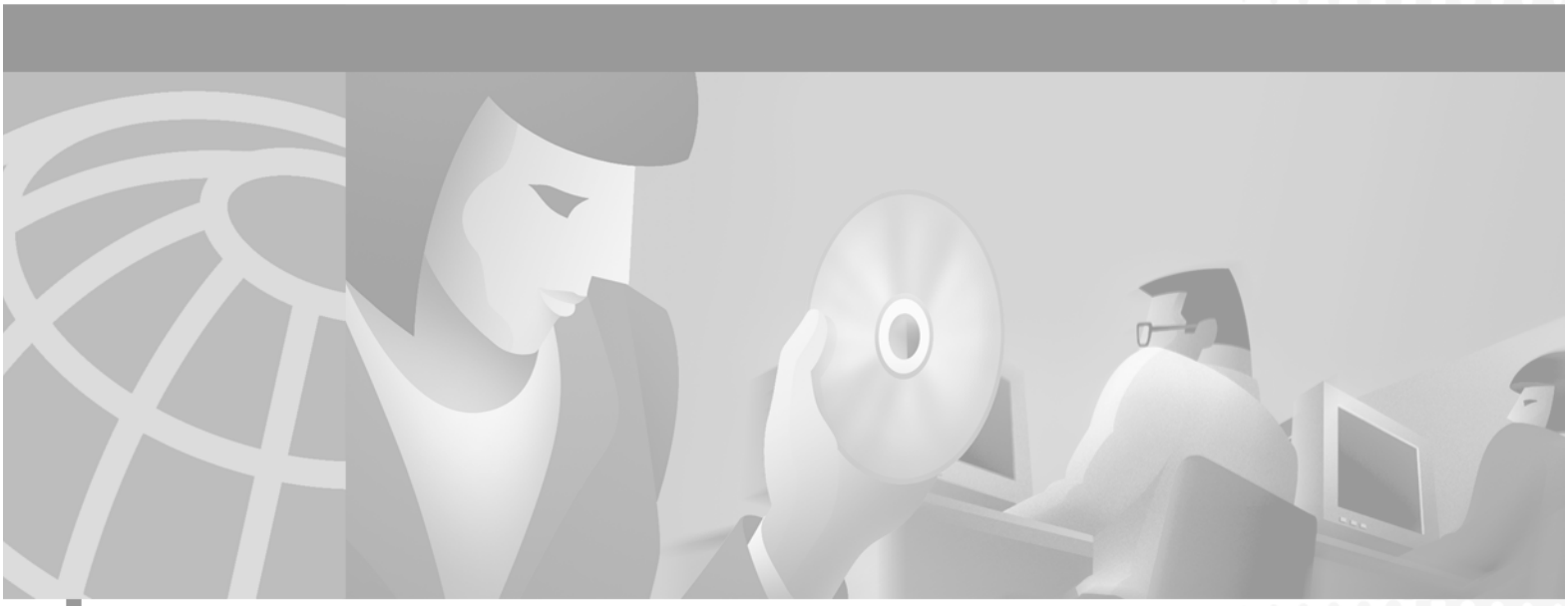

Cisco ONS 15200 Installation, Setup, and Test Manual

Hardware Release 1.1
January 2002

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Customer Order Number: DOC-7813765=
Text Part Number: 78-13765-01

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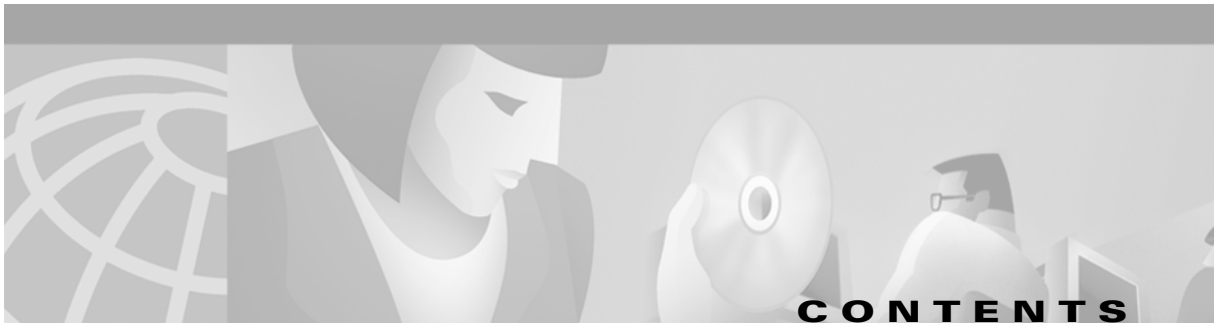

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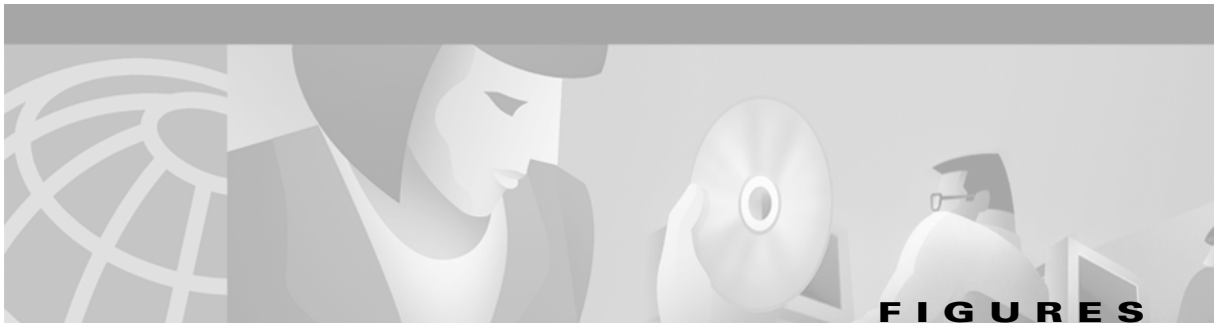

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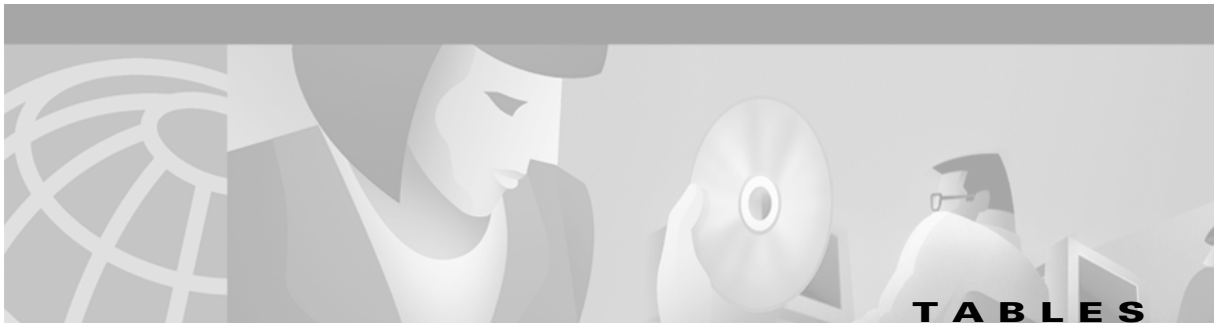

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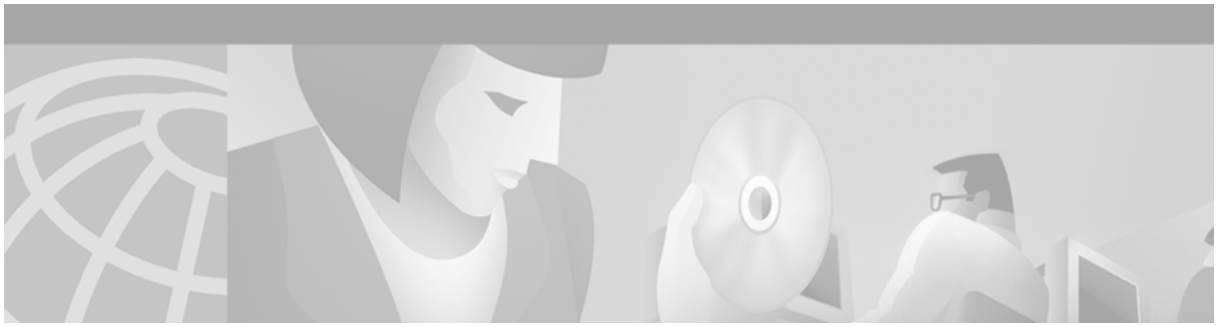

About this Manual

The *ONS 15200 Installation, Setup, and Test Manual* provides procedures for creating an ONS 15200 system configuration.

This publication is intended for use by installation, manintenance, and repair technicians or personnel with similar duties.

Manual Structure

The ONS 15200 is a DWDM metro system operating in the 1550 nm transmission window. All ONS 15200 configurations consist of one or more ONS 15252 Multichannel Units (MCUs) and ONS 15201 Single-Channel Units (SCUs).

The *ONS 15200 Installation, Setup, and Test Manual* has five chapters and two appendices:

- Chapter 1, “Safety Summary,” lists required and recommended safety practices for working with electrical equipment and electro-optical equipment.
- Chapter 2, “Pre-Installation Procedures,” includes preinstallation equipment storage and handling, site verification of equipment, site preparation, and equipment unpacking.
- Chapter 3, “Installation,” provides specific installation procedures.
- Chapter 4, “Turn Up and Test,” provides site setup and test procedures.
- Chapter 5, “Connectors and Cabling,” describes electrical and optical connectors within the system.
- Appendix A, “Acronyms,” defines acronyms and other abbreviations used in this manual.
- Appendix B, “Acceptance Test Plan,”contains the forms and tables required for initial customer acceptance of the system.

Related Documentation

For additional information about the ONS 15200 system, refer to the following documents:

- *Cisco ONS 15200 Product Description*
- *Cisco ONS 15200 Module Handbook*
- *Cisco ONS 15200 Maintenance Manager Installation and Operations Guide*
- *Cisco ONS 15200 Web Interface Software User Manual*
- *Cisco ONS 15200 Command Line Interface Manual*

Relevant Standards

ONS 15200 system design, construction, and performance adhere to the following standards:

- CFR 1040.10
- EN 60 950
- ETS 300 019-1-1 (1992)
- ETS 300 019-1-2 (1992)
- ETS 300 019-1-3 (1992)
- ETS 300 132-2 (1996)
- ETS 300 253 (1995)
- ETS 300 386-1 (1994)
- EU LVD 73/23/ECC
- FCC Part 15
- IEC 60825-1 (1993)
- IEC 60825-2 (2000)
- ITU-T G.652 (1997)
- ITU-T G.655 (1996)
- ITU-T G.825 (1993)
- ITU-T G.957 (1995)
- ITU-T G.958 (1995)
- ITU-T G.972 (1999)
- ITU-T G.692
- Telcordia GR-63-CORE
- Telcordia GR-1089-CORE
- UL 1950

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Optical Networking Product Documentation CD-ROM

Optical networking-related documentation, including the *Cisco ONS 15200 Installation, Setup, and Test Manual*, is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated as required and therefore may be more current than printed documentation. The CD-ROM package is available as a single package or as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco product documentation and the Documentation CD-ROM from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

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To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

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http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

http://www.cisco.com/register/

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

CHAPTER 1

Safety Summary

This chapter provides safety considerations for operating the Cisco ONS 15200 system.

1.1 Critical Safety Warnings

Warning **Do not perform cabling on an electrically-live system. Ensure that all power is removed from the shelf before continuing with this procedure. Actual wire gauge should be determined based on local engineering standards and practices.**

Warning **Before connecting power to the ONS 15252 MCU, remove the fuses from both the A and B sides of the battery distribution bay (BDB) and power distribution panel (PDP). Failure to do so can cause serious injury or death. Actual wire gauge should be determined based on local engineering standards and practices.**

Warning **Before installing the ONS 15252 MCU, remove the fuses from both the A and B sides of the PDP. Failure to do so can cause serious injury or death.**

Warning **Touching electrical connectors or other exposed electrical circuitry inside the ONS 15252 MCU or ONS 15201 SCU when they are energized can cause serious injury or death.**

Warning **Before connecting power to the ONS 15201 SCU, remove the fuses from both the A and B sides of the BDB and PDP. Failure to do so can cause serious injury or death. Actual wire gauge should be determined based on local engineering standards and practices.**

1.2 General Safety Precautions

General safety precautions are not related to any specific procedures and do not appear elsewhere in this publication. Personnel must understand and apply the following precautions during installation and testing of the ONS 15200 system.

- Know standard electrical safety and electrical wiring and connection practices.
- Be familiar with cardio-pulmonary resuscitation (CPR). Obtain this information through the appropriate national authority (such as the Red Cross or the local equivalent). This knowledge is imperative for personnel working with or near voltages with levels capable of causing injury or death.

1.3 Recommended Safety Precautions

The following precautions are recommended when working on the ONS 15200 system:

- Do not lift an object alone that could be too heavy for one individual.
- Keep your work area tidy and free of obstructing objects at all times.
- Do not wear loose clothing, jewelry, or other items that could be caught in the components during installation or use.
- Use the equipment only in accordance with the electrical power rating.
- Do not work alone if hazardous conditions may exist in your workplace.
- Install the ONS 15200 components in compliance with the following local and national electrical codes:
  - In the United States: National Fire Protection Association (NFPA) 70; US National Electrical Code
  - In Canada: Canadian Electrical Code, part I, CSA C22.1
  - Elsewhere: International Electrotechnical Commission (IEC) 364, part 1-7
- Properly ground the equipment.
- Connect only a DC power source that complies with the safety extra-low voltage (SELV) requirements in UL1950, CSA 950, EN 60950, and IEC950 to an ONS 15200 DC power supply input.
- Install DC power supplies used in restricted access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.
- Terminate all laser outputs properly before connecting laser inputs.
- Disconnect the input end of an optical fiber jumper cable before disconnecting the output end.
- Handle glass fiber with care. Glass fiber can be broken if mishandled. Using broken fiber can result in permanent equipment damage.
- Protect skin from exposed glass fiber. It can penetrate the skin.
- Limit the number of personnel that have access to lightwave transmission systems. Personnel should be authorized and properly trained if access to laser emissions is required.
- Limit the use of laser test equipment to authorized, trained personnel during installation and service. This precaution includes using optical loss test (OLT) set, optical spectrum analyzer, and optical time domain reflectometer (OTDR) equipment.
- Exclude any unauthorized personnel from the immediate laser radiation area during service and installation when there is a possibility that the system may become energized. Consider the immediate service area to be a temporary laser-controlled area.

- The ONS 15200 system functions in the 1310 – 1550 nm window, which is considered invisible radiation. You cannot see the laser light being emitted by a fiber, a pigtail, or a bulkhead connector. Use appropriate eye protection during fiber-optic system installation or maintenance whenever there is potential for laser radiation exposure, as recommended by the company's health and safety procedures. Observe this precaution whether warning labels have been posted.

1.4 Safety Symbols and Labels

ONS 15200 equipment is clearly labeled with warnings about the equipment radiation level. Read and understand all warning labels before working with the equipment.

1.4.1 ONS 15252 Multichannel Unit Safety Labels

The ONS 15252 Multichannel Unit (MCU) has a warning label located inside the passive optical shelf door. The warning label consists of warning text and a warning triangle with a yellow background, as shown in Figure 1-1.

Figure 1-1 ONS 15252 MCU laser safety warning labels

1.4.2 ONS 15201 Single-Channel Unit Safety Labels

The ONS 15201 Single-Channel Unit (SCU) has two warning labels. One label consists of the laser warning triangle shown in Figure 1-2. The other label consists of the laser warning text shown in Figure 1-3. Both labels have a yellow background. The triangle is placed above the text. In addition, small warning triangles and warning text are located close to the DWDM IN and OUT ports.

Figure 1-2 ONS 15201 SCU laser safety warning symbol label

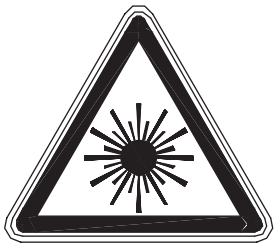


Figure 1-3 ONS 15201 SCU laser safety warning text label

1.4.3 Client Layer Interface Port Safety Label

Each Client Layer Interface Port (CLIP) module is labeled with a laser radiation warning label similar to Figure 1-4. The warning label has a yellow background.

Figure 1-4 CLIP Module laser safety warning label

1.5 Electrostatic Discharge Cautions

Some ONS 15200 components are classified as Class 0 ESD-sensitive devices. Adhere to the following rules:

- Observe standard precautions for handling ESD-sensitive devices.
- Assume that all solid-state electronic devices are ESD-sensitive.
- Ensure that you are grounded with a grounded wriststrap or equivalent while working with ESD-sensitive devices.
- Transport, store, and handle ESD-sensitive devices in static-safe environments.

CHAPTER 2

Pre-Installation Procedures

This chapter provides pre-installation procedures for the Cisco ONS 15200. Chapter topics include shipment verification, site preparation, and equipment unpacking.

2.1 Shipment Verification

When you receive ONS 15200 system equipment at the installation site, immediately verify that the shipment is correct.

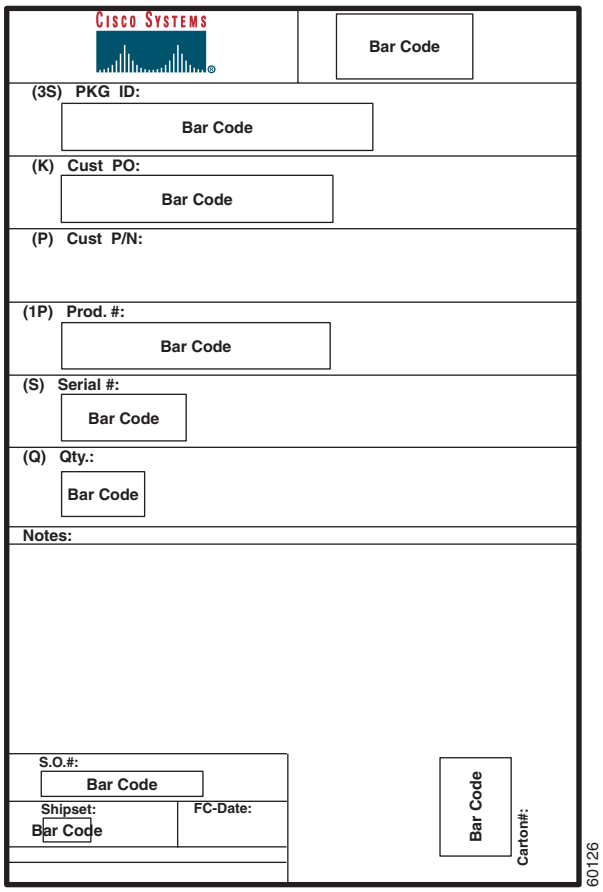
Note Cisco does not recommend shipping equipment that is mounted in racks. To ship equipment from one site to another, pack the equipment in the original box.

Note If you store the ONS 15200 before installing it, keep the ONS 15200 system equipment in the original shipping containers. The storage period should not exceed 12 months. Store the packed equipment indoors in a well-ventilated and static-safe environment.

2.1.1 ONS 15200 Shipping Container Label

The ONS 15200 shipping container label provides specific information about the shipped item. The label displays information in alphanumeric bar code format. Figure 2-1 shows a sample of a shipping container label.

Figure 2-1 Example of a shipping container label



2.1.2 Preliminary Inventory Check

Compare the packing list information with the alphanumeric information provided on the shipping labels. The packing list and shipping labels should contain the same information. If there are any discrepancies between the shipping label information and the packing list information, call the Cisco Technical Assistance Center (TAC) at 1-877-323-7368.

2.1.3 Reporting Damage

To report damage to shipped articles, contact the Cisco Technical Assistance Center (TAC) at 1-877-323-7368 to open a *Return Material Authorization and Fault Symptom Report (RMA)*.

2.2 Site Preparation

Verify that the installation site meets the following criteria:

1. The site conforms to all environmental specifications in the *Cisco ONS 15200 Product Description*.

2. The floor or mounting area where you will install the equipment can support the equipment weight load. Table 2-1 lists the specific floor-loading requirements of the ONS 15200 equipment.

Note The following tables are based on typical ONS 15200 system configurations. Floor loading, power consumption, heat dissipation, and clearances may vary in specific customer configurations.

Table 2-1 Floor-Loading Requirements by ONS 15200 Equipment Type

Equipment Type	Floor Loading Requirements
ONS 15252 MCU	75 kg/m^2 (15 lb./ft^2) per ONS 15252 MCU
ONS 15201 SCU	8.6 kg/m^2 (1.6 lb./ft^2) per ONS 15201 SCU

3. The installation site meets the power consumption requirements of the ONS 15200 equipment. Table 2-2 lists these requirements.

Table 2-2 Power Consumption Requirements by ONS 15200 Equipment Type

Equipment Type	Power Consumption Requirements
ONS 15252 MCU	140 W
ONS 15201 SCU	8 W

4. The installation location accommodates the heat dissipation requirements of the ONS 15200 equipment. Table 2-3 lists these requirements.

Table 2-3 Heat Dissipation Requirements by ONS 15200 Equipment Type

Equipment Type	Heat Dissipation Requirements
ONS 15252 MCU	230 W/m^2 per m of vertical frame space (6.5 W/ft^2 per ft of vertical frame space)
ONS 15201 SCU	346.2 W/m^2 per m of vertical frame space (9.793 W/ft^2 per ft of vertical frame space)

5. Minimum recommended clearance is provided for accessing bays from the front and back, opening front covers, and clearing the top of the racks. Table 2-4 provides clearance requirements.

Table 2-4 Required Access Clearance

Item	Clearance Required
Bay access needed for maintenance	Front access only, 482 mm (19 in.)
Back clearance to bays	15 cm (6 in.)
Clearance to open equipment covers	16 cm (6.4 in.)

2.3 Unpacking

Use the following considerations when unpacking and storing ONS 15200 equipment:

- Leave equipment packed until it is needed for immediate installation.
- Store packed equipment in the temperature and environmental conditions described in the *Cisco ONS 15200 Product Description*.
- After unpacking the equipment, save and store the packaging material in case the equipment must be returned.
- If the packaging is damaged and possible equipment damage is present, preserve as much of the packaging as possible to allow Customer Service and the shipper to analyze the damage. To report damage to shipped articles, contact the Cisco Technical Assistance Center (TAC) at 1-877-323-7368 to open an RMA.

The following procedures contain specific instructions for unpacking ONS 15200 system equipment.

Procedure: Unpack the ONS 15252 Multichannel Units

Caution When opening a subrack container, use caution to avoid damaging the contents.

Caution Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.

Step 1 Open the top of the ONS 15252 MCU shipping container.

Step 2 Lift the cardboard top tray with all of its subpackages out of the MCU shipping container.

Warning **A fully-equipped ONS 15252 MCU with packaging weighs 37 kg (82 lb.). Two people must lift an ONS 15252 MCU; failure to do so may cause personal injury.**

Step 3 Remove the top protection of the MCU from the main cardboard container.

Step 4 Take out the entire MCU and remove the bottom protection and the plastic protection bag.

The MCU shipping container should contain the following items:

- One MCU, configured as ordered
- Four subpackages containing the following items:
  - Fiber guide
  - Fan unit (1RU)
  - Accessory kit, which includes rack mounting screws, optical fiber cable ties, disposable ESD wrist straps, two power supply connectors with instructions, a ground strip, an internal bus (CAN bus) extension cable, a CIM RS-232 adapter cable, and a documentation CD.

Procedure: Unpack the ONS 15201 Single-Channel Units

Caution When opening a subrack container, use caution to avoid damaging the contents.

Caution Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.

Step 1 Open the top of the cardboard shipping container.

Step 2 Take the box containing the ONS 15201 SCU accessory kit out of the shipping container.

Step 3 Lift the ONS 15201 SCU packaging box and strip the inserts away. Open the packaging box.

Step 4 Lift the SCU out of the packaging box and remove the plastic protective bag.

The ONS 15201 SCU shipping container should contain the following items:

- One SCU
- Accessory kit, which includes rack mounting screws, disposable ESD wrist straps, power supply units (2 pcs), power supply cables (2 pcs), a ground strip, an internal bus (CAN bus) extension cable, and a documentation CD.

Procedure: Unpack the ONS 15200 Modules

Caution When opening a module container, use caution to avoid damaging the contents.

Caution Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Each subrack is equipped with grounding wrist strap connectors. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.

Step 1 Open the container and remove the module(s) and packing material.

Step 2 Carefully remove the protective foam packing material from the module(s).

Step 3 If any optical adapters are included in the container, remove them and save them for use while installing the module front-panel optical fiber jumper cables (Chapter 3, “Installation”).

CHAPTER 3

Installation

This chapter provides instructions for installing Cisco 15200 units, which include assembled-to-order Cisco 15252 Multichannel Units (MCUs) and individual MCU components, and assembled-to-order ONS 15201 Single-Channel Units (SCUs) and individual SCU components. This chapter also explains how to install a new channel on an MCU and how to link multiple nodes to accommodate additional traffic.

Note The instructions in this section primarily address the installation of the ONS 15252 MCUs, ONS 15201 SCUs, and modules supplied by Cisco Systems. When installing racks, electrical wiring, raceways, and other equipment not covered in this manual, you should follow all local, state, federal, or international (if applicable) codes and regulations.

3.1 Installation Overview

You should be thoroughly familiar with the instructions in this manual before starting any work. Use the following general order of work when installing a site:

Step 1 Read and observe all safety cautions and warnings in Chapter 1, “Safety Summary.”

Step 2 When you arrive at the site, first verify the ONS 15200 equipment according to the procedures in Chapter 2, “Pre-Installation Procedures.” If there is a problem with the equipment, contact the Cisco Technical Assistance Center (TAC) at 1-877-323-7368.

Step 3 If you do not install the equipment when it arrives, store as specified in Chapter 2, “Pre-Installation Procedures.”

Step 4 Unpack equipment only after preparing the site as described in Chapter 2, “Pre-Installation Procedures.”

Step 5 When installing equipment at a site, follow the procedures in this chapter in the order presented.

Step 6 Turn up and test the ONS 15200 system as described in Chapter 4, “Turn Up and Test.”

Step 7 Make connections using the information in Chapter 5, “Connectors and Cabling.”

3.2 Installation Planning

Based on the system to be installed, determine the size, number, and location of racks, as well as the MCUs and SCUs required. The MCUs and SCUs will fit in 485 mm (19-in.) equipment racks, and can be adapted for 584 mm (23-in.) racks. The racks must be accessible from the front and rear for equipment installation.

Note If you do not have rear access to the equipment, you must install the ground and power on the equipment before mounting the equipment in a rack.

Plan rack and unit installation based on the following considerations:

- Install the lowest unit in a rack first.
- Determine wire size based on cable length and local engineering standards and practices.
- Plan the power cable from the power distribution panel (PDP) to the individual units, proceeding down along the right side of the equipment rack.
- Plan grounding cable runs from the ground window down along the right side of the rack to the units.
- Plan to route the optical cables to and from the units along the upper-left side of the rack to the overhead cable transport tray.

3.2.1 Required Items

To install an ONS 15200 system, customary installation and electrical tools are required. The following items are also required:

- Multimeter
- Slotted (3 mm wide) or Phillips (PH1) screwdriver for NAMs/DNAMs and CIM
- All modules necessary for the specific site configuration
- Phillips screwdriver (PH3) to attach the MCU to the rack, and a slotted (3 mm wide) Phillips (PH1) to attach NAMs/DNAMs and CIM, and a torx screwdriver (T10) to remove the transport crossbar of the hinged lid connector
- 10 mm wrench (socket is recommended) to fix the ground bolts to the hardware
- Grounding wrist strap
- Cletop cleaning cassette (type A for SC, type B for MU optical connectors)
- Caps for optical connectors (SC, MU, duplex MU)
- Plugs for optical adapters (SC, MU)
- Fiber holder (included in the MCU accessory kit)
- Tie wraps

Chapter 4 lists the items required for turn up and test.

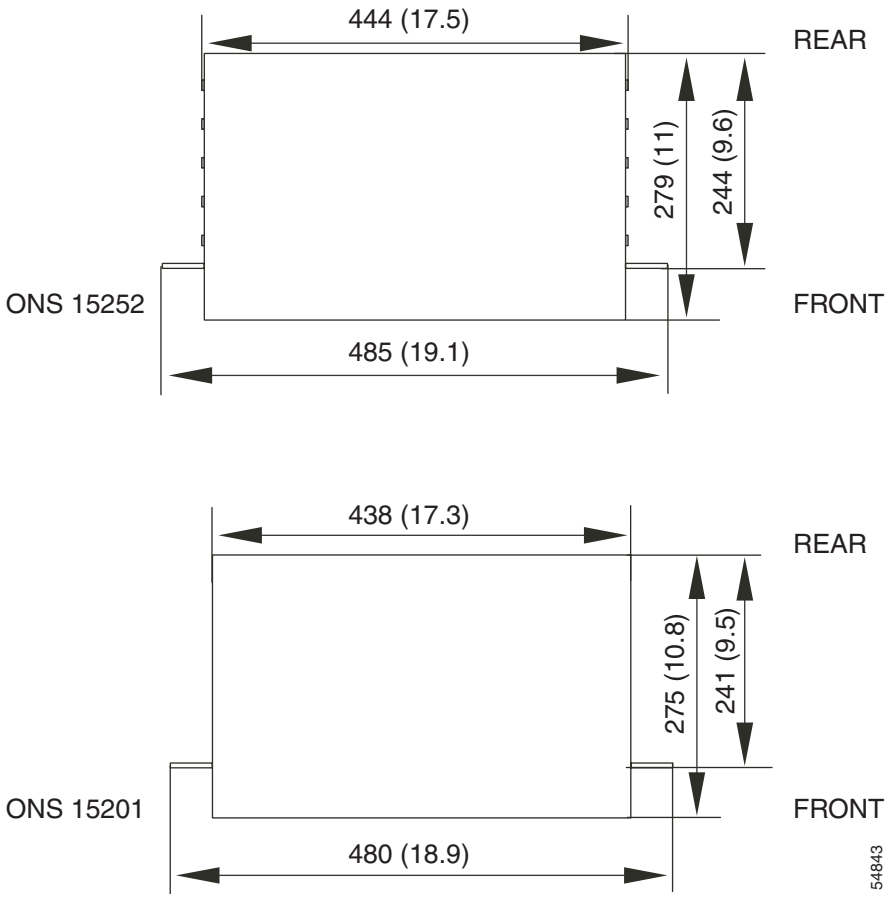
3.2.2 Installation Guidelines

When installing ONS 15200 equipment into racks, follow these guidelines:

- Consider the effect of additional electronic equipment and its generated heat on the ONS 15200 system equipment. You must install the fan unit above each ONS 15252 MCU to avoid overheating.
- Make sure the equipment rack is properly bolted to the ground, and, if required, to the ceiling. Ensure that the weight of the equipment does not make the rack unstable.
- When mounting the equipment between two posts or rails, ensure that the minimum clearance between the sides is 445 mm (17.5 in.).
- Maintain a minimum clearance of 482 mm (19 in.) in front of the equipment and 16 cm (6 in.) at the back of the equipment.

Figure 3-1 shows the outer dimensions of the ONS 15200 system equipment.

Figure 3-1 Outer dimensions (mm and in.) of the ONS 15200 system equipment



3.2.3 Grounding Considerations

It is vital that the ONS 15252 MCU, ONS 15252 fan unit, and ONS 15201 SCU are properly grounded. The grounding points on the ONS 15200 units are located as follows:

- The MCU is grounded at one of two possible locations on the back of the unit. The MCU should not be grounded at both locations, which can cause ground currents and electromagnetic interference (EMI) problems. To ground the MCU, use nuts and locking washers on the M6-threaded ground studs located at the selected grounding point.
- The fan unit is grounded at one of two possible locations on the back of the unit. To ground the fan unit, use the pair of grounding pins (M4 screws) located beside each of the power connectors on the fan-unit back panel. To avoid ground loops, use only one M4 screw.
- The SCU is grounded in the back of the unit, adjacent to the PS-1 power supply connector, on the two M6-threaded ground studs. Use a nut and a locking washer on one or both of the studs.

Note A ground strip (P/N 72-2755) 30 cm (11.8 in.) long is supplied with the equipment in the ONS 15252 MCU accessory kit (P/N 53-1678) or the ONS 15201 SCU accessory kit (P/N 53-1679).

The location of the grounding points on the MCU and SCU is shown in Figure 3-2. The location of the fan unit grounding points is shown in Figure 3-3.

Figure 3-2 Ground points on the ONS 15252 MCU and ONS 15201 SCU

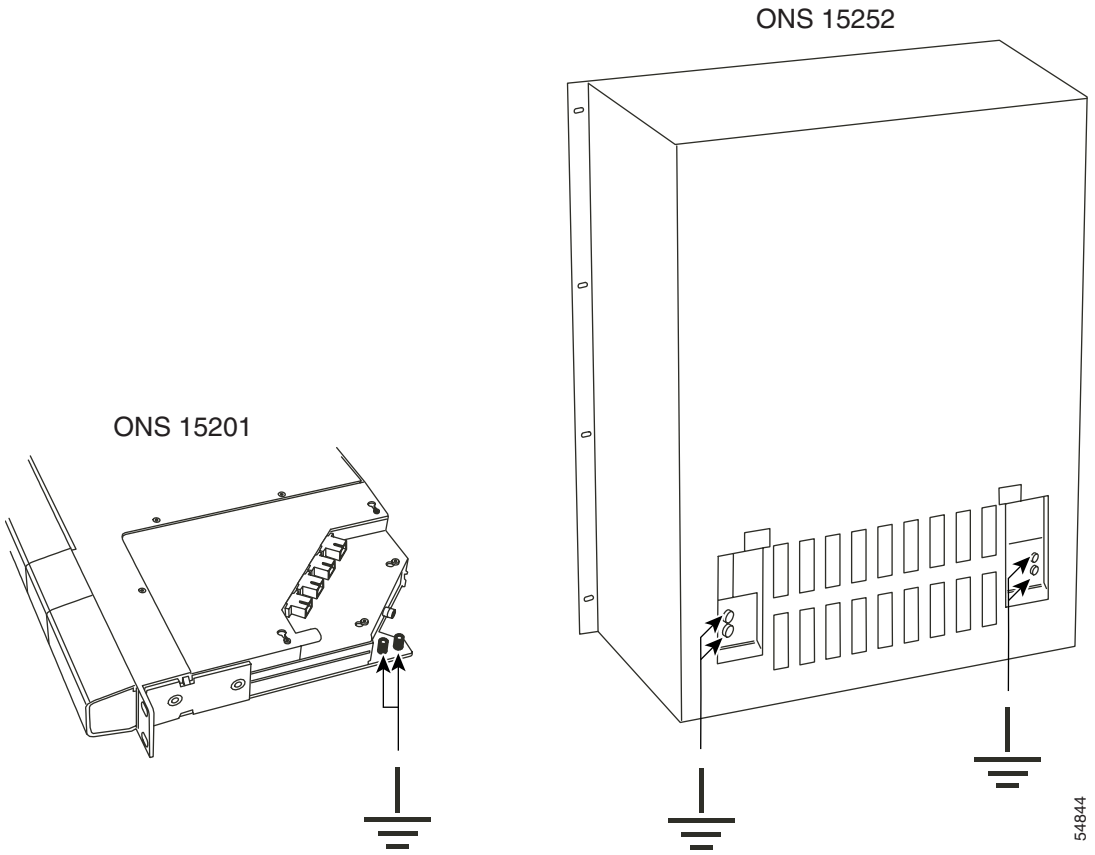
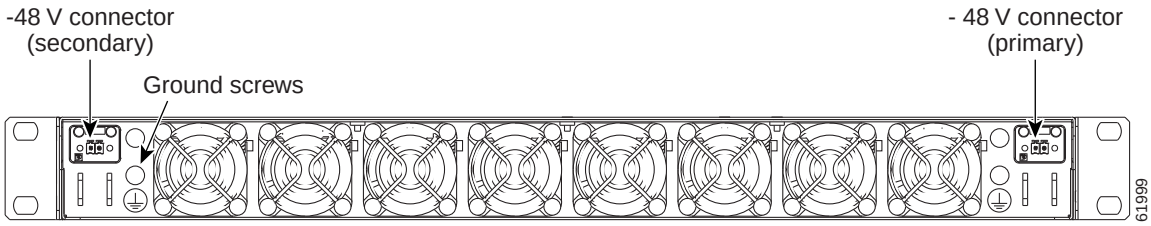


Figure 3-3 Ground points on the ONS 15252 fan unit



3.2.4 Power Considerations

The ONS 15252 MCU, ONS 15252 fan unit, and ONS 15201 SCU can be powered with a regular telecommunication power supply of –48 VDC (and 0 VDC return). AC powering can be made from the regular power grid, at both 115 VAC and 230 VAC, through the use of AC-to-DC power converters. Two independent power supplies can be attached to the ONS 15200 equipment. If two different supplies are used, they should be independently powered.

Caution Do not use the AC cord that can be ordered for the SCU in cable management devices such as wiring ducts, plenums, or risers. For such applications, you must provide an approved AC power cord. At minimum, the AC power cord must meet all National Electrical Code (NFPA 70, National Electrical Code, 2000 Edition) standards and all local building code requirements. This applies to Central Offices and other buildings.

3.2.5 Shelf Version Considerations

Two versions of the ONS 15252 MCU mechanical shelf exist: Release 1.0 and Release 1.0.1. Cisco currently ships only the Release 1.0.1 shelf and no longer ships the Release 1.0 shelf.

The Release 1.0.1 shelf includes a baffle**.** The baffle is a partially-perforated, angled metal plate that is mounted below and behind the metal support beam, and is mechanically attached to the back of the shelf. It runs the width of the shelf. To view the baffle, look up through the ventilation cavities at the back of the shelf.

The ONS 15252 Release 1.0.1 includes a fan unit. Before using the Release 1.0.1 shelf, you must install the fan unit. Do not use the fan unit with a Release 1.0 shelf. See the *Cisco ONS 15200 Product Description* for more information about the fan unit.

Caution You must install the fan unit in a Release 1.0.1 shelf. Cisco does not recommend or support running the Release 1.0.1 shelf without the fan unit. Equipment damage may occur.

Caution Do not install the fan unit in a Release 1.0 shelf. Cisco does not recommend or support running the Release 1.0 shelf with a fan unit. Equipment damage may occur.

The ONS 15252 Release 1.0.1 includes an updated Network Adaptation module (NAM). The Release 1.0.1 NAM is designated with a “NEBS-3 compliant” label on the faceplate, whereas the previous version of the NAM does not have a faceplate label. The Release 1.0.1 shelf requires the Release 1.0.1 NAM. You can also use Release 1.0.1 NAMs in the Release 1.0 shelf. See the *Cisco ONS 15200 Module Handbook* for more information about the NAM.

Caution Cisco does not recommend or support placing NAMs without the “NEBS-3 compliant” label into an Release 1.0.1 shelf. Equipment damage may occur.

3.3 Fiber Cleaning

You will need a Cletop cleaning kit (type A for SC and type B for MU fiber connectors) to clean the fiber connectors and adapters before installing fiber.

Caution Clean the fibers before use to prevent equipment damage.

Procedure: Clean Fiber Connectors

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or view directly with optical instruments.**

Step 1 Remove the dust cap from the fiber connector.

Step 2 Insert the connector into the Cletop cleaning cassette slot, rotate one quarter turn, and gently swipe downwards.

Step 3 Insert the fiber connector into the applicable adapter.

Step 4 Place dust caps on the fiber connectors when not in use.

Procedure: Clean Fiber Adapters

Step 1 Remove the dust plug from the fiber adapter.

Step 2 Insert a cleaning stick into the adapter opening.

Step 3 To access the male connector in the adapter, loosen the two screws that attach the metal cover to the CLIP, and remove the metal cover.

Step 4 Clean the male connector in the fiber adapter.

Step 5 Place dust plugs on the fiber adapters when not in use.

3.4 ONS 15252 MCU Assembled-to-Order Installation

Use the following procedures to install an assembled-to-order (ATO) ONS 15252 MCU. Prior to installing an MCU in an equipment rack, verify that at least 13 rack units (578 mm [22.8 in.]) of space is available. The lower portion of the MCU is the passive optical shelf.

You can also install the MCU using extension brackets, included in the MCU accessory kit, to convert a 485 mm (19-inch) rack to a 584.2 mm (23-inch) rack.

The ATO MCU contains a Release 1.0.1 shelf. See the "Shelf Version Considerations" procedure on page 3-5.

Note An ATO MCU comes equipped with two Termination modules (TMs). The Bridge module (BM) is delivered as a separate item.

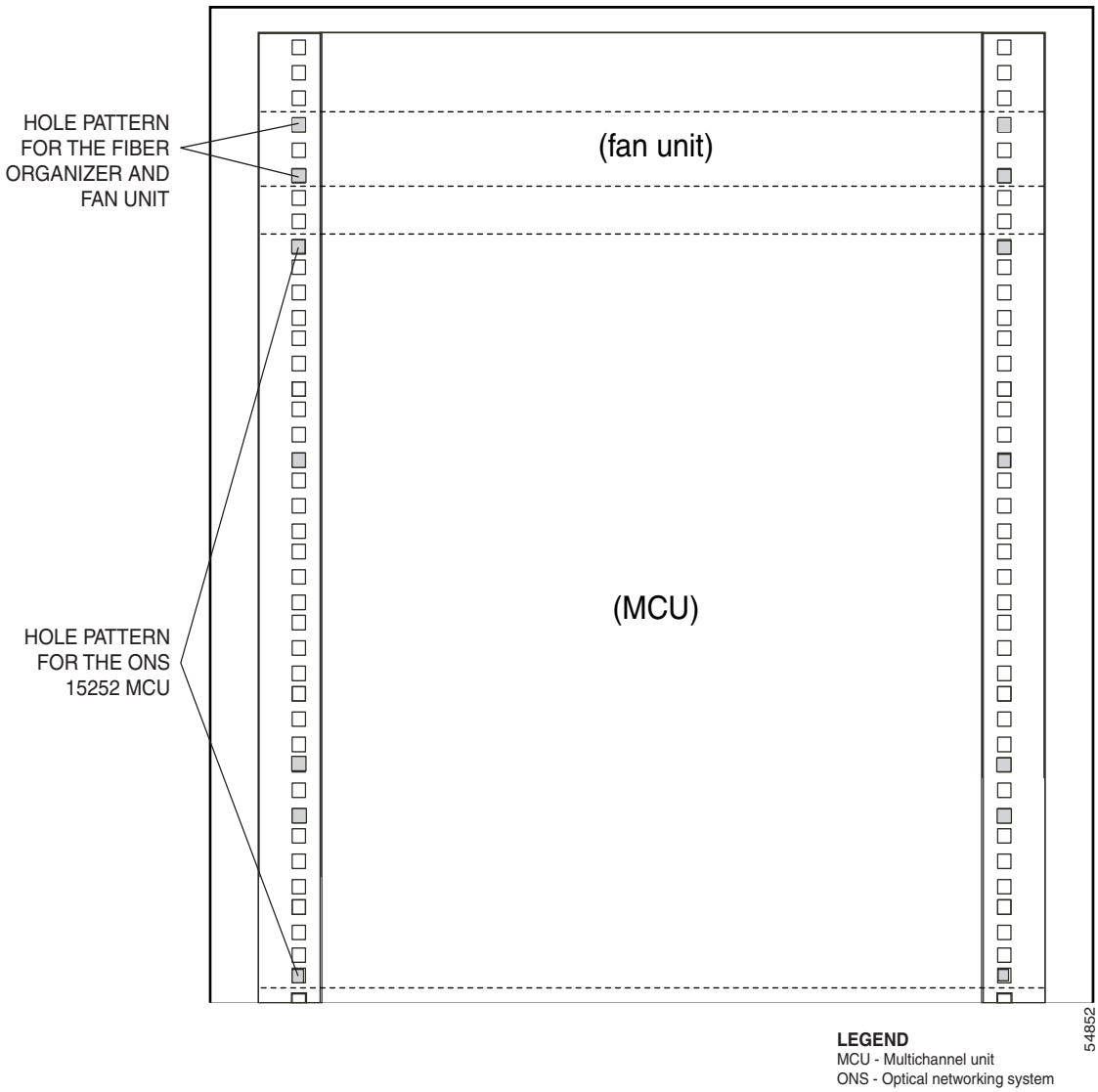
Procedure: Mount the ONS 15252 MCU in an Equipment Rack

Note You can install the ground and power cables before mounting the MCU. See the "Install the ONS 15252 MCU Ground Cable" procedure on page 3-13 and the "Connect the ONS 15252 MCU A-side and B-side Power Connections to the PDP" procedure on page 3-17 for more information.

Caution During the ONS 15252 MCU installation, two people are required to lift and hold the unit in position.

Step 1 Align eight M6 cage nuts in the equipment rack. Figure 3-4 shows an example of an equipment rack, with the cage nuts shaded in gray.

Figure 3-4 Aligning the ONS 15252 MCU with the rack cage nuts



Step 2 Lift and align the MCU with the equipment rack and cage nuts. The mounting holes in the MCU should align with the cage nuts.

Step 3 Attach the MCU to the equipment rack with eight screws (M6 or UNC 12-24).

Step 4 Mount the cable ties (item 51-2587-01 in the accessory kit) to the racks, immediately outside the opening in the hinged lid cover. You will use the cable ties to manage the cable in the "Install the ONS 15252 MCU Fiber Cable" procedure on page 3-18.

Procedure: Mount the ONS 15252 MCU in an Equipment Rack Using Extension Brackets

The shelf assembly comes preset for installation in a 485 mm (19-in.) rack, but you can use extension brackets to convert it to a 584.2 mm (23-in.) rack. You will need two 13 RU extension brackets (P/N: 700-13268) for this procedure.

Caution During the ONS 15252 MCU installation, two people are required to lift and hold the unit in position.

Step 1 Align the indented edge of one of the extension brackets with the equipment rack.

Step 2 Attach the indented edge of the extension bracket to the equipment rack with the mounting screws (UNC 12-24) provided with the panel adapter.

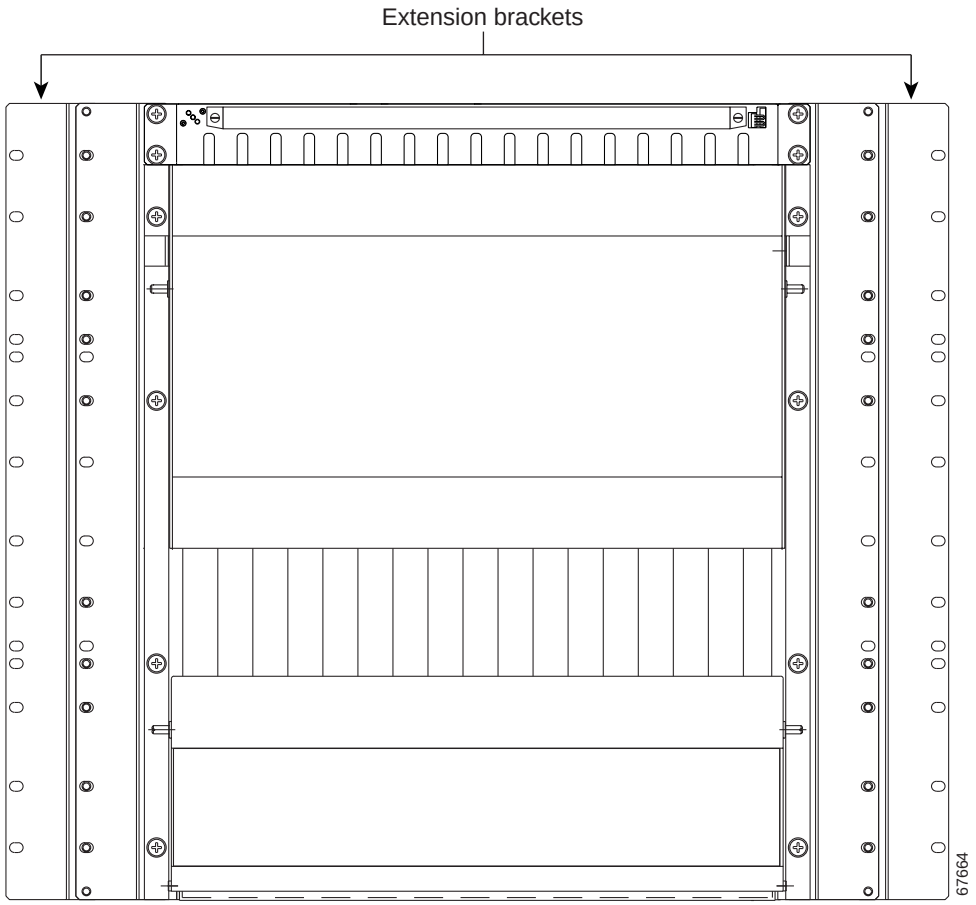
Step 3 Repeat Steps 1 and 2 for the second extension bracket.

Step 4 Once the extension brackets are secure, lift and align the MCU with the mounting holes.

Step 5 Attach the MCU to the extension brackets with eight screws (M6 or UNC 12-24).

Figure 3-5 shows the extension brackets attached to the equipment rack.

Figure 3-5 Attached extension brackets



Step 6 Mount the cable ties (item 51-2587-01 in the accessory kit) to the racks. You will use the cable ties to manage the cable in the "Install the ONS 15252 MCU Fiber Cable" procedure on page 3-18.

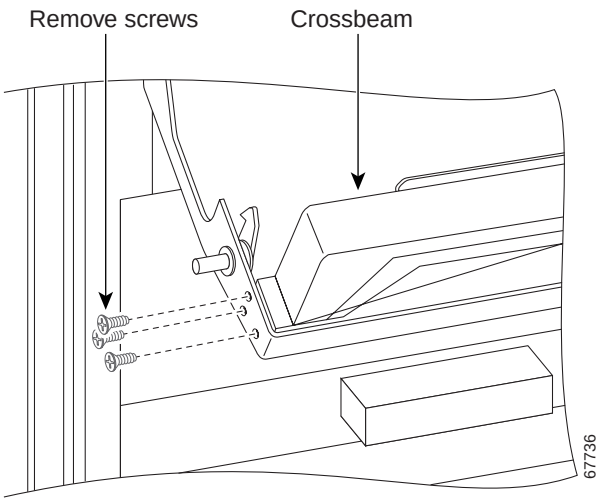
Procedure: Remove the ONS 15252 MCU Transport Crossbeam from the Passive Optical Shelf Door

Step 1 Open the passive optical shelf door.

Step 2 Locate the three left-side crossbeam mounting screws.

Step 3 Use a Phillips screwdriver to remove the crossbeam mounting screws from the left side. Figure 3-6 shows the location of the screws on the left side.

Figure 3-6 Removing the crossbeam screws



Step 4 Locate the three crossbeam mounting screws on the right side. Use a Phillips screwdriver to remove the crossbeam mounting screws from the right side.

Step 5 When the left- and right-side crossbeam mounting screws are removed, lift and remove the crossbeam from the passive optical shelf door.

Note Keep the transport crossbeam and the screws stored in a safe location for possible retrieval and reinstallation in case the equipment is moved to another location.

Procedure: Install the ONS 15252 MCU Fan Unit

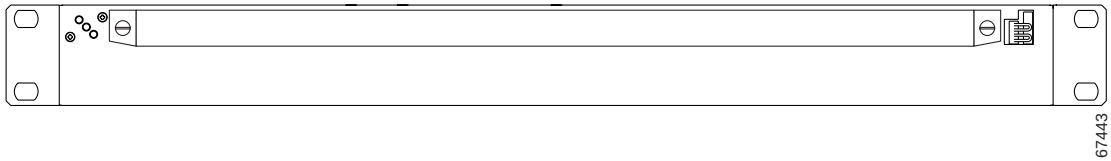
You must install a fan unit in the equipment rack above each ONS 15252 MCU.

Caution You must install the fan unit in a Release 1.0.1 shelf. Cisco does not recommend or support running the Release 1.0.1 shelf without the fan unit. Equipment damage may result. For more information about shelf versions, see the "Shelf Version Considerations" procedure on page 3-5.

Caution Do not install the fan unit in a Release 1.0 shelf. Cisco does not recommend or support running the Release 1.0 shelf with a fan unit. Equipment damage may result. For more information about shelf versions, see the "Shelf Version Considerations" procedure on page 3-5.

Step 1 Insert the fan unit in the equipment rack. See the hole pattern for the fan unit in Figure 3-4 on page 3-8. Figure 3-7 on page 3-11 shows the fan unit.

Figure 3-7 Fan unit



Step 2 Use four screws (M6 or UNC 12-24) to connect the fan unit to the equipment rack.

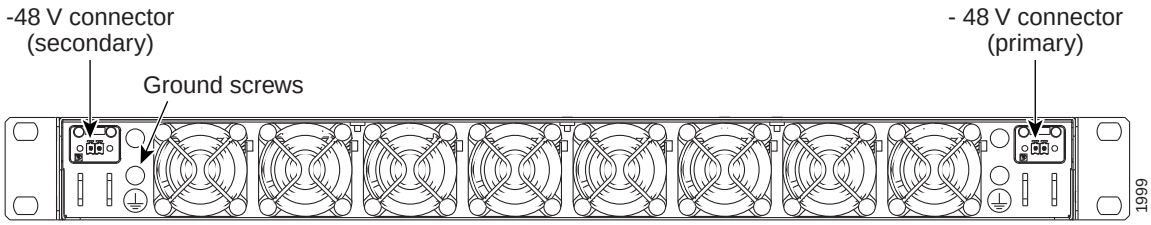
Step 3 Connect the power to the two fan unit -48 VDC power inputs located on the far right (primary) and far left (secondary) of the fan-unit back panel (Figure 3-8):

a. Insert each of the two wire ends into the cable plug (P/N 27-1769).

b. Insert each cable plug into a power connector (primary and secondary) on the fan unit back panel. Make sure that when inserting each cable plug, you obtain the correct polarity. When you are viewing the fan unit from the rear, Pin 1 (on the left) is 0 VDC and pin 2 (on the right) is -48 VDC. If the polarity is correct, continue with Step 3c. If the polarity is not correct, switch the two wires inserted in Step 3a.

c. Tie-wrap the power cable to the fan unit.

Figure 3-8 Power and ground points on the ONS 15252 fan unit



Note If back access is not possible, you must connect the power before mounting the fan unit in the rack.

Note If you connect just one power supply to the fan unit, the fan unit will run but a minor alarm will occur.

Step 4 Install the ground cable (P/N 72-3526). A pair of grounding pins (M4 screws) is located beside each of the power connectors on the fan-unit back panel (Figure 3-8). You must connect the grounding cable to one of the pairs of screws. Choose the pair that is the most convenient connection point for your installation. You can use either a single or double lug (see Figure 3-9).

a. Use a screwdriver to remove one M4 screw (if you are using a single lug) or two M4 screws (if you are using a double lug).

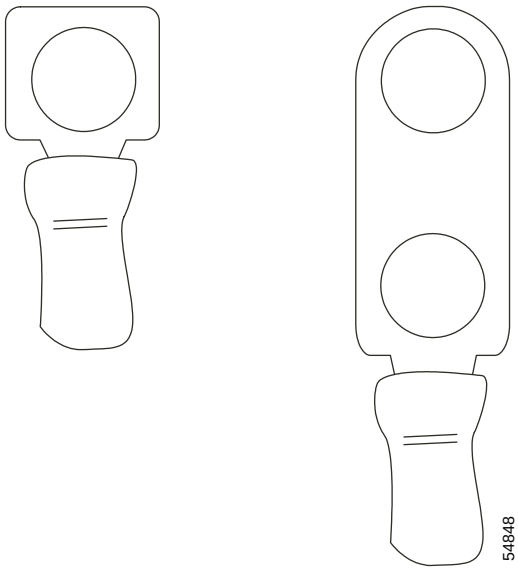
b. Route the ground cable lug to the location where you removed the M4 screw(s).

c. Insert the M4 screw(s) into the ground cable lug opening(s).

d. Use a screwdriver to firmly tighten the M4 screw(s) so that the ground cable is secure.

e. Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

Figure 3-9 Ground cable lugs (single and double)



Step 5 Connect the fan unit to an external alarm panel (if applicable). Connect the alarm panel cable (P/N 74-2603) to the 6-pole [P/N AMP 0-176125-6] connector on the front of the fan unit.

Note When a fan unit is connected to an external alarm panel, you must use a jumper plug (P/N 74-3524) to plug into the 4-pole connector on the front of the fan unit.

Caution The maximum power for a signal line is 24 V DC/300mA. Do not exceed this level when interfacing between an external alarm panel and the fan unit.

Step 6 Once you have installed the fan unit, verify the following:

- The incoming power is within the range of –42 VDC to –56 VDC before applying power.
- The green LED is lit to indicate that the fan unit has power.
- Both the red and yellow LEDs are off. (If only one power source is connected or if a single fan fails, the yellow LED will be lit. If two or more fans fail, the red LED will be lit.)
- All fans are running.
- The total consumption for the unit is 240mA±20mA.

Procedure: Replace the Filter in the Fan Unit

You can replace the filter in the fan unit without removing the fiber organizer. Replacing the filter does not affect traffic.

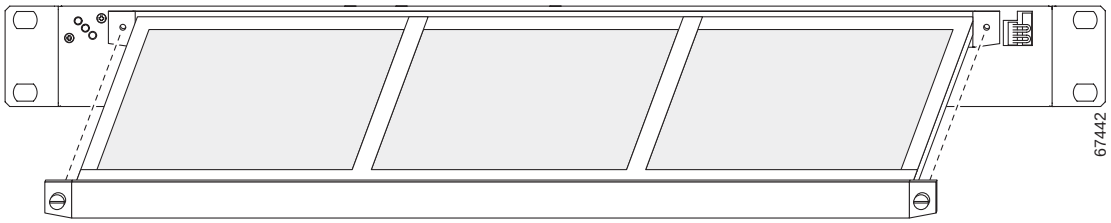
Warning **Do not insert your fingers into the fan tray while the fans are running.**

Note Remove and visually inspect the fan-unit filter every six months. If necessary, replace the old filter with a new filter (P/N 700-12955).

Step 1 Turn the screws one quarter-turn counter clockwise.

Step 2 Slide the filter frame out from the fan unit, as shown in Figure 3-10.

Figure 3-10 Removing the filter frame



Step 3 Lift up one of the ends of the metal bands that secure the filter.

Step 4 Remove the old filter.

Step 5 Place the new filter in the filter frame.

Step 6 Mount the metal bands by entering the two back extensions into the back of the filter frame and the right extension into the right of the frame. Bend the remaining left metal band extension under the frame.

Step 7 Slide the filter frame back into the fan unit.

Step 8 Lock the filter frame by turning the screws one quarter-turn clockwise.

Procedure: Install the Fiber Organizer In Front of the Fan Unit

The fiber organizer uses the same four screws (M6 or UNC 12-24) that are used to secure the fan unit.

Step 1 Remove any screws that obstruct the mounting of the fiber organizer (Figure 3-4).

Step 2 Align the fiber organizer with its four mounting holes (Figure 3-4).

Step 3 Insert and tighten the four screws to connect the fiber organizer to the fan unit and equipment rack.

3.4.1 Install the ONS 15252 MCU Ground Cable

The following procedures describe how to ground an ONS 15252 MCU. The lug on the ONS 15252 MCU ground cable can be either a single or dual lug as shown in Figure 3-11. You can also ground the MCU using the ground strip (P/N 72-2755) shown in Figure 3-12.

Figure 3-11 Ground cable lugs (single and double)

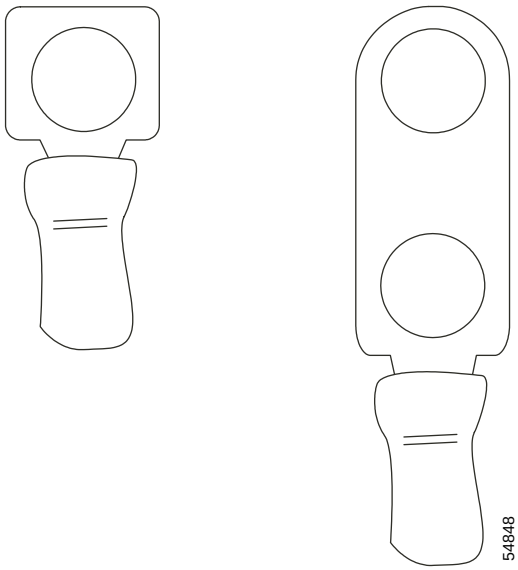
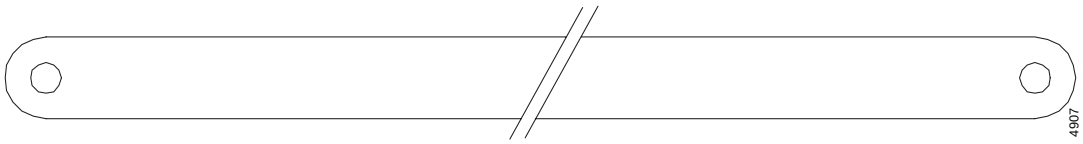


Figure 3-12 Ground strip



Procedure: Install an ONS 15252 MCU Single-Lug Ground Connection

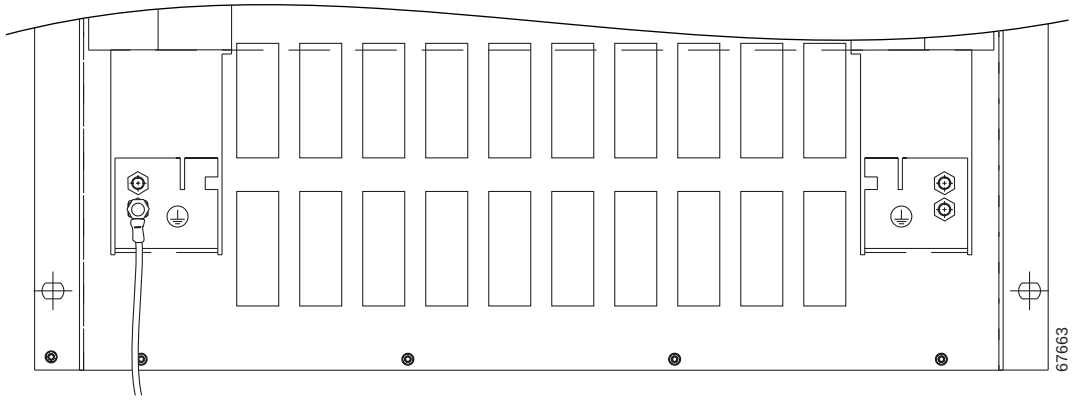
Step 1 Remove one M6 nut and washer from one of the grounding pins located on either side of the MCU backplane.

Step 2 Route the ground cable to the grounding pin where the M6 nut and washer were removed.

Step 3 Attach the ground cable to the grounding pin using the M6 nut and washer removed in Step 1.

Step 4 Use a socket wrench to firmly tighten the M6 nut on the grounding pin. The attached ground cable should look similar to the one shown in Figure 3-13.

Figure 3-13 Attaching a single-lug ground cable



Step 5 Connect the other end of the ground cable to the ground window.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

Procedure: Install an ONS 15252 MCU Dual-Lug Ground Connection

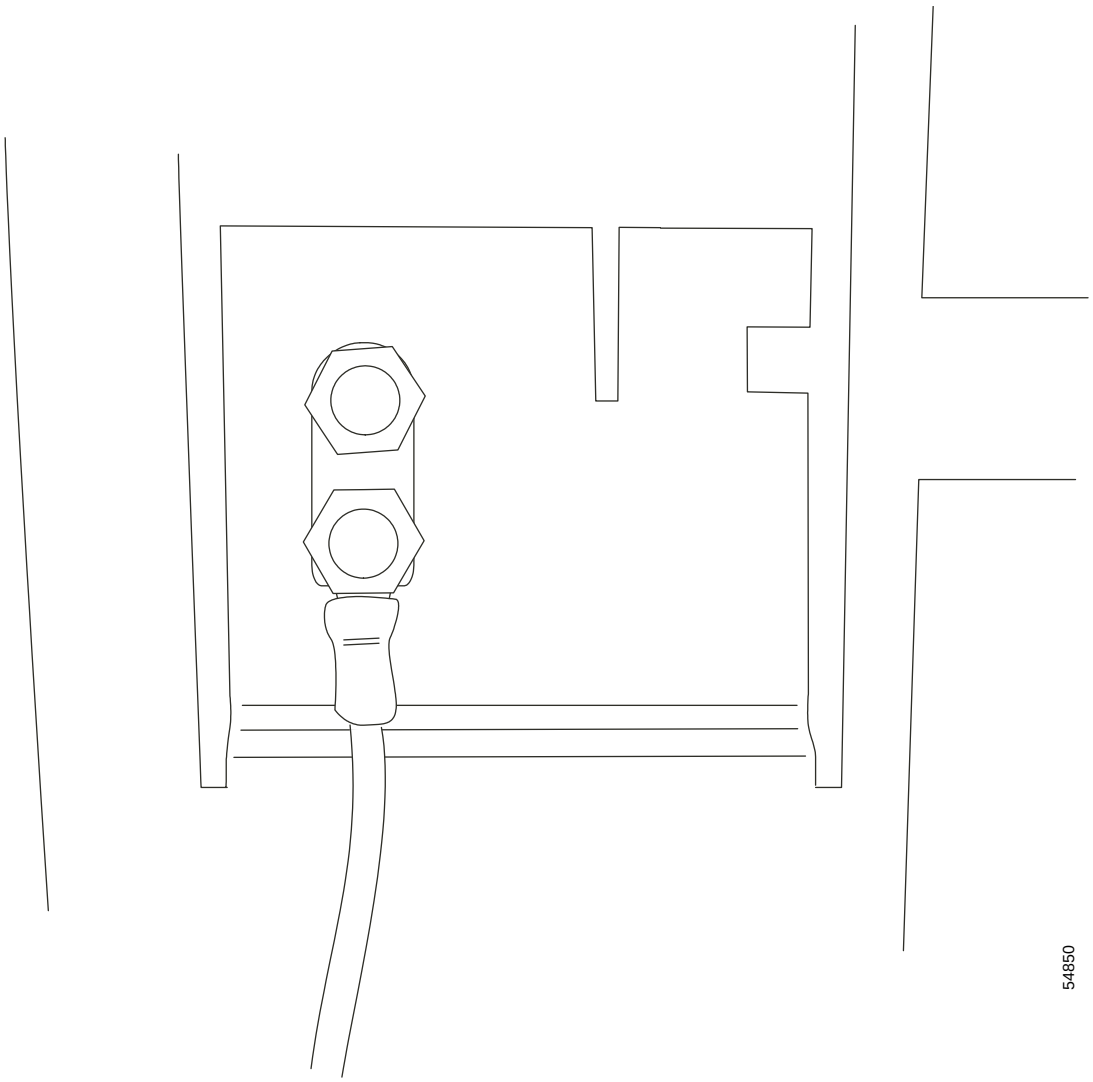
Step 1 Remove the M6 nut and washer from two of the grounding pins located on either side of the MCU.

Step 2 Route the ground cable to the grounding pins where the M6 nuts and washers were removed.

Step 3 Attach the ground cable to the grounding pins using the M6 nuts and washers removed in Step 1.

Step 4 Use a socket wrench to firmly tighten the M6 nuts on the grounding pins. The attached ground cable should look like the one in Figure 3-14.

Figure 3-14 Attaching a dual-lug ground cable



Step 5 Connect the other end of the ground cable to the ground window.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test again.

Procedure: Install an ONS 15252 MCU Ground Strip Connection

Step 1 Remove one M6 nut and washer from one of the grounding pins located on either side of the MCU backplane.

Step 2 Route the ground strip to the grounding pin where the M6 nut and washer were removed.

Step 3 Attach the ground strip to the grounding pin with the M6 nut and washer removed in Step 1.

Step 4 Use a socket wrench to firmly tighten the M6 nut on the grounding pin.

Step 5 Connect the other end of the ground strip to the equipment rack.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

3.4.2 Install the ONS 15252 MCU Power

The following procedure explains how to install ONS 15252 power connections.

Procedure: Connect the ONS 15252 MCU A-side and B-side Power Connections to the PDP

Warning **Before installing power to the ONS 15252 MCU, remove the fuses from both the A and B sides of the battery distribution bay (BDB) and power distribution panel (PDP). Failure to do so can result in injury or death. Determine the actual wire gauge based on local engineering standards and practices.**

Warning **To prevent equipment damage and injury, do not reverse the polarity of the PDP-to-ONS 15252 MCU power connections.**

Step 1 Remove the A- and B-side fuses from the BDB and the PDP.

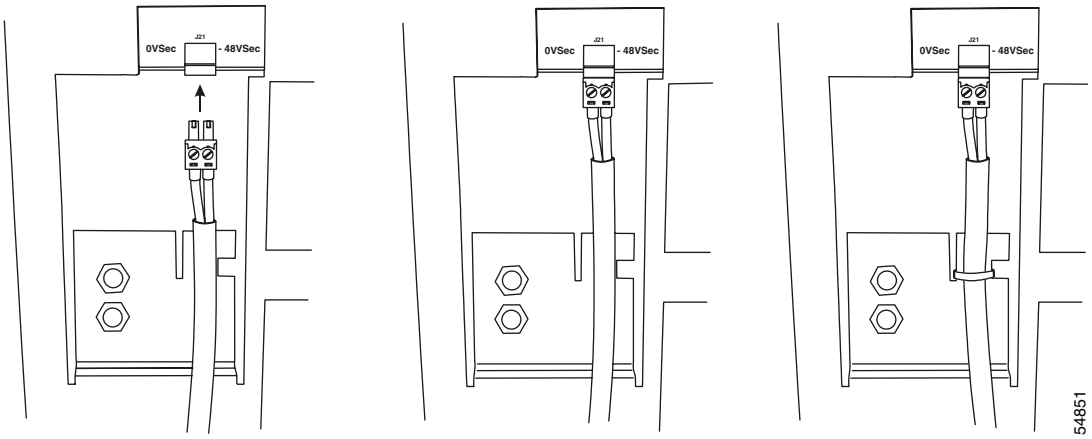
Step 2 Connect the MCU power cable to the B side of the PDP. Be sure the poles are correct when you connect the power cable.

Step 3 Insert the power cables into the connector and tighten the wire retaining screws.

Step 4 Align and connect the power cable to the PS-2 (Power Supply 2) connector (left side) on the MCU backplane as shown in Figure 3-15.

Step 5 Tie-wrap the power cable to the MCU as shown in Figure 3-15.

Figure 3-15 Connecting power to the ONS 15252 MCU



Step 6 Connect the MCU power cable to the A side of the PDP. Be sure the poles are correct.

Step 7 Insert the power cables into the connector and tighten the wire retaining screws.

Step 8 Align and connect the power cable with the PS-1 connector (right side) on the MCU backplane.

Step 9 Tie-wrap the power cable to the MCU.

Step 10 Reinsert the A-side and B-side BDB and PDP fuses.

Step 11 Verify that A- and B-side -48 VDC and -48 VDC return (0 VDC) of the MCU are connected to the proper poles at the power source. The -48 VDC return must be connected to ground the PDP on both the A and B sides.

Step 12 Verify that the incoming power is within the range of –42 VDC to –56 VDC before applying power.

Step 13 Install the Network Control Board (NCB) and Communication Interface module (CIM) temporarily to determine if the ONS 15252 MCU has power. The LEDs on the CIM and NCB are green when the MCU has power.

Note To obtain an accurate LED reading, do not insert an NCB in a CLIP slot while the corresponding NAM is inserted. You must first remove the corresponding NAM if you want to insert the NCB in a CLIP slot.

3.4.3 Install the ONS 15252 MCU Fiber Cable

Caution Always use the supplied electrostatic discharge (ESD) wristband when working with an ONS 15252 MCU.

The ONS 15252 MCU Client Layer Interface Port (CLIP) modules and the DWDM interface port use SC fiber connectors.

To install fiber-optic cables in the ONS 15252, connect a fiber cable with the corresponding connector type to the transmit and receive ports on the CLIP and the DWDM interface. On a CLIP module, the transmit and receive ports are located at the top of the CLIP. The receive port is located on the left and has an arrow pointing towards the CLIP label. The transmit port is located on the right and has an arrow pointing away from the CLIP label.

The MCU DWDM transmit and receive ports are the two bottom ports located on the A- and B-side Line modules (LMs). The receive port is labeled “IN” and the transmit port is labeled “OUT.”

Cisco recommends that you label the client-side transmit and receive fiber and A-side and B-side DWDM fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance.

Warning **Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.**

Procedure: Connect the Client Layer Fiber

Step 1 Remove the dust plugs from the CLIP module client-layer connectors.

Step 2 Clean and inspect the client-layer optical-fiber jumper cable connectors.

Step 3 Connect the CLIP module input and output to the customer-specified point.

Step 4 Repeat Steps 1–3 for each CLIP.

Step 5 Guide the fiber through the fiber guide above the MCU and then to the cable ties mounted on the sides of the rack. The cable ties hold the fiber to the side of the rack to reduce the risk of fiber pinching.

Procedure: Connect the DWDM Fiber

Step 1 Remove the dust plugs from the A-side LM DWDM optical connectors.

Step 2 Clean and inspect the A-side DWDM optical-fiber jumper cable connector.

Step 3 Connect the A-side DWDM input and output to the customer-specified demarcation point.

Step 4 Repeat on the B-side LM.

Step 5 Guide the fiber through the cable ties mounted on the rack. The cable ties hold the fiber to the side of the rack to reduce the risk of fiber pinching.

3.5 ONS 15201 SCU Assembled-to-Order Installation

This section describes how to install an assembled-to-order (ATO) ONS 15201 SCU in an equipment rack.

Note You can install the ground and power cables before mounting the SCU. See the “Connect the ONS 15201 SCU to Ground” procedure on page 3-21 and the “Install the ONS 15201 SCU Power” procedure on page 3-23 for more information.

Note Clean all optical connectors and use covers to protect them.

Caution Static electricity can damage electro-optical equipment. While unpacking and handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

Caution Do not use the AC cord that can be ordered for the SCU in cable management devices such as wiring ducts, plenums, or risers. For such applications, you must provide an approved AC power cord. At minimum, the AC power cord must meet all National Electrical Code (NFPA 70, National Electrical Code, 2000 Edition) and all local building code requirements. This applies to Central Offices and other buildings.

The ONS 15201 SCU, shown in Figure 3-16, is designed to be installed at ONS 15200 system client sites.

Procedure: Mount the ONS 15201 SCU in an Equipment Rack

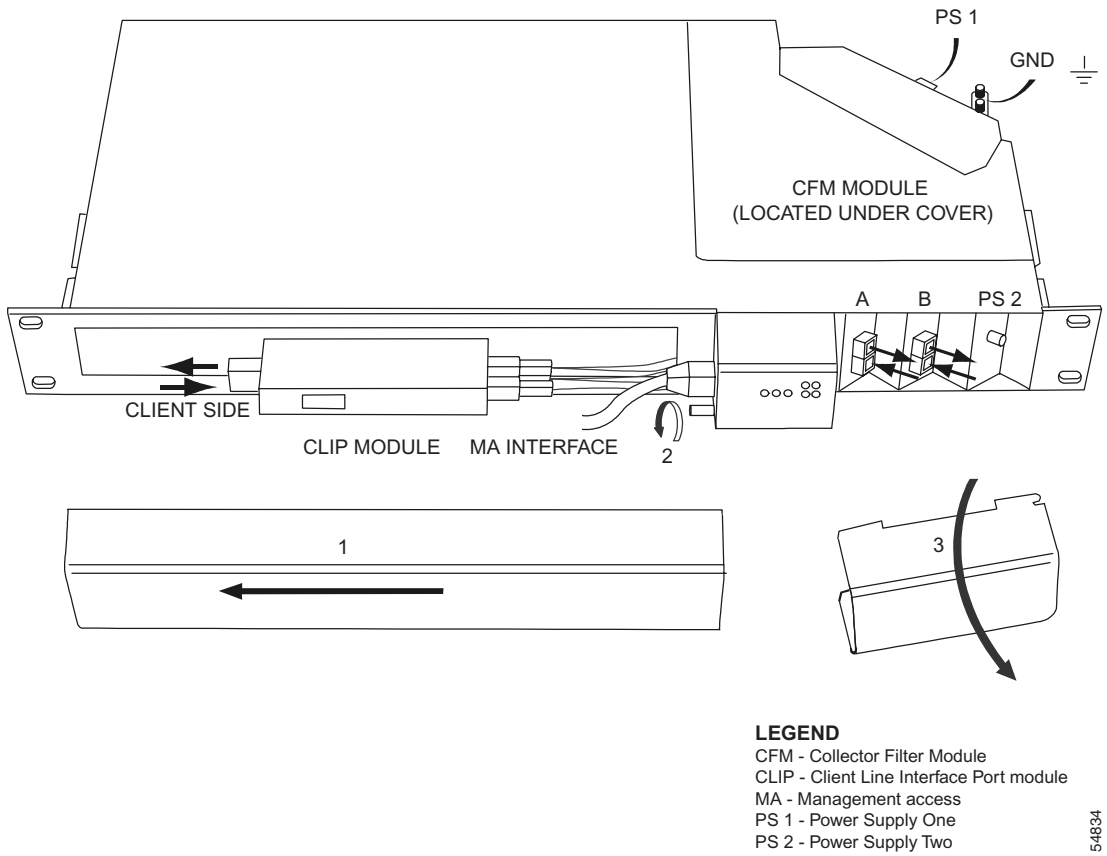
Step 1 Align four M6 cage nuts in the equipment rack with the mounting holes on the front of the SCU.

Step 2 Align the SCU with the equipment rack and cage nuts.

Step 3 Insert the SCU into the equipment rack.

Step 4 Connect the SCU to the equipment rack with four M6 screws.

Figure 3-16 An ONS 15201 SCU with front covers removed



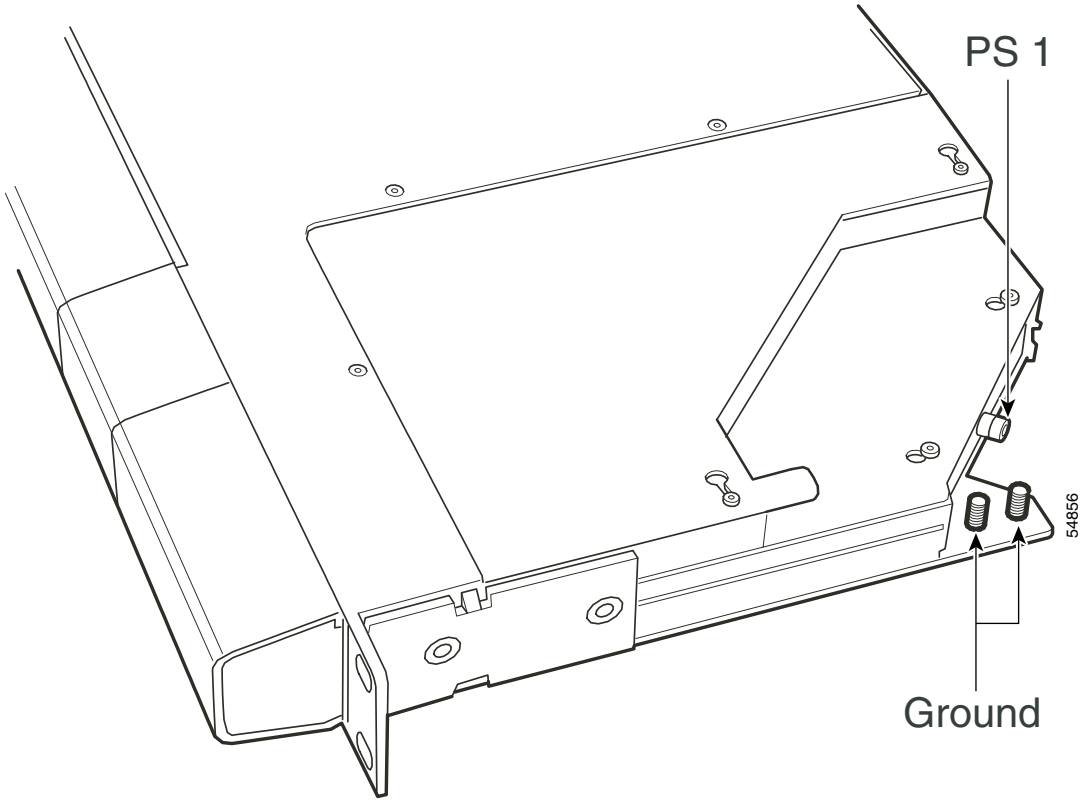
3.5.1 Connect the ONS 15201 SCU to Ground

The lug on the ONS 15201 SCU ground cable can be either a single lug or dual lug as shown in Figure 3-11 on page 3-14. You can also ground the ONS 15201 SCU using a ground strip as shown in Figure 3-12 on page 3-14.

Procedure: Install an ONS 15201 SCU Single-Lug Ground Connection

Step 1 Remove one M6 nut and washer from one of the grounding pins located on the SCU backplane as shown in Figure 3-17.

Figure 3-17 ONS 15201 SCU power and ground connections



Step 2 Route the ground cable to the grounding pin where the M6 nut and washer were removed.

Step 3 Attach the ground cable to the grounding pin using the M6 nut and washer removed in Step 1.

Step 4 Firmly tighten the M6 nut on the grounding pin with a socket wrench.

Step 5 Connect the other end of the ground cable to a reliable earth ground.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

Procedure: Install an ONS 15201 SCU Dual-Lug Ground Connection

Step 1 Remove the M6 nut and washer from two of the grounding pins located on the back of the SCU as shown in Figure 3-17.

Step 2 Route the ground cable to the grounding pins where the M6 nuts and washers were removed.

Step 3 Attach the ground cable to the grounding pins using the M6 nuts and washers removed in Step 1.

Step 4 Firmly tighten the M6 nuts on the grounding pins with a socket wrench.

Step 5 Connect the other end of the ground cable to a reliable earth ground.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

Procedure: Install an ONS 15201 SCU Ground Strip Connection

Step 1 Remove one M6 nut and washer from one of the grounding pins located on the SCU backplane as shown in Figure 3-17.

Step 2 Route the ground strip to the grounding pin where the M6 nut and washer were removed.

Step 3 Attach the ground strip to the grounding pin with the M6 nut and washer removed in Step 1.

Step 4 Firmly tighten the M6 nut on the grounding pin with a socket wrench.

Step 5 Connect the other end of the ground strip to a reliable earth ground.

Step 6 Use a multimeter that is set to read ohms to test the ground connection. The display on the multimeter should be less than 5 ohms. If the display is more than 5 ohms, tighten or reconnect the ground connection and test it again.

3.5.2 Install the ONS 15201 SCU Power

The following procedures describe how to connect electrical power to an ONS 15201 SCU.

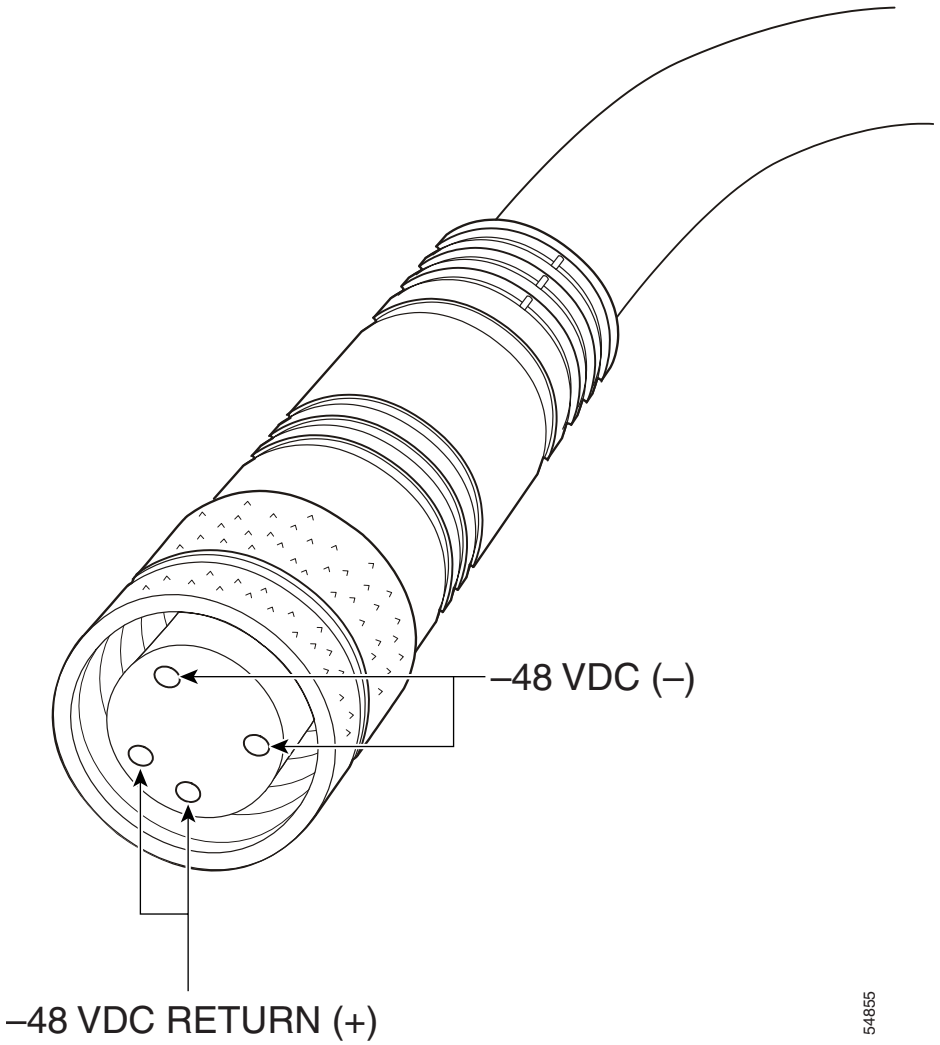
Procedure: Connect the Power Using AC-to-DC Power Supplies

Step 1 Route the SCU AC-to-DC power supply cable to the PS-1 connector on the rear of the unit. Figure 3-17 shows the location of the connector.

Step 2 Align the connector on the power cable with the PS-1 power connector on the rear of the SCU. Figure 3-18 shows the power cable connector.

Note Do not splice DC leads.

Figure 3-18 ONS 15201 SCU power cable connector



Step 3 Insert the power cable connector into the PS-1 connector.

Step 4 Hand-tighten the power cable connector to firmly mate it to the PS-1 connector.

Step 5 Connect the AC line cord on the AC-to-DC power supply to the AC power grid.

Procedure: Connect a Redundant Power Source to the ONS 15201 SCU

Step 1 Route the SCU redundant AC-to-DC power supply cable to the PS-2 power connector on the front of the unit. Figure 3-16 on page 3-21 shows the SCU PS-2 connector.

Step 2 Align the connector on the power cable with the PS-2 connector on the front of the ONS 15201 SCU. Figure 3-18 on page 3-24 shows the power cable connector.

Step 3 Insert the power cable connector into the PS-2 power supply connector.

Step 4 Hand-tighten the power cable connector to firmly mate it to the PS-2 connector.

Step 5 Connect the AC line cord on the AC-to-DC power supply to the AC power grid.

Note You can also use PS-2 as a single power-connection point.

Procedure: Connect the ONS 15201 SCU PS-1 and PS-2 Power Connections to the PDP

Warning **Before installing power to the ONS 15201 SCU, remove the fuses from both the A and B sides of the BDB and PDP. Failure to do so can cause injury or death. Determine the actual wire gauge based on local engineering standards and practices.**

Warning **Do not reverse the polarity of the PDP connections to the ONS 15201 SCU power connections. Failure to heed this caution can cause equipment damage and personal injury.**

Step 1 Remove the A- and B-side fuses from the BDB and the PDP.

Step 2 Connect the SCU power cable to the B side of the PDP. Be sure the poles are correct.

Step 3 Align the connector on the power cable with the PS-1 connector on the SCU backplane as shown in Figure 3-17 on page 3-22.

Step 4 Connect the power cable to the PS-1 connector on the SCU backplane.

Step 5 Make sure the power cable connector is firmly mated to the PS-1 connector.

Step 6 Connect the SCU power cable to the A side of the PDP. Be sure the poles are correct.

Step 7 Align the connector on the power cable with the PS-2 connector on the front panel of the SCU.

Step 8 Connect the power cable to the PS-2 connector on the front panel of the SCU.

Step 9 Make sure the power cable connector is firmly mated to the PS-2 connector.

Step 10 Replace the A- and B-side BDB and PDP fuses.

Step 11 Verify that the A-side –48 VDC and B-side –48 VDC return (0 VDC) of the SCU are connected to the proper poles at the power source.

Step 12 Verify that the incoming power is within the range of –42 VDC to –56 VDC before applying power.

3.5.3 Install the ONS 15201 Fiber Cable

Caution Always use the supplied ESD wristband when working with an ONS 15201.

ONS 15201 SCU client and DWDM interface use SC fiber connectors.

To install fiber-optic cables in the SCU, connect a fiber cable with the corresponding connector type to the transmit and receive ports on the CLIP and the DWDM side or Collector Filter module (CFM). On the CLIP, the transmit and receive client ports are located on the left side. The receive port is located on the bottom and has an arrow pointing towards the CLIP label.

The DWDM transmit and receive ports are located on the right side of the SCU. The A-side transmit port is located on the top left and the A-side receive is located on the bottom left. The B-side transmit is located on the top right and the B-side receive is located on the bottom right. The ports are labeled for the A side and the B side with arrows indicating which is transmit and which is receive. See Figure 3-16 on page 3-21 for clarification.

Cisco recommends that you label the client side transmit and receive fibers and A-side and B-side DWDM fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance.

Warning **Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.**

Procedure: Connect the Client Layer Fiber

Use the following procedure to connect the ONS 15201 CLIP to the customer-specified point.

Step 1 Remove the dust plugs from the CLIP module client-layer connectors.

Step 2 Remove the caps from the connectors.

Step 3 Clean and inspect the client-layer optical-fiber jumper cable connectors.

Step 4 Connect the CLIP module input and output to the customer-specified demarcation point.

Procedure: Connect the DWDM Fiber

Use the following procedure to connect the ONS 15201 DWDM signal to the customer-specified demarcation point.

Step 1 Remove the dust plugs from the A-side DWDM optical connectors.

Step 2 Clean and inspect the A-side DWDM optical-fiber jumper cable connector.

Step 3 Connect the A-side DWDM input and output to the customer-specified demarcation point.

Step 4 Repeat on the B-side.

3.6 ONS 15252 MCU Module Installation (Non-ATO)

Normally, the ONS 15252 MCU is configured and shipped with customer-requested modules installed (assembled to order [ATO]). The ATO MCU contains a R1.0.1 shelf. See "Shelf Version Considerations" procedure on page 3-5.

Use the following module installation instructions only when an MCU must be built from scratch. Figure 3-19 shows the MCU without modules installed. If the MCU was not assembled to order, see the "ONS 15252 MCU Assembled-to-Order Installation" procedure on page 3-7 for procedures to remove the crossbeam, install the fan unit, fiber organizer, ground, power, and fibers.

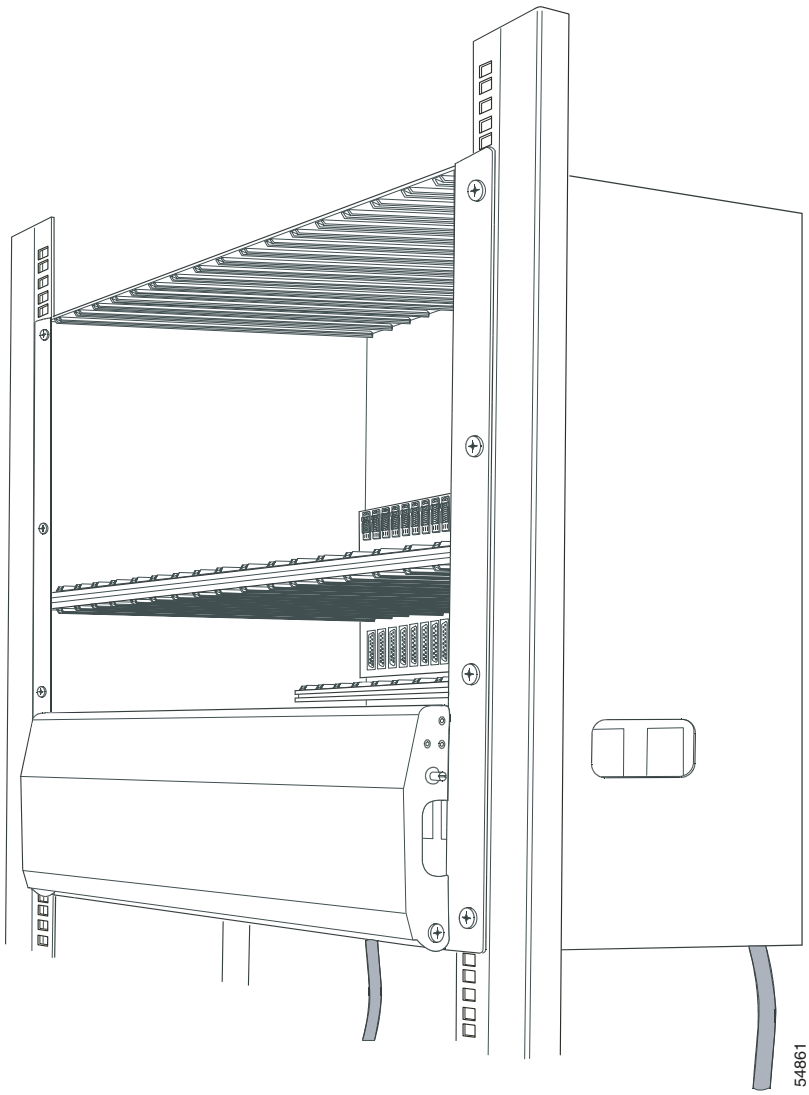
Warning **Before installing the ONS 15252 MCU, remove the fuses from both the A and B sides of the PDP. Failure to do so can cause injury or death.**

Warning **Touching electrical connectors or other exposed electrical circuitry inside the ONS 15252 MCU when it is energized can cause serious injury or death.**

Caution Static electricity can damage electro-optical equipment. While unpacking and handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

Note Clean all optical connectors and keep them protected with caps prior to connection.

Figure 3-19 An ONS 15252 MCU without modules

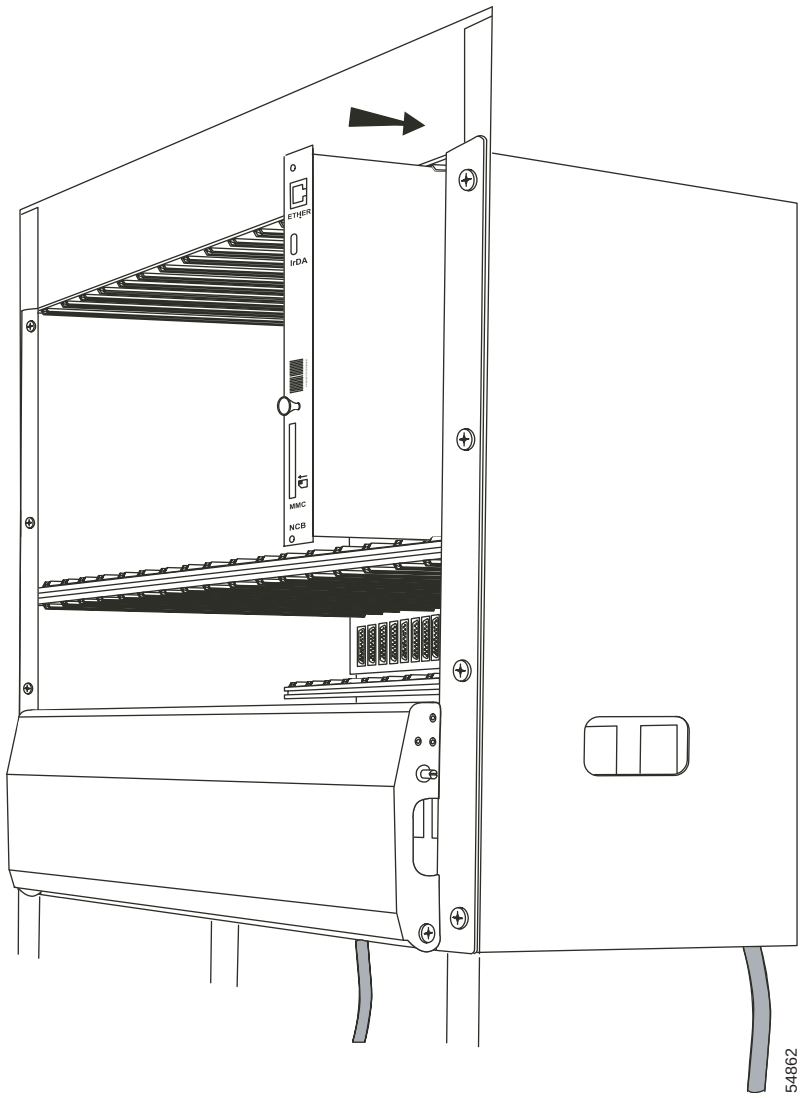


Procedure: Install the Network Control Board Module in the ONS 15252 MCU

Step 1 Align the NCB module with the NCB module slot located on the right of the upper portion of the ONS 15252 MCU (Slot 17).

Step 2 Carefully insert the NCB module in the NCB module slot as shown in Figure 3-20. Be sure the NCB module connector and the backplane connector mate correctly.

Figure 3-20 Installing a Network Control Board in an ONS 15252 MCU



Step 3 Tighten the NCB module thumbscrews.

Procedure: Install the Communication Interface Module in the ONS 15252 MCU

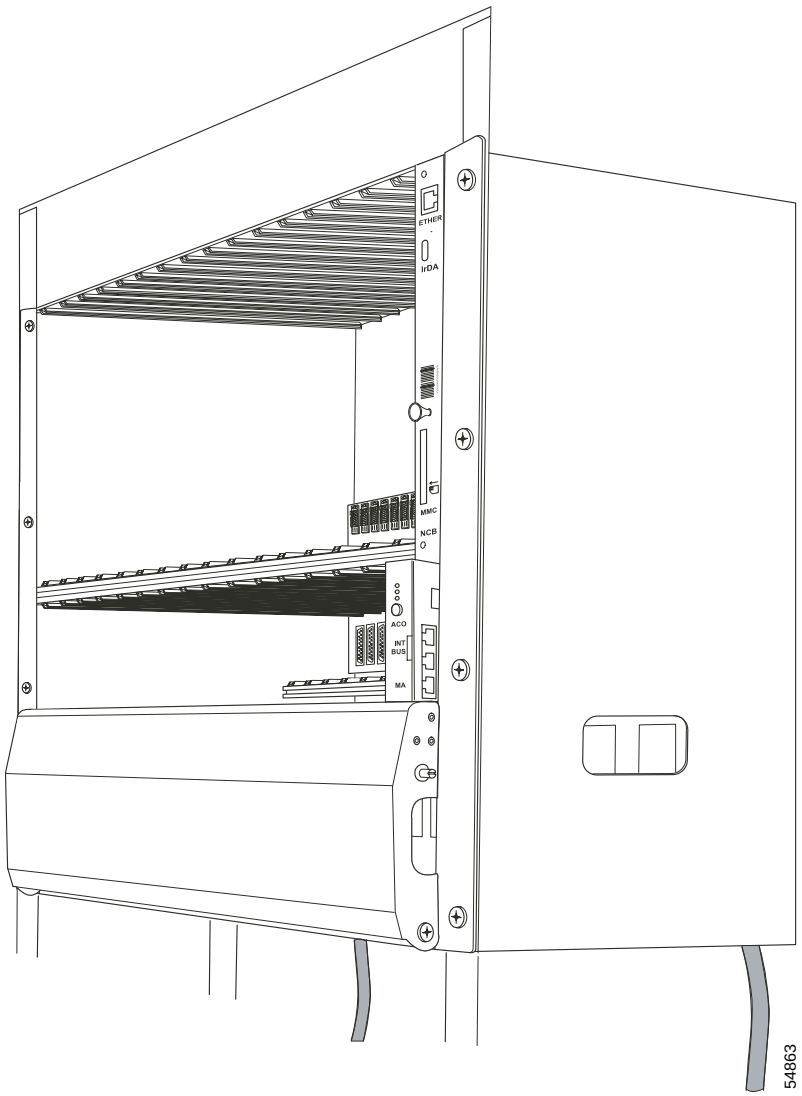
Step 1 Align the CIM with the slot directly below the NCB module.

Step 2 Carefully insert the CIM into the slot and lower guide rail, making sure that no fibers are pinched in the process. Be sure the CIM connector and the backplane connector mate correctly.

Step 3 Use a slot or Phillips screwdriver to tighten the CIM retaining screws.

Figure 3-21 shows the CIM installed in the ONS 15252 MCU.

Figure 3-21 Installing a Communications Interface module in an ONS 15252 MCU



Procedure: Install the Client Layer Interface Port Module in the ONS 15252 MCU

Step 1 Align the CLIP module with a CLIP module slot in the MCU. Install CLIP modules from left to right.

Step 2 Carefully insert the CLIP module into the slot. Be sure the CLIP module connector and the backplane connector mate correctly.

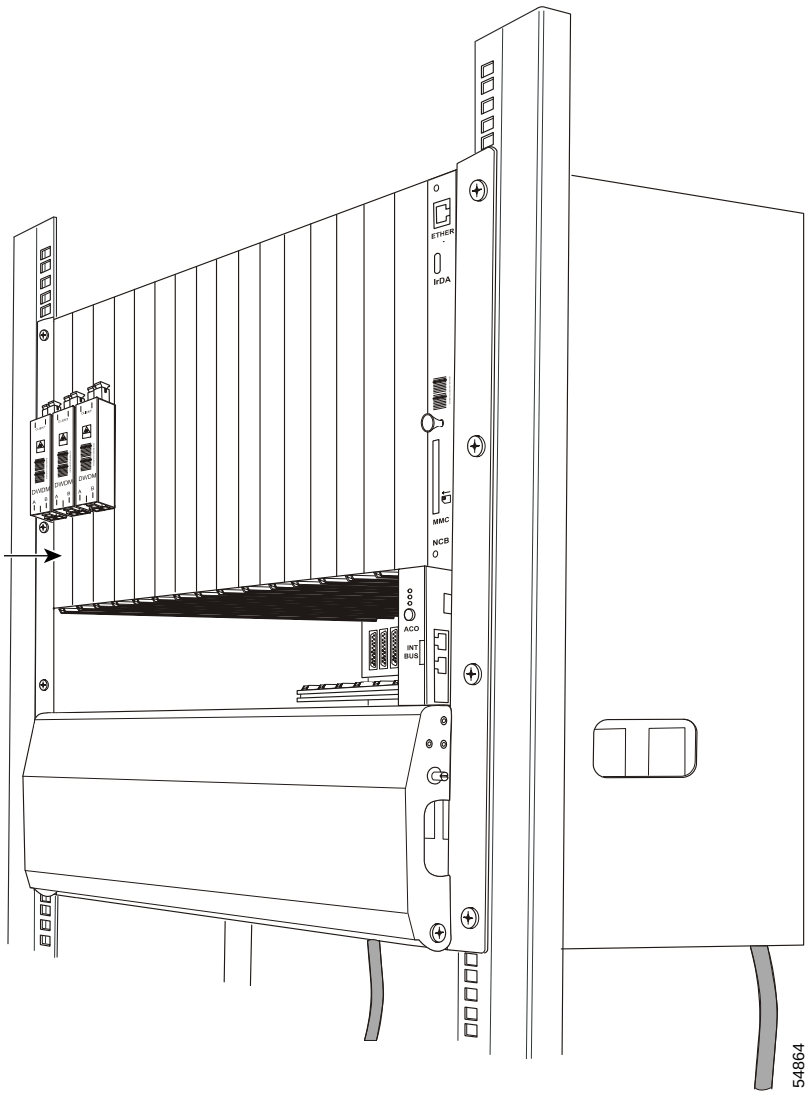
Step 3 Tighten the CLIP module thumbscrews.

Step 4 Repeat Steps 1–3 for each CLIP module in the ONS 15252 MCU.

Step 5 Install a CLIP module slot cover for each empty CLIP module slot.

Figure 3-22 illustrates an ONS 15252 MCU with three CLIP modules installed.

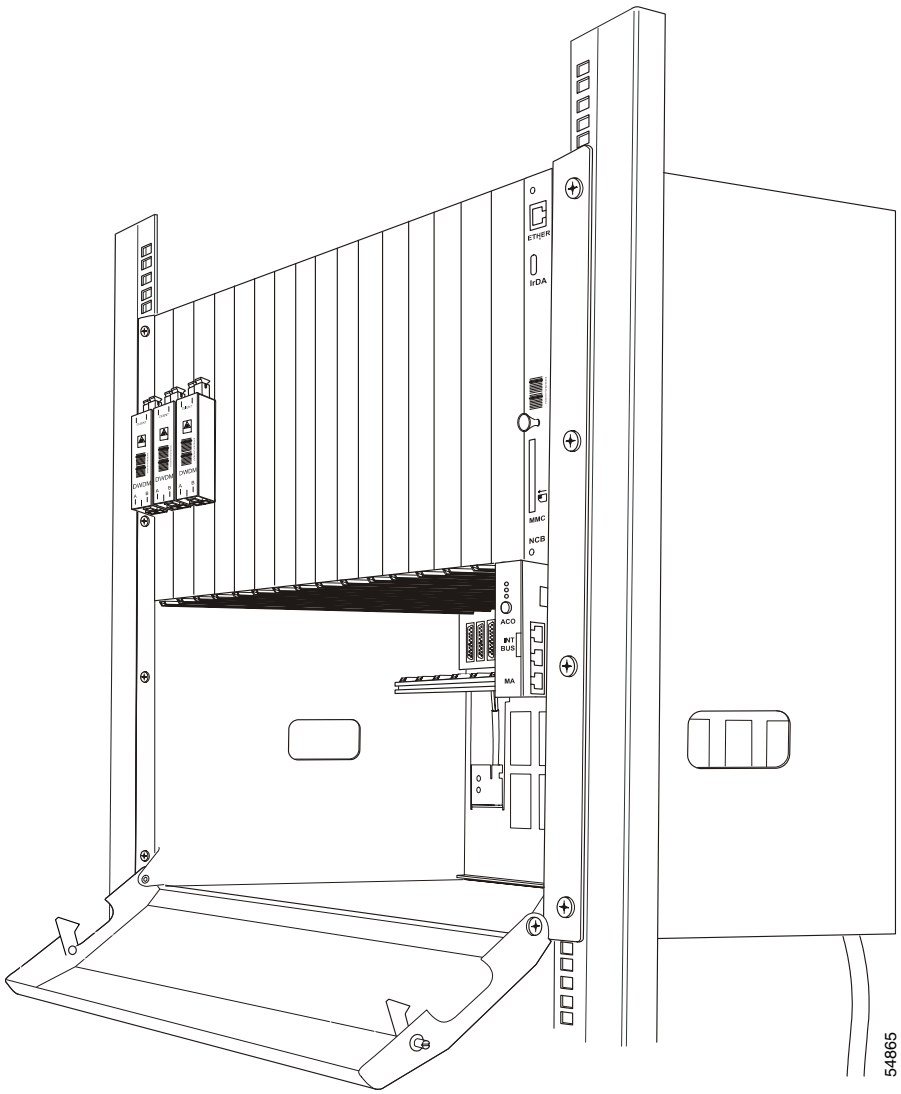
Figure 3-22 Installing a Client Layer Interface Port module in an ONS 15252 MCU



Procedure: Install the Line Module in the ONS 15252 MCU

Step 1 To open the MCU passive optical shelf, pull up on the door latches located on the left and right sides of the door and pull gently towards you. Figure 3-23 illustrates an ONS 15252 MCU with the passive optical shelf door open.

Figure 3-23 An ONS 15252 MCU with the passive optical shelf door open



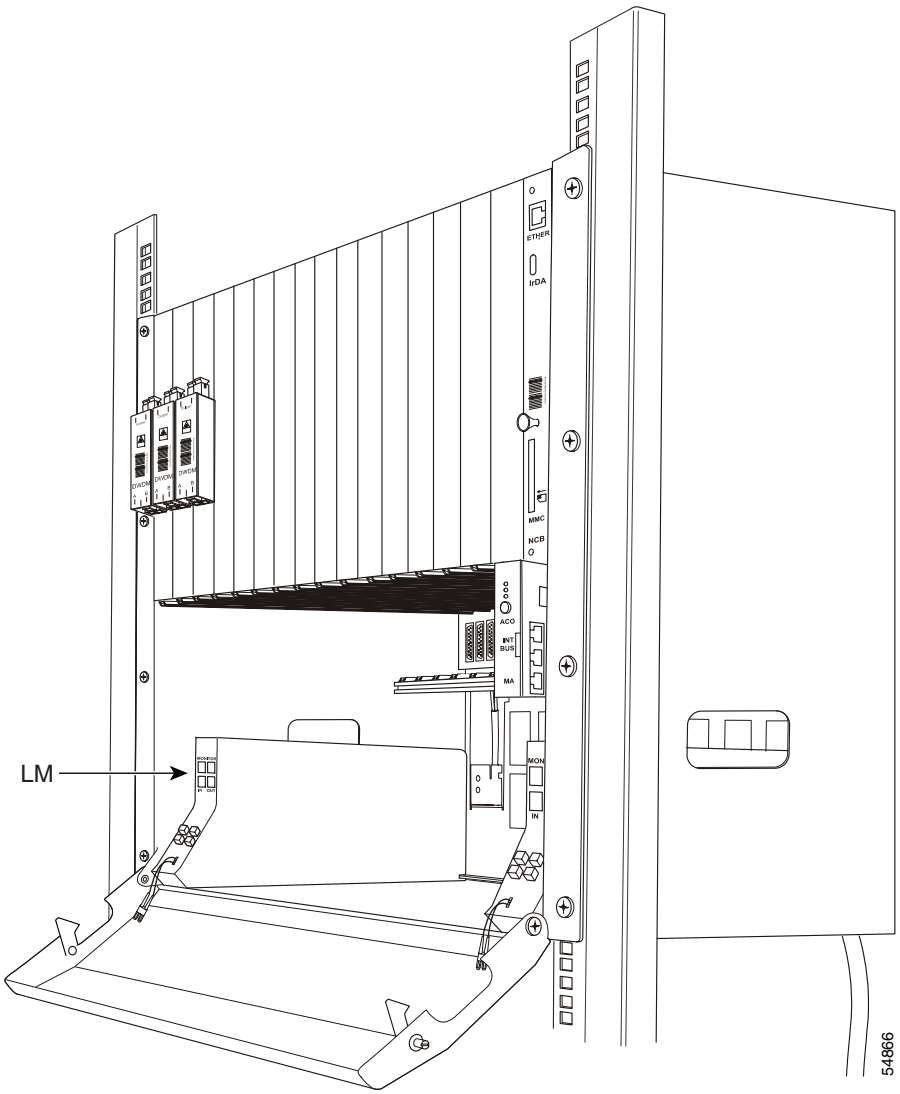
Step 2 Align the A-side LM with the far left position (if applicable) and the B-side LM with the far right position (if applicable) in the passive optical shelf. Insert them as shown in Figure 3-24.

Note Normally an MCU is equipped with two LMs, but under some circumstances there may be only one LM or no LM at all.

Step 3 Make sure the crossbar at the back of the passive optical shelf and the groove in the back of the LMs fit together.

Step 4 Push the button at the bottom front of the LMs and snap the LMs into place.

Figure 3-24 Installing a Line module in an ONS 15252 MCU



Procedure: Position the Hub Filter Modules in the ONS MCU 15252 Passive Optical Shelf

This procedure explains how to insert the Hub Filter modules (HFMs). However, before actually connecting the HFMs as described in the "Interconnect the ONS 15252 MCU Passive Optical Shelf Modules" procedure on page 3-40, you must install the following modules:

- The Bridge module (BM), described in the "Install the Bridge Module in the ONS 15252 MCU Passive Optical Shelf" procedure on page 3-35, or the Termination module (TM) described in the "Install the Termination Module in the ONS 15252 MCU Passive Optical Shelf" procedure on page 3-36.
- Any Connection Module Xs (CMXs), described in the "Install a Connection Module X in Two ONS 15252 MCUs" procedure on page 3-37, or Connection Module Ys (CMYs), described in the "Install a Connection Module Y in Two ONS 15252 MCUs" procedure on page 3-38.
- Any Dummy Filter modules (DFMs), as described in the "Install the Dummy Network Adaptation Module in the ONS 15252 MCU" procedure on page 3-45.

Note The placement order of the HFM modules in the passive optical shelf must match the placement order given by the network planner.

Step 1 Align an HFM with the designated location in the ONS 15252 MCU passive optical shelf. Installation of the A-side HFM modules should be from left to right, starting with the slot adjacent to the A-side LM. Installation of the B-side HFM modules should be from right to left, starting with the slot adjacent to the B-side LM.

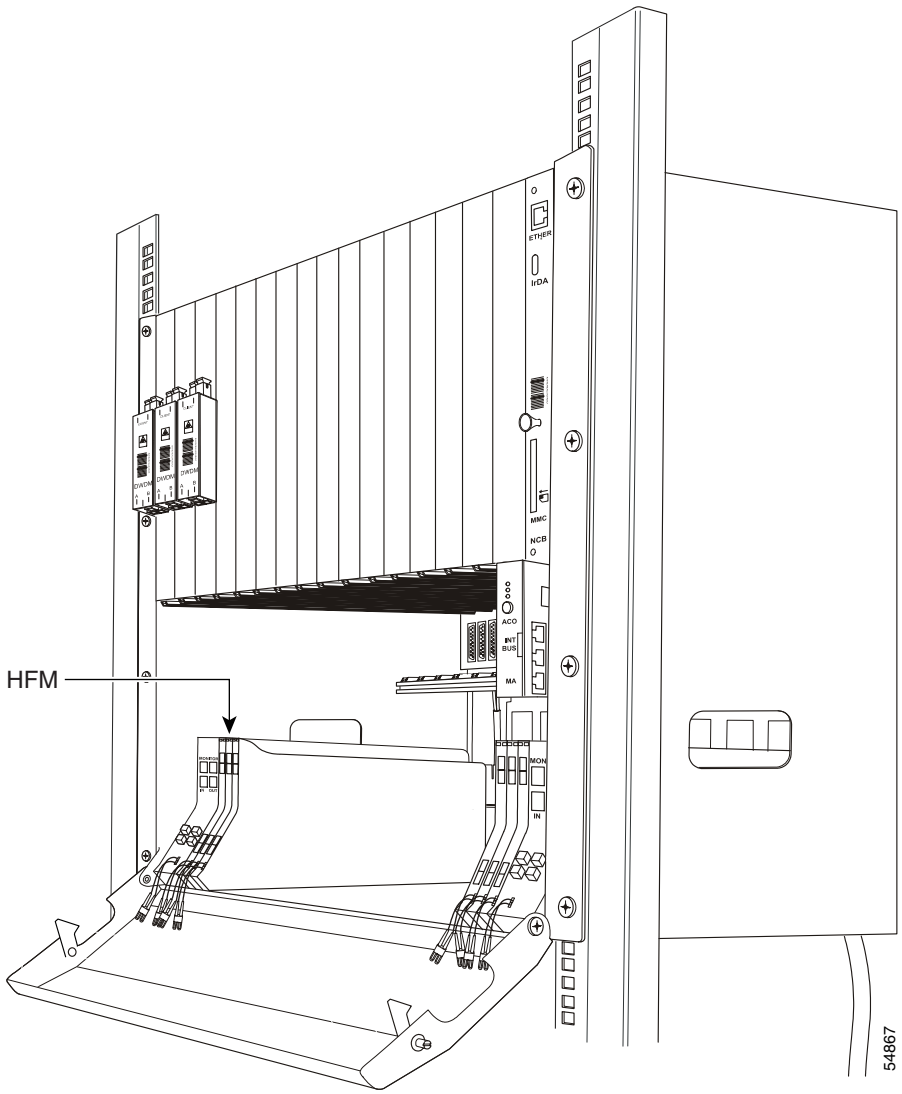
Step 2 Insert and slide the HFM into the passive optical shelf.

Be sure that the crossbeam in the passive optical shelf interlocks with the slot on the bottom of the HFM.

Step 3 Once the HFM is positioned in place in the passive optical shelf, push the retainer button located at bottom of the HFM front panel and snap the HFM into place.

Step 4 Repeat Steps 1–3 for each HFM located in the MCU passive optical shelf. Once the HFMs are installed in the passive optical shelf, the MCU should appear as illustrated in Figure 3-25.

Figure 3-25 Installing a Hub Filter module in an ONS 15252 MCU



Procedure: Install the Bridge Module in the ONS 15252 MCU Passive Optical Shelf

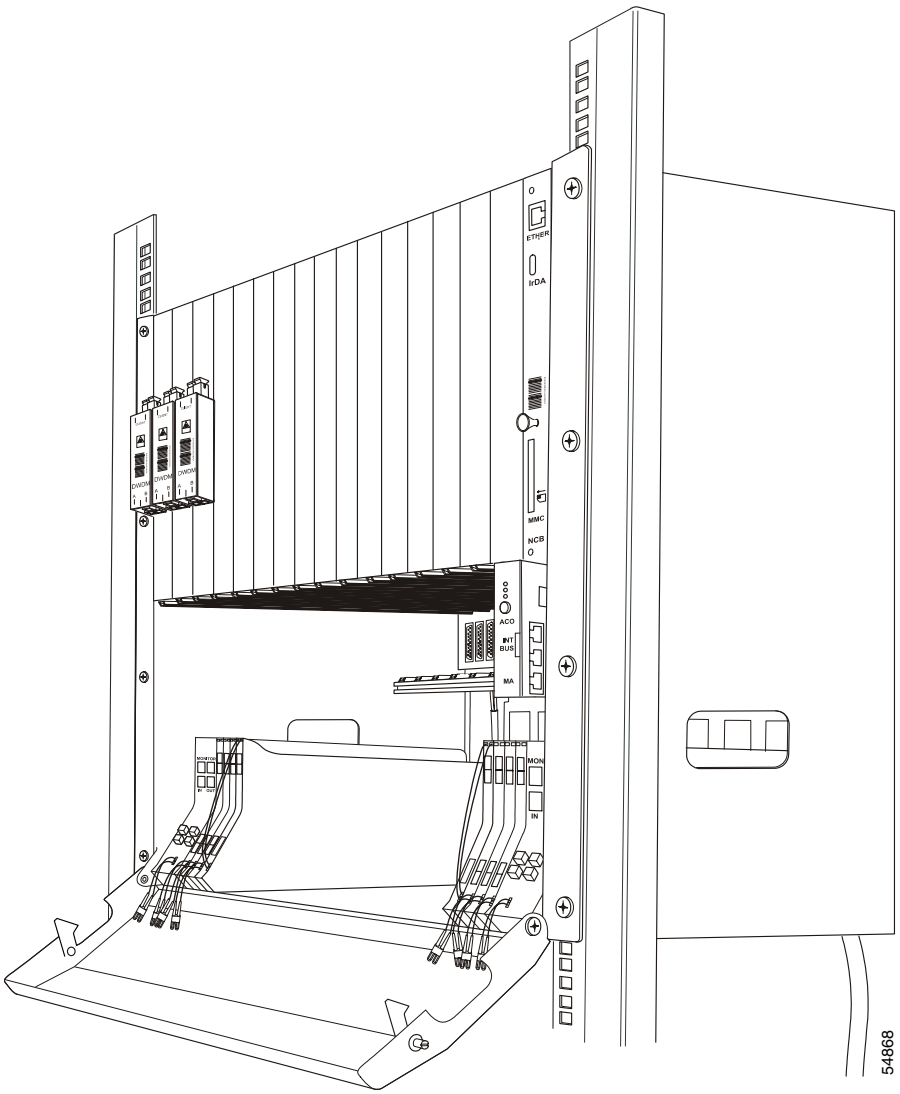
You will install one BM, or one or two TMs, but not both a BM and a TM together. See the "Install the Termination Module in the ONS 15252 MCU Passive Optical Shelf" procedure on page 3-36. You can also install a combination of Connection Module Xs (CMXs) and Connection Module Ys (CMYs). See the "Install a Connection Module X in Two ONS 15252 MCUs" procedure on page 3-37 and the "Install a Connection Module Y in Two ONS 15252 MCUs" procedure on page 3-38. Figure 3-26 illustrates a BM installation.

Step 1 Position the BM into the passive optical shelf at the end of the A-side and B-side rows of HFMs. Place one side of the BM at the end of the A-side row of HFMs and the other side of the BM at the end of the B-side row of HFMs.

Step 2 Carefully slide each side of the BM into the passive optical shelf. Be sure the passive optical shelf crossbeam and the slot on the bottom of each side of the BM connect properly.

Step 3 Push the retainer button located on the bottom of each side of the BM front panel and individually snap each side of the BM into place.

Figure 3-26 Installing a Bridge module in an ONS 15252 MCU



Procedure: Install the Termination Module in the ONS 15252 MCU Passive Optical Shelf

You will install a BM, or one or two TMs, but not both a BM and a TM together. See the "Install the Bridge Module in the ONS 15252 MCU Passive Optical Shelf" procedure on page 3-35. You can also install a combination of Connection Module Xs (CMXs) and Connection Module Ys (CMYs). See the "Install a Connection Module X in Two ONS 15252 MCUs" procedure on page 3-37 and the "Install a Connection Module Y in Two ONS 15252 MCUs" procedure on page 3-38.

Step 1 Position the TM in the passive optical shelf at the end of the row of HFMs.

Step 2 Carefully slide the TM into the passive optical shelf. Be sure the groove on the back of the TM connects with the passive optical shelf crossbeam.

Step 3 Push down on the TM retainer button located on the TM front panel and snap the TM into place.

Step 4 If applicable, repeat Steps 1–3 for the other TM.

Procedure: Install a Connection Module X in Two ONS 15252 MCUs

Note Use this procedure if you are using two or more installed assembled-to-order (ATO) MCUs.

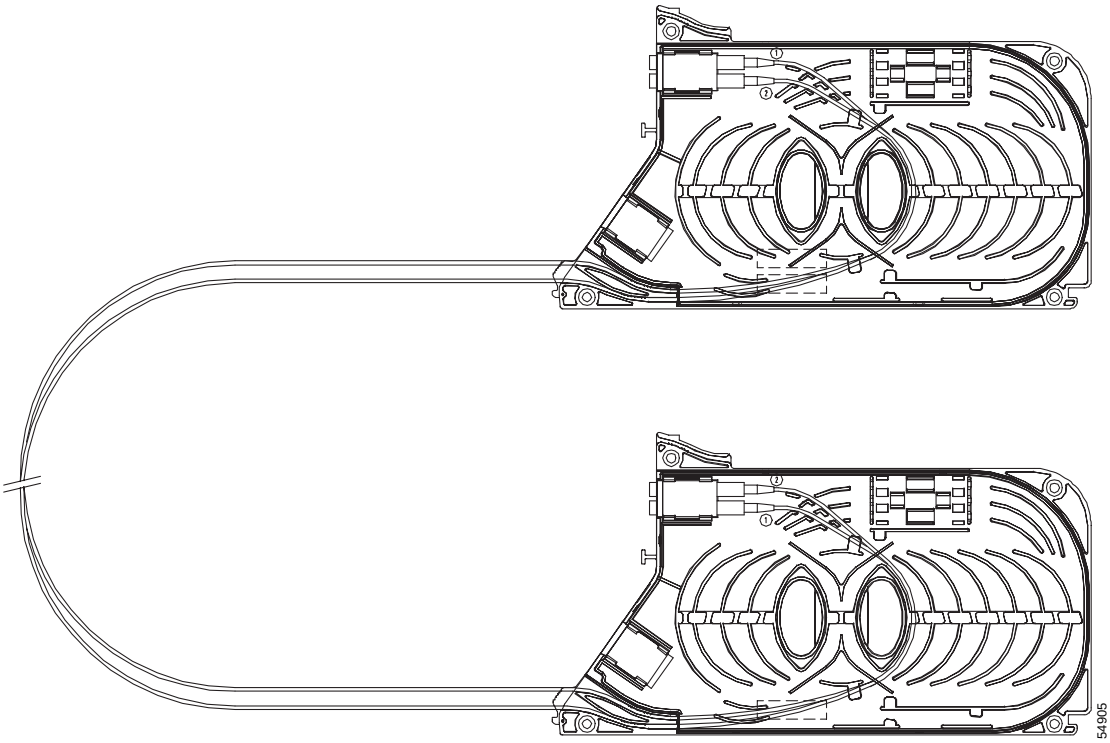
Step 1 Disconnect the MU duplex connector from the TM you will replace.

Step 2 Put protective caps on the MU duplex connector.

Step 3 Remove a TM module from the passive optical shelf of the first MCU.

Step 4 Position one side of the CMX (Figure 3-27) in the passive optical shelf of the first MCU where the TM was removed.

Figure 3-27 Side view of a CMX module



Step 5 Carefully insert the half CMX into the passive optical shelf. Be sure the groove on the back of the module interlocks with the crossbeam located in the passive optical shelf.

Step 6 Snap the CMX into place by pushing the retainer located at the bottom of the CMX.

Step 7 Remove the dust plugs located on the CMX duplex MU-MU adapter.

Step 8 Remove the fiber caps on the MU duplex connector in the adjacent HFM.

Step 9 Clean, inspect, and insert the MU duplex connector from the adjacent HFM into the CMX.

Step 10 Fasten a fiber holder on the side of the passive optical shelf just outside the door.

Step 11 Guide the optical fiber cable from the CMX to the fiber holder and fasten the cable.

Step 12 Remove the fiber caps on the MU duplex connector in the adjacent HFM.

Step 13 Remove the MU plugs in the CMX half.

Step 14 Inspect and clean the duplex MU connector.

Step 15 Insert the connector in the CMX half.

Step 16 Remove a TM from the passive optical shelf of the second MCU.

Step 17 Place dust caps on the connectors.

Step 18 Position the second half of the CMX in the passive optical shelf of the second MCU where the TM was removed.

Step 19 Carefully insert half of the CMX into the passive optical shelf. Be sure the groove on the back of the module interlocks with the crossbeam in the passive optical shelf.

Step 20 Snap the CMX into place by pushing downwards on the CMX front panel.

Step 21 Remove the dust caps from the duplex connector of the adjacent HFM.

Step 22 Remove the dust plugs located on the CMX duplex adapter.

Step 23 Clean, inspect, and insert the MU duplex connector from the adjacent HFM into the CMX.

Step 24 Fasten a fiber holder on the side of the passive optical shelf just outside the door.

Step 25 Guide the optical fiber cable from the CMX to the fiber holder and fasten the cable.

Procedure: Install a Connection Module Y in Two ONS 15252 MCUs

Note Use this procedure if you are using two installed assembled-to-order (ATO) MCUs.

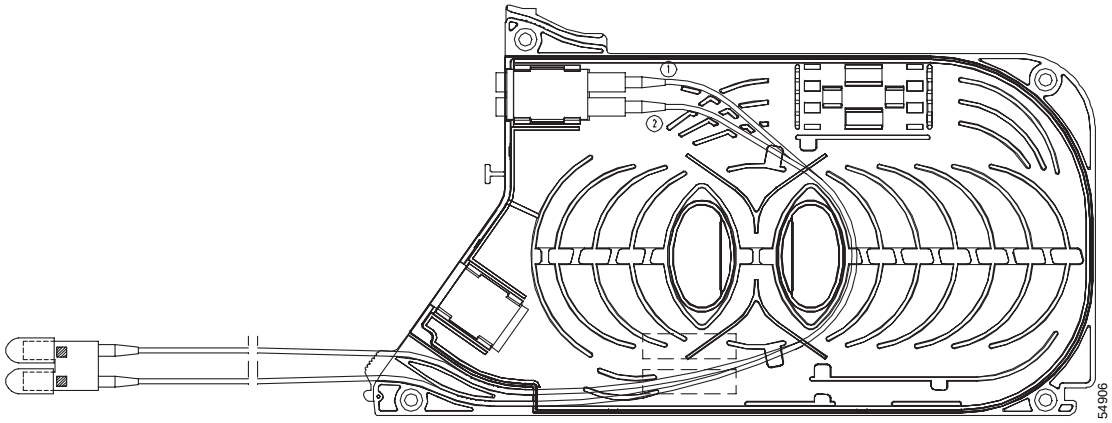
Step 1 Disconnect the adjacent HFM from the TM that you will remove.

Step 2 Protect the optical duplex MU connector with fiber caps.

Step 3 Remove a TM from the passive optical shelf of the first ONS 15252 MCU.

Step 4 Position the CMY (Figure 3-28) in the passive optical shelf of the first MCU where you removed the TM.

Figure 3-28 Side view of a CMY module



Step 5 Carefully insert the CMY. Be sure the groove on the back of the module interlocks with the crossbeam in the passive optical shelf.

Step 6 Snap the CMY into place by pushing the retainer located at the bottom of the CMY front panel.

Step 7 Remove the dust plugs located on the CMY duplex adapter.

Step 8 Remove the fiber caps on the adjacent HFM.

Step 9 Clean, inspect, and insert the MU duplex connector from the adjacent HFM into the CMY.

Step 10 Fasten a fiber holder on the side of the passive optical shelf just outside the door.

Step 11 Guide the optical fiber cable from the CMY to the fiber holder and fasten the cable.

Step 12 Remove the dust plugs from the appropriate HFM in the second MCU.

Step 13 Remove the dust caps located on CMY optical fiber connectors.

Step 14 Clean, inspect, and insert the MU duplex connector from the CMY into the HFM in Step 12.

Step 15 Fasten a fiber holder on the side of the passive optical shelf just outside the door of the second MCU.

Step 16 Guide the optical fiber cable from the CMY to the fiber holder and fasten the cable.

Procedure: Install the Dummy Filter Module in the ONS 15252 MCU

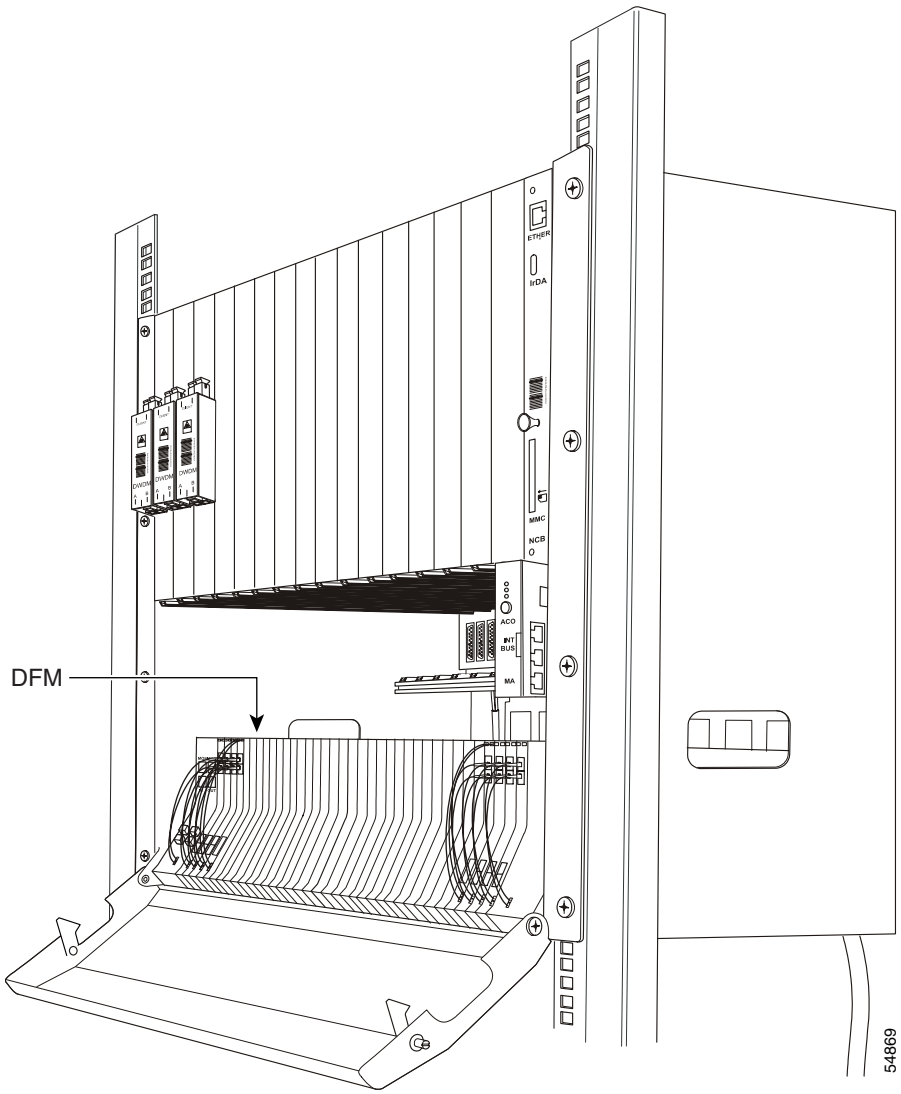
Step 1 Position the DFM in the passive optical shelf between the last A-side optical module and the last B-side optical module.

Step 2 Slide the DFM into the passive optical shelf. Be sure the slot located on the back of the DFM aligns with the crossbeam in the rear of the ONS 15252 MCU.

Step 3 Snap the DFM into place by pressing the retainer button located at the bottom front of the DFM.

Step 4 Repeat Step 1 – 3 until the passive optical shelf is filled (Figure 3-29).

Figure 3-29 Installing a Dummy Filter module in an ONS 15252 MCU



Procedure: Interconnect the ONS 15252 MCU Passive Optical Shelf Modules

After positioning the HFMs, and installing the BMs or TMs, CMX or CMY, and DFMs, connect the passive optical shelf modules to complete the passive optical shelf installation.

Step 1 When all HFMs, the BM/TM, the CMX/CMY, and the DFMs are installed in the passive optical shelf, remove the dust plugs from the duplex MU adapter on the HFM closest to the LM (from left to right on the A side and from right to left on the B side).

Step 2 Remove the dust caps from the MU duplex connector connected to the LM.

Step 3 Clean and inspect the LM MU duplex fiber cable connector.

Step 4 Connect the LM MU duplex fiber jumper connector to the duplex MU adapter of the HFM closest to the LM.

Step 5 Remove the dust plugs from the optical-fiber jumper cable connector in the HFM.

Step 6 Remove the dust plugs from the duplex MU optical adapter in the next HFM.

Step 7 Clean and inspect the optical-fiber jumper cable connector in the first HFM.

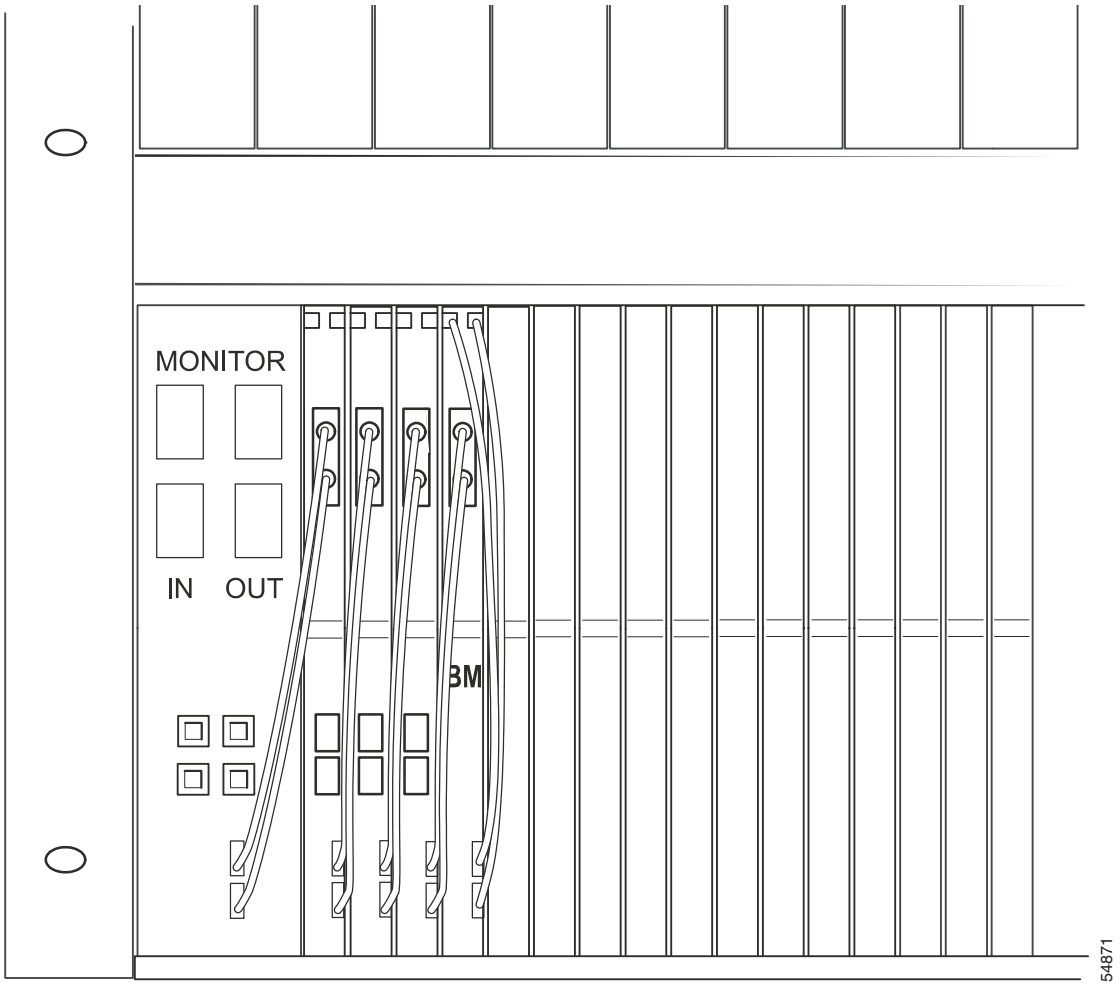
Step 8 Connect the duplex MU optical-fiber jumper cable connector to the next module.

Step 9 Repeat Steps 3–8 until all modules have been interconnected, ending with either a BM half, a TM, a CMX half, or a CMY.

Step 10 Repeat the procedure for both the A and B sides, if applicable, and with other MCUs, if applicable (using CMX and/or CMY).

When the modules are connected, see Figure 3-30 for an example of what the passive optical shelf should look like (with a BM module installed).

Figure 3-30 The ONS 15252 MCU passive optical shelf after the modules are connected



Procedure: Install the Network Adaptation Module in the ONS 15252 MCU

Cisco builds NAM modules per customer design specifications. If you plan to install multiple NAMs, verify that the NAM splitter ratio (50/50, 90/10, 10/90, 100/0, or 0/100) matches the requirements of the associated CLIP module.

Caution In an ONS 15200 Release 1.0.1 shelf assembly, you must install the Release 1.0.1 NAM, identified by the "NEBS-3 compliant" faceplate. Cisco does not recommend or support placing NAMs without the "NEBS-3 compliant" faceplate into an Release 1.0.1 shelf. Equipment damage may result. For more information about shelf versions, see "Shelf Version Considerations" procedure on page 3-5.

Note You can install Release 1.0.1 NAMs (identified by the "NEBS-3 compliant" faceplate label) in either a Release 1.0 or Release 1.0.1 shelf. See "Shelf Version Considerations" procedure on page 3-5.

Step 1 Align the NAM with the NAM slot immediately below a previously installed CLIP module.

Step 2 Carefully insert the NAM into the slot. Make sure that the NAM is properly inserted in the lower guide rail located in the NAM slot, and that the NAM connector and the backplane connector mate correctly.

Caution When you insert the NAM, ensure that the fiber cables and connector emerging from the NAM are not pinched, which could damage the fibers.

Step 3 Use a slot or Phillips screwdriver to tighten the NAM retaining screw.

Step 4 Remove the dust plugs from the CLIP module.

Step 5 Remove the dust cap from one of the three NAM MU connectors (for a protected channel) or one of the two NAM MU connectors (for an unprotected channel), as shown in Figure 3-31. Start with the fibers connected to the receivers, labeled either A or B.

Step 6 Clean and inspect the MU connector.

Step 7 For a protected channel, connect the NAM fiber labeled A and B to the corresponding MU optical adapters (also labeled A and B) on the associated CLIP module.

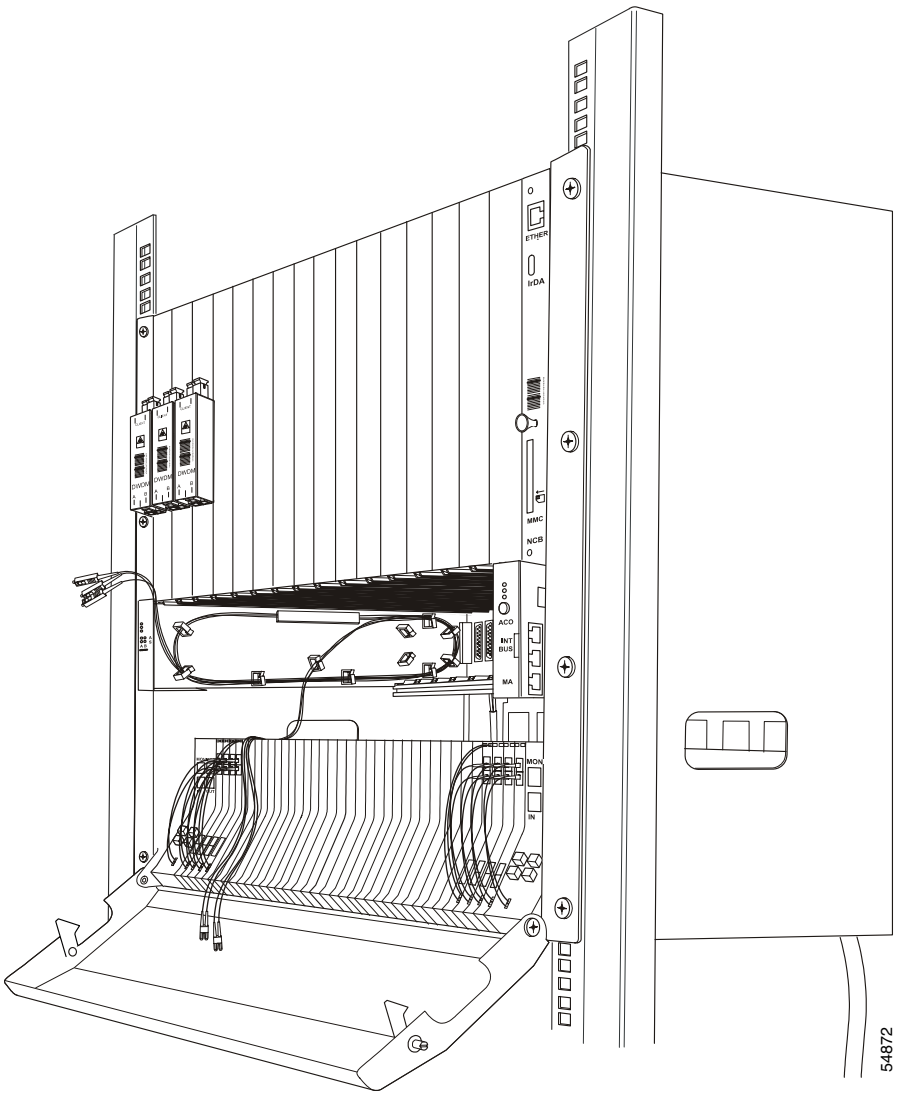
Step 8 Repeat Steps 6 and 7 for the other receiver.

Step 9 For an unprotected channel, connect the optical-fiber jumper cable labeled A to the A-side MU adapter on the associated CLIP module.

Step 10 Connect the transmitter optical fiber to the DWDM transmitter MU adapter on the CLIP (labeled with a down arrow). See Figure 3-32.

Note The receive side of the duplex fiber connected to the HFM is labeled with the intended side of the passive optical shelf. The transmit side of the fiber is labeled with the transmitted power percentage.

Figure 3-31 Installing an ONS 15252 MCU Network Adaptation module (Part 1)



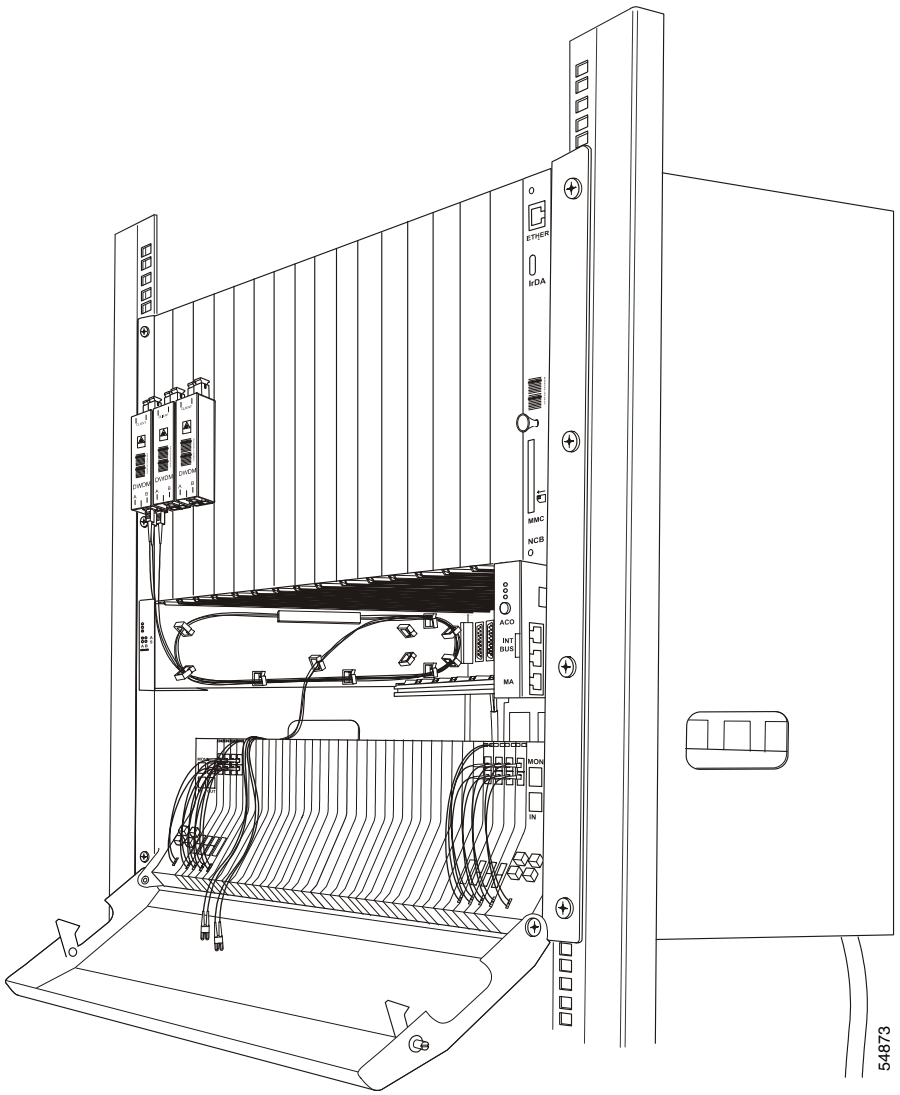
Step 11 One at a time, remove the dust caps on the connectors coming from the NAM.

Step 12 Remove the dust plugs on the associated HFM optical connectors.

Step 13 Clean and inspect the optical-fiber jumper cable connectors. Connect the duplex MU optical connectors from the NAM to the associated HFM.

Step 14 Repeat Steps 11–13 for protected traffic. Use the labeling on the fiber to ensure that the A side and the B side of the node are not interchanged (Figure 3-32).

Figure 3-32 Installing an ONS 15252 MCU Network Adaptation module (Part 2)

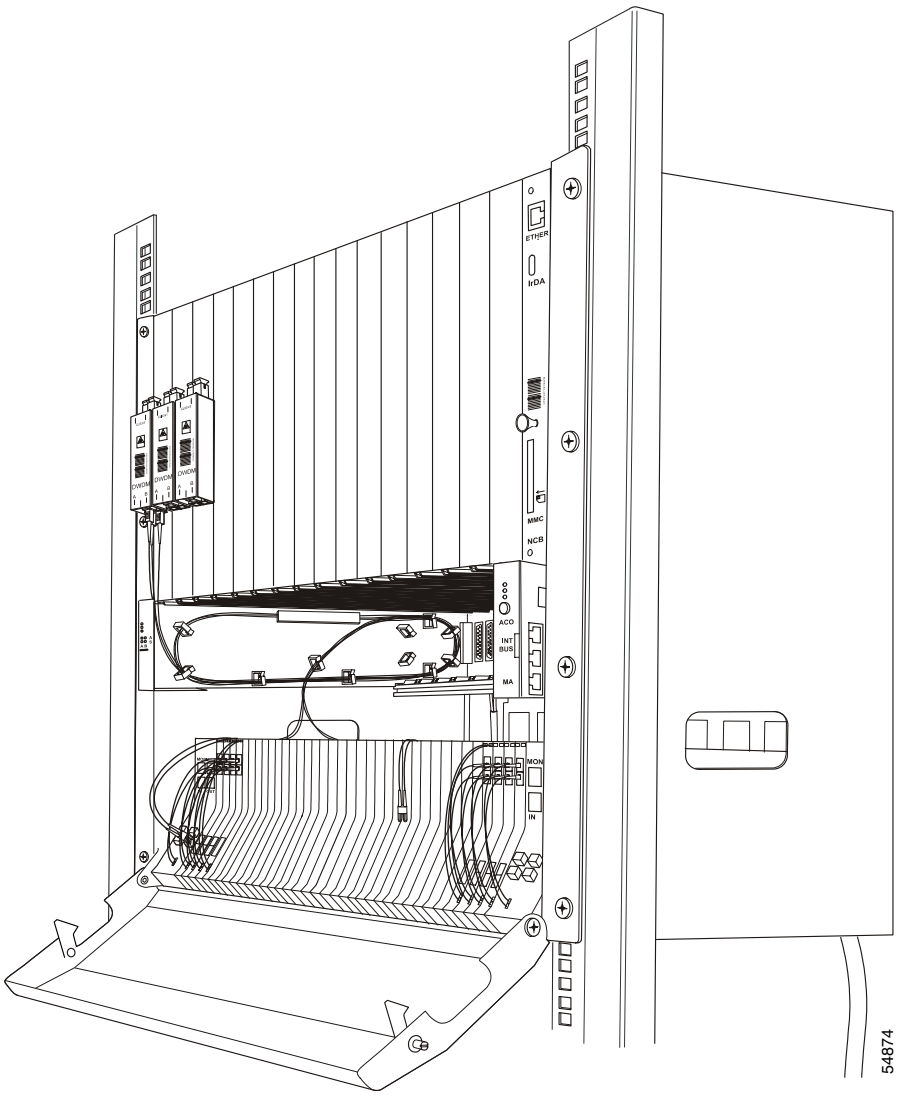


Step 15 After connecting the NAM fiber to the HFM, push the HFM slightly upward to expose the two lateral grooves on the top of the HFM.

Note Do not install fiber with sharp bends. The radius of all bends must be at least 35 mm (1.4 in.).

Step 16 Insert the fiber into the lateral grooves and snap the HFM back into place (Figure 3-33).

Figure 3-33 Installing an ONS 15252 MCU Network Adaptation module (Part 3)



Step 17 For protected channels, repeat Step 15 and Step 16 for the other HFM.

Step 18 Store excess length of the fiber in the space between the NAM and the MCU passive optical shelf (shown in Figure 3-33).

Step 19 Repeat Steps 1–16 for each NAM in the MCU.

Procedure: Install the Dummy Network Adaptation Module in the ONS 15252 MCU

You must install a Dummy Network Adaptation module (DNAM) in all unused NAM slots.

Step 1 Align a DNAM with an empty NAM slot.

Step 2 Carefully insert the DNAM into the slot. Be sure the DNAM connector and the backplane connector mate correctly, and that no fibers are pinched in the process.

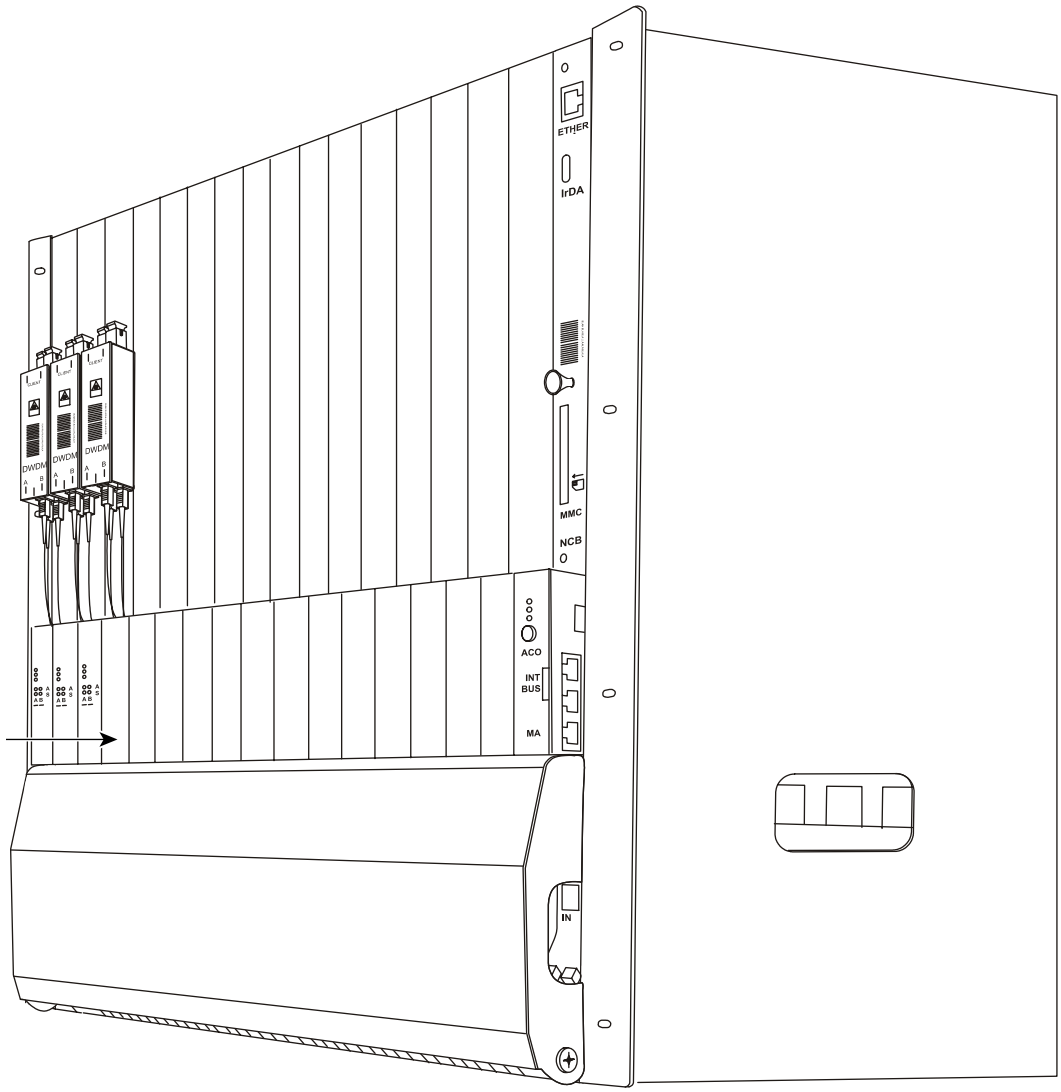
Caution When you insert the DNAM, ensure that the fiber and connector emerging from the adjacent NAMs are not pinched, which could damage the fibers.

Step 3 Use a slot or Phillips screwdriver to tighten the DNAM retaining screws.

Step 4 Repeat Steps 1–3 for each DNAM you are installing in the MCU.

The ONS 15252 MCU with all modules installed and cover lid shut is shown in Figure 3-34.

Figure 3-34 An installed ONS 15252 MCU Dummy Network Adaptation module



3.7 ONS 15201 SCU Module Installation (Non-ATO)

Normally, the ONS 15201 SCU is configured and shipped with the customer-requested modules already installed. Use the following module installation instructions only when you must build the ONS 15201 SCU from scratch. The following paragraphs describe how to install the individual modules in the ONS 15201 SCU.

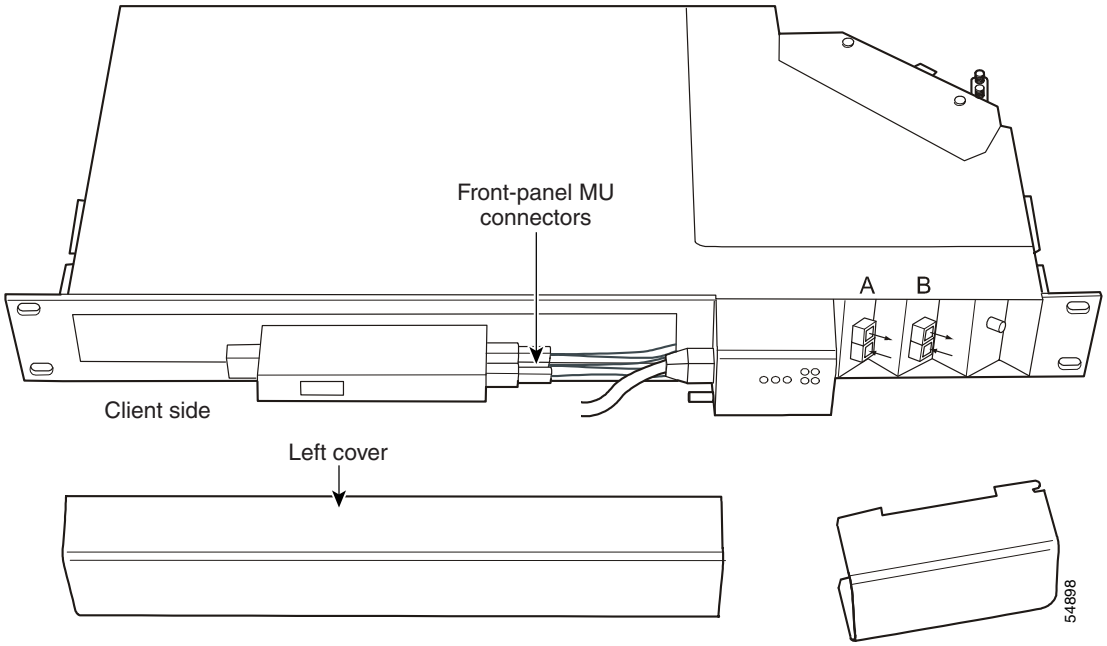
Before beginning this section, see the "ONS 15201 SCU Assembled-to-Order Installation" procedure on page 3-19 to mount the equipment in a rack, and install power, ground, and fiber.

Procedure: Install the Collector Filter Module

Step 1 Remove the front covers of the ONS 15201 SCU.

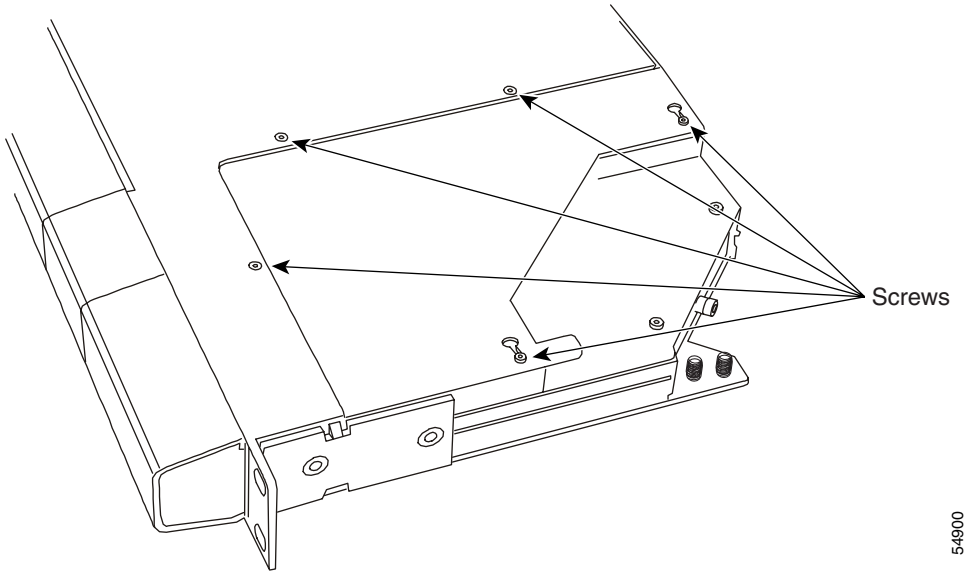
Step 2 Locate the CFM cover lid (Figure 3-35).

Figure 3-35 The cover lid of the ONS 15201 SCU Collector Filter module



Step 3 Use a slot or Phillips screwdriver to loosen the retaining screws on the CFM cover lid. The positions of the retaining screws are shown in Figure 3-36.

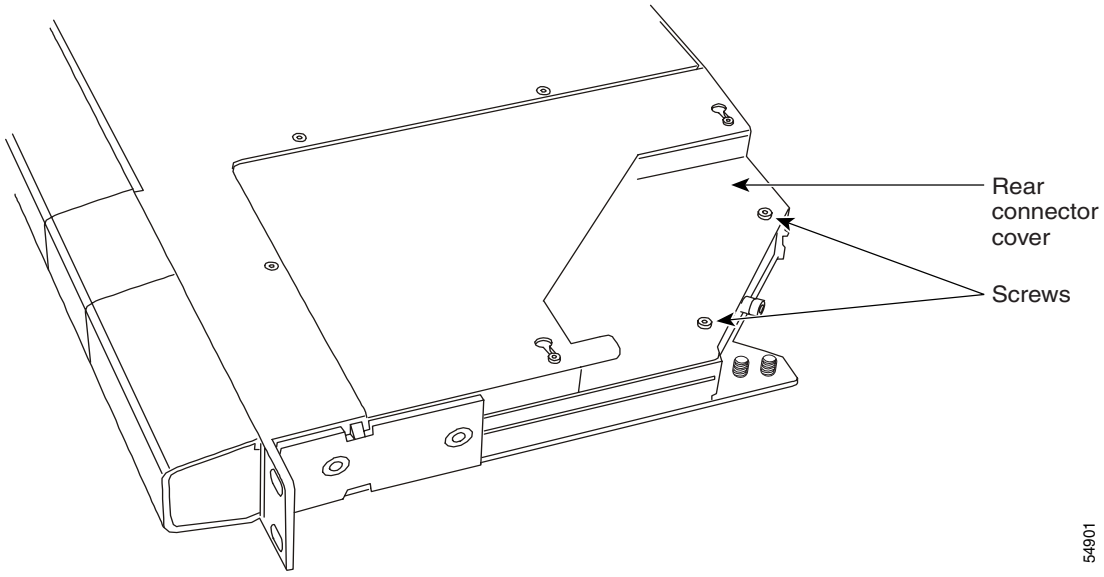
Figure 3-36 Position of retaining screws on the Collector Filter module cover lid



Step 4 Remove the cover lid by sliding it to the right and pulling up.

Step 5 Use a slot or Phillips screwdriver to loosen the rear collector cover retaining screws of the rear connector cover. Figure 3-37 shows the position of the retaining screws.

Figure 3-37 ONS 15201 SCU rear connector cover and retaining screws



Step 6 Remove the rear connector cover by sliding it back and pulling up.

Step 7 Carefully insert the CFM into the SCU. Be careful not to damage the CFM fiber while inserting the module.

Step 8 Align the four holes in CFM case with the four CFM standoffs inside the SCU. When properly aligned, the CFM standoffs fit in the holes in the CFM case.

Step 9 Fasten the CFM to the CFM standoffs with four retaining screws.

Step 10 Remove the dust plugs located on the inside of the SCU SC-to-SC adapters.

Step 11 Perform the following for each SC connector on the CFM fiber:

a. Remove the dust cap from the SC connector on the CFM fiber. Do not remove the dust cap on the MU connector of the CFM fiber.

b. Clean and inspect each SC connector on the fiber.

Step 12 Connect the CFM fiber to the A- and B-side SC-to-SC adapters in accordance with the labels on the cables. Figure 3-38 shows a CFM for an unprotected channel; Figure 3-39 shows a CFM for a protected channel. Figure 3-40 through Figure 3-44 show the connection information for each configuration.

Figure 3-38 CFM for an unprotected channel (100/0 or 0/100)

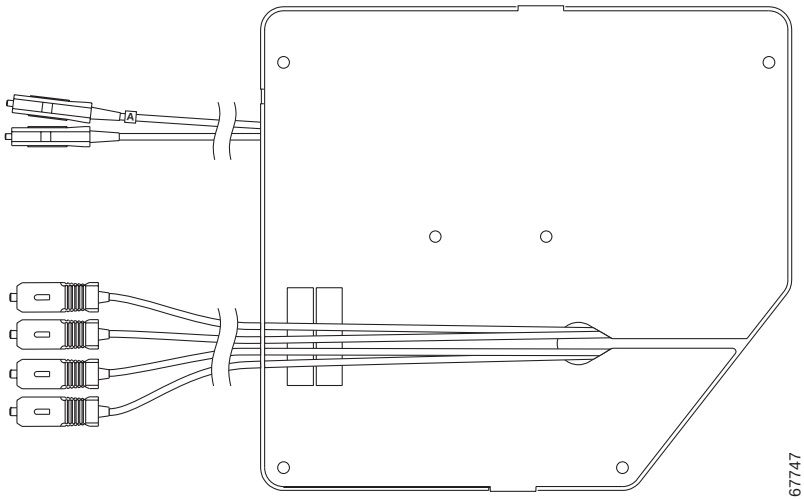


Figure 3-39 CFM for a protected channel (90/10, 10/90, or 50/50)

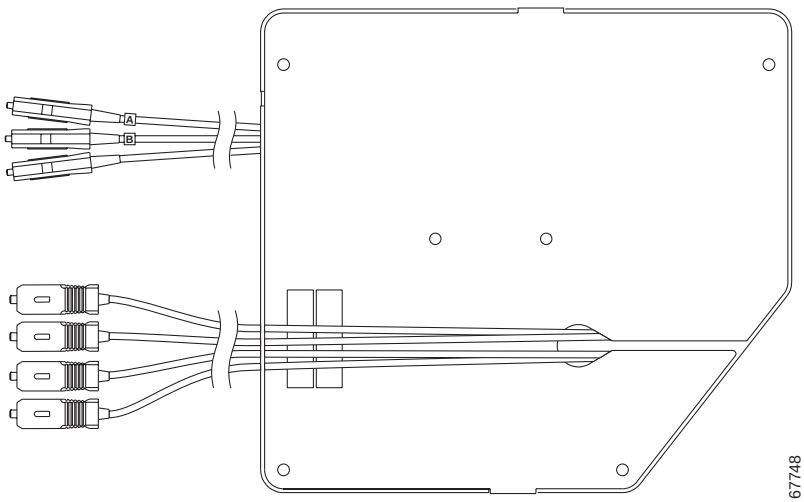


Figure 3-40 90/10 split ratio (protected) connections

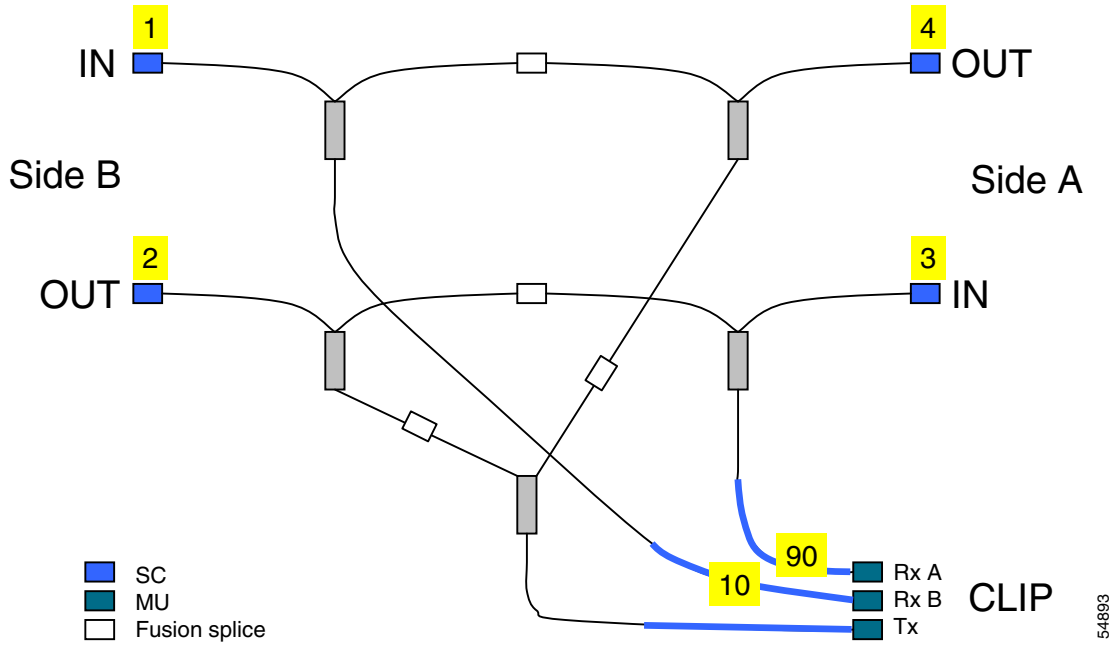


Figure 3-41 10/90 split ratio (protected) connections

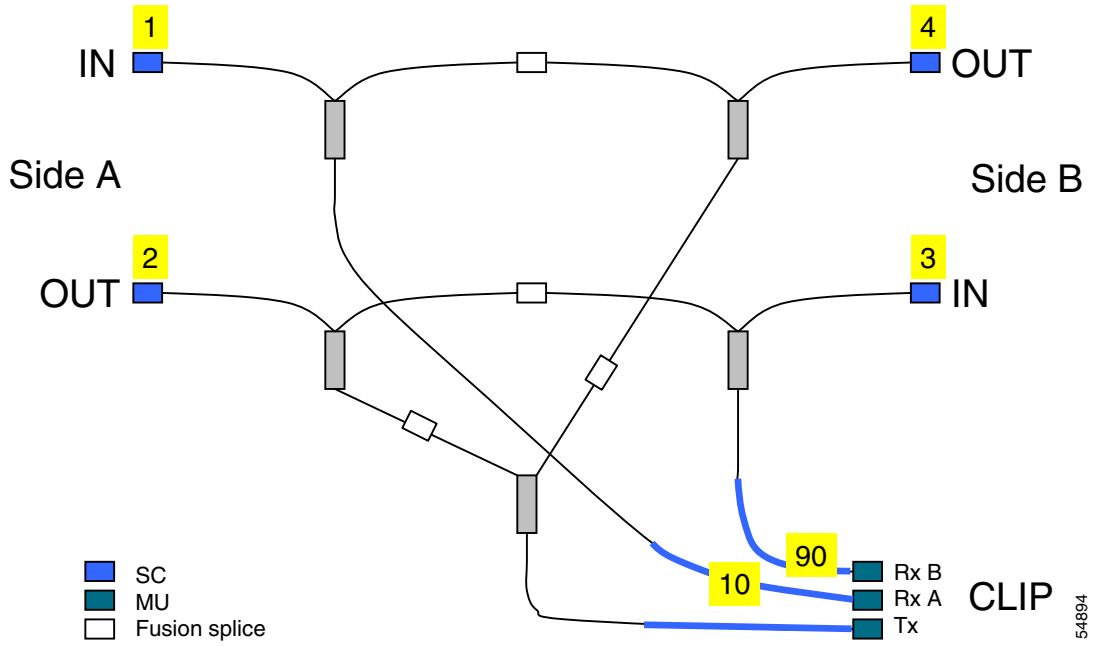


Figure 3-42 50/50 split ratio (protected) connections for a CFM

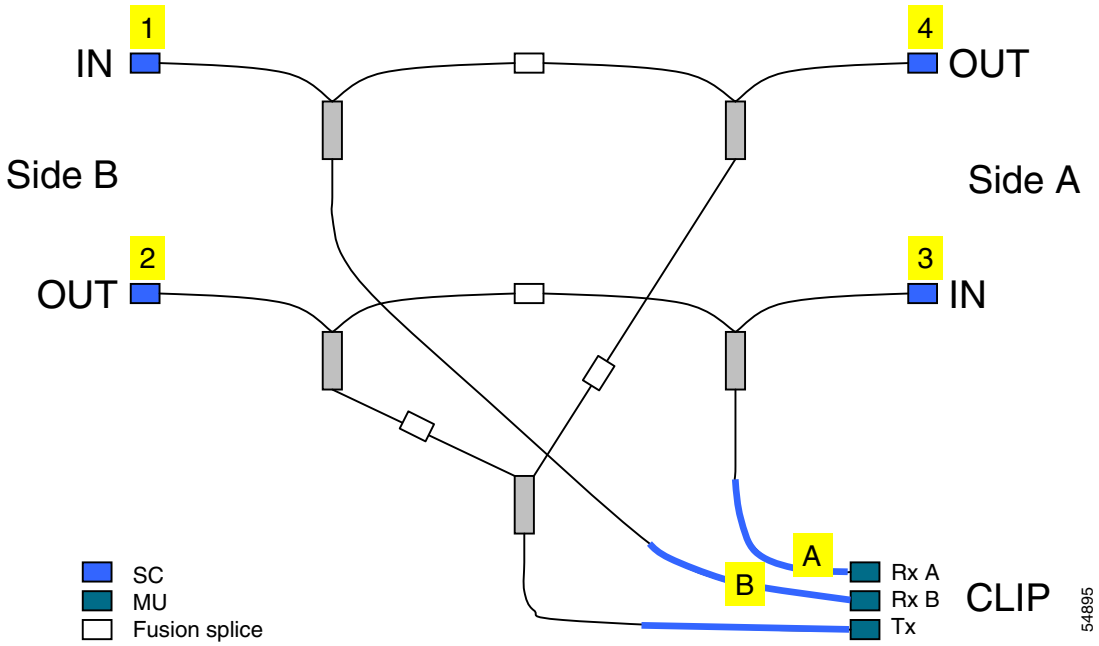


Figure 3-43 0/100 split ratio (unprotected) connections for a CFM

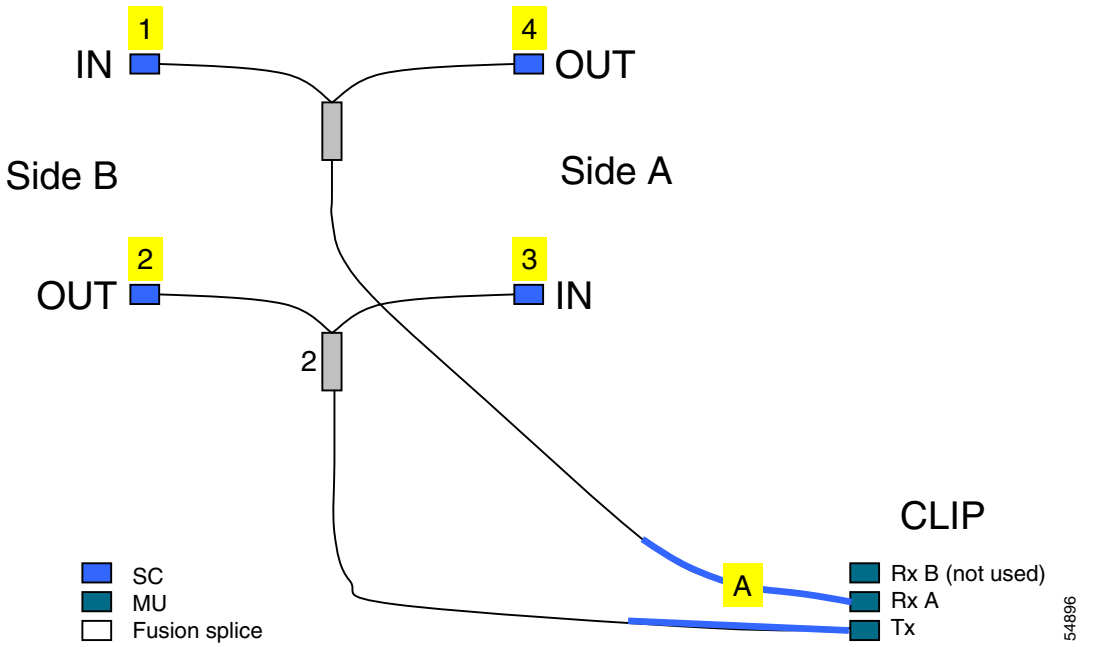
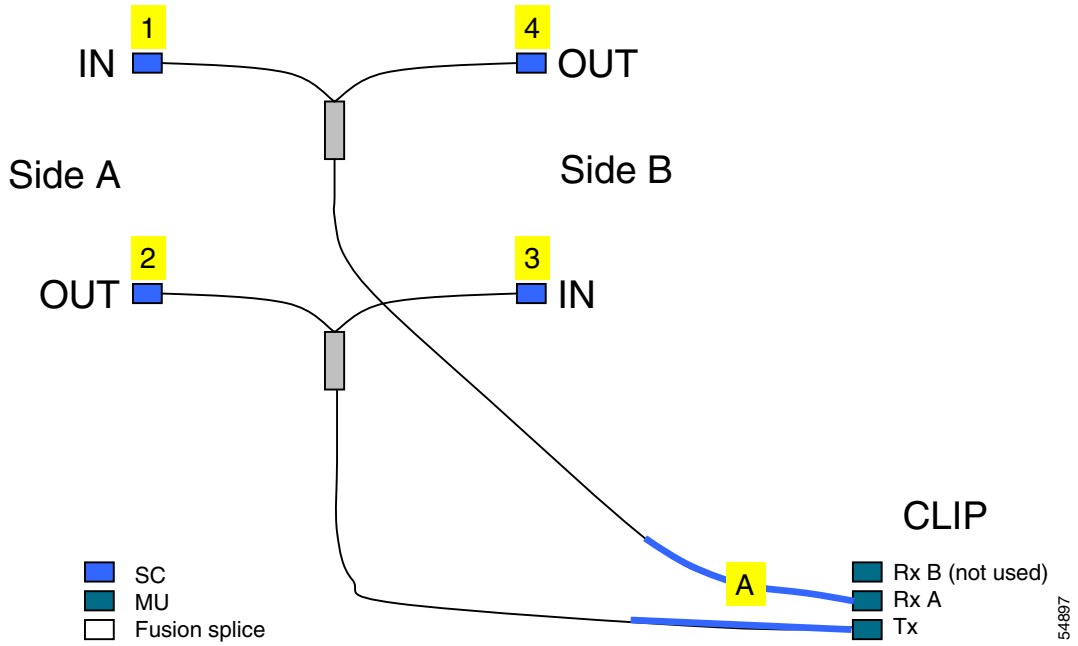


Figure 3-44 100/0 split ratio (unprotected) connections for a CFM



Step 13 Route the CFM MU connectors to the CLIP module area (a CLIP has not yet been installed) through the opening in the front panel of the SCU (to the left of the LED-panel).

Step 14 Align the rear collector cover with its retaining screws.

Step 15 Install the rear collector cover.

Step 16 Use a slot or Phillips screwdriver to tighten the rear collector cover retaining screws.

Step 17 Align the CFM access lid with the rear collector cover retaining screws.

Step 18 Install the CFM access lid by pushing down on the lid and sliding it to the left.

Step 19 Use a slot or posidrive screwdriver to tighten the CFM access lid retaining screws.

Procedure: Install the Client Layer Interface Port Module

Step 1 Align the CLIP module with the CLIP module slot in the ONS 15201 SCU.

Step 2 Carefully insert the CLIP module in the slot. Be sure the CLIP module connector and the backplane connector mate correctly and that no fibers are pinched.

Step 3 Tighten the CLIP module thumbscrews.

Step 4 Remove the MU dust cap from one of the MU connectors on the CFM.

Step 5 One at a time, remove the dust plugs from the CLIP module optical-fiber adapter, starting with the receivers.

Step 6 Clean and inspect the connectors on the fiber.

Step 7 Connect the fiber to the CLIP module optical connectors in accordance with the labels located on the cables, starting with the receivers.

Step 8 Repeat Steps 1 – 7 for each SCU in the configuration.

3.8 ONS 15200 System Internal Bus Connection

You can extend the ONS 15200 system internal bus between system nodes by physically connecting control area network (CAN) bus cables between the nodes.

You may combine the two different network objects as long as the total CAN bus length is less than 22 meters and the following rules apply:

Note You can obtain one-meter (3.3 ft.) and five-meter (16.4 ft.) bus cables from Cisco (P/N 72-2654 and 72-2790, respectively).

- The ONS 15252 MCU has a CAN bus length of 1 meter.
- The ONS 15201 SCU has a CAN bus length of 0.5 meters.
- Two SCUs are joined with a 6-pole cable with RJ-12 male connectors CAN bus extension cable. The CAN bus length of the extension cable combination is 1.5 times the physical length of the cable (Figure 3-45 and Figure 3-46).
- If Maintenance Manager is connected to either the ONS 15252 or the ONS 15201 with a PC CAN cable/LAP CAN driver cable combination, the CAN bus length of the cable is three times the physical length of the cable.

Route the bus cables from one node to another and connect them to the INT BUS ports.

A CAN bus connects CLIP modules on an ONS 15252 MCU, as well as the NCB modules (no more than two NCB modules are allowed per CAN bus). You can extend this data bus over several co-located network elements (ONS 15252 MCUs or ONS 15201 SCUs) to a larger logical unit. Normally one CAN bus connects all ONS 15200 equipment located at one site.

Figure 3-45 MCU CAN-bus access points

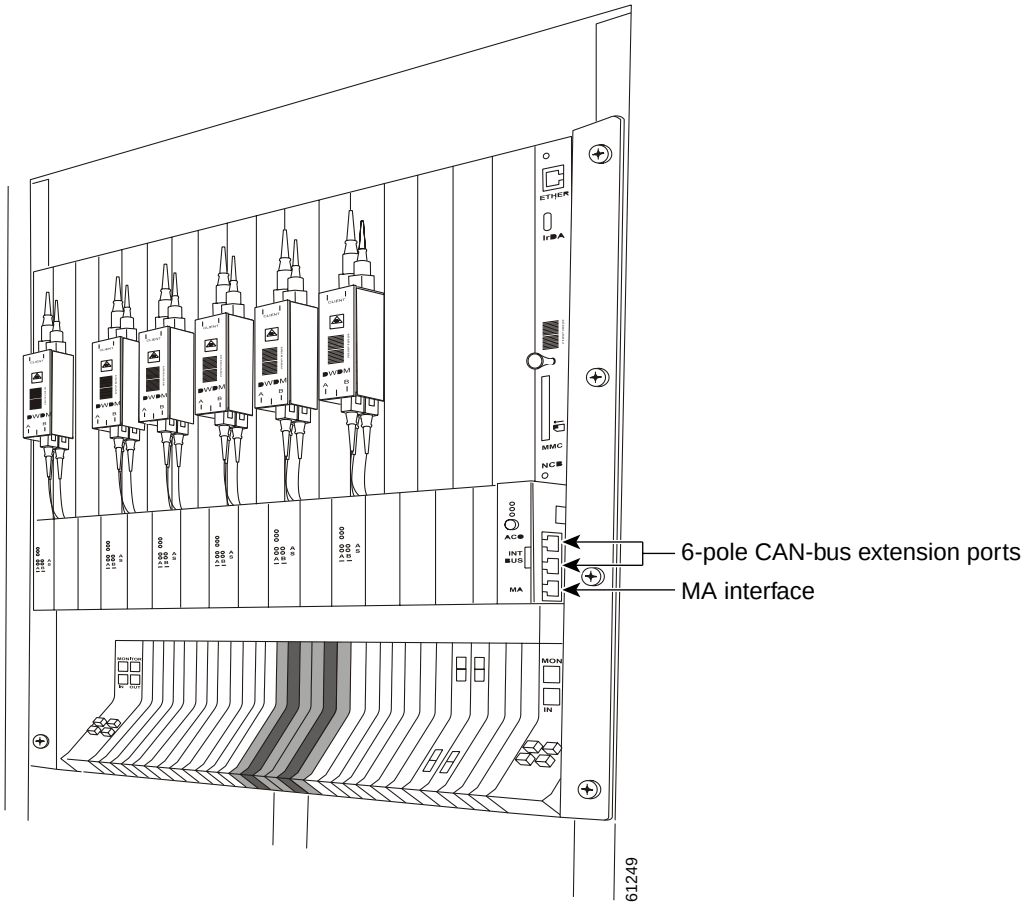
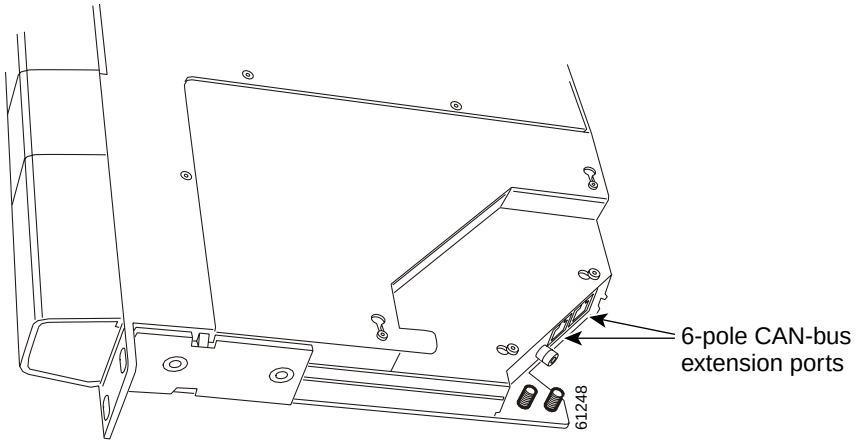


Figure 3-46 SCU CAN-bus access points



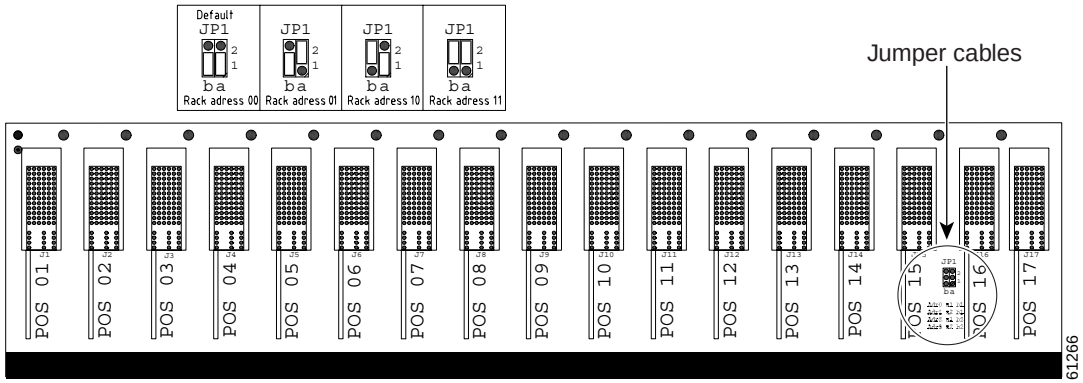
When several MCUs are joined on a single CAN bus, they must have different backplane jumpers. The backplane jumpers are located between Slots 15 and 16 of the MCU backplane (Figure 3-47).

When leaving the factory, the two jumpers are set to 00. When adding MCUs to a single CAN bus, reset

these jumpers to 01, 10, and 11. In an MCU with backplane jumpers set to 11, only Slots 1 through 12 will be used because the system will try to assign identical DCN addresses to all CLIPs in Slots 12 through 16. Each CLIP must have a unique DCN address.

Note Before changing the MCU backplane jumper settings, turn the MCU power off. After you have changed the settings, turn the power back on. When the you restart the power, the system assigns each CLIP a new unique DCN address. If you can't change the MCU backplane jumper settings due to live traffic, the firmware will resolve address conflicts as they occur.

Figure 3-47 Jumpers on the MCU backplane



3.9 Additional Channel Installation

This section describes how to install an additional channel in an ONS 15200 system. To add a channel, two CLIP modules are necessary at different nodes, either an MCU or an SCU.

Caution Installing a new channel may cause traffic interruption for some configurations. Before adding a channel, verify that protected CLIPs are not set to switch mode "forced_a" or "forced_b."

3.9.1 Channel Installation in an ONS 15252 MCU

This section describes how to set up an additional channel at an ONS 15252 MCU. Because a channel is always between different nodes, repeat the process at the other endpoint of the channel. If you instead plan to add a channel between an MCU and SCU, after completing the procedures in this section, continue with the "Channel Addition Using an ONS 15201 SCU" procedure on page 3-58.

Procedure: Install a Client Layer Interface Port Module at the ONS 15252 MCU

Step 1 Open the ONS 15252 MCU passive optical shelf door.

Step 2 Remove the common cover for the CLIPs.

Step 3 Remove the blank front panel from the first slot on the right side of the installed CLIP modules.

Step 4 Align the CLIP module with the CLIP module slot.

Step 5 Carefully insert the CLIP module into the slot. Be sure that the backplane connector and the CLIP module connector are correctly mated and that no optical fiber is damaged in the process.

Step 6 Tighten the CLIP module thumbscrews.

Procedure: Install an A-Side Hub Filter Module

For each fiber-protected channel to be installed in the ONS 15252 MCU, you must install two Hub Filter modules (HFMs) in the passive optical shelf—one for the A side and one for the B side. Your network planner will help you determine where the HFMs should be installed for optimal performance.

Note If you are installing an HFM for an unprotected channel, you do not need to install an HFM on both the A and B sides.

Step 1 Unplug the connector that connects the two modules where the new HFM is to be inserted.

Step 2 Place dust caps on the appropriate fiber connectors.

Step 3 Slide the existing HFMs and DFMs to the right to make room for the new HFM. If necessary, remove a few DFMs and replace them after completing the procedure.

Step 4 Insert the new HFM between the two modules mentioned in Step 1.

Step 5 Disconnect the duplex fiber connector from the duplex MU adapter of the new HFM.

Step 6 Clean and inspect the fiber connectors of the new HFM.

Step 7 Connect the new HFM to the adjacent HFM.

Step 8 Remove the dust caps from the fiber connectors of the HFM (installed in Step 1).

Step 9 Attach the duplex MU connectors to the new HFM.

Procedure: Install a B-Side Hub Filter Module

Step 1 Unplug the connector that connects the two modules where the new HFM is to be inserted.

Step 2 Place dust caps on the appropriate fiber connectors.

Step 3 Slide the existing HFMs and DFMs to the left to make room for the new HFM. If necessary, remove a few DFMs and replace them after completing the procedure.

Step 4 Insert the new HFM between the two modules mentioned in Step 1.

Step 5 Disconnect the duplex fiber connector from the duplex MU adapter of the new HFM.

Step 6 Clean and inspect the fiber connectors of the new HFM.

Step 7 Connect the new HFM to the adjacent HFM.

Step 8 Remove the dust caps from the fiber connectors of the second HFM (installed in Step 1).

Step 9 Attach the duplex MU connectors to the new HFM.

Procedure: Install a Network Adaptation Module

Step 1 Remove the DNAM from the slot directly below the CLIP module installed in the "Install a Client Layer Interface Port Module at the ONS 15252 MCU" procedure on page 3-55.

Step 2 Slide the new NAM into the slot where the DNAM was removed.

Step 3 Use a slot or Phillips screwdriver to tighten the retaining screws.

Note Ensure that the NAM fibers are not pinched when you insert the module.

Procedure: Connect the Network Adaptation Module to the A-side Hub Filter Module

Step 1 Remove the dust plugs from the A-side HFM installed in the "Install an A-Side Hub Filter Module" procedure on page 3-56.

Step 2 Clean the NAM connector labeled A-XX. The letter *A* on the receiver fiber indicates the A side of the MCU, and the *XX* on the transmit fiber indicates the split factor of the NAM.

Step 3 Connect the fiber from the NAM to the HFM.

Step 4 Insert the fibers from the NAM into the grooves along the top of the HFM. You must move the HFM upward slightly to access the grooves at the top. Arrange the fibers from the NAM in a smooth curve on top of the passive optical shelf. Keep the permanent fiber bending radius above 35 mm.

Step 5 Carefully snap the HFM back into place after you insert the fibers.

Procedure: Connect the Network Adaptation Module to the B-side Hub Filter Module

Step 1 Remove the dust plugs from the B-side HFM installed in the "Install a B-Side Hub Filter Module" procedure on page 3-56.

Step 2 Clean the NAM connector labeled B-XX. The letter *B* indicates the B side of the MCU, and the *XX* indicates the split factor of the NAM.

Step 3 Connect the fiber from the NAM to the HFM.

Step 4 Insert the fibers from the NAM into the grooves along the top of the HFM. Move the HFM upward slightly to access the grooves at the top. Arrange the fibers from the NAM in a smooth curve on top of the passive optical shelf.

Step 5 Snap the HFM back into place after you insert the fibers.

Procedure: Connect the Network Adaptation Module to the Client Layer Interface Port Module

Step 1 Remove the dust plugs from the fiber adapters on the bottom of the CLIP module.

Step 2 Clean and inspect the fiber from the NAM that is labeled A.

Step 3 Connect the fiber labeled A to the A-side DWDM receiver on the CLIP module.

Step 4 If the channel is protected, clean the fiber from the NAM that is labeled B.

Step 5 Connect the fiber that is labeled B to the B-side DWDM receiver on the CLIP module.

Step 6 Clean the transmit DWDM fiber.

Step 7 Connect the DWDM fiber from the NAM to the center fiber input on the CLIP module (labeled with a down arrow).

Procedure: Add a Channel at Another ONS 15252 MCU

Step 1 Complete the procedures described in the "Channel Installation in an ONS 15252 MCU" procedure on page 3-55 for a second ONS 15252 MCU.

Step 2 Check the optical power levels.

Step 3 At each MCU, connect the client-layer fibers:

- **a.** Remove the dust plugs from the CLIP module client-layer connectors.
- **b.** Clean and inspect the client-layer optical-fiber jumper cable connectors.
- **c.** Connect the CLIP module input and output to the customer-specified point.
- **d.** Guide the fiber through the cable ties mounted on the rack. The cable ties hold the fiber to the side of the rack to reduce the risk of fiber pinching.

3.9.2 Channel Addition Using an ONS 15201 SCU

This section describes how to complete a channel by adding an ONS 15201 SCU to the ring.

Procedure: Add an ONS 15201 SCU to the Ring

Step 1 Set the switchmode for all CLIP modules in the ring to automatic:

- **a.** At the NCB:> prompt, type `con clip clip_xxx` (where *xxx* is the serial number of the CLIP module) and press **Enter**.
- **b.** Type `cd dwdm` and press **Enter**.
- **c.** Type `list value` and press **Enter**.
- **d.** Type `switchmode automatic` and press **Enter**.
- **e.** Type `exit` to quit the CLIP module.
- **f.** Repeat Steps a–e for all CLIP modules.

Step 2 Install the new SCU (ATO) in the equipment rack.

Step 3 Inhibit the board.power alarm if you are only using one power source.

Step 4 Connect the new SCU power to power connector PS1 or PS2 (or both if redundant power supplies are used) and verify that no red LED is lit.

Step 5 To break the ring, disconnect the fiber connecting the ONS 15252 MCU to the ONS 15201 SCU A-side IN and OUT ports, or the fiber between two SCUs.

Step 6 To connect the new SCU:

a. Connect the A-side IN and OUT ports on one node to the B-side OUT and IN ports on an adjacent node.

b. Connect the B-side IN and OUT ports of the other node to the A-side OUT and IN ports of the first node.

Step 7 Connect the client ports of the new SCU to the appropriate client equipment.

CHAPTER 4

Turn Up and Test

This chapter describes the turn up and test procedures for the ONS 15200 system. This chapter includes the ONS 15252 Multichannel Unit (MCU) turnup, the ONS 15201 Single-Channel Unit (SCU) turnup, and the system span test. Appendix B, "Acceptance Test Plan" contains the tables and forms that you must complete during system turn up and testing.

After adding channels to the ONS 15200 system configuration, test the added channels using the procedures in the "Perform System Span Testing for a Hub Configuration" section on page 4-19.

4.1 Equipment

You need the following equipment to turn up and test the ONS 15200 system:

- Optical power meter
- Bit error rate (BER) test equipment with OC-48 signal transmit or other bit rate
- Gigabit Ethernet signal generator (optional; use if required by customer)
- 5- and 10-dB fixed optical attenuators with SC connectors
- Optical fiber jumper cables with SC connectors
- Wavelength meter or optical spectrum analyzer (OSA)
- Communication Interface Module (CIM) RS-232 cable (P/N 72-2746) for initial communication with the Network Control Board (NCB) module
- SC and MU fiber cleaning equipment:
  - Cletop cassette cleaner (type A and B recommended)
  - Cletop stick cleaner (1.25 and 2.5 mm)
  - SC and MU protective plugs and caps
  - Fiber inspection microscope
  - Patch cord MU-MU (2)
  - Patch cord MU-SC (2)
  - Optical adapter SC simplex (2)
  - Optical adapter MU simplex (2)
- To manage an SCU, Maintenance Manager software and hardware (P/N 800-16721) installed on a PC

- To manage an MCU, the following items are required:
  - CAN accessory kit (p/n 800-20162-01, includes the CAN board, CAN cable, and CAN LAN cable)
  - Cisco ONS 15200 Maintenance Manager CD-ROM (p/n 85-2510-01) software installed on a PC
  - Crossover Ethernet cable for direct connection to the NCB (optional)

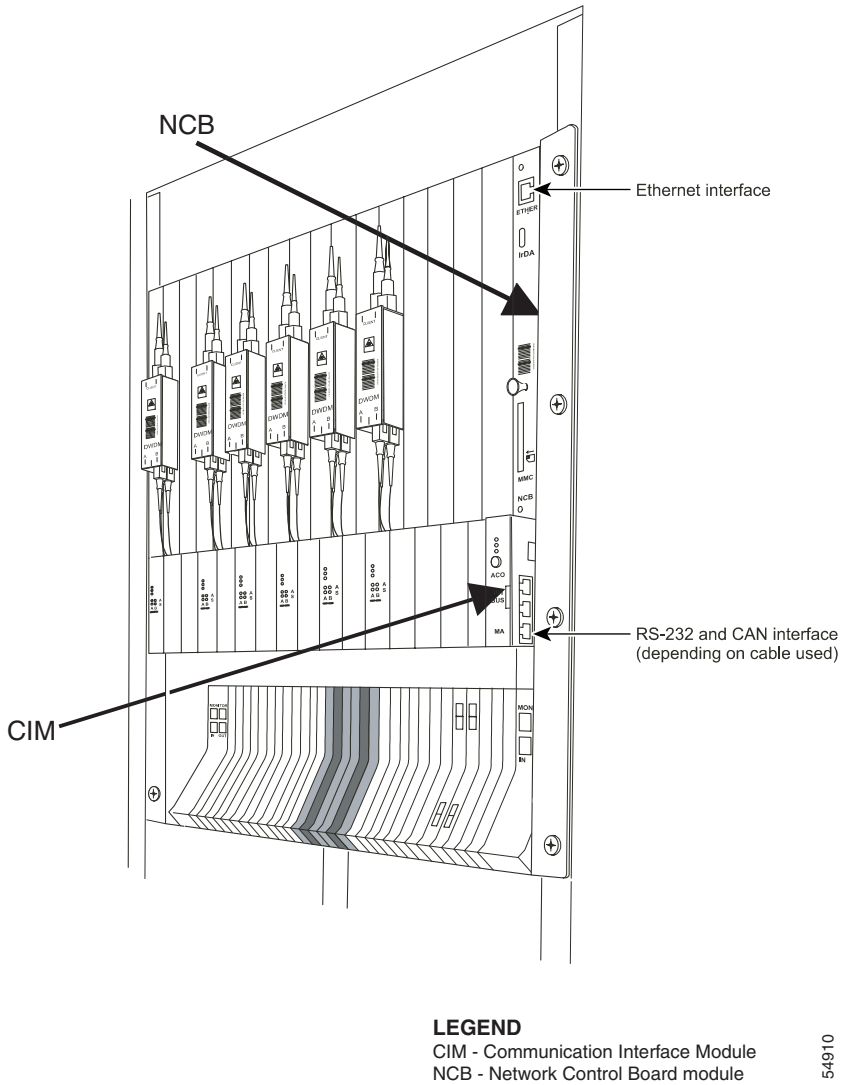
4.2 ONS 15200 Network Configuration

This section describes how to set up the NCB module so you can communicate with the MCU and SCUs. It also describes how to configure the ONS 15200 network.

Procedure: Configure the Network

Step 1 Using a CIM RS-232 cable, connect the laptop to the management access (MA) port on the Communication Interface module (CIM). See Figure 4-1.

Figure 4-1 Communication Interface module connections



Step 2 Use HyperTerminal to configure the RS-232 parameters listed in Table 4-1 on page 4-4. See the following steps for an example of the procedure you may follow when using HyperTerminal.

Note The steps in this procedure are an example of the steps you might follow when using HyperTerminal to configure the RS-232 parameters. Not all HyperTerminal installations are the same. The following example lists the necessary steps when using the Microsoft Windows NT operating system.

a. Choose **Start > Programs > Accessories > Communications > HyperTerminal**. HyperTerminal opens.

b. On the Connection Description dialog box, type a session name and click **OK**.

c. On the Connect To dialog box, choose **COM1** from the Connect Using drop-down list. Click **OK.**

d. On the COM1 Properties dialog box, choose the port settings shown in Table 4-1 on page 4-4. Click **OK.**

e. Choose **File > Properties**.

f. On the Properties dialog box, click the **Settings** tab and then click the **ASCII Setup** button.

g. On the ASCII Setup dialog box, check **Send line ends with line feed**s. Click **OK** until all dialog boxes are closed. Leave the HyperTerminal window open.

Table 4-1 RS-232 Parameters

Parameter	Value
Speed	19200 bps
Data bits	8
Parity	None
Stop bits	1
Flow control	None
ASCII	Send EOL with LF

Step 3 After you have connected the CIM RS-232 adapter cable (Step 1) and set the parameters in Table 4-1, press **Enter** in the HyperTerminal window. The system responds with a logon prompt. Press **Enter** again. Because no password is needed, press **Enter** a third time.

Step 4 Create a user with administrator privileges:

a. At the NCB:> prompt, type `create user <user1>` and press **Enter**. The system responds: `Created <user1>`. The user1:# prompt appears on the screen.

b. At the user1:# prompt, type `password <password1>` and press **Enter** to create a password for a new user.

c. Type `privileges administrator` and press **Enter** to assign administrator privileges to the new user.

d. Type `exit` to return to the NCB:> prompt.

e. At the NCB:> prompt, type `commit user <user1>` to finish adding a user with administrator privileges.

Step 5 Create a user with operator privileges:

a. At the NCB:> prompt, type the command `create user <user2>` and press **Enter**. The system responds: `Created <user2>`. The user2:# prompt appears on the screen.

b. Type `password <password2>` and press **Enter** to create a password for the new user.

c. Type `privileges operator` and press **Enter** to assign operator privileges to the new user.

d. Type `exit` to return to the NCB:> prompt.

e. At the NCB:> prompt, type `commit user <user2>` to finish adding a user with operator privileges.

Step 6 Set the initial IP address of the NCB module:

a. At the NCB:> prompt, type `con sys` and press **Enter**.

b. At the NCB:= prompt, type `ipconf <ipaddr> <subnet> <gateway>` and press **Enter**.

Step 7 Reboot the system for the changes to take effect. At the NCB:= prompt, type `reboot` and press **Enter**.

Step 8 Disconnect the CIM RS-232 adapter cable. The Subnetwork Manager on the NCB module now has an IP address and can be accessed directly at the Ethernet port on the NCB module front panel with the standard protocols (telnet, ftp, and http) , provided that the subnet mask and gateway are set appropriately and that your PC has an appropriate IP address.

Step 9 Connect a crossover Ethernet cable to the PC and the Ethernet port on the NCB module.

Step 10 Start a telnet session on the host computer by typing the command `telnet <ipaddr>` at a command prompt (MS-DOS prompt).

Step 11 Log into the system as a user with operator privileges.

Step 12 Set the system time (in 24-hour format), if necessary. A soft reboot does not restart the clock.

a. At the NCB:> prompt, type `con sys` and press **Enter**.

b. At the NCB:= prompt, type the `time <yyyy:mm:dd> <hh:mm:ss>` command and press **Enter**.

c. At the NCB:= prompt, type `exit` and press **Enter** to return to the NCB:> prompt.

Step 13 At the NCB:> prompt, type `show inventory` and press **Enter**. Verify that an inventory of all installed CLIP modules appears, and the CLIP module slot number and ITU channel number match the information in Table B-5 on page B-2. Complete Step 13 of Table B-4 on page B-2. The NCBs and CLIPs are not assigned at this point to any MCU or SCU.

Step 14 Create the MCU and its container name:

a. At the NCB:> prompt, type `configure network` and press **Enter**.

b. At the Network: # prompt, type `create mcu <neid><rackid>` and press **Enter**. This creates the MCU, and associates it with a NE ID (neid) and a rack ID.

c. At the Network: # prompt, type `name <mcu_name>` and press **Enter**. This sets the container name.

Step 15 Configure the MCU:

a. At the <name>: # prompt, type `insert snm_#####` and press **Enter**.

b. At the <name>: # prompt, type `insert clip_###` and press **Enter**. Repeat for all CLIPs.

c. Type `commit` and press **Enter**.

Step 16 Create the SCUs and the container names:

a. At the NCB:> prompt, type `configure network` and press **Enter**.

b. At the Network: # prompt, type `create scu <neid>` and press **Enter**. This creates the SCU and associates it with an NE ID (neid).

Note An MCU and an SCU can have the same neid.

c. At the Network: # prompt, type `name <scu_name>` and press **Enter**. This sets the container name.

d. Repeat for all SCUs.

e. Type `commit` and press **Enter**.

Step 17 Configure each SCU:

a. At the <name>: # prompt, type `insert clip_###` and press **Enter**.

b. Type `commit` and press **Enter**.

c. Repeat for all SCUs.

Step 18 Set the unit ID of the NCB module. This step is necessary for the NCB to scan the network for nodes.

a. At the NCB:> prompt, type `configure network` and press **Enter**.

b. At the Network: # prompt, type `configure snm <snm_xxx>` and press **Enter**.

c. At the snm_xxx: # prompt, type `unitid snm_#` (where *snm_#* is snm_1 or snm_2) and press **Enter**.

Step 19 Set available NCBs as the primary or secondary manager:

a. At the Network: # prompt, type `con clip clip_xxx <type>` where *type* is primary or secondary. Press **Enter**.

b. To set the NCB as the primary manager, type `primary this`. To set the NCB as the secondary manager, type `secondary this`.

c. Type `commit` and press **Enter**.

d. Repeat for all CLIPs.

Step 20 Set up performance monitoring, if applicable:

a. At the NCB:> prompt, type `configure clip clip_xxx` and press **Enter**.

b. At the clip_xxx:# prompt, type `pm on` and press **Enter**.

c. Type `commit` and press **Enter**.

d. Repeat for any other CLIPs, as applicable.

4.3 ONS 15252 MCU Turn Up and Test

This section describes how to turn up and test an ONS 15252 MCU.

Procedure: Initialize the ONS 15252 MCU

Step 1 Record the information for each Client Layer Interface Port (CLIP) module in Table B-5. Locate the CLIP information in the following places:

- Table 4-2 provides ITU channel, wavelength, and frequency information for the ONS 15200 system CLIP modules.
- The CLIP module label provides channel number, transmit power level, and information about protection status. “VL” indicates very long range (0 dBm; 3000 ps/nm dispersion tolerance), “L” indicates long range (+7 dBm laser with 1800 ps/nm of dispersion tolerance), and “M” indicates medium range (0 dBm with 1800 ps/nm of dispersion tolerance).
- “U” means unprotected and “P” means protected.
- The frequency is based on 19x.x THz, where x.x is the associated channel number.
- The splitter ratio appears on the underside of the NAM.
- If you are planning to use an MU attenuator, insert the attenuator in the middle port on the CLIP interface (labeled with the down arrow).

Table 4-2 ONS 15200 Wavelength Plan

Channel Number	Frequency (THz)	Wavelength (nm)
23	192.3	1558.98
25	192.5	1557.36

Table 4-2 ONS 15200 Wavelength Plan (continued)

Channel Number	Frequency (THz)	Wavelength (nm)
27	192.7	1555.75
29	192.9	1554.13
31	193.1	1552.52
33	193.3	1550.92
35	193.5	1549.32
37	193.7	1547.72
43	194.3	1542.94
45	194.5	1541.35
47	194.7	1539.77
49	194.9	1538.19
51	195.1	1536.61
53	195.3	1535.04
55	195.5	1533.47
57	195.7	1531.90

Step 2 Compare the data in Table B-5 with data provided by the network planner, and verify that the data is consistent. Complete Step 2 of Table B-4.

Step 3 Compare the order of the Hub Filter modules (HFMs) on the A and B sides of the passive optical shelf with those provided by the network planner and verify that the order is the same. Complete Step 3 of Table B-4.

Step 4 Check wavelength and output power:

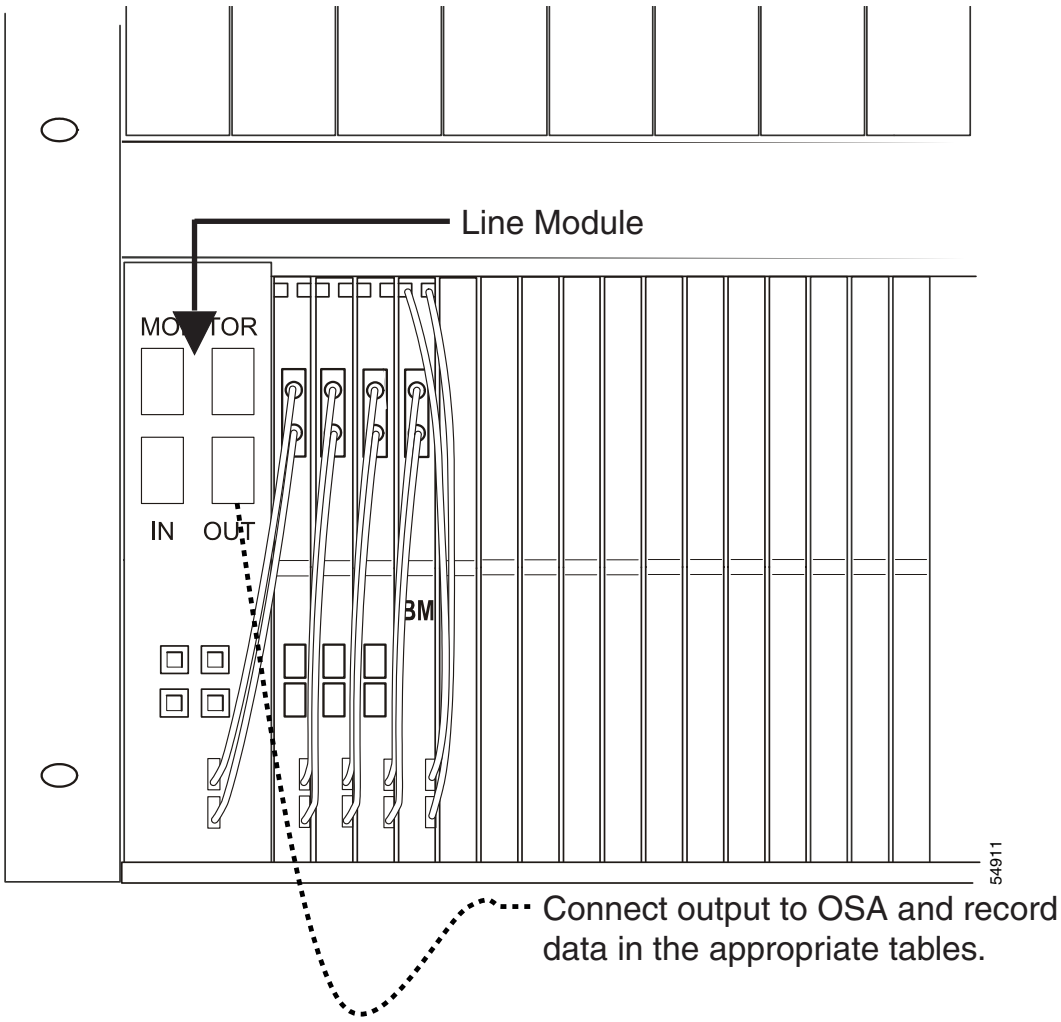
a. Connect a fiber from the A-side LM output port to a wavelength meter or an optical spectrum analyzer (OSA) as shown in Figure 4-2.

b. Set the wavelength range to a value between 1530 and 1560 nm. Record the wavelength and output power in Table B-6 on page B-3.

c. Repeat on the B-side LM output port. Record the wavelength and output power in Table B-7 on page B-4.

Note Your network planner can provide the following values: expected output power, maximum, and minimum. Actual transmit power on the LM OUT port must fall within the range provided by the network planner.

Figure 4-2 An OSA-to-LM connection



Procedure: Check DWDM Receivers and Client Transmit Levels

Use the following steps to check DWDM receivers and client transmit levels.

Step 5 Attenuate the DWDM transmit port:

a. Attenuate the output port of the B-side LM of the MCU so that the optical power measured is within the DWDM receiver specification for each wavelength.

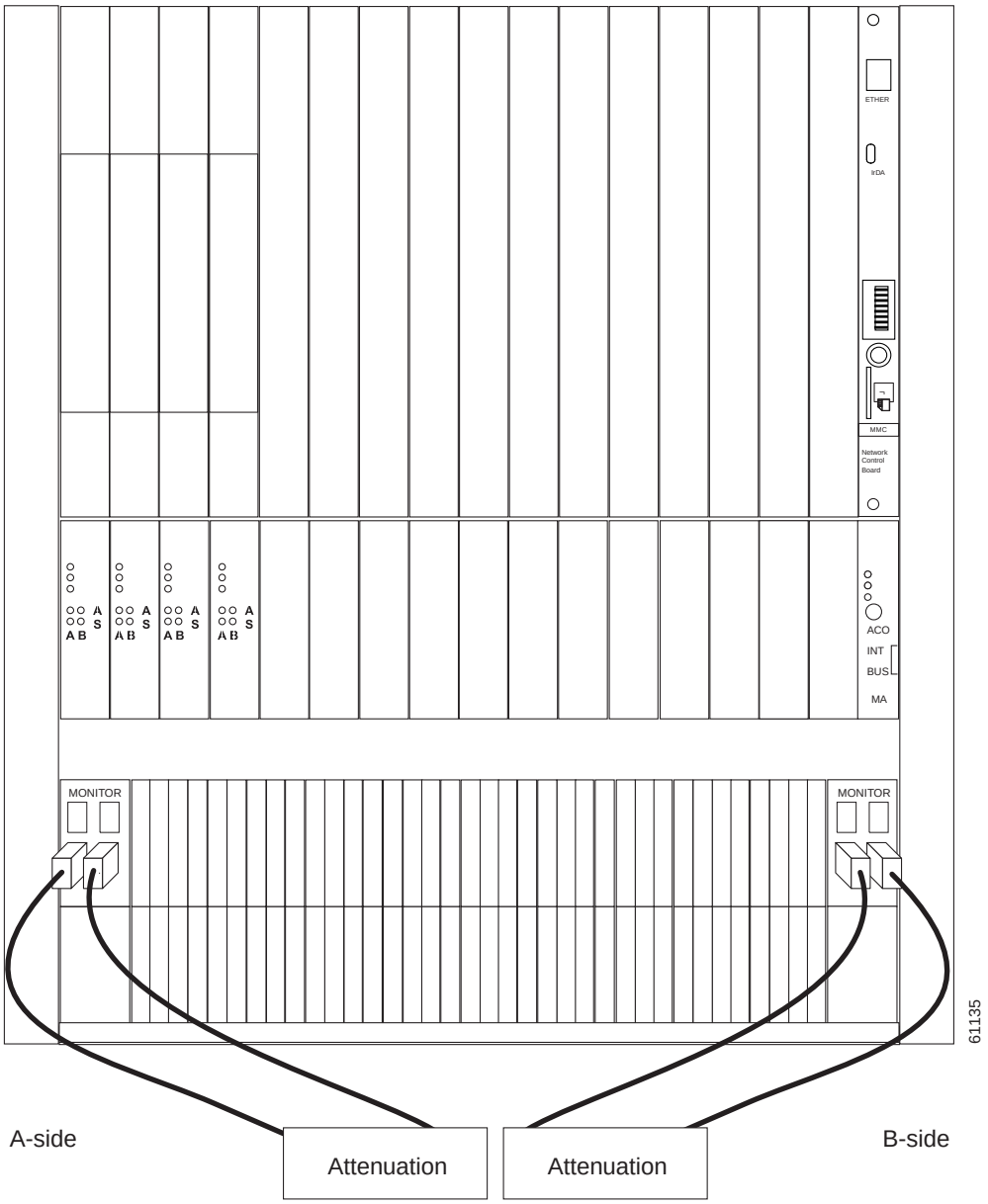
The receiver operating range is -31 and -8 dBm, but the default warning thresholds of -28 and -10 should be used on all CLIP interfaces. As a rough guide, the power level for each channel should be between -19 and -10 dBm on the LM IN port.

b. Record the attenuated power level for each channel in Table B-8 on page B-5.

c. Insert the attenuated fiber-optical cable into the B-side IN port (Figure 4-3).

d. Repeat Steps a–c on the A side.

Figure 4-3 Attenuators from the A Side and B Side Line modules



Step 6 Retrieve the DWDM receive level:

a. At the NCB:> prompt, type `show power`. Press **Enter**. This retrieves the measured optical power levels from the DWDM receivers. Record the values in Table B-8 on page B-5.

b. Calculate the expected receive power on the A and B sides and record the values in Table B-8 on page B-5.

To calculate the expected receive power, take the measured attenuated transmit power from Table B-8 on page B-5 and subtract the associated losses from the dropping of the channel (see the formula and explanation below). The actual receive power should be ±2.5 dB of the expected receive power.

Formula:

ERp = MTp – (HFM x 0.5 – 2.5)

ERp—Expected receiver power

MTp—Measured transmitted power at the LM OUT port with attenuators attached

HFM—Number of filters the signal passes through, starting at the LM IN port, before it reaches the CLIP module

2.5—Value (in dB) that must be subtracted to account for the combined loss in the pass-through of the NAM and the drop in the HFM and the LM.

Note Do not remove the fibers.

Step 7 Set the data rate for each CLIP module if the desired rate differs from the default value (the default is OC-48/STM-16):

a. At the NCB:> prompt, type `configure clip clip_xxx` where *xxx* is the serial number of the CLIP module. Press **Enter**. (The CLIP module serial number can be found on the CLIP module, or by typing the `show inventory` command.)

b. Type `list value` and press **Enter**. Verify the data rate.

c. To change the data rate, type `datarate <rate>`, where <*rate*> is STM-1, OC-3, STM-4, OC-12, STM-16, OC-48, or gbit_eth. Press **Enter**.

d. Type `list value` and press **Enter** to verify that the change was accepted.

e. Type `exit` to quit the CLIP module.

f. Repeat Steps a–e for all CLIP modules.

Step 8 Check the client side transmit levels:

a. Connect a fiber from the transmit port of the signal generator to the client IN port for the first CLIP (slot one). The valid input range on the client side receive is -3 to -18 dBm.

b. Run a jumper cable from the client OUT port of the first CLIP to your power meter.

c. Set the wavelength on the power meter to 1310 nm.

d. Measure and record the output power of the client side transmit in Table B-9 on page B-5.

e. Repeat Steps a–d for all remaining CLIPs (connect the test set to the IN port of the current CLIP and the power meter to the OUT port of the same CLIP).

Procedure: Check Alarms

Continue with the following steps to verify that no alarms exist.

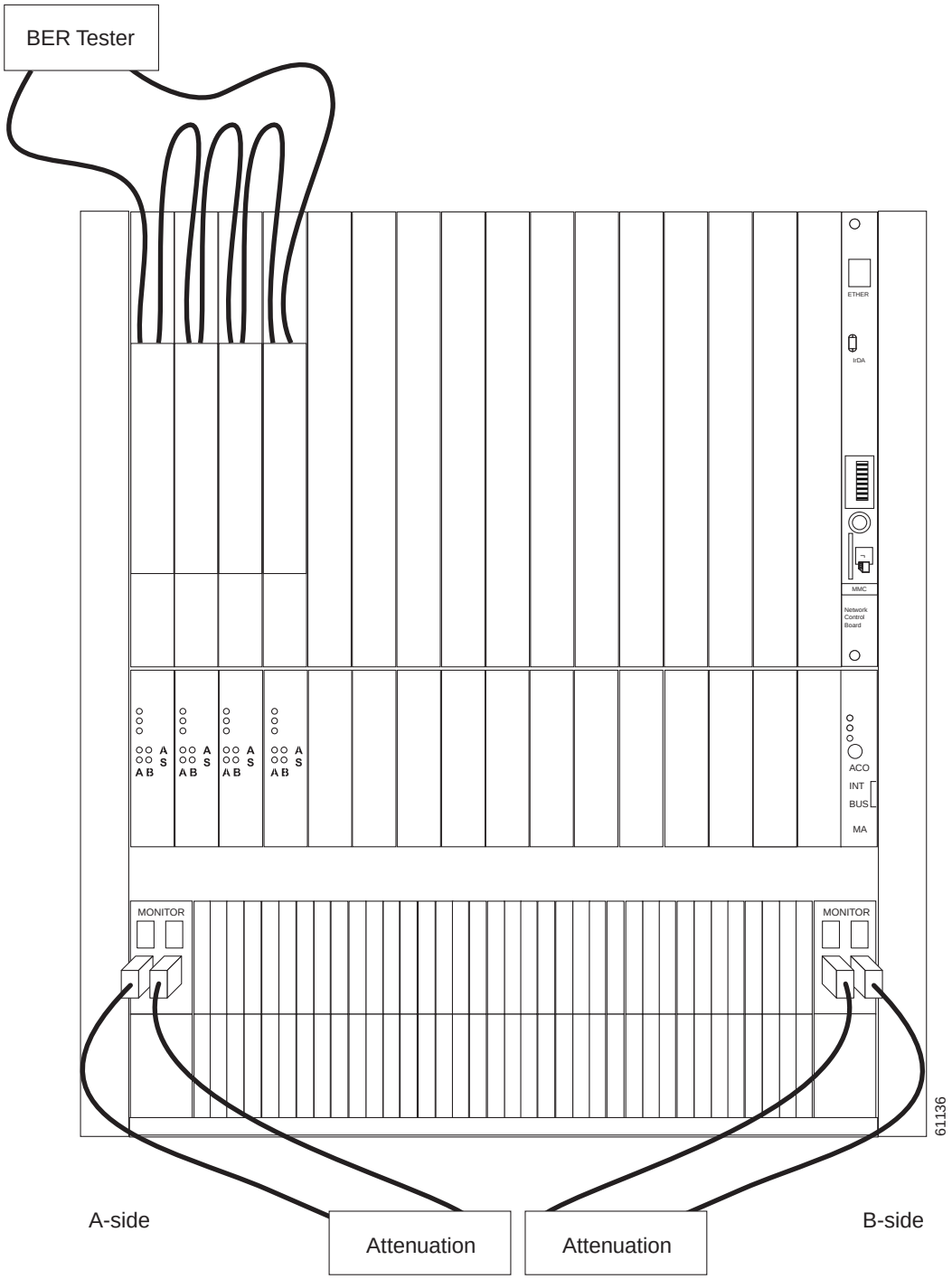
Step 9 Connect all CLIP modules in a daisy chain:

a. Connect a fiber from the transmit port of the signal generator to the client IN port on the first CLIP (Slot 1). The valid input range on the client side receiver is -3 to -18 dBm.

b. Run a jumper cable from the Client OUT port of the first CLIP module to the client IN port of the second CLIP module (Slot 2).

c. Repeat until all CLIP modules are daisy-chained together with the last CLIP module's OUT port returning to the test set, as shown in Figure 4-4.

Figure 4-4 Daisy-chained CLIP modules



Step 10 Type **show alarm** and press **Enter**. Verify that no alarms exist and that no red diodes are lit on any of the NAMs or on the CIM. Complete Step 10 in Table B-4 on page B-2.

If the network design does not provide optical protection, skip the "Check Optical Protection" procedure on page 4-12 and proceed to the "Test the Bit Error Rate" procedure on page 4-12.

Procedure: Check Optical Protection

Continue with the following steps to check optical protection.

Step 11 Set the switchmode for all CLIP modules to automatic:

a. Record the current switchmode setting for each CLIP module in Table B-10 on page B-6. You will need to revert to the original switchmode setting after checking the bit error rate.

b. At the NCB:> prompt, type `conf clip clip_xxx` (where *xxx* is the serial number of the CLIP module) and press **Enter**.

c. Type `cd dwdm` and press **Enter**.

d. Type `list value` and press **Enter**.

e. Type `switchmode automatic` and press **Enter**.

f. Type `exit` to quit the CLIP module.

g. Repeat Steps a–f for all CLIP modules.

Step 12 Remove the fiber jumper cable from the LM A-side INPUT and verify that the Active LED on the A side goes out and the B side switches from Standby to Active on each CLIP module. Complete Step 12 in Table B-4 on page B-2.

Step 13 Reconnect the jumper cable on the A side and verify that the A-side green Standby LED is illuminated on each CLIP module and that the B-side Active LED remains illuminated. Complete Step 13 in Table B-4 on page B-2.

Step 14 Remove the fiber jumper from the LM B-side INPUT and verify that the Active LED on the B side turns off. Verify that the A side switches from Standby to Active on each CLIP module. Complete Step 14 in Table B-4 on page B-2.

Step 15 Reconnect the jumper cable on the B side and verify that the B-side green Standby LED is illuminated on each CLIP module and that the A-side Active LED remains illuminated. Complete Step 15 in Table B-4 on page B-2.

Step 16 Before continuing with the bit error rate testing, complete the following:

- Verify that all the CLIP modules are still in a daisy chain.
- Verify that the first CLIP module client IN port is connected to the output of the test set, and the last CLIP module OUT port returns to the test set receive port.
- Verify that the LM A-side IN port is connected to the LM A-side OUT port, and the LM B-side IN port is connected to the B-side LM OUT port.

Procedure: Test the Bit Error Rate

Continue with the following steps (as applicable) to test the BER.

Note The maximum number of spans is six for a 3R CLIP, and two for a 2R CLIP.

Step 17 To test bit error rate on unprotected modules, clear all errors on the test set and run BER tests error free for 15 minutes. Complete Step 17 in Table B-4 on page B-2.

Step 18 Test A-side protected channels and all non-protected channels:

a. Break the connection on the B-side LM. All of the protected channels should have the Active light on the A side illuminated and no LED illuminated on the B side. Unprotected channels should have either the Active light on the A side illuminated or no lights illuminated. Bit errors are caused by a broken connection.

b. Reconnect the B-side jumper and ensure that the A-side Active LED remains illuminated on protected CLIP modules and that all unprotected CLIP modules are active on either the A side or B side.

c. Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 18 in Table B-4 on page B-2.

Step 19 Test B-side protected channels and all non-protected channels:

a. Break the connection on the A-side LM. All of the protected channels should have the B-side Active LED illuminated and no LED illuminated on the A side. Unprotected channels should either have the B-side Active LED illuminated or no LED illuminated. Bit errors are caused by a broken connection.

b. Reconnect the A-side jumper cable and verify the following: the B-side Active LED remains lit on the protected CLIP modules, the A-side Standby LED illuminates, and all unprotected CLIP modules are Active on either the B side or the A side.

c. Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 19 in Table B-4 on page B-2.

Step 20 Return the CLIP switchmode setting to the original setting (Table B-10 on page B-6).

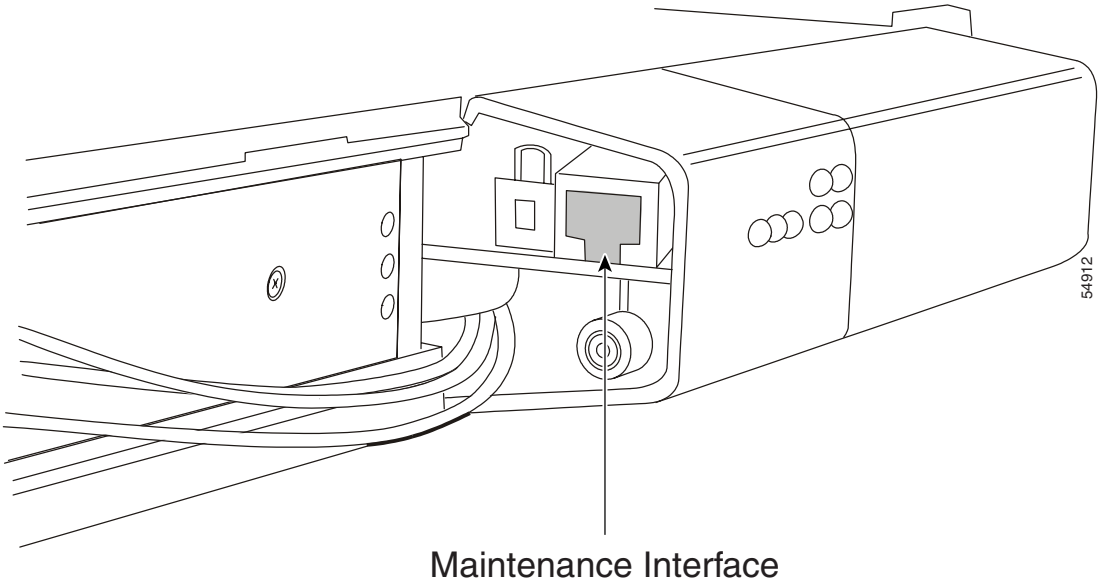
4.4 ONS 15201 SCU Turn Up and Test

Use the following procedures to turn up and test the ONS 15201 SCU.

Procedure: Initialize the ONS 15201 SCU

Step 1 Connect a laptop to the management access (MA) port located on the ONS 15201 SCU using the PCCAN cable, CAN interface cable, and the PCMCIA LAPcan board (Figure 4-5). For more information, refer to the *Cisco ONS 15200 Maintenance Manager Installation and Operations Guide*.

Figure 4-5 ONS 15201 SCU management access interface



Step 2 Open Maintenance Manager and expand the ONS 15201 SCU information.

Step 3 Record the information for the Client Layer Interface Port (CLIP) module in Table B-12 on page B-7. Locate the CLIP information in the following places:

- Table 4-2 provides ITU channel, wavelength, and frequency information for the ONS 15200 system CLIP module.
- The CLIP module label provides the serial number, channel number, transmit power level, and information about protection status. “VL” indicates very long range (0 dBm; 3000 ps/nm dispersion tolerance), “L” indicates long range (+7 dBm laser with 1800 ps/nm of dispersion tolerance), and “M” indicates medium range (0 dBm with 1800 ps/nm of dispersion tolerance).
- “U” means unprotected and “P” means protected.
- The frequency is based on 19x.x THz, where x.x is the associated channel number.
- The splitter ratio appears on the SCU above the DWDM ports.
- If you are planning to use an MU attenuator, insert the attenuator in the middle port on the CLIP interface (labeled with an arrow pointing away from the CLIP).

Step 4 Compare data in Table B-12 on page B-7 with data provided by the network planner, and verify that the data is consistent. Complete Step 4 in Table B-11 on page B-7.

Step 5 Check the output power. Unprotected channels will have an output on only one of the DWDM ports.

a. Connect an optical-fiber jumper cable from the A-side output port to a wavelength meter or an optical spectrum analyzer (OSA).

b. Set the wavelength range on the OSA to a value between 1530 and 1560 nm. Record the wavelength and the output power in Table B-13 on page B-7.

c. Repeat Steps a–b for the B side and record the information in Table B-13 on page B-7.

Note The network planner provides the expected output power.

Procedure: Check DWDM Receivers and Client Transmit Levels

Continue with the following steps to check DWDM receivers and client transmit levels.

Step 6 Attenuate the DWDM transmit port:

a. Attenuate the output port of the B-side of the SCU so that the optical power measured is within the DWDM receiver specification for each wavelength. The receiver operating range is -31 and -8 dBm, but the default warning thresholds of -28 and -10 should be used on all CLIP interfaces. As a rough guide, the input power for each channel should be between -25 and -10 dBm.

b. Record the B-side attenuated power level in Table B-14 on page B-7.

c. Insert the attenuated jumper into the B input port, as shown in Figure 4-6.

d. Repeat Steps a–c on the A side. Record the A-side attenuated power level in Table B-14 on page B-7.

e. Check the received power using the Maintenance Manager, and record the values in Table B-14 on page B-7.

To calculate the expected receive power, take the measured transmit power and subtract the associated losses caused by the channel dropping. Actual received power should be within 2 dB of the expected received power.

Formula:
ERp = MTp – 2

ERp—Expected received power

MTp—Measured transmitter power (with attenuators attached) on the OUT port of the SCU side in use

2—Value (in dB) that must be subtracted to account for the combined loss from the connectors and drop in the CFM

Step 7 Double-click the data rate parameter in Maintenance Manager, and set the data rate to OC-48 (datarate stm_16). Verify the data rate.

Step 8 Check the client side transmit levels.

a. Connect a fiber from the transmit port of the signal generator to the client IN port for the CLIP. (The valid input range on the client side receive is -3 to -18 dBm.)

b. Run a jumper cable from the client OUT port of the CLIP to your power meter.

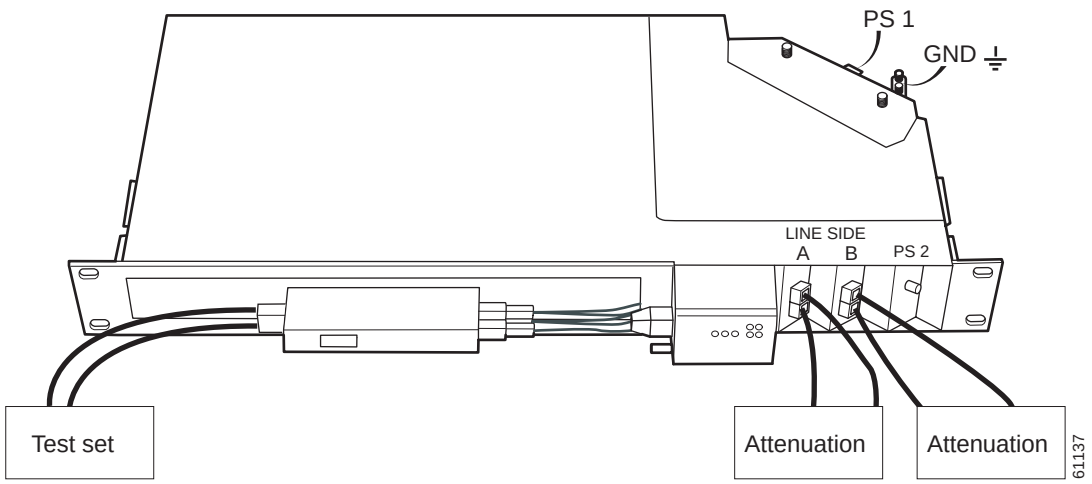
c. Set the wavelength on the power meter to 1310 nm.

d. Measure and record the output power of the client side transmit in Table B-15 on page B-8.

Step 9 Disconnect the power meter from the client side output and run a fiber from the client OUTPUT interface to the receive of the signal generator.

Note Do not remove any fibers.

Figure 4-6 ONS 15201 SCU CLIP Module A side and B side with attenuators



Step 10 Verify that red LEDs on the ONS 15201 SCU are not illuminated. Click the folder CLIP alarms and ensure that no alarms are active. Complete Step 10 in Table B-11 on page B-7.

If the network design is not configured with protected channels, skip the "Check Optical Protection" procedure on page 4-16 and proceed to the "Test the Bit Error Rate (Single SCU)" procedure on page 4-17.

Procedure: Check Optical Protection

Continue with the following steps to check optical protection.

Note Before changing the switchmode, record the current setting for the CLIP module in Table B-15 on page B-8. You will need to reset the original switchmode setting after checking the bit error rate.

Step 11 Set the switchmode for all CLIP modules to automatic:

- **a.** Record the current switchmode setting for each CLIP module in Table B-16 on page B-8. You will need to revert to the original switchmode setting after checking the bit error rate.
- **b.** At the NCB:> prompt, type `conf clip clip_xxx` (where *xxx* is the serial number of the CLIP module) and press **Enter**.
- **c.** Type `cd dwdm` and press **Enter**.
- **d.** Type `list value` and press **Enter**.
- **e.** Type `switchmode automatic` and press **Enter**.
- **f.** Type `exit` to quit the CLIP module.
- **g.** Repeat Steps a–f for all CLIP modules.

Step 12 Remove the fiber jumper cable from the B-side INPUT to simulate a break in the B-side path. The Active LED for the A side should be illuminated. Complete Step 12 in Table B-11 on page B-7.

Step 13 Reconnect the fiber jumper cable pulled in Step 12. The Standby green light for the B-side should be illuminated, and the A side Active LED should remain illuminated. Complete Step 13 in Table B-11 on page B-7.

Step 14 Remove the fiber jumper cable from the A side and verify that the Active LED on the A side goes out and the B-side switches from Standby to Active. Complete Step 14 in Table B-11 on page B-7.

Step 15 Replace the jumper on the A side and verify that the A green Standby LED is illuminated and that the B Active LED remains illuminated. Complete Step 15 in Table B-11 on page B-7.

Procedure: Test the Bit Error Rate (Single SCU)

Continue with the following steps, if applicable, to test the bit error rate for a single SCU.

Step 16 Test the A-side protected channel:

- **a.** Remove the jumper cable from the B-side input and verify that the A side is Active.
- **b.** Reconnect the B-side jumper cable. Verify that the A-side Active LED and the B-side Standby LED are illuminated.
- **c.** Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 16 in Table B-11 on page B-7.

Step 17 Test the B-side protected channel or unprotected channel:

- **a.** Remove the jumper cable from the A-side input. For a protected SCU or an uprotected SCU configured as 0/100, verify that the B side is Active. For an unprotected SCU configured as 100/0, verify that neither the A side or B side is Active.
- **b.** Reconnect the A-side jumper cable. F or a protected SCU, verify that the B-side Active LED and the A-side Standby LED are illuminated. For an unprotected SCU configured as 0/100, the B-side Active will be illuminated with no Standby, and for an unprotected SCU configured as 100/0, the A-side Active will be illuminated with no Standby.
- **c.** Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 17 in Table B-11 on page B-7. The turn up and test for a single ONS 15201 SCU is complete.

Step 18 Reset the original switchmode settings (Table B-16 on page B-8).

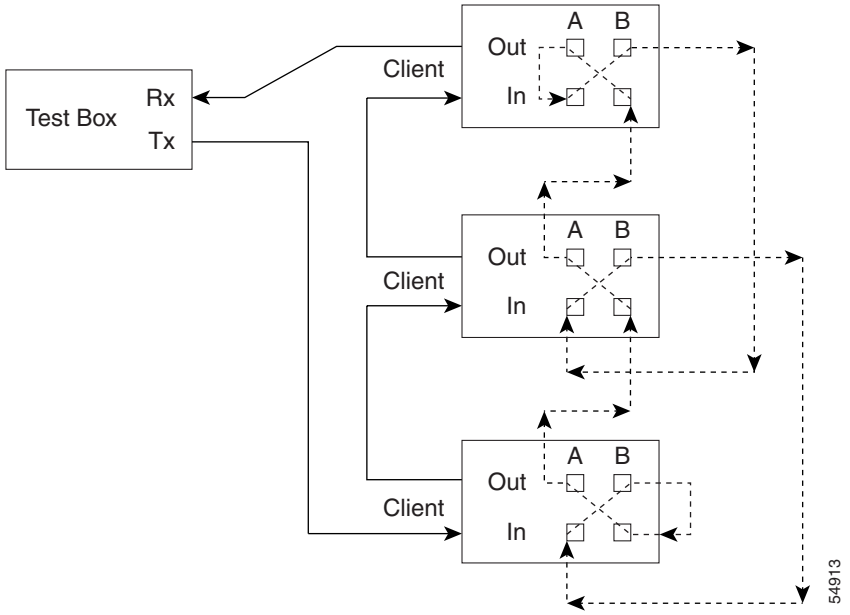
Procedure: Test the Bit Error Rate (Multiple SCUs at a Site)

Continue with the following steps to test the bit error rate for multiple SCUs at a site.

Step 19 Configure the SCUs for testing:

- **a.** Connect the signal generator transmit fiber to the client INPUT port of the bottom SCU.
- **b.** Connect the receive of the signal generator to the bottom SCU client-side OUTPUT port.
- **c.** Daisy-chain client INPUT and OUTPUT ports of all other SCUs together as shown in Figure 4-7.

Figure 4-7 ONS 15201 SCU in a daisy-chain configuration



d. Attenuate the output of the A and B ports between -10 and -28 to avoid damage to the CLIP DWDM receivers before looping them back.

e. Loop the B-side INPUT and OUTPUT ports together on the bottom SCU.

f. Loop the A-side INPUT and OUTPUT ports together on the top SCU.

g. Run a fiber from the B-side OUTPUT port of the top SCU to the A-side INPUT port of the second SCU.

Check each OUTPUT port with an OSA before connecting it to the next INPUT port and before inserting the required number of attenuators. Verify that the level of the channel to be dropped at the next SCU is within operating levels of the DWDM receivers. As a rough guide, the input power should be between -25 and -10 dBm (receiver operating range is -30 and -8 dBm).

h. Repeat Step 3f–g for all SCUs, connecting the B-side OUTPUT port to the A-side INPUT port as shown in Figure 4-7.

i. From the bottom SCU, run a fiber from the A-side OUTPUT port to the B-side INPUT port of the previous SCU. Check each OUTPUT port with an OSA before connecting it to next INPUT port.

j. Repeat Step 3d. for all SCUs, connecting the A-side OUTPUT to the B-side INPUT, as shown in Figure 4-7.

k. Verify that the level of the channel to be dropped at the next SCU is within operating levels of the DWDM receivers. As a rough guide, the input power should be between -25 and -10 dBm (receiver operating range is -30 and -8 dBm).

Step 20 To test unprotected channels, clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 20 in Table B-11 on page B-7.

Step 21 Test A-side protected channels and all unprotected channels:

a. Disconnect the jumper cable on the B-side INPUT port of the bottom SCU in loopback mode.

b. Reconnect the B-side jumper cable and verify that all protected SCUs identify the A side as Active and the B side as Standby.

c. Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 21 in Table B-11 on page B-7.

Step 22 Test B-side protected channels and all unprotected channels:

a. Disconnect the jumper cable on the A-side INPUT port of the top SCU in loopback mode.

b. Reconnect the A-side jumper cable and verify that all protected ONS 15201 SCUs identify the B side as Active and the A side as Standby.

c. Clear all errors on the test set and run the BER test error-free for 15 minutes. Complete Step 22 in Table B-11 on page B-7.

Step 23 Reset the original switchmode settings (Table B-16 on page B-8).

4.5 Perform System Span Testing for a Hub Configuration

Use the following procedures to perform ONS 15200 system span testing for a hub configuration.

Note First complete the individual turn up and test procedures for each ONS 15252 MCU and ONS 15201 SCU in the network.

Procedure: Connect a Path

Step 1 Configure the MCU so that the signal generator transmit is connected to the Client INPUT port on the first CLIP module.

Step 2 Daisy chain the remaining CLIP modules together by using fiber-optic jumper cables to connect the OUTPUT port of the previous CLIP module to the INPUT port of the next CLIP module on the client side. The last CLIP module OUTPUT port is connected to the receive on the signal generator.

Step 3 Beginning at the MCU hub node, use an OSA to measure and record the power level of each wavelength on the LM A-side OUTPUT port and the LM B-side OUTPUT port. Record the measured values in Table B-18 on page B-8.

Step 4 Run a fiber from the OUTPUT port on the A-side LM of the MCU counterclockwise to the B-side INPUT port of the first node in the ring (per customer design).

Step 5 At the first node (counterclockwise) connected to the A-side LM, use an OSA to measure and record the signal level of each wavelength going into the B-side INPUT port.

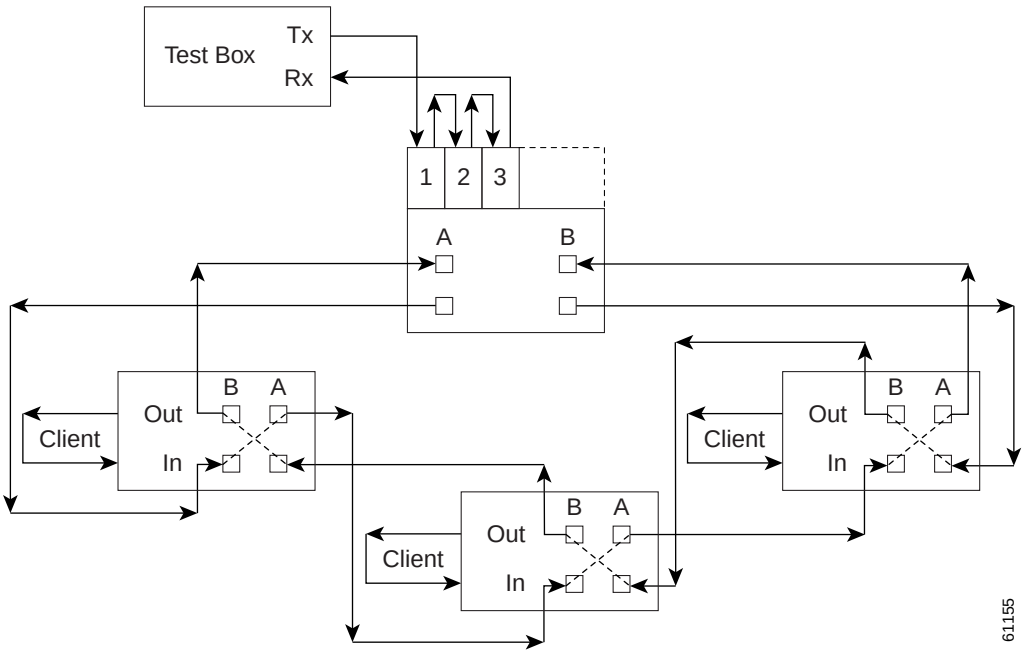
If necessary, use attenuators to reduce the level of the dropped wavelength to within receiver specification range. As a rough guide, the input power should be between -25 and -7 dBm for the wavelength (receiver operating range is -30 and -8 dBm). Record the (unattenuated) measured OSA incoming signal levels in Table B-19 on page B-9.

Step 6 Use an OSA to measure and record the optical power level on the A-side OUTPUT port for each wavelength. Record the measured OSA outgoing signal levels in Table B-19 on page B-9.

Step 7 Connect a fiber from the A-side OUTPUT port of the first node to the B-side INPUT port of the next node in the ring. Continue until the ring is completed by connecting the fiber from the last node A-side OUTPUT port to the INPUT port of the originating MCU B-side INPUT port (Figure 4-8).

Record the OSA-measured B-side receive levels and A-side transmit levels in Table B-19 on page B-9 for each remote node in the ring. At the originating hub node, record the incoming signal on the B-side in Table B-18 on page B-8.

Figure 4-8 ONS 15200 system span test connection (hub configuration)



Step 8 At the first node (clockwise) connected to the B-side LM, use an OSA to measure and record the signal level of each wavelength going into the A-side INPUT port. If necessary, use attenuators to reduce the level of the dropped wavelength to within receiver specification. As a rough guide, the input power should be between -19 and -7 dBm for the wavelength (receiver operating range is -30 and -8 dBm). Record in Table B-19 on page B-9.

Step 9 Use an OSA to measure and record the optical power level on the B-side OUTPUT port for each wavelength. Record the measured OSA outgoing signal levels in Table B-19 on page B-9.

Step 10 From the first node, connect a fiber from the B-side OUTPUT port to the A-side INPUT port of the next node in the ring. Continue until the ring is complete by connecting the fiber from the last node B-side OUTPUT port to the A-side INPUT port of the originating ONS 15252 MCU (Figure 4-8).

Record the OSA-measured A-side receive levels and B-side transmit levels in Table B-19 on page B-9 for each remote node in the ring. At the hub node, record the incoming signal on the A side in Table B-18 on page B-8.

Step 11 Log into the MCU and verify that the data rate is set to stm_16 (or another data rate that conforms with the test set) for each MCU and SCU CLIP in the ring.

Step 12 Type `show power` at the CLI to obtain the signal level at the receivers. Compare the receive power at each node with the results given by your network planner and complete Table B-20 on page B-10 for the hub node and Table B-21 on page B-10 for the remote nodes.

Procedure: Test the Bit Error Rate for Unprotected Channels

Continue with the following steps to test the bit error rate for unprotected channels. If you have one or more protected channels, proceed with Step 14.

Step 13 Clear all errors on test box and run the bit error rate test (BERT) error free for two hours. Complete Step 13 in Table B-17 on page B-8.

You have completed the span test for networks with no protection.

Procedure: Test the Bit Error Rate for Protected Channels

Continue with the following steps to test the BER for protected channels.

Step 14 Test the A-side protected channels:

a. Write down the switchmode of all protected CLIPs in Table B-22 on page B-11.

b. Set the switchmode to forced_a for all protected CLIPs.

c. Verify through the web browser that all of the protected channels are active on the A side.

d. Clear all errors on the test set and run BERT error free for two hours. Complete Step 14 in Table B-17 on page B-8.

Step 15 Test the B-side protected channels:

a. Set the switchmode to forced_b for all protected CLIPs.

b. Verify through the web browser that all of the protected channels are active on the B side.

c. Clear all errors on the test set and run BERT error free for two hours. Complete Step 15 in Table B-17 on page B-8.

Step 16 Reset the original switch mode settings recorded in Table B-22 on page B-11.

Note It is important to perform this step.

CHAPTER 5

Connectors and Cabling

This chapter contains line assignments for electrical and optical cables. For specific optical configurations, consult your network planner.

5.1 Electrical Connectors

Caution Static electricity can damage electro-optical equipment. While unpacking and handling electro-optical modules, wear a properly grounded wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap to a tested earth ground.

5.1.1 ONS 15252 MCU Electrical Connectors

Table 5-1 shows Communication Interface module (CIM) Management Access (MA) connections.

Table 5-1 ONS 15252 CIM Management Access Connections

Pin Number	Function	Signal
1	RxD	RS-232 receive
2	GND	0 VDC reference for RS-232 and CAN bus
3	CANL_RET	CAN bus return (low) from MA system
4	CANH_RET	CAN bus return (high) from MA system
5	CANH	CAN bus (high) to MA system
6	CANL	CAN bus (low) to MA system
7	TERM_INSERT	+4.5 VDC, 72ohms (Reserved, part of the CAN bus control)
8	TxD	RS-232 transmit

Table 5-2 shows the CIM internal bus (INT BUS) connections.

Table 5-2 ONS 15252 CIM Internal Bus Connections

Pin Number	Function	Signal
1	Floating	Reserved, part of the CAN bus termination control
2	Floating	Reserved, part of the CAN bus termination control
3	CANH	CAN bus (high)
4	CANL	CAN bus (low)
5	GND	0 VDC
6	LINE_INSERT	+4.5 VDC, 145 ohms (Reserved, part of the CAN bus termination)

Table 5-3 shows ONS 15252 MCU power supply connections.

Table 5-3 ONS 15252 MCU Power Supply Connections

Connector	Pin Number	Voltage
PS-1	1	–48 VDC return
PS-1	2	–48 VDC
PS-2	1	–48 VDC return
PS-2	2	–48 VDC

5.1.2 ONS 15201 SCU Electrical Connectors

Table 5-4 shows ONS 15201 internal bus (INT BUS) connections.

Table 5-4 ONS 15201 Internal Bus Connections

Pin Number	Function	Signal
1	Floating	Reserved, part of the CAN bus termination control
2	Floating	Reserved, part of the CAN bus termination control
3	CANH	CAN bus (high)
4	CANL	CAN bus (low)
5	GND	0 VDC
6	LINE_INSERT	+4.5 VDC, 145 ohms (Reserved, part of the CAN bus termination control)

Table 5-5 shows management access (MA) connections.

Table 5-5 ONS 15201 Management Access Connections

Pin Number	Function	Signal
1	NA	Not used
2	GND	0 VDC reference for CAN bus and part of CAN bus relay control
3	CANL_RET	CAN bus return (low) from MA system

Table 5-5 ONS 15201 Management Access Connections (continued)

Pin Number	Function	Signal
4	CANH_RET	CAN bus return (high) from MA system
5	CANH	CAN bus (high) to MA system
6	CANL	CAN bus (low) to MA system
7	TERM_INSERT	+4.5 VDC, 72ohms (Reserved, part of the CAN bus control)
8	NA	Not used

Table 5-6 shows ONS 15201 SCU power supply connections.

Table 5-6 ONS 15201 SCU Power Supply Connections

Connector	Pin Number	Voltage
PS-1	1	–48 VDC (–)
PS-1	2	–48 VDC (+) return
PS-1	3	–48 VDC (–)
PS-1	4	–48 VDC (+) return
PS-2	1	–48 VDC (–)
PS-2	2	–48 VDC (+) return
PS-2	3	–48 VDC (–)
PS-2	4	–48 VDC (+) return

5.2 Optical Fiber Jumper Cable Connectors

Note Inspect and clean optical connectors prior to making optical connections. Unused optical connectors should have plugs inserted.

5.2.1 ONS 15252 MCU Optical Connectors

Line module (LM) optical connections in the ONS 15252 MCU are listed in Table 5-7. For specific optical configurations, consult with your network planner.

Table 5-7 ONS 15252 LM Optical Connections

Connector	Connection
Client IN (All CLIP modules)	Client input signal (toward the ONS 15252 MCU)
Client OUT (All CLIP modules)	Client output signal (from the ONS 15252 MCU)
A-side LM IN	A-side DWDM input signal (toward the ONS 15252 MCU)
A-side LM OUT	A-side DWDM output signal (from the ONS 15252 MCU)

Table 5-7 ONS 15252 LM Optical Connections (continued)

Connector	Connection
B-side LM IN	B-side DWDM input signal (toward the ONS 15252 MCU)
B-side LM OUT	B-side DWDM output signal (from the ONS 15252 MCU)

5.2.2 ONS 15201 SCU Optical Connectors

Note Inspect and clean optical connectors prior to making optical connections. Unused optical connectors should have plugs inserted.

Table 5-8 lists optical connections for the ONS 15201 SCU.

Table 5-8 ONS 15201 SCU Optical Connections

Connector	Connection
Client IN	Client input signal (toward the ONS 15201 SCU)
Client OUT	Client output signal (from the ONS 15201 SCU)
A-side SCU IN	A-side DWDM input signal (toward the ONS 15201 SCU)
A-side SCU OUT	A-side DWDM output signal (from the ONS 15201 SCU)
B-side SCU IN	B-side DWDM input signal (toward the ONS 15201 SCU)
B-side SCU OUT	B-side DWDM output signal (from the ONS 15201 SCU)

APPENDIX A

Acronyms

The following acronyms and other abbreviations are used in this manual:

A

A

A-side

ADM

add/drop multiplexer

B

B

B-side

BDB

battery distribution bay

BER

bit error rate

BM

Bridge module

C

C

Celsius

CAN

control area network

CCAN

Collector Control Area Network board

CFM

Collector Filter module

CFR

Code of Federal Regulations

CIM

Communications Interface module

CLI

Command Line Interface

CLIP

Client Line Interface Port module

CMX

Connection Module X

CMY

Connection Module Y

D

dB

decibels

dBm

decibels referenced to 1 milliwatt

DFM

Dummy FIlter module

DNAM

Dummy Network Adaptation module

DWDM

dense wavelength division multiplexing

E

EIA

Electronic Industries Association

EMC

electromagnetic compatibility

EMI

electromagnetic interference

ETS

European telecommunication standard

F

F

Fahrenheit

FCC

Federal Communications Commission

FDA

Food and Drug Administration

FTP

file transfer protocol

H

HFM

Hub Filter module

I

IEC

International Electrotechnical Commission

ITU

International Telecommunications Union

L

LM

Line module

MA

management access

MCU

Multichannel Unit

MM

Maintenance Manager

N

NAM

Network Adaptation module

NCB

Network Control Board module

NE

network element

NEBS

Network Building System

NFPA

National Fire Protection Association

O

OADM

optical add/drop multiplexer

ONS

optical networking system

OSA

optical spectrum analyzer

P

PCI

personal computer interface

PDP

power distribution panel

Q

QDBS

database system

QPP

proprietary protocol

R

Rx

optical receiver

S

SCU

Single-Channel Unit

SDH

synchronous digital hierarchy

SNM

Subnetwork Manager

STM

synchronous transfer mode

T

TAC

Technical Assistance Center

TCP

Transport Control Protocol

TIA

Telecommunication Industry Association

TM

Termination module

Tx

optical transmitter

W

www

World Wide Web

APPENDIX B

Acceptance Test Plan

This chapter contains tables and checklists sheets to use during the first turn up and test of a Cisco ONS 15200 system. When you are performing the turn up and test procedures in Chapter 4, "Turn Up and Test," you are asked to complete the tables in this appendix to prepare for customer acceptance of the ONS 15200 system.

Table B-1 Customer Information

Customer	
Site Name	
Location	
System Configuration	

Table B-2 Team Information

Lead Engineer	
Test Engineer	
Test Engineer	
Date	

B.1 ONS 15200 Network Configuration

Table B-3 ONS 15200 Network Configuration Checklist

Related Step in Chapter 4	Description	Pass	Fail
13	All Client Layer Interface Port modules display correctly		

B.2 ONS 15252 Multichannel Unit Turn Up and Test

Table B-4 ONS 15252 MCU Turn Up and Test Procedure Checklist

Related Step in Chapter 4	Description	Pass	Fail
2	Data is consistent with network planner		
3	A-side Hub Filter Module (HFM) order correct		
3	B-side HFM order correct		
10	Alarm verification		
12	A-side to B-side switch		
13	A-side standby, B-side active		
14	B-side to A-side switch		
15	A-side active, B-side standby		
17	BER test error free for 15 minutes—unprotected		
18	BER test error-free for 15 minutes—A-side		
19	BER test error-free for 15 minutes—B-side		

Table B-5 ONS 15252 MCU CLIP Data

Slot Number	CLIP Serial Number	ITU Channel Number	ITU Frequency (THz)	Wavelength (nm)	Tx Power (dB)	MU Transmit Attenuator (8 or 0 dB)	Splitter Ratio
1							
2							
3							
4							
5							
6							
7							

Table B-5 ONS 15252 MCU CLIP Data (continued)

Slot Number	CLIP Serial Number	ITU Channel Number	ITU Frequency (THz)	Wavelength (nm)	Tx Power (dB)	MU Transmit Attenuator (8 or 0 dB)	Splitter Ratio
8							
9							
10							
11							
12							
13							
14							
15							
16							

Note The expected minimum and maximum transmit power is provided by your network planner. Actual transmit power must be within the range provided by your network planner.

Table B-6 A-Side ONS 15252 MCU Wavelength and Output Power Data

A-Side Slot Number	Wavelength Expected (nm)	Wavelength Reading from Frequency Meter (nm)	Output Power Expected (dBm)	Output Power Measured (dBm)	Output Power Measured Within Network Planner Range Pass or Fail
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

Table B-6 A-Side ONS 15252 MCU Wavelength and Output Power Data (continued)

A-Side Slot Number	Wavelength Expected (nm)	Wavelength Reading from Frequency Meter (nm)	Output Power Expected (dBm)	Output Power Measured (dBm)	Output Power Measured Within Network Planner Range Pass or Fail
14					
15					
16					

Table B-7 B-Side ONS 15252 MCU Wavelength and Output Power Data

B-Side Slot Number	Wavelength Expected (nm)	Wavelength Reading from Frequency Meter (nm)	Output Power Expected (dBm)	Output Power Measured (dBm)	Output Power Measured Within Network Planner Range Pass or Fail
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Table B-8 ONS 15252 MCU DWDM Receive Data

Slot Number	Attenuated OSA Reading A Side	DWDM A-Side Rx Expected (dBm)	DWDM A-Side Rx Measured (dBm)	Pass or Fail	Attenuated OSA Reading B-Side	DWDM B-Side Rx Expected (dBm)	DWDM B-Side Rx Measured (dBm)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Table B-9 ONS 15252 MCU Client Transmit Data

Slot Number	Measured Client Transmit Power (dBm)	Pass or Fail Valid Range -8 to -10 dBm
1		
2		
3		
4		
5		
6		
7		
8		
9		

Table B-9 ONS 15252 MCU Client Transmit Data (continued)

10		
11		
12		
13		
14		
15		
16		

Table B-10 ONS 15252 MCU CLIP Switchmode

CLIP Serial Number	Switchmode

B.3 ONS 15201 Single-Channel Unit Turn Up and Test

Table B-11 ONS 15201 Turn Up and Test Procedure Checklist

Related Step in Chapter 4	Description	Pass	Fail
4	Data is consistent with your network planner		
10	Alarm verification		
12	B side to A side switch		
13	A side active, B side standby		
14	A side to B side switch		
15	A side standby, B side active		
16	BER test error-free for 15 minutes — A-side		
17	BER test error-free for 15 minutes — B-side (unprotected)		
20	BER test error free for 15 minutes — unprotected		
21	BER test error-free for 15 minutes — A-side		
22	BER test error-free for 15 minutes — B-side		

Table B-12 ONS 15201 SCU CLIP Data

CLIP Serial Number	ITU Channel Number	ITU Frequency (THz)	Wavelength (nm)	Tx Power (dBm)	MU Attenuation	Splitter Ratio

Table B-13 ONS 15201 SCU Wavelength and Output Power Data

Output Port	Wavelength Expected (nm)	Wavelength Reading from Frequency Meter (nm)	Output Power Expected (dBm)	Output Power Measured (dBm)	Output Power Measured Within Range Pass or Fail
A					
B					

Table B-14 ONS 15201 SCU DWDM Receive Data

Attenuated OSA Reading A Side	DWDM A-Side Rx Expected (dBm)	DWDM A-Side Rx Measured (dBm)	Pass or Fail	Attenuated OSA Reading B Side	DWDM B-Side Rx Expected (dBm)	DWDM B-Side Rx Measured (dBm)	Pass or Fail

Table B-15 ONS 15201 SCU Client Transmit Data

CLIP Serial Number	Measured Client Transmit Power (dBm)	Pass or Fail Valid Range -8 to -10 dBm

Table B-16 ONS 15201 CLIP Switchmode

CLIP Serial Number	Switchmode

B.4 ONS 15200 System Span Test

Table B-17 ONS 15200 System Span Test Procedure Checklist

Related Step in Chapter 4	Description	Pass	Fail
12	BER test error-free for 2 hours — unprotected		
13	BER test error-free for 2 hours — A-side		
14	BER test error-free for 2 hours — B-side		

Note The comparison between measured and expected values is only relevant when the fiber has been characterized.

Table B-18 ONS 15200 Hub Span DWDM Transmit and Receive Measurements

ONS 15252 MCU Slot #	ITU Channel	OSA Measured DWDM A Side Tx	OSA Measured DWDM A Side Rx	OSA Measured DWDM B Side Tx	OSA Measured DWDM B Side Rx

Table B-18 ONS 15200 Hub Span DWDM Transmit and Receive Measurements (continued)

Table B-19 ONS 15200 Remote Span DWDM Transmit and Receive Measurements

Location	ITU Channel	OSA Measured DWDM A Side Tx	OSA Measured DWDM A Side Rx	OSA Measured DWDM B Side Tx	OSA Measured DWDM B Side Rx

Table B-20 ONS 15252 MCU DWDM Receive Measurements

ONS 15252 MCU Slot Number	DWDM A-Side Rx Measured (dBm)	DWDM A-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail	DWDM B-Side Rx Measured (dBm)	DWDM B-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Note The comparison between measured and expected values is only relevant when the fiber has been characterized. The expected received power (both a maximum and minimum value) is provided by your network planner. The value is based on customer-provided data for fiber loss.

Actual received power must fall within the range provided by your network planner.

Table B-21 ONS 15200 DWDM Receive Measurements

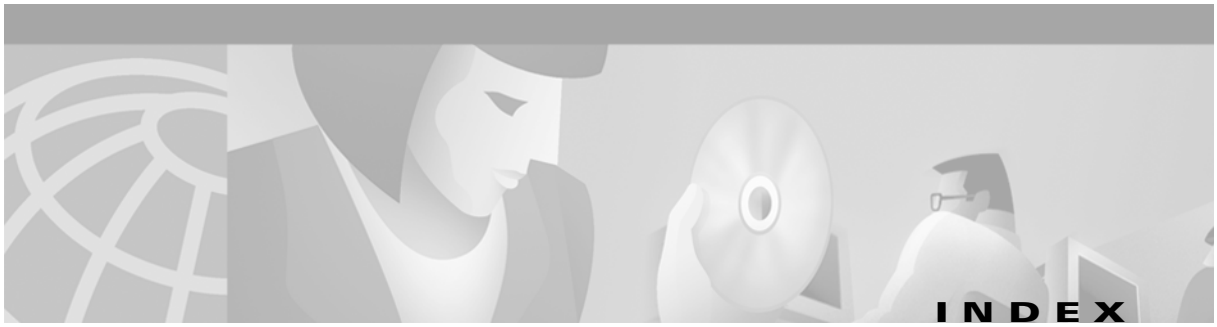
NE Location	Remote ITU Number	DWDM A-Side Rx Measured (dBm)	DWDM A-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail	DWDM B-Side Rx Measured (dBm)	DWDM B-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail

Table B-21 ONS 15200 DWDM Receive Measurements (continued)

NE Location	Remote ITU Number	DWDM A-Side Rx Measured (dBm)	DWDM A-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail	DWDM B-Side Rx Measured (dBm)	DWDM B-Side Rx Expected (dBm)	Rx Measured Within Range Pass or Fail

Table B-22 ONS 15200 CLIP Switchmode

CLIP Serial Number	Switchmode



A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W