanes that can be inter-mixed in a single router frame. (See [Figure 1-5](#).) Each backplane contains connectors for receiving or distributing signals. The number of connectors on a backplane and the type of connector is determined by the signal type.

There are five types of backplanes, each featuring a unique set of connectors, as shown in Figure 1-6. The type of signal being received or distributed determines the backplane used. For each backplane installed a corresponding input card or output card must also be installed. For example, if a backplane is installed to receive AES unbalanced signals, then the input card for AES unbalanced signals must be installed in the corresponding card slot. (See [Input Cards](#) on page 20.)

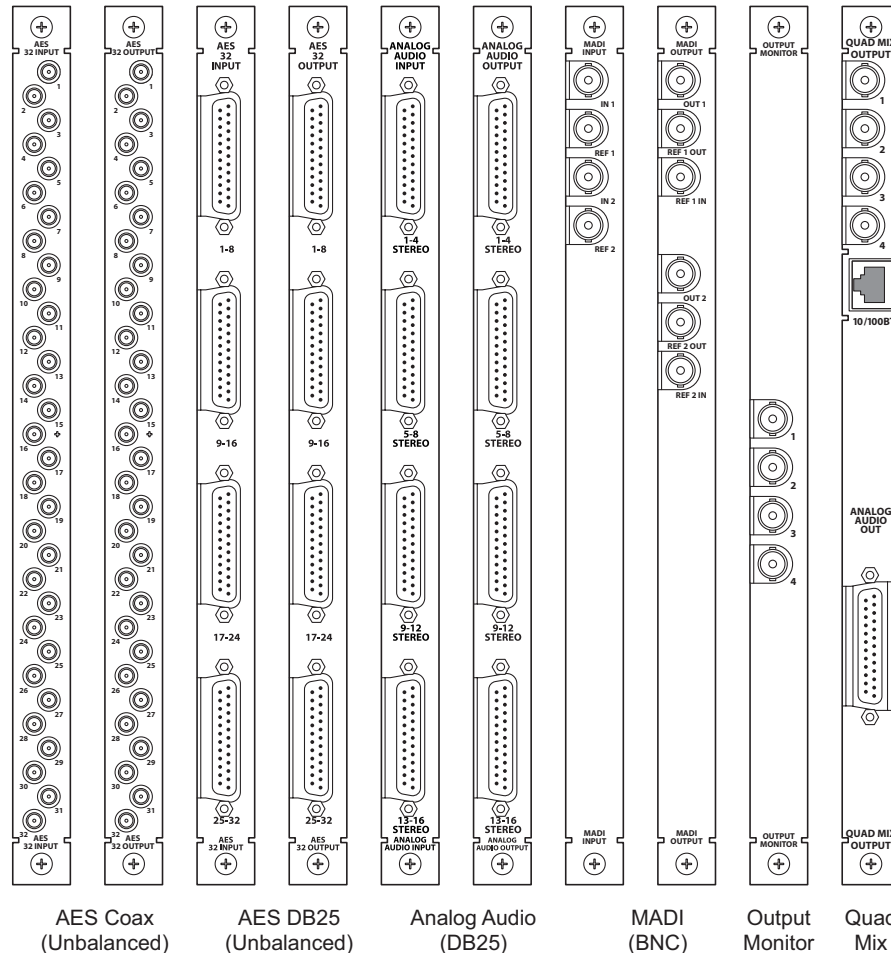


Figure 1-6. NV7512 Backplanes

Backplane connectors are labeled with numbers that correspond to the number assigned the signal passing through the connector. Signal numbers are used when creating switching configurations (see [Switching Configurations](#) on page 7). For example, on the ‘AES Unbalanced’ backplane, each connector is labeled ‘1’, ‘2’ and so on up to ‘32’. The signal passing through connector ‘1’ is routed as signal number 1, the signal passing through connector ‘2’ is routed as signal number 2, and so on. For a list of all backplane types, connectors and signals managed, see [Backplane Types and Signals](#) on page 14. For information on making connections between backplanes and signal sources or destinations, see [Making Signal Connections](#) on page 44.

Quad Mix Backplane

Unlike other backplanes, the Quad Mix backplane features three different types of connectors on a single backplane. Four BNC connectors distribute up to four AES unbalanced audio outputs. A single DB25 connection can distribute up to 8 stereo or 16 mono analog audio outputs. An additional Ethernet connection provides a connection to the Quad Mix control panel (NV9660). The NV9660

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Module Slots and Rear Connectors

manages the signal mixing performed by the Quad Mix card and is required if the Quad Mix backplane and Quad Mix output card are installed. For more information about the Quad Mix card, see [Quad Mix](#) on page 28. There is no corresponding input backplane or input card. For more information on connecting to the NV9660, see [NVISION's NV9660 Quad Mix Control Panel](#) on page 98.

Monitor Backplane

The monitor backplane features four BNC connectors that distribute outgoing signals for monitoring purposes. Each BNC connector can be connected to external monitoring equipment so that the quality of outgoing signals can be verified. The monitor backplane has a corresponding monitor card and is installed in a unique backplane slot in the back plate. There is no corresponding input backplane or input card. For more information, see [Installing Backplanes](#) on page 41 and [Monitor Card](#) on page 29.

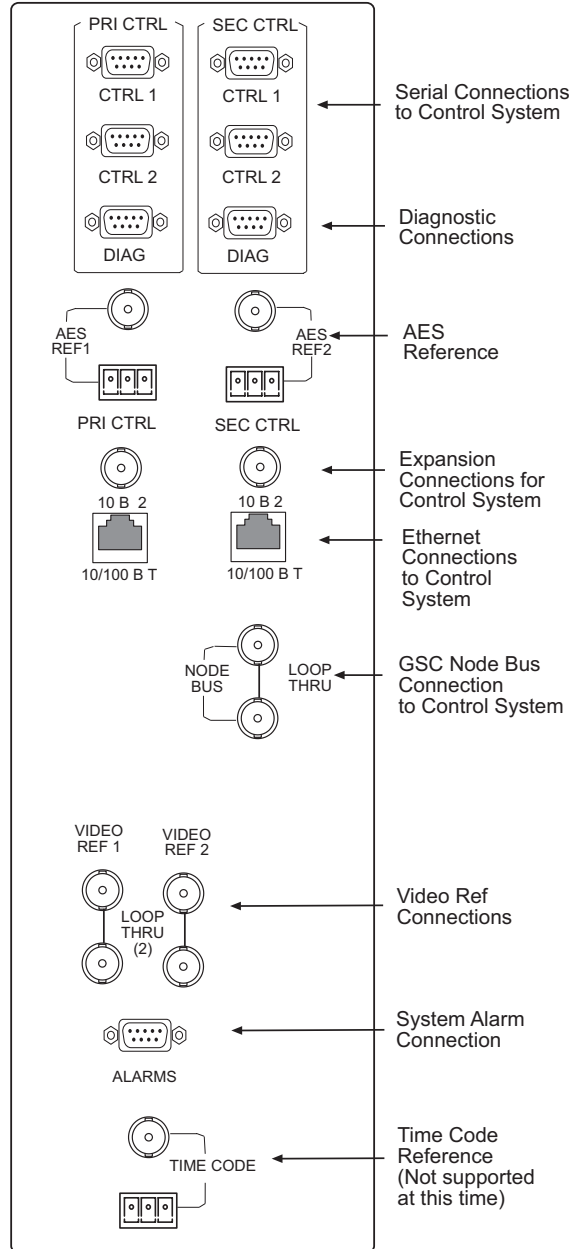
Backplane Types and Signals

The following is a list of each backplane type, associated connectors, signal types managed, and the number of signals each backplane can receive or distribute. For your convenience, the part number for each backplane is included.

Type of Signals Managed	Backplane Name	Connector Type(s)	Connectors per Backplane	Signals Managed	Part Number (Input)	Part Number (Output)
AES unbalanced, synchronous	AES	DIN 1.0/2.3	32	32 stereo 64 mono	EM0486	EM0485
AES balanced, synchronous	AES	DB25	4	16 stereo 32 mono	EM0490	EM0491
Analog	Analog	DB25	4	16 stereo 32 mono	EM0420	EM0421
MADI unbalanced, synchronous Note: 2 connectors support 2 signal streams; 2 connectors support optional MADI references (see MADI Reference on page 67).	MADI	BNC	4	64 mono	EM0492	EM0493
AES unbalanced and Analog (Ethernet connection to Quad Mix control panel, NV9660)	Quad Mix (output only)	BNC Ethernet DB25	4 BNC 1 Ethernet 1 DB25	AES balanced: 4 stereo Analog: 4 stereo or 8 mono	N/A	EM0512
Forwards outgoing signals to monitor equipment (see Monitor Card on page 29).	Monitor	BNC	4	1 output from each output card	N/A	EM0429

System Connections

The NV7512 features connections for managing system functions. These connections are used to connect to:



- A router control system using either serial, Ethernet or GSC Node Bus connectors.

- A stable source of audio signal for reference purposes.

- The UniConfig application, installed on a configuration PC.

- A system alarm that sends notification of a system failure, such as a fan malfunction.

- A power supply alarm that sends notification of a power supply failure.

Figure 1-7 shows the system connections located on the rear of the router. Time Code references are not supported at this time.

Each system connection and function is described in the proceeding sections.

Figure 1-7. System Connections for the NV7512 (Rear View)

1. Introduction

Module Slots and Rear Connectors

Router Control System Connections

A router control system is used to manage routing configurations in the router. The router control system sends instructions to the router control card, which in turn sends commands directing signal switching in the router. A router control system is a separate external unit, which is connected to the router. The NV7512 provides three types of a router control system connections: serial, Ethernet or GSC Node Bus. The router control system determines which connection is used. For example, to connect to the NVISION NV9000 router control system an Ethernet connection is preferred.

Serial Connections

The NV7512 has four serial router control system connections, as shown in Figure 1-8. The connections are divided into two sets, one primary ('PRI CTRL') and one secondary ('SEC CTRL'). Primary control connects to the primary control card. Secondary control connects to the secondary (optional for redundancy) control card. (See [Control Cards](#) on page 20.) 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 a redundant 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 Router Control Connections](#) on page 58.

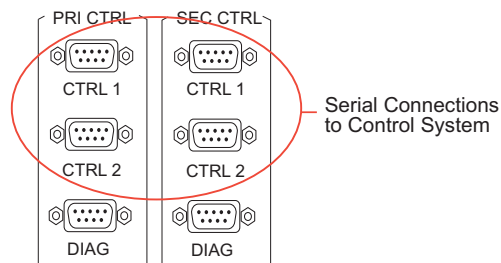


Figure 1-8. Serial Connections to Router Control System (Rear View)

Ethernet Connections

The NV7512 has two Ethernet router control system connections, labeled '10/100 BASE T', as shown in Figure 1-9. Both connections are shared by the primary control card and the secondary control card. (See [Control Cards](#) on page 20.) Because Ethernet network connections can be used to connect to alternate control systems, there are no separate connections provided. For installation instructions, see [Ethernet Router 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 Uni-Config. For more information, see the UniConfig User's Guide.

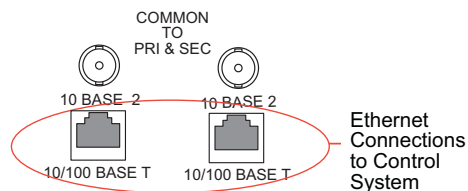


Figure 1-9. Ethernet Connections to Router Control System (Rear View)

GSC Node Bus Connections

Some third-party router control systems require a GSC Node Bus connection. The NV7512 has one GSC Node Bus connection, labeled ‘NODE BUS’, as shown in Figure 1-10. The connection is shared by both the primary control card and the secondary control card. (See [Control Cards](#) on page 20.) To use the GSC Node Bus connection, an optional module must be installed on each control card being used. For details, contact NVISION. For installation instructions, see [GSC Node Bus Router Control Connections](#) on page 60.



Figure 1-10. GSC Node Bus Connections to Router Control System (Rear View)

Router Control System Expansion Connections

In order to manage multiple connected NV7512 routers, the router control system expansion connections need to be connected between the routers. Control system expansion connections are located on the rear of the router, labeled ‘10 BASE 2’, as shown in Figure 1-11.

When making router control system connections, only one router is directly connected to the router control system. This router acts as the *primary* router. When connecting two or more routers, each router’s control system expansion connection is connected to the next router in line, ending with the *primary* router. For example, if connecting four routers, Router 4 is connected to Router 3, which is connected to Router 2, and Router 2 is connected to Router 1. Router 1 is the *primary* router and connected directly to the router control system. This enables the router control system to communicate with all connected routers through the primary router’s control system connection. For instructions on making control system expansion connections, see [Router Control System Expansion Connections](#) on page 61.

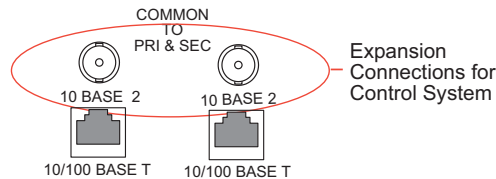


Figure 1-11. Expansion Control System Connections (Rear View)

Diagnostic Connections

The diagnostic connections enable the NV7512 to communicate with the UniConfig application. UniConfig runs on external hardware (e.g., PC) separate from the router and is used to perform system setup tasks, and configure and monitor the router. For more information on UniConfig, see the UniConfig User’s Guide.

There are two types of diagnostic connections: temporary and permanent. A temporary diagnostic serial connection is located on the front of each control card. (See [Control Cards](#) on page 20.) Permanent diagnostic connections are located on the rear of the router, labeled ‘DIAG’, as shown in Figure 1-12 on page 18. NVISION recommends using the temporary diagnostic connection when configuring the router because the port has fixed communications parameters. The permanent diagnostic connections are used for upgrading firmware or control card protocols when there is no Ethernet connection to the router. For instructions on making temporary or permanent diagnostic connections, see [Making Diagnostic Connections](#) on page 64.

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There are two permanent ‘DIAG’ ports, one primary (‘PRI CTRL’) and one secondary (‘SEC CTRL’). The primary control connects to the primary control card. The secondary control connects to the secondary (optional for redundancy) control card.

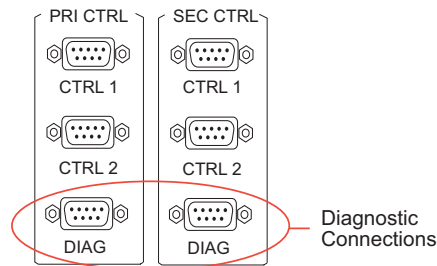


Figure 1-12. Permanent Diagnostic Connections (Rear View)

AES Reference Connections

The AES reference is used for clock generation. The clock 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 jumpers on the control card. (See [Control Card Jumper Settings](#) on page 85.)

The NV7512 has two AES reference connections labeled ‘AES REF1’ and ‘AES REF2’, as shown in Figure 1-13 on page 18. Both connections are shared by the primary control card and the secondary control card. (See [Control Cards](#) on page 20.) 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, it is not recommended that you operate under these settings for high-quality program audio feeds. Router specifications are not guaranteed; 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 Reference Connections](#) on page 18.) 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 48kHz. For instructions on making AES reference connections, see [AES Reference](#) on page 67.

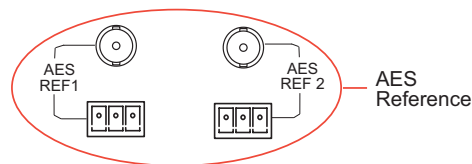


Figure 1-13. Connections to AES References (Rear View)

Video Reference Connections

The NV7512 provides timing reference connections for video signals, labeled ‘VIDEO REF 1’ and ‘VIDEO REF 2’, as shown in Figure 1-14. These connections provide a reference input for determining the router’s video frame switch point. The same reference can be used for both connections or a different reference used for each connection.

If a video reference is present, signals switch at the defined frame and line switch points. If a video reference is not present, the router still switches the signal, but to an internal reference. When the video reference is not connected the control card red LEDs remain lit. (See [Indicator LEDs](#) on page 100.)

The video reference connections require a stable source of PAL, NTSC or Tri-level sync. For instructions on making video reference connections, see [Video Reference](#) on page 69.

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 automatically fails-over to the redundant reference. When using different references, or “dual” references, routing switch takes can be configured to occur based on one or the other reference. For example, ‘VIDEO REF 1’ uses NTSC as a reference and ‘VIDEO REF 2’ uses PAL as a reference.

“Redundant” or “dual” mode is selected using UniConfig. If “dual” is selected, each output can be configured individually to use ‘VIDEO REF 1’ or ‘VIDEO REF 2’ as the reference (see the Uni-Config User’s Guide).

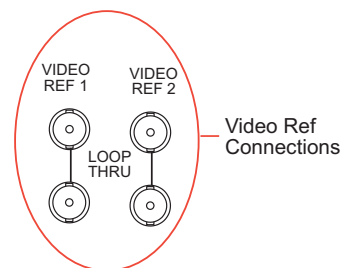


Figure 1-14. Connections to Video References (Rear View)

Alarm Connections

The NV7512 provides system alarms that notify you of a malfunction, such as when a fan or power supply is not functioning properly. The NV6257 (power supply) and the NV7512 each have alarm connections that can be connected to external equipment that display visual signals when an alarm is activated. Creation of external monitoring equipment is outside the scope of this manual. However, basic instructions on wiring the alarm connections for external monitoring is provided. See [Alarm Indicator Equipment](#) on page 72.

In addition to an alarm connection, the router control system receives status information from the router’s control card(s). The control cards read the status of NV6257’s power supply and fans through the ‘Power Supply Monitors’ connection. (See [Module Slots and Rear Connectors](#) on page 9.) At the same time, the control card monitors the local router’s power supply, fans, and video reference connections. Both NV6257 and router information is then communicated to the router control system and is viewable using UniConfig (see the UniConfig User’s Guide).

A SNMP agent can be installed on the router control system (i.e., NVISION 9000) to communicate power supply information to a SNMP manager. Installation of SNMP agents and use of SNMP managers is outside the scope of this User’s Guide.

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Active Cards

The router alarm connection is labeled ‘ALARM’, as shown in Figure 1-15. For instructions on making alarm connections, see [Making Alarm Connections](#) on page 71.

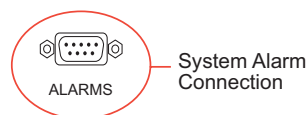


Figure 1-15. Alarms Connection (Rear View)

Active Cards

The NV7512 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 and has a two levers that aid card ejection.

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 (optional)

Each card and function is described in the preceding sections. For information on installing cards, see [Installing Active Cards](#) on page 42.

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, output, crosspoint and monitor cards.

Both the primary control card and the secondary control card receive router control system commands, but only the primary control card actively sends commands to the crosspoint cards. Because both cards receive router control system commands, if the active (primary) control card fails, the back-up (secondary) control card automatically and seamlessly takes over processing. In addition, the primary control 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.

The control card also monitors taxometers on the fans, which indicate if the fan is spinning or not. The control card forwards this information to the router control system for monitoring.

The control card includes a status reporting circuit. Four LEDs on the front of the control card indicate the card's status: low battery (Red), alarm (Red), active (Amber) and operating normally (Green). For more information, see [Indicator LEDs](#) on page 100.

Input Cards

The router frame can house up to 16 input cards, each processing up to 32 signals, depending on the card. Input cards receive incoming signals through passive coaxial connectors on backplanes. (See [Backplanes](#) on page 12.) There are three types of input cards managing different signal formats.

Different input cards can be inter-mixed in a single frame to meet specific switching configuration needs.

Analog and AES synchronous signals may be converted between analog and digital within the same router frame. (See [Mixing Analog and Digital](#) on page 5.) Analog or AES synchronous signals may be routed as stereo or mono signals, but not as AES asynchronous channels.

The following is a list of the different input cards available. Each card is listed by the type of signal it manages. For your convenience, the part number for each card has been included.

Input Card	Number of Inputs	Number of Incoming Signals per Sample Rate	Part Number
AES synchronous balanced and unbalanced	32 stereo 64 mono	32 stereo (64 mono) at 48kHz 16 stereo (32 mono) at 96kHz 8 stereo (16 mono) at 192kHz	EM0488
MADI synchronous unbalanced	64 mono	2 streams totaling: 64-channel, 24-bits at 48kHz 32-channel, 24-bits at 96kHz Note: One stream may contain all 64 or 32 channels.	EM0476
Analog	16 stereo 32 mono	16 stereo (rate N/A) 32 analog (rate N/A) Converts analog input to internal digital format at 48kHz	EM0418

For MADI signals, an optional MADI reference can be used for signals arriving at sample rates other than 48kHz. (See [MADI Reference](#) on page 67.) In addition, a pair of Sample Rate Converter sub-modules can be installed to support asynchronous signals. (See [AES Synchronous \(Balanced and Unbalanced\)](#) on page 27.)

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

AES Synchronous (Balanced and Unbalanced)

The AES synchronous input card (EM0488) receives balanced or unbalanced incoming signals through local I/O connectors: DIN 1.0/2.3 for unbalanced signals and DB25 for balanced signals.

The input card receives up to 32 stereo signals. Each signal is transformer coupled. The signal is then forwarded to a receiver. The receiver automatically determines if the incoming signal sample rate (48kHz, 96kHz or 192kHz) is valid for the signal input connectors being used. (See [Mixing AES Signal Sample Rates](#) on page 4.)

Next, the receiver separates the signal into a right channel and a left channel, channel status information, and user bits. At that time, the sample rate of the signal is known (48kHz, 96kHz or 192kHz) and sample rate information forwarded with the signal. The signal is synchronized to the system clock; adding and dropping samples as needed until the signal is synchronized.

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Active Cards

The receiver forwards the signal to a buffer, which in turns sends the signal to the motherboard and onward to all crosspoint cards.

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.

Figure 1-16 shows the signal flow for an AES synchronous input card.

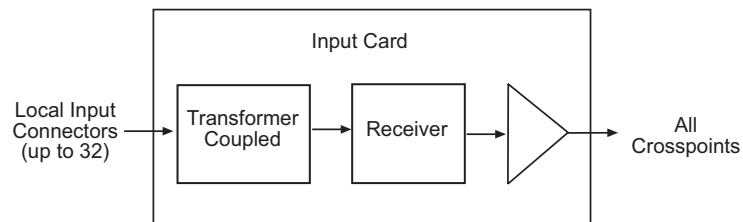


Figure 1-16. AES Synchronous Input Card Block Diagram

MADI (Unbalanced)

The MADI input card (EM0476) supports incoming MADI unbalanced signals received through local BNC coaxial connectors. MADI audio signals are grouped into 32-bit packets for each audio channel with one MADI frame composed of up to 64 continuous channels. MADI signals require a reference in accordance with AES11 standards. (See [MADI Reference](#) on page 67.)

Using DIP switches on the input card, channels can be allocated between the two BNC connectors. In addition, the sample rate of the MADI signal, whether standard or legacy format, can be set and if channel status data remains untouched or forced to match common professional channel status. For more information, see [Setting MADI Channels](#) on page 92.

Asynchronous MADI signals are supported if two Sample Rate Converter (SM0478) sub-module are installed on the input card. (See [Input Cards](#) on page 20.) MADI streams containing asynchronous audio data use the same input card, output card, and backplane as MADI synchronous signals.

The MADI input card can receive up to 64 audio channels. Each MADI signal is transformer coupled to remove “noise” and forwarded to a receiver. The receiver extracts clock and data information, removing any unnecessary synchronization information. The signal is then forwarded to a MADI processing module, which performs two functions: If a Sample Rate Converter sub-module has been installed, the processing module formats the signal for rate conversion by the sub-module. The Sample Rate Converter sub-module recombines any asynchronous signal data as a digital signal with a sample rate of 48kHz or 96kHz for internal routing and forwards the signal back to the processing module.

If a Sample Rate Converter sub-module is not installed, the processing modules recombines signal data to create a signal with a sample rate of 48kHz or 96kHz for internal routing. From the processing module, all signals are forwarded to a buffer. The buffer feeds the signal to the motherboard and onward to all crosspoint cards.

Figure 1-17 shows the signal flow for a MADI synchronous input card.

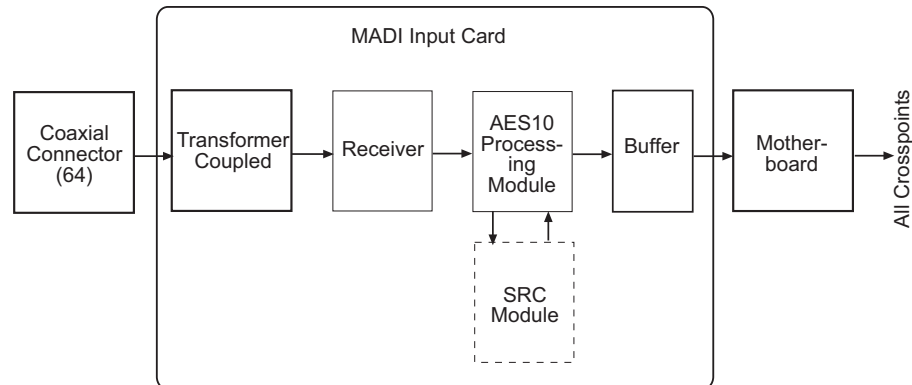


Figure 1-17. MADI Synchronous Input Card Block Diagram

MADI Asynchronous Sample Rate Converter Sub-Module

MADI signals may contain audio data that is asynchronous to the system clock. To convert the signals to the same rate, two Sample Rate Converter sub-modules (SM0478) can be installed on the MADI input card in the SODIMM sockets. A DIP switch on the Sample Rate Converter sub-module indicates if the input rate is 1x (32kHz to 50kHz) or 2x (64kHz to 96kHz), and converts all incoming audio data to 48kHz or 96kHz. If the Sample Rate Converter sub-modules are installed, the MADI reference connections must be connected. (See [MADI Reference](#) on page 67.) For more information on acquiring, installing, and setting DIP switches on the Sample Rate Converter sub-module, contact NVISION.

If the Sample Rate Converter sub-module is not installed and the asynchronous signal is not synchronized to the system reference, the data becomes corrupt.

Analog

The analog input card (EM0418) supports incoming analog signals received through local DB25 connectors. The input card features DIP switches and a jumper that allow gain and mute detection to be set. (See [Gain and Mute Detection](#) on page 87.) In addition, using a separate DIP switch setting the operating level of the card can be set to match the operating level of the facility. For example, if the operating level is +24 dBu, the card can be set to +24 dBu. 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 [Operating Levels](#) on page 89.

The analog input card can receive up to 16 stereo (32 mono) signals. Each signal is forwarded to an analog-to-digital converter. The converter converts the signal into a digital signal with a sample rate of 48kHz for internal routing. The converter then sends the signal to the motherboard and onward to the crosspoint cards.

Figure 1-16 shows the signal flow for an analog input card.

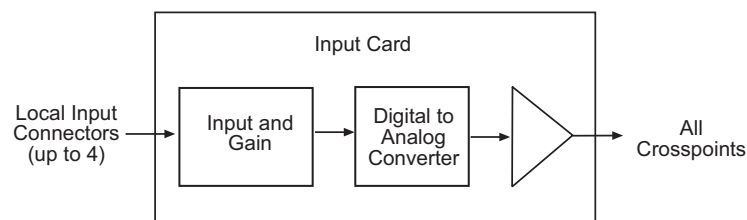


Figure 1-18. Analog Input Card Block Diagram

1. Introduction

Active Cards

Status Reporting

All input cards feature a circuit that performs status reporting and drives the card's functions. Two LEDs on the front of the input card indicate the card's status: alarm (Red), power good (Green). Three additional LEDs situated further back on the card indicate if software is loaded (Amber), if there is good communication with the control card (Green) or bad communication with the control card (Red). For more information, see [Indicator LEDs](#) on page 100.

Crosspoint Cards

A crosspoint card (EM0525) receives signals from the input cards and commands from the control card. The crosspoint card then performs switching as directed, sending signals to up to four output cards. Each crosspoint card can receive up to 512 inputs and distribute up to 128 outputs.

The NV7512 crosspoint cards feature Time Domain Multiplexing (TDM). TDM technology enables multiple signals to travel on a single cable by placing the incoming signals in a continuous stream. This enables signals to be sent between input cards and output cards, and between frames, using a significantly fewer number of crosspoint connections. In turn, this reduces the amount of physical space required to house the router frame. In addition, the crosspoint card is able to store and switch AES synchronous channels separately for mono switching.

On the crosspoint card, memory is divided into four segments, one for inputs from the local input cards and three for inputs from up to three additional connected frames. For example, one segment of memory is used for Router 1, the current frame, the next segment is used for Router 2, the next segment for Router 3, and so on.

Crosspoint Card Functions

Each crosspoint card receives inputs from the local router and from any connected routers (up to four total). Local inputs are forwarded to a TDM multiplexer and a TDM crosspoint circuit. The TDM multiplexer creates three copies of the signal, forwarding each copy to the expansion connectors. The TDM crosspoint circuit forwards signals to four output cards on the local router. Signals received from the expansion connections are forwarded to a TDM demuxer, which in turn sends the signals to the TDM crosspoint circuit. The TDM crosspoint circuit forwards a signal to four output cards on the local router.

Figure 1-19 shows the flow of signals through the crosspoint card.

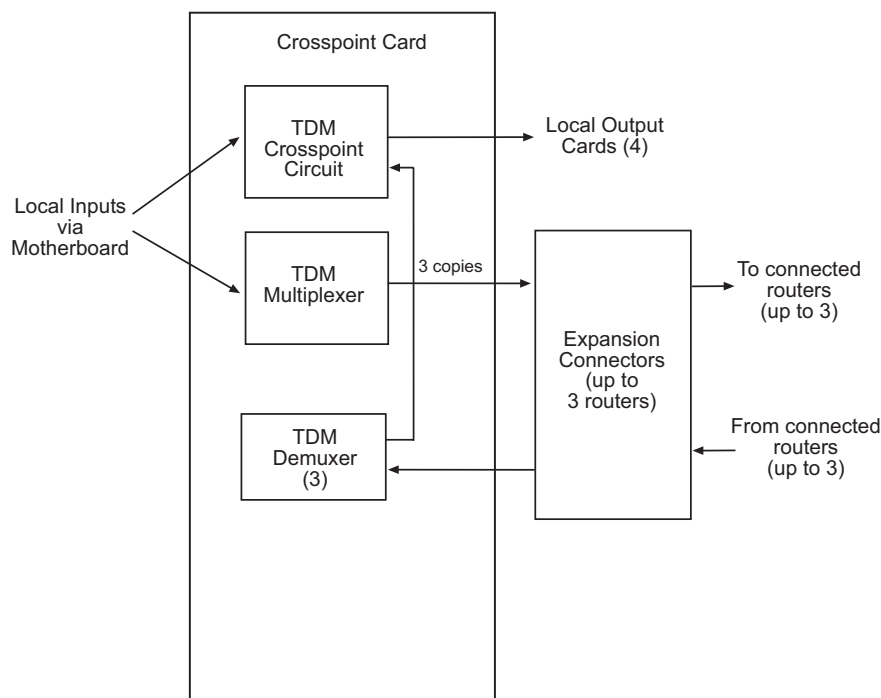


Figure 1-19. Crosspoint Card Block Diagram

When facing the front of the router, crosspoint cards can be installed in one of four horizontal slots. (See [Front Slots](#) on page 9.) The slot determines which signals the crosspoint card manages. For example, the crosspoint card installed in the *top* slot—Slot A—manages all inputs and outputs 1-256. For a description of each slot and outputs managed, see [Crosspoint Card Slots and Outputs](#) on page 7.

Minimum Crosspoint Cards Required

The switching configuration being implemented determines the minimum number of crosspoint cards required. Because each crosspoint card receives all inputs, but routes signals to only four output cards, only those crosspoint cards managing outputs need to be installed. For a list of crosspoint cards required and the slot in which a crosspoint card must be installed to route specific signals, see [Crosspoint Card Slots and Outputs](#) on page 7.

1. Introduction

Active Cards

Status Reporting

The crosspoint card includes a status reporting circuit. Five LEDs on the front of the crosspoint card indicate the card's status: alarm (Red), power good (Green), software loaded (Amber), good communication with the control card (Green) and bad communication with the control card (Red). For more information, see [Indicator LEDs](#) on page 100.

Output Cards

The router frame can house up to 16 output cards, each processing up to 32 signals, depending on the card. Output cards receive signals from the crosspoint card (via the motherboard) and feed outputs to I/O connectors housed on backplanes for distribution. (See [Backplanes](#) on page 12.)

There are four types of output cards, each supporting different signal formats. Different output cards can be inter-mixed in a single frame to meet specific switching configuration needs. For more information on switching configurations, see [Switching Configurations](#) on page 7.

In addition to standard output cards, there is a Quad Mix output card. This card can manage AES synchronous unbalanced and analog signals, and can be installed in place of any other output card. (See [Quad Mix](#) on page 28.)

Analog and AES synchronous signals may be converted between analog and digital within the same router frame. (See [Mixing Analog and Digital](#) on page 5.) Analog or AES synchronous signals may be routed as stereo (2 channels) or mono (1 channel) signals.

The following is a list of the different output cards available. Each card is listed by the type of signal it manages. For your convenience, the part number for each card has been included.

Output Card	Number of Inputs from XPT Card	Number of Outputs	Sample Rates for Output	Part Number
AES synchronous balanced and unbalanced	64 mono	32 stereo 64 mono	48kHz 96kHz 192kHz	EM0489
MADI synchronous unbalanced	64 mono	2 streams 2 AES reference outputs, timed to the output audio data.	48kHz 96kHz	EM0477
Analog	32 mono	16 stereo 32 mono Converts internal digital format to analog output.	N/A	EM0589
Quad Mix	Up to 64 mono	AES unbalanced: 4 stereo, 8 mono Analog: 4 stereo, 8 mono. Converts internal digital format to analog output.	AES: 48kHz	EM0511

Output cards process outgoing signals. The functions of each type of output card are described in the preceding sections. Cards are listed by signal type.

AES Synchronous (Balanced and Unbalanced)

The AES synchronous output card (EM0489) receives outgoing signals from the crosspoint card (via the motherboard) and forwards the signals to local I/O connectors: DIN 1.0/2.3 for unbalanced signals and DB25 for balanced signals.

The output card receives up to 32 stereo signals. Inputs are sent to reformatters that rejoin right and left channels, channel status information, and user bits to create an AES signal. The reformatter then creates two copies of the signal, forwarding one copy to a cable driver and one copy to a 32 x 1 monitor Mux. The cable driver forwards the signal to local I/O connectors for distribution. The 32 x 1 Mux forwards the signal to the motherboard, which forwards the signal to the monitor card for monitoring.

Signals sent to the output card may not be Z-bit or block-aligned. To manage these signals, the output card delays the right channel's status bits to align them with the left channel's status bits. If the source selection for the left channel changes, the right channel status bits are re-aligned with the new left channel's status bits. Only the right channel's status bits are delayed; the audio sample is not delayed.

Figure 1-20 shows the signal flow for an AES synchronous output card.

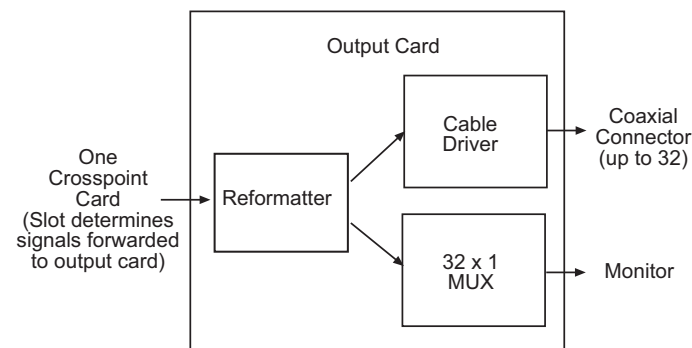


Figure 1-20. AES Synchronous Output Card Block Diagram

MADI (Unbalanced)

The MADI output card (EM0477) receives outgoing signals from the crosspoint card (via the motherboard) and forwards the signals to local BNC connectors. All 64 channels can be distributed through a single connector, or divided between two MADI connectors.

Using DIP switches on the output card, channels can be allocated between the two BNC connectors. In addition, the sample rate of the MADI signals, whether standard or legacy format, can be set and if channel status data remains untouched or forced to match common professional data. For more information, see [Setting MADI Channels](#) on page 92.

The MADI output card can receive up to 64 audio channels. Each signal is forwarded to a receiver that feeds the signal to a reformatter that rejoin right and left channels, channel status information, and user bits to create a MADI signal. The reformatter sends the signal to a cable driver, which forwards the signal to local I/O connectors for distribution.

For monitoring purposes, a copy of the digital audio channels are sent to the monitoring card prior to encoding. The data is 48 kHz and AES format.

1. Introduction

Active Cards

Figure 1-21 shows the signal flow for a MADI synchronous output card.

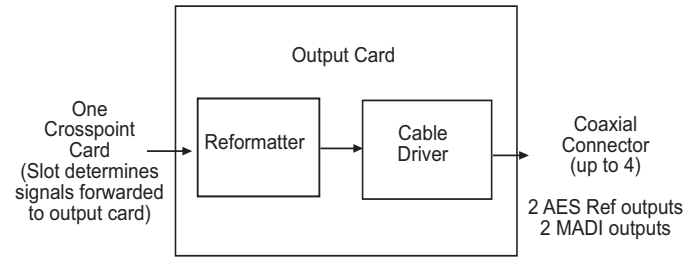


Figure 1-21. MADI Synchronous Output Card Block Diagram

Analog

The analog output card (EM0589) receives outgoing signals from the crosspoint card and forwards the signals to local DB25 connectors. Similar to the analog input card, the analog output card features DIP switches that allow the operating level to be set to match the operating level of the facility. (See [Operating Levels](#) on page 89.) This means for less degradation when converting the signal from digital back to analog.

The analog output card can receive up to 16 stereo signals (32 mono channels). Each signal is forwarded to a digital-to-analog converter which converts the signal from an internal digital format to analog. The converter forwards the signal to a balanced line driver, which feeds the to a I/O connector for distribution. At the same time, each output channel in digital format is sent to the monitor card. Analog signals are not sent to the monitor card; only digital signals prior to the analog conversion. The digital signal is 48 kHz, AES formatted.

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 600Ω loads continuously and may overheat if used in a 600Ω environment.

Figure 1-22 shows the signal flow for an analog output card.

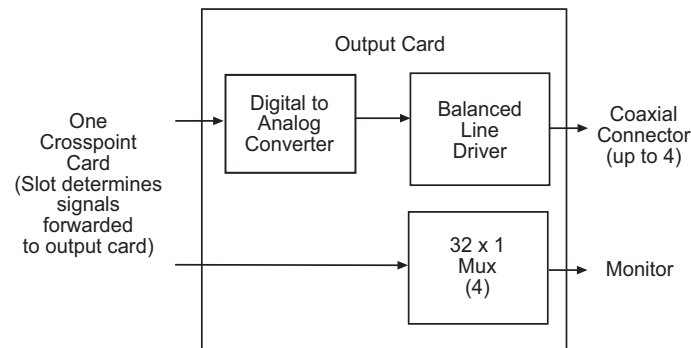


Figure 1-22. Analog Output Card Block Diagram

Quad Mix

The Quad Mix output card (EM0511) is designed to receive inputs from the crosspoint card and distribute outgoing signals as both AES unbalanced signals and analog signals. The Quad Mix card can be installed in any output card slot in place of any other output card.

The Quad Mix output card is managed through a separate Quad Mix control panel (NV9660). The Quad Mix control panel is used to set balance and gain levels. For more information, see the NV9660 User's Guide.

The Quad Mix card can receive up to 32 signals from the crosspoint cards. Each signal is forwarded to one of 4 mixers, designated 1 through 4. Incoming data for mixer 1 comes from the first 8 outputs associated with the output card's location. Incoming data for mixer 2 comes from the next outputs associated with the output card's location, and so on. The mixer adjusts the balance and gain for each signal according to settings entered in the NV9660 Quad Mix Control Panel (see the NV9660 User's Guide). Each signal is then forwarded to a 16 x 1 Mux, which forwards two copies of the signal. One copy is distributed as an AES signal through 4 BNC coaxial connectors. The other copy is forwarded to a digital-to-analog converter and distributed as an analog signal through a DB25 connector. The Quad Mix output card does not send a copy of the outgoing signals to the monitor card.

Figure 1-23 shows the signal flow for a Quad Mix output card.

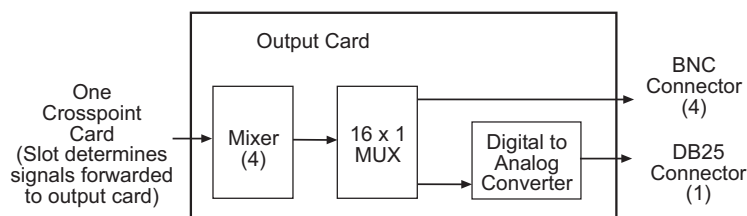


Figure 1-23. Quad Mix Output Card Block Diagram

Status Reporting

All output cards feature a circuit that performs status reporting and drives the card's functions. Five LEDs on the front of each output card indicate the card's status: alarm (Red), power good (Green). For more information, see [Indicator LEDs](#) on page 100.

Monitor Card

Using a monitor card, the quality of outgoing signals can be monitored. The monitor card (EM0429-10) receives a single signal from each output card, except for the Quad Mix output card. For analog signals, the digital signal prior to conversion to analog is sent to the monitor card, not the analog signal. The monitor card then sends two outgoing signals for monitoring purposes. Monitor cards only receive outgoing signals from the local router on which it is installed.

Frame Expansion

Up to four NV7512 router frames can be connected together, creating a maximum switching configuration of 2048 inputs x 2048 outputs stereo (4096 inputs x 4096 outputs mono). The total number of signals in the configuration depends on the type of signal. For example, for AES unbalanced signals, configurations can start at 32 inputs x 32 outputs, but analog signals start at 16 inputs x 16 outputs. For a complete list of signal inputs and outputs, see [Signal Types and Rates](#) on page 4.

1. Introduction

Frame Expansion

How Frame Expansion Works

Each NV7512 router frame can manage up to 512 inputs x 512 outputs (AES synchronous unbalanced). Every set of four output cards requires one crosspoint card. On the crosspoint card, memory is divided into four segments, one for the local inputs and three for signals received from connected router frames. For example, one segment of memory is used for Router 1, the current frame, the next segment is used for connected Router 2, the next segment for connected Router 3, and so on.

Each frame can contain up to 16 input cards and 16 output cards, and up to four crosspoint cards. When another frame is added that also contains 512 x 512, each crosspoint card has one expansion input cable and one expansion output cable connected from every frame to every other frame.

To connect multiple frames, the following connections need to be made:

- I/O Signals—Each frame has 24 signal expansion connections, each forwarding up to 512 stereo or 1,024 mono input signals. Connections are made between each connected router. See [Signal Expansion Connections](#) on page 53.
- Router Control System—One router is connected directly to the router control system. Using control system expansion connections, control system connections are made between the connected routers. This enables the router control system to communicate with all routers through one router control system connection. See [Router Control System Expansion Connections](#) on page 61.

Depending on your switching configuration, each frame may have one, two, three or four crosspoint cards, up to 16 input cards, and up to 16 output cards. For more information about switching configurations, see [Switching Configurations](#) on page 7.

[Figure 1-24](#) shows the flow of signals between four connected routers. The signals are forwarded to the connected router through signal expansion connections.

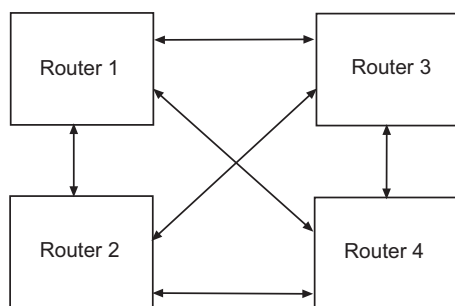


Figure 1-24. Frame Expansion Diagram



2. Installation

When setting up the NV7512 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 33.
- 2 Connect power being sure to install PS6000 modules *after* power is connected. See [Making Power Connections](#) on page 35.
- 3 Install backplanes in the appropriate rear slots. If reconfiguring, remove backplanes and reinstall in the newly desired slots. See [Installing Backplanes](#) on page 41.
- 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 42.
- 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 44.
- 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 connections, as needed, for the Quad Mix control panel. See [Making Quad Mix Control Panel Connections](#) on page 63.
- 8 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 64.
- 9 Make connections to signals acting as references for audio and video signals. If reconfiguring, verify that all necessary reference connections are made for the signals being routed. See [Making Reference Connections](#) on page 67.
- 10 Make connections between monitoring equipment and the monitor equipment to monitor the quality of signals being switched. See [Making Monitor Connections](#) on page 70.
- 11 Connect the alarm connection on the router to an external indicator. If reconfiguring, skip this step if alarm connections are still adequate. See [Making Alarm Connections](#) on page 71.
- 12 Install UniConfig. If reconfiguring, UniConfig does not need to be reinstalled. See the *UniConfig User's Guide*.

2. Installation

Package Contents

Package Contents

When your NV7512 products from NVISION arrive, immediately inspect the shipping container for any obvious damage. If the container is damaged, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

When unpacking the shipping container, look for the packing slip and compare it against the contents to verify that everything ordered was received. If anything is missing (or if equipment is damaged unrelated to shipping), please contact NVISION.

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

Note

The NV7512 has a separate power supply frame (NV6257).
--

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

Preparing for Installation

You will need the following items before getting started:

- A PC running Windows® 2000 or higher, or Windows XP Professional.® This PC is required only for system configuration.
 - PC hardware requirements:
 - CD drive
 - EIA-232 serial COM port (DE9) capable of operating at 38.4 kb/s.
 - 10BaseT or 10/100BaseT (preferred) Ethernet port.
 - 100 MB/s Ethernet switch with at least 4 ports.
 - RJ-45 connectors and Ethernet cables (category 5).
 - DE9 connectors EIA-232 serial cable.
 - DIN 1.0/2.3 connectors and 1855A Belden cables; tool for connecting DIN connectors.
 - 75 Ω connectors and 1694A Belden cables (for frame expansion).
 - 75 Ω BNC connectors and coaxial cables.
 - 50 Ω BNC connectors and coaxial cables.
 - Reference audio and video source at the line rate appropriate for your system.
 - Frame rack suitable for mounting the router and NV6257 power supply.

Rack Mount

The NV7512 and the NV6257 power supply, which provides power to the router, are designed to mount in a standard EIA 19" (482.6 mm) rack. Although it is not required that both the router and NV6257 power supply be mounted in the same rack, for simplicity this manual assumes only one rack frame is used.

How to rack mount the router and the NV6257 power supply

- 1 Determine the placement of the router frame and NV6257 power supply frame in the rack, and the rack in the facility. When placing the frames and rack, keep in mind the following requirements (For details, see [Mounting](#) on page 1):
 - The router requires 14 RUs of vertical space.
 - The NV6257 power supply requires 5 RUs of vertical space.
 - Be sure to locate the rack near an accessible AC source power outlet. The AC source is used to power the NV6257 power supply, which supplies power to the router.
 - To ensure proper cooling, leave space for unrestricted air flow through the front of the router and NV6257, and a minimum of six inches clearance at the rear where the cooling fans are located.
 - The router and NV6257 do not require space above or below and can be mounted one on top of the other. However, it is recommended that the NV6257 be installed near the bottom of the rack and the router higher up for easy access to router connections and cards.
- 2 Locate the NV6257 power supply frame.
- 3 If the NV6257 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 [Connecting One NV6257 to One Router](#) on page 36.

- 4 Lift the NV6257 frame into position and attach the NV6257 frame to the front of the rack with the appropriate screws. Be sure to leave room for the NV7512 frame to be mounted in the rack. Place screws in all frame mounting screw holes.
- 5 Locate the 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.

2. Installation

Rack Mount

- 7 If the router was shipped with the active cards (e.g., circuit boards) and fan trays in the frame, consider removing them to make the frame lighter for installation. If removing active cards, be sure to note which card was installed in which slot for later reinstallation.

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 2-1. The handle fits into the keyhole-shaped slots. These handles are used to lift the frame into position.

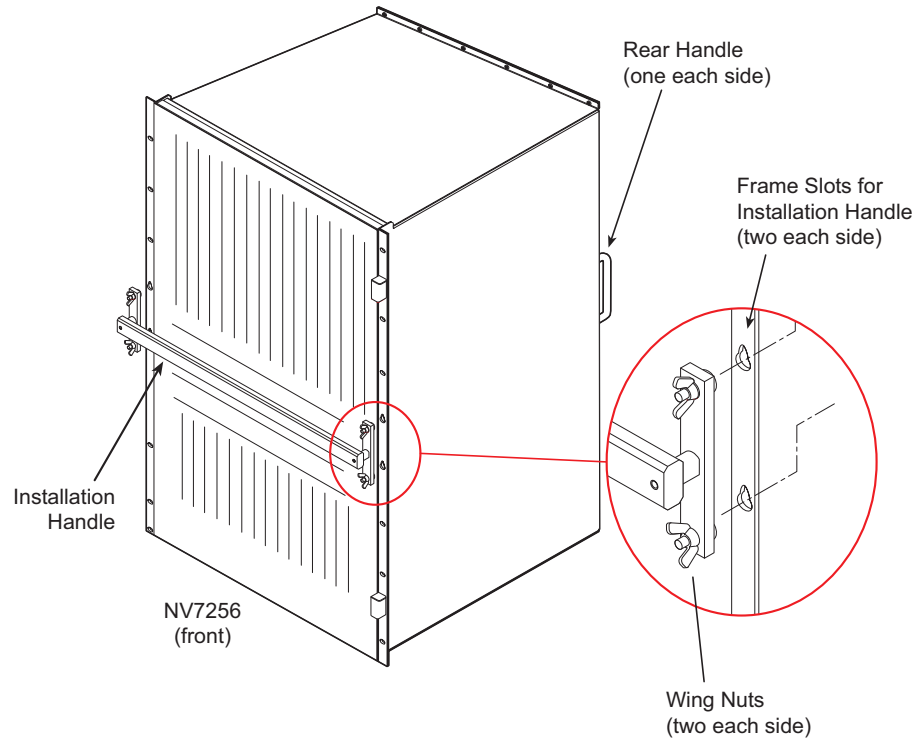


Figure 2-1. Frame Installation Handles, Front and Rear

- 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 router frame is considered too heavy for one person to lift and install in the rack.

- 10 Remove the temporary installation handles.
- 11 If not already installed, install the fan trays:
Locate the fan trays. There should be three.
Insert fan trays in the fan tray slots, located at the *top*, *right*, and *bottom* when facing the front of the router frame, as shown in Figure 1-3 on page 10. *Top* and *bottom* fan tray are installed right-side up. The *right* fan tray is installed with the top of the tray facing left.
- 12 Reinstall any previously removed active cards (circuit boards). Be sure to install them in the correct location. For installation instructions, see [Installing Backplanes](#) on page 41.
- 13 Reinstall the front door.

Making Power Connections

The power supply for the NV7512 router is mounted externally in a separate frame, the NV6257. The NV6257 uses the NVISION PS6000 power supply module. The NV7512 requires a minimum of two PS6000 power supply modules (plus two optional modules for redundancy). The NV6257 can house up to four PS6000 power supply modules (plus four optional modules for redundancy). One NV6257 can power two NV7512 routers. For more information, see [Power Supply](#) on page 2.

The connectors and cables used to connect the router to the NV6257 depend on whether one or two routers are being connected to the NV6257. All connectors and cables are provided by NVISION except for the “Y” monitoring cable. The following is a list of cables and connectors and corresponding part numbers:

- One NV7512 router—one WC0085 power supply cable and one WC0046 monitor cable.
- Two NV7512 routers—two WC0085 power supply cables and a “Y” monitor cable. NVISION does not supply this cable. For instructions on creating a “Y” cable, see [Creating a “Y” Cable](#) on page 40.

Follow the procedure that matches your router and power supply situation:

[Connecting One NV6257 to One Router](#) on page 36

[Connecting One NV6257 to Two Routers](#) on page 38

The NV7512 has 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 has two DB25 connections, located on the rear. One connection, labeled ‘Power Supply Monitor’ carries alarm and temperature signals to the router. This connection is connected at the same time the power connections are made. The other connection, labeled ‘Alarms’ presents isolated alarm signals that can be connected to an external alarm indicator. For information on connecting NV6257 alarms connections, see [Making Alarm Connections](#) on page 71.

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 be connected to a separate branch circuit. A wire bail can be used to hold the power cable in place to reduce the possibility of an accidental disconnect.

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

2. Installation

Making Power Connections

Connecting One NV6257 to One Router

How to connect a single NV6257 to a single router frame

Caution

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

- 1 Locate the power cords, PS6000 power supply modules, and cables supplied by NVISION.
- 2 If not already removed, remove all PS6000 power supply modules.
- 3 Facing the rear of the **NV6257**, connect the power supply cable (WC0085) to 'Output Power 1', as shown in Figure 2-2.

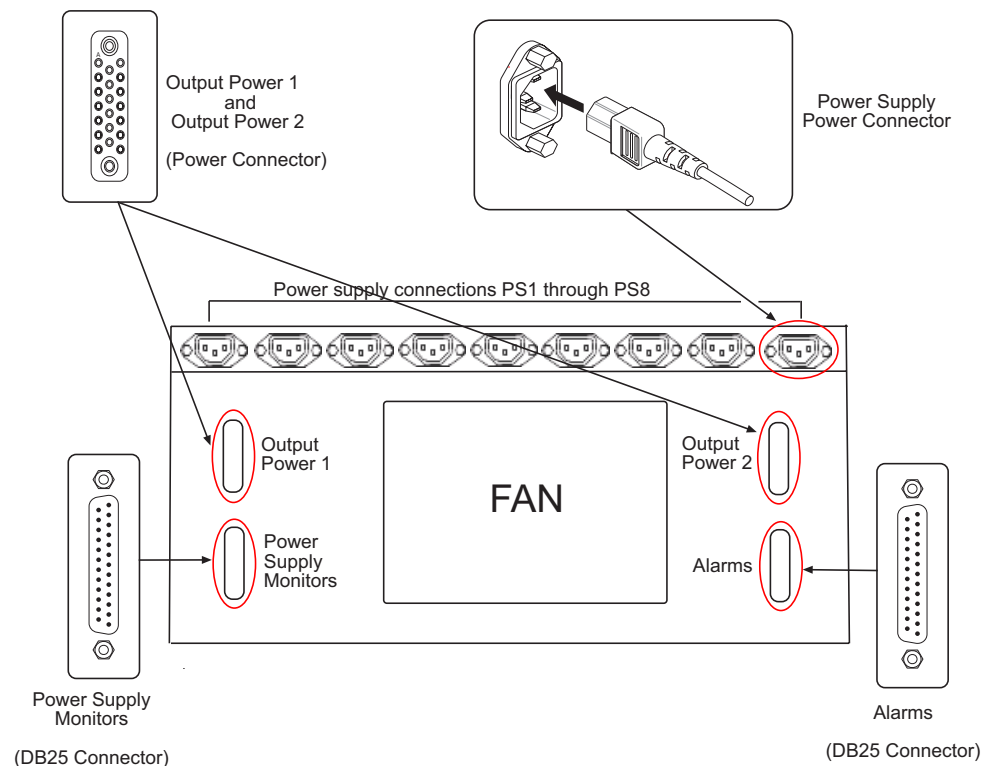


Figure 2-2. NV6257 Power Supply (Rear View)

2. Installation

Making Power Connections

- 4 Facing the rear of the **router**, connect the other end of the power supply cable to ‘POWER INPUT’, as shown in Figure 2-3.

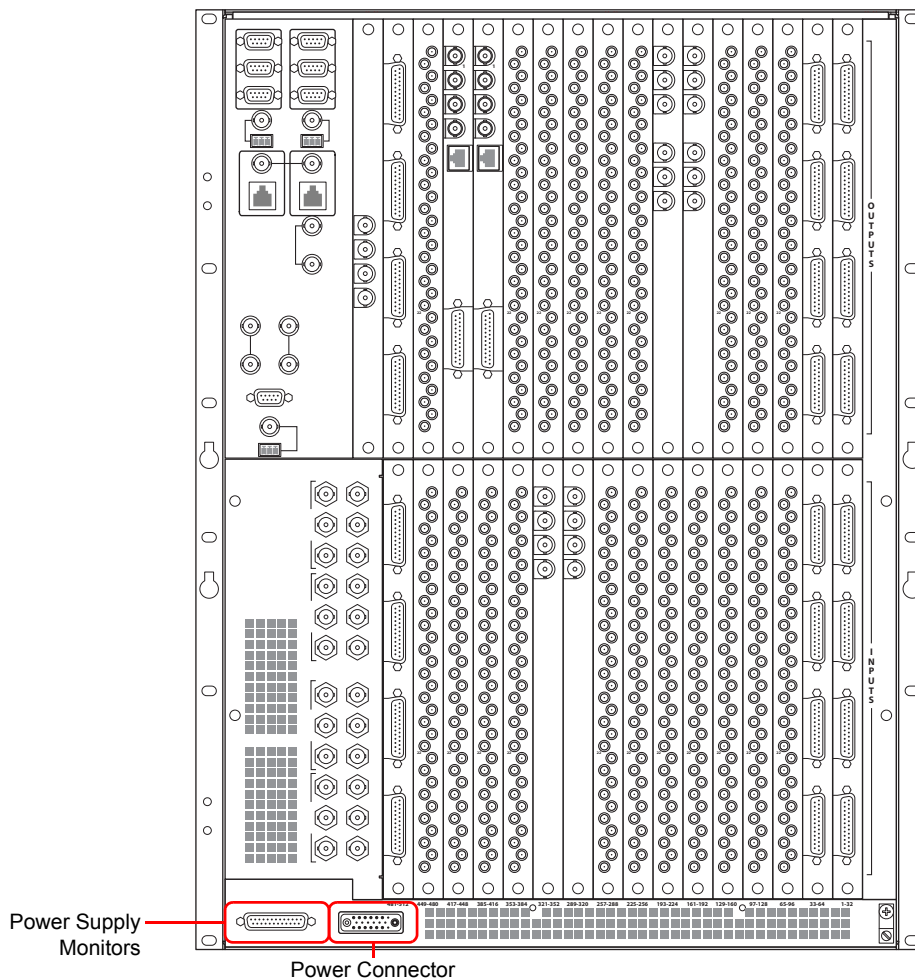


Figure 2-3. Location of Power Supply Monitor Connection

- 5 Facing the rear of the **NV6257**, connect one end of the monitor cable (WC0046) to the ‘Power Supply Monitors’ connection, as shown in Figure 2-2 on page 36.
- 6 Facing the rear of the **router**, connect the other end of the monitor cable to ‘POWER SUPPLY MONITORS’, as shown in Figure 2-3.
- 7 Facing the rear of the **NV6257**, connect power cords from an AC power source (90-130/180-230 VAC, 50/60Hz) into power connections *PS 1* through *PS 8*, as shown in Figure 2-2 on page 36. Connect one power cord for each PS6000 power supply module installed (see Step 8).
- 8 Install the PS6000 power supply modules as follows:
 - a Facing the front of the **NV6257**, install the primary PS6000 power supply modules in slots *PS 1* and *PS 3*, as shown in Figure 2-4 on page 38.

Note

The NV6257 fans are powered by slot *PS 1* or *PS 2*. A PS6000 power supply module must be installed in one of these slots.

2. Installation

Making Power Connections

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

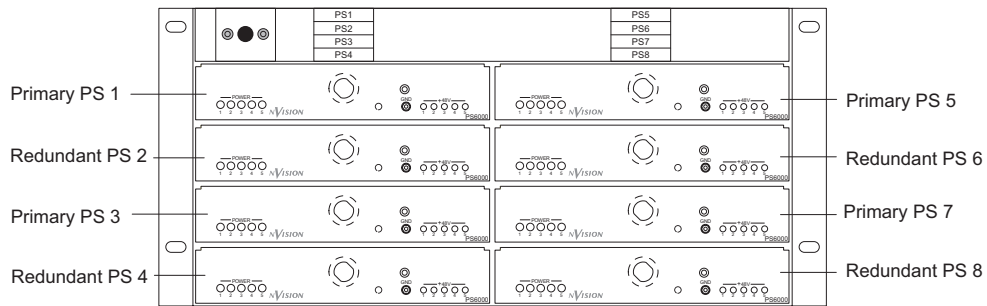


Figure 2-4. NV6257 Power Supply (Front View)

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

Connecting One NV6257 to Two Routers

When two routers are connected to one NV6257 power supply, different PS6000 power supply module slots (see Figure 2-4) provide power to one or the other of the two routers (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

To connect power to two routers from a single NV6257, two power supply cables (WC0085) are required, provided by NVISION.

To make monitor connections between one NV6257 and two NV7512 routers, you will need to create a “Y” cable. The “Y” cable has one central cable that branches into two cables, enabling one source to be connected to two destinations. For instructions, see [Creating a “Y” Cable](#) on page 40.

How to connect a single NV6257 to two router frames

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

- 1 Locate the power cords, PS6000 power supply modules, and cables supplied by NVISION.
- 2 If not already removed, remove all PS6000 power supply modules.
- 3 Create a “Y” cable. For instructions, see [Creating a “Y” Cable](#) on page 40.
- 4 Facing the rear of the **NV6257**, using one of the two power supply cables (WC0085), connect one end of the cable to ‘Output Power 2’, as shown in Figure 2-2 on page 36.

2. Installation

Making Power Connections

- 5 Facing the rear of the **first router** (Router 1), connect the other end of the power supply cable to 'POWER INPUT', as shown in Figure 2-3 on page 37.
- 6 Facing the rear of the **NV6257**, using the remaining power supply cable (WC0085), connect one end of the cable to 'Output Power 1', as shown in Figure 2-2 on page 36.
- 7 Facing the rear of the **second router** (Router 2), connect the other end of the power supply cable to 'POWER INPUT', as shown in Figure 2-3 on page 37.
- 8 Facing the rear of the **NV6257**, connect the "Y" cable to 'Power Supply Monitors', as shown in Figure 2-5.

Important

For Steps 8, 9 and 10 be sure to use the connector wired for the connection you are connecting to (see [Creating a "Y" Cable](#) on page 40).

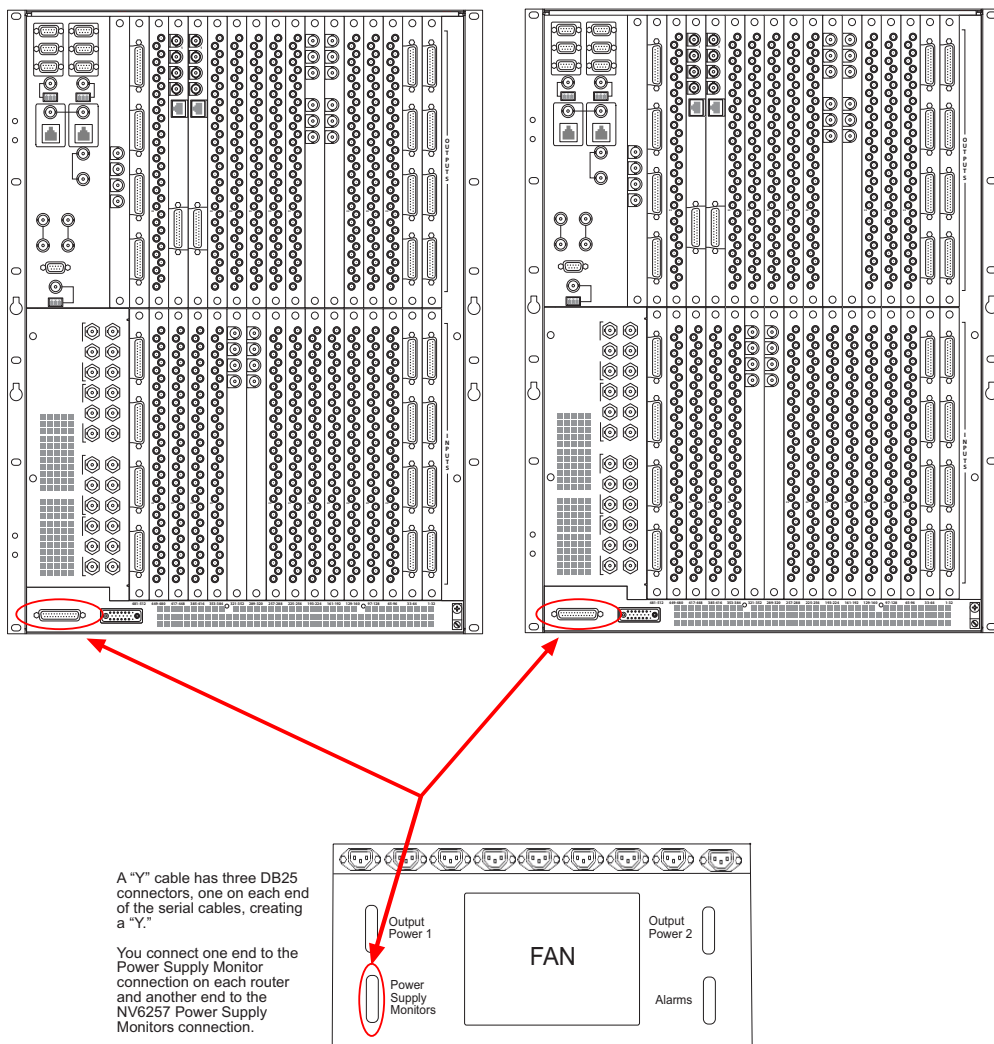


Figure 2-5. "Y" Cable Connecting Two Routers to a Single NV6257

- 9 Facing the rear of the **first router** (Router 1), connect one of the two remaining monitor "Y" cable connectors to 'POWER SUPPLY MONITORS', as shown in Figure 2-5.

2. Installation

Making Power Connections

- 10 Facing the rear of the **second router** (Router 2), connect the remaining monitor “Y” cable connector to ‘POWER SUPPLY MONITORS’, as shown in Figure 2-5 on page 39.
- 11 Facing the rear of the **NV6257**, connect a power cord from an AC power source (90–130/180–230 VAC, 50/60 Hz) into power connections *PS 1* through *PS 8*. Connect one power cord for each PS6000 power supply module installed (see Step 12).
- 12 Install the PS6000 power supply modules as follows:
 - a Facing the front of the **NV6257**, install the primary PS6000 power supply modules in slots *PS 1*, *PS 3*, *PS 5* and *PS 7*, as shown in Figure 2-4 on page 38.

Note

The NV6257 fans are powered by slot *PS 1* or *PS 2*. A PS6000 must be installed in one of these slots.
 - b (Optional) Facing the front of the **NV6257**, install redundant PS6000 power supply modules in slots *PS 2*, *PS 4*, *PS 6* and *PS 8*, as shown in Figure 2-3 on page 37.
- 13 Facing the rear of **each router** (Router 1, Router 2), connect each 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

A “Y” cable is needed to connect two router frames to a single NV6257. A “Y” cable is a cable that has one connector at one end, but then splits and has two separate connectors on the other end. NVISION does not supply this cable at this time.

To create a “Y” cable you need:

- Three male DB25 connectors
- Two standard PC printer cables (remove any 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 each connector be labeled according to its destination connection.

DB25 Pin	NV6257 Connector	Router 1 Connector	Router 2 Connector
20	PS_TACH	PS_TACH	PS_TACH
21	PS_ALARM1	PS_ALARM1	PS_ALARM5
19	PS_ALARM2	PS_ALARM2	PS_ALARM6
18	PS_ALARM3	PS_ALARM3	PS_ALARM7
17	PS_ALARM4	PS_ALARM4	PS_ALARM8
16	PS_ALARM5	NC	NC
15	PS_ALARM6	NC	NC
23	PS_ALARM7	NC	NC
22	PS_ALARM8	NC	NC
8	TEMP1	TEMP1	TEMP5
6	TEMP2	TEMP2	TEMP6
5	TEMP3	TEMP3	TEMP7

DB25 Pin	NV6257 Connector	Router 1 Connector	Router 2 Connector
4	TEMP4	TEMP4	TEMP8
3	TEMP5	NC	NC
2	TEMP6	NC	NC
10	TEMP7	NC	NC
9	TEMP8	NC	NC
11	GND	GND	GND
12	GND	GND	GND
13	GND	GND	GND
14	GND	GND	GND
25	GND	GND	GND
1	GND	GND	GND

NC = No Connect

Installing Backplanes

The NV7512 features backplanes that correspond to different signal types. Backplanes are inserted into empty slots in the back plate on the rear of the router. For a description of each backplane and the type of signal managed, see [Backplanes](#) on page 12.

How to install a backplane

- 1 Viewing the router frame from the rear, remove the plate that currently exists in the slot into which a backplane is being installed. Use a #1 Phillips 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 new backplane into the frame, applying gentle pressure to the backplane to ensure the connector is fully mated with the motherboard. Use a #1 Phillips screwdriver to tighten the two spring-loaded card retention screws.

Be sure to align the backplane 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.

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

2. Installation

Installing Active Cards

Installing Active Cards

The NV7512 router features several active cards that manage incoming signals, forward control system commands, perform signal switching, and distribute outgoing signals. Cards slide into a card guide such that the connectors on the rear of the card interface with the motherboard. Each card has two levers—one at the top and one at the bottom—that help eject the card for easy removal. For a description of each card, see [Active Cards](#) on page 20. Cards are held in place by pressure from the closed router door against the metal plate on the front of each card. All cards can be inserted and removed with the power on.

Installing I/O, Control, Crosspoint and Monitor Cards

Different combinations of input cards and output cards can be installed in a single router frame. For example, four AES synchronous input cards, 8 MADI input cards and four analog input cards. Be sure to install the appropriate input cards and output cards, and the correct number needed for your switching configuration. For information about signal types managed, see [Signal Types and Rates](#) on page 4. For information on each type of input card and output card available, see [Input Cards](#) on page 20 and [Output Cards](#) on page 26.

Input and output cards must match the backplane installed for that slot. For example, if the backplane installed for Slot 1 contains DIN 1.0/2.3 connectors for unbalanced AES signals, then the input card installed in Slot 1 must support unbalanced AES signals. For more information, see [Backplanes](#) on page 12.

If only one control card is being installed, an optional systems clock generator card may be installed to ensure system clock information backup. See [Installing a Systems Clock Generator \(Optional\)](#) on page 43.

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

How to install active cards

Caution

Do not drop, roughly handle, or stack active cards. If a card does not remove or insert easily, stop installation activities and contact NVISION Technical Support (see [Technical Support Contact Information](#) on page iii).

- 1 Facing the front of the router (door open), locate the control, input, crosspoint, and output card slots.
- 2 Insert each card into the router frame by sliding it into a card guide. On all cards, the metal plate on the front of the card should be facing outward.

Insert the card in designated slots only, as follows (see Figure 2-6 on page 43):

- Insert control cards in the two right-most *upper* bay slots. Locking levers are located at the top and bottom of each card.
- Insert input cards in the *lower* bay slots. Locking levers are located at the top and bottom of each card.
- Insert output cards in the *upper* bay slots. Locking levers are located at the top and bottom of each card.

2. Installation

Installing Active Cards

- Insert crosspoint cards in the horizontal center slots. Locking levers are located at the right and left edges of each card.
- Insert the optional monitor card in the *upper* bay slot between output card slot 16 and the secondary control card slot. Locking levers are located at the top and bottom of the card.

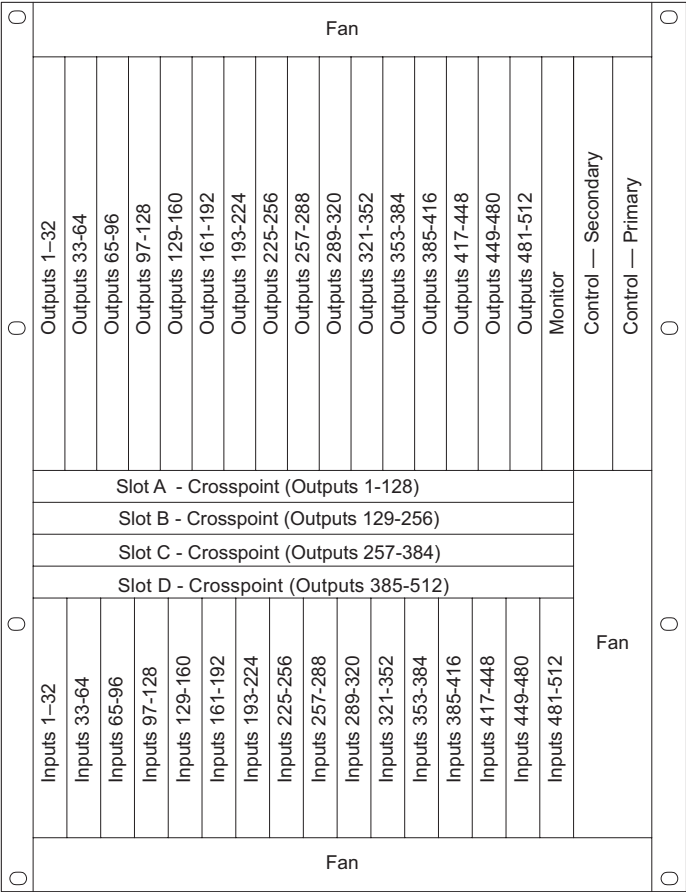


Figure 2-6. Active Module Locations (Front View)

- 3 Press each lever downward so that the lever is tucked into the channel at the edge of the shelf on the top and bottom. When the door is closed, pressure from the door ensures that the card is fully seated with the motherboard.
- 4 Reinstall and close the frame front door after all cards have been installed. The door must be closed for the router cooling system to work properly.

Installing a Systems Clock Generator (Optional)

The system clock is located on the control card. (See [Control Cards](#) on page 20.) This clock is critical and used by all input cards and output cards; if the clock fails, the router cannot route signals. As a preventive measure, a secondary (optional for redundancy) control card can be installed to act as a backup should the primary control card fail. If you do not want to install two control cards, an optional systems clock generator card (EM0414) can be installed in place of the secondary control card. The systems clock generator card ensures that in the event of a primary control card failure the system continues to receive clock information. However, the systems clock generator card only provides clock information and cannot take over control card tasks.

2. Installation

Making Signal Connections

How to install the systems clock generator card

- 1 Locate the secondary (redundant) control card slot, as shown in Figure 2-7.

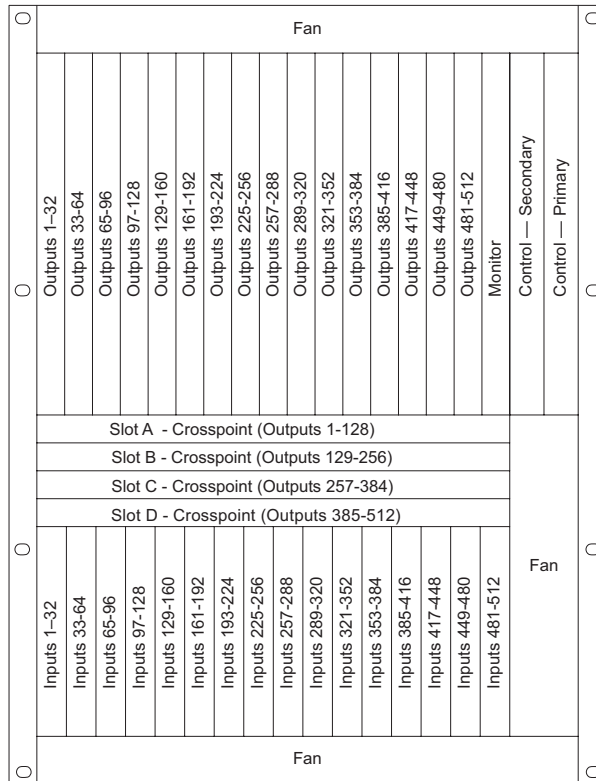


Figure 2-7. Location of Secondary Control Card (Front View)

- 2 Install the systems clock generator card into the slot.
- 3 Reinstall and close the frame front door after the card has been installed.

Note

For proper cooling, the frame must be operated with the door closed.

Making Signal Connections

In order for the NV7512 to properly route incoming and outgoing signals, the I/O connections on the rear of the router must be connected to cables that receive and distribute the signals. The NV7512 contains a maximum of 512 input connections and a maximum of 512 output connections. The total number of connections depends on the type of signals being routed and the corresponding backplane installed. (See [Backplanes](#) on page 12.)

If connecting two or more NV7512 routers together, additional signal expansion connections must also be connected. These connections enable the routers to send and receive signals between the connected routers. (See [Signal Expansion Connections](#) on page 53.)

Local Signal Connections

Signal connections differ depending on the signal being managed and the backplane installed. Follow the procedure for the type of signals being received or distributed:

- AES synchronous (both balanced and unbalanced). See [AES Synchronous Signals](#) on page 45.
- MADI synchronous (unbalanced). See [MADI Synchronous Signals](#) on page 47.
- Analog. See [Analog Signals](#) on page 49.
- Quad Mix. See [Quad Mix](#) on page 52.

AES Synchronous Signals

The NV7512 can route both balanced and unbalanced AES synchronous signals. Unbalanced signals are received and distributed through DIN 1.0/2.3 connections. Balanced signals are received and distributed through DB25 connections. The coaxial connections are housed on backplanes installed in the back plate. (See [Backplanes](#) on page 12).

For unbalanced signals, the backplane contains 32 DIN 1.0/2.3 connections labeled '1', '2' and so on up to '32'. For balanced signals, the backplane contains four DB25 connections labeled '1-4 Stereo', '5-8 Stereo', '9-12 Stereo' and '13-16 Stereo'. The labels correspond to the signal numbers assigned to signals passing through that connector. (See [Backplanes](#) on page 12).

NVISION recommends using the 1855A Belden cable for DIN 1.0/2.3 connections, however, alternative cable choices are available. For more information, see the *DIN 1.0/2.3 Coaxial Connectors Application Note* on the NVISION web site (www.nvision.tv).

2. Installation

Making Signal Connections

How to make AES signal connections

- 1 Locate the AES *input* connections at the rear of the router, as shown in Figure 2-8. Inputs are located in the lower half of the router frame. The exact location of the backplanes and corresponding connectors may be different depending on your router configuration.

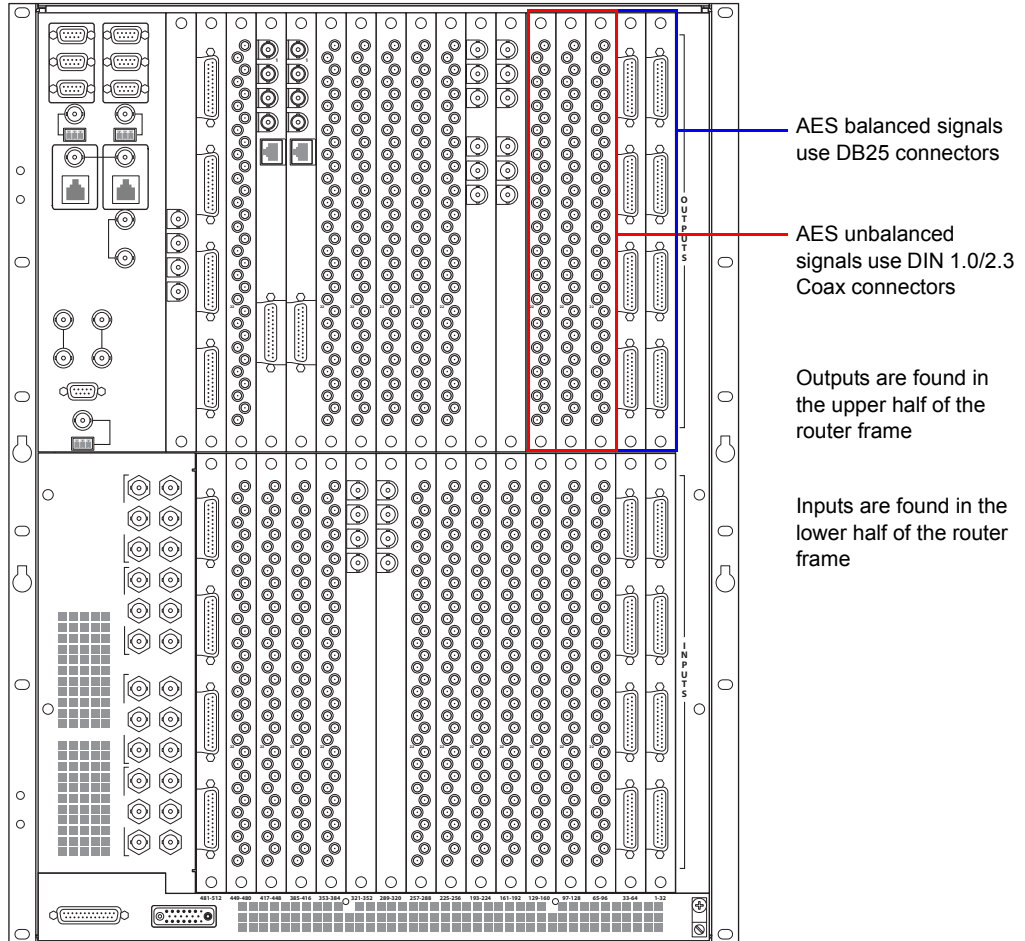


Figure 2-8. AES signal connections (Rear View)

- 2 For each input connection, connect using the connector and cable appropriate for the type of incoming signal:

For **AES unbalanced** signals, use a DIN 1.0/2.3 coax connector and 1855A Belden cable, or equivalent.

For **AES balanced** signals, use NVISION's breakout cable (NV5000-Cable1) or a DB25 connector and cable with custom wiring:

This table lists which the signal associated with each wire in the *breakout cable*:

Signal	Wire Number	Jacket Color (corresponds to wire number)
Left 1	1	Brown
Right 1	2	Red
Left 2	3	Orange
Right 2	4	Yellow

2. Installation

Making Signal Connections

Signal	Wire Number	Jacket Color (corresponds to wire number)
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 2-9. .

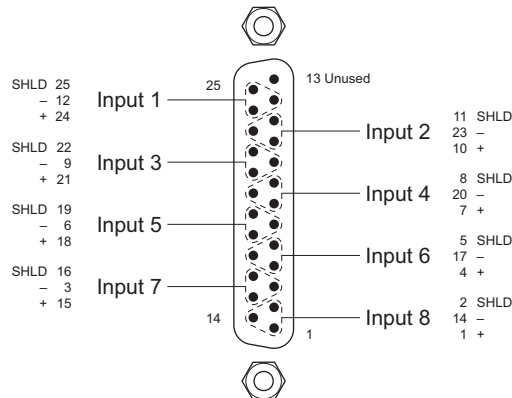


Figure 2-9. DB25 Pin Wiring

- 3 Connect the other end of the cable to the source of the signal.
- 4 Locate the AES *output* connections on the rear of the router, as shown in Figure 2-8 on page 46.
- 5 For each output connection, connect using the connector and cable appropriate for the type of outgoing signal as described in Step 2.
- 6 Connect the other end of the cable to the signal destination.
- 7 Make other signal connections for MADI signals (see), analog signals. See [MADI Synchronous Signals](#) on page 47, [Analog Signals](#) on page 49, or [Quad Mix](#) on page 52, as needed.
- 8 If connecting two or more NV7512 routers together, connect the signal expansion connections. (See Signal Expansion Connections on page 53.)

MADI Synchronous Signals

The NV7512 can manage MADI synchronous signals (unbalanced only). Signals are received and distributed through BNC connections housed on backplanes. (See [Backplanes](#) on page 12.) Only two of the BNC connectors are used for receiving and distributing MADI signals, labeled '1' and '2'. The remaining two BNC connectors are available to connect to a source of AES for reference. For more information, see [MADI Reference](#) on page 67.

2. Installation

Making Signal Connections

How to make MADI signal connections

- 1 Locate the MADI *input* connections at the rear of the router, as shown in Figure 2-10. Inputs are located in the lower half of the router frame. The exact location of the backplanes and corresponding connectors may be different depending on your router configuration.

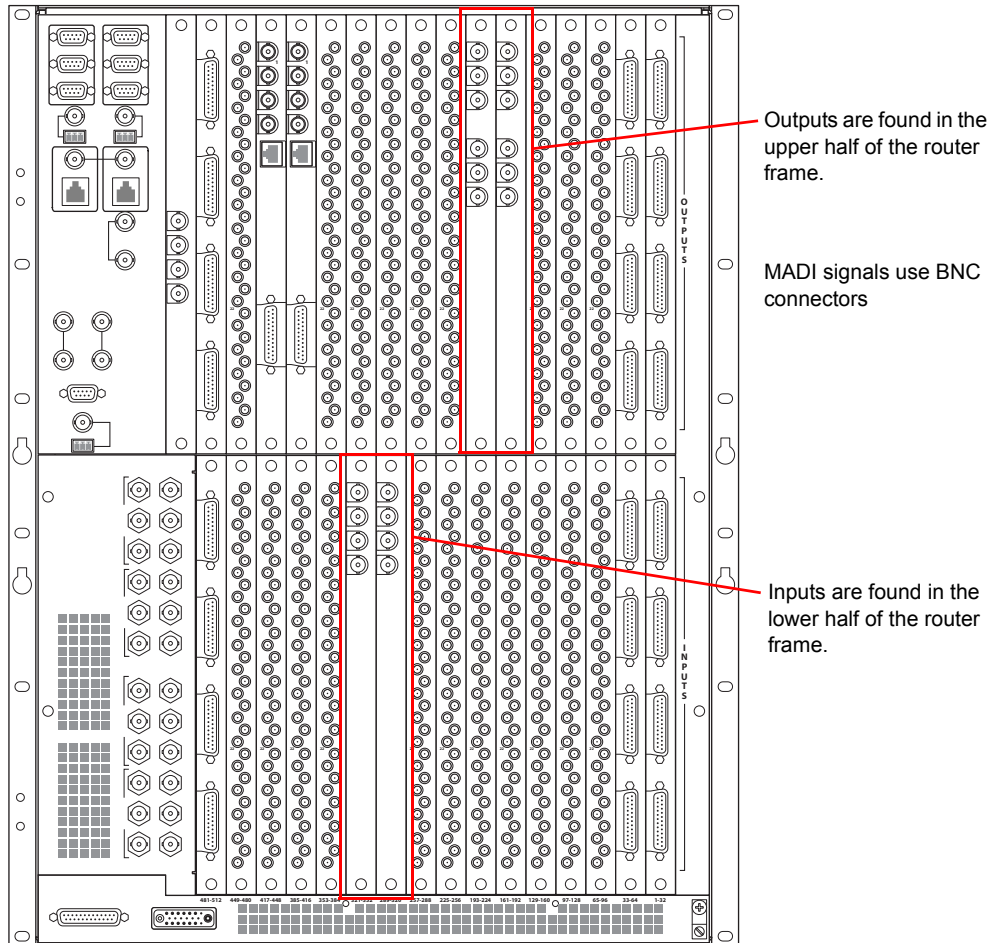


Figure 2-10. MADI Signal Connections (Rear View)

- 2 For each input connection—labeled ‘1’ and ‘2’—connect using a 75 Ω BNC connector and coaxial cable.
If two 32-channel, 24-bit MADI streams are being received, use both BNC connectors, one for each stream.
If one 64-channel, 24-bit MADI stream is being received, use one BNC connector.
The remaining BNC connectors, labeled ‘REF 1’ and ‘REF 2’, are available for connecting to a MADI reference source (see [MADI Reference](#) on page 67).
- 3 Connect the other end of the cable to the source of the signal.
- 4 Locate the MADI *output* connections on the rear of the router, as shown in Figure 2-10.
- 5 For each output connection, labeled ‘1’ and ‘2’, connect using a 75 Ω BNC connector and coaxial cable, as described in Step 2.
- 6 Connect the other end of the output connector and cable to the signal destination.
- 7 Make other signal connections for AES signals, analog signals. See [AES Synchronous Signals](#) on page 45, [Analog Signals](#) on page 49, or [Quad Mix](#) on page 52, as needed.

- 8 If connecting two or more NV7512 routers together, connect the signal expansion connections. (See [Signal Expansion Connections](#) on page 53.)

MADI Asynchronous Signals

MADI asynchronous signals can be managed by installing two Sample Rate Converter (SRC) sub-modules on the MADI input card. For more information, see [MADI Asynchronous Sample Rate Converter Sub-Module](#) on page 23.

Analog Signals

The NV7512 can route analog signals. Signals are received and distributed through DB25 connections, housed on backplanes. (See [Backplanes](#) on page 12.)

Each backplane contains four DB25 connectors. Each connector supports either stereo or mono signals:

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

The DB25 connections are labeled ‘1–4 Stereo’, ‘5–8 Stereo’, ‘9–12 Stereo’ and ‘13–16 Stereo’. The labels correspond to the signal numbers assigned signals passing through that connector (see [Backplanes](#) on page 12).

Analog signals are converted to digital (sample rate of 48kHz) for internal routing. (See [Analog](#) on page 23.) For proper conversion to occur, the system AES reference connection must be connected. For information on connecting the AES reference, see [AES Reference](#) on page 67.

Mono Signals

How the NV7512 switches mono signals is dependent upon the router control system. Before setting up analog signals, make sure that the router control system can manage mono signals. All signal number labeling on the router refers to stereo signals, not mono signals. In order to successfully install and implement cards receiving and distributing mono signals, great care should be taken to avoid confusion. For more information on mono signals and signal number labeling, see [Analog Signals and Signal Numbers](#) on page 11.

Gain, Mute Detection and Operating Levels

When receiving and distributing unbalanced analog 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 and is normal. Using a switch located on the analog audio input card, an additional 6dB of gain can be added to compensate for the drop. In addition, mute detection and operating levels can be set, ensuring a clearer audio signal. For instructions on setting gain, mute detection and operating levels, see [Setting Analog Gain, Mute Detection and Operating Levels](#) on page 87.

2. Installation

Making Signal Connections

How to make analog signal connections

- 1 Locate the analog *input* connections on the rear of the router, as shown in Figure 2-11. Inputs are located in the lower half of the router frame. The exact location of the backplanes and corresponding connectors may be different depending on your router configuration.

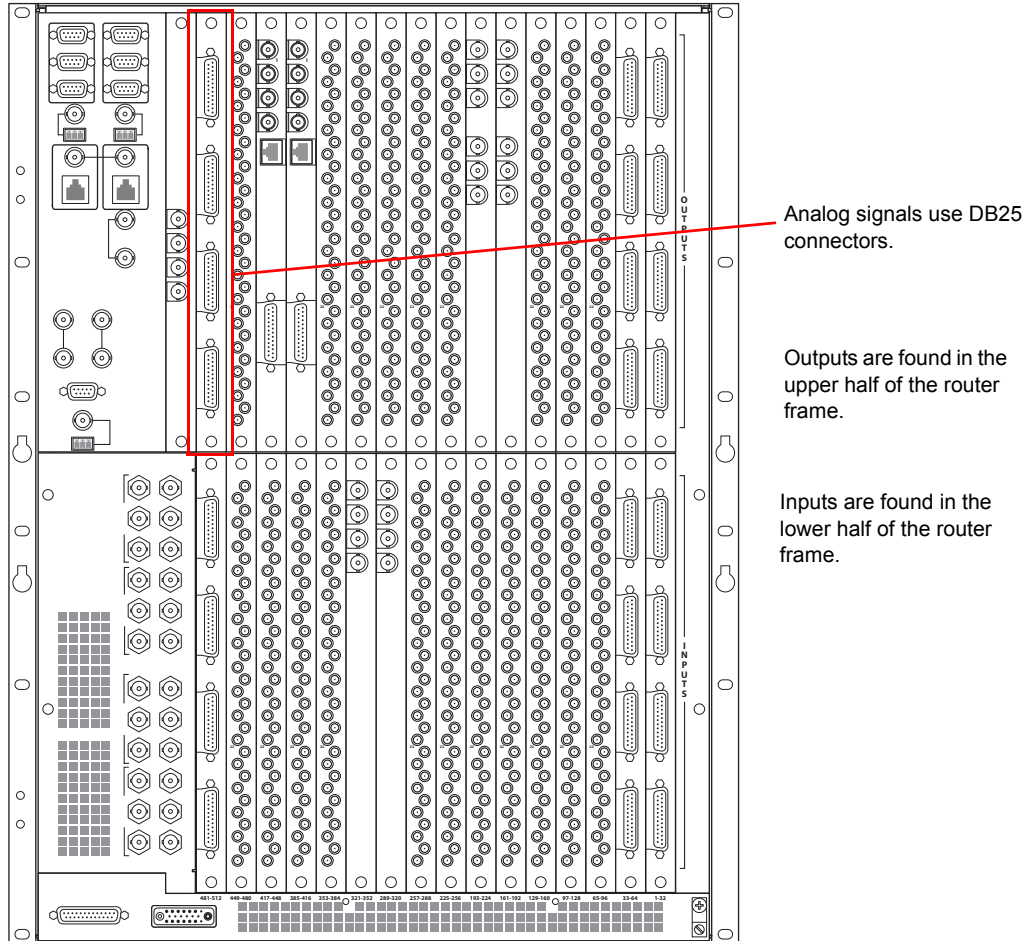


Figure 2-11. Analog Signal Connections (Rear View)

- 2 Make cable connections. The DB25 wiring is as follows:

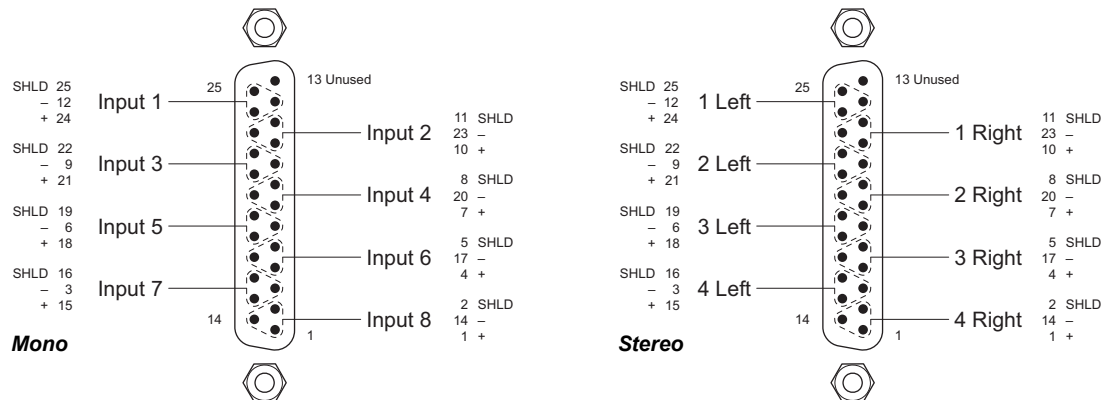


Figure 2-12. DB25 Pin Wiring

2. Installation

Making Signal Connections

An optional pre-made DB25 male to pigtail breakout cable is available from NVISION (NV5000-Cable1). The balanced wiring details for this cable are as follows:

Channel	Pair	Jacket Color	DB25 Connector Pin Number		
			Red (+)	Black (-)	GND
1 - Left	1	BROWN	24	12	25
1 - Right	2	RED	10	23	11
2 - Left	3	ORANGE	21	9	22
2 - Right	4	YELLOW	7	20	8
3 - Left	5	GREEN	18	6	19
3 - Right	6	BLUE	4	17	5
4 - Left	7	VIOLET	15	3	16
4 - Right	8	GRAY	1	14	2

Note: Pin 13 is not used.

For single-ended wiring, connect the signal or “hot” wire from the source to the “+” input and connect the common or “shield” wire from the source to the “-” input. Bridge the ground pin to the “-” pin:

Channel	DB25 Connector Pin Number	
	Signal	Common
1 - Left	24	12, 25
1 - Right	10	11, 23
2 - Left	21	9, 22
2 - Right	7	8, 20
3 - Left	18	6, 19
3 - Right	4	5, 17
4 - Left	15	3, 16
4 - Right	1	2, 14

Note: Pin 13 is not used.

- 3 Connect the other end of the cable to the source of the signal.
- 4 Locate the analog *output* connections on the rear of the router, as shown in Figure 2-11 on page 50.
- 5 For each output, connect using a DB25 connector and cable, wiring the connectors as described in Step 2.
- 6 Connect the other end of the cable to the signal destination.
- 7 Make other signal connections for AES signals, MADI signals. See [AES Synchronous Signals](#) on page 45, [MADI Synchronous Signals](#) on page 47, or [Quad Mix](#) on page 52, as needed.
- 8 If connecting two or more NV7512 routers together, connect the signal expansion connections. (See [Signal Expansion Connections](#) on page 53.)

2. Installation

Making Signal Connections

Quad Mix

Using the Quad Mix output card, the NV7512 can route both AES synchronous unbalanced signals and analog signals through a single backplane. (See [Quad Mix](#) on page 28.) The Quad Mix output card and Quad Mix backplane can be used in place of any other output card and related backplane.

AES synchronous unbalanced signals are distributed through four BNC connections, labeled '1', '2', '3', and '4' and one DB25 connector (not labeled) for analog signals. The coaxial connections are housed on the Quad Mix backplane installed in the back plate. (See [Backplanes](#) on page 12.)

The Quad Mix backplane also features a connection to the Quad Mix control panel, NV9660. The NV9660 is required to manage the Quad Mix output card functions. For more information on the NV9660 control panel, see [NVISION's NV9660 Quad Mix Control Panel](#) on page 98.

How to make Quad Mix connections

- 1 Locate the Quad Mix output connections at the rear of the router, as shown in Figure 2-13. Outputs are located in the upper half of the router frame. The exact location of the backplanes and corresponding connectors may be different depending on your router configuration.

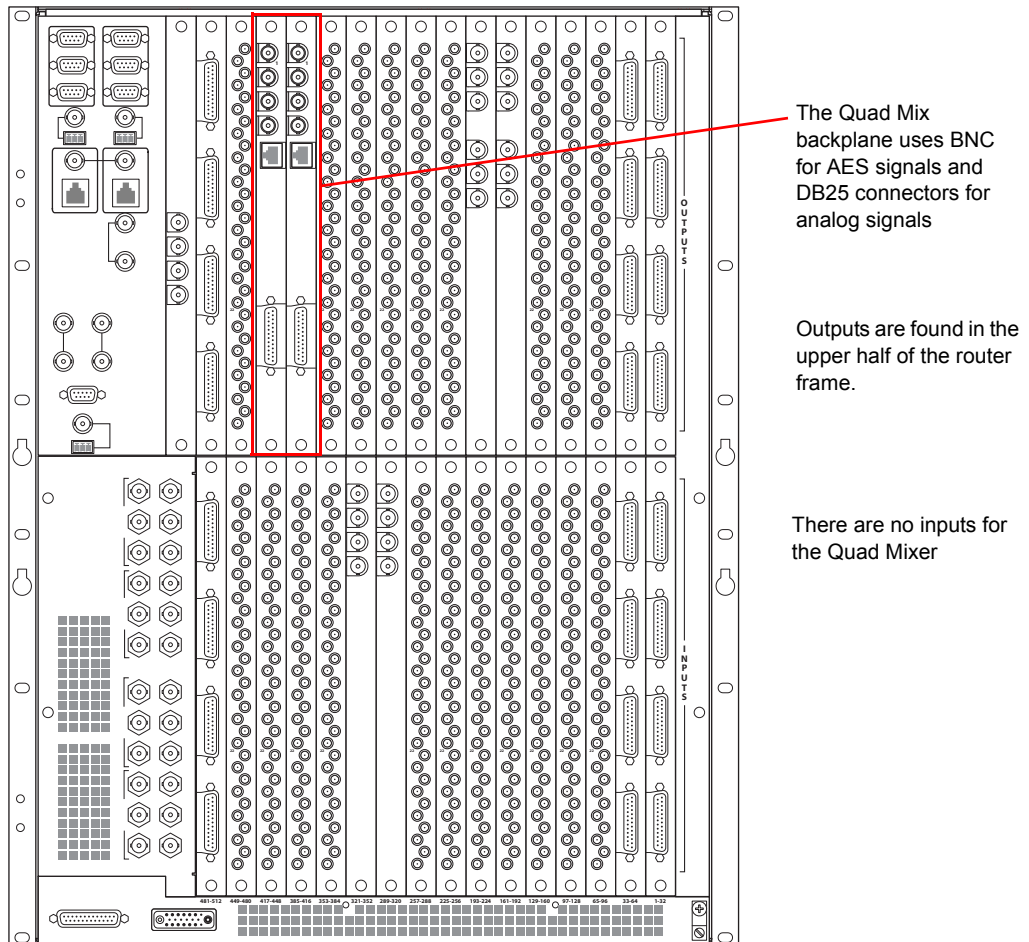


Figure 2-13. BNC and DB25 Connectors on Quad Mix Backplane (Rear View)

- 2 For **AES unbalanced** signals, use a 75 Ω BNC connector and coaxial cable.
- 3 Connect the other end of the cable to the signal destination.

2. Installation

Making Signal Connections

- 4 For **analog** signals, use NVISION's breakout cable (NV5000-Cable1) or a DB25 connector and cable with custom wiring:

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

Signal	Wire Number	Jacket Color (corresponds to wire number)
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 2-14.

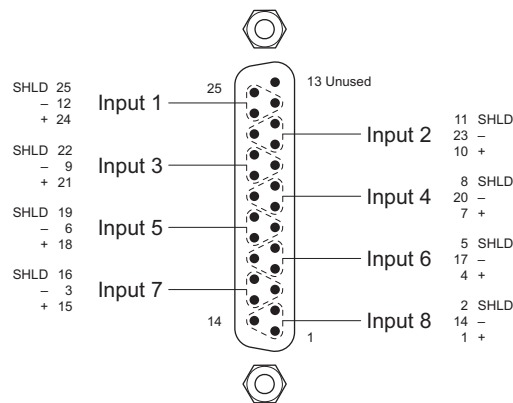


Figure 2-14. DB25 Pin Wiring

- 5 Connect the other end of the cable to the signal destination.
- 6 If connecting two or more NV7512 routers together, connect the signal expansion connections. (See [Signal Expansion Connections](#) on page 53.)

Signal Expansion Connections

Using the signal expansion connections, up to four NV7512 frames can be connected together to create a maximum switching matrix of 2048 inputs and 2048 outputs stereo (4096 inputs and 4096 outputs mono). The signal expansion connections transmit signals between the connected routers and feed the signals to the connected router's crosspoint cards. Connections are located on the rear of the router.

The NV7512 contains 24 signal expansion connections, located on the rear of the router. Signal expansion connections are divided into four sets; one for each crosspoint card. Each connection is labeled to correspond to a specific crosspoint card slot, as follows. (See [Crosspoint Card Slots and Outputs](#) on page 7.)

- XPT 1—The crosspoint card installed in the *top* slot: 'A'.
- XPT 2—The crosspoint card installed in the *center-top* slot: 'B'.

2. Installation

Making Signal Connections

- XPT 3—The crosspoint card installed in the *center-bottom* slot: ‘C’.
- XPT 4—The crosspoint card installed in the *bottom* slot: ‘D’.

Within each ‘XPT’ set, connections are labeled: ‘OUT 1’, ‘OUT 2’ and ‘OUT 3’, and ‘IN 1’, ‘IN 2’ and ‘IN 3’. Each ‘OUT’ and each ‘IN’ correspond to a segment of memory on the crosspoint card. For more information, see [Frame Expansion](#) on page 29. To connect two router frames together, you connect the ‘OUT’ connection on one router (Router 1) to the ‘IN’ connection on a second router (Router 2). One ‘OUT’ is connected to one ‘IN’ for each crosspoint card, as shown in Figure 2-16 on page 55.

The signal expansion connections use 75 Ω BNC connectors and Belden 1694A cable.

Note

The routers should be placed in close proximity; the cable has a maximum length of 100 feet (30 m).

How to make expansion signal connections

- 1 Locate the signal expansion connections on the rear of the router, as shown in Figure 2-15.

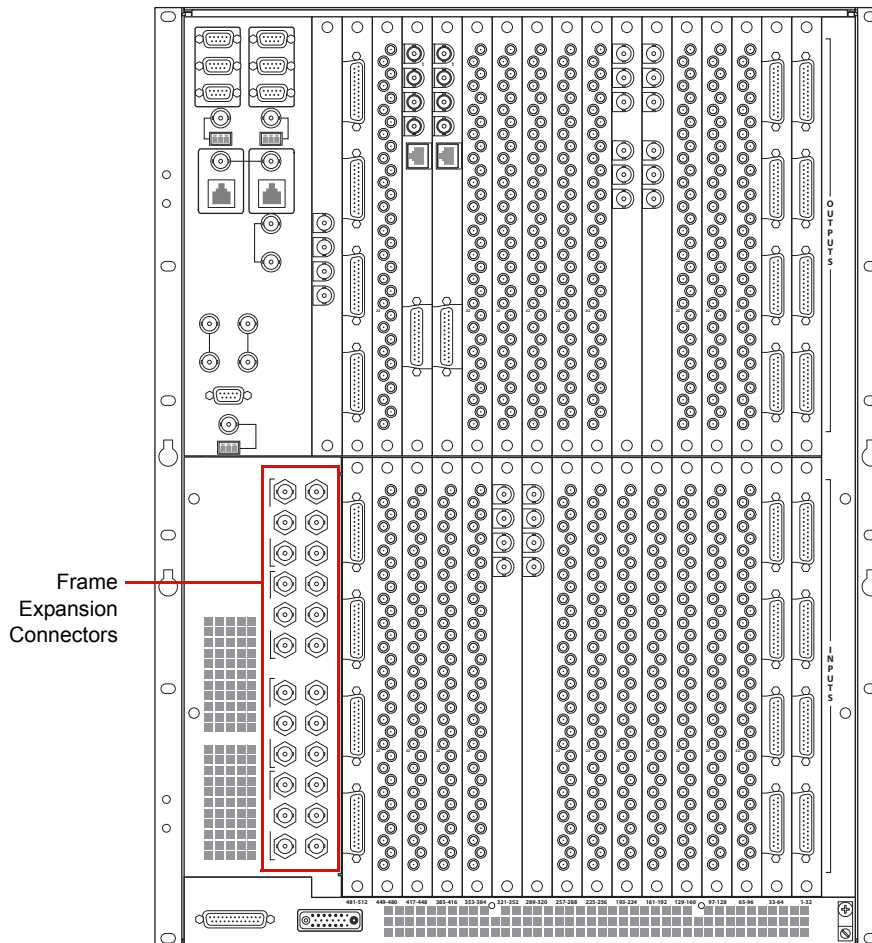


Figure 2-15. Signal Expansion Connections (Rear View)

2. Installation

Making Signal Connections

2 Locate the expansion connections labeled ‘XPT 1’ on each router frame being connected.

First, connect to the signal expansion connections on each frame, looping serially from one frame to the next, as shown in Figure 2-16. Connect each ‘OUT’ expansion connector to the corresponding ‘IN’ connector on the next router. Similarly, connect each ‘IN’ expansion connector to the corresponding ‘OUT’ connector on the next router. For example, on Router 1, ‘OUT 1’ is connected to ‘IN 1’ on Router 2. For another example, see Figure 2-18 on page 57.

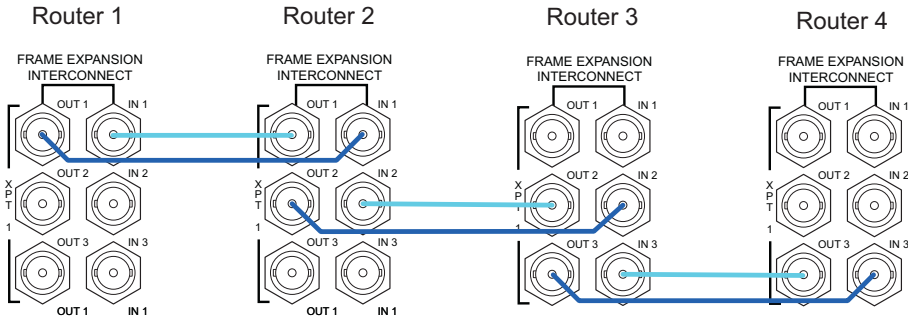


Figure 2-16. Frame Interconnections — First Set of Connections

Next, connect to the signal expansion connections on each frame, looping serially from one frame to the next, as shown in Figure 2-17.

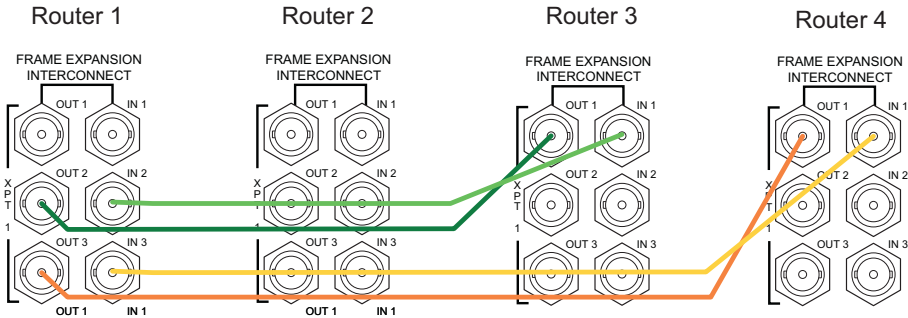


Figure 2-17. Frame Interconnections — Second Set of Connections

Use the following table as a reference when making signal expansion connections. Each set of ‘IN’ and ‘OUT’ connections are divided into sets that correspond to a crosspoint card: ‘XPT 1’, ‘XPT 2’, ‘XPT 3’ and ‘XPT 4’. The ‘IN’ and ‘OUT’ numbers correspond to the numbers listed next to each signal expansion connector. (See Figure 2-18 on page 57.)

The following table lists each connection by whether it is an ‘IN’ or ‘OUT’ connection, then the crosspoint card number (1, 2, 3 or 4) and lastly the ‘IN’ or ‘OUT’ number (1, 2 or 3). For example, in the Router 1 column, ‘IN 2-1’ represents the connector in the ‘XPT 1’ section labeled ‘IN 2’. Similarly, ‘OUT 4-1’ represents the connector labeled ‘OUT 1’ in the ‘XPT 4’ section.

Router 1	Router 2	Router 3	Router 4
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		

2. Installation

Making Signal Connections

Router 1	Router 2	Router 3	Router 4
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		
	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

2. Installation

Making Router Control System Connections

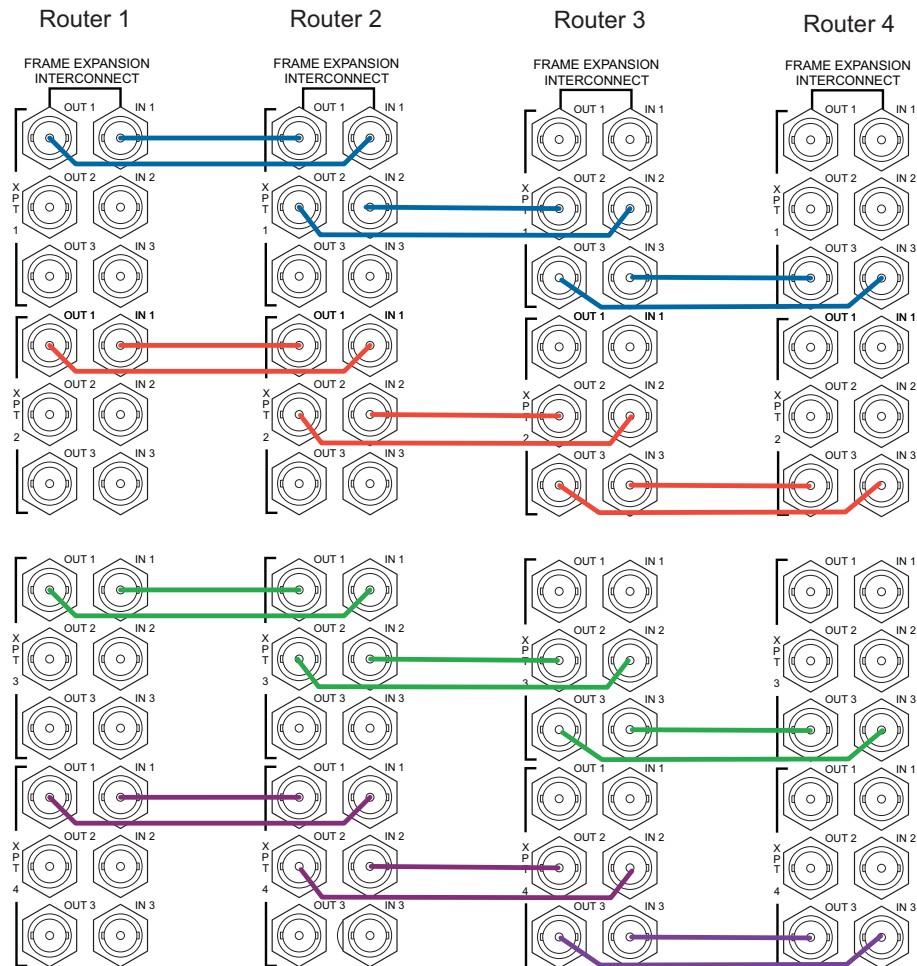


Figure 2-18. Frame Interconnections

3 **Important!** Terminate all unused signal expansion connectors using a 75 Ω BNC terminator.

Making Router Control System Connections

To manage signal switching in the NV7512, connections need to be created between the router control system, UniConfig and the router.

If connecting two or more NV7512 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 additional, connected routers. This enables the router control system to communicate with all routers through the primary router. (See [Router Control System Expansion Connections](#) on page 61.)

The router and the router control system cannot communicate until the port through which the control system connection is made is initialized. For more information, see the *UniConfig User's Guide*.

2. Installation

Making Router Control System Connections

Local Router Control Connections

Local router connections connect the current, local router to the router control system.

The router control system may use one of these connections:

- Serial Control—Use to connect to third-party router control systems requiring a serial control connection. (See [Serial Router Control Connections](#) on page 58.)
- Ethernet—Use to connect to the NVISION NV9000 router control system and to create network connections. (See [Ethernet Router Control Connections](#) on page 59.)
- GSC Node Bus—Use to connect to third-party router control systems requiring a GSC Node Bus connection. (See [GSC Node Bus Router Control Connections](#) on page 60.)

Serial Router Control Connections

Serial router 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 NVISION NV9000 control system, it is recommended that an Ethernet connection is used instead. (See [Ethernet Router Control Connections](#) on page 59.)

Serial control connections use SMPTE 207M DE9 connectors and serial (RS-422/489) cable. For a detailed description of the serial control connections, see [Serial Connections](#) on page 16.

How to make a serial connection to the router control system

Locate the serial control connections on the rear of the router, as shown in Figure 2-19. Serial control connections are labeled ‘PRI CTRL’ for the primary control card and ‘SEC CTRL’ for the secondary control card.

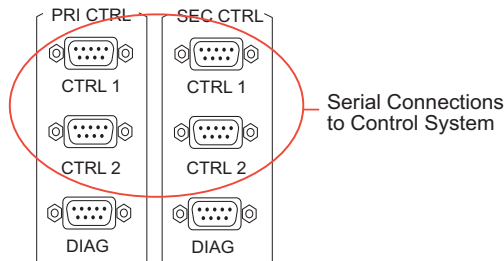


Figure 2-19. Serial Connections to Router Control System (Rear View)

- 4 Connect to the ‘CTRL 1’ connection in the ‘PRI CTRL’ section using a DE9 connector and serial cable.

2. Installation

Making Router Control System Connections

- 5 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:

Router Control System 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

- 6 If a secondary control card (optional for redundancy; see [Serial Connections](#) on page 16) is installed, connect to the 'CTRL 1' connection in the 'SEC CTRL' section as described in Step 2 and Step 3.
- 7 If an alternate router control system (e.g., for redundancy or dual control) is being used, make connections as follows:
- Connect to the 'CTRL 2' connection in the 'PRI CTRL' section using a DE9 connector and serial cable.
 - Connect the other end of the serial cable to the *secondary* router control system using a DE9 connector, wiring the connector as described in Step 3.
 - Connect to the 'CTRL 2' connection in the 'SEC CTRL' section using a DE9 connector and serial cable.
 - Connect the other end of the serial cable to the *secondary* router control system using a DE9 connector, wiring the connector as described in Step 3.
- 8 If two NV7512 routers are being connected together, connect the control system expansion connections. See [Router Control System Expansion Connections](#) on page 61.

Or

If the NV7512 is being used as a standalone router, install 50 Ω BNC terminators on the control system expansion connections.

Ethernet Router Control Connections

Ethernet router control connections connect the router to the router control system using Ethernet connectors. Ethernet connections are helpful if the PC running the router control system is going to be on a network. An Ethernet connection is recommended for the NVISION NV9000 router control system. The Ethernet ports are shared by the primary and secondary control cards. For a detailed description of the Ethernet connections, see [System Connections](#) on page 15.

In order for the router to communicate with the router control system through an Ethernet connection, an IP address for the router needs to be set in the control card. For more information, see the UniConfig User's Guide.

The Ethernet connections use RJ-45 connectors and CAT5, or better, cable. The Ethernet port is 10/100baseT.

2. Installation

Making Router Control System Connections

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 2-20. Ethernet control connections are labeled '10/100baseT'.

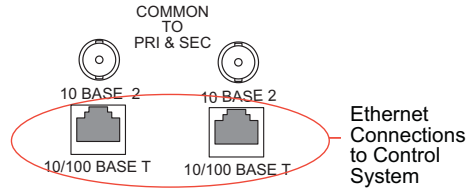


Figure 2-20. Ethernet Connections to Router Control System (Rear View)

- 2 Connect to either '10/100baseT' connection using a RJ45 connector and Cat5, or better, cable.
- 3 Connect the other end of the Ethernet cable to the primary router control system PC.
- 4 If a secondary (optional for redundancy; see [Control Cards](#) on page 20) control card is installed, connect to the remaining '10/100 BASE T' connection using a RJ45 connector and Cat5, or better, cable
- 5 Connect the other end of the second Ethernet cable to the redundant router control system PC.
- 6 If two NV7512 routers are being connected together, connect the control system expansion connections. See [Router Control System Expansion Connections](#) on page 61.

Or

If the NV7512 is being used as a standalone router, install 50Ω BNC terminators on the control system expansion connections.

GSC Node Bus Router Control Connections

Some third-party router control systems require a GSC Node Bus connection to connect the router to the router control system. The NV7512 has one GSC Node Bus connection, labeled 'NODE BUS', which is shared by both the primary and secondary control cards. For a detailed description of the GSC Node Bus connection, see [GSC Node Bus Connections](#) on page 17.

To use the GSC Node Bus connection, an optional module must be installed on each control card. For details, contact NVISION.

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 2-21. The GSC Node Bus connection is labeled 'NODE BUS'.



Figure 2-21. GSC Node Bus Connection to Control System (Rear View)

- 2 Connect to the 'NODE BUS' connection using a 75 Ω BNC connector and coaxial cable.
- 3 Connect the other end of the coaxial cable to the router control system.
- 4 On all unused GSC Node Bus connections, be sure to terminate the loop-thru by installing a 75 Ω BNC terminator.
- 5 If two NV7512 routers are being connected together, connect the control system expansion connections. See [“Router Control System Expansion Connections” on this page](#).

Or

If the NV7512 is being used as a standalone router, install 50 Ω BNC terminators on the control system expansion connections.

Router Control System Expansion Connections

Router control system expansion connections enable up to four connected NV7512 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 connected routers. This enables the router control system to manage all connected routers through the primary router connection. Because up to four routers can be connected together, this procedure refers to each router as Router 1 for the *primary* router, Router 2 for the second router, Router 3 for the next router being connected, and Router 4 for the final router frame being connected.

The control system expansion connections are labeled '10 Base 2' and use 50 Ω BNC connectors and Cat3, or better, coaxial cable. The BNC terminator is supplied by NVISION (1211598).

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 2-22. The connections are labeled '10 BASE 2'.

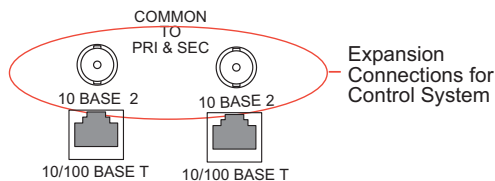


Figure 2-22. Ethernet Expansion Connections to Control System (Rear View)

2. Installation

Making Router Control System Connections

- 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, as shown in Figure 2-23.

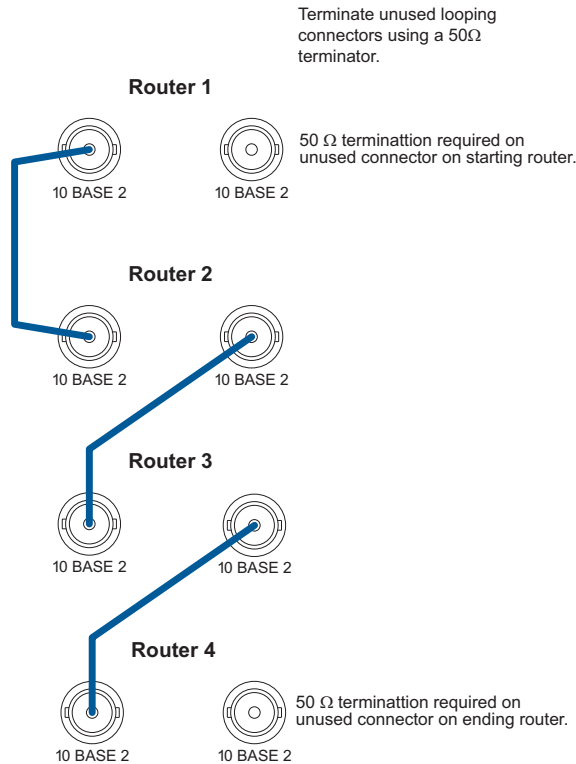


Figure 2-23. Control System Expansion Connections Between Routers

- 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 2-23.
- 4 On **Router 2**, connect to the *right* '10 BASE 2' connection using a 50Ω BNC connector and coaxial cable, as shown in Figure 2-23 on page 62.
- 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 2-23 on page 62.
- 6 On **Router 3**, connect to the *right* '10 BASE 2' connections using a 50Ω BNC connector and coaxial cable, as shown in Figure 2-23 on page 62.
- 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 2-23 on page 62.
- 8 On **Router 4**, connect to the *right* '10 BASE 2' connections using a 50Ω BNC terminator (NVISION part 1211598).

2. Installation

Making Quad Mix Control Panel Connections

9 **Important!** Terminate any unused control system expansion connections using 50Ω BNC terminators.

Locate the control system expansion connections on the rear of the router, as shown in Figure 2-24. The connections are labeled '10 B 2'.

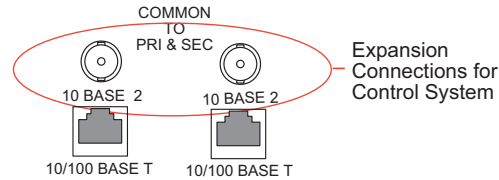


Figure 2-24. Expansion Connections to Control System (Rear View)

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

Making Quad Mix Control Panel Connections



Figure 2-25. Quad Mix Backplane

The Quad Mix output card and the Quad Mix backplane can distribute AES synchronous unbalanced signals and analog signals. See [Quad Mix](#) on page 28. The Quad Mix output card is controlled using the Quad Mix control panel (NV9660). In order to use the NV9660, the Quad Mix backplane on the router must be connected to the NV9660. See [NVISION's NV9660 Quad Mix Control Panel](#) on page 98.

The Quad Mix backplane features an Ethernet port used to connect to the NV9660. See [Backplanes](#) on page 12. The Ethernet connection uses a RJ45 connector and Cat5, or better, cable. The Ethernet port is 10/100 B T.

How to make Quad Mix control panel connections

- 1 Locate the Ethernet port on the rear of the Quad Mix backplane, as shown in Figure 2-25. The connection is labeled '10/100 B T'
- 2 Connect to the '10/100 B T' connection using a RJ45 connector and Cat5, or better, cable.
- 3 Connect the other end of the Ethernet cable to the Quad Mix control panel (NV9660).

2. Installation

Making Diagnostic Connections

Making Diagnostic Connections

The diagnostic connections enable the NV7512 to communicate with the UniConfig application. UniConfig is installed on hardware (e.g., a PC), separate from the router, and is used to perform system setup tasks, and configure and monitor the router. (See [Configuration](#) on page 85.) For information about using UniConfig, see the UniConfig User's Guide.

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 diagnostic connections, see [Diagnostic Connections](#) on page 17.

Temporarily Connecting to UniConfig

A temporary connection is created through the DE9 port located on the front of the primary control card. (See [Control Cards](#) on page 20.) The settings for this connection are RS-232, DTE, 9600 baud, 8 data bits, no parity.

How to make a temporary diagnostic connection

- 1 Locate the primary control card slot, as shown in Figure 2-26. When facing the front of the router, the control cards are located in the upper, right-hand section.

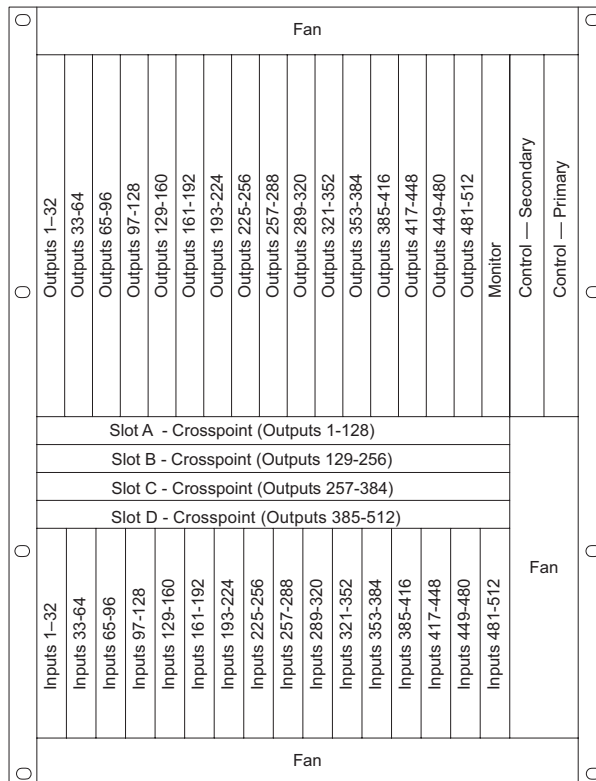


Figure 2-26. Location of Primary Control Card (Front View)

2. Installation

Making Diagnostic Connections

- 2 On the front of the control card, connect to the DE9 connection using a DE9 connector and a serial cable set for EIA-232.

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

Hardware End	Pins	Router End
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 hardware running the UniConfig application using a DE9 connector (see the UniConfig User's Guide).
- 4 Using UniConfig, initialize the router control system connection. For instructions, see the UniConfig User's Guide.
- 5 When done configuring, remove the temporary connection.

Permanently Connecting to UniConfig

There are two diagnostic ports located on the rear of the router, labeled 'DIAG'. The diagnostic ports default to 38400 baud, RS-232, but can be set to RS-422 using UniConfig. For more information, see the UniConfig User's Guide.

How to make a permanent diagnostic connection

- 1 Locate the diagnostic connections on the rear of the router, as shown in Figure 2-27. The diagnostic connections are labeled 'DIAG'.

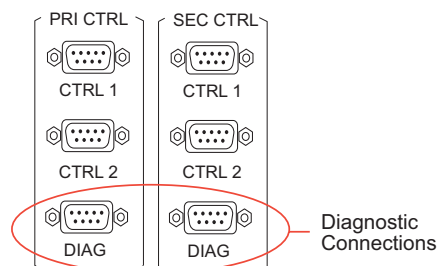


Figure 2-27. Diagnostic Connections (Rear View)

2. Installation

Making Diagnostic Connections

- 2 Connect to the 'DIAG' connection in the 'PRI CTRL' section using a DE9 connector and a serial cable. The ports are set for RS-232:

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

Hardware End 9-Pin Signal	Pins	Router End 9-Pin Signal
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:

Hardware 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 hardware running the UniConfig application.
- 4 If a secondary control card is installed (optional for redundancy), connect to the 'DIAG' connection in the 'SEC CTRL' section using a DE9 connector and a serial cable as described in Step 2 and Step 3. (See [Control Cards](#) on page 20.)

Making Reference Connections

The NV7512 provides timing reference connections for AES, MADI and video signals. Reference connections provide a reference input for aligning incoming signals within the router.

AES Reference

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 locations on the control card. (See [Control Card Jumper Settings](#) on page 85.)

The NV7512 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 18.

How to make AES reference connections

- 1 Locate the AES reference connections on the rear of the router, as shown in Figure 2-28. AES reference connections are labeled 'AES REF 1' and 'AES REF 2'.

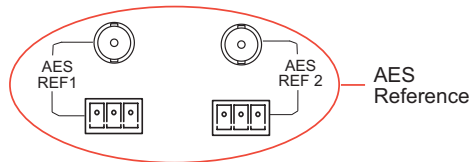


Figure 2-28. AES Reference Connection (Rear View)

- 2 Connect to the 'AES REF1' connection using the connector and cable appropriate for the reference signal type:
 - For AES unbalanced signals, use a 75 W BNC connector and coaxial cable.
 - For AES balanced signals, use an 110 W Phoenix connector and twisted pair cable.
- 3 Connect the other end of the cable to a stable source of 48kHz AES audio signals.
- 4 For resiliency, 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 48kHz AES audio signals.

MADI Reference

MADI reference connections are used when incoming MADI signals are at a different sample rate than the AES reference (sample rate 48kHz). If no MADI reference is detected, the MADI signal is locked to the AES reference sample rate. If a MADI reference is detected, the signal is locked to the MADI reference sample rate.

The MADI reference provides the sample rate that drives a Sample Rate Converter sub-module on the MADI input card used for asynchronous MADI signals (see [MADI \(Unbalanced\)](#) on page 22). If a Sample Rate Converter sub-module is installed, the MADI reference connections must be connected. (See [MADI \(Unbalanced\)](#) on page 22.)

2. Installation

Making Reference Connections

'REF 1 IN' and 'REF 2 IN' connections are not currently supported. The 'REF 1 OUT' and 'REF 2 OUT' connections are used as two AES reference outputs. Each MADI channel is supplied with an AES reference. This signal tells the downstream equipment at what rate the MADI audio is encoded. Clocks that are synchronous to the encoded audio can be extracted out of the AES reference. Without this reference, the downstream receiver has no way of knowing if the audio sampling rate is at 44.1kHz, 48kHz, and so on. There are two reference outputs because the DIP switch selections allow for up to four channel allocation possibilities. (See [Setting MADI Channels](#) on page 92.) Three of these possibilities are to output two different MADI channels, therefore there is an AES output for each.

The MADI reference connections are installed as a separate backplane and require a stable source of 48kHz AES audio signals. (See [Installing Backplanes](#) on page 41.)

How to make MADI reference connections

- 1 Locate the MADI reference connections on the *MADI inputs* backplane on the rear of the router, as shown in Figure 2-29). Reference connections are located on backplane housing the MADI signal connections. Inputs are located in the lower half of the router frame. The exact location of the backplane may differ depending on your configuration.

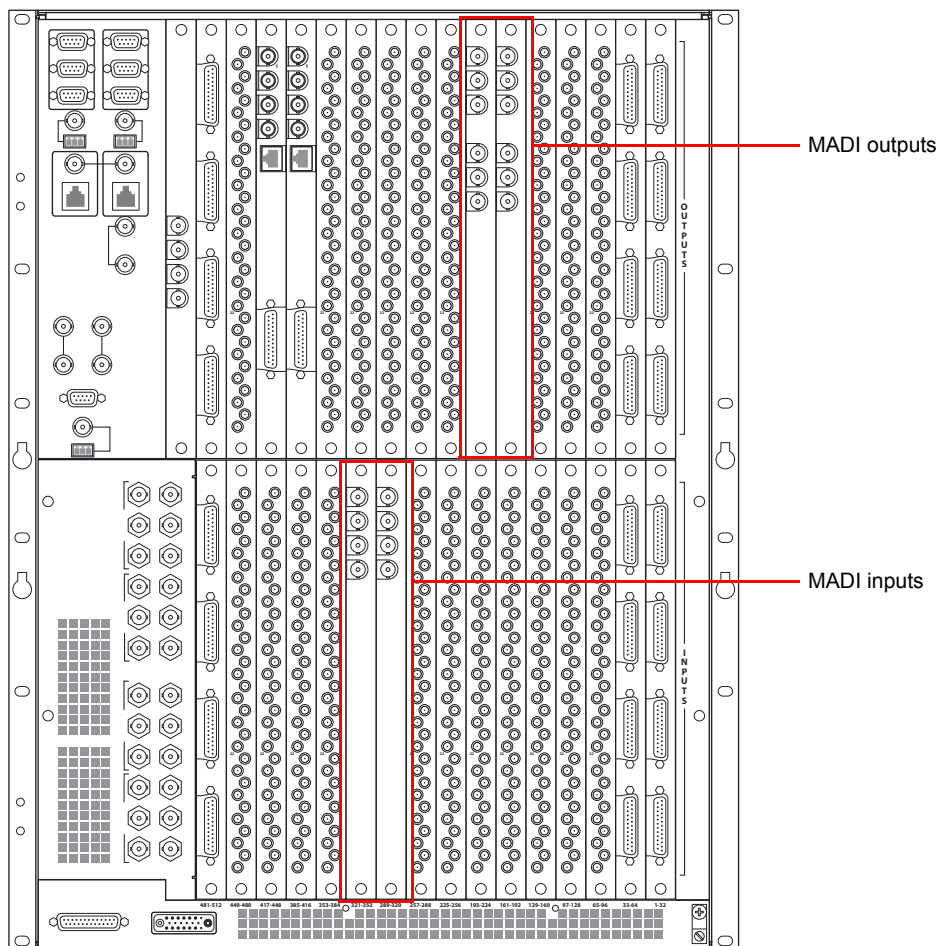


Figure 2-29. MADI Reference Connection (Rear View)

2. Installation

Making Reference Connections

- 2 Locate the MADI reference connections on the *MADI outputs* backplane on the rear of the router, as shown in Figure 2-29 on page 68), labeled 'REF 1 OUT' and 'REF 2 OUT'. Reference connections are located on backplane housing the MADI signal connections. Outputs are located in the lower half of the router frame.
- 3 Connect to the 'REF 1 OUT' connection using a 75 Ω BNC connector and coaxial cable.
- 4 Connect the other end of the cable to a source of stable AES audio signals at the rate you want to reference.
- 5 Repeat steps 3 and 4 for the 'REF 2 OUT' connection.

Video Reference

The NV7512 provides timing reference connections for analog video signals. The video reference connections require a stable source of PAL, NTSC or Tri-level sync. The video reference connections are labeled 'VIDEO REF 1' and 'VIDEO REF 2' and use 75 Ω BNC connectors and coaxial cable. For more information on signal switching when a reference is or is not present and a detailed description of the video reference connections, see [Video Reference Connections](#) on page 18.

Each 'VIDEO REF' connection can be use the same reference source (redundant for backup should one source fail) or two unique reference sources (dual). For more information, see [Redundant and Dual References](#) on page 19.

Video reference connections can use a loop-thru to connect to other routers. Terminate any unused 'VIDEO REF' connections using a 75 Ω BNC terminator.

How to make video reference connections

- 1 Locate the video reference connections on the rear of the router, as shown in Figure 2-30. Video reference connections are labeled 'VIDEO REF 1' and 'VIDEO REF 2'.

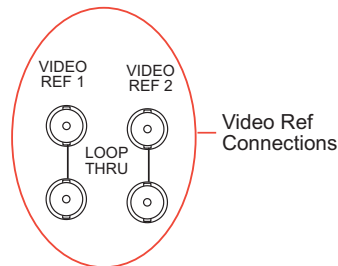


Figure 2-30. Video Reference Connections (Rear View)

- 2 Connect to the 'VIDEO REF 1' connection using a 75 Ω BNC connector and coaxial cable.
- 3 Connect the other end of the cable to a video reference signal. Be sure the incoming signal is from a stable source. The signals can be:
 - PAL
 - NTSC
 - Tri-Level Sync (1080i 50/59.94/60 and 720p 50/59.94/60)
- 4 Connect to the 'VIDEO REF 2' input connection, as described in Steps 2 and 3. The reference can use redundant or dual sources. For more information, see [Video Reference Connections](#) on page 18.
- 5 **Important!** Terminate any unused video reference loop-thru connection by installing a 75 Ω BNC terminator.

2. Installation

Making Monitor Connections

Making Monitor Connections

The monitor connections on the rear of the NV7512 enable the monitoring of outgoing signals. The monitor connections forward signals from the monitor card, which receives one signal from each output card in the 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.

Monitor connections use 75Ω BNC connectors and coaxial cable.

How to make monitor connections

- 1 Locate the monitor connections on the rear of the router, as shown in Figure 2-31. Monitor connections are labeled, '1', '2', '3' and '4'.

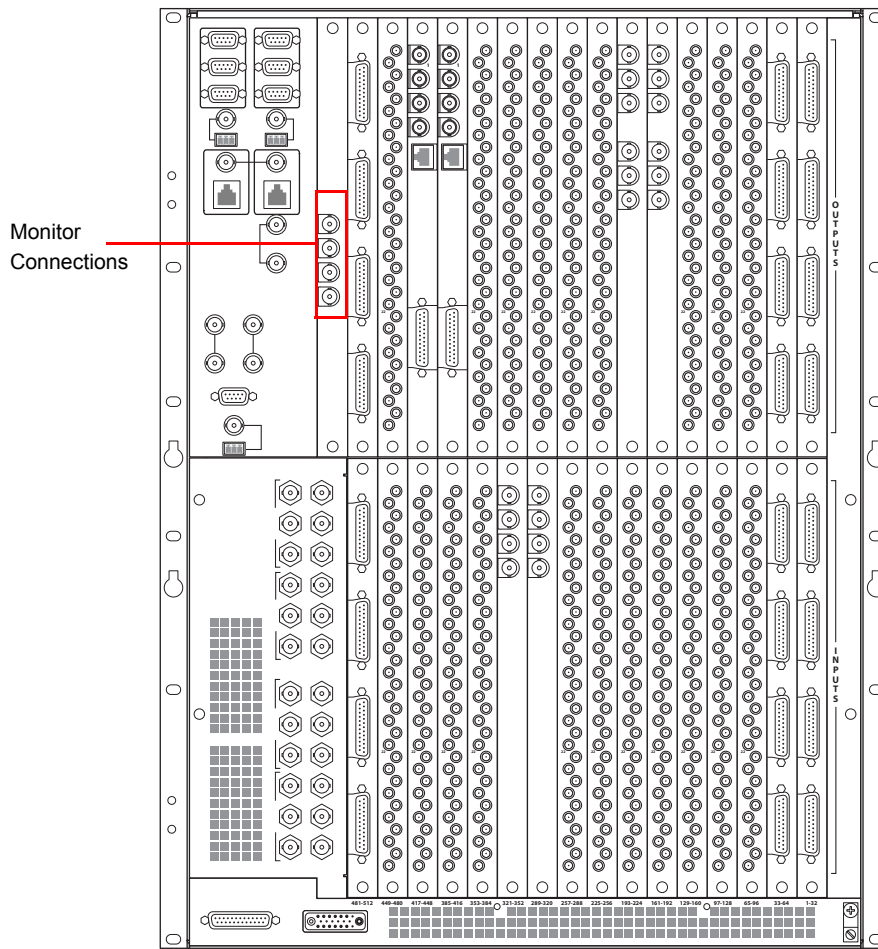


Figure 2-31. Monitor Connections (Rear View)

- 2 Connect to the '1' monitor connection using a 75 Ω BNC connector and coaxial cable.
- 3 Connect the other end of the cable to the monitoring equipment being used to monitor outgoing signals.
- 4 Connect to the '2', '3' and '4' monitor connections using a 75 Ω BNC connector and coaxial cable, as described in steps 2 and 3.

Making Alarm Connections

The NV7512 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. The NV6257 (power supply) and the NV7512 each have alarm connections. NVISION does not provide external indicator equipment, but does provide instructions on wiring the alarm connections. See [Alarm Indicator Equipment](#) on page 72. Both the NV6257 and the router send status information to the router control system. For a detailed description of the router alarm connection, see [Alarm Connections](#) on page 19.

How to make alarm connections

- 1 On the rear of the NV6257, locate the 'Alarms' connection, as shown in Figure 2-32.

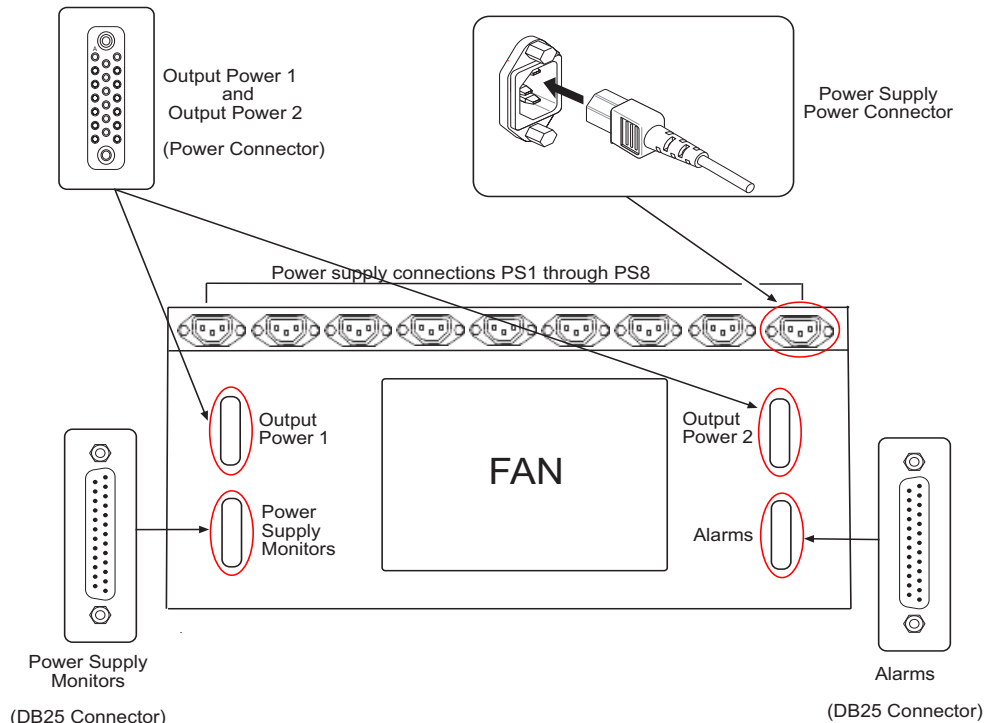


Figure 2-32. NV6257 Power Supply (Rear View)

- 2 Connect to the 'Alarms' connection using a DB25 connector and serial cable.
- 3 Connect the other end of the cable to an external alarm indicator box. See [NV6257 Alarms](#) on page 72 for information on wiring the DB25 connector.

2. Installation

Making Alarm Connections

- 4 On the rear of the **router**, locate the ‘ALARMS’ connection, as shown in Figure 2-33.

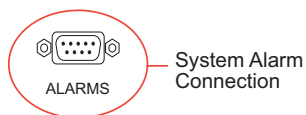


Figure 2-33. Alarms Connection (Rear View)

- 5 Connect to the ‘ALARMS’ connection using a DE9 connector and serial cable.
- 6 Connect the other end of the cable to an external alarm indicator. See [Router Alarms](#) on page 73 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 NV6257 power supply or the NV7512 router frame. LEDs can be wired to specific pins on a DE9 or DB25 connector. Each LED indicates what specific router module has failed.

- For NV6257 alarms, see [NV6257 Alarms](#) on page 72.
- For NV7512 alarms, see [Router Alarms](#) on page 73.

NV6257 Alarms

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

To create an indicator box, connect to the ‘Alarms’ connection using a DB25 female connector, wiring as shown in Figure 2-34. Each pin monitors a specific function and activates a specific alarm.

2. Installation

Making Alarm Connections

NV6257 External Power Supply Alarm, DB25, Female

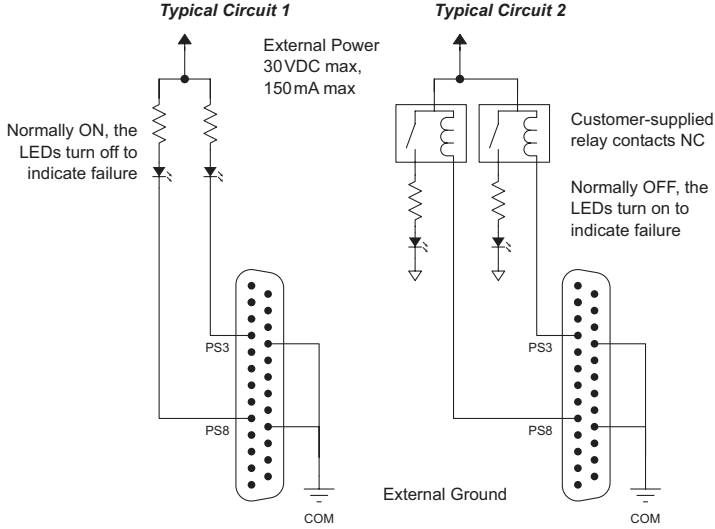
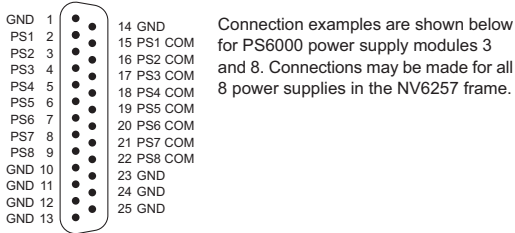


Figure 2-34. NV6257 Power Supply Alarms Connection

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

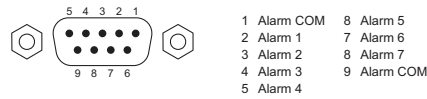
Router Alarms

The ‘ALARM’ connection on the rear of the NV7512 uses a DE9 connector. An “alarm” or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again.

To create an indicator box, connect to the ‘ALARM’ connection using a DE9 female connector, wiring as shown in Figure 2-35. Each pin monitors a specific function and activates a specific alarm.

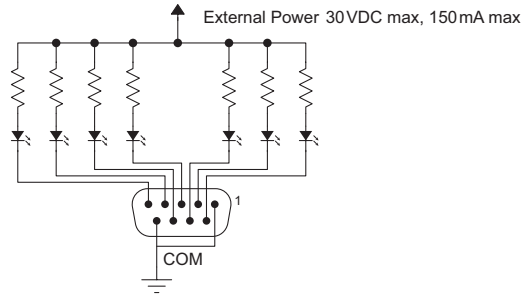
2. Installation

Making Alarm Connections



Typical Circuit 1

Normally ON, the LEDs turn off to indicate failure



Typical Circuit 2

Normally OFF, the LEDs turn on to indicate failure

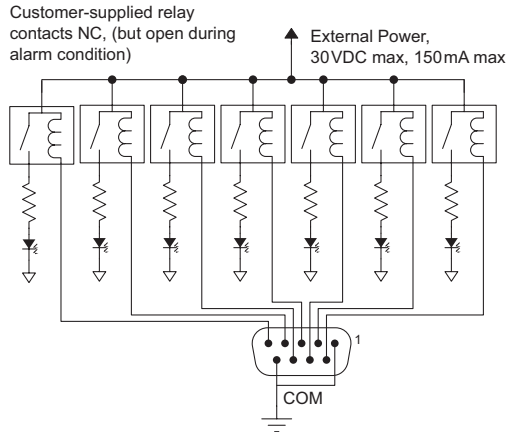


Figure 2-35. Alarm Connections and On/Off Switches

The following lists each DE9 pin and the associated alarm. The pin number listed corresponds to the pin numbers in Figure 2-35 on page 74:

Pin	Signal	Description	Possible Conditions Causing the Alarm
1 and 9	Alarm_COM	Common	Common connection for all alarm pins.
2	Alarm_1	Major Alarm	Indicates missing reference inputs, or missing power supplies.
3	Alarm_2	Minor Alarm	Alarm_3, or Alarm_4, or Alarm_5, or Alarm_6
4	Alarm_3	Power Supply	Missing power supply module.
5	Alarm_4	Video Ref	Missing Video Ref 1 or Video Ref 2.
6	Alarm_5	AES Ref	Missing AES Ref 1 or AES Ref 2.
7	Alarm_6	Fans or Temperature	Indicates a fan failure or module over temperature.
8	Alarm_7	Control Module Health	Any control module not “healthy.”

Verification

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

- On the NV6257 power supply, check that all 5 green power LEDs on the front of each power supply module are lit. If any or all LEDs are off:
 - Check that the power supply module is fully seated in its slot.
 - Check the AC fuse on the power supply.
 - Check for +48 volts at each of the 5 front test points.
- On the NV7512, check that the LEDs on the input cards, crosspoint cards, control cards, and output cards are lit and indicating a “healthy” system. See [Indicator LEDs](#) on page 100 for a list of normal and alert LED states.
- Make sure that the flow of air through the front of the router is unimpeded and the door is properly installed and closed. For more information, see [Air Flow](#) on page 101.

2. Installation

Verification



3. DSP Submodule

The DSP sub-module is a separate unit that can be installed on the crosspoint card. (See [Crosspoint Cards](#) on page 24.) The DSP sub-module enables manipulation of audio input or output as follows:

- **Gain Adjustment.** The gain of incoming signals can be adjusted from -108 dB up to +12 dB in increments of 0.1 dB.
- **Phase Inversion.** On occasion, incoming signals may be out of phase. Using the DSP sub-module, signal polarity can be inverted. The polarity of each input channel may be independently set to be non-inverted or inverted.
- **Crossfade.** The crossfade functionality allows for switching between signals by gradually decreasing the value of one signal while simultaneously increasing the value of a second signal. A crossfade takes approximately 85 milliseconds from start to finish.
- **Channel Summing.** Left and right channels of a signal can be combined so that the left channel and right channel are identical, called channel summing. Because the channels are now twice the level of the original channels, the channels are divided by 2 to return each channel back to the original level.

The DSP sub-module effects only the signals being directly switched by the crosspoint card on which it is installed. To implement DSP sub-module features, the module must be installed and then configured using UniConfig. For more information, see [Installing the Module](#) on page 78 and [Configuring the DSP Sub-Module](#) on page 80.

3. DSP Submodule

Installing the Module

Installing the Module

The DSP sub-module is installed directly on the crosspoint card. Only those signals being switched by the crosspoint card are effected.

How to install the DSP submodule

- 1 Locate the crosspoint card on which the DSP sub-module is being installed:

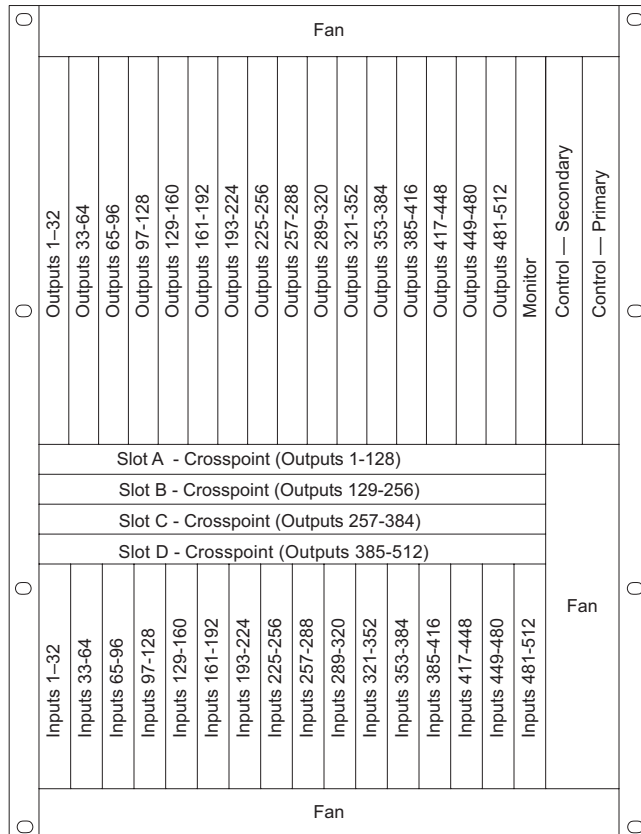


Figure 3-1. Location of Crosspoint Cards (Front View)

- 2 Gently remove the crosspoint card from the router frame.
- 3 Locate connections J18 and J17 on the crosspoint card, as shown in Figure 3-3 on page 79.
- 4 Firmly press the DSP sub-module on to the crosspoint card. The DSP sub-module should “click” into place.

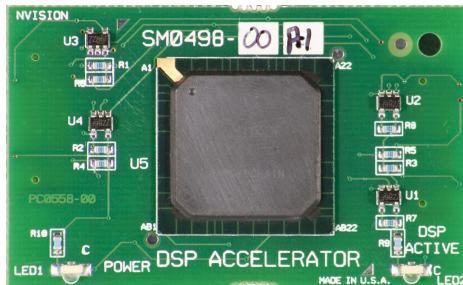


Figure 3-2. DSP Submodule

3. DSP Submodule Installing the Module

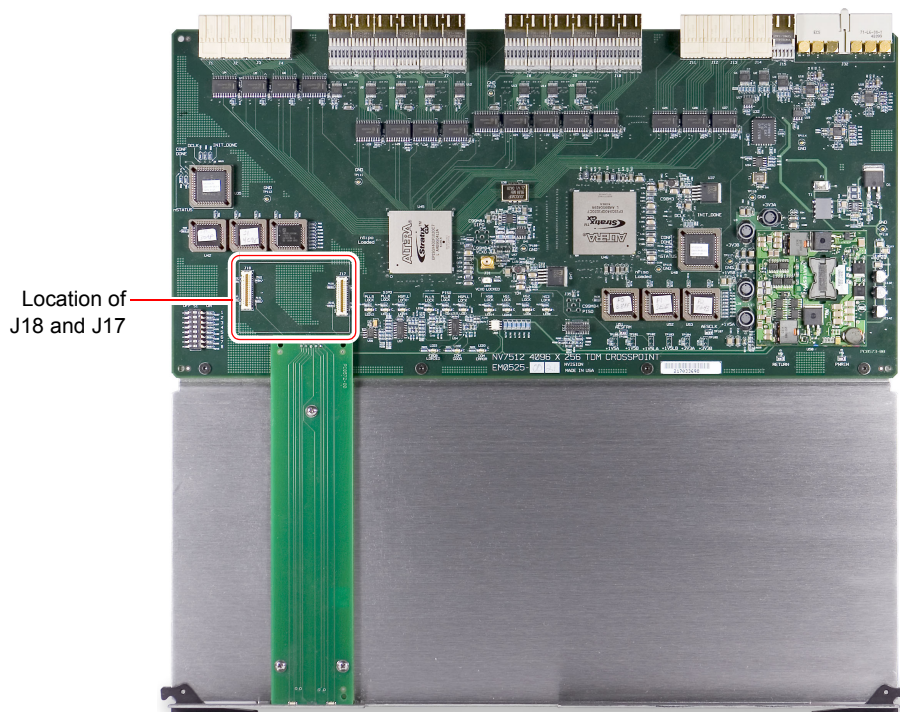


Figure 3-3. Location of Jumpers on TDM Crosspoint Card

- 5 Return the crosspoint card to its original location in the router frame, being sure to close the frame door.

3. DSP Submodule

Configuring the DSP Sub-Module

Configuring the DSP Sub-Module

After the DSP sub-module is installed, UniConfig must be configured to activate and manage DSP sub-module functions. When the DSP sub-module is installed, the control card automatically reads it. However, the router control system cannot read and manage DSP functions until UniConfig is configured to see the module.

The DSP sub-module enables manipulation of input gain, phase inversion, crossfade and channel summing. Each of these functions are set up individually in separate UniConfig screens.

How to configure input gain

- 1 Launch UniConfig.
- 2 From the menu bar, select 'Window > Audio Adjustment'. The 'Audio Adjustment' window appears, as shown in Figure 3-4.

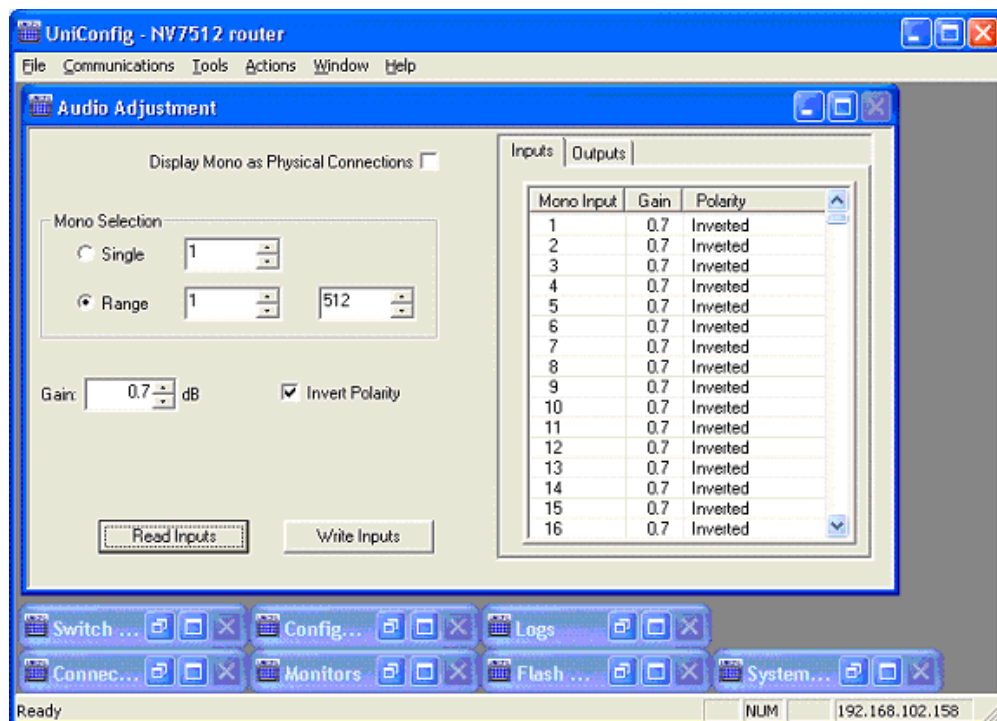


Figure 3-4. Input Gain Values in UniConfig Audio Adjustment Window

- 3 Click the 'Inputs' tab. The tab displays current 'Mono Input', 'Gain' and 'Polarity' settings.

3. DSP Submodule

Configuring the DSP Sub-Module

- 4 In the 'Mono Selection' section, select the 'Single' radio button for a single input channel or select the 'Range' radio button for a range of input channels.
If 'Single' is selected, enter the channel number in the corresponding field.
If 'Range' is selected, enter the channel number in the corresponding fields to the right. Enter the beginning channel number in the left-most field and the ending channel number in the right-most field.
- 5 Enter the 'Gain' in the field provided. Gain can be adjusted from -88 dB to 12 dB in increments of 0.1 db.
- 6 (Optional) To display each left or right channel of a stereo signal, check the 'Display Mono as Physical Connections' check box, as shown in Figure 3-5.

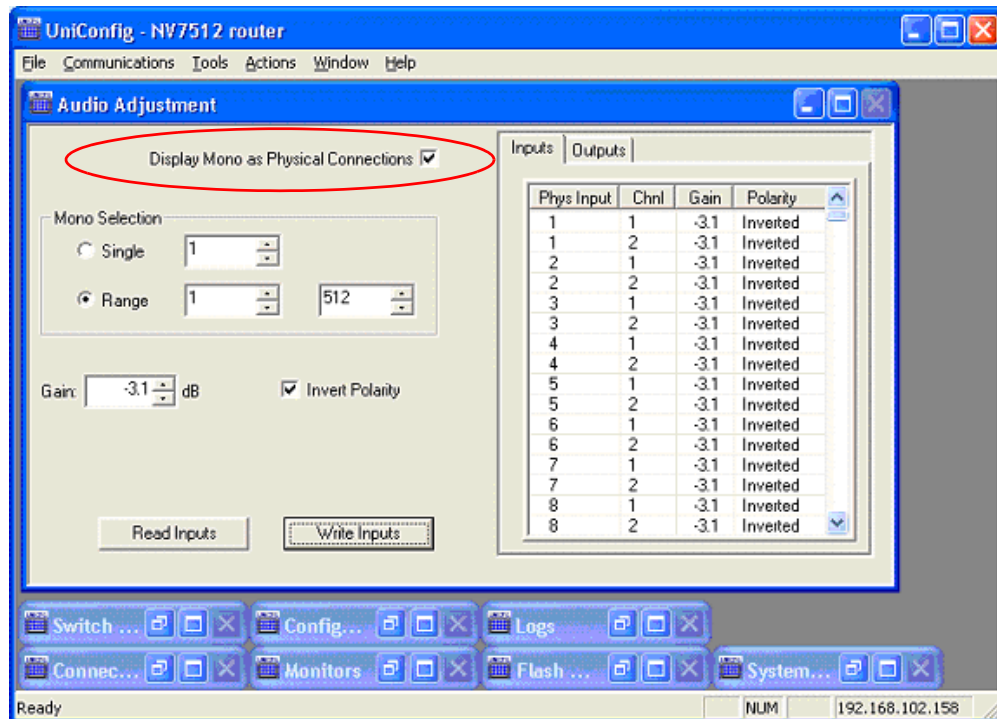


Figure 3-5. Input Gain Values in UniConfig Audio Adjustment Window - Mono Mode

- 7 Click **Read Inputs** to display changes on the 'Inputs' tab.
- 8 Click **Write Inputs** to write and save your changes.

3. DSP Submodule

Configuring the DSP Sub-Module

How to configure phase inversion

- 1 Launch UniConfig.
- 2 From the menu bar, select 'Window > Audio Adjustment'. The 'Audio Adjustment' window appears, as shown in Figure 3-6 on page 82.

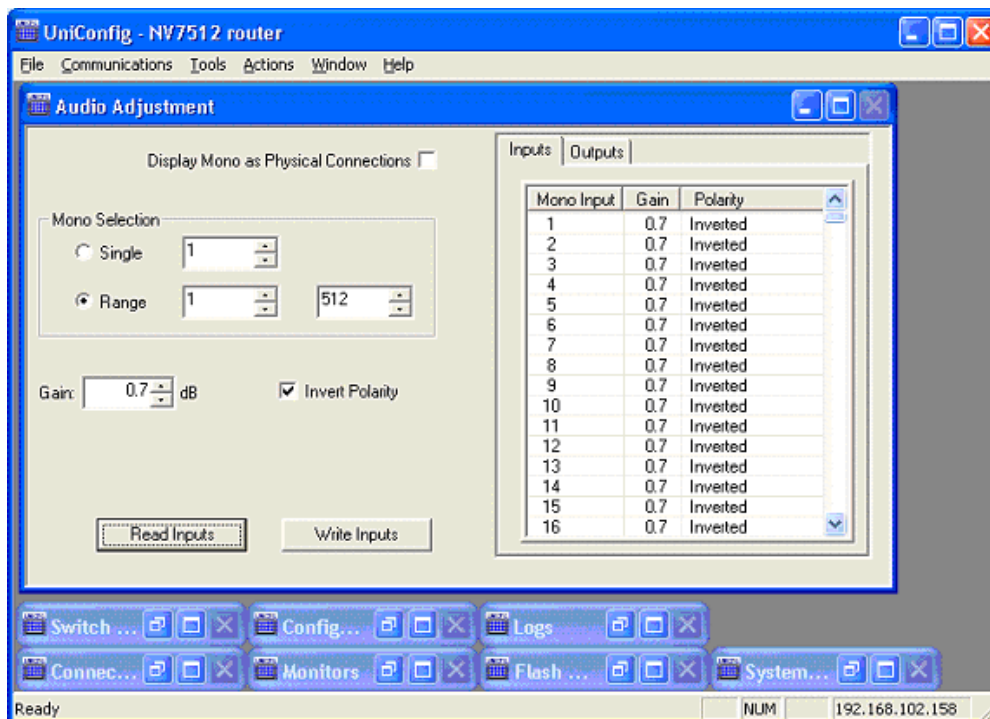


Figure 3-6. UniConfig Audio Adjustment Window

- 3 Click the 'Input' tab. The tab displays current 'Mono Input', 'Gain' and 'Polarity' settings.
- 4 Click **Read Inputs**. Crosspoint information displays in the 'Input' tab.
- 5 In the 'Mono Selection' section, select the 'Single' radio button for a single input channel or select the 'Range' radio button for a range of input channels.
 - If 'Single' is selected, enter the channel number in the corresponding field.
 - If 'Range' is selected, enter the channel number in the corresponding fields to the right. Enter the beginning channel number in the left-most field and the ending channel number in the right-most field.
- 6 Check the 'Invert Polarity' check box to invert polarity.
- 7 (Optional) To display each left or right channel of a stereo signal, check the 'Display Mono as Physical Connections' check box, as shown in Figure 3-6.
- 8 Click **Read Inputs** to display changes on the 'Inputs' tab.
- 9 Click **Write Inputs** to write and save your changes.

How to configure crossfades

Crossfades occur between previously selected output sources and newly selected output sources. Both channels of each output may be independently disabled or enabled.

- 1 Launch UniConfig.
- 2 From the menu bar, select 'Window > Switch Point Setup'. The 'Switch Point Setup' window appears, as shown in Figure 3-7 on page 83.

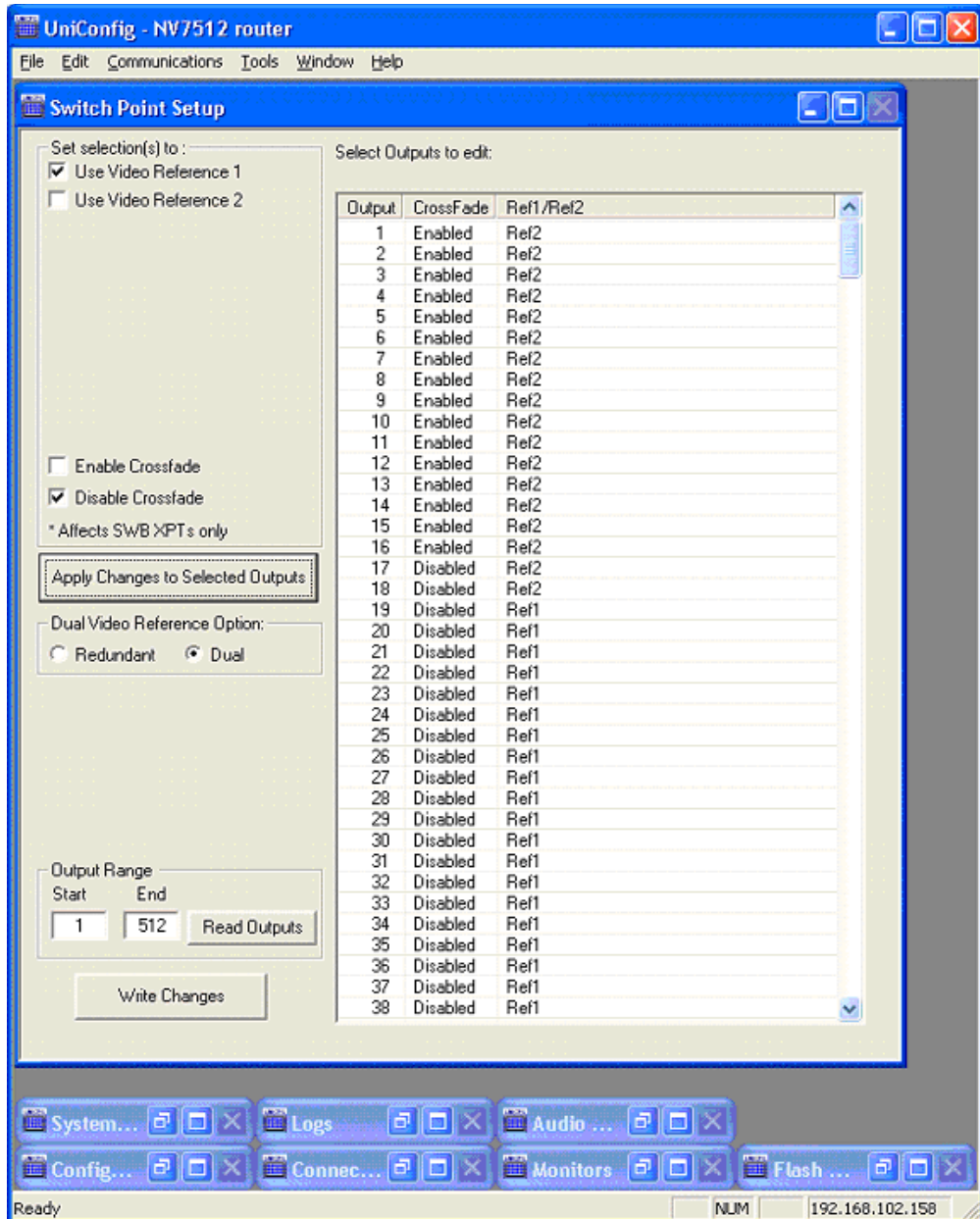


Figure 3-7. Switch Point Setup Window

- 3 Click **Read Outputs**. Outputs information displays.
- 4 In the 'Select Outputs to edit' field, select the channels for which crossfade functions are being enabled or disabled. Use the 'Shift' key on your keyboard to select several channels at one time.

3. DSP Submodule

Configuring the DSP Sub-Module

- 5 Check the 'Enable Crossfade' check box or the 'Disable Crossfade' check box to enable or disable crossfade functions for the selected channels.
- 6 Click **Write Changes** to write and save your changes. Changes display in the 'Select Outputs to edit' field.

How to configure phase inversion

The input channels routed to both channels of each output may be independently disabled or enabled. Output mono mix is expressed by a single bit where 0 = disabled and 1= enabled.

- 1 Launch UniConfig.
- 2 From the menu bar, select 'Window > Audio Adjustment'. The 'Audio Adjustment' window appears, as shown in Figure 3-8.

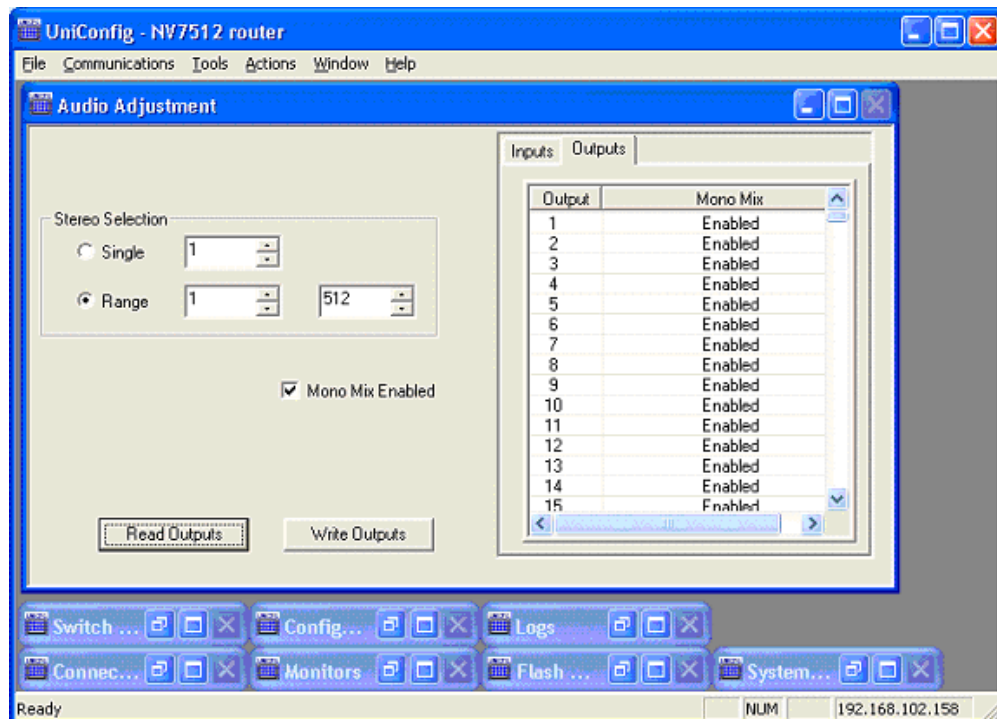


Figure 3-8. UniConfig Audio Adjustment Window

- 3 Click the 'Output' tab. The tab displays 'Output' channel number and if 'Mono Mix' (i.e., channel summing) is enabled.
- 4 Click **Read Outputs**. Outputs information displays in the 'Output' tab.
- 5 In 'Stereo Selection' section, select the 'Single' radio button for a single input channel or select the 'Range' radio button for a range of input channels.
If 'Single' is selected, enter the channel number in the corresponding field.
If 'Range' is selected, enter the channel number in the corresponding fields to the right. Enter the beginning channel number in the left-most field and the ending channel number in the right-most field.
- 6 Check the 'Mono Mix Enabled' check box to enable channel summing.
- 7 Click **Read Outputs** to display changes on the 'Inputs' tab.
- 8 Click **Write Outputs** to write and save your changes.

4. Configuration

Before being placed into service, the NV7512 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 PC apart from the router. For detailed information on using UniConfig, see the *UniConfig User's Guide*.

Control Card Jumper Settings

The control card(s) contains several jumpers. Each jumper connection is labeled with a jumper identification number. By default, jumpers are placed in the position most commonly used.

These jumpers must be set before the control card is placed into service.

How to set jumpers

- 1 Locate the control cards, primary and secondary, as shown in Figure 4-1.

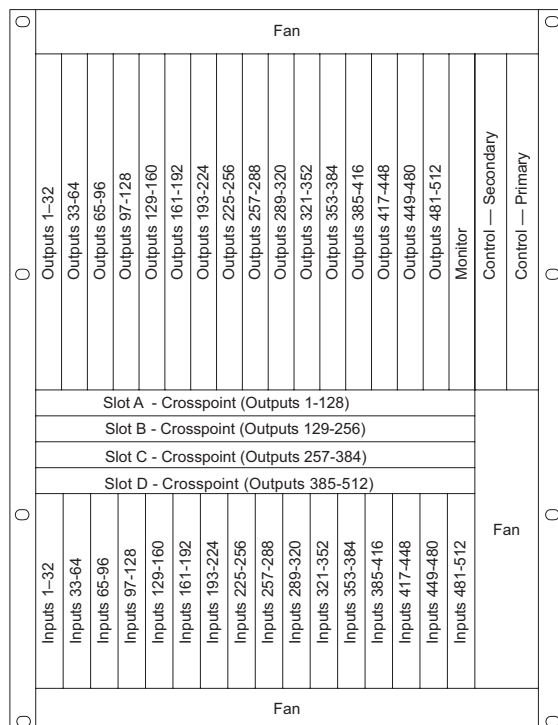


Figure 4-1. Location of Control Cards (Front View)

- 2 Gently remove the control card whose jumpers you want to configure.

4. Configuration

Control Card Jumper Settings

- 3 On the card, locate each jumper by its label number, placing jumper sleeves as needed, as shown in Figure 4-2. Jumpers are colored blue.

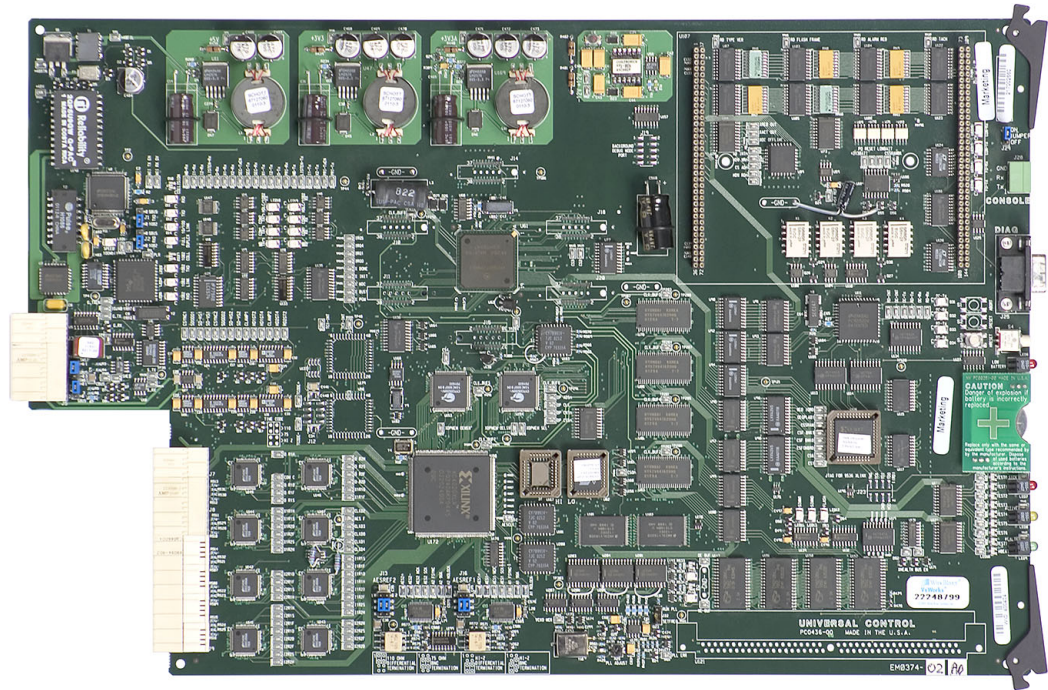


Figure 4-2. Control Card

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. Default set to lower 10Base2 position.
J2 SBUS/10B2	Sets rear connectors labeled 10Base2 to be used for Ethernet. Default set to lower 10Base2 position.
J4 SMS7/SBUS	Sets rear Node Bus connectors to be used for third-party router control systems. Default set to upper SMS7000 position.
J6 SMS7/SBUS	Sets rear Node Bus connectors to be used third-party router control systems. Default set to upper SMS7000 position.
J13 AES REF2	Sets the rear AES REF 2 input impedance to 110 Ω , 75 Ω , or HiZ (high impedance). Upper position selects 110 Ω for use with Phoenix rear connectors, the middle position selects 75 Ω for use with BNC rear connectors, or the lower position selects HiZ if this input is the last connection in an equipment chain.
J16 AES REF1	Sets the rear AES REF 1 input impedance to 110 Ω , 75 Ω , or HiZ (high impedance). Upper position selects 110 Ω for use with Phoenix rear connectors, the middle position selects 75 Ω for use with BNC rear connectors, or the lower position selects HiZ 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 Close the router door.

Setting Analog Gain, Mute Detection and Operating Levels

The analog input card includes several DIP switch sets and jumpers that determine the gain, mute detection and operating level of incoming signals. Additionally, the operating level of outgoing signals can be set on the analog output card. For more information on each card functions, see [Analog](#) on page 23 for analog input cards and [Analog](#) on page 28 for analog output cards.

Gain and Mute Detection

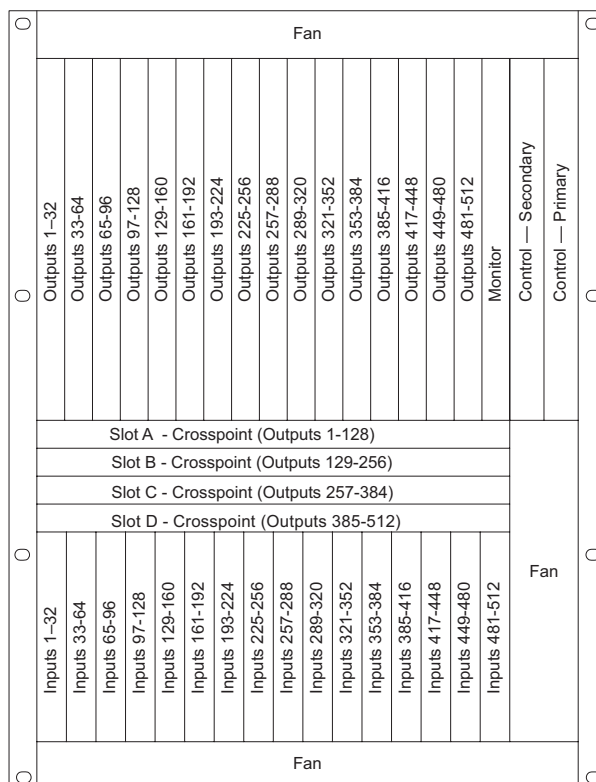
The analog input card features four, 8-position DIP switch sets that allow the gain of each channel to be increased by 6 dB. These switches are labeled SW1 through SW4. With the switch in the OFF position, gain is normalized at 0 dBu. With the switch in the ON position, the gain is increased by 6 dB. 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 operate with an effective FSD of +24 dBu. When the Gain switch is set to ON, a +18 dBu input generates a +24 dBu output.

This card also contains a Mute Detect enable jumper. When the analog audio input level drops to –78 dB 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 card, turning the mute function on or off for all inputs globally.

How to set analog gain and mute detection

- 1 Locate the analog input cards, as shown in Figure 4-5.



4. Configuration

Setting Analog Gain, Mute Detection and Operating Levels

Figure 4-3. Location of Input Cards (Front View)

- 2 Gently remove the input card being configured.

4. Configuration

Setting Analog Gain, Mute Detection and Operating Levels

- 3 On the card, locate the DIP switches labeled 'INPUT CHANNEL GAIN', as shown in Figure 4-4.

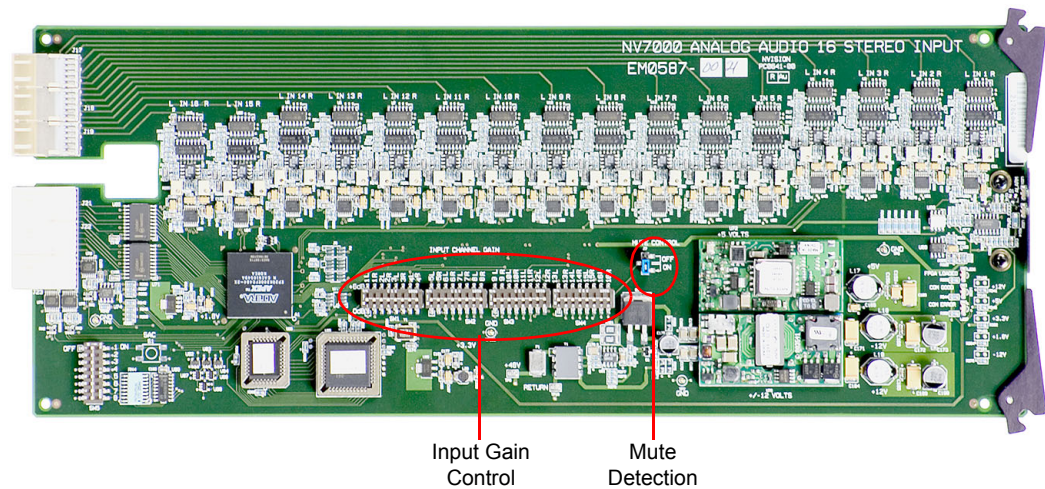


Figure 4-4. Analog Audio Input Card Switch and Jumper Locations

- 4 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 1	Switch 2	System Gain	Maximum Input Level
Off	Off	0dB	+ 24 dBu
On	On	+ 6 dB	+ 18 dBu

- 5 Locate the 'J7' jumper labeled 'MUTE DETECTION', as shown in Figure 4-4.
- 6 Place jumper sleeves in the 'ON' position to activate mute detection, or in the 'OFF' position to deactivate mute detection.
- 7 When all switches and the jumper are set, gently slide the analog input card back into place in the router frame.
- 8 When all cards are inserted back in the router, close the router door.

Operating Levels

The analog input card and analog output cards feature an additional DIP switch set that can be used to match the operating level of the facility. For example, if the incoming signal operating level is +24 dbu, the card can be set to +24 dbu. 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.

By default, all switches are set to 'OFF' and the operating level set to +24 dBu. By setting the DIP switches in specific sequences, operating levels can be set for +15 dBu, +18 dBu or +24 dBu.

4. Configuration

Setting Analog Gain, Mute Detection and Operating Levels

How to set analog operating levels

- 1 Locate the analog input cards, as shown in Figure 4-5.

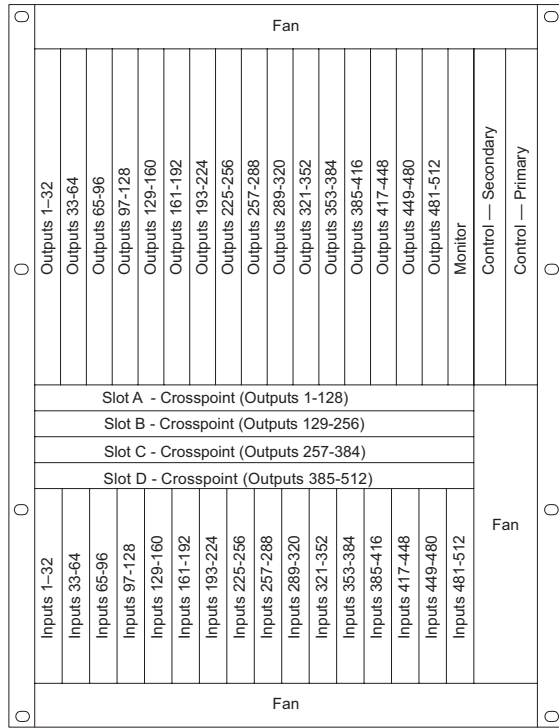
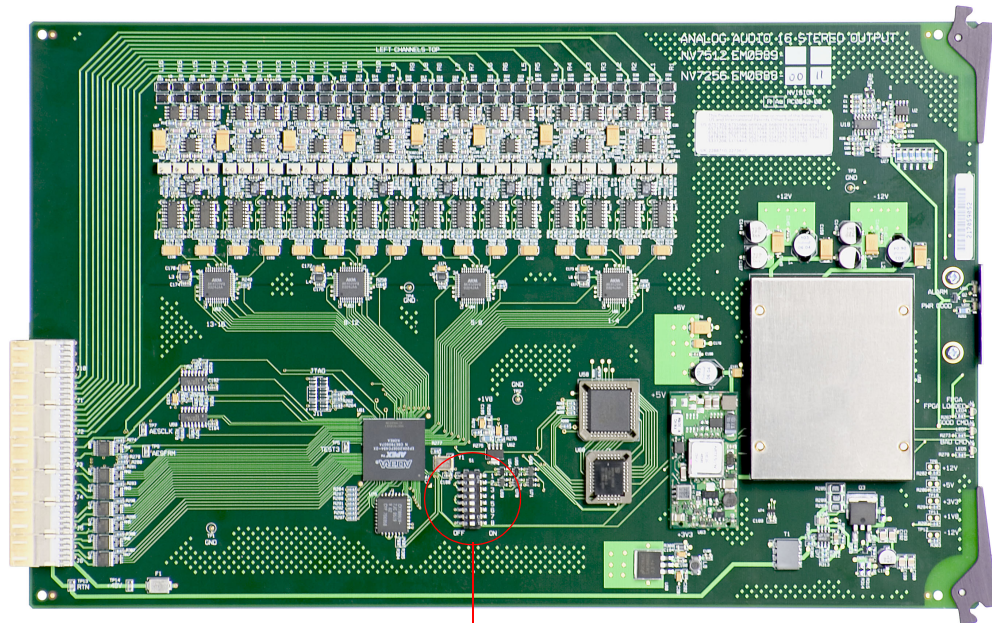


Figure 4-5. Location of Input Cards (Front View)

- 2 Gently remove the input card being configured.
- 3 On the card, locate the DIP switches for setting operating levels, as shown in Figure 4-6.



DIP Switches

Figure 4-6. Analog Audio Input Card Switch and Jumper Locations

4. Configuration

Setting Analog Gain, Mute Detection and Operating Levels

- 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 switch, setting to 'ON' or 'OFF' as needed.

The following lists each switch position and the maximum input level:

Switch 1	Switch 2	Maximum Input Level
Off	Off	+24 dBu
Off	On	+24 dBu
On	Off	+18 dBu
On	On	+15 dBu

- When all switches are set, gently slide the analog input card back into place in the router frame.
- Locate the analog output cards, as shown in Figure 4-5 on page 90.
- Set the operating level for outgoing analog signals as described in Steps 2 through 5.
- When all cards are inserted back in the router, close the router door.

4. Configuration

Setting MADi Channels

Setting MADi Channels

MADi audio signals are grouped into 32-bit packets for each audio channel with one MADi frame composed of up to 64 continuous channels. MADi signals require a reference in accordance with AES11 standards. (See [MADi Reference](#) on page 67.) Signals are received and distributed through two BNC connectors. Using DIP switches on the MADi input card and the MADi output card, the signals being received and distributed can have several attributes set, as follows:

- Allocate channels between the two BNC connectors (Input 1 and Input 2).
- Set sample rate and if standard or legacy for Input 1 and Input 2 MADi channels can be received and distributed at sample rates of 48 kHz or 96 kHz.
- Choose to pass through channel status data in its current state or force it into a known professional state.

Forcibly adding common, professional channel status data is called “channel status stripping.” It is useful in instances where the signal channels have been recombined and the channel status data may have been corrupted. If the sample rate of the MADi signals is being changed, the channel status data is automatically removed and channel status stripping applied by default.

Standard and Legacy Formats

When a MADi stream is set to a sample rate of 96kHz, the number of samples is 2:1 compared to 48kHz, which is 1:1. Because there are twice the number of samples in the same period of time, the samples can be organized consecutively (1, 2, 3, 4...) or interlaced (1, 2, 1, 2...). Consecutive ordering is known as ‘standard’ format and interlacing as ‘legacy’ format. Using the ‘STD MODE/LEGACY MODE’ switch on the card, the incoming or outgoing MADi stream format can be matched to the format of the signal being received or the facility receiving the distributed signals.

By default, all switches on the DIP switch are set ‘OFF’ — the left position — corresponding to a synchronous audio rate of 48kHz and 64 channels.

How to set MADI signal levels

- 1 Locate the MADI input cards, as shown in Figure 4-5.

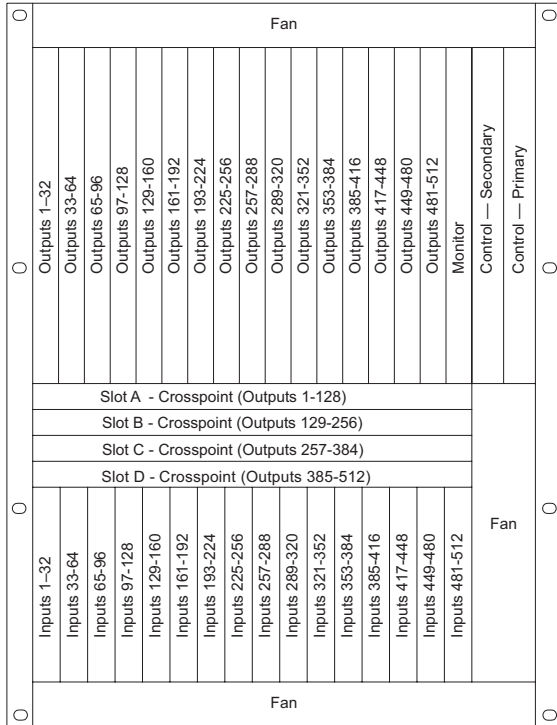


Figure 4-7. Location of Input Cards (Front View)

- 2 Gently remove the input card being configured.

4. Configuration

Configuring the Quad Mix Card

- Using a small, pointed object, such as a ball point pen, slide the beige switch piece to the right or left to set the sample rate and if standard or legacy for each input:

- Input 1

Switch 3	Switch 4	Input 1
48 kHz	STD MODE	48 kHz, standard
48 kHz	LEGACY MODE	48 kHz, legacy
96 kHz	STD MODE	96 kHz, standard
96 kHz	LEGACY MODE	96 kHz, legacy

- Input 2

Switch 5	Switch 6	Input 2
48 kHz	STD MODE	48 kHz, standard
48 kHz	LEGACY MODE	48 kHz, legacy
96 kHz	STD MODE	96 kHz, standard
96 kHz	LEGACY MODE	96 kHz, legacy

- Locate DIP switch 7, as shown in Figure 4-8 on page 94. This switch sets whether to pass through channel status data “as is” or to force channel status data into a known, common professional states. Using a small, pointed object, such as a ball point pen, slide the beige switch to the left for ‘C-S Pass’ (channel status data pass through) or right for ‘C-S STRIPE’ (channel stripping).
- When all switches are set, gently slide the MADI input card back into place in the router frame.
- Locate the MADI output cards, as shown in Figure 4-7 on page 93.
- Allocate channels, set sample rates and channel status data manipulation as described in Steps 3 through 8.
- When all cards are inserted back in the router, close the router door.

Configuring the Quad Mix Card

The Quad Mix output card is designed to receive inputs from the crosspoint card and distribute outgoing signals as both AES unbalanced signals and analog signals. The Quad Mix card can be installed in any output card slot in place of any other output card.

The Quad Mix output card is managed through a separate Quad Mix control panel (NV9660). The Quad Mix control panel is used to set balance and gain levels. For more information, see the NV9660 User’s Guide.

To configure the Quad Mix card, a separate configuration application is used, similar to UniConfig, called QMOCDiag. For more information on installing and using QMOCDiag, contact NVISION.

4. Configuration

Configuring the Quad Mix Card



5. Operation

To use the NV7512 router, you need a control system. The control system provides an interface for the operations and maintenance personnel. Through the control system, signal switching can be actively configured, reference inputs selected, partitions for organizing signal switching created, and certain system functions monitored.

The NV7512 was designed to partner with the NVISION NV9000 or NV910 control system. However, the routers are designed with a certain degree of flexibility and can be used with certain third-party control systems. For detailed information on using the NVISION NV9000 or NV910 control system, see the associated User's Guide. For information on using third-party control systems, see the third-party vendor literature and User Guide. You can also contact NVISION for more information on compatible control systems.

NVISION's NV9000 Router Control System

Most facilities require multi-level switching capability (audio follow video, for example) and intuitive device naming capabilities. The choice of control system dramatically affects how operators use the NV7512 and the ease with which devices are accessed.

NVISION's NV9000 and the NV915 control systems provide a powerful and flexible approach to controlling NVISION and third party equipment. The NVISION control systems are comprised of software and hardware. The control system application runs on a Windows-based server and can be loaded on a primary server alone, or also on a secondary (redundant) server as a fail-over backup. NVISION control panels or third-party systems connected to the server can be used to manage the router and other network equipment.

NVISION's NV9000 control system offers the choice of several control surfaces, supports redundancy and facilitates easy expansion as routing needs change. The NV9000 control system is also capable of interfacing with third-party signal routing equipment. Because of the variety of features, capabilities and limitations of other manufacturers' equipment, users are urged to work closely with NVISION's technical staff and with the supplier of the third-party equipment when integrating it into an NV9000 control system.

Third-Party Router Control Systems

NV7512 control cards use a default protocol. However, at the timing or ordering, a number of third-party control protocols can be installed upon request.

NVISION provides assistance to users wanting to configure NVISION products to function with third-party control systems. However, because NVISION does not manufacture or warrant control

5. Operation

NVISION's NV9660 Quad Mix Control Panel

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

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

Please consult with NVISION if you are considering using a third-party interface to control an NV7512 router.

NVISION's NV9660 Quad Mix Control Panel

The NV9660 is a hybrid panel combining an audio mixer panel and a router control panel. The panel controls the input selection and mixing functions on the NVISION NV7512 Quad Mix output card (see [Quad Mix](#) on page 28). One NV9660 is required per output card. The NV9660 is connected to the Quad Mix output card through the Quad Mix backplane. See [Quad Mix Backplane](#) on page 13.

For detailed description of the NV9660 and information on operating the control panel, see the NV9660 User's Guide. For information on purchasing the NV9660, contact NVISION.



6. Maintenance

The NV7512 Audio Router does 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 may want to check the system's [Indicator LEDs](#) (page 100) occasionally to ensure that the system is operating normally and to make sure cooling air flow to the power supply fans is unobstructed.

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

Periodic Inspection

Periodically inspecting the NV7512 for signs of trouble is the best way to prevent unplanned outages. The following items will be helpful when performing this inspection.

Begin the inspection at the front of the frame. Open the door to the router and make these observations.

- 1 Check the +48VDC LEDs on the front of the PS6000 power supplies. An LED that is off or very dim in brightness indicates a failed or failing supply.
- 2 Place your hand lightly across the air intakes on the front of the power supplies. Slight air movement should be felt, indicating that the internal cooling fans are running. These fans run at very low speed, so only slight air movement will be noticed. A flashlight may be used to verify that the fan blades are rotating at the proper speed.
- 3 Look at each active card and verify that none of the red alarm LEDs are illuminated. Normally, the green and/or amber LED's should be illuminated. Refer to [Indicator LEDs](#) on page 100 to interpret the LED status indicators.
- 4 Look at the control card(s) and verify that the green and amber LED's are illuminated on the active controller, and that the green LED is ON for the standby controller (if present). Verify that the low battery LED is off on one or both control cards. [Indicator LEDs](#) (page 100) describes the various LEDs and their meaning.
- 5 Inspect the air intake filter located inside the door. If the filter is dirty or clogged, refer to the next section for information on how to clean it.
- 6 Next, move around to the rear of the matrix frame. Ensure that there are no missing backplane cover plates. Replace any missing cover plates to ensure proper cooling in the frame.
- 7 Place a hand near the air exhausts. Strong air pressure should be felt evenly across the entire opening.
- 8 Check cable connectors for any sign of unseating.

6. Maintenance

Fuse Replacement

- 9 Verify that one or both AC cords are firmly seated at both ends. Make sure that the spring bail power cord retainers on the rear of the frame are in place.

Fuse Replacement

If a problem occurs on a card, the first thing to do is check the fuses.

Fuses are located on each of the router's active cards. Each card features either a "fast blow" or a fuse that can be reset ("slow blow"). If the card requires a large amount of power, the fuse is "fast blow" and must be replaced if blown. If the fuse can be reset, reset the fuse by removing the card from the frame and letting the card temperature cool down. When the fuse temperature reduces to a safe operating temperature, the fuse automatically resets itself and the card can be reinstalled. The following table lists the fuses on each card:

Card or Module	Fuse Value
Power supply AC Line Fuse	8 Amp, 5 × 20 mm, Slow Blow
Control card	1 Amp, Fast Blow
Crosspoint card	1 Amp, Fast Blow
Input card	1 Amp, reset
Output card	1 Amp, reset
Monitor card	1 Amp, reset

Warning

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

Indicator LEDs

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

Indicator LEDs on Power Supplies

The five green LEDs on the front of the 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 NVISION Technical Support. (See Technical Support Contact Information on page iii.)
RED (LOW BATTERY)	Indicates the battery needs replacing. See Battery Replacement on page 102.
AMBER (ACTIVE)	Indicates the card is the active control card. On the reserve control card, this LED should be OFF.
GREEN (HEALTH)	Normally ON. Indicates the card is operating normally.

Indicator LEDs on Input, Crosspoint, and Output Cards

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 (ALARM)	Normally OFF. If it is lit, it indicates a problem; replace the card or call NVISION Technical Support.
GREEN (POWER)	Normally ON. Indicates the card is operating normally and receiving power.

Indicator LEDs on Fans

Each fan features two LEDs that indicate if the fan is operating properly. The fan LEDs are not visible when the router door is closed. However, the control cards monitor taxometers on the fans and forwards to determine if the fans are spinning and sends this information to the router control system. The LEDs indicate the following:

LED Indicator	Indicator Function
RED (ALARM)	Normally OFF. If it is lit, it indicates a problem and that fan is not spinning.
GREEN (POWER)	Normally ON. Indicates the fan is operating normally and receiving power.

Air Flow

The NV7512 draws cooling air from the front of the router, through the door, and exhausts heated air through the rear of the frame. The router must have the door properly installed and closed for proper airflow through the chassis. For maximum air flow, regularly inspect router fans and filters.

Caution If airflow is impeded overheating may occur.

6. Maintenance

Battery Replacement

Fan Cleaning and Replacement

Three plug-in fan trays containing two cooling fans each are located at the top, bottom, and right side of the router frame (when viewing from the front). The trays can be removed for inspection or cleaning by opening the frame front door, sliding the latches that hold each fan module in place, and pulling the module out of the frame. If the fans become dusty or clogged with lint, use a vacuum or compressed air to clean the dust off. Also check the openings at the back of the frame where air enters and exits to be sure dust and lint have not accumulated.

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

Intake Filter Screen Cleaning

The intake filter is located on the front door assembly of the NV7512 Audio Router. 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 card turns on, the battery located on the front edge of the card needs replacing. Grasp the exposed edge of the battery with your fingers and pull it towards you to remove it.

Call NVISION for replacement battery information.

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

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

Replacing Modules

Active cards, power supply modules and backplanes can be replaced or reconfigured in the router frame. Whenever reconfiguring, be sure each active card has the correct corresponding backplane.

Active Cards and Power Supply Modules

All front-loaded active cards and the power supply modules (PS6000) may be removed or installed with the power on (“hot swapped”). Prior to installing a replacement card, verify that user settings are configured correctly. Cards that receive and process serial data from the control card will automatically configure themselves at power up. If a card appears to be defective, first try re-seating it in the frame.

Backplanes

All backplanes are passive and may be removed at any time. Use the same cautions as exercised with front-loaded modules. Be sure to match backplanes to the corresponding front active cards. However, no damage will normally occur from an unintentional mismatch.

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 the [Introduction](#) on page 1 for an overview of the system and its major components. Try troubleshooting the system yourself, and if you are not successful, call NVISION 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. Check the AC line fuse on the power supply module. See Fuse Replacement on page 100.
One or a few PS6000 power supply modules not powering up or not operating properly.	Check that the PS6000 is fully seated in the frame. Reset the PS6000 by reseating it in the frame. Check that all five green LEDs on the front of the power supply modules are lit. If an LED is not lit, it indicates a branch circuit may be faulty, which could affect only certain modules in the frame. Replace the power supply. Check PS6000 fuses. See Fuse Replacement on page 100.

6. Maintenance

Obtaining Service

Symptom	Possible Causes and Solutions
Intermittent signal on one or two outputs.	Check input and output cable continuity Check AES Reference Check Video Reference Check cable terminations Possible bad card. Swap each card in the signal path with another card to see if the problem moves with the card. If so, replace the card. If all cables, terminations, and cards check out OK, call Technical Support. (See Technical Support Contact Information on page iii.)
Intermittent or missing signals on all outputs.	Problems with the AES 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 card, which processes the references to produce sync. A synchronous system requires an operational control card in order to pass signals. An asynchronous system will operate in its last state even if the control card is removed. Change over to the reserve control card 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:

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

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

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.
- 12 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 NVISION at your company's expense.
- 13 When repair or replacement of in-warranty equipment is complete, NVISION return ships the items at our expense. For out-of-warranty equipment NVISION charges a shipping and handling fee. The standard shipping method is Second Day.

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



7. Technical Details

This section provides electrical, video, audio, and mechanical specifications for the NV7512.

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 NV7512:

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 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 (512 x 512 Sync AES), power factor corrected 900 Watts typical (256 x 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	NVISION 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 degrees Centigrade Relative humidity: 0 to 90%, non-condensing
Regulatory Compliance	UL Listed and CE Compliant

7. Technical Details

Physical Specifications

Physical Specifications

The following table provides physical specifications for the NV7512.

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
Modules and Module Slots	16 Input cards, up to 32 signals each 16 Output cards, up to 32 signals each 4 Crosspoint cards 2 Control cards (1 primary, 1 optional secondary) 1 Monitor card 3 Fan modules
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: 75Ω
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: 75Ω or 110Ω 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-thru Impedance: 75 Ω Signal Details: See related section of this specification for details for each signal type, I/O levels and return loss.

7. Technical Details

Environmental Specifications

Specification	Detail
Control Expansion	Type: 10Base2 port Connector: 2, BNC, loop-thru Impedance: 50 Ω
Power Supply Monitor	Connector: DB25

Environmental Specifications

The following table provides environmental specifications for the NV7512.

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

Audio Specifications

The following table provides audio specifications for the NV7512.

Specification	Detail
Audio Reference Input	Type: Serial digital audio Standard: AES 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
AES3 Inputs/Outputs	Type: Balanced digital audio Standard: AES3 Sample Rate, Single Frame: synchronous 48, 96 or 192 kHz Sample Rate, Multiple Frames: synchronous 48, 96 or 192 kHz Connector: DB25 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, 96 or 192 kHz Sample Rate, Multiple Frames: synchronous 48, 96 or 192 kHz Connector: DIN 1.0/2.3 Impedance: 75 Ω Input Level: 100 mV to 1.2 Vpp Output Level: 1 V \pm 10%

7. Technical Details

Video Specifications

Specification	Detail
AES10 (MADI) Inputs/Outputs	Type: Unbalanced digital audio Standard: AES10 Sample Rate, Single Frame: synchronous 48 or 96 kHz Sample Rate, Multiple Frames: synchronous 48 or 96 kHz Connector: BNC Impedance: 75 Ω Input Level: 150 mV to 600 mV Output Level: 600 mV
Analog Audio Inputs/Outputs	Type: Analog audio Standard: 24-bit at 48 kHz Sample Rate: 48 kHz Connector: DB25 Impedance: Input >20K Ω , 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 \pm 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 μ S Input to Output Delay: <1.2 mS Crosstalk: -80 dB worst case Insertion Gain: \pm 0.1 dB CMRR: >75 dB from 60 Hz to 20 kHz

Video Specifications

The following table provides video specifications for the NV7512.

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 (>20,000 ohm), not selectable Input Level: 0.5 Vpp to 2.0 Vpp Input Return Loss: \geq 30 dB to 5 MHz

Time Code Specifications

The following table provides time code specifications for the NV7512.

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. Technical Details

Time Code Specifications



A. Part Numbers

This appendix provides a list of parts provided by NVISION for the NV7512 router and NV6257 power supply:

Power Supply

PS6000	Power supply module for the NV6257
WC0046	Power supply monitor cable
WC0085	Power supply “straight” cable for connecting one router to one NV6257 power supply

Frame Expansion

1211598	50Ω BNC terminator for terminating unused control system expansion connections.
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Backplanes

EM0420	Analog input backplane— Analog signals
EM0421	Analog output backplane— Analog signals
EM0486	AES input backplane— unbalanced signals
EM0485	AES output backplane— unbalanced signals
EM0490	AES input backplane— balanced signals
EM0491	AES output backplane— balanced signals
EM0492	MADI input backplane— MADI signals
EM0493	MADI output backplane— MADI signals
EM0429	Monitor backplane— Outgoing signals forwarded to monitoring equipment.
EM0512	Quad mix output backplane— unbalanced AES and analog signals

8. Part Numbers

Cards

Cards

EM0374	Control card
EM0418	Analog input card
EM0589-10	Analog output card
EM0476-02	Input card—MADI synchronous signals, balanced or unbalanced
EM0477-00	Output card—MADI synchronous signals, balanced or unbalanced
EM0488-12	AES input card—AES 3 synchronous signals, balanced or unbalanced
EM0489-13	AES Output card—AES 3 synchronous signals, balanced or unbalanced
EM0468	Monitor card
EM0511-01	Quad mix output card—AES unbalanced and analog signals. Requires Quad Mix controller (NV9660)
EM0525-10	TDM crosspoint card

Misc.

NV5000	Breakout cable for connecting from source or destination for AES balanced signals.
SM0478	Sample rate converter sub-module installed on MADI input card to process incoming asynchronous MADI signals.
EM0414	Clock generator card. Used to provide clock information to router in case primary control card fails and a secondary control card is not installed.



9. Glossary

AC	Alternating Current
A/D	Audio to digital
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.
AES3, AES3-id	The AES routers support AES3-id and provide 75Ω BNC connectors. AES3-id uses 75Ω coaxial cable up to 1000 meters. (AES3 uses 110Ω shielded twisted pair (STP) cable with XLR connectors up to a distance of 100 meters.)
Analog audio	A signal where the instantaneous voltage is proportional to the diaphragm velocity at the microphone.
ASIC	Application Specified Integrated Circuit
Asynchronous	A system where various signals are unlocked (not synchronized). Switching between signals leads to unpredictable results.
D/A	Digital to analog
DC	Direct Current
dBu	Unit of audio level where 0 dBu is 0.775 V rms.
EIA	Electronic Industries Alliance. The EIA (until 1997 Electronic Industries Association) is a trade organization for electronics manufacturers in the United States. EIA is accredited by the American National Standards Institute (ANSI) to help develop standards on electronic components, consumer electronics, electronic information, telecommunications, and Internet security.
ESD	Electrostatic discharge
FPGA	Field-programmable gate array
IMD	Inter-modulation distortion
I/O	Input / Output
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 reconfigure a function.
LED	Light Emitting Diode
MADI	Multi-channel Audio Digital Interface. MADIs are comprised of MADI signal streams. MADI streams can move up to 16 incoming or outgoing signals on a single wire.
Mini-DIN	Connector for DIN 1.0/2.3 connections.

9. Glossary

PROM	Programmable Read-only Memory. PROMs are manufactured as blank chips on which data can be written with a special device called a PROM Programmer.
RAM	Random Access Memory
RU	Rack Units. A standard measure or size for frames (1.75 inches).
Serial Control	Used to communicate via multiple serial ports at once.
SMS7000	Competitor's control system, similar to the NVISION NV9000 or NV910 control system.
TDM	Time Domain Multiplexing. A form of signal management that places incoming signals onto a single wire in sequence.
THD	Total harmonic distortion
Time code	An AES signal that is data; contains a time stamp of hours and minutes, usually associated with film and video frames, established by the SMPTE. Time codes provide a time reference for editing, synchronization, and identification. The time code is usually a low speed data signal, whose bit rate (nominally about 2.4 Kbs) and spectral content varies with changes in tape speed.
Unbalanced signals	Balance is defined in terms of the impedance of the two signal conductors with respect to a reference, which is usually ground. If these impedances are equal and non-zero, the system is balanced. If the impedances are unequal (including a signal conductor with a grounded return) the system is unbalanced.
UniConfig	Application used to configure the NVISION NV9000 or NV915 control system.
VDC	Volts of Direct Current



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