MediaMatrix®

A Division of Peavey Electronics Corporation

nion™

Network Input Output Node

Hardware Manual

v.05

Intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

CAUTION: Risk of electrical shock — DO NOT OPEN!
CAUTION: To reduce the risk of electric shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

WARNING: To prevent electrical shock or fire hazard, do not expose this appliance to rain or moisture. Before using this appliance, read the operating guide for further warnings.

Este símbolo tiene el propósito, de alertar al usuario de la presencia de "(voltaje) peligroso" sin aislamiento dentro de la caja del producto y que puede tener una magnitud suficiente como para constituir riesgo de descarga eléctrica.

Este símbolo tiene el propósito de alertar al usario de la presencia de instruccones importantes sobre la operación y mantenimiento en la información que viene con el producto.

PRECAUCION: Riesgo de descarga eléctrica ¡NO ABRIR!
PRECAUCION: Para disminuír el riesgo de descarga eléctrica, no abra la cubierta. No hay piezas útiles dentro. Deje todo mantenimiento en manos del personal técnico cualificado.

ADVERTENCIA: Para evitar descargas eléctricas o peligro de incendio, no deje expuesto a la lluvia o humedad este aparato Antes de usar este aparato, Iea más advertencias en la guía de operación.

Ce symbole est utilisé dans ce manuel pour indiquer à l'utilisateur la présence d'une tension dangereuse pouvant être d'amplitude suffisante pour constituer un risque de choc électrique.

Ce symbole est utilisé dans ce manuel pour indiquer à l'utilisateur qu'il ou qu'elle trouvera d'importantes instructions concernant l'utilisation et l'entretien de l'appareil dans le paragraphe signalé.

ATTENTION: Risques de choc électrique — NE PAS OUVRIR!
ATTENTION: Afin de réduire le risque de choc électrique, ne pas enlever le couvercle. Il ne se trouve à l'intérieur aucune pièce pouvant être reparée par l'utilisateur. Confiez I'entretien et la réparation de l'appareil à un réparateur Peavey agréé.

AVERTISSEMENT: Afin de prévenir les risques de décharge électrique ou de feu, n'exposez pas cet appareil à la pluie ou à l'humidité. Avant d'utiliser cet appareil, lisez attentivement les avertissements supplémentaires de ce manuel.

Dieses Symbol soll den Anwender vor unisolierten gefährlichen Spannungen innerhalb des Gehäuses warnen, die von Ausreichender Stärke sind, um einen elektrischen Schlag verursachen zu können.

Dieses Symbol soll den Benutzer auf wichtige Instruktionen in der Bedienungsanleitung aufmerksam machen, die Handhabung und Wartung des Produkts betreffen.

VORSICHT: Risiko — Elektrischer Schlag! Nicht öffnen!
VORSICHT: Um das Risiko eines elektrischen Schlages zu vermeiden, nicht die Abdeckung enfernen. Es befinden sich keine Teile darin, die vom Anwender repariert werden könnten. Reparaturen nur von qualifiziertem Fachpersonal durchführen lassen.

ACHTUNG: Um einen elektrischen Schlag oder Feuergefahr zu vermeiden, sollte dieses Gerät nicht dem Regen oder Feuchtigkeit ausgesetzt werden. Vor Inbetriebnahme unbedingt die Bedienungsanleitung lesen.

IMPORTANT SAFETY INSTRUCTIONS

WARNING: When using electrical products, basic cautions should always be followed, including the following:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding plug. The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point they exit from the apparatus.
11. Note for UK only: If the colors of the wires in the mains lead of this unit do not correspond with the terminals in your plug, proceed as follows:

    a) The wire that is colored green and yellow must be connected to the terminal that is marked by the letter E, the earth symbol, colored green or colored green and yellow.

    b) The wire that is colored blue must be connected to the terminal that is marked with the letter N or the color black.

    c) The wire that is colored brown must be connected to the terminal that is marked with the letter L or the color red.
12. Only use attachments/accessories provided by the manufacturer.
13. Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
14. Unplug this apparatus during lightning storms or when unused for long periods of time.
15. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
16. Never break off the ground pin. Write for our free booklet "Shock Hazard and Grounding." Connect only to a power supply of the type marked on the unit adjacent to the power supply cord.
17. If this product is to be mounted in an equipment rack, rear support should be provided.
18. Exposure to extremely high noise levels may cause a permanent hearing loss. Individuals vary considerably in susceptibility to noise-induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a sufficient time. The U.S. Government's Occupational and Health Administration (OSHA) has specified the following permissible noise level exposures:

Duration Per Day In Hours	Sound Level dBA, Slow Response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

According to OSHA, any exposure in excess of the above permissible limits could result in some hearing loss. Ear plugs or protectors to the ear canals or over the ears must be worn when operating this amplification system in order to prevent a permanent hearing loss, if exposure is in excess of the limits as set forth above. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels such as this amplification system be protected by hearing protectors while this unit is in operation.

SAVE THESE INSTRUCTIONS!

To prevent electrical shock or potential fire hazards, do not expose this product to moisture or rain. Before using this product, read the user manuals for further warnings and cautions.

The following cautions should be carefully observed when installing, wiring or using this product:

DO NOT use any other power supply or cable other than the one provided with this unit.

DO NOT remove the top cover of the unit. There are no user-serviceable parts inside. Refer service to qualified personnel.

DO NOT use solvents or other cleaners to clean the unit. Basic external care requires only a damp cloth. Disconnect the power supply cord before cleaning.

Read all safety and installation instructions and retain all documentation for further reference.

This product should be installed so that its mounting position does not interfere with proper ventilation. Do not block air intake or exhaust vents.

This product should not be installed or placed near a source of heat.

Power supply cords and associated connectors should be unplugged from the power source when the unit is not used for long periods of time or stored.

This product is designed for EIA rack mounting only. Use racks of sufficient depth and width to accommodate proper airflow and cable harnessing.

Care should be taken to ensure that the installation is clear of possible sources of contamination. Make sure that the product's ventilation openings are not exposed to possible sources of liquid, gases, or other contaminant's.

This product should be inspected by a qualified service technician if the power supply cord or connector has been damaged, if the unit has been dropped, or if a foreign substance has gained access to the interior electronic and electrical components.

The information contained in this manual is subject to change without notice. Peavey Electronics is not liable for improper installation or configuration. The information contained herein is intended only as an aid to qualified personnel in the design, installation and maintenance of engineered audio systems. The installing contractor or end user is ultimately responsible for the successful implementation of these systems.

Manual by WR/JP

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Manual Version History

Because of the dynamic nature of NION technology and the associated products, NION manuals are subject to frequent updates. Please make sure you have the latest version of this manual by checking our website:

http://mm.peavey.com.

The complete version history is summarized below:

v.01 - 02-03-05. Initial release version provides basic information only including features, panel callouts and specifications.

v.02 - 04-1-05. Added GPIO section

v.03 - 04-25-05. Consolidated manual for both current NION DSP products (n6 and n3).

v.04 - 06-24-05. Added Basic Configuration Section, Serial Port Pinout Information, Warranty Statement.

v.05 - 09-26-05. Corrections, Static IP configuration, RS-232 port pinout and description.

Thank You!

Thank you for purchasing the MediaMatrix® NION Network Input/Output Node. This product is designed to provide years of trouble-free operation and high quality performance. We are confident that you will find this product and other MediaMatrix products to be of the highest quality.

Objective

This manual includes information about the product's features, functionality and performance characteristics from a hardware perspective. If you require additional information that this manual does not provide, please consult the help file provided with the NWare application.

We are always looking for better ways to provide information about our products, and your input is always appreciated. If you have a comment about this manual or would like to make a suggestion, please write to: Peavey Electronics Corp., MediaMatrix Division, 5022 Hartley Peavey Drive, Meridian MS, 39305. Thank you again for using MediaMatrix!

What's In The Box?

NION Series products are packaged in a single container. This container includes the following items:

1- NION n6 or n3 Network Input/Output Node
1- IEC removable power supply cable (120 VAC Domestic)
1- Shielded CAT 6 Cable, 1'
1- Software Installation CD
1- User Manual/Literature Package

If any of these items are missing, please contact your Authorized Peavey MediaMatrix contractor/dealer.

Description

The NION (n. nee-on) n6 and n3 are programmable digital audio processing nodes designed for professional and commercial audio and communications applications. Coupled with floating-point DSPs and the industry's most efficient audio algorithms, the NION extends the world-class power of MediaMatrix to levels never seen before. The internal processing core is supported by a wide range of features including MediaMatrix's Scalable I/O Architecture, a modular I/O scheme that supports a variety of optional plug-in cards for maximum versatility. Four module bays support up to 64 simultaneous analog audio channels each while the integrated CobraNet port provides another 64 channels, for a total of 320 simultaneous configurable audio channels. The NION is built on a new embedded Linux architecture designed for stable, efficient and robust performance. A new 512-channel digital audio bus allows for seamless stacking and redundant, self-healing configurations. Low-latency audio across all I/O ports makes NION perfect for performance audio projects, in addition to applications where a large amount of audio processing is required. Software support includes an all-new Windows-based interface that works with multiple nodes across an Ethernet network. Additional support for third party control and SNMP management tools is included. An intuitive front panel interface features an LCD display, soft buttons and rotary encoder to enable access to common system functions. Additional control interfacing is provided by both RS-232 and RS-485 ports, while a new configurable GPIO system makes interface with hard-contacts and logic systems easier than ever.

Features

- Floating point DSP Engine with 6 (n6) or 3 (n3) DSP chips
- World-famous MediaMatrix audio algorithms
- 320 channels total audio I/O (not including XDAB)
- 32-bit processing engine
- 24-bit conversion
- Scalable I/O Architecture with four 32x32-channel bays
- Low-latency audio performance
- Integrated, modular CobraNet I/O
- Network-centric architecture
- Supports centralized, distributed or hybrid system models
- Integrated serial support
- X-DAB bus supports up to 512 bi-directional audio channels
- Front panel interface with intuitive user input controls
- Robust embedded Linux system controller
- Integrated flash-based storage
- Extensible Windows configuration and control client
- Support for SNMP network management tools
- Universal industrial-grade power supply
- Software support for large-scale multi-node systems
- Advanced DSP compiler
- Configurable GPIO with optional DIN rail break-out block
- Transparent control linking across physical nodes
- Supports redundant, self-healing configurations
- Supports sample rates of 48 kHz and 96 kHz
- Stand alone or combined operation

Applications

- Stadiums
- Auditoriums
- Arenas
- Civic centers
- Performing arts centers
- Theaters
- Courts of law
- Houses of worship
- Campus buildings
- Theme parks
- Hotel meeting rooms
- Conference centers
- Schools
- Cruise ships
- Teleconferencing
- Distance learning
- Large-scale paging
- Multi-purpose facilities
- Retail
- Restaurants & bars
- Gaming
- Institutional paging
- Communications
- Correctional facilities
- Professional complexes
- Residential

Front Panel Features
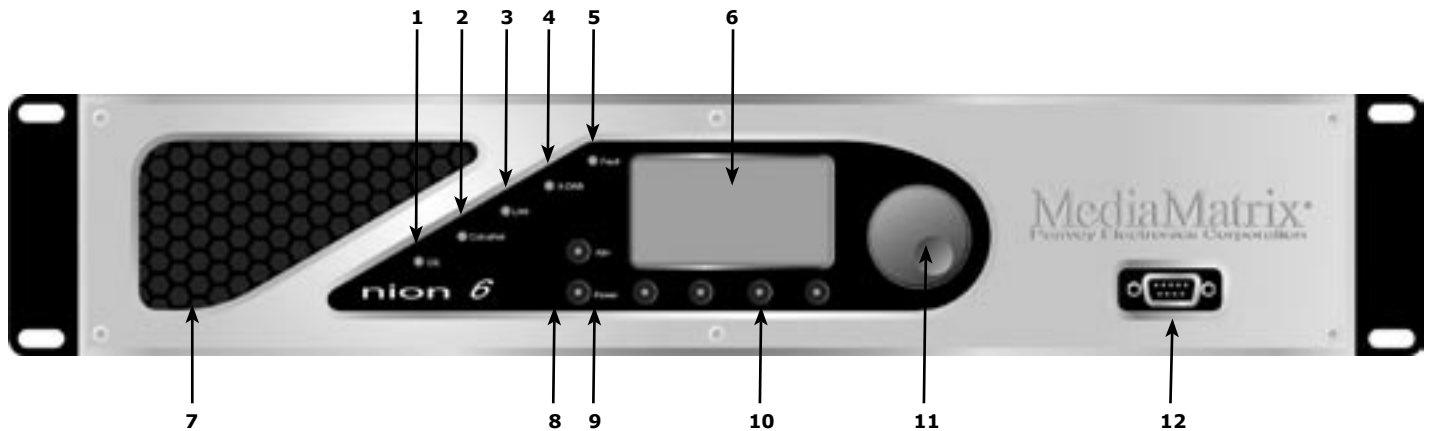
1. **IDE** Single-color LED indicates activity to/from the internal IDE storage media.

2. **CobraNet** Single-color LED indicates activity to/from the internal CobraNet audio transport.

3. **LAN** Single-color LED indicates activity to/from the Ethernet network interface.

4. **XDAB** Single-color LED indicates activity to/from the XDAB audio expansion bus.

5. **Fault** Single-color LED indicates muted audio condition.

6. **LCD Display** Backlit graphical display provides access to system hardware monitoring, configuration and status functionality.

7. **Air Vent** Air intake vent provides fresh air flow to internal cooling system. Do not block or obstruct this vent. Proper airflow must be maintained for proper operation.

8. **ATTN** Button includes a red LED that flashes when user response is required. Upon pressing, LCD will then jump directly to the LCD screen that will show the error.

9. **Power** Button will start the boot up process when in standby mode. When the unit is running, the button will cause the LCD screen to jump directly to the Power menu, where you can choose to Power Down or Reboot. Note that there is an intentional delay after powering off and before the Power button will turn on the unit. This is meant to protect the circuitry by allowing voltages to fully discharge. The integrated LED will not illuminate.

10. **Soft Buttons (4)** Momentary buttons used in conjunction with the LCD display allow user input and navigation of hardware functionality. The function of each button is indicated on the display text of the LCD display graphic nearest the corresponding button. The integrated LEDs will not illuminate.

11. **Data Wheel** Continuous action rotary encoder and embedded push-button provide navigation and data entry functionality in conjunction with the LCD display. The function of these controls is dependent on the active function of the LCD display.

12. **Serial Port** Female DB-9 panel connector provides RS-232 communications for external control protocols.

Rear Panel Features
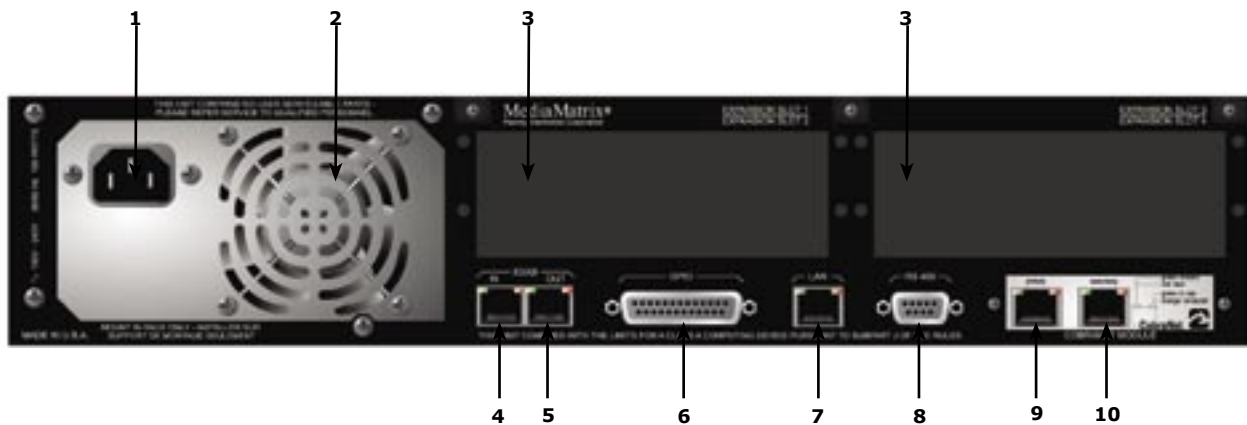
1. **Power Receptacle** Flush-mount IEC power receptacle for connecting a compatible IEC power cable (included). Use only the supplied cable or an equivalent international version.

2. **Power Supply** Industrial ATX format power supply with exhaust fan.*

3. **Module Bays** Housing bays for NION Series expansion cards. Up to 4 Nio Series I/O cards can be installed.

4. **XDAB In** RJ-45 panel connector accepts a shielded CAT6 data cable for transport of the proprietary NION digital audio input bus.

5. **XDAB Out** RJ-45 panel connector accepts a shielded CAT6 data cable for transport of the proprietary NION digital audio output bus.

6. **GPIO** Female DB-25 panel connector provides access to the internal GPIO control functionality.

7. **LAN** RJ-45 panel connector accepts a CAT5 data cable for data transport to/from the internal network interface. This connection is required on all units for system configuration and inter-unit communications.

8. **RS-485/422** Female DB-9 panel connector accepts a standard DB-9 connector (not included) to provide access to the external RS-485 or RS-422 external control protocols.

9. **CobraNet Primary** RJ-45 panel connector accepts a CAT5 data cable for data transport to/from the integrated CobraNet audio transport network interface.

10. **CobraNet Secondary** RJ-45 panel connector accepts a CAT5 data cable for data transport to/from the secondary integrated CobraNet audio transport network interface. Note that this port does not provide additional CobraNet capacity and only becomes active in the event that the network connected to the Primary CobraNet port becomes inoperative.

*Additional air flow is provided on the side panel opposite the power supply. Install with at least 2" of free clearance on sides of unit. Do not block any air intake or exhaust vent.

Basic Setup

Although there are many variables that exist for properly configuring the NION to pass audio, the most basic requirements are shown below. These basic parameters will ensure that you can connect, pass audio and control the NION processor.

Before you can get audio to pass through the NION, you will need to design your project file in the NWare software. Please refer to the Help within the NWare software for specific help on this. It is highly recommended that this process be deferred to system designers, engineers or technicians who have completed the NION Technology & Applications Factory Seminar.

To properly configure the NION for audio operation, the following items are required or recommended:

- NION n6 or n3 processing node
- At least one Nio Series analog audio input card
- At least one Nio Series analog audio output card
- A late model computer running Windows 2000/XP
- NWare software
- Properly configured NWare project file
- One Ethernet 100Base/TX network switch
- At least two CAT5 cables
- Audio source
- Powered loudspeaker
- Audio cabling

For the purposes of testing and establishing basic operation, configure the NION as a stand-alone processor. Typical connections for this configuration are shown in the illustration.
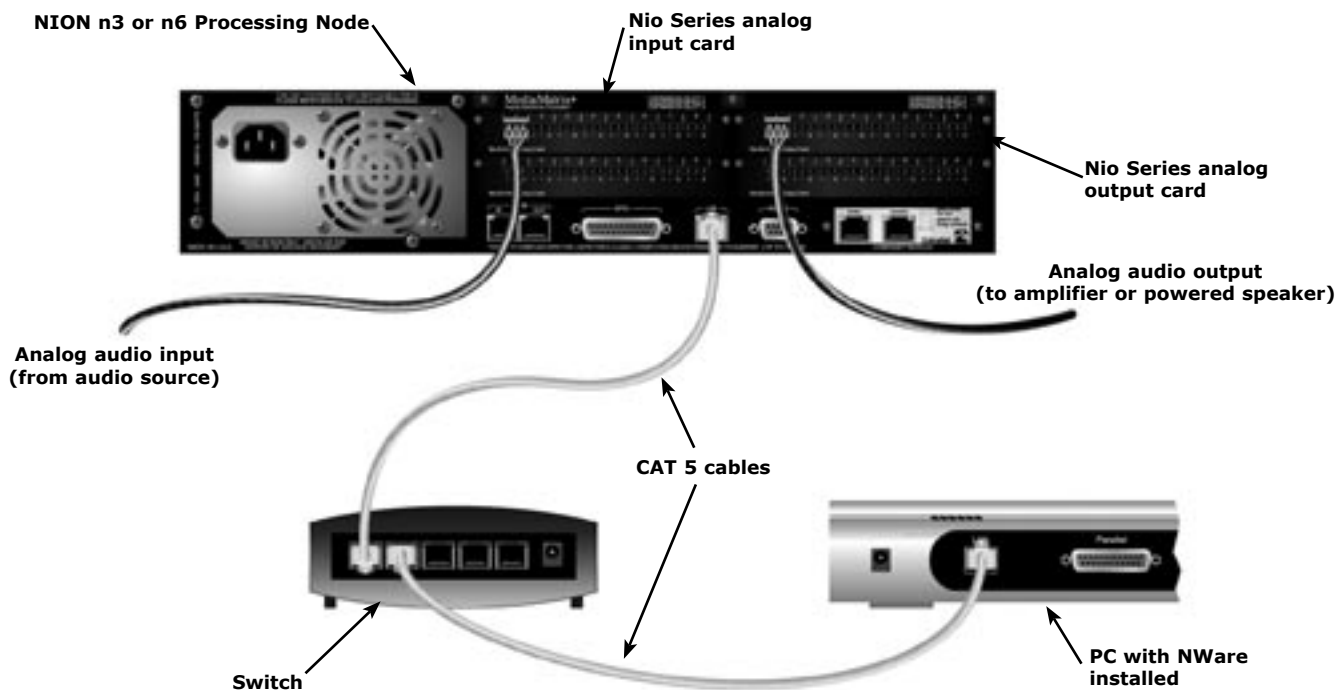
Configuration

When you have established typical connections and are ready to load your NWare Project File, you should first configure the NION's basic operational parameters. Certain functions, such as communications, may not function correctly until properly configured. The configuration process is accomplished with the NION's front panel interface.

The interface includes an LCD display, four context-sensitive soft buttons, two fixed function buttons and a data wheel with integrated push button. Basic navigation is accomplished with the soft buttons and the wheel, while the wheel's push button is used to select and confirm settings. Each section of the NION interface includes several pages. Each page is accessible in sequence, controlled by PREV and NEXT soft buttons. To complete an entry use the OK soft button. To cancel out completely, use the CANCEL soft button. Once a page is selected, the wheel and wheel push button will provide the navigation.

The cursor type indicates the action and position. An outlined cursor indicates the current cursor position. A solid filled cursor indicates a selection. Once a cursor position is selected, the wheel provides the ability to change the value at the current position. Pressing the wheel button again returns the cursor to position status.

Setting the IP Mode

DHCP vs. Static IP

Care should be taken when choosing to use Dynamic Host Configuration Protocol or DHCP rather than using a static IP address. DHCP mode is provided on the NION as a convenience when using NioNodes in informal settings, such as when you are experimenting. A static IP address should always be used when NioNodes are deployed in "production" systems. DHCP-obtained IP addresses depend on a "lease" to be maintained by the DHCP server in order to keep an assigned IP address. If the IP lease is allowed to expire, there is a chance that the IP assigned to one or more NioNodes could be lost, changed or reassigned, resulting in the loss of control or audio from a NION project.

The network administrator should be able to give you a range of static (or fixed) IP addresses to use for your project. When requesting these IP addresses, make sure to obtain enough to cover each unit (two if you are also assigning an IP to the CM-1).

Setting the NioNode for DHCP

1. Confirm that the network to which you are connecting the NioNode actually has a DHCP server. In DHCP mode and without this server, the NioNode will be unable to use TCP/IP.
2. Confirm that the NION is displaying the "Home" page as shown. If this screen is not displayed, there should be a "Home" prompt on the display just above the left soft button as shown in the next screenshot.

The first page of the Config Section is LAN CONFIG. This is the page where the NION's IP type, address, subnet mask and gateway configurations are set.

Setting the IP Mode - Continued

3. From the NION Home page, use the wheel to move the cursor to the "Config" icon. Then, press the wheel button to make the selection and bring up the first Configuration page, "LAN CONFIG".

4. For basic testing operation on a network that includes a DHCP server, move the cursor to the MODE position and push the wheel button to select. Once selected, move the wheel until the cursor position indicates "DHCP", and then push the wheel button again to confirm the settings.

5. Since we are using DHCP, we are not concerned about the actual IP address, the subnet mask or gateway since they are automatically assigned by the DHCP process.

NOTE: To use the NION in DHCP mode, the network must include a DHCP server. In this example, the DHCP server is provided by the router. Ensure that your test network is using a router. A plain switch will not provide the required DHCP server for our text example.

6. When you are sure that the IP address mode is configured correctly, select NEXT to advance to the next page, or OK to confirm the settings and exit. To abort the process, select CANCEL.

Setting the NioNode for Static IP

1. Confirm that the NION is displaying the "Home" page as shown. If this screen is not displayed, there should be a "Home" prompt on the display just above the left soft button as shown in the next screenshot.

2. From the NION Home page, use the wheel to move the cursor to the "Config" icon. Then, press the wheel button to make the selection and bring up the first Configuration page, "LAN CONFIG".

3. Move the cursor to the MODE position and push the wheel button to select. Once selected, move the wheel until the cursor position indicates "Static IP", and then push the wheel button again to confirm the settings.

Setting up the NION for Static IP. You must ensure that the first 3 numbers of the IP address (known as "octets") match the other NION devices and the PC running NWare. Currently, the only valid mask is 255.255.255.0. Gateway is only used to communicate with IP addresses across a router. If you have no router, Gateway should be 0.0.0.0.

4. Using the wheel and its push to toggle between field selection and adjustment mode, set your chosen IP address. Note that this IP address should be unique on the network to avoid conflicts.

5. The IP Mask should always be 255.255.255.0. No other mask values are currently supported.

6. If your subnet is connected to a router and this NioNode will be connecting to NioNodes or NWare sessions across the router, enter the router's IP address in the Gateway area.

7. When you are sure that the IP address mode is configured correctly, select NEXT to advance to the next page, or OK to confirm the settings and exit. To abort the process, select CANCEL.

Configuring for CobraNet

CobraNet is an important component of system design with NION products. In order to ensure proper operation of the CobraNet audio transport, several variables must considered.

The NION is shipped with a default CM-1 setting of 0.0.0.0, which means that the IP will be set only when the CobraNet Discovery application needs and assigns it. For any other use of TCP/IP with a CM-1, you must configure the IP address and Mask.

1. For DHCP operation, use the wheel and the wheel push button to set the IP address to 0 0 0 0 and the Mask to 255 255 255 0.
2. For fixed IP operation, use the same process to configure the IP address and Mask as required by your network.
3. Select NEXT to advance to the next page, or OK to confirm the settings and exit. To abort the process, select CANCEL.

For typical audio transport, it is generally not necessary to configure the CobraNet node for an IP address. However, because the CM-1 supports the Simple Network Management Protocol (SNMP), configuration of the IP Address and Mask may be required.

Setting the Time & Date

For proper operation and accurate reporting, it is critical to configure the NION to operate with the proper Time Zone, Time and Date settings.

1. Use the wheel and the wheel push button to change the CONTINENT, COUNTRY and ZONE settings for your location.

2. Once the settings are correct, select APPLY, then NEXT to advance to the next page.

3. The next page is the TIME / DATE page. Using the same procedure, set the hours, minutes, seconds and AM or PM for the TIME field.

4. Move the cursor to the DATE field and configure the month, date and year using the wheel and wheel push button as before.

5. Once the settings have been correctly configured, select APPLY, then NEXT to advance to the next page.

Correctly setting the time and location parameters will ensure that the event logs and other time sensitive information is accurately recorded and displayed.

This setting is especially important, since events are logged by time and date. An inaccurate configuration will prevent proper monitoring of system events.

Adjusting the LCD View Angle

The LCD CONFIG page provides adjustment of the LCD backlight intensity and the view angle.

1. Use the wheel and push button to select the LCD Backlight control.

2. Use the wheel's rotary control to select the desired value. The range is 0 (least intense) to 15 (most intense). When you are satisfied, select NEXT.

3. Use the wheel and push button to select the Viewing Angle control.

4. Use the wheel's rotary control to select the desired value. The range is 10 to 40 with the 20 position providing the highest contrast and color when viewing the display "head on" or directly in front.

5. When you are satisfied with the display setting, select NEXT to advance or HOME to complete the adjustment.

The perceived contrast is dependent on the viewing position. For example, a setting that provides high contrast when viewing the display from the front, may provide an inverted view when looking at the display from above. Adjust for the best view at the common working angle.

Setting the Network Services

The NETWORK SERVICES page provides access to global network services. Each control is a two-state control where the service is either ON (ENABLED) or OFF (DISABLED).

1. Use the wheel and wheel push button to configure the each service as required.

2. When you are satisfied with the services settings, select APPLY and press the wheel button to complete the adjustment.

About Network Services

WEB
The NION processor includes a built-in WEB server that provides access to several key hardware functions from any web browser. For more information about WEB services, please see the NWare help file.

SNMP
Simple Network Management Protocol is a network protocol that provides robust monitoring and control of system parameters across the network. Using SNMP, you can use a host of standard software tools and third-party systems to extend the control and monitoring power of the NION for a wide variety of applications.

TELNET
Telnet is a communications protocol that provides access to the Linux system kernel on the NioNode. Note that the TELNET function is not required for communications with the NWare software or for using RATC. For this reason, we recommend that you leave TELNET in the disabled state.

For more information on network services, please see the NWare Software help.

Configuring Security

An integral password-based security function is included in the NION hardware. This feature allows the system designer to secure the NION by locking all front panel functionality.

To enable security, a front-panel password, or "combination" must be configured. Once the combination is correctly configured, the system can be locked from the system LOCK screen.

1. Using the wheel and the wheel push button, move the cursor to each field and select a number. If a previous combination exists, you can change the combination at this screen as well.

   NOTE: If you would like to disable the FRONT PANEL COMBINATION feature enter the old combination to gain access to the new combination function. Enter 0 0 0 0 as the new combination.

2. When you are satisfied with your combination, move the selection to APPLY and press the wheel push button. Exit this page by selecting HOME to return to the main page.

3. Move the cursor to the LOCK icon and use the wheel push button to enter the LOCK screen.

4. Use the wheel and the wheel push button to enter the combination configured in step 1.

5. Move the cursor to LOCK and push the wheel's push button to engage security, or select CANCEL to abort the process.

6. Relock the front panel upon completion

CAUTION: The FRONT PANEL COMBO fea ture will secure the NION from front panel access. A lost password cannot be retrieved and there is no "back door". If the password combination is lost, the NION must be reset to a virgin state, thereby discarding any resident audio configuration files. Use the FRONT PANEL COMBO and LOCK features with caution.

The NION security combination is a 4-digit numeric password. If a previous password exists, it must be entered before any changes can be enabled.

Once the LOCK function has been enabled, access to the front panel is not possible. To re-gain access, enter the combination on the Unlock screen and select UNLOCK.

Once the LOCK function has been enabled, access to the front panel is not possible. To re-gain access, enter the combination on the Unlock screen and select UNLOCK.

GPIO Overview

NION Series products include a versatile GPIO (General Purpose Input Output) system for terminating external logic, controls, relays and other external systems. Each control pin is supported by NWare for configuration, control and monitoring. Any combination of control pins may be used simultaneously, regardless of the configuration. For information on the GPIO configuration options, please refer to the NWare Help, included with the software.

The GPIO system provides the following features:

Configurable General Purpose ports (16 Control Pins)

These ports represent the bulk of the NION's GPIO functionality. Each of these ports can be configured as follows:

Digital In (3.0V TTL logic - Low: 0VDC - 0.8VDC; High: 2.0VDC - 24VDC)
Digital Out (3.0V TTL logic - Low: 0VDC - 0.4VDC; High: 2.4VDC - 3.3VDC)
Analog In 1K, 12V (using external 12VDC power source)
Analog In 10K, 12V (using external 12VDC power source)
Analog In 10K, 24V (using external 24VDC power source)
Analog In 1K, self powered (pin feeds required voltage through pot or switch to common)
Analog In 10K, self powered (pin feeds required voltage through pot or switch to common)
Rotary Encoder (requires 2 pins and a common)
Raw (all modes available, software configurable)
Clock signals on pins 6-8*

High current output ports (4 Ports)

Each high current port provides 11.5VDC at 0.5A. High current outputs can be configured for straight logic (on/off) or PWM (Pulse Width Modulation) operation.

Fault relay

A single system relay is configured for supervising project faults. This Form C relay provides 1A contacts and is activated when the front panel fault LED is illuminated, which indicates a muted condition. Muted conditions could indicate many things, including the following

- A firmware/Role mismatch
- A voltage rail malfunction
- XDAB Fault Policy exceeded
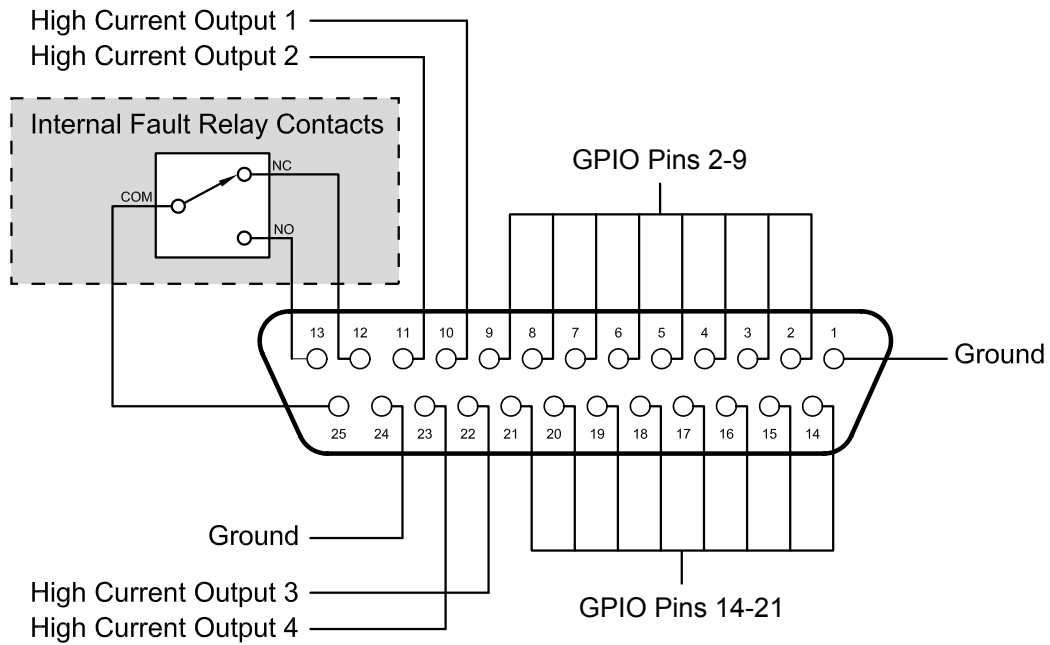- Network or Network Synchronization lost

Connection

The rear panel of the NION includes a 25-pin DSub connector (DB-25) for accessing the GPIO functions. Although it is possible to terminate GPIO functions directly to the DB-25 connector, we recommend that you use the optional breakout accessory (GPIO-25: Peavey Part# 00510490). The GPIO-25 is a convenient way to access each pin and facilitates easy rack wiring and troubleshooting. The GPIO-25 is a DIN rail package and includes removable Euro connectors for terminating the pins. A single DB-25 male/female cable connects the GPIO-25 to the NION.

The illustration on the following page shows the pin assignments for the GPIO system. If you are using the GPIO-25, use the screened pin numbers to identify the functions available for the associated captive wire terminal.

* Not discussed in this document. Please see the NWare help file.

GPIO Pin Assignment

High Current Output 1
High Current Output 2
Internal Fault Relay Contacts
NC
COM
NO
GPIO Pins 2-9
Ground
Ground
High Current Output 3
High Current Output 4
GPIO Pins 14-21

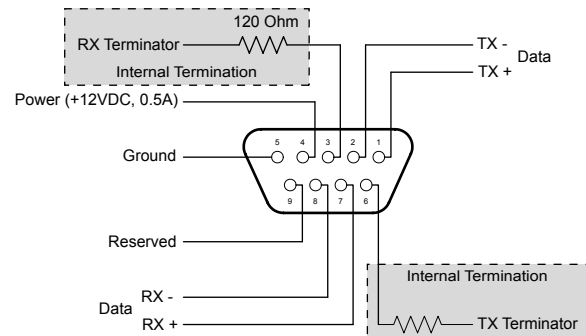| PIN	FUNCTION
1	Ground
2	Configurable GPIO
3	Configurable GPIO
4	Configurable GPIO
5	Configurable GPIO
6	Configurable GPIO
7	Configurable GPIO
8	Configurable GPIO
9	Configurable GPIO
10	High Current Output 1
11	High Current Output 2
12	Fault Relay N.C.
13	Fault Relay N.O.
14	Configurable GPIO
15	Configurable GPIO
16	Configurable GPIO
17	Configurable GPIO
18	Configurable GPIO
19	Configurable GPIO
20	Configurable GPIO
21	Configurable GPIO
22	High Current Output 3
23	High Current Output 4
24	Ground
25	Fault Relay Common

Serial Communications

NION supports both RS-422 full duplex and RS-485 half-duplex serial communications. A single rear panel female DB-9 connector provides access to both protocols. Follow the pinout drawings and charts below for terminating either protocol. Note that both protocols cannot be used simultaneously.

RS-422 Serial Port

For RS-422 separate data pairs are provided for transmit (TX) and receive (RX). Additionally, there is a 120 Ohm terminating resistor provided for each data pair for applications that require an EOL termination. The termination is optional and is accessible by connecting the terminating pin for each data transport pair. To enable termination for the transmit pair, connect the terminating resistor pin (TX Terminator) to the positive data transmit (TX+) pin. To enable termination for the receive pair, connect the terminating resistor pin (RX Terminator) to the positive data receive (RX+) pin.

Power (+12VDC) is provided on pin 4 and is referenced to ground, pin 5. The power pin is protected by a self-resetting fuse and is limited to 0.5A, max.

NOTE: Transmit (TX) and Receive (RX) are from the point of view of the NioNode. Connect them to the opposite port of the remote unit.
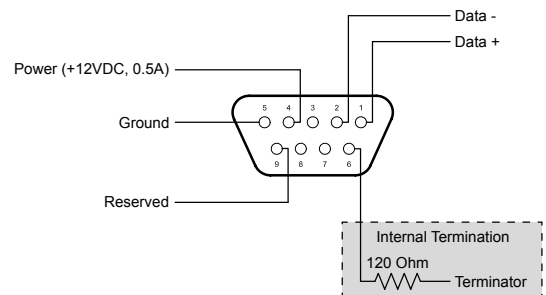
PIN	FUNCTION
1	TX Data +
2	TX Data -
3	RX 120 Ohm Terminating Resistor
4	+12VDC (0.5A)
5	Ground
6	TX 120 Ohm Terminating Resistor
7	RX Data +
8	RX Data -
9	Reserved (no connection)

RS-485 Serial Port

For RS-485 applications the serial port is configured for half-duplex operation. A single data pair is provided for transmit (Data+) and receive (Data-).

Additionally, there is a 120 Ohm terminating resistor provided for applications that require an EOL termination. The termination is optional and is accessible by connecting the terminating pin (TX Terminator) to the positive data (Data+) pin.

Power (+12VDC) is provided on pin 4 and is referenced to ground, pin 5. The power pin is protected by a self-resetting fuse and is limited to 0.5A, max.

PIN	FUNCTION
1	Data +
2	Data -
3	Not used
4	+12VDC (0.5A)
5	Ground
6	120 Ohm Terminating Resistor
7	Not used
8	Not used
9	Reserved (no connection)

RS-232 Port

In addition to the rear panel serial ports, the NION also includes a front-panel RS-232 port. This port can be used for external control of software-based controls in the same way as the RS-485/422 port.
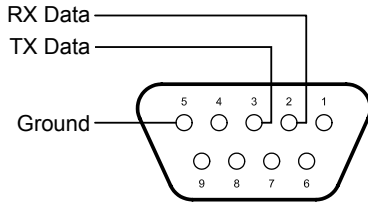
PIN	FUNCTION
1	N.C.
2	RX Data
3	TX Data
4	N.C.
5	Ground
6	N.C.
7	N.C.
8	N.C.
9	N.C.

NOTE: Transmit (TX) and Receive (RX) are from the point of view of the NioNode. Connect them to the opposite port of the remote unit.

Serial Control Protocols

You may use any of the following protocols with these ports:

• PASHA/PageMatrix - same as the classic PASHA protocol on Miniframes and Mainframes
• PASHA/XControl - Provides basic 'S' (Set) PASHA functionality with X-Net2-style trigger commands
• RATC1 - same as classic RATC, but via the serial ports
• RATC2 - RATC2 via serial ports

Definitions:
• **PASHA** - Peavey Audio Serial Handling Adapter, a serial protocol for controlling MediaMatrix systems from external control systems
• **RATC** - Remote Access Telnet Command, a protocol for controlling MediaMatrix systems from external control systems that are capable of TCP/IP and Telnet communications

Specifications

Rear Panel Connections

Mains Power: 100v > 240v 50/60 Hz 300W A/C. Terminated to rear panel IEC connector.
LAN: Female RJ-45 - transports control and communications via Ethernet on Category 5e (CAT5e) cabling.
XDAB: Dual Female RJ-45 Connector - proprietary LVDS signaling via shielded Category 6 (CAT6) cable terminated with shielded male RJ-45 jacks, max. length 10 feet (3m).
Serial: Female DB-9 - supports bi-directional RS-422 full duplex and RS-485 half-duplex multi-drop serial communications.
CobraNet: CM-1 Module with 2 Female RJ-45 connectors - transports digital audio via CobraNet audio network on Category 5e (CAT5e) cabling terminated with male RJ-45 jacks.
GPIO: Female DB-25 - breaks out configurable general purpose logic and status connections to external DIN terminating block (optional).
I/O Bays: 4x Proprietary I/O Card Slots - supports proprietary audio and interface cards, available separately.

Front Panel Connections

RS-232 Serial: Female DB-9 - supports general purpose RS-232 communications.

Digital Audio Performance

Audio Processing: 32-bit floating point audio.
Processing: PowerPC Host (Linux OS) with 6 (n6) or 3 (n3) ADI Sharc Hammerhead digital signal processors.
DSP MFLOPS: 2400 sustained, 3600 peak (n6); 1200 sustained, 1800 peak (n3).
Sample Rate: Configurable, 22.05KHz, 24KHz, 32KHz, 44.1KHz, 48KHz, 64KHz, 88.2KHz, 96KHz.
Latency: Configurable, minimum latency (analog in to analog out @ 48kHz sample rate, 8 sample vector) 1.8msec. Total latency varies with audio configuration.
Storage: 256 Mbit Compact Flash, supports OS, configuration, control and .wav audio.

XDAB Performance

Data Format: 32-bit floating point audio.
Protocol: Proprietary.
Channels: 512 channels at 48kHz, 256 channels at 96kHz.
Maximum XDAB Latency: 3 sample vectors.
Synchronization: +/-20ns box-to-box word clock sync (via Ethernet).
Redundancy: Dual counter-rotating rings.
Cable Length: 10 foot (3m) maximum cable length.

CobraNet Performance

Data Format: 16/20/24-bit audio (default = 20)
Protocol: Ethernet with Proprietary CobraNet protocol.
Channels: 64 channels at 48kHz

GPIO

Connections: 20 ports configurable pins and a fault output via internal Form-C relay
Digital Input: Vin < 0.8VDC = logic 0; Vin > 2.0VDC = logic 1 (1.2V hysteresis).
Analog Input: 0.0VDC < Vin < 24.0VDC; 12-bit analog converter precision.
Digital Output: logic 0 Vout = 0.0VDC, Isink <= 2mA; logic 1 Vout = 3.3DC, Isource <= 2mA.
High Current Outputs: 4 ports, each with a 0.5A self-resetting fuse and protection diodes for driving inductive loads. Vout = 11.5V nominal @ Isource = 0.5A. Direct short protection from ground to +36V.
Relay Contacts: Form C contacts rated at 0.3A @ 125VAC or 110VDC, or 1A @ 30VDC.

Mechanical Specifications

Chassis Style: 2RU EIA rack package
Installation: EIA rack mount only
Dimensions: 19 in. W x 16.8 in. D x 3.5 in. H
Cooling: Forced air, front and side panel intake, rear exhaust.

Architect's & Engineer's Specifications

Audio Processing Node

The audio processing node shall be a 2RU industrial package designed for fixed installation in engineered audio and communications systems. The unit shall include an architecture based on an integrated floating-point Digital Signal Processor (DSP) engine with at least 3 DSP chips. The DSP shall operate with a common internal digital audio bus and support at least 512 simultaneous high-speed digital audio channels. The digital audio bus shall include an external expansion port that supports an additional 512 audio channels of bus-level connectivity for connecting additional units. Separate transmit and receive ports shall be provided for the external digital audio bus. Software devices shall be included to allow the digital audio expansion ports to be easily integrated into the configuration file. The DSP shall be completely configurable via a Windows-based software utility, with additional tools for creating user interface clients and integration with third-party control systems. Customizable I/O, control and signal flow design algorithms shall be integrated within the design environment for intuitive system configuration. This software shall include an XML architecture. Support for standard Ethernet management, including, but not limited to SNMP shall be standard from an integrated, rear-panel LAN port. The audio processing node shall include an embedded Linux operating system. The operating system shall reside on non-mechanical IDE storage media. The storage system shall include support for reading/writing data from the operating system, configuration software and the front panel. Audio file support, including but not limited to .wav audio, shall be standard and shall be completely integrated with the unit's software tools. A non-mechanical storage device of at least 256M shall be used as the primary storage media and operating system root. The audio processing node shall include a modular I/O card bay system for support of four expansion cards. Each expansion bay shall be capable of supporting not less than 32 inputs and 32 outputs of simultaneous audio. Cards shall be available for microphone and line-level analog audio with options for digital and proprietary audio transports. The audio node shall include a CobraNet audio transport module with support for at least 64 20-bit digital audio channels. Separate software devices shall be provided for integrating CobraNet audio I/O into the configuration file. The audio processing node shall include support for serial data transport including an RS-232 and RS-485/422 port. All data transports, including Ethernet, shall be available simultaneously and shall include software devices for integration into the configuration file. The audio processing node shall include an integrated GPIO control system with at least 16 configurable low-current, low voltage ports and 4 configurable high-current ports. All GPIO ports shall include software devices for integrating their function into the configuration file. The audio processing node shall include a front panel interface with LCD display. Navigation of the display shall include a rotary data wheel with push switch and at least four context-sensitive soft buttons. Status LEDs shall be included on the front panel for monitoring network status, storage, audio faults and power conditions. The audio processing node shall be fan-cooled with a front-panel intake and shall operate with a modular universal computer-grade power supply. The audio processing node shall be the MediaMatrix NION n6 or n3 or approved equal.

FC

FCC Compliancy Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications to the equipment not approved by Peavey Electronics Corp. can void the user's authority to use the equipment.

Warranty Statement

MediaMatrix®
PEAVEY ELECTRONICS CORPORATION
DOMESTIC (USA) LIMITED WARRANTY
Effective Date: May 1, 2005

What This Warranty Covers: This Warranty covers defects in material and workmanship in Peavey MediaMatrix products purchased and serviced in the United States of America (USA).

What This Warranty Does Not Cover: The Warranty does not cover: (1) damage caused by accident, misuse, abuse, improper installation or operation, rental, product modification or neglect; (2) damage occurring during shipment; (3) damage caused by repair or service performed by persons not authorized by Peavey; (4) products on which the serial number has been altered, defaced or removed; (5) products not purchased from an Authorized MediaMatrix Integrator. This warranty does not cover associated costs incurred from servicing equipment, including, but not limited to, travel, jobsite-related costs, fabrication, freight, loaner equipment, installation, cabling or harnessing, mounting materials or other variable costs.

Who This Warranty Protects: In applications where the product is sold "over the counter", this Warranty protects the original retail purchaser. In applications where the product is part of an integrated system, and such system is warrantied by the integrator as a complete assembly, this Warranty protects only the system integrator.

How Long This Warranty Lasts: The Warranty begins on the date of purchase by the original retail purchaser or on the date received by the system integrator. (See "Who This Warranty Protects", above). The duration of the Warranty varies by product as summarized below:

MediaMatrix® DPU cards, NION™ Processing Nodes,
Breakout Boxes, I/O cards, Cinema Processors,
Power Amplifiers, Pre-Amplifiers, Mixers,
Electronic Filter Sets and Dynamics Processors: **5 years**

MM Series Cardframes, MF Series Cardframes,
ControlMatrix™ Host Processors, Servers and Controllers,
Remote Control Panels, Plates, Paging Stations,
Ambient Sense Devices and other devices installed in user-accessible
locations: **1 year**

Loudspeaker Components (including speakers, baskets, drivers,
diaphragm replacement kits and passive filter networks.)
and all Accessory Products: **90 days**

What Peavey Will Do: We will repair or replace (at Peavey's discretion) products covered by warranty at no charge for labor or materials. If the product or component must be shipped to Peavey for warranty service, the consumer must pay initial shipping costs. If the repairs are covered by warranty, Peavey will pay the return shipping costs.

How To Get Warranty Service: End Users: Take the defective product and your dated sales receipt or other proof of purchase to your Authorized MediaMatrix Systems Integrator or Authorized Peavey Service Center. System Integrators: Ship the defective product, prepaid, to Peavey Electronics Corporation, International Service Center, 412 Highway 11 & 80 East, Meridian, MS 39301, 601-483-5365. Include a detailed description of the problem, the name and location of the jobsite and a copy of your invoice as evidence of warranty coverage. Please include a complete return shipping address.

Limitation of Implied Warranties: ANY IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE LENGTH OF THIS WARRANTY.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Exclusions of Damages: PEAVEY'S LIABILITY FOR ANY DEFECTIVE PRODUCT IS LIMITED TO THE REPAIR OR REPLACEMENT OF THE PRODUCT, AT PEAVEY'S OPTION. IF WE ELECT TO REPLACE THE PRODUCT, THE REPLACEMENT MAY BE A RECONDITIONED UNIT. PEAVEY SHALL NOT BE LIABLE FOR DAMAGES BASED ON INCONVENIENCE, LOSS OF USE, LOST PROFITS, LOST SAVINGS, DAMAGE TO ANY OTHER EQUIPMENT OR OTHER ITEMS AT THE SITE OF USE, OR ANY OTHER DAMAGES WHETHER INCIDENTAL, CONSEQUENTIAL OR OTHERWISE, EVEN IF PEAVEY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

If you have any questions about this warranty or service received, or if you need assistance in locating an Authorized Service Center, please contact the Peavey International Service Center at (601) 483-5365.

Features and specifications subject to change without notice.

MediaMatrix®

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