

Vanguard Managed Solutions

Vanguard 6500^{PLUS} Installation Manual

Notice

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Part No. T0002, Rev C
Publication Code: KP
First Printing: April 1996

Manual is current for Release 5.2 of VanguardMS's Operating Network Software.

To comment on this manual, please send e-mail to LGEN031@vanguardms.com

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Overview

Introduction

This manual describes features, hardware, specifications, and applications for the 6500^{PLUS}.

■ **Note**

For information on operating system software and configuration, see the *Vanguard Basics Manual*.

Audience

This manual is intended for operators of the 6500^{PLUS}.

How To Use This Manual

The following table describes the contents of this manual.

<i>This Chapter...</i>	<i>Describes:</i>
Chapter 1	6500 ^{PLUS} hardware and software features, and FCC and telephone company procedures and requirements.
Chapter 2	Installing the hardware on the 6500 ^{PLUS} , powerup and verification, and installation of software options.
Appendix A	Cable pinouts for Ethernet and Token Ring.
Appendix B	Product specifications.

Downloading Software

For operating software download procedures, refer to 6500^{PLUS} *Downloading Procedures*.

About This Manual (continued)

Special Notices

The following notices emphasize certain information in the manual. Each serves a special purpose and is displayed in the format shown:

special purpose and is displayed in the format shown:

■ Note

Note is used to emphasize any significant information.



Caution

Caution provides you with information that, if not followed, can result in damage to software, hardware, or data.

Mise en garde

Une mise en garde vous fournit des informations qui, si elles ne sont pas observées, peuvent se traduire par des dommages pour le logiciel, le matériel ou les données.

Vorsicht

Ein Vorsichtshinweis macht Sie darauf aufmerksam, daß Nichtbefolgung zu Software-, Hardware- oder Datenschäden führen kann.



Warning

Warning is the most serious notice, indicating that you can be physically hurt.

Avertissement

Un avertissement constitue le message le plus sérieux, indiquant que vous pouvez subir des blessures corporelles.

Warnung

Eine Warnung ist der ernsthafteste Hinweis auf Körperverletzungsgefahr.

Software Revision Level

This manual describes Release 5.2 of the Operating Network Software.

Chapter 1

About the 6500^{PLUS}

Overview

Introduction

The 6500^{PLUS} is a family of networking devices that can operate in private networks or over public data networks. A 6500^{PLUS} node can have from 6 to 54 ports, with terminal port speeds of up to 38.4 kbps and network port speeds of up to 384 kbps.

Software Features

Introduction

You can configure, administer, and troubleshoot a 6500^{PLUS} node from a local or remote terminal acting as a control terminal. The terminal calls into the node's Control Terminal Port (CTP), a software module that acts as the logical control terminal port.

In addition, configurations can be saved and restored when a PC (with Kermit protocol) is used as the local or remote control terminal.

Features and Protocols

For a list of features and protocols supported by the 6500^{PLUS} refer to the Software Release Notice that came with the operating software.

Hardware

Introduction

A 6500^{PLUS} node consists of at least one processor card, one or more optional support cards, and, optionally, a TRIM card. A node can be contained in a standalone enclosure, which can support only a processor card, or in a Modulus nest enclosure, which can support one or more processor cards and several support cards.

Card Types

The 6500^{PLUS} includes the following types of cards:

- 6500^{PLUS} processor cards
 - Auxiliary processor cards
 - Asynchronous I/O (AIO) card
 - Universal I/O (UIO) card
 - Network storage option (NSO) card
 - Token Ring Interface Module (TRIM) card
-

Processor Cards

The 6500^{PLUS} processor cards provide the basic functions of a 6500^{PLUS} node and can be modified as required. The 6500^{PLUS} processor cards are necessary to run 6500^{PLUS} Release 3.10 and greater software.

Support Cards

The AIO, UIO, and NSO cards work with the processor cards to provide additional ports and data storage.

TRIM Card

The TRIM card provides access to Token Ring local area networks and supports IBM/IEEE 802.5-compatible LANs.

The 6500^{PLUS} does not have a dedicated control terminal port. Instead, any asynchronous PAD port can become a control terminal port when an attached terminal calls the node's control terminal facility and the proper password is entered. For more details, refer to the *Vanguard ONS Basics Protocols Manual (T0106)*.

Enclosures and Backplanes

Introduction

The two types of enclosures for the 6500^{PLUS} are:

- Standalone
- Modulus

Standalone Enclosure

A standalone enclosure (Figure 1-1) holds just one card, which must be a processor card. A standalone unit supports up to six X.25 or terminal ports depending on the type of processor card installed.

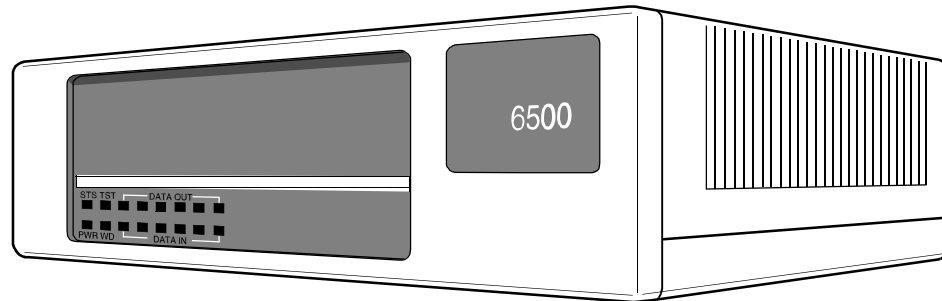


Figure 1-1. 6500^{PLUS} Standalone Enclosure

Modulus Enclosure

The Modulus enclosure provides a 6500^{PLUS} node with space for one or more processor cards and several support cards, such as auxiliary processor cards, I/O cards, or NSO cards (Figure 1-2).

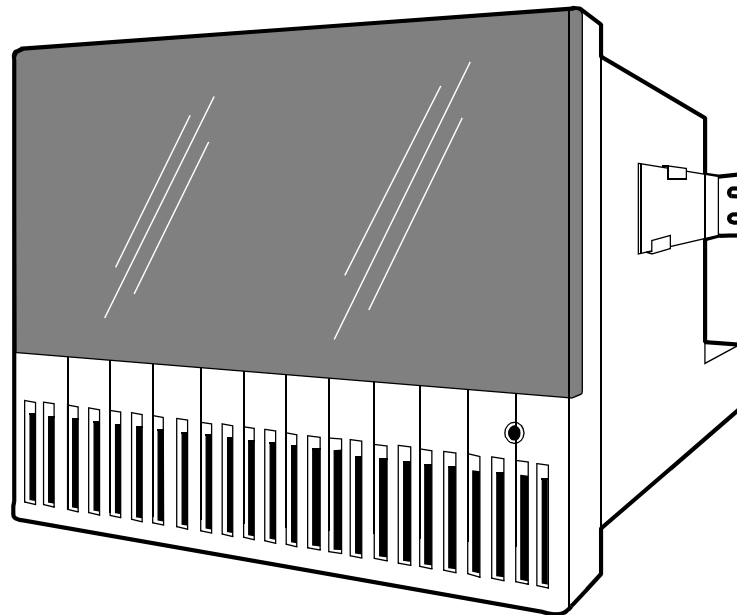


Figure 1-2. Modulus 21 Enclosure

Supports Other VanguardMS Products

A Modulus enclosure contains plug-in card versions of VanguardMS products, including Network Access Products, providing common housing and power to multiple products. A single Modulus enclosure can include, for example, 35xx DSU/CSUs, 326x dial modems, or 33xx leased-line modems in addition to 65xx nodes.

Types of Modulus Enclosures

There are four types of Modulus enclosures. The Modulus 8 and Modulus 18 enclosures are older models; the Modulus 9 and Modulus 21 enclosures are newer models that are based on the Modulus 8/18 enclosures.

Modulus 8

Modulus 8 has 8 slots, holds four 6500^{PLUS} product cards, and supports up to 24 ports. It is designed to be a desktop unit.

Modulus 18

Modulus 18 has 18 slots, holds eight 6500^{PLUS} product cards, and supports up to 48 ports. It is designed to be installed in an industry-standard 19-inch rack.

Modulus 9

Modulus 9 has 9 slots, holds four 6500^{PLUS} product cards, and supports up to 24 ports. It is designed as a desktop unit.

Modulus 21

Modulus 21 has 21 slots, holds nine 6500^{PLUS} product cards, and supports up to 54 ports. It is designed to be installed in an industry-standard 19-inch rack.

■ Note

Two processor cards are needed to support 54 ports.

Backplanes

To accommodate the variety of products that you can install in Modulus enclosures, VanguardMS has a line of product-specific backplanes to carry the signal and data flow between the cards and the external environment and to provide cable connections to the product card. Backplanes connect to the 6500^{PLUS} cards on the inside of the enclosure. Both the Modulus 8/18 and the Modulus 9/21 enclosures have 25-pin DB25 connectors on the outside. (Older versions of Modulus 9/21 enclosures/backplanes have 26-pin DB26 connectors).

You can mount more than one backplane in a Modulus 8/18 and Modulus 9/21 enclosure to form independent nodes, but signals between backplanes cannot be physically bridged. In other words, you cannot bridge two 24-port backplanes to form a single backplane.

For general information on setting up Modulus 8/18 enclosures and inserting 6500^{PLUS} cards into the enclosures, refer to the *Modulus Planning and Installation Guide* (Product Code 80300). For Modulus 9/21 enclosures, see the *Modulus 9 and 21 Installation and Operation Guide* (Part No. 09564, Rev B).

6500^{PLUS} Processor Cards

Introduction

The 6500^{PLUS} processor card provides the main processing power in a 6500^{PLUS} node. There are three types of processor cards:

- 6505^{PLUS} Asynchronous Access Server
- 6507^{PLUS} Multifunctional Access Server
- 6525^{PLUS} Network Concentrator

Description

6500^{PLUS} processor cards are shipped with Single Inline Memory Modules (SIMMs) in sockets U79 and U80. The processor card cannot operate without SIMMs.

Each processor card has six ports. You can password protect all ports on the 6505^{PLUS} and 6507^{PLUS} cards and all asynchronous ports on the 6525^{PLUS}. You can also configure processor cards from a locally or remotely connected terminal.

6505^{PLUS} Asynchronous Access Server

The 6505^{PLUS} is an asynchronous packet assembler/disassembler (PAD). If your node is based on the 6505^{PLUS} processor card, you can:

- Use only one 6505^{PLUS} processor card in each node.
- Increase the maximum number of ports to 24 by adding up to three asynchronous I/O (AIO) cards.
- Have only two network ports per node; these must be Ports 1 and 2 of the processor card.
- Have a maximum number of 23 DTE ports per node.

■ **Note**

You can use UIO cards in 6505^{PLUS} nodes if the UIO is configured only for PAD ports.

6507^{PLUS} Multifunctional Access Server

The 6507^{PLUS} is a multifunction/multiprotocol packet assembler/disassembler (PAD). If your node is based on the 6507^{PLUS} processor card, you can:

- Have up to two 6507^{PLUS} processor cards in each node.
- Have a maximum number of 24 ports per node (combination of processor cards, AIO, or UIO cards).
- Have a maximum number of 4 network ports per node.
- Have a maximum number of 23 DTE ports per node.
- Optionally, configure ports to operate with network protocols (Frame Relay, MX.25, XDLC), or with synchronous protocols (BSC 3270, BSC 2780, SDLC). Any port can be configured as an asynchronous PAD port or to operate with optional synchronous protocols.

6525^{PLUS} Network Concentrator

A 6525^{PLUS} is a multifunction/multiprotocol packet assembler/disassembler (PAD) and X.25 switch. If your node is based on the 6525, you can:

- Have up to nine 6525^{PLUS} processor cards in a node.
- Have a maximum number of 54 ports per node (combination of processor cards, AIO, or UIO cards).
- Have a maximum number of 54 network ports per node.
- Have a maximum number of 53 DTE ports per node.
- Configure any or all ports as X.25, MUX, or PAD ports because the 6525^{PLUS} allows switching on all six ports. Optionally, you can configure ports to operate with synchronous protocols (SDLC, BSC2780/3270, and so on).

Port Configurations

A 6500^{PLUS} node contains only one type of processor card. For example, a single node may include up to nine 6525^{PLUS} processor cards, but it cannot contain a mix of 6525^{PLUS} and 6507^{PLUS} processor cards. The following table shows the port configurations available for the different processor cards.

Card	Maximum Processor Cards Per Node	Port Type	Port Speed	Port Number
6505 ^{PLUS}	1	PAD	50 bps to 38.4 kbps	1, 2, 3, 4, 5, 6
		MUX	1200 bps to 80 kbps	1, 2
		X.25	1200 bps to 80 kbps	1, 2
6507 ^{PLUS}	2	PAD	50 bps to 38.4 kbps	1, 2, 3, 4, 5, 6
		MUX	1200 bps to 80 kbps	1, 2, 3, 4, 5, 6
		X.25	1200 bps to 128 kbps, optionally to 384 kbps	1, 2, 3, 4, 5, 6*
6525 ^{PLUS}	9	PAD	50 bps to 38.4 kbps	1, 2, 3, 4, 5, 6
		MUX	1200 bps to 80 kbps	1, 2, 3, 4, 5, 6
		X.25	1200 bps to 128 kbps, optionally to 384 kbps	1, 2, 3, 4, 5, 6*
*On 6507 ^{PLUS} and 6525 ^{PLUS} cards, Ports 3, 4, 5, and 6 have a maximum port speed of 80 kbps if configured as X.25 ports.				

Processor Card

Figure 1-3 shows the front panel display for the processor card. From the front panel, you can reset the card, test the lights, and monitor data transmissions by observing the lights.

Physically, the processor cards are identical. The ID Module of each processor card (located in socket U40) is unique and provides the functions specific to each type of processor card.

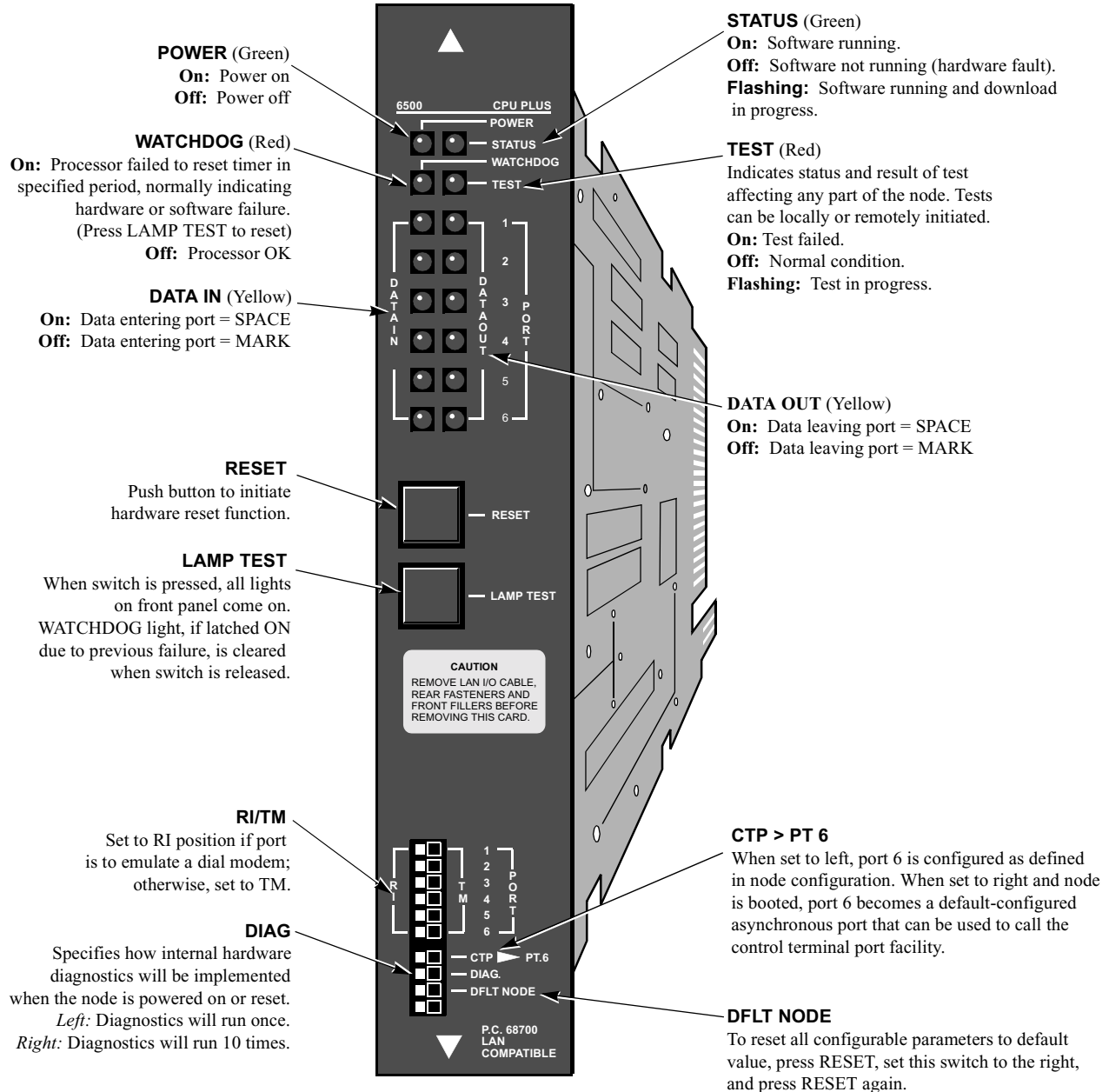


Figure 1-3. 6500^{PLUS} Processor Card Front Panel

**Optional FLASH
Module**

Optionally, a FLASH memory module can be attached to a processor card to provide software distribution and software download capabilities. This optional daughtercard contains up to 3 Mbytes of nonvolatile FLASH memory and is used for remote software distribution and software download.

6500^{PLUS} Auxiliary Processor Cards

Introduction

6500^{PLUS} auxiliary processor cards increase throughput for 6507^{PLUS} and 6525^{PLUS} nodes. They provide additional processing power, as well as six additional ports.

Description

A 6500^{PLUS} auxiliary processor card is a 6507^{PLUS} or 6525^{PLUS} processor card without a FLASH module, meaning that the card lacks software storage capabilities. Optionally, you can purchase a FLASH module for a 6500^{PLUS} auxiliary processor card for downloading software. The front panel is the same as the front panel of the 6500^{PLUS} processor cards shown in Figure 1-3.

■ Note

You cannot use a 6500^{PLUS} auxiliary processor card as the primary processor card in a node and cannot install it in the lowest-numbered slot in the node. The 6500^{PLUS} auxiliary processor card is intended to be used for redundancy and to increase node performance.

6500^{PLUS} Asynchronous and Universal I/O Cards

Introduction

Two types of I/O cards are:

- Asynchronous I/O (AIO)
- Universal I/O (UIO)

AIO Card

You can use an AIO card with all 6500^{PLUS} processor cards. It provides six asynchronous ports that can be configured as PAD ports. This card supports PAD port speeds from 50 to 19200 bps and split speed operation (75 bps inbound and 1200 bps outbound) on all ports.

UIO Card

You can use a UIO card with 6507^{PLUS} and 6525^{PLUS} cards. The UIO card provides six asynchronous or synchronous ports. You can configure ports as X.25, MUX, or PAD ports. Optionally, you can configure them to operate with synchronous access protocols (SDLC, BSC3270, BSC2780/3780, and so on). This card supports PAD port speeds from 50 to 19200 bps, and synchronous speeds from 1200 bps to 80 kbps.

■ Note

You can use UIO cards with 6505^{PLUS} processors if you configure them only for PAD ports.

Description

The following table describes the characteristics of each card.

Card Type	Works with...	Port Types	Split Speed
AIO	<ul style="list-style-type: none"> • 6505^{PLUS} • 6507^{PLUS} • 6525^{PLUS} 	PAD	Yes
UIO	<ul style="list-style-type: none"> • 6507^{PLUS} • 6525^{PLUS} • 6505^{PLUS}, if PAD ports only 	<ul style="list-style-type: none"> • PAD • MUX • X.25 • optional synchronous protocols 	No

Front Panel Display Figure 1-4 shows the front panel display, which is the same for both types of I/O cards.

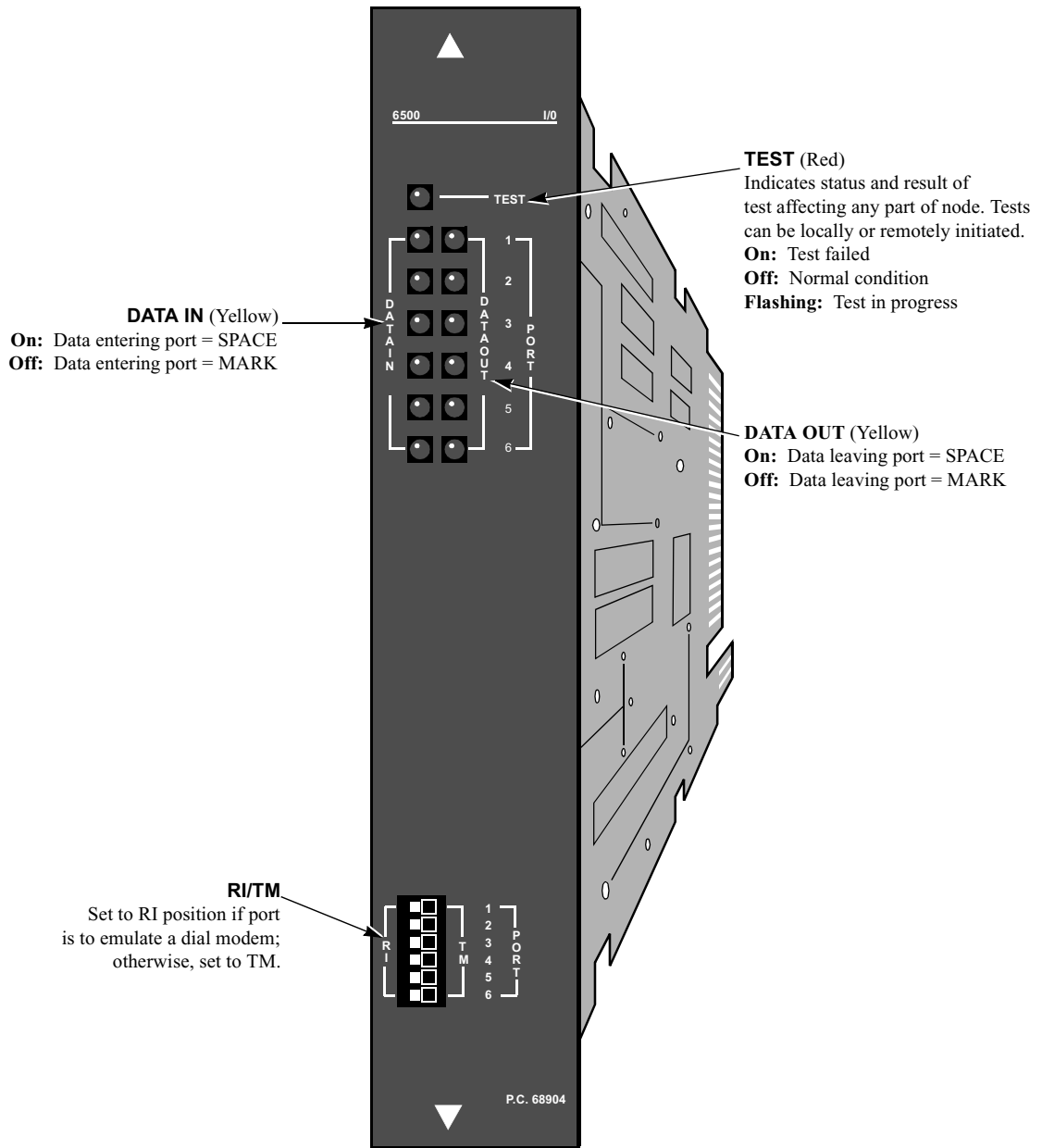


Figure 1-4. 6500^{PLUS} Universal I/O or Asynchronous I/O Card Front Panel

6500^{PLUS} Network Storage Option Card

Introduction

The 6500^{PLUS} network storage option (NSO) card expands basic node memory for support of large packet sizes.

NSO Card Description

The NSO card has a 3.5-inch high-density floppy disk drive with a storage capacity of 1.4 Mbytes (MS-DOS-formatted disks). The disk drive is used to download new and optional software to the node. The card contains 1 Mbyte of DRAM, which can be increased in 2-Mbyte increments to 5 Mbytes by inserting SIMMs.

The MEM lights on the front panel indicate the amount of NSO RAM used by the system. A node with a lot of memory in the processor card may not use all the memory in the NSO card. In this case, only some of the lights on the NSO card may come on.

NSO Card

Figure 1-5 shows the NSO card.

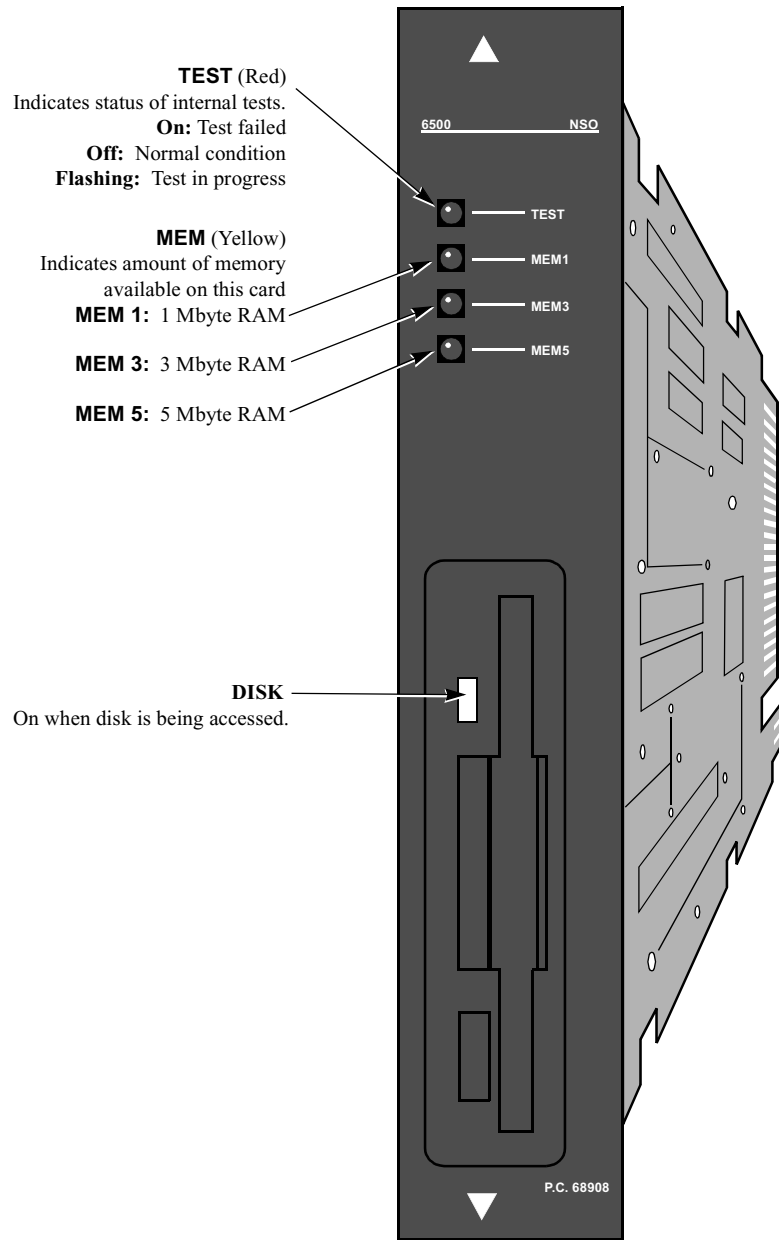


Figure 1-5. 6500^{PLUS} Network Storage Option Card

6500^{PLUS} Token Ring Interface Module Option

Introduction

The Token Ring Interface Module (TRIM) card is an option card that lets you route LAN traffic through your network.

Features

The TRIM card provides the following features:

- VanguardMS Periphery Routing
- One Token Ring LAN port operating over Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP) cable at 16 or 4 Mbps
- IBM-compatible Source Route Bridging support
- Support for up to 32 remote LAN bridge connections
- Capability for Frame Relay, X.25, MX.25, and/or XDLC network connections for Token Ring LAN traffic

Description

You can mount the TRIM card on 6507^{PLUS} or 6525^{PLUS} processor cards (not 6505^{PLUS} cards) within a Modulus enclosure. The TRIM card is suitable only in a Modulus enclosure. A single node can support just one TRIM card. Modulus 8 and Modulus 9 enclosures can support one node containing a TRIM card. Modulus 18 and Modulus 21 enclosures can support a maximum of three nodes containing TRIM cards.

The TRIM card provides one LAN port through its backplane; connection can be made through either the unshielded twisted pair (UTP) or the shielded twisted pair (STP) LAN connectors. All LAN configuration is performed through Control Terminal Port (CTP) menus. See the *Vanguard ONS Basics Protocols Manual (T0106)* for configuration information.

A PROM chip on the TRIM card provides the BIA (Burned In Address), the LAN MAC address unique to that port. The BIA is the default value for the Port TMAC Address (found in the Port configuration record).

TRIM Card

Figure 1-6 shows how the TRIM card is mounted on the processor card.

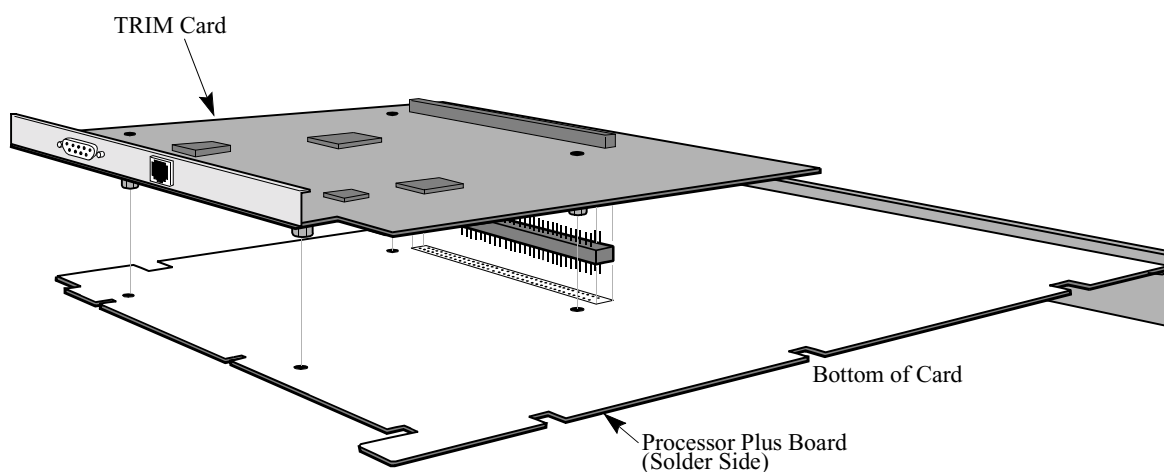


Figure 1-6. Token Ring Interface Module (TRIM) Card

**TRIM-Compatible
Processor Card
Upgrade**

Not all 6500^{PLUS} processor cards can support the TRIM card. A TRIM-compatible processor card has a “LAN COMPATIBLE” marking on the lower front panel (Figure 1-3). If your processor card does not have this marking, see your VanguardMS Sales representative to order a LAN-capable processor card.

6500^{PLUS} Integral DSU

Introduction

The 6500^{PLUS} Integral DSU option is intended for use in installations requiring connection to a DDS interface, conforming to AT&T 62310 or ANSI T1E1.4/91-006, and running at a rate of 56 kbps. At present, this optional DSU interface is only available with VanguardMS 6500^{PLUS} enclosures using a 25-pin D connector interface.

The DSU option normally uses clocking derived from the network interface, but may also be configured to originate the clocking, thus providing the standard DSU and CSU loopbacks. Installation of the DSU option requires a hardware and software upgrade to the base 6500^{PLUS} product.

Hardware Components

The DSU option consists of two hardware modules, the Data Interface Module (DIM) and the External Interface Module (EIM).

DIM

The DSU DIM is a small (approximately 1 in. x 3.5 in.) circuit card installed as a daughtercard onto the 6500^{PLUS} processor card. The DIM module provides the proper power to the EIM and also performs the data translation functions.

EIM

The EIM, shown in Figure 1-7, contains the telco interface circuitry portion of the option. The EIM has an 18 in. cable with a 25-pin connection for interface with the 6500^{PLUS} unit, and an RJ-48S jack for connection to the DDS line.

Example of an EIM Figure 1-7 shows the EIM.

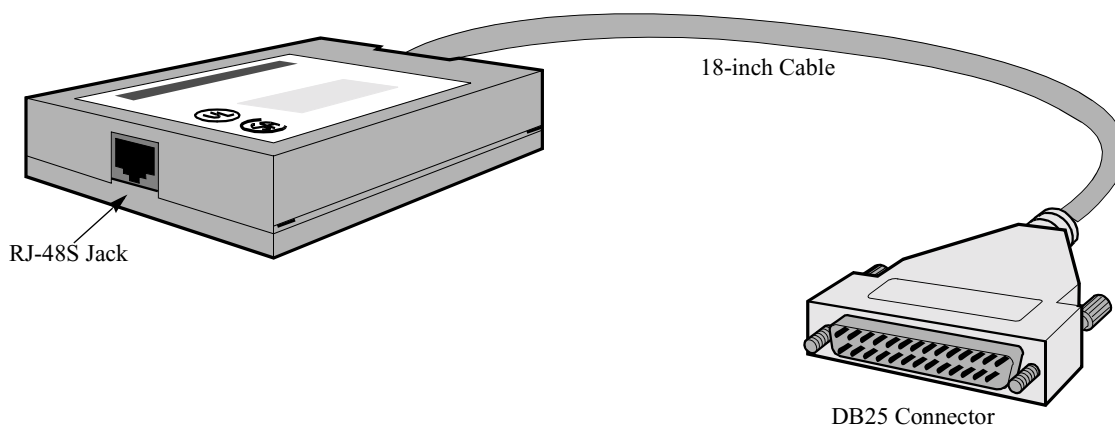


Figure 1-7. External Interface Module (EIM)

DSU Interface

The DIM and EIM modules work cooperatively to provide a DSU interface and must be installed together for proper operation. These devices are only intended for use with VanguardMS 6500^{PLUS} equipment.

Overview

Introduction

This chapter contains installation procedures for:

- 6500^{PLUS} Series standalone enclosures
- 6500^{PLUS} processor card components
- Software options

A description of the processor front panel LED power-up sequence and software upgrade procedures are also included.

This chapter also contains instructions for installing TRIM cards in Modulus enclosures. For general information on setting up Modulus 8/18 enclosures and inserting 6500^{PLUS} cards into the enclosures, refer to the *Modulus Planning and Installation Guide*. For Modulus 9/21 enclosures, see the *Modulus 9 and 21 Installation and Operation Guide*.

Warning etc.

The following special notices apply to *all* equipment handling procedures in this chapter:

Be sure a power outlet is near the equipment and easily accessible.



Warning

Only trained, qualified technicians should perform the installation and replacement procedures in this chapter.



Caution

Ports that are capable of connecting to other apparatus are defined as SELV. To ensure conformity with EN60950 — ensure that these ports are only connected to ports of the same type on other apparatus.

6500^{PLUS} cards, DIMs, SIMMs, and FLASH modules are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions whenever you handle a 6500^{PLUS} card.

Installing Standalone Units

Introduction

This section explains how to set up a 6500^{PLUS} standalone enclosure. When you receive the enclosure, it already contains a 6505^{PLUS}, 6507^{PLUS}, or 6525^{PLUS} card.

Unpacking

Before you unpack the 6500 standalone enclosure, check the outside of the package. If the package is damaged, contact the shipping agent.

Site Preparation

Install the standalone enclosure in a clean location free from shock, vibration, and extremes of temperature and humidity. The site must meet the physical and environmental requirements listed in Appendix B, Specifications. Be sure there is at least 12 inches (30.5 cm) clearance at the rear of the unit for interface cabling and ventilation.



Caution

Be sure that the standalone enclosure's air vents are uncovered. If the vents are covered, the unit could overheat.

Example of Standalone Enclosure

Figure 2-1 shows a standalone enclosure.

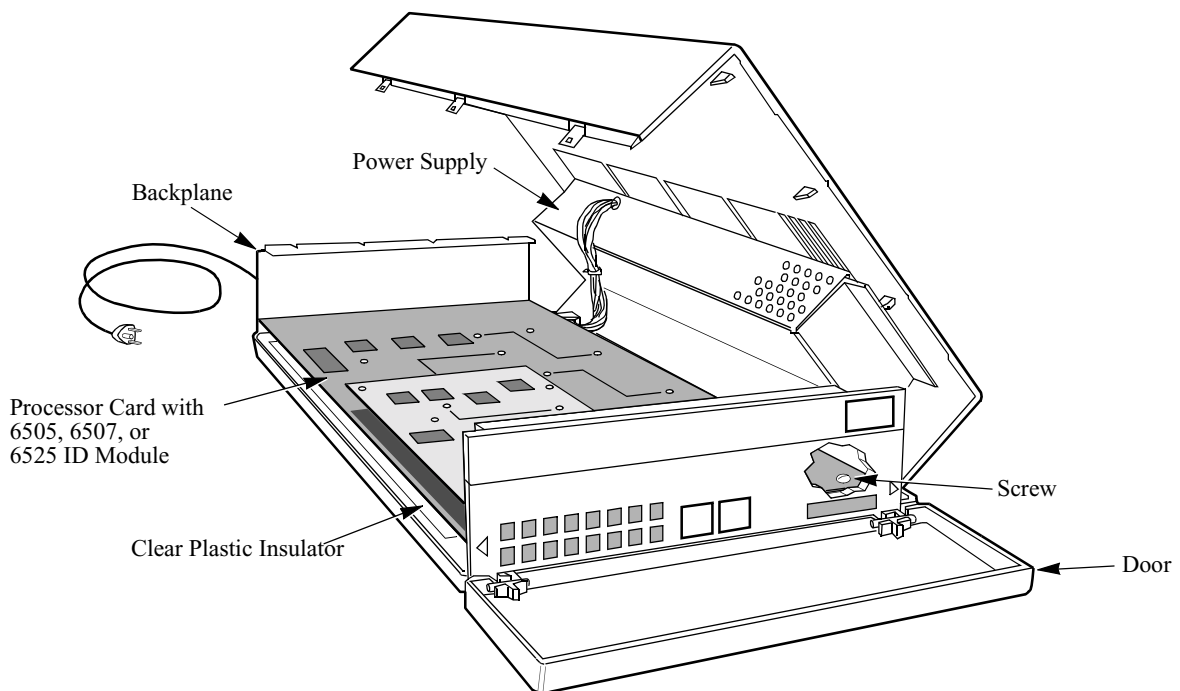


Figure 2-1. Standalone Enclosure

Installation Procedure

The standalone enclosure already contains a 6505^{PLUS}, 6507^{PLUS}, or 6525^{PLUS} card. To install the unit, follow these steps:

Step	Action	Description/Result
1	Place the unit at its designated site and plug the power cord into a suitable primary power source.	The power cord is attached to the back of the unit (Figure 2-2).
2	Switch on the power, located at the rear of the unit.	The front panel lights turn on as described in the “Power-Up Verification” section on page 2-74. After a few minutes, the green STATUS light comes on to indicate the node is ready to process calls. If this does not occur, call your VanguardMS representative.
3	Configure the unit through the Control Terminal Port (CTP) menus.	To access the CTP, attach a terminal to Port 6 with an EIA 232-D connector. Port 6’s default settings are standard terminal port values: 9600 baud, 8 data bits, 1 stop bit, no parity.
4	When the (*) prompt appears on the terminal, type the following: .ctp <CR> At the password prompt, press <CR>	This is the default password value. The Main menu appears. See the <i>Vanguard ONS Basics Protocols Manual (T0106)</i> for configuration information.

Rear View

Figure 2-2 shows the rear view of the standalone enclosure.

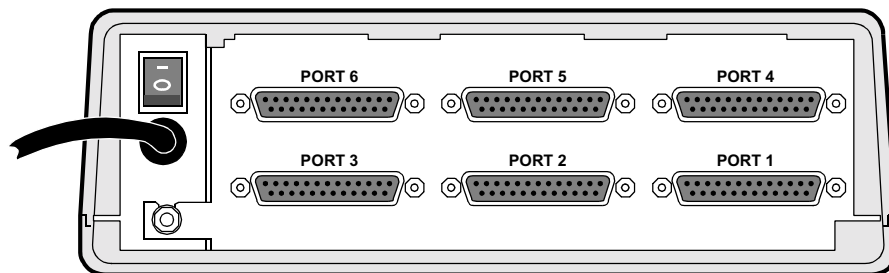


Figure 2-2. Rear View of Standalone Enclosure

Replacing Processor Cards in Standalone Enclosures

Introduction

This section describes how to replace a 6500^{PLUS} processor card in a standalone enclosure.



Warning

Before opening the enclosure, be sure that it is unplugged from the power source.



Caution

6500^{PLUS} cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card.

Card Removal Procedure

To remove a processor card, follow these steps:

Step	Action
1	Open the front door of the enclosure and remove it by pressing down on the hinges, as shown in Figure 2-3.
2	Turn over the enclosure so it is resting on its cover (Figure 2-4) and locate the six locking tab slots (three on each side). There are four locking clips (two in the front and two in the back) in the slots.
3	Using a small pair of pliers, remove the four locking clips from the slots.
4	Using a small screwdriver or similar tool, press the locking tabs inside the slots until they release (Figure 2-5).
5	On the rear panel above the power cable, loosen, but do not remove, the locknut and washer.
6	Turn the enclosure over so it is upright. Tilt the cover clockwise (when viewed from the rear) until you encounter resistance (Figure 2-3). There is a cable connecting the power supply and the backplane.
7	Reach into the enclosure and disconnect the power cable from the backplane socket.
8	Remove the cover.
9	Using a screwdriver, remove the screw holding the card to the bottom of the enclosure (Figure 2-6).
10	Lift the card and backplane out of the enclosure and carefully remove the backplane from the card.

Door Removal

Figure 2-3 shows how to remove the door on the standalone enclosure.

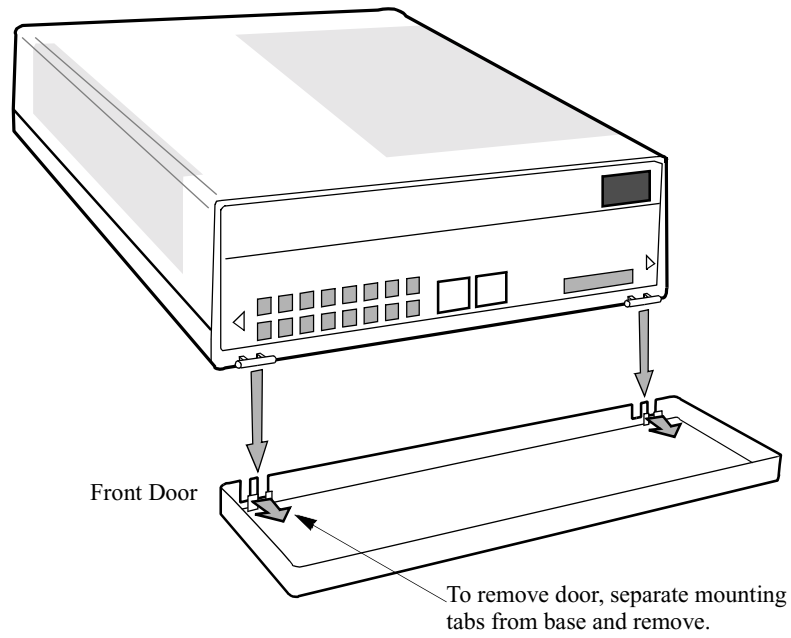


Figure 2-3. Remove the Standalone Enclosure Door

Enclosure Resting on Cover

Figure 2-4 shows the bottom of the standalone enclosure.

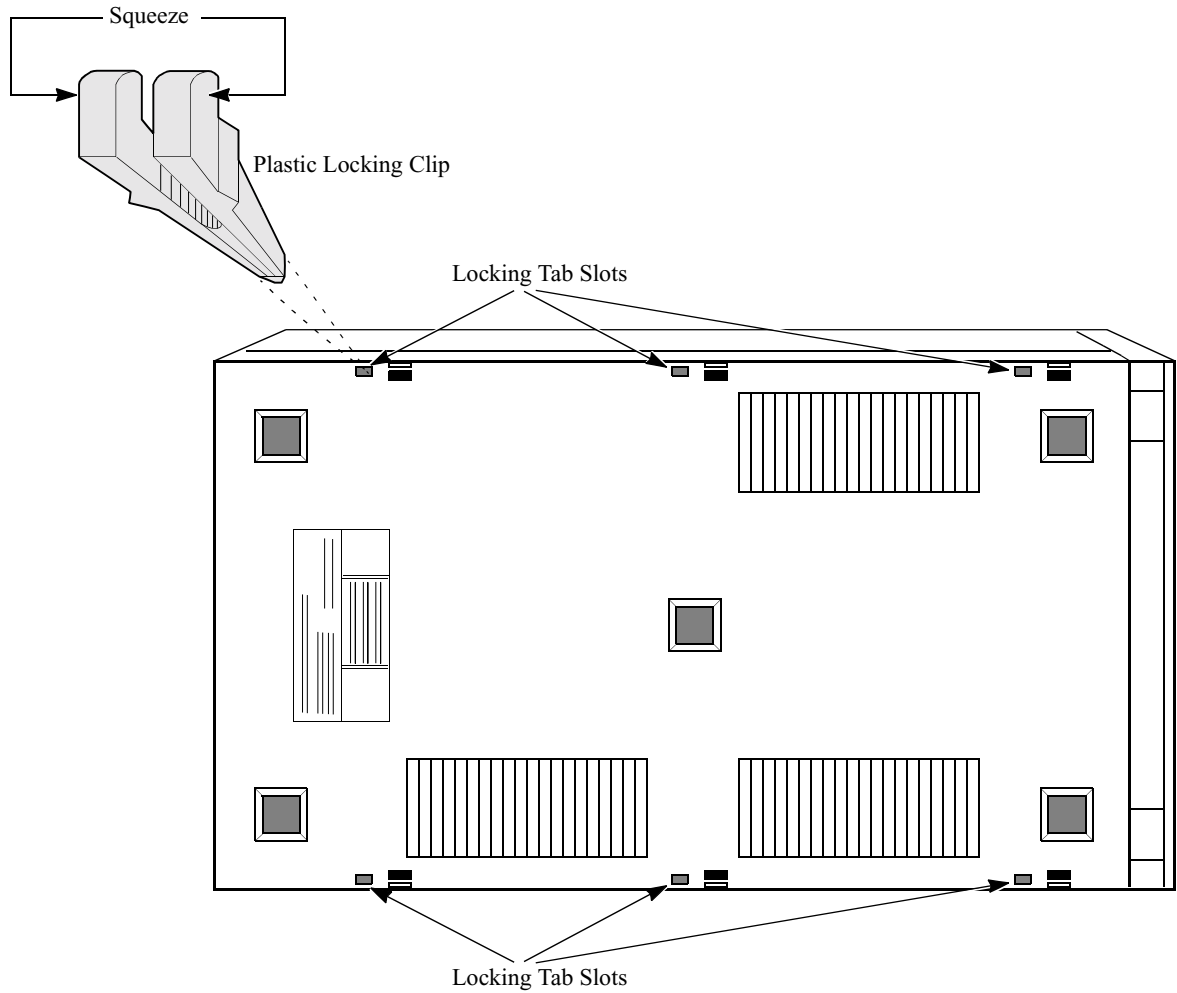


Figure 2-4. Bottom of Standalone Enclosure

Locking Tabs

Figure 2-5 shows how to release the tabs.

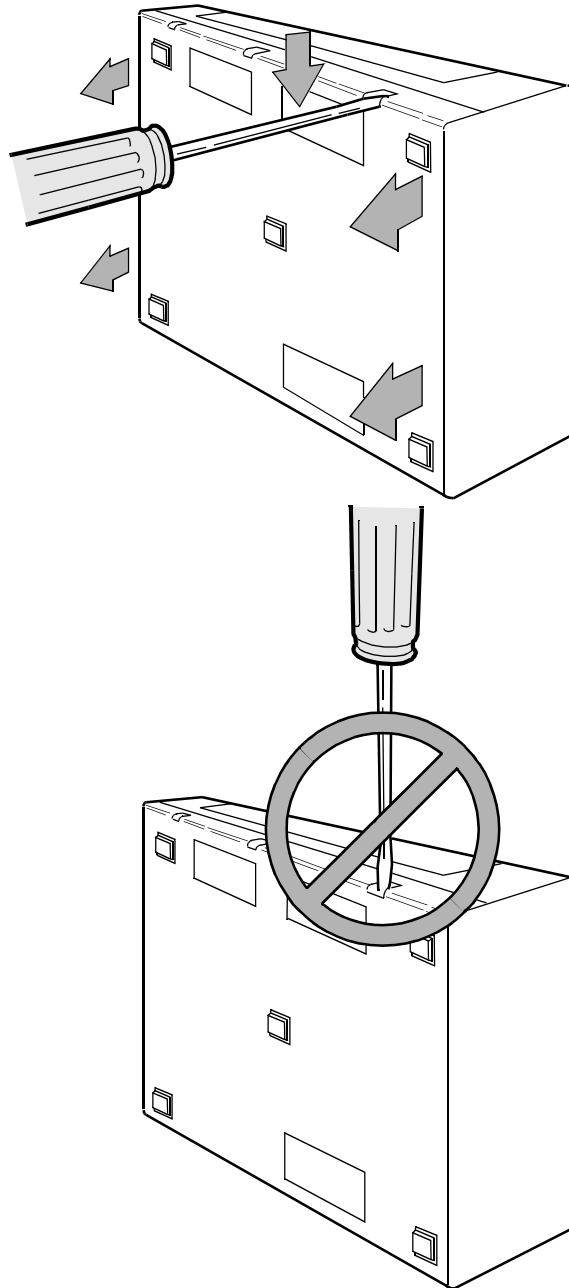


Figure 2-5. Using Screwdriver on Locking Tabs

Retaining Screws

Figure 2-6 shows the retaining screws on the processor card.

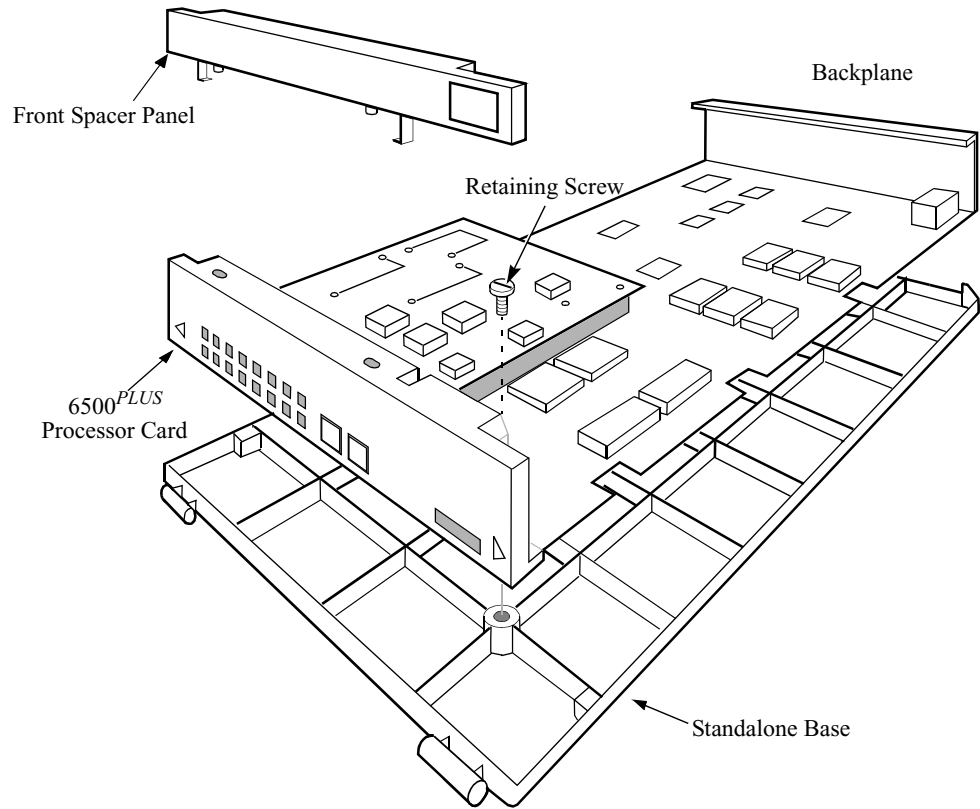


Figure 2-6. 6500^{PLUS} Processor Card with Retaining Screw

Procedure to Add a Replacement Card

Follow these steps to add a processor card to the standalone enclosure:

Step	Action
1	Carefully insert the replacement card into the backplane's connector. Be sure that the clear plastic insulator is in place, under the card. When pressing the replacement card into the backplane connector, use direct force. Wiggling the card may damage it. The card's tabs and the backplane's connector are keyed, so you cannot insert the card incorrectly.
2	From the old card, remove the spacer panel attached to the front panel and mount it to the front panel of the new card (Figure 2-6).
3	Place the backplane and card into the bottom of the enclosure. Be sure that the backplane and the card mounting hole are properly aligned.
4	Secure the card to the enclosure using the retaining screw that held the card to the bottom of the enclosure.

Step	Action
5	Take the enclosure cover and connect the power cable to the backplane connector. Be sure to align the keyed pin on the cable to the connector.
6	Align the enclosure cover and bottom, and press the two gently together. This requires alignment of the backplane and the locking tabs. Be sure that the cables are not pinched between the enclosure and metal parts. When all elements are correctly aligned, the locking tabs snap into place.
7	Tighten the locknut and washer on the rear panel.
8	Insert the four locking clips into the slots.
9	Reinstall the door by gently pressing the hinge parts together. After the card has been properly installed, reconnect the cables and turn on the unit.

Installing Nodes in Modulus Enclosures

Introduction

Installing 6500^{PLUS} cards into Modulus enclosures is the same as installing any other type of Modulus product card.

Additional Information

For general information on setting up Modulus 8/18 enclosures, attaching product backplanes, inserting cards, and attaching front and rear filler panels to the enclosures, refer to the *Modulus Planning and Installation Guide* . For general information about Modulus 9/21 enclosures, see the *Modulus 9 and 21 Installation and Operation Guide*.

The following sections contain Modulus information specific to 6500^{PLUS} products, including multi-processor node information, TRIM card installation, and grounding strap installation.

Multiprocessor Nodes

Introduction

A node based on the 6507^{PLUS} or the 6525^{PLUS} processor card can contain more than one processor card to improve reliability and availability. The two processor cards provide backup support to each other.

Multiprocessor Node Example

Figure 2-7 shows a multiprocessor node where an enclosure is configured for two 6507^{PLUS} or two 6525^{PLUS} cards.

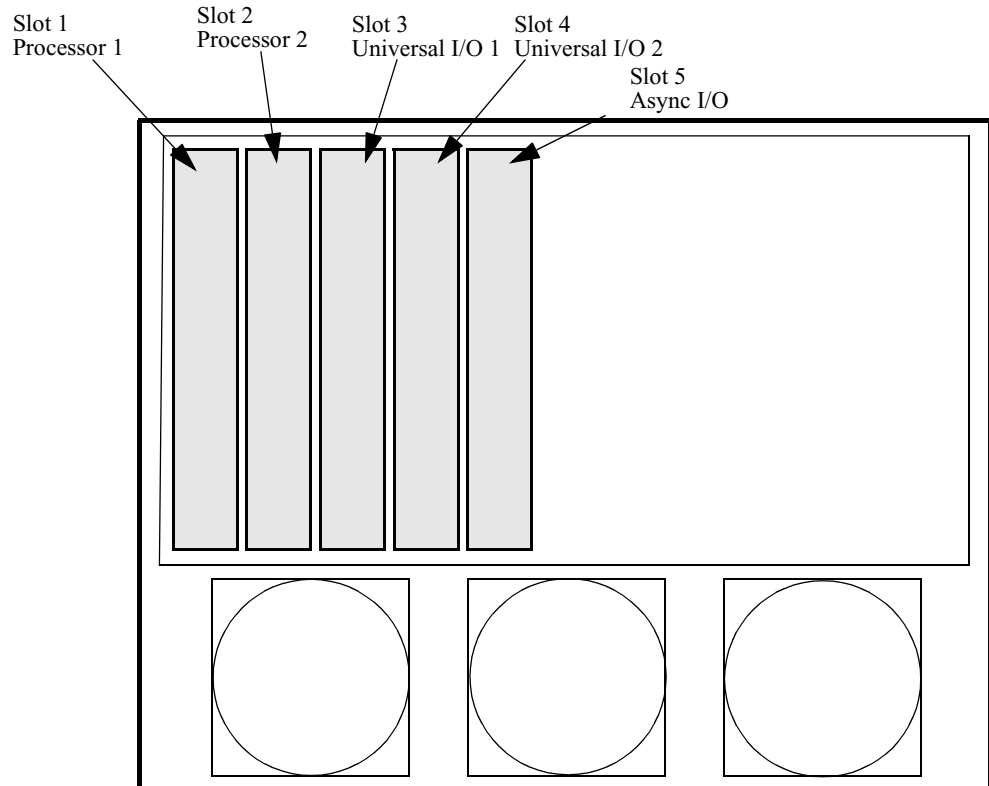


Figure 2-7. Multiprocessor Node

Operation

This is how a multiprocessor node operates under normal conditions, with both processors working.

- Processor 1 handles the I/O interrupts from its own six on-board ports. The processor card in the lowest-numbered slot is the master. In Figure 2-7, Processor 1 is the master processor.
- Processor 2 handles its own on-board interrupts plus those from universal I/O cards 1 and 2 and the asynchronous I/O card.
- If Processor 2 fails, the node restarts and Processor 2 is disabled. When a processor card is disabled, interrupt requests generated by cards to the right pass to the processor card on its left. While overall throughput is reduced, links to the right of the failed processor are restored automatically.

Replacing Master Processor of Multi-Processor Node

Introduction

This section describes how to replace a failed master processor in a multiprocessor node without losing your configuration.

Keeping the Original Node Configuration

All processor cards in a node contain identical copies of CMEM. If the master processor fails, you can keep the original node configuration and options if you:

- Replace the master processor with another processor card from the node (preserving the configuration).
- Keep the ID Module of the original master, retaining the original SAKs for the options you purchased.

Replacement of Other Processor Cards

To replace a processor card other than the master, remove the old processor card and insert the new one. Be sure you use the correct type of ID Module (for example, 6505, 6507, or 6525). You do not have to change the configuration. When the node starts up, the CMEM on the new processor card is loaded automatically with the node configuration.

■ Note

All processor cards in a multiprocessor configuration must operate on the same revision of software. If they do not have the same software revision, remove the software from the failed processor card and exchange it with the software on the spare card. All processor cards in a multiprocessor configuration must use the same type of ID Modules—the node must be composed entirely of one type of processor card (6505, or 6507, or 6525 cards).

Replace the Master Processor

Follow these steps to replace the master processor:



Caution

This procedure saves your configuration. If you do not use this procedure to replace the master processor card, the default configuration is transferred to the other processor cards in the node and you must reenter or download your configuration.

Step	Action	Result/Description
1	Remove the failed processor card from the lowest-numbered slot in the node.	
2	Exchange the ID Module and the CMEM chip between the failed master processor card and the new processor card.	See the “Replacing ID Modules” section on page 2-63 and “Replacing the CMEM Chip” section on page 2-65 for instructions. Return the failed card to your VanguardMS Service representative.
3	Install the new processor card into the lowest-numbered slot.	This will now be the master processor.
4	Boot the node.	

Adding a Secondary 6500^{PLUS} Processor with FLASH

Introduction

When adding another 6500^{PLUS} processor card to a node, be sure that all processor cards are running the same software revision. 6500^{PLUS} processor cards redistributed within a network may contain different revisions of software.

When To Add Another Processor with FLASH

Two situations in which you may add an additional 6500^{PLUS} processor card with FLASH memory to a node are when you want to:

- Maintain the current software revision
- Upgrade with software from the new 6500^{PLUS} processor card

In both cases, the FLASH Enable Option is required.

These situations apply to the 6507^{PLUS} and 6525^{PLUS} nodes. A 6505^{PLUS} node does not support multiple processor cards.

Before You Begin

Follow these steps to access the control terminal port:

Step	Action	Result/Description
1	Connect a terminal to a local PAD port, and enter the following at the (*) prompt: .ctp <CR>	
2	Enter the password when you are prompted.	The default password is <CR>. After you enter the password, the Main menu appears. For more information about accessing the CTP, see the <i>Vanguard ONS Basics Protocols Manual (T0106)</i> .

Maintaining the Current Software Revision

Follow these steps to add a processor card with FLASH memory to your node and download the current software revision to the new processor's FLASH memory:

Step	Action
1	At the control terminal port, use the Node Statistics to confirm that the node is running software from RAM and that FLASH is enabled. If FLASH is disabled, enable FLASH by doing the following: <ol style="list-style-type: none"> a) Select FLASH Memory from the Main menu b) Select Enable FLASH.
2	Install the new processor card in any slot on the node to the right of the master processor.
3	At the control terminal: <ol style="list-style-type: none"> a) Select FLASH Memory from the Main menu. b) Select Copy Software to FLASH. It may take several minutes to load the software
4	After the software has been written to the FLASH, check the Node Statistics to see that all FLASH cards in the node contain the same revision of software.

Software Distribution

Generally, software distribution is managed from a central site. The Network Manager configures and initiates software updates as required.

When Software is Unavailable

You can upgrade with software from the new processor card when the software is unavailable elsewhere in the network by:

- Adding a secondary processor with FLASH memory to your node
- Making the software in the new processor's FLASH the operating revision of software in the node
- Retaining the node's configuration and options

Upgrading with Software From the New Processor Card

Follow these steps to ensure that the node's configuration is not lost. If you do not follow this procedure, CMEM will be overwritten.

Step	Action
1	At the control terminal, use the Node Statistics to confirm that the node is running software from RAM and that FLASH is enabled. If FLASH is disabled, enable FLASH by doing the following: a) Select FLASH Memory from the Main menu b) Select Enable FLASH.
2	Remove the master 6500 ^{PLUS} processor card (in lowest-numbered slot).
3	Exchange the ID Module and CMEM chips between the master 6500 ^{PLUS} processor card and the new 6500 ^{PLUS} processor card. See the "Replacing ID Modules" section on page 2-63 and "Replacing the CMEM Chip" section on page 2-65 for instructions.
4	Install the new 6500 ^{PLUS} processor card in the lowest-numbered slot and install the former master processor card in the slot to the right.
5	At the control terminal, use the Node Statistics to confirm that the node is running the new software. If the new software is not running, the FLASH memory may not have been enabled on the new processor card. Enable the FLASH memory and cold boot the node to force loading from FLASH memory.
6	At the control terminal: a) Select FLASH Memory from the Main menu. b) Select Copy Software to FLASH.

Installing/Replacing Processor Cards

Introduction

You can insert and remove any 6500^{PLUS} processor card from a powered-up Modulus nest without damage.



Caution

6500^{PLUS} cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card.

Replacement Procedure

After inserting or removing a card, press the Reset button on the 6500^{PLUS} processor card to restart the node. Reboot the node.

Replacing a Card in a Modulus 8/18 Enclosure

When replacing a card in a Modulus 8/18 enclosure, refer to the *Modulus Planning and Installation Guide*. When replacing a card in a Modulus 9/21 enclosure, refer to the *Modulus 9 and 21 Installation and Operation Guide*.

Requirements for Installing a TRIM Card

Introduction

This section describes the requirements for installing a TRIM card. TRIM cards are suitable only in a Modulus enclosure and only with 6507^{PLUS} and 6525^{PLUS} cards.

A 6500^{PLUS} node can support only one TRIM card. Modulus 8 and Modulus 9 enclosures can support just one node containing a TRIM card. Modulus 18 and 21 enclosures can support up to three nodes containing TRIM cards.

TRIM Card Upgrade Kits

The following product codes allow you to upgrade your system for LAN compatibility:

Product Code	Product	Description
68517	LAN Bridging Software Authorization Key (SAK)	Accesses the LAN bridging software.
68505	TRIM Card	Provides just the Token Ring Interface Module card.
68506	6500 ^{PLUS} LAN compatible processor card upgrade.	Provides a LAN compatible 6500 ^{PLUS} processor card with TRIM card already attached.
68507	Modulus 9/21 12-port TRIM Package	Includes a TRIM card, a Modulus 9/21 12-port backplane, and front and rear filler panels.
68514	Modulus 18 RFI Suppression Screen	Required for Modulus 18 installations.
68516	6500 ^{PLUS} TRIM Installation Kit for Modulus 9/21 Enclosures	Provides the front and rear filler panels needed when you install a TRIM card into the Modulus 9/21 nest.
68518	6500 ^{PLUS} TRIM Installation Kit for Modulus 8/18 Enclosures	Provides the front and rear filler panels used when installing a TRIM card into the Modulus 8/18 nest.
68520	Modulus 21 RFI Suppression Bar	Required for Modulus 21 installations.

TRIM-Compatible Processor Card

Not all 6500^{PLUS} processor cards can support the TRIM card. A processor card that supports a TRIM card has a "LAN COMPATIBLE" label on the lower front panel. TRIM cards can be physically mounted on all 6500^{PLUS} processor cards, but work only with cards marked "LAN COMPATIBLE." If your processor card does not have this marking, see your VanguardMS sales representative to order a LAN-capable processor card.

In multiple-CPU configurations, only the processor card supporting the TRIM card needs to be LAN-compatible.

Modulus 8/18 Nests The TRIM card has its own backplane and attaches to the solder side of the 6500^{PLUS} processor card. The TRIM card requires two Modulus slots. The TRIM filler panel for Modulus 8/18 nests is two slots wide as shown in Figure 2-8.

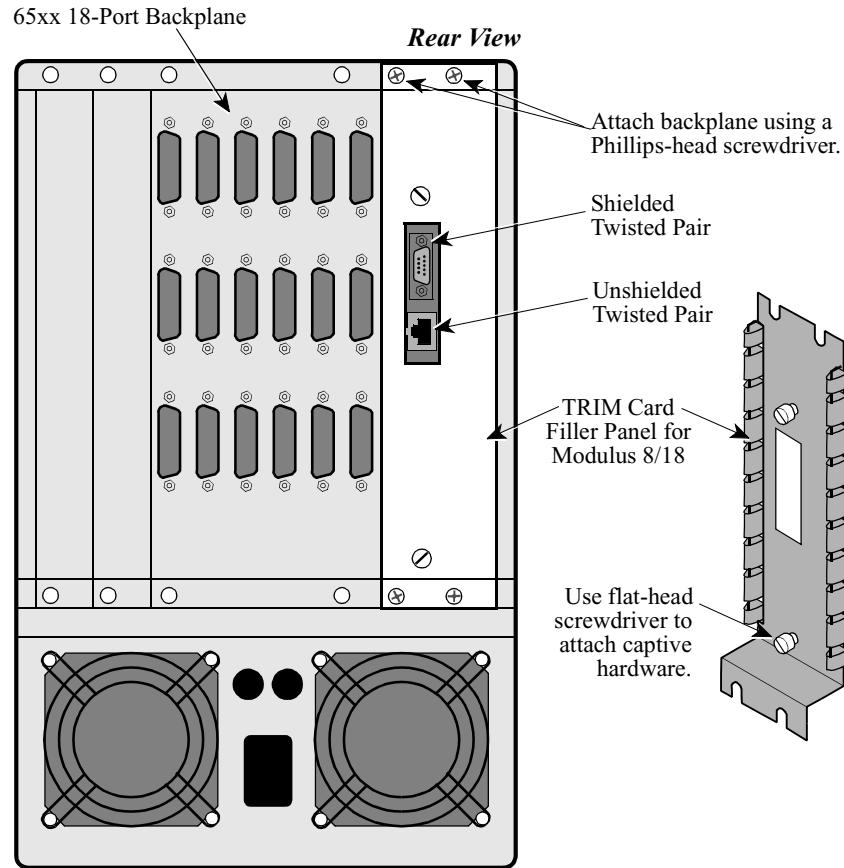


Figure 2-8. TRIM Card Rear Filler Panel for Modulus 8/18 Enclosures

**Guidelines for
Installing a TRIM
Card in a Modulus
8/18**

Consider the following if you install a TRIM card in a Modulus 8/18 enclosure:

■ **Note**

Before you add a TRIM card to an existing node, be sure the enclosure has room for it as described above. To make space, you may need to rearrange cards and backplanes, which requires a node shutdown first.

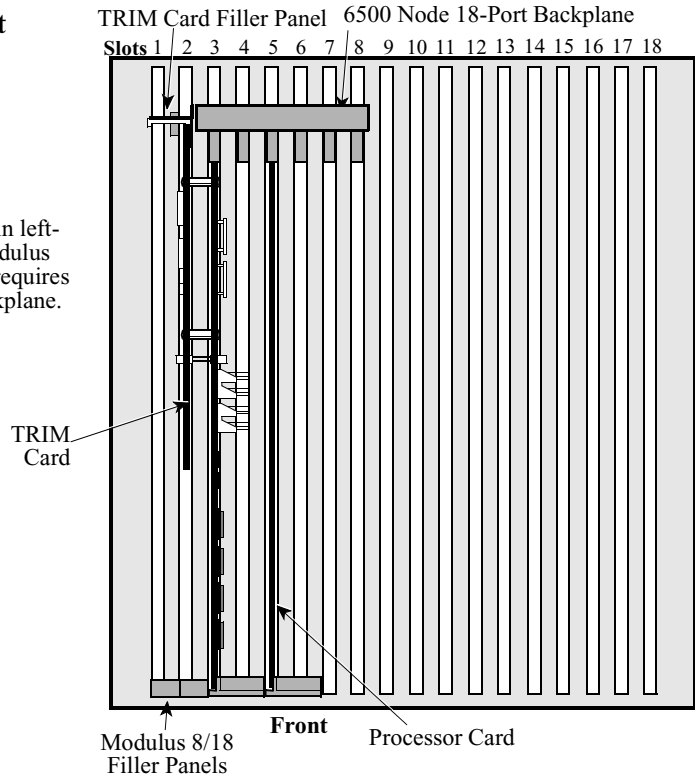
- A processor card with attached TRIM card requires four slots — two slots for the TRIM card and two for the processor card.
- You can attach a TRIM card only to the processor card in the lowest-numbered slot of a backplane (this is the master processor in a multi-processor node).
- There must be two empty slots beside the backplane next to the lowest-numbered processor card.
- The TRIM card rear filler panel covers the back of the two slots taken by the TRIM card. This rear panel, which has a cutout for the LAN port connectors, covers the TRIM card backplane (Figure 2-8). Two standard Modulus 8/18 front filler panels cover the front of the TRIM card's slots (Figure 2-9).
- When installing in a Modulus 18 enclosure, a metal screen must be installed onto the Modulus 18 door to meet FCC requirements. See the “Preparing Modulus Enclosures for RFI Suppression” section on page 2-49.

Modulus 18

Figure 2-9 shows the TRIM card spacing in a Modulus 18 enclosure.

**Modulus 18-Slot Nest
Top View**

Note: 6500^{PLUS} installed in left-most position in Modulus 18. The TRIM card requires two slots for its backplane.



Note: 6500^{PLUS} installed to the left or right of a product backplane in Modulus 18. The TRIM card requires two slots for its backplane.

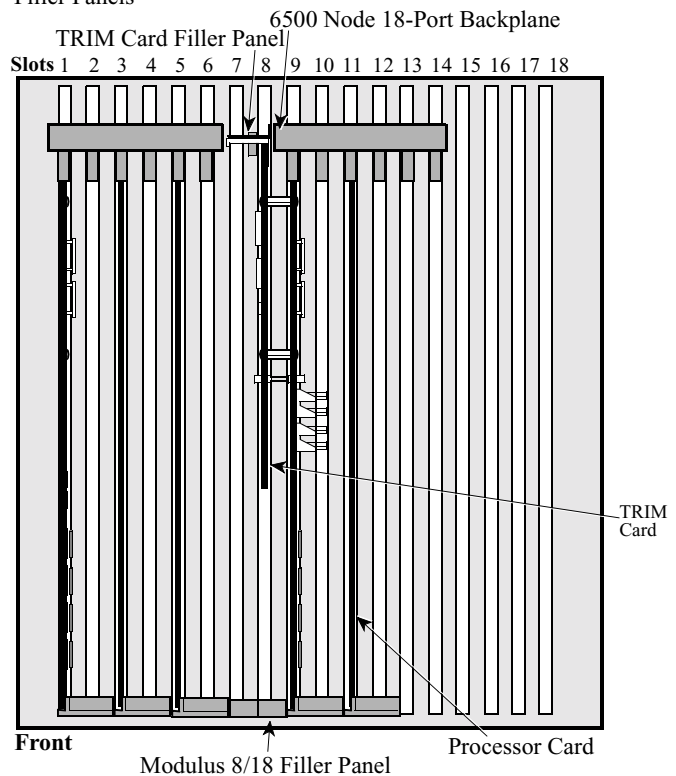


Figure 2-9. TRIM Card Spacing in a Modulus 18 Enclosure

Modulus 9/21 Nests The TRIM card has its own backplane and attaches to the solder side of the 6500^{PLUS} processor card. The TRIM card requires two Modulus slots. The TRIM filler panel for Modulus 9/21 nests is one slot wide as shown in Figure 2-10.

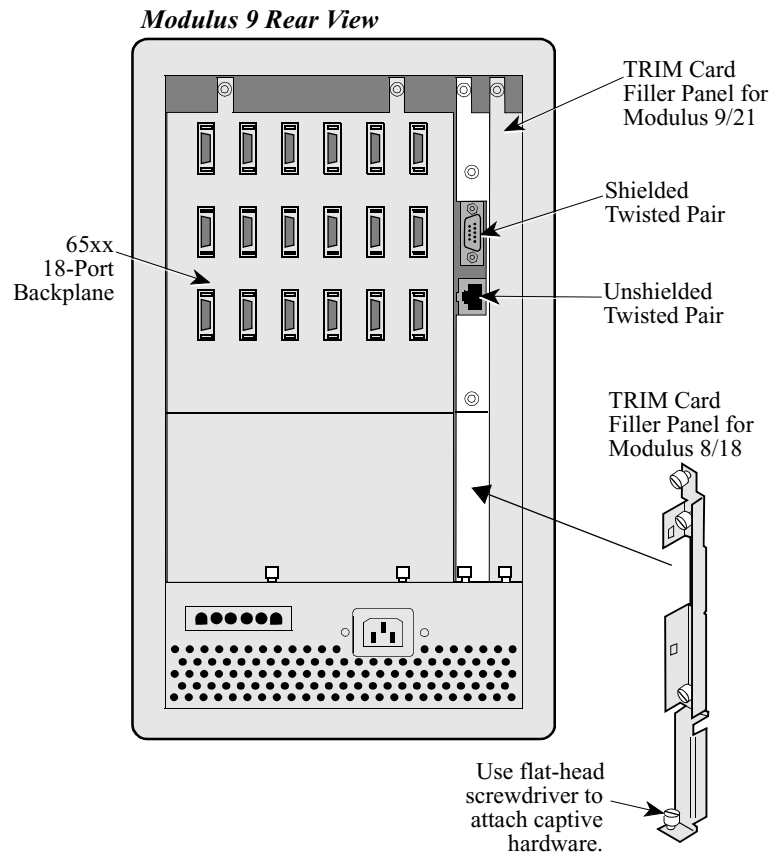


Figure 2-10. TRIM Card Rear Filler Panel for Modulus 9/21 Enclosures

Guidelines for Installing a TRIM Card in a Modulus 9/21 Enclosure

Consider the following if you install a TRIM card in a Modulus 9/21 enclosure:

■ **Note**

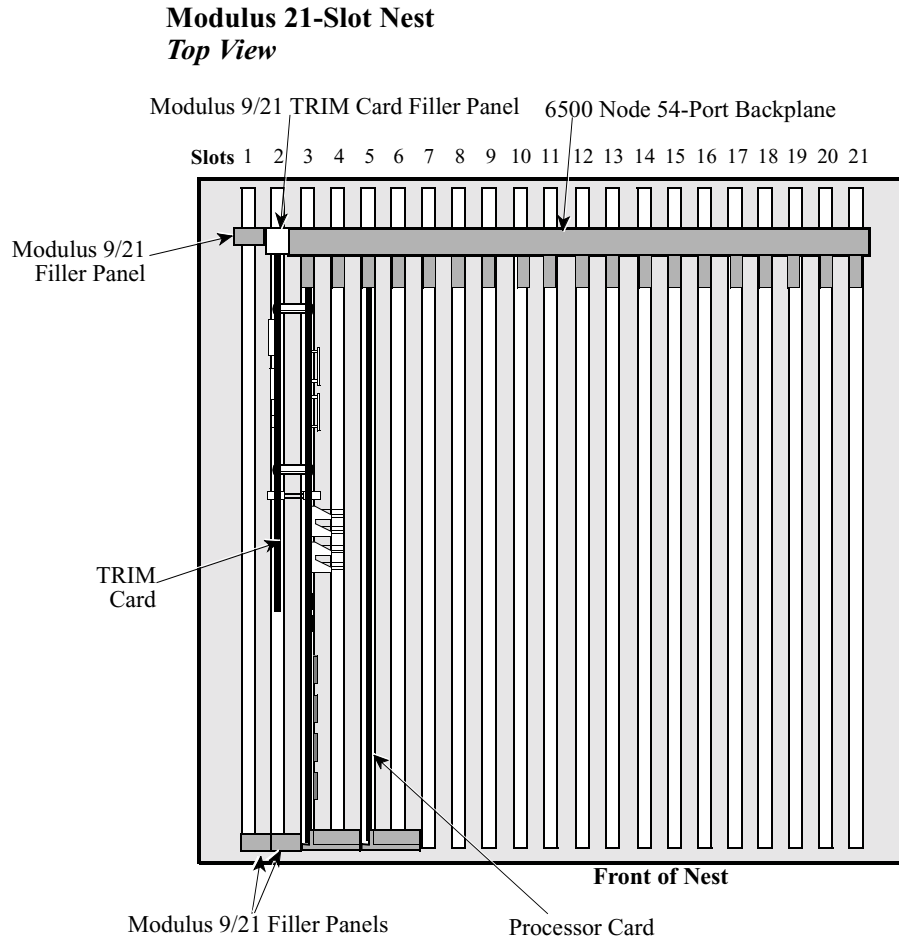
Before you add a TRIM card to an existing node, be sure the enclosure has room for it as described above. To make space, you may need to rearrange cards and backplanes, which requires a node shutdown first.

- A processor card with attached TRIM card requires four slots — two slots each for the TRIM card and the processor card.
- The TRIM card attaches only to the processor card in the lowest-numbered slot of a backplane (this is the master processor in a multi-processor node).
- When installing in a Modulus 21, install a horizontal bar on the front door to meet FCC requirements.

- **To install a node with a TRIM card in the left-most position of a nest,** attach the backplane at Slot 3 of the nest. Insert the TRIM/processor card into Slot 3. The TRIM card takes up Slot 2 and Slot 1 (the width of the card does not permit it to be installed in Slot 1). The TRIM card rear filler panel, which has cutouts for the LAN port connectors, covers the backplane in Slot 2; a standard Modulus 9/21 rear filler panel covers the back of Slot 1. Two standard Modulus 9/21 front filler panels cover Slots 1 and 2 at the front of the nest.
- If there is a product in the nest, such as a modem, that consists of a one-slot wide product card plugged into a two slot-wide backplane, then one slot can be saved when installing a TRIM. The modem product should be installed to the left of the TRIM card.
- **To install a node with a TRIM card next to another product backplane,** leave one slot empty between backplanes. Modulus 9/21 product backplanes take one slot in addition to what their product cards take. For example, a 54-port backplane takes up 19 slots, although its nine cards take up 18 slots (two slots per card). The TRIM backplane fills the one slot between the two backplanes. The TRIM card itself fills the one slot gap and one slot from the adjacent backplane. Two standard Modulus 9/21 front filler panels cover the front of the TRIM card's slots in Modulus 9/21 enclosures (Figure 2-12). This works only if a one-slot card is installed to the left of the node.

TRIM Card in Left-Most Position

Figure 2-11 shows the TRIM card in the left-most position of the Modulus 21 enclosure.



Note: TRIM card installed in left-most position in Modulus 21.
The TRIM card requires two slots for its backplane.

Figure 2-11. TRIM Card In Left-most Position of Modulus 21 Enclosure

**TRIM Card
Between Two
Backplanes**

Figure 2-12 shows A TRIM card between two backplanes in Modulus 21.

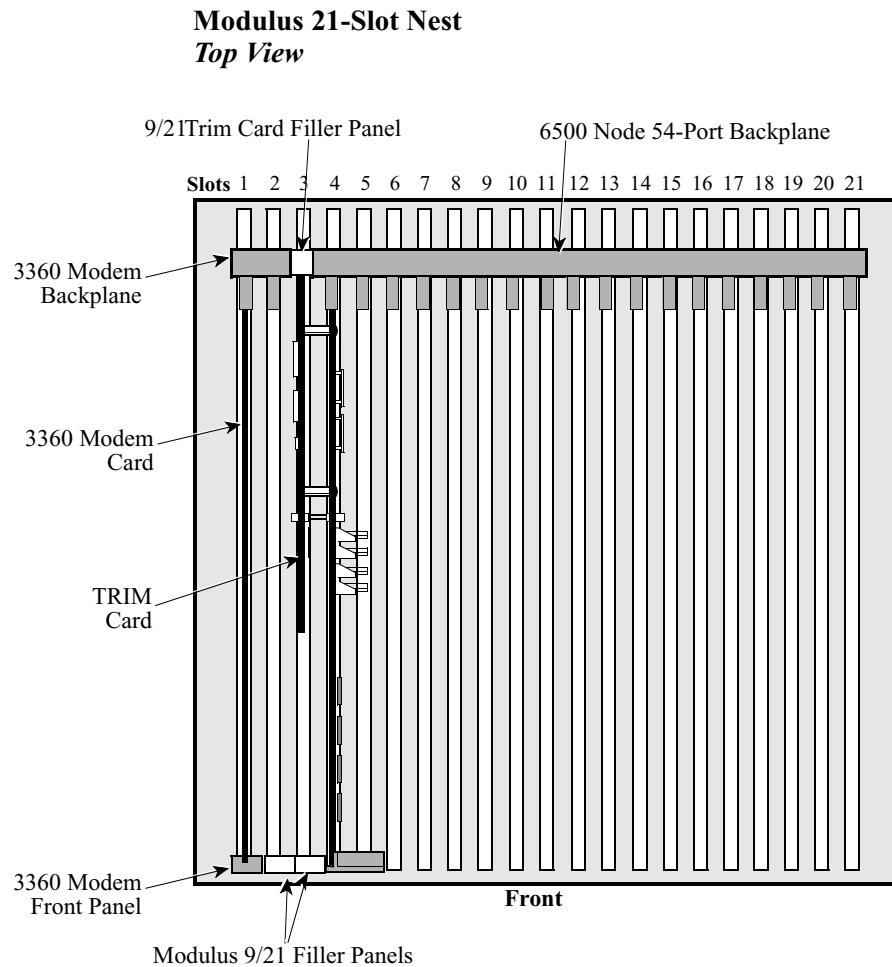


Figure 2-12. TRIM Card Between Two Backplanes In Modulus 21

**Backplane Support
for TRIM Cards**

The following table lists the backplanes capable of supporting TRIM cards. Modulus 18 and 21 enclosures support a maximum of three TRIM cards, but the actual number of nodes with TRIM cards depends on the sizes of the enclosures and backplanes you choose.

Enclosure	6507^{PLUS}	6525^{PLUS}
Modulus 8	6-,12-, and 18-port backplanes	6-,12-, and 18-port backplanes
Modulus 18	6-,12-,18-, and 24-port backplanes	6-,12-,18-, 24-, 36- and 48-port backplanes
Modulus 9	12- and 18-port backplanes	12- and 18-port backplanes
Modulus 21	12-,18-, and 24-port backplanes	12-,18-, 24-, 36-, and 54-port backplanes

Installing and Connecting a TRIM Card

Introduction

This section describes how to install a TRIM card in a 6500^{PLUS} node.



Caution

6500^{PLUS} cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card.

Steps for Installing a TRIM Card

To install a TRIM card, perform the following steps:

- 1) Attach the TRIM card if it is not already attached when it arrives from the factory.
- 2) Install the processor card into the modulus nest.
- 3) Connect the LAN cables.

Note

In multiple-CPU configurations, only the processor card supporting the TRIM card needs to be LAN-compatible.

Attaching a TRIM Card

Depending on the product code you have ordered, your TRIM card may arrive already attached to the processor card. If this is the case, skip to the next section, “Installing and Connecting a TRIM Card.” Otherwise, follow these steps:

Step	Action
1	Follow the Modulus space considerations described in previous sections.
2	Attach the TRIM rear filler panel to the enclosure. <ul style="list-style-type: none"> • If you are installing the TRIM card in a Modulus 8/18 enclosure, use a Phillips-head screwdriver to attach the TRIM rear filler panel to the backplane with the four screws provided (Figure 2-8). • If you are installing the TRIM card in a Modulus 9/21 enclosure, use a flat-head screwdriver to attach the captive screws on the top and bottom of the rear filler panel to the backplane (Figure 2-10). Attach a standard Modulus rear filler panels as needed.
3	Attach the header pins to the TRIM card. Insert the header pins in the socket so that the four pins without ferrite beads face the top of the processor card (Figure 2-13). The pins should seat firmly into the socket; do not bend them.
4	Turn the 6500 ^{PLUS} processor card so that its solder side faces upward. Insert the header pins into the socket on the processor card, being careful not to bend the pins (Figure 2-13). Be sure to support both the TRIM and processor cards while pressing them together to avoid bending and thereby possibly damaging the processor card.
5	On the component side of the processor card, screw the four fastener screws into the standoffs on the TRIM card (Figure 2-13).

Installing and Connecting a TRIM Card

Follow these steps to install and connect the TRIM card:

Step	Action
1	Insert the 6500 ^{PLUS} processor/TRIM card combination into the lowest-numbered slot of the node backplane. You can insert the processor/TRIM card combination in a powered-on nest. However, power to other cards in the nest may be disturbed because of the inrush of current to the TRIM card.
2	Using a flat-head screwdriver, attach the captive screws on the TRIM rear panel to the TRIM card backplane (Figure 2-10).
3	Attach two Modulus front filler panels to the front of the slots filled by the TRIM card.
4	The TRIM card supports only one LAN connection. Use either the DB9 or the RJ45 connector to make the LAN connection, but do not attach cables to both. <ul style="list-style-type: none">• If your LAN cable is an STP cable, attach it to the DB9 connector at the back of the TRIM card.• If your LAN cable is a UTP cable, attach it to the RJ45 connector at the back of the TRIM card.• If you are installing the TRIM card in a Modulus 21 enclosure, install the RFI suppression bar across the front door of the enclosure. See the Preparing Modulus Enclosures for RFI Suppression section.• If you are installing a TRIM card in a Modulus 18 enclosure, attach the RFI suppression screen to the inside of the front door. See the “Preparing Modulus Enclosures for RFI Suppression” section on page 2-49. The suppression screen replaces the suppression bars.

Attaching the TRIM Card Figure 2-13 shows the attachment of the TRIM card to the processor card.

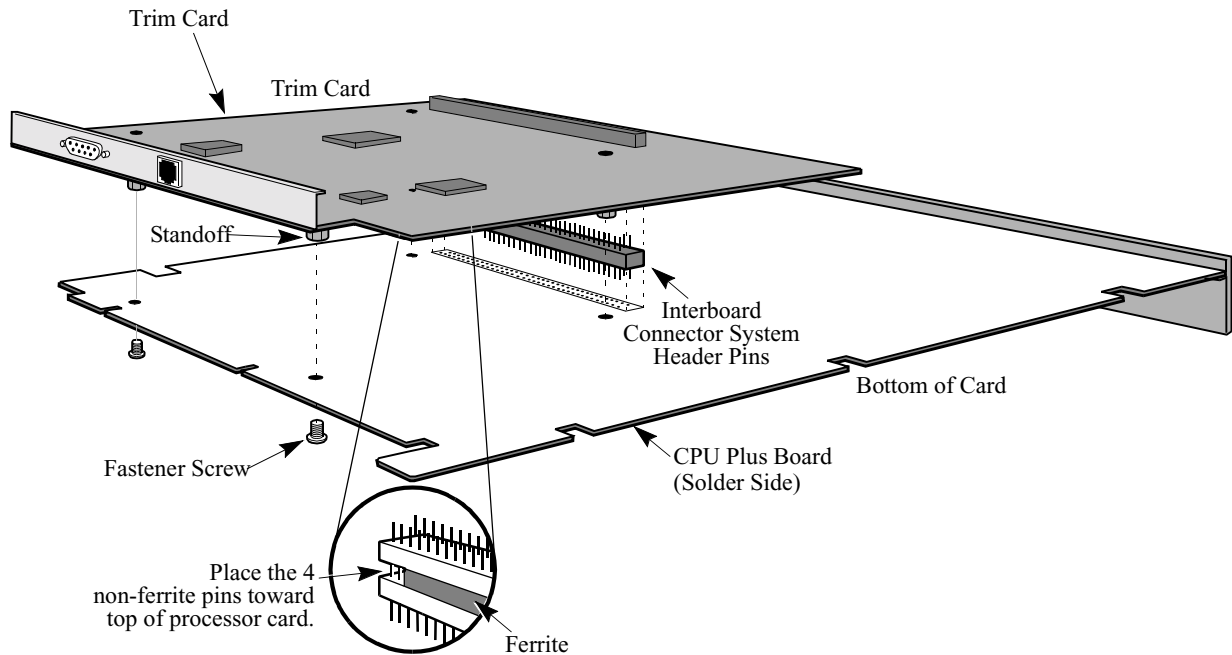


Figure 2-13. Attaching the TRIM Card to the Processor Card

Attaching the Cables

The LAN port is Port 55, regardless of how many active X.25, PAD, or MUX ports are in your node. To configure the LAN port and for information about LAN statistics, see the *Vanguard ONS Basics Protocols Manual (T0106)*.

Removing/Replacing TRIM Cards

Introduction

This section describes the removal and replacement of TRIM cards.



Caution

6500 cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card.

Before Removing TRIM Cards

Before removing the TRIM card from the Modulus enclosure, disconnect the LAN cable and detach the TRIM rear filler panel from the TRIM card backplane.

Failure to do so could damage the LAN cable or the TRIM card. The following caution label on the processor card is a reminder:

“REMOVE LAN I/O CABLE, REAR FASTENERS AND FRONT FILLERS BEFORE REMOVING THIS CARD.”

Removing the TRIM/Processor Card

Follow these steps to remove the TRIM/processor card from the nest:

Step	Action
1	Detach the LAN cable from the backplane.
2	Using a flat-head screwdriver, unscrew the captive hardware that attaches the TRIM card rear filler panel to the TRIM card backplane.
3	Detach the two Modulus front filler panels that cover the TRIM card.
4	<p>Pull out the TRIM/processor card. When detaching a TRIM card from its processor card, follow the procedures in “Installing and Connecting a TRIM Card” section on page 2-45 in reverse order.</p> <ul style="list-style-type: none"> • If you are removing or replacing a card in a Modulus 8/18 enclosure, refer to the <i>Modulus Planning and Installation Guide</i>. • If you are removing or replacing a card in a Modulus 9/21 enclosure, refer to the <i>Modulus 9 and 21 Installation and Operation Guide</i>.

Updating LAN Port MAC Address

The BIA (Burned In Address) is a unique LAN MAC address that is supplied by a PROM chip on the TRIM card. The BIA is used as the LAN port MAC address if the Port MAC Address parameter (in the Port configuration record) is set to a default value of 00-00-00-00-00-00.

If you replace the TRIM card, reboot the node to reset the LAN port address to the new BIA value contained on the replacement TRIM card. If, however, you want to use the BIA address from the removed card, update the node configuration to ensure that the older BIA address is used.

Preparing Modulus Enclosures for RFI Suppression

Introduction

To meet FCC requirements, the Modulus 18 and Modulus 21 enclosures require special RFI suppression hardware. In the Modulus 18 enclosure, the RFI suppression scheme differs depending on whether a TRIM card is installed in the unit.

Modulus 18 with TRIM Card

Figure 2-14 shows a Modulus 18 enclosure with a TRIM card. It also shows the suppression screen that you need to install.

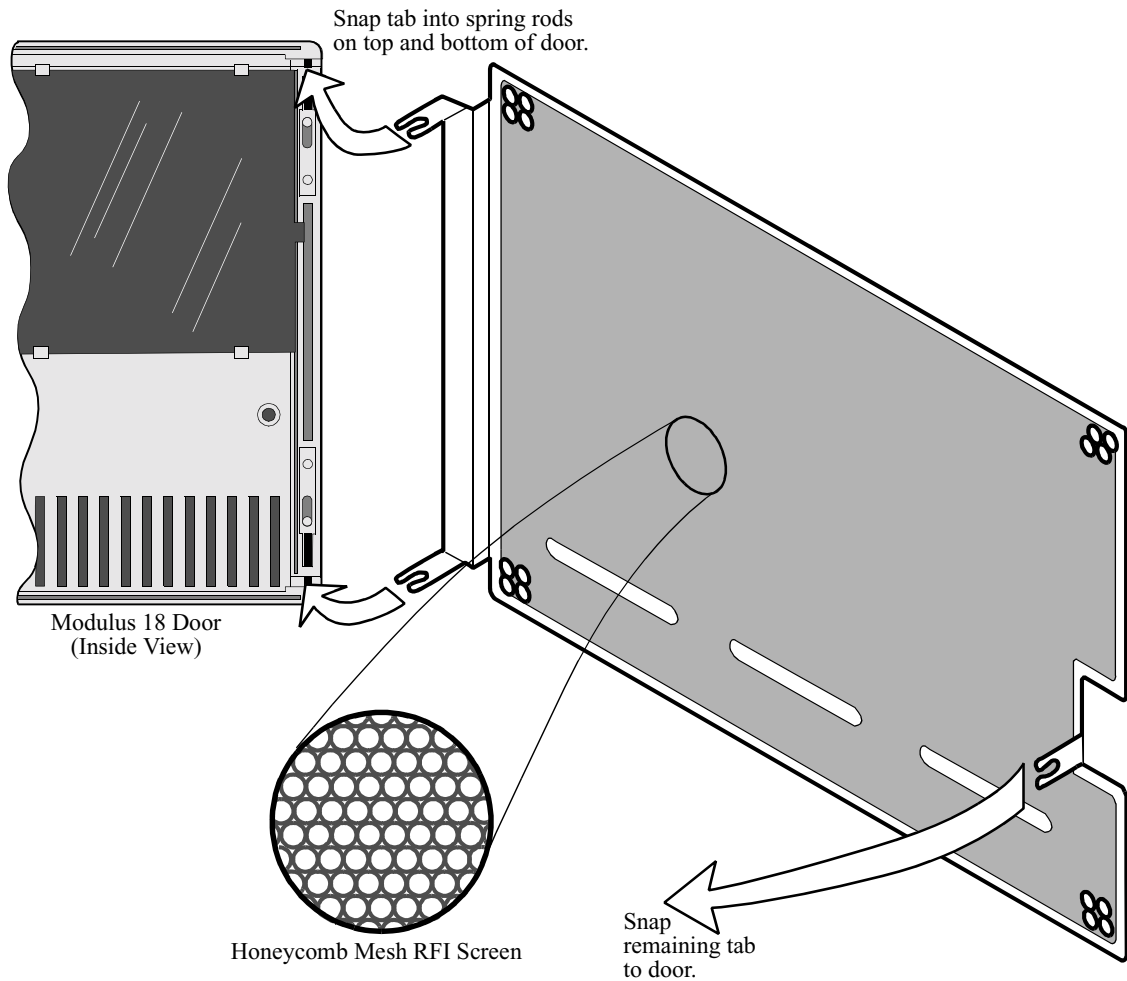


Figure 2-14. RFI Suppression Screen (Modulus 18 - with TRIM Card)

Installing RFI Suppression Screen

If you have a Modulus 18 enclosure and *at least one TRIM card*, follow these steps to install the RFI suppression screen shown in Figure 2-14, to meet FCC requirements:

Step	Action
1	Open the door of the enclosure. If the two RFI suppression straps have been installed, as shown in Figure 2-15, remove them.
2	Place the screen flat against the inside of the door with the three attachment points facing the inside of the door. The edge with two attachment tabs aligns with the top and bottom door hinges, as shown in Figure 2-14, and the single attachment tab aligns with the inside of the door latch.
3	To install the screen, you can leave the door connected to the enclosure. Swing the door open wide, and align the two tabs to the top and bottom hinges. Press each point gently but firmly to make solid connections. Then press the single tab to the door latch. The screen is then in place.

Modulus 18: RFI Suppression without a TRIM Card

If you have a 6500^{PLUS} node in a Modulus 18 enclosure *and there are no TRIM cards*, install two RFI (radio frequency interference) grounding straps to the front of the enclosure (inside the front cover) as shown in Figure 2-15. These are needed to meet FCC requirements. The straps are not needed if at least one TRIM card is installed in the enclosure.

■ Note

If you have older model 6500 nodes (non-6500^{PLUS} nodes) installed in Modulus 21 enclosures, you must install similar RFI straps in the Modulus 21 enclosure as well.

**Modulus 18 With
No Trim Card**

Figure 2-15 shows a Modulus 18 with no TRIM cards and the RFI suppression straps.

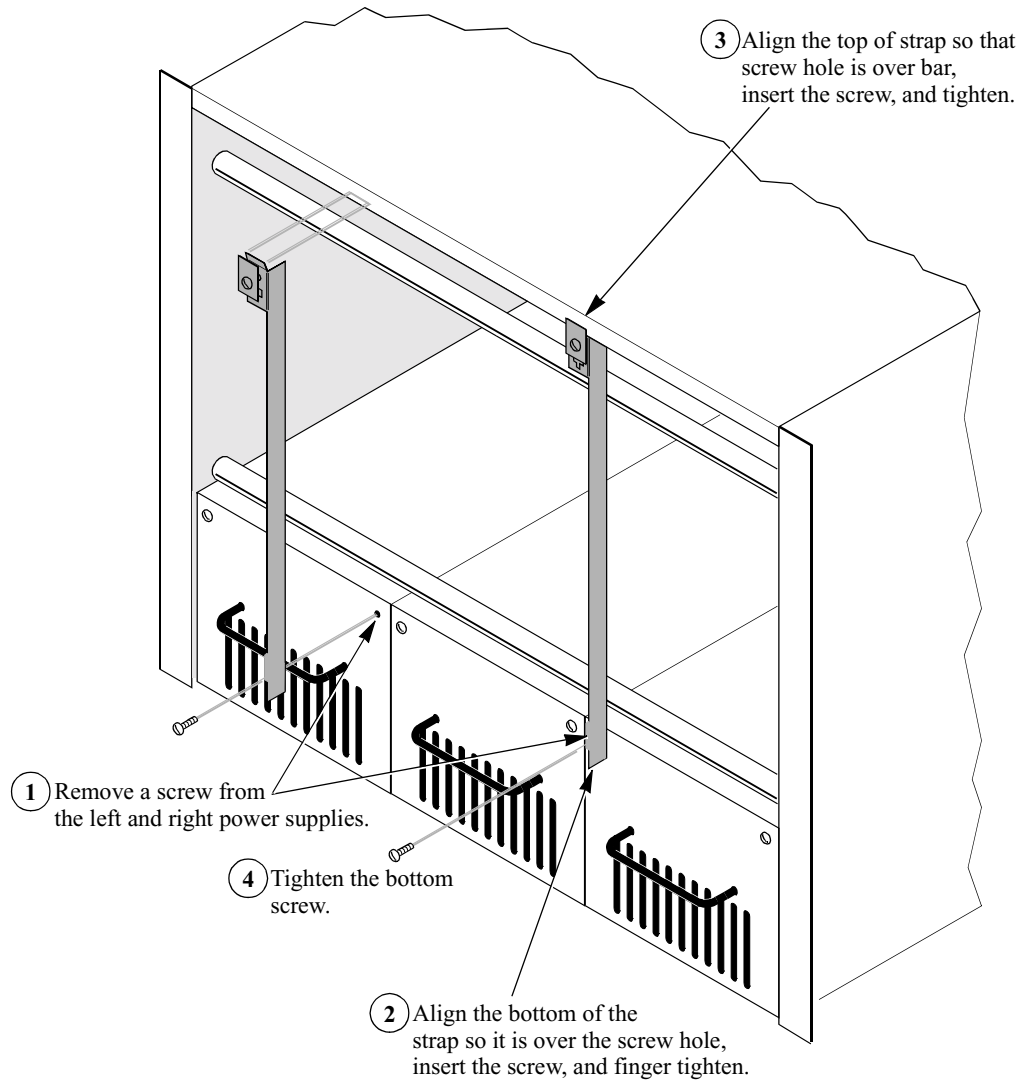


Figure 2-15. RFI Suppression Straps (Modulus 18 - No TRIM Card)

Modulus 21 and RFI Suppression Bar

If you are installing a TRIM card in a Modulus 21 enclosure, add the RFI suppression bar as shown in Figure 2-16. The bar is notched to fit across the inside of the door.

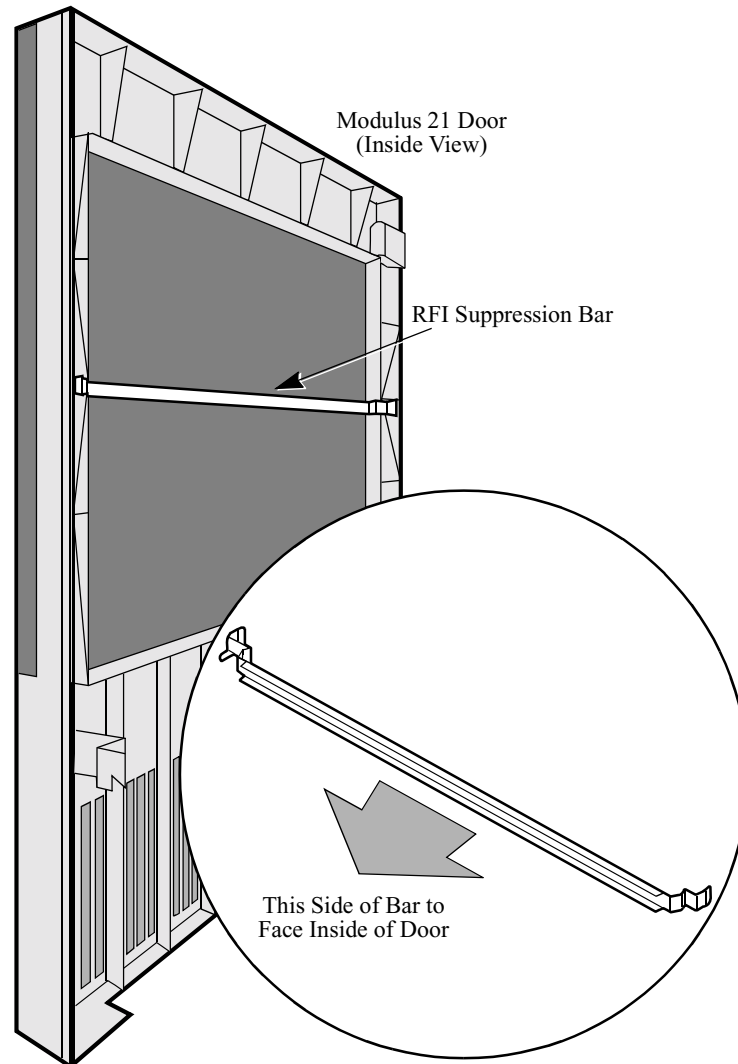


Figure 2-16. RFI Suppression Bar (Modulus 21 Enclosure)

Starting Up the Node

Introduction

After you install the node in the enclosure, you can start up the node.

Node Startup

Follow these steps to start up the node:

Step	Action	Result/Description
1	Power up the Modulus enclosure by connecting the power cord to a suitable primary power source.	The front panel lights of the processor card turn on as described in the DSU DIM Installation section. After a few minutes, the green STATUS light comes on to indicate the node is ready to process calls. If this does not occur, call your VanguardMS representative.
2	Configure the unit through the control terminal port (CTP) menus.	To access the CTP, attach a terminal to Port 6. Port 6's default settings are standard terminal port values: 9600 baud, 8 data bits, 1 stop bit, no parity.
3	When the (*) prompt appears on the terminal, type the following: .ctp <CR>	
4	At the password prompt, enter <CR>.	This is the default password value. The Main menu appears. See the <i>Vanguard ONS Basics Protocols Manual (T0106)</i> for configuration information.

Replacing Processor Card Components

Introduction

You can upgrade and replace components on the 6500^{PLUS} processor card. In both standalone and Modulus enclosures, you can:

- Replace DIMs (data interface modules)
- Set jumpers on the port interface pins
- Install single in-line memory modules (SIMMs)
- Replace a FLASH module
- Replace the ID Module
- Replace PROMs
- Replace PROMs
- Replace the CMEM chip

Processor Card

Figure 2-17 shows the location of these components on a 6500^{PLUS} processor card.

■ Note

The PROMs are located beneath the FLASH Module.

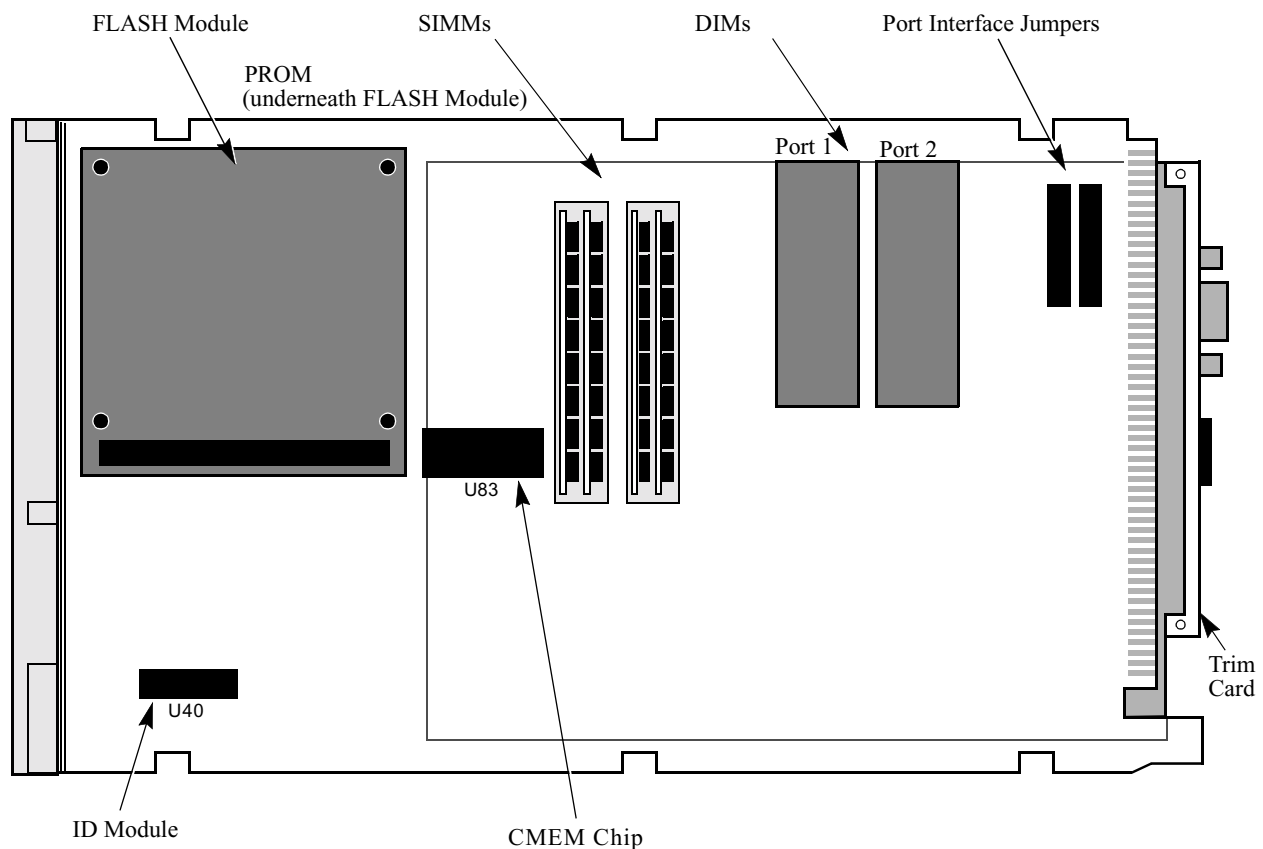


Figure 2-17. 6500^{PLUS} Processor Card

Replacing DIMs

Introduction	There are two Data Interface Modules (DIMs) on a 6500 ^{PLUS} processor card.
Description	Each DIM is a 64-pin, dual in-line module that can be repositioned so that Ports 1 or 2 act as either DCE or DTE ports. For most cases, the DIMs are positioned so the ports act as DCEs. One DIM corresponds to Port 1 and the other to Port 2 (Figure 2-18). While most 6500 ^{PLUS} processor cards contain EIA 232-D DIMs, you can purchase DIMs that will support V.35, V.36, and X.21 interfaces.
Replacement Procedure	Use the DIM Extraction Tool (58862-01) provided with the accessory kit to perform the following procedure. Do not use a screwdriver or other tool that may damage the components on the card.



Caution

6500^{PLUS} cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card.

Step	Action
1	Remove the TRIM card first if you are installing or replacing DIMs onto a processor card that has an attached TRIM card. Otherwise, there is no physical support to the processor card when you insert the DIMs on the board.
2	Lift A DIM from its socket as shown in Figure 2-18, using the DIM removal strap to lift out the DIM. Be sure that you do not bend the pins during removal.
3	Insert the DIM into the other set of parallel sockets if you are moving the DIM to another position.
4	Insert the new DIM into the original location if you are just replacing a DIM. Be sure the pins are seated firmly in the sockets and are not bent.
5	Reattach the TRIM card to the processor card.

Example of DIM Removal

Figure 2-18 shows DIM removal.

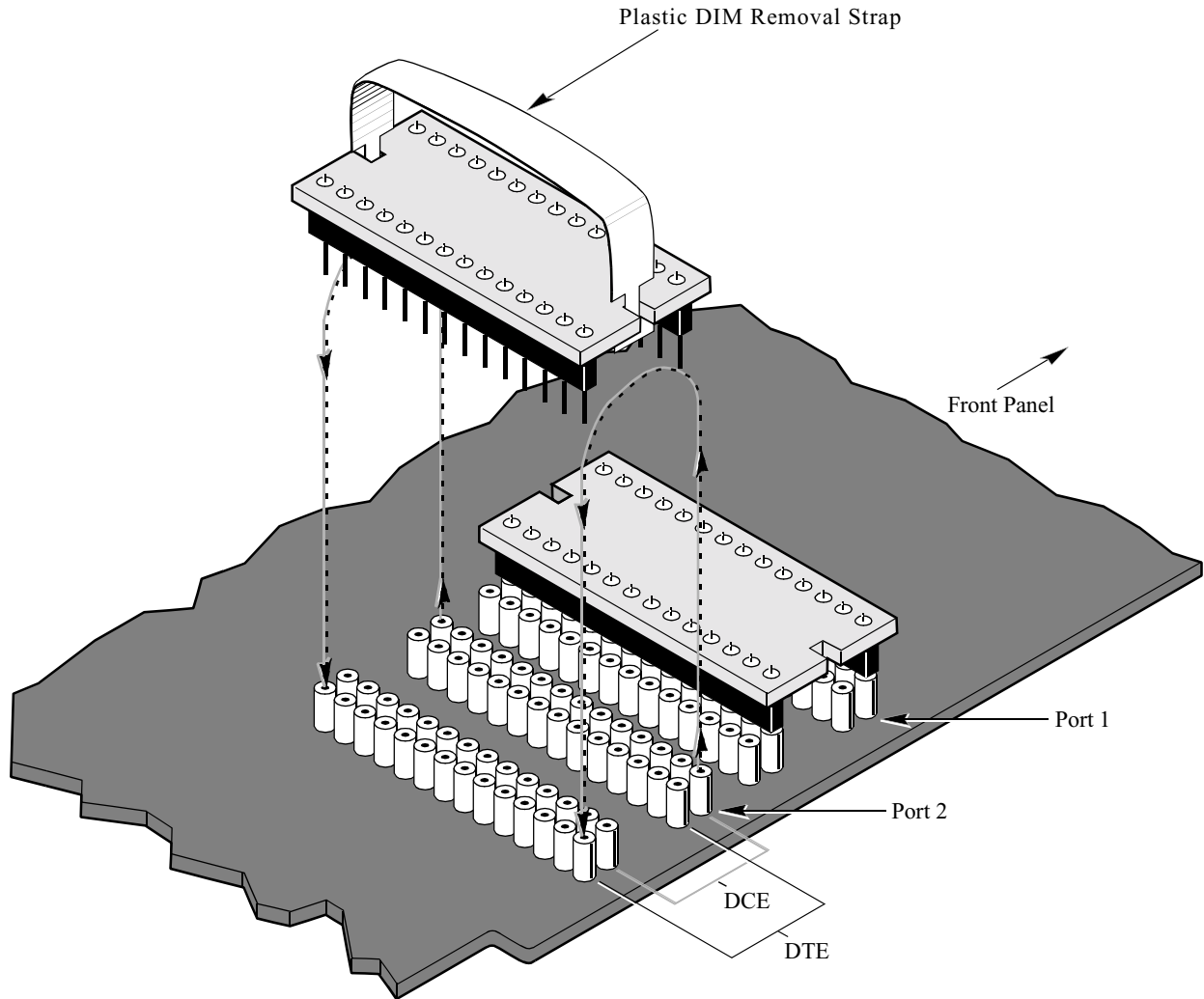


Figure 2-18. DIM Removal

New DIM Installation

If you install a new type of DIM on the 6500^{PLUS} processor card, you may need to change the jumpers on the port interface jumper pins. Figure 2-19 shows the location of the pins on the card.

Jumpers

Figure 2-19 shows where the jumpers should be placed on the pins for various applications and enclosures.

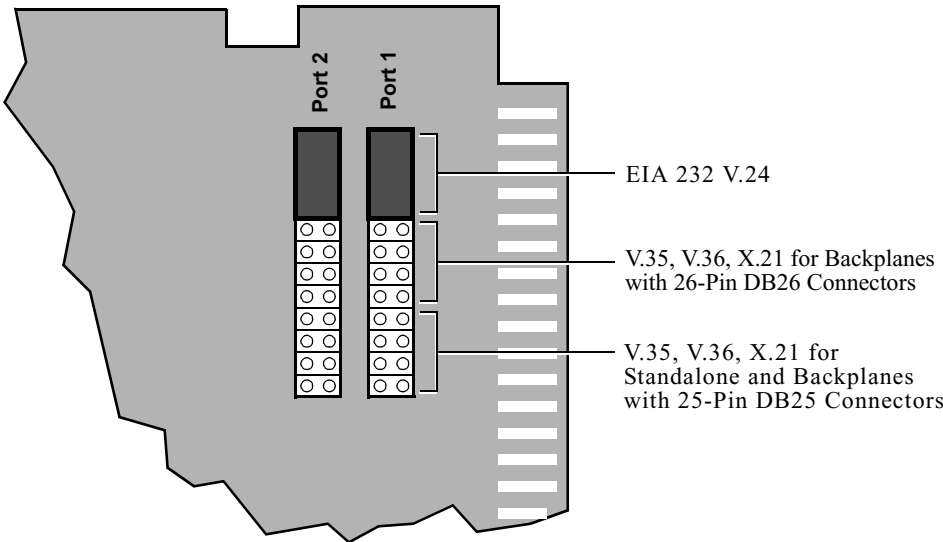


Figure 2-19. Jumpers on the Port Interface Pins

Jumper Installation Figure 2-20 shows how to install the jumpers.

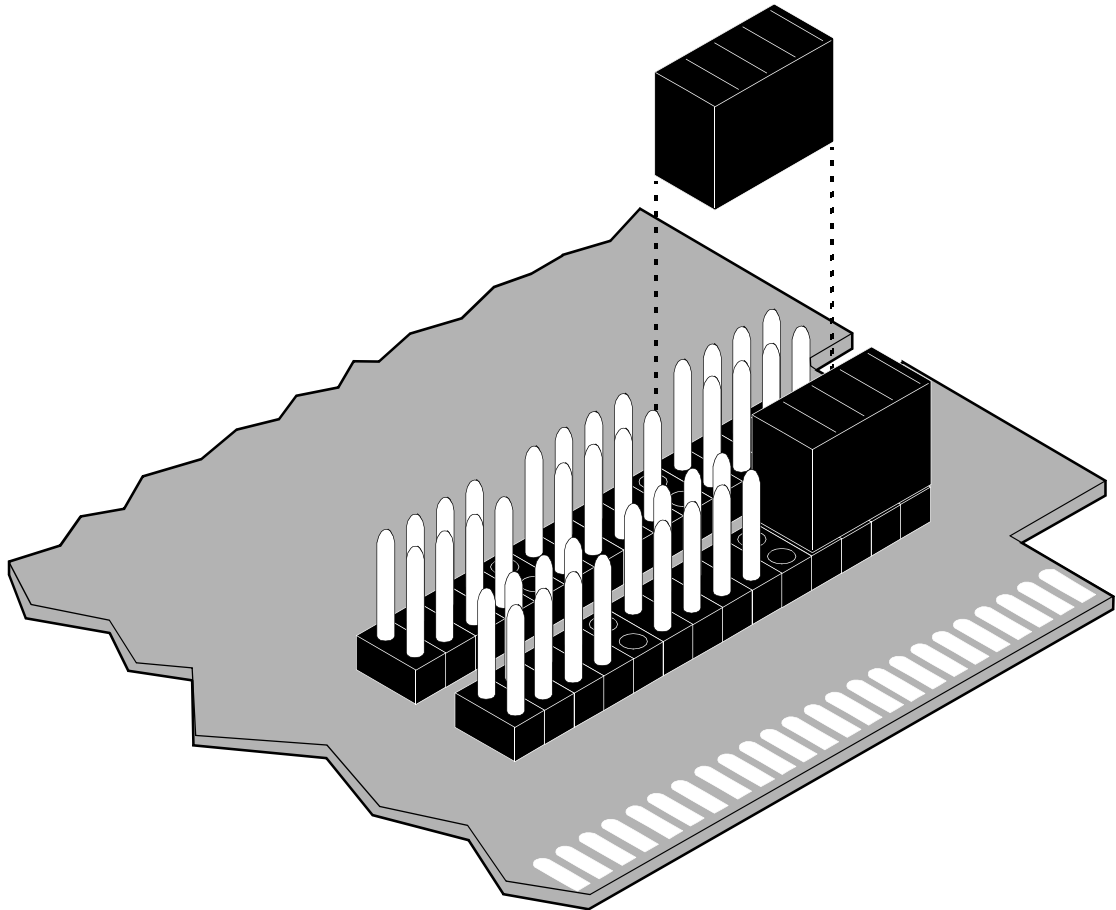


Figure 2-20. Installing Jumpers on the Port Interface Pins

Installing SIMMs

Introduction The 6500^{PLUS} processor card comes with 3 Mbytes of RAM on the card. You can add additional RAM for a total of 5 Mbytes per 6500^{PLUS} processor card. Figure 2-17 shows the location of the SIMM slots on the 6500^{PLUS} processor card.

- Guidelines**
- Install SIMMs in pairs only.
 - The 6500^{PLUS} processor card is shipped with SIMMs in sockets U79 and U80. Install additional SIMMs in sockets U81 and U82.

Installation Procedure Follow these steps to install a SIMM:



Caution

6500^{PLUS} cards and their components are sensitive to static discharge, which can damage components. Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card

Step	Action
1	Insert the SIMM at a slight angle as shown in Figure 2-21. For proper operation, SIMMs must be in sockets U79 and U80
2	Press the SIMM into the socket. Be sure it locks in place with the locking tab.

SIMM Removal When removing a SIMM, pull against the side with the chips so it disengages from the locking tabs. Then lift out the SIMM.

Example of SIMM Installation

Figure 2-21 shows how a SIMM is installed in a slot.

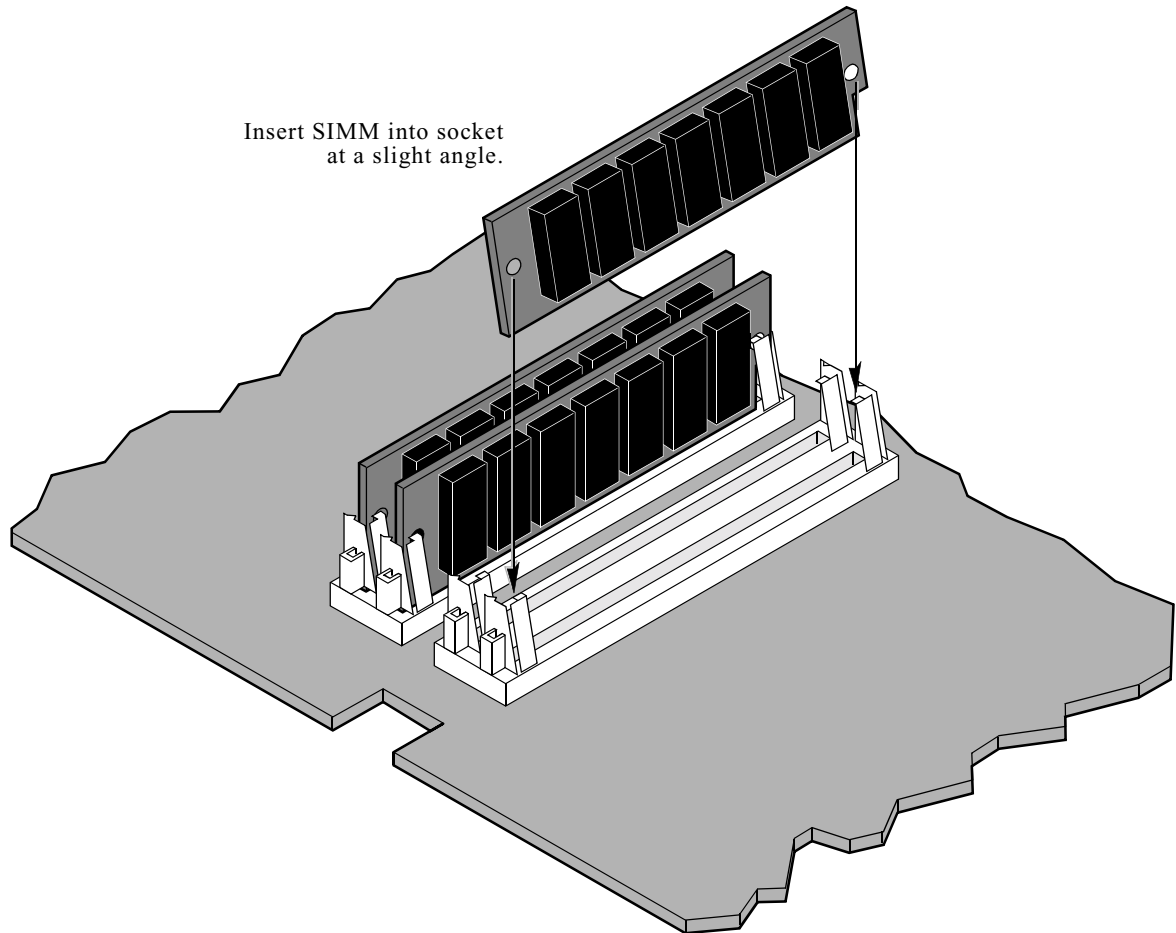


Figure 2-21. SIMM Installation

Replacing FLASH Modules

Introduction

You can replace a FLASH module on a 6500^{PLUS} processor card. The location of a FLASH module is shown in Figure 2-17.



Caution

Use proper handling and grounding precautions, including the use of an anti-static grounding strap, whenever you handle a card

Replacement Procedure

Follow these steps to replace a FLASH module (see Figure 2-22):

Step	Action
1	Remove the card from the nest or enclosure. You might have to wiggle the card until the header pins disengage from the socket on the card.
2	<ul style="list-style-type: none"> a) Loosen and remove the four screws that hold the FLASH module to the processor card. b) Carefully lift the FLASH module from the 6500^{PLUS} processor card.
3	Using the old module as a guide, insert the header pins of the new module.
4	Place the new module on the 6500 ^{PLUS} processor card.
5	Insert the header pins into the socket. Seat the pins firmly into the socket. Do not bend them.
6	Use four screws to secure the FLASH module to the 6500 ^{PLUS} processor card as shown. Do not overtighten the screws.

Installation Example

Figure 2-22 shows an example of a FLASH module installation.

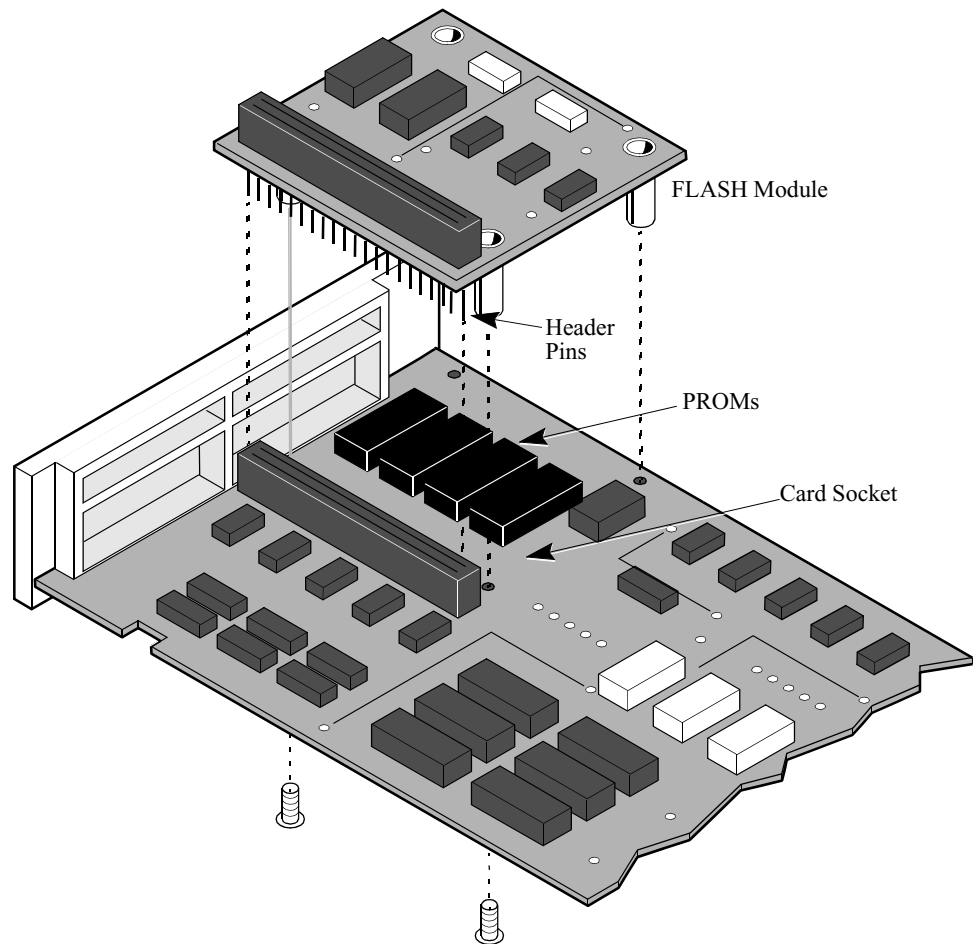


Figure 2-22. Flash Module Installation

Replacing ID Modules

Replace the ID Module

Perform these steps to replace the ID Module:

Step	Action
1	Remove the card from the nest or enclosure.
2	Locate the ID Module (Figure 2-17) and note the location of the notch, which is toward the front of the card. This will help you orient the new chip.
3	Using a standard chip-puller, remove the ID Module.
4	Insert the new ID Module into the socket. Be sure that the notch in the chip is oriented toward the front of the card.

Replacing PROM Chips

Replace PROM Chips

Follow these steps to replace a PROM chip:

Step	Action
1	Remove the card from the nest or enclosure.
2	Loosen and remove the four screws that hold the FLASH module to the 6500 ^{PLUS} processor card (Figure 2-22).
3	Carefully lift the FLASH module from the 6500 ^{PLUS} processor card. You may have to wiggle the card until the header pins disengage from the socket.
4	Locate the PROMs as shown in Figure 2-22. Note the location of the notch on each chip and, using a standard chip-puller, remove the PROMs. This will help you orient the new chips. ■ Note Not all four PROM sockets may have PROMs.
5	Insert the new PROMs into the sockets. Be sure that they are oriented the same way as the old chips.
6	Place the FLASH module on the 6500 ^{PLUS} processor card. Insert the header pins into the socket. The pins should seat firmly into the socket, but be careful not to bend the pins.
7	On the other side of the 6500 ^{PLUS} processor card, use four screws to secure the FLASH module to the 6500 ^{PLUS} processor card. Do not overtighten the screws or you may damage the 6500 ^{PLUS} processor card.

Replacing the CMEM Chip

Replace CMEM Chips

Follow these steps to replace a CMEM chip:

Step	Action
1	Remove the card from the nest or enclosure.
2	Locate the CMEM chip (Figure 2-17). On the CMEM chip, note the location of the dot in the lower left corner, which is toward the front of the card. This will help you orient the new chip.
3	Using a standard chip-puller, remove the CMEM chip.
4	Insert the new CMEM chip into the socket. Be sure that the dot in the chip is oriented toward the front of the card.

DSU DIM Installation

Introduction

The DSU DIM is designed to be **installed in the DTE position only**. The DSU option will not operate if the DIM is installed in the DCE position.

You can install up to two DSUs per platform using both ports 1 and 2.

Example of Installing the DSU DIM

Figure 2-23 shows the DSU DIM installation.

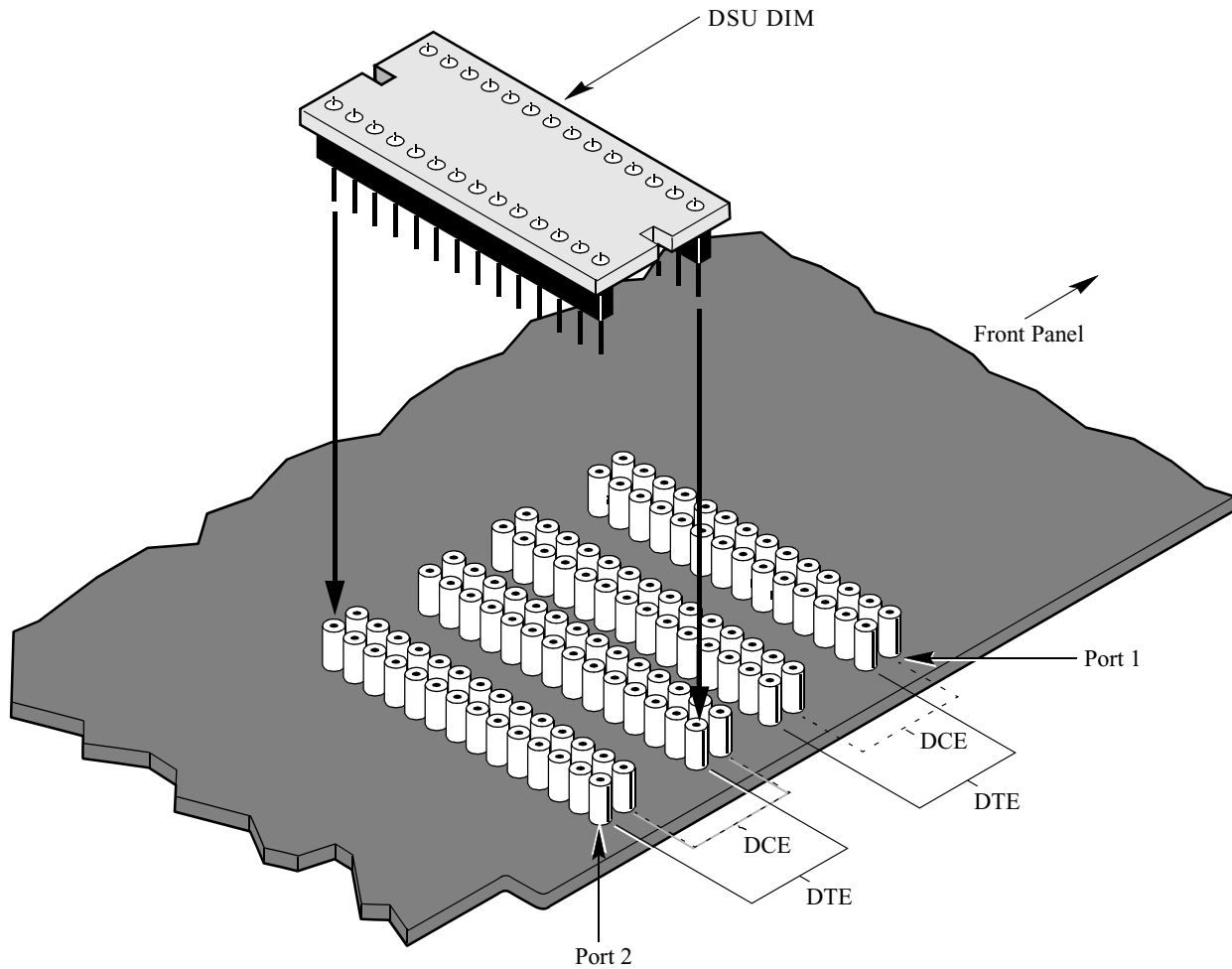


Figure 2-23. DIM Installation

Installation Procedure

Follow these steps to install the DSU DIM:

Step	Action
1	Install the DSU DIM in the DTE position only (see Figure 2-23). The DSU option does not operate if the DIM is installed in the DCE position.
2	Set the jumpers properly. This option requires the jumpers be set for the high speed 1 setting (M1/HS). This is the same jumper location listed for the V.35, V.36, and X.21 interfaces on standalone or Modulus 8/18 hardware.
3	Plug the EIM into the backplane connector corresponding to the DIM port containing the DSU DIM (Port 1 or 2). Verify that the EIM is only connected to a port that has a DSU DIM installed.
4	Tighten the connector mounting screws to provide proper grounding and ensure signal integrity.



Caution

Be sure that the telco plug is disconnected before the EIM is disconnected from the 6500^{PLUS}. Also, do not connect the telco plug to the EIM until the EIM has been connected to the 6500^{PLUS}.

Software supporting the DSU option is necessary for the 6500^{PLUS} to recognize the DSU hardware. The provided software requires an NSO or similar equipment to (remotely) download the software, and a Flash card.

Control Terminal Port

For configuration, reporting, and troubleshooting the CTP port must be used. Network Management is not supported for the Integral DSU option.

Configuring the 6500^{PLUS} for DSU Operation

Configuration Procedure

You use the CTP to configure the DSU. Follow these steps to configure the 6500^{PLUS} for DSU operation:

Step	Action
1	Refer the <i>Vanguard ONS Basics Protocols Manual (T0106)</i> . However, you do not need to complete these configuration parameters: <ul style="list-style-type: none">• Clock Speed• Connection Type• Port Control
2	Configure the clock source parameter under port configuration as follows: <ul style="list-style-type: none">• INT: Use this setting when providing clock to the network.• EXT: Use this setting when using the network-provided clock (usual mode for DSU operation).

DSU Input and Output Signaling

Introduction

The input and output signaling information is useful as a debugging tool and replaces the EIA summary information associated with other DIM types.

Input Signals

This table describes the input signals.

NIS	Not In Service—This signal is normally low (L). If no signal is received, or the DSU option is in DSU Loopback mode, or if idle codes are received, NIS is listed as high (H). This signal is used to determine if the other end of the connection is available.
BPV	Bipolar Violation—This signal is “H” during normal operation. When the signal is “L,” it indicates that some type of bipolar violation was received by the DSU option. The signal toggles during a DSU loopback condition.
DL	DSU Loopback—This signal is normally “H.” An “L” indicates that a DSU loopback mode is entered.
C+	Positive Sealing Current*— This signal is “H” if the DC current on the telephone company interface is not in the positive direction.
C-	Negative Sealing Current* —This signal is “H” if the DC current on the telephone company interface is not in the negative direction. An “L” indicates that the DSU option has detected a negative “sealing” current and is therefore performing a CSU loopback.

■ Note

When both C+ and C- are “H”, it indicates that no sealing current exists. This is often the case when connected to other DSU type hardware. Normally, the signal for C+ is “L” when connected to central office equipment (OCU hardware).

Output Signals

Although you cannot directly access the output signals, they are manipulated by the DSU option software and may be useful for informational purposes. The following table describes the output signals.

RS	Reset— This output resets the DSU option hardware. Its normal operating state is “H.”
LL	Local Loopback — When this signal is “L”, the DSU hardware is locally looping data back to the 6520 hardware by way of the EIM.
CL	CSU Loopback —When this signal is “L”, the DSU hardware is looping the remote connection's receive to transmit.
IDL	Idle —An “H” on this signal tells the DSU hardware to send idle bipolar violations to the remote system.
CLK	Clock Mode—The signal “H” denotes the use of the network clock. The DSU option provides the clock when this signal is “L.”

You can view these signals using the control terminal Monitor menu item on the Main menu within the CTP in the control terminal.

Other Reporting Differences

Other differences in control terminal output are:

- Detailed Port Statistics— show DSU input and output signaling as well as note the installed DSU DIM
- Detailed Node Statistics— show DSU DIM installation

Example of Diagnostics Menu

Figure 2-24 shows the Diagnostics menu within the CTP in the control terminal. You use this menu to access the loopback options described in the next section.

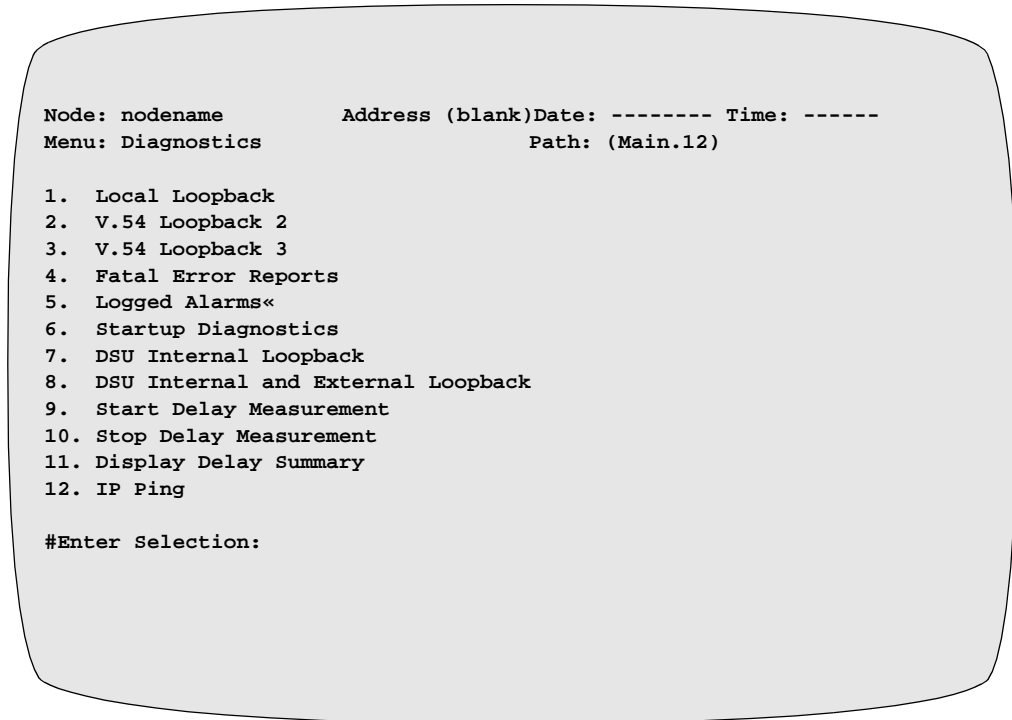


Figure 2-24. Diagnostics Menu

Control Terminal Loopback Options

The following table describes the control terminal loopback options.

DSU Internal Loopback	This loopback mode does not affect the external interface but it does loop the local transmit data back to the receive data within the EIM. This test is useful for verifying that the EIM is connected and is working properly from a digital integrity perspective.
DSU Internal and External loopback	This loopback mode performs the internal loopback mentioned above along with looping the external transmit to the external receive to allow manual testing of the remote interface.

Troubleshooting DSU DIM Installation

Introduction

Some of the potential installation problems are listed below:

- Improper port connection of the EIM
 - Improper telco interface connection
 - DSU DIM not connected in DTE configuration
 - Processor card jumpers not in HS1 mode
 - DSU option software not operational
 - DSU port clock source option not correct
 - No signal from telco interface
-

CTP Troubleshooting

The following information can be derived from the control terminal to aid in troubleshooting.

Node Statistics	Used to verify that the software is a version which contains the DSU option modifications. It also shows if the DSU DIM is recognized by the software.
Port Statistics	Used to verify that data is being sent without error. Error counts may denote an error in clocking mode configuration. It also shows if the DSU DIM is recognized by the software.
Monitor	Input/output signals can be used to determine if the DSU option is in a loopback mode requested by the remote end. This would be an explanation for the inability to send data. Continuous bipolar violations would also indicate the remote system is out of service.
DSU Internal Loopback	Failure of this loopback mode would indicate that the EIM module is not connected.

DSU DIM FCC Information

Customer-Provided Telephone Equipment

FCC regulations and telephone company procedures prohibit connection of customer-provided equipment to telephone company-provided coin service (central office-implemented systems). Connection to party lines is subject to state tariffs.

Occasionally, the telephone company may make changes in their equipment, operations, or procedures. If these changes affect your equipment or service, the telephone company will provide written notice so you can make the necessary changes to maintain uninterrupted service.

Contact your telephone company if you have any questions about your telephone line.

In some circumstances, the telephone company may ask you for information about your equipment that is connected to the telephone line. Within the United States (at the request of the telephone company), you should provide your equipment's FCC registration number. This number is located on the unit's label.

FCC and Telephone Company Procedures and Requirements

Before the 6500^{PLUS} DSU option can be connected to the network, the local operating company must have the equipment's registration number, and the proper connections must be ordered.

To order the proper service, provide the telephone company with the following information:

- USOC number of the required jack (shown below)
- Facility interface codes
- Service code

Type of Interface	USOC Jack Connector	REN/Service Code	Facility Interface Code
56-kbps digital interface	RJ48S	6.0F	04DU5-56

Regulations Concerning Electromagnetic Radiation

The Federal Communications Commission (FCC) of the United States of America and the Industry and Science Canada (ISC), have published regulations which govern the allowable limits of emanation of radio frequency energy of computing devices and associated peripherals. These regulations are concerned with interference to radio communications, such as radio and television. The regulations require equipment for use in the United States or Canada to be labeled and to be accompanied by the following notice:

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 interference when 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 interference to radio communications.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the ISC.

Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to take adequate measures to correct the interference.

This product was verified under test conditions that include use of shielded DTE cable(s). Leased line cables with 1.5 turns through a ferrite cylinder were also used. Use of different cables will invalidate verification and increase the risk of causing interference to radio and TV reception.

You can obtain the proper cables from VanguardMS.

If this equipment causes interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorienting the receiving antenna
- Relocating the equipment with respect to the receiver
- Moving the equipment away from the receiver
- Plugging the equipment into a different outlet so that the equipment and receiver are on different circuits

If necessary, you should consult the dealer or an experienced radio/television technician for additional circuits.

You may find the following booklet prepared by the FCC helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

**If Problems Arise
Installing the DSU
DIM**

If any of your equipment is not operating correctly, immediately remove it from the telephone line before it harms your network. If the telephone company notes the problem, they may temporarily disconnect your service. They will notify you in advance of the disconnection, when possible. If advance is not feasible, you will be notified as soon as possible. When you are notified, you will be given the chance to correct the problem and be informed of your right to file a complaint with the FCC.

If your 6500 IFX needs repairs, they should be performed by VanguardMS or an authorized representative of VanguardMS. For information, contact the VanguardMS Customer Support Center at 1-800-544-0062.

Power-Up Verification

Introduction

The front panel lights on the different 6500^{PLUS} cards help you isolate a problem. These sections describe the light display when the enclosure is powered up.

Normal Sequence

The following list describes what you see on the front panel if the power-up sequence is performed correctly.

- POWER light comes on (processor and I/O cards).
- WATCHDOG light flashes briefly.
- TEST light flashes briefly.
- STATUS light comes on.
- PORT/DATA OUT lights come on and go off in sequence.
- If:
 - You have an NSO card, one or more of the MEM (memory) lights come on.
 - There is a disk in the drive, the drive light comes on as data is loaded into the node.

This entire process may take a few minutes if an NSO card is loading data.

When the node passes the internal tests, the STATUS light (processor and I/O cards) comes on. This indicates that the node is ready to process calls. You may also see some of the port lights remain on depending on their configuration.

Checking the Lights

If you want to make sure that all the lights are working, press the Lamp Test button on the processor card. All the lights in the node momentarily come on.

Failed Sequence

The following describes what happens if the node does not come up.

<i>Event</i>		<i>Result/Description</i>
If the TEST light comes on and remains on, the node failed one or more of the diagnostic tests.		There is a hardware problem with the card (processor and I/O cards).
Reboot the node by pressing the RESET button.		This reruns the internal diagnostic tests.
<i>If...</i>	<i>Then...</i>	
The TEST light comes on again and this is the first time the node is turned on	Contact your VanguardMS representative.	Otherwise, check the Status and Statistics menus.



Caution

Pressing the RESET button disrupts communication for the entire node.

If the WATCHDOG light on a processor card comes on and remains on, the card is an auxiliary processor card. This card must be enabled from a control terminal.

**Power-Up
Diagnostics**

In the event of major problems that affect the entire node, you can reboot a node to initiate the power-up diagnostics. After the power-up diagnostics are complete, check the Statistics screens to see the results

To initiate power-up diagnostics, press the RESET button on the 6500^{PLUS} processor card's front panel or issue a cold Node Boot from the control terminal.

Setting Node to Default Configuration

Introduction

You can set a node to the default configuration in two ways:

- Set the DFLT switch on the front panel
- Select the Default Node selection from the CTP Main menu

Defaulting the Node

Follow these steps to default the node using the DFLT switch:

Step	Action
1	Push the DFLT switch to the left and press the RESET button.
2	Push the DFLT switch to the right when the STATUS light turns steady on and press the RESET button.
3	Push the DFLT switch back to the left when the STATUS light turns steady on and press the RESET button. When the STATUS light turns steady on, the node is set to default values. For more information about the Default Node menu option, see the <i>Vanguard ONS Basics Protocols Manual</i>

Installing Software Options

Introduction

The 6500^{PLUS} contains all the software options available for the current release of the product. To access an option, however, you need to purchase the Software Authorization Key (SAK) for that option. Each option has its own SAK and each SAK can be used on only one specific node.

How to Get a SAK

If you purchased the option with the 6500^{PLUS} processor card, your VanguardMS sales representative will supply the SAK for the option on that card. To purchase an option for an existing 6500 card, provide your VanguardMS sales representative with the software serial number of the ID Module in the 6500^{PLUS} processor card.

There are two ways to get the serial number:

- From a node that is already running, access the Node Statistics.
 - From the Software Acknowledgment Sheet that ships with the hardware.
-

Accessing Node Serial Number from Node Statistics

Access Serial Number

Perform these steps to find the SAK serial number using the Node Statistics:

Step	Action	Result/Description
1	Access the CTP by entering the following at the * prompt: .ctp <CR>	You are prompted to enter the password.
2	Enter the password.	The default password is <CR>. After you enter the password, the Main menu appears.
3	From the Main menu, select Status/Statistics .	
4	Select Node Stat .	The Node Statistics consists of several screens. The 6500 ^{PLUS} processor's serial number is on the third screen, as shown in Figure 2-25. ■ Note Multi-CPU card serial numbers appear on subsequent screens.
5	<p>a) Take this serial number and if the card is a: 6505^{PLUS}, add a -1 (dash 1) 6507^{PLUS}, add a -2 (dash 2) 6525^{PLUS}, add a -3 (dash 3)</p> <p>b) Give the serial number with the dash number to the VanguardMS sales representative.</p>	

Node Stat Screen

Figure 2-25 shows an example of the Node Stat screen.

Serial Number Needed for SAK

```
Node: Nodename Address: (blank) Date: ----- Time: -----
Detailed Node Statistics Page: 3 of 7

Board 1: Board Type: CPU+ Number of ports: 6 Status: Running
Serial #: 1806280

Memory Configuration:
EPROM: 1.0 MBytes DRAM: 1.0 MBytes
FLASH: 2.0 MBytes

Flash Memory:
Software: Used: 0

Port Configuration:
Port 0 DIM: EIA-232-D DCE
Port 1 DIM: EIA-232-D DCE

CPU Throughput: CPU utilization: 14%
Current Maximum
Characters/sec: 0 55
Packets/sec: 0 1
Buffer Usage: 33 (0%) 44 (1%) Available: 3978

Press any key to continue (ESC to exit) ...
```

Figure 2-25. Serial Number on Node Stat Screen

Enabling A Software Access Key

Follow These Steps...

Follow these steps to enter the number at the node's control terminal:

Step	Action		Result/Description
1	Access the CTP. One way to do this is to connect a terminal to a local PAD port (Port 6), and enter the following at the * prompt: .ctp <CR>		You are prompted to enter the password.
2	Enter the password.		The default password is <CR>. After you enter the password, the Main menu appears.
3	From the Main menu, select Configure.		
4	Select Software Key Table.		
5	At the *Key Value prompt, enter the SAK.		
	If...	Then...	
	You change the SAK number or enter the wrong one by mistake	The option is disabled.	
	You make a mistake entering the SAK	Blank out the entry by pressing the space bar and enter the SAK number again.	
6	Boot the node to implement the option.		<p>■ Note</p> <p>You need a separate SAK for each node in which the option is to be enabled.</p>

After you receive the printed version of the SAK, save a copy in a safe place in case you have to enter it again.

Installing New Software Options in an Existing Network

Install New Software

Follow these steps if you are installing new software options in an existing network and you want to get the serial number for a remote node at a central site:

Step	Action
1	Place a call to the CTP at a remote node.
2	Log in to the remote node.
3	Access the Node Stats and get the serial number. If you configure the key remotely, boot the node to activate the link. The link will go down during the node boot.

Enhanced LAN Option

Enhanced LAN Option

The Enhanced LAN Option is a Software Authorization Key (SAK) that enables IPX Routing and AppleTalk features for the 6520 and Vanguard 300, and provides IP Routing/SNMP for the 6500^{PLUS}.

What It Does for the 6520 and Vanguard 300

The Enhanced LAN Option enables IPX Routing and AppleTalk features for the 6520 and Vanguard 300, if present in the software image that is loaded.

IP Routing is now available in all base software packages. A SAK is no longer required to enable this feature.

What It Does for the 6500^{PLUS}

The Enhanced LAN Option provides a CSK IP Routing/SNMP for the 6500^{PLUS}. This CSK enables the full IP Routing capability for SNMP management across a WAN link or Token Ring if present, with the use of the full router for Release 4.50 (configuration of the IP/Routing SAK is no longer required).

CSK Information

The IP Routing/SNMP Customer Software Key (CSK) for the 6500^{PLUS} product is:

SG6CUJEQ6MYTGU4XRFPK

If you already have the IP/Routing SAK configured, you do not have to configure the new CSK.

Guidelines

The Enhanced LAN Option is available for purchase as a SAK. You must install the CSK for IP Routing/SNMP for the 6500^{PLUS} on each node on which you want to perform IP Routing/SNMP.

Introduction

The tables in this appendix describe the pinouts for ports on Standalone, Modulus 8/18, and Modulus 9/21 enclosures and include this information:

- Standalone, Modulus 8/18, and 9/21 enclosures: EIA 232-D signals with V.24 DIMs on the processor card
- Modulus 9/21 enclosures: V.35/V.36 signals with V.35/V.36 DIMs on the processor card
- Modulus 9/21 enclosures: V.11 signals with X.21 DIMs on the processor card
- Standalone and Modulus 8/18 enclosures: V.35/V.36 signals with V.35/V.36 DIMs on the processor card
- Standalone and Modulus 8/18 enclosures: V.11 signals with X.21 DIMs on the processor card
- Standalone and Modulus 8/18 enclosures: EIA 232-D crossover cable
- Token Ring LAN STP (shielded twisted pair) cable pinouts
- Token Ring LAN UTP (unshielded twisted pair) cable pinouts

The descriptions of EIA 232 pinouts apply to all 6500 cards. However, V.35, V.36, and X.21 interfaces are available only on the first two ports on a 6500^{PLUS} processor card. For example, in a multi-processor node, Ports 1 and 2 on the first processor card could be configured (with the DIMs and jumpers) for V.35, and Ports 7 and 8 on the second processor card could also be configured (with the DIMs and jumpers) for V.35.

The arrows in the tables indicate the direction of the port signal, as follow:

<----- indicates an input signal to the port

-----> indicates an output signal from the port

EIA 232-D Signals (Standalone, Modulus 8/18, and 9/21 Enclosures)

<i>Pin</i>	<i>DCE Position</i>	<i>Function/Signal Name</i>	<i>Pin</i>	<i>DTE Position</i>	<i>Function/Signal Name</i>
1	-----	Shield/Frame Ground	1	-----	Shield/Frame Ground
2	<-----	TXD	2	----->	TXD
3	----->	RXD	3	<-----	RXD
4	<-----	RTS	4	----->	RTS
5	----->	CTS	5	<-----	CTS
6	----->	DSR	6	<-----	DSR
7	-----	Signal Ground	7	-----	Signal Ground
8	-----	DCD	8	<-----	DCD
14	<-----	DATA RESTRAINT	14	----->	DATA RESTRAINT
15	----->	TRANSMIT CLOCK or V.54 Loop 3 *	15	<-----	TRANSMIT CLOCK
16	----->	STANDBY INDICATOR	16	<-----	STANDBY INDICATOR
17	----->	RECEIVE CLOCK	17	<-----	RECEIVE CLOCK
18	<-----	EXTERNAL RECEIVE CLOCK	18	----->	EXTERNAL RECEIVE CLOCK or V.54 Loop 3 *
20	<-----	DTR	20	----->	DTR
21	----->	V.54 Loop 2	21	----->	V.54 Loop 2
22	<----->	RI/TM *	22	NC	(No Connection)
24	<-----	EXTERNAL TRANS- MIT CLOCK	24	----->	EXTERNAL TRANSMIT CLOCK
25	<-----	TEST MODE	25	<-----	MAKE BUSY

* Pin assigned double function as follows:

Pin 15: Outputs TRANSMIT CLOCK if the port is configured for internal clocks. Otherwise it acts as a V.54 Loop 3 signal when connected to a modem.

Pin 22: Used as the Ring Indicator output if the port is configured to emulate a dial modem. For this to work properly, the RI/TM switch of the port must be set to RI. When the RI/TM switch is set to TM, this pin acts as an input, and the TM output from the attached modem (pin 25 on the modem) comes into the 6500 on this pin.

V.35/V.36 (Modulus 9/21 Enclosures)

Pin	DCE Position	Function/ Signal Name	Pin	DTE Position	Function/ Signal Name
1	-----	SHIELD/FRAME GROUND	1	-----	SHIELD/FRAME GROUND
2	<-----	TRANSMITTED DATA A	2	----->	TRANSMITTED DATA A
3	----->	RECEIVED DATA A	3	<-----	RECEIVED DATA A
4	<-----	REQUEST TO SEND	4	----->	REQUEST TO SEND
5	----->	CLEAR TO SEND	5	<-----	CLEAR TO SEND
6	----->	DATA SET READY	6	<-----	DATA SET READY
7	-----	SIGNAL GROUND	7	-----	SIGNAL GROUND
8	----->	DATA CARRIER DETECT	8	<-----	DATA CARRIER DETECT
13	----->	TRANSMIT CLOCK B	13	<-----	TRANSMIT CLOCK B
14	<-----	TRANSMITTED DATA B	14	----->	TRANSMITTED DATA B
15	----->	TRANSMIT CLOCK A	15	<-----	TRANSMIT CLOCK A
16	----->	RECEIVED DATA B	16	<-----	RECEIVED DATA B
17	----->	RECEIVE CLOCK A	17	<-----	RECEIVE CLOCK A
18	NC	(No Connection)	18	----->	LOOP 3 (V.36 ONLY).
19	----->	RECEIVE CLOCK B	19	<-----	RECEIVE CLOCK B
20	<-----	DATA TERMINAL READY	20	----->	DATA TERMINAL READY
21	<-----	LOOP 2 (V.36 ONLY).	21	----->	LOOP 2 (V.36 ONLY).
23	<-----	EXTERNAL TRANSMIT CLOCK B	23	----->	EXTERNAL TRANSMIT CLOCK B
24	<-----	EXTERNAL TRANSMIT CLOCK A	24	----->	EXTERNAL TRANSMIT CLOCK A
25	NC	(No Connection)	25	<-----	TEST MODE (V.36 ONLY)

V.11 Signals (Modulus 9/21 Enclosures)

<i>Pin</i>	<i>DCE Position</i>	<i>V.11</i>	<i>Function/Signal Name</i>	<i>Pin</i>	<i>DTE Position</i>	<i>Function/Signal Name</i>
1	-----		SHIELD/FRAME GROUND	1	-----	SHIELD/FRAME GROUND
2	<-----	T (A)	TRANSMITTED DATA A	2	----->	TRANSMITTED DATA A
3	----->	R (A)	RECEIVED DATA A	3	<-----	RECEIVED DATA A
4	<-----	C (A)	CONTROL A	4	----->	CONTROL A
6	----->	I (B)	INDICATION B	6	<-----	INDICATION B
7	-----		SIGNAL GROUND	7	-----	SIGNAL GROUND
8	----->	I (A)	INDICATION A	8	<-----	INDICATION A
13	----->	S (B)	TRANSMIT CLOCK B	13	<-----	TRANSMIT CLOCK B
14	<-----	T (B)	TRANSMITTED DATA B	14	----->	TRANSMITTED DATA B
15	----->	S (A)	TRANSMIT CLOCK A	15	<-----	TRANSMIT CLOCK A
16	----->	R (B)	RECEIVED DATA B	16	<-----	RECEIVED DATA B
17	----->	*	RECEIVE CLOCK A	17	<-----	RECEIVE CLOCK A
19	----->	*	RECEIVE CLOCK B	19	<-----	RECEIVE CLOCK B
20	<-----	C (B)	CONTROL B	20	----->	CONTROL B
23	<-----	X (B)	EXTERNAL TRANSMIT CLOCK B	23	----->	EXTERNAL TRANSMIT CLOCK B
24	<-----	X (A)	EXTERNAL TRANSMIT CLOCK A	24	----->	EXTERNAL TRANSMIT CLOCK A

* These V.11 signals are not used in the X.21 standard.

V.35/V.36 Signals (Standalone and Modulus 8/18 Enclosures)

<i>Pin</i>	<i>DCE Position</i>	<i>Function/ Signal Name</i>	<i>Pin</i>	<i>DTE Position</i>	<i>Function/ Signal Name</i>
1	-----	SHIELD/FRAME GROUND	1	-----	SHIELD/FRAME GROUND
2	<-----	TRANSMITTED DATA A	2	----->	TRANSMITTED DATA A
3	----->	RECEIVED DATA A	3	<-----	RECEIVED DATA A
4	<-----	REQUEST TO SEND	4	----->	REQUEST TO SEND
5	----->	CLEAR TO SEND	5	<-----	CLEAR TO SEND
6	----->	DATA SET READY	6	<-----	DATA SET READY
7	-----	SIGNAL GROUND	7	-----	SIGNAL GROUND
8	----->	DATA CARRIER DETECT	8	<-----	DATA CARRIER DETECT
13	----->	TRANSMIT CLOCK B	13	<-----	TRANSMIT CLOCK B
14	<-----	TRANSMITTED DATA B	14	----->	TRANSMITTED DATA B
15	----->	TRANSMIT CLOCK A	15	<-----	TRANSMIT CLOCK A
16	-----	RECEIVED DATA B	16	<-----	RECEIVED DATA B
17	----->	RECEIVE CLOCK A	17	<-----	RECEIVE CLOCK A
18	----->	RECEIVE CLOCK B	18	<-----	RECEIVE CLOCK B
19	----->	RECEIVE CLOCK B	19	<-----	RECEIVE CLOCK B
20	<-----	DATA TERMINAL READY	20	----->	DATA TERMINAL READY
21	----->	TRANSMIT CLOCK B	21	<-----	TRANSMIT CLOCK B
22	<-----	EXTERNAL TRANSMIT CLOCK B	22	----->	EXTERNAL TRANSMIT CLOCK B
24	<-----	EXTERNAL TRANSMIT CLOCK A	24	----->	EXTERNAL TRANSMIT CLOCK A
25	NC	(No Connection)	25	<-----	TEST MODE (V.36 ONLY).

V.11 Signals (Standalone and Modulus 8/18 Enclosures)

<i>Pin</i>	<i>DCE Position</i>	<i>V.11</i>	<i>Function/Signal Name</i>	<i>Pin</i>	<i>DTE Position</i>	<i>Function/Signal Name</i>
1	-----		SHIELD/FRAME GROUND	1	-----	SHIELD/FRAME GROUND
2	<-----	T (A)	TRANSMITTED DATA A	2	-----	TRANSMITTED DATA A
3	----->	R (A)	RECEIVED DATA A	3	<-----	RECEIVED DATA A
4	<-----	C (A)	CONTROL A	4	----->	CONTROL A
6	----->	I (B)	INDICATION B	6	<-----	INDICATION B
7	-----		SIGNAL GROUND	7	-----	SIGNAL GROUND
8	----->	I (A)	INDICATION A	8	<-----	INDICATION A
13	----->	S (B)	TRANSMIT CLOCK B	13	<-----	TRANSMIT CLOCK B
14	<-----	T (B)	TRANSMITTED DATA B	14	----->	TRANSMITTED DATA B
15	----->	S (A)	TRANSMIT CLOCK A	15	<-----	TRANSMIT CLOCK A
16	----->	R (B)	RECEIVED DATA B	16	<-----	RECEIVED DATA B
17	----->	*	RECEIVE CLOCK A	17	<-----	RECEIVE CLOCK A
18	----->	*	RECEIVE CLOCK B	18	<-----	RECEIVE CLOCK B
19	----->	*	RECEIVE CLOCK B	19	<-----	RECEIVE CLOCK B
20	<-----	C (B)	CONTROL B	20	----->	CONTROL B
21	----->	S(B)	TRANSMIT CLOCK B	21	<-----	TRANSMIT CLOCK B
22	<-----	X (B)	EXTERNAL TRANSMIT CLOCK B	22	----->	EXTERNAL TRANSMIT CLOCK B
24	<-----	X (A)	EXTERNAL TRANSMIT CLOCK A	24	----->	EXTERNAL TRANSMIT CLOCK A
*These V.11 signals are not used in the X.21 standard.						

<i>P1</i>	<i>P2</i>
1	1
2	3
3	2
4	8
5	14
6	20
7	7
8	4
14	5
15	18
17	24
18	15
20	6
22	25
24	17
25	22
16	21
21	16

<i>Pin</i>	<i>Function</i>
1	Receive+
6	Receive-
5	Transmit-
9	Transmit+
NOTE: All other pins are reserved and should remain unconnected.	

<i>Pin</i>	<i>Function</i>
4	Receive+
5	Receive-
3	Transmit-
6	Transmit+
NOTE: All other pins are reserved and should remain unconnected.	

Appendix B

Specifications

Introduction

This section describes the physical and environmental specifications and power requirements for the enclosures.

Additional Information

For more information about Modulus 8/18 enclosures, refer to the *Modulus Planning and Installation Guide* (Product Code 80300). For Modulus 9/21 enclosures, see the *Modulus 9 and 21 Installation and Operation Guide* (Part No. 09564, Rev. B).

Physical Characteristics

Unit	Dimensions
6500 Standalone Enclosure	<i>Height: 2.75 in. (6.99 cm)</i> <i>Width: 8.54 in. (21.69 cm)</i> <i>Depth: 16.00 in. (40.64 cm)</i> <i>Weight: 5.00 lb (2.3 kg)</i>
Modulus 8	<i>Height: 14.0 in. (35.6 cm)</i> <i>Width: 8.5 in. (21.6 cm)</i> <i>Depth: 22.0 in. (55.9 cm)</i> <i>Weight (Empty): 32 lb (14.5 kg)</i> <i>Max Number of 6500 Product Cards: 4</i>
Modulus 18	<i>Height: 14.0 in. (35.6 cm)</i> <i>Width: 19.0 in. (48.3 cm)</i> <i>Depth: 22.0 in. (55.9 cm)</i> <i>Weight (Empty): 40.5 lb (18.4 kg)</i> <i>Max Number of 6500 Product Cards: 8</i>
Modulus 9	<i>Height: 14.5 in. (36.8 cm)</i> <i>Width: 8.7 in. (22.1 cm)</i> <i>Depth: 20.5 in. (52.1 cm)</i> <i>Weight (Empty): 35 lb (15.9 kg)</i> <i>Max Number of 6500 Product Cards: 4</i>

Unit (continued)	Dimensions
Modulus 21	Height: 14.0 in. (35.6 cm) Width: 17.8 in. (45.2 cm) Depth: 20.75 in. (52.7 cm) Weight (Empty): 48 lb (21.8 kg) Max Number of 6500 Series Product Cards: 9

Power Requirements

Standalone Enclosure	100-240 VAC nominal, 47 to 63 Hz
Modulus 8	100-120 VAC, 8.0 A, 50 to 60 Hz 220-240 VAC, 6.0A, 50 to 60 Hz
Modulus 9	100-120 VAC, 5.0A, 50 to 60 Hz 220-240 VAC, 3.0A, 50 to 60 Hz
Modulus 18 and Modulus 21	100-120 VAC, 10.0A maximum, 50 to 60 Hz 220-240 VAC, 6.0A maximum, 50 to 60 Hz
Modulus 18, -48 VDC Power Supply Module	-48 to -60 VDC, 10.0A maximum
Modulus 21, -48 VDC Power Supply Module	-48 to -60 VDC, 15.0A maximum
Power Rating for 6500^{PLUS} Processor Card with TRIM Card	18.5

Environmental Limits

- *All enclosures, 6500 CPU, 6500^{PLUS} processor, 6500 I/O cards:* 0° C to 50° C (32° F to 122° F)
- *6500 NSO card:* 0° C to 45° C (32° F to 113° F)
- *Storage Temperature:* -40° C to 70° C (-40° F to 158° F)
- *Relative Humidity:* 5% to 90% (noncondensing)

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