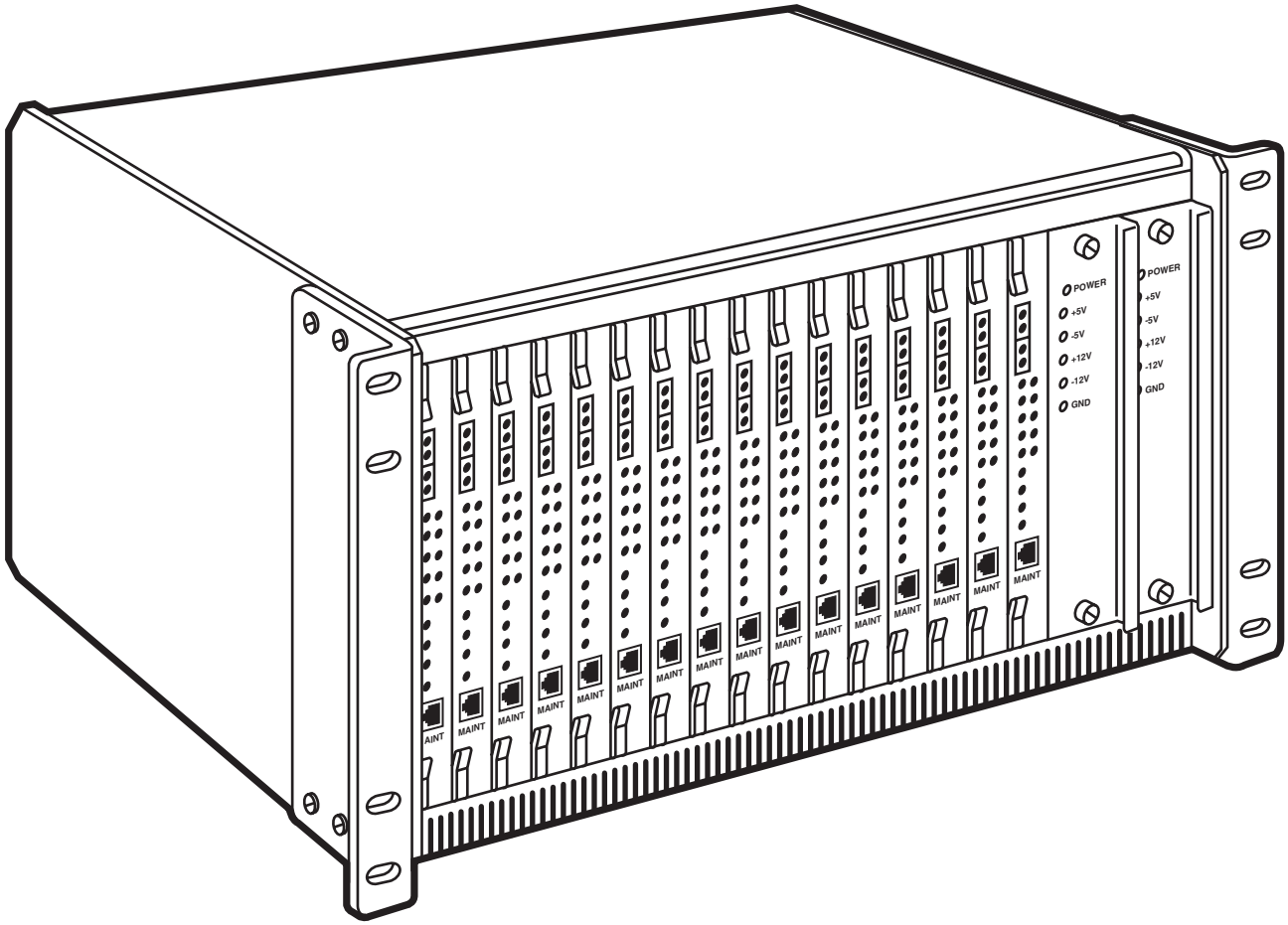
BLACK BOX®
NETWORK SERVICES

MAY 1995

MT500A
MT500A-24V
MT500A-48V
MT505A-AC
MT505A-24VDC
MT505A-48VDC

WAN Rack 16 (AC)
WAN Rack 16 (24 VDC)
WAN Rack 16 (48 VDC)
WAN Rack AC Power Module
WAN Rack 24 VDC Power Module
WAN Rack 48 VDC Power Module



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FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

Contents

1. Specifications

Communication-Module Capacity	Maximum of 16 Communication Modules (front access); Maximum of 16 I/O-Interface Modules (rear access)
Backplane Buses	(3): Management bus (low-speed); Multiplexor bus (16 signal paths); Packet bus (high-speed)
Input Power	115/220 VAC ±10% (universal power); +24 VDC; -48 VDC

Output Power

Voltage	Maximum	Minimum
+5	25 amps	1 amp
-5	8 amps	0 amp
+12	2 amps	0 amp
-12	2 amps	0 amp

Operating Temperature	32° to 122°F (0° to 50°C)
Humidity	0 to 95% noncondensing
Altitude	0 to 10,000 feet (0 to 3048 m)
Size	10.25"H x 17.25"W x 13.5"D (26.04 x 43.8 x 34.29 cm)
Weight	Rack (empty): 21 lb. (9.53 kg) Rack (full): 51.4 lb. (23.3 kg)

2. Introduction

2.1 Overview

The WAN Rack 16 is a rack-mounted chassis that houses a variety of digital access equipment in one central location for ease of operation and management. Brackets mounted on the sides of the Rack allow installation in either a 19- or a 23-inch cabinet. See Figures 2-1 and 2-2 for front and rear views of the WAN Rack 16.

The WAN Rack 16 provides a self-contained operating environment for up to 16 vertically mounted Communication Modules, such as CSU/DSU cards. A central backplane, in which the Power Module(s), Communication Modules, and I/O-Interface Modules are seated, features a tri-bus architecture. The three buses are discussed below.

Management Bus—This bus provides network management for the entire WAN Rack 16, regardless of the number or types of modules installed. The Management bus allows inter-module communication over which network control information can be passed. This bus can be accessed locally or remotely via in-band or out-of-band supervisory channels and is accomplished independent of any special control module.

Multiplexor Bus—This bus provides 16 individual high-speed (8-Mbps) signal paths. Module-to-module data and signaling transfers can be made using this bus. The loss of separate signal paths will not cause a failure on the entire bus. Management functions continue to be handled by the Management Bus.

High-Speed Packet Bus—This bus allows migration to ATM and more advanced technologies by providing capabilities beyond those available through the Multiplexor Bus.

2.2 Features

- Supports a mix of digital access cards including CSU, CSU/DSU, IMUX, DDS, and ISDN access.
- Provides integration of data, voice, imaging, and video communications into a single chassis.
- Full bandwidth-on-demand capabilities.
- Tri-bus architecture for optimum system performance and management control.
- Compliance with both domestic and international industry standards.
- SNMP management system for configuration, control, and maintenance.
- Redundant AC/DC Power-Supply Module(s) provide uninterrupted operations.
- Ability to “hot-swap” Power-Supply Modules, Communication Modules, and I/O-Interface Modules without powering down the WAN Rack 16.
- PC management system for configuration, control, and maintenance.

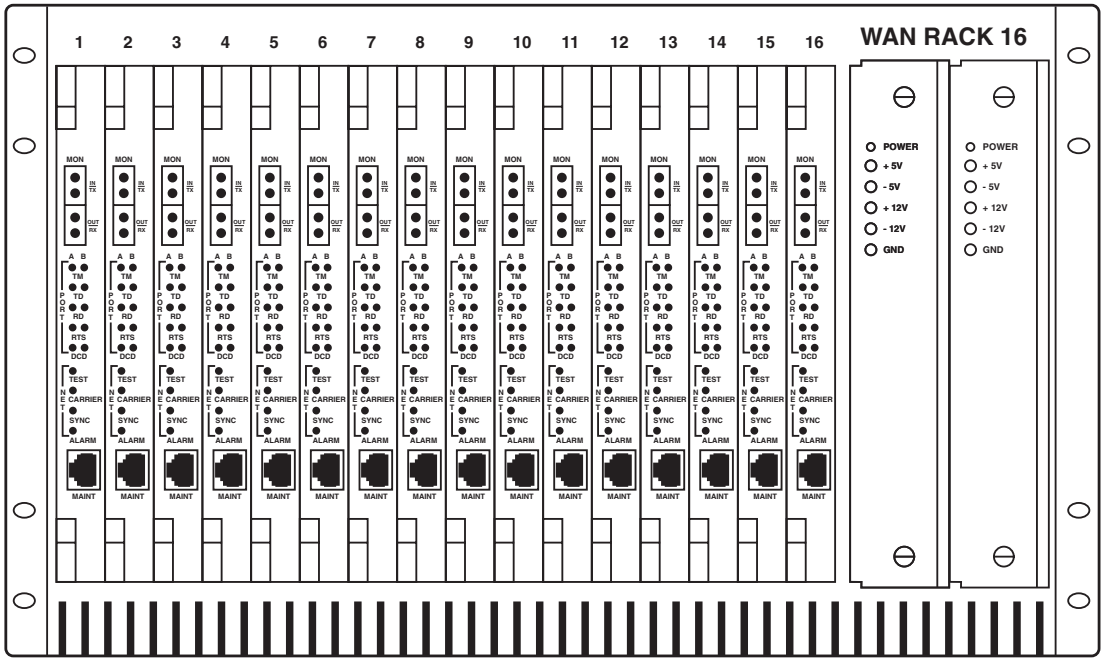

Figure 2-1. Front View of the WAN Rack 16 (MT500A).

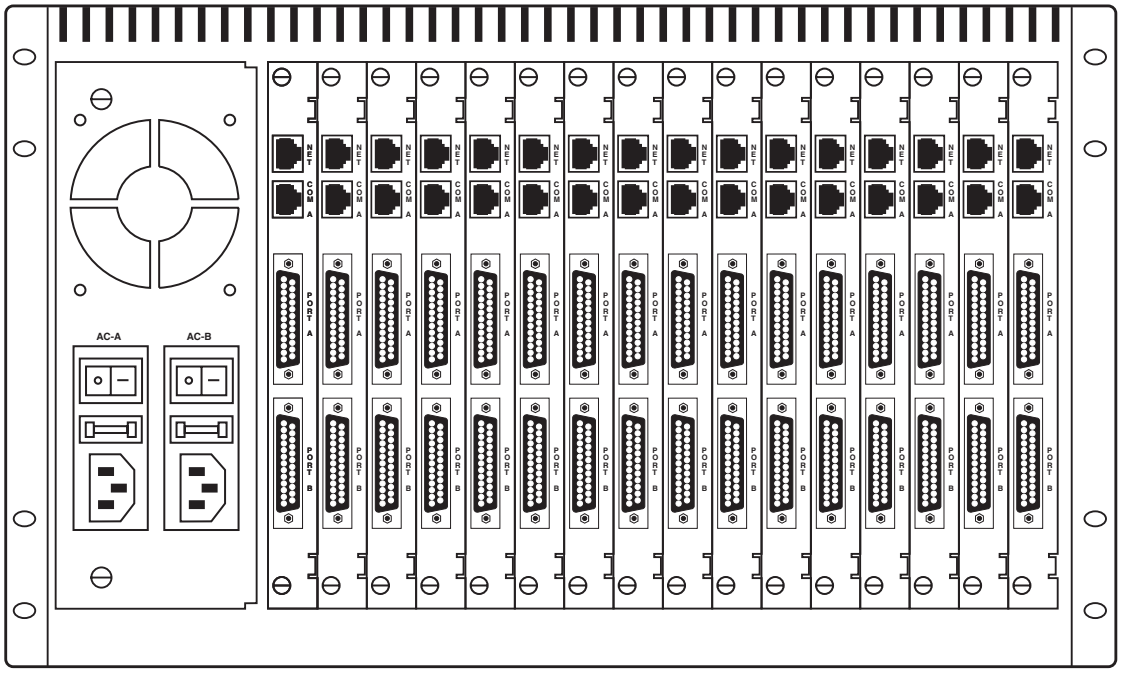

Figure 2-2. Rear View of the WAN Rack 16 (MT500A).

2.3 Power Supplies

The WAN Rack 16's power assembly is made up of two separate modules: a rear-mounted Power-Connector Module and a front-mounted Power-Supply Module.

2.3.1 Power-Connector Module

The Power-Connector Module accepts local source power and, after filtering, passes it to the Power-Supply Module. The connector module occupies the left most (facing the WAN Rack's rear) chassis slot. Top and bottom captive screws secure the module to the chassis.

Three versions of the Power-Connector Module are available: a single universal AC version accepting 115 or 220 VAC, a DC version accepting +24 VDC, and a DC version accepting -48 VDC.

The AC version contains:

- Two power units (AC-A and AC-B). Unit AC-B provides source power to the redundant Power-Supply Module. See Figure 2-3.

  Each power unit provides:

  -an AC receptacle into which a power cord, carrying source AC, is plugged.

  -a connector into which the front installed Power-Supply Module is plugged.

  -a fuse holder containing an on-line fuse providing surge protection and a spare fuse.

- A cooling fan.
- An on/off switch, located directly above each receptacle. This switch controls the application of source voltage to the Power-Supply Module.

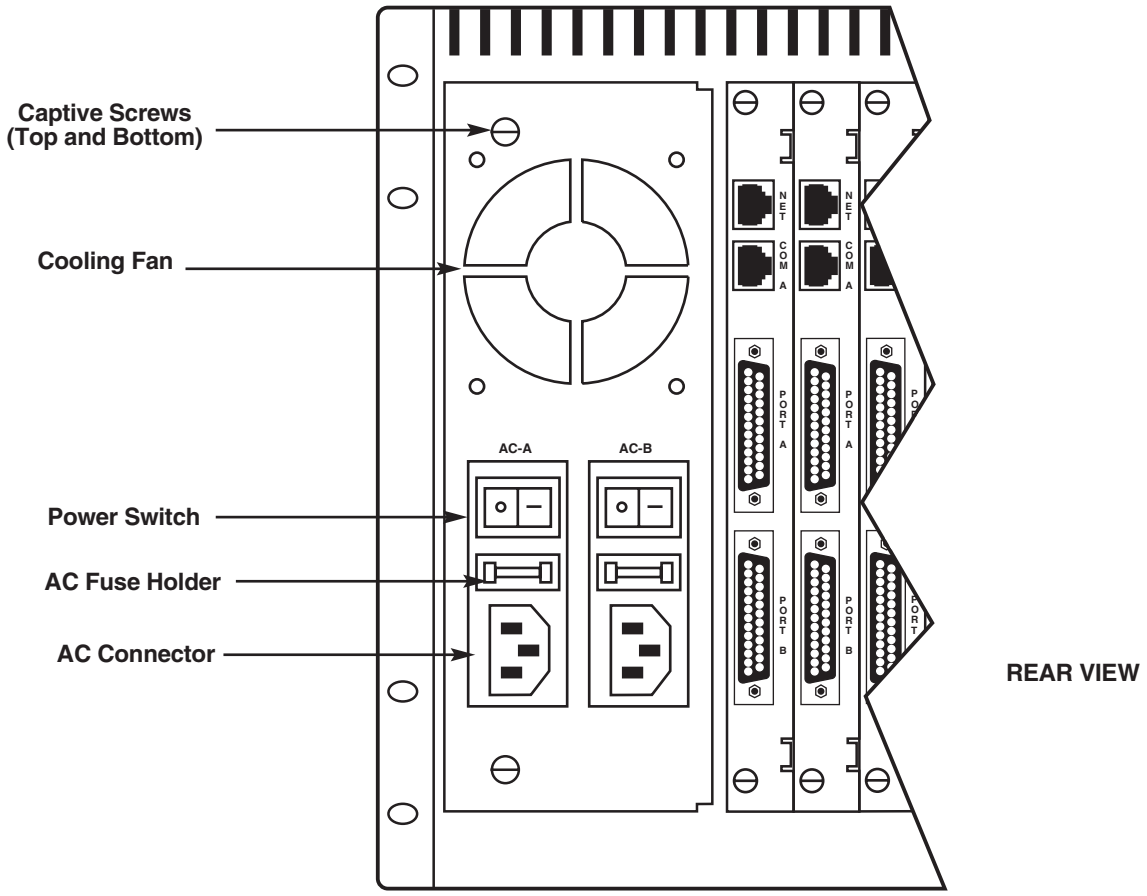

Figure 2-3. AC Power-Connector Module.

The DC version contains:

- Two power units (DC-A and DC-B). Unit DC-B provides source power to the redundant Power-Supply Module. See Figure 2-4.

  Each power unit provides:

  -a terminal block onto which wires carrying either source +24 VDC or -48 VDC are connected.

  -a connector into which the front installed Power-Supply Module is plugged.

  -a fuse holder containing an on-line fuse providing surge protection.

- A cooling fan.

NOTE

DC versions of the Power-Connector Module do not have a power switch. Voltage to these modules is controlled from an independent power supply or daisychained from an existing installation.

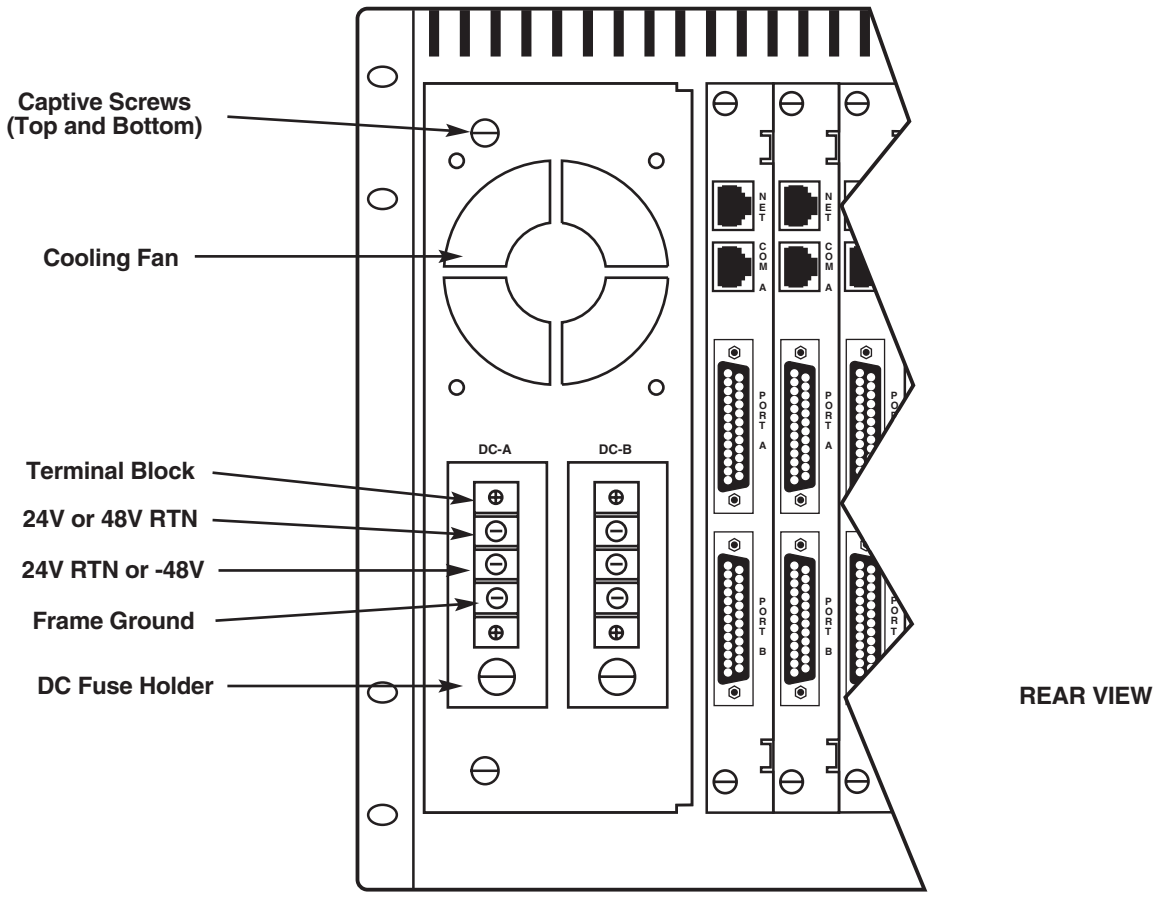

Figure 2-4. DC Power-Connector Module.

2.3.2 Power-Supply Modules

The Power-Supply Module accepts source power from the Power-Connector Module and creates +5 VDC, -5 VDC, +12 VDC, and -12 VDC. These voltages are then distributed to the backplane of the WAN Rack 16.

Three versions of the Power-Supply Module are available: a single universal AC version accepting 115 or 220 VAC (MT505A-AC), a DC version accepting +24 VDC (MT505A-24VDC), and a DC version accepting -48 VDC (MT505A-48VDC). See Figure 2-5.

The Power-Supply Module occupies the rightmost (facing the WAN Rack 16's front) chassis slot. Top and bottom captive screws secure the module to the chassis.

A single green LED (PWR), located on the front of the Power-Supply Module, lights to indicate the presence of source power.

Individual test points, also located on the front of the Power-Supply Module, provide a means of measuring the power module's output voltages (+5 VDC, -5 VDC, +12 VDC, and -12 VDC) being applied to the WAN Rack 16's backplane.

NOTE

Actual voltages measured using the Power-Supply Module's test points may vary ±5% depending on chassis current/voltage loading requirements.

Although a single Power-Supply Module is designed to meet the power requirements of a fully loaded WAN Rack, you may want to install a second Power-Supply Module to provide power redundancy in the event the first power module should fail.

If two Power-Supply Modules have been installed, during normal operations the WAN Rack 16's current/voltage load requirements are shared between the two power supplies. Should a fault occur in either of the power supplies, the other would immediately assume full load responsibility. The transition of power loading would be transparent to the users.

The WAN Rack's design allows for the removal and insertion of Power-Supply Modules without powering down the chassis.

NOTE

To ensure full power redundancy, we recommend that each Power-Supply Module be cabled to an independent source of power.

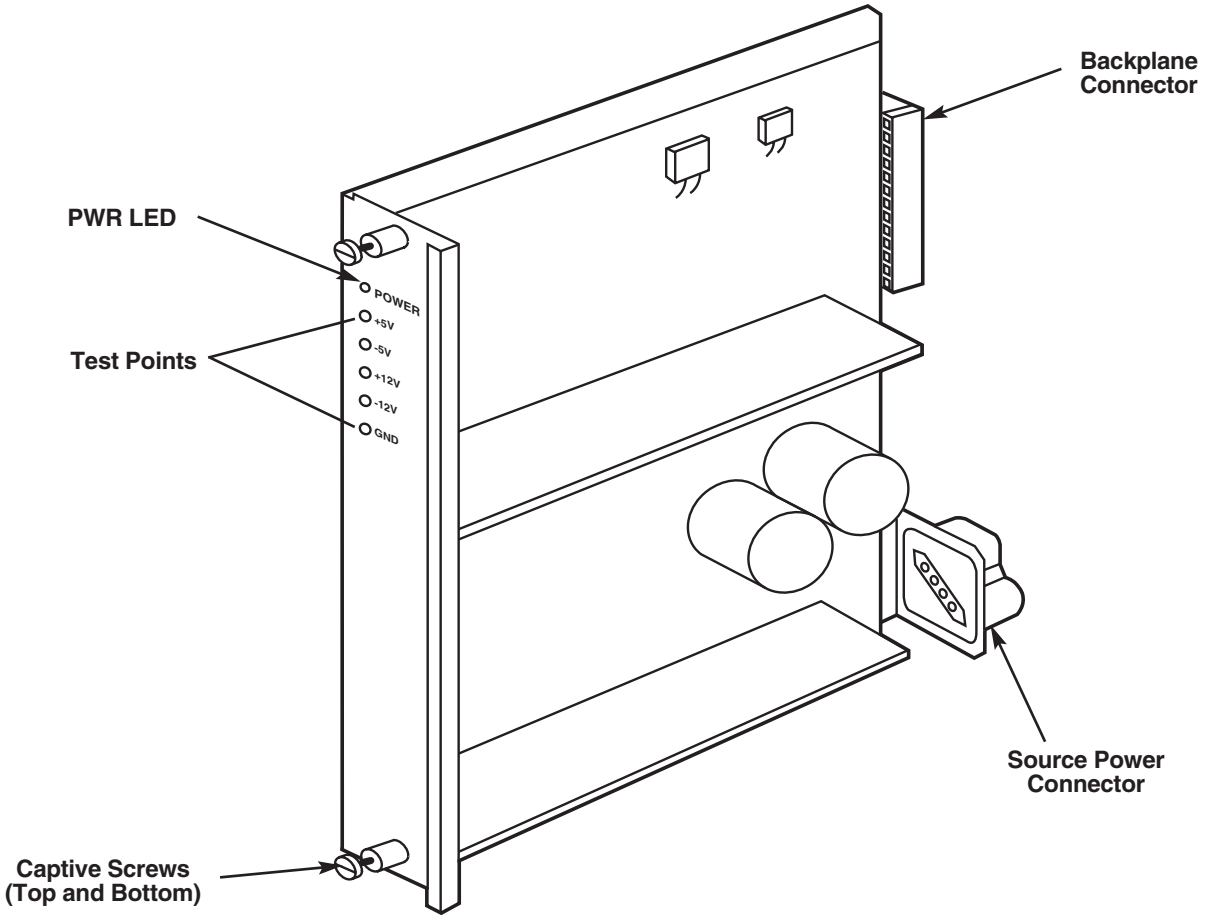

Figure 2-5. Power-Supply Module.

2.3.3 Communication Modules

Communication Modules are individual network access devices (in modular form) which mount (install) vertically in the front of the WAN Rack 16. Top and bottom ejector tabs secure these modules to the chassis. An example of one such module is the FT1 Mux Card-2D (MT520A) illustrated in Figure 2-6.

The WAN Rack 16 can accommodate 16 installed Communication Modules.

NOTE

It is beyond the scope of this chapter to discuss individual Communication and I/O-Interface Modules in detail. For more information, refer to the Operator's Manual for the Communication Module you will be using.

The functionality of Communication Modules will vary depending on the network access operations they are designed to perform. Common features shared by all Communication Modules within the WAN Rack environment are listed below:

- The lack of DTE and network ports. These ports are contained on separate I/O-Interface Modules.
- A rear connector that, when installed, will engage the chassis backplane.
- Controls and indicators specific to the type of network-access functions the Communication Module is designed to perform.

The WAN Rack 16's design allows for the removal and insertion of Communication Modules without powering down the chassis.

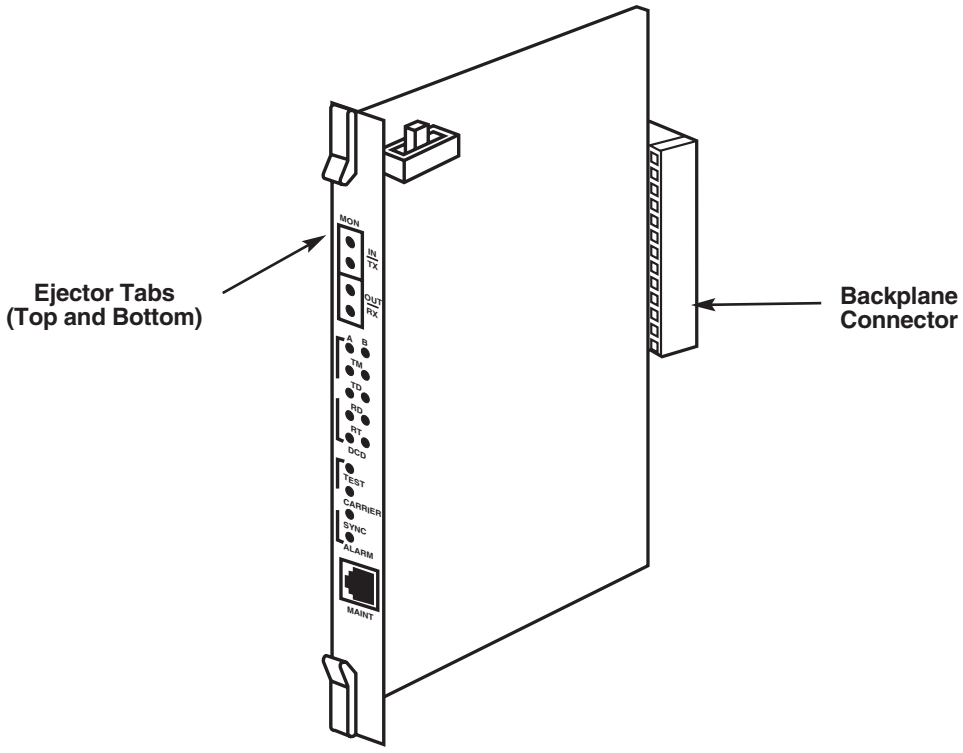

Figure 2-6. FT1 Mux Card-2D (MT520A).

2.3.4 I/O-Interface Modules

I/O-Interface Modules mount vertically in the rear of the WAN Rack 16 and provide a cabling interface for DTEs and the network. Top and bottom captive screws secure these modules to the chassis. An example of the I/O-Interface Module used with the FT1 Mux Card-2D is illustrated in Figure 2-7.

The WAN Rack 16 can accommodate 16 installed I/O-Interface Modules.

NOTE

It is beyond the scope of this chapter to discuss individual Communication and I/O- Interface Modules in detail. For more information, refer to the Operator's Manual for the Communication Module you will be using.

The I/O-Interface Module used with the FT1 Mux Card-2D contains:

- a rear connector that, when installed, will engage the chassis backplane.
- an 8-pin RJ-48 NET (network) connector.
- an 8-pin RJ-48 COM A (terminal or printer) connector.
- two DB25 PORT A and PORT B connectors. These DTE ports are software-selectable, through their assigned Communication Module, for V.35 or RS-449 operations.

As previously mentioned, Communication Modules do not physically contain DTE or network ports. This interface capability is provided by the I/O-Interface Module.

The WAN Rack 16's design allows for the removal and insertion of I/O-Interface Modules without powering down the chassis.

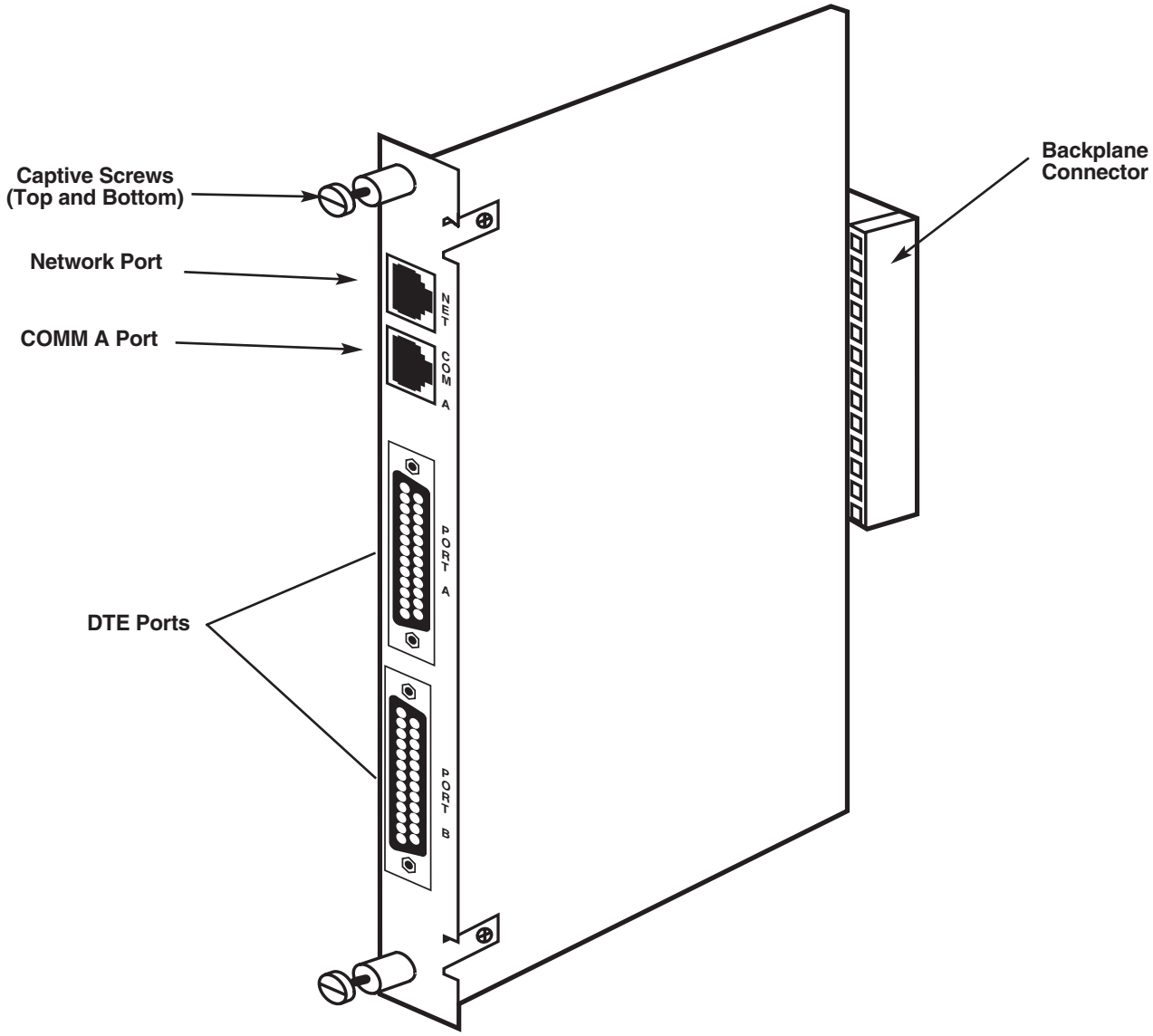

Figure 2-7. I/O-Interface Module.

3. Installation and Operation

CAUTION

The installation steps presented in this chapter are designed to be completed in the order in which they are presented. Deviation from this order may cause damage to the equipment.

3.1 Unpacking the WAN Rack 16

The WAN Rack components are shipped in a carton designed to ensure that they arrive at your location safely and undamaged.

To unpack the WAN Rack:

1. Carefully remove all packing material from the carton. The carton should contain the following items:
    - WAN Rack 16 chassis.
    - Power-Supply Module (two if the redundant Power-Supply Module was ordered).
    - Source AC power cord (two cords if the redundant Power-Supply Module was ordered).
    - Rear Power-Connector Module.
    - Mounting brackets (for 19- or 23-inch cabinet installations—specified when ordered).
    - Filler panels (specified when ordered).
    - This manual.

NOTE

Save the packing material and carton in case it becomes necessary to move the WAN Rack 16 to another location in the future.

2. Inspect each of the components in the carton for damage that may have occurred during shipment. If any damage is noted or if items are missing from the carton, contact your supplier.

3.2 Installing the WAN Rack 16

3.2.1 First Step: Installing the Side Brackets

Two side brackets are supplied with the WAN Rack. When installed, these brackets allow the chassis to be mounted inside either a 19- or a 23-inch cabinet.

NOTE

The side brackets are different for 19-inch cabinet and 23-inch cabinet installations. These brackets are not interchangeable.

To install the side brackets, complete the following:

1. Select the set of chassis mounting holes you will use to install the side brackets. These holes are located on each side of the chassis and allow the WAN Rack 16 to be installed at three different cabinet depths. See Figure 3-1.
2. Working on either the left or right side of the chassis, align one of the two side bracket's four pre-drilled holes over the set of holes chosen from Step 1. See Figure 3-1.
3. Secure the side bracket to the chassis using the four slotted screws provided. See Figure 3-1.
4. Repeat Steps 2 and 3 on the opposite side bracket.

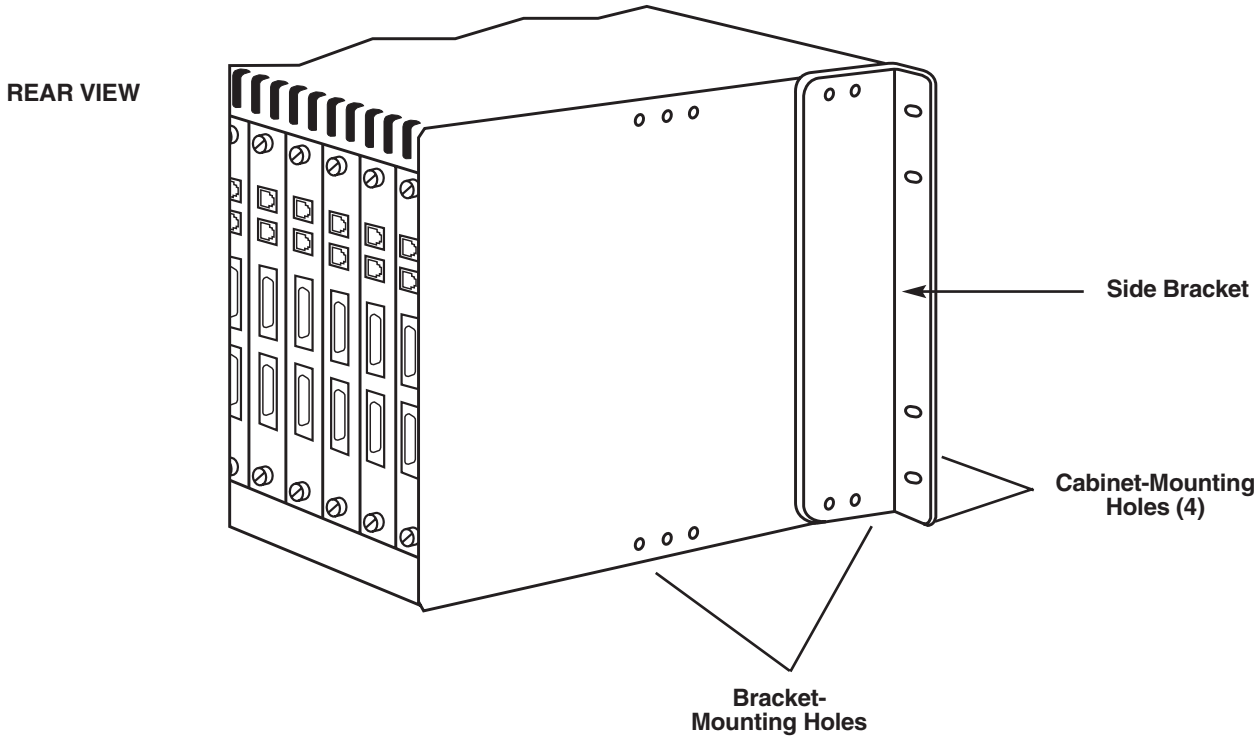

Figure 3-1. Installing the Side Brackets.

3.2.2 Second Step: Rack-Mounting the WAN Rack 16

After the two side brackets have been mounted, the WAN Rack is ready to be installed into the cabinet.

To install the WAN Rack in either a 19- or a 23-inch cabinet:

WARNING

Because the WAN Rack 16 is heavy, we recommend that two people perform this procedure.

1. Maneuver the WAN Rack through the front opening of the cabinet. Align the eight holes located in the side brackets (previously installed) over the selected set of holes in the cabinet's side rails. See Figure 3-2.

2. Secure the WAN Rack to the cabinet's side rails using the eight screws provided. See Figure 3-2.

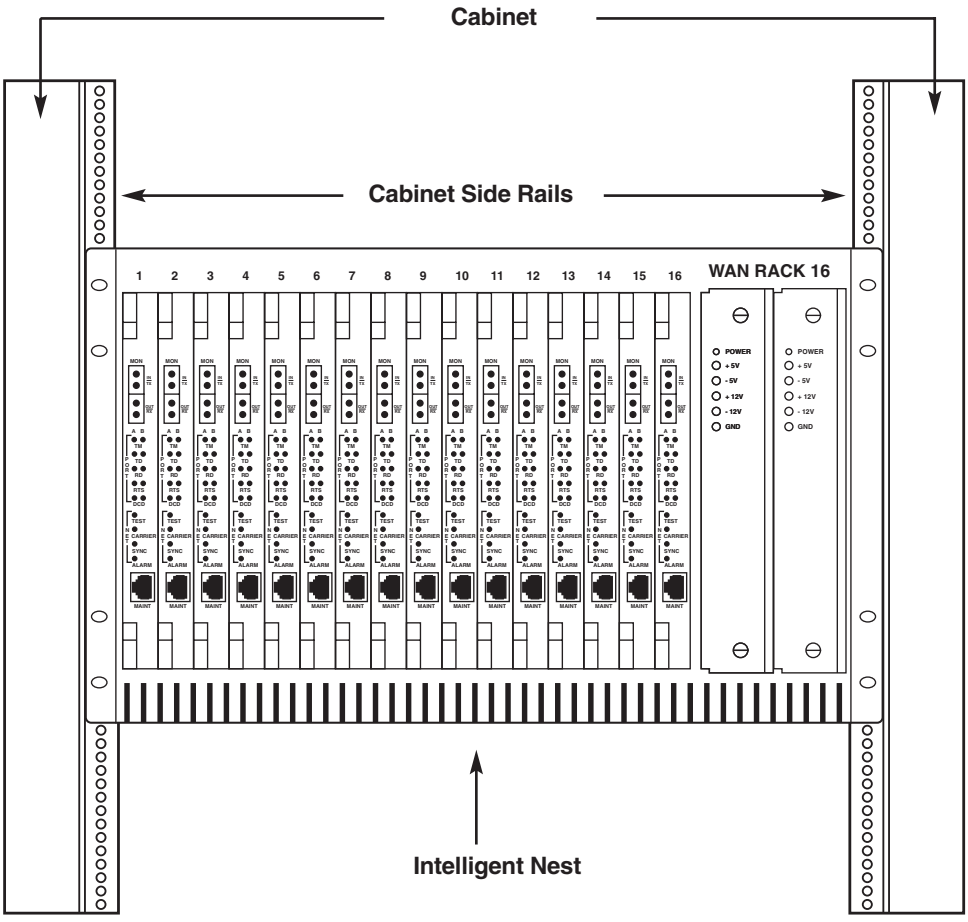

Figure 3-2. Rack-Mounting the WAN Rack 16.

3.2.3 Third Step: Reseating the Power Supply

The Power-Supply Module may have loosened from the backplane or Power-Connector Module during shipping or cabinet installation. To prevent problems associated with this condition, the Power-Supply Module must be reseated.

To reseat the Power-Supply Module:

1. Unscrew the top and bottom captive screws securing the Power-Supply Module to the chassis. See Figure 3-3.
2. Gently pull the Power-Supply Module toward you until you feel it release from the backplane. *Do not remove the module entirely from the chassis.*
3. Gently push the Power-Supply Module forward until it is seated in the backplane. The module should be flush with the chassis. See Figure 3-3.
4. Hand-tighten the top and bottom captive screws. These screws secure the Power-Supply Module to the chassis. See Figure 3-3.
5. Repeat Steps 1 through 4 for the redundant Power-Supply Module (if installed).

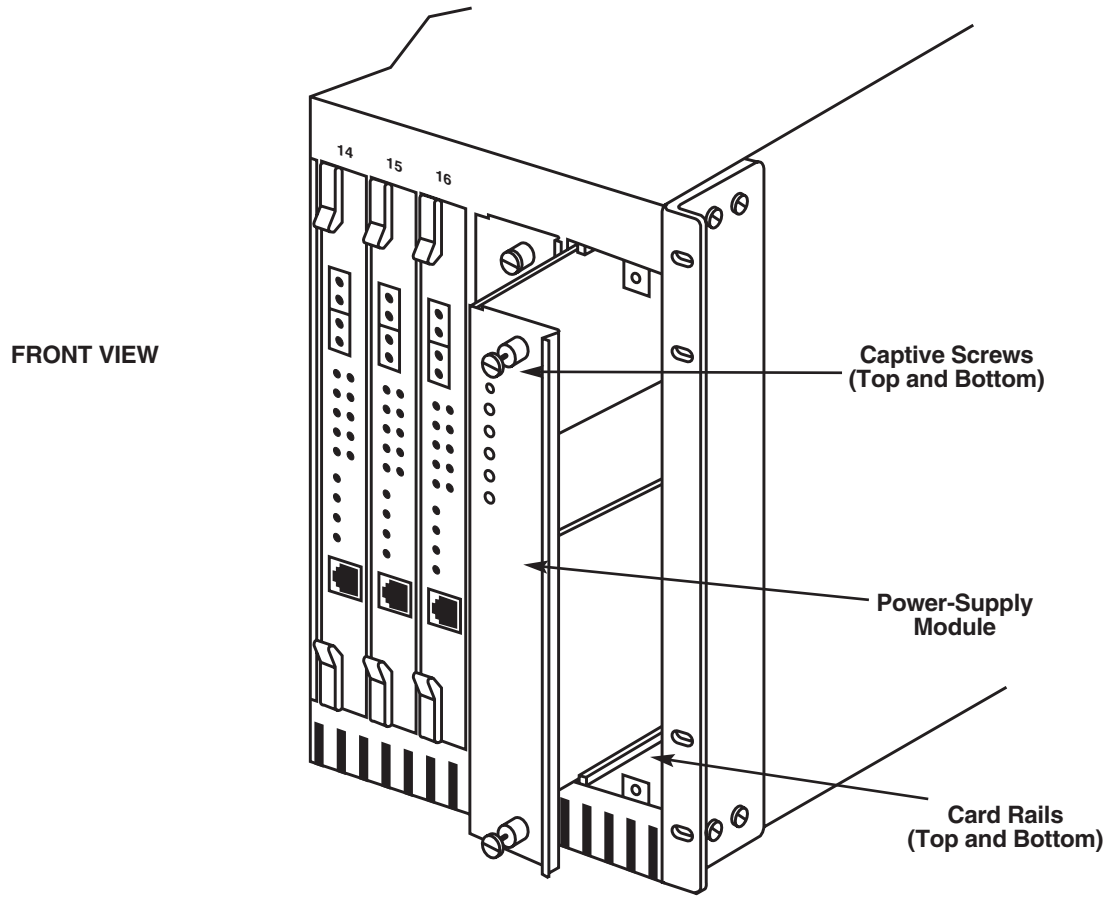

Figure 3-3. Reseating the Power-Supply Module.

3.2.4 Fourth Step: Reseating Communication Modules

The Communication Modules may have loosened from the backplane during shipping or cabinet installation. To prevent problems associated with this condition, each Communication Module must be reseated.

To reseat each Communication Module:

1. Release the top and bottom ejector tabs securing the Communication Module to the chassis. See Figure 3-4.
2. Gently pull the Communication Module toward you until you feel it release from the backplane. *Do not remove the module entirely from the chassis.*
3. Hold each of the ejector tabs in its open position. Gently push the Communication Module forward until it is seated in the backplane. The module should be flush with the chassis.
4. Lock the top and bottom ejector tabs. These tabs secure the Communication Module to the chassis. See Figure 3-4.
5. Repeat Steps 1 through 4 for each of the remaining Communication Modules.

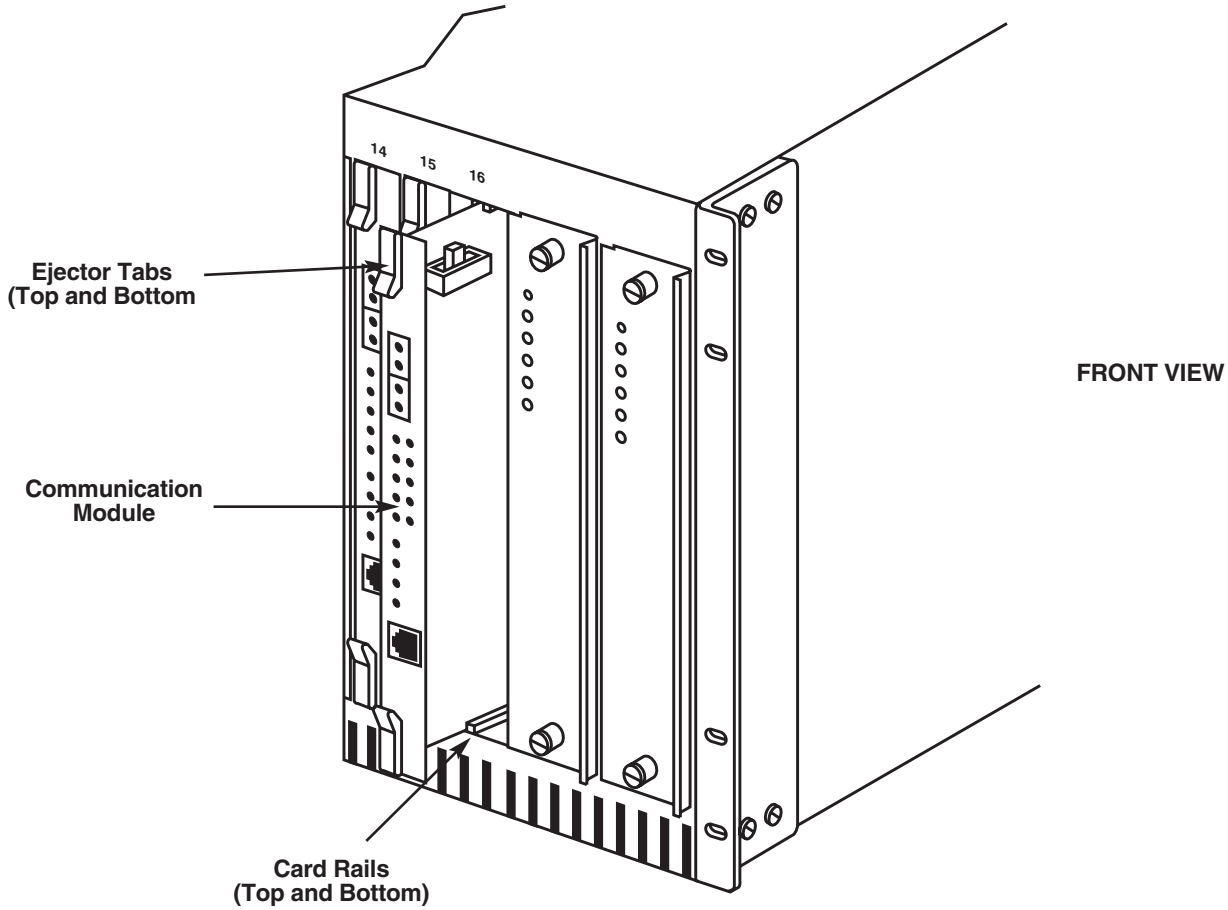

Figure 3-4. Reseating a Communication Module.

3.2.5 Fifth Step: Reseating I/O Modules

The I/O Modules may have loosened from the backplane during shipping or cabinet installation. To prevent problems associated with this condition, each I/O-Interface Module must be reseated.

To reseat each I/O-Interface Module:

1. Unscrew the top and bottom captive screws securing the I/O-Interface Module to the chassis. See Figure 3-5.
2. Gently pull the I/O-Interface Module toward you until you feel it release from the backplane. *Do not remove the module entirely from the chassis.*
3. Gently push the I/O-Interface Module forward until it is seated in the backplane. The module should be flush with the chassis.
4. Hand-tighten the top and bottom captive screws. These screws secure the I/O-Interface Module to the chassis. See Figure 3-5.
5. Repeat Steps 1 through 4 on each of the remaining I/O-Interface Modules.

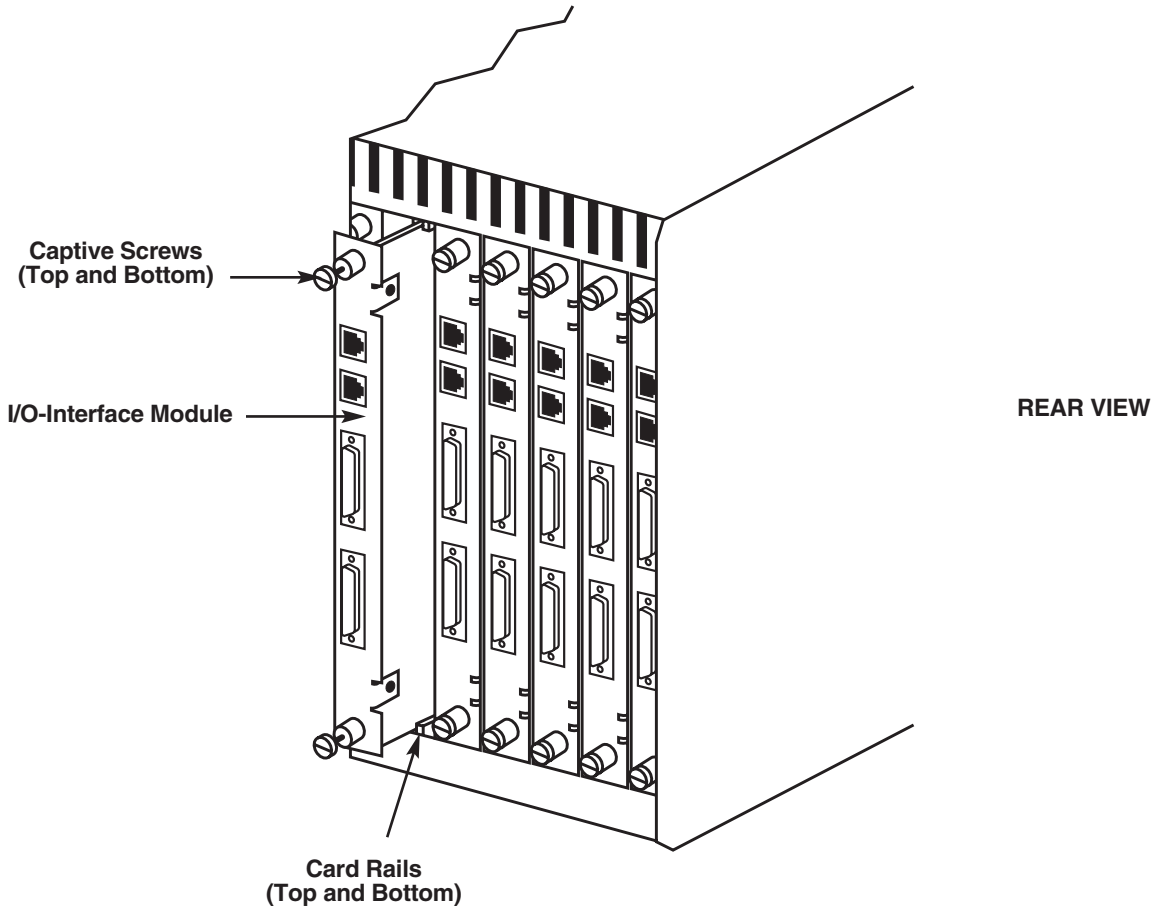

Figure 3-5. Reseating an I/O-Interface Module.

3.2.6 Sixth Step: Verifying the Presence of Filler Panels

To enhance air flow throughout the WAN Rack chassis and to keep contaminants out, make sure that all unused slots have filler panels installed and that they are properly attached to the chassis through either ejector tabs (Communication Module filler panels) or captive screws (I/O-Interface Module and redundant Power-Supply Module filler panels).

3.3 Powering Up the WAN Rack 16

3.3.1 Powering Up the AC Chassis

To power up the WAN Rack:

1. Make sure that the power switch, located above the AC-A power receptacle, has been placed in the Off (0) position. See Figure 3-6.
2. Plug the female end of the 7-foot (2.1-m) VAC power cord into the AC-A power receptacle. See Figure 3-6. Plug the male end of the power cord into source power (wall receptacle or a power strip).
3. Place the power switch, located above the AC-A power receptacle, into the On (1) position. See Figure 3-6. Confirm that the Power Supply Module's green PWR LED is lit.

   If the LED did not light up, refer to **Chapter 4**.

NOTE

If the redundant Power-Supply Module has been installed, repeat Steps 1 through 3, substituting AC-B for all AC-A references.

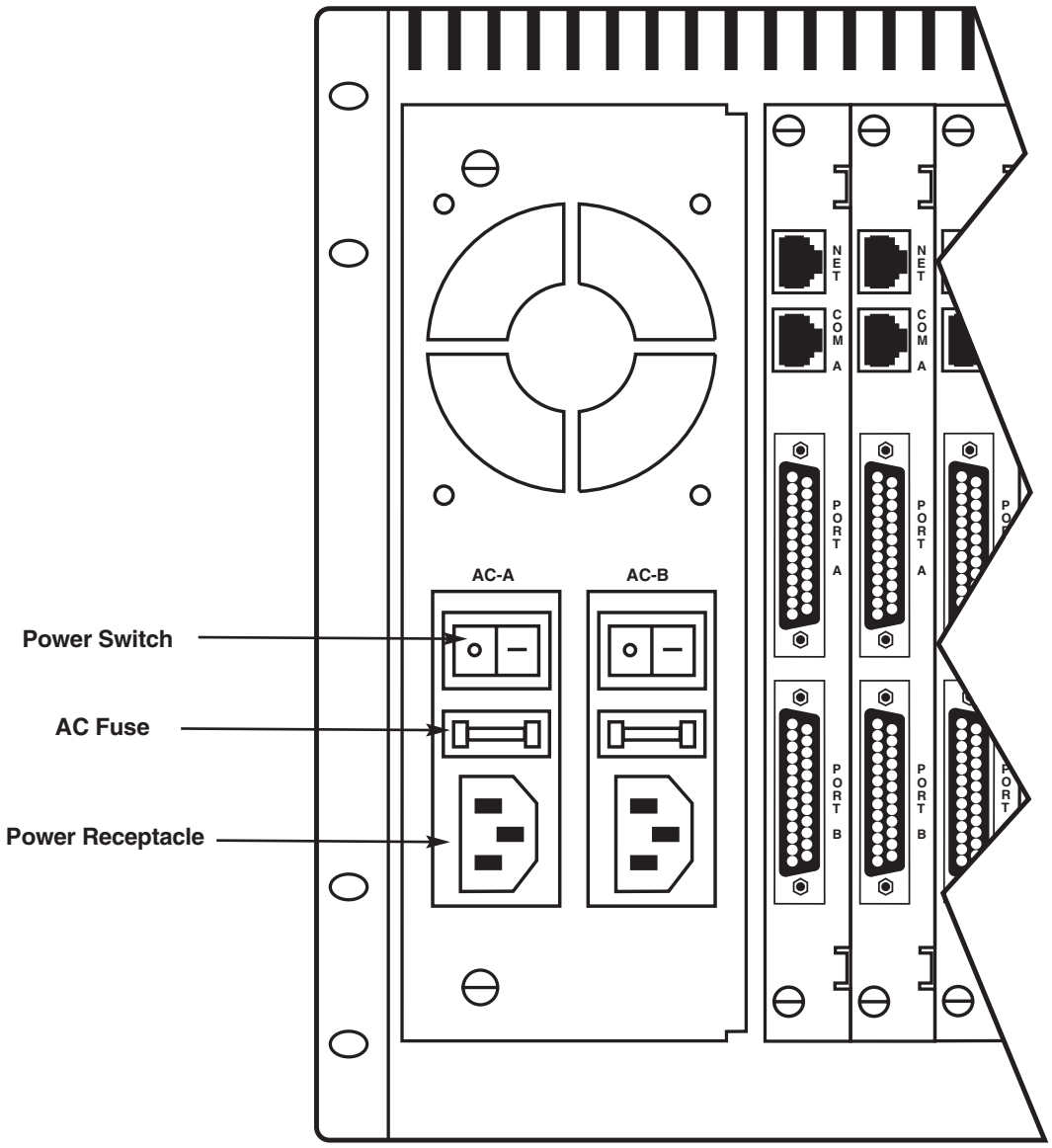

Figure 3-6. Powering Up the AC Chassis.

3.3.2 Powering Up the +24 VDC Chassis

To power up the WAN Rack:

1. Make sure that the power supply or circuit breaker that will be delivering VDC to the rear DC-A power terminal block has been turned OFF.

NOTE

Source power and ground for your +24 VDC chassis may originate from an independent power supply or be daisychained from an existing installation.

2. Slide the wire carrying +24 VDC under the terminal block screw labeled 24V. Tighten the screw. See Figure 3-7.
3. Slide the wire carrying Ground under the terminal block screw labeled 24V RTN. Tighten the screw. See Figure 3-7.
4. Slide the wire carrying Frame Ground under the terminal block screw labeled FRM GND (Frame Ground). Tighten the screw. See Figure 3-7.
5. Turn ON the power supply or circuit breaker which is the supplying voltage to the DC-A power terminal block.

   Confirm that the Power-Supply Module's green PWR LED is lit.

   If the LED did not light up, refer to **Chapter 4**.

NOTE

If the redundant Power-Supply Module has been installed, repeat Steps 1 through 5, substituting DC-B for all DC-A references.

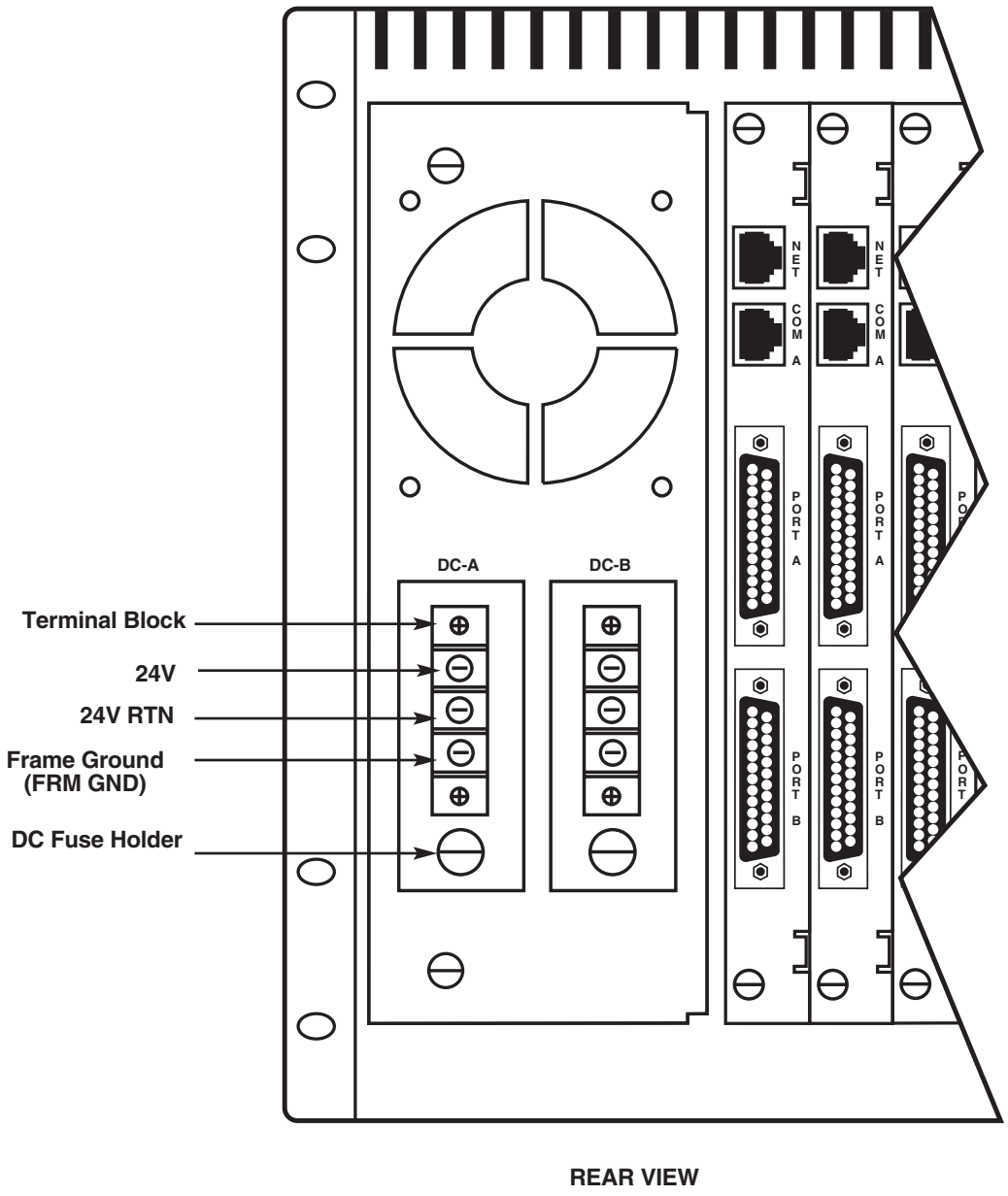

Figure 3-7. Powering Up the +24 VDC Chassis.

3.3.3 Powering Up the -48 VDC Chassis

To power up the WAN Rack:

1. Make sure that the power supply or circuit breaker that will be delivering VDC to the DC-A power terminal block has been turned OFF.

NOTE

Source power and ground for your -48 VDC chassis may originate from an independent power supply or be daisychained from an existing installation.

2. Slide the wire carrying -48 VDC under the terminal block screw labeled -48V. Tighten the screw. See Figure 3-8.
3. Slide the wire carrying Ground under the terminal block screw labeled 48V RTN. Tighten the screw. See Figure 3-8.
4. Slide the wire carrying Frame Ground under the terminal block screw labeled FRM GND (Frame Ground). Tighten the screw. See Figure 3-8.
5. Turn ON the power supply or circuit breaker which is supplying voltage to the DC-A power terminal block.

   Confirm that the Power-Supply Module's green PWR LED is lit.

   If the LED did not light up, refer to **Chapter 4**.

NOTE

If the redundant Power-Supply Module has been installed, repeat Steps 1 through 5, substituting DC-B for all DC-A references.

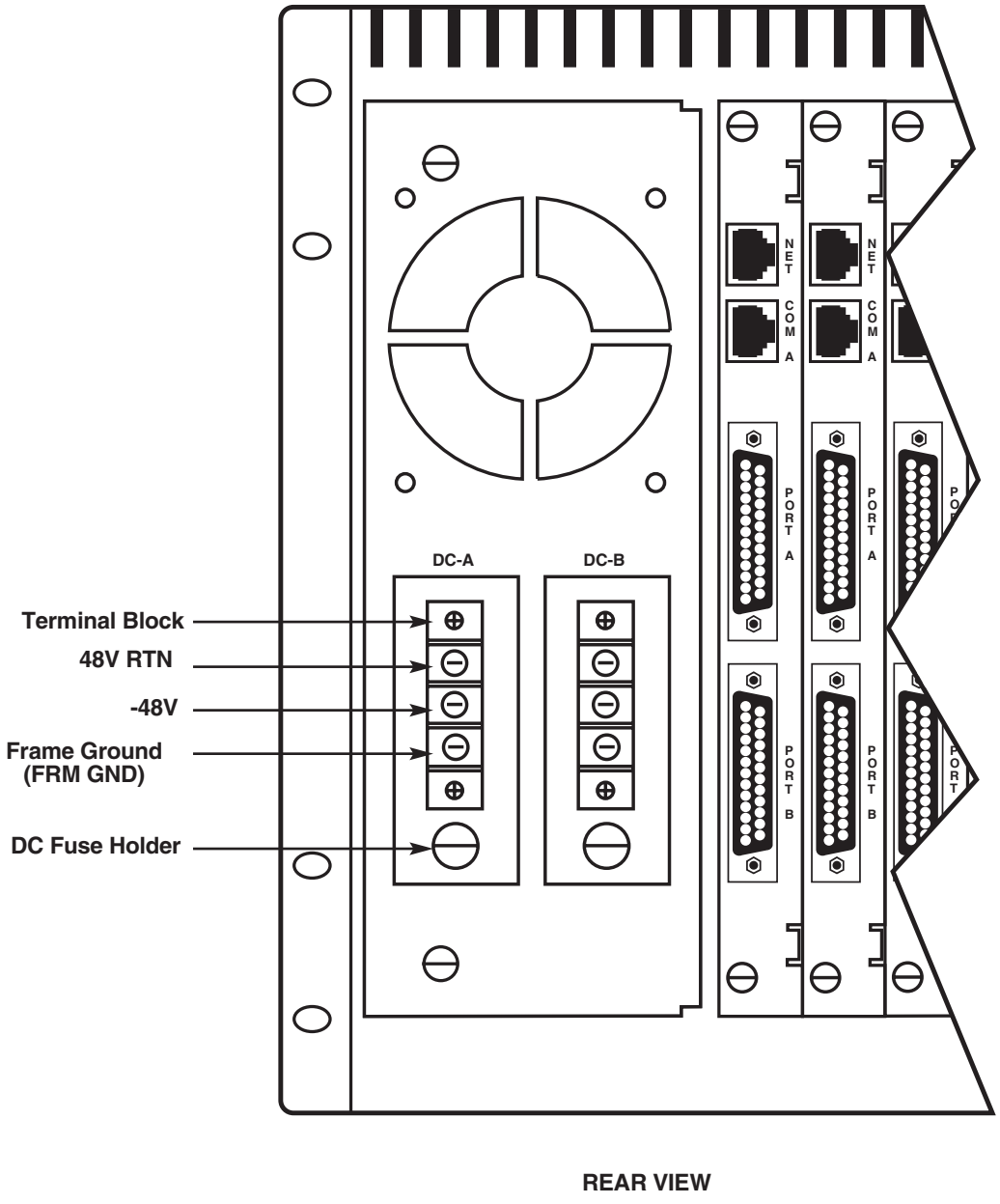

Figure 3-8. Powering Up the -48 VDC Chassis.

3.4 Configuring Communication Modules

The Communication Modules are capable, through their individual MAINT interfaces, of being configured to accommodate a wide range of digital applications.

NOTE

For detailed information on programming Communication Modules and other related subjects, refer to the Operator's Manual for the Communication Module you will be using.

3.5 Cabling I/O-Interface Modules

The I/O-Interface Modules, which reside in the WAN Rack are connected logically to Interface Modules through the tri-bus resident in the backplane.

Pin-outs for some of the more common cables used with the WAN Rack are illustrated in Figure 3-9.

NOTE

For detailed information on cabling I/O-Interface Modules and other related subjects, refer to the Operator's Manual for the Communication Module you will be using.

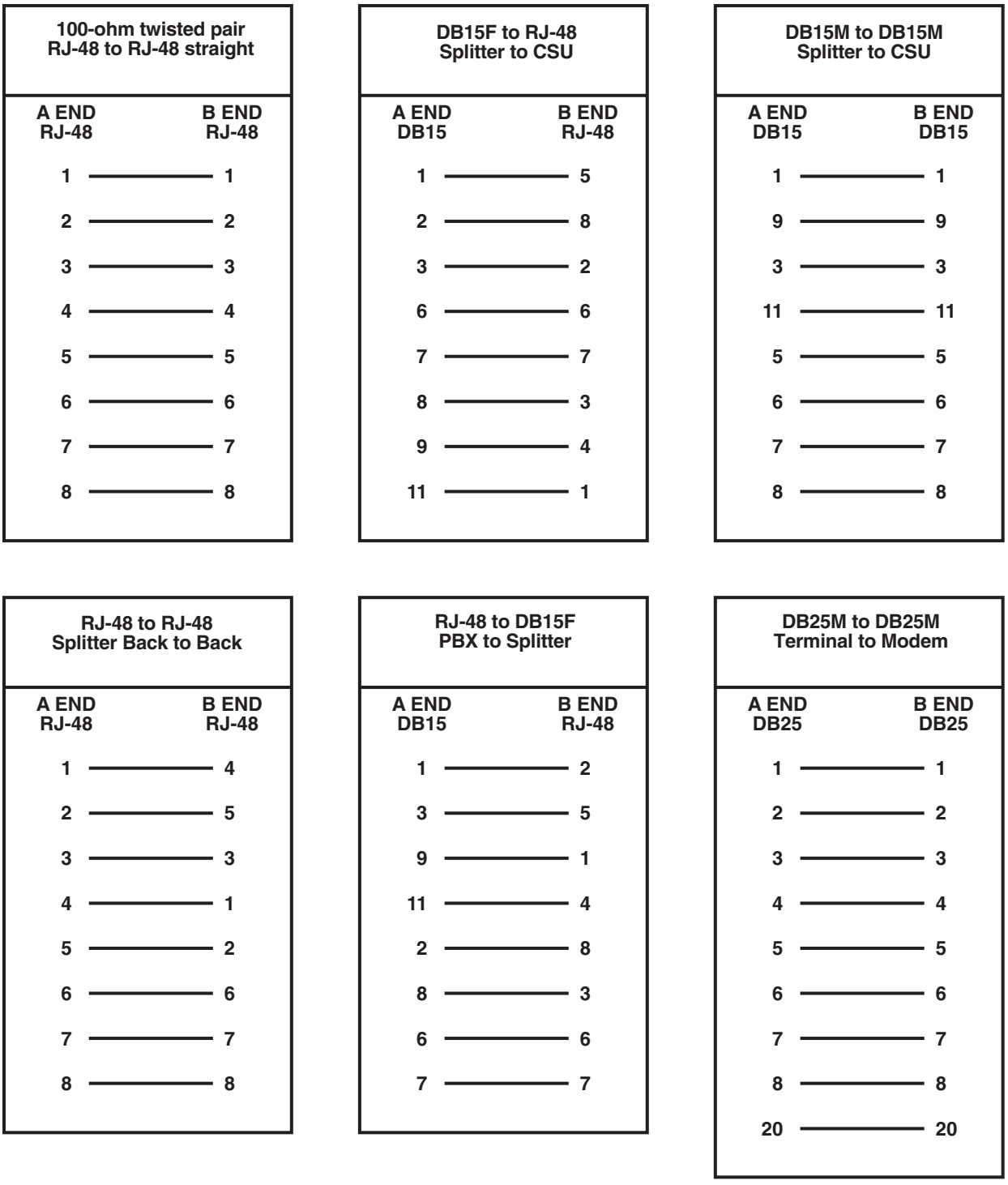

Figure 3-9. Common Cable Pinouts.

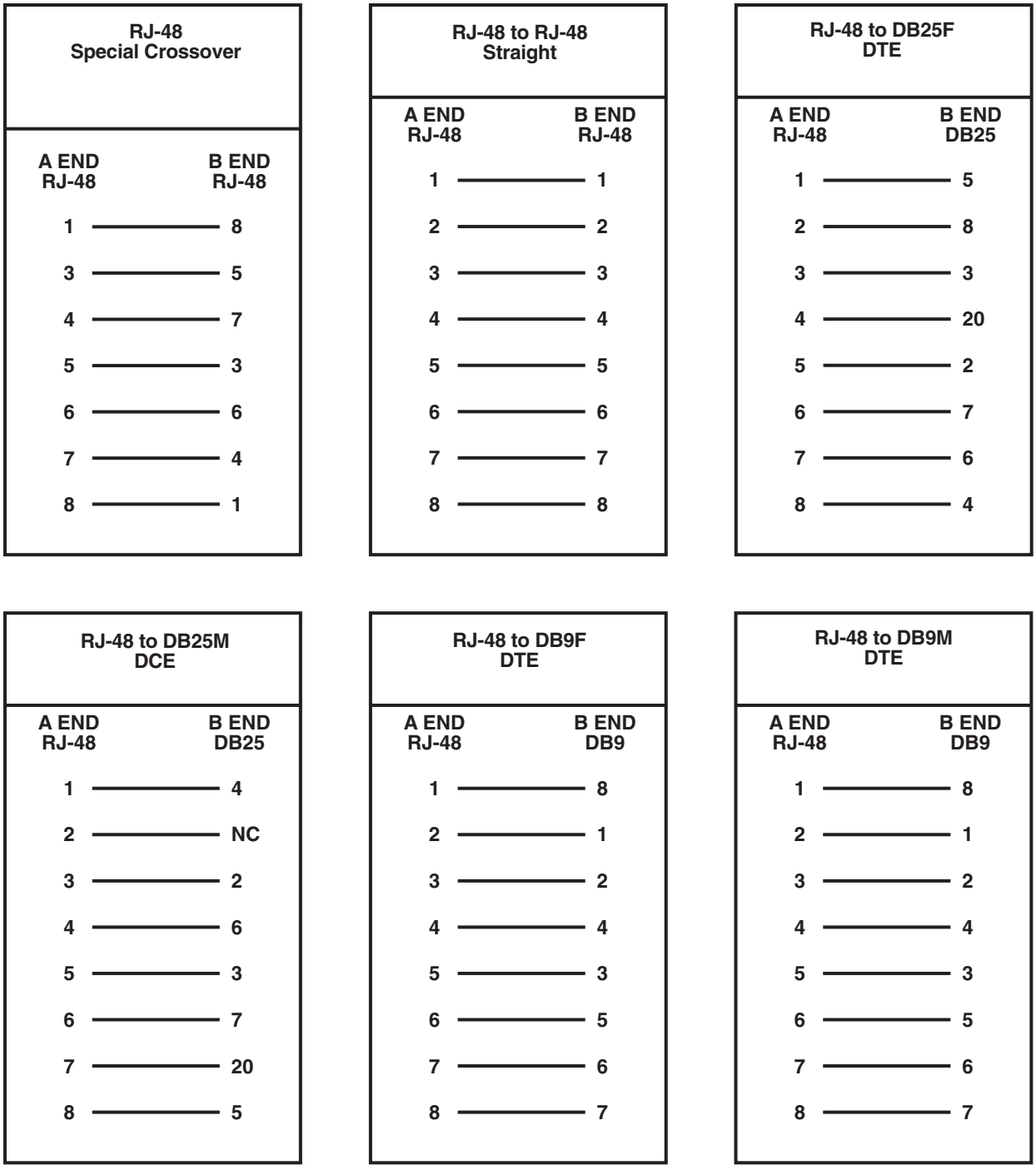

Figure 3-9. Common Cable Pinouts (continued).

3.6 Installing Additional Modules

The WAN Rack can accommodate a maximum of 16 Communication and I/O Modules. Each of these modules is installed vertically in any order, with the Communication Modules occupying the front 16 slots and the I/O-Interface Modules occupying the rear 16 slots.

NOTE

For detailed information on installing additional Communication and I/O Modules and other related subjects, refer to the Operator's Manual for the Module you will be using.

3.7 Installing the Redundant Power-Supply Module

The redundant Power-Supply Module is physically and functionally identical to the Power-Supply Module currently providing power to your WAN Rack. It will occupy the chassis slot immediately to the left (facing the front of the chassis) of the currently installed Power-Supply Module. Top and bottom captive screws secure the module to the chassis.

To install the redundant Power-Supply Module:

1. Unscrew the top and bottom captive screws securing the redundant Power-Supply Module's filler panel to the chassis. See Figure 3-10. Set the filler panel aside.

2. Align the redundant Power-Supply Module with the chassis slot's top and bottom card rails. See Figure 3-11.

3. Slowly push the redundant Power-Supply Module forward along its card rails until you feel it contact the backplane.

   Continue to gently push the module until it is seated in the backplane. The module should be flush with the front of the chassis. See Figure 3-11.

4. Hand-tighten the top and bottom captive screws. These screws secure the redundant Power-Supply Module to the Power-Supply chassis. See Figure 3-11.

5. Cable source power to the Power-Connector Module's redundant AC-B receptacle or DC-B terminal block.

   If the Power-Connector Module is AC, complete **Section 3.3.1** by substituting AC-B for all AC-A references.

   If the Power-Connector Module is +24 VDC, complete **Section 3.3.2** by substituting DC-B for all DC-A references.

   If the Power-Connector Module is -48 VDC, complete **Section 3.3.3** by substituting DC-B for all DC-A references.

6. Check the redundant Power-Supply Module's green PWR LED. Is it lit?

   - If yes, then the redundant Power-Supply Module installation procedure is complete.
   - If no, then refer to **Chapter 4**.

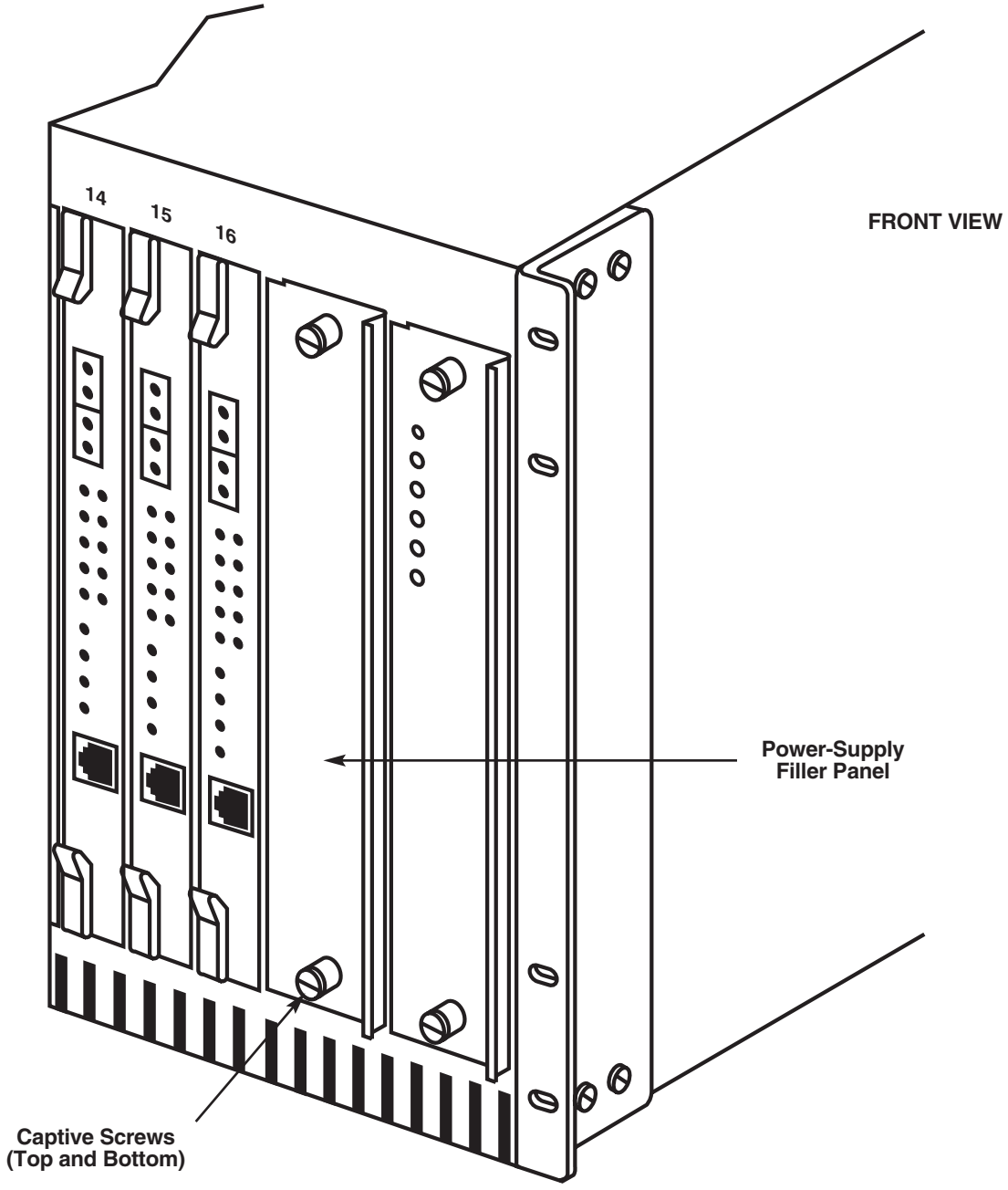

Figure 3-10. Removing the Filler Panel.

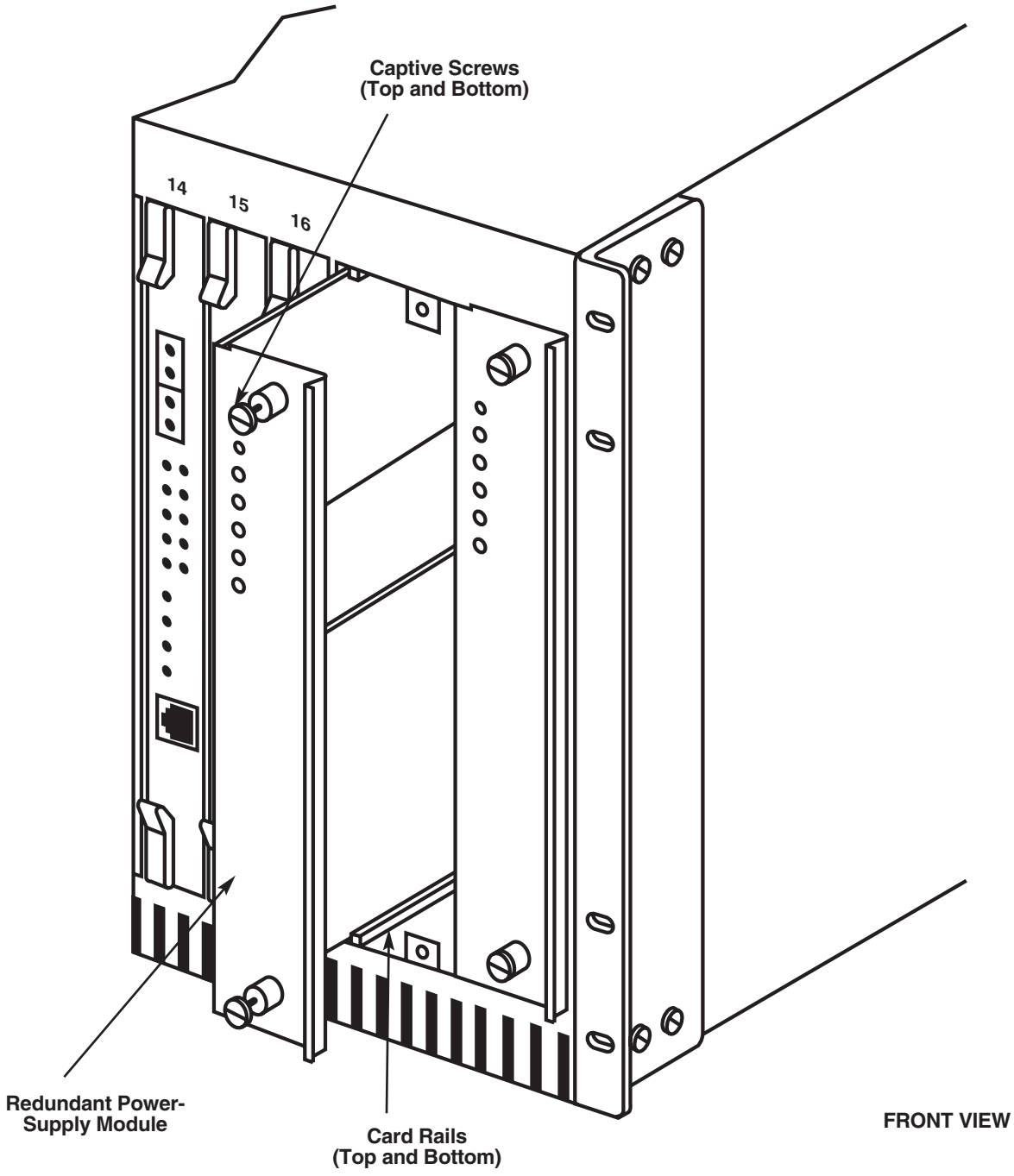

Figure 3-11. Installing the Power-Supply Module.

4. Troubleshooting

This chapter contains information that will help you identify power-fault symptoms associated with your WAN Rack 16 and return your system to full operation.

4.1 Overview

Restoring your WAN Rack 16 to full operation after a power-fault condition has occurred requires troubleshooting in a systematic and logical manner.

This systematic approach has been incorporated into the troubleshooting flowchart and support illustrations, which provide a sequential approach toward fault isolation, identification, and correction of power problems associated with your WAN Rack 16.

The first step in troubleshooting is evaluating the problem. Evaluation includes the following routines:

- Checking all available LEDs to help evaluate the specific problem area.
- Gathering information about the problem. Collect as much system information (configuration information, operator action) as possible before starting any troubleshooting routine.

4.2 Troubleshooting a Power Problem

The WAN Rack 16 contains only a few power-related items that you may check at the field level:

- AC power cord or DC wires.
- AC power receptacle or DC terminal-block fuse.
- AC power-receptacle switch.
- Power-Supply Module.

To isolate and correct a power problem, follow the instructions in Figure 4-1.
Use Figures 4-2 and 4-3 for additional reference.

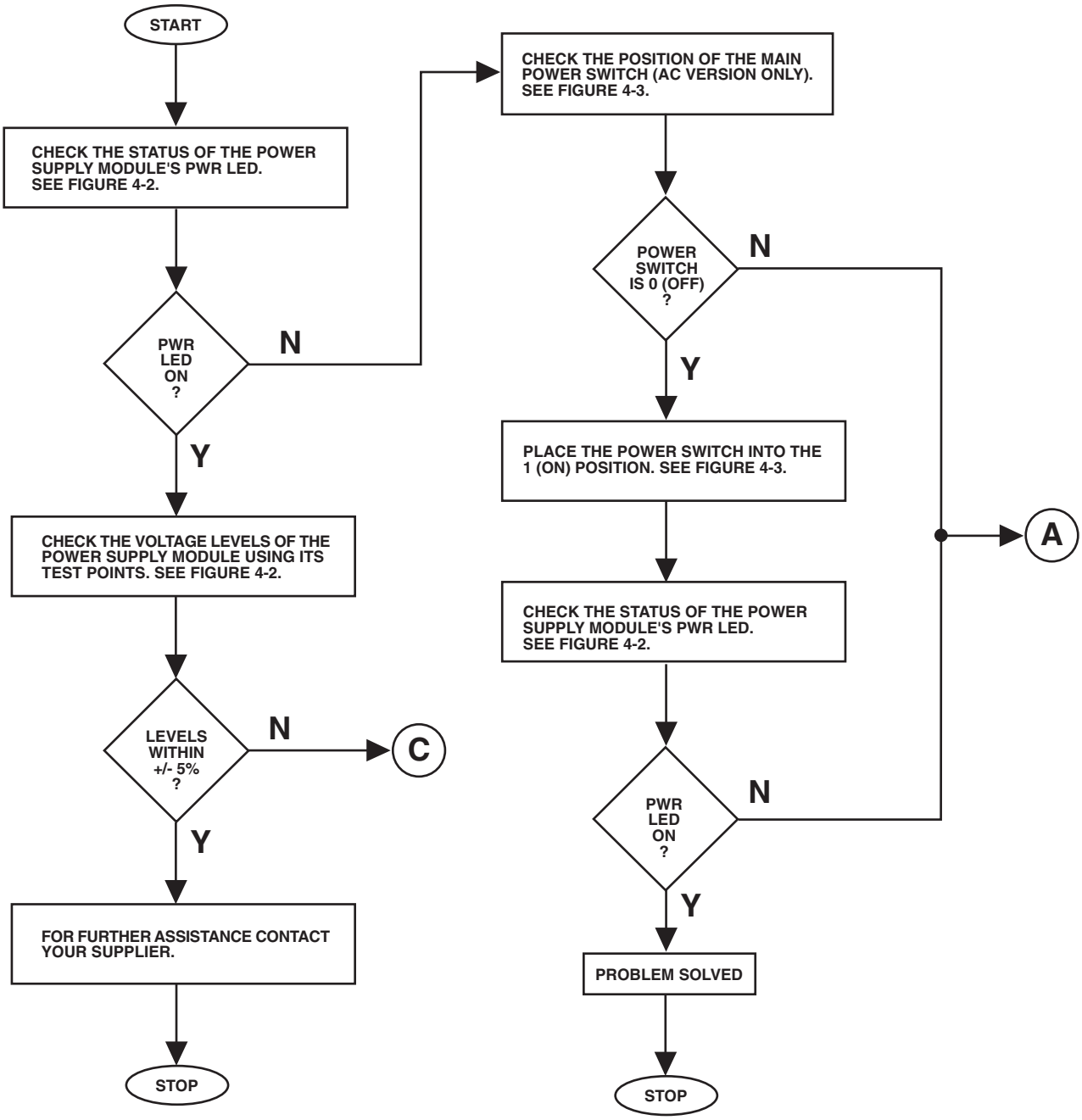

Figure 4-1. Troubleshooting a Power Problem.

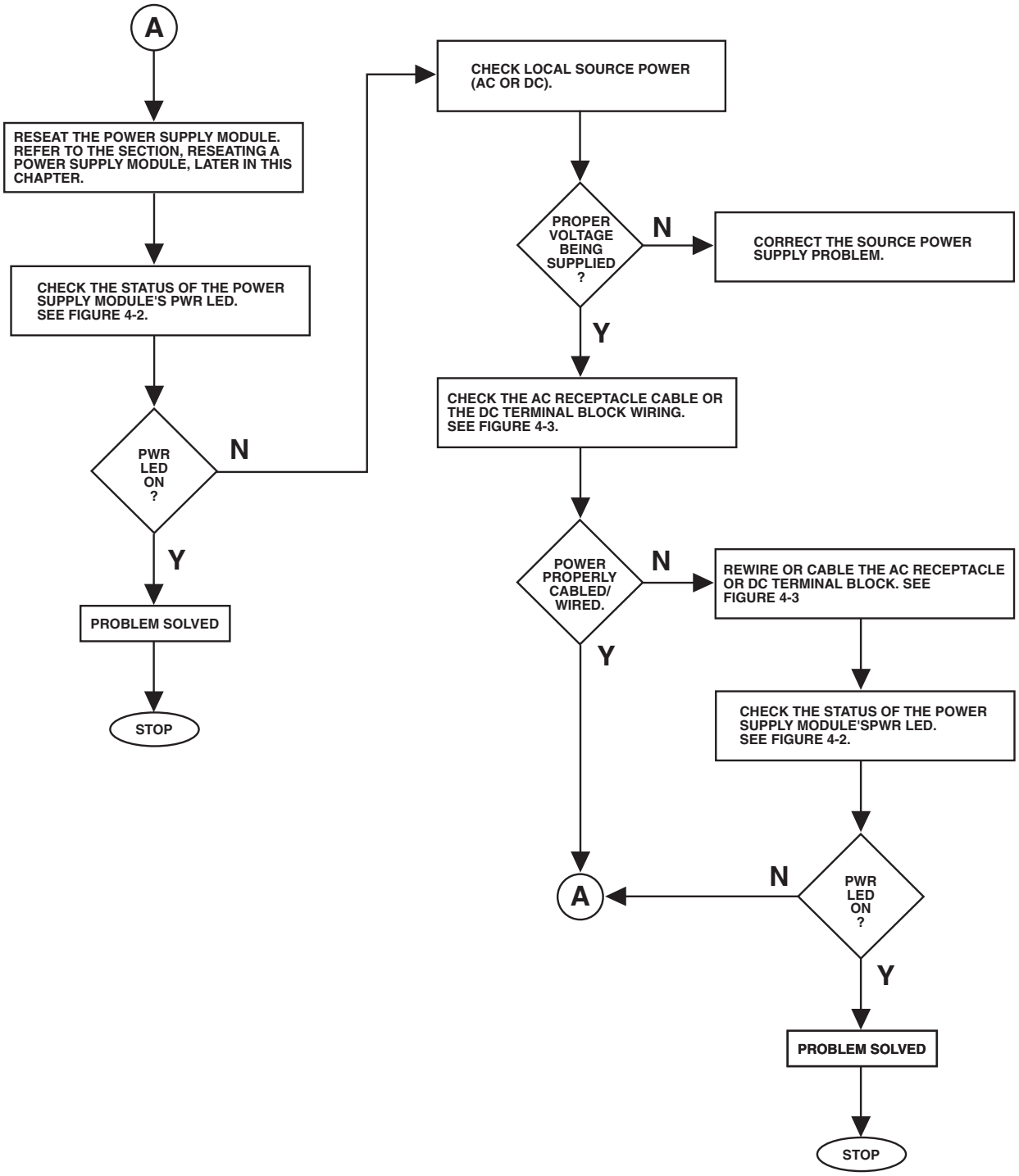

Figure 4-1. Troubleshooting a Power Problem (continued).

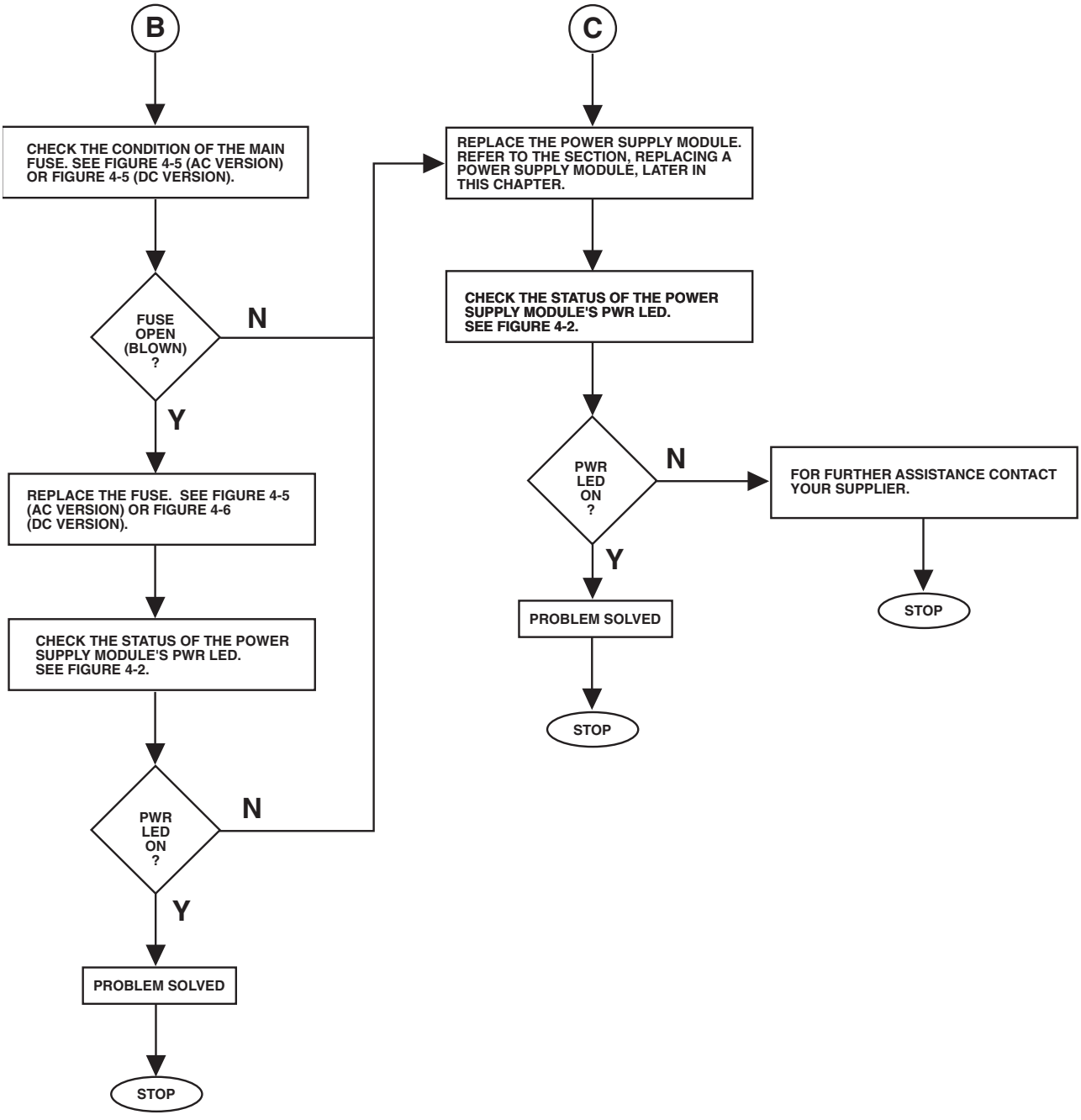

Figure 4-1. Troubleshooting a Power Problem (continued).

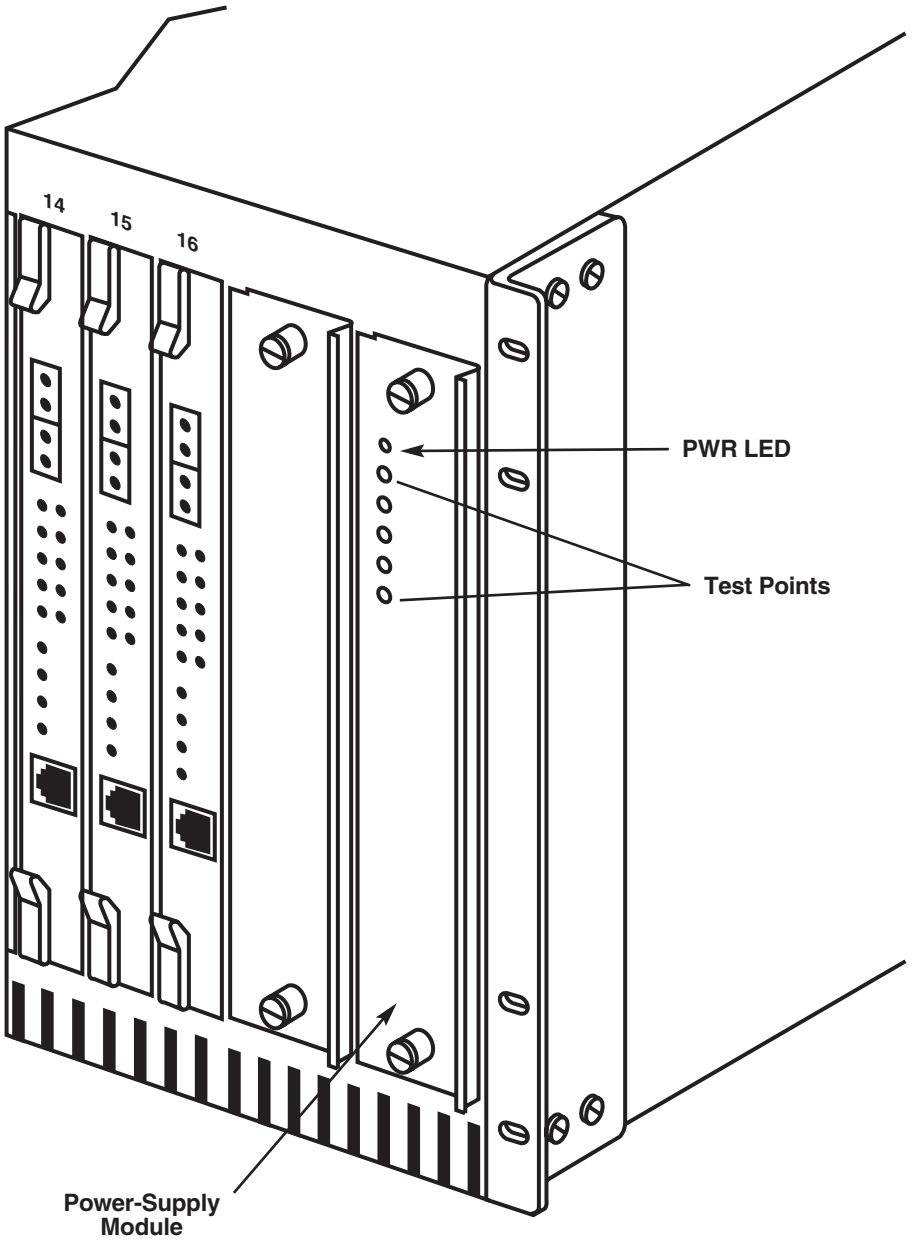

Figure 4-2. Power-Supply Module (Front View).

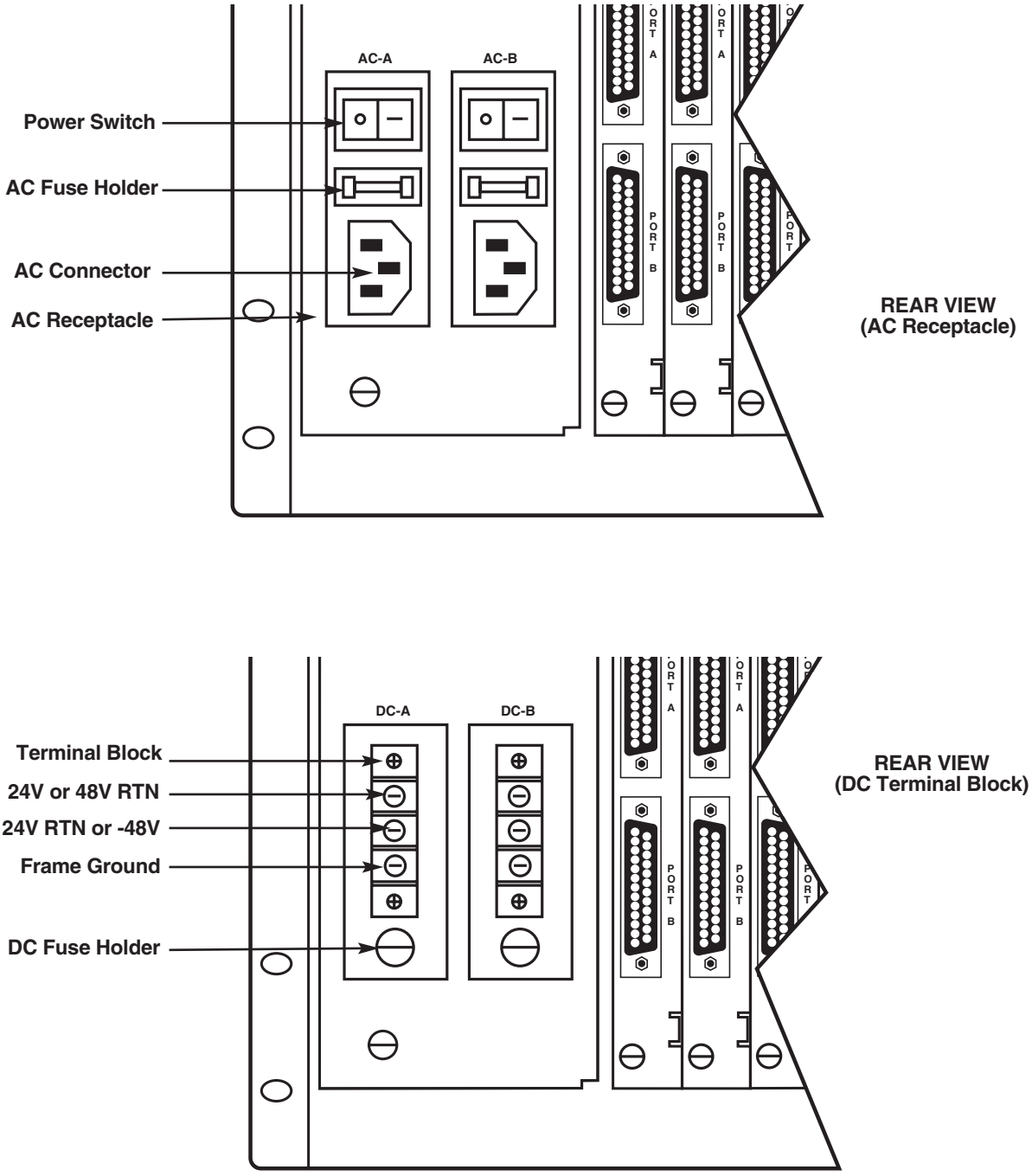

Figure 4-3. AC Receptable and DC Terminal Block.

4.3 Reseating the Power-Supply Module

1. Unscrew the top and bottom captive screws securing the Power-Supply Module to the chassis. See Figure 4-4.
2. Gently pull the Power-Supply Module toward you until you feel it release from the backplane. *Do not remove the module entirely from the chassis.*
3. Gently push the Power-Supply Module forward until it is seated in the backplane. The module should be flush with the chassis.
4. Hand-tighten the top and bottom captive screws. These screws secure the Power-Supply Module to the chassis. (See Figure 4-4.)

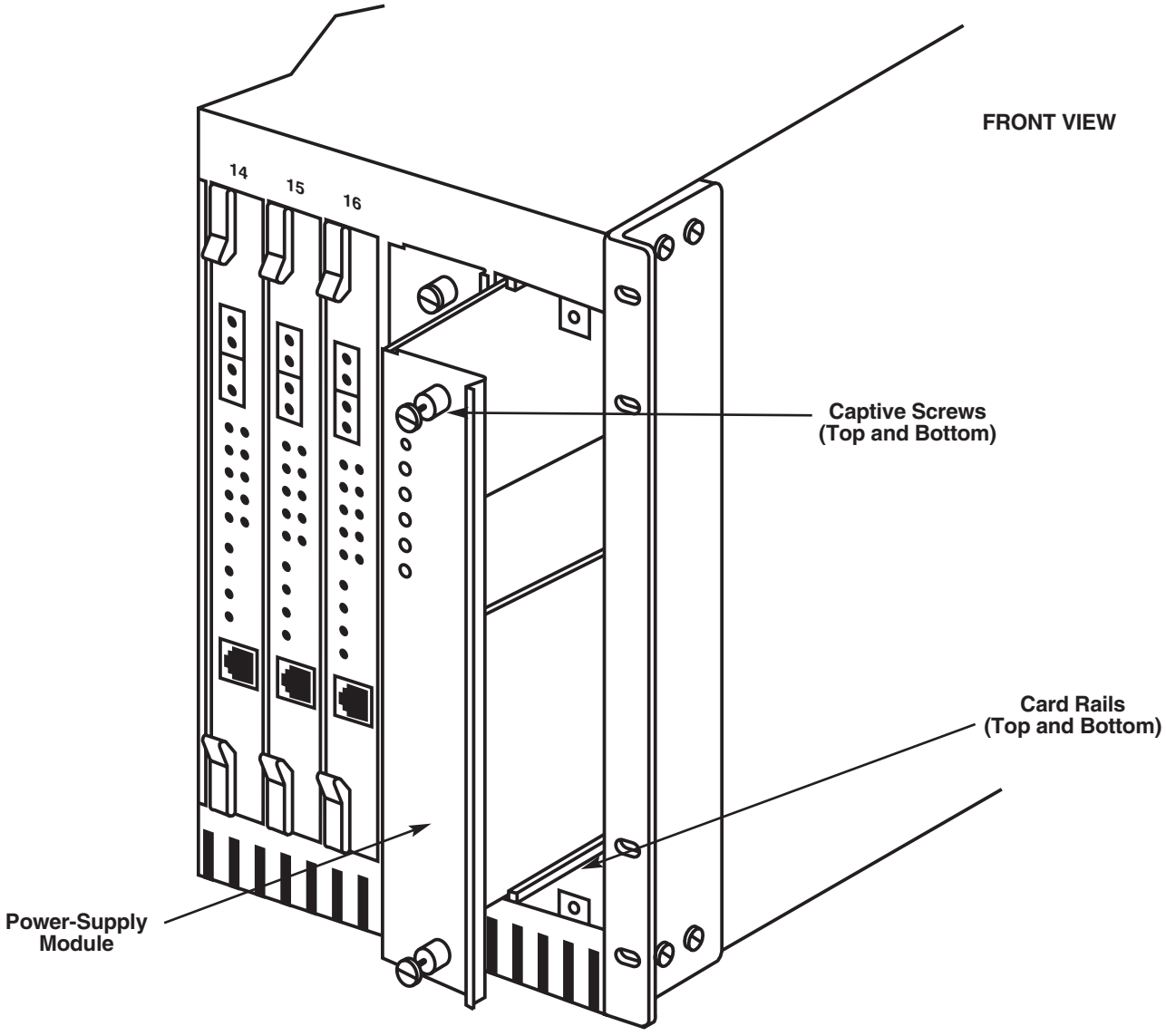

Figure 4-4. Reseating a Power-Supply Module.

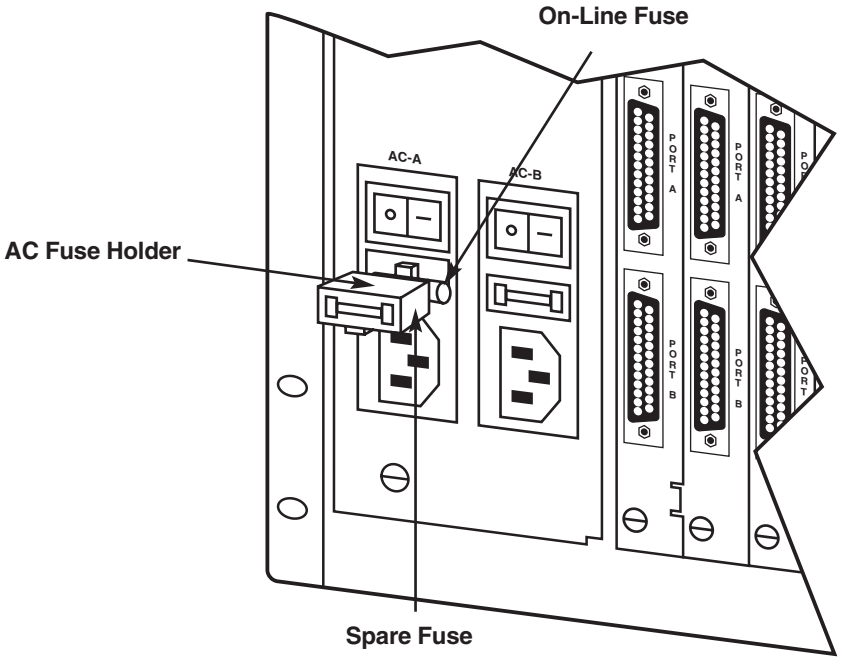

Figure 4-5. Checking/Replacing an AC Fuse.

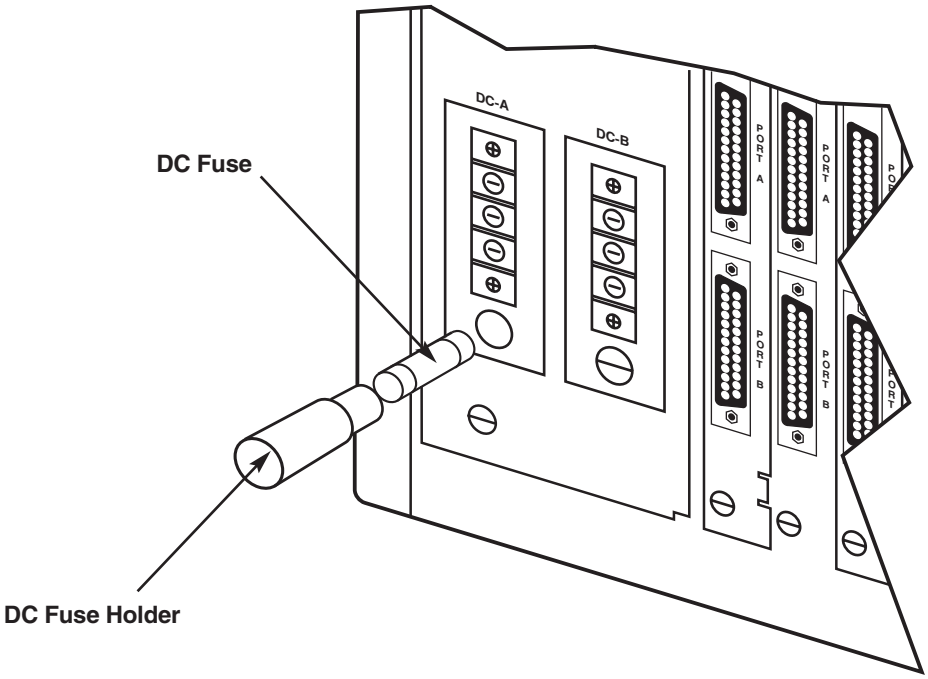

Figure 4-6. Checking/Replacing a DC Fuse.

4.4 Replacing the Power-Supply Module

1. Unscrew the top and bottom captive screws securing the faulty Power-Supply Module to the chassis. See Figure 4-7.
2. Gently pull the faulty Power-Supply Module toward you until you feel it release from the backplane. Remove the module entirely from the chassis.
3. Align the new Power-Supply Module with the chassis slot's top and bottom card rails.
4. Slowly push the Power-Supply Module forward along its card rails until you feel it contact the backplane.

   Continue to gently push the module until it is seated in the backplane. The module should be flush with the chassis.
5. Hand-tighten the top and bottom captive screws. These screws secure the Power-Supply Module to the chassis. (See Figure 4-7.)

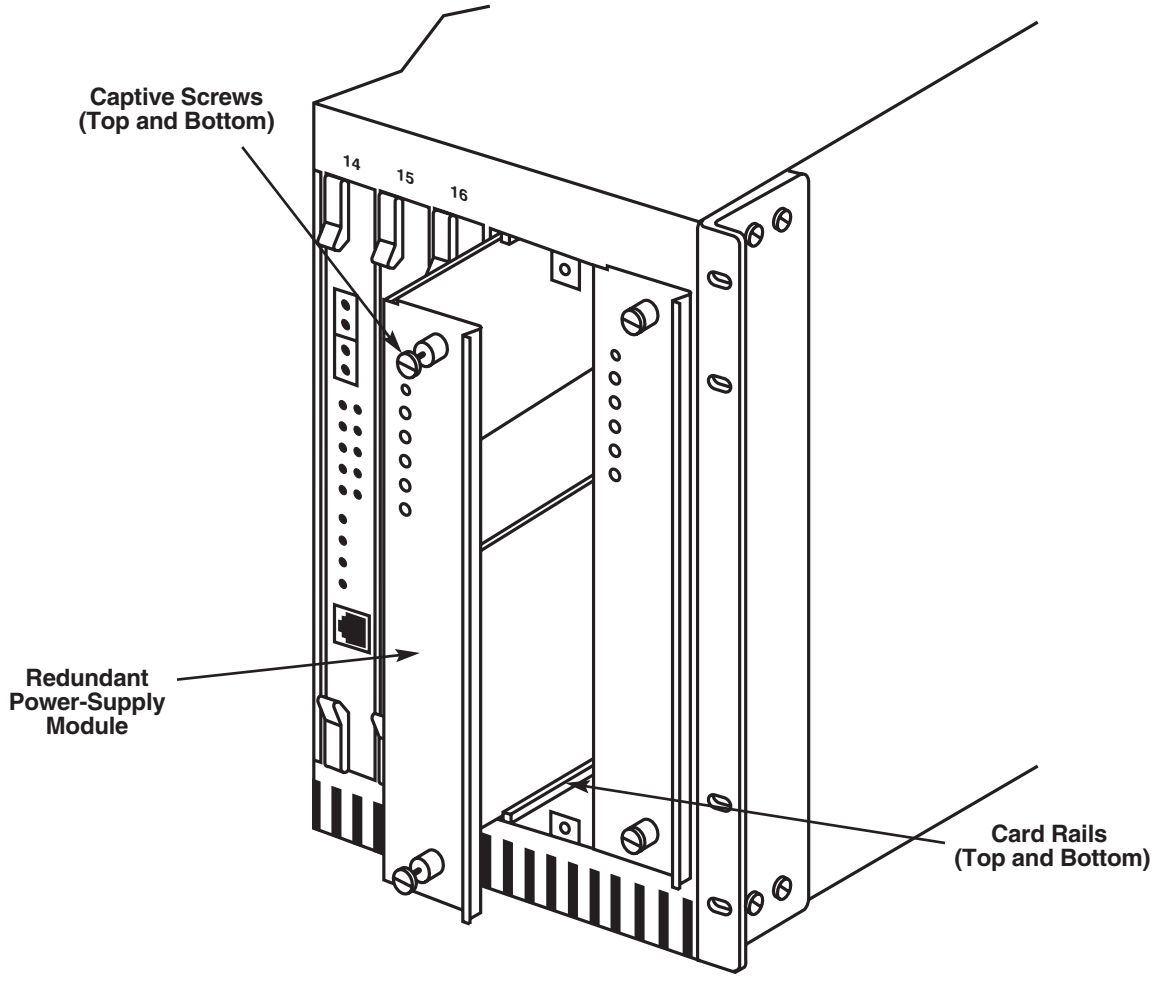

Figure 4-7. Replacing a Power-Supply Module.

Appendix A. FCC Document Requirements

The following information, which informs the user of his rights and obligations in connecting this equipment to the network and in ordering service, is required by FCC Part 68 Rules.

This equipment complies with Part 68 of FCC Rules. Please note the following:

1. When you order service, the telephone company needs to know:

   The Facility Interface Code:

   04DU-B (1.544 MB D4 framing format)

   04DU9-C (1.544 MB ESF format)

   The Service Order Code: 6.0F

   A signal power affidavit (refer to **Appendix B**) will be required to guarantee encoded analog content and billing protection unless this unit is used in combination with an XD-type device or no encoded analog signals and billing information are transmitted. For most uses, the second box is appropriate.

   The USOC Jack Required: RJ48C

   In addition, if requested, inform the telephone company of the make, model, and FCC Registration Number, which are on the label.

2. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

3. If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

4. If you experience trouble with the telephone equipment, contact us for information on obtaining service or repairs. Repairs should be performed by us or our authorized agent.

5. You are required to notify the telephone company when this unit is disconnected from the network.

Appendix B. CPE Affidavit

Affidavit for the connection of Customer Premises Equipment (CPE) to 1.544 Mbps and/or Subrate Digital Services (SDS)

For work to be performed in the certified territory of:

_____

(TELCO's Name)

State of: _____ County of: _____

I, _____ , _____

(Name) (Business Address)

Representing _____

Being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to _____ 1.544 Mbps and/or _____ Subrate Digital Services. The terminal equipment to be connected complies with Part 68 of the Commission's rules except for the encoded analog content and billing protection specifications.

Continued on the next page

CPE Affidavit, continued

With respect to encoded analog content and billing protection:

I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and encoded billing information continuously comply with Part 68 of the FCC's Rules and Regulations.

The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network. The encoded analog and billing protection is factory-set and is not under the control of the customer.

I attest that the operator(s)/maintenance(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully completing one of the following (check all appropriate boxes).

☐ a. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals: *or*

☐ b. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals: *or*

☐ c. An independent training course (i.e., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals: *or*

☐ d. In lieu of the preceding training requirements, the operator(s)/maintainer(s) is (are) under control of a supervisor trained in accordance with ___above.

(*fill in one*)

Continued on the next page

CPE Affidavit, continued

I agree to provide _____ with proper documentation to demonstrate
(TELCO's) name
compliance with the information as provided in the preceding paragraph, if so requested.

Signature _____

Title _____

Date _____

Subscribed and Sworn to before me

this ____ day of _____, 19 ____

_____
Notary Public

My commission expires: _____

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