Installing the Network 9000 Routing Hub

Installation and servicing of the chassis and all modules should be performed only by qualified, trained service personnel.

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EFFECTIVE PAGES

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1-1 through 1-12	Original
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A-1	Original
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C-1	Original
D-1 through D-7	Original
G-1 through G-5	Original

CAUTION: The modules that are intended to be installed or serviced in the Model N9-9003-001, N9-9006-001, N9-9015-001, and N9-9015-002 are limited to service personnel.

Attention: Les cartes d'extention qui sont destinee a etre installee ou entretien dans les modeles N9-9003-001, N9-9006-001, N9-9015-001, et N9-9015-002 est limitee aux depanneur.

Vorsicht: Die Modelle N9-9003-001, N9-9006-001, N9-9015-001, und N9-9015-002 dürfen nur von ausgebildetem Servicepersonal installiert und gewartet werden.

Table of Contents

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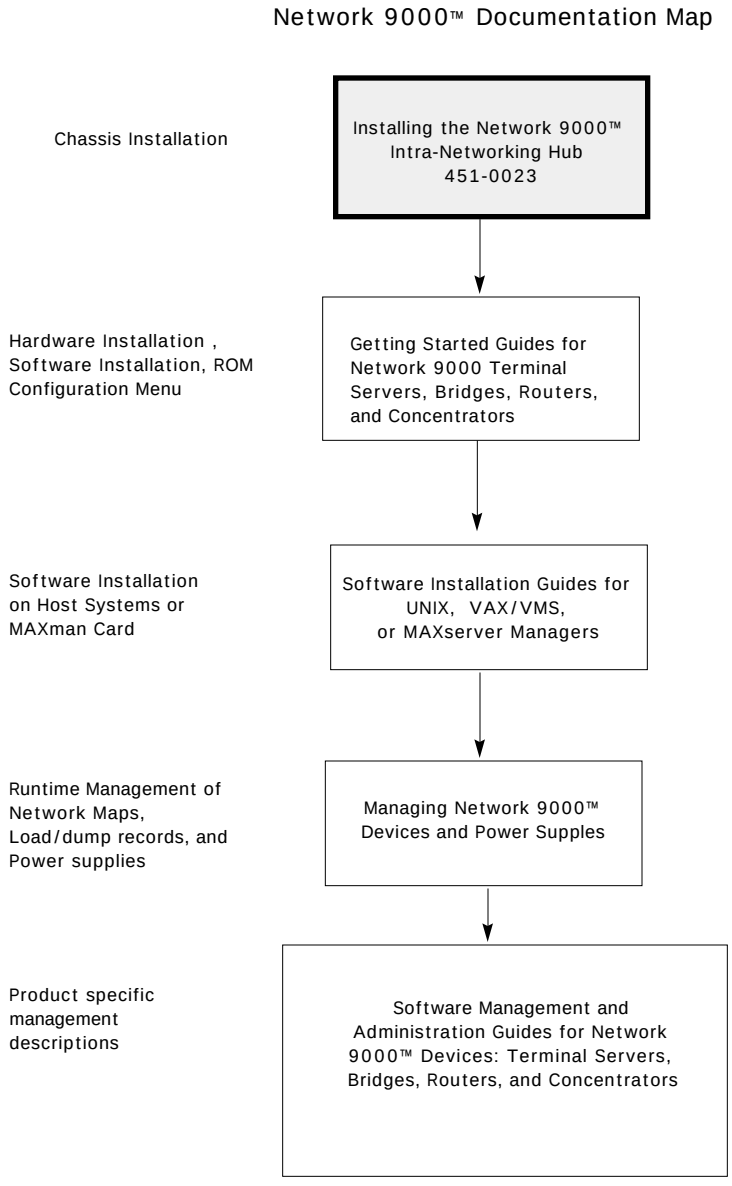
Preface

How To Use This Guide

This guide, *Installing the Network 9000 Chassis,* is intended to be used in series with other Xyplex product documentation. This set of documentation is organized to make the installation of Network 9000 products easy, and to help you get started using the Network 9000 Chassis in the shortest possible time. The following documentation map shows the order in which you should use various Xyplex documentation. The shaded block indicates where this Guide fits in the installation process.



What this Guide Covers

This guide covers installation of the Xyplex Network 9000 Chassis, power supplies, fan modules, and the available product modules and cabling options.

This guide is organized as follows:

Preface	
Chapter 1	**- Introducing the Network 9000 Multimedia Intelligent Hub**
Chapter 2	**- Installing the Network 9000 Chassis**
Chapter 3	**- Power Supply, Fans, and AC Input Modules**
Chapter 4	**- Installing and Removing Processor and I/O Modules**
Appendix A	**- Specifications**
Appendix C	**- Slot Ethernet Addresses**
Glossary	

Chapter 1: Introducing the Network 9000 Intra-Networking Hub, summarizes the features of the Network 9000 Hub, and briefly describes how you can use the Hub and functional options to build a network.

Chapter 2: Installing the Network 9000 Chassis, describes the hardware installation procedures. These procedures include:

Site Preparation
Unpacking and Inspection
Mounting
Connecting AC Power

Chapter 3: Power Supply, Fans, and AC Input Modules, describes the power supply redundancy features and how to install or remove power supply, fan trays, and ac input modules. This chapter also describes controls and indicators of these items, and the steps to take if you encounter a hardware problem.

Chapter 4: Installing and Removing Processor and I/O Modules, describes the general procedure and considerations for installing and removing/replacing all function card and I/O card options.

Appendix A, Specifications, lists the specifications of the chassis, power supplies, etc.

Appendix B, Slot Ethernet Addresses, shows you how to calculate the Ethernet address for each device that is installed in a Network 9000 chassis.

The Glossary defines some commonly used terms in Network 9000 documentation, including this manual.

Chapter 1

Introducing the Network 9000 Routing Hub

1.1 Overview

The Network 9000 Routing Hub consists of a family of chassis, processor and I/O modules, and power supply modules which provide media connectivity, internetworking, and communication server functions. The Network 9000 Hub provides desktop and backbone connections to Ethernet/IEEE 802.3, IEEE 802.5 Token Ring, and FDDI networks. The Network 9000 Hub delivers cost effective desktop connections for users of local and remote resources. This chapter covers the basic features of the hub and options that are available at product introduction.

1.2 Network 9000 Architecture

The Network 9000 chassis comes in three sizes; 3, 6 and 15 slots[1]. The components of the Network 9000 chassis are the enclosure, multimedia midplane, fan tray modules, and AC Power Input Module. All components except the actual enclosure and midplane are common to both units. Figure 1-1 depicts a six-slot Network 9000 Routing Hub.

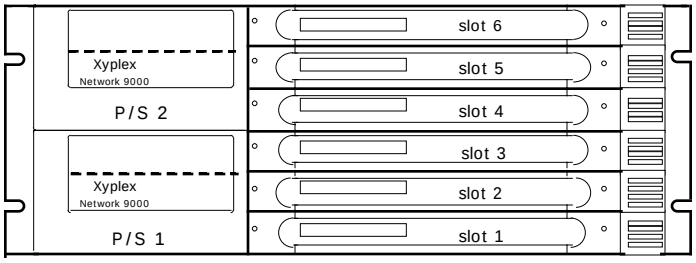


Figure 1-1. View of Six-Slot Network 9000 Hub, Showing Processor and Power Modules.

1 Slot 1 offers a subset of the Network 9000 management capabilities that are described in section 1.2.5. Slot 1 can be used for Xyplex MAXserver family cards, as well as a class of Network 9000 cards that can be used to meet your networking needs at a lower cost.

A variety of communications options are provided by Xyplex-supplied products, which consist of the processor and I/O modules (Figure 1-1 depicts Network 9000 Hub processor modules). You install product modules and power supply modules into the appropriate locations in the Network 9000 chassis (see Figure 1-2). The Network 9000 architecture provides you with the flexibility to choose from a variety of Xyplex product modules, so you can easily customize your configuration for current needs without restricting your network growth. These options include: multi-protocol terminal servers, remote and local bridge/routers, 10Base-T/10Base-FL (FOIRL) concentrators, FDDI-to-Ethernet bridge/routers, and token-ring concentrators. An adaptor module allows you to use cards from the Xyplex MAXserver product family with the Network 9000 Hub.

You can also choose from a family of power supply modules, including managed and unmanaged power supplies. Managed power supplies are designed to provide status information over the network, and can respond to certain commands entered by a network manager. The Network 9000 power supply system is designed so that you can add power supplies as your network needs grow. These power supplies are also designed to operate in redundant or fault-tolerant modes, by simply installing additional power supplies into the chassis.

1.2.1 Network 9000 Multimedia Midplane

The heart of the Network 9000 Hub is the multimedia midplane. It is called a midplane because it is located in the middle of the enclosure (instead of the front or back as with most hubs). The midplane enhances flexibility and reliability by permitting separate I/O and processor modules which can be swapped independently.

The midplane supports three Ethernet LAN segments, four IEEE 802.5 Token Ring LAN segments, a dual-ring FDDI LAN segment, a local management bus (LMB), and power lines. The LMB provides a common communications channel for any native Network 9000 product module to use, independent of the LANs to which it may be connected. Manageable power supplies can also connect to the LMB. As a dedicated management bus, the LMB facilitates the management of modules regardless of the state (off line, active, reset, loading software, etc) of the module.

Figure 1-2 depicts the location of the midplane in a Network 9000 chassis. As shown in Figure 1-2, there are circuit boards that plug into one side of the midplane which are called called processor modules. These modules hold the processing power of the product. Circuit boards which plug into the opposite side of the midplane are called I/O modules. These modules contain connectors for making external connections to devices. Some products (such as terminal servers, bridge/routers, managed concentrators, etc) require both a processor and an I/O module to function. Other products (unmanaged 10Base-T or 10Base-FL/FOIRL concentrators) require only the I/O module to function.

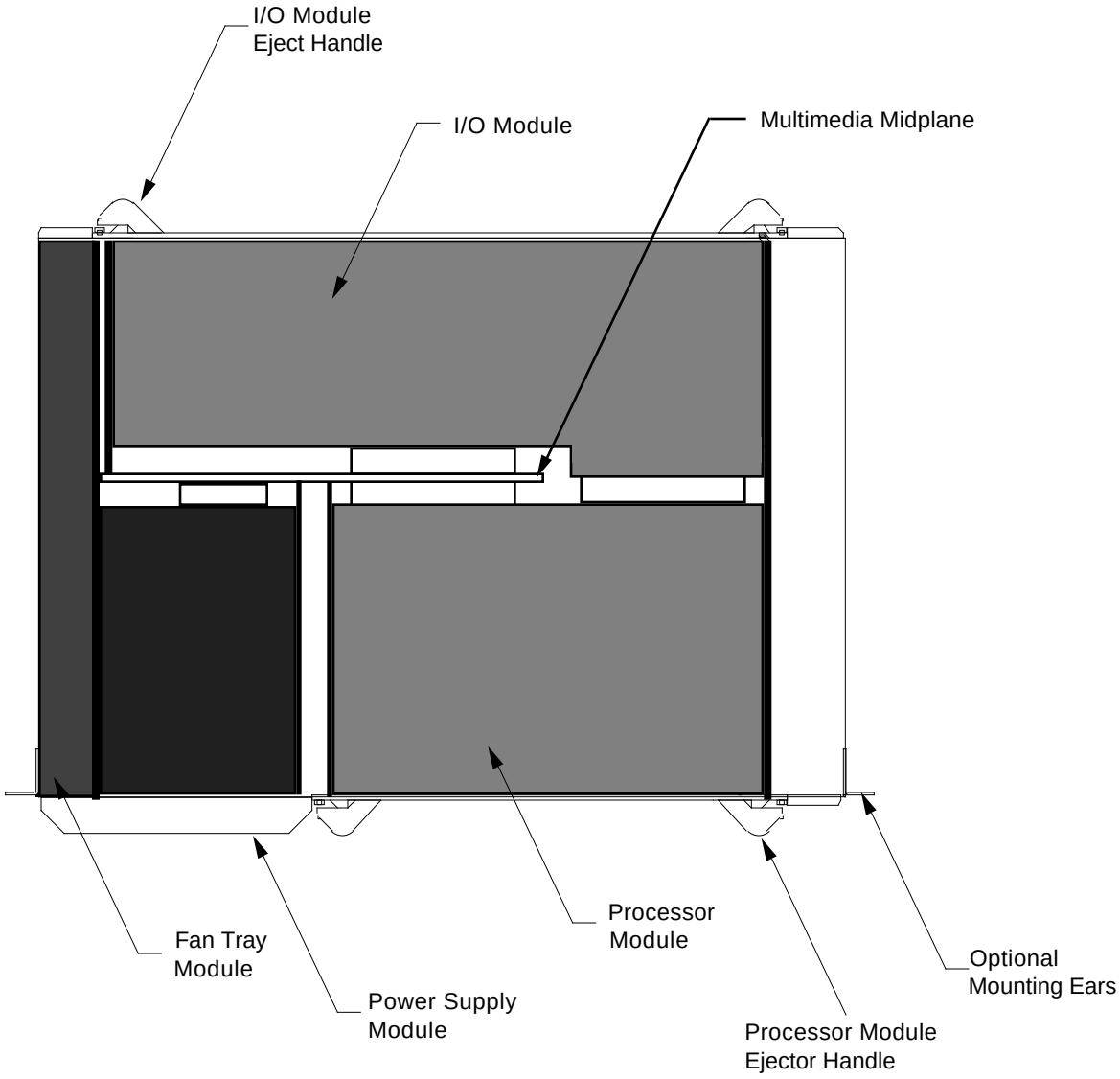


Figure 1-2. Cut-Away Top View of the Network 9000 Chassis

1.2.3 Power Supply Modules

Power is delivered to Network 9000 product modules by one or more Model P/S 130 Managed Power Supply Modules. The Model P/S 130 managed power supply modules are 150 Watt power supplies. Each module is hot swappable, can be configured redundantly, and is manageable. Each P/S 130 module adapts to a wide range of ac input voltage (110 to 240 Vac). Power factor correction has been incorporated. Redundancy is supported in N+1 fashion, that is, if two power supplies deliver enough power then a third makes the system redundant. Load sharing is used so that no interruption of power occurs should a redundant supply fail.

☞ **It is possible that you can configure options in a Network 9000 Hub so that the hub does not operate redundantly. Use the Power Supply Configuration Worksheets contained in Appendix B to calculate power supply requirements for your Hub. You should also recalculate these requirements prior to adding modules to the Hub.**

Each managed power supply has a microcontroller which controls and reports on its operation. The microcontroller keeps track of how much power is being output by its own supply and by any other supplies in the hub, which allows it to determine if its supply is redundant. It also monitors thermal limits, generating a warning if the supply is overheating. The microcontroller can also turn off or reset its supply. The microcontroller obtains its power from the general power bus instead of its local supply, thus allowing monitoring of the supply even when it is turned off.

For the P/S 130 module, management information is available from front panel LED indicators, SNMP or SHOW commands. Front panel LED indicators include a bar graph to show power utilization, and redundancy and status LEDs. This information is also available via SNMP commands and from the user interface of any Network 9000 product module. SNMP and user interface commands also allow a P/S power supply module to be turned off or reset.

1.2.4 AC Power Input Module

The AC input module is an I/O module that plugs into the bottom I/O module slot (slot 1) of the hub. The ac power input module includes the connection for the power cord, a circuit breaker switch, and storage for the initialization parameters used by each functional module (this is referred to as Control Storage; refer to section 1.3.3). It also incorporates a MAXserver adaptor module which will be discussed in the options section.

A Redundant AC Power Input Module is available for Network 9000 fifteen-slot chassis . The Network 9000 Redundant AC Power Input Module provides the means to ensure uninterrupted service, in the event of a power system failure, when an AC circuit within a facility fails, or when an AC Power Input Module fails. These modules are included with the redundant version of the Network 9000 fifteen-slot chassis, and are similar to the standard Network 9000 AC Power Input Module in appearance, features, and operation.

1.2.5 Communication Options Management Capabilities

The Network 9000 product family offers you a choice of communication options which let you decide the most cost-effective combination of performance, functionality, and managability for your network. Xyplex categorizes Network 9000 products into two types on the basis of their ability to take advantage of some Network 9000 chassis management capabilities, which are described later in this chapter, as well as their ability to connect to Ethernet segments A, B, or C.

Type 1 products are those products which must be managed using methods listed in the next section, other than the Network 9000 chassis management capabilities. Also, Type 1 products can only be connected to Ethernet segment A. Network 9000 products such as the 3605 LAN Interface Card (LIC) and the 6800 WAN Loader Card are Type 1 products. All MAXserver family cards are Type 1 products.

Type 2 products can be managed using either the Network 9000 chassis management capabilities or any of the other methods listed in the next section. The products can be connected to Ethernet segments A, B, and/or C. Appendix B of this manual lists the currently available Type 1 and Type 2 products.

Managing Network 9000 Products

Network managers have available to them a variety of software tools with which to manage Network 9000 products. Some of these tools are supplied by Xyplex; other tools are supplied by vendors such as Digital Equipment Corporation, Sun Microsystems, Inc., etc.

All products support the following network management tools:

- **ControlPoint**
- **SNMP**
- **The DECnet Network Control Program (NCP)**
- **DEC Terminal Server Manager (TSM)**

Only Type 2 products support the following network management tool:

- **Network 9000 Chassis Management Commands**

Refer to the *Guide to Managing Network 9000 Devices and Power Supplies* for more information about these methods.

1.3. Network 9000 System Features

The Network 9000 Hub combined with its product modules implement the following features:

- **hot swap**
- **software image loading**
- **parameter storage and loading**
- **remote device management**
- **security loading**

1.3.1 Hot Swap

All processor, I/O, and fan tray modules in six and fifteen slot Network 9000 Hubs are hot swappable without disturbing any other function in the Hub. Depending on your configuration, power supply modules may be hot swapped without disturbing any other function in the Hub.

☞ **Chapters 3 and 4 describe the procedures that you use to remove and replace individual modules, as well as some important safety considerations.**

1.3.2 Software Image Loading

When a processor module is plugged into the Hub it will run diagnostics then attempt to load itself with operational software. Network 9000 product s are capable of loading from: a memory card installed in the processor modules' memory card slot; another Network 9000 product module acting as a load server; a host on the network via the DEC MOP protocol, RARP/TFTP, BOOTP/TFTP, directed TFTP, or by other Xyplex products (XMOP). The network manager can select which method the product module will use to load software. The control storage on the ac power input module mentioned earlier holds this loading information. The control storage is configured at the factory with a default initialization configuration for each product module (load from midplane Ethernet LAN segment A, all protocols enabled).

Three initialization configurations are available for each slot (these are referred to as primary, secondary, and tertiary initialization configurations). Each initialization configuration specifies where the product module should to attempt to load from (e.g. Ethernet A, WAN connector 1) and which protocols to use. If loading fails based on the information in the primary record then the secondary configuration is used and finally the tertiary. If all configurations fail the product module waits briefly then retries starting with the primary configuration.

1.3.3 Parameter Storage and Loading

Each product module uses and stores two sets of parameters: initialization parameters and operational parameters. Both types of parameters are not stored on the card itself, rather they are stored elsewhere on the network to facilitate "hot swapping" of modules in the hub.

Initialization parameters refer to values that the product module uses during the software loading process. Initialization parameters include which protocols should be used to load software and operational parameters. These parameters are stored in the Control Storage of the ac input module of the Network 9000 chassis. You can change most of these parameters via the product module's initialization configuration menu or by the commands listed in the *Guide to Managing Network 9000 Devices and Power Supplies*.

Operational parameters (e.g., those affected by DEFINE commands) affect the operation of the device after it has been loaded. Typically, operational parameters affect WAN or LAN interfaces, serial ports (e.g., speed, parity, character size, etc), the availability of local services, Internet characteristics (e.g., internet-address, domain-name, subnet-mask, etc), and LAT characteristics, etc, depending on the product. You can configure the unit to load its operational parameters from a flash memory card, if one is available, or from a network host, called a parameter server, using the initialization configuration menu. Alternatively, you can use DEFINE SERVER commands to change the parameter loading method (refer to the *Guide to Managing Network 9000 Devices and Power Supplies* for more information).

The server may be configured to store parameters locally on a flash memory card, if one is available, on the memory card of another product module in the hub acting as a parameter server, or remotely in a file at any properly configured parameter servers. You use commands to change the parameter storing method. Operational parameters can be stored redundantly so that if one parameter server is not available during a reboot other parameter servers may be used.

☞ **The term operational parameters is used in this guide to refer to parameters which affect the operation of the software after initialization. Readers of the TCP/IP-LAT Documentation Set should note that the term operational parameters is used there to refer to "temporary" parameters.**

1.3.4 Remote Device Management

Remote device management allows any Type 2 product module to send a command over the LMB to another product module or managed power supply. Typically, you would use this feature to manage from a central location the connections to external interfaces or to internal midplane LAN segments. You can also use remote device management to reset processor modules or power supplies.

Soft switching is a feature that enables a network manager to configure via software which LANs and which connectors a product module will use. For example, a four port local router has 4 AUI connectors on the I/O module and three midplane Ethernet LAN segments available for connection. Ethernet ports on the local router can be connected to the available connectors or midplane LAN segments with a user command. Figure 1-3 depicts the possible connections. The user command can be executed via SNMP, or through the processor module's console port, or by connecting to the console from the network via Telnet or the DEC RCP protocol, or through the local management bus as previously described.

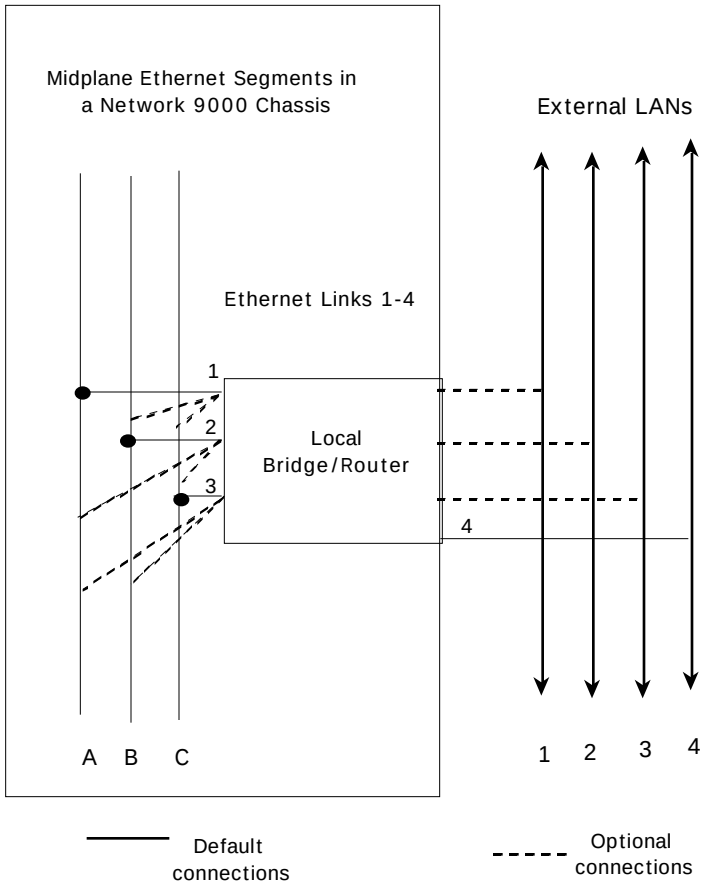


Figure 1-3. Possible Local Router Ethernet Connections

1.4 Network 9000 Communication Options

The communication options for the Network 9000 include 10 Base T and FOIRL concentrators, Ethernet-to-FDDI bridge-routers, Token Ring Concentrators, Tri-Port Ethernet Repeaters, multiport LAN and WAN bridge-routers and terminal servers. Native Network 9000 product modules can be soft switched to any compatible midplane Ethernet LAN segment. A MAXserver adaptor module allows cards developed for the MAXserver family of communications options to be installed in the Network 9000 Hub. MAXserver cards can only be connected to midplane Ethernet LAN segment A.

1.4.1 10Base-T/10Base-FL (FOIRL) Fiber Concentrators

The 10Base-T concentrators come in three models. The model 201 has 24 ports on two 50 pin Telco connectors, a management port and an AUI uplink. The model 202 is similar to the model 201, but with the addition of an FOIRL fiber uplink. The model 203 has 20 ports using RJ-45 connectors and a management port. The 10Base-FL concentrator has 12 fiber ports and is FOIRL compliant.

Each of these concentrators consists of an I/O module, which can optionally be used in conjunction with the Management Processor 210. The concentrator can connect to any of the three midplane Ethernet LAN segments and also connects to the LMB. The concentrator does not require a software load image or operational parameters. Its operating software and characteristics are permanently stored on the I/O module. The concentrator determines which midplane Ethernet LAN segment it will connect to by reading initialization parameters located in the control storage. (You can configure which Ethernet LAN segment a concentrator will be connected to from a Management Card or another product module in the Hub.) The concentrator provides status and control information which can be obtained by other product modules in the Hub.

1.4.2 Enhanced Management Card

The Management Processor 210 provides an IEEE 802.1k compliant SNMP agent for the concentrator. With additional memory (user upgradable SIMMs) it can also provide a command line interface using the management port on a concentrator I/O module, or through a remote console mechanism (DEC RCP, Telnet, etc). When the model 210 is installed in the processor module slot it will continuously read status information from the I/O module in the same slot (a concentrator) and process this information for retrieval via SNMP or the user interface. Further, the model 210 can be directed to control and acquire status information from a concentrator in another slot. The model 210 loads a software image and operational parameters as described in the System Features section. If a memory card is installed it can load the software image and operational parameters from the memory card. It can also load and store parameters for other products in the Network 9000 Hub.

1.4.3 Internetworking

Internetworking in the Network 9000 is provided by the 410 and 460 bridge-router cards. Xyplex internetworking features include:

- **Routing via IP-OSPF, IP-EGP, IP-RIP, IPX, DECnet IV, Appletalk (1992)**
- **Concurrent bridging**
- **Filtering on source, destination, protocol field and data patterns**
- **Fully Distributed Redundant Bridging**
- **PPP and Frame Relay WAN support**

The model 410 is a four port local bridge router. The I/O module for the local bridge router has four AUI connectors. The four ports on the model 410 can be connected to any of the four AUI connectors, or to the three midplane Ethernet LAN segments. For example, one could configure the model 410 to connect to the three midplane Ethernet LAN segments and still have one port available for connection to an external Ethernet LAN via an AUI connector.

The model 460 is a four port remote bridge-router with one Ethernet connection. The Ethernet connection can be soft switched to one of the midplane Ethernet LAN segments or to an external Ethernet LAN via an AUI connector. The I/O module has four V.35 connectors.

MAXserver LAN and WAN bridge-routers are also available for the Network 9000 using the MAXserver adaptor module.

1.4.4 Terminal Server

The model 720 is the terminal server processor module for the Network 9000. Xyplex terminal server features include:

- **Licensed LAT**
- **Telnet and Rlogin**
- **TN3270**
- **DECserver and Unix style commands**
- **Accounting**
- **Scripting**
- **Multisessions support**
- **SLIP**
- **Kerberos authentication**
- **Dialback modem security**
- **Password security**
- **SNMP, TSM and remote console via Telnet and RCP management**
- **Xremote**
- **Port to port connections with rotary support**

The model 720 is a high performance terminal server. It can be ordered with three types of I/O modules: the 721, 724, and 723. The 721 I/O module supports 16 ports on two 50 pin Telco connectors. The 724 I/O module supports 24 ports on two 50 pin Telco connectors. Each port uses 6 wires per port to supply Xmt, Rcv, Gnd, DTR/RTS, DCD/CTS, and Ring signals. While each port can operate at speeds up to 115.2 kbps, it is recommended that you be careful to use short line lengths when operating at speeds greater than 64 kbps, due to "cross talk" considerations.

The model 723 I/O module has 20 ports with RJ-45 connectors. Each port uses 8 wires per port to supply Xmt, XmtGnd, Rcv, RcvGnd, DTR, DCD, CTS/Ring and RTS. The RJ-45 ports are capable of speeds up to 115.2 kbps.

1.4.5 MAXserver Adaptor I/O Module

The MAXserver adaptor I/O module allows the MAXserver family of communications options to be used in the Network 9000 Hub. It maps the MAXserver LANbus™ Ethernet channel and other necessary signals to the Network 9000 multimedia midplane. With this adaptor most MAXserver family options (excluding the MAXman card) can use midplane Ethernet LAN segment A in the Network 9000 hub. The adaptor module provides a location in which to plug in the MAXserver I/O connector card. Network 9000 Type 1 products also use the Adaptor I/O module, unless they are installed in slot 1. In this case, the AC power input module provides the Adaptor I/O function (refer to section 1.2.4).

Chapter 2

Installing the Network 9000 Chassis

2.1 General

Installation and servicing of the chassis and all modules should be performed only by qualified, trained service personnel.

The hardware installation consists of a few simple procedures to:

- **Select an appropriate site.**
- **Unpack the hardware, check the contents against the packing list, and inspect for possible shipping damage.**
- **Mount the hub in a rack, or place it on a flat surface.**
- **Install power supply modules.**

2.2 Tools Required

A Phillips screwdriver is required to install the chassis in a 19" rack and to install or remove any power supply, function card, or I/O card options.

2.3 Site Preparation

The Hub can be installed in any location as long as the simple environmental, space and electrical requirements (Appendix A) are met. Perform the following steps:

a. Make sure that your site can support the following specifications listed in Table 2-1.

b. Make sure there is no obstruction of the side air vents of the unit.

c. Make sure that cables can be routed to the hub in a manner that does not exceed the maximum cable lengths. You can find this information in the Getting Started Guides supplied with the card options.

d. Make sure that the installation is at an optimum height from the floor to allow easy inspection of the LED indicators and decrease the possibility of dust from the floor from entering the unit.

Table 2-1. Chassis Site Requirements

Item	Three-Slot Chassis	Six-Slot Chassis	Fifteen Slot Chassis
Height: Depth: Standalone Width: Rackmount Width:	3.45 in (8.8 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)	6.9 in (17.6 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)	17.4 in (44.6 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)
Weight (Chassis with fans and one AC input module)	7.5 lbs (344 kg)	15.0 lbs (6.8 kg)	35.0 lbs (15.9 kg)
Power Requirements (per model)	110-240~ 2.5-1.25A	110-240~ 5-2.5A	110-240~ 12-6A
(all)	47-63 Hz, 420W peak, 1245 BTU		
Environment (all)	32 to 113 degrees F (0 to 45 degrees C) 5 to 90% humidity, noncondensing		

2.4 Unpacking and Inspecting the Hardware Kit

The hardware is delivered in 2 or more packages. The Hub chassis, power cable, mounting hardware and documentation are contained in one box. Power supply, processor, and I/O modules, and cables and associated connectors are normally shipped in separate boxes.

Perform the following steps to unpack and inspect the hardware kit:

a. Carefully unpack the hub.

b. Inspect the kit and check that all parts listed in the shipping order were received. The cards are supplied separately. To prevent damage from static electricity, leave the cards in their static protective bags until you are ready to install them. The hub is shipped to you with the basic items listed in Table 2-2.

Table 2-2. Network 9000 Hub Supplied Items

Item	Quantity	Xyplex Part Number
Three-slot Network 9000 Hub Base Unit with AC power input module and fan module	**1**	**N9-9003-001**
Six-slot Network 9000 Hub Base Unit with AC power input module and fan modules	**1**	**N9-9006-001**
Fifteen-slot Network 9000 Hub Base Unit with AC power input module and fan trays	**1**	**N9-9015-001**
Fifteen-slot Network 9000 Hub Base Unit with redundant AC power input modules and fan trays	**1**	**N9-9015-002**
***Installing the Network 9000 Intra-Networking Hub* (this guide)**	**1**	**451-0023**
AC Line Cord	**1**	**151-0001[1]**
Accessories Kit (contains following items)	**1**	**130-0006**
Screw, Truss Head 10-32 x 1/2 MS	**4**	
Nut, Tinnerman 10/32	**4**	
Wrist Strap	**1**	
RJ-45 Crossover Cable, 10 ft.	**1**	**151-3028**
Modular Adaptor (DB-25 to RJ-45)	**1**	**350-0181**

Set aside the line cord, documentation, wrist strap, cabling items, and rack-mounting hardware.

c. Return all packing materials to the shipping container and store the container in a safe place. If you need to return the unit to Xyplex, you should pack it in the original packing material.

d. If you ordered cabling/connectors, unpack and inspect the box(es) that contain them.

e. If the unit has been damaged, or if parts are missing notify your Xyplex Sales representative immediately.

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1 US and Canada only. For international shipments, Xyplex may supply a different line cord which will be appropriate for the power requirements of your country.

2.5 Mounting

2.5.1 General

The chassis can be installed in either a 19-inch rack or can stand alone on a flat surface as long as adequate ventilation is provided. The unit is cooled by pulling air from the side of the chassis. The air is expelled through the side fan ducts.

2.5.2 Rack Mount Installation

A height of 6.9 inches (17.6 cm) is required for the six-slot chassis. A height of 17.4 inches (44.6 cm) is required for the fifteen-slot chassis. Perform the following steps to install the unit in a 19-inch rack:

a. Locate a mounting position.

☞ **If you need to, you can remove the "feet" at the bottom of the chassis, by using a flat-head screwdriver to pry out the plastic post in the center.**

b. The chassis is shipped with the ears attached to the side of the chassis. Locate the rack-mount "ears" and flat-head Phillips mounting screws (6-32 x 0.5-in, painted black) which attach the ears to the chassis. As shipped, the ears are attached so that the processor and power supply modules would be mounted at the front on the rack. However, the ears can be mounted on the chassis on either side (which allows you to select whether the I/O modules and cables or the processor modules will be in the front of the rack. If you want to rack mount the chassis so that the I/O modules will be at the front, remove the ears from the chassis and mount them on the other side of the chassis. Use a Phillips screw driver to secure the ears to the chassis. Each ear has three holes, which match the mounting bracket screw locations shown in Figure 2-1.

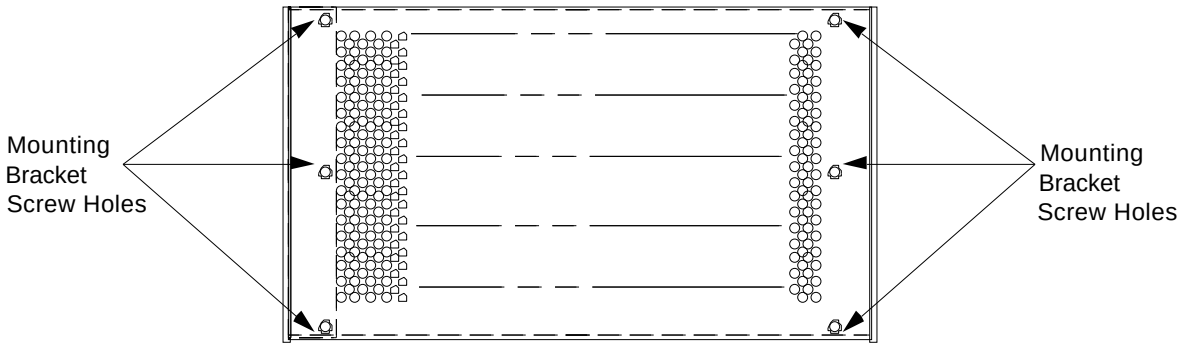

Figure 2-1. Side View of Network 9000 Hub, Showing Location of Bracket Holes.

c. Locate the 4 mounting screws and Tinnerman nuts in the accessories bag. Each ear has a hole in the top and bottom (see Figure 2-1). Partially screw two of the mounting screws into the rack at the bottom of where the chassis is to be mounted. Leave about one-eighth inch protruding, so that the hole at the bottom of the chassis ears will sit on the screw.

d. The chassis requires 2 people to lift it. Place the bottom holes of the ears on the screws in the rack. Then, one person holds the chassis in place, aligning the side ear holes with the holes in the rack. The other person, using a Phillips screw driver, secures the chassis to the rack. Place a screw through each ear/rack hole and fasten a nut to it. Secure the bottom screws first. After you have two screws securing the holes that open to the side of the ears, remove the two screws holding the bottom of the ear and complete the process of securing the holes that open to the side of the ears. Figure 2-2 shows how you install the chassis into a standard 19" rack (in the example in Figure 2-2, the function cards and power supplies will be at the front of the rack).

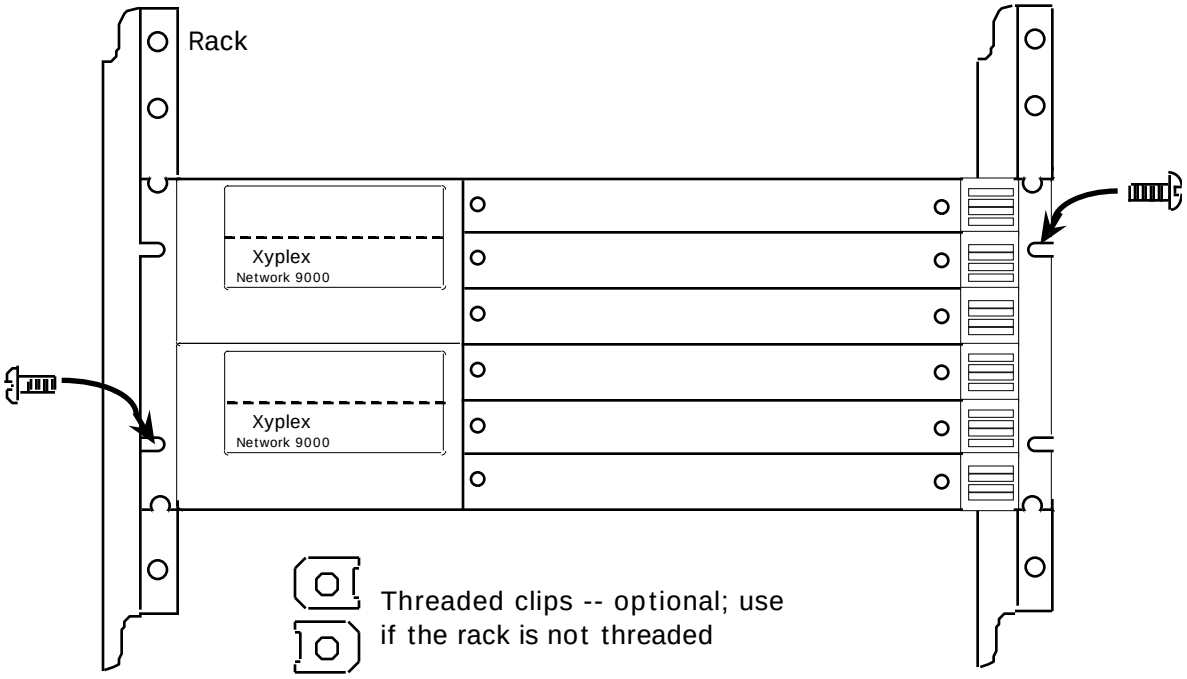

Figure 2-2. Rack Mounting Hub Chassis.

2.5.3 Stand-Alone Installation

The hub can be mounted in any location as long as the site requirements (paragraph 2.3) are met. A location should be selected that does not require each cable's maximum bend radius to be exceeded. If you wish, you can remove the mounting ears and store them for later use.

2.6 Additional Installation Activities

After you have completed the chassis installation, you must install power supplies, function cards, and I/O cards with their associated cabling. Chapter 3 describes the procedures for installing power supplies. Chapter 4 describes the general procedure for installing function cards and I/O cards into the chassis. You should also refer to the *Getting Started Guide* supplied with each function card for any installation notes that are specific to the card, as well as cabling information.

Chapter 3

Power Supplies, Fans, and AC Input Modules

Installation and servicing of the chassis and all modules should be performed only by qualified, trained service personnel.

High voltages are present inside the Network 9000 Chassis. Observe the following safety precautions when installing or removing any modules:

- **Do not insert metallic objects (such as a screwdriver, etc) inside the Network 9000 chassis, while power is on. If you must straighten out a bent pin on the midplane, you MUST first turn off power to the chassis.**
- **All midplane servicing must be done only by qualified service personnel.**

3.1 General

The AC power input module, power supply modules, and fan tray modules are removable. Depending on your Network 9000 hub configuration, the power supplies may be "hot swapped" without bringing the unit down. This chapter describes the procedures used to install and remove these options, and provides a quick reference to the controls and indicators found on the ac input and power supply modules.

3.2 Power Supply Modules

Figure 3-1 shows the front panel of the P/S 130 Managed Power Supply. Table 3-1 lists the LED indicators and controls of the P/S 130 Managed Power Supply.

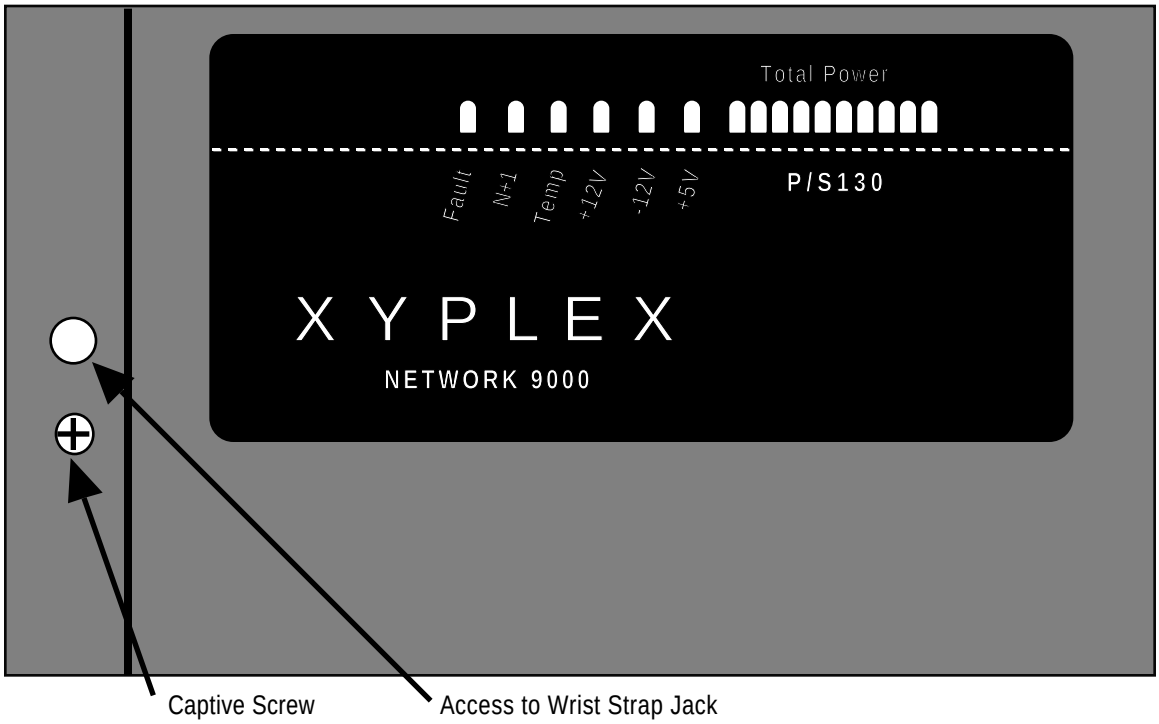

Figure 3-1. P/S 130 Managed Power Supply Front Panel.

Table 3-1. P/S 130 LED Indicators.

Item	Purpose
Fault LED	**ON - indicates that an internal power supply fault has occurred. You should examine the other LEDs for specific details of the fault condition.**
	OFF - indicates that the power supply is functioning properly.
	Flashing - indicates that the power supply has been inhibited. All other LEDs will be off.
N+1 LED	**ON - indicates that if one power supply in the hub fails, is removed, or is inhibited via the On/Off switch the remaining power supplies will have sufficient capacity to provide power and insure uninterrupted operation (i.e., power supplies are operating redundantly).**
	OFF - indicates that if one power supply in the hub fails, is removed, or is inhibited via the On/Off switch the remaining power supplies will not have sufficient capacity to provide power and insure uninterrupted operation (i.e., power supplies are not operating redundantly).
Temp LED	**ON - indicates that the temperature in the power supply is within normal operating limits (less than 55° C).**
	OFF - indicates that the temperature in the power supply is outside normal operating limits (greater than 55° C).
+12V LED	**ON - indicates that the +12 Vdc supply is functioning within normal operating limits.**
	OFF - indicates that the +12 Vdc supply is not functioning within normal operating limits.
-12V LED	**ON - indicates that the -12 Vdc supply is functioning within normal operating limits.**
	OFF - indicates that the -12 Vdc supply is not functioning within normal operating limits.
+5V LED	**ON - indicates that the +5 Vdc supply is functioning within normal operating limits.**
	OFF - indicates that the +5 Vdc supply is not functioning within normal operating limits.
Total Power LEDs	**LEDs form a bar graph indicating how much power is being provided by the power supply module. Each LED segment indicates 15W of output power. When all LEDs are lit, the hub is drawing on the full capacity of the power supply. Fewer LEDs lit indicate that the power supply can handle additional load.**

3.2.1 Installing and Removing Power Supply Modules

The Network 9000 architecture permits you to add, change, and remove power supply modules while the unit is powered on. Depending upon the configuration of your hub power supplies, this can sometimes be done without disrupting other devices in the hub.

The installation and removal of power supply modules is uncomplicated. Each unused power supply slot is covered by a blank panel. To install a new power supply module, remove the blank panel and insert the power supply module. Secure the module with the Phillips head captive screw.

Installing Power Supplies

Depending on the Hub model, power supply slots are numbered 1 through 2, or 1 through 5, beginning from the bottom.

Perform the following steps to install a power supply:

a. Loosen the 1 screw securing the front blank panel of the selected power supply slot. Remove the panel.

For a standard Network 9000 chassis, Xyplex recommends that you install P/S 130 modules in the order shown in Figure 3-2 (slots P/S 2, P/S 3, P/S 4, P/S 1, and P/S 5). For a redundant Network 9000 chassis, Xyplex recommends that you install P/S 130 modules in pairs in the order shown in Figure 3-3 (slots P/S 2 and P/S 3, then P/S 4 and P/S 1).

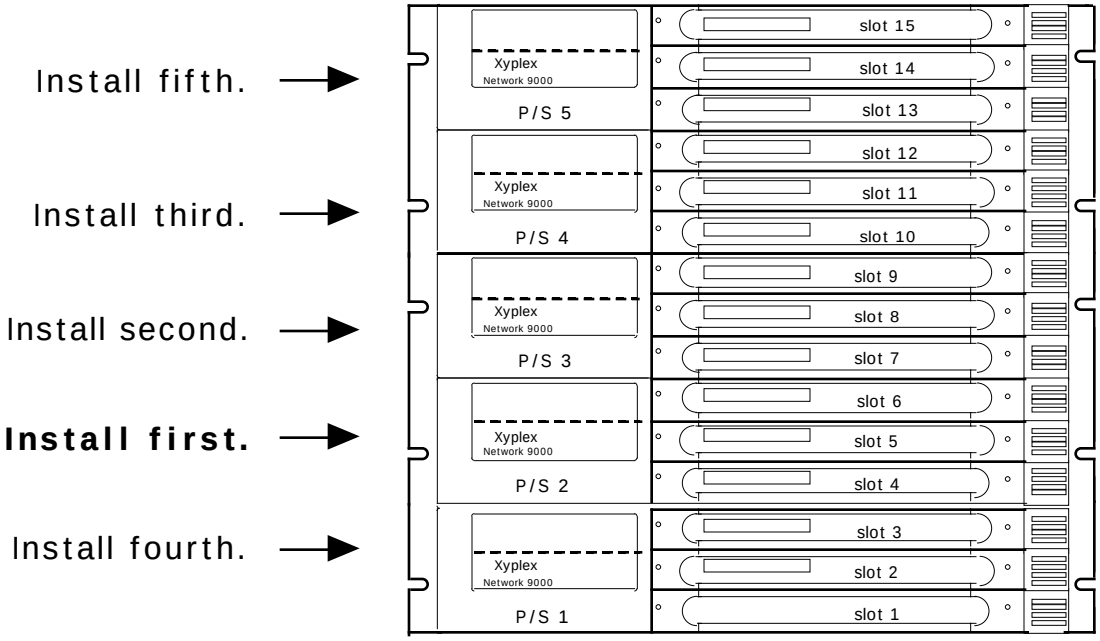

Figure 3-2. Installing Power Supplies in a Standard Network 9000 Chassis.

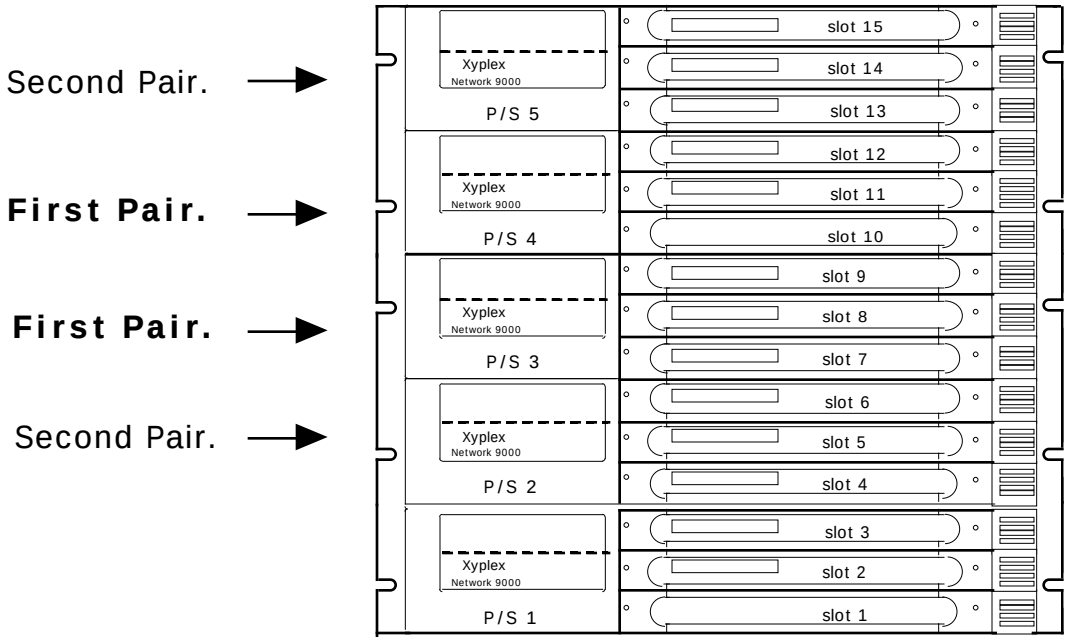

Figure 3-3. Installing Power Supplies in a Redundant Network 9000 Chassis.

b. Examine the area inside the hub that was uncovered by removing the blank panel. Along both sides of this area you will see card guides. There are two card guides for each power supply slot. (Parts of the printed circuit boards of the power supply protrude out from the metal power supply housing. These protrusions go in the card guides.) At the rear of the power supply slot you will also see two female connectors which will mate with connectors on the power supply. The detail portion of Figure 3-4 depicts the location of the card guides and the connectors.

c. Remove the power supply from its packaging. Hold the supply by the handle on the left side. Gently slide the supply into its slot, making sure that the portion of the printed circuit board slides between the card guides. To avoid damage to the power supply or the pins on the male connector at the back of the supply, use care to insert the supply straight in. After the connectors engage, a final push in the front of the module will seat the module completely.

d. Secure the power supply using the Phillips head captive screw.

e. Store the blank panel and the packaging for possible future use.

f. When all supplies are installed, turn on any managed power supplies (generally, you should control power to the Hub via the circuit breaker on the AC power input module, to avoid placing unnecessary stress on any single power supply module).

Removing Power Supplies

Reverse the power supply installation procedure to remove any power supply. Perform the following steps to remove any power supply:

a. Loosen the captive screw securing the power supply to the chassis.

b. Grasp the handle on the left side of the supply and pull straight back. The power supply will slide out.

c. If the supply is to be replaced with another, install the new supply and secure it. If the supply will not be replaced with another, cover the empty slot with a blank panel. Secure the panel to the chassis using the screws supplied with the panel.

☞ **It is essential that you cover an empty slot with a blank panel to ensure proper chassis cooling and safety.**

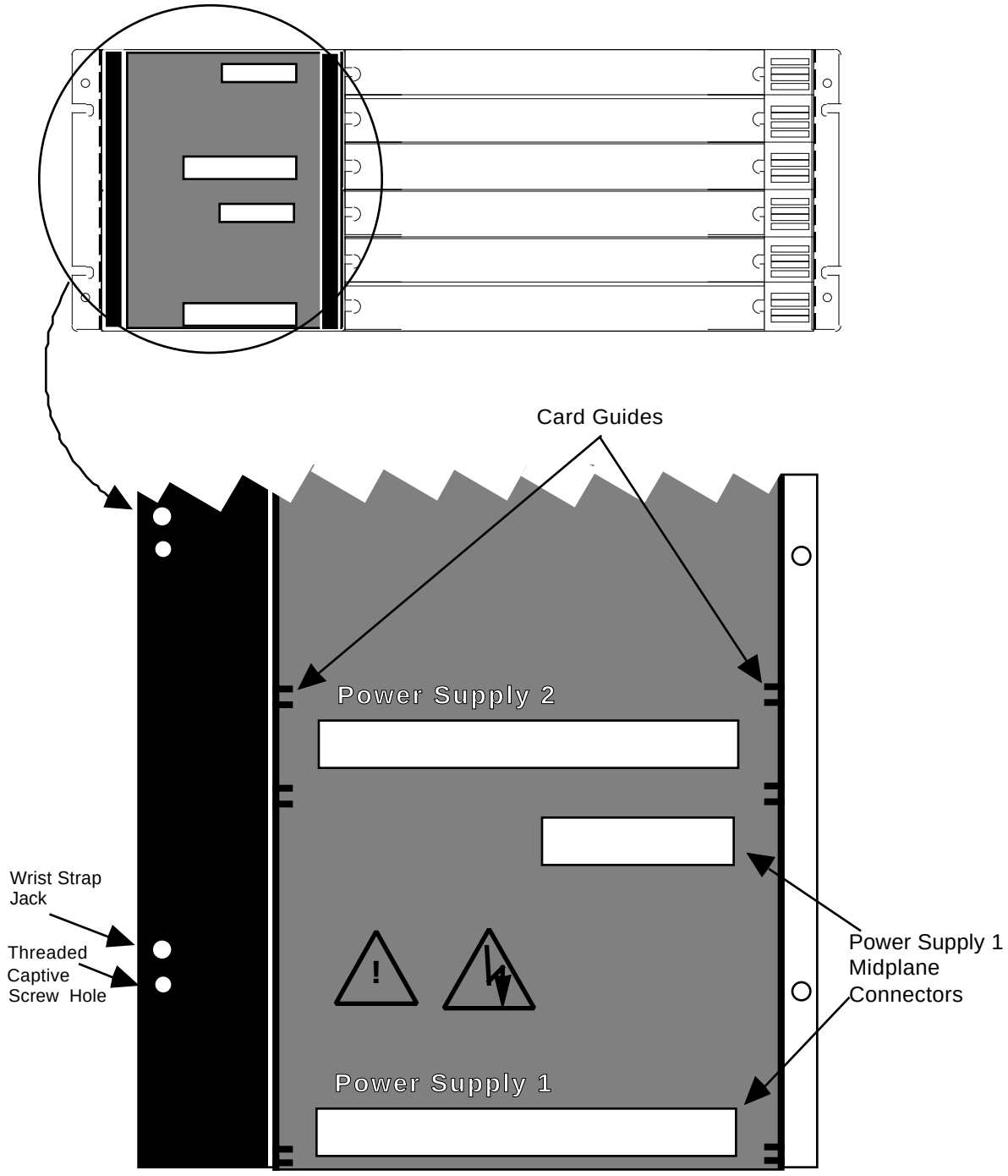

Figure 3-4. Interior of Hub Power Supply Area.

3.3 AC Power Input Module

☞ **Refer to Appendix D if you have a unit which contains redundant AC Power Input Modules.**

Figure 3-5 depicts the Network 9000 AC Power Input Module. A Standard Network 9000 Fifteen Slot Chassis contains one of these modules. A Redundant Network 9000 Fifteen Slot Chassis contains two of these modules. These modules are pre-installed in the Network 9000 chassis. The power input module must be installed in the bottom slot of the Network 9000 chassis.

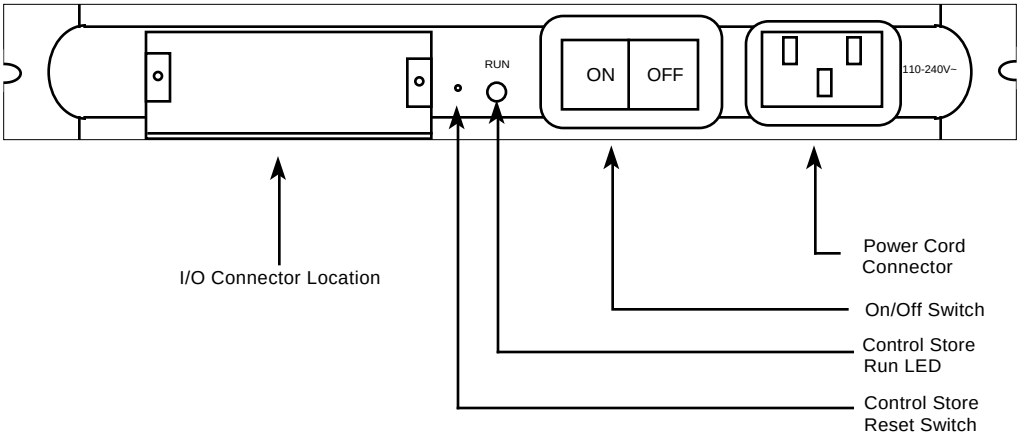

Figure 3-5. Standard AC Input Module.

3.3.1 Connecting AC Power

Perform the following steps to connect ac power:

a. Set the power switch located to the left of the ac power cord connector (socket) on the rear of the unit to the OFF position.

b. Plug the ac line cord (supplied) into the power cord connector in the rear of the unit and plug the other end into a nearby power receptacle.

c. Set the power switch located to the left of the ac power socket on the rear of the unit to the ON position.

3.3.2 Installing and Removing the AC Power Input Module

A Standard Network 9000 Fifteen Slot Chassis contains one of these modules. A Redundant Network 9000 Fifteen Slot Chassis contains two of these modules. One module is always located in the bottom I/O card slot of the hub. In a Redundant Network 9000 Fifteen Slot Chassis, the second module is installed in slot 10. You will only need to remove an AC Power Input Module if it fails or you wish to swap or repair the chassis itself. (If you install the AC Power Input Module, and the same functional units into a new chassis, no reconfiguration of the functional units will be needed. Contact Xyplex Customer Support in the event that the AC Power Input Module itself needs to be replaced - it may be possible to lessen the requirements for reconfiguring your hub.) If a failure occurs, use the following procedures to remove a failed module and replace it with another one.

Removing the AC Power Input Module

Perform the following steps to remove the ac power input module:

a. Turn the power switch on the AC Power Input Module to the Off position.

b. Disconnect the power cord from the ac power input module.

c. If there is an I/O connector installed on the AC Power Input Module, remove the cables from the I/O connector. Loosen the 2 screws securing any I/O connector from the power input module. Remove the I/O connector from the module.d. Loosen the 2 screws securing the power input module to the chassis.

e. Grasp the ejector handles on the edges of the module and swing them out away from the module. The module will then pop free allowing you to slide it straight out from the chassis.

Installing a New AC Power Input Module

Perform the following steps to install a replacement AC power input module:

a. Remove the replacement AC power input module from its packaging.

b. Examine the area inside the hub slot that was uncovered by removing the ac power input module. Along both sides of the slot you will see two card guides, which consist of two protrusions formed in the metal separated by about one-eighth inch. Gently slide the module into the slot between the card guides. To avoid damage to the AC input power module or the pins on the male connectors on the midplane at the back of the slot, use care to insert the module straight in.

c. Secure the power module using the two captive screws.

d. If there was an I/O connector installed in the previously removed ac power input module, re-install the I/O connector. Remove the blank plate from the module and secure the I/O connector with its screws.

e. Ensure that the power switch is in the Off position. Plug the ac line cord (supplied) into the connector in the rear of the unit and plug the other end into a nearby power receptacle.

f. Set the power switch located to the left of the ac power socket on the rear of the unit to ON.

3.4 Fan Trays

Figure 3-6 depicts a Network 9000 fan tray. Six-slot Network 9000 hubs must contain two fan trays. Fifteen-slot hubs must contain five fan trays. Each Network 9000 hub is shipped with the maximium number of fan trays it can support. The only reason you should ever need to remove a fan tray is due to a failure. If a failure occurs, use the following procedures to remove the failed fan tray and replace it with a new or spare one.

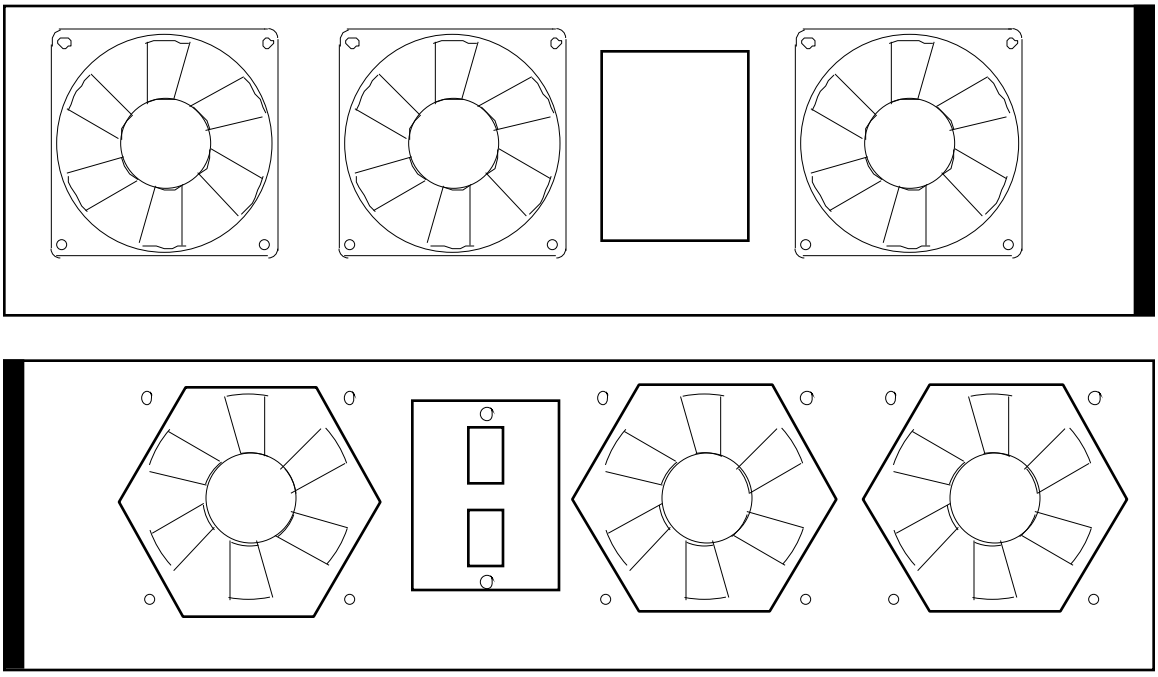

Figure 3-6. Network 9000 Fan Tray, Viewed From Each Side.

Removing a Fan Tray

To remove a fan tray:

The fan tray extends the entire depth of the hub enclosure (that is, from the back to the front). The fan tray is secured in the chassis with the same captive screw that secures a power supply module or blank panel. Loosen the captive screw securing the fan tray to be removed. Next, locate the wrist strap jack at the end of the failed fan tray. Insert a thin round object, such as a screw driver or pencil, into the jack. Press on the end of the fan tray, until it pops free. Remove the fan tray from the chassis by pulling the fan tray straight back.

Inserting a Fan Tray

To insert a fan tray:

Locate the fan tray guides in your Network 9000 Hub. Figure 3-7 depicts the fan tray guides. The sheet metal of the fan tray is designed to slide into these guides. Insert the sheet metal into the guide and push the fan tray all the way in.

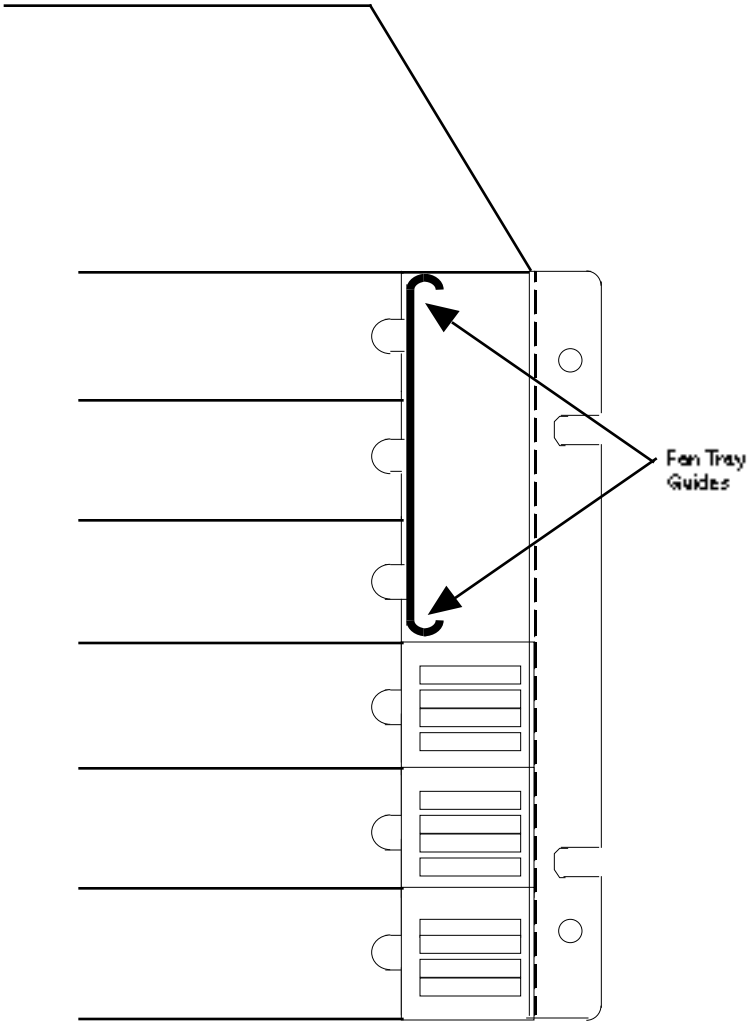

Figure 3-7. Location of Fan Tray Guides.

Chapter 4

Installing and Removing Processor and I/O Modules

Installation and servicing of the chassis and all modules should be performed only by qualified, trained service personnel.

4.1 General

The Network 9000 architecture permits you to add, change, and remove modules while the hub is powered on, without disrupting other devices. This chapter describes the installation and removal of modules.

CAUTION

ALWAYS WEAR AN ANTI-STATIC BRACELET BEFORE HANDLING ANY Network 9000 MODULES. Each Network 9000 chassis comes with an anti-static bracelet that attaches to a jack next to the power supply (see Figure 4-1).

The installation and removal of modules is uncomplicated. Each unused slot is covered by blank panels in both the front and rear of the unit. To install a new module, the front and rear blank panels are removed, and the processor module and the associated I/O module are then inserted. The appropriate cables are then connected.

4.2 Installing and Removing Modules

Depending on the model of Network 9000 hub you have, slots are numbered designated as 1-15 or from 1-6 beginning from the bottom. A Network 9000 module can be placed in any available slot, except slot 1. (Slot 1 contains the ac power input module, but can be used with a single-slot module from the MAXserver family of communication options.) Do not remove the module from the static-protection bag yet!

Perform the following steps to install a module:

a. Attach a grounding wrist bracelet to one wrist and plug the grounding strap into the jack located to the left of the power supply front panel.

b. Loosen the 2 screws securing the blank panel of the selected slot. Remove the blank panel.

c. Examine the area inside the hub slot that was uncovered by removing the blank panels. Along each side of the slot you will see a card guide, which consists of two protrusions formed in the metal separated by about one-eighth inch. Figure 4-1 depicts the card guides for a processor module slot. The I/O module slot has a similar card guide. Remove the module from the static-protection bag. Gently slide the module into the slot between the card guides. To avoid damage to the module or the pins on the connectors on the midplane at the back of the slot, use care to insert the module straight in. Secure the module using the captive screws.

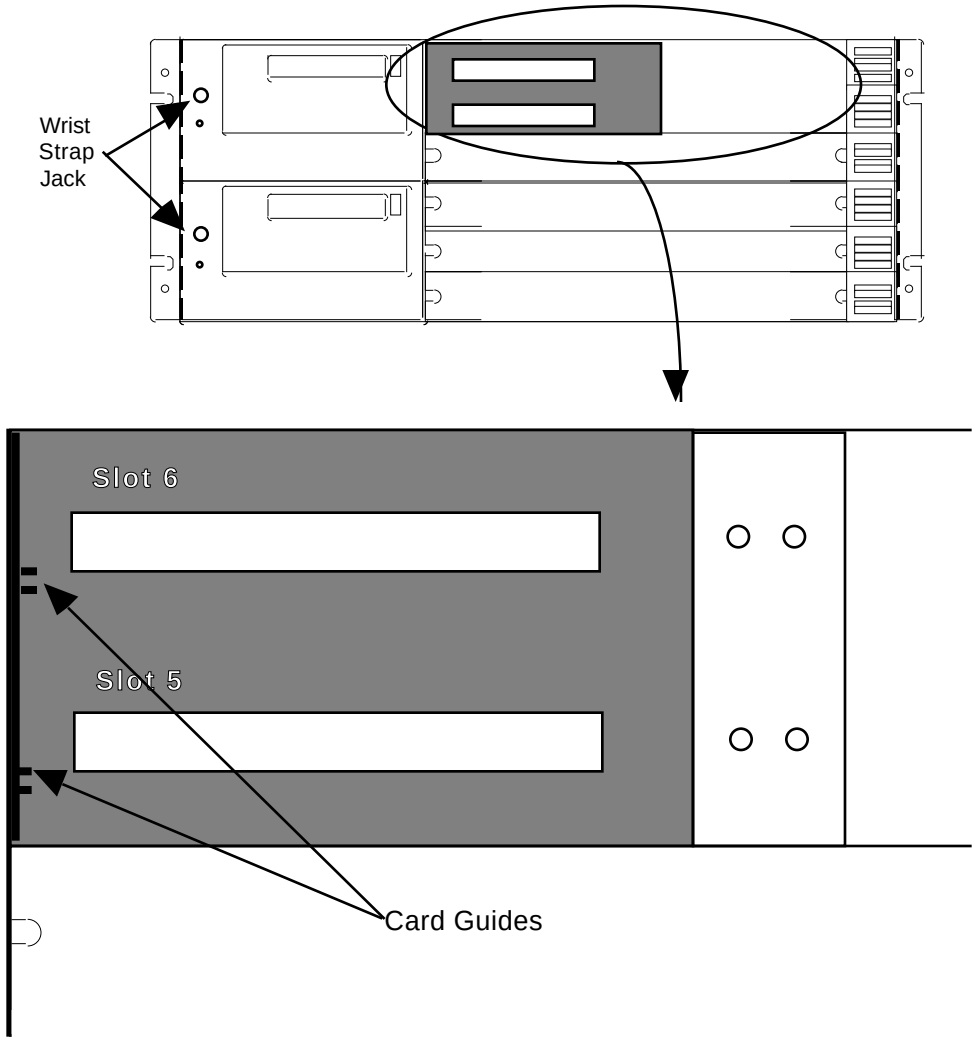

Figure 4-1. Card Guide

d. Connect new cables, as required.

e. Remove the grounding wrist strap from your arm and front-panel jack.

f. Store blank panels and the static-protection bags for possible future use.

Removing Modules

Reverse the module installation procedure to remove any module. The cabling and associated I/O module in the rear of the unit will only have to be disconnected if the slot is no longer to be used with the same type of I/O module. Leave the I/O module and cabling connected to this slot if you are swapping the processor module with a new processor module of the same type, or if you are reseating the module if a self-test failure occurred.

Perform the following steps to remove any module:

a. Locate the static-protective bag for the module.

b. Attach a grounding wrist bracelet to one wrist and plug the grounding strap into the jack located on the power supply front panel.

CAUTION

ALWAYS WEAR AN ANTI-STATIC BRACELET BEFORE HANDLING ANY Network 9000 MODULES. Each Network 9000 hub comes with an anti-static bracelet that attaches to the jack on the power supply front panel (see Figure 4-1).

c. Using a bent paper-clip "tool" press the reset switch on the processor module once to place the module into reset mode. (You should do this even if you are removing an I/O module. In this case, place the processor module, that is in the same slot as the I/O module to be removed, into reset mode.)

☞ **Do not remove a running processor module which contains a flash memory card, without first placing the module into reset mode, or you can corrupt the memory card.**

d. Loosen the 2 screws securing the module to the chassis.

e. Grasp the ejector handles on the edges of the module and swing them out away from the module. The module will then pop free allowing you to slide it straight out from the chassis. Place the module in the protective bag.

f. If the processor module is to be replaced with another module of the same type, install the new module and secure it. Normally, the I/O module and cabling can be left connected when swapping only a processor module. If the new processor module is a different type of module than the one being replaced, you will usually need to remove the I/O module and replace it with an I/O module that is appropriate to the new processor module. If you are only changing the I/O module, install the new I/O cable module and secure it using the 2 captive screws. Then, connect the appropriate cabling for this interface. Perform step "f" if the slot will not be used immediately.

g. Cover the empty slot with a blank panel. Secure the panel to the hub using the captive screws supplied with the panel.

☞ **It is essential that you cover an empty slot with a blank panel to ensure proper chassis cooling.**

Appendix A

Technical Specifications

Item	Three-Slot Chassis	Six-Slot Chassis	Fifteen Slot Chassis
Height: Depth: Standalone Width: Rackmount Width:	3.45 in (8.8 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)	6.9 in (17.6 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)	17.4 in (44.6 cm) 14.1 in (35.9 cm) 17.6 in (44.6 cm) 19.0 in (48.3 cm)
Weight (Chassis with fans and one AC input module)	7.5 lbs (344 kg)	15.0 lbs (6.8 kg)	35.0 lbs (15.9 kg)
Power Requirements (per model)	110-240~ 2.5-1.25A	110-240~ 5-2.5A	110-240~ 12-6A
(all)	47-63 Hz, 420W peak, 1245 BTU		
Environment (all)	32 to 113 degrees F (0 to 45 degrees C) 5 to 90% humidity, noncondensing		

Appendix B

Xyplex Hardware Types

Product Family	Unit Type	Device Code
Network 9000 Processor Modules (Type 2 Options)	Terminal Server 720	76
	LAN/WAN Bridge/Router 401	80
	Management Processor 210	84
	Secure Processor 211	94
	Hub/Router 220	93
	Secure Hub/Router 221	95
Network 9000 Type 1 Options	6800 WAN loaders	81
MAXserver Cards:	MX-TSERV-J8 8-port terminal server card	33
	MX-TSERV-J16 16-port terminal server card	34
	MX-NPC-P1 Network Printer server card	39
	MX-TSRVL-J16 16-port LAT terminal server card	40
	MX-TSRVM-J8 8-port terminal server card	42
	MAXserver 6510 Remote Bridge card	46
	MAXserver 2710 TCP/IP-LAT Gateway card	51
	MAXserver 3510 Local Bridge card	57
	MAXserver 6625 X.25 Gateway card	58
	MX-2120 8-port terminal server card	59
	MX-3610 10BASE-T Hub card	61
	MX-6710 Remote Router card	70
	MX-2210A 16-port LAT terminal server card	79
	MX-2210B 16-port LAT terminal server card	96
	MX-2220 16-port terminal server card	56
	MX-6800 WAN loaders	81

Appendix C

Slot Ethernet Addresses

Each slot of a Network 9000 Chassis has a unique Ethernet address. When a device is installed in a given slot, it acquires the Ethernet address of that slot. There is a label on the AC Power Input Module which specifies the Ethernet address for the slot 1. This is the "base address" of the chassis. To determine the address for each slot, substitute the last digit of the slot 1 Ethernet address with the hexadecimal number shown in the following table:

Slot Number	Hexadecimal Digit
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F

Example: Assume that the base Ethernet address for the chassis is 08-00-87-01-46-D1. For each slot in that chassis, the Ethernet addresses would be:

Slot Number	Hexadecimal Digit
1	08-00-87-01-46-D1
2	08-00-87-01-46-D2
3	08-00-87-01-46-D3
4	08-00-87-01-46-D4
5	08-00-87-01-46-D5
6	08-00-87-01-46-D6
7	08-00-87-01-46-D7
8	08-00-87-01-46-D8
9	08-00-87-01-46-D9
10	08-00-87-01-46-DA
11	08-00-87-01-46-DB
12	08-00-87-01-46-DC
13	08-00-87-01-46-DD
14	08-00-87-01-46-DE
15	08-00-87-01-46-DF

Appendix D

Network 9000 Redundant AC Power Input Modules

This appendix covers the Redundant AC Power Input Module (Model N9-000-119R) for Xyplex Redundant Network 9000 fifteen-slot chassis (Model N9-9015-002). The Network 9000 Redundant AC Power Input Module provides the means to ensure uninterrupted service, in the event of a power system failure, when an AC circuit within a facility fails, or when an AC Power Input Module fails. These modules are included with the redundant version of the Network 9000 fifteen-slot chassis, and are similar to the standard Network 9000 AC Power Input Module in appearance, features, and operation. Figure 1 depicts the Network 9000 Redundant AC Power Input Module.

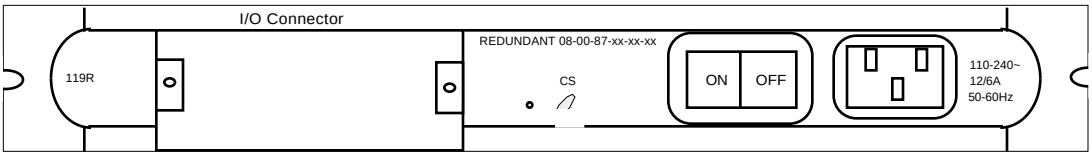

Figure 1. Network 9000 Redundant AC Power Input Module.

Specific topics covered in this appendix include:

- **Product Prerequisites**
- **Controls and Indicators**
- **Installation Notes**
- **Operation**
- **Restrictions**
- **Specifications**
- **Order Codes**

Product Prerequisites

Redundant AC Power Input Modules require a Redundant Network 9000 fifteen-slot chassis which includes a "split" midplane. Not all Network 9000 fifteen slot chassis include a split midplane. An installed standard Network 9000 fifteen-slot chassis can be upgraded to a Redundant chassis, but this requires that you return the chassis to the factory. Your Xyplex sales representative or distributor can give you more information about upgrading an installed chassis.

Xyplex Redundant AC Power Input Modules are included as part of the redundant Network 9000 fifteen- slot chassis configuration, or can be ordered separately as a replacement power input module for an installed Redundant Network 9000 fifteen-slot chassis.

Each Redundant Network 9000 fifteen-slot chassis comes with two Redundant AC Power Input Modules pre-installed in the chassis. One Redundant AC Power Input Module is installed in slot 1 (the bottom slot of the Network 9000 chassis), the other in slot 10. Xyplex recommends that you order 2 or 4 power supplies for the chassis to ensure power supply redundancy.

Controls and Indicators

Figure 2 shows the location and purpose of all controls and LED indicators on the Network 9000 Redundant AC Power Input Module.

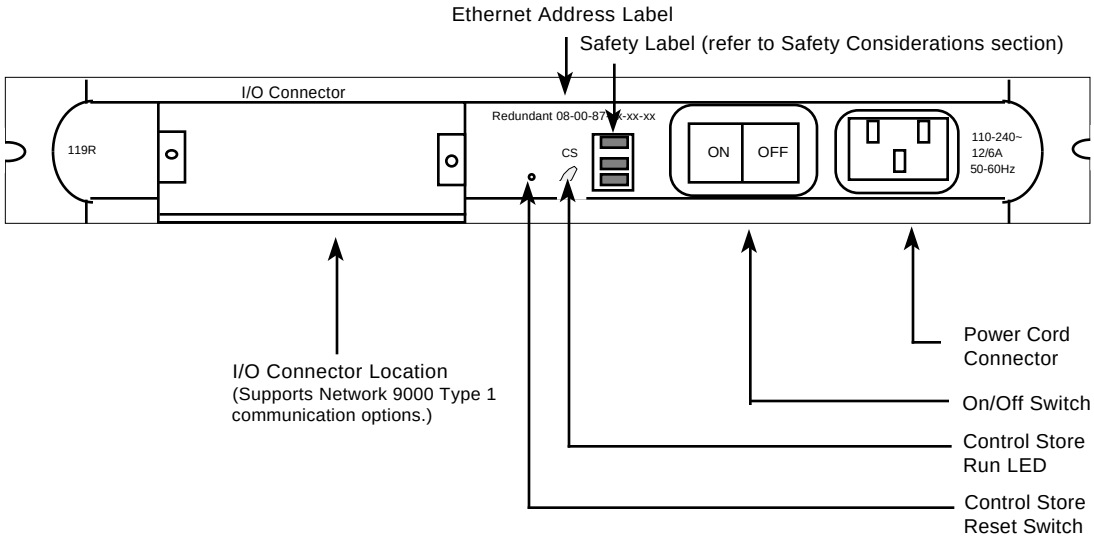

Figure 2. Redundant AC Input Module Controls and Indicators.

Installation Notes

The power input modules and power supply modules are removable. When configured as a redundant system, individual power input modules and power supply modules may be "hot swapped" without bringing the unit down. Generally, you install power supply modules and Redundant AC Power Input Modules using the standard installation and removal procedures, that are described in Chapter 3. This section describes some minor differences from procedures, that are due to the use of Redundant AC Power Input Modules.

Safety Considerations

Installation and servicing of the chassis and all modules should be performed only by qualified, trained service personnel.

Do not insert any item, such as a screwdriver (for example to straighten out a bent pin, etc), into the inside of the chassis while power is on as damage to the equipment can occur.

Use caution when installing or removing modules. Do not remove any item from the Network 9000 midplane. All modifications or upgrades to the midplane must be made at the factory.

A safety label is affixed to each Redundant AC Power Input Module (see Figure 2 for location). This label states:

CAUTION- THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT 2 POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.

ATTENTION- CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PREVENIR LES CHOCS ELECTRIQUES, DEBRANCHER LES 2 CORDONS. D'ALIMENTATION AVANT DE FAIRE LE DEPANNGE.

ACHTUNG- DIESES GERAT BESITZT ZWEI NETZANSCHLUSSE VOR DEM BEGINN VON WARTUNGSARBEITEN TRENNEN SIE UNBEDINGT BEIDE ANSCHLUSSE VOM NETZ.

Power Supply Planning Considerations

With a Redundant Network 9000 chassis configuration, you can obtain redundancy for a system drawing a maximum of 300 W of power (two 150 W power supplies when using P/S 130 power supply modules). When using the power supply worksheets, you must ensure that the communication options that you install in the Network 9000 chassis can be adequately powered by a total of 300W.

Installing Power Supplies

When using a Redundant AC Power Input Module, each individual module shares some of the load during normal operation. The power input module in slot 1 provides AC power to the power supplies in power supply slots 1, 2, and 3. The power input module in slot 10 provides AC power to the power supplies in power supply slots 4 and 5. When one AC power source fails, or when one power input module fails, the power supplies in the associated power supply slots will go into a fault condition. The power supplies that are associated with the functioning power input module take over the entire load.

To make sure that each segment of the split midplane receives power, install power supplies in pairs into power supply slots in the following order, rather than the order shown in the Network 9000 Chassis *Hardware Installation and Maintenance Guide*: P/S 3, P/S 4, P/S 2, and P/S 5. Figure 3-3 shows this order.

The actual installation of power supply modules is uncomplicated and is fully described in Chapter 3. Each unused power supply slot is covered by a blank panel. To install a new power supply module, remove the blank panel and insert the power supply module. Secure the module with the Phillips head captive screw.

Connecting AC Power

Perform the following steps to connect AC power:

a. Set the power switch located to the left of the AC power cord connector (socket) on the rear of both power input modules to the OFF position.

b. Plug the AC line cords (supplied) into the power cord connectors in the rear of the power input modules and plug the other end of each into nearby power receptacles. You must connect each power cord to a different AC circuit to ensure redundant operation of the Network 9000 hub,

c. Set the power switches located to the left of the AC power socket on the rear of the power input module in slot 1 to the ON position. Then do the same for the module in slot 10.

Installing and Removing the AC Power Input Module

If a Redundant AC Power Input Module fails, use the procedures described in the Network 9000 Chassis *Hardware Installation and Maintenance Guide* to remove the failed module and replace it with another one.

Operation

During normal operation, each redundant AC power input module shares some of the load of providing AC input power to the Network 9000 Power Supplies. Specifically, the Redundant AC Power Input Module in I/O module slot 1 provides AC power to the power supply modules in power supply slots 1, 2, and 3, while the Redundant AC Power Input Module in I/O module slot 10 provides AC power to the power supply modules in power supply slots 4 and 5.

In the event that AC power is lost in one connected circuit, or an AC power input modules fails, the power supply modules serviced by the failed AC power input module also go out of service, but the remaining power supply modules continue to provide power to all Network 9000 processor modules and I/O modules in the chassis. If AC power is lost due to circuit failure, full power redundancy is restored when power is restored. If a power input module fails, full power redundancy is restored when the failed power input module is replaced with another module.

Both Redundant AC Power Input Modules maintain the slot Ethernet addresses for each Network 9000 device. Both Redundant AC Power Input Modules maintain this information. When a Redundant AC Power Input Module is replaced with a new module, the new module automatically "learns" the correct slot Ethernet address information for the chassis from the other Redundant AC Power Input Module.

Notes and Restrictions

Initialization Configurations. In addition to the slot Ethernet addresses for each Network 9000 device, the AC power input module in slot 1 (the "primary" power input module) also maintains in its control storage the initialization configurations for Network 9000 processor modules. The AC power input module in slot 10 (the "secondary" power input module) does not maintain a copy of this information as long as the control storage for the primary power input module is operating properly (future software releases will change this behavior). If the control storage of the primary power input module fails (or the entire module fails) this information will be lost the next time each processor module is reinitialized and units may not be able to locate software or parameters to load.

Also, you can no longer make changes to the initialization configurations or save parameters to a local flash memory card unless you reinitialize the unit. When processor modules are reinitialized, they will determine that they must examine the control storage in the secondary power input module or in a replacement primary module. This means that when a processor module reinitializes, it will only have default initialization configurations. You can restore the initialization configurations using the configuration menu.

Prior to the replacement of the failed primary power input module, any processor modules that are reinitialized will use the secondary module for storing initialization configuration changes. After the primary module is replaced, when the processor module is next reinitialized, it will again use the primary module for storing changes to initialization configurations (and again begin using default initialization configurations).

Minimizing Reconfiguration Due to Primary Power Input Module Failure. Because initialization configuration information is not lost until you re-initialize a processor module, you can minimize the need for reconfiguration in a few ways. First, if you have a spare Redundant AC Power Input Module, install it immediately and turn it on. Log on to one of the processor modules, and for each Type 2 processor module, type a command similar to:

```
Xyplex>> DEFINE CHASSIS SLOT slot-number RESTORE
```

This will cause the initialization configuration information to be saved in control storage of the new primary power input module. (You must be running a software version that supports this command. For Terminal Server 720 products, V5.0 and later support this command. For Bridge/Router and Ethernet Concentrator products, V4.0 and later support this command.)

If you do not have a spare Redundant AC Power Input Module, use the configuration menu to set up the initialization configurations as they existed prior to the failure of control storage for the primary power input module. These configurations will be stored at the secondary module. Then, when the replacement power input module arrives, do NOT install it in slot 1. Rather, at a convenient time, shut down the entire chassis, move the power input module from slot 10 to slot 1, and install the replacement module in slot 10. This makes the secondary module the new primary module. When you power the chassis on again, the processor modules will use the stored initialization configurations.

Parameter Loading. The information in the initialization configurations includes information about where the processor module obtains parameters. Problems can occur when the information in control storage is lost and the processor module needs to be reinitialized. When the processor module reinitializes, the software will load it with a default parameter file, rather than permitting the processor module to request parameter service from the network (because the control storage of the secondary power input module indicates that the unit should start with a default parameter file). You can restore server and port parameters using the configuration menu.

Type 1 Products. Type 1 processor modules only know about the primary AC power input module. (A Type 1 option is a Network 9000 product or a MAXserver family product which does not support chassis management commands, and has a *link* to midplane Ethernet segment A only.) Therefore, when the primary AC power input module fails, Type 1 products no longer function properly.

Powering On Input Modules Incorrectly. You should turn on the input module in slot 1 before you turn on the module in slot 10. If you do not turn these modules on in the correct order, you can create a situation where the processor modules become confused about where to obtain initialization configuration data.

Specifications

Item	Description
Type	12A Thermal Circuit Breaker with integrated ON/OFF switch.
Dimensions	Height -- 2.8 cm. (1.2 in.) Depth -- 13.5 cm. (5.3 in.) Width -- 35.6 cm. (13.98 in.)
Weight	0.44 kg. (1 lb.)
Display lights	CS (Control Store Run LED)
Controls	ON/OFF switch and Control Store Run/Reset push button switch
Operating Environment	20% to 80% humidity, noncondensing, 0° - 40° C (32° - 104° F)
Input Voltage	110 - 240 Vac 50 - 60 Hz
Power	Maximum: 120V - 10.0A 240V - 5.0A +5V - 3.0A +12V - 0.3A -12V - 0.3A
Enclosure Requirements	One I/O slot in a Redundant Network 9000 intra-networking hub.
Emissions Compliance	FCC Class A, EN55022 Class A

Order Codes

Product Name and Description	Order Code
Network 9000 Redundant Fifteen-Slot Chassis (includes two Redundant AC Power Input Modules)	N9-9015-002
Redundant AC Power Input Module (spare)	N9-000-119R

Network 9000 Glossary

This glossary defines some commonly used terms in Network 9000 documentation, including this manual. Terms that appear in *italics* are defined elsewhere in the glossary.

ac input module **The AC input module is a Network 9000 I/O module that provides power to the *control storage* of the chassis.**

adapter card **An adapter card is a Network 9000 I/O module that allows you to use *LANbus I cards* in a Network 9000 chassis.**

chassis **A Network 9000 chassis is the physical enclosure that contains the *midplane,* the slots for the *processor modules* and the *I/O modules,* and compartments for *power supplies* and the *AC input module.* Two types of Network 9000 chassis are available: a six-slot chassis with compartments for two power supplies and a fifteen-slot chassis with compartments for five power supplies.**

chassis management commands **Chassis management commands are a set of commands that reference chassis slots and power supplies, and can change the operational link map, the status and parameters of initialization records, and reset processor modules and power supplies. Network managers can use these commands to manage modules locally or remotely, without using the initialization configuration menu.**

configuration menu **see *initialization configuration menu.***

control storage **The chassis provides control storage that contains slot-specific information, as well as the three initialization records for the processor modules in each chassis slot.**

dump file **A dump file is a file that resides on a dump server, which is a host on the network. If a processor module fails for some reason, it sends the contents of its memory to the dump server, which create the dump file. Xyplex field personnel can then analyze the contents of the dump file to diagnose the failure.**

Ethernet **An Ethernet, as defined by the IEEE 802.3 standard, is a type of local area network (LAN). The Network 9000 *midplane* supports three separate Ethernet segments.**

firmware **Firmware is a type of program that resides in read-only memory (ROM). The firmware in a Network 9000 processor module contains an initialization program which begins executing automatically when you power on a processor module.**

flash card ***See memory card.***

initialization configuration menu **An initialization configuration menu is a set of screens which display fields with values for *initialization parameters,* including the link selection, protocols, and the software load image filename. The firmware on the processor module prompts you to accept or change the values in each field. You can then save the changes or reset the parameters to their default values. You can also change these parameters with chassis management commands.**

To start up the initialization configuration menu, follow these steps:

1. **Press the Reset button on the front of the processor module once.**

2. **Press the Reset button again, and hold the button in. With the button held in, observe the front panel lights. The lights should flash in sequence from left to right and then from right to left. At the end of this sequence, release the Reset button. The processor module runs the standard self-test diagnostics, which last about 20 seconds.**

3. **Press the <Return> key a few times at the terminal connected to the port when the self test has completed; the Run light flashes rapidly. This causes the serial port to set the port speed, or baud rate, automatically (autobaud). Once the processor module has selected a port speed, it generates a message similar to this for a terminal server:**

   ```
   Terminal Server, Type xx, Rev x
   Ethernet address 08-00-87-xx-xx-xx, port 1
   Configuration in progress. Please wait.
   ```

4. Enter the password ACCESS (note that there is no prompt). The main initialization configuration menu appears on the screen.

initialization parameters **Initialization parameters are characteristics that determine how and where the *processor module* obtains the software load image and parameter file it needs to become operational. Initialization parameters reside in an initialization record, and include load and dump protocols, load image filenames, the Internet addresses of gateways and load hosts, and the status of the initialization record.**

initialization record **An initialization record contains a set of *initialization parameters,* and resides is the *control storage* of the chassis. Each slot has three initialization records: primary, secondary, and tertiary. An initialization record can be enabled or disabled. If it is enabled, the processor module can use it to obtain initialization parameters.**

I/O module **An I/O module is a Network 9000 component that provides links to the network and cabling. Terminal servers, LAN bridge/routers, WAN bridge/routers, and managed concentrators consist of a *processor module* and an I/O module. Unmanaged 10BASE-T concentrators consist of an I/O module only.**

LAN **LAN is an acronym for Local Area Network.**

LANbus I card **A LANbus I card is part of the Xyplex MAXserver family of products, including terminal servers, bridges, and routers. The Network 9000 *adapter card* allows you to use LANbus cards in a Network 9000 chassis.**

LIC **A LAN Interface Card (LIC) is a component of the Network 9000 chassis which provides a connection to an external LAN for Ethernet Link 1 on terminal servers and WAN bridge/routers.**

link **A link is a connection to either a *midplane Ethernet segment* or an external network. Different Network 9000 products have different numbers and types of links. For example, a terminal server has one Ethernet link; a WAN bridge/router has one Ethernet link and four WAN links.**

link map **A link map specifies the connections for all the links on a Network 9000 managed concentrator, terminal server, LAN bridge/router,or WAN bridge/router. Network managers can change the link map through the initialization configuration menu, and with chassis management commands or *SNMP* during operation.**

link selection **The link selection is a specific connection to either a *midplane Ethernet segment* or an external network that the *processor module* uses to obtain the software load image and parameter file from the network, or to send information to a dump file.**

load image **see *software load image***

local management bus (LMB) **The local management bus (LMB) is a transport system that is part of the chassis midplane. The LMB transports management information among chassis slots, and allows you to monitor the modules in different chassis slots, and the power supplies. The LMB operates automatically, and users do not need to enable or manage it.**

local slot **The local slot is the slot in the chassis holding the processor module where you are logged on.**

memory card **A memory card is a type of media which contains a software load image and, optionally, operational parameters for a Network 9000 processor module. Two types of memory cards exist: "Flash" cards, which are readable and writeable, and can be upgraded to newer versions of software, and "ROM" or "OTP" cards, which are read-only, and cannot be upgraded to newer versions of software. Flash cards may include operational parameters, and ROM cards do not include operational parameters.**

midplane **The midplane is a hardware component in the middle of the Network 9000 chassis. It connects the *processor module* and the *I/O module* of a Network 9000 product. Independent I/O modules also plug into the midplane. The midplane supports three internal Ethernet segments, four Token Ring Segments, and two FDDI segments.**

midplane Ethernet segment **A midplane Ethernet segment is one of the three Ethernet LANs that the Network 9000 supports for managed concentrators, terminal servers, LAN bridge/routers, or WAN bridge/routers.**

Network 9000™ Intra-Networking Hub **A Xyplex Network 9000 Intra-networking Hub is a family of products and components that includes chassis, processor modules, I/O modules, power supplies, and software. Together, these products provide highly reliable connections to local and remote resources through LAN and WAN links. The Network 9000 Intra-Networking Hub can support many different network configurations, and network managers can adapt it to suit the needs of different users and computing environments.**

operational parameters **Operational parameters are characteristics that determine how a Network 9000 *processor module* operates after initialization. Some operational parameters are specific to each product, and the network manager can change them with commands specific to that product. Others are common to all processor modules in the chassis, such as the *link map*, and a network manager can change them with chassis management commands.**

parameter file **A parameter file is a file which contains the operational characteristics for a processor module. These include the *link map*, the Internet address, security options, services, and port characteristics for terminal servers. Parameter files can reside on a parameter server, which is a host on the network, or a *flash memory card*.**

power supply **A power supply is a component of the Network 9000 chassis which supplies power to the modules in the chassis. The Network 9000 chassis supports two types of power supplies: model PS/130 managed power supplies and model PS/120 unmanaged power supplies. Network managers can configure power supplies for *redundancy*, so that if one power supply fails the others will compensate for the power loss and the modules will continue to operate without interruption.**

processor module **A processor module is a Network 9000 component that includes the central processor for the unit and the operational software and parameters.**

redundancy **Redundancy is the ability of one component in a system to provide alternate support if another component in the system fails. Network 9000 power supplies can provide redundancy to the processor modules and I/O modules in the *chassis*. For example, if two power supplies in a five-slot chassis each provide adequate power to support all the modules in the chassis, one power supply can compensate if the other one fails.**

software load image **A software load image is a program that contains the executable software that makes a processor modules operational. A software load image can reside on a load server, which is a host on the network, another Xyplex product, or a *memory card*.**

SCM **The Single Chip Microcontroller (SCM) provides the interface between certain Network 9000 components and the *local management bus (LMB)*. These components include the AC Input module, processor modules, I/O modules, and managed power supplies.**

SNMP **The Simple Network Management Protocol (SNMP) is a standard Internet protocol that specifies how network management information is carried through the network.**

target slot **A slot that you specify in a chassis management command line, other than the one where you are logged on.**

type 1 option **A Type 1 option is a Network 9000 product or a MAXserver family product which does not support chassis management commands, and has a *link* to midplane Ethernet segment A only.**

type 2 option **A type 2 option consists of a Network 9000 module or module set. Type 2 options support chassis management commands and have *links* that can connect to *midplane Ethernet segment* A, B, or C.**

WAN **WAN is an acronym for Wide Area Network. A Network 9000 WAN Bridge/Router has four WAN links.**