

DECconcentrator™ 500



Problem Solving

Order Number: EK-DEFCN-PS-004

NOTICE – Class 1 Laser Device:

The lasers in this equipment are Class 1 devices, compliant with CDRH Rules 21, CFR Subchapter J, Part 1040.10, at date of manufacture. Class 1 laser devices are not considered to be hazardous.

NOTICE – Class A Computing Device:

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, measures taken to correct the interference are at the user's expense.

CAUTION

The people who install the cabling system described in this manual should know local building codes, fire codes, and any other applicable codes or regulations. The manufacturers or their distributors and agents will not be responsible for damage due to improperly installed cabling, neglect, misuse, or improper connection of devices to the cabling system.

DECconcentrator 500

Problem Solving

January 1992

This manual describes how to troubleshoot and service the DECconcentrator 500 unit. Information includes an overview, troubleshooting and testing, and removal and replacement procedures.

For additional information about the option cards, refer to the specific option card installation documentation.

Supersession/Update Information: This is a revised manual.



Order Number: EK-DEFCN-PS-004

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Safety

Any warning or caution that appears in this manual is defined as follows:

Warning	Contains information to prevent personal injury.
Caution	Contains information to prevent damage to equipment.
Vorsicht	Enthält Informationen, die beachtet werden müssen, um den Benutzer vor Schaden zu bewahren.
Achtung	Enthält Informationen, die beachtet werden müssen, um die Geräte vor Schaden zu bewahren.
Danger	Signale les informations destinées à prévenir les accidents corporels.
Attention	Signale les informations destinées à prévenir la détérioration du matériel.
Aviso	Contiene información para evitar daños personales.
Precaución	Contiene información para evitar daños al equipo.

The warnings and cautions you must observe for the hardware described in this manual are listed below in English, German, French, and Spanish. The pages on which these safety messages appear are also listed.

WARNING

Disconnect the ac power cord before removing any field-replaceable units. Do not apply power to the wiring concentrator unless all covers are installed. Only qualified service engineers should perform any of these removal and replacement procedures. (3–1)

VORSICHT

Ziehen Sie immer zuerst das Netzkabel aus der Wandsteckdose, wenn Sie FRUs entfernen oder austauschen müssen. Sie dürfen an den Kabelkonzentrator erst dann Spannung anlegen, wenn alle Abdeckungen ordnungsgemäß angebracht sind. Diese Arbeiten dürfen nur von qualifiziertem Wartungspersonal durchgeführt werden.

DANGER

Avant de procéder à la dépose d'unités remplaçables, débranchez le cordon d'alimentation. Ne reliez le concentrateur de câbles au secteur qu'après l'installation complète de tous les capots. Seuls des techniciens de maintenance qualifiés sont habilités à effectuer les opérations de dépose et de pose.

AVISO

Se desconecta el cable de corriente alterna antes de quitar cualquier parte que se vaya a sustituir. No transmitir corriente al concentrador a menos que se hayan instalado todas las cubiertas.

WARNING

Some fiber optic equipment can emit laser light that can injure your eyes. Never look into an optical fiber or connector port. Always assume the cable is connected to a light source. (3–1)

VORSICHT

Schauen Sie niemals direkt in ein Glasfaserkabel oder einen Glasfaseranschluß. Die Laserstrahlen in faser-optischen Geräten können Augenverletzungen verursachen.

DANGER

Certains équipements utilisant les fibres optiques peuvent émettre des rayonnements laser dangereux pour les yeux. Ne vous avisez jamais de regarder par l'extrémité d'une fibre optique ou dans l'ouverture d'un connecteur. Considérez toujours que le câble est relié à une source lumineuse.

AVISO

Algunos equipos de fibra óptica pueden emitir luz láser que dañalos ojos. No sedebe mirar en una puerta de conector o fibraóptica. Siempre se debe suponer que el cable está conectado a la luz.

WARNING

Always remove the power cord from the wiring concentrator and ac source when performing any removal and replacement procedures. Also remove any port cable connectors when servicing the wiring concentrator. (3–2, 3–4)

VORSICHT

Ziehen Sie immer zuerst das Netzkabel aus der Steckdose und anschließend aus dem Kabelkonzentrator, wenn Sie Teile entfernen oder austauschen müssen. Bei Wartungsarbeiten am Kabelkonzentrator müssen Sie außerdem alle anderen Kabel abziehen.

DANGER

Assurez-vous toujours que le cordon d'alimentation est débranché du concentrateur et du secteur lors des procédures de dépose et pose de composants. Débranchez tous les connecteurs des ports du concentrateur lors des opérations d'entretien.

AVISO

Se debe sacar el cable de alimentación del concentrador y eliminar cualquier corriente alterna antes de realizar cualquier tarea de sustitución. También se debe quitar cualquier conectar del cable de puerta mientras se trabaja con el concentrador.

WARNING

Do not attempt to remove any of the field-replaceable units (including the option boards) while the ac power cord is connected or while there is power to the wiring concentrator (ON). Safety regulations require all covers to be installed before applying power to the wiring concentrator. Removal and installation of the field-replaceable units should only be performed by qualified service personnel. (3–7)

VORSICHT

Versuchen Sie nicht, FRUs zu entfernen (einschließlich der Erweiterungskarten), solange das Gerät an das Strom-netz angeschlossen ist oder am Kabelkonzentrator Spannung anliegt. Vergewissern Sie sich, daß alle Abdeckungen angebracht sind, bevor Sie den Kabelkonzentrator mit dem Netz verbinden. FRUs dürfen nur von qualifiziertem Wartungspersonal entfernt oder ausgetauscht werden.

DANGER

N'essayez pas de déposer des unités remplaçables (y compris les cartes en option) sans avoir au préalable débranché le cordon d'alimentation ou mis le concentrateur hors tension. Les instructions de sécurité imposent que tous les capots soient installés avant la mise sous tension. Seuls des techniciens de maintenance qualifiés sont habilités à effectuer les opérations de dépose et de pose des unités remplaçables.

AVISO

No se debe tratar de quitar ninguna unidad reemplazable (incluyendo las placas de opciones) mientras esté conectado el cable de corriente alterna o mientras haya corriente en el concentrador. Las regulaciones de seguridad exigen que estén instaladas todas las cubiertas antes de aplicar corriente al concentrador. La sustitución de aquellas partes que se puedan reemplazar sólo debería realizarla personal cualificado.

WARNING

Do not attempt to remove the chassis cover while the ac power cord is connected or while there is power to the wiring concentrator. Chassis cover and field-replaceable unit removal should only be performed by qualified service personnel. (3–10)

VORSICHT

Das Gehäuse darf erst geöffnet werden, wenn das Netzkabel aus der Steckdose gezogen ist und am Kabelkonzentrator keine Spannung mehr anliegt. Das Gehäuse darf nur von qualifiziertem Wartungspersonal geöffnet werden. Dasselbe gilt für den Austausch von FRUs.

DANGER

Ne retirez pas le capot du châssis sans avoir au préalable débranché le cordon d'alimentation ou mis le concentrateur hors tension. Seuls des techniciens de maintenance qualifiés sont habilités à effectuer les opérations de dépose et de pose du capot du châssis et des unités remplaçables.

AVISO

No se debe tratar de quitar la cubierta del chasis mientras esté conectado el cable de corriente alterna o mientras haya corriente en el contratador. Sólo personal cualificado debería realizar la sustitución de las partes reemplazables y de la cubierta del chasis.

CAUTION

Static electricity can damage modules and electronic components. Digital recommends you use a grounded wrist strap and grounded work surface (Digital P/N 29-11762) when you handle any modules or internal parts. (3–7)

ACHTUNG

Module und elektronische Komponenten können durch elektrostatische Entladungen beschädigt werden. Benutzen Sie immer eine antistatische Gelenkmanschette und eine geerdete Arbeitsunterlage, wenn Sie am offenen Gerät arbeiten in Antistatik-Kit ist in der BRD bei DECdirekt unter der Bestellnummer 29-26246 erhältlich.

ATTENTION

Les charges excessives d'électricité statique peuvent endommager les modules et les composants électroniques. Digital conseille l'utilisation d'un bracelet de masse et d'un plan de travail mis à la terre (Réf. 29-11762) lors de la manipulation des modules et des composants internes.

PRECAUCIÓN

La electricidad estática puede dañar los componentes electrónicos y los módulos. Digital recomienda que se utilicen cintas de pasadores y superficies de trabajo conectadas a tierra (Digital P/N 29-11762) al trabajar con cualquier módulo o parte interna.

CAUTION

Use a pointed tool to change switch settings. Never use a pencil; graphite can damage switches. (1–3, 3–8)

ACHTUNG

Verwenden Sie einen spitzen Gegenstand, z.B. einen Kugelschreiber, wenn Sie Schaltereinstellungen ändern wollen. Benutzen Sie dazu keinen Bleistift, da der Graphitabrieb die Schalter beschädigen kann.

ATTENTION

Utilisez un outil pointu pour changer le positionnement des commutateurs. N'utilisez jamais un crayon, car le graphite de la mine pourrait endommager les commutateurs.

PRECAUCIÓN

Con cualquier herramienta puntiaguda se cambian los parámetros de conexión, pero nunca con lápices porque el grafico daña los interruptores.

Preface

This manual describes how to troubleshoot, test, and service the DECconcentrator 500 unit. The manual contains problem-solving methods and removal and replacement procedures.

Intended Audience

This manual is for the system/network manager, as well as Digital Equipment Corporation training, services, and manufacturing personnel who have been trained to perform product maintenance and repair. Knowledge of Fiber Distributed Data Interface (FDDI) is a prerequisite to using this manual effectively.

Document Structure

This document has three chapters and three appendices:

Chapter 1	Contains information on the concentrator controls and indicators.
Chapter 2	Contains procedures to help isolate problems to a faulty field replaceable unit (FRU).
Chapter 3	Provides removal and replacement procedures for each of the FRUs.
Appendix A	Contains an exploded view and list of FRUs.
Appendix B	Contains concentrator specifications.
Appendix C	Contains a list of related documents.

Controls and Indicators

1.1 Controls and Indicators

Figure 1–1 shows the DECconcentra 500 controls and indicators. Table 1–1 and Table 1–2 describe the controls, connectors, and LEDs.

Figure 1–1: Controls and Indicators

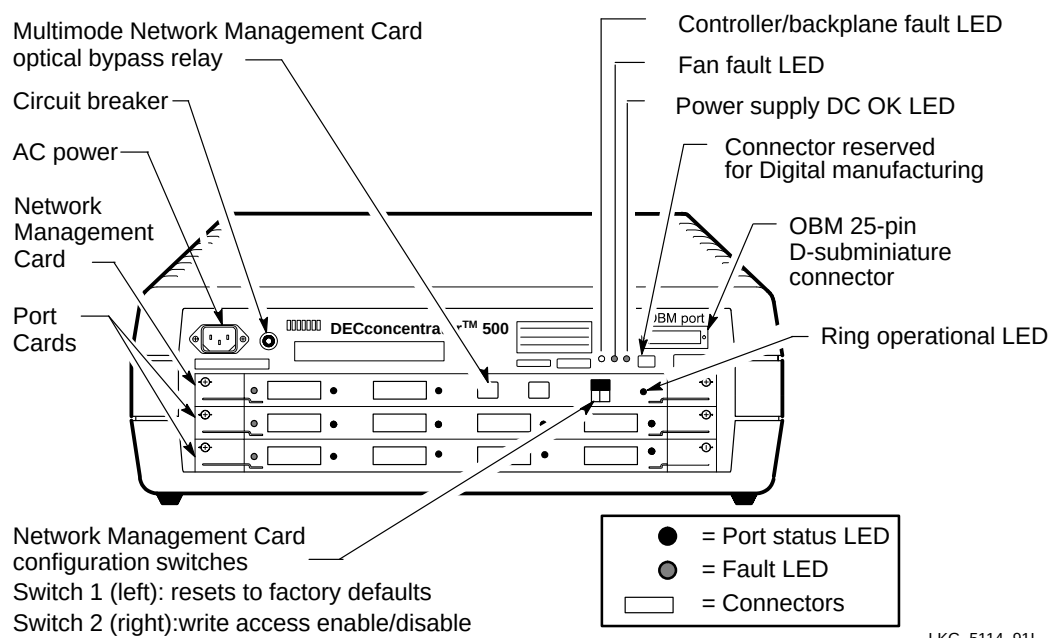


Table 1–1: DECconcentrator 500 Controls and Connectors

Control	Description
AC power socket	For connection to an ac source.
Circuit breaker	Provides overcurrent protection for the concentrator. If the circuit breaker trips, the white center of the circuit breaker pops out and ac power is removed from the concentrator. Press the white center to reset the circuit breaker.
Out-of-band management connector	Provides remote management by allowing a connection directly to a terminal or through a modem to a terminal.
Optical bypass connector	Provides connectivity of the FDDI ring in the absence of power or during fault conditions in a node. The connector is located on the Multimode Network Management Card.

Table 1–2: DECconcentrator 500 Indicators

LED	Symbol	Color	Normal State
Controller/backplane Fault		Red	OFF
Fan fault		Red	OFF
Power supply DC OK		Green	ON
Ring operational	Ring OK	Green	ON
Card fault		Red	OFF
Port status	PHY	Green/Red	Green ON

1.2 Network Management Switch

The Network Management Card has two software readable switches that are accessible through the front panel. The switch on the left (switch 1) is used to reset to default control parameters that have been changed by remote management. The switch on the right (switch 2) is used to enable or disable remote management write access functions. The default setting for the switches is the OFF position. Figure 1–1 shows the location of the switches. Table 1–3 lists the switch functions.

CAUTION

Use a pointed tool to change switch settings. Never use a pencil; graphite can damage switches.

Table 1–3: Network Management Configuration Switch Settings

Switch	Factory Setting	Function
1 (Reset to default)	OFF	When set to OFF at power up, no parameters are changed, altered, or reset. When switch 1 is set to ON at power up, any control parameters that have been changed through remote management (DECelms or DECMcc) are reset to their default settings. For example, if remote management has disabled a port, that port is no longer disabled when you reset to the default parameters. To reset to the default parameters, after the concentrator is installed and operational, or after being reinstalled, do the following: 1. Set switch 1 to ON. 2. Cycle the power and wait for self-test to complete. 3. Set switch 1 to OFF.
2 (Write access enable)	OFF	When set to ON, enables write access for system control parameters, such as the password and firmware upgrade.

1.3 Out-of-Band Management

The DECconcentrator 500 has an Out-of-Band Management (OBM) port that allows the concentrator to be managed locally or remotely through a terminal. Refer to the *DECconcentrator 500 Installation* manual for a description of how to use the out-of-band management feature.

Troubleshooting and Testing

This chapter describes the problem-solving methods used for diagnosing and isolating a concentrator fault to the field-replaceable unit (FRU).

2.1 Tools and References

The following tools and references are recommended:

- Loopback connector (Refer to Appendix A for a list of connectors.)
- Optical power meter (P/N 29-28384-01)
- Option card installation manuals
- *DECconcentrator 500 Installation* manual

2.2 Problem-Solving Checklist

Before starting the problem-solving procedures and removing any attached cabling, use the following checklist to ensure that a simple and easily overlooked problem is not causing the concentrator fault:

- Ensure that the power cord is secure at the concentrator and power source receptacles.
- Ensure that appropriate power is available at the electrical outlet.

- Ensure that the circuit breaker (located on the concentrator front panel) has not tripped. If it has, press in the white button to reset the breaker.
- Verify that the switches on the Network Management Card are set properly (see Section 1.2).
- Ensure that all option cards are fully seated and locked.
- Check that all option card modules are installed in the correct location. The Network Management Card must be in the top slot. The Port Cards can be installed in any slot.
- Check that all interface cables are firmly attached.
- Ensure that the green power supply LED is on.

2.3 Tests

To check the concentrator for normal operation or to isolate a fault, run self-test and the loopback test, if necessary.

2.4 Self-Test

Self-test is initiated when power to the concentrator is removed and restored. Self-test diagnostics verify that the FRUs are operating properly before the concentrator connects to the network. Visual indicators (LEDs) provide pass/fail status to identify failed modules.

When self-test is in process the following events occur:

- The green power supply LED, green ring operational LED, and all red fault LEDs turn on.
- The Network Management Card port LEDs turn red, then green, then turn off.
- The Port Card LEDs turn red, then green, then turn off.
- If there are no fatal errors, all red FRU indicators go out and the concentrator becomes operational.

- If a non-fatal error is detected, the LED associated with the faulty port remains on, the controller/backplane fault LED turns off, and control passes to operational firmware. Depending on the type of fault, non-fatal errors result in either a single port being bypassed or the entire card being bypassed.
- The fault LEDs turn off and the port LEDs blink green (if not connected).
- The power supply and ring operational LEDs stay on.
- If a fatal error is detected, the associated fault LED(s) remain on and the unit is not operational.

When the operational firmware is running and the concentrator is connected to the network, an LED next to each port indicates operational status.

2.4.1 Network Management Initiated Self-Test

The concentrator self-test can be run by software command from a host command console by the Extended LAN Management Software (DECelms) or DECMcc. The command sequence for self-test from the host consists of identifying the concentrator and forcing the initialization. This is equivalent to powering down and powering up the device. See the *DECelms Use* or *DECMcc Concentrator Access Module Use* guide for additional information.

2.4.2 Power-up Initiated Self-Test

If any ports have been disabled by remote management (DECelms or DECMcc), the LEDs may not light as indicated in these procedures. This requires resetting the switch on the Network Management Card to obtain the default parameters. Before resetting the switch, notify the network/system manager. Refer to Section 1.2 for information on setting the switch.

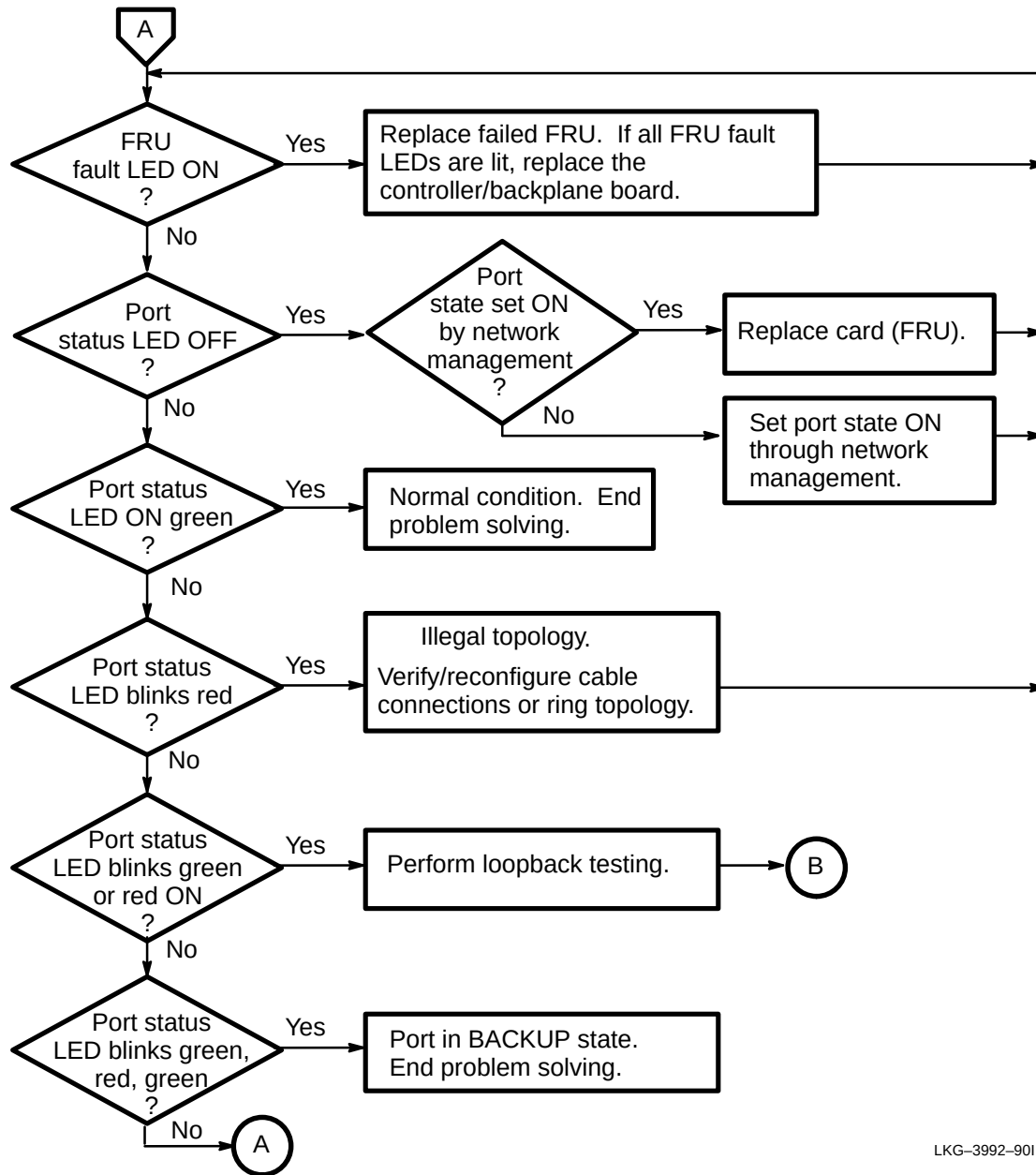
To run self-test, apply power to the unit. The flow chart in Figure 2–1 shows the troubleshooting process. It identifies the test methods and suggested corrective action.

NOTE

When using the flow chart, start at Station A. Station B is at the other end of the cable.

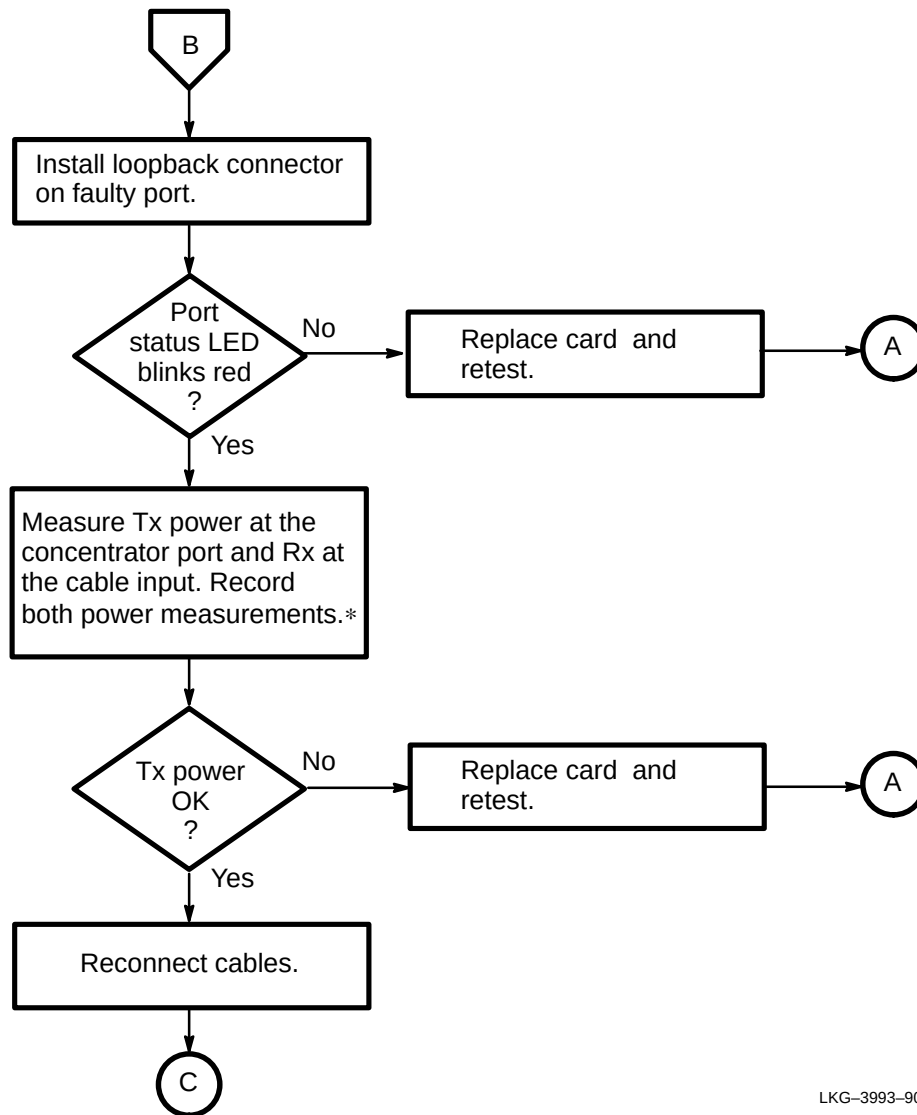
At the completion of the self-test, observe the LED display and refer to Table 2–1 through Table 2–4 to determine the appropriate course of action.

Figure 2-1: Fault and Port Status LED Problem-Solving Flow Chart



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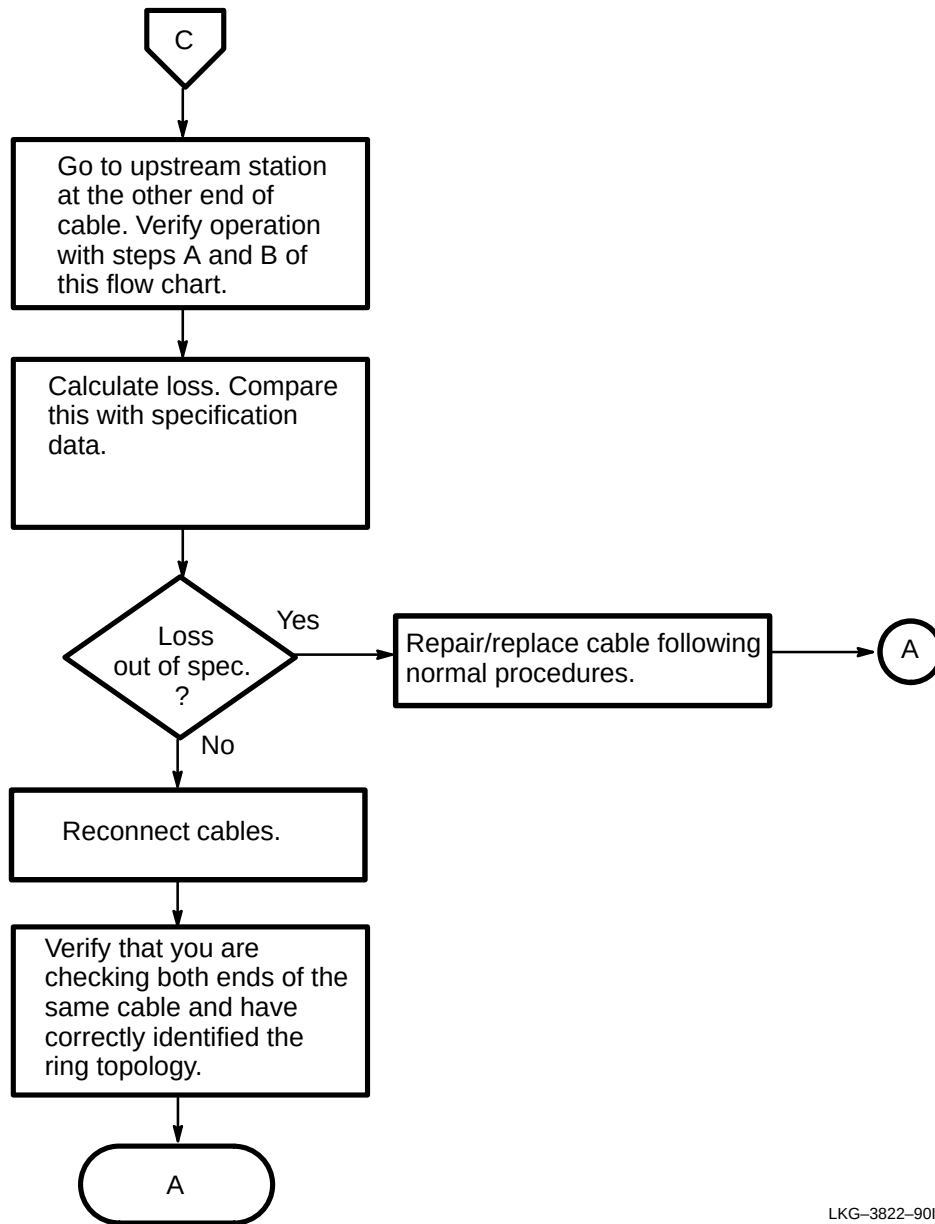
Figure 2–1 (cont.): Fault and Port Status LED Problem-Solving Flow Chart



LKG-3993-901

*Perform all transmit (Tx) power measurements at the concentrator transmit connector, not at a patch panel. Always disconnect the receive (Rx) connector from the concentrator when measuring transmit power.

Figure 2-1 (cont.): Fault and Port Status LED Problem-Solving Flow Chart



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2.5 Problem Solving Using the LED Indicators

This section lists typical LED displays for various error conditions, along with probable causes and suggested corrective actions. Table 2–1 describes problem solving for the main unit, Table 2–2 for the Network Management Card, Table 2–3 for the Port Card, and Table 2–4 for the optical bypass relay (optional).

Table 2–1: Main Unit Problem Solving

Symptom	Probable Cause	Corrective Action
All LEDs OFF.	Circuit breaker tripped.	Reset the breaker. If the breaker continues to trip, it indicates a more serious problem.
	Power cord disconnected.	Make sure the power cord is firmly connected at both ends.
	Faulty power cord.	Measure the continuity of the cord. Replace the cord if defective.
	Incorrect power or no power at wall outlet.	Check the wall outlet circuit breaker. Verify that correct power is available. Connect the power cord to another wall outlet.
	Blown power connector fuse.	In some countries the power connector at the wall outlet has a fuse. Replace the fuse if necessary. If the fuse continues to blow, it indicates a more serious problem.
DC OK LED is off and any other LED is on.	Problem with the power supply.	Replace or repair the power supply.
Fan LED is on (red).	Problem with the fan or fan connection.	Check the fan connector. Replace the fan.
Controller/backplane fault LED is blinking red.	Bad OBM card	Replace OBM card.
Controller/backplane LED is on (red) and all option card fault LEDs are on (red).	Problem with the Controller/backplane, LED, or connection to the power supply.	Check the connection to the power supply. Replace controller/backplane board. Rerun self-test diagnostics.
Fan LED blinking.	Incompatible hardware/firmware (firmware version is 2.3 or below, backplane hardware revision is 1 or higher*).	Load the latest firmware.

* The hardware revision number of the backplane can be read by the network management software as an attribute under a table column called *FRU Revision*. Refer to the documentation for your particular management software for details.

Table 2–2: Network Management Card Problem Solving

Symptom	Probable Cause	Corrective Action
Card Fault LED on (red); other Port Card LEDs off; unit LEDs are normal.	Problem with the Network Management Card.	Replace the Network Management Card.
Card Fault LED blinking red.	Network Management Card is installed in the wrong slot (B or C).	Install the Network Management Card in the top slot (A).
Ring Operational LED off.	Network is not operational or problem with Network Management Card.	Verify activity on network. Replace Network Management Card.
Port LED off.	Port disabled by management, Bad LED or faulty card.	Enable port through the management software. Otherwise, use the reset to default parameter switch (and notify the network manager that you are resetting the parameters). Replace the card
Port LED blinking red.	Unsupported configuration or ring topology, or loopback connector installed.	Notify your network manager. Reconfigure the cable connections or ring topology.
Port LED blinking green	Unable to connect; no cable attached.	Check cable connections. Run loopback test described in Section 2.6 to test the port. See Table 2–5 for problem solving during loopback testing.
Port LED red and card fault LED off.	Link Confidence Test (LCT) failure. Possible cable or cable connection problem.	Check the cable connections. Run the loopback test to verify the port.
Port LED red and card fault LED on.	Port in broken state.	Replace the card.
Port LED alternates red and green (port A only).	Port is in backup state.	No corrective action is required. The backup link becomes active if the primary link fails.

Table 2–3: Port Card Problem Solving

Symptom	Probable Cause	Corrective Action
A Card Fault LED is on (red), other Port Card LEDs are off, and unit LEDs normal.	Problem with the Port Card.	The card needs to be replaced or repaired. Notify your system/network manager or service provider.

Port LED off.	Port disabled by management, Bad LED or faulty card.	Enable port through the management software. Otherwise, use the reset to default parameter switch (and notify the network manager that you are resetting the parameters). Replace the card.
Port LED blinking red.	Unsupported configuration or ring topology.	Notify your network manager. Reconfigure the cable connections or ring topology.
Port LED blinking green	Connection in progress	Connection may take up to 1 minute to achieve. LED remaining in this state may be caused by very poor signal. Make sure the cable is fully connected and the connecting unit on the far end is powered up. If LED is still blinking green, perform the loopback test, as described in Section. 2.6.
Port LED red and card fault LED on.	Port broken.	The card needs to be replaced or repaired. Notify your system/network manager or service provider.
Port LED red and card fault LED is off.	Link Confidence Test (LCT) failure, possible cable or cable connection problem.	Check cable connections. Run the loopback test described in Section 2.6 to test the port. See Table 2–5 for problem solving during loopback testing.
Port LED alternates red and green.	Port is in backup state.	No corrective action is required. The backup link becomes active if the primary link fails.

Table 2–4: Optical Bypass Relay Problem Solving

Symptom	Probable Cause	Corrective Action
DECconcentrator 500 is OK but cannot communicate with the dual ring.	Optical bypass relay is stuck in the <i>bypass</i> position or RJ12 connector is not plugged in.	Verify by removing the relay and observing that communications among all stations is re-established. Replace the relay.
Upstream and downstream stations are wrapped when the concentrator is powered down or the controller/backplane LED is red.	1. Optical bypass relay is stuck in the <i>inserted</i> position. 2. Excessive loss induced by the optical bypass relay.	1. Replace the relay. 2. Ensure that the link loss induced by the relay does not cause the total interstation loss to exceed 11 dB. (Refer to the <i>FDDI Network Configuration Guidelines</i> manual.)

2.6 Loopback Testing

Perform loopback testing when LEDs indicate port faults on either the Port or Network Management Cards. Do this by using a loopback connector, which routes the transmitter output back into receiver. This test is used to discriminate between faults originating at the concentrator and those caused by the network or by devices on the network.

This test verifies the basic ability to transmit and receive. However, it does not verify the ability to receive minimum level signals or that the transmitter's output level is within specification.

To perform loopback testing, follow these steps:

1. Refer to the option card installation manual for the type of loopback connector to use.
2. Install the loopback connector in the port to be tested.
3. Observe and record the port LED status on the port where the loopback connector is installed. Normal operation for this LED is to blink red (indicating an illegal configuration).
4. Refer to Table 2–5 for corrective action.

Table 2–5: Problem Solving During Loopback Testing

Symptom	Probable Cause	Corrective Action
Port LED red ON, green ON, or blinking green.	Port failure.	Replace the Port card for that port.
Port LED blinking red.	Normal during loopback testing.	No action required.

2.7 Measuring the Optical Power

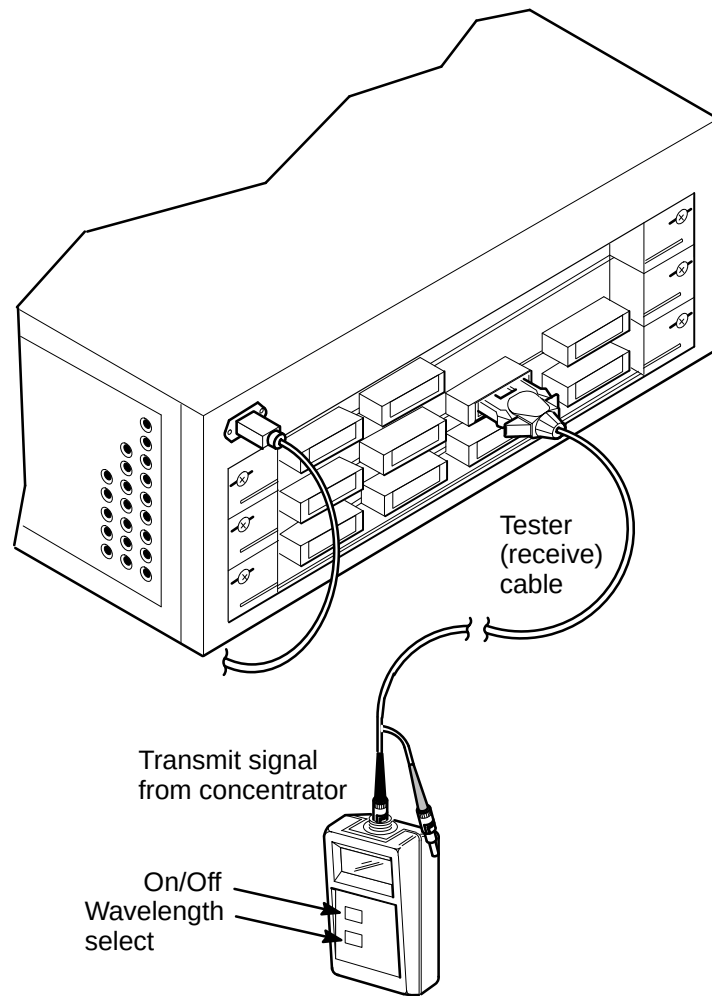
If a failure in a port disappears when a loopback test is performed, check the optical signals into and out of the port to determine if they are within specifications. To measure the power levels of the transmit and receive optical signals at the concentrator, use the SDU optical power meter kit (P/N 29-28384-01). This kit contains an optical power meter, a receive cable, and cleaning pads. To make the measurements, use the following steps:

NOTE

If measuring power at a simplex connector (ST), both the transmit and receive cables must be disconnected to get a proper light-signal pattern and observe correct power readings.

1. Set up the optical power meter as follows:
 - a. Remove the protective cap from the input test head.
 - b. Turn on the meter by pressing the ON/OFF switch.
 - c. Use the λ select switch to select the 1300-nm wavelength range. The wavelength value will appear on the LCD display.
2. To ensure a clean test connection, remove the protective caps from the test cable connectors and use a cleaning pad to wipe the connector faces.
3. To measure the power of the fiber optic signal transmitted by the concentrator port, refer to Figure 2–2 and follow these steps:
 - a. Connect the FDDI connector end of the receive cable to the port receptacle on the concentrator.
 - b. The other end of the receive cable has two leads (and fiber optic connectors). The lead with the arrow pointing towards the connector carries the transmit signal from the concentrator. Plug this lead into the test head of the meter.
 - c. The power level of the transmit signal will be displayed on the meter's LCD display. Record the value in Table 2–6.
 - d. Disconnect the receive cable from the concentrator and from the meter.

Figure 2-2: Measuring the Transmit Power (Multimode)



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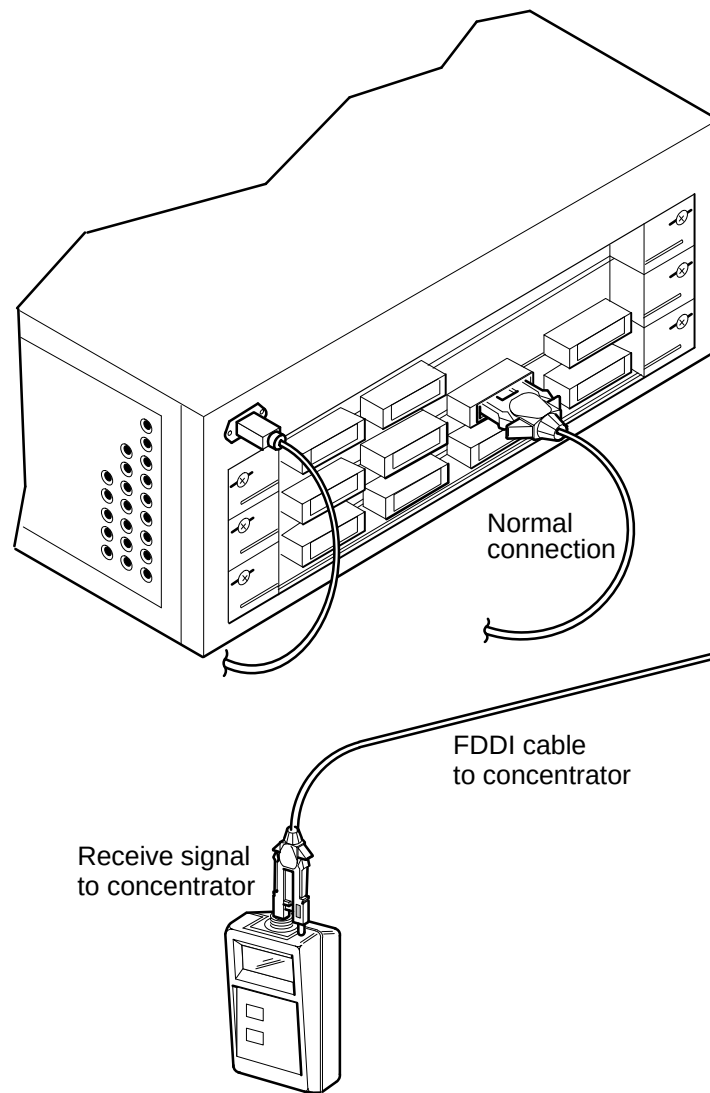
4. To measure the power of the fiber optic signal received by the concentrator, refer to Figure 2–3 and follow these steps:
 - a. Move the power meter close to the FDDI cable that normally plugs into the port of the concentrator.
 - b. Plug the output connector on that cable into the test head of the meter. (Note: The output connector is the smaller of the two connectors on the cable.)
 - c. The power level of the receive signal will be displayed on the meter's LCD display. Record the value in Table 2–6.

NOTE

If there is no reading when you perform step 4.-c, you could be checking the wrong connector (that is, the input connector rather than the output). If this occurs, measure power at the other connector.

Table 2–6 shows a sample table that you can use to record the receive and transmit power for the concentrator (station A) and for the upstream device (station B). You can also use the table to record the cable loss between the two stations (the transmit power at one station minus the receive power at its downstream station).

Figure 2-3: Measuring the Receive Power (Multimode)



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5. Check the recorded values against the specifications given below. If either measurement falls outside the given range, that optical signal is not within specifications. Refer to the flow chart in Figure 2–1 for recommended corrective actions.

ANSI multimode (using 62.5-μm multimode fiber cable):

- Power level of the transmit signal: –20 dBm to –14 dBm (max)
- Power level of the receive signal: –31 dBm to –14 dBm (max)

Low-power multimode (using 62.5-μm multimode fiber cable):

- Power level of the transmit signal: –22 dBm to –14 dBm (max)
- Power level of the receive signal: –29 dBm to –14 dBm (max)

Single-mode:

- Power level of the transmit signal: –8.0 dBm to –2.5 dBm (max)
- Power level of the receive signal: –30 dBm to –14 dBm (max)

Table 2–6: FDDI Transmit and Receive Power Calculation

Tx Power	STA	_____ dBm	STB	_____ dBm
Rx Power	STB	_____ dBm	STA	_____ dBm
Loss		_____ dBm		_____ dBm

Removal and Replacement Procedures

This chapter contains the removal and replacement procedures for the concentrator FRUs.

WARNING

Disconnect the ac power cord before removing any field-replaceable units. Do not apply power to the concentrator unless all covers are installed. Only qualified service engineers should perform any of these removal and replacement procedures.

WARNING

Some fiber optic equipment emits laser light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that the cable is connected to a light source.

3.1 Preparing the Concentrator for Servicing

The concentrator can be a desktop unit or rackmounted. The Network Management Card and Port Card(s) can be installed or removed without removing the plastic enclosure (for desktop models) or removing the concentrator from the rack. If the concentrator is a desktop unit, remove the plastic enclosure before servicing the internal FRUs. If the concentrator is rackmounted, remove it from the rack before servicing the internal FRUs.

The steps in Section 3.1.1 explain how to remove and replace the plastic enclosure from a desktop model. The steps in Section 3.1.2 explain how to remove and replace the concentrator from a rackmount.

3.1.1 Removing and Replacing the Plastic Enclosure

Desktop units have a plastic cover (top, bottom, and side spacers) and rubber feet that you must remove to access the main unit.

To remove the plastic enclosure, perform the following steps:

1. Remove power to the concentrator by unplugging the power cord from the wall outlet and then from the concentrator.

WARNING

Always remove the power cord from the concentrator and ac source when performing any removal and replacement procedures. Also remove any port cable connectors when servicing the concentrator.

2. Record the location and cable tag number of each port cable. Note the orientation of each cable and remove all port cables.

NOTE

Reinstall all cables back in their original ports and position; an incorrectly installed cable can cause the network to fail.

3. Turn the unit upside down and remove the four rubber feet screws as shown in Figure 3–1. (These screws also hold the top plastic cover and side spacers in place.)

NOTE

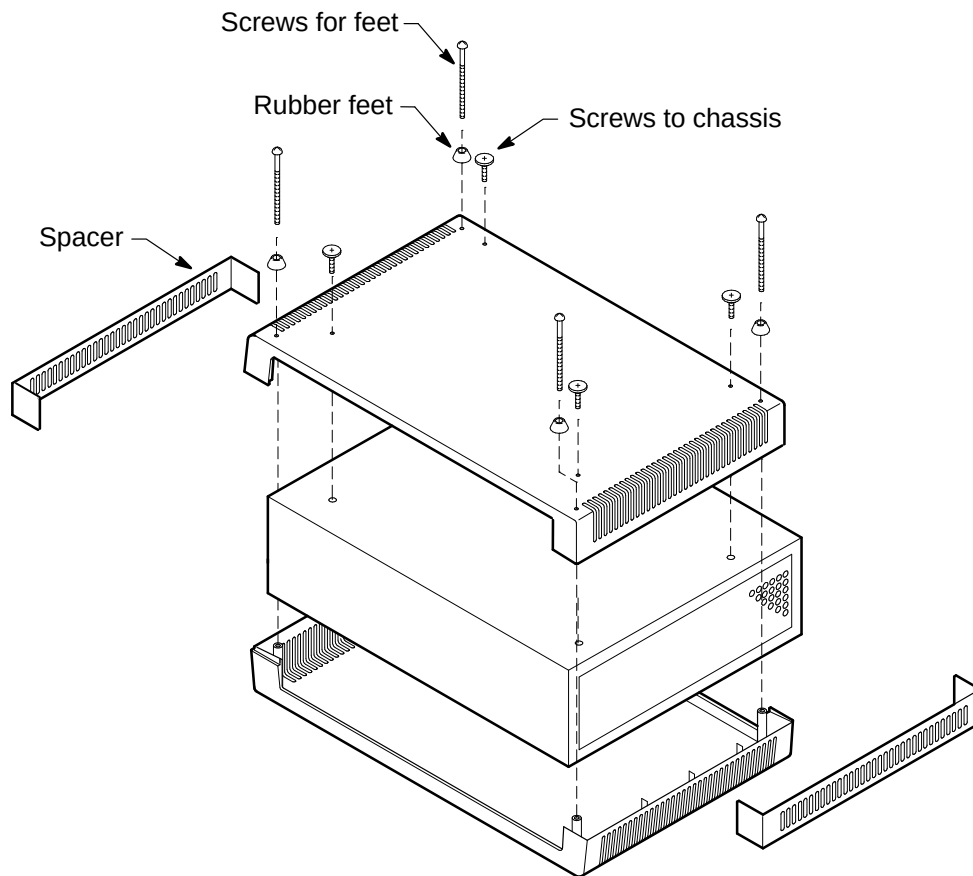
The top and bottom of the enclosure have arrows imprinted on the inside to help with the reassembly. The arrows indicate the front of the unit.

4. Remove the four bottom cover screws as shown in Figure 3–1.

5. Lift the bottom cover up and off, remove the side spacers, and lift the concentrator up and away from the top cover.
6. Save all removed hardware for later reinstallation.

To reinstall the plastic cover, reverse steps 1–5.

Figure 3–1: Plastic Enclosure Removal and Replacement



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3.1.2 Removing and Replacing a Rackmount Unit

To remove the concentrator from a rackmount, perform the following steps:

1. Remove power to the concentrator by unplugging the power cord from the wall outlet and then from the concentrator.

WARNING

Always remove the power cord from the concentrator and ac source when performing any removal and replacement procedures. Also remove any port cable connectors when servicing the concentrator.

2. Record the location and cable-tag number of each port cable. Note the orientation of each cable and remove all port cables.

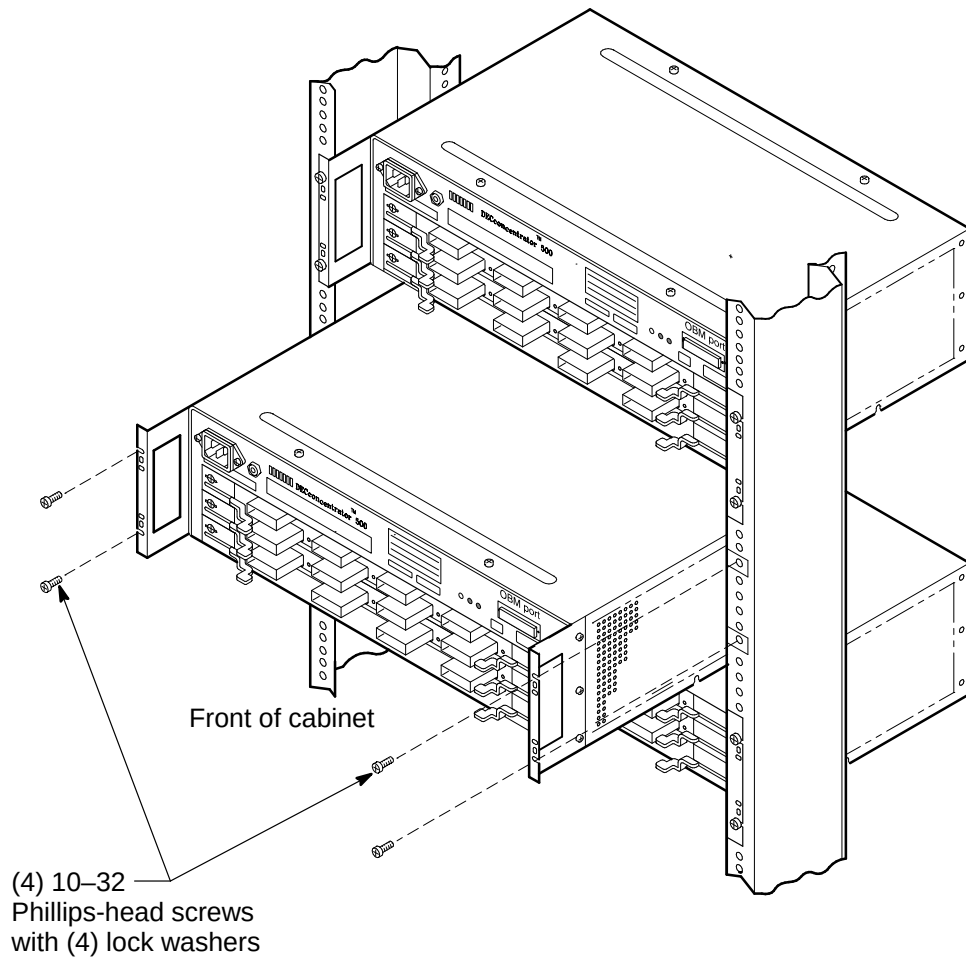
NOTE

Make sure to reinstall all cables back in their original ports and position; an incorrectly installed cable can cause the network to fail.

3. Support the unit and remove the four rackmount screws as shown in Figure 3-2.
4. Remove the unit from the rack.
5. Place the concentrator on a clean flat surface.
6. If necessary, remove the rackmount brackets by removing the six bracket screws as shown in Figure 3-3.
7. Save all removed hardware for later reinstallation.

To install the concentrator in a rack, reverse steps 1-6.

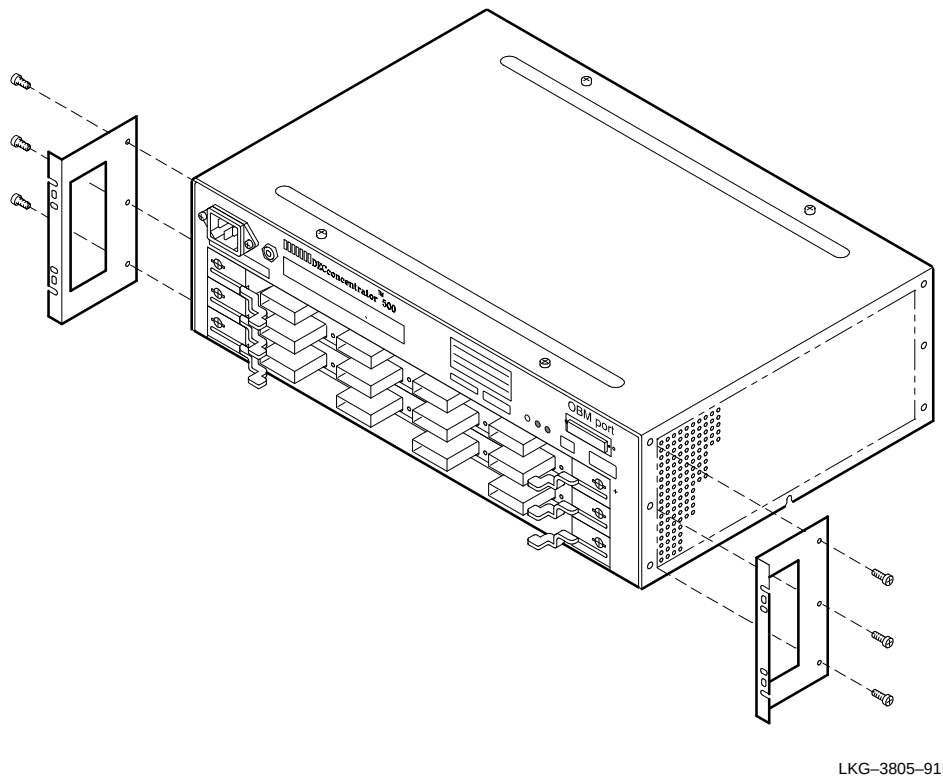
Figure 3-2: Rackmount Unit Removal and Replacement



NOTE:
Always leave 2.54 cm (1 in) of space between
mounted devices for passing cables to the back of the rack.

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Figure 3-3: Rackmount Bracket Removal and Replacement



3.2 Removing and Replacing Concentrator FRUs

This section describes how to remove option cards and how to remove the metal chassis cover to gain access to the concentrator internal FRUs. Options cards are removed directly from the concentrator and do not require the removal of any covers for access. Internal FRUs require the removal of the metal chassis cover. Once the chassis cover is removed, follow the appropriate procedure for the FRU to be replaced.

The major concentrator FRUs are:

- Option cards (Network Management and Port Card—all variations)

Internal FRUs:

- Controller/backplane board
- Fan
- Power supply
- OBM card and cable assembly

Additional procedures are included for the following replaceable items:

- Power connector and filter
- Circuit breaker removal

A Phillips-head screwdriver is required to perform the removal and replacement procedures.

WARNING

Do not attempt to remove any of the field-replaceable units (including the option cards) while the ac power cord is connected or while there is power to the concentrator (ON). Safety regulations require all covers to be installed before applying power to the concentrator. Removal and installation of the field-replaceable units should only be performed by qualified service personnel.

CAUTION

Static electricity can damage modules and electronic components. Digital recommends you use a grounded wrist strap and grounded work surface (Digital P/N 29-11762) when you handle any modules or internal parts.

3.2.1 Removing and Replacing Option Cards

Options cards are removed directly from the concentrator and do not require the removal of any covers. Rackmount units do not need to be removed from the rack to replace the option cards.

Several versions of the Network Management Card and the Port Card exist. Make sure that you replace a defective card with an identical card. Refer to the option card version identification on the left side of the handle.

NOTE

The Network Management Card contains two switches. Set the switches on the replacement card to match the card you removed. (See Section 1.2 for information on location and setting the switches.)

NOTE

Follow the directions in Section 2.4.2 when you are ready to reapply power to the unit.

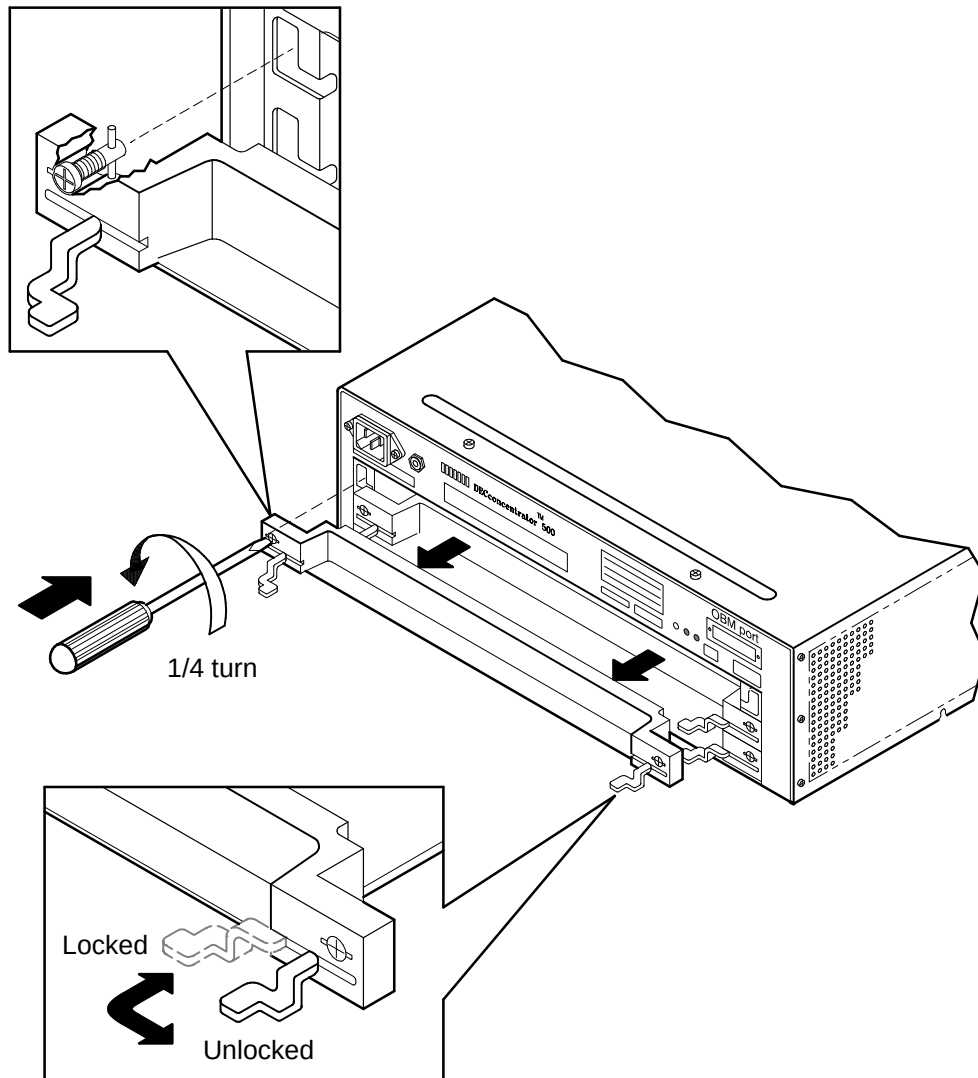
CAUTION

Use a pointed tool to change switch settings. Never use a pencil; graphite can damage switches.

To remove an option card, perform steps 1–5.

1. Remove power to the concentrator by unplugging the power cord from the wall outlet and then from the concentrator.
2. Record the location and cable tag number of each port cable being removed. Note the orientation of each cable and remove all port cables from the option card.
3. Push in each option card handle captive screw and rotate it 1/4 turn counter-clockwise to release as shown in Figure 3–4.
4. Unlock the option card locking levers.
5. Pull the option card straight out.

Figure 3-4: Option Card Removal and Replacement



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To replace an option card, perform steps 6–9.

6. Place the option card locking levers in the unlocked position (swung outward) and slide the card into the slot until it makes contact with the controller/backplane board connectors.
7. Push the option card locking levers inward to lock the card in place.
8. Push in each option card handle captive screw and rotate it 1/4 turn clockwise to secure the card.
9. Connect the interface cables and the power cord when you complete the installation.

3.2.2 Opening the Chassis Cover

Before opening the chassis cover, ensure that the concentrator is prepared for servicing by following the instructions in Section 3.1.

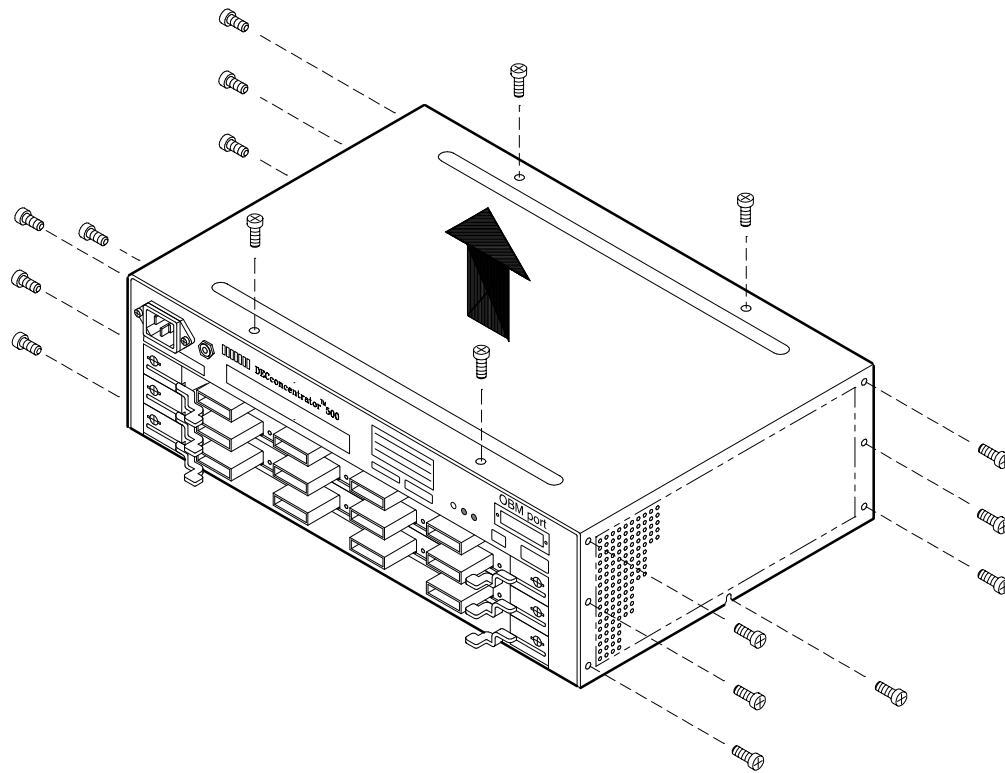
WARNING

Do not attempt to remove the chassis cover while the ac power cord is connected or while there is power to the concentrator. Chassis cover and field-replaceable unit removal should only be performed by qualified service personnel.

Open the metal chassis cover (make sure that the ESD wrist strap is attached) by performing the following steps:

1. Remove the four top chassis screws as shown in Figure 3–5.
2. Remove the 14 end screws shown Figure 3–5. (On a rackmounted unit, you removed six of these screws when you removed the rackmount brackets.)
3. Lift the chassis cover off.
4. Save all removed hardware for later reinstallation.

Figure 3-5: Chassis Cover Removal and Replacement



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3.2.3 Removing and Replacing the OBM Card

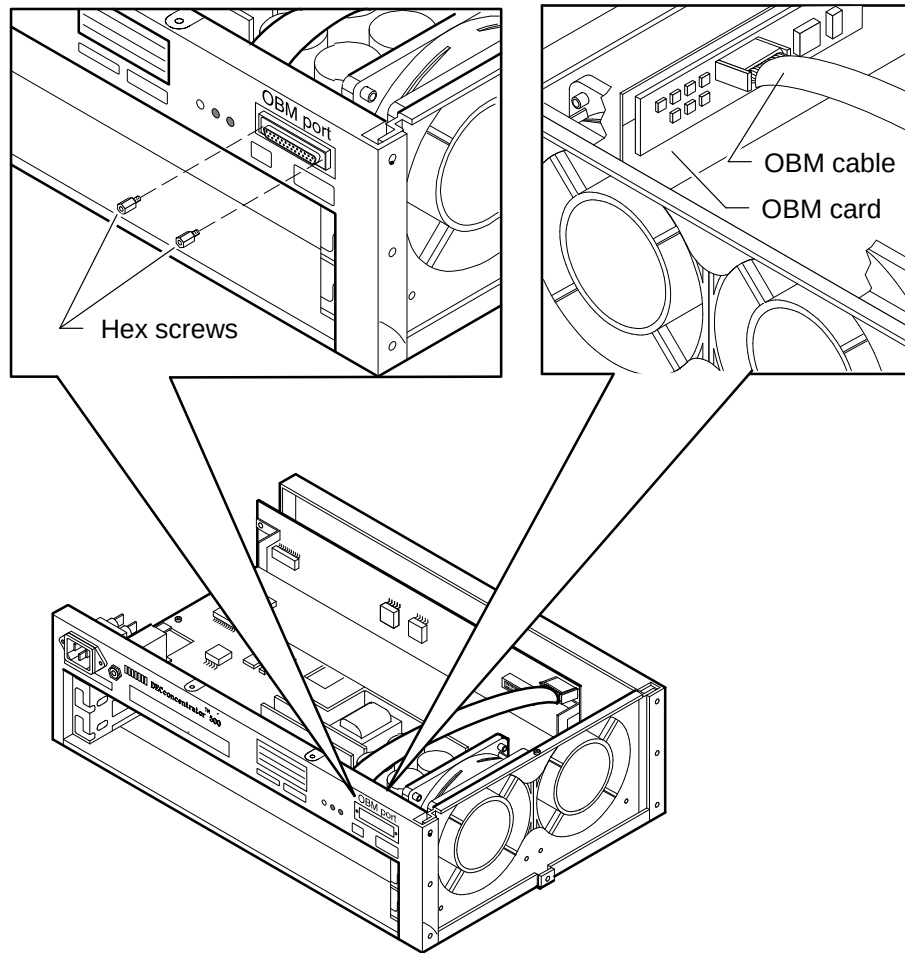
Before beginning this procedure, refer to Section 3.1 for instructions on preparing the concentrator for servicing, and to Section 3.2.2 for instructions on removing the chassis cover.

To remove the OBM card, perform the following steps:

1. Disconnect the OBM cable from the backplane connector.
2. Remove the two hex screws that attach the OBM card to the I/O panel, as shown in Figure 3-6.
3. Remove the OBM card and cable assembly from the concentrator.
4. Save the screws for later reinstallation.

To install an OBM card, reverse steps 1 – 3.

Figure 3–6: OBM Card Removal and Replacement



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3.2.4 Removing and Replacing the Controller/Backplane Board

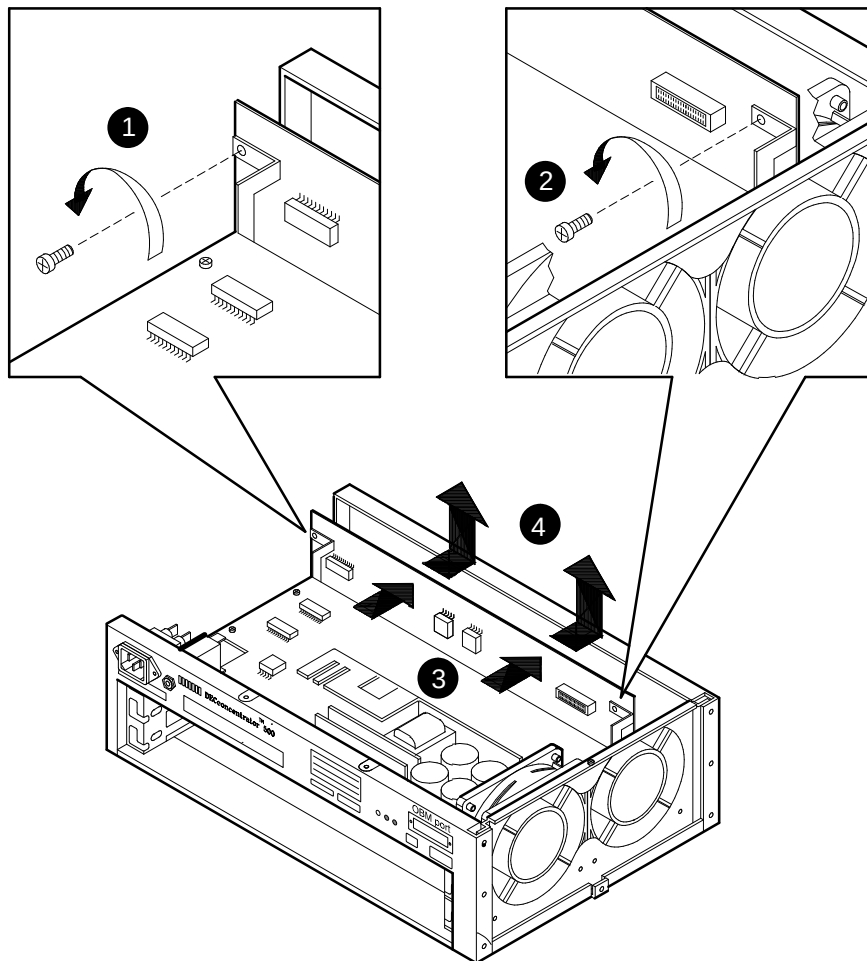
Refer to Section 3.1 for detailed instructions on preparing the concentrator for servicing. Refer to Section 3.2.2 for instructions on removing the chassis cover.

To remove the controller/backplane board, perform the following steps:

1. Remove all option cards.
2. Disconnect the OBM cable from its backplane connector as shown in Figure 3–6.
3. Remove the two controller/backplane board screws from the card cage posts as shown in Figure 3–7.
4. Disconnect the controller/backplane board from the power supply by gently pushing the top edge of the card away from the power supply.
5. To remove the controller/backplane board, lift the card straight up from the chassis.
6. Save all removed hardware for later reinstallation.

To install a controller/backplane board, reverse steps 1–5.

Figure 3–7: Controller/Backplane Board Removal and Replacement



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3.2.5 Removing and Replacing the Fan

This section describes how to remove the concentrator fans. Both fans are replaced as an assembly.

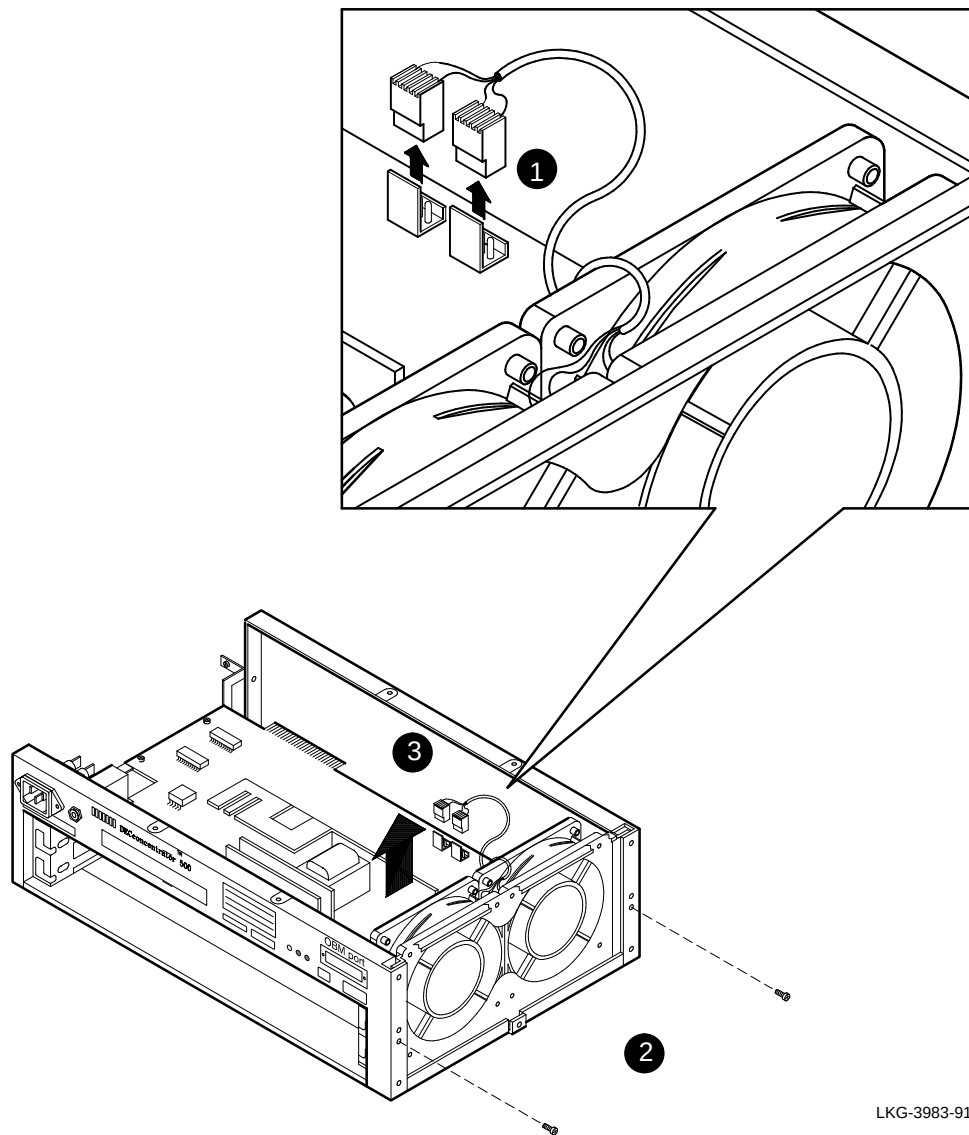
Before beginning this procedure, refer to Section 3.1 for instructions on preparing the concentrator for servicing, and to Section 3.2.2 for instructions on removing the chassis cover.

To remove the fan assembly, perform the following steps:

1. Remove the chassis cover as described in Section 3.2.
2. Disconnect the two 3-pin fan connectors from the power supply as shown in Figure 3–8.
3. Remove the two fan restraining screws as shown in Figure 3–8 and lift the assembly straight up.
4. Save all removed hardware for later reinstallation.

To install a fan assembly reverse steps 1–3.

Figure 3–8: Fan Removal and Replacement



3.2.6 Removing and Replacing the Power Supply

This section describes how to remove the concentrator power supply.

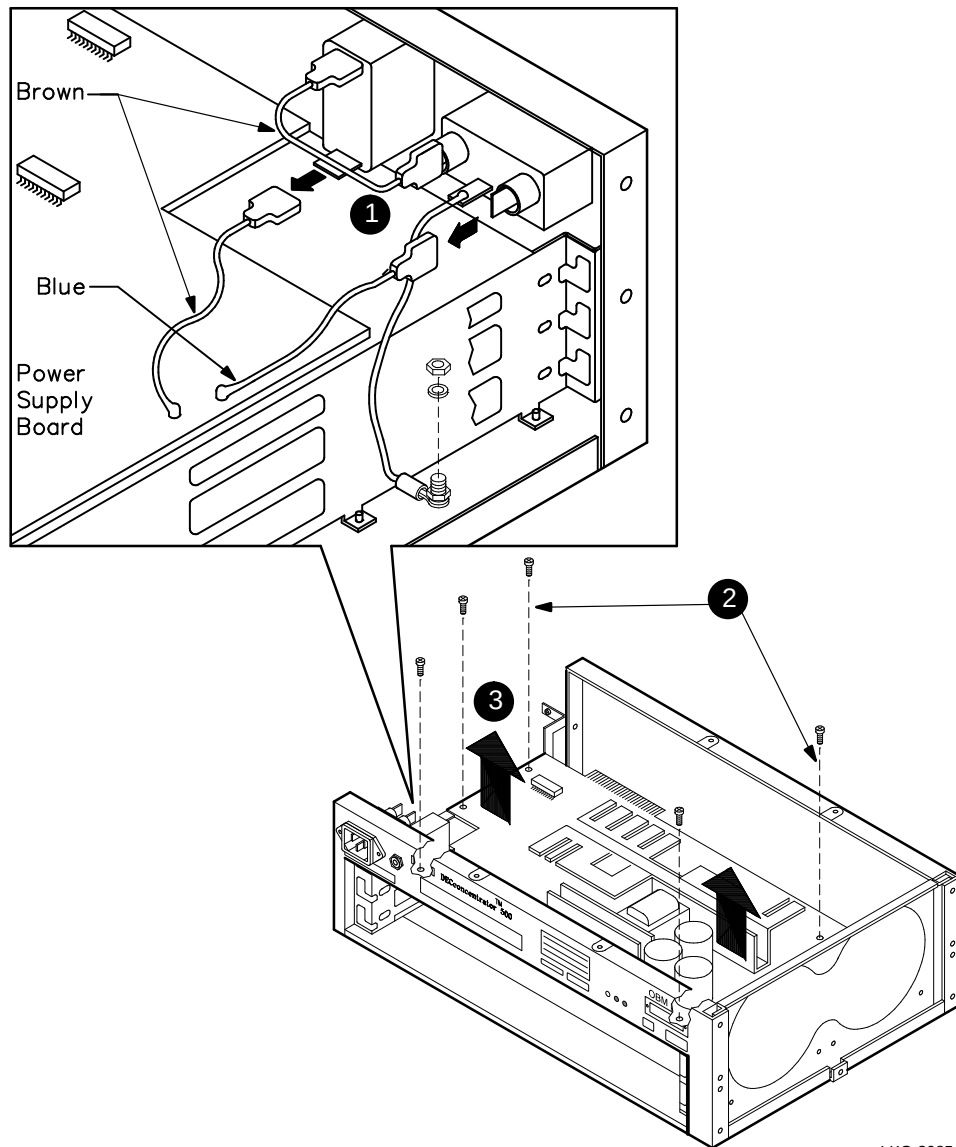
Before beginning this procedure, refer to Section 3.1 for instructions on preparing the concentrator for servicing, and to Section 3.2.2 for instructions on removing the chassis cover.

To remove the power supply perform the following steps:

1. Remove the controller/backplane board as described in Section 3.2.4 to allow access to the power supply.
2. Disconnect the OBM cable from the OBM card and remove the cable.
3. Disconnect the two 3-pin fan connectors from the power supply as shown in Figure 3–8.
4. Disconnect the blue and brown lead wires from the circuit breaker and line filter as shown in Figure 3–9.
5. Remove the five power supply screws from the card cage as shown in Figure 3–9.
6. Lift the power supply straight up and out of the cage.

To install a power supply, reverse steps 1–6.

Figure 3–9: Power Supply Removal and Replacement



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3.2.7 Removing and Replacing the Power Connector and Filter

This section describes how to remove the concentrator power connector and filter.

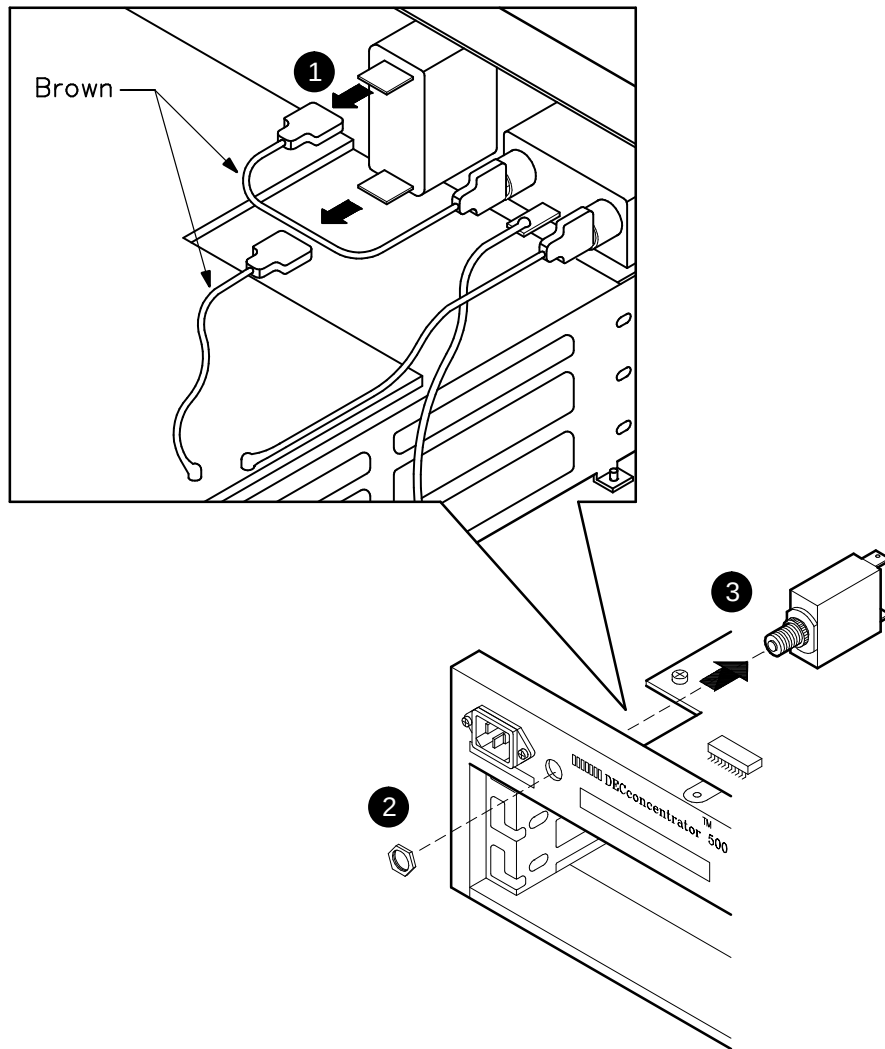
Before beginning this procedure, refer to Section 3.1 for instructions on preparing the concentrator for servicing, and to Section 3.2.2 for instructions on removing the chassis cover.

To remove the power connector and filter, perform the following steps:

1. Disconnect the green/yellow grounding strap from the chassis, and the blue and brown lead wires from the filter as shown in Figure 3–10.
2. Remove the two power connector and filter screws as shown in Figure 3–10.
3. Pull the power connector and filter out from the unit.

To install a power connector and filter, reverse steps 1–3.

Figure 3–10: Power Connector and Filter Removal and Replacement



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3.2.8 Removing and Replacing the Circuit Breaker

This section describes how to remove the concentrator circuit breaker.

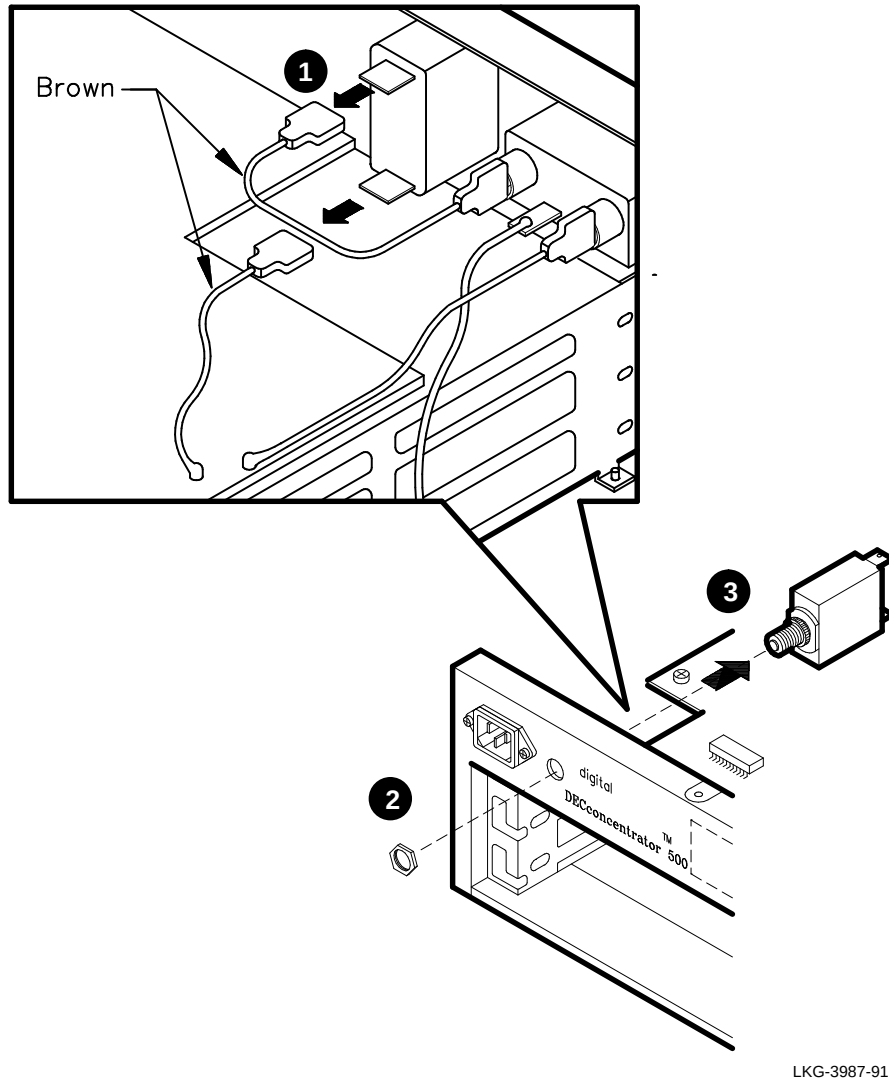
Before beginning this procedure, refer to Section 3.1 for instructions on preparing the concentrator for servicing, and to Section 3.2.2 for instructions on removing the chassis cover.

To remove the circuit breaker, perform the following steps:

1. Disconnect the two brown lead wires from the circuit breaker as shown in Figure 3–11.
2. Remove the circuit breaker nut and washer as shown in Figure 3–11.
3. Push the circuit breaker away from the panel and remove.

To install a circuit breaker, reverse steps 1–3.

Figure 3–11: Circuit Breaker Removal and Replacement



3.3 Reassembling and Reinstalling the Concentrator

To reassemble the concentrator, perform steps 1–4.

1. Carefully replace the chassis cover onto the bottom of the chassis.
2. Reinstall the 18 screws on the sides and top of the unit. Note that four flathead screws go on the top of the chassis and should be reinstalled first to help with the cover alignment. Six of the side screws hold the rackmounting brackets, which should be installed at this time.
3. Reinstall the option cards.
4. Test the unit for proper operation by following the procedures contained in Chapter 2.

To reinstall the concentrator, perform step 5 or 6.

5. If the unit is a desktop model, reinstall the plastic enclosure by following the instructions in Section 3.1.1. Note that the unit is shown upside down so that the rubber feet and screws can be reinstalled. Connect all cables and verify the installation by referring to the *DECconcentrator 500 Installation* manual.

NOTE

The top and bottom of the enclosure have arrows imprinted on the inside to help with the reassembly. The arrows indicate the front of the unit.

6. If the concentrator is rackmounted, reinstall the unit by following the instructions in Section 3.1.2. Verify the reinstallation by referring to the *DECconcentrator 500 Installation* manual.

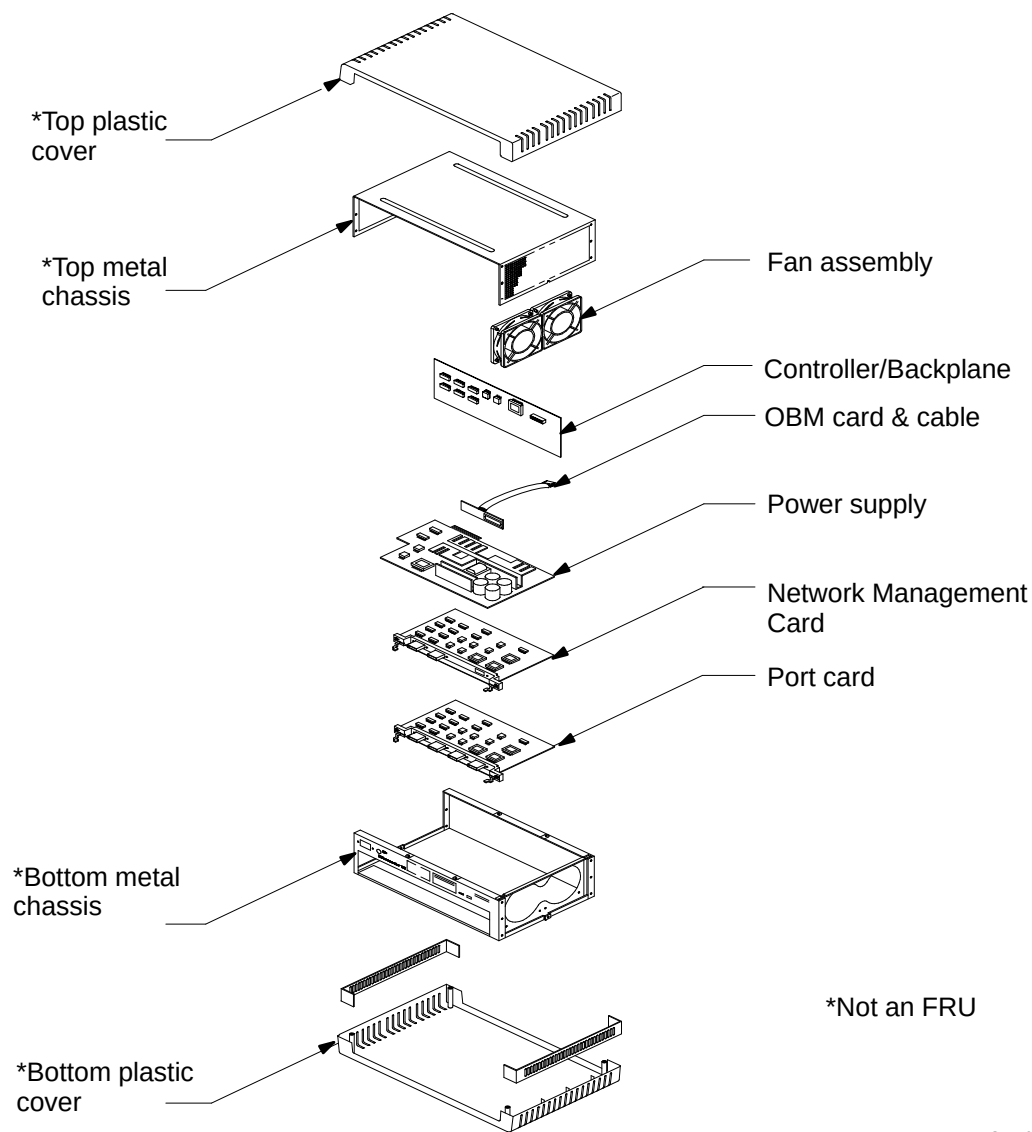
A

Parts List

Figure A-1 is an exploded view of the concentrator modular components. Table A-1 lists the FRUs and their Digital part numbers.

Refer to the *DECconcentrator 500 Illustrated Parts Breakdown* manual for additional information on part numbers.

Figure A-1: DECconcentrator 500 FRUs



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Table A-1: DECconcentrator 500 Parts List

Part	Digital Part Number
Controller/backplane board	54-19379-01
OBM card	54-19449-01
OBM cable	17-03347-01
Network Management Card (DEFCN-MA)	54-19383-01
Network Management Card (DEFCN-EA)	54-19383-02
Network Management Card (DEFCN-CA)	54-19383-03
Network Management Card (DEFCN-DA)	54-19383-04
Port Card (DEFCN-NA)	54-19381-01
Port Card (DEFCN-LA)	54-19393-01
Port Card (DEFCN-FA)	54-19381-02
Port Card (DEFCN-SA)	54-19431-01
Port Card (DEFCN-TA)	54-19425-01
Dual fan assembly	70-26996-01
Power supply	H7855-A
Circuit breaker assembly	12-19912-02
Power connector/filter assembly	12-32976-01
Blank handle	70-26994-01
Subassembly, base (chassis)	70-26993-01
Assembly, cover (chassis cover)	70-26727-01
Plastic enclosure bottom	74-32072-03
Plastic enclosure spacer	74-32246-01
Plastic enclosure top	74-32072-01
Rackmount brackets	H041-AE
Fiber optic loopback connector	12-32005-01
Low power loopback connector	17-02970-01
Single-mode loopback connector	12-34830-01
STP loopback connector	12-35629-01
ThinWire loopback connector	12-35621-01
Antistatic service kit	29-11762

Specifications

This section contains the DECconcentrator 500 physical, electrical, and environmental specifications.

B.1 Physical Specifications

The DECconcentrator 500 is available as either a rackmounted or desktop unit. The physical dimensions are detailed in Table B-1.

Table B-1: Physical Specifications

Rackmounted Unit	Desktop Unit
Height 13.4 cm (5.3 in)	Height 16.1 cm (6.3 in)
Depth 29.9 cm (11.8 in)	Depth 31.4 cm (12.3in)
Width 43.6 cm (17.2 in)	Width 49.3 cm (19.4 in)
Weight 7.9 kg (17.5 lbs)	Weight 10 kg (22 lbs)

B.1.1 Environmental Specifications

The DECconcentrator 500 operates in an open office environment, equipment room, or in an exposed area of an industrial site. The DECconcentrator 500 is not designed for operation in an air plenum. The environmental specifications are detailed in Table B-2.

Table B-2: Environmental Specifications

Parameter	Specification
<i>Operating Environment:</i>	
Temperature (at sea level)*	5° C (41° F) to 35° C (95° F) – with plastic enclosure 5° C (41° F) to 50° C (122° F) – without plastic enclosure
Relative humidity	10% or less to 95% (noncondensing)
Wet bulb	32° C (90° F) maximum
Dew point	2° C (36° F) minimum
Altitude	Sea level to 2.4 km (8000 ft)
Air flow	200 LFM (minimum). For adequate airflow, provide about 10 to 15 cm (4 to 6 in) of space at both ends
Inlet/outlet air temperature	Inlet: 50° C (122° F) maximum Outlet: 60° C (140° F) maximum
<i>Shipping Environment:</i>	
Temperature	–40° C (–40° F) to 66° C (151° F)
Relative humidity	10% or less to 95% (noncondensing)
Altitude	Sea level to 9.1 km (30,000 ft)
*Reduce the maximum operating ambient temperature by 1.8° C/1000 m (or 1° F/1000 ft) for operation at high-altitude sites.	

B.1.2 Electrical Specifications

The DECconcentrator 500 operates at 120 Vac or 220/240 Vac. The electrical specifications are detailed in Table B–3. Details on the internal power supply are contained in Table B–4.

Table B–3: Electrical Specifications

Parameter	120 Vac Operation	220/240 Vac Operation
Line voltage	110 V	220 V
Voltage tolerance	88 Vac to 132 Vac	176 Vac to 264 Vac
Power source phasing	Single	Single
Frequency	50/60 Hz	50/60 Hz
Line frequency tolerance	47 Hz to 63 Hz	47 Hz to 63 Hz
Input current (typical)	1.6 ARMS at 88 VRMS line	0.92 ARMS at 176 RMS line
Input current (maximum)	2.3 ARMS at 88 VRMS line	1.2 ARMS at 176 RMS line
Input power (typical)	105 W (input VA 155 maximum)	105 W (input VA 177 maximum)
Input power (maximum)	120 W (input VA 200 maximum)	120 W (input VA 200 maximum)
Overvoltage condition	150 VRMS for 1 second maximum	300 VRMS for 1 second maximum
Cold start inrush current	Low range: 35 A peak High range: 35 A peak	Low range: 35 A peak High range: 35 A peak
Heat dissipation (typical)	105 W	105 W
Heat dissipation (maximum)	120 W	120 W

B.2 Power Supply

The DECconcentrator 500 power supply is a 154-watt, open-frame, low-noise off-line switching power supply. The outputs are listed in Table B–4.

Table B–4: Power Supply Specifications

Voltage	Current	Maximum Current*
+5.1 Vdc	18 A	25 A
+12.0 Vdc	1 A	2.5 A
–5.2 Vdc	10 A	15 A

* The maximum power output of the supply is 154 watts. The maximum currents listed for the individual supplies can be drawn, provided the sum of the currents does not exceed the total power output of the supply.

The power supply automatically shuts down if any of the following conditions occur:

- Improper Output
 - If an overcurrent condition occurs on either the +5.1 Vdc or –5.2 Vdc output, the power supply output becomes latched and will not automatically recover even if the cause of the overcurrent condition is removed. To reset the supply and resume normal operation, you must cycle power by removing ac power to the unit, waiting at least 10 seconds, then reapplying the ac power.

With the proper cooling, the outputs are capable of operating indefinitely into a short circuit.

If an overcurrent condition occurs on the +12 Vdc output none of the other outputs will be affected. The supply will automatically recover when the cause of the overcurrent is removed. The output current of the +12 Vdc must be less than 5 amperes after 1 minute.
- Overvoltage Protection
 - If an overvoltage condition occurs on any of the outputs, the power supply becomes latched. To reset the supply and resume normal operation, you must remove ac power, wait 10 seconds, then reapply the ac power.

- Thermal Protection
 - The maximum inlet temperature must not exceed 50° C (122° F). If cooling air is lost and the unit operating temperature exceeds 50° C (122° F), the power supply protects itself by shutting down. Just prior to shutting down, the power supply deasserts POK to alert the system of the impending shutdown. After the problem has been corrected, the power supply must be reset by recycling ac power as described in the previous paragraph .
- Auto-voltage select
 - This feature permits operation at 110/120 Vac or 220/240 Vac without setting a voltage selection switch.

B.3 Fiber Cable Specifications

Table B–5 and Table B–6 list multimode fiber optic cable specifications.

Table B–5: Multimode Fiber Cable Specifications

Recommended Cable	Parameters
Core diameter	$62.5 \pm 3.0 \mu\text{m}$
Cladding diameter	$125.0 \pm 2.0 \mu\text{m}$
Nominal operating wavelength	1300 nm
Nominal aperture	0.275 ± 0.015
Zero dispersion slope	$0.110 \text{ ps}/(\text{nm}^2 \bullet \text{km})$, maximum
Optical power attenuation	$\leq 1.5 \text{ dB/km @ } 1300 \text{ nm}$
Minimum power budget	11.0 dB @ 1300 nm
Minimum bandwidth	500 MHz•km
Maximum distance	2 km (1.2 mi.)

Table B-6: Alternate Multimode Fiber Cable Specifications

Alternate Cable	100/140	50/125
Nominal core diameter	100 $\mu\text{m}^* \pm 4.0 \mu\text{m}$	50 $\mu\text{m}^* \pm 3.0 \mu\text{m}$
Nominal cladding diameter	140 $\mu\text{m}^* \pm 6.0 \mu\text{m}$	125 $\mu\text{m}^* \pm 2.0 \mu\text{m}$
Nominal operating wavelength	1300 nm	1300 nm
Nominal numerical aperture	0.290 $\pm$ 0.02	0.200 $\pm$ 0.02
Minimum bandwidth	500 MHz•km	500 MHz•km
Minimum power budget	11 dB	6.0 dB
Maximum distance	1.6 km (0.96 mi.)	2 km (1.2 mi.)
* Power budget depends on core and cladding tolerances.		

NOTE

Lengths less than 1 km (0.6 mi.) of 100 micron fiber do not have sufficient optical loss. Malfunction of the receiver can occur. Use 62.5/125 patch cords to induce loss.

The FDDI single-mode PMD standard (currently under development) describes the characteristics of single-mode fiber for long-distance links. Table B-7 lists the single-mode fiber optic cable specifications.

Table B-7: Single-Mode Fiber Cable Specifications

Recommended Cable	Parameters
Mode Field diameter	8.2 μm to 10.5 μm
Cladding diameter	125 $\mu\text{m} \pm 2 \mu\text{m}$
Fiber cladding noncircularity	2% maximum
Core to cladding concentricity error	1 μm maximum
Nominal operating wavelength	1300 nm
Fiber cutoff wavelength	1270 nm maximum
Zero dispersion wavelength	1300 to 1322 nm
Zero dispersion slope	0.095 ps/(nm ² •km) maximum
Optical power attenuation	$\leq 0.40 \text{ dB/km @ } 1310 \text{ nm}$
Power budget	22 dB
Minimum required loss	12 dB
Maximum distance	40 km (24 miles)

B.4 General Specifications for ThinWire and Shielded Twisted-Pair Cable

The cableplant meets the following parameters:

- The maximum cable length is 100 meters.
- The link has a maximum of two patch cables: a crossconnect cable and a non-spliced behind-the-wall cable.
- The cable is continuous, without any taps or junctions.

Cable configurations conform to the EIA/TIA-568 building wiring standard, which states that the horizontal is limited to a maximum of 90 meters, including a maximum of 3 meters in the work area, and a maximum of 6 meters for cross-connecting.

B.5 ThinWire Cabling Specifications

The ThinWire cableplant should meet the following:

- The ThinWire/10base2 50-ohm coaxial cable must conform to the IEEE 802.3 standard.
- The loss must be less than 11.5 dB measured at 62.5 MHz with a Hewlett-Packard HP4195A or equivalent network analyzer.
- Cables must be installed in accordance with the typical installation guidelines specified by the vendors of each cable type.

B.6 Shielded Twisted-Pair Cabling Specifications

Verify that each cableplant meets the following parameters:

- Cabling must be installed and verified to conform to the IEEE 802.5 token ring network installation guidelines.
- Cables must be installed in accordance with the typical installation guidelines specified by the vendors of each cable type.
- The loss must be less than 12 dB measured at 62.5 MHz.

Related Documents

Refer to the following documents for additional information about the DECconcentrator 500 and other associated FDDI products. Information for ordering the documents is at the back of this manual.

- *DECconcentrator 500 Installation* (Order No. EK-DEFCN-IN)

This manual describes how to configure and install the DECconcentrator 500.

- *DECconcentrator 500 Multimode Option Card Installation*
(Order No. EK-DEFCN-MM)

This manual describes how to install additional or replacement multimode option cards in the DECconcentrator 500.

- *DECconcentrator 500 Single-mode Option Card Installation*
(Order No. EK-DEFCN-SM)

This manual describes how to install additional or replacement single-mode option cards in the DECconcentrator 500.

- *DECconcentrator 500 ThinWire and Shielded Twisted-Pair Option Card Installation* (Order No. EK-DEFCN-CM)

This manual describes how to install ThinWire and shielded twisted-pair option cards in the DECconcentrator 500.

- *DECconcentrator 500 Illustrated Parts Breakdown* (Order No. EK-DEFCN-IP)

This manual shows all the parts of the concentrator and lists the part order numbers.

- *DECbridge 500/600 Installation and Upgrade* (Order No. EK-DEFEB-IN)

This manual describes how to install or upgrade the DECbridge 500/600 series.

- *DECbridge 500/600 Problem Solving* (Order No. EK-DEFEB-PS)

This manual describes how to isolate faults in the DECbridge 500/600 series to the field-replaceable unit (FRU), and also how to remove and replace each FRU. This is a field problem-solving manual.

- *DECconnect System Fiber Optic Planning and Configuration* (Order No. EK-DECSY-FP)

This manual describes the planning requirements, product information, and guidelines for configuring DECconnect system fiber optic networks that use DECconnect system fiber optic products.

- *DECconnect System Fiber Optic Installation* (Order No. EK-DECSY-FI)

This manual describes how to install a DECconnect system fiber optic plant.

- *DECelms Installation* (Order No. AA-PAK1A-TE)

This manual describes how to install and verify DECelms (DEC Extended LAN Management Software) on a VMS system.

- *DECelms Use* (Order No. AA-PAK2A-TE)

This manual describes how to use DECelms to configure, manage, and monitor the LAN Bridge 100, LAN Bridge 150, LAN Bridge 200, DECbridge 500, and DECconcentrator 500.

- *DECelms Reference* (Order No. EK-PBWBA-TE)

This is a reference guide to the DECelms commands.

- *DECmcc Installation* (Order No. AA-PD58-BTE)

This manual describes how to plan and install the DECmcc Extended LAN Manager software.

- *DECmcc Concentrator Access Module Use* (Order No. AA-PH31A-TE)

This manual describes the DECconcentrator 500 entity model, entity management, and the directives necessary to perform typical management operations.

- *Fiber Distributed Data Interface System Level Description*
(Order No. EK-DFSLD-SD)

This manual describes the FDDI system, how it works, and the role of the individual components.

- *Fiber Distributed Data Interface Network and Configuration Guidelines*
(Order No. EK-DFDDI-CG)

This manual describes the guidelines for connecting devices to an FDDI network. It also includes network configurations and examples.

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HOW TO ORDER ADDITIONAL DOCUMENTATION

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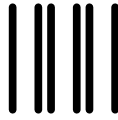
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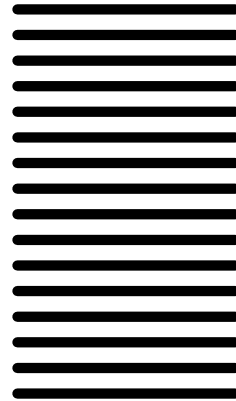
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