EC9535
GSC Node Bus Converter

User's Guide

EC9535 User's Guide

- **Revision**: 1.0

- **Software Version**: -na-

- **Part Number**: UG0050-00

Notice

FCC 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.

Declaration of Conformance (CE)

All of the equipment described in this manual has been designed to conform with the required safety and emissions standards of the European Community. Products tested and verified to meet these standards are marked as required by law with the CE mark. (See Symbols and Their Meanings on page v.)

When shipped into member countries of the European Community, this equipment is accompanied by authentic copies of original Declarations of Conformance on file in Miranda offices in Grass Valley, California USA.

Trademarks

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Brand and product names mentioned in this manual may be trademarks, registered trademarks or copyrights of their respective holders. All brand and product names mentioned in this manual serve as comments or examples and are not to be understood as advertising for the products or their manufactures.

Software License Agreement and Warranty Information

Contact Miranda for details on the software license agreement and product warranty.

Technical Support Contact Information

Miranda has made every effort to ensure that the equipment you receive is in perfect working order and that the equipment fits your needs. In the event that problems arise that you cannot resolve, or if there are any questions regarding this equipment or information about other products manufactured by Miranda, please contact your local representative or contact Miranda directly through one of the appropriate means listed here.

- Main telephone: 530-265-1000 (9 am to 9 pm PST)
  Fax: 530-265-1021

  In the Americas, call toll-free: +1-800-224-7882 (9 am to 9 pm EST)
  In Europe, the Middle East, African or the UK, call +44 (0) 1491 820222 (9 am to 6 pm, GMT)
  In France, call +33 1 55 86 87 88 (9 am to 5 pm, GMT + 1)
  In Asia, call +852-2539-6987 (9 am to 5 pm, GMT + 8)
  In China, call +86-10-5873-1814

- Emergency after hours: toll-free: +1-800-224-7882
  Tel: +1-514-333-1772

- E-Mail:

  In the Americas, support@miranda.com
  In Europe, the Middle East, African or the UK, eurotech@miranda.com
  In France, eurotech@miranda.com
  In Asia, asiatech@miranda.com
  In China, asiatech@miranda.com

- Website: http://www.miranda.com

- Mail   Shipping

  Miranda GVD   Miranda GVD
  P.O. Box 1658   125 Crown Point Court
  Nevada City, CA 95959, USA   Grass Valley, CA 95945, USA

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

Change History

The table below lists the changes to the EC9535 GSC Node Bus Converter User's Guide.

- User's Guide Part # UG0050-00

- Software version: -na-

Rev	Date	ECO	Description	Approved By
1.0	14 Dec 09	16272	Initial release	DEM

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Restriction on Hazardous Substances (RoHS)

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

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

It is our objective at NV to maintain compliance with all relevant environmental and product regulatory requirements. Detailed information on specific products or on the RoHS program at Miranda is available from Miranda Customer Support at

1-800-719-1900 (toll-free) or
1-530-265-1000 (outside the U.S.).

Important Safeguards and Notices

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

Warning

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

Symbols and Their Meanings

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

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

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

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

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

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

General Warnings

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

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

• Do not use this equipment in or near water.

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

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

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

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

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

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

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

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

General Cautions

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

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

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

• Use only the specified replacement parts.

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

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

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

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

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

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1. Introduction

The EC9535 GSC Node Bus Converter is a communications protocol converter designed to enable Miranda's NV8288, NV8288-Plus or NV8500 Family (NV8144, NV8280 or NV8576) routers to communicate with a SMS7000 system controller. A system controller is a hardware system that runs a router control system application. The router control system sends commands to a router's control cards (i.e., circuit boards), telling them what switching tasks to perform.

The SMS7000 system controller requires a GSC Node Bus connection in order to connect and communicate with the router. All of Miranda's routers have a GSC Node Bus connection, except for the NV8288, NV8288-Plus or NV8500 Family. The EC9535 solves this problem by providing an interface with a GSC Node Bus. The SMS7000 connects to the EC9535, which in turn, is connected to the NV8288, NV8288-Plus or NV8500 Family router.

Product Overview

The EC9535 GSC Node Bus Converter is used as an interface between a SMS7000 system controller and a specific Miranda router. Unlike a router, the EC9535 does not actively manage signals. Instead the EC9535 provides a GSC Node Bus to serial interface that enables a SMS7000 system controller to communicate with Miranda routers that feature only serial system controller connections. In addition, the EC9535 provides high reliability through redundant power supplies and redundant control cards, as well as deterministic communications processing.

Mounting

The EC9535 GSC Node Bus Converter mounts in a rack with minimum dimensions of 2RU high (3.47 inches, 88.1 mm), and 16.0 inches (406 mm) deep. When placing the rack in your facility, be sure to leave enough space for air flow through the front and rear of the EC9535 and within easy access of an AC power source. For mounting instructions, see Rack Mount on page 10.

Fuses

The EC9535 GSC Node Bus Converter has no user-serviceable fuses.

Cooling

The EC9535 GSC Node Bus Converter has one fan providing forced air cooling. The fan is accessed from the front of the frame. The fan draws cooling air from the front of the frame, through the door, and exhausts it through a grill in the rear door. The EC9535 must have the door correctly installed and closed for proper airflow through the chassis.

Caution	If airflow is impeded, overheating may occur.

Power Supply

Power for the EC9535 is supplied through the Miranda PS0007 power supply module. The PS0007 power supply module accepts a wide range of AC input voltages and produces +48 VDC outputs. The power supply automatically senses the AC input voltage range (90–130 and 180–250 VAC) and adjusts to maintain a relatively constant DC output; no voltage selection is required.

Frame Front

The front of the EC9535 GSC Node Bus Converter features a single door. When facing the front of the frame the right-hand side features an open grill through which a fan draws cooling air. A handle is provided on the left-hand side. The door is hinged on the right-hand side and swings open from left to right. By opening the door, you can access the control cards.

Figure 1-1 shows the front of the EC9535 with the door closed. Figure 1-1 shows the EC9535 with the door removed. The card guides that house the control cards are visible.
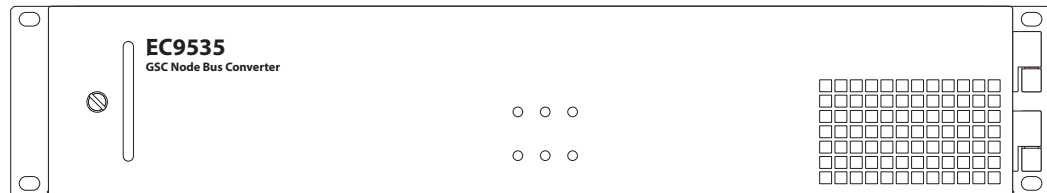
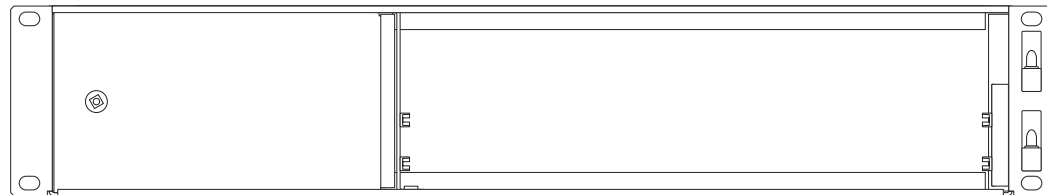Figure 1-1. Front of EC9535 with Door Closed

Figure 1-2. Front of EC9535 with Door Removed

Control Cards

The EC9535 has two control cards (EM0374), one primary and one secondary. The secondary card is optional and used as a redundant, or stand-by, controller. Each control card is equipped with a special mezzanine (SM0220) that facilitates communication between the control cards and the SMS7000 system controller. Each card receives commands from a router control system, and in turn, sends commands to the connected router's control cards. Only the active control card sends commands. The active control card updates the stand-by control card.

Both the primary control card and the secondary control card receive commands from the router control system, but only the active control card responds. Because both cards receive router control system commands, if the active control card fails, the stand-by control card automatically takes over processing without interruption. In addition, the primary control card and secondary control card communicate with each other. Should either control card fail, the newly active control card communicates the failure to the router control system.

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 21.

Rear Connections

The rear of the EC9535 frame features a back plate containing several connections for managing system functions and two power connections:
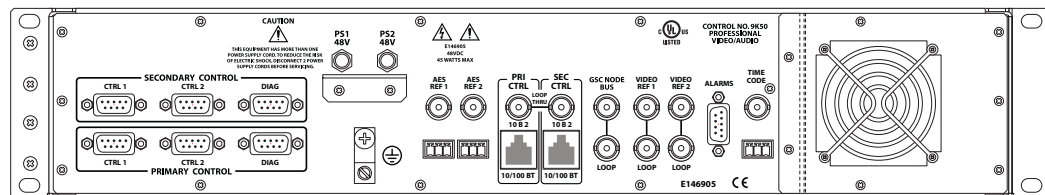

Figure 1-3. EC9535 (Rear View)

These connections enable you to connect to a system controller, reference signals, power sources and system alarms. When facing the rear of the frame, the far right-hand side has a grill behind which is located the fan for frame cooling. All system and power connections are located to the left of the fan.

GSC Node Bus Control Connections

The EC9535 GSC Node Bus Converter has one port labeled 'GSC NODE BUS', as shown in Figure 1-4. This connection is used to connect a SMS7000 system controller to the EC9535. In turn, the EC9535 is connected to a NV8288, NV8288-Plus or NV8500 Family router. Through the GSC Node Bus connection, the SMS7000 router control system sends commands to both the EC9535's primary and secondary control cards. In turn, the control cards forward the commands to the attached router through serial connections. (See Serial Control Connections on page 3.) For installation instructions, see Making System Controller Connections on page 11.
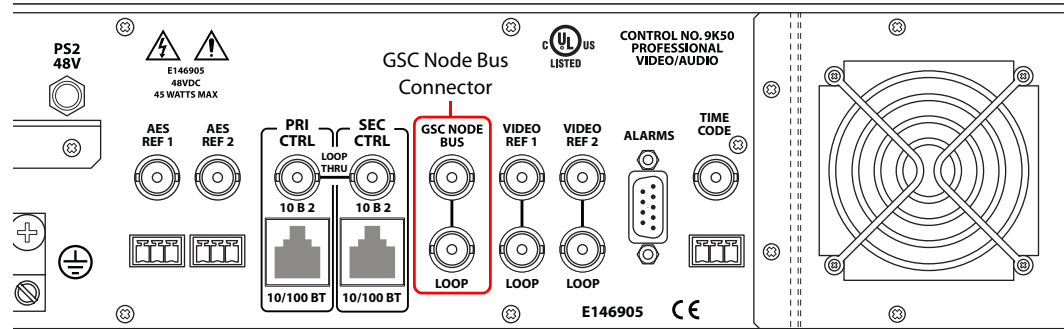

Figure 1-4. GSC Node Bus Control Connection (Rear View)

Serial Control Connections

Figure 1-5 shows the serial control connections to the router. The ports are divided into two sets, one primary control and one secondary control. Primary control is the connection to a router's primary control card. Secondary control is the connection to a router's secondary control card (which

is optional for redundancy). Each set is further divided into connections that correspond to router control systems: 'CTRL 1' corresponds to the primary control system and 'CTRL 2' corresponds to an alternate control system. Only 'CTRL 1' is used. 'CTRL 2' is not used because there is no alternate control system (i.e., backup system) for the SMS7000 system controller. However, the connection is provided for future flexibility. For installation instructions, see Making Router Connections on page 12.
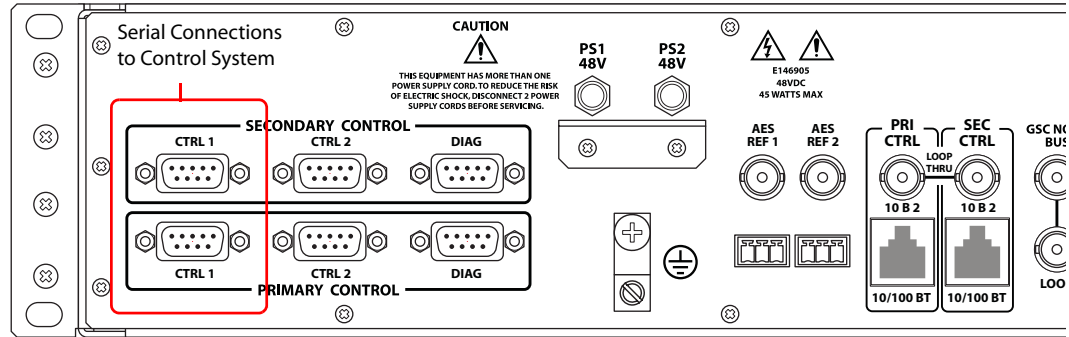

Figure 1-5. Serial Control Connections (Rear View)

Diagnostic Connections

The diagnostic connections enable the EC9535 to communicate with the UniConfig application. UniConfig runs on a PC separate from the EC9535 and is used to perform system setup tasks, and configure and monitor EC9535. (See Configuration on page 19.) See also the *UniConfig User's Guide*.

Diagnostic connections connect the EC9535 to the computer (PC) running the UniConfig application. Two diagnostic connections are located on the rear of the EC9535, labeled 'DIAG'. The ports are divided into two sets: one primary and one secondary, as shown in Figure 1-6 on page 4. The primary control connects to EC9535's primary control card. The secondary control connects to EC9535's secondary (optional for redundancy) control card. For instructions, see Making Diagnostic Connections on page 13.
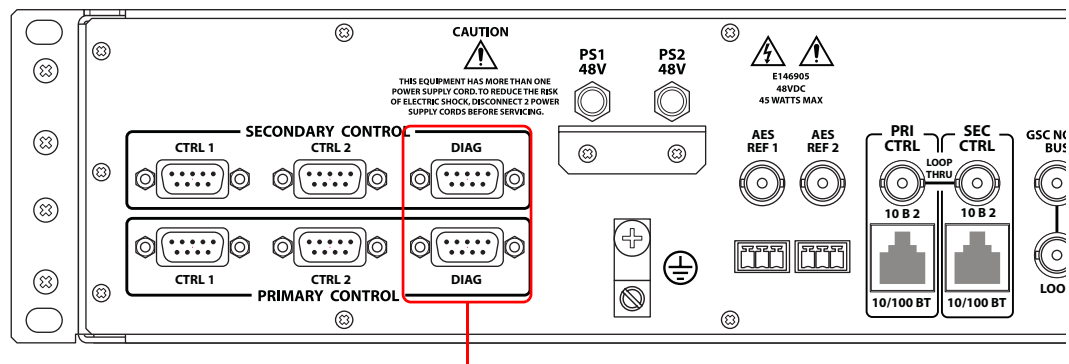
Diagnostic Connections

Figure 1-6. Diagnostic Connections (Rear View)

Ethernet Connections

The EC9535 has two Ethernet ports, labeled '10/100BT', as shown in Figure 1-7. These ports are divided into two sets, one primary ('PRI CTRL') and one secondary ('SEC CTRL'). These connec-

tions can be used to connect to a PC running UniConfig. However, in general these connections are not used at this time and provided for future network use.
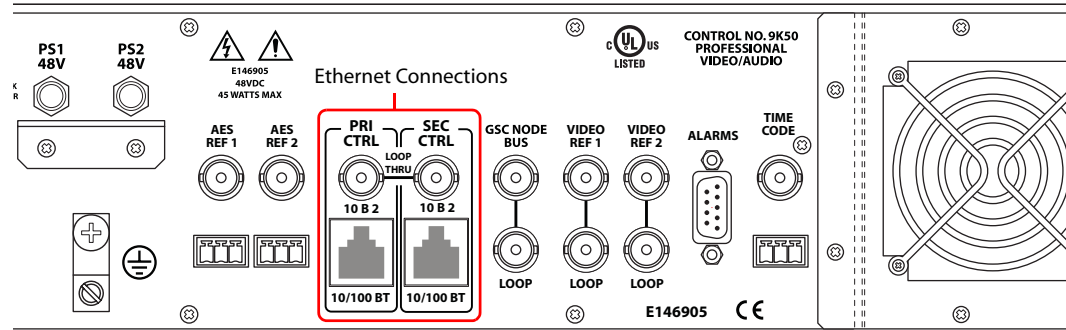

Figure 1-7. Ethernet Control Connections (Rear View)

In order for EC9535 to communicate with UniConfig through an Ethernet connection, you must configure an IP address for each of EC9535's control cards. The IP address is set using UniConfig. However, UniConfig runs on a PC and cannot communicate with EC9535 until an IP address has been entered. Therefore, you must use a serial connection—the 'DIAG' port(s)—to communicate with the computer (PC) running UniConfig to define the IP address(es). See Making Diagnostic Connections on page 13.

Note	If using an Ethernet connection, 50ohm terminators must be installed on the '10 B 2' connectors.

AES Reference Connections

The AES reference is used for clock generation, which provides a timing reference for AES synchronous signals and for timing circuits on the EC9535 control card. This reference is not currently used, but provided for future flexibility. For more information, contact Technical Support. (See Technical Support Contact Information on page iii.)

Figure 1-8. Connections to AES References (Rear View)

Video Reference

The EC9535 provides timing reference connections for video signals, labeled 'VIDEO REF 1' and 'VIDEO REF 2', as shown in Figure 1-9. Located on the rear of the frame, these connections provide a reference input for determining the video frame switch point. The video reference connections require a stable source of PAL, NTSC or Tri-level sync. This reference is not currently used, but provided for future flexibility. For more information, contact Technical Support. (See Technical Support Contact Information on page iii.)

Figure 1-9. Connections to Video References (Rear View)

Time Code Reference Connection

There is a single Time Code reference connection labeled 'TIME CODE', as shown in Figure 1-10. This reference is not currently used in the EC9535, but provided for future flexibility. For more information, contact Technical Support. (See Technical Support Contact Information on page iii.)
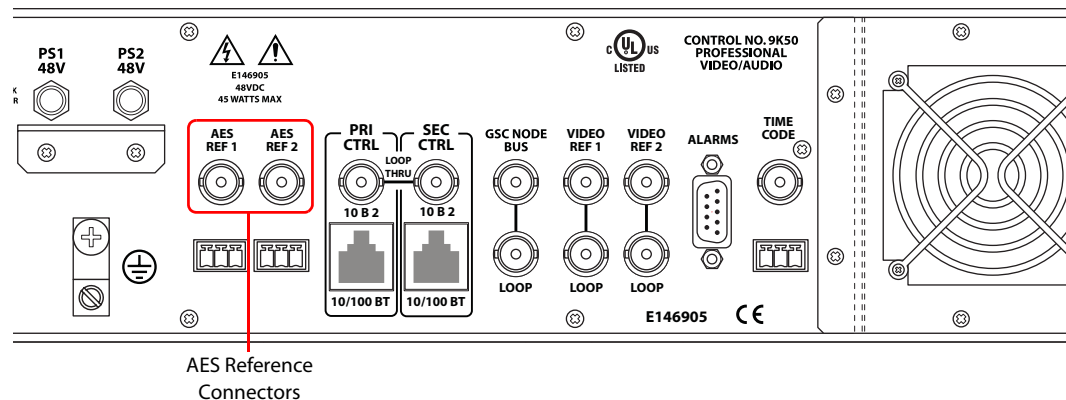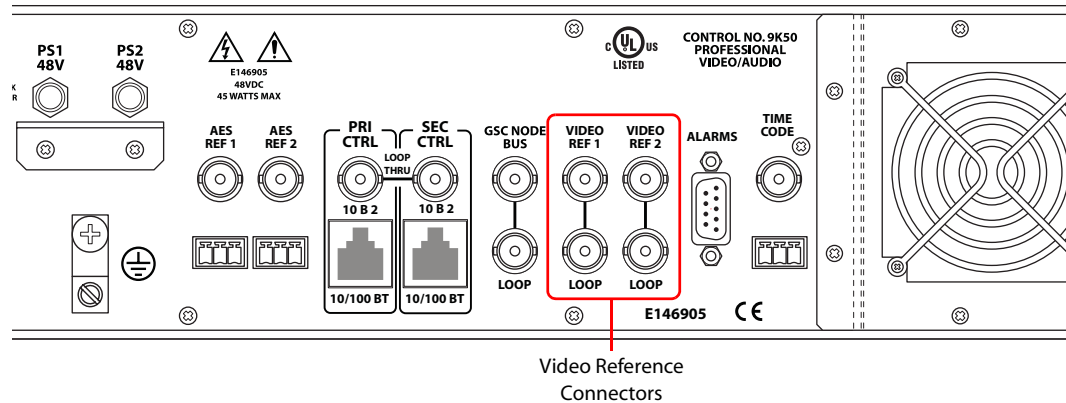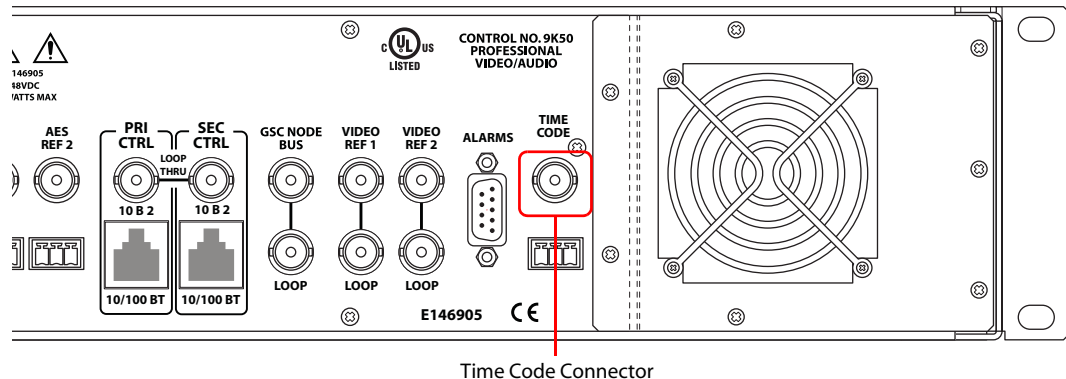

Figure 1-10. Time Code Reference Connection (Rear View)

System Alarm

The EC9535 has a system alarm that sends notification of a malfunction, such as when a fan or power supply is not functioning properly. The alarm connection can be connected to external equipment that display visual signals when an alarm is activated. Creation of an external alarm indicator is outside the scope of this manual, however basic instructions on wiring the alarm connection for external monitoring is provided. See Alarm Indicator Equipment on page 16.

The alarm connection is labeled 'ALARMS' and is located on the rear of the EC9535, as shown in Figure 1-11. For instructions on making alarm connections, see Making System Alarm Connections on page 15.
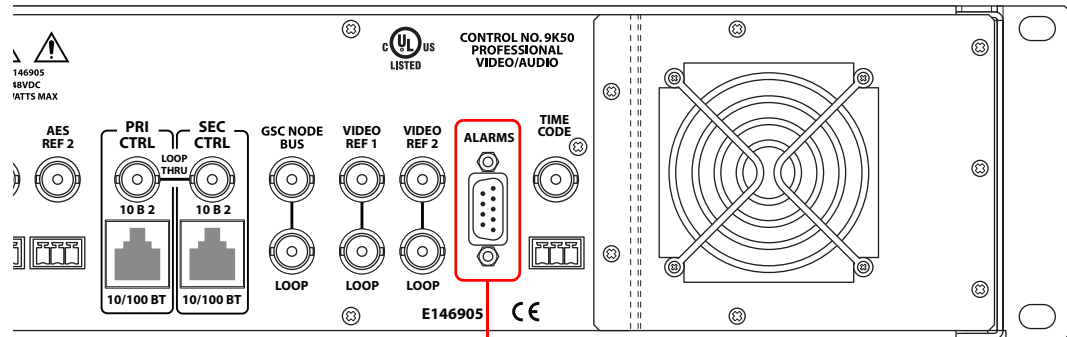
Figure 1-11. System Alarm Connection (Rear View)

1. Introduction

Rear Connections

2. Installation

When setting up an EC9535 GSC Node Bus Converter for the first time, or reconfiguring an existing 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. If you are reconfiguring, only perform the step related to the configuration you are changing:

1 Mount the EC9535 in a rack. See Rack Mount on page 10.

2 Make connections between the EC9535 and the SMS7000 system controller. See Making System Controller Connections on page 11.

3 Make connections between the EC9535 and the router. See Making Router Connections on page 12.

4 Make 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 13.

5 Connect the alarm connection on the router to an external indicator. See Making System Alarm Connections on page 15.

6 Connect power. See Connecting to Power on page 16.

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

Package Contents

When your EC9535 products from Miranda 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 Miranda. For contact information, see Technical Support Contact Information on page iii.

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

Preparing for Installation

You will need the following items before getting started:

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

PC hardware requirements:

☐ CD drive.

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

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

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

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

☐ 75 Ω BNC connector and coaxial cable.

☐ Frame rack suitable for mounting EC9535.

Rack Mount

The EC9535 is designed to mount in a 19″ (482.6 mm) EIA rack.

How to Rack Mount the EC9535

1 Determine the placement of the EC9535 and the rack in the facility. When placing the frame and rack, be sure to locate the rack near an accessible AC source power outlet. The AC source is used to power the frame.

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

3 If open, close the front door. This ensures proper airflow for frame cooling.

Installing Control Cards

The EC9535 comes with two control cards (EM0374) already installed. Each control card has a mezzanine (SM0220) designed to communicate with the SMS7000 control system. The following are instructions for installing control cards, should the need arise.

Cards are inserted by sliding them into card guides through the front of the frame.

How to install control cards

Caution	Do not drop, roughly handle, or stack circuit boards. If you cannot easily insert or remove a board, stop and contact Miranda Technical Support.

1 Open the door at the front of the frame. The door is hinged on the right-hand side and swings from left to right. Use the handle on the left-hand side to gently pull the door open.

2 There are two control card guides, as shown in Figure 2-1. Insert each control card horizontally into each set of guides. The cards should slide in easily; do not force them.
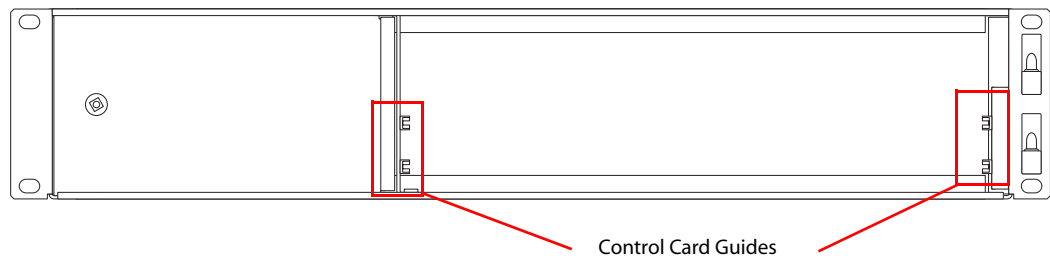
Control Card Guides

Figure 2-1. Front of EC9535 with Door Removed

3 For each card, press the lever(s) inward, making sure each card is fully seated in its slot.

4 Close the frame door. The door must be closed for the router cooling system to work properly.

Making System Controller Connections

In order for a SMS7000 system controller and a NV8288, NV8288-Plus or NV8500 Family router to communicate, the system controller must be connected to an EC9535. The SMS7000 system controller is connected using the 'GSC NODE BUS' connection located on the rear of the EC9535 frame. The connection uses a 75 Ω BNC connector and coaxial cable.

How to Make SMS7000 System Controller Connections

1 Locate the GSC Node Bus connections on the rear of the router, as shown in Figure 2-2. System controller connections are labeled 'GSC NODE BUS'.
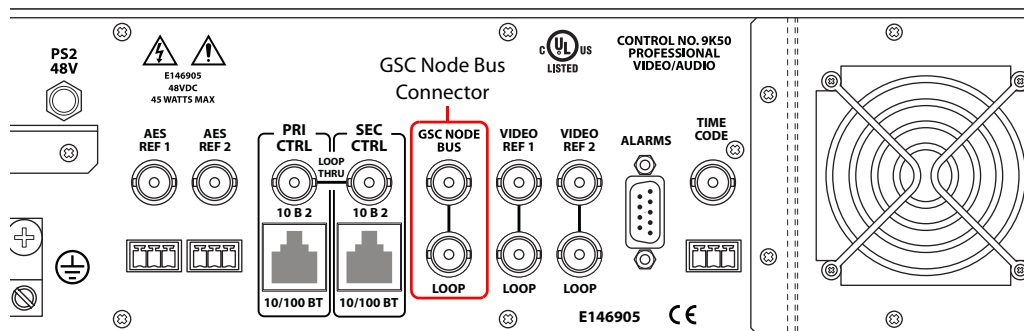
Figure 2-2. GSC Node Bus Control Connection (Rear View)

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

3 Connect the other end of the cable to the SMS7000 system controller. For detailed instructions, refer to the SMS7000 documentation.

4 On the unused GSC Node Bus connection, terminate the loop-through by installing a 75 Ω BNC terminator.

Making Router Connections

In order for a NV8288, NV8288-Plus or NV8500 Family router to communicate with a SMS7000 system controller, the router must be connected to an EC9535. The router is connected using the serial control system connections, located on the rear of the EC9535, and a cable provided by Miranda (WC0152). The proprietary cable is 20 feet (6.096 meters) long with two DB9 connectors on each end for a total of four DB9 connectors.

The serial control ports are divided into two sets that enable the primary control card or the secondary control card in the EC9535 frame to communicate with the corresponding control card in the router frame.

How to Make Router Control Connections

1 Locate the serial control connections on the rear of the router, as shown in Figure 2-3. Serial control connections are labeled 'PRIMARY CONTROL' for the primary control card and 'SECONDARY CONTROL' for the secondary control card.
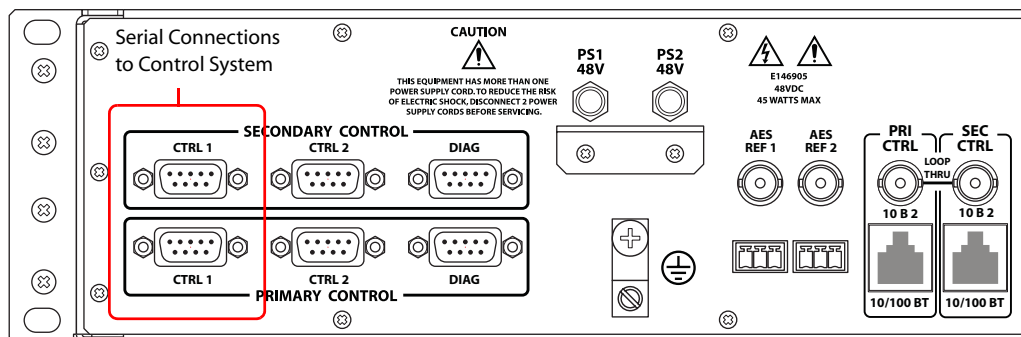

Figure 2-3. Serial Control Connections (Rear View)

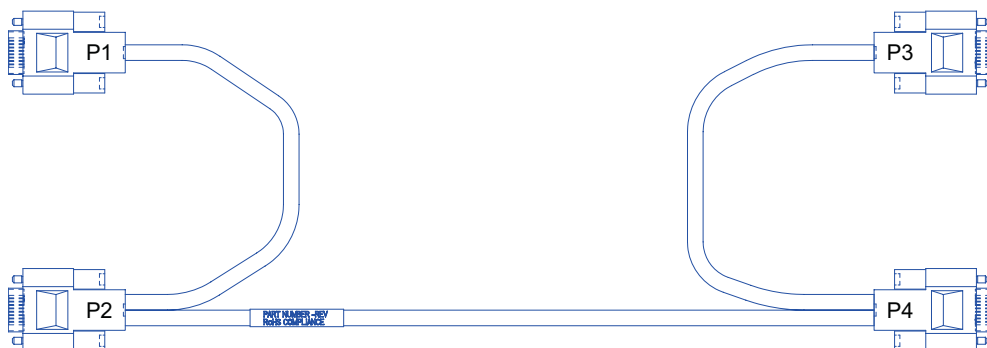2 Locate the cable WC0152 provided with the EC9535. The cable has four DE9 connectors as shown:

Figure 2-4. WC152 Cable for connecting to router

3 Facing the rear of the EC9535 frame, make connections as follows:

  a Connect the DB9 connector labeled 'P1' to the 'CTRL 1' connection in the 'PRIMARY CONTROL' section.

  b Connect the DB9 connector labeled 'P2' to the 'CTRL 1' connection in the 'SECONDARY CONTROL' section.

4 Facing the rear of the *router*, locate the router control serial connections:

  • On the NV8288 and NV8288-Plus, the section is labeled 'PRI CTRL' and 'SEC CTRL'

  • On the NV8500 Family routers (NV8144, NV8280 or NV8576) the section is labeled 'PRI' and 'SEC'.

5 Make connections as follows:

  a Connect the DB9 connector labeled 'P3' to the 'CTRL 1' connection in the 'PRI CTRL' or 'PRI' section, depending on the router.

  b Connect the DB9 connector labeled 'P4' to the 'CTRL 1' connection in the 'SEC CTRL' or 'SEC' section, depending on the router.

Making Diagnostic Connections

The diagnostic connections enable the EC9535 to communicate with the UniConfig application. UniConfig is installed on a unit, separate from the router (e.g., PC), and is used to perform system setup tasks, and configure and monitor the EC9535. For information about using UniConfig, see the *UniConfig User's Guide*.

There are two sets of diagnostic connections: one set is located on the front of the control cards and one set is located on the rear of the EC9535, labeled 'DIAG'. Which is used is entirely up to you and your facility needs. Usually the control card connection is used when the diagnostic connection to UniConfig is temporary. The diagnostic connections on the rear of the EC9535 frame are most often used to make a permanent connection to UniConfig. For a detailed description of the serial connections, see Diagnostic Connections on page 4.

Control Card Diagnostic Connections

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

How to Make Control Card Diagnostic Connections

1 Facing the front of the EC9535, open the door and locate the primary control card slot. The primary control card is located on top (above) and the secondary control card is located below. (See Figure 2-1 on page 11.)

2 On the front of the control card is a single serial port. Connect to the serial port using a DE9 connector and a serial cable.

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

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

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

4 When done configuring, remove the temporary connection.

Frame Diagnostic Connections

There are two diagnostic ports located on the rear of the EC9535, labeled 'DIAG'. The diagnostic ports are fixed at 38400 baud, RS-232. For more information, see the *UniConfig User's Guide*.

How to Make Frame Diagnostic Connections

1 Locate the diagnostic connections on the rear of the EC9535, as shown in Figure 2-5. The diagnostic connections are labeled 'DIAG'.
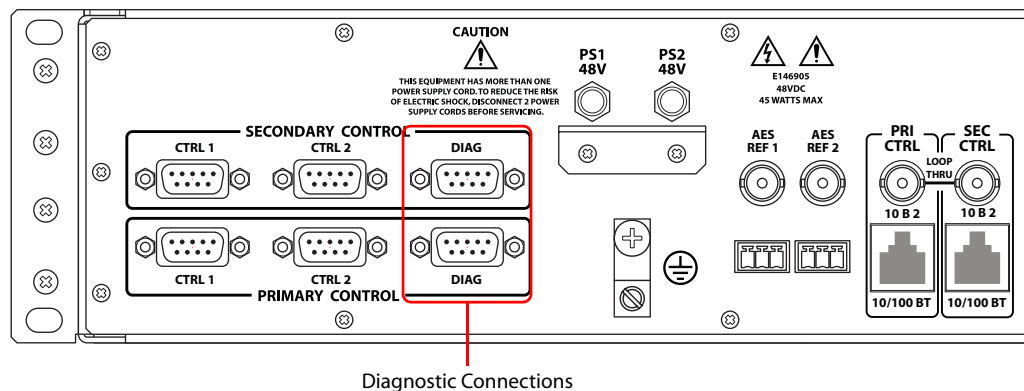

Diagnostic Connections

Figure 2-5. Diagnostic Connections (Rear View)

2 Connect to the 'DIAG' connection in the 'PRI' 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:

PC End (DCE)	Pin	Router End (DTE)
DCD	1	Ground
RXD	2	TXD

| PC End (DCE)	Pin	Router End (DTE)
TXD	3	RXD
DTR	4	DSR
Signal Ground	5	Signal Ground
DSR	6	DTR
RTS	7	CTS
CTS	8	RTS
Ground	9	Ground

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

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

Making System Alarm Connections

The EC9535 provides a system alarm that notifies you of a malfunction, such as when a fan or power supply is not functioning properly. And alarm can be connected to an external alarm indicator that displays visual cues when the alarm is activated. Miranda does not provide external indicator equipment, but does provide instructions on wiring the alarm connections. See Alarm Indicator Equipment on page 16.

How to Make Alarm Connections

1 On the rear of the router, locate the 'ALARMS' connector:
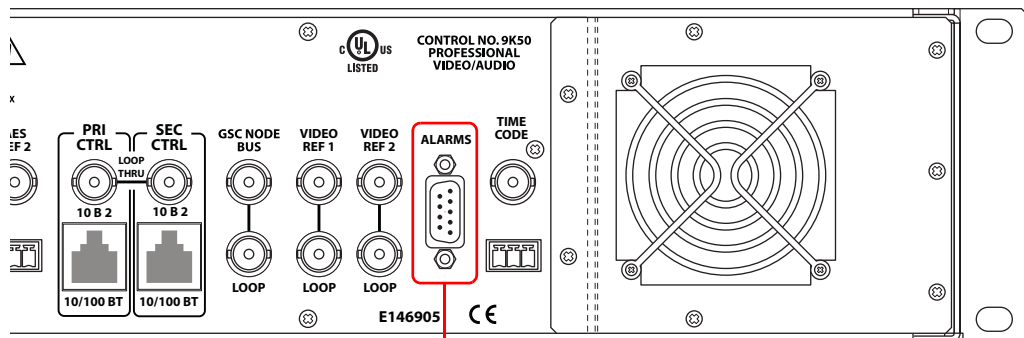
System Alarm Connector

Figure 2-6. System Alarm Connection (Rear View)

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

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

Alarm Indicator Equipment

An external alarm indicator can be created to display visual cues when a failure has occurred on the EC9535 frame. LEDs can be wired to specific pins on a DE9 connector such that each LED indicates what specific router module has failed.

The 'ALARM' connection on the rear of the EC9535 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 2-7. Each pin monitors a specific function and activates a specific alarm.
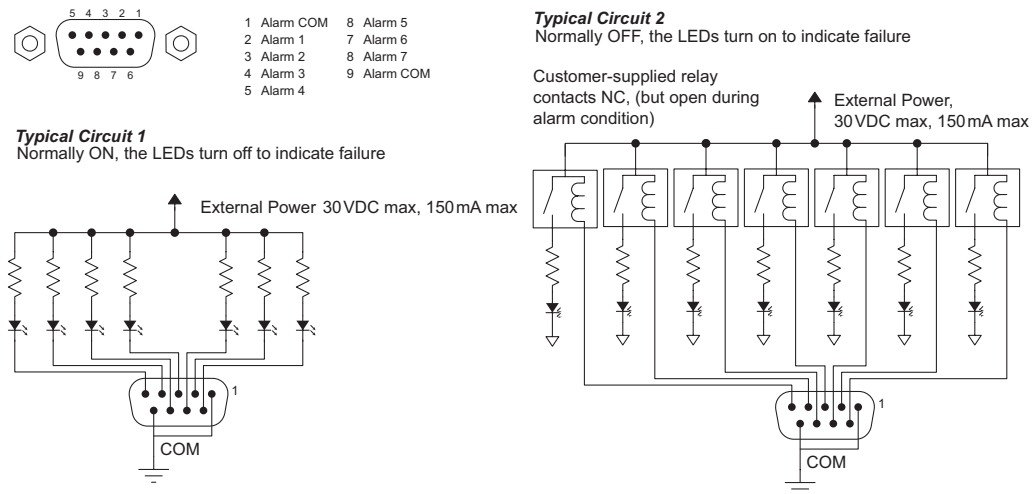

Figure 2-7. Alarm Connections and On/Off Switches

The following lists each DE9 pin and the associated alarm. The pin number listed corresponds to the pin numbers in Figure 2-7 on page 16:

PIN	Signal	Description	Possible Conditions Causing the Alarm
1, 9	Alarm_COM	Common	Common connection for all alarm pins.
2	Alarm_1	Major Alarm	Indicates missing reference inputs, or missing power supplies.
3	Alarm_2	Minor Alarm	Alarm_3, 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	Not used in EC9535.
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."

Connecting to Power

The EC9535 uses a proprietary power supply (PS0007) to connect to an AC power source (90–230 VAC, 50–60 Hz).

How to Connect to Power

1 Locate the power connections on the rear of the EC9535. The connections are labeled 'PS1 48V' and 'PS2 48V, as shown in Figure 2-8.
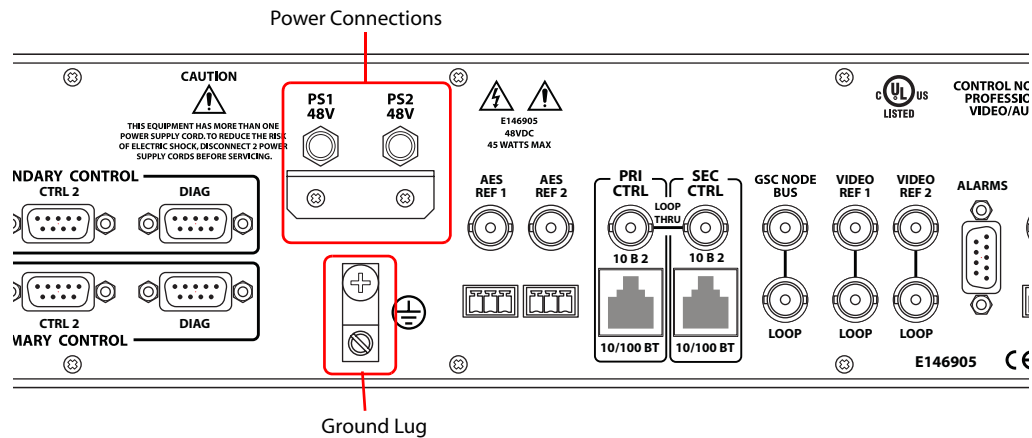
Power Connections

Ground Lug

Figure 2-8. Power Connections and Ground Lug (Rear View)

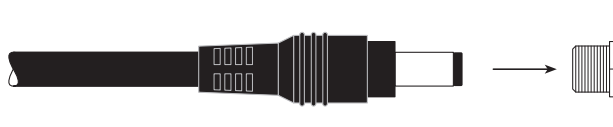2 Connect one cable (PS0007) to 'PS1'. Figure 2-9 is an example of the PS0007 DC power cord.

Figure 2-9. PS0007 DC Power Cord

3 Connect the other end of the cable to a source of AC power.

Note	To protect against accidentally disconnecting the cable from the power source, loop a ty-wrap or similar restraining item around the cable and through the retention plate.

4 Repeat step 2 and step 3 for the 'PS2 48V' connection.

5 Connect the EC9535's ground lug to earth ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower right corner of the frame, as shown in Figure 2-8 on page 17.

3. Configuration

Before being placed into service, the EC9535 must be configured for your particular router control system and settings. Configuration is managed through UniConfig, which resides on a PC and is separate from the router. For information on using UniConfig, see the *UniConfig User's Guide*. For instructions on configuring EC9535, see the section "Configuring EC9535" within the *UniConfig User's Guide.*

When configuring the EC9535, the EC9535's 'CTRL 1' serial port must be set to the same baud rate as the controlled router's 'CTRL 1' serial port rate. (See Serial Control Connections on page 3.) By default, the NV8288, NV8288-Plus and NV8500 Family routers have the 'CTRL 1' ports set to 38,400 baud. However, the number of destinations that can be switched per frame in a system using a SMS7000 system controller, an EC9535, and a NV8288, NV8288-Plus or NV8500 Family router is determined by the EC9535 and the router serial port baud rates. Because higher rates may be used, you may want to set the serial ports at the highest available rate (115,200 baud) unless doing so results in communication errors. For information on setting the serial port baud rates for routers, see the "Setting Up Communication" section within the *UniConfig User's Guide.*

3. Configuration

4. Maintenance

The EC9535 does not require any periodic electrical or physical maintenance. However, it is recommended that the system's indicator LEDs be checked on a regular basis to ensure that the system is operating properly. (See Indicator LEDs on page 21.) It is also a good idea to regularly make sure cooling air flow to the power supply fans is unobstructed.

Note   Only qualified service personnel should perform procedures in this section. There are no user-serviceable fuses.

Indicator LEDs

Indicator LEDs indicate whether DC power is present and if a card is operating normally. LEDs are visible when the router front door is closed.

LEDs are listed in the order they appear on the card, from right to left. The meanings of the LED indicators are as follows:

LED Indicator	Function
Red (low battery)	Normally OFF. If lit, indicates that the battery needs replacing. See Battery Replacement on page 21.
Red (alarm)	Normally OFF. If lit, indicates a problem or fault. Check the external reference signals. If that does not resolve the problem, refer to the system status window in UniConfig for additional information. If you cannot resolve the problem, call Miranda Technical Support. For contact information, see Technical Support Contact Information on page iii.
Yellow (active card)	Normally ON. Indicates the card is the active control card. On the standby control card, this LED should be OFF.
Green (health, power)	Normally ON. Indicates the card has power and is operating normally.

Battery Replacement

If the red Low Battery LED indicator on the control card is lit, 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.

Important   Do not use a metallic tool to remove the battery.

Call Miranda for replacement battery information. For contact information, see Technical Support Contact Information on page iii.

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

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

Air Flow

A fan in the EC9535 frame draws cooling air from the front of the frame, through the door, and exhausts heated air through the rear. The EC9535 must have the door correctly installed and closed for proper airflow through the chassis. For maximum air flow, regularly inspect the fan. If the fan becomes dusty, gently vacuum the fan and grills.

Caution	If airflow is impeded overheating may occur.

Obtaining Service

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

• Call Miranda Technical Support. (See Technical Support Contact Information on page iii.) Our Service Personnel will help you resolve any service issues.

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

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

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

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

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

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

5. Technical Details

This section provides technical specifications for the of routers and the EC9535.

Power Specifications

Type	Parameters
AC input	90–130/180–250 VAC, 50/60 Hz, auto-ranging
AC fuses	No user serviceable fuses
AC connectors	2, PS0007
AC power usage	40 Watts, maximum

Mechanical Specifications

Type	Parameter	
Dimensions	2RU (3.47 inches, 88.1 mm) high 19.0 inches (483 mm) wide 16.0 inches (406 mm) deep	
Weight	22 lbs, 9.97 kilograms	
Mounting	EIA 310-C, 19.0 inches (483 mm)	
Grounding terminal	Copper, accepts 14-6 AWG	
Modules and module slots	2 Control cards (1 primary, 1 optional secondary)	
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	10/100baseT
	Standard	IEEE 802.3
	Protocol	NVISION Ethernet protocol
	Connector	2, RJ-45
GSC node bus	Type	Serial
	Standard	Proprietary
	Connector	2, BNC, loop-thru, non-terminating pair
	Impedance	75 Ω

5. Technical Details

Environmental Specifications

Type	Parameter
Operating temperature	0 to 40° Centigrade
Relative humidity	0 to 90%, non-condensing

Audio Specifications

Type	Parameter	
Audio Reference Input	Type	Serial digital audio
	Standard	AES3id
	Sample Rate	48 kHz
	Connector	2, BNC (redundant)
	Impedance	75 Ω
	Input Level	0.5 V pp to 2.0 V pp

Video Specifications

Type	Parameters	
Video Reference Input	Type	Analog video reference
	Standard	PAL, NTSC or tri-level sync
	Connector	Loop-through, BNC
	Impedance	75 Ω or Hi-Z (>20,000 Ω), not selectable
	Input Level	0.5 V pp to 2.0 V pp
	Input Return Loss	>30 dB to 5 MHz

Time Code Specifications

Type	Parameter	
Time Code Reference Input	Type	1 BNC
	Standard	SMPTE 12M
	Connector	BNC terminating
	Data Rates	1/30th to 80 times normal
	Impedance	75 Ω

6. Glossary

Active Cards	See Modules.
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, AES3id	The AES routers support AES3id and provide 75Ω BNC connectors. AES3id is specified for 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.
Async AES, Sync AES	The term "Async AES" refers to an asynchronous AES-compliant audio signal, whereas "Sync AES" refers to a synchronous AES signal with a data rate of 48kbps. A system where various signals are unlocked (not synchronized). Switching between signals leads to unpredictable results.
AVC	"Analog Video Conversion." NVISION uses this abbreviation to describe a simple conversion technique used to create an SD digital output signal from a composite analog video input, or to describe the means by which SD signal is coded into an analog composite video output signal. Path delay and subcarrier phase may not be precisely maintained in an AVC conversion path within an NV5128 frame. AVC coding provides a cost-effective method to provide feeds to picture monitors without requiring an external conversion device. AVC modules are not a substitute for professional-grade format converters."
Baud Rate	Refers to the symbols per second or pulses per second. It is the unit of symbol rate, also known as baud rate or modulation rate; the number of distinct symbol changes (signaling events) made to the transmission medium per second in a digitally modulated signal or a line code.
DC	Direct Current
dBu	Unit of audio level where 0dBu is 0.775 Vrms.
DB25	A DB25 connector is the common 25-pin subminiature D connector. Most modern PCs use a female DB25 connector for the printer parallel port connector.
DE9	Sometimes mistakenly referred to as a DE9 connector, a DE9 connector is the common 9-pin subminiature D connector. The serial port of modern PCs employ a male DE9 connector.
Device	As the term is used in a NV9000 system, a device is a grouping of input and output ports that define a logical entity. (The logical entity does not have to be a real entity.) For example, a system might have 3 levels: video, AES, and time code. A hypothetical device in this system is Camera 1, which consists of video on input port 1 of the video router, AES on input port 5 of the AES router, and time code on input port 8 of the time code router. (The EC9535 does presently include time-code routers.).
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

6. Glossary

	National Standards Institute (ANSI) to help develop standards on electronic components, consumer electronics, electronic information, telecommunications, and Internet security.
ESD	Electrostatic discharge
HD	HD and HD-SDI are equivalent in Miranda terminology. An HD signal is a high definition, serial digital interface video format that conforms to the SMPTE 292M standard.
I/O	Inputs and outputs are the physical connections (e.g., BNCs) on the back of the routing switcher. The term "input port" is used interchangeably with "input" and the term "output port" is used interchangeably with "output."
Matrix	1. The rack-mounted EC9535 chassis or frame which contains the subassemblies (modules, backplanes, power supplies, etc.) which comprise the EC9535.
	2. An X-Y array of crosspoint switches, a *crosspoint matrix*.
Module	1. In the EC9535, modules are electronic assemblies that plug into the matrix. Modules include but are not limited to input, output and controller printed circuit boards also called active cards.
	2. Any removable subassembly may be referred to as a module. Router backplanes may occasionally be referred to as modules.
Operator	The term operator usually refers to users other than the system administrator. An operator is responsible for making most of the routes.
Physical Level	In a GSC Node Bus Converter system, a physical level is the same thing as a router. The idea is that multiple routers provide different "levels" on which to switch the signals of devices. Any particular device might send or receive HD, SD, AES, time-code, or machine-code signals. A GSC Node Bus Converter switches one type, or level, of a device's signal set.
Physically Contiguous	Matrix modules are said to be in physically contiguous slots in a EC9535 frame when both the inputs and outputs associated with those slots are in numerical sequence. For example, input slots 5 and 6 are physically contiguous because inputs 1-16 and 17-32 are in numerical sequence. In the same way, output slots 4 and 16 are contiguous because outputs 49-64 (slot 4) and 65-80 (slot 16) are in numerical sequence.
Port	A port is the physical connection on a router. In a configuration application system, a port can only be an input port or an output port.
Reference Signal	A timing signal used to synchronize events such as the switching of video signals during a specific portion of the vertical interval. Reference signals are externally applied. In their absence, internally generated signals are used to sustain operation.
RAM	Random Access Memory
RJ45, RJ-45	Registered Jack, type 45 as defined in the United States Code of Federal Regulations. A common 8-pin modular plug and/or jack used in the telecommunications and broadcast industry to transport Ethernet or machine control signals.
RS-422	Sometimes referred to as RS-422 or TIA/RS-422-B and other similar variations. A bidirectional communications standard. The use of this term implies that NVISION intends to refer to the latest standard in effect at the time the product was developed.
RU	Rack Units. A standard measure or size for frames (1.75 inches).
SD	SD and SDI are equivalent terms in NVISION documents. An SD signal is a standard definition, serial digital interface video format that conforms to the SMPTE 259M standard.

Source/Desti-nation	The term "source device" is used interchangeably with "source" and the term "destination device" is used interchangeably with "destination." A source is a device that is connected to one or more input ports. A destination is a device that is connected to one or more output ports. An example of such a device would be a monitor.
	A device can be both a source and destination. An example of such a device is a VTR.
SWB	(Super Wide Band). A term originated by Miranda that refers to the ability of a router to pass a wide range of digital bit rates and formats. Miranda's SWB supports data rates from about 15 Mb/s to 1.5 GB/s.
	Input signals must be nominally 800mV p-p and bi-level or tri-level in nature. The EC9535 video routers bypasses re-clocking for non-video rates. Rates that *are* re-clocked include common SD data rates of 143 and 270 Mb/s (SMPTE 259M-A and -C, but not B or D) and HD data rates at nominally 1.485 Gb/s. SWB accepts SD at 177 Mb/s, but does not reclock it.
Sync AES, Async AES	The term "Async AES" refers to an asynchronous AES-compliant audio signal, whereas "Sync AES" refers to a synchronous AES signal with a data rate of 48 kb/s.
System admin-istrator	The system administrator is the person responsible for installing, configuring, and maintaining a router control system.
Time Code	A linear time code signal complying with SMPTE 12M or the corresponding EBU standard.
UniConfig	A Windows-based application (Universal Configuration) used to configure NVISION products using a serial or Ethernet connection. UniConfig uses an easy-to-learn GUI (Graphical User Interface) to simplify the configuration process.

6. Glossary

7. Part Numbers

This appendix provides a list of parts provided by Miranda for the EC9535.

Part Number	Description
PS0007	AC to 48V DC Power supply
EM0374	Control card
SM0220	Mezzanine on control card for SMS7000 system controllers
WC0152	Proprietary router control system cable with 4 DB9 connectors.
FR0061	EC9535 frame

7. Part Numbers

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