



# **Metropolis<sup>®</sup> Enhanced Optical Networking (EON) (OLS 40G/80G)**

**Release 8.2**

Installation Guide

365-575-562 R8.2  
Issue 3  
March 2002

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This document was developed by the Metropolis® EON Technical Support Services Organization.

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Metropolis<sup>®</sup> Enhanced Optical Networking (EON)  
(OLS 40G/80G)  
Installation Guide

365-575-562 R8.2 Issue 3.0 Date: March 2002

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# About This Document

**Purpose** This document, *Metropolis*<sup>®</sup> Enhanced Optical Networking (EON) *Installation Guide, 365-575-562 R8.2, Issue 3*, provides step-by-step procedures for the installation of Metropolis<sup>®</sup> EON Integrated Bays and for miscellaneous-mounted EON (OLS) and OT Shelves.

**Important!** The installation procedures in this document are for new installations. Using these procedures on "in-service" Metropolis<sup>®</sup> EON (or OLS 40G/80G) systems will result in a "Loss of Service." Use the appropriate MIP document for "in-service" upgrades

**Reason for Reissue** This is Issue 3.0 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

Some of the chapters in this Installation Guide have been reorganized from previous issues; refer to the Chapter descriptions for more information.

**Safety Labels** Working on the complex equipment and systems described in this document requires special training of the personnel. For more information, please read Chapter 1, Safety.

**Intended Audience** The intended audience of this document primarily consists of people who are responsible for the installation of network elements and for the node to node system connections.

## How to Use This Document

This document consists of chapters that provide methods and procedures for installing Metropolis<sup>®</sup> EON equipment.

**Important!** This document is for the installation of new Release 8.2 Metropolis<sup>®</sup> EON equipment. Please refer to the appropriate Modification Implementation Procedure (MIP) documents for modifying and upgrading existing OLS 40G/80G equipment.

## Assumptions

This document assumes that readers have the following required skills.

- Basic principles of optical telecommunication transmission
- Common optical telecommunication and system terminology (a glossary is provided in this document)
- Test sets and tools used in the telecommunication industry
- The customer's local operational and functional procedures
- Personal computer (PC) operation, common PC terminology, and navigational tasks in a windows-style user interface.

## Training

Prerequisite training that will allow the installer to become proficient in understanding and operating the Metropolis<sup>®</sup> EON is described in Related Training: page -xv.

## Information Contained in This Document

The following table briefly describes the information found in each chapter. The chapters are arranged in the order in which it is recommended they are performed. Each chapter has a pre-checklist to be performed before any activities in that chapter are performed, and a post-checklist to verify all procedures in that chapter were performed correctly. If the installer deviates from the recommended order of operations, the checklists of each chapter should be completed to maintain records of installation activities.

Chapter	Description
About This Document	The preface <ul style="list-style-type: none"><li>describes the purpose of the document, intended audience, and organization,</li><li>lists related documentation,</li><li>explains how to comment on this document.</li></ul>
Chapter 1, Safety	Contains a series of very important safety instructions concerning the handling of optical equipment.
Chapter 2, Equipment Installation	Provides procedures for installation of equipment bay frames or miscellaneous mounted shelves.
Chapter 3, Power Cable Installation and Powering	Provides procedures for installing power cables and connecting power to Metropolis <sup>®</sup> EON equipment
Chapter 4, Wired Cable Installation	Provides installation instruction for wired cables for the Metropolis <sup>®</sup> EON equipment including the Office Alarms; Serial, Parallel and X.25 Telemetry Cables; CIT DTE Cable; Orderwire Cables; Intershelf Integration Cables; and Miscellaneous Discrete Cables.
Chapter 5, Circuit Pack Placement	Describes circuit pack placement procedures for the Metropolis <sup>®</sup> EON equipment.
Chapter 6, Optical Fiber Installation	Provides procedures for optical fiber installation.
Chapter 7, Network Element Start-up and Provisioning	Provides procedures for seating the circuit packs in the shelves, downloading Network Element (NE) software, logging into the system, and entering basic provisioning commands.

<b>Chapter</b>	<b>Description</b>
Chapter 8, Local Installation Testing	Provides instructions for Auto Turnup tests available in the NE software, for verifying functionality of OMU/ODU, and for testing the cabling and Operations Systems interfaces.
Chapter 9, Network Element Connections	Provides the procedures for establishing and optical line system through outside plant fiber connections.
Chapter 10, DWDM Wavelength Connections	Provides procedures for connecting customer traffic as DWDM wavelengths.
Chapter 11, Trouble Clearing	Provides guidelines for trouble clearing an out-of-service system during initial start-up.
Appendix A, Pin Repair	Describes procedures for repairing back plane pins that require replacement.
Appendix B, Fiber Cleaning	Describes proper fiber connector cleaning procedures.
Appendix C, CMC Dantel Alarm and Control Block Installation, Extended Miscellaneous Discretes	Describes how to install the Dantel Alarm Control Block for use with the extended miscellaneous discretes feature.
Appendix D, Harris C-1000 Centurion Installation - Extended Miscellaneous Discretes	Describes how to install the Harris C-1000 Centurion for use with the extended miscellaneous discretes feature.
Appendix E, Related Equipment	Describes the Dantel Orderwire use and connections.
Appendix F, Line BuildOut (LBO)	Describes the various types of buildouts available for the Metropolis <sup>®</sup> EON equipment, and their properties.
Appendix G, Tools and Test Equipment	Provides the required tools and test equipment for each section of this guide.
Glossary	Defines telecommunication terms and expands common telecommunication abbreviations and acronyms.

**Conventions Used** The following conventions are used throughout this document.

### **Numbering**

The chapters of this document are numbered consecutively. The page numbering restarts at *I* (one) in each chapter. To facilitate identifying pages in different chapters, the page numbers are prefixed with the chapter number. For example, page 2-3 is the third page in Chapter 2.

### **Cross References**

Cross reference conventions are identical with those used for numbering (for example, the first number in a reference to a particular page refers to the corresponding chapter).

### **Keyword Blocks**

This document contains so-called keyword blocks to facilitate the location of specific text passages. The keyword blocks are placed to the left of the main text and indicate the contents of a paragraph or group of paragraphs.

### **Typographical Conventions**

Special typographical conventions apply to elements of the graphical user interface (GUI), filenames and system path information, keyboard entries, alarm messages etc.

- Elements of the graphical user interface (GUI)  
These are examples of text that appears on a graphical user interface (GUI), such as menu options, window titles, or pushbuttons.
  - **Provision...**, **Delete**, **Apply**, **Close**, **OK** (pushbuttons)
  - **Provision Timing/Sync** (window title)
  - **View Equipment Details...** (menu option)
  - **Administration** → **Security** → **User Provisioning...** (sequence for invoking a window)
- Filenames and system path information  
These are examples of filenames and system path information.
  - *setup.exe*
  - *C:\Program Files\Lucent Technologies*
- Keyboard entries  
These are examples of keyboard entries.

- **F1, Esc X, Alt-F, Ctrl-D, Ctrl-Alt-Del** (simple keyboard entries) A hyphen between two keys means that both keys have to be pressed simultaneously. Otherwise, a single key has to be pressed, or several keys have to be pressed in sequence.
- **copy abc xyz** (command)  
A complete command has to be entered.
- Alarms and error messages  
These are examples of alarms and error messages:
  - STM Loss of Signal
  - Circuit Pack Failure
  - HPUNEQ, MSAIS, STMLOS, STMLOF
  - Not enough disk space available

### Abbreviations

Abbreviations used in this document can be found in the Glossary unless it can be assumed that the reader is familiar with the abbreviation.

### Related Documents

This section briefly describes the documents that are included in the Metropolis<sup>®</sup> EON documentation set.

- *Metropolis<sup>®</sup> EON, Applications and Planning Guide, 365-575-558, R8.2*, is for use by network planners, analysts and managers. It is also for use by the Lucent Account Team. It presents a detailed overview of the system, describes its applications, gives planning requirements, engineering rules, ordering information, and technical specifications.
- *Metropolis<sup>®</sup> EON, User Operations Guide, 365-575-559, R8.2*, provides step-by-step information for use in daily system operations. The User Operations Guide (UOG) demonstrates how to perform system provisioning, operations, and administrative tasks by use of CIT.
- *Metropolis<sup>®</sup> EON, Alarm Messages and Troubleclearing Guide, 365-575-560, R8.2*, gives detailed information on each possible alarm message. Furthermore, it provides procedures for routine maintenance, troubleclearing, diagnostics, and component replacement.

- *Metropolis® EON, Operations Systems Engineering Guide, 365-575-561, R8.2*, gives detailed information on each TL1 command. Furthermore, it includes information on the Operations Interfaces used with Metropolis® EON systems.
- *Metropolis® EON, Software Release Description (SwRD), C109204131*, is a description of procedural information required to install or upgrade the Metropolis® EON software to Release 8.0.2. It also includes a listing of Release 8.0.2 features, problems fixed, known problems, and other helpful information.
- *Metropolis® EON, Provisioning Job Aid, 365-575-564, R8.2*, is a set of laminated job aid cards, containing detailed provisioning information, that are used for quick reference.
- *Metropolis® EON, Threshold-Crossing Alert (TCA) Parameters Provisioning Job Aid, 365-575-565 R8.2* is a set of laminated job aid cards, containing detailed TCA parameter provisioning information, that are used for quick reference.

### **Related Training**

Information regarding training that is available for the Metropolis® EON system can be found in the *Metropolis® EON, User Operations Guide, 365-575-559, R8.2*. The Lucent Learning Organization (LLO) provides courses for system planning, engineering, and ordering, as well as courses to train telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses is also available. Contact LLO at 1-888-LUCENT8 (1-888-582-3688) to enroll in training classes. To arrange suitcase sessions, call the Product Training Manager at 1-800-432-6317 (within USA) or 1-614-764-5542 (worldwide). For a list of available courses, see the LLO website at: <http://www.lucent.product-training.com>

### **Technical Support**

#### **Technical Assistance**

Many of our customers have established their own support procedures. These procedures usually involve escalation within their own companies. However, some issues may require additional assistance from Lucent Technologies.

Lucent Technologies has been and continues to be committed to providing excellence in technical customer support for its products and services. Therefore, we provide a hierarchical support structure ready and available to solve any Metropolis® EON technical issue.

When additional technical assistance is needed, the Lucent Technologies Customer Technical Assistant Management (CTAM) center is your first point of contact. A CTAM operator can direct your call to engineers that are highly trained and skilled at resolving issues involving Lucent Technologies products. Technical assistance is available 24 hours a day, 7 days a week.

**Lucent Technologies Customer Technical Assistant Management (CTAM) center**

**1-866-LUCENT8 (1-866-583-3688)** (continental U.S.)

**(24 hours a day, 7 days a week)**

By using CTAM as the entry point for Lucent Technologies support, you will be assured of timely and effective technical support services.

Outside the continental US, call **+1-630-224-4762**

**Customer Assistance Request Entry System (CARES)**

CARES (Customer Assistance Request Entry System) is an internal Customer Technical Support tool that allows Lucent engineers to record customer requests for a variety of products. CARES replaces all legacy systems within Lucent Technologies, Inc., such as CAROD, QUES/DIAS, CTSS, and GTSIP.

The Customer Web Access tools provide customers an easy method to access data about Lucent Products using the World Wide Web.

Customers can choose to search for data in three different applications:

- Assistance Request

The Assistance Request Tool allows external customers to search their Assistance Requests and to submit new Assistance Requests. In addition, customers can send e-mail notifications to the Lucent Assignee and Owner of the Assistance Request. Customers using the web access can search the Assistance Request database using a number of fields such as, AR Number, product or priority.

- Solutions

The Solutions access tool allows customers to view and search known problems and solutions for products. Entries are created within CARES by a Lucent engineer. Customers using the web

access can search for solutions using a number of fields such as product, subproduct, created date or description. Only solutions with a state of active will be returned.

- **Product Notifications**

The Product Notification access tool allows customers to view and search for information regarding Lucent products that have an issue which needs to be communicated immediately to their customers. A detailed text description of the issue and the urgency of the issue is the kind of information available in the Product Notification database. Customers using the web access can search the Product Notification database using a number of fields such as Product Notification ID, product or created date.

To inquire about obtaining a login, contact Customer Technical Assistance Management (CTAM)/ Virtual Call Center (VCC) at 1-800-225-4672 or WECARE/VCC at 1-800-932-2273 or Non-U.S. at 1-630-224-4672. Please make sure to ask for a CARES Customer Web Access Login. An agent will create an Assistance request in CARES and forward your request to the appropriate login administrator.

**How to Comment**

Customer comments on Metropolis<sup>®</sup> EON documents are welcome. A comment form can be found at the beginning of this document. The comment form can be faxed to **1-978-960-1992**.

**How to order**

The *Metropolis*<sup>™</sup> metroEON documents can be ordered as individual paper copies or as a set on CD-ROM from the Customer Information Center (CIC).

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Telephone: 1-317-322-6416

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# 1 Safety

## Overview

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**Purpose** This chapter provides important safety instructions for the Metropolis<sup>®</sup> EON equipment.

**Reason for Reissue** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Contents** This chapter contains the following sections.

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Important Safety Instructions	<a href="#">1-11</a>



# General Notes on Safety

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**Overview** The present chapter on safety *must* be read by the responsible technical personnel before carrying out relevant work on the system. The valid version of this document must always be kept close to the equipment.

Not only must the general instructions in this chapter on safety be observed, but also the specific safety instructions in the individual chapters.

All safety instructions have a uniform appearance. Please refer to Structure of safety instructions: page 1-2.

The equipment has been developed in line with the present state-of-the-art technology and fulfils the current national and international safety requirements. It is provided with a high degree of operational safety resulting from many years of development experience and continuous stringent quality checks within Lucent Technologies.

**Potential sources of danger** The equipment is safe in normal operation. There are, however, some potential sources of danger that cannot be completely eliminated. In particular, these arise during the

- opening of housings or equipment covers,
- manipulation of any kind within the equipment, even if it has been disconnected from the power supply,
- disconnection of optical or electrical connections,

through possible contact with:

- live parts,
- laser light,
- hot surfaces,
- sharp edges, or
- components sensitive to electrostatic discharge.

**Structure of safety instructions** All safety instructions include a *warning symbol* and a *signal word* that classify the danger and a *text block* that contains descriptions of the type and cause of the danger, the consequences of ignoring the safety instruction and the measures that can be taken to minimize the danger.

**Example:**

***Arcing on removing or inserting a live power supply plug.***

*Arcing can cause serious burns to the hands and damage to the eyes.*

*Ensure that the line circuit-breaker on the Rack Connection Panel (RCP) is in the “OFF” position before removing or inserting the power supply plug.*

**Danger classification**

There are three classes of safety instructions: ***Danger***, ***Warning*** and ***Caution***. The class depends on the consequences of ignoring the safety instruction.



***Hazard that will cause death or severe personal injury.***



Hazard that *can* cause death or severe personal injury.



Hazard that will or can cause minor personal injury or property damage, or property-damage-only including equipment damage, loss of software or service interruption.

**Special safety instructions**

The aspects of ***laser safety*** and ***handling of components sensitive to electrostatic discharge*** (ESD) are of vital importance for the equipment. Therefore, the key safety instructions for these subjects are summarized in the sections Laser Safety: page 1-5 and Electrostatic Discharge: page 1-10.

**General safety requirements**

In order to keep the technically unavoidable residual risk to a minimum, it is imperative to observe the following rules.

- Follow all warnings and instructions marked on the product.

- Slots and openings in this product at the back or bottom are provided for ventilation. To protect the product from overheating, these openings must not be blocked or covered.
- Opening or removing rear covers or sheet metal parts may present exposure to high current or electrical energy levels or to other risks.
- Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
- Refer servicing to qualified service personnel.
- Use caution when installing and modifying telecommunications lines.
- Never install telecommunication wiring during a lightning storm.
- Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.
- Installation must include an independent frame ground conductor to building ground. Grounding/bonding circuit continuity is vital for safe operation of this equipment. Never operate with grounding/bonding conductor disconnected.
- This product has two –48 VDC input power feeders. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect the two power supply cables to remove power from the system.
- Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection as applicable.
- For continued protection against risk of fire, replace only with same type and rating of fuse.
- Use only Lucent Technologies manufactured, recognized circuit packs.
- This equipment is intended for installation in Restricted Access Locations where access is controlled or where access can only be gained by service personnel with a key or tool. Access to this equipment is restricted to qualified service personnel only.



# Laser Safety

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**System design** The Lucent Technologies system complies with FDA/CDRH 21 CFR 1040.10 and 1040.11 as a Class I and with IEC 60825-1 as a Class 1 Optical Fiber Telecommunication laser product. The system has been designed to ensure that the operating personnel is not endangered by laser radiation during normal system operation. The safety measures specified in the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations and the international standards IEC-60825 or DIN/EN 60825 are met. Please also refer to Laser Product Classification: page 1-8.

**Potential sources of danger** Beware of the following potential sources of danger which will remain despite all safety measures taken.

- Laser radiation can cause damage to the skin and eyes.
- Laser radiation from optical transmission systems is in a wavelength range that is invisible to the human eye.

**Laser classes** The maximum output power of laser radiation depends on the type of laser diode used. The international standards IEC-60825 or DIN/EN 60825 define the maximum output power of laser radiation for each laser class in accordance with the wavelength.

Laser class	Wavelength	Maximum output power of laser radiation
1	1310 nm	8.85 mW (9.47dBm)
	1550 nm	10 mW (10.0 dBm)
3A	1310 nm	24 mW (13.80 dBm)
	1550 nm	50 mW (16.99 dBm)
3B	1310 nm	0.5 W (26.99 dBm)
	1550 nm	0.5 W (26.99 dBm)

**Laser warning labels** The laser warning labels indicate either only the laser class or both the laser class and the maximum output power of laser radiation.

The following figure shows different types of laser warning labels and their characteristics.



### Legend

Legend to the different types of laser warning labels.

1. Laser warning symbol.
2. This laser warning label is mounted on the front cover outside. It always refers to normal operation.
3. This laser warning label is affixed inside the subrack.

### Laser safety instructions

Observe the following instructions to avoid exposing yourself and others to risk.

- Read the relevant descriptions in the manuals before taking equipment into operation or carrying out any installation and maintenance work on the optical port units, and follow the instructions. Ignoring the instructions can result in exposure to dangerous radiation.

- Do not view directly into the laser beam with optical instruments such as a fiber microscope, because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.
- Never look into the end of an exposed fiber or an open connector as long as the optical source is still switched on.
- Ensure that the optical source is switched off before disconnecting optical fiber connectors.
- In the event of doubt, check that the optical source is switched off by measuring with an optical power meter.



# Laser Product Classification

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**Standards compliance** The product complies with both IEC standards and the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations.

**FDA/CDRH regulations** Laser products are classified in accordance with the FDA/CDRH - 21 CFR 1010 and 1040. The classification scheme is based on the ability of the laser emission to cause injury to eye or skin during normal operating conditions.

In the United States, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes.

- Class I,
- Class IIIb, or
- Class IV.

Laser classification is dependent upon operating wavelength, output power and fiber modefield diameter (core diameter).

**IEC requirements** The International Electro-Technical Commission (IEC) establishes standards for the electrical and electronic industries. IEC-60825 has been established for the worldwide safety of laser products.

According to the IEC classification, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes.

- Class 1,
- Class 3A,
- Class 3B, or
- Class 4.

There are some major differences between the FDA/CDRH regulations and IEC.

1. The Accessible Emission Limits (AEL) are different.
2. Class 3A applies to all wavelengths.
3. Class 3B requires strict engineering controls.
4. Classification is under single fault conditions.

**Hazard level assignment**

*Hazard level* refers to the potential hazard from laser emission at any location in an end-to-end optical fiber communication system that may be accessible during service or in the event of a failure. The assignment of hazard level uses the AELs for the classes.

Hazard levels for optical transmission equipment are assigned in either of the following two ways.

- Actual output power from the connector or fiber cut.
- If automatic power reduction is used, output power at the connector or fiber cut at one second after automatic power reduction takes place provided that maximum output and restart conditions are met.

**Classification of optical telecommunication equipment**

Optical telecommunication equipment is generally classified as IEC Class 1 or FDA/CDRH Class I, because under normal operating conditions, the transmitter ports terminate on optical fiber connectors. These are covered by a front panel to ensure protection against emissions from any energized, unterminated transmitter.

The circuit packs themselves, however, may be IEC Class 1 or 3A or FDA/CDRH Class I or IIIb.

**OA3 Optical Amplifier**

The OA3 Optical Amplifier is capable of Class IIIb/3B operation when more than 16 channels are equipped. The OUT port of the OA3 is protected by a cover that prevents access to the OUT port when the circuit pack is seated and powered in the shelf.



# Electrostatic Discharge

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**Overview** Electrostatic discharge (ESD) (for example, caused by touching with the hand) can destroy semiconductor components. The correct operation of the complete system is then no longer assured.

*All* semiconductor components are basically sensitive to electrostatic discharge. The electrostatic discharge can also affect the components indirectly using contacts or conductor tracks.

**Barred-hand symbol** Circuit packs containing components that are especially sensitive to electrostatic discharge are identified by warning labels bearing the barred-hand symbol.



**ESD instructions** Observe the following ESD instructions to avoid damage to electrostatic-sensitive components.

- Wear working garment made of 100% cotton to avoid generating electrostatic charge.
- Only handle the circuit packs at the edges or the insertion and removal facilities.
- Ensure that the bay frame or rack is grounded.
- Wear conductively connected wrist straps and connect them to the ESD bonding point on the bay frame.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to a tested ESD bonding point.
- Conductively connect all test equipment and trolleys to a tested ESD bonding point.
- Store and ship circuit packs and components in their ESD-approved packing material. Circuit packs and components must be packed and unpacked only at workplaces suitably protected against build-up of charge.



# Important Safety Instructions

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**Instructions** The following safety instructions are of particular importance for Metropolis<sup>®</sup> EON systems.

## Invisible laser radiation



**DANGER**

*Injury to eyes caused by invisible laser radiation.*

*Metropolis<sup>®</sup> EON operates with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.*

*Never look into the end of an exposed fiber or plug-in optical connectors as long as the optical source is switched on. Always observe the laser warning instructions (cf. Laser Safety: page 1-5).*

## Power cable plug



**DANGER**

*Arcing on removing or inserting a live power supply plug.*

*Arcing can cause serious burns to the hands and damage to the eyes.*

*Ensure that the line circuit-breaker on the customer's power distribution panel (or Battery Distribution Fuse Panel - BDFB) is in the "OFF" position before removing or inserting the power cable plug.*

**Shielded 10BaseT LAN cables****DANGER*****Risk of electrical shock and/or serious injury***

*There is a risk of electrical shock and/or serious injury if shielded 10BaseT LAN cables are used, and the applicable national safety requirements have not been met.*

*The usage of **shielded** 10BaseT LAN cables is only allowed if the applicable national safety requirements have been met by the user. Otherwise, there is a risk of electrical shock and/or serious injury.*

**Electrostatic discharge (ESD)****CAUTION**

*Destruction of components by electrostatic discharge.*

*Electronic components can be destroyed by electrostatic discharge.*

*Plug-in units must therefore always be kept in antistatic covers. Use the original packaging if possible. Always observe the ESD instructions (cf. Electrostatic Discharge: page 1-10).*





## 2 Equipment Installation

### Overview

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<b>Purpose</b>	This section provides the general requirements and methods for installing the Metropolis <sup>®</sup> EON Integrated Bay and the installation of miscellaneous-mounted Metropolis <sup>®</sup> EON (OLS) and OT Shelves.
<b>Reason for revision</b>	This is Issue 3 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications.
<b>Objectives</b>	The chapter provides the installer with the necessary information and procedures for installing the Metropolis <sup>®</sup> EON Integrated Bay or miscellaneous-mounted EON (OLS) and OT Shelves or DCM Shelves in customer-supplied bay frames.
<b>Installation Recommendations</b>	<p>The following items should be verified at the site to support the Metropolis<sup>®</sup> EON equipment installation:</p> <ul style="list-style-type: none"><li>• Safety instructions provided in Chapter 1 have been read and understood.</li><li>• Equipment and/or bay frame installation location has been identified by the customer.</li><li>• AC power available for use by installer.</li></ul>

- General Considerations**
- The recommended installation tools and test equipment are listed in Appendix G.
  - A wrist strap connected to a wrist strap ground jack on the terminal must be worn for ESD protection during all installation processes associated with circuit packs.
  - Connectors on the shelf interconnection panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
  - Do not remove the shelf backplane cover.
  - The customer-designated engineer shall specify and order all the equipment and installation details. The engineer will also provide the installer with a equipment list and mounting location information for each customer location.
  - Reference drawings for equipment are:
    - Integrated Bay: J68982D-1, L2 and ED7G048-30
    - EON (OLS) Shelf: J68982C-1, L12 and ED7G028-30
    - OT Shelves: J69000C-1, L15, 16 & 17 and ED7G045-30.
  - The equipment information provided in this chapter is the latest information available at the time of the issue. To verify current information, see the reference drawings.

**Contents** This chapter contains the following:

Metropolis® EON Equipment Information	<a href="#">2-3</a>
Equipment Frame Installation Information	<a href="#">2-4</a>
Integrated Bay Installation	<a href="#">2-7</a>
Miscellaneously-Mounted Shelf Installation	<a href="#">2-14</a>
DCM Shelf Installation	<a href="#">2-23</a>
Final Verification	<a href="#">2-24</a>



# Metropolis® EON Equipment Information

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**General** Metropolis® EON equipment may be ordered as an Integrated Bay or as individual shelf assemblies. Equipment ordering information is provided in the *Metropolis® EON, Applications and Planning Guide*, (365-575-558, R8.2).

The Integrated Bay is shipped with its wired shelves assembled, but without the circuit packs in place. Circuit packs for use in the Integrated Bay and for use in miscellaneous-mounted EON (OLS) and OT Shelves are shipped separately for their protection.

**Integrated Bays** The Integrated Bay consists of an EON (OLS) Shelf, an OT System Controller Shelf, an OT Complementary Shelf 1 and Fan Unit and Baffle assemblies mounted in a Lucent Seismic Bay frame. Intershelf control cabling and power cabling is factory installed.

The J68982D-1, L2 Integrated Bay for R8.0 and greater is identified by ordering code 848790317. The ordering code for 2 Integrated Bays intended for Ring Terminal applications is 848790325.

**Miscellaneous-Mounted Shelves** The EON (OLS) Shelf, OT System Controller Shelf and OT Complementary Shelves 1 & 2 may be ordered individually for mounting in customer provided bay frames. Fan Unit and Baffle assemblies are provided with the miscellaneous-mounted shelf orders as part of the associated installation kits.

The ordering codes for miscellaneous-mounted shelves are:

- 848802658 - Kit with OLS Shelf, OT System Controller Shelf, OT Complementary Shelf and
- 848802641 - 2 of the 848802658 kits
- 848818803 - Kit for J68982C-1, L12 EON (OLS) Shelf
- 848818811 - Kit for J69000C-1, L15 OT System Controller Shelf
- 848818787 - Kit for J69000C-1, L16 OT Complementary Shelf 1
- 848818795 - Kit for J69000C-1, L17 OT Complementary Shelf 2
- 848848958 - DCM Shelf Assembly



## Equipment Frame Installation Information

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### Customer Installation Requirements

Equipment bay frames for Metropolis® EON may be mounted on either concrete or raised floors and may accept power and network connections from either above or below the bay frames.

The customer is responsible for engineering the site in accordance with the Metropolis® EON system engineering guidelines and determining the seismic rating for the location.

The mounting recommendations for Lucent Seismic Frames are:

Seismic Zone	Mounting Base	Lucent Seismic Frame Recommendations
0, 1, & 2	Concrete Floor	Four Mounting Bolts Drop-in Anchors
3 & 4	Concrete Floor	Four Mounting Bolts Heavy Duty Anchors

The customer must provide a floor layout or job floor plan showing the positions of the bay frames for Metropolis® EON equipment, including Integrated Bays. This information will be used to mark the floor for drilling.

The customer is responsible for providing the installer with:

- Floor plan locations for mounting the equipment bay frames or cabinets for the Metropolis® EON equipment
- Physical mounting arrangements based on the specific site requirements

**Important!** The customer shall provide mounting recommendations for use with the raised floor system at their site.

### ETSI Frame Installation Requirements

The customer engineer is responsible for providing the installer with detailed instructions for mounting the customer-provided ETSI frames.

**Frame Installation Information**

Additional information relating to the installation of bay frames can be found as listed below:

Frame Type	Installation Information
Lucent Seismic Frame	Lucent Document Number 065-215-250
Newton Seismic Frame	Contact Newton Instrument Company ( <a href="http://www.newtoninst.com">http://www.newtoninst.com</a> )
Lucent ETSI Frame	Currently Not Available

**Mounting Materials and Installation Tools**

Verify the specified mounting materials and bay frame accessories are available as below:

- Hold-down plates and washers
- Anchors for concrete floors
- Mounting studs or bolts and nuts
- Mounting shims

The installer is expected to have access to small hand tools normally used for assembling equipment frame hardware (see Appendix G, Tools and Test Equipment). Other tools that may be useful for equipment installation are listed in the Tools Required for Chapter 2 listed in Appendix G.

**Mark and Drill Mounting Holes**

Use the following procedure for equipment frames mounted on concrete floors for marking the floor and drilling the mounting holes:

- 1 Obtain or create a template to match the mounting holes in the base of the bay frame
- 2 Mark the location of the mounting holes on the floor using the template. Four mounting holes should be provided with each bay frame.
- 3 Drill four holes in the floor at the locations marked for the anchors.
- 4 Always wear safety glasses when drilling holes in concrete.
- 5 Insert the drop-in anchors or heavy duty anchors as specified by job requirements.
- 6 Follow the anchor manufacturer's assembly and setting instructions.
- 7 Remove all debris from the mounting area.
- 8 Determine if floor mounting area is level and if shims may be needed.

END OF STEPS



# Integrated Bay Installation

---

**General** The J68982D-1, L2 (848790317) Integrated Bay is shipped with shelves and inter-bay wiring installed at the factory into a 7-foot Lucent Seismic Bay frame (ED-8C800-50, G1).

Refer to the *Metropolis*<sup>®</sup> EON, *Applications and Planning Guide*, (365-575-558, R8.2) for additional descriptions of the *Metropolis*<sup>®</sup> EON Integrated Bay.

**Mounting Preparation** Prepare the location for installing the *Metropolis*<sup>®</sup> EON Integrated Bay. Refer to the appropriate procedures in the Equipment Frame Installation Information section for specific instructions.

---

**1** Verify the location for installing the Integrated Bay with the customer's floor plan.

---

**2** Mark and drill mounting holes in concrete floor.

---

**3** **Safe Stop** if needed. Stop here if time does not permit completion of the installation procedure. Otherwise, proceed to the next section.

END OF STEPS

---

**Figure 2-1 Metropolis® EON Integrated Bay**



Integrated Bay  
(Covers Removed)

Integrated Bay  
(Covers Installed)

**Uncrate the Integrated Bay**

**Cautions** 

Do NOT store containers in any position other than marked position.

Do NOT stack equipment more than two bays high.

Move container in shipping position only.

Uncrate all material in a location away from the equipment room to avoid contamination of other equipment.

Use care during uncrating to avoid damage to equipment bay.

Avoid sudden shock or strain to the equipment bay while moving.

Physical size and weight may create hazards for installation personnel

- 
- 1** Using a pinch-bar and claw type hammer in areas that have been nailed, uncrate the bay in its shipping position. The bottom plate where the bay rests may remain until the equipment bay is at its final position.
- 

- 2** Remove the plastic bag and all foreign materials.
- 

- 3** Remove the stile strips secured to the sides of the bay and set aside, if equipped.
- 

- 4** Remove any guard rail covers from the base of the bay and set aside.

END OF STEPS

---

**Move the Integrated Bay**

Below are listed the steps for moving the Integrated Bay to the specified location:

- 
- 1** Plan out the moving procedure before starting to move the equipment. Two or more installers should be used for this operation.

**CAUTION**

*The weight of an uncrated Metropolis® EON Integrated Bay may exceed 450 pounds. Verify that all lifting and transporting devices are rated to accept the weight of the equipment bay. Two or more installers should be used to move a Metropolis® EON Integrated Bay.*

Use the channel-type framework of the bay when lifting and moving the bay.

Threaded holes for 5/8-11 eye bolts are provided in the top of the bay frame for the attachment of lifting devices.

The bottom shipping detail should be removed if a transport dolly is to be attached to the base of the bay. Removal can take place after the bay has been hoisted to the upright position.

The top shipping detail should remain in place until the bay is in its final floor location. It may be temporarily removed for entry or door clearance, but should be replaced prior to additional movement.

- 
- 2 Move the equipment bay to the designated location.

**CAUTION**

*Verify all lifting and/or transporting devices meet the local codes and regulations and that installation personnel have been trained in their use.*

**Erecting and Mounting the Integrated Bay**

If frame extenders are required by the customer, assemble these before erecting and mounting the Integrated Bay. Refer to Section 9 of Lucent 065-215-250 *Installation Guide for 500/800 Type Bay Frame* “Frame Extender Assembly” for mounting information.

Do not remove any of the shelves or hardware parts from the Integrated Bay. These parts are interconnected and require precise alignment.

Follow the steps outlined that follow to erect and mount an Integrated Bay while observing all cautions.

- 
- 1 Lift the Integrated Bay and place it into the proper location.

---

  - 2 Visually inspect the bay and shelves for any physical damage.

---

  - 3 Verify the bay is level and aligned with adjacent bays. If necessary, use floor mounting shims to achieve suitable level or alignment. (Refer to Section 5 of Lucent 065-215-250 *Installation Guide* for shim part numbers.) The distance between adjacent bays is typically 1/8".

---

  - 4 Trial fit three 2" x 1 3/4" junction plates (top, middle and bottom) between the wide flange of the frame and frame of adjacent bays. Use the provided four 12-24 x 1/4 screws. Do not fully tighten the screws. When the junction plates can be assembled onto an adjacent bay and the equipment is level, the bay is ready to be assembled to the floor.

---

  - 5 Assemble the bay to the floor using the mounting hardware specified on the customer order.

---

  - 6 After hold down plates, studs, washers and nuts have been placed in position, tighten the nuts to a torque of 25 ft.-lbs.  
**Requirement:** Nuts to be tightened to a torque of 25 ft.-lbs.

---

  - 7 Tighten the screws connecting the three junction plates between the Integrated Bay and any adjacent bay frame.

END OF STEPS

---

## Connect the Integrated Bay Frame to Building Ground

The following section provides the procedures necessary to connect the Integrated Bay frame to building or office safety ground so as to:

- Provide a direct earth ground connection for fault current and lightning protection.
- Provide a common ground potential for electrostatic discharge (ESD) protection.

### Additional information

All Metropolis<sup>®</sup> EON Integrated Bay frames are shipped with a ground cable assembly. The ground cable should be connected between the bay frame ground connection point and a suitable building safety ground connection point immediately after the bay frame has been mounted to the floor. Refer to document *065-215-250 (500/800) Series - Installation Guide for 500/800 Type Bay Frame (Seismic)*, available from CIC, for further information.

Follow the steps listed below to connect the Integrated Bay frame to building safety ground

- 
- 1 Identify the building safety ground to which the Integrated Bay frame ground cable will be connected. Refer to customer engineer's instructions and local Site Surveys, if available.
- 
- 2 Verify that the safety ground to which the Integrated Bay will attach is in compliance with one of the following:
    - Lucent Grounding Practices/Guidelines
    - Generally recognized safety ground practice standards
    - Customer-specific Grounding System Practices
- 
- 3 If not already attached, connect the ground cable lug to the bay frame at the unpainted area in the upper left front corner on the frame with two (2) #12-24 x 1/4 thread-rolling screws.

**Important!** The building ground cable associated with raised floor installations may be below the floor. It is permissible to attach a ground wire nearer the base of the frame if the contact area has been cleaned down to bare metal.

- 
- 4** Connect the Integrated Bay ground cable to the building ground cable using a crimped Thomas & Betts 54720 C-tap lug. The recommended crimping tool is a Thomas & Betts TBM5S with die code “brown.”

END OF STEPS

---

### **Install Associated Bay Frame Assembly Parts**

This section covers the installation of any associated bay frame parts that were removed during uncrating or are called out in the customer order.

#### **Assembly Instructions**

Reinstall the any assembly parts removed during uncrating and preparation for moving the bay frames.

Refer to the customer order for any additional bay frame assembly parts such as end guards, kick plates, shields or AC raceways on the Lucent Seismic Frame. Assemble these parts using the instructions in Lucent Document 065-215-250.

Refer to the customer engineer’s instructions for any additional assembly parts associated with ETSI frames.



# Miscellaneously-Mounted Shelf Installation

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**Introduction** Miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) or OT Shelves are designed to mount into customer-provided bay frames. It is assumed that the bay frames have been installed properly, are grounded and meet earthquake zone requirements.

**Bay Frame Requirements** The bay frames for mounting the miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) or OT Shelves must meet the following requirements:.

Frame Type	Frame Feature	Dimension
Seismic (NAR)	Side to Side Horizontal Opening	21.5 inches
	Hole to Hole Horizontal Spacing	22.312 in
	Vertical Mounting Hole Spacing	1.0 inch
ETSI	Side to Side Horizontal Opening	500 mm
	Hole to Hole Horizontal Spacing	515 mm
	Vertical Mounting Hole Spacing	12.5/25 mm

**Vertical Space Requirements** When installing miscellaneously-mounted shelves in a bay frame, the following mounting requirements must followed:

- Miscellaneously-mounted Metropolis<sup>®</sup> EON shelves are shipped with a Fan Unit and a 2-inch Baffle, which are required for proper cooling of the equipment. The Fan Unit should be mounted directly below each shelf. The 2-inch Baffle should be mounted directly above each shelf.
- Either another 2-inch Baffle or an open space of three (3) inches is required for air intake below the Fan Unit under the lower-most miscellaneously- mounted EON (OLS) or OT Shelf in a bay frame.
- If a Metropolis<sup>®</sup> EON (OLS) Shelf will be mounted in a bay with an OT System Controller Shelf and an OT Complementary Shelf, then the OT Complementary Shelf should be mounted at the bottom, the OT System Controller shelf in the middle, and the Metropolis<sup>®</sup> Metropolis<sup>®</sup> EON (OLS) shelf at the top, as in the Integrated Bay configuration. (A 2-inch Baffle is not used at the base or the top of an Integrated Bay configuration.)

The minimum vertical space required for the Metropolis® EON (OLS) or OT miscellaneous-mounted shelves is as follows:

<b>Metropolis® EON Shelf Type</b>	<b>Ordering Code</b>	<b>Min Vertical Space Required</b>
EON (OLS) - J68982C-1, L12	848818803	33.375 inches (plus 3 inch clearance)
OT System Controller J69000C-1, L15	848818811	22.75 inches (plus 3-inch clearance)
OT Complementary 1 J69000C-1, L16	848818787	22.75 inches (plus 3-inch clearance)
OT Complementary 2 J69000C-1, L16	848818795	22.75 inches (plus 3-inch clearance)
DCM Shelf Assembly	848848958	5 inches

**Important!** When a Metropolis® EON shelf is mounted directly above another Metropolis® EON shelf, then the 3-inch clearance otherwise required below the upper shelf is not necessary. The 2-inch Baffle between the shelves functions as an air exhaust for the lower shelf and as an air intake for the upper shelf.

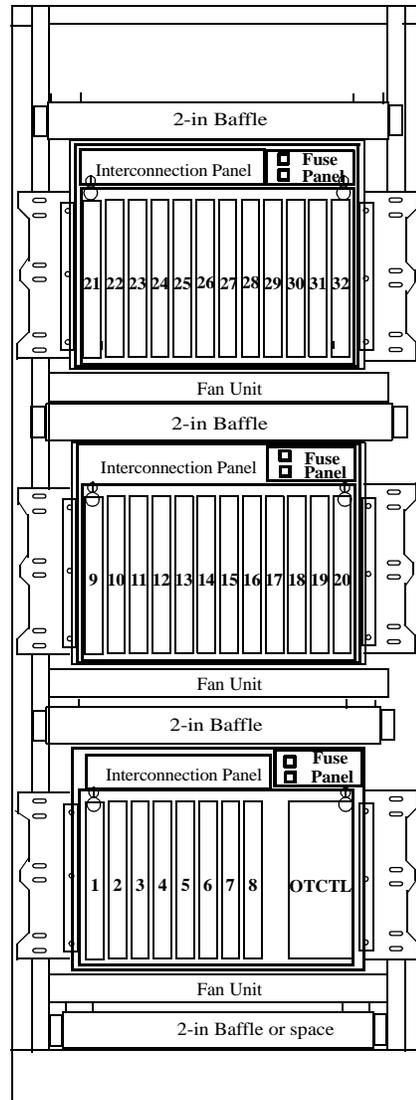
### **OT Shelf Product Notification**

The OT Shelves (System Controller, Complementary 1 and Complementary 2) may have a problem with the lower screw that fastens the left-hand mounting bracket to the shelf assembly. There are 3 screws that fasten each side mounting bracket to the OT Shelf. The upper 2 screws also attach a plastic clip to the shelf. The clip acts as a washer/spacer that reduces the distance that the upper 2 screws protrude into the shelf. The lower screw does not have a plastic clip and it protrudes into the shelf and may interfere slightly with circuit packs as they are installed into the far left-hand slot position. This may only be a problem with 41S, 41T and 41U Quad-carrier units. Both the screw and the exposed left-hand surfaces of circuit packs are at frame ground.

Inspect the inside of OT Shelves to determine if the lower screw on the left-hand side protrudes into the shelf. The lower screw may be replaced with a shorter M5-8mm screw (843988940) or a washer may also be applied to eliminate the protrusion into the shelf.

Figure 2-2 shows three miscellaneously-mounted OT Shelves in a Lucent Technologies 800-Type bay frame.

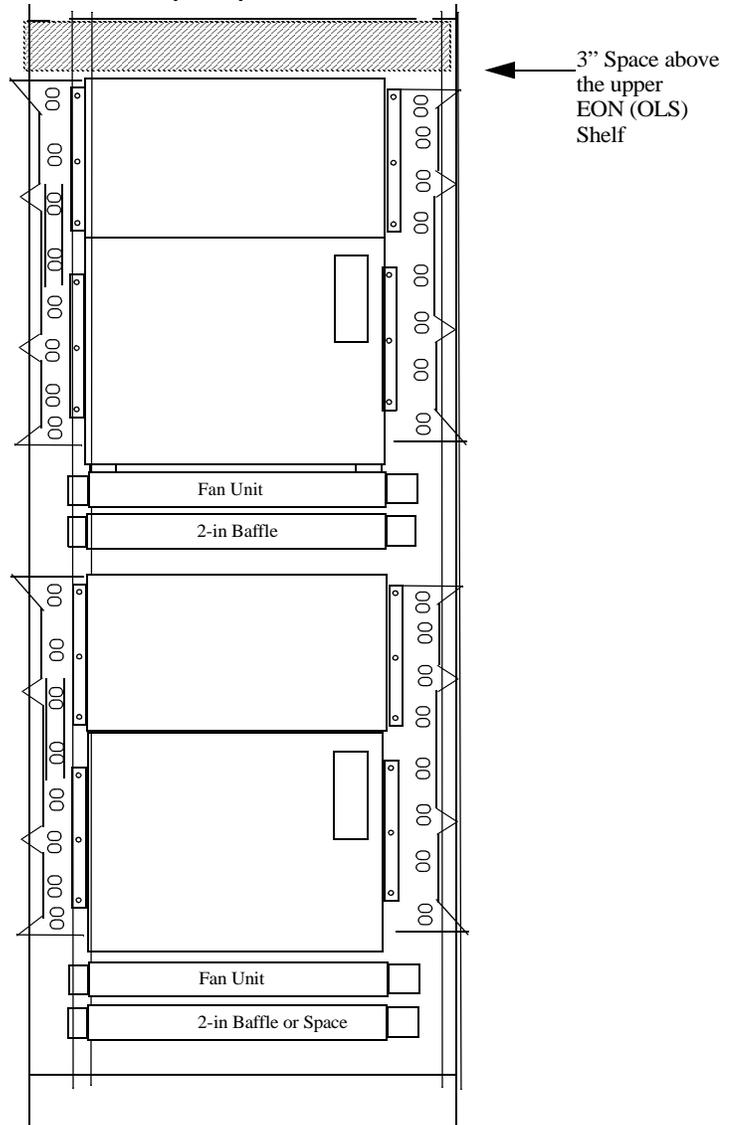
**Figure 2-2 Miscellaneously-Mounted OT Shelves**



**Important!** A minimum of a 3-inch open space or a Baffle should be provided below each miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) or OT Shelf.

Figure 2-3 shows two Miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) Shelves in a Lucent Technologies 800-Type bay frame.

**Figure 2-3 Two Miscellaneously-Mounted Metropolis<sup>®</sup> EON(OLS) Shelves**



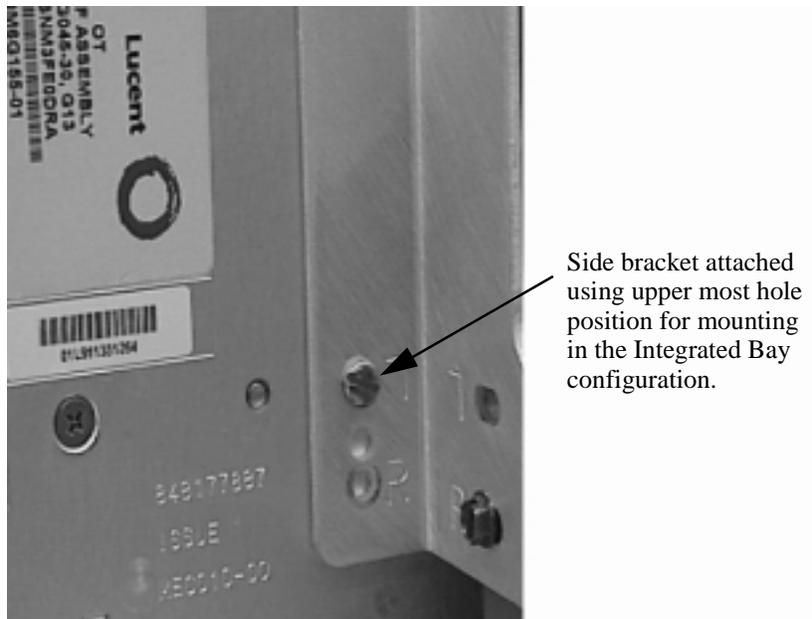
**Important!** A 3-inch open space may be used at the top of a bay frame instead of a 2-inch Baffle above the upper EON (OLS) Shelf.

**Adjustment of Side Mounting Brackets**

The side mounting brackets on the Metropolis® EON (OLS) and OT Shelves, are factory installed for mounting to the narrow mounting flange of a Lucent Technologies 800-Type bay frame. These side brackets are identified by the letters L and R stamped on them.

For a 3-shelf configuration similar to the Integrated Bay, the side mounting brackets on the OT System Controller Shelf must be moved down on the shelf to adjust the shelf mounting position in the bay frame. The bracket-to-shelf mounting screws should be positioned in the upper-most mounting hole in each mounting hole grouping. (Factory mounting position is lower-most hole.)

**Figure 2-4 OT System Controller Shelf Mounting Bracket.**



**Important!** Verify that the lower screw on the left-hand side does not protrude into the shelf. See the OT Shelf Product Notification information on page 2-15.

For mounting shelves to the Lucent Technologies 801-Type frame using the wide mounting flange, the side brackets need to be moved forward to another set of mounting holes on all the shelves.

For other bay frame types, the side brackets should be positioned to provide the best overall results or removed entirely and the shelf mounted using the front flanges.

If the mounting bracket needs to be moved forward on the side of the shelf, follow the procedures below:

.....  
**1** Remove the three (3) screws holding the side bracket.

.....  
**2** Slide the bracket one inch forward towards the front of the shelf.

.....  
**3** Align the bracket holes with the new set of mounting holes on the chassis side.

**Result:** The bracket should now be parallel with its previous position, offset by one inch.

.....  
**4** Install and tighten the bracket mounting screws.

.....  
**5** Perform the same operation with the mounting bracket on the other side of the shelf.

.....  
E N D O F S T E P S  
.....

**Mounting Shelf to Bay Frame**

Follow the steps listed below to install a miscellaneously-mounted Metropolis® EON (OLS) or OT Shelf in a bay frame. A Fan Unit should be installed directly below the shelf, and a 2-inch Baffle should be installed directly above the shelf.

---

- 1** Identify the customer-designated mounting positions in the bay frame for the EON (OLS) or OT Shelf and the associated Fan Unit and Baffle.

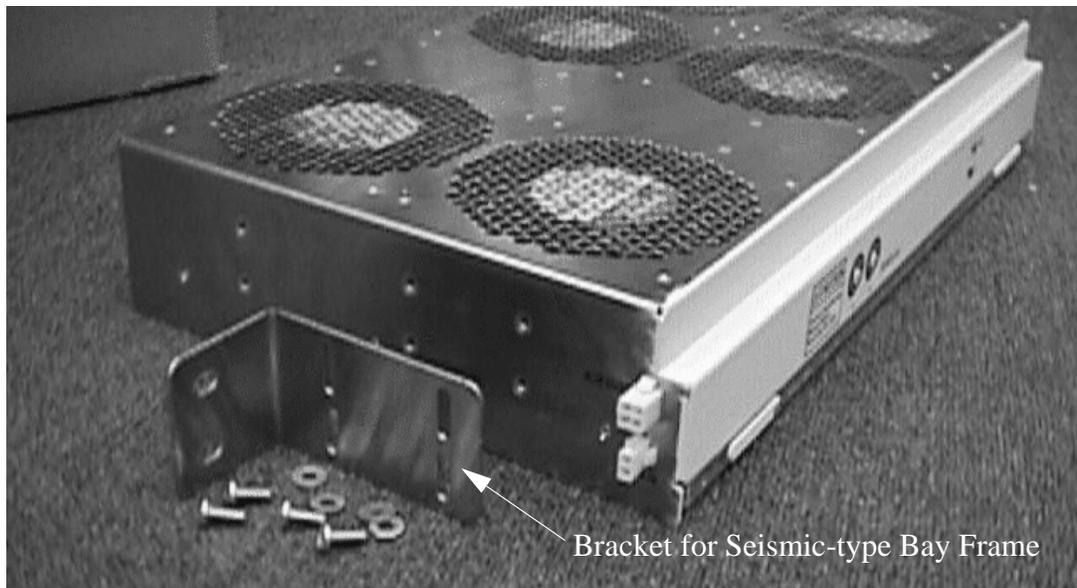
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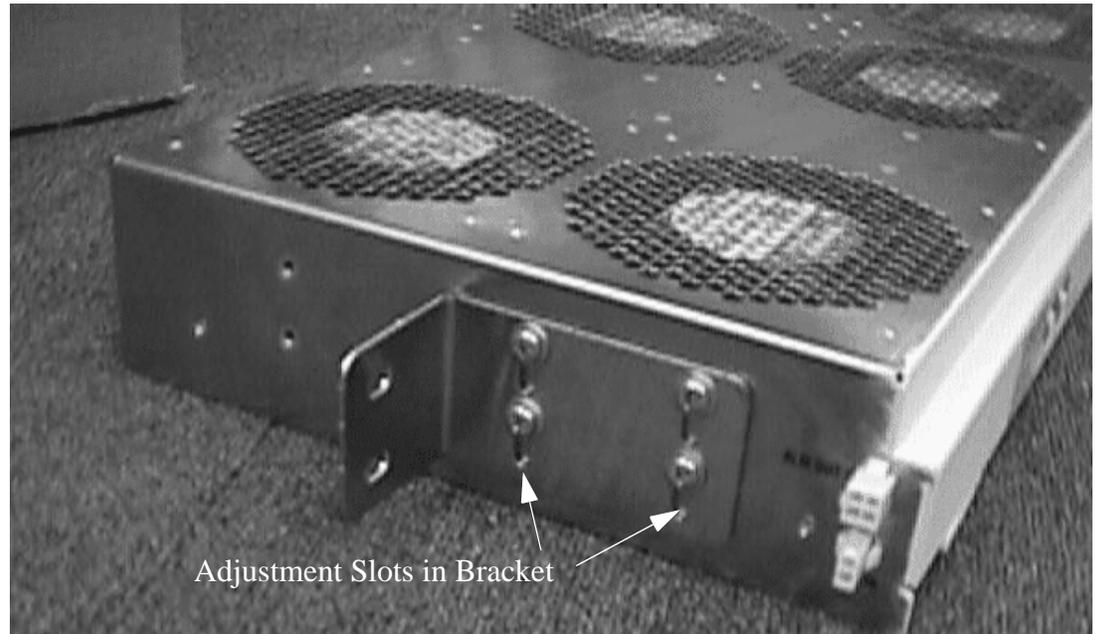
- 2** Verify that a three (3) inch or greater open space is available below the Fan Unit directly under the shelf, or that the Fan Unit is to be installed immediately above a 2-inch Baffle.

---

- 3** Locate the Fan Unit (408630705) package provided in the Installation Kit. There is a Fan Unit associated with each EON (OLS) and OT shelf. Identify the set of brackets for use with the Seismic-type bay frame. (The other set of longer brackets is for use with ETSI frames.) Assemble the brackets to the left and right side of each Fan Unit using the pan head screws and flat washers supplied with the Fan Unit package. Install the Air Filter into the base of the Fan Unit with air flow arrow facing in the up direction.

**Figure 2-5 Fan Unit with Mounting Bracket and Hardware**



**Figure 2-6 Fan Unit with Bracket Assembled**

**Important!** Fan Unit mounting bracket position may need to be adjusted for proper vertical spacing in bay frame.

---

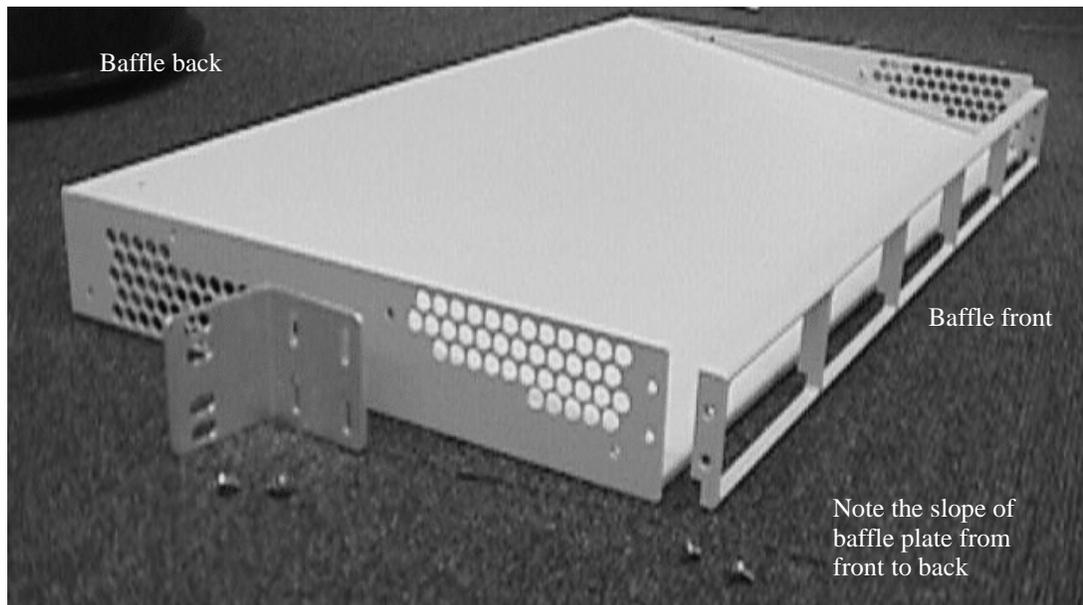
**4** Locate the Baffle piece parts for assembly. The Baffle piece parts include:

- 848820361 Baffle
- 848819280 Baffle Bracket (2)
- 901293068 Screws for bracket (4)
- 848824942 Baffle Front
- 901339978 Screws for Baffle Front (4)

(Extra bracket pair is for ETSI applications.)

Assemble the Baffle parts by attaching the Baffle Front and Baffle Brackets to the Baffle using the screws provided in the Installation Kit.

The Baffle is designed to allow air to enter at the front for the Fan Unit mounted above the Baffle - and/or - to allow air to exit at the rear from the shelf mounted below the Baffle. Note the slope of the Baffle from front to back.

**Figure 2-7 Baffle Assembly Details**

- 5 Review the customer engineer's placement information for the EON (OLS) and OT Shelves.

Beginning with the EON (OLS) or OT Shelf to be mounted in the lowest bay frame position, install a Fan Unit into the bay frame using 4 new thread-rolling screws (901211177) provided in the Installation Kit for Seismic-type bay frames. The vertical position of the Fan Unit may need to be adjusted to allow the EON (OLS) or OT Shelf to fit closely above the Fan Unit. Refer to the customer engineer's instructions for mounting position details.

**Important!** A minimum 3-inch clearance should be left below this Fan Unit to allow for air to be drawn into the fans. A 2-inch Baffle may be specified in place of the open space. The lowest Fan Unit position would use the 3rd and 4th mounting holes at the base of the Seismic-type bay frame.

- 6 Mount the EON (OLS) or OT Shelf to the bay frame directly above the Fan Unit using three (3) thread-rolling screws through the brackets on each side. The Lucent 800 and 801-Type Seismic Bay frames use 12-24 x 3/8-inch thread-rolling screws (901211177) for mounting. If using a different bay frame, check mounting hardware requirements for that particular bay frame.

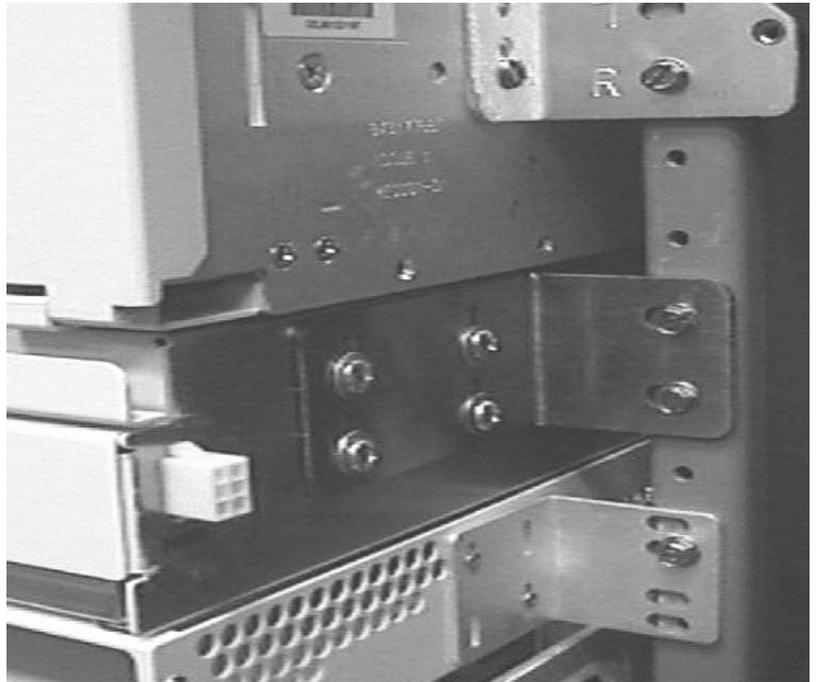
- 
- 7 Adjust the position of the Fan Unit to be butted tightly up against the bottom of the EON (OLS) to OT Shelf to minimize forced-air leakage. (The Fan Unit brackets are slotted to allow vertical adjustment.)

**Important!** The OT Shelf Fiber Management Channel will overlap the front top edge of the Fan Unit.

**Figure 2-8 OT Shelf Mounted above Fan Unit**

**Fiber Management Channel overlapping the Fan Unit below**

**2-inch Baffle shown below the Fan Unit**



- 
- 8 A separate ground cable is provided on the right side of each shelf for grounding directly to the building safety ground system. If designated on the customer work order, connect the ground cable to the building safety ground system or directly to the grounded bay frame.

- 
- 9 Mount the assembled 2-in Baffle onto the bay frame centered directly above the EON (OLS) or OT Shelf using thread-rolling screws.

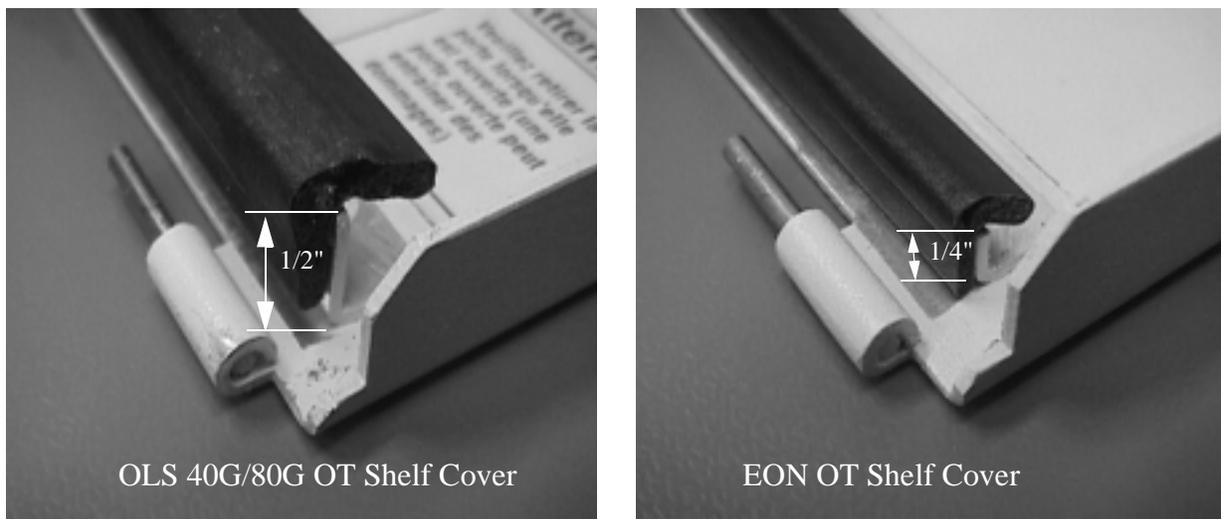
**Important!** Install Baffle Assembly with the plane of the Baffle sloping up from front to back as shown in Figure 2-7.

**Note:** The customer engineer may specify that the Baffle should be mounted directly below the Fan Unit if there is sufficient open space above the EON (OLS) or OT Shelf.

- 
- 10** Trial fit a cover (door) on the EON (OLS) or OT Shelf below to insure that the Baffle does not interfere with closing the cover. Adjust the Baffle mounting bracket positions, if necessary, to fit above the EON (OLS) or OT Shelf.

**Important!** The new Metropolis<sup>®</sup> EON OT Shelf covers have a shorter gasketed lip along the base of the cover than existing OLS 40G/80G covers. Do not mix these covers at locations where both Metropolis<sup>®</sup> EON and OLS 40G/80G equipment is installed. The longer lip of the existing OLS 40G/80G covers will interfere with optical fibers positioned in the fiber management guides on the Metropolis<sup>®</sup> EON shelves. Refer to Figure 2-9 for visual comparison.

**Figure 2-9 OT Shelf Cover Comparison**



- 
- 11** Repeat Steps 1 through 9 for each miscellaneous-mounted EON (OLS) or OT Shelf.

END OF STEPS

---

**ETSI Frame Mounting Information**

The following procedure is for mounting Metropolis® EON (OLS) and OT Shelves in an **ETSI 600mm Frame**:

- 1 Remove the ground cable and the large side mounting brackets from each shelf.
- 2 Remove the shielding plate from the side of each side by removing the three screws holding the plate.
- 3 Mount shelf to ETSI frame using three screws through the front mounting bracket on each side of the shelf.
- 4 The Fan Unit and Baffle assembly kits each contain a set of brackets for use with ETSI frames. Assemble these brackets onto the Fan Unit and Baffle for the forward mounting position used on ETSI frame.
- 5 Mount a Fan Unit into the customer-designated position using two mounting screws on each side.
- 6 Mount the Metropolis® EON (OLS) or OT Shelf into the ETSI frame directly above the Fan Unit. Adjust the position of the Fan Unit to be butted tightly up against the bottom of the EON (OLS) to OT Shelf to minimize forced-air leakage. (The ETSI Fan Unit brackets are slotted at the frame mounting position to allow vertical adjustment.)  
  
**Important!** The OT Shelf Fiber Management Channel will overlap the front top edge of the Fan Unit.
- 7 Mount the assembled 2-in Baffle onto the bay frame directly above the EON (OLS) or OT Shelf.  
  
**Important!** The customer engineer may specify that the Baffle should be mounted directly below the Fan Unit if there is sufficient open space above the EON (OLS) or OT Shelf.

# DCM Shelf Installation

---

**Introduction** Dispersion compensation is an optional feature of the Metropolis® EON system when the LEA307 Optical Amplifiers are installed. Dispersion Compensation Modules may be specified to be installed in a miscellaneous-mounted DCM Shelf. (The shelf cover is labeled as DCM Carrier.)

**Mounting Requirements** The 848848958 DCM Shelf Assembly is designed to mount in the same types of bay frames as the miscellaneous-mounted Metropolis® EON shelves. There are mounting brackets both for Lucent Seismic-type bay frames and ETSI-type frames. A minimum vertical space of 5 inches is needed for mounting the DCM Shelf Assembly. The Dispersion Compensation Modules (DCMs) are passive and no electrical power connection is needed for the DCM Shelf Assembly.

**Installing DCM Shelf** The following is the procedure for installing the DCM Shelf Assembly.

---

- 1** Identify the side brackets to be used with the Seismic-type or ETSI-type bay frame. Assemble the side brackets onto the DCM Shelf using the pan head screws and flat washers (Seismic) or flat head screws (ETSI) provided with the DCM Shelf Assembly. (Refer to 848848958 drawing sheet 6.)

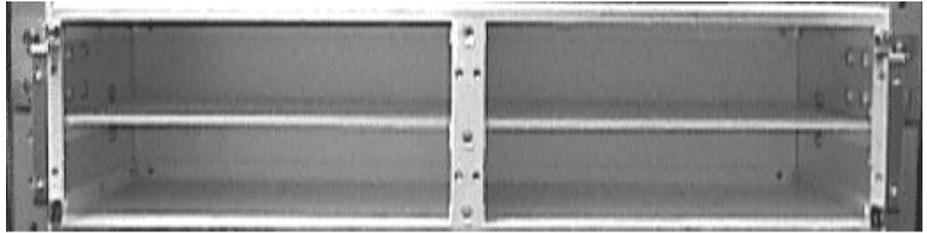
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- 2** Assemble the two cover brackets onto the front of the DCM Shelf using the screws provided with the DCM Shelf Assembly.

---

- 3** Mount the DCM Shelf to the bay frame in the position designated by the customer's engineer. Adjust the mounting position as needed by using the slots in the mounting brackets.

**Figure 2-10 DCM Shelf in Seismic-type Bay Frame**



DCM Shelf without Cover

Side Bracket for  
Seismic-type  
bay frame

Cover Bracket  
on front of Shelf



- 
- 4** Assemble the Cover onto the DCM Shelf using four M3 x 0.5 x 6mm screws provided with the DCM Shelf Assembly.

END OF STEPS

---

## Final Verification

---

### Equipment Installation Checklist

Verify the following actions have been completed to ensure that the Metropolis® EON equipment has been properly installed:

Check when done	Item to check
	Bay frame properly installed (refer to Metropolis® EON Equipment Information: page 2-3)
	Bay frame connected to ground (refer to Connect the Integrated Bay Frame to Building Ground: page 2-12)
	Miscellaneously-mounted shelves installed in bay frame (refer to Mounting Shelf to Bay Frame: page 2-20)
	Fan Unit(s) installed in bay frame (refer to Mounting Shelf to Bay Frame: page 2-20)
	Baffle(s) installed in bay frame (refer to Mounting Shelf to Bay Frame: page 2-20)
	If specified for this location, DCM Shelf Assembly installed in bay frame as assigned by customer engineer.





# 3 Power Cable Installation and Powering

## Overview

---

<b>Purpose</b>	This section provides the general requirements and methods for installing, connecting and checking the power cables for Metropolis <sup>®</sup> EON Integrated Bays and miscellaneous-mounted EON (OLS) and OT Shelves.
<b>Reason for revision</b>	This is Issue 3 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications.
<b>Objectives</b>	This chapter provides the installer with the necessary information and procedures for installing and connecting power cables.
<b>Installation Recommendations</b>	<p>The following items should be verified at the site to support the Metropolis<sup>®</sup> EON power cable installation:</p> <ul style="list-style-type: none"><li>• The Integrated Bay or customer-provided bay frame has been installed properly.</li><li>• The Integrated Bay or customer-provided bay frame has been properly connected to the building ground.</li><li>• The procedures in Chapter 2, <i>Equipment Installation</i>, have been completed and the final verification checklist completed.</li><li>• The assigned circuit breakers off or fuses out at the BDFB (locked-out and tagged-out)</li><li>• Circuit packs have not as yet been installed in the shelves.</li><li>• AC power is available for use by installer.</li></ul>

**General Considerations**

Voltage references in this chapter assume that the Metropolis<sup>®</sup> EON system is to be connected to a customer's -48V power plant.

The recommended installation tools and test equipment are listed in Appendix G.

A wrist strap connected to a wrist strap ground jack on the terminal must be worn for ESD protection during the installation process.

Connectors on the interconnect panel come equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.

**DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Also avoid direct exposure to the beam.*

Keep the following information under consideration during cable installation:

- This cable information is the latest cable information available at the time of the issue. For up-to-date information, refer to the SD-6G157-01 and T-6G157-33.
- For ordering information, refer to *Metropolis<sup>®</sup> EON, Applications and Planning Guide (365-575-558 R8.2)*.
- Do not remove the shelf backplane cover during the installation process.

**Contents**

This chapter contains the following:

Integrated Bay	<a href="#">3-3</a>
Miscellaneous Mounted Shelves	<a href="#">3-5</a>
Safety Ground and Voltage Checks	<a href="#">3-9</a>
Final Verification	<a href="#">3-14</a>



# Integrated Bay

---

**Introduction** The Integrated Bay is powered by nominal –48 volt direct current sources. Since redundant power is used to ensure maximum availability of the equipment, two power feeds are required for each terminal. (The insulation on power feed A is RED and on power feed B is BLUE.)

**Power Requirements** The power requirements for Metropolis® EON Integrated Bay are:

- Two power feeds (A and B) are required for powering the bay.
- Each independent power feed must supply –48 volts direct current and a return.
- The recommended protected capacity of each power feed at the battery distribution fuse board (BDFB) or equivalent circuit breaker distribution panel should be 50 amperes minimum.

**Integrated Bay Power Cable Installation** The Metropolis® EON Integrated Bay is provided with a power cable assembly incorporating both the A and B power feeds. These power feeds are to be connected to the customer-provided power feed cables to the BDFB or equivalent circuit breaker distribution panel.

- 
- 1** Identify the fuse or circuit breaker positions assigned at the customer's power distribution panel to A and B power feeds for the Integrated Bay. Remove the fuses or operate the circuit breakers to the off position. Lock-out and tag-out the fuse or circuit breaker positions.

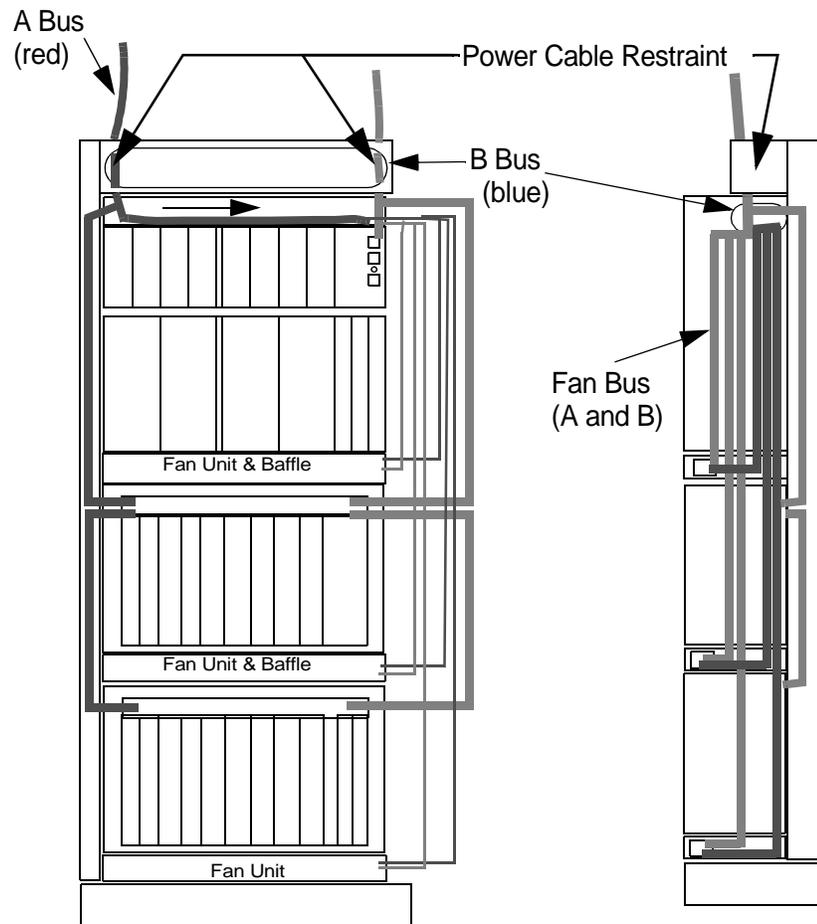
**Important!** The customer may not permit Lucent personnel to work at their BDFB or equivalent power distribution panel.

- 
- 2** Identify the A and B power feed cables provided from the power distribution panel to the location of the Integrated Bay. These should be labeled -48A, -48ARTN, -48B, and -48BRTN.

- 
- 3** If the customer provided power feed cables are being carried in an overhead cable rack, route the A and B power cable stubs out through the top of the bay frame. If the customer provided power feed cables are being run under a raised floor, route the A and B power cable stubs out through the base of the bay frame.

- 
- 4 Verify that the bay power cables are routed and connected to the EON (OLS) and OT Shelves and Fan Units as shown in Figure 3-1. If the power cables are not yet connected to their respective connectors within the bay, connect them now.

**Figure 3-1 Integrated Bay Power Cable Routing**



- 
- 5 Splice the customer provided A and B power feed cables from the BDFB to the Integrated Bay power cables. The red and blue power leads connect to  $-48V$ . The white power leads connect to the power feed return.

END OF STEPS



# Miscellaneously-Mounted Shelves

---

**Introduction** Miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) and OT Shelves are powered by nominal –48 volt direct current sources. Since redundant power is used to ensure maximum availability of the equipment, two power feeds are required for each terminal. (The insulation on power feed A is RED and on power feed B is BLUE.)

**Power Requirements** The power requirements for Miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) and OT Shelves are:

- Two power feeds (A and B) are required for powering each shelf.
- Each independent power feed must supply –48 volts direct current and a return.
- The recommended protected capacity of each power feed at the battery distribution fuse board (BDFB) or equivalent circuit breaker distribution panel should be 15A minimum for each EON (OLS) Shelf and 25A minimum for each OT Shelf.

**Power Cable Installation** Miscellaneously-mounted Metropolis<sup>®</sup> EON (OLS) and OT Shelves are each provided with a power cable assembly incorporating both the A and B power feeds. These power feeds are to be assembled into the shelf and connected to the customer-provided power feed cables.

- 
- 1 Identify the fuse or circuit breaker positions assigned at the customer's power distribution panel to A and B power feeds for the miscellaneously-mounted shelf. Remove the fuses or operate the circuit breakers to the off position. Lock-out and tag-out the fuse or circuit breaker positions.

**Important!** The customer may not permit Lucent personnel to work at their BDFB or equivalent power distribution panel.

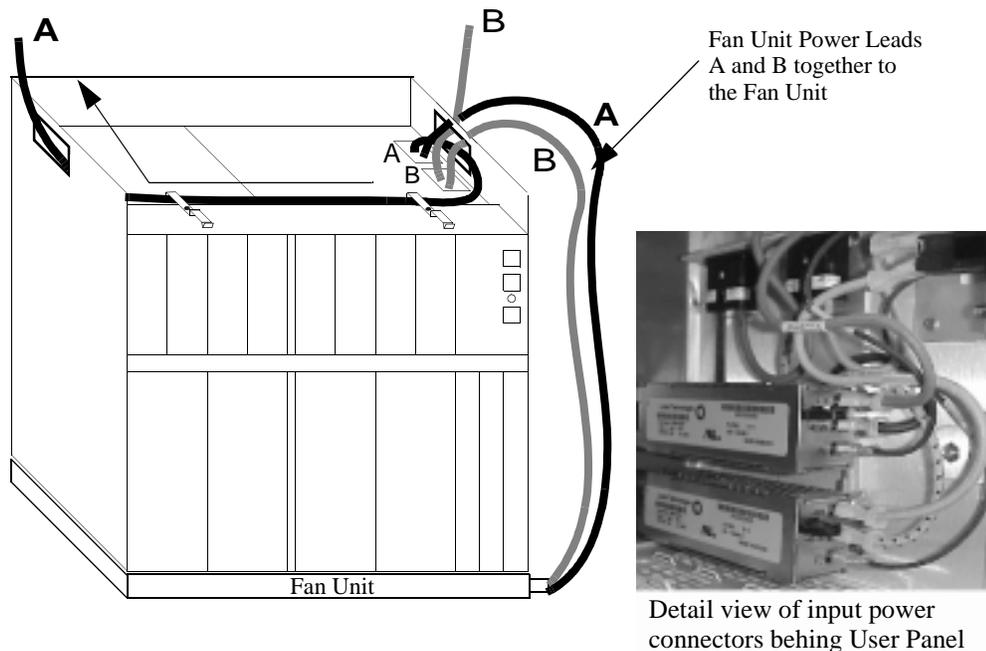
- 
- 2 Identify the A and B power feed cables provided from the power distribution panel to the location of the miscellaneously-mounted shelf. These should be labeled -48A, -48ARTN, -48B, and -48BRTN.

- 
- 3 If the power cable assembly has already been installed in the shelf, proceed to step 5. Otherwise, locate the power cable assembly for each miscellaneous-mounted shelf:
- 848824561 for the EON (OLS) Shelf
  - 848824553 for each OT Shelf
- 

- 4 For EON (OLS) Shelf: Install the power cable assembly into the shelf by routing the red cable end into the right-side opening at the top of the shelf and out through the left-side opening. (See Figure 3-2.)

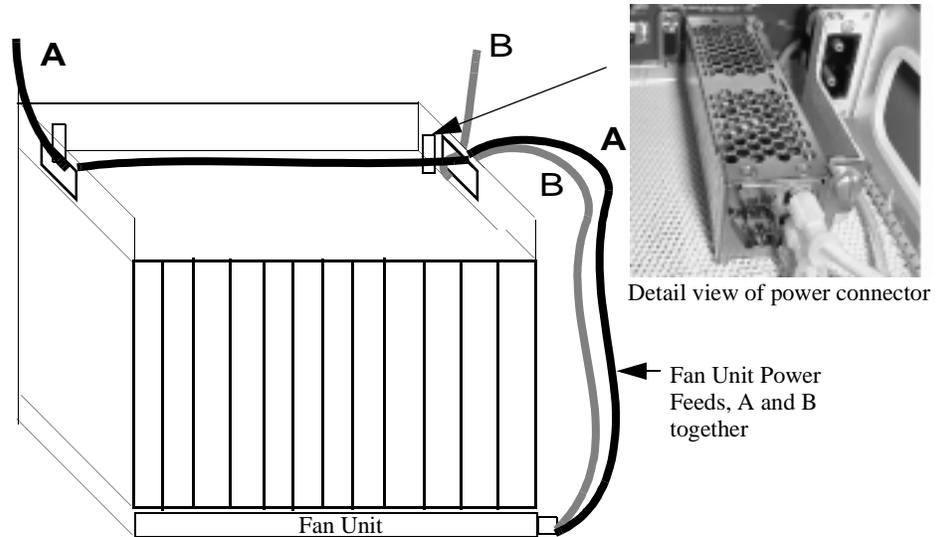
Remove the shelf User Panel and the small piece of Fire/EMC Shield on the right side of the Interconnection Panel. Connect the A and B feed power connectors into each of the A and B-feed connectors on the OLS Shelf (behind the User Panel). The power cables are mechanically keyed to prevent incorrect insertion. Fully seat the cable end until it is locked into the connector. Replace the Fire/EMC Shield with the power cables dressed through the slots in the screen; and re-install the User Panel.

**Figure 3-2 Metropolis® EON (OLS) Power Cable Routing (Frame Not Shown).**



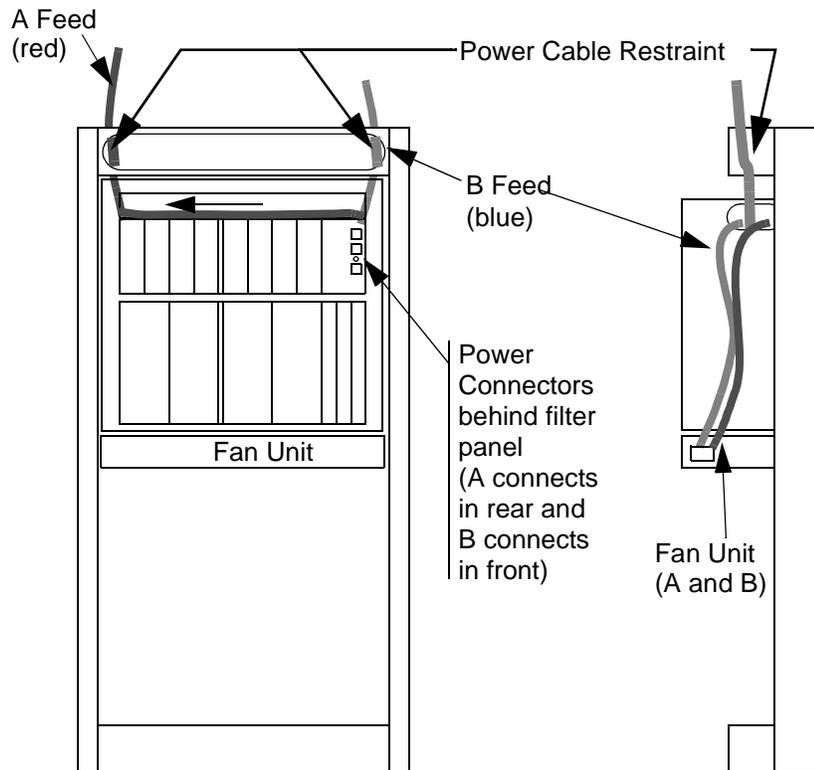
For each OT Shelf (System Controller or Complementary): Install the power cable assembly into the shelf by routing the red cable end into the right-side opening at the top of the shelf and out through the left-side opening. Connect the A and B-feed power connectors into the A and B input power connectors on the left and right sides of the OT Shelf. The power cables are mechanically keyed to prevent incorrect insertion. Fully seat the cable end until it is locked into the connector.

**Figure 3-3 OT Shelf Power Cable Routing (Frame not Shown)**



- 
- 5 Route the Fan Unit power cables, which extend from the A and B power feed cable connectors, down the right side of each shelf and connect to the PWR connector on the Fan Unit mounted directly below the miscellaneously-mounted shelf.
- 
- 6 If the customer-provided power feed cables are being fed by an overhead cable rack, route the A and B-feed power cable stubs out of the shelf and up along the bay frame to the top. If the customer-provided power feed connections are being fed from under a raised floor, route the A and B-feed power cable stubs out of the shelf along the bay frame to the base.

**Figure 3-4 Metropolis® EON (OLS) Miscellaneous Shelf Power Cable Routing .**



- 
- 7** Dress any excess power feed cable into the bay frame channel on left or right side and tie to frame. Secure the power feed cables and Fan Unit power leads to the bay frame
- 
- 8** Splice the customer provided power feeds from the BDFB to the miscellaneous-mounted shelf power cables. The red and blue power leads connect to  $-48V$ . The white power leads connect to the power feed return.

END OF STEPS



# Safety Ground and Voltage Checks

---

**Introduction** The power feed connections are validated by checking the safety ground path resistance and the voltage supplied to each shelf.

**Safety Ground Check** The safety ground path connection is verified by checking the resistance in the circuit path from the shelf framework back through the building safety ground and to the power feed return connection. Building ground should be connected to the power feed return path at the battery plant (or equivalent). An analog-type Ohmmeter (not a digital multi-meter!) must be used for an accurate resistance measurement in the presence of voltage noise on the power feed return path.

**Important!** Complete Steps 1 through 14 for **each** Metropolis<sup>®</sup> EON (OLS) and OT Shelf at this location

---

- 1 Verify that the power feeds are off and locked-out at the BDFB.

---

- 2 Remove and save the fuses from both fuse holders on each shelf.
  - a. Open the fuse holder retainer by lifting up on the bottom edge of the retainer.
  - b. Press lightly down on the top edge of the fuse cap.
  - c. The fuse cap will pop out with the fuse.

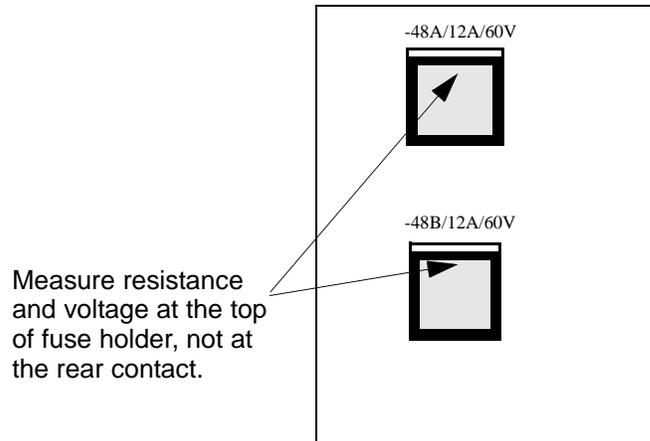
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- 3 Using an analog Ohmmeter, measure the resistance from the top terminal inside each fuse holder to frame ground. (The ESD jack should be at frame ground.) For Metropolis<sup>®</sup> EON (OLS) Shelf, see Figure 3-5 and for OT Shelves, see Figure 3-6.

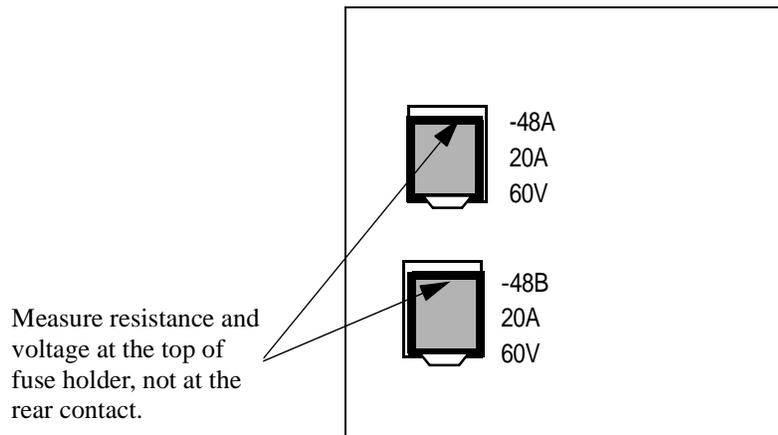
**Requirement:** The resistance measurement should be an open circuit (more than a megaohm reading) for each fuse holder. If the resistance measurement requirement is not met then check the polarity of the power feed cables or for short circuit to ground.

**Important!** For an Integrated Bay, perform the steps for the Metropolis<sup>®</sup> EON (OLS) Shelf and for both OT Shelves.

**Figure 3-5 Metropolis<sup>®</sup> EON (OLS) User Panel Measurement Point**



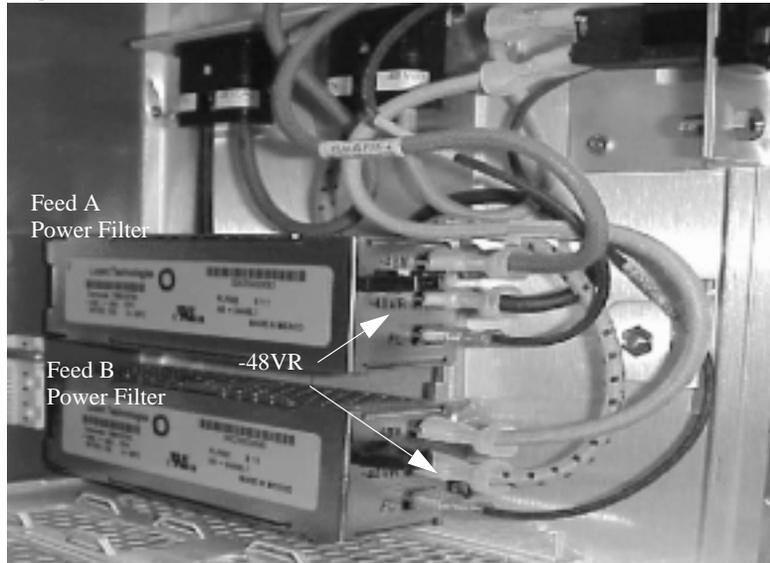
**Figure 3-6 OT Shelf Fuse Panel Measurement Point**



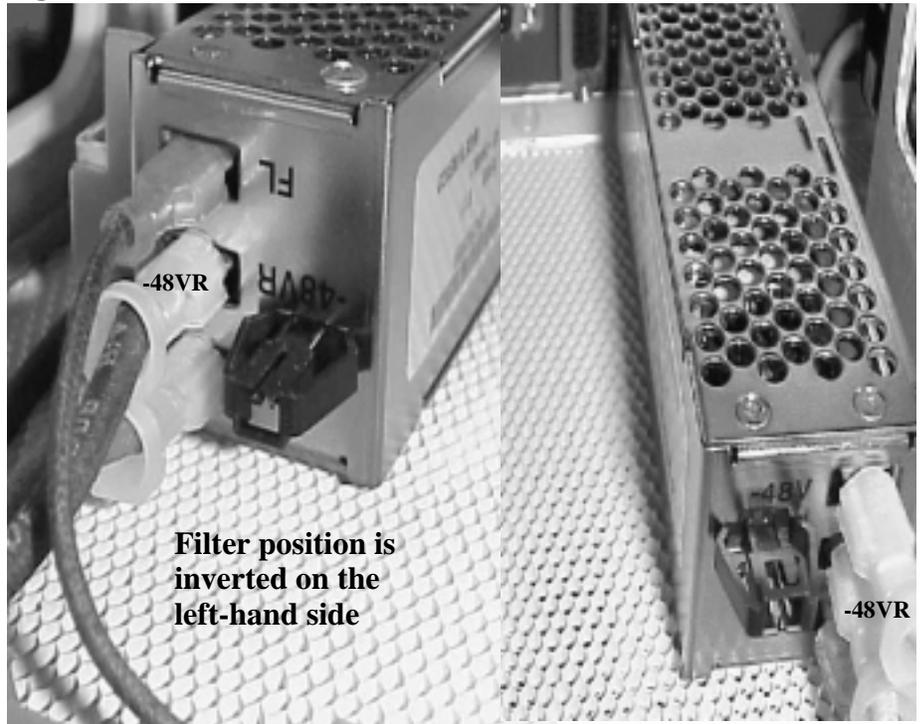
**Important!** Front contact of fuse holder is connected to the -48V power feed and the rear contact is connected to the -48V return.

- 
- 4 Remove any covers that may be in place for access to the input power filters.
    - EON (OLS) Shelf - power filters are located behind the User Panel. Remove the 2 screws and extract User Panel assembly.
    - OT Shelves - power filters are located at the right and left sides of the Interconnection panel.

**Figure 3-7 EON (OLS) Shelf Power Filters**



**Figure 3-8 OT Shelf Power Filters**



**Feed A Power Filter  
(Left-hand Side)**

**Feed B Power Filter  
(Right-hand Side)**

- 
- 5 Remove the spade lug connector from the middle terminal of the input power filter labeled -48VR. Using an **Analog** Ohmmeter, measure the resistance between the inside of the spade lug connector and an unpainted surface of the shelf.

**Requirement:** The resistance measurement through the -48V return path to frame ground shall be less than one (1) ohm. If the requirement is not met then check the bay frame and shelf grounding connections and the power feed -48V return path.

**Important!** Remember that a Digital Multimeter may give an erroneous reading due to voltage noise on the -48V return path.

---

- 6 Repeat the resistance measurement in Step 5 for each input power filter.
- 

- 7 After completing the resistance measurement, restore the spade lug connection at each power filter. Replace the User Panel on the EON (OLS) Shelf.

**Voltage Check** After the Safety Ground check has been completed, the power feed connections will be checked by measuring voltages at the fuse holders.

---

- 8 Remove the lock-out and tag out-devices from the BDFB (or equivalent) and apply power to the Metropolis<sup>®</sup> EON equipment by installing fuse or operating circuit breakers for both the A and B power feeds to the Integrated Bay or for each miscellaneous-mounted shelf.

**Requirement:** The PWR LED on each Fan Unit should be illuminated and each fan in the Fan Unit should be operating.

---

- 9 Use a voltmeter (analog or digital) to measure the voltage between the top terminal of each fuse holder and a frame ground point on each shelf. (Refer to Figures 3-5 and 3-6.)

**Requirement:** Voltage measurement for -48V power plant should be between -41.75V and -60.0V. This voltage should also be within 5 volts of the supply voltage at the BDFB (or equivalent). If the requirement is not met then check power feed connections from the BDFB and internal connections at the shelf.

- 
- 10** Replace the fuses previously removed from the fuse holders. (12A fuses for a EON (OLS) Shelf and 20A fuses for each OT Shelf)
- Open the retainer from the bottom edge and swing it up and out of the way.
  - Put the fuse in the fuse cap, and the entire assembly in the fuse position on the bay. Be sure to put the lettering right-side-up.
  - Push up and in gently on the bottom edge of the fuse. The fuse will securely snap into place.
  - Close the retainer over the fuse cap and snap it in place.

**Requirement:** After replacing the fuses the PWR ON LED should be illuminated on each shelf User or Fuse Panel.

**Verify Power Feed Connections**

After the Voltage Check has been completed, verify that the A and B-feed power connections are correct.

---

- 11** Disconnect the B-feed power to the Metropolis<sup>®</sup> EON equipment at the BDFB or equivalent. Remove the B fuse from the User/Fuse Panel at the shelf associated with the power feed. (Remove all the B fuses from the 3 shelves at an Integrated Bay.)

**Requirement:** Verify that the User or Fuse Panel PWR ON LED remains illuminated. If the requirement is not met that check for possible swap of A and B power feed connections.

**Important!** The Fan Units are connected directly to the A and B power feeds and will continue to operate, but at a higher speed with only one voltage feed connected.

---

- 12** Replace the B fuses at the User/Fuse Panels for each shelf and reconnect the B-feed power at the BDFB.
- 

- 13** Repeat Steps 11 and 12 for the A-feed power and A fuses at each shelf.
- 

- 14** Disconnect both A and B power feeds at the BDFB. Lock-out and tag-out the fuse or circuit breaker positions at the BDFB.
-

## Final Verification

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### Power Cable Installation and Powering Checklist

Verify the following items have been performed to ensure that cables are properly installed:

Check when done	Item to Check
	Fuses out or circuit breakers off and positions locked-out and tagged-out at BDFB
	Customer provided power feed cables in place from BDFB to location of Metropolis <sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelf.
	A and B-feed power cables are routed, connected, dressed, and labeled properly.
	A and B-feed power cables spliced to customer provided power feed cables.
	Safety ground and voltage checks completed.





# 4 Wired Cable Installation

## Overview

---

<b>Purpose</b>	This chapter provides the general requirements and methods for installing and connecting the wired cables for Metropolis <sup>®</sup> EON Integrated Bays and for miscellaneous-mounted EON (OLS) and OT Shelves.
<b>Reason for revision</b>	This is Issue 3.0 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications.
<b>Objectives</b>	This chapter provides the installer with the necessary information and procedures for installing and connecting wired cables.
<b>Installation Recommendations</b>	<p>The following items should be verified at the customer's site to support the Metropolis<sup>®</sup> EON power cable installation:</p> <ul style="list-style-type: none"><li>• The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.</li><li>• The procedures in Chapter 2 and Chapter 3 have been completed and the final verification checklists completed.</li><li>• The assigned circuit breakers off or fuses out at the BDFB (locked-out and tagged-out)</li><li>• Circuit packs have not as yet been installed in the shelves.</li><li>• AC power is available for use by installer.</li></ul>

- General Considerations**
- The recommended installation tools and test equipment are listed in Appendix G.
  - A wrist strap connected to a wrist strap ground jack on the terminal must be worn for ESD protection during all installation processes associated with circuit packs.
  - Connectors on the shelf interconnection panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
  - Do not remove the shelf backplane cover.
  - See page 4-41 for shelf Interconnection Panel layout information.
  - The customer-designated engineer shall specify and order all the wired cable assemblies and provide the installer with a cabling list and cable routing information for each installation location.
  - Reference drawings for wired cable information are: SD-6G156-01, SD-6G157-01 and T-6G157-33.
  - The cable information provided in this chapter is the latest information available at the time of issue. To verify current information, refer to the SD and T drawings.
  - When installing cable assemblies, match cable end designation with panel connector designation such that, for example, a P7 cable plug connector is connected to a J7 panel jack connector.

**Contents** This chapter contains the following:

System Integration Cables	<a href="#">4-3</a>
Fan Alarm Cables	<a href="#">4-14</a>
Office Alarm Cable	<a href="#">4-17</a>
IntraOffice LAN Cable	<a href="#">4-20</a>
Serial, Parallel, and X.25 Telemetry Cable Installation	<a href="#">4-22</a>
Line Orderwire, Section Orderwire, and Section User Channel Cables	<a href="#">4-31</a>
(CMC) CIT-DTE Cable Installation	<a href="#">4-37</a>
Interconnection Panel Description	<a href="#">4-41</a>
System Integration Cable Verification	<a href="#">4-45</a>
Final Verification	<a href="#">4-47</a>

# System Integration Cables

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**Description** System integration cables are used to provide a control interface between Metropolis® EON (OLS) and OT Shelves. Each OT Complementary Shelf is connected to an OT System Controller Shelf which in turn is connected to an EON (OLS) Shelf. Except for a Repeater application, all miscellaneous-mounted Metropolis® EON (OLS) shelves need to have system integration cables installed.

The EON (OLS) Shelf, OT System Controller Shelf and OT Complementary Shelf in an Integrated Bay have their system integration cables pre-installed at the factory. Some modifications to these cables will be necessary if additional miscellaneous-mounted shelves are to be connected through the Integrated Bay.

System integration cables are not required for repeater locations where only EON (OLS) Shelves are installed. However, verify that ED7G028-20, G6 Termination Plugs are installed at both P15 and P15 on the EON (OLS) Shelf Interconnection Panel.

## **Cable Assembly Ordering Information**

The customer engineer shall specify and order the system integration cable assemblies required for each installation location. Cable lengths may vary depending on the physical locations of miscellaneous-mounted shelves. Cable design reference information is found in SD-6G156-01 and SD-6G157-01. Detail ordering information is found in *Metropolis® EON, Applications and Planning Guide (365-575-558 R8.2)*.

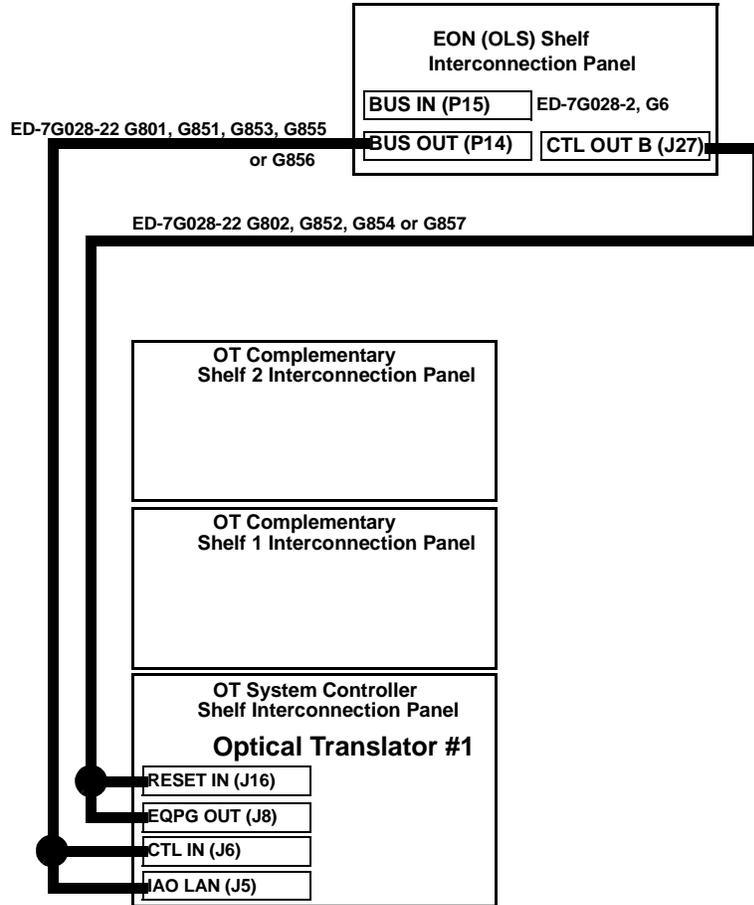
## **System Configurations**

A Metropolis® EON terminal with one EON (OLS) Shelf may be configured with system integration connections to one or to two Optical Translator (OT) systems. Each OT system may consist of an OT System Controller Shelf and optional OT Complementary Shelves 1 and 2. System integration cables are to be specified by the customer engineer for each OT system configuration.

**EON (OLS) with One OT System**

The system integration cables for this configuration include connections between the EON (OLS) Shelf and the OT System Controller Shelf; and between the OT System Controller Shelf and its associated OT Complementary Shelves. Refer to Figure 4-1 and Table 4-1 for the EON (OLS) Shelf to OT System Controller Shelf cables; and to Figures 4-2 & 4-3 and Tables 4-2 & 4-3 for the OT System Controller Shelf to OT Complementary Shelf cables.

**Figure 4-1 EON (OLS) with 1 OT System**



**Important!** The ED7G028-20, G6 Termination Plug remains installed at P15 (BUS IN) on the EON (OLS) Shelf Interconnection Panel.

Remove the ED7G028-20, G6 Termination Plug from P14 (BUS OUT) on the EON (OLS) Shelf Interconnection Panel for connection to the OT system.

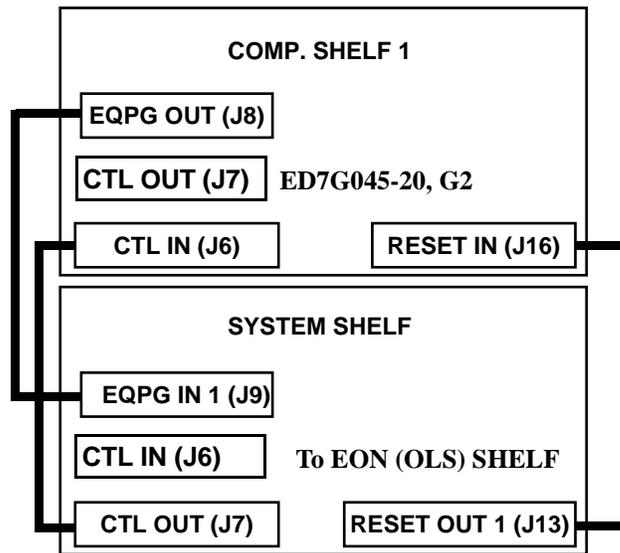
**Table 4-1 System Interconnection Cables for One OT System**

ED7G028-22 Group	Cable Length (ft.)	Connections			
		EON (OLS)		OT Controller	
801	20	P14	BUS OUT	J5	IAO LAN
851	100			J6	CTL IN
853	200				
855	180				
856	50				
802	20	J27	CTL OUT (B)	J8	EQPG OUT
852	100			J16	RESET IN
854	200				
857	50				

**Important!** If the miscellaneous-mounted shelves are to be configured in one bay frame similar to the Integrated Bay layout then the following cable assemblies should be provided:

- 848809497 - EON (OLS) P14 to OT Controller J5 and J6
- 848809331 - EON (OLS) J27 to OT Controller J8 and J16

**Figure 4-2 System Interconnection Cables for OT Complementary Shelf 1**



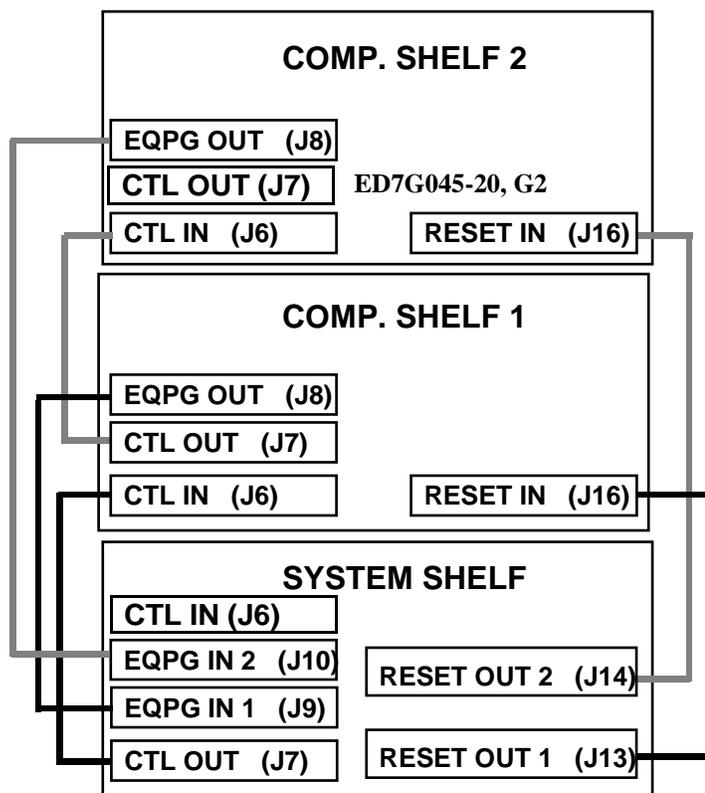
**Important!** The ED-7G045-20, G2 Termination Plug is removed from J6 on the OT System Controller Shelf and installed at J7 on the OT Complementary Shelf 1 Interconnection Panel.

**Table 4-2 Shelf Interconnecting Cables for OT Complementary Shelf 1**

Cable Part No.	Route Cable	Connections	
ED-7G045-20, G6 (length = 5 ft)	Left	System Shelf J7	Compl. Shelf 1 J6
ED-7G045-20, G7 (length = 4 ft 7 in)	Left	System Shelf J9	Compl. Shelf 1 J8
ED-7G045-20, G9 (length = 4 ft 2 in)	Right	System Shelf J13	Compl. Shelf 1 J16

**Important!** The application of these cable assemblies is based on mounting the OT Complementary Shelf 1 directly above or below the OT System Controller Shelf (with a Fan Unit and Baffle in between).

**Figure 4-3 Shelf Interconnecting Cables for OT Complementary Shelf 2**



**Important!** The ED-7G045-20, G2 Termination Plug is moved to J7 on the OT Complementary Shelf 2 Interconnection Panel.

**Table 4-3 Shelf Interconnecting Cables for OT Complementary Shelf 2**

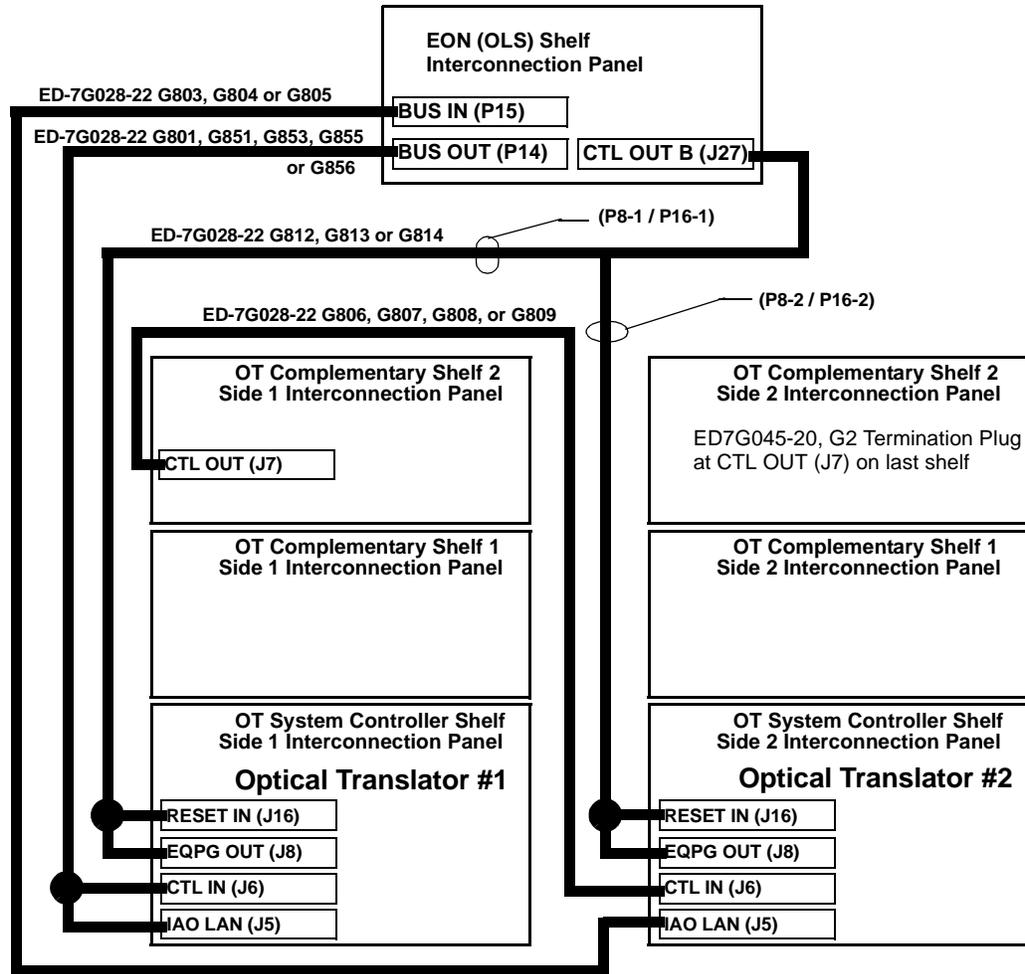
Cable Part No.	Route Cable	From Shelf/Jack	To Shelf/Jack
ED-7G045-20, GR11 (length = 5 ft)	Left	Compl. Shelf 1 J7	Compl. Shelf 2 J6
ED-7G045-20, GR8 (length = 6 ft 5 in)	Left	System Shelf/ P10 to J10	Compl. Shelf 2/P8 to J8
ED-7G045-20, GR10 (length = 6 ft)	Right	System Shelf/ P14 to J14	Compl. Shelf 2/P16 to J16

**Important!** The application of these cable assemblies is based on mounting the OT Complementary Shelf 2 directly above or below the OT Complementary Shelf 1 (with a Fan Unit and Baffle in between).

**EON (OLS) with Two OT Systems**

The system integration cables for this configuration include connections between the EON (OLS) Shelf and both OT System Controller Shelves; and between each OT System Controller Shelf and its associated OT Complementary Shelves. Refer to Figure 4-4 and Table 4-4 for the EON (OLS) Shelf to OT System Controller Shelf cables; and to Figures 4-2 & 4-3 and Tables 4-2 & 4-3 for the OT System Controller Shelf to OT Complementary Shelf cables

**Figure 4-4 EON (OLS) with 2 OT Systems**



**Important!** The ED7G028-20, G6 Termination Plugs are removed from both P14 and P15 on the EON (OLS) Shelf Interconnection Panel.

The cable assemblies connecting the OT Complementary Shelves are the same as shown in Figures 4-2 and 4-3.

**Table 4-4 System Interconnecting Cables for 2 OT Systems**

ED-7G028-22 Group	Cable Length (each leg)	Connections			
		EON (OLS)		OT Controller	
801	20 ft	P14	BUS OUT	J5	IAO LAN
851	100 ft			J6	CTL IN
853	200 ft				
855	180 ft				
856	50 ft				
812	20 ft	J27	CTL OUT (B)	J8-1	EQPG OUT
813	100 ft			J16-1	RESET IN
814	200 ft			J8-2	EQPG OUT
				J16-2	RESET IN
803	20 ft	P15	BUS IN	J5	IAO LAN
804	100 ft				
805	200 ft				
		<b>OT System 1</b>		<b>OT System 2</b>	
806	20 ft	J7	OT Comp Side 1	J6	OT Sys Ctl Side 2
807	100 ft				
808	200 ft		CTRL OUT		CTRL IN
809	180 ft				

**Important!** If an Integrated Bay is to be configured with a second OT System then the 838809331 cable assembly would be replaced with the ED7G028-22 G812 or G813 or G814 cable assembly.

## System Integration Cable Installation Procedure

Detailed procedural steps are provided in the following sections for installing the System Integration cables. An optional verification procedure is provided at the end of this chapter.

### EON (OLS) Shelf to OT System Controller Shelf

Refer to Figures 4-1 and 4-4 for cabling diagrams.

A Metropolis® EON Integrated Bay has factory-installed system integration cables for one OT System Controller Shelf. If a second OT System is required go to Step 5 and replace the 848809331 cable assembly installed in the Integrated Bay.

- 
- 1 Remove the ED-7G028-20 G6 Termination Plug from P14 on the EON (OLS) Shelf Interconnection Panel. (Refer to Figure 4-7 on page 4-41 for EON (OLS) Shelf Interconnection Panel layout information.)

- 
- 2 Route the J14 end of the ED-7G028-22 G801, 851, 853, or 855 or 848809497 cable assembly through the left side of the EON (OLS) Shelf and connect to P14 (BUS OUT) on the Interconnection Panel.

- 
- 3 Route the P5 & P6 ends of this cable assembly through the left side of the (Side 1) OT System Controller Shelf to the Interconnection Panel.
    - Connect P5 of this cable to J5 (IAO LAN)
    - Connect P6 of this cable to J6 (CTL IN) - remove and save ED7G045-20, G2 Termination Plug if equipped on J6

Refer to Figure 4-9 for OT System Controller Shelf Interconnection Panel layout information.

- 
- 4 **For 1 OT System:** Route the P27 end of the ED-7G028-22 G802, 852, 854 or 857 or 848809331 cable assembly through the right side of the EON (OLS) Shelf and connect to the J27 [CTL OUT (B)].

**For 2 OT Systems:** Route the P27 end of the ED-7G028-22 G802, 812, 814 or 814 cable assembly through the right side of the EON (OLS) Shelf and connect to the J27 [CTL OUT (B)].

- 
- 5 For 1 OT System:** Route the P8 & P16 ends of this cable through the left side of the OT System Controller Shelf to the Interconnection Panel
- Connect P8 of this cable to J8 (EQPG OUT)
  - Connect P16 of this cable to J16 (RESET IN)

**For 2 OT Systems:** Route the P8-1 & P16-1 ends of this cable through the left side of the Side 1 OT System Controller Shelf and P8-2 & P16-2 ends through the left side of the Side 2 OT System Controller Shelf

- Connect P8-1 of this cable to Side 1 J8 (EQPG OUT)
- Connect P16-1 of this cable to Side 1 J16 (RESET IN)
- Connect P8-2 of this cable to Side 2 J8 (EQPG OUT)
- Connect P16-2 of this cable to Side 2 J16 (RESET IN).

**Important!** If the 2 OT System cable assembly is specified for future growth of a 1 OT System, the unused side 2 cable branch is to be routed and left unconnected. The unused branch may be coiled and stored until needed with no special termination required on the other end.

- 
- 6 For 2 OT Systems:** Route the P7 end of the ED-7G028-22 G806, 807, 808 or 809 cable assembly through the left side of the last OT Complementary Shelf on Side 1 and to the Side 2 OT System Controller Shelf.

Connect P6 on this cable to J6 (CTL IN) at the Side 2 OT System Controller Shelf. Remove and save ED7G045-20, G2 Termination Plug if equipped on J6

- 
- 7** Dress and tie the cable assemblies to the bay frames.

## OT System Controller Shelf to OT Complementary Shelves

Refer to Figures 4-2 and 4-3 for cabling diagrams.

The system control LAN path must be terminated at the last shelf in the Metropolis® EON System. The ED7G045-20, G2 Termination Plug is moved to the J7 (CTL OUT) connector on the last shelf as additional OT Shelves are connected to the Metropolis® EON System.

An Integrated Bay has factory-installed system integration cables between the OT System Controller Shelf and the OT Complementary Shelf 1. If a second OT Complementary Shelf is required go to Step 4 and install the cable assemblies for 2 OTs to connect to the miscellaneous-mounted shelf to the Metropolis® EON System.

Steps 8 through 12 apply to OT Complementary Shelves with both 1 and 2 OT Systems.

**Important!** Be careful not to confuse ED-7G045-20 G6 and ED-7G045-20 G11 cables, which both have P6 and P7 labels on the connector boots. The cables are wired differently and are not interchangeable. Refer to the shelf interconnecting tables for proper connection locations.

- 
- 8 Remove the ED-7G045-20 G2 Termination Plug from J7 (CTL OUT) on the System Controller Shelf. Save the Termination Plug for later installation on the last OT Shelf in the Metropolis® EON System.

---

  - 9 Install interconnecting cables for **OT Complementary Shelf 1** as specified in Table 4-2. Refer to Figure 4-2. If this is the last OT Shelf in the Metropolis® EON System, install the Termination Plug at J7 (CTL OUT) on this shelf (Termination Plug is required for proper system operation).

---

  - 10 Route cables out the left or right side access holes as specified in Table 4-2. When all the cables have been installed, tie excess cable into left or right bay frame channels.

- 
- 11** Install interconnecting cables for **OT Complementary Shelf 2** as specified in Table 4-3. Refer to Figure 4-3. If this is the last OT Shelf in the Metropolis<sup>®</sup> EON System, install the Termination Plug at J7 (CTL OUT) on this shelf (Termination Plug is required for proper system operation).
- 
- 12** Route cables out the left or right side access holes as specified in Table 4-3. When all the cables have been installed, tie excess cable into left or right bay frame channels.
- 
- 13** The System Integration cable connections may be verified with the optional Verification Test procedure on page 4-45.

END OF STEPS

---



## Fan Alarm Cables

---

**Description** The Fan Units installed with the Metropolis® EON (OLS) and/or OT Shelves require a fan alarm cable connection that is “daisy-chained” from shelf to shelf and connected as a miscellaneous discrete alarm at the EON (OLS) Shelf. Fan alarm cables are factory-installed with the shelves in the Integrated Bay. Fan alarm cables for miscellaneous-mounted EON (OLS) and OT Shelves are ordered separately and then installed at the customer site.

Follow the steps below to install the fan alarm cables:

### Miscellaneous-mounted EON (OLS) Shelf

---

- 1 Locate and identify the Fan Alarm cable assembly (848819363) for the EON (OLS) Shelf.

---
- 2 Dress the Fan Alarm cable (848819363) through the left side of the EON (OLS) shelf and connect to P24 (MISC DSCRT 2) on the Interconnection Panel.

---
- 3 Route Fan Alarm cable (848819363) down the left side of the EON (OLS) Shelf and connect to the ALM OUT connector on the Fan Unit mounted directly below the EON (OLS) Shelf.

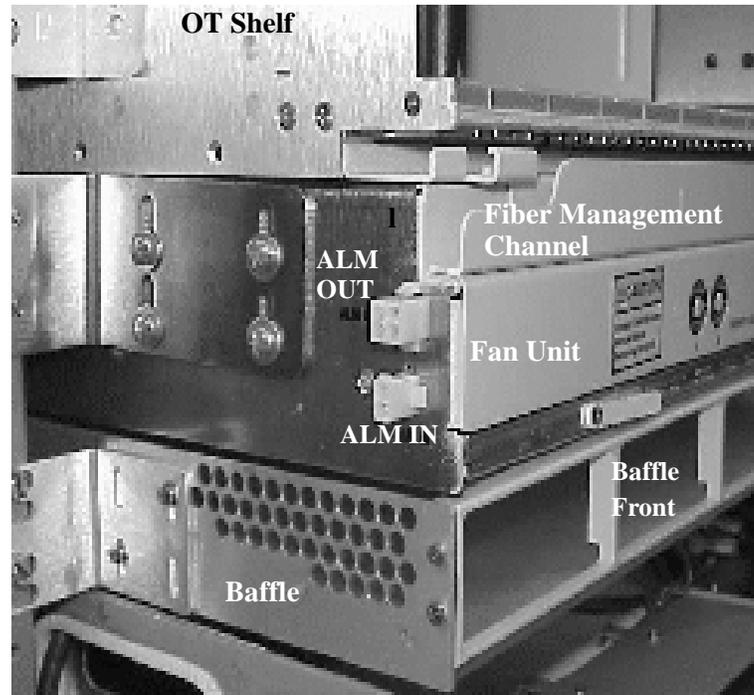
### Miscellaneous-mounted OT Shelf

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- 4 Locate and identify the Fan Alarm cable assembly provided for the miscellaneous-mounted OT Shelf.

Fan Alarm cable assemblies are specified by the customer engineer for the cable length between shelves.

- 848825097 (length = 67 inches) for OT Shelves mounted below another Metropolis® EON shelf.
- 848836748 (10 ft) or 848836730 (20 ft) for OT Shelves mounted in adjacent bay frames.

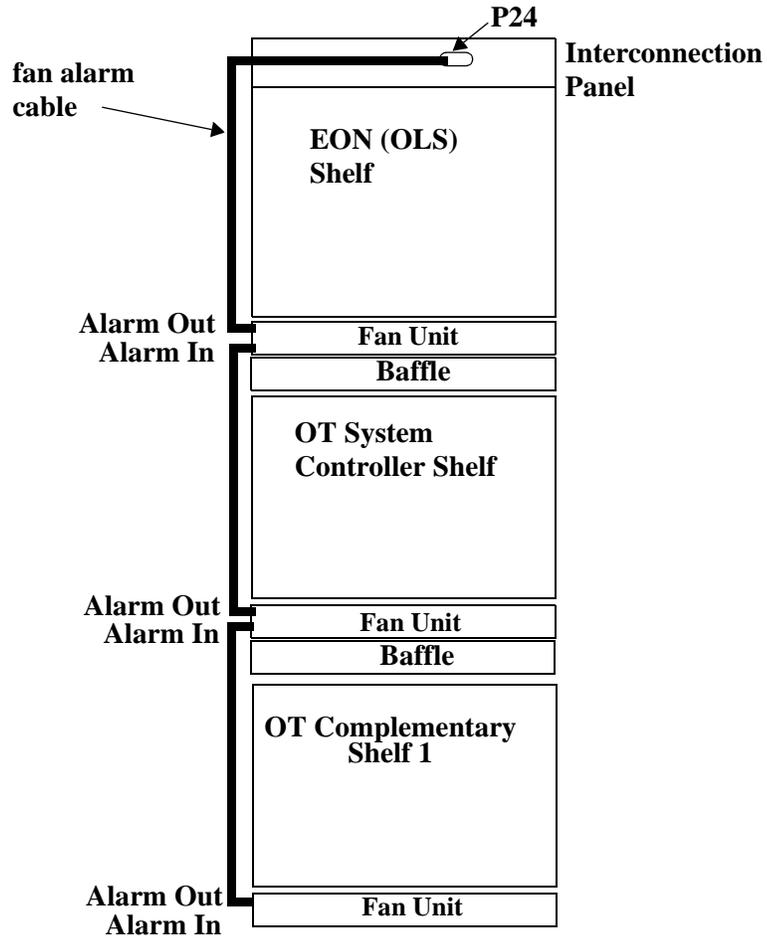
**Figure 4-5 Fan Unit and Baffle Mounted below OT Shelf**

- 
- 5** For the first OT System Controller Shelf, connect the specified Fan Alarm cable assembly to ALM IN connector on the Fan Unit that is mounted directly below the EON (OLS) Shelf.
- 
- 6** Route this Fan Alarm cable on the left side of the bay frame and connect the ALM OUT connector on the Fan Unit mounted directly below the OT System Controller Shelf.
- 
- 7** For additional OT Shelves, locate the Fan Alarm cable assemblies specified for each shelf. Repeat Steps 5 and 6 by “daisy-chaining” the Fan Alarm cables from the ALM IN connector on the Fan Unit associated with the preceding shelf to the ALM OUT connector on the Fan Unit associated with the next OT Shelf. Continue the Fan Alarm “daisy-chain” from the last OT Complementary Shelf on Side 1 to the OT System Controller Shelf on Side 2; and then to the Side 2 OT Complementary Shelves.

END OF STEPS

---

**Figure 4-6 Integrated Bay Fan Alarm Cable Connections**



**Important!** The last Alarm In port in the "daisy chain" is to remain open without any cable connection.



## Office Alarm Cable

---

**Description** The Office Alarm cable provides connections between the Metropolis<sup>®</sup> EON (OLS) Shelf and the local office audible and visual alarm system. Table 4-5 provides the Office Alarm cable connections at P29 on the Metropolis<sup>®</sup> EON (OLS) Shelf Interconnection Panel.

**Table 4-5 P29 Office Alarm Connections**

Alarm Name	Designation	Pin	Wire Color
Office Alarm Critical Audible	OACRAUD	1	BL-W
Office Alarm Critical Visual	OACRVIS	2	O-W
Office Alarm Major Audible	OAMJAUD	3	G-W
Office Alarm Major Visual	OAMJVIS	4	BR-W
Office Alarm Minor Audible	OAMNAUD	5	S-W
Office Alarm Minor Visual	OAMNVIS	6	BL-R
No Connection	None	7	None
No Connection	None	8	None
Office Alarm Critical Audible Return	OACRAUDR	9	W-B
Office Alarm Critical Visual Return	OACRVISR	10	W-O
Office Alarm Major Audible Return	OAMJAUDR	11	W-G
Office Alarm Major Visual Return	OAMJVISR	12	W-BR
Office Alarm Minor Audible Return	OAMNAUDR	13	W-S
Office Alarm Minor Visual Return	OAMNVISR	14	R-BL
No Connection	None	15	R-O

**Office Alarms Cables**

The following cables may be specified for local Office Alarms applications. (These same cable assemblies may also be specified for use with Miscellaneous Discrete and Parallel Telemetry applications.)

**Table 4-6 Office Alarms Cables**

ED-7G028-22 Group	Cable Length (ft.)
351	150
361	250
371	50
381	100

**Office Alarm Cable Installation**

The customer engineer shall provide the installer with detailed information concerning transient current conditions associated with office alarm connections. Diodes or other suppression devices may be required for the specific office alarm circuit arrangement.

**Metropolis® EON (OLS) Office Alarm Connection**

Connect the Office Alarm cable between the Metropolis® EON (OLS) Shelf and the customer’s office alarm system.

- 1 Locate and identify the Office Alarm cable specified for this location.
- 2 Review specific information concerning transient suppression requirements for the customer’s alarm system.
- 3 Install any transient suppression devices specified at the customer’s alarm system per the customer engineer’s instructions.
- 4 Route the office alarm cable through the right-hand opening in the Metropolis® EON (OLS) Shelf.
- 5 Connect the office alarm cable to P29 (OFFICE ALARMS) on the Interconnection Panel.

---

**6** Dress and tie the Office Alarm cable in place.

---

**7** Disconnect the Office Alarm from P29. (The Office Alarm cable will be reconnected after the Metropolis<sup>®</sup> EON system is ready for service.)

END OF STEPS

---



## IntraOffice LAN Cable

---

**Description** The IntraOffice LAN (IAO LAN) connection is used for 10Base-T LAN communications between an Metropolis® EON (OLS) Shelf to another Metropolis® EON (OLS) Shelf or through a LAN hub to an Element Management Systems (EMS) such as NMA or Navis (SNMS). The IAOLAN connection is optional and requires that a LDA3 IAOLRP circuit pack be installed per instructions in Chapter 5.

**Important!** Note that the 10Base-T LAN cable connection may be straight-type or crossover-type depending on the application.

The customer engineer shall provide the installer with the specific LAN connection information for each location.

**Table 4-7 IntraOffice LAN Cables (DA15P to RJ45)**

ED-7G028-22 Group	Cable Type	Length
815	Straight	150 ft.
816		300 ft.
817		25 ft.
818		75 ft.
819	Crossover	25 ft.
820		75 ft.

**Table 4-8 IntraOffice LAN Cables (DA15 to DA15)**

Comcode	Cable Type	Length
848845376	Crossover	10 ft.
848845350		20 ft.
848845343		50 ft.
848845384		100 ft.
848845368		150 ft.
848845335		300 ft.

**IntraOffice LAN Cable  
Installation**

Follow the steps below to install the IntraOffice LAN Cable:

- 
- 1** Locate and identify the IntraOffice LAN cable as specified by the customer engineer for this location.

---

  - 2** Route the D-subminiature connector end of the cable through the left side of the Metropolis<sup>®</sup> EON (OLS) Shelf and connect to the J13 (INTRAOFFICE) connector on the Interface Panel.

---

  - 3** Route the other end of this cable along the side of the bay frame and connect to the equipment specified by the customer engineer.

---

  - 4** Dress and tie the IntraOffice LAN cable in place.

END OF STEPS



# Serial, Parallel, and X.25 Telemetry Cable Installation

---

**Serial Telemetry** Serial telemetry (TBOS) provides information to the maintenance center about that location and remote control over that location from the maintenance center. The External Miscellaneous Discretes Unit (EMDU) may be used with a serial telemetry connection to monitor Miscellaneous Discrete alarm points to provide an additional means of notifying an Operations System (OS) maintenance center of environmental conditions at the Metropolis® EON site.

Serial telemetry connections are made at P19 (SER TLM 1). The use of the SER TLM 2 port (P20) is **not** supported.

**Table 4-9 Serial Telemetry Connector**

Name	Designation	Pin	Wire Color
TBOS TRM Transmit N	TBASTXN	1	BL (CA1)
No Connection	None	2	None
TBOS TRM Receive N	TBASRXN	3	O (CA2)
No Connection	None	4	None
No Connection	None	5	None
TBOS TRM Transmit P	TBASTXP	6	W (CA1)
No Connection	None	7	None
TBOS TRM Receive P	TBASRXP	8	W (CA2)
No Connection	None	9	None

The following cables may be specified for Serial Telemetry applications:

**Table 4-10 Serial Telemetry Cables**

ED-7G028-22 Group	Cable Length
251	150 ft
261	250 ft
271	25 ft
281	100 ft

### Serial Telemetry Cable Installation

Perform the following steps to install serial telemetry cable:

- 1 Locate and identify the Serial Telemetry cable assembly specified for this location.  
.....
- 2 Review the customer engineer's instructions for connecting the Serial Telemetry cable to the customer's office equipment.  
.....
- 3 Route the Serial Telemetry cable in the right-hand side of the Metropolis<sup>®</sup> EON (OLS) Shelf.  
.....
- 4 Connect Serial Telemetry cable to P19 (SER TLM 1) on the Interconnection Panel.  
.....
- 5 Route the serial telemetry cable to the customer's serial telemetry system.  
.....
- 6 Connect the Serial Telemetry cable by cutting the cable to length and wire-wrapping the loose ends onto the customer's panel.  
.....
- 7 Label the connections that are wire-wrapped.  
.....
- 8 Dress and tie the serial telemetry cable in place.

END OF STEPS  
.....

**X.25 (TL-1) Telemetry Cable Installation**

X.25 is a synchronous network communication protocol commonly used with operations systems. It utilizes Transaction Language 1 (TL1) for the message language.

Pin connections for the X.25 cable (EIA-232D) are listed below. For more information about the TL1 interface, refer to Lucent Technologies *Metropolis® EON Operations Systems Engineering Guide, 365-575-561, R8.2*.

**Table 4-11 TL1/X.25 Interface — EIA-232D Pin Connections**

Pin	Description
1	Protective Ground (Shield)
2	Transmitted Data
3	Received Data
4	Request to Send (RTS)*
5	Clear to Send (CTS)†
6	DSR Data Set Ready
7	Signal Ground
8	Received Line Signal Detector
15	Transmitter Signal Element Timing (DCE to DTE)
17	Receiver Signal Element Timing (DCE to DTE)
20	DTR Data Terminal Ready*

\* RTS and DTR are always on when Metropolis® EON is powered.

† Metropolis® EON will only transmit data via X.25 when CTS is on.

The following cables may be specified for X.25 Telemetry applications:

**Table 4-12 X.25 Telemetry Cables**

ED-7G028-22 Group	Cable Length	Connector Types F = Female M = Male
625	20 ft	F-M
652	150 ft	F-M

The maximum length of the intraoffice X.25 cable is 150 feet.

X.25 cable connections and designations for Group 625 and 652 cables are provided below:

**Table 4-13 X.25 Telemetry Cable Connection**

Name	Designation	P156A Terminal	Wire Color	Datakit End
Protective Ground	GRD	1	BL	1 GRD
MSR Transmit Data	MSRTDX	2	BL/W	2 TDX
MSR Receive Data	MSRRXD	3	O/W	3 RXD
MSR Request To Send	MSRRTS	4	G/W	No Connect
MSR Clear To Send	MSRCTS MSRDTR	5 20	W/G W/S	4 RTS 20 DTR*
MSR Data Set Ready	MSRDSR	6	BR/W	6 DSR
Signal Ground	GRD	7	S/W	7 GRD
MSR Receive Line Signal Detected	MSRRLSD	8	BL/R	8 RLSD
No Connection	None	9	None	
No Connection	None	10	None	
No Connection	None	11	None	
No Connection	None	12	None	
No Connection	None	13	None	
No Connection	None	14	None	
MSR Transmitter Signal Element Timing	MSRTSET	15	R/O	15 TSET
No Connection	None	16	None	
MSR Receiver Signal Element Timing	MSRRSET	17	R/G	17 RSET
No Connection	None	18	None	
No Connection	None	19	None	
MSR Data Terminal Ready	MSRDTR MSRCTS	20 5	W/S W/G	20 DTR 4 RTS**
No Connection	None	21	None	

Name	Designation	P156A Terminal	Wire Color	Datakit End
MSR Ring Indicator	MSRRI	22	R/BL	22 RRI
No Connection	None	23	None	
No Connection	None	24	None	
No Connection	None	25	None	

\* The short between 5 and 20 at the Metropolis® EON end, and 4 and 20 at the Datakit end, is physically accomplished at the Datakit end with a black wire between 4 and 20. Pin 5 is No Connect at the Datakit end.

### X.25 Telemetry Cable Installation

**Important!** ED-7G028-22 Group 625 and 652 cables have a jack (female-type connector with a blank label) at one end and a plug (male-type connector labeled P156A) at the other end. The cable plug end (male) mates with the jack (J18) on the Metropolis® EON (OLS) Shelf. The jack end (female) is intended to mate with the X.25 network equipment. For cables that have two blank labels, mark P18 on the blank label at the plug (male) end of the cable.

Perform the following steps to install X.25 telemetry cable:

- 1 Locate and identify the X.25 Telemetry cable assembly specified for this location.
- 2 Review the customer engineer’s instructions for connecting the X.25 Telemetry cable to the customer’s office equipment.
- 3 Mark the blank label at the jack (female) end of the cable with the appropriate jack number for the X.25 port on the customer’s operation support system.
- 4 Route the plug end X.25 Telemetry cable into the right-hand side of the Metropolis® EON (OLS) Shelf and connect to J18 (SHELF X.25) on the Interconnection Panel.

- 
- 5** Route the X.25 Telemetry cable to the customer's operation support system and connect to the designated X.25 port.
- 

- 6** Dress and tie the X.25 Telemetry cable in place.

END OF STEPS

---

**Parallel Telemetry Cable  
Installation**

Parallel telemetry reports a minimum set of alarms and status indications to a maintenance center via a telemetry system.

**Table 4-14 Parallel Telemetry Cable Connections**

<b>Alarm Name</b>	<b>Designation</b>	<b>Pin</b>	<b>Wire Color</b>
Local Alarm Minor	LAMN	1	BL-W
Local Alarm Major	LAMJ	2	O-W
Local Alarm Critical	LACR	3	G-W
Remote Alarm Minor	RAM	4	BR-W
Remote Alarm Major	RAMJ	5	S-W
Remote Alarm Critical	RACR	6	BL-R
No Connection	None	7	None
No Connection	None	8	None
Local Alarm Minor Return	LAMNR	9	W-BL
Local Alarm Major Return	LAMJR	10	W-O
Local Alarm Critical Return	LACRR	11	W-G
Remote Alarm Minor Return	RAMNR	12	W-BR
remote Alarm Major Return	RAMJR	13	W-S
Remote Alarm Critical Return	RACRR	14	R-BL
No Connection	None	15	R-O

The following cables may be specified for local Parallel Telemetry applications. (These same cable assemblies may also be specified for use with Office Alarms and Miscellaneous Discrete applications.)

**Table 4-15 Parallel Telemetry Cables**

ED-7G028-22 Group	Cable Length
351	150 ft
361	250 ft
371	50 ft
381	100 ft

**Parallel Telemetry Cable Installation**

Perform the following steps to install the Parallel Telemetry cable:

- 1 Locate and identify the Parallel Telemetry cable assembly specified for this location.
- 2 Review the customer engineer’s instructions for connecting the Parallel Telemetry cable to the customer’s office equipment.
- 3 Route the Parallel Telemetry cable into the right-hand side of the Metropolis® EON (OLS) Shelf and connect to P28 (PAR TLM) on the Interconnection Panel.
- 4 Route the Parallel Telemetry cable to the customer’s parallel telemetry equipment at this location.
- 5 Connect the Parallel Telemetry cable to the customer’s parallel telemetry equipment by cutting the cable to length and wire-wrapping the loose ends onto the designated terminal strip. Label the connections that are wire-wrapped.
- 6 Dress and tie the Parallel Telemetry cable in place.

# Line Orderwire, Section Orderwire, and Section User Channel Cables

---

**Description** Line Orderwire, Section Orderwire, and Section User Channel cables allow for access to SONET overhead bytes. They include:

- Orderwire capabilities
- User Channel access

Cable connections for Line Orderwire, Section Orderwire, and Section User Channel are made to the Interconnection Panel on the Metropolis® EON (OLS) Shelf. The columns correspond to the associated telemetry packs, Line 1A, Line 1B, and so forth.

**Table 4-16 Line Orderwire, Section Orderwire, and Section User Channel Cable Connections at Interconnection Panel**

Cable Application	Interconnection Panel Location			
	Line 1A	Line 1B	Line 2A	Line 2B
Line Orderwire	J1	J4	J7	J10
Section Orderwire	J3	J6	J9	J12
Section User Channel	J2	J5	J8	J11

The following cables may be specified for Line Orderwire, Section Orderwire, and Section User Channel applications:

**Table 4-17 Line Orderwire, Section Orderwire, and Section User Channel Cables**

ED-7G028-22 Group	Cable Length
451	150 ft
461	250 ft
471	25 ft
481	100 ft

## Line Orderwire Cable Installation

The Line Orderwire cable connections and designations are provided below:

**Table 4-18 Line Orderwire Cable Connection**

Name	Designation	Pin	Wire Color
Overhead E2 Clock Input N	OE2CIN	1	BL-W
Overhead E2 Sync Input N	OE2SIN	2	O-W
Overhead E2 Data Input N	OE2DIN	3	G-W
Overhead E2 Data Output N	OE2DON	4	BR-W
Overhead E2 Sync Output N	OE2SON	5	S-W
Overhead E2 Clock Output N	OE2CON	6	BL-R
No Connection	None	7	None
No Connection	None	8	None
Overhead E2 Clock Input P	OE2CIP	9	W-BL
Overhead E2 Sync Input P	OE2SIP	10	W-O
Overhead E2 Data Input P	OE2DIP	11	W-G
Overhead E2 Data Output P	OE2DOP	12	W-BR
Overhead E2 Sync Output P	OE2SOP	13	W-S
Overhead E2 Clock Output P	OE2COP	14	R-BL
No Connection	None	15	None

Perform the following steps to install the Line Orderwire cable:

- 1 Locate and identify the Line Orderwire cable assembly (or assemblies) specified for this location.
- 2 Review the customer engineer's instructions for connecting the Line Orderwire cable(s) to the customer's office equipment.

---

**3** Route the Line Orderwire cable(s) into the left-hand side of the Metropolis<sup>®</sup> EON (OLS) Shelf and connect to J1, J4, J7 or J10 (ORDERWIRE) on the Interconnection Panel as specified in the customer engineer's instructions.

---

**4** Route the Line Orderwire cable to the customer's orderwire equipment.

---

**5** Connect Line Orderwire cable to the customer's orderwire equipment by cutting the cable to length and wire-wrapping the loose ends onto the designated terminal strip per the engineer's instructions.

---

**6** Label the connections that are wire-wrapped.

---

**7** Dress and tie the Line Orderwire cable in place.

END OF STEPS

---

### Section Orderwire Cable Installation

The Section Orderwire cable connections and designations are provided below:

**Table 4-19 Section Orderwire Cable Connection**

Name	Designation	Pin	Wire Color
Overhead E1 Clock Input N	OE1CIN	1	BL-W
Overhead E1 Sync Input N	OE1SIN	2	O-W
Overhead E1 Data Input N	OE1DIN	3	G-W
Overhead E1 Data Output N	OE1DON	4	BR-W
Overhead E1 Sync Output N	OE1SON	5	S-W
Overhead E1 Clock Output N	OE1CON	6	BL-R
No Connection	None	7	None
No Connection	None	8	None
Overhead E1 Clock Input P	OE1CIP	9	W-BL
Overhead E1 Sync Input P	OE1SIP	10	W-O
Overhead E1 Data Input P	OE1DIP	11	W-G
Overhead E1 Data Output P	OE1DOP	12	W-BR
Overhead E1 Sync Output P	OE1SOP	13	W-S
Overhead E1 Clock Output P	OE1COP	14	R-BL
No Connection	None	15	None

Perform the following steps to install the Section Orderwire cable:

- 1 Locate and identify the Section Orderwire cable assembly (or assemblies) specified for this location.
  
- 2 Review the customer engineer's instructions for connecting the Section Orderwire cable(s) to the customer's office equipment.

---

**3** Route the Section Orderwire cable(s) into the left-hand side of the Metropolis<sup>®</sup> EON (OLS) Shelf and connect to J3, J6, J9 or J12 (ORDERWIRE) on the Interconnection Panel as specified in the engineer's instructions.

---

**4** Route the Section Orderwire cable to the customer's orderwire equipment.

---

**5** Connect Section Orderwire cable to the customer's orderwire equipment by cutting the cable to length and wire-wrapping the loose ends onto the designated terminal strip per the engineer's instructions.

---

**6** Label the connections that are wire-wrapped.

---

**7** Dress and tie the Section Orderwire cable in place.

END OF STEPS

---

### Section User Channel Cable Installation

The Section User Channel cable connections and designations are provided below:

**Table 4-20 Section User Channel Cable Connection**

Name	Designation	Pin	Wire Color
Overhead F1 Clock Input N	OF1CIN	1	BL-W
Overhead F1 Sync Input N	OF1SIN	2	O-W
Overhead F1 Data Input N	OF1DIN	3	G-W
Overhead F1 Data Output N	OF1DON	4	BR-W
Overhead F1 Sync Output N	OF1SON	5	S-W
Overhead F1 Clock Output N	OF1CON	6	BL-R
No Connection	None	7	None
No Connection	None	8	None
Overhead F1 Clock Input P	OF1CIP	9	W-BL
Overhead F1 Sync Input P	OF1SIP	10	W-O
Overhead F1 Data Input P	OF1DIP	11	W-G
Overhead F1 Data Output P	OF1DOP	12	W-BR
Overhead F1 Sync Output P	OF1SOP	13	W-S
Overhead F1 Clock Output P	OF1COP	14	R-BL
No Connection	None	15	None

Perform the following steps to install the Section User Channel cable:

- 1 Locate and identify the Section User Channel cable assembly (or assemblies) specified for this location.
- 2 Review the customer engineer's instructions for connecting the Section User Channel cable(s) to the customer's office equipment.

.....  
**3** Route the Section User Channel cable(s) into the left-hand side of the Metropolis<sup>®</sup> EON (OLS) Shelf and connect to J2, J5, J8, or J11 (USER CHAN) on the Interconnection Panel as specified in the engineer's instructions.  
.....

**4** Route the Section User Channel cable to the customer's equipment.  
.....

**5** Connect the Section User Channel cable to the customer's equipment by cutting the cable to length and wire-wrapping the loose ends onto the user channel unit per the engineer's instructions.  
.....

**6** Label the connections that are wire-wrapped.  
.....

**7** Dress and tie the Section User Channel cable in place.

END OF STEPS  
.....



## (CMC) CIT-DTE Cable Installation

---

**Description** The Metropolis<sup>®</sup> EON system provides access to remote CenterLink Management Console (CMC) PCs through a local area network or modem connection to the SHELF CIT DTE port on the Metropolis<sup>®</sup> EON (OLS) Shelf.

Information is transferred from the OT Shelves to the Metropolis<sup>®</sup> EON (OLS) Shelf via the OT Controller (LUD1) and appropriate OT integration cables. Therefore, a CIT connection to the OT Shelves is not necessary.

---

**(CMC) CIT-DTE Cables** The (CMC) CIT-DTE cable connects from J17 (SHELF CIT DTE) on the Metropolis<sup>®</sup> EON (OLS) Shelf Interconnection Panel to a local area network or modem as specified by the customer engineer. Refer to the Metropolis<sup>®</sup> EON, Applications and Planning Guide, 365-575-558 R8.2 for additional modem configuration information.

Cables available for (CMC) CIT-DTE applications for Metropolis<sup>®</sup> EON are.

**Table 4-21 (CMC) CIT-DTE Cables**

<b>ED-7G028-22 Cable Group</b>	<b>Cable Length</b>
725	20 ft
752	150 ft
753	50 ft
754	100 ft
755	250 ft

The (CMC) CIT-DTE cable connections and designations are.

**Table 4-22 (CMC) CIT-DTE Cable Connection**

<b>Name</b>	<b>Designation</b>	<b>Pin</b>	<b>Wire Color</b>
Protective Ground	GRD	1	Ground wire
CT Transmit Data	CTTXD	2	BL/W
CT Receive Data	CTRXD	3	O/W
CT Request To Send	CTRTS	4	G/W
CT Clear To Send	CTCTS	5	BR/W
CT Data Set Ready	CTDSR	6	S/W
Signal Ground	GRD	7	BL/R
CT Receive Line Signal Detected	CTRLSD	8	R/BL
No Connection	None	9	None
No Connection	None	10	None
No Connection	None	11	None
No Connection	None	12	None
No Connection	None	13	None
No Connection	None	14	None
No Connection	None	15	R/O
No Connection	None	16	None
No Connection	None	17	R/G
No Connection	None	18	None
No Connection	None	19	None
CT Data Terminal Ready	CTDTR	20	W/S
No Connection	None	21	None
No Connection	None	22	R/BL
No Connection	None	23	None
No Connection	None	24	None
No Connection	None	25	None

**(CMC)CIT-DTE Cable  
Installation**

Perform the following steps to install the (CMC) CIT-DTE cable:

- .....
- 1** Locate and identify the (CMC) CIT-DTE cable assembly specified for this location.  
.....
  - 2** Review the customer engineer's instructions for connecting the (CMC) CIT-DTE cable assembly to the customer's office equipment.  
.....
  - 3** Route the (CMC) CIT-DTE cable assembly into the right-hand side of the Metropolis<sup>®</sup> EON (OLS) Shelf and connect to J17 (SHELF CIT DTE) on the Interconnection Panel as specified in the engineer's instructions.  
.....
  - 4** Route the cable assembly to the customer's interface equipment as specified by the engineer.  
.....
  - 5** Connect the (CMC) CIT-DTE cable to the RS-232 DCE port on the local area network or modem.  
.....
  - 6** Dress and tie the (CMC) CIT-DTE cable in place.

END OF STEPS

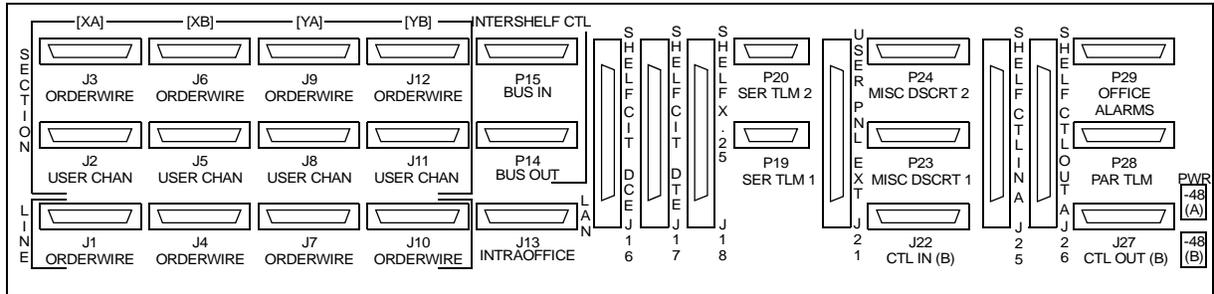


# Interconnection Panel Description

**Description** The descriptions of the Metropolis® EON (OLS) and OT Shelf Interconnection Panels are provided in this section.

**Metropolis® EON (OLS) Interconnection Panel** The Metropolis® EON (OLS) Interconnection Panel is shown below.

**Figure 4-7 Metropolis® EON Interconnection Panel**



The connector types used on the Metropolis® EON (OLS) shelf are shown below.

**Table 4-23 Metropolis® EON (OLS) Interconnection Panel Connectors and Types**

Connector	Type	Connector Orientation
J1-13, J22, J27	DB15 Female	
P14, P15, P23, P24, P28, P29	DB15 Male	
P19, P20	DB9 Male	
J16, J18, J21, J25, J26	DB25 Female	
J17	DB25 Male	

The interconnection panel provides the following interfaces:

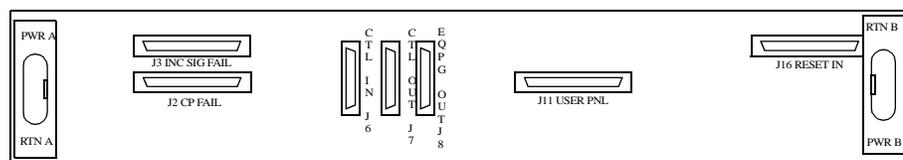
- **SECTION ORDERWIRE LINE (XA) J3; (XB) J6; (YA) J9; (YB) J12:** These connectors provide an interface that allows an orderwire set access to the section orderwire (E1 byte) of the OC-3 supervisory signal for voice communications, or (with additional wiring and converters) other uses such as connection to remote alarm or CMC ports.
- **LINE ORDERWIRE LINE (XA) J1; (XB) J4; (YA) J7; (YB) J10:** These connectors provide an interface that allows an orderwire set access to the line orderwire (E2 byte) of the OC-3 supervisory signal for voice communications.
- **SECTION USER CHAN LINE (XA) J2; (XB) J5; (YA) J8; (YB) J11:** These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-3 supervisory signal.
- **INTRAOFFICE LAN J13:** This connector provides an interface for a 10-Mb/s intraoffice local area network (LAN) to the OT System Controller Shelf.
- **INTERSHELF CTL BUS OUT P14:** These connectors provide shelf-to-shelf local area network connections.
- **INTERSHELF CTL BUS IN P15:** These connectors provide shelf-to-shelf local area network connections.
- **SHELF CIT-(DCE) J16:** This connector provides an interface to the CIT (DCE) port that allows local access.
- **SHELF CIT-(DTE) J17:** This connector provides an interface to a modem that allows dial-up CenterLink Management Console (CMC) access.
- **SHELF X.25 J18:** This connector provides an interface to a message-based operations system that uses X.25 protocol and the Transaction Language 1 (TL1) message language.
- **SER TLM 1 P19:** These connectors provide a serial telemetry interface that uses telemetry byte-oriented serial (TBOS) protocol. Provides an interface to the External Miscellaneous Discrete Unit (EMDU).
- **SER TLM 2 P20:** These connectors provide a serial telemetry interface that uses telemetry byte-oriented serial (TBOS) protocol. SER TLM2 is not currently used.
- **USER PNL EXT J21:** This connector provides an interface to the alarm and status indicators and ACO switch on the indicator strip (cabinet) and user panel (miscellaneous mounted shelves.)

- **MISC DSCRT 1 P23 and MISC DSCRT 2 P24:** These connectors provide an interface to external equipment via a terminal strip. This allows an operations system to monitor and control equipment co-located with the Metropolis® EON (OLS), such as the Fan Unit alarm.
- **CTL IN (B) J22:** This connector provides an interface for shelf-to-shelf connections with the OT System Controller Shelf.
- **CTL OUT (B) J27:** This connector provides an interface for shelf-to-shelf connections with the OT System Controller Shelf.
- **SHELF CTLIN A J25:** This connector provides an interface for shelf-to-shelf connections.
- **SHELF CTLOUT A J26:** This connector provides an interface for shelf-to-shelf connections.
- **OFFICE ALMS P29:** This connector provides an interface to the local office audible and visible alarms.
- **PAR TLM P28:** This connector provides an interface to an operations center for alarm information.

## OT Interconnection Panels

The Interconnection Panel for the OT Complementary Shelves 1 and 2 are identical and all connections are utilized. The OT System Shelf has a different interconnection panel with some interfaces active and others available for future releases. Installation instructions are provided for all interconnections whether being used now or in the future.

**Figure 4-8 Interconnection Panel for OT Complementary Shelf 1 & 2**

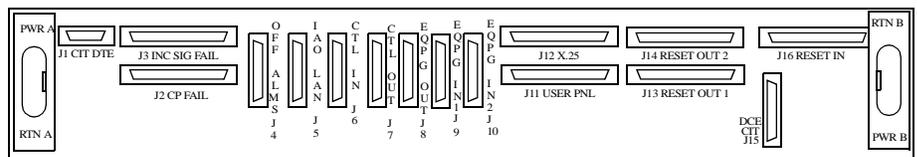


The external interface connections that are operational for OT Complementary Shelves 1 and 2 are as follows:

- **CP FAIL J2:** This connector provides an interface to the Circuit Pack Failure Miscellaneous Discrete relay contacts located on each OTU within the shelf.
- **INC SIG FAIL J3:** This connector provides an interface to the Incoming Loss of Signal Miscellaneous Discrete relay contacts located on each OTU within the shelf.

- **CTL IN J6:** This connector provides shelf-to-shelf local area network connections.
- **CTL IN J7:** This connector provides shelf-to-shelf local area network connections.
- **EQUIP OUT J8:** This connector provides an interface to the System Controller Shelf for equipage information.
- **RESET IN J16:** This connector provides an interface to the System Controller Shelf for reset information.
- **PWR A and B:** These connectors provide an interface to the -48V DC power coming from source A and source B. They are installed at the factory.

**Figure 4-9 Interconnection Panel for OT System Shelf**



The System Shelf external interface connections are operational as follows:

- **CP FAIL J2:** This connector provides an interface to the Circuit Pack Failure Miscellaneous Discrete relay contacts located on each OTU within the shelf.
- **INC SIG FAIL J3:** This connector provides an interface to the Incoming Loss of Signal Miscellaneous Discrete relay contacts located on each OTU within the shelf.
- **IAO LAN J5:** This connector provides an interface for a 10-Mb/s intraoffice local area network (LAN) to the Metropolis<sup>®</sup> EON (OLS) End Terminal Shelf.
- **CTL IN J6:** This connector provides shelf-to-shelf local area network connections.
- **CTL OUT J7:** This connector provides shelf-to-shelf local area network connections.
- **EQUIP OUT J8:** This connector provides an interface to the System Controller Shelf for equipage information.
- **EQUIP IN 1 J9:** This connector provides an interface to the Complementary Shelf 1 for equipage information.

- **EQUIP IN 2 J10:** This connector provides an interface to the Complementary Shelf 2 for equipage information.
- **USER PNL J11:** This connector provides to an interface to the alarm and status indicators on the indicator strip (cabinet) and user panel (miscellaneously mounted shelves).
- **RESET OUT 1 J13:** This connector provides an interface to the Complementary Shelf 1 for reset information.
- **RESET OUT 2 J14:** This connector provides an interface to the Complementary Shelf 1 for reset information.
- **RESET IN J16:** This connector provides an interface to the Metropolis<sup>®</sup> EON (OLS) End Terminal Shelf.
- **PWR A and B:** These connectors provide an interface to the –48V DC power coming from source A and source B. They are installed at the factory.
- OT System Shelf connectors **J4, J12, and J15** are not used.

# System Integration Cable Verification

---

**Introduction** This is an optional verification test procedure that may be performed at this point if the installation job order completes with the tasks in this chapter. This verification test requires that system control circuit packs be installed and that communication with a PC configured as a CenterLink CIT be established. If the installation job order includes the Network Element Start-up procedures in Chapter 7, this verification test may be done after the control circuit packs have been installed at that point in the overall installation process.

The System Integration Cable connections, including the cables and shelf wiring, are verified by using a CenterLink command to observe that the expected equipment information is reported. Each OT slot position may also be checked to observe that they are functional.

**Test Procedure** This test requires control circuit packs LEA1 SYSCTL, LEA2 SYSMEM, LUD1 OTCTL and a 41-type OTU. A PC configured for use as a CIT is required for the CenterLink commands and reports. It is preferred to have the SYSMEM and CIT loaded with the latest software release, although any software release may be used for this LAN connections verification test. Review the Network Element Start-up procedures in Chapter 7 before starting this test.

- 
- 1** Acquire the required circuit packs either from an installation test kit or by arrangement with the customer. Verify that the PC is configured as a CenterLink CIT and that compatible software is available.

---

  - 2** Restore power to the Metropolis<sup>®</sup> EON equipment. Refer to Chapter 3.

---

  - 3** For a blank SYSMEM, follow the Network Element Start-up procedures in Chapter 7 to install the SYSMEM and SYSCTL circuit packs and load the specified software. If the SYSMEM is pre-loaded with software, follow the circuit pack handling instructions of Chapter 7 to seat the SYSMEM and SYSCTL circuit packs.

- 
- 4 Wait for the SYSMEM and SYSCTL to complete their start-up cycle (i.e. boot up). When the red LEDs are off, connect the PC to the CIT port on the User Panel and log in to the Network Element following the procedures in Chapter 7. (Use default TID or TID provided with the preloaded SYSMEM)

---

  - 5 Install the OTCTL circuit pack in the OT System Controller Shelf. (For 2-OT systems, either a second OTCTL will be needed or the OTCTL will need to be moved to the Side 2 OT System Controller Shelf.) Install the 41-type OTU in the (Side 1) OT slot position 1.

---

  - 6 Wait for the OTCTL and OTU circuit packs to boot up. Execute the **CONFIGURATION->Update->System** command so the control system will be able to identify these circuit packs.

---

  - 7 Execute the **CONFIGURATION->Retrieve->Equipment** command to verify that the control system recognizes the OTU in (Side 1) slot position 1. If the OTU is not recognized as expected for the Side and slot position, contact your next level of technical support.

---

  - 8 Move the OTU to the next OT slot position in the system, update the system as in Step 5, and verify the equipment report as in Step 6.

---

  - 9 Repeat Step 8 for each OT slot position in Side 1. If a second OT System Controller Shelf is installed, repeat Steps 5-7 for Side 2.

---

  - 10 After completing the equipment verification for each OT slot position, log out from CenterLink and disconnect the CIT. Remove the verification test circuit packs from the shelves. If instructed by the customer, disconnect power to the Metropolis<sup>®</sup> EON equipment as described in Chapter 3.

END OF STEPS

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## Final Verification

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### Wired Cable Installation Checklist

Perform the following steps to ensure that the Metropolis<sup>®</sup> EON wired cables are properly installed:

Check when done	Item to check
	Metropolis <sup>®</sup> EON (OLS)/OT system integration cables connected to each shelf. Verify termination positions - If missing, install replacement terminations. These are required for proper system performance. (Not applicable at Repeater.)
	(Optional) System integration cable verification test completed
	Fan alarm cables installed.
	Office alarm cables installed, if applicable.
	IntraOffice LAN cable installed for connection to adjacent End Terminal or EMS, if applicable.
	Serial telemetry cable installed, if applicable.
	Parallel telemetry cable installed, if applicable.
	X.25 cable installed, if applicable.
	Orderwire cables installed, if applicable.
	(CMC) CIT-DTE cable installed, if applicable.
	All wired cables properly secured and dressed.
	All wired cables properly labeled.







# 5 Circuit Pack Placement

## Overview

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<b>Purpose</b>	This chapter provides the general requirements and methods for installing circuit packs for the various Network Element configurations available with the Metropolis <sup>®</sup> EON Integrated Bays and for the miscellaneous-mounted Metropolis <sup>®</sup> EON (OLS) and OT Shelves.
<b>Reason for revision</b>	This is Issue 3.0 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications. Additional circuit pack codes have been added.
<b>Objectives</b>	This chapter provides the installer with the necessary information and procedures for installing circuit packs in the Metropolis <sup>®</sup> EON (OLS) and OT Shelves.
<b>Installation Recommendations</b>	<p>The following items should be verified at the site to support the Metropolis<sup>®</sup> EON circuit pack placement:</p> <ul style="list-style-type: none"><li>• The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been properly installed.</li><li>• The procedures in Chapters 2, 3 and 4 have been completed and the final verification checklists completed.</li><li>• The assigned circuit breakers are turned off or fuses out at the BDFB (locked-out and tagged-out)</li><li>• AC power is available for use by installer.</li></ul>

**General Considerations**

- The recommended installation tools and test equipment are listed in Appendix G.
- The customer-designated engineer shall specify and order all the circuit packs and provide the installer with a circuit pack list and the slot-position placement information for each shelf.
- Circuit pack blanks are to be installed at all unused slot positions in each OT Shelf to control air flow.
- An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
- Connectors on the EON (OLS) and OT Shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
- Circuit packs are keyed to prevent their being inserted into a wrong shelf position.
- Do not remove the backplane cover from the EON (OLS) or OT Shelves.
- Before installing any circuit packs, visually inspect the **circuit pack side** of the backplane for any bent or broken backplane pins. If any pins are found to be bent, straighten the pin if possible. Refer to *Appendix A, Pin Repair* for information concerning straightening or replacing pins on the backplane.
- Circuit packs are to be placed but **not** fully seated until the Network Element start up procedures in Chapter 7.

**DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

*No optical fiber jumpers should be connected to the circuit packs or units at this time. Do not connect the optical fiber jumpers until instructed to do so.*

- The circuit pack information provided in this chapter is the latest information available at the time of the issue. To verify current information, refer to the appropriate application schematics (SD-6G156-01 and SD-6G157-01).

- A Metropolis<sup>®</sup> EON (OLS) Network Element that is capable of terminating the DWDM channels is designated as an End Terminal. (Refer to the Glossary in this document for terminology definitions and to the APG document for more information about End Terminals.)

**Important!** A Metropolis<sup>®</sup> EON (OLS) Ring Terminal application may be installed as two End Terminals in a back-to-back configuration, one 1A-TX-type End Terminal and one 1A-RCV-type End Terminal. The two End Terminals may have a Telemetry Feed Through optical fiber connection between them (1A-TX-Thru and 1A-RCV-Thru), or may use the optional IntraOffice LAN interface connection with an electrical cable for the DCC.

Each End Terminal will be a separate Network Element configuration and each will be considered as a separate Node by the Metropolis<sup>®</sup> EON system control elements.

Follow the installation instructions for each End Terminal individually and the customer engineer's instructions concerning the DCC connection between them for Ring Terminal applications.

**Contents** This chapter contains the following:

Metropolis <sup>®</sup> EON (OLS) Shelf	<a href="#">5-4</a>
1A-Transmit End Terminal NE Types	<a href="#">5-10</a>
1A-Receive End Terminal NE Types	<a href="#">5-21</a>
Repeater NE Type	<a href="#">5-32</a>
Dual-Facing NE Types	<a href="#">5-34</a>
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DCM Carrier	<a href="#">5-42</a>
Final Verification	<a href="#">5-45</a>



# Metropolis® EON (OLS) Shelf

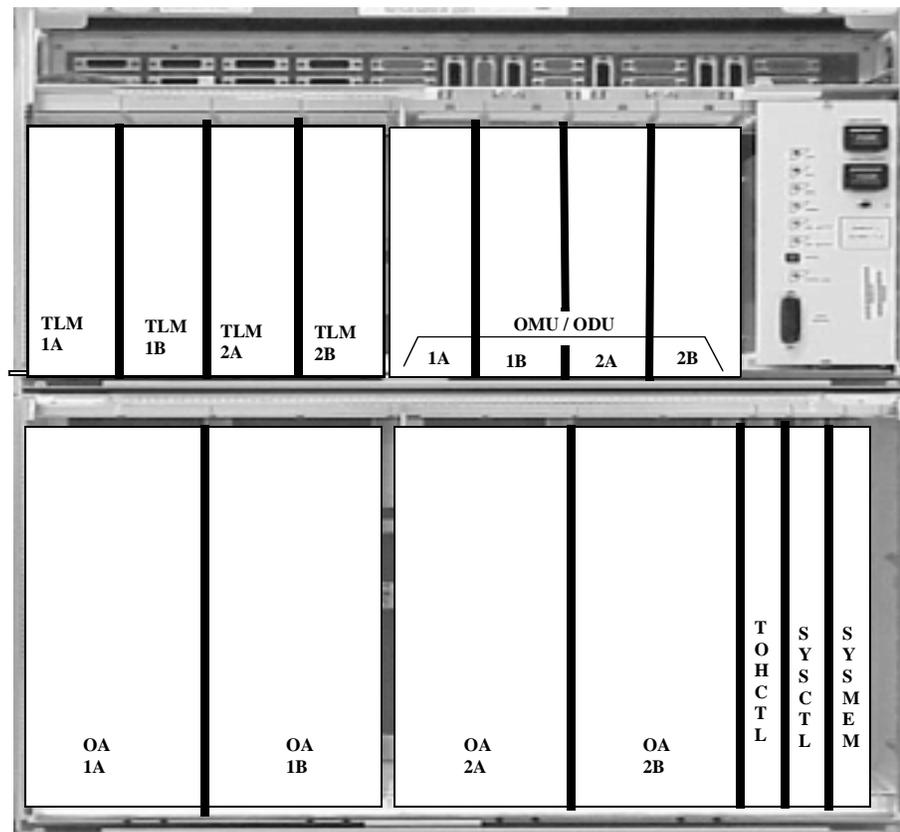
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**Introduction** The circuit packs to be installed in the Metropolis® EON (OLS) Shelf provide the high-speed DWDM transmission and system control functions in the Enhanced Optical Networking system. This EON (OLS) shelf may be configured as different Network Element types depending on the circuit pack placement (and optical fiber connections).

The companion Optical Translator (OT) Shelves are connected to the EON (OLS) Shelf via cables for local system control and via optical fibers for individual channel multiplexing and demultiplexing.

**Circuit Pack Slot Positions** The EON (OLS) Shelf has both upper and lower circuit pack slot positions. (The original intent of the slot position designations was to associate optical Lines 1 and 2 with transmit or receive identifiers A and B.)

**Figure 5-1 EON (OLS) Shelf Circuit Pack Slot Positions**



- EON (OLS) Circuit Packs** There are four types of circuit packs used within the EON (OLS) Shelf:
- System Control circuit packs
  - Optical Transmission circuit packs
  - Optical Multiplex and Demultiplex Unit circuit packs
  - Telemetry and LAN interface circuit packs

Specific circuit pack usage is provided in Table 5-1 which shows the circuit pack codes supported for each Network Element type.

### **System Control Circuit Packs**

The System Control circuit packs are installed in the EON (OLS) Shelf for each Network Element type. These circuit packs are:

- LEA102 Overhead Controller (TOHCTL)
- LEA1 System Controller (SYSCTL)
- LEA2 System Memory (SYSTEMEM)

These circuit packs are to be installed in the slot positions designated as TOHCTL, SYSCTL and SYSTEMEM on the lower right side of the shelf.

### **Optical Transmission Circuit Packs**

The Optical Transmission circuit pack include several codes of Optical Amplifiers (OAs), Line Receive or Transmit Units and Heater Unit. The original OLS application was a 2-OA system with a transmit amplifier and a receive amplifier for each 2-fiber optical line. The Line Units are used with Release 8.2 in the OA slot positions for 1-OA and 0-OA systems. The Optical Transmission circuit packs are to be installed in the OA-1A, OA-1B, OA-2A or OA-2B slot positions on the lower shelf, depending on the Network Element configuration. Apparatus blanks are to be placed in any unoccupied OA slot positions.

### **Optical Multiplex and Demultiplex Unit Circuit Packs**

The Optical Multiplex Unit (OMU) and Demultiplex Unit (ODU) circuit packs include several codes with different insertion loss and optical channel assignments. These circuit packs are to be installed in the upper right-side slot positions designated as OMU/ODU 1A,1B, 2A and 2B, depending on the Network Element configuration.

### **Telemetry and LAN Interface Circuit Packs**

The Telemetry and LAN interface circuit packs include the Telemetry Controller units for the supervisory channel and LAN interface units. These circuit packs are to be installed in the upper left slot positions designated as TLM 1A, TLM 1B, TLM 2A and TLM 2B.

**Circuit Pack Usage** Table 5-1 identifies the supported combinations of circuit packs or units for each Metropolis® EON Network Element configuration.

Other circuit pack codes may be allowable for use with R8.2 but are not orderable with R8.2. (Refer to the Metropolis® EON R8.2 Engineering Rules for additional information or contact your next level of technical support.)

The LEA102 TOHCTL must be installed for R8.2 applications.

**Table 5-1 Circuit Pack Usage Supported with R8.2**

Network Element Configuration		Supported Circuit Pack Usage Combinations				
NE Type (DIRN @ CIT)	side1_sys or side2_sys	OA OA2 (see Note 1)	LITX LIRCV LIHTR	TLM (see Note 2)	OMU16 OMU32	ODU16 ODU32
Repeater (blank DIRN)	-	LEA7 LEA104	NA	LDA1	NA	NA
		LEA7B LEA107B	NA	LDA1 or LDA4	NA	NA
		LEA207 LEA307	NA	LDA4	NA	NA
1A-TX, 1A-TX-THRU, 1A-RCV, or 1A-RCV-THRU  (End Terminal)	2_OA	LEA7 LEA104 LEA105	NA	LDA1	506A or 506B 507A or 507B	606A or 606B 606C or 606D 607A 607B
		LEA7B LEA107B	NA	LDA1 or LDA4	506A or 506B 507A or 507B	606A or 606B 606C or 606D 607A or 607B
		LEA207 LEA307	NA	LDA4	506B 507A or 507B	606C 607A or 607B
	1_OA	LEA7 LEA7B LEA105	No	LDA1	506A or 506B	606B or 606D
		LEA207 LEA307	LEA209	LDA4	506B 507A or 507B	606C 607A or 607B

Network Element Configuration		Supported Circuit Pack Usage Combinations				
NE Type (DIRN @ CIT)	side1_sys or side2_sys	OA OA2 (see Note 1)	LITX LIRCV LIHTR	TLM (see Note 2)	OMU16 OMU32	ODU16 ODU32
DUAL	2_OA	LEA7 LEA104 LEA105	NA	LDA1	506A or 506B 507A or 507B	606A or 606B 606C or 606D 607A or 607B
		LEA7B LEA107B	NA	LDA1 or LDA4	506A or 506B 507A or 507B	606A or 606B 606C or 606D 607A or 607B
		LEA207 LEA307	NA	LDA4	506B 507A or 507B	606C 607A or 607B
	1_OA	LEA7 LEA7B LEA105	NA	LDA1	506A or 506B	606B or 606D
		LEA7B LEA207 LEA307	LEA209	LDA4	506B 507A or 507B	606C 607A or 607B
	0_OA	NA	LEA209 and LEA211	LDA4	506B 507A or 507B	606C 607A or 607B
1A-TX-32, 1A-TX-THRU-32, 1A-RCV-32, or 1A-RCV-THRU-32  (See Note 3)	2-OA	LEA207 LEA307	LEA210 with 508/608	LDA4	507A or 507B 508A or 508B 509A or 509B	607A or 607B 608A or 608B 609A or 609B
	1-OA	LEA207 LEA307	LEA209 LEA210 with 508/608	LDA4	507A or 507B 508A or 508B	607A or 607B 608A or 608B
	0-OA	NA	LEA209 and LEA211 LEA210 with 508/608	LDA4	507B 508B (5.5 dB OMU with 0-OA)	607B 608B (5.5 dB ODU with 0-OA)

**Note 1:** Install 2 Apparatus Filler Blanks (848825287) in each unoccupied OA slot position.

**Note 2:** The optional LAN interface circuit pack (LDA3) may be used in the TLM-1B slot position for Network Element applications that are not “THRU”.

**Note 3:** The 1A-TX/RCV-32 Network Element types may be 16-wavelength systems for Release 8.2. They are considered 32-wavelength ready for the expected upgrade by the addition of an additional 508 OMU and 608 ODU pair for wavelengths 17-32.

## Network Element Configurations

The EON (OLS) Shelf may be configured as many different Network Element (NE) types depending on the selection and placement of circuit packs. (These Network Element types will also need to be designated via the Craft Interface Terminal during the Network Element Start-up and Provisioning procedures.)

The NE types are designated as **x-OA 1A-TX/RCV-Thru-32**, where:

- **x-OA** indicates the number of Optical Amplifiers per line, x=0, 1 or 2.
- **1A** indicates the slot position for either the Transmit or Receive units on the EON (OLS) Shelf.
- **TX/RCV** indicates which units are assigned to the A-slot positions on the EON (OLS) Shelf
- **Thru** indicates the optional configuration for telemetry feed-thru
- **32** indicates that the NE and circuit packs are 32-wavelength ready (If left blank, the NE is configured for 16-wavelength operation.)

The sections that follow in this chapter will identify the circuit pack slot position assignments for the following types of Network Elements associated with Release 8.2.

### 1A-Transmit NE types - Transmit units in A-slot positions

Network Element Type	SD-6G157-01 FS Figure Reference	
	One-Line System	Two-Line System
2-OA 1A-TX	FS 23	FS 25
2-OA 1A-TX-Thru	FS 27	FS 29
1-OA 1A-TX	FS 24	FS 26
1-OA 1A-TX-Thru	FS 28	FS 30
2-OA 1A-TX-32	FS 43	N/A
1-OA 1A-TX-32	FS 44	N/A
0-OA 1A-TX-32	FS 45	N/A
2-OA 1A-TX-Thru-32	FS 46	N/A
1-OA 1A-TX-Thru-32	FS 47	N/A
0-OA 1A-TX-Thru-32	FS 48	N/A

**Note:** One-Line systems only for 32-wavelength applications.

**1A-Receive NE types - Receive functions in A-slot positions**

Network Element Type	SD-6G157-01 FS Figure Reference	
	One-Line System	Two-Line System
2-OA 1A-RCV	FS 31	FS 33
2-OA 1A-RCV-Thru	FS 35	FS 37
1-OA 1A-RCV	FS 32	FS 34
1-OA 1A-RCV-Thru	FS 36	FS 38
2-OA 1A-RCV-32	FS 49	N/A
1-OA 1A-RCV-32	FS 50	N/A
0-OA 1A-RCV-32	FS 51	N/A
2-OA 1A-RCV-Thru-32	FS 52	N/A
1-OA 1A-RCV-Thru-32	FS 53	N/A
0-OA 1A-RCV-Thru-32	FS 54	N/A

**Note:** One-Line systems only for 32-wavelength applications.

**Repeater - Single OA for each side of the Line**

Network Element Type	SD-6G157-01 FS Figure Reference	
	One-Line System	Two-Line System
Repeater	FS 21	FS 22

**Note:** One-Line Repeater only for R8.2 applications

**Dual-Facing NE Types**

Network Element Type	SD-6G157-01 FS Figure Reference	
	One-Line System	Two-Line System
2-OA, 2-OA	FS 39	N/A
1-OA,1-OA	FS 40	N/A
1-OA, 1-OA (with LIRCV)	FS 41	N/A
0-OA, 0-OA	FS 42	N/A

**Note:** Dual-facing shelves are configured as 1A-RCV in the Line 1 slot positions and as 1A-TX in the Line 2 slot positions. The 32-wavelength applications are not supported with Dual-Facing.

## 1A-Transmit End Terminal NE Types

---

**Description** This section provides the methods for placing circuit packs in the EON (OLS) Shelf for the following 1A-Transmit End Terminal NE types:

1A-TX NE Type	Procedure
2-OA 1A-TX	page 5-11
2-OA 1A-TX-Thru	page 5-12
1-OA 1A-TX	page 5-13
1-OA 1A-TX-Thru	page 5-14
2-OA 1A-TX-32	page 5-15
1-OA 1A-TX-32	page 5-16
0-OA 1A-TX-32	page 5-17
2-OA 1A-TX-Thru-32	page 5-18
1-OA 1A-TX-Thru-32	page 5-19
0-OA 1A-TX-Thru-32	page 5-20

The engineer shall specify the specific circuit pack codes and their assigned slot positions for the 1A-Transmit NE type. (See Table 5-1.)

The transmit OA will be placed in the OA-1A slot position and an OMU will be placed in the OMU/ODU 1A slot position for each 1A-Transmit NE type. (Exception for 1-OA NE types without LIRCV and for 0-OA NE types.)

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A -> 2A and 1B -> 2B.

When completed with the circuit pack placement for the NE type in this section, continue with the associated Optical Translator Shelves: page 5-37.



### **DANGER**

***No fiber jumpers shall be connected to the circuit packs or units at this time. Do not connect the fiber jumpers until instructed to do so.***

**2-OA 1A-TX** Review the General Considerations information on page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- OMU in the OMU/ODU-1A position
- ODU in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves: page 5-37.

END OF STEPS

---

**2-OA 1A-TX-Thru** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- OMU in the OMU/ODU-1A position
- ODU in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

END OF STEPS

---

- 1-OA 1A-TX** Review the General Considerations information on page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.
- 

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-1-A, OA-2A and OA-2B positions
- 

- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- OMU (506A/B) in the OMU/ODU-1A position
- ODU (606B/D) in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

- 4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

END OF STEPS

---

**1-OA 1A-TX-Thru** Review the General Considerations information on page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-1A, OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - OMU (506A/B) in the OMU/ODU-1A position
  - ODU (606B/D) in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

- 4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves: page 5-37.

END OF STEPS

---

**2-OA 1A-TX-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- OMU (507A/B) in the OMU/ODU-1A position
- ODU (607A/B) in the OMU/ODU-1B position
- OMU (508A/B) in the OMU/ODU-2A position (optional)
- ODU (608A/B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37.

**1-OA 1A-TX-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Line Receiver Unit (LEA209) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - OMU (507A/B) in the OMU/ODU-1A position
  - ODU (607A/B) in the OMU/ODU-1B position
  - OMU (508A/B) in the OMU/ODU-2A position (optional)
  - ODU (608A/B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

- 4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

**0-OA 1A-TX-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations. (OMUs and ODUs are B-type for 0-OA application.)

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Line Transmit Unit (LEA211) in the OA-1A position
  - Line Receiver Unit (LEA209) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- OMU (507B) in the OMU/ODU-1A position
- ODU (607B) in the OMU/ODU-1B position
- OMU (508B) in the OMU/ODU-2A position (optional)
- ODU (608B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

**2-OA 1A-TX-Thru-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - OMU (507A/B) in the OMU/ODU-1A position
  - ODU (607A/B) in the OMU/ODU-1B position
  - OMU (508A/B) in the OMU/ODU-2A position (optional)
  - ODU (608A/B) in the OMU/ODU-2B position (optional)No other circuit packs or units should be seated at this time.

---
- 4** Place, but do not seat, the telemetry e circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

**1-OA 1A-TX-Thru-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Line Receiver Unit (LEA209) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - OMU (507A/B) in the OMU/ODU-1A position
  - ODU (607A/B) in the OMU/ODU-1B position
  - OMU (508A/B) in the OMU/ODU-2A position (optional)
  - ODU (608A/B) in the OMU/ODU-2B position (optional)No other circuit packs or units should be seated at this time.

---
- 4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

**0-OA 1A-TX-Thru-32** Review the General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-x for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations. (OMUs and ODUs are B-type for 0-OA application.)

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Line Transmit Unit (LEA211) in the OA-1A position
  - Line Receiver Unit (LEA209) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - OMU (507B) in the OMU/ODU-1A position
  - ODU (607B) in the OMU/ODU-1B position
  - OMU (508B) in the OMU/ODU-2A position (optional)
  - ODU (608B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---
- 4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

## 1A-Receive End Terminal NE Types

---

**Description** This section provides the methods for placing circuit packs in the EON (OLS) Shelf for the following 1A-Receive End Terminal NE types:

1A-RCV NE Type	Procedure
2-OA 1A-RCV	page 5-22
2-OA 1A-RCV-Thru	page 5-23
1-OA 1A-RCV	page 5-24
1-OA 1A-RCV-Thru	page 5-25
2-OA 1A-RCV-32	page 5-26
1-OA 1A-RCV-32	page 5-27
0-OA 1A-RCV-32	page 5-28
2-OA 1A-RCV-Thru-32	page 5-29
1-OA 1A-RCV-Thru-32	page 5-30
0-OA 1A-RCV-Thru-32	page 5-31

The engineer shall specify the circuit pack codes and their assigned slot positions for the 1A-Receive NE type. (See Table 5-1.) The receive OA will be placed in the OA-1A slot position and an ODU will be placed in the OMU/ODU 1A slot position for each 1A-Receive NE type. (Exception for 1-OA NE types without LIRCV and for 0-OA NE types.)

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A->2A and 1B->2B.

When completed with the circuit pack placement for the NE type in this section, continue with the associated Optical Translator Shelves: page 5-37.



### **DANGER**

*No fiber jumpers shall be connected to the circuit packs or units at this time. Do not connect the fiber jumpers until instructed to do so.*

**2-OA 1A-RCV** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU in the OMU/ODU-1A position
- OMU in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves: page 5-37.

END OF STEPS

---

**2-OA 1A-RCV-Thru** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Optical Amplifier (OA) in the OA-1B position
  - Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU in the OMU/ODU-1A position
- OMU in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

END OF STEPS

---

**1-OA 1A-RCV** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Apparatus Filler Blanks in the OA-1B, OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (606B/D) in the OMU/ODU-1A position
- OMU (506A/B) in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

END OF STEPS

---

**1-OA 1A-RCV-Thru** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA) in the OA-1A position
  - Apparatus Filler Blanks in the OA-1B, OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (606B/D) in the OMU/ODU-1A position
- OMU (506A/B) in the OMU/ODU-1B position

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

END OF STEPS

---

**2-OA 1A-RCV-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---
- 2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions

---
- 3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):
  - ODU (607A/B) in the OMU/ODU-1A position
  - OMU (507A/B) in the OMU/ODU-1B position
  - ODU (608A/B) in the OMU/ODU-2A position (optional)
  - OMU (508A/B) in the OMU/ODU-2B position (optional)No other circuit packs or units should be seated at this time.

---
- 4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:
  - Telemetry Controller in TLM in the TLM-1A position
  - (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37.

**1-OA 1A-RCV-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-x for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Line Receiver Unit (LEA209) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (607A/B) in the OMU/ODU-1A position
- OMU (507A/B) in the OMU/ODU-1B position
- ODU (608A/B) in the OMU/ODU-2A position (optional)
- OMU (508A/B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

**0-OA 1A-RCV-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations. (OMUs and ODUs are B-type for 0-OA application.)

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Line Receiver Unit (LEA209) in the OA-1A position
  - Line Transmit Unit (LEA211) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (607B) in the OMU/ODU-1A position
- OMU (507B) in the OMU/ODU-1B position
- ODU (608B) in the OMU/ODU-2A position (optional)
- OMU (508B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry and LAN interface circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- (optional) IAOLRP in TLM-1B position.

Continue with Optical Translator Shelves page 5-37

**2-OA 1A-RCV-Thru-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA2-LEA207) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (607A/B) in the OMU/ODU-1A position
- OMU (507A/B) in the OMU/ODU-1B position
- ODU (608A/B) in the OMU/ODU-2A position (optional)
- OMU (508A/B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry e circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

**1-OA 1A-RCV-Thru-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Line Receiver Unit (LEA209) in the OA-1A position
  - Optical Amplifier (OA2-LEA207) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (607A/B) in the OMU/ODU-1A position
- OMU (507A/B) in the OMU/ODU-1B position
- ODU (608A/B) in the OMU/ODU-2A position (optional)
- OMU (508A/B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

**0-OA 1A-RCV-Thru-32** Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations. (OMUs and ODUs are B-type for 0-OA application.)

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Line Receiver Unit (LEA209) in the OA-1A position
  - Line Transmit Unit (LEA211) in the OA-1B position
  - Line Heater Units (LIHTR-LEA210) or Apparatus Filler Blanks in the OA-2A and OA-2B positions
- 

**3** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws):

- ODU (607B) in the OMU/ODU-1A position
- OMU (507B) in the OMU/ODU-1B position
- ODU (608B) in the OMU/ODU-2A position (optional)
- OMU (508B) in the OMU/ODU-2B position (optional)

No other circuit packs or units should be seated at this time.

---

**4** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves page 5-37

## Repeater NE Type

---

**Description** This section provides the methods for placing circuit packs in the EON (OLS) Shelf for the Repeater NE type.

The customer engineer shall specify the circuit pack codes and their assigned slot positions for the Repeater NE application.

The OMU and ODU circuit packs are not installed at an EON (OLS) Shelf configured as a Repeater. The Optical Amplifiers provide both a receive and transmit function and are placed by the assigned side (A or B) of the Line.

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A->2A and 1B->2B.

When completed with the circuit pack placement for the Repeater NE type in this section, continue with the associated Optical Translator Shelves: page 5-37.



### **DANGER**

*No fiber jumpers shall be connected to the circuit packs or units at this time. Do not connect the fiber jumpers until instructed to do so.*

**Repeater Shelf**

Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

**1** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:

- Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position
- 

**2** Place, but do not seat, the optical transmission circuit packs in the EON (OLS) Shelf:

- Optical Amplifier (OA or OA2) in the OA-1A position
- Optical Amplifier (OA or OA2) in the OA-1B position
- Apparatus Filler Blanks in the OA-2A and OA-2B positions

**Important!** The code of the OAs installed at the Repeater must match the code of the OAs used at the end terminals in the optical transmission section. In particular, the LEA207 OA2 should be installed for 32-wavelength ready systems.

---

**3** Place, but do not seat, the telemetry circuit packs in the EON (OLS) Shelf:

- Telemetry Controller in TLM in the TLM-1A position
- Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Fiber Installation in Chapter 6.

END OF STEPS

---



## Dual-Facing NE Types

---

**Description** This section provides the methods for placing circuit packs in the EON (OLS) Shelf for the Dual-Facing NE types.

The engineer shall specify the circuit pack codes and their assigned slot positions for the Dual-Facing shelf.

Dual-Facing shelves are configured as a 1A-RCV NE-type in Line 1 slot positions and as a 1A-TX NE-type in Line 2 slot positions. The 32-wavelength applications are not supported, although the LE207 OA2 or LEA307 OA3 (without DCM units) may be installed.

The NE type on the Line 1 side does not have to match the NE-type on the Line 2 side of a Dual-Facing Shelf. There may be any combination of 2-OA, 1-0A and 0-OA NE-types used at a Dual-Facing Shelf. One set of system control circuit packs are installed at the Dual-Facing Shelf and is recognized by the Metropolis<sup>®</sup> EON system as a single node.

When completed with the circuit pack placement for the NE type in this section, continue with the associated Optical Translator Shelves: page 5-37.



### **DANGER**

*No fiber jumpers shall be connected to the circuit packs or units at this time. Do not connect the fiber jumpers until instructed to do so.*

**Dual-Facing Shelf**

Review General Considerations: page 5-2 before beginning this procedure. Refer to Table 5-1 for circuit pack usage supported for this configuration and to Figure 5-1 for EON (OLS) Shelf slot position locations.

---

- 1** Determine from the customer engineer's instructions what are the Line 1 1A-RCV-NE and the Line 2 1A-TX NE configurations for this Dual-Facing Shelf. Refer to the appropriate 1A-RCV and 1A-TX sections in this chapter for detailed information on Optical Transmission, Multiplex/Demultiplex and Telemetry circuit pack types and locations.

---

- 2** Place, but do not seat, the system control circuit packs in the EON (OLS) shelf:
  - Overhead Controller in the TOHCTL slot position
  - System Controller in the SYSCTL slot position
  - System Memory in the SYSMEM slot position

---

- 3** Place, but do not seat, the Optical Transmission circuit packs in the EON (OLS) Shelf:
  - Optical Amplifier or Line Unit in the OA-1A position per 1A-RCV NE type
  - Optical Amplifier or Line Unit in the OA-1B position per 1A-RCV NE type
  - Optical Amplifier or Line Unit in the OA-2A position per 1A-TX NE type
  - Optical Amplifier or Line Unit in the OA-2B position per 1A-TX NE type
  - Apparatus Filler Blanks in any unequipped OA slot positions

- 
- 4** Place, and seat, the Optical Multiplex and Demultiplex circuit packs in the EON (OLS) Shelf: (Remove and discard the screws from the shelf positions if OMUs and ODUs are equipped with captive screws.)
- ODU in the OMU/ODU-1A position
  - OMU in the OMU/ODU-1B position
  - OMU in the OMU/ODU-2A position
  - ODU in the OMU/ODU-2B position
- 
- 5** Place, but do not seat, the Telemetry and LAN interface circuit packs in the EON (OLS) Shelf:
- Telemetry Controller in TLM in the TLM-1A position
  - Telemetry Controller in TLM in the TLM-1B position

Continue with Optical Translator Shelves: page 5-37.

END OF STEPS

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# Optical Translator Shelves

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**Introduction** The circuit packs to be installed in the Optical Translator Shelves provide the relatively low-speed interface to the EON (OLS) Shelf in the Enhanced Optical Networking system

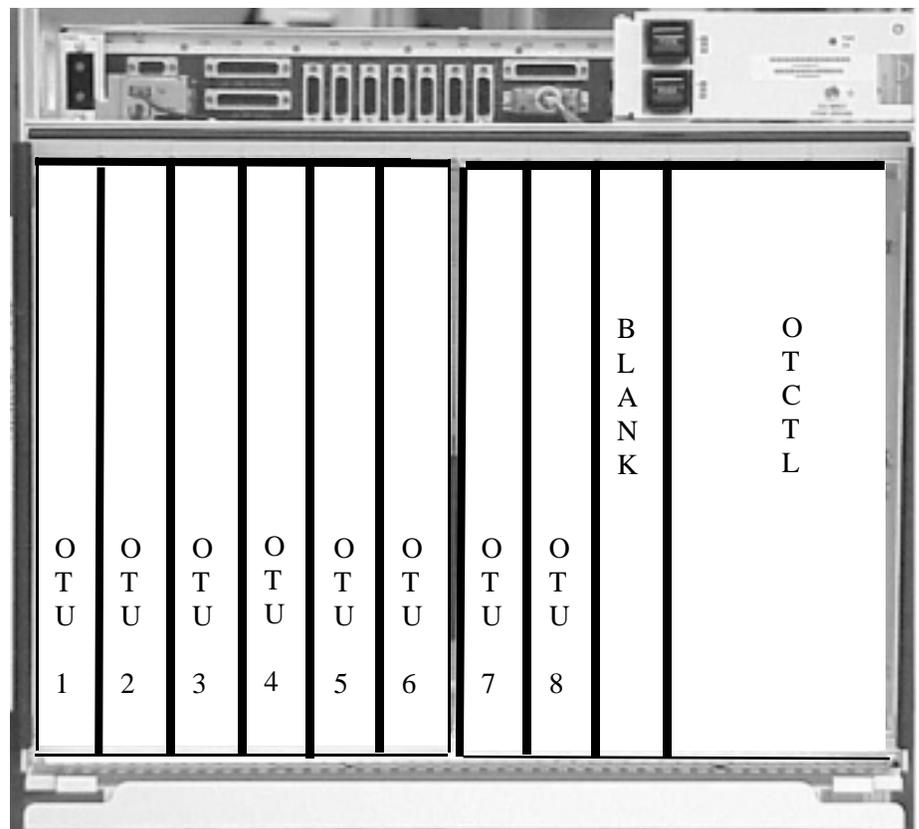
There are three types of Optical Translator Shelves:

- OT System Controller Shelf
- OT Complementary Shelf 1
- OT Complementary Shelf 2

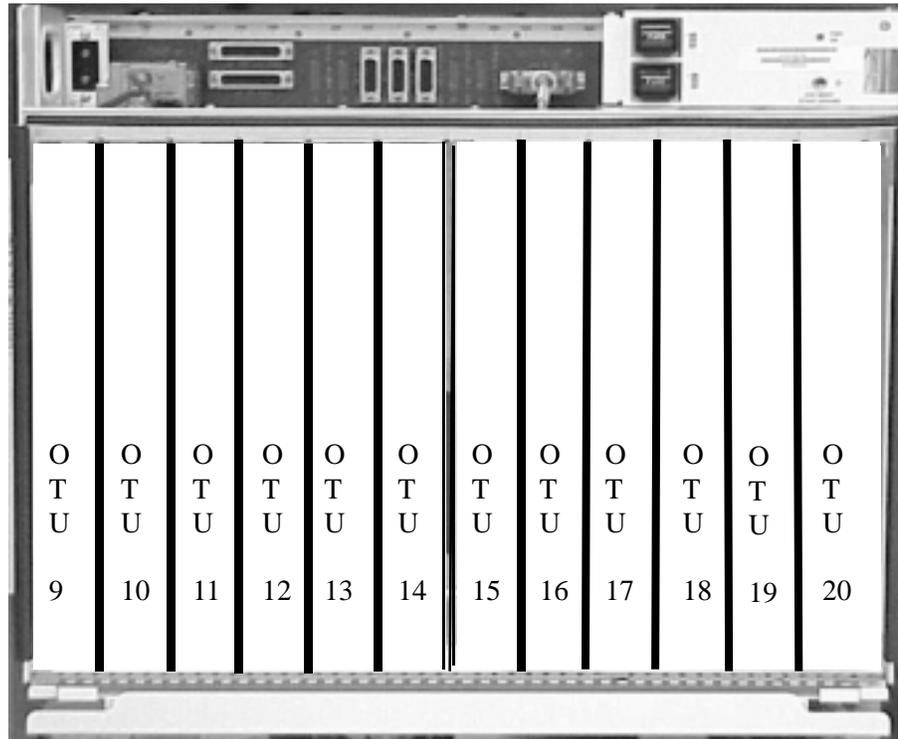
A maximum of two OT System Controller Shelves may be associated with a single EON (OLS) Shelf. Each OT System Controller Shelf may be connected to an OT Complementary Shelf 1 and to an OT Complementary Shelf 2.

**Circuit Pack Slot Positions** The OT System Controller Shelf and Complementary Shelves slot positions are shown in Figures 5-2, 5-3, and 5-4.

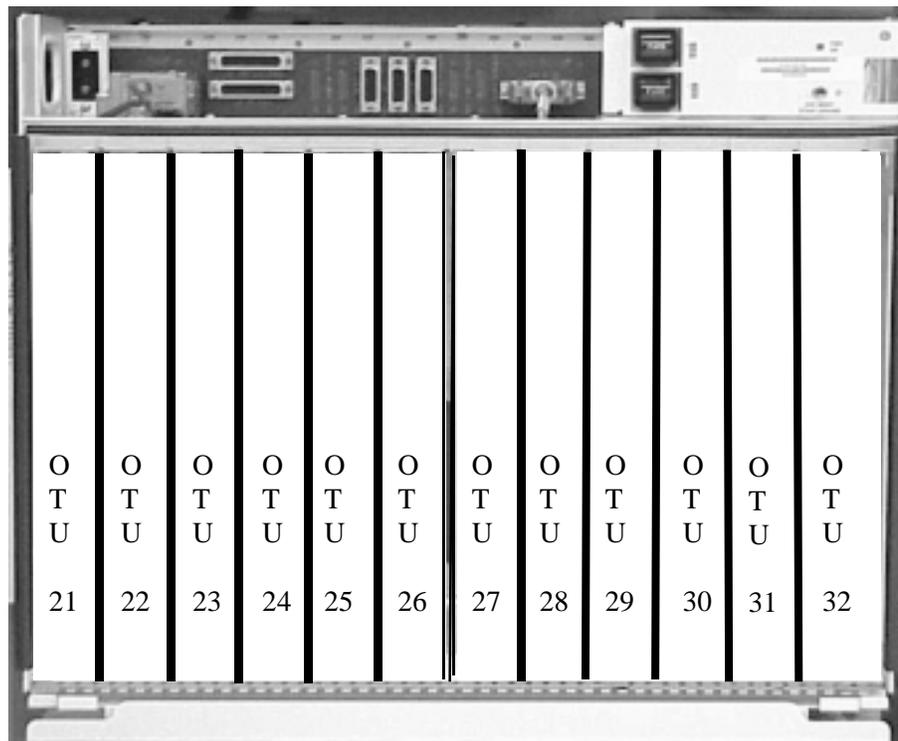
**Figure 5-2 OT System Controller Shelf Slot Positions**



**Figure 5-3 OT Complementary Shelf 1 Slot Positions**



**Figure 5-4 OT Complementary Shelf 2 Slot Positions**



**OT Shelf Circuit Packs**

There are 5 types of circuit packs used with the OT Shelves:

- Control (OTCTL)
- Optical Translator Units (OTU)
- Optical Translator Port Modules (OTPM)
- Quad-carrier units with 4 ports for OTPMs
- Unidirectional Optical Path Switched Ring (OUPSR) unit

The Optical Translator Controller (LUD1) occupies the last 3 slot positions on the right-hand side of the OT System Controller Shelf. (The slot position immediately to the left of the LUD1 OTCTL unit is unused and must be filled with a blank for forced-air considerations.)

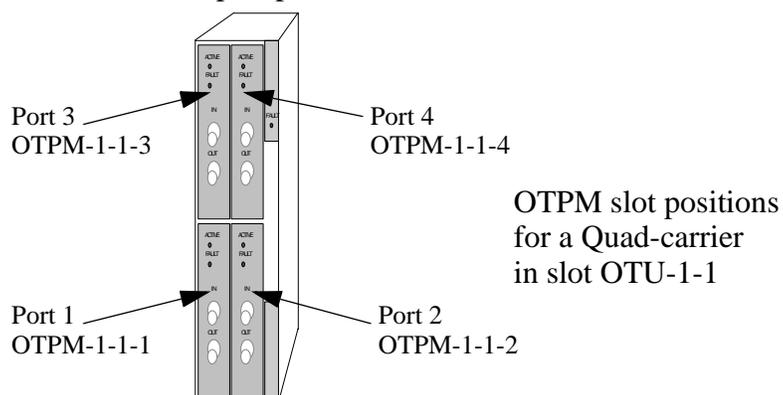
All the other slot positions in the OT Shelves are available for Optical Translator units and Quad-carrier units with OTPMs.

Note that the slot positions are designated as OTU-1 through OTU-8 on the OT System Controller Shelf, OTU-9 through OTU-20 on the OT Complementary Shelf 1 and OTU-21 through OTU-32 on the OT Complementary Shelf 2.

The first OT System Controller Shelf to be connected to the EON (OLS) Shelf is designated as the Side 1 Controller and the slot positions associated with Side 1 are designated as OTU-1-1 through OTU-1-32. If a second OT System Controller Shelf to be connected to the EON (OLS) Shelf, it will be designated as the Side 2 Controller with slot positions OTU-2-1 through OTU-2-32.

Quad-carrier units occupy 2 OTU slot positions and must be placed so that they occupy a combination of odd-even slot positions, such as OTU-1 & OTU-2 but not OTU-2 & OTU-3. A Quad-carrier to be installed in slot positions OTU-1 & OTU-2 will be assigned as slot position OTU-1.

Each Quad-carrier has 4 port positions:



**OT Circuit Pack Codes** The circuit pack codes used in the OT Shelves with Release 8.2 are:

- LUD1 Optical Translator Control (OTCTL)
- 41-type Optical Translator Units (OTU)
- Optical Translator Port Modules (OTPM)
  - 42-type
  - 43-type
  - 44-type
  - 46-type
  - 47-type
- Quad-carrier Units
  - 41S - used with 42-, 43- and 44-type OTPMs
  - 41T - used with 46-type OTPMs
  - 41U - used with 47-type OTPMs
- Optical Unidirectional Path Switched Ring (OUPSR) units
  - LEP2 - used with single-mode fiber applications
  - LEP3 - used with multi-mode fiber applications

Refer to the APG and UOG documents for more information concerning circuit pack codes used with OT Shelves.

**OT Shelves Circuit Pack Placement**

Other than for the LUD1 OTCTL, there are no pre-assigned slot positions for circuit packs in the OT Shelves. The customer engineer shall provide the installer with specific instructions for both the circuit pack codes and their assigned slot positions at each customer location.

Review General Considerations: page 5-2 before beginning this procedure. Refer to Figures 5-2, 5-3 and 5-4 for OT Shelf slot position locations.

- 
- 1** Determine from the customer engineer's instructions which circuit packs are to be placed in the OT Shelves and their assigned slot or port positions.
- 
- 2** Place, but do not seat, the OTCTL circuit pack(s) in the OT System Controller Shelf (and side 2 OT System Controller Shelf, if installed).

- 
- 3** Place, but do not seat, the OTU and Quad-carrier circuit packs into the slot positions assigned by the customer engineer.

**Important!** Be careful not to flex the Quad-carrier circuit board when placing these units in the shelf. Flexing the circuit board during installation may damage components or create an interference condition with adjacent units.

**Important!** The 41T and 41U Quad-carrier circuit packs prior to series 1:2 may have an interference problem with adjacent units. Visually inspect the outside circuit board side for either components or component leads that would extend more than 0.11 inch above the circuit board or would extend beyond the edge of the faceplate. The OT slot position to the left of the center shelf support may be used as an approximate gauge. Carefully and slowly slide the Quad-carrier into this position and observe for potential interferences with the center support. Do not install any 41T or 41U circuit packs that may have this interference problem. Contact your next level of technical support. (Refer to Problem Notification xxTBDxx.)

- 
- 4** Place, but do not seat, any OTPM circuit packs in the Quad-carrier port positions assigned by the customer engineer.

**Important!** The 41S, 41T and 41U Quad-carriers are not fully seated in their slot positions at this time.

- 
- 5** Place, but do not seat, any OUPSR circuit packs into the slot positions assigned by the customer engineer

- 
- 6** Install Appartus Filler Blanks for air flow control in any unequipped OTU or OTPM positions in the OT Shelves.

- 848825287 - Filler Blank for OTU slot positions
- 848832192 - Filler Blank for OTPM quad-carrier positions

END OF STEPS

---



# DCM Carrier

---

**Introduction** If specified by the customer engineer, Dispersion Compensation Modules (DCMs) are to be installed in the miscellaneous-mounted DCM Carrier shelf assembly. Up to 4 DCM units may be installed in a DCM Carrier.

**DCM Comcodes** The comcodes for the DCM units are:

DCM Unit	Comcode
EONDCM2.5	109199612
EONDCM5.0	109199620
EONDCM7.5	109199638
EONDCM10	109199646
EONDCM20	109199653
EONDCM30	109199661
EONDCM40	109199679
EONDCM50	109199778
EONDCM60	109199703
EONDCM70	109199711
EONDCM80	109199729
EONDCM90	109199737
EONDCM100	109199745

**Installing DCM Units** The passive DCM units are installed in the DCM Carrier positions as follows:

---

- 1 Identify where DCM units are to be installed in the miscellaneous-mounted DCM Carrier from the information (work order/job specification) provided by the customer engineer. See Figure 5-5 for the DCM position designations in the DCM Carrier.

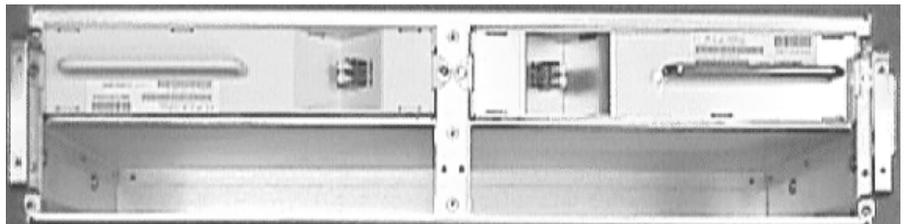
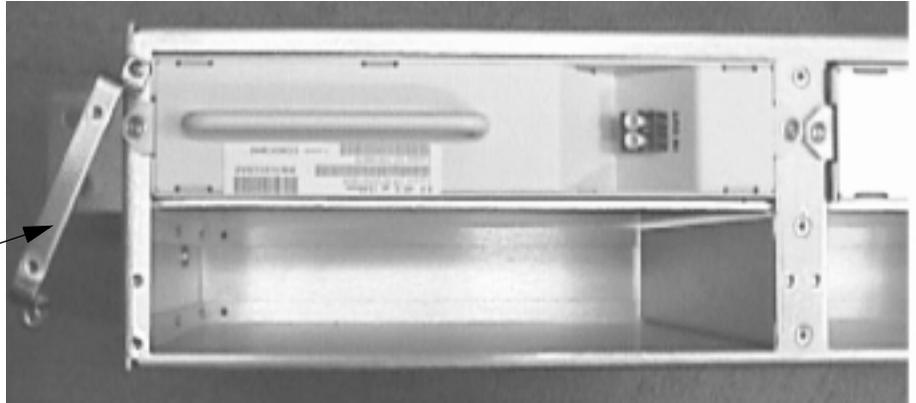
**Figure 5-5 DCM Positions in DCM Carrier**

<b>DCM 1</b>	<b>DCM 3</b>
<b>DCM 2</b>	<b>DCM 4</b>

- 
- 2** Remove the cover from the DCM Carrier by unfastening the screws holding the cover in place. Put the cover and screws aside for later reassembly.
- 
- 3** Remove one screw from the cover bracket and loosen the other screw to rotate the cover bracket to allow the DCM unit to be placed in the DCM Carrier.

**Figure 5-6 DCM Installation**

DCM Carrier  
Cover Bracket  
rotated to allow  
DCM unit to be  
installed



DCM units installed in DCM1 and DCM 3 positions. Note the orientation of DCM units in positions 1 and 2 will be "upside down" so the DCM optical ports will be located near the center.

- 
- 4** Install a DCM unit by gently sliding it into the assigned DCM Carrier position and fastening the captive screws. (There is no electrical or backplane connector associated with the passive DCM units.)

**Important!** The DCM units are placed so that the optical ports are located toward the middle of the DCM Carrier. This will allow the optical fibers to be routed with minimal bend radius.

---

- 5** Repeat Steps 3 and 4 for each DCM unit to be installed.
- 

- 6** Reassemble the cover brackets that were moved in Step 3.
- 

- 7** Reassemble the protective cover onto the DCM Carrier.

END OF STEPS

---

## Final Verification

---

### Final Verification Checklist

Verify the following items are completed to ensure that circuit packs are properly placed.:

<b>Check when done</b>	<b>Items to Check</b>
	EON (OLS) Shelf circuit packs are placed in their proper slot positions according to Network Element configuration designated by the customer engineer.
	Apparatus Filler Blanks are placed in any unoccupied OA slot positions in the EON (OLS) Shelf.
	OT Shelf circuit packs are placed in the slot positions assigned by the customer engineer.
	Apparatus Filler Blanks are placed in any unoccupied OTU or OTPM positions in OT Shelves.
	If specified for this location, DCM units are placed in the DCM Carrier positions assigned by the customer engineer.







# 6 Optical Fiber Installation

## Overview

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<b>Purpose</b>	This chapter provides the general requirements and methods for installing optical fibers for the various Network Element configurations available with the Metropolis <sup>®</sup> EON Integrated Bays and for the miscellaneous-mounted Metropolis <sup>®</sup> EON (OLS) and OT Shelves.
<b>Reason for revision</b>	This is Issue 3.0 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications.
<b>Objectives</b>	This chapter provides the installer with the necessary information and procedures for installing optical fibers in the Metropolis <sup>®</sup> EON shelves.
<b>Installation Recommendations</b>	<p>The following items should be verified at the site to support the Metropolis<sup>®</sup> EON optical fiber installation:</p> <ul style="list-style-type: none"><li>• The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.</li><li>• The procedures in Chapters 2, 3, 4 and 5 have been completed and the final verification checklists completed.</li><li>• The assigned circuit breakers off or fuses out at the BDFB (locked-out and tagged-out)</li><li>• AC power is available for use by installer.</li></ul>

- General Considerations**
- The recommended installation tools and test equipment are listed in Appendix G.
  - The customer-designated engineer shall specify and order all the optical fibers and provide the installer with an optical fiber list and fiber routing information for each shelf.
  - An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
  - Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
  - Do not remove the shelf backplane cover.
  - Optical fibers shall be connected to circuit packs that have been placed but will not be fully seated until the Network Element start up procedures in Chapter 7.

**DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

- The optical fiber information provided in this chapter is the latest information available at the time of the issue. To verify current information, refer to the appropriate application schematics (SD-6G156-01 and SD-6G157-01).
- Carefully place optical fibers in a protective tube, channel or duct when routing the optical fibers between shelves or the customer's terminating equipment.
- Carefully place optical fibers in a customer-designated duct or cable rack with nothing on top of them.
- Always maintain a minimum 1.5-inch bend radius when routing optical fibers.
- Some optical fiber connections between Metropolis<sup>®</sup> EON circuit packs will use LC-type fiber connectors. Other optical fiber connections may have ST, FC or LC-type fiber connectors as specified by the customer.

- A Metropolis<sup>®</sup> EON (OLS) that is capable of terminating the DWDM channels is designated as an End Terminal. (Refer to the Glossary in this document for terminology definitions and to the APG document for more information.)

**Important!** A Metropolis<sup>®</sup> EON (OLS) Ring Terminal application may be installed as two End Terminals in a back-to-back configuration, one 1A-TX-type End Terminal and one 1A-RCV-type End Terminal. The two End Terminals may have a Telemetry Feed Through optical fiber connection between them (1A-TX-Thru and 1A-RCV-Thru), or may use the optional LAN interface connection with an electrical cable connection.

Each End Terminal will be a separate Network Element configuration and each will be considered as a separate Node by the EON system control elements.

Follow the installation instructions for each End Terminal individually and the customer engineer's instructions concerning the connection between them for Ring Terminal applications.

**Contents** This chapter contains the following:

Metropolis <sup>®</sup> EON (OLS) Shelf	<a href="#">6-4</a>
1A-Transmit NE End Terminal Types	<a href="#">6-5</a>
1A-Receive End Terminal NE Types	<a href="#">6-17</a>
Repeater NE Type	<a href="#">6-29</a>
Dual-Facing Configurations	<a href="#">6-33</a>
OMU/ODU - OT Connections	<a href="#">6-43</a>
External Optical Connections	<a href="#">6-54</a>
Fiber Retention Gasket	<a href="#">6-75</a>
Final Verification	<a href="#">6-77</a>



# Metropolis<sup>®</sup> EON (OLS) Shelf

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**Introduction** The optical fibers to be installed in the Metropolis<sup>®</sup> EON (OLS) Shelf connect the “high-speed” DWDM transmission and supervisory functions in the Enhanced Optical Networking system. The Enhanced Optical Networking Shelf may be configured as different Network Element types depending on the circuit pack placement within the shelf. Refer to the circuit pack slot position information for the EON (OLS) Shelf in Chapter 5 for detailed information on circuit pack placement for each Network Element type.

The OTU circuit packs in the companion Optical Translator (OT) Shelves are connected to the OMU and ODU circuit packs in the EON (OLS) Shelf via “low-speed” optical fibers for individual channel multiplexing and demultiplexing.

**EON (OLS) Intra-shelf Optical Fibers** Intra-shelf optical fibers on the EON (OLS) Shelf connect between the Optical Amplifiers or Line Transmit/Receive Units and the Telemetry and the OMU/ODU circuit packs.

The optical ports on the Optical Amplifiers, Line Receive/Transmit Units and Telemetry circuit packs are equipped with universal build-out blocks. These ports may be equipped with either ST, SC or FC-type optical connectors or LBOs. The intra-shelf optical fibers should be ordered by the customer engineer to match the optical connector type ordered for these circuit packs.

The optical ports on the OMU and ODU circuit packs are equipped with LC-type connectors. The intra-shelf optical fibers should be ordered by the customer engineer with LC-type connectors on one end to match the OMU and ODU circuit packs.

**Optical Fiber Labels** Labels for the optical fibers are provided to identify the fiber connection ports should the optical fibers need to be removed and reinstalled at a later time.

**LBO Selection/Placement** Line Build-Out units (LBOs) may need to be installed at the universal build-out ports as specified to attenuate the optical power out from or into circuit pack optical ports. Refer to Appendix F for more information concerning LBOs and Universal Build-out ports.



## 1A-Transmit NE End Terminal Types

---

**Description** This section provides the methods for installing optical fibers in the EON (OLS) Shelf for the following 1A-Transmit End Terminal Network Element types:

1A-TX NE Type	Procedure
2-OA 1A-TX & 1A-TX-Thru	page 6-6
1-OA 1A-TX & 1A-TX-Thru	page 6-10
2-OA 1A-TX-32 & 1A-TX-Thru-32 (See OA3 DCM note below)	page 6-14
1-OA 1A-TX-32 & 1A-TX-Thru-32 and 0-OA 1A-TX-32 & 1A-TX-Thru-32 (See OA3 notes below)	page 6-15

### OA3 Notes:

- **OA3 OUT port:** The OA3 Optical Amplifier (LEA307) is capable of Class IIIb/3B operation when more than 16 channels are equipped. The OA3 may be damaged if a dirty optical fiber or LBO is connected to the OUT port. Clean and/or inspect optical fibers and LBOs before installing them at an OA3 Optical Amplifier
- **OA3 DCM :** The OA3 Optical Amplifier has DCM IN and DCM OUT ports that require an optical fiber connection. Refer to Figures 6-xx and 6-xx for the DCM optical fiber connections.

Optical fibers for the EON (OLS) Shelf are provided as part of the kits ordered with the miscellaneous-mounted EON (OLS) Shelf or with the Integrated Bay. Follow the procedures in this section to connect and route optical fibers within the EON (OLS) Shelf.

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A->2A and 1B->2B. The 32-channel ready NEs are one-line configurations only and no circuit packs should be installed in the OA-2A and 2B positions.

When completed with the optical fiber installation for the NE type in this section, continue with the associated OMU/ODU - OT Connections: page 6-43.

**2-OA 1A-TX & 1A-TX-Thru** The EON (OLS) intrashelf optical fiber connections are the same for the 2-OA 1A-TX and 2-OA 1A-TX-Thru NE configurations. Refer to Figures 6-1 through 6-4 for connection and routing information.

.....

**1** Identify the intrashelf optical fibers required from Table 6-1. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

.....

**2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-1.

.....

**3** Replace the 0-dB LBO equipped at the OUT port on the OA in the OA-1B (and 2B) position with a 7-dB LBO from the LBO kit.

.....

**4** Route the optical fibers as shown in Figures 6-1 through 6-4. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

.....

**5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

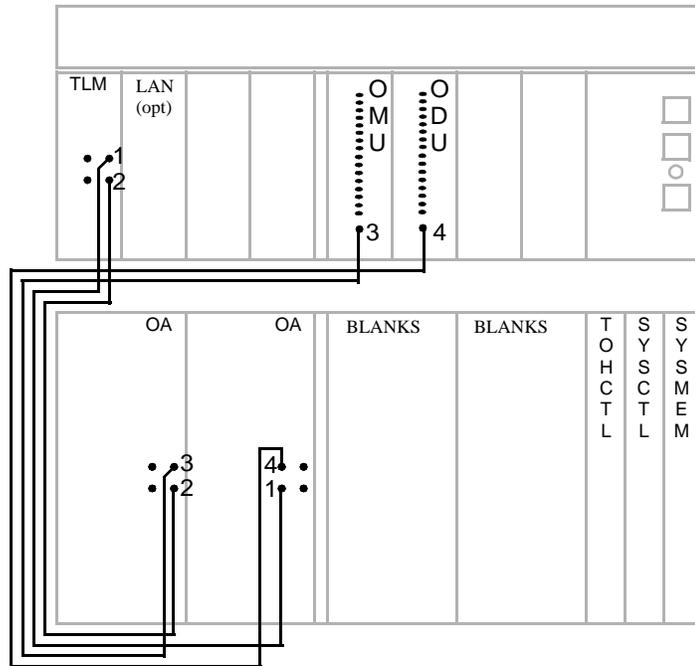
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**6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

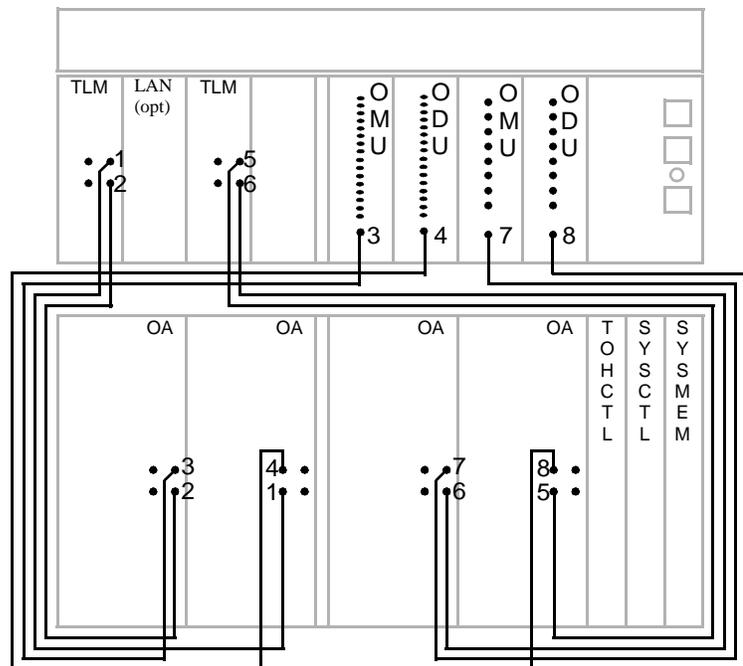
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**Figure 6-1 One-Line, 2-OA 1A-TX Intrashelf Optical Fibers**



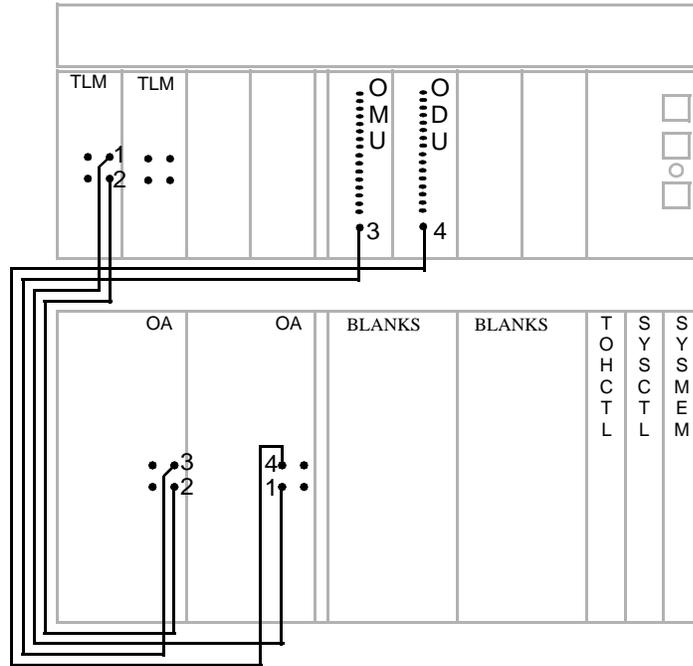
(Replace 0-dB LBO at OA-1B OUT port - Fiber ID #4)

**Figure 6-2 Two-Line, 2-OA 1A-TX Intrashelf Optical Fibers**



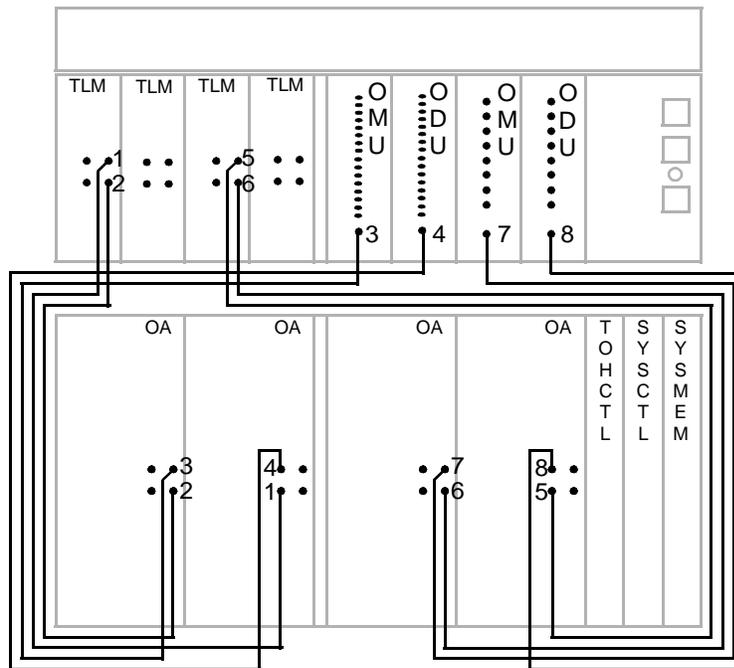
(Replace 0-dB LBO at OA-1B(&2B) OUT port - Fiber ID #4 & #8)

**Figure 6-3 One-Line, 2-OA 1A-TX-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at OA-1B OUT port - Fiber ID #4)

**Figure 6-4 Two-Line, 2-OA 1A-TX-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at OA-1B(&2B) OUT port - Fiber ID #4 & #8)

**Table 6-1 Optical Fibers and Labels for 2-OA 1A-TX and 1A-TX-Thru End Terminals**

Line	Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	1	50 inches	TLM 1A	IN	1A-TLM-IN
			OA 1B	TLM OUT	1B-OA-TLMOUT
	2	50 inches	TLM 1A	OUT	1A-TLM-OUT
			OA 1A	TLM IN	1A-OA-TLMIN
	3	50 inches	OMU 1A	OMU OUT	1-OMU-OUT
			OA 1A	IN	1A-OA-IN
	4	50 inches	ODU 1B	ODU IN	1-ODU-IN
			OA 1B	OUT	1B-OA-OUT
2	5	50 inches	TLM 2A	IN	2A-TLM-IN
			OA 2B	TLM OUT	2B-OA-TLMOUT
	6	50 inches	TLM 2A	OUT	2A-TLM-OUT
			OA 2A	TLM IN	2A-OA-TLMIN
	7	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
			OA 2A	IN	2A-OA-IN
	8	50 inches	ODU 2B	ODU IN	2-ODU-IN
			OA 2B	OUT	2B-OA-OUT

(Refer to Figures 6-1 through 6-4 for fiber ID information.)

**1-OA 1A-TX & 1A-TX-Thru** The EON (OLS) intrashelf optical fiber connections are the same for the 1-OA 1A-TX and 1-OA 1A-TX-Thru NE configurations. Refer to Figures 6-5 through 6-8 for connection and routing information.

.....

**1** Identify the intrashelf optical fibers required from Table 6-2. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

.....

**2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-2.

.....

**3** Replace the 0-dB LBO equipped at the IN port on the TLM in the TLM-1A (and 2A) position with a 5-dB LBO from the LBO kit.

.....

**4** Route the optical fibers as shown in Figures 6-5 through 6-8. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

.....

**5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

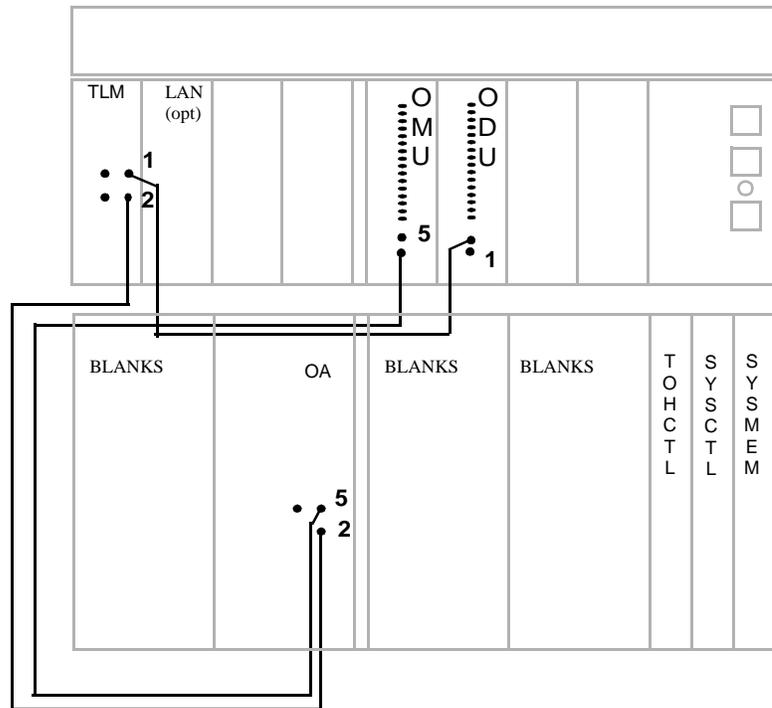
.....

**6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

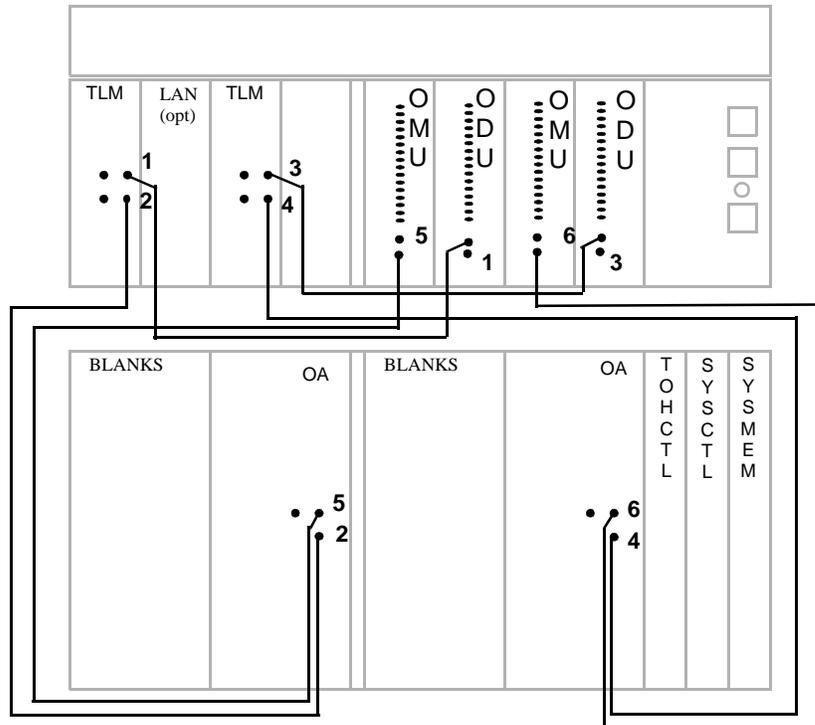
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**Figure 6-5 One-Line, 1-OA 1A-TX Intrashelf Optical Fibers**



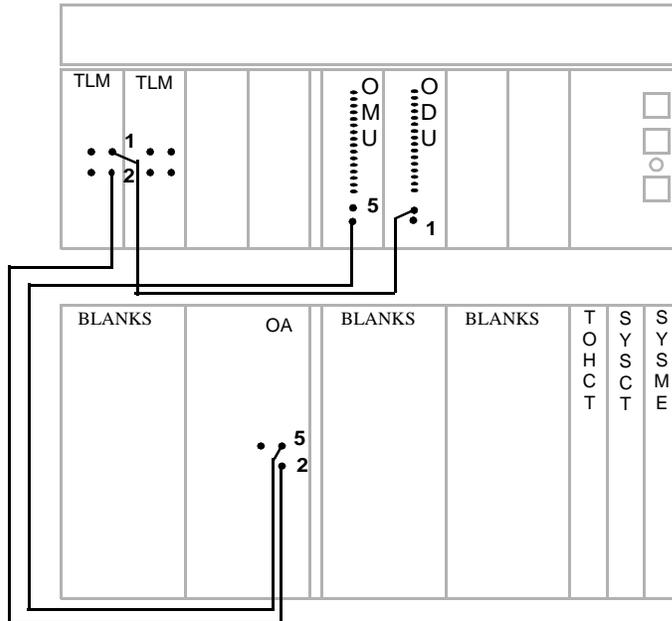
(Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Figure 6-6 Two-Line, 1-OA 1A-TX Intrashelf Optical Fibers**



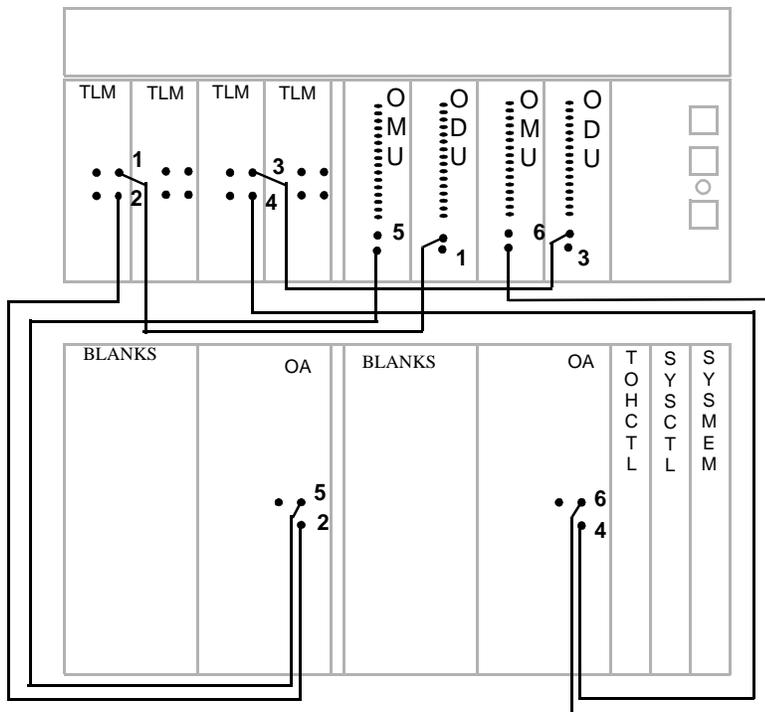
(Replace 0-dB LBO at TLM 1A(2A) IN port - Fiber ID #1 & #3)

**Figure 6-7 One-Line, 1-OA 1A-TX-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Figure 6-8 Two-Line, 1-OA 1A-TX-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at TLM 1A(2A) IN port - Fiber ID #1 & #3)

**Table 6-2 1-OA 1A-TX and 1-OA 1A-TX-Thru Intrashelf Optical Fibers**

<b>Line</b>	<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
1	1	50 inches	TLM 1A	IN	1A-TLM-IN
			ODU 1B	TLM OUT	1-ODU-TLMOUT
	2	50 inches	TLM 1A	OUT	1A-TLM-OUT
			OA 1B	TLM IN	1B-OA-TLMIN
	5	50 inches	OMU 1A	OMU OUT	1-OMU-OUT
			OA 1B	IN	1B-OA-IN
2	3	50 inches	TLM 2A	IN	2A-TLM-IN
			ODU 2B	TLM OUT	2-ODU-TLMOUT
	4	50 inches	TLM 2A	OUT	2A-TLM-OUT
			OA 2B	TLM IN	2B-OA-TLMIN
	6	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
			OA 2B	IN	2B-OA-IN

(Refer to Figures 6-5 through 6-8 for fiber ID information.)

**2-OA 1A-TX-32 & 1A-TX-Thru-32**

The EON (OLS) intrashelf optical fiber connections are the same for the 2-OA 1A-TX-32 and 2-OA 1A-TX-Thru-32 NE configurations. These 32-channel ready NEs are one-line configurations only and no circuit packs should be positioned in the line 2 slot positions. (Appartus Filler Blanks should be in the OA-2A and 2B positions.) Refer to Figure 6-9 for connection and routing information.

The OMU32 and ODU32 units may not be equipped at the initial installation. They may be added at a later time.

- 
- 1 Identify the intrashelf optical fibers required from Table 6-3. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

---

  - 2 Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-3.

---

  - 3 Replace the 0-dB LBO equipped at the OUT port on the OA in the OA-1B position with a 7-dB LBO from the LBO kit.

---

  - 4 Route the optical fibers as shown in Figure 6-9. Carefully dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

---

  - 5 Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

---

  - 6 Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

---

**1-OA 1A-TX-32 & 1A-TX-32-Thru and 0-OA 1A-TX-32 & 1A-TX-32-Thru**

The EON (OLS) intrashelf optical fiber connections for the 1-OA 1A-TX-32 and 1-OA 1A-TX-32-Thru NE configurations are the same as for the 2-OA configurations. (The LIRCV unit is connected the same as an OA.)

The EON (OLS) intrashelf optical fiber connections for the 0-OA 1A-TX-32 and 0-OA 1A-TX-32-Thru NE configurations are also the same as for the 2-OA configurations. (The LITX and LIRCV units are connected the same as the OAs.)

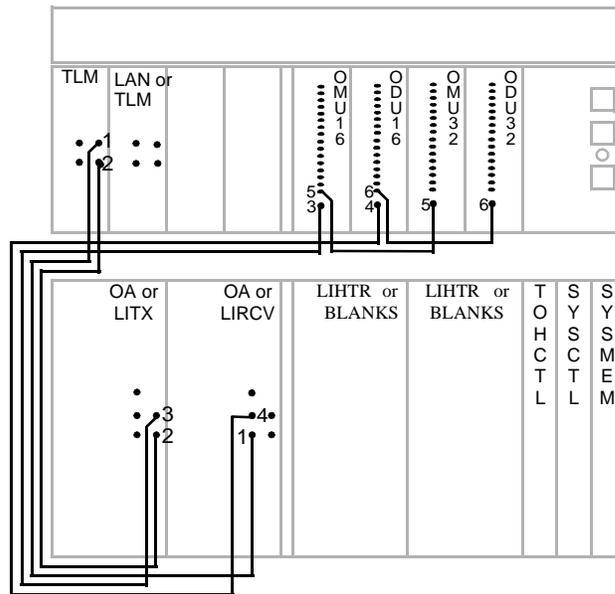
All these 32-channel ready NEs are one-line configurations only and no circuit packs should be positioned in the line 2 slot positions. (Appartus Filler Blanks should be in the OA-2A and 2B positions.) Refer to Figure 6-9 for connection and routing information.

Follow the procedures for 2-OA systems and refer to Figure 6-9 and Table 6-3 for optical fiber information concerning the 1-OA and 0-OA 32-channel ready configurations.

For 0-OA NE configurations, replace the 0-dB LBO equipped at the IN port of the TLM in the TLM-1A position with a 10-dB LBO from the LBO kit.

The OMU32 and ODU32 units may not be equipped at the initial installation. They may be added by the customer at a later time.

**Figure 6-9 1A-TX-32 and 1A-TX-32-Thru Intrashelf Optical Fibers**



(2-OA NEs: Replace 0-dB LBO at OA-1B OUT port - Fiber ID #4)  
 (1/0-OA NEs: Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Table 6-3 2/1/0-OA 1A-TX-32 and 2/1/0-OA 1A-TX-32-Thru Intrashelf Optical Fibers**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
		OA 1B or LIRC V	TLM OUT	1B-OA-TLMOUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
		OA 1A or LITX	TLM IN	1A-OA-TLMIN
3	50 inches	OMU 1A	1-32 OUT	1-OMU-OUT
		OA 1A or LITX	IN	1A-OA-IN
4	50 inches	ODU 1B	1-32 IN	1-ODU-IN
		OA 1B or LIRC V	OUT	1B-OA-OUT
5	TBD inches	OMU 2A	17-32 OUT	2-OMU-32-OUT
		OMU 1A	17-32 IN	1-OMU-32-IN
6	TBD inches	ODU 1B	17-32 OUT	1-ODU-32-OUT
		ODU 2B	17-32 IN	2-ODU-32-IN

## 1A-Receive End Terminal NE Types

---

**Description** This section provides the methods for installing optical fibers in the EON (OLS) Shelf for the following 1A-Receive End Terminal Network Element types:

1A-TX NE Type	Procedure
2-OA 1A-RCV & 1A-RCV-Thru	page 6-18
1-OA 1A-RCV & 1A-RCV-Thru	page 6-22
2-OA 1A-RCV-32 & 1A-RCV-Thru-32 (See OA3 DCM note below)	page 6-26
1-OA 1A-RCV-32 & 1A-RCV-Thru-32 and 0-OA 1A-RCV-32 & 1A-RCV-Thru-32 (See OA3 notes below)	page 6-27

### OA3 Notes:

- **OA3 OUT port:** The OA3 Optical Amplifier (LEA307) is capable of Class IIIb/3B operation when more than 16 channels are equipped. The OA3 may be damaged if a dirty optical fiber or LBO is connected to the OUT port. Clean and/or inspect optical fibers and LBOs before installing them at an OA3 Optical Amplifier
- **OA3 DCM :** The OA3 Optical Amplifier has DCM IN and DCM OUT ports that require an optical fiber connection. Refer to Figures 6-xx and 6-xx for the DCM optical fiber connections.

Optical fibers for the EON (OLS) Shelf are provided as part of the kits ordered with the miscellaneous-mounted shelf or with the Integrated Bay. Follow the procedures in this section to connect and route optical fibers within the EON (OLS) Shelf.)

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A->2A and 1B->2B. The 32-channel ready NEs are one-line configurations only and no circuit packs should be installed in the OA-2A and 2B positions.

When completed with the optical fiber installation for the NE type in this section, continue with the associated OMU/ODU - OT Connections: page 6-43.

**2-OA 1A-RCV & 1A-RCV-Thru**

The EON (OLS) intrashelf optical fiber connections are the same for the 2-OA 1A-TX and 2-OA 1A-TX-Thru NE configurations. Refer to Figures 6-10 through 6-13 for connection and routing information.

- 
- 1** Identify the intrashelf optical fibers required from Table 6-4. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

---

  - 2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-4.

---

  - 3** Replace the 0-dB LBO equipped at the OUT port on the OA in the OA-1A (and 2A) position with a 7-dB LBO from the LBO kit.

---

  - 4** Route the optical fibers as shown in Figures 6-10 through 6-13. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

---

  - 5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

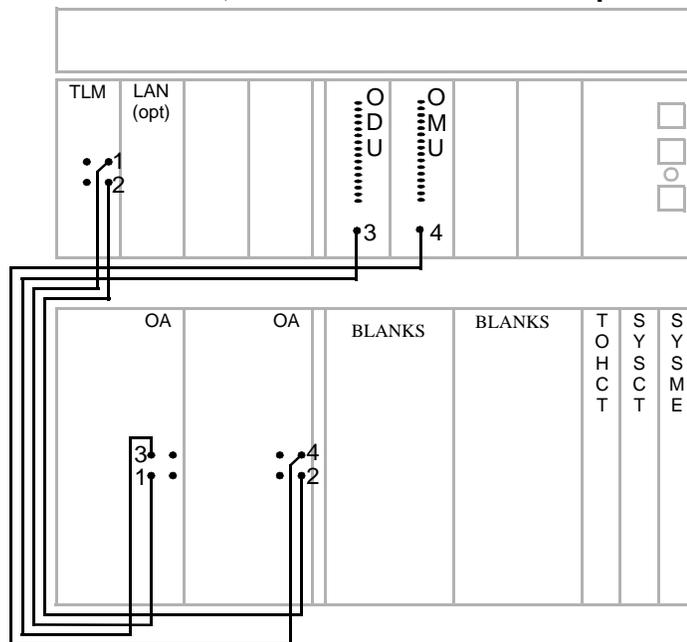
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  - 6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

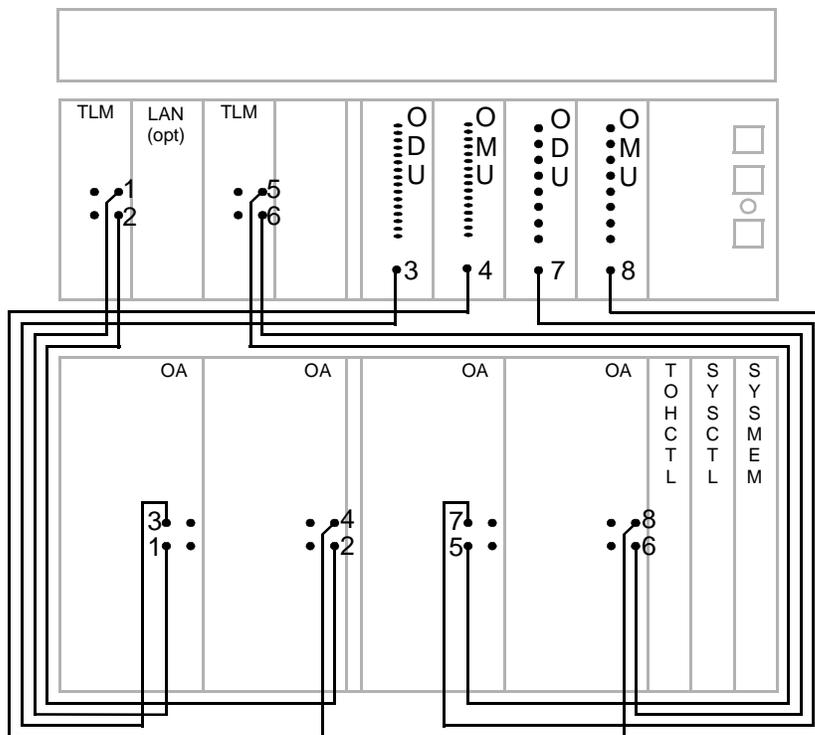
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**Figure 6-10 One-Line, 2-OA 1A-RCV Intrashelf Optical Fibers**



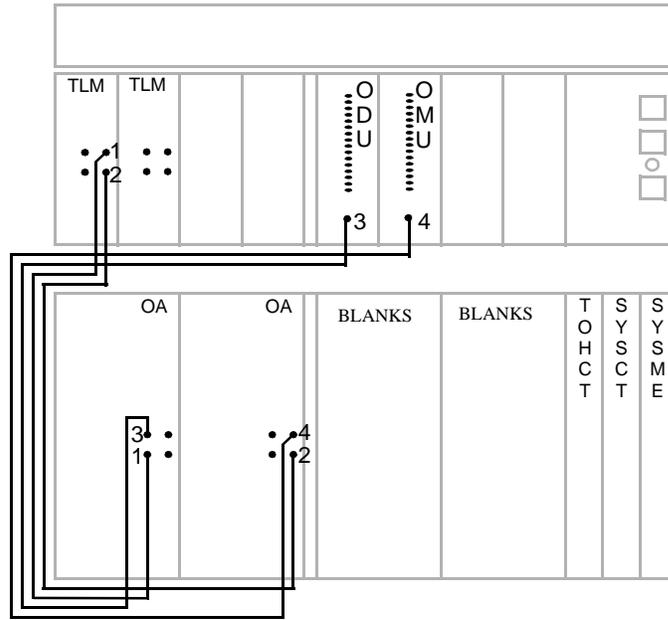
(Replace 0-dB LBO at OA-1A OUT port - Fiber ID #3)

**Figure 6-11 Two-Line, 2-OA 1A-RCV Intrashelf Optical Fibers**



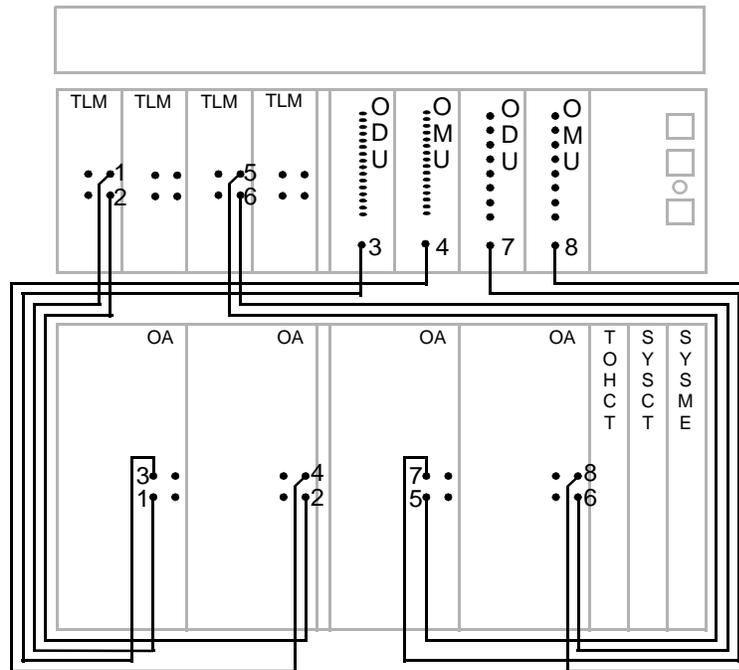
(Replace 0-dB LBO at OA-1A(&2A) OUT port - Fiber ID #3 & #7)

**Figure 6-12 One-Line, 2-OA 1A-RCV-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at OA-1A OUT port - Fiber ID #3)

**Figure 6-13 Two-Line, 2-OA 1A-RCV-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at OA-1A(&2A) OUT port - Fiber ID #3 & #7)

**Table 6-4 2-OA 1A-RCV and 2-OA 1A-RCV-Thru Intrashelf Optical Fibers**

<b>Line</b>	<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
1	1	50 inches	TLM 1A	IN	1A-TLM-IN
			OA 1A	TLM OUT	1A-OA-TLMOUT
	2	50 inches	TLM 1A	OUT	1A-TLM-OUT
			OA 1B	TLM IN	1B-OA-TLMIN
	3	50 inches	ODU 1A	ODU IN	1-ODU-IN
			OA 1A	OUT	1A-OA-OUT
	4	50 inches	OMU 1B	OMU OUT	1-OMU-OUT
			OA 1B	IN	1B-OA-IN
2	5	50 inches	TLM 2A	IN	2A-TLM-IN
			OA 2A	TLM OUT	2A-OA-TLMOUT
	6	50 inches	TLM 2A	OUT	2A-TLM-OUT
			OA 2B	TLM IN	2B-OA-TLMIN
	7	50 inches	ODU 2A	ODU IN	2-ODU IN
			OA 2A	OUT	2A-OA-OUT
	8	50 inches	OMU 2B	OMU OUT	2-OMU OUT
			OA 2B	IN	2B-OA-IN

(Refer to Figures 6-10 through 6-13 for fiber ID information.)

**1-OA 1A-RCV & 1A-RCV-Thru**

The EON (OLS) intrashelf optical fiber connections are the same for the 1-OA 1A-RCV and 1-OA 1A-RCV-Thru NE configurations. Refer to Figures 6-14 through 6-17 for connection and routing information.

.....

- 1** Identify the intrashelf optical fibers required from Table 6-5. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

.....

- 2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-5.

.....

- 3** Replace the 0-dB LBO equipped at the IN port on the TLM in the TLM-1A (and 2A) position with a 5-dB LBO from the LBO kit.

.....

- 4** Route the optical fibers as shown in Figures 6-14 through 6-17. Dress the optical fibers into the fiber guide and fiber channel in front below the circuit packs.

.....

- 5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

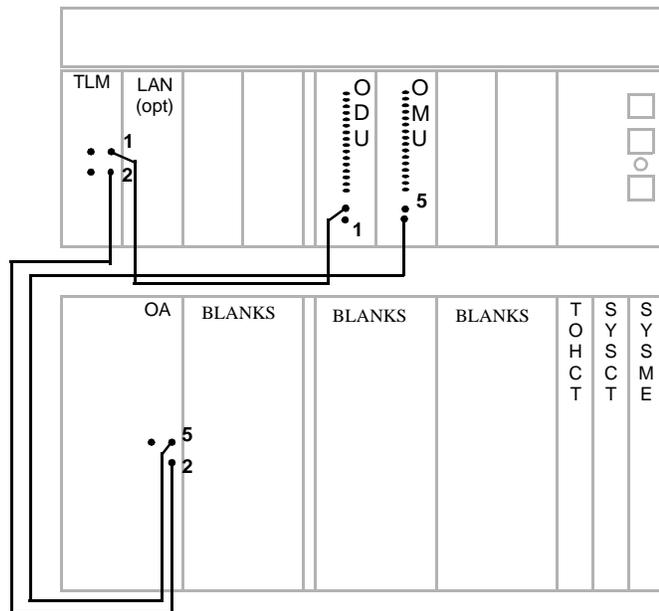
.....

- 6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

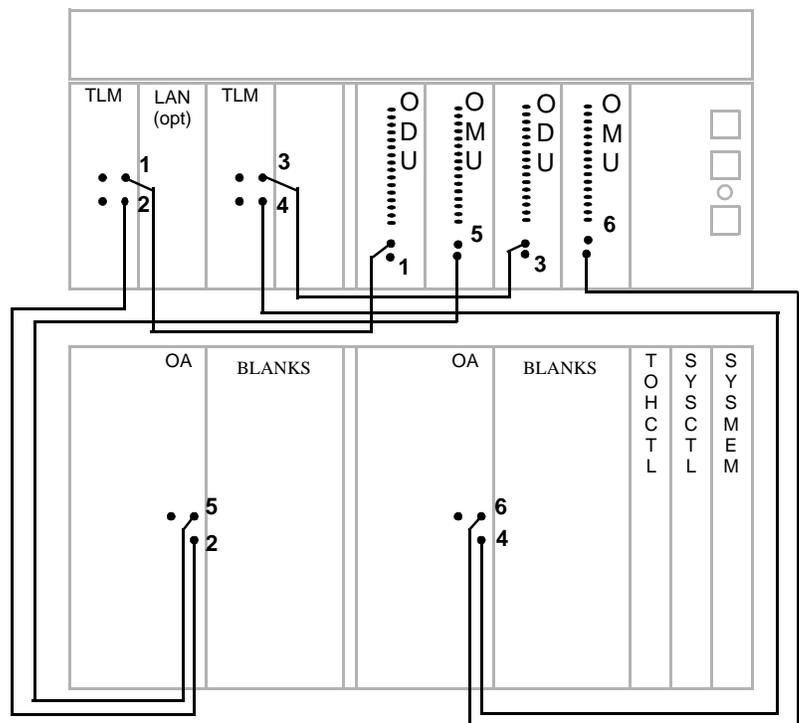
.....

**Figure 6-14 One-Line, 1-OA 1A-RCV Intrashelf Optical Fibers**



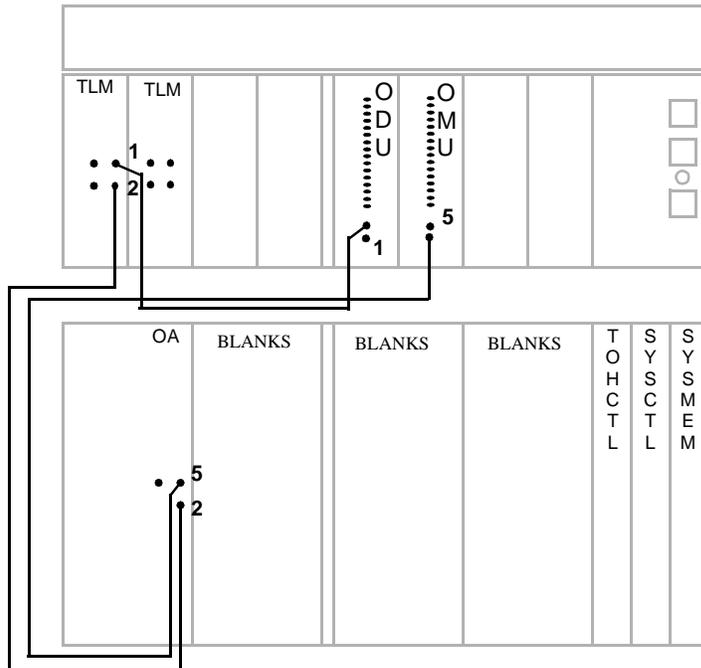
(Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Figure 6-15 Two-Line, 1-OA 1A-RCV Intrashelf Optical Fibers**



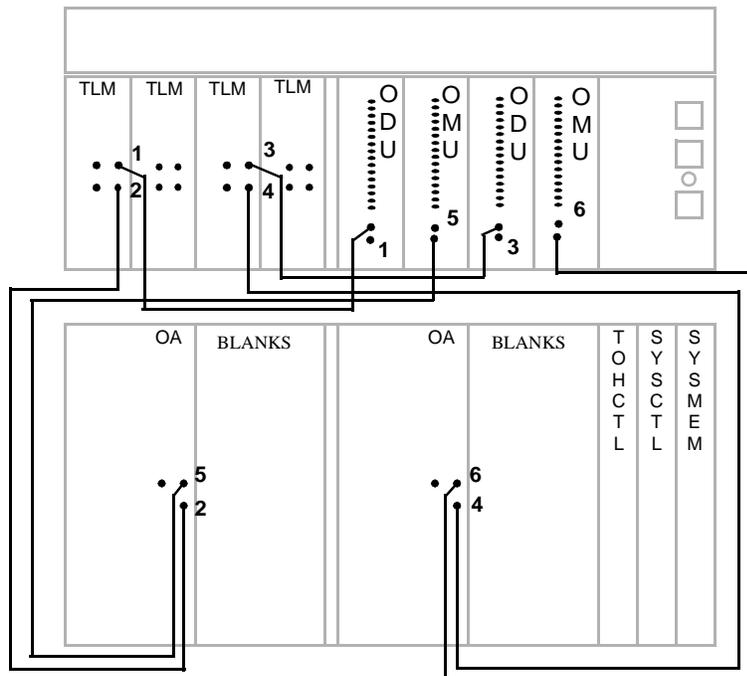
(Replace 0-dB LBO at TLM 1A(&2A) IN port - Fiber ID #1 & #3)

**Figure 6-16 One-Line, 1-OA 1A-RCV-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Figure 6-17 Two-Line, 1-OA 1A-RCV-Thru Intrashelf Optical Fibers**



(Replace 0-dB LBO at TLM 1A(&2A) IN port - Fiber ID #1 & #3)

**Table 6-5 1-OA 1A-RCV and 1-OA 1A-RCV-Thru Intrashelf Optical Fibers**

<b>Line</b>	<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
1	1	50 inches	TLM 1A	IN	1A-TLM-IN
			ODU 1A	TLM OUT	1-ODU-TLMOUT
	2	50 inches	TLM 1A	OUT	1A-TLM-OUT
			OA 1A	TLM IN	1A-OA-TLMIN
	5	50 inches	OMU 1B	OMU OUT	1-OMU-OUT
			OA 1A	IN	1A-OA-IN
2	3	50 inches	TLM 2A	IN	2A-TLM-IN
			ODU 2A	TLM OUT	2-ODU-TLMOUT
	4	50 inches	TLM 2A	OUT	2A-TLM-OUT
			OA 2A	TLM IN	2A-OA-TLMIN
	6	50 inches	OMU 2B	OMU OUT	2-OMU-OUT
			OA 2A	IN	2A-OA-IN

**2-OA 1A-RCV-32 & 1A-RCV-32-Thru**

The EON (OLS) intrashelf optical fiber connections are the same for the 2-OA 1A-RCV-32 and 2-OA 1A-RCV-32-Thru NE configurations. These 32-channel ready NEs are one-line configurations only and no circuit packs should be positioned in the line 2 slot positions. (Apparatus Filler Blanks should be in the OA-2A and 2B positions.) Refer to Figure 6-18 for connection and routing information.

The OMU32 and ODU32 units may not be equipped at the initial installation. They may be added at a later time.

- 
- 1** Identify the intrashelf optical fibers required from Table 6-6. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

---

  - 2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-6.

---

  - 3** Replace the 0-dB LBO equipped at the OUT port on the OA in the OA-1A position with a 7-dB LBO from the LBO kit.

---

  - 4** Route the optical fibers as shown in Figure 6-9. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

---

  - 5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

---

  - 6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

END OF STEPS

---

**1-OA 1A-RCV-32 & 1A-RCV-32-Thru and 0-OA 1A-RCV-32 & 1A-RCV-32-Thru**

The EON (OLS) intrashelf optical fiber connections for the 1-OA 1A-RCV-32 and 1-OA 1A-RCV-32-Thru NE configurations are the same as the 2-OA configurations. (The LINRCV unit is connected the same as an OA.)

The EON (OLS) intrashelf optical fiber connections for the 0-OA 1A-RCV-32 and 0-OA 1A-RCV-32-Thru NE configurations are the same as the 2-OA configurations. (The LINRCV and LINTX units are connected the same as the OAs.)

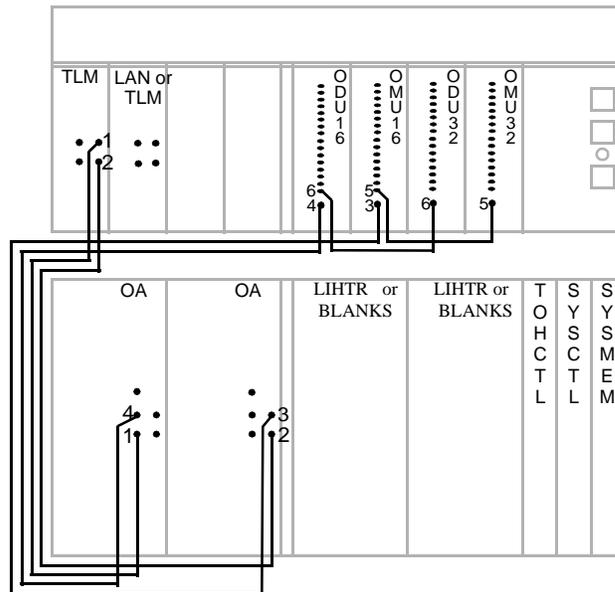
All these 32-channel ready NEs are one-line configurations only and no circuit packs should be positioned in the line 2 slot positions. Refer to Figure 6-18 for connection and routing information.

Follow the procedures above for 2-OA systems and refer to Figure 6-18 and Table 6-6 for optical fiber information concerning the 1-OA and 0-OA 32-channel ready configurations.

For 0-OA NE configurations, replace the 0-dB LBO equipped at the IN port of the TLM in the TLM-1A position with a 10-dB LBO from the LBO kit.

The OMU32 and ODU32 units may not be equipped at the initial installation. They may be added by the customer at a later time.

**Figure 6-18 1A-RCV-32 and 1A-RCV-32-Thru Intrashelf Optical Fibers**



(2-OA NEs: Replace 0-dB LBO at OA-1A OUT port - Fiber ID #4)  
 (1/0-OA NEs: Replace 0-dB LBO at TLM 1A IN port - Fiber ID #1)

**Table 6-6 2/1/0-OA 1A-RCV-32 and 2/1/0-OA 1A-RCV-32-Thru Intrashelf Optical Fibers**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
		OA 1A or LIRCV	TLM OUT	1A-OA-TLMOUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
		OA 1B or LITX	TLM IN	1B-OA-TLMIN
3	50 inches	OMU 1B	1-32 OUT	1-OMU-OUT
		OA 1B or LITX	IN	1B-OA-IN
4	50 inches	ODU 1A	1-32 IN	1-ODU-IN
		OA 1A or LIRCV	OUT	1A-OA-OUT
5	TBD inches	OMU 2B	17-32 OUT	2-OMU-32-OUT
		OMU 1B	17-32 IN	1-OMU-32-IN
6	TBD inches	ODU 1A	17-32 OUT	1-ODU-32-OUT
		ODU 2A	17-32 IN	2-ODU-32-IN

## Repeater NE Type

---

**Description** This section provides the methods for installing optical fibers in the EON (OLS) Shelf for the Repeater Network Element type.

Optical fibers for the EON (OLS) Shelf are provided as part of the kits ordered with the miscellaneous-mounted shelf. Follow the procedures in this section to connect and route optical fibers within the EON (OLS) Shelf.)

**OA3 Notes:**

- **OA3 OUT port:** The OA3 Optical Amplifier (LEA307) is capable of Class IIIb/3B operation when more than 16 channels are equipped. The OA3 may be damaged if a dirty optical fiber or LBO is connected to the OUT port. Clean and/or inspect optical fibers and LBOs before installing them at an OA3 Optical Amplifier
- **OA3 DCM :** The OA3 Optical Amplifier has DCM IN and DCM OUT ports that require an optical fiber connection. Refer to Figures 6-xx and 6-xx for the DCM optical fiber connections.

**Important!** The procedures in this section are presented for one-line systems. For two-line systems, follow the one-line procedures substituting the slot position designations 1A->2A and 1B->2B. The 32-channel ready NEs are one-line configurations only and no circuit packs should be installed in the OA-2A and 2B positions.

When completed with the optical fiber installation for the NE type in this section, continue with External Optical Connections: page 6-54.

**Repeater Shelf** There are no OMU and ODU circuit packs installed at a Repeater Shelf. The EON (OLS) intrashelf optical fibers consist only of the telemetry connections in each direction of transmission. Refer to Figures 6-19 and 6-20 for connection and routing information.

---

- 1** Identify the intrashelf optical fibers required from Table 6-7. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

---

- 2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-7.

---

- 3** Route the optical fibers as shown in Figures 6-19 and 6-20. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

---

- 4** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

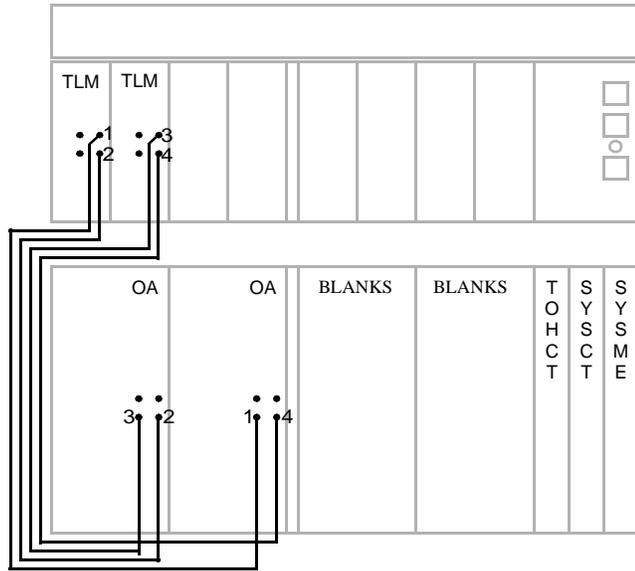
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- 5** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

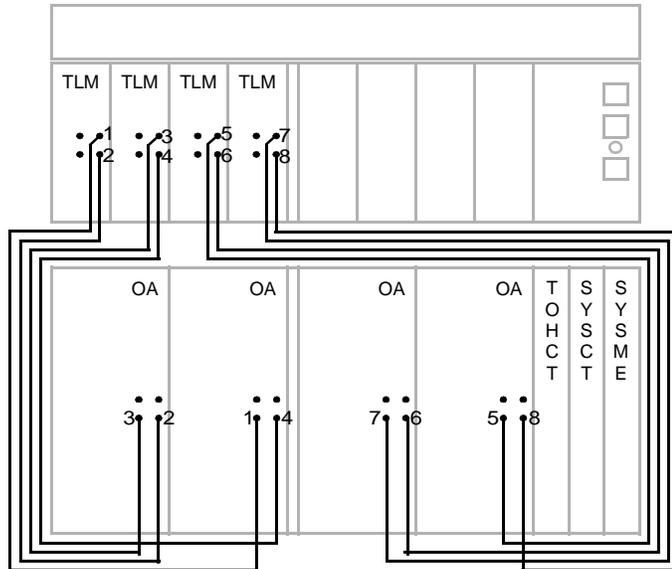
END OF STEPS

---

**Figure 6-19 One-Line Repeater Intrashelf Optical Fibers**



**Figure 6-20 Two-Line Repeater Intrashelf Optical Fibers**



**Table 6-7 Repeater Intrashelf Optical Fibers**

<b>Line</b>	<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
1	1	50 inches	TLM 1A	IN	1A-TLM-IN
			OA 1B	TLM OUT	1B-OA-TLM-OUT
	2	50 inches	TLM 1A	OUT	1A-TLM-OUT
			OA 1A	TLM IN	1A-OA-TLMIN
	3	50 inches	TLM 1B	IN	1B-TLM-IN
			OA 1A	OUT	1A-OA-TLM-OUT
	4	50 inches	TLM 1B	OUT	1B-TLM-OUT
			OA 1B	TLM IN	1B-OA-TLM-IN
2	5	50 inches	TLM 2A	IN	2A-TLM-IN
			OA 2B	TLM OUT	2B-OA-TLM-OUT
	6	50 inches	TLM 2A	OUT	2A-TLM-OUT
			OA 2A	TLM IN	2A-OA-TLMIN
	7	50 inches	TLM 2B	IN	2B-TLM-IN
			OA 2A	OUT	2A-OA-TLM-OUT
	8	50 inches	TLM 2B	OUT	2B-TLM-OUT
			OA 2B	TLM IN	2B-OA-TLM-IN



## Dual-Facing Configurations

---

**Description** This section provides the methods for installing optical fibers in the EON (OLS) Shelf for the Dual-Facing End Terminal Network Element types.

Dual-Facing shelves are configured as a 1A-RCV NE-type in Line 1 slot positions and as a 1A-TX NE-type in Line 2 slot positions. Many combinations of the different NE types may be configured in a Dual-Facing shelf. The 32-wavelength applications are not supported, although the LE207 OA2 or LEA307 OA3 (without DCM units) may be installed.

Some typical combinations are shown in this section.

Dual-Facing NE Type Combinations	Figure and Table
2-OA 1A-RCV/TX & 2-OA 1A-RCV/TX-Thru	page 6-35
1-OA 1A-RCV/TX 1-OA 1A-RCV/TX-Thru	page 6-37
1-OA 1A-RCV/TX-32 1-OA 1A-RCV/TX-Thru-32	page 6-39
0-OA 1A-RCV/TX-32 0-OA 1A-RCV/TX-Thru-32	page 6-41

Optical fibers for the EON (OLS) Shelf are provided as part of the kits ordered with the miscellaneous-mounted shelf or with the Integrated Bay. Follow the procedures in this section to connect and route optical fibers within the EON (OLS) Shelf.)

When completed with the optical fiber installation for the NE type in this section, continue with the associated OMU/ODU - OT Connections: page 6-43.

**Dual Facing NE Types**

The engineer or customer shall identify the Network Element types for the Line 1 (1A-RCV NE-type) and Line 2 (1A-TX NE-type) sides of the Dual Facing shelf. Note that each side may be equipped differently, such as: 2-OA/2-OA, 2-OA/1-OA, 0-AO/2-OA, etc.

The optical fibers shall be installed using the procedures from the 1A-Transmit and 1A-Receive End Terminals NE Type sections. Some typical Dual-Facing combinations are described in this section.

- 
- 1** Identify the intrashelf optical fibers required from Table 6-6. Note that the optical fiber connectors need to match the optical port connectors selected by the customer.

---

  - 2** Apply the fiber labels from the fiber kit to the connector ends of the of the optical fibers as specified in Table 6-6.

---

  - 3** 2-OA: Replace the 0-dB LBO equipped at the OUT port on the OA in the OA-1A and the 2B position with a 7-dB LBO from the LBO kit.  
  
1-OA: Replace the 0-dB LBO equipped at the IN port of the TLM in the TLM-1A (or 2A) positions with a 5-dB LBO from the LBO kit.  
  
0-OA: Replace the 0-dB LBO equipped at the IN port of the TLM in the TLM-1A (or 2A) positions with a 10-dB LBO from the LBO kit

---

  - 4** Route the optical fibers as suggested in Figure 6-9. Dress the optical fibers into the fiber guide and fiber channel in front and below the circuit packs.

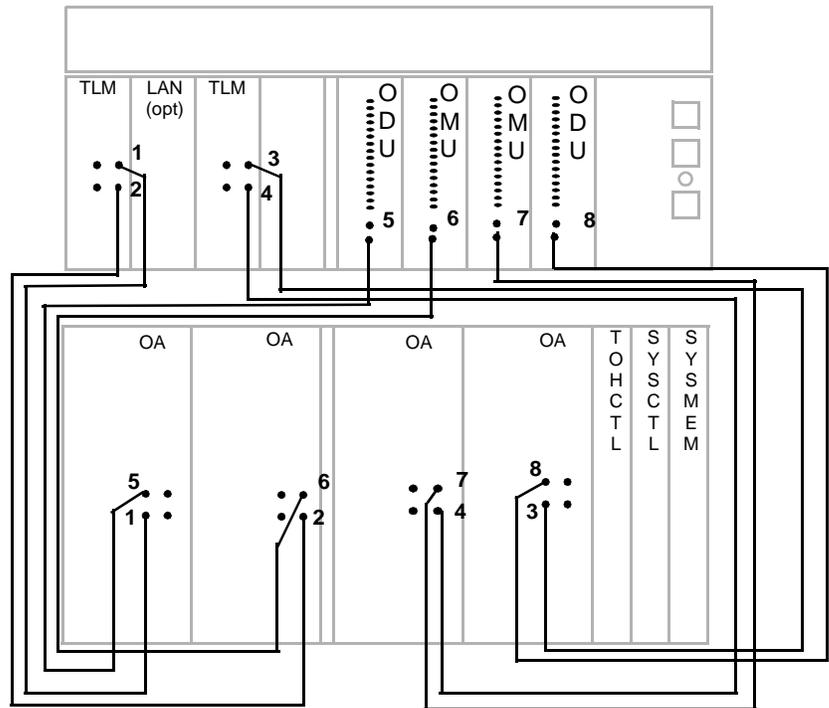
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  - 5** Clean and connect the intrashelf optical fibers. Refer to Appendix B for fiber cleaning tools and procedures.

---

  - 6** Cut the fiber retention gasket material to length as necessary and carefully insert the gasket material in the fiber channel to hold the optical fibers in place. (See Fiber Retention Gasket section on page 6-75.)

**Figure 6-21 2-OA Dual Facing Shelf Intrashelf Optical Fibers**



(Replace 0-dB LBO at OA-1A OUT port - Fiber ID #5)

(Replace 0-dB LBO at OA-2B OUT port - Fiber ID #8)

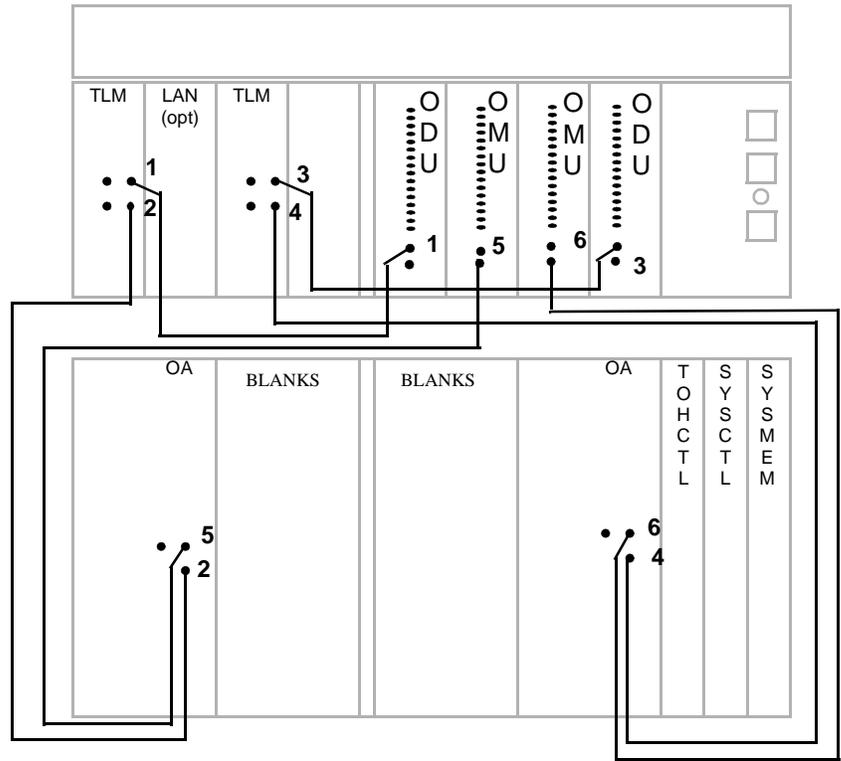
**Table 6-8 Line 1: 2-OA Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-4: 2-OA 1A-RCV)**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
	50 inches	OA 1A	TLM OUT	1A-OA-TLM-OUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
	50 inches	OA 1B	TLM IN	1B-OA-TLM-IN
5	50 inches	ODU 1A	IN	1-ODU-IN
	50 inches	OA 1A	OUT	1A-OA-OUT
6	50 inches	OMU 1B	OUT	1-OMU-OUT
	50 inches	OA 1B	IN	1B-OA-IN

**Table 6-9 Line 2: 2-OA Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-1: 2-OA 1A-TX)**

<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
3	50 inches	TLM 2A	IN	2A-TLM-IN
	50 inches	OA 2B	TLM OUT	2B-OA-TLM-OUT
4	50 inches	TLM 2A	OUT	2A-TLM-OUT
	50 inches	OA 2A	TLM IN	2A-OA-TLM-IN
7	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
	50 inches	OA 2A	IN	2A-OA-IN
8	50 inches	ODU 2B	IN	2-ODU-IN
	50 inches	OA 2B	OUT	2B-OA-OUT

**Figure 6-22 1-OA Dual Facing Shelf Without LIRCV Intrashelf Optical Fibers**



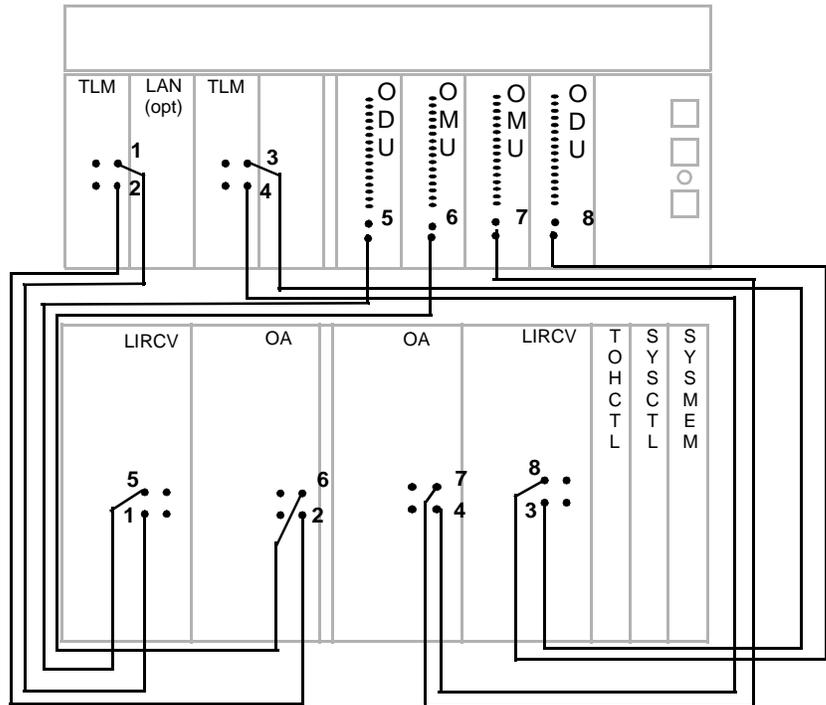
**Table 6-10 Line 1: 1-OA (Without LIRCV) Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-5: 1-OA-RCV)**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
	50 inches	ODU 1A	TLM OUT	1-ODU-TLMOUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
	50 inches	OA 1A	TLM IN	1A-OA-TLM-IN
5	50 inches	OMU 1B	OUT	1-OMU-OUT
	50 inches	OA 1A	IN	1A-OA-IN

**Table 6-11 Line 2 One OA (Without LIRCV) Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-2: 1-OA 1A-TX)**

<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
3	50 inches	TLM 2A	IN	2A-TLM-IN
	50 inches	ODU 2B	TLM OUT	2-ODU-TLMOUT
4	50 inches	TLM 2A	OUT	2A-TLM-OUT
	50 inches	OA 2B	TLM IN	2B-OA-TLM-IN
6	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
	50 inches	OA 2B	IN	2B-OA-IN

**Figure 6-23 1-OA Dual Facing Shelf With LIRCV Intrashelf Optical Fibers**



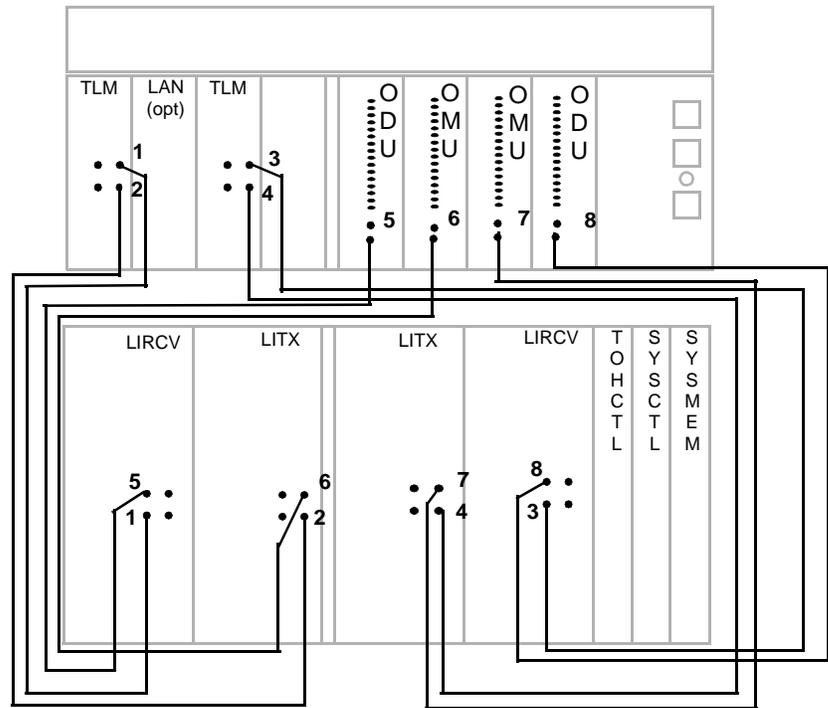
**Table 6-12 Line 1: 1-OA (With LIRCV) Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-6)**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
	50 inches	LIRCV 1A	TLM OUT	1A-OA-TLM-OUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
	50 inches	OA 1B	TLM IN	1B-OA-TLM-IN
5	50 inches	ODU 1A	IN	1-ODU-IN
	50 inches	LIRCV 1A	OUT	1A-OA-OUT
6	50 inches	OMU 1B	OUT	1-OMU-OUT
	50 inches	OA 1B	IN	1B-OA-IN

**Table 6-13 Line 2 One OA (With LIRCV) Dual Facing Shelf  
Optical Fibers (See also Table 6-6: 1-OA 1A-TX-32)**

<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
3	50 inches	TLM 2A	IN	2A-TLM-IN
	50 inches	LIRCV 2B	TLM OUT	2B-OA-TLM-OUT
4	50 inches	TLM 2A	OUT	2A-TLM-OUT
	50 inches	OA 2A	TLM IN	2A-OA-TLM-IN
7	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
	50 inches	OA 2A	IN	2A-OA-IN
8	50 inches	ODU 2B	IN	2-ODU-IN
	50 inches	LIRCV 2B	OUT	2B-OA-OUT

**Figure 6-24 0-OA Dual Facing Shelf Intrashelf Optical Fibers**



**Table 6-14 Line 1: 0-OA Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-**

Fiber ID in Figures	Optical Fiber Length	Circuit Pack & Slot	Port Label	Fiber Label
1	50 inches	TLM 1A	IN	1A-TLM-IN
	50 inches	LIRCV 1A	TLM OUT	1A-OA-TLM-OUT
2	50 inches	TLM 1A	OUT	1A-TLM-OUT
	50 inches	LITX 1B	TLM IN	1B-OA-TLM-IN
5	50 inches	ODU 1A	IN	1-ODU-IN
	50 inches	LIRCV 1A	OUT	1A-OA-OUT
6	50 inches	OMU 1B	OUT	1-OMU-OUT
	50 inches	LITX 1B	IN	1B-OA-IN

**Table 6-15 Line 2: 0-OA Dual Facing Shelf Intrashelf Optical Fibers (See also Table 6-6: 0-OA 1A-TX-32)**

<b>Fiber ID in Figures</b>	<b>Optical Fiber Length</b>	<b>Circuit Pack &amp; Slot</b>	<b>Port Label</b>	<b>Fiber Label</b>
3	50 inches	TLM 2A	IN	2A-TLM-IN
	50 inches	LIRCV 2B	TLM OUT	2B-OA-TLM-OUT
4	50 inches	TLM 2A	OUT	2A-TLM-OUT
	50 inches	LITX2A	TLM IN	2A-OA-TLM-IN
7	50 inches	OMU 2A	OMU OUT	2-OMU-OUT
	50 inches	LITX 2A	IN	2A-OA-IN
8	50 inches	ODU 2B	IN	2-ODU-IN
	50 inches	LIRCV 2B	OUT	2B-OA-OUT



## OMU/ODU - OT Connections

---

**Description** This section provides the methods for installing optical fibers between circuit packs in the Optical Translator shelves and the OMU/ODU circuit packs in the EON (OLS) Shelf. These optical fiber connections are referred to as the “low-speed” fibers as they are each associated with a single wavelength or optical channel. The optical circuit packs in the Optical Translator shelves include the Optical Translator Units (OTUs), Optical Translator Port Modules (OTPMs) and the Optical Unidirectional Path Switched Ring (OUPSR) unit.

Each wavelength that is added to the EON (OLS) optical line is multiplexed by connection to its IN channel port on the OMU. “Add” wavelengths may be connected directly from the customer’s terminal equipment or through an OTU/OTPM. (Connections from and to the customer’s terminal equipment are described in the next section.)

Each wavelength that dropped from the EON (OLS) optical line is demultiplexed by connection to its OUT channel port on the ODU. “Drop” wavelengths may be connected directly to the customer’s terminal equipment or through an OTU/OTPM.

Transmission reliability may be improved by routing the customer’s wavelength through an OUPSR unit to provide 2 optical paths on a EON (OLS) ring system.

The customer engineer shall provide the installer with a “routing list” of optical fiber connections between the OTUs/OTPMs and the OMUs/ODUs; as well as optical fiber connections between OTUs/OTPMs and OUPSR units.

This section is divided into two parts:

- Installing optical fibers between the OTUs/OTPMs and the OMU and ODU units.
- Installing optical fibers when the OUPSR feature is applied.

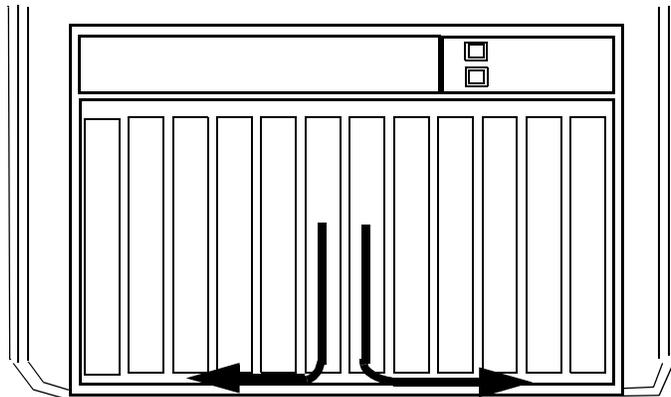
Apparatus filler blanks are positioned in any unoccupied OT slot positions and any unoccupied OTPM port positions. The blanks may be used to support optical fibers for circuit packs that will be added to the system at a later time.

**Optical Fiber Routing**

The Optical Translator shelves may be located in a bay frame separate from the EON (OLS) Shelf. The low-speed optical fibers routed between shelves should be protected in fiber ducts or tubes.

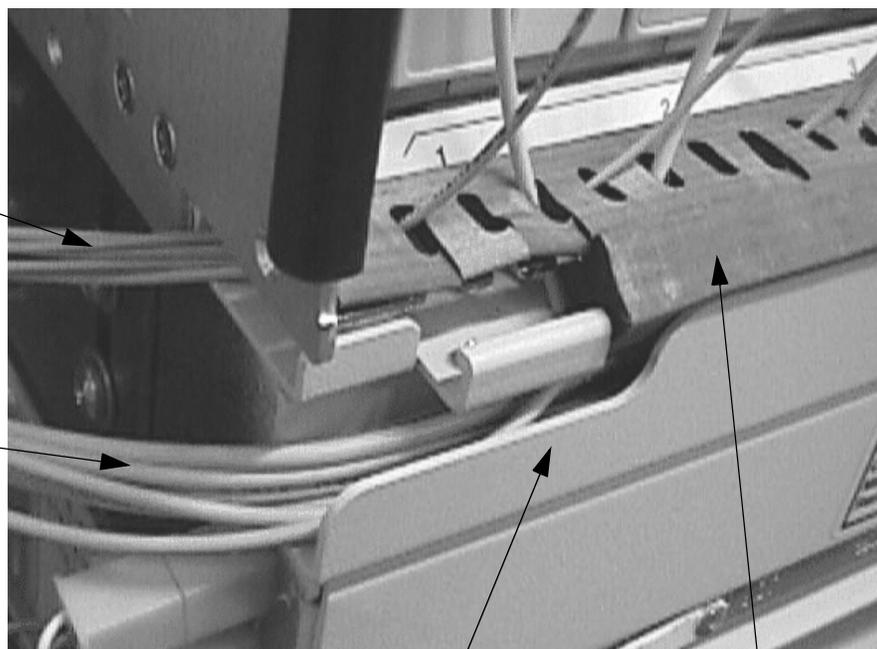
Optical fiber connections at the OT shelves are dressed down through the fiber guide and into the fiber channel for routing out to the sides.

**Figure 6-25 Fiber Routing for Individual OT Shelf**



Mini-Cord (1mm)  
Optical Fiber to OMU  
and from ODU

3-mm Optical Fiber  
to and from customer  
terminal equipment

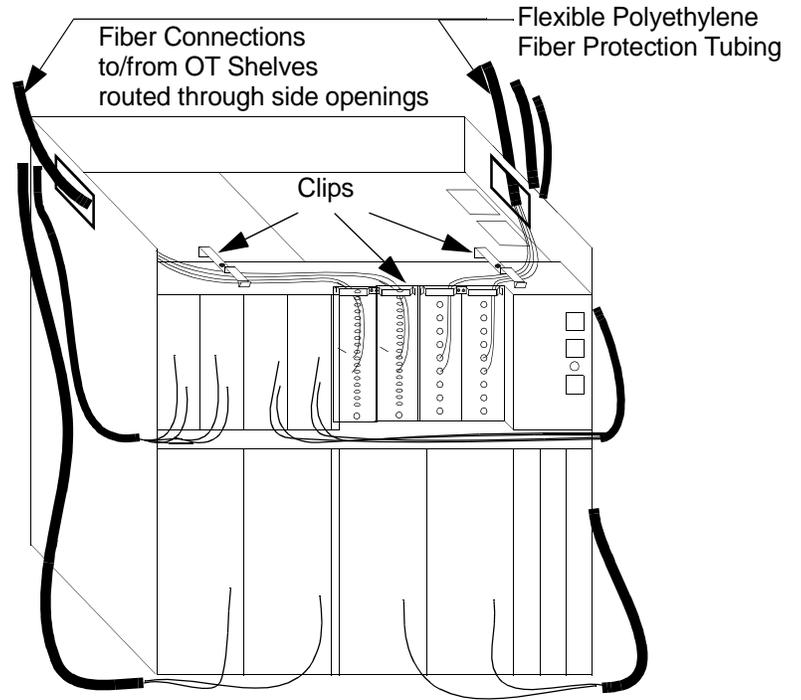


OT Shelf Fiber Management Channel

Fiber Retention Gasket

Optical fiber connections at the EON (OLS) Shelf are routed into the upper part of the shelf and dressed under the clips for distribution to the OMU and ODU channel ports.

**Figure 6-26 EON (OLS) Shelf Fiber Routing**



**OTU/OTPM - OMU/ODU  
Fiber Connections**

The customer engineer shall specify the length and fiber connector types for the optical fibers to be connected between the OTU/OTPM units and the OMU/ODU units.

“Add” wavelength/channel connections are made between the OUT ports of the OTU/OTPM units and the designated channel IN ports of the OMU units.

“Drop” wavelength/channel connections are made between the designated channel OUT ports of the ODU units and the IN ports of the OTU/OTPM units.

- 
- 1 Verify from the routing list the slot or port positions of the OTU/OTPM units in the OT shelves. Note that there may be 2 OT systems associated with each EON (OLS) Shelf so that the slot and port positions may include an OT system designator (see page 5-39).

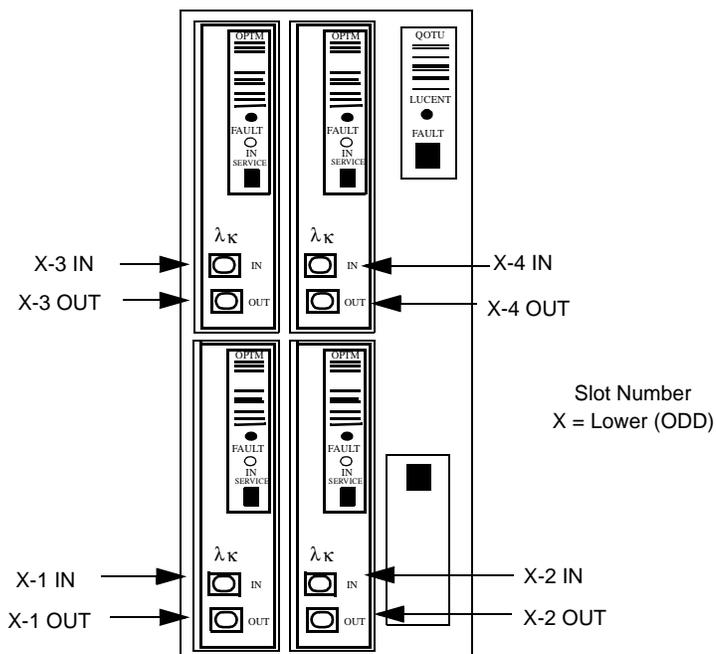
- 
- 2 Identify the optical fibers specified for each fiber connection. Leave the protective end caps in place on the fiber connectors when routing the optical fibers between shelves.

- 
- 3 Label the **OTU/OTPM** end of the optical fiber by the slot or port position associated with the OTU/OTPM using the labels provided on the OTU label sheet (847823218) or OTPM label sheet (848062022).
    - An optical fiber to be routed to an OMU will be connected to the OTU/OTPM OUT port and will be labeled with the OT slot number followed by OUT.
    - An optical fiber to be routed to an ODU will be connected to the OTU/OTPM IN port and will be labeled with the OT slot number followed by IN.

OTU Example: Optical fiber to be connected between an OMU and an OTU at slot position 26 in OT Complementary Shelf 2. The OTU end of this fiber shall be labelled **OTU 26 OUT**.

Optical Translator Port Modules (OTPMs) are installed in Quad-carriers which occupy two OT slots in the OT shelf in odd/even matched pairs (3 & 4 or 25 & 26, for example). Each QOTU can contain up to four OTPMs, each with input and output ports.

**Figure 6-27 OTPM Input and Output Fiber Labeling**



OTPM Example: Optical fiber to be connected between an ODU and an OTPM at slot position 23-3 in OT Complementary Shelf 2. The end of this fiber shall be labelled **OTPM 23-3 IN**.

- 
- 4 Label the **OMU/ODU** end of the fiber using the optical channel labels. Select the label for the appropriate optical line, whether the fiber will connect to the OMU or ODU, and the channel number of the wavelength to be to be connected to the OMU or ODU.

OMU Example: An optical fiber routed from OTU 41A6C OUT to the OMU in line 2 at the 6 IN port and would be labeled as **2M6**.

ODU Example: An optical fiber routed to OTU 41B IN from the ODU in line 1 at the 14 OUT port and would be labeled as **1D14**.

- 
- 5 Start at the OTU/OTPM circuit pack for each optical fiber connection on the routing list. Determine the approximate length of fiber required from the fiber management channel at the bottom of the OT shelf to the designated OTU/OTPM port. Do not connect the optical fiber at this time.

- 
- 6** Dress the optical fiber down from the OTU/OTPM port through the fiber guides at the bottom edge of the OT shelf then into and horizontally along the fiber management channel to the appropriate side of the OT shelf. For OTUs/OTPMs located left of center, route the fiber to the left. For OTUs/OTPMs located right of center, route the fiber to the right. The mini-cord optical fibers connecting to the OMUs/ODUs should be routed in the upper section of the fiber management channel as shown in Figure 6-25.

**Important!** Information for the installation of the Fiber Retention Gasket is provided on page 6-75.

---

- 7** Route the optical fiber along the side of the bay frame (or bay frames) to the EON (OLS) shelf. Pass the fiber through the opening on either the left or right at the **top** of the EON(OLS) shelf. Dress the fibers into the fiber retention clips on the top of the EON (OLS) Shelf, and at the top of the OMU or ODU unit. Refer to Figure 6-26.

**Important!** To place the fibers through the clips, lift the clip and slide one fiber through at a time to prevent overstressing the clip.

---

- 8** Repeat steps 3 through 7 for each optical fiber connection between the OTU/OTPM units and the OMU/ODU units.
- 

- 9** Dress the optical fibers in the split polyethylene tubes provided with the OT installation kit. Using cable ties to fasten the tubes, run the tubes to the side of the bay frame(s) in the space between the shelves and the frame(s).

Continue with OUPSR Fiber Connections or, if OUPSR units are not equipped, proceed to External Fiber Connections on page 6-54.

END OF STEPS

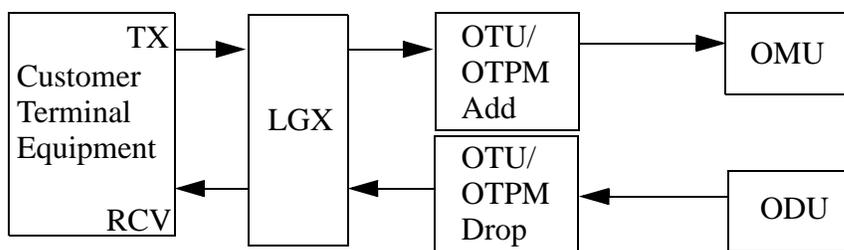
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**OUPSR Fiber Connections**

Optical path protection may be specified on a per-wavelength basis by having the customer’s signal split at one EON (OLS) end terminal and selected by a switch at another EON (OLS) end terminal. The OUPSR circuit pack contains the both the splitter function for transmitting to another end terminal and the protection switch function for receiving from the other end terminal. The LEP2 OUPSR circuit pack is used with single-mode fiber applications and the LEP3 OUPSR circuit pack is used with multi-mode applications.

The optical fiber connections for low-speed signal flows without the OUPSR feature are illustrated in Figure 6-28.

**Figure 6-28 Low-Speed Signal Flow without OUPSR**



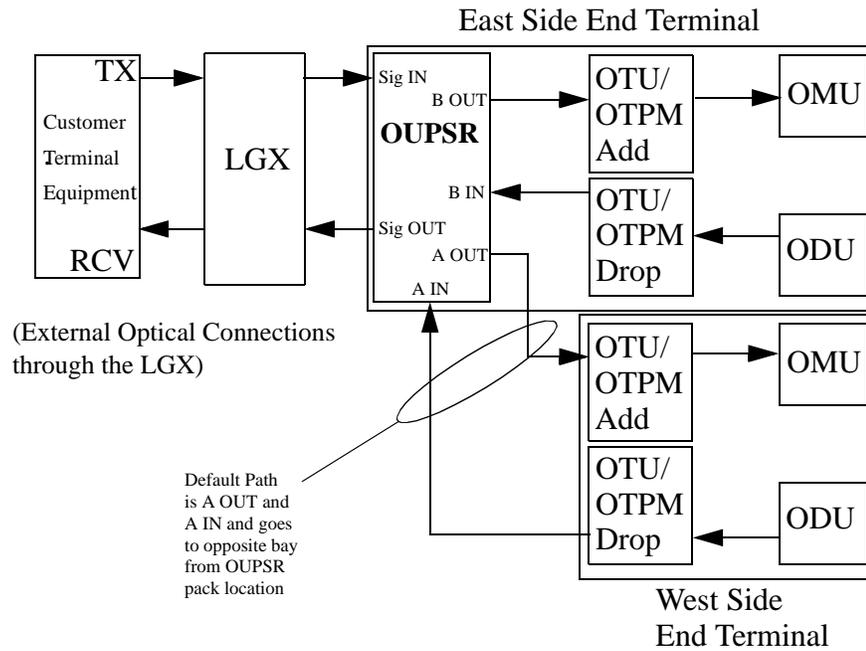
(External Optical Connections through the LGX)

The optical path protection feature may be implemented with Release 8.2 software in two configurations. The function of the Add and Drop OTUs/OTPMs may either be protected or unprotected by the OUPSR unit.

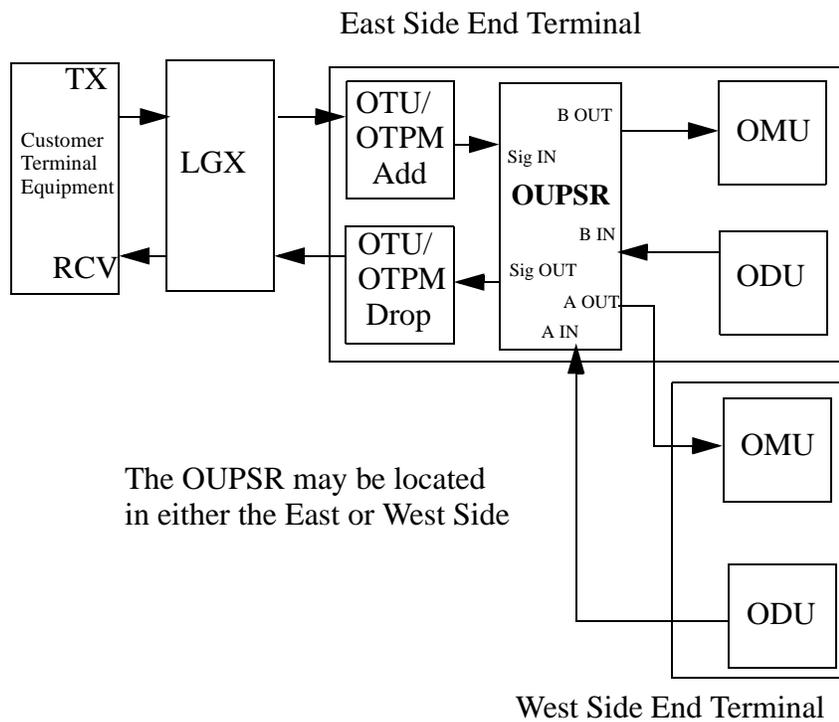
The optical fiber connections are illustrated in Figures 6-29 and 6-30 for low-speed signal flows for the OUPSR feature with and without protection of the Add and Drop OTUs/OTPMs. (Note that the customer engineer may not specify Add and Drop OTUs/OTPMs when the Customer Terminal Equipment has EON compatible transmitter and receiver units.)

The default paths within the OUPSR unit are from A IN and to A OUT. The OUPSR unit will usually be installed in the End Terminal associated with the B IN and B OUT optical path connections.

**Figure 6-29 Low-Speed Signal Flow with OUPSR (Protected Add and Drop OTUs/OTPMs)**



**Figure 6-30 Low-Speed Signal Flow with OUPSR (Unprotected Add and Drop OTUs/OTPMs)**



### Procedure for OUPSR Fiber Connections

A Ring Terminal may be composed of two Metropolis® EON End Terminals in a back-to-back configuration; one End Terminal will be designated as the East Side and the other as the West Side. An OUPSR may be used with OTUs/OTPMs in the protected or unprotected configuration.

Protected configuration: One Add or Drop OTU/OTPM unit will be located in the East Side End Terminal and the companion OTU/OTPM unit will be located in the West Side End Terminal. The OUPSR unit usually will be located in the End Terminal associated with the B IN and B OUT optical path connections.

Unprotected configuration: The unprotected Add and Drop OTU/OTPM units may be located in the same End Terminal as the OUPSR. The OUPSR may be located in either the East or West Side.

- 
- 1** For each OUPSR unit installed at this location, identify the wavelengths to be protected using OUPSR from the optical fiber routing list and the slot or port positions of the OTU/OTPM units associated with the OUPSR. (The protected or unprotected configuration may be determined from the routing list information.)
- 
- 2** Identify the optical fibers specified for the optical connections between the OUPSR unit and the associated OTU/OTPM units, OMU/ODU or LGX. Typically, one set of IN/OUT fiber connections will be within the same End Terminal and the other set of IN/OUT fiber connections will be routed to the other End Terminal in a Ring Terminal configuration.

- 
- 3** Label the OUPSR end of each optical fiber with a fiber label from the OUPSR label kit.

Protected Configuration:

- An optical fiber connected to a SIG IN (or SIG OUT) port will be labeled with the associated Add (or Drop) OT slot position and OUPSR SIG port, such as **OT 22 - IN** (or **OT 22 - OUT**).
- An optical fiber connected to an A or B OUT port will be labeled with the associated Add OT slot position and OUPSR port, such as **OT 14 - A OUT**.
- An optical fiber connected to an A or B IN port will be labeled with the associated Drop OT slot position and OUPSR port, such as **OT 26 - B IN**.

Unprotected Configuration:

- An optical fiber connected to a SIG IN (or SIG OUT) port will be labeled with the associated Add (or Drop) OT slot position and OUPSR SIG port, such as **OT 22 - IN** (or **OT 22 - OUT**).
- An optical fiber connected to an OUT port will be labeled with the associated Add OT slot position and OUPSR port, such as **OT 14 - A OUT**.
- An optical fiber connected to an IN port will be labeled with the associated Drop OT slot position and OUPSR port, such as **OT 26 - B IN**.

- 
- 4** Label the OTU/OTPM end of each optical fiber with a fiber label from the OTU fiber label sheet in the same manner as other OTU/OTPM units. Refer to step 3 on page 6-45 for additional information.
- 

- 5** Start at the OUPSR circuit pack for each optical fiber connection on the routing list. Clean and connect the fiber to the designated port on the OUPSR unit.
- 

- 6** Dress the optical fiber down from the OUPSR port through the fiber guides at the bottom edge of the OT shelf then into and horizontally along the fiber management channel to the appropriate side of the OT shelf. Refer to Figure 6-25 on page 6-44.

- 
- 7** As noted on the routing list, route the optical fiber to the associated OTU/OTPM slot position - or - to the designated OMU/ODU.
- For OTU/OTPM within same shelf - route the fiber horizontally in fiber management channel and then up through fiber guide.
  - For OTU/OTPM or OMU/ODU in a different shelf, route the fiber out of shelf and along bay frame to OT Shelf with assigned OTU/OTPM or EON Shelf with designated OMU/ODU.

The mini-cord optical fibers connecting to the OMUs/ODUs should be routed in the upper section of the fiber management channel as shown in Figure 6-25.

**Important!** Information for the installation of the Fiber Retention Gasket is provided on page 6-71.

---

- 8** Clean and connect the fiber to the designated port on the assigned OTU/OTPM or OMU/ODU unit.

**Important!** The optical fiber for remaining port on the OTU/OTPM unit should not be connected at this time.

---

- 9** Repeat steps 3 through 8 for each optical fiber connection between the OUPSR unit and the associated OTU/OTPM or OMU/ODU units.
- 

- 10** Dress the optical fibers that extend beyond an OT Shelf into protective tubing or fiber ducts.

Continue with External Fiber Connections on page 6-54.

END OF STEPS

---



## External Optical Connections

---

- Description** This section provides the methods for installing optical fibers between circuit packs within the EON (OLS) equipment and other equipment at the customer's location. These external optical connections include:
- Outside Plant connections: Optical line connections to EON (OLS) Network Elements at other locations.
  - DCM port connections when the OA3 Optical Amplifier is equipped.
  - Customer Terminal connections: Optical connections between the OTU/OTPM units and customer terminal equipment - or directly between OMU/ODU units and EON-compatible customer terminal equipment. Customer terminal equipment may also be connected directly to OUPSR units.
  - Direct Pass-Through connections: Pass-through connections for wavelengths (or channels) may be made at Ring Terminal locations from the ODU at one End Terminal to the OMU at the companion End Terminal.
  - Telemetry Feed-through connections: Optical connections between Telemetry circuit packs in companion End Terminals for a Ring Terminal configuration.
  - Customer Maintenance Signal (CMS) connections: Not available with the LDA4 Telemetry Controller circuit pack required with Release 8.2 equipment configurations (32-channel ready).

Some or all of these external optical connections may be routed through a LightGuide Cross Connect (LGX) panel as part of the optical connection.

---



### CAUTION

*Do not connect external optical fibers to the circuit packs in the EON (OLS) or OT shelves at this time. These fiber connections will be made during the procedures in subsequent chapters.*

**Outside Plant Connections**

The transmit and receive optical line connections are to be made between the Optical Amplifier or Line Transmit/Receive units and (typically) the customer's LGX panel.

Optical line connections are to be made to the OUT port of the OA or Line unit designated as Transmit and to the IN port of the OA or Line unit (or ODU for 1-OA 16-channel configurations) designated as Receive.

The customer engineer shall provide the installer with a routing list of the optical line (outside plant) connections between the EON (OLS) Shelf and the customer's LGX panel.

Some typical outside plant connections (along with other external optical connections) are illustrated in the figures and tables that follow:

<b>NE Configuration</b>	<b>Refer to Figure</b>	<b>Refer to Table</b>
2-OA 1A-TX or 2- OA 1A-TX-Thru	Figure 6-31	Table 6-16
1-OA 1A-TX or 1-OA 1A-TX-Thru	Figure 6-32	Table 6-17
2-OA 1A-RCV or 2-OA 1A-RCV-Thru	Figure 6-33	Table 6-18
1-OA 1A-RCV or 1-OA 1A-RCV-Thru	Figure 6-34	Table 6-19
Repeater	Figure 6-35	Table 6-20
2-OA or 1-OA with LIRCV or 0-OA Dual Facing Shelf	Figure 6-36	Table 6-21
1-OA without LIRCV Dual Facing Shelf	Figure 6-37	Table 6-22

## Procedure for Outside Plant Optical Fiber Connections

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- 1** Verify from the routing list the slot positions and optical port identifications of the outside plant connections on the EON (OLS) Shelf and the optical port positions at the customer's LGX panel.  

---
- 2** Identify the optical fibers specified for each fiber connection. Verify that the fiber connectors match the optical port connectors. Leave the protective end caps in place on the fiber connectors when routing the fibers between the EON (OLS) Shelf and the LGX panel.  

---
- 3** Label the EON (OLS) end of each fiber with a fiber label from the label kit corresponding to the NE configuration. Refer to Tables 6-16 through 6-22.  

---
- 4** Label the LGX end of each optical fiber per the engineer's instructions.  

---
- 5** Start at the EON (OLS) end for each fiber connection. Determine the approximate length of fiber required from the designated optical port to the fiber channel at the base of the shelf. Do not connect the optical fiber at this time.  

---
- 6** Dress the optical fiber into and horizontally along the fiber channel to the side of the shelf as indicated in Figures 6-30 through 6-36.  

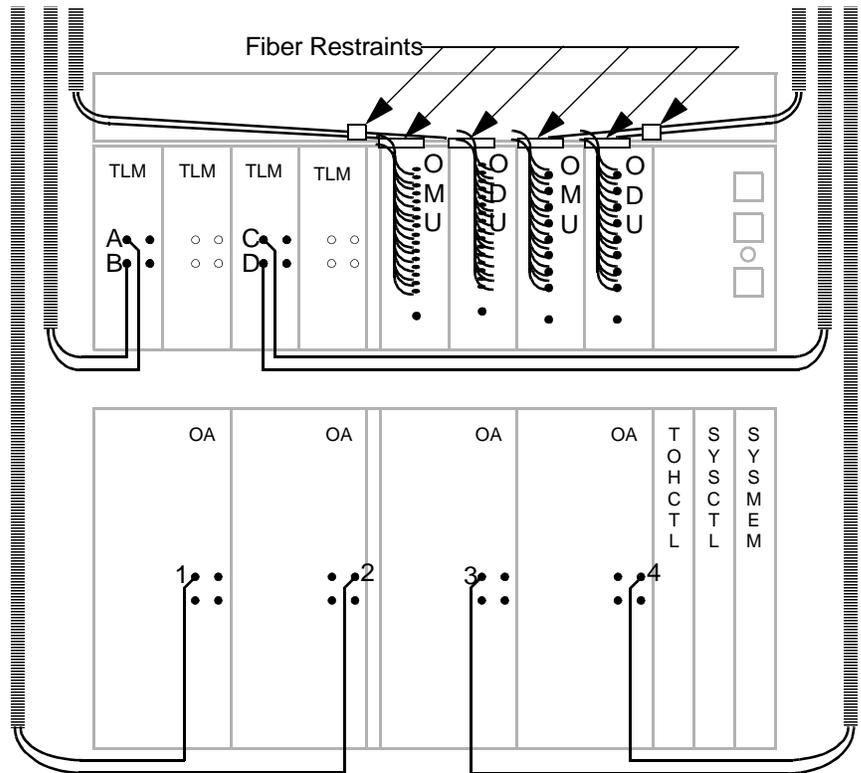
---
- 7** Route the fiber along the side of the bay frame and into the customer's fiber duct system to the LGX panel. Clean and connect the fiber to the assigned LGX port.  

---
- 8** Repeat steps 3 through 7 for each outside plant fiber connection.  

---
- 9** Dress the optical fibers in the split polyethylene tubing provided with the installation kit or into customer-provided fiber ducts.  

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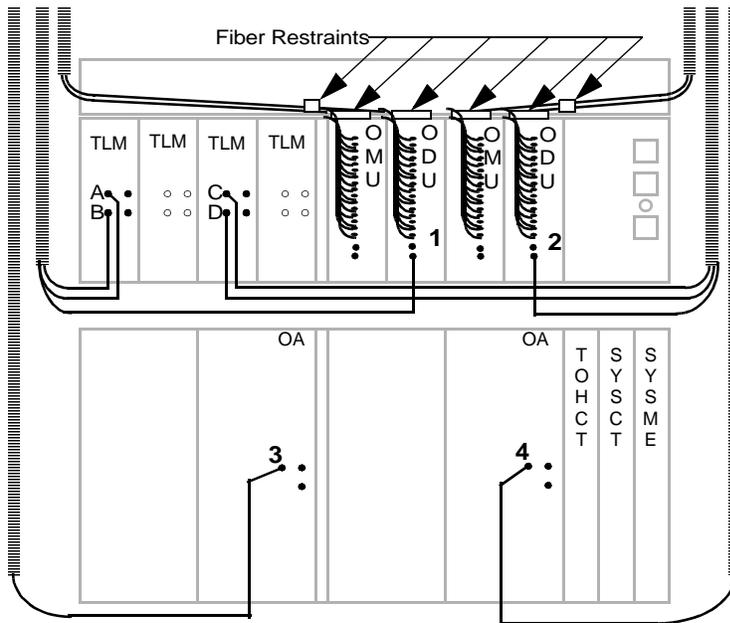
**Figure 6-31 2- OA 1A-TX and 2-OA 1A-TX-Thru Outside Plant, OMU/ODU, CMS and TLM Feed-Thru Optical Fibers**



**Table 6-16 2-OA 1A-TX and 2-OA 1A-TX-Thru Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
1A-TX and 1A-TX-Thru End Terminals	1	1	OA 1A	OUT	1A-OA-OUT
		2	OA 1B	IN	1B-OA-IN
	2	3	OA 2A	OUT	2A-OA-OUT
		4	OA 2B	IN	2B-OA-IN

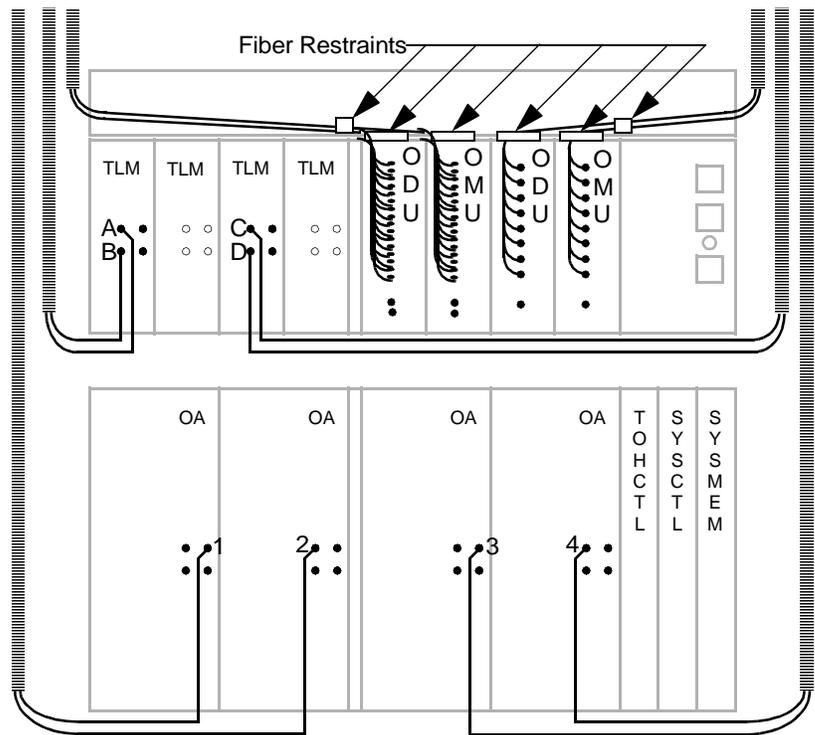
**Figure 6-32 1-OA 1A-TX and 1-OA 1A-TX-Thru Outside Plant, OMU/ODU, CMS and TLM Feed-Thru Optical Fibers**



**Table 6-17 1-OA 1A-TX and 1-OA 1A-TX-Thru Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
End Terminal 1-OA 1A-TX	1	1	ODU 1A	IN	1A-ODU-IN
		3	OA 1B	OUT	1B-OA-OUT
1-OA 1A-TX-Thru	2	2	ODU 2A	IN	2A-ODU-IN
		4	OA 2B	OUT	2B-OA-OUT

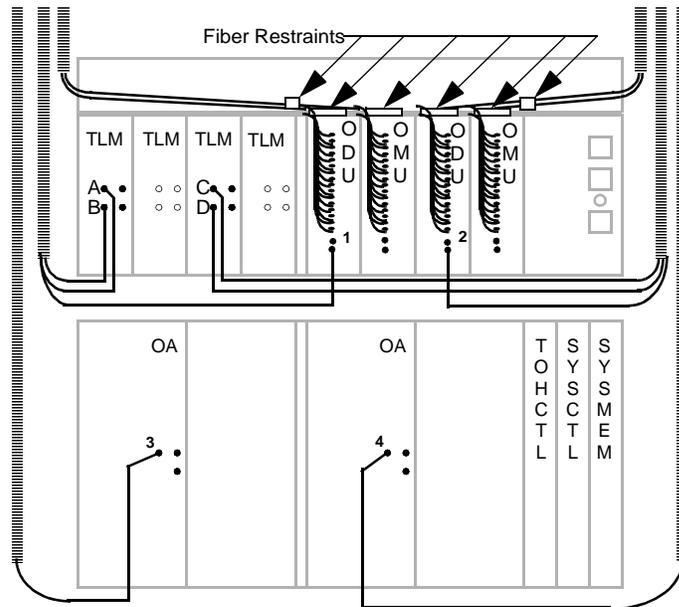
**Figure 6-33 2-OA 1A-RCV and 2-OA 1A-RCV-Thru Outside Plant, OMU/ODU, CMS and TLM Feed-Thru Optical Fibers**



**Table 6-18 2-OA 1A-RCV and 2-OA 1A-RCV-Thru Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
1A-RCV and 1A-RCV-Thru End Terminal	1	1	OA 1A	IN	1A-OA-IN
		2	OA 1B	OUT	1B-OA-OUT
	2	3	OA 2A	IN	2A-OA-IN
		4	OA 2B	OUT	2B-OA-OUT

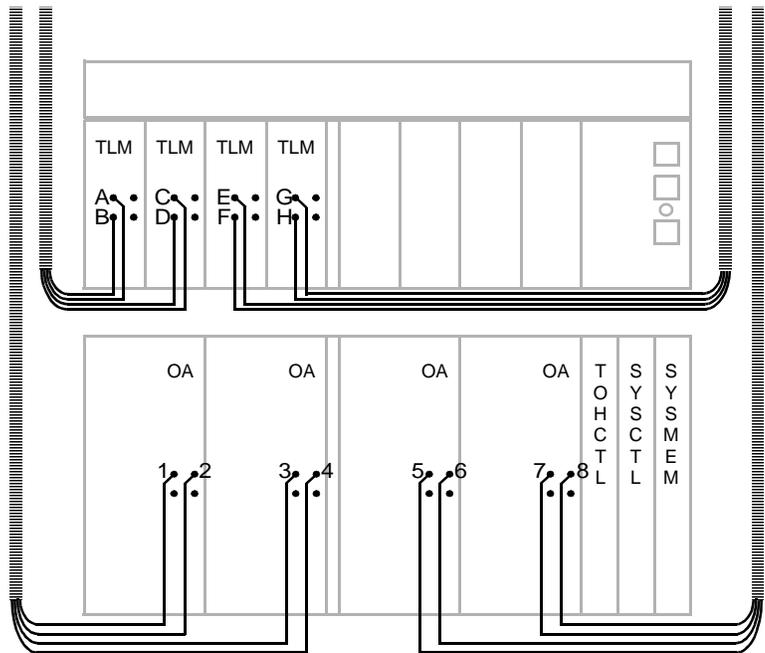
**Figure 6-34 1-OA 1A-RCV and 1-OA 1A-RCV-Thru Outside Plant, OMU/ODU, CMS and TLM Feed-Thru Optical Fibers.**



**Table 6-19 1-OA 1A-RCV and 1-OA 1A-RCV-Thru Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
1-OA 1A-RCV and 1-OA 1A-RCV-Thru End Terminals	1	1	ODU 1A	IN	1A-ODU-IN
		3	OA 1A	OUT	1A-OA-OUT
	2	2	ODU 2A	IN	2A-ODU-IN
		4	OA 2A	OUT	2A-OA-OUT

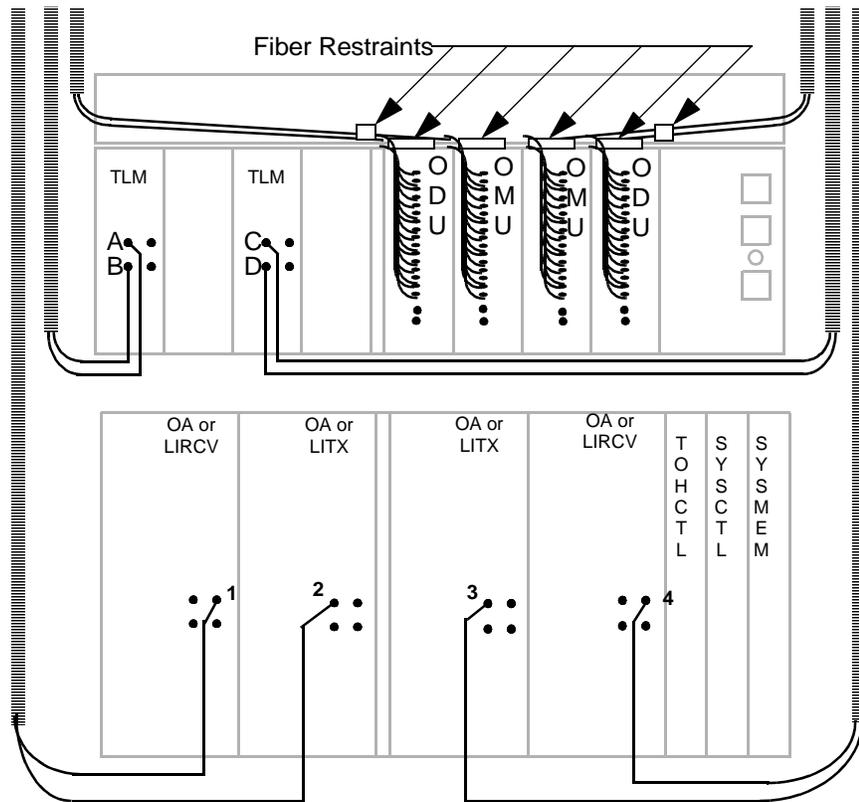
**Figure 6-35 Repeater Outside Plant and CMS Optical Fibers**



**Table 6-20 Repeater Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
Repeater	1	1	OA 1A	OUT	1A-OA-OUT
		2	OA 1A	IN	1A-OA-IN
		3	OA 1B	OUT	1B-OA-OUT
		4	OA 1B	IN	1B-OA-IN
	2	5	OA 2A	OUT	2A-OA-OUT
		6	OA 2A	IN	2A-OA-IN
		7	OA 2B	OUT	2B-OA-OUT
		8	OA 2B	IN	2B-OA-IN

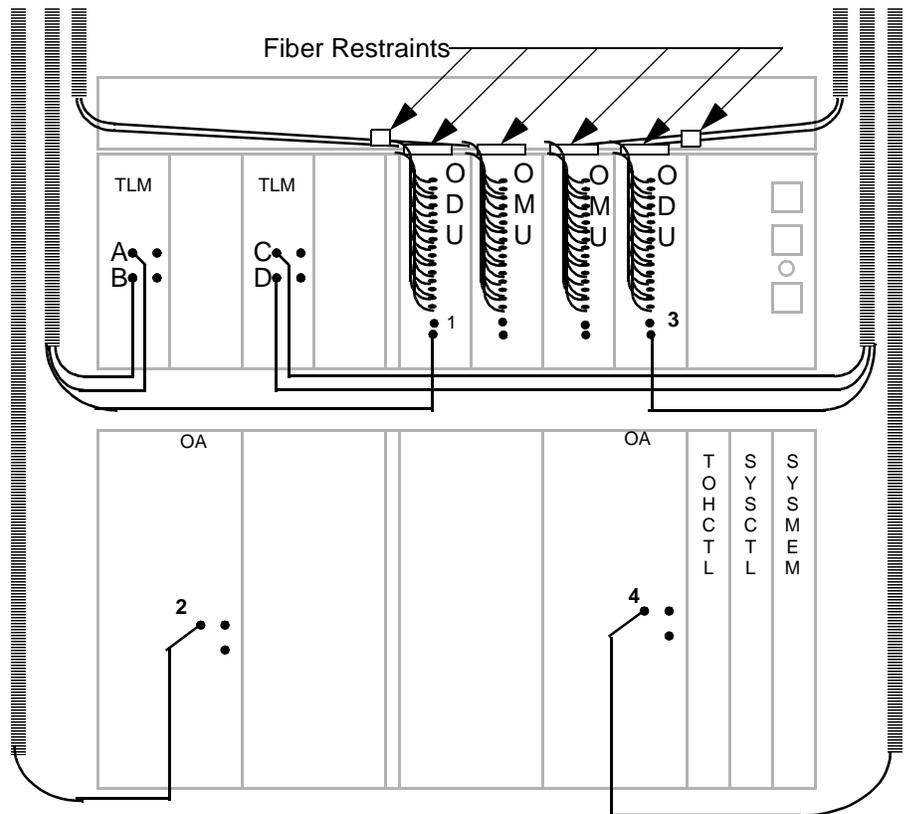
**Figure 6-36 2-OA, 1-OA with LIRCV, or 0-OA Dual Facing Shelf Outside Plant, OMU/ODU & CMS Optical Fibers**



**Table 6-21 2-OA, 1-OA with LIRCV, or 0-OA Dual Facing Shelf Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
2-OA, 1-OA with LIRCV, or 0-OA Dual Facing Shelf	1	1	OA 1A or LIRCV	IN	1A-OA-IN
		2	OA 1B or LITX	OUT	1B-OA-OUT
	2	3	OA 2A or LITX	OUT	2A-OA-OUT
		4	OA 2B or LIRCV	IN	2B-OA-IN

**Figure 6-37 1-OA without LIRCV Dual Facing Shelf Outside Plant, OMU/ODU & CMS Optical Fibers**

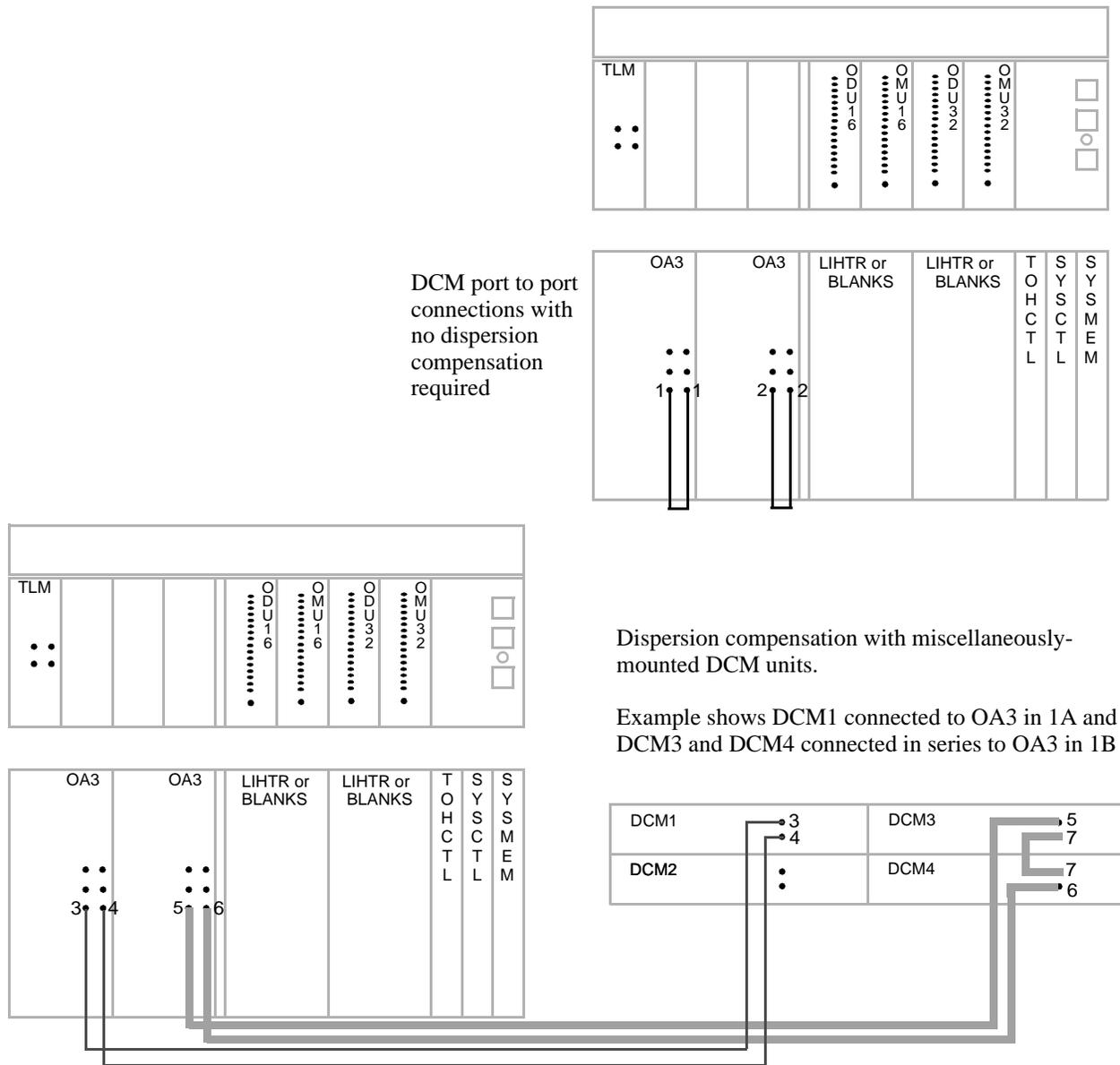


**Table 6-22 1-OA without LIRCV Dual Facing Shelf Outside Plant Optical Fibers**

Application	Line	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
1-OA without LIRCV Dual Facing Shelf	1	1	ODU 1A	IN	1A-ODU-IN
		2	OA 1A	OUT	1A-OA-OUT
	2	3	ODU 2B	IN	2B-ODU-IN
		4	OA 2B	OUT	2B-OA-OUT

**OA3 DCM Connections** The OA3 Optical Amplifier has DCM OUT and DCM IN ports that allow the optical line to have compensation for excess chromatic dispersion on the outside plant fiber path. Dispersion Compensation Modules (DCMs) may be specified to be connected to each OA3 Optical Amplifier at a Network Element. When dispersion compensation is not required the DCM OUT port will need to be connected to the DCM IN port with a short optical fiber.

**Figure 6-38 OA3 DCM Optical Fibers**



**Table 6-23 OA3 DCM Optical Fibers**

Fiber ID	From				To				Length
	Circuit Pack	Connector	Conn Type	Label to Install	Circuit Pack	Connector	Conn. Type	Label to Install	
1	OA 1A	DCM OUT	UBO	1A-OA-DCMOUT	OA 1A	DCM IN	UBO	1A-OA-DCMIN	TBD
2	OA 1B	DCM OUT	UBO	1B-OA-DCMOUT	OA 1B	DCM IN	UBO	1B-OA-DCMIN	TBD
3	OA 2A	DCM OUT	UBO	2A-OA-DCMOUT	DCM1	IN	LC	DCM1-IN	Order to Length
4	DCM1	OUT	LC	DCM1-OUT	OA 2A	DCM IN	UBO	2A-OA-DCMIN	
5	OA 2B	DCM OUT	UBO	2B-OA-DCMOUT	DCM3	IN	LC	DCM3-IN	TBD
6	DCM4	OUT	LC	DCM4-OUT	OA 2B	DCM IN	UBO	2B-OA-DCMIN	
7	DCM3	OUT	LC	DCM3-OUT	DCM4	IN	LC	DCM4-IN	

## Procedure for OA3 DCM Optical Fiber Connections

---

- 1 Verify from the work order whether OA3 Optical Amplifiers are equipped at this Network Element.  

---
- 2 Identify the optical fibers specified for each DCM IN/OUT port connection. (The DCM connections may not be the same for each OA3.) Verify that the fiber connectors match the optical port connectors at both ends. Leave the protective end caps in place on the fiber connectors when routing the fibers from the EON (OLS) Shelf.  

---
- 3 Label both ends of the optical fibers with a fiber label from the DCM label kit corresponding to the assigned unit position and port. Refer to Table 6-23 for typical label assignments.  

---
- 4 Start at the DCM OUT port for each fiber connection. Follow the procedures of Appendix B to clean and inspect the optical fiber connector ends. Connect the optical fiber to the DCM OUT port.  

---
- 5 Dress the fiber down and into the EON (OLS) Shelf fiber management guide
  - For a direct DCM OUT to DCM IN connection, route the fiber in the fiber management channel and up through the fiber management guide to the DCM IN port. Clean and inspect the fiber end before connecting to the DCM IN port on the same OA3.
  - For connection to a miscellaneous-mounted DCM unit, route the fiber out of the EON (OLS) Shelf to the DCM unit in the DCM Carrier. Clean and inspect the fiber end before connecting to the IN port on the designated DCM unit.

---
- 6 For the return dispersion compensation connection at the OA3 DCM IN port, clean and inspect the optical fiber before connecting to the DCM port.  

---

- 
- 7** Dress the fiber down and into the EON (OLS) Shelf fiber management guide
- Route the fiber out of the EON (OLS) Shelf to the DCM unit in the DCM Carrier. Clean and inspect the fiber end before connecting to the OUT port on the designated DCM unit.
- 
- 8** For a series connection between DCM units in the DCM Carrier, label both ends of the fiber in a similar manner as shown in the example for Fiber ID 7 in Table 6-23. Clean and inspect the fiber ends before connecting to the IN and OUT ports on the designated DCM units. Dress the fiber carefully within the DCM Carrier.

END OF STEPS

---

## Customer Terminal Connections

Each wavelength or channel operating on the Metropolis<sup>®</sup> EON (OLS) system will have optical fiber connections (transmit and receive pair) between customer terminal equipment and OTU/OTPM circuit packs - or - directly to the OMU/ODU units when the customer terminal equipment has EON (OLS) compatible transmitter and receiver units.

“Protected” wavelengths will be connected between the customer’s terminal equipment and OUPSR units.

The customer engineer shall provide the installer with a routing list of the customer terminal optical fiber connections. Some of the connections may be routed through the customer’s LGX panel. The customer may elect to route these fiber connections themselves.

### Procedure for Customer Terminal Optical Fiber Connections

- 
- 1 Verify from the routing list the slot positions and optical port identifications at the EON (OLS) and OT shelves for the customer terminal connections. Verify the corresponding physical locations and optical port identifications at the customer’s terminal equipment or LGX panel.
- 
- 2 Identify the optical fibers specified for each optical fiber connection. Verify that the fiber connectors match the optical port connectors at both ends. Leave the protective end caps in place on the fiber connectors when routing the fibers between the EON (OLS) and OT shelves and the customer’s terminal equipment or LGX panel.
- 
- 3 Label the OTU/OTPM, OUPSR or OMU/ODU end of each fiber with a fiber label from the label kit corresponding to the assigned unit and port.
    - “Add” OTU input: OTU slot number / IN, e.g., **OTU 6 IN**
    - “Add” OTPM input: OTPM port ID / IN, e.g., **OTPM 15-4 IN**
    - “Add” OUPSR input: OT slot number / IN, e.g., **OT 11 SIG IN**
    - “Add” OMU input: line and channel number, e.g., **2M6**
    - “Drop” OTU output: OTU slot number / OUT, e.g., **OTU 19 OUT**
    - “Drop” OTPM output: OTPM port ID / OUT, e.g., **OTPM 5-1 OUT**

- “Drop” OUPSR output: OT slot number / OUT, e.g., **OT 7 SIG OUT**
  - “Drop” ODU output: line and channel number, e.g., **1D14**
- 

**4** Label the LGX end of each optical fiber per the customer engineer’s instructions.

---

**5** Start at the EON (OLS) or OT end for each fiber connection. Determine the approximate length of fiber required from the designated optical port to the fiber channel at the base of the shelf. Do not connect the optical fiber at this time.

---

**6** Dress the optical fiber into the EON (OLS) or OT Shelf similar to previous fiber connections at the OMU/ODU, OUPSR and OTU/OTPM circuit packs. The 3-mm optical fibers connecting to the OTUs/OTPMs should be routed in the lower section of the fiber management channel as shown in Figure 6-25.

**Important!** Information for the installation of the Fiber Retention Gasket is provided on page 6-75.

---

**7** Route the fiber along the side of the bay frame and into the customer’s fiber duct system to the customer’s terminal equipment (or the LGX panel). Clean and connect the fiber to the assigned port at the customer’s terminal equipment (or LGX panel).

---

**8** Repeat steps 3 through 7 for each customer terminal fiber connection.

---

**9** Dress the optical fibers in the split polyethylene tubing provided with the installation kit or into customer-provided fiber ducts.

END OF STEPS

---

**Pass-Through Connections**

The Metropolis<sup>®</sup> EON (OLS) system may be configured to have pass-through wavelength or channel connections at a Ring Terminal from the ODU in one of the End Terminals directly to the OMU in the companion End Terminal.

Since there will be no “through” OTU in this optical path that could change wavelength, the OMU input port channel ID must be the same as the ODU output port channel ID.

The engineer shall provide the installer with a routing list of the direct pass-through optical fiber connections. The engineer also shall specify the optical fibers to be used for these connections.

**Procedure for Direct Pass-Through Optical Fiber Connections**

- 1 Verify from the routing list the OMU/ODU units and optical port identifications at the EON (OLS) Shelves in the companion End Terminals for the direct pass-through connections.  
.....
- 2 Identify the optical fibers specified for each optical fiber connection. Verify that the fiber connectors match the optical port connectors at both ends. Leave the protective end caps in place on the fiber connectors when routing the fibers between the EON (OLS) Shelves.  
.....
- 3 Label both the ODU and the OMU end of each optical fiber with a fiber label from the label kit corresponding to the assigned unit and port.
  - Drop ODU output: line and channel number, e.g. **1D16**
  - Add OMU input: line and channel number, e.g. **1M16**  
.....
- 4 Start at the ODU end for each fiber connection. Determine the approximate length of fiber required from the designated optical port to the through the upper part the shelf. Do not connect the optical fiber at this time.  
.....
- 5 Dress the optical fiber into the EON (OLS) Shelf similar to previous fiber connections at the ODU unit.

- 
- 6** Route the fiber along the side of the bay frame and into the customer's fiber duct system to the companion End Terminal at this Ring Terminal location.
- 
- 7** Dress the optical fiber into the EON (OLS) Shelf, allowing sufficient length to connect at the designated port on the OMU unit. Do not connect the optical fiber at this time.
- 
- 8** Repeat Steps 3 through 7 for each direct pass-through fiber connection.
- 
- 9** Dress the optical fibers in the split polyethylene tubing provided with the installation kit or into customer-provided fiber ducts.

END OF STEPS

---

**Telemetry Feed-Thru Connections**

The Metropolis<sup>®</sup> EON (OLS) system may be configured to have telemetry feed-thru connections via optical fibers between adjacent End Terminals. A fiber pair connection will allow system control communication between the End Terminals using the supervisory channel. Ring Terminal configurations may use telemetry feed-thru connections between the companion End Terminals. The telemetry feed-thru connections may be routed through an LGX panel if there is some distance between adjacent End Terminals.

The customer engineer shall provide the installer with a routing list of the telemetry feed-thru optical fiber connections. The engineer also shall specify the optical fibers to be used for these connections.

The TLM-OUT port will be connected to a TLM-IN port on the adjacent End Terminal.

**Procedure for Telemetry Feed-Thru Optical Fiber Connections**

- 
- 1 Verify from the routing list the slot positions and optical port identifications at the EON (OLS) Shelves for the telemetry feed-thru connections. Verify the corresponding physical locations and optical port identifications at the companion end terminal (or at the customer's LGX panel).

---

  - 2 Identify the optical fibers specified for each optical fiber connection. Verify that the fiber connectors match the optical port connectors at both ends. Leave the protective end caps in place on the fiber connectors when routing the fibers between the EON (OLS) End Terminals (or LGX panel).

---

  - 3 If not already installed, replace the 0-dB LBO on the TLM IN port at the Telemetry Controller circuit pack with an LBO value as specified by the engineer.

**Important!** The target level range for optical power at the TLM IN port should be between -18 dBm and -31 dBm.

- 
- 4** Label the end of each fiber with a fiber label from the label kit corresponding to the assigned Telemetry Controller (TLM) unit and port. Refer to Table 6- 23.

---

  - 5** Start at either End Terminal for the fiber pair connections. Determine the approximate length of fiber required from the designated optical ports on the TLM 1B (or 2B) circuit pack to the fiber channel in the upper part the shelf. Do not connect the optical fiber at this time.

---

  - 6** Dress the optical fiber out of the EON (OLS) Shelf similar to previous fiber connections at the TLM circuit pack. Refer to Figure 6-38.

---

  - 7** Route the fiber out of the shelf along the side of the bay frame and into the customer's fiber duct system to the companion End Terminal at this Ring Terminal location.

---

  - 8** Dress the optical fiber into the EON (OLS) Shelf, allowing sufficient length to connect at the designated port on the TLM 1B (or 2B) circuit pack. Do not connect the optical fiber at this time.

---

  - 9** Repeat Steps 3 through 8 if Line 2 is equipped.

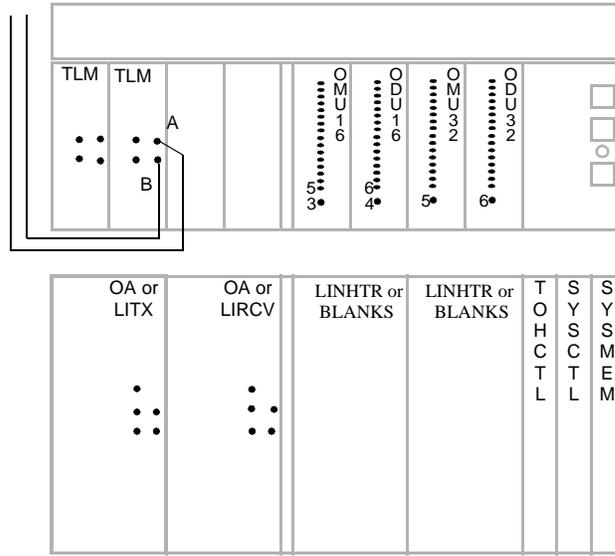
---

  - 10** Dress the optical fibers in the split polyethylene tubing provided with the installation kit or into customer-provided fiber ducts.

END OF STEPS

---

**Figure 6-39 Telemetry Feed-Thru Optical Fiber Connections**



**Table 6-24 Telemetry Feed-Thru Optical Fiber Connections**

Application	Fiber ID	Circuit Pack & Slot	Port Label	Fiber Label
1A-TX-Thru	A	TLM 1B	IN	1B-TLM-IN
1A-RCV-Thru	B	TLM 1B	OUT	1B-TLM-OUT
1A-TX-32-Thru				
1A-RCV-32-Thru				



# Fiber Retention Gasket

---

**Description** Fiber Retention Gaskets (848757720) are provided for each fiber management channel in the the EON (OLS) or OT Shelves. The Fiber Management Gasket is constructed with ESD-safe, fire-resistant fabric coated foam material. The gasket is used to safely restrain the optical fibers in the fiber management channel.

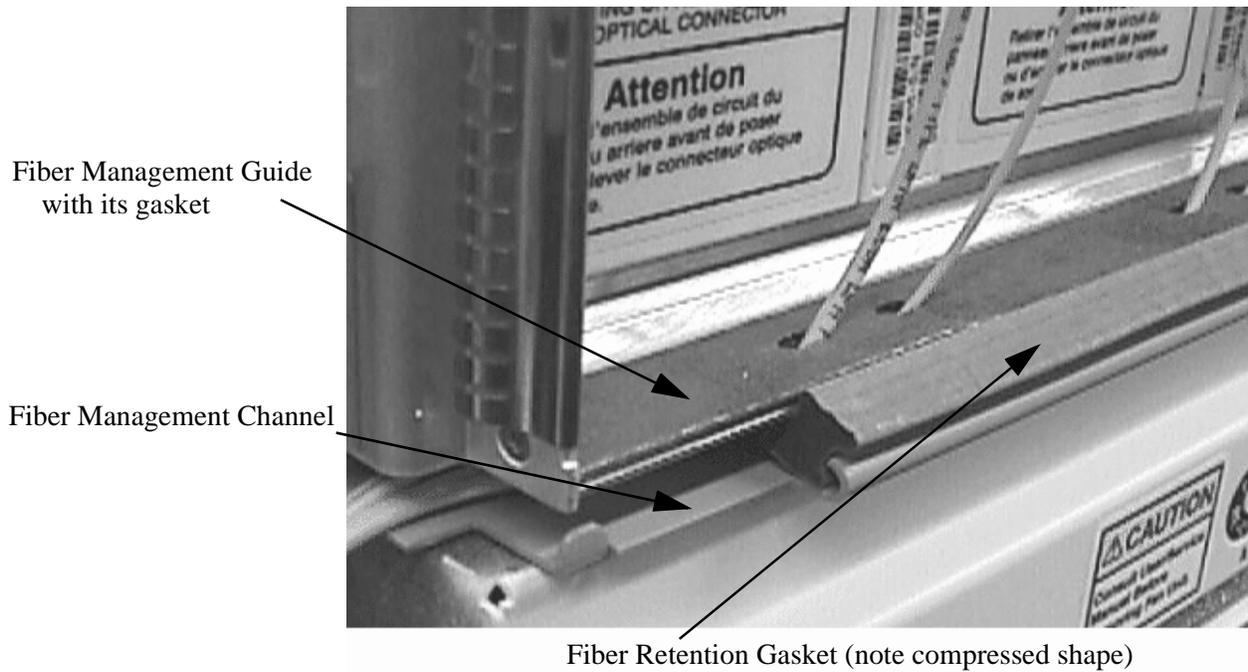
**Installation Procedure** Install a Fiber Retention Gasket in the fiber management channel of each EON (OLS) or OT Shelf after all the optical fibers have been routed into position.

- 1 Locate the Fiber Retention Gasket pieces provided with each EON (OLS) or OT Shelf and with the Integrated Bay. (The gasket is 16.75 inches long and has a 0.5 in x 0.5 in cross-section.)
- 2 Verify that the optical fibers are properly installed through the Fiber Management Guide at the base of each shelf and that the fibers are routed neatly in the Fiber Management Channel.
- 3 Trial fit the appropriate shelf cover in place to observe where the hinge pins link into the Fiber Management Guide. Cut the Fiber Retention Gasket to fit into the Fiber Management Guide between the cover hinge pins.
- 4 Carefully press the Fiber Retention Gasket into the opening between the Fiber Management Guide and the Fiber Management Channel to restrain the optical fibers in place. The gasket will compress and should be at or below the gasket on the Fiber Managment Guide. Refer to Figures 6-40 and 6-41.
- 5 Trial fit the appropriate shelf cover to verify that the lower lip on the cover will ride over and not pinch the Fiber Retention Gasket.

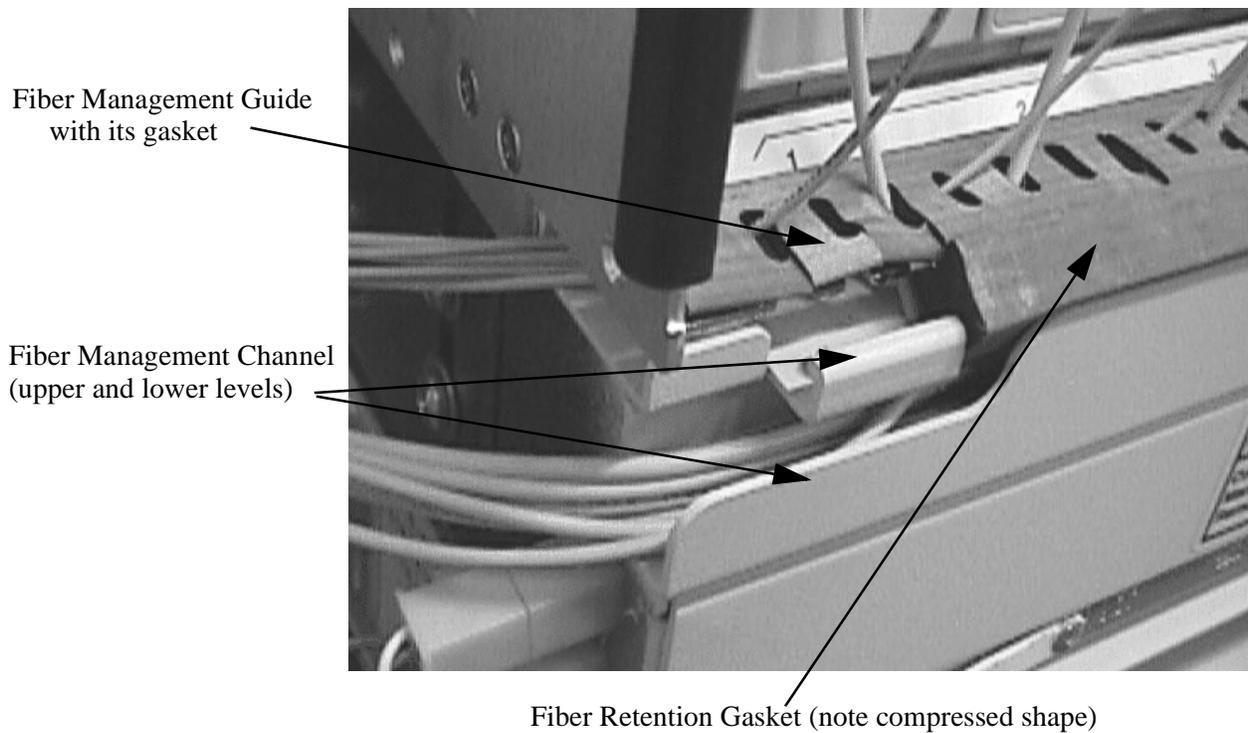
END OF STEPS

---

**Figure 6-40 EON (OLS) Shelf with Fiber Retention Gasket**



**Figure 6-41 OT Shelf with Fiber Retention Gasket**



## Final Verification

---

### Final Verification Checklist

Verify the following items are completed to ensure that circuit packs and fibers are properly installed:

<b>Check When Done</b>	<b>Item to Check</b>
	Circuit packs are in their proper positions according to the designated Network Element configuration.
	OMUs/ODUs are the only circuit packs seated at this time.
	All optical fibers are properly secured, dressed, and protected.
	All optical fibers are properly labeled.
	No optical fibers are connected to OTUs or OTPMs (other than to from OUPSR units).
	Fiber retention gaskets are placed in the shelf fiber management channels.
	Optical fibers are dressed away from the hinge points for shelf covers.
	Verify that there is no interference with optical fibers on OLS/OT shelves by carefully installing and latching the shelf covers. (See note for Metropolis <sup>®</sup> EON OT Shelf covers on page 2-24.)







# 7 Network Element Start-up and Provisioning

## Overview

---

- Purpose** This section provides procedures to:
- Install software into the SYSMEM circuit pack at the Metropolis<sup>®</sup> EON (OLS) Network Element
  - Install circuit packs into the Metropolis<sup>®</sup> EON (OLS) Network Element
  - Perform basic provisioning of the Metropolis<sup>®</sup> EON (OLS) Network Element so that installation testing can be performed

**Reason for revision** This is Issue 3.0 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This chapter provides the installer with the necessary information and procedures to seat the circuit packs, install software, and provision the Metropolis<sup>®</sup> EON (OLS) Network Element.

## Installation Recommendations

The following items should be verified at the site to support the Metropolis<sup>®</sup> EON Network Element start-up and provisioning:

- The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.
- The procedures in Chapters 2, 3, 4, 5 and 6 have been completed and the final verification checklists completed.
- The assigned circuit breakers off or fuses out at the BDFB (locked-out and tagged-out)
- A Personal Computer (PC) is available with Metropolis<sup>®</sup> EON Release 8.2 software loaded.
- AC power is available for use by installer.

**Important!** It is assumed that the installer is familiar with the use of a Personal Computers and its use as a CenterLink Management Console (CMC). If instruction in this area is needed, refer to the Release 8.2 Software Release Description C109204131 for information including: software installation, setting up a PC for use with the Metropolis<sup>®</sup> EON system, and logging into the system using the CMC with a PC. More information is also available in the Metropolis<sup>®</sup> EON User Operations Guide (365-575-559).

## General Considerations

- Required equipment is given in Appendix G of this document. Essential equipment for this section is: one personal computer (PC) with CMC software for use as CenterLink Management Console and a connecting RS-232 cable.
- An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
- Do not remove the shelf backplane cover.
- Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
- Do not remove the shelf backplane cover.



### **DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

- Metropolis<sup>®</sup> EON (OLS) equipment that is capable of terminating the DWDM channels is designated as an End Terminal. (Refer to the Glossary in this document for terminology definitions and to the APG document for more information.)

**Important!** A Metropolis<sup>®</sup> EON (OLS) Ring Terminal application may be installed as two End Terminals in a back-to-back configuration, one 1A-TX-type End Terminal and one 1A-RCV-type End Terminal. The two End Terminals may have a Telemetry Feed Through optical fiber connection between them (1A-TX-Thru and 1A-RCV-Thru), or may use the optional IAOLAN interface with an electrical cable connection.

- Each End Terminal will be a separate Network Element configuration and each will be considered as a separate Node by the EON system control elements. Follow the installation procedures for each End Terminal individually and the customer engineer's instructions concerning the connection between them for Ring Terminal applications.

Note the following before starting:

- Disconnect the office alarms from the Network Element before performing any tests. Reconnect the office alarms after completing the testing.



**Contents** This chapter contains the following:

Software Installation	<a href="#">7-4</a>
NE Connection	<a href="#">7-7</a>
Circuit Pack Insertion	<a href="#">7-9</a>
Initial Provisioning	<a href="#">7-12</a>
Final Verification	<a href="#">7-23</a>

## Software Installation

---

**Description** The software installation procedure for new Metropolis<sup>®</sup> EON installations is provided in the *Software Release Description* that is shipped with the CD-ROM. The upgrade of software to in-service terminals should follow the upgrade procedures also provided in the *Software Release Description*. Refer to the *Software Release Description* for the most up-to-date software installation instructions.

**General Software Installation Considerations**

- Read the entire software installation procedure in the *Software Release Description* before beginning.
- Coordinate the software installation with the alarm monitoring group, if applicable, or disconnect office alarms if they have been connected. This is done by removing the connector from P29A on the EON (OLS) Shelf interconnection panel. Alarms are immediately generated when the SYSCTL and SYSMEM circuit packs are inserted and remain until the system is in full operation.
- Installation of the CenterLink Management Console (CMC) 3rd party software to the hard drive of the PC takes about 3 minutes.
- Installation of the CMC Network Element software to the PC hard drive takes about 5 minutes.
- Installation of the Network Element (NE) software to the NE takes approximately 45-55 minutes.
- The person(s) performing the software installation should be trained and have an understanding of the Metropolis<sup>®</sup> EON system.
- Perform the software installation procedure in the sequence provided. Any deviation may lead to unpredictable Network Element behavior.
- Do not proceed if the network element software fails to install correctly. Install the software again from the beginning. If failure continues, write down the output message that the PC is displaying and contact your next level of support.
- Use care when handling circuit packs. Always use the ESD wrist straps and static-safe bags.
- Do not enter a second command until the first command has completed.

- The software may be shipped on a CD-ROM Optical Disk. Use care when handling the CD-ROM to avoid fingerprints on the mirror finish and possible breakage.
- If any mistakes are made while making selections, press the displayed cancel button on the screen to back up and re-enter the selection(s).
- If any error message windows are displayed, refer to Chapter 11, Trouble Clearing, of this manual to address the problem.

### Setting Up the PC

Follow the procedures listed in the *Software Release Description*, C109204131, to set up the PC for CenterLink Software Installation. A PC loaded with Metropolis® EON software may be referred to as a Craft Interface Terminal (CIT).

**Important!** Power the PC from an AC source. Battery power of laptop PCs may not last long enough to complete the installation.

### Network Element Software Download

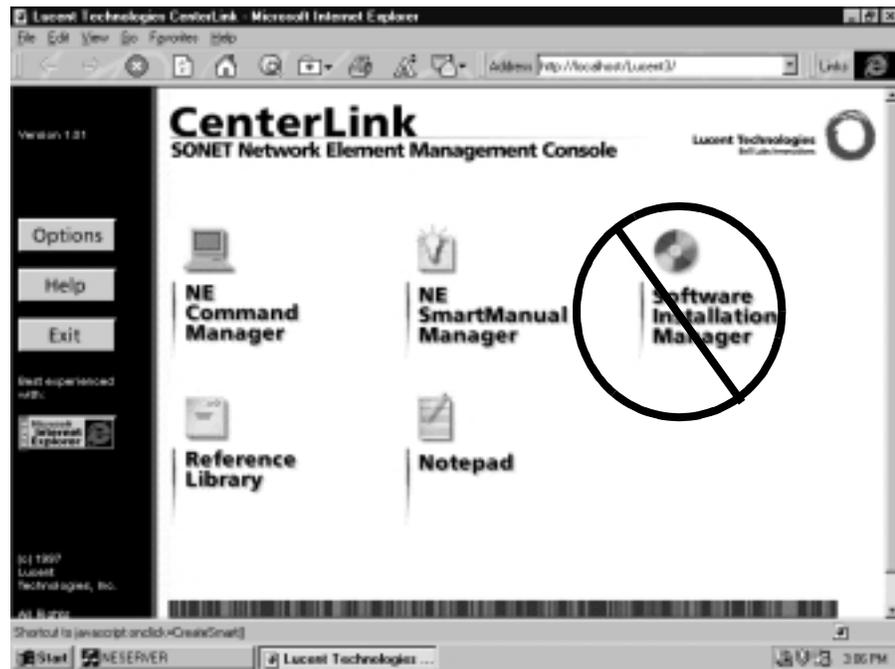
In parallel with the procedures outlined in the *Software Release Description*, follow the steps in the table below to install the Network Element Software:

- 
- 1 Verify that power has been restored to the Metropolis® EON equipment. The green LED on the EON (OLS) Shelf User Panel designated as PWR ON should be illuminated.
- 
- 2 Seat the LEA2 SYSMEM circuit pack in the slot marked SYSMEM.  
**Requirement:** The FAULT LED remains illuminated and the MJ LED is lit on the alarm panel.
- 
- 3 Seat the LEA1 SYSCTL circuit pack in the slot marked SYSCTL.  
**Requirement:** The FAULT LED is illuminated  
**Important!** The timing of the start of the software download after seating the SYSCTL is important. Follow the software install procedure in the *Software Release Description*.

- 
- 4 Follow the procedures in the *Software Release Description* C109204131 to download the Release 8.2 NE software into New Blank Systems using the Download Manager.

**Important!** Do **not** use the Software Installation Manager that is provided on the opening page of the NE Management Console (or CIT display). Refer to Figure 7-1.

**Figure 7-1 Software Installation Manager Selection**



- 
- 5 When the download completes, the following actions will occur:
- The system will automatically initiate a reset.
  - The LEDs on the SYSMEM and SYSCTL will extinguish after the reset completes.
- 
- 6 This completes the New Blank System Software Installation Procedure.

END OF STEPS

---



## NE Connection

---

**Procedures** Use the following steps to connect to (log into) the Network Element:

- 1 Either double click on the CenterLink icon (with the Lucent symbol) on the desktop or select **Start->Programs->Lucent Technologies->CenterLink** to start the CenterLink Management Console (CMC).
- 2 Click on the NE Command Manager Icon. See Figure 7-1.
- 3 Enter the default Target Identifier (TID):
  - **LT-FT-2000** (Use capital letters and zeros.)then click on the Submit button.

**Figure 7-2 NE Selection Menu Window**



- 
- 4 Enter User Identifier (UID) and Private Identifier (PID):
- Default UID: **LT01** (All caps with a zero.)
  - Default PID: **FT-2000** (All caps with zeros.)

The EXPERT Privilege Level is automatically associated with the LT01 UID in Release 8.2. See Figure 7-3.

**Figure 7-3 Network Element Login Window**



- 
- 5 CenterLink will connect to the Network Element and a Login Successful confirmation will be received.

If no connection is established, proceed as follows:

1. Verify that the RS-232 (CIT) cable is connected properly between the COM port on the PC and the CIT (DCE) connector on the EON (OLS) Shelf User Panel.
2. Verify NEServer is running.
3. Return to the Network Element Login command and try again.

- 
- 6 This completes the Login to the Network Element procedure.

END OF STEPS

---

## Circuit Pack Insertion

---

### General Considerations

- A wrist strap, connected to a wrist strap ground jack, must be worn when handling circuit packs.
- Circuit packs are keyed to prevent being inserted into the wrong shelf position.
- Before seating any circuit packs, inspect the **circuit pack side** of the shelf backplane for any bent or broken backplane pins. If any pins are found to be bent, straighten the pin if possible.
- Any broken pins or bent pins that cannot be straightened must be replaced using the BERG MT370-01 pin kit for the METRAL pins. Refer to Appendix A, Pin Repair.
- Use care when installing circuit packs to insert them straight to avoid damaging the circuit packs or the backplane pins.
- Optical fiber connectors on optical circuit packs should always be either covered by protective caps or connected with an optical fiber. Note that the optical fibers should not be connected to the circuit packs or units at this time.

### Installing the System Control Circuit Packs

Follow the steps below to install the System Control circuit packs:

- 
- 1** Verify that the SYSMEM and SYSCTL circuit packs have been installed and their LEDs have extinguished after the software download.

---

  - 2** Seat the TOHCTL into its slot in the Metropolis<sup>®</sup> EON (OLS) shelf  
**Requirement:** After an approximate 5-minute reset period the FAULT LED on the TOHCTL will extinguish.

---

  - 3** Seat the LUD1 OTCTL into its slot on the OT System Controller Shelf if an OT System will be integrated with the Metropolis<sup>®</sup> EON (OLS) Shelf. (Seat a second LUD1 into its slot if the Side 2 OT System Controller Shelf is equipped.)  
**Requirement:** After about a 2-minute reset period the FAULT LED on the OTCTL will extinguish.

**Optical Transmission  
Circuit Packs**

Follow the steps below to seat the Optical Transmission circuit packs:

**Important!** To prevent potential damage to the Optical Amplifiers, clean and connect the optical fiber to the “IN” and “OUT” ports **before** seating these packs into the shelf

**CAUTION**

*The OA3 Optical Amplifier (LEA307) is capable of Class IIIb/3B operation when more than 16 channels are equipped. The OA3 may be damaged if a dirty optical fiber or LBO is connected to the OUT port. Clean and/or inspect optical fibers and LBOs before installing them at an OA3 Optical Amplifier. In addition, clean the OUT port using a stick cleaner as per instructions in Appendix B.*

- 
- 1 At an End Terminal NE, insert the OMU/ODU units and carefully tighten the captive screws, if these units have not already been seated.
- 
- 2 Seat the remaining Optical Transmission, Telemetry and Optical Translator circuit packs into the shelf or shelves. These circuit packs include OAs, TLMs, and OTUs/OTPMs. Clean and connect the optical fibers if not already connected.

**Requirement:** Verify that after initial unit reset all the FAULT LEDs are extinguished, except for the LEDs on OA circuit packs, which may be flashing (indicating a LOS condition).

**Important!** At an End Terminal or Dual Facing Shelf, the OA circuit packs functioning as receivers will be flashing because there is no optical signal input. At a Repeater, the FAULT LEDs on all of the OA circuit packs will be flashing.

**Important!** The recommended procedure for connecting or disconnecting optical fibers at an Optical Amplifier is to first unseat the OA before connecting or disconnecting the fiber.

---

**3** Enter a **Configuration -> Update -> System** command using CenterLink. Wait for the update to complete.

---

**4** Enter a **Fault -> Retrieve -> Condition -> All** command. This will report all the alarm conditions present on the system.

**Requirement:** Verify that the no circuit pack failures are shown on the CenterLink report.

**Important!** Other alarm conditions, such as LOS, will be reported as the NE is not as yet connected to other Nodes.

# Initial Provisioning

---

## Before Beginning Provisioning

The following procedure **MUST** be done immediately after the software installation and circuit pack insertion has been completed to avoid repeated visits to each Node in a system.

**Important!** Failure to Initialize the system using the following procedures could cause problems when provisioning the parameters listed in the following section.

---

- 1 Enter the **CONFIGURATION -> Initialize -> System, AID=All, PH=3** (system reset) command using CenterLink.

**Requirement:** The command completes. The full reset time is approximately 10 minutes. The reset will cause the CMC to be disconnected from the network element.

**Important!** Under certain circumstances, a **CONFIGURATION ->Initialize->System, AID=All, PH=3** command will cause an erroneous OA-1A alarm. This erroneous alarm condition can be cleared with a **CONFIGURATION -> Update->System** command.

END OF STEPS

---

## Basic Network Element Provisioning

Based on information provided by the customer engineer, the following provisionable parameters will be set in this section:

- Network Element specific information
- Date and Time
- Far End Communications
- IntraOffice LAN connection



### DANGER

*Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC Class IIIB/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*



### CAUTION

*To comply with IEC regulations, systems containing an IEC Class3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.*

- 
- 1 Log back into the NE using CenterLink.
- 
- 2 Enter the **SECURITY->Enter->System** command. See Figure 7-4 for the resulting CenterLink screen. (Click on the Help button at the bottom of the screen for system parameter descriptions.)
- 
- 3 Enter the NEW\_TID (Target Identifier) designated by the customer for this NE in the box provided. Hit the tab key or move the mouse pointer to the DSNE provisioning box.

**Important!** Write the new TID on a temporary label or tag and attach to the User Panel on the EON (OLS) Shelf for reference during installation.

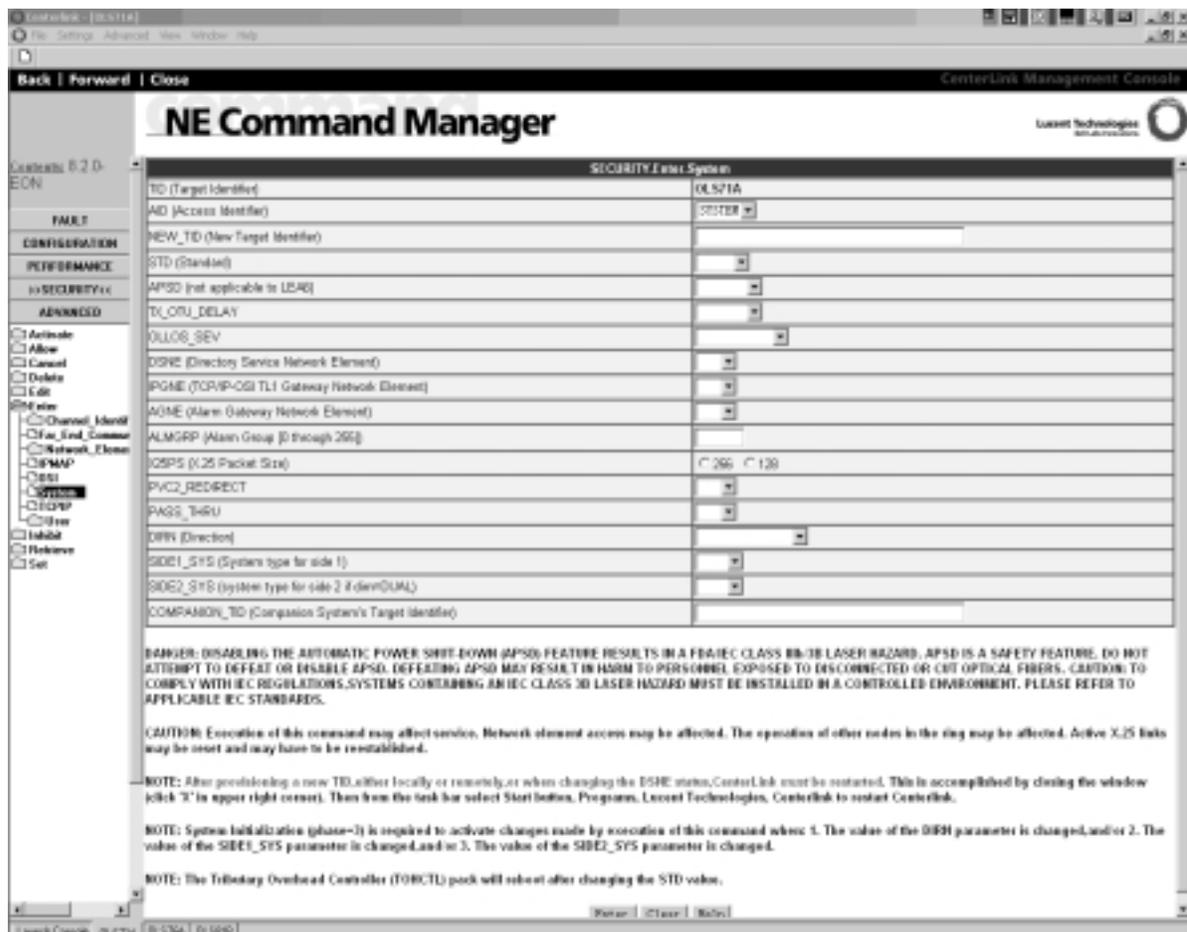
- Set the DSNE (Directory Services Network Element): Select YES in the pull-down box.

**Important!** If the Network Element is not temporarily provisioned as the DSNE, the TID may not be completely changed in the SYSMEM until communication with the DSNE node is established later.

- Click on the ENTER button on the bottom of the screen to set this provisioning information. The TOHCTL will reset when the DSNE status is changed. This activity will take about 5 minutes.

After the ENTER command completes, the new TID must be used to log back into the NE.

**Figure 7-4 Security -> Enter -> System Screen**



- 
- 6** It may be necessary to log back into the NE. Use the log in procedure on pages 7-7 and 7-8 with the new TID as the Target ID. Continue to use **LT01** as the UID and **FT-2000** as the PID.

The new TID will appear in the CMC connection messages.

---

- 7** Enter the **SECURITY->Enter->System** command for additional provisioning of this Network Element.
- 

- 8** Set the alarm-reporting STANDARD: Select SONET or SDH from the pull-down box as designated by the customer engineer. Hit the tab key or move the mouse pointer to the next box.
- 

- 9** Leave APSD and TX\_OTU\_DELAY in the ENABLE (default) state.
- 

- 10** If directed by the customer engineer, set the OLLOS\_SEV (Optical Line LOS Severity) alarm reporting state. Otherwise, leave as default.
- 

- 11** Set the IPGNE per the customer engineer's instructions: Select either yes or no from the pull-down box. Hit the tab key or move the mouse pointer down to the next box.
- 

- 12** Set the AGNE per the customer engineer's instructions: Select either the yes or no from the pull-down box. (There may be more than one AGNE in a Metropolis<sup>®</sup> EON system.) Hit the tab key or move the mouse pointer down to the next box.
- 

- 13** Set the ALMGRP per the customer engineer's instructions: Enter the designated alarm group if not using the default value (255). Hit the tab key or move the mouse pointer down to the next box.
- 

- 14** Set the X25PS (packet size) per the customer engineer's instructions: Click on the appropriate packet size. Hit the tab key or move the mouse pointer down to the next box.

- .....
- 15** Set the X.25 redirect per the customer engineer's instructions: In the "PVC2\_Redirect" drop down menu, select YES or NO, depending on whether the NE will utilize the X.25 redirect option or not. Hit the tab key or move the mouse pointer down to the next box.
- .....
- 16** Set the PASS-THRU per the customer engineer's instructions: Select YES from the drop down menu if the NE will have pass-through wavelengths, without OTUs. Select NO if the NE will not utilize the pass-through feature. Hit the tab key or move the mouse pointer down to the next box.
- .....
- 17** Set the DIRN (Direction) per the customer engineer's instructions: Click on the appropriate selection for the NE type: 1A-TX, 1A-TX-THRU, 1A-RCV, 1A-RCV-THRU, 1A-TX-32, 1A-TX-32-THRU, 1A-RCV-32, 1A-RCV-32-THRU, or Dual. (Leave the DIRN value blank if the NE is a Repeater.) Hit the tab key or move the mouse pointer down to the next box.
- .....
- 18** Set the SIDE1\_SYS (OA pump power setting) per the customer engineer's instructions: Verify the appropriate setting, A, B, C, 1\_OA, or 0\_OA from Table 7-1 and select it from the SIDE1\_SYS pull-down box. Hit the tab key or move the mouse pointer down to the next box.

**Table 7-1 OA Pump Power Setting**

OA Type	OA Pump Setting	Spans between End Terminals
LEA207 or	A	1-8
LEA307	1-OA	1
LEA7 or	A	1-3
LEA7B	B	4-5
	C	6-8
	1-OA	1
LEA105	A	1
	1_OA	1
LEA104 or	A	1-3
LEA107B	B	4-5

- 
- 19** SIDE2\_SYS: If the DIRN selection is Dual, select the appropriate power setting for side 2 from Table 7-1 and select it from the SIDE2\_SYS pull-down box. If NE is not Dual, leave this box blank.
- 
- 20** Leave the COMPANION\_TID in the default state of blank, unless otherwise instructed by the customer's engineer.
- 
- 21** If corrections need to be made, click on CLEAR and re-enter the information beginning at Step 8. When all entries have been made and verified, click on the ENTER button at the bottom of the screen.
- 
- 22** After the Enter-System command completes, enter the **CONFIGURATION -> Initialize -> System, AID=All, PH=3** (system reset) command
- 
- 23** After the system reset completes, log back into the NE and enter the **SECURITY->Retrieve->System** command to verify all the provisioning.
- 
- 24** If this NE is not designated as the DSNE for the system, it will be necessary to change its status from YES back to NO.

**Important!** A MJ alarm (multiple DSNEs defined) will result if this NE and one or more other NEs on the system are specified as the DSNE when the NEs are connected together.

If necessary, repeat Steps 2, 4 and 5 changing the DSNE to NO.

END OF STEPS

---

## Additional Provisioning

Complete the provisioning of the NE in the following steps:

- 
- 1 If necessary after changing the DSNE, log back into the NE. Verify the initial provisioning status is in agreement with the customer engineer's instructions.

If the initial provisioning selections are not made, the following factory default values will remain in place:

**Table 7-2 Factory Default Values**

Option	Default
TID	LT-FT-2000
Alarm Group	255
Packet Size	256
Alarm Gateway Network Element (AGNE)	No
Directory Server Network Element (DSNE)	No
Automatic Power Shut Down (APSD)	Enabled
PVC2_Redirect	No
Pass_Thru	No
IPGNE	No

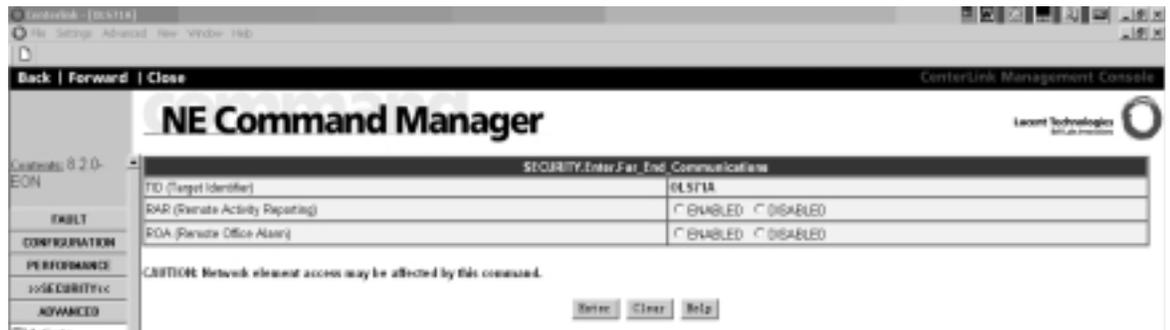
- 
- 2 If LEA307 Optical Amplifiers (OA3s) are equipped, they must be provisioned for either Normal or High Gain. Refer to the customer engineer's job specification or work order to determine which gain setting is to be provisioned on this Metropolis<sup>®</sup> EON system.

Select **CONFIGURATION->Enter->Optical\_Line** and select the Normal or High Gain setting as directed by the customer engineer. Enter the command to provision the OA3 gain setting.

Verify the provisioning by entering the **CONFIGURATION->Retrieve->Optical\_Line** and observe the screen report.

- 3 Enter the **SECURITY->Enter->Far End Communications** command and click on RAR (Remote Alarm Reporting) Enabled to enable Far End Communications.

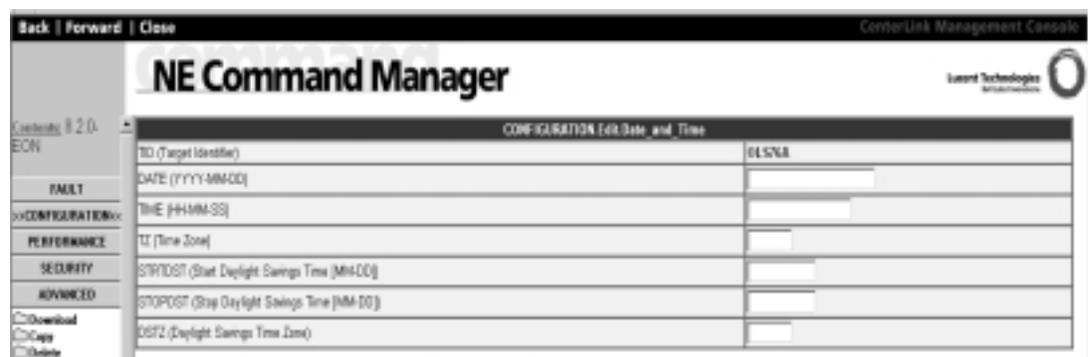
**Figure 7-5 Security->Enter->Far End Communications**



- 4 Enter the **CONFIGURATION->Edit->Date\_And\_Time** command to set the date and time where:
- YY-MM-DD is the date in Year, Month, and Day
  - HH-MM-SS is the time in Hours, Minutes, and Seconds
  - TZ is the Time Zone: EST, CST, MST, or PST (for North America).
  - STRTDST is the start date of daylight savings time
  - STOPDST is end date of daylight savings time
  - DSTZ, the Daylight Savings Time Zone, is EDT, CDT, MDT, or PDT (for North America). If daylight savings time is not used, leave both the start and stop dates with the same date.

**Requirement:** CenterLink responses now display the provisioned date and time in the headings.

**Figure 7-6 Configuration -> Edit -> Date\_and\_Time**



- 5 If an LDA3 (IAOLRP) circuit pack is equipped and the IntraOffice LAN port will be connected to another NE or to an EMS (such as Navis-SNMS or NMA), then IntraOffice LAN port must be enabled. Otherwise, it must be disabled. (Verify the customer engineer's instructions.) Enter the **SECURITY->Enter->Channel Identifier->Security** command. In the AID field, select LAN from the drop down menu. In the PORTACC field, select ENABLE (or DISABLE) from the drop down menu, as directed by the customer engineer. Click on the ENTER button to provision the LAN port.

**Requirement:** After the TOHCTL performs a 2 minute reset, the TOHCTL LED will extinguish.

Figure 7-7 SECURITY->Enter->Channel Identifier->Security

The screenshot shows the 'NE Command Manager' interface for the 'SECURITY:Enter:Channel\_Identifier:Security' configuration. The left sidebar contains a navigation menu with categories like FAULT, CONFIGURATION, PERFORMANCE, SECURITY, and ADVANCED. The main area displays a configuration table with the following fields:

TID (Target Identifier)	0LS71A
AID (Access Identifier)	LAN
TIMEOUT (Time Out [0-999 minutes for DCE, DTE, and DCC ports])	
PORTACC (Port Access [bit for DCE or X.25 port])	ENABLE
BAUDRATE (Baud Rate [For DTE or DCE port with type TL1])	
CHAN (Channel Type [For X.25 port])	
OSTYPE (Operations System Type [For X.25 port])	
CALLADDR (Calling Address [For switched X.25 port with OSTYPE other than NONE])	
YEARFMT (Year format, 2-digit or 4-digit [For DCE, DTE, and X.25])	

Below the table, there are two notes:

NOTE: The user must log out of CenterLink, close the CenterLink window, close the NE\_SERVER window, and re-open CenterLink again after changing the YEARFMT for a DCE or DTE channel. The user must log out of CenterLink, physically disconnect and reconnect the SVC/PVC link, and log in again after changing the YEARFMT for a X.25 channel.

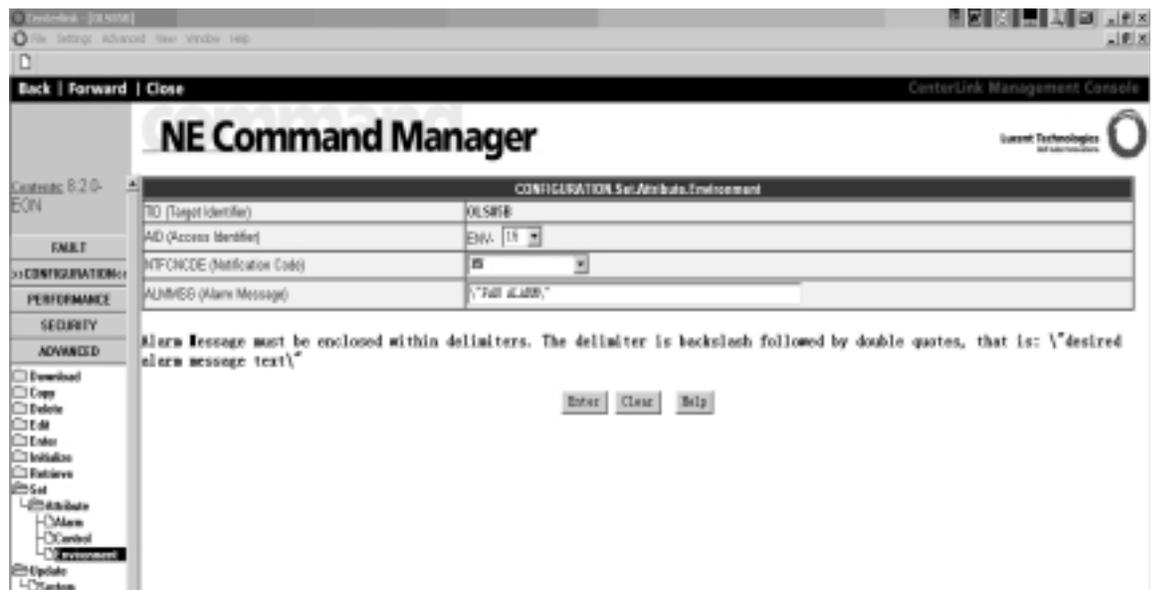
NOTE: The user must "cancel-user" and "act-user" after changing the TIMEOUT parameter. In order for the change to take effect.

At the bottom of the form, there are three buttons: Enter, Clear, and Help.

- 6 The Fan Alarm condition must be provisioned as an environmental attribute. Refer to the customer engineer's instructions as to the Notification Code (alarm level) and Alarm Message text.

Select **CONFIGURATION->Set->Attribute->Environment** and select 15 in the ENV box, select the Notification Code as instructed, and enter the Alarm Message text as directed.

**Figure 7-8 Fan Alarm Provisioning**



- 7 OTU and OTPM units may need to be provisioned for specific customer signals or data rates. Verify the customer engineer's instructions for provisioning any OTU or OTPM units. Refer to the User Operations Guide document (365-575-559) for additional information concerning OTU and OTPM provisioning.
- 8 Enter the **FAULT->Retrieve->Condition->All** command to view all the alarm conditions. Click on ENTER.

**Requirement:** Verify there are no unexpected alarms (alarms may vary depending upon AGNE & DSNE designations for this NE).



## Final Verification

---

### Final Verification Checklist

Verify the following items were completed in this section before proceeding with the next chapter:

Check When Done	Item to check
	Verify all circuit packs have been fully seated in their final positions and only the EON (OLS) intrashelf optical fibers are connected and dressed into place
	Network Element Release 8.2 Software installed per the <i>Software Release Description</i>
	<p>Network Element has been provisioned according to customer specifications. Verify using the following CIT commands:</p> <ul style="list-style-type: none"> <li>• <b>SECURITY-&gt;Retrieve-&gt;System</b></li> <li>• <b>CONFIGURATION-&gt;Retrieve-&gt;Date and Time</b></li> <li>• <b>SECURITY-&gt;Retrieve-&gt;Far End Communications</b></li> <li>• <b>SECURITY-&gt;Retrieve-&gt;Channel Identifier-&gt;Security</b></li> <li>• <b>CONFIGURATION-&gt;Retrieve-&gt;Attribute-&gt;Environment</b></li> </ul>
	If stopping here and not continuing on with the procedures in Chapter 8, install the covers (doors) on the shelves and operate the latches to the locked position. This is important to ensure electrical contact for EMI protection.







# 8 Local Installation Testing

## Overview

---

- Purpose** This chapter provides the LED test, Auto Turnup Local test, ODU/OMU Optical Continuity test and Operational tests for the Metropolis<sup>®</sup> EON; including the testing of OTUs/OTPMs and Metropolis<sup>®</sup> EON (OLS)/OT integration.
- Reason for revision** This is Issue 3.0 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.
- Objectives** The installer will perform the local installation tests to verify the Network Element is ready for connection to other Network Elements to establish a Metropolis<sup>®</sup> EON system.

## Installation Recommendations

The following items should be verified at the site to support the Metropolis<sup>®</sup> EON local installation testing:

- The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.
- The procedures in Chapters 2, 3, 4, 5, 6, and 7 have been completed and the final verification checklists completed.
- A Personal Computer (PC) is available with Metropolis<sup>®</sup> EON Release 8.2 software loaded.
- AC power is available for use by installer.

**Important!** It is assumed that the installer is familiar with the use of a Personal Computers and its use as a CenterLink Management Console (CMC). If instruction in this area is needed, refer to the Release 8.2 Software Release Description C109204131 for information including: software installation, setting up a PC for use with the Metropolis<sup>®</sup> EON system, and logging into the system using a CMC PC. More information is also available in the Metropolis<sup>®</sup> EON User Operations Guide (365-575-559).

## General Considerations

- Required equipment is given in Appendix G of this document. Essential equipment for this section is: one personal computer (PC) with CMC software for use as CenterLink Management Console and connecting cable.
- An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
- Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
- Do not remove the shelf backplane cover.



## DANGER

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

- A Metropolis® EON (OLS) that is capable of terminating the DWDM channels is designated as an End Terminal. (Refer to the Glossary in this document for terminology definitions and to the APG document for more information.)

**Important!** A Metropolis® EON (OLS) Ring Terminal application may be installed as two End Terminals in a back-to-back configuration, one 1A-TX-type End Terminal and one 1A-RCV-type End Terminal. The two End Terminals may have a Telemetry Feed Through optical fiber connection between them (1A-TX-THRU and 1A-RCV-THRU), or may use the optional LAN interface connection with an electrical cable connection.

- Each End Terminal will be a separate Network Element configuration and each will be considered as a separate Node by the EON system control elements. Follow the installation instructions for each End Terminal individually and the engineer's instructions concerning the connection between them for Ring Terminal applications.
- Disconnect the office alarms from the Network Element before performing any tests. Reconnect the office alarms after completing the testing.



## CAUTION

*Installation Auto Turnup tests are performed only out of service. If these tests are performed in service, service will be interrupted.*

- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress

**Contents** This chapter contains the following:

LED Test	<a href="#">8-4</a>
Auto Turnup Local Test	<a href="#">8-5</a>
ODU/OMU Optical Continuity Test	<a href="#">8-13</a>
Local Operational Tests	<a href="#">8-20</a>
Final Metropolis™ EON (OLS) Operations	<a href="#">8-24</a>
Final OT Operations	<a href="#">8-25</a>
Final Verification	<a href="#">8-27</a>

## LED Test

---

**LED Test Description** The LED test verifies proper operation of LEDs within the Metropolis® EON equipment. Proper LED operation is necessary to assist in trouble isolation.

**Procedure** Perform the following steps to test all LEDs on the Metropolis® EON equipment:

---

- 1 Log into the Network Element using the PC as described in Chapter 7.

The detailed CMC connection and login procedure is provided in the *Software Release Description*.

---

- 2 Enter the **FAULT->Test->LED** command from the CenterLink menu.
- 

- 3 Enter “2” in the Repeat Value box and click on ENTER.

**Requirement:** Observe that all LEDs light for 10 seconds, then turn off for 10 seconds. The 20 second sequence repeats, then the LEDs revert to their initial state.

If failed LEDs are indicated (they do not light), replace the circuit pack or unit. (Only the PWR ON green LEDs are in sockets.) Repeat the test procedure until all LEDs pass the test. If a FAULT LED on a circuit pack works in one slot, it will work in any slot. There is no need to move circuit packs to unequipped slots.

END OF STEPS

---



## Auto Turnup Local Test

---

**Description** This local test verifies the supervisory (SUPR) signal path through the TLM and OA circuit packs and the associated intrashelf optical fiber connections. Since an optical loopback is required, this test may also be used to verify the proper connection of optical fibers at the LGX panel. The test may take up to 5 minutes to complete. A more detailed description of the test is given in Chapter 11, Trouble Clearing. If the LDA1 TLM circuit pack is equipped, an optional local test in Chapter 11 verifies the Customer Maintenance Signal (CMS) feature.

### Auto Turnup Local SUPR Procedures for End Terminals

The following procedure is the Auto Turnup Local SUPR test for End Terminal Network Element types:

**Important!** The Auto Turnup Local SUPR test for Repeaters is provided in the next section.

- 
- 1 Enter the **SECURITY->Enter->System** command and select Disable in the APSD window. Click on ENTER and wait for the command to complete. Verify APSD is disabled by entering the **SECURITY->Retrieve->System** command and viewing the report. The APSD feature will be enabled at the completion of this test.



### **DANGER**

*Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC ClassIIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*

- 
- 2 For 2-OA NE applications, loop back the high-speed signal path on optical Line 1 through 33 dB of attenuation from the OUT port of the transmitting OA to the IN port of the receiving OA. The loop-back may be made at the LGX panel if the outside plant optical fiber connections are in place.

**CAUTION**

*To prevent potential damage to the Optical Amplifiers or the optical fiber jumpers themselves, connect the optical fiber jumpers to the “IN” and “OUT” ports with these transmission circuit packs **unseated**, then reseal them into the shelf.*

For a THRU-type Network Element (i.e. telemetry feed through), loop back the IN port to the OUT port on the TLM circuit pack in slot 1B, using 15 to 18 dB of attenuation on the IN port. Refer to Figures 8-1 and 8-2.

For 1-OA NE applications with a Line Receive Unit, loop back the high-speed signal path on optical Line 1 through 33 dB of attenuation from the OUT port of the transmitting OA to the IN port of the LIRCV unit. The loop-back may be made at the LGX panel if the outside plant optical fiber connections are in place.

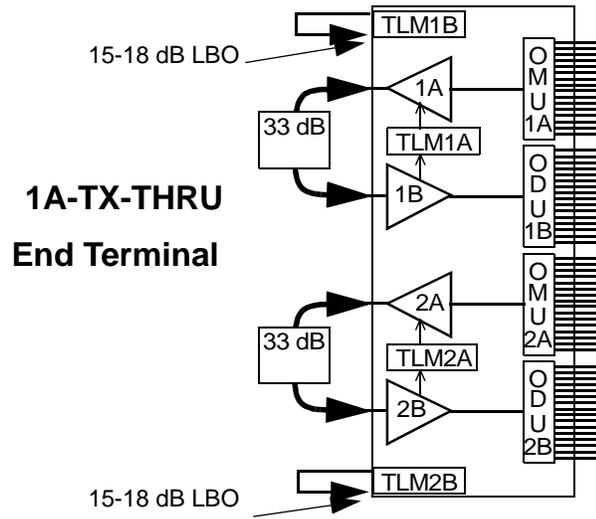
For 1-OA NE applications without a Line Receive Unit, connect the transmit OA OUT port to the ODU directly as shown in Figure 8-3. There will be no receive OA for these applications. Use a 10-dB LBO on the OA OUT port and a 5-dB LBO on the TLM IN port with an optical fiber jumper in between. (Do not use the 33-dB optical fiber jumper.)

For 0-OA NE applications, loop back the high-speed signal path on optical Line 1 through 33 dB of attenuation from the OUT port of the LITX unit to the IN port of the LIRCV unit. The loop-back may be made at the LGX panel if the outside plant optical fiber connections are in place.

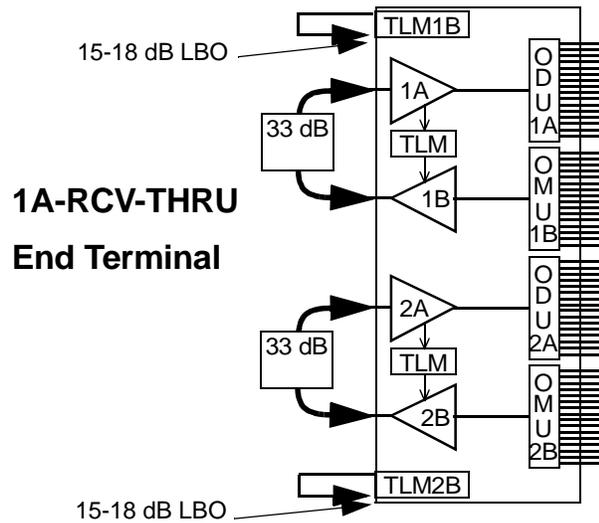
If optical Line 2 is equipped, loop back the Line 2 high-speed signal for the NE type as described above for optical Line 1.

- 
- 3 Verify the Customer Maintenance Signal ports (CM IN/CM OUT) are not looped on the LDA1 TLM circuit pack, if equipped. The CMS feature is not provided with the LDA4 TLM circuit pack.

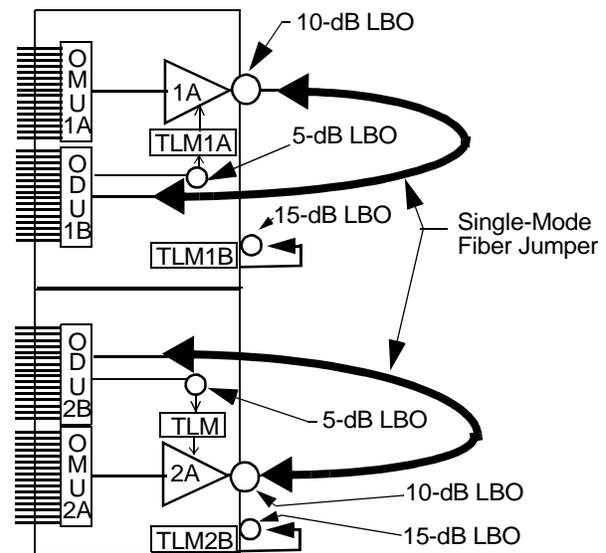
**Figure 8-1 Auto-Turnup-Local SUPR Connections for 2-OA (1A-TX-THRU)**



**Figure 8-2 Auto-Turnup-Local SUPR Connections for 2-OA (1A-RCV-THRU)**



**Figure 8-3 Auto-Turnup-Local SUPR Connections for 1- OA without a LIRCV unit**



- 
- 4** Enter the **CONFIGURATION->Update->System** command.
- Requirement:** The command clears loss of signal alarms. **FAULT** LEDs on all OAs, LIRCV or LITX units should be off and not flashing.
- 
- 5** Wait 2 or 3 minutes for the Network Element to recognize the loopback conditions. Enter the **FAULT->Condition->All** command and observe the report.
- Requirement:** Both the Optical Line Mismatch and Ring Map Incomplete alarm conditions must be reported before the Auto Turnup Local Test can be initiated.

If the requirement is not met, wait for 1-2 minutes and re-enter the **FAULT->Condition->All** command.

- 
- 6** Select the **FAULT->Test->Auto->Local**. Enter SUPR-All in the box provided and click on the Enter button. This test will take up to 5 minutes, depending on how many optical lines are equipped (typically less than 1 minute for one optical line).

**Requirement:** Report as Good for equipped TLM slot positions. Failed TLMs will report as Fail. An untested slot (not equipped) reports as “-”. If any TLM fails, move the circuit pack to a known good slot position and retest. If the failure moves with the circuit pack, it indicates a failed unit. Replace any failed unit and repeat the test. If the slot fails when equipped with a known good circuit pack, a possible backplane or wiring problem is indicated. Contact your next level of support.

---

- 7** Remove the loop-back optical fiber jumpers and attenuation from the high-speed optical line paths. For 1-OA and 0-OA NEs, leave the 5-dB LBO in place on the IN port of the TLM circuit pack.
- 

- 8** For THRU NE applications, remove the loopback and attenuation from the 1B and 2B TLM circuit packs. Replace the LBO as originally specified by the customer engineer at the IN port of 1B (and 2B) TLM circuit pack for the THRU connection.
- 

- 9** Enter the **CONFIGURATION->Update->System** command to clear alarm conditions that resulted from removing the optical fiber jumpers.
- 

- 10** When finished local SUPR testing, enter the **SECURITY->Enter->System** command and enable APSD. The APSD feature **must** be enabled for safety purposes. See DANGER notice on page 8-5.

END OF STEPS

---

**Auto Turnup Local SUPR  
Procedures for Repeaters**

Use the following procedures to perform the Auto Turnup Local SUPR Test for Repeaters:

- 
- 1 Enter the **SECURITY->Enter->System** and select Disable in the APSD window. Click on ENTER and wait for the command to complete. Verify APSD is disabled by entering the **SECURITY->Retrieve->System** command and viewing the report. The APSD feature will be enabled at the completion of this test.

**DANGER**

*Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC ClassIIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*

- 
- 2 Loop back the high-speed signal path on optical Line 1 by connecting the OUT port of OA 1A to the IN port of OA 1B through 33 dB of attenuation; and by connecting the OUT port of OA 1B to the IN port of OA 1A through 33 dB of attenuation. See Figure 8-4.

---

  - 3 If optical Line 2 is equipped, loop back the Line 2 high-speed signal path by connecting the OUT port of OA 2A output to the IN port of OA 2B input through 33 dB of attenuation; and by connecting the OUT port of OA 2B to the IN port of OA 2A through 33 dB of attenuation. See Figure 8-4.

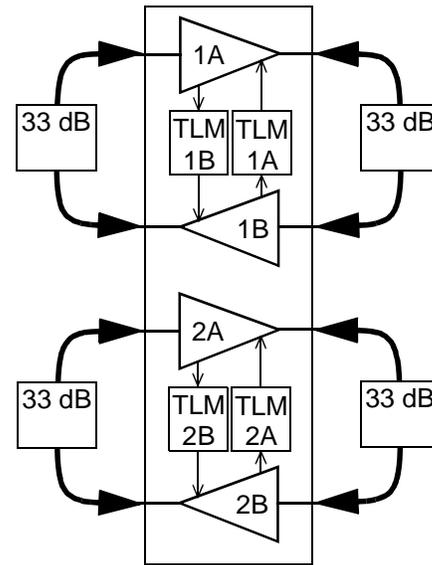
---

  - 4 Verify the Customer Maintenance Signal ports (CM IN/CM OUT) are not looped on the LDA1 TLM circuit packs, if equipped. The CMS feature is not provided with the LDA4 TLM circuit packs.

---

  - 5 Enter the **CONFIGURATION->Update->System** command.  
**Requirement:** The command clears loss of signal alarms. FAULT LEDs on both OAs are off and are not flashing.

**Figure 8-4 Auto-Turnup-Local SUPR Connections for Repeaters**



- 6 Wait 2 or 3 minutes for the Network Element to recognize the loopback conditions. Enter the **FAULT->Condition->All** command and observe the report.

**Requirement:** Both the Optical Line Mismatch and Ring Map Incomplete alarm conditions must be reported before the Auto Turnup Local Test can be initiated.

If the requirement is not met, wait for 1-2 minutes and re-enter the **FAULT->Condition->All** command.

- 7 Select the **FAULT->Test->Auto->Local**. Select SUPR-All in the box provided and click on Enter. This test will take up to 5 minutes, depending on how many optical lines are equipped (typically less than 1 minute).

**Requirement:** Report as Good for equipped TLM slot positions. Failed TLMs will report as Fail. An untested slot (not equipped) reports as “-”. If any TLM fails, move the circuit pack to a known good slot position and retest. If the failure moves with the circuit pack, it indicates a failed unit. Replace any failed unit and repeat the test. If the slot fails when equipped with a known good circuit pack, a possible backplane or wiring problem is indicated. Contact your next level of support.

- 
- 8 Remove the loop-back optical fiber jumpers and attenuation from the high-speed optical line paths.

---

  - 9 Enter the **CONFIGURATION->Update->System** command to clear alarm conditions that resulted from removing the optical fiber jumpers.

---

  - 10 When finished local SUPR testing, enter the **SECURITY->Enter->System** command to enable APSD. The APSD feature **must** be enabled for safety purposes. See DANGER notice on page 8-10.

END OF STEPS

---

## ODU/OMU Optical Continuity Test

---

**Description** This test verifies optical continuity with the 32-channel-ready ODU and OMU units at End Terminals. A wideband optical source is required to perform this continuity test. The pre-Release 8 Optical Amplifiers can be used to provide a wideband optical noise output with no input signal applied. These amplifiers may be used as the wideband optical source for this test. Pre-Release Optical Amplifiers that may be used for this test are:

- LEA6
- LEA7 or LEA7B
- LEA104
- LEA105

The wideband optical source is connected to the ODU input. The ODU filters the wideband optical signal into individual wavelengths or channels. These individual wavelengths may be measured and then be connected to the OMU to verify per channel optical continuity.

This ODU/OMU Continuity test is **not** intended as a field test of the insertion loss through the ODU and OMU units, although significant insertion loss differences of many dB may be detected.

**Continuity Test Procedure** This procedure describes the continuity test for ODU types: 607A/B and 608A/B and OMU types: 507A/B and 508A/B. These are the expected ODU and OMU types for the 32-channel-ready Network Element configurations. (This test procedure may also be used for pre-Release 8 ODU and OMU units, or the ODU and OMU tests provided in pre-Release 8 Installation Manuals may be applied for these units.)



### CAUTION

*To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA7B, LEA104, LEA105, LEA207 or LEA307) or the optical fibers themselves, unseat these circuit packs before connecting or disconnecting the optical fibers to the IN and OUT ports; then reseat the circuit pack.*

- 
- 1 Identify the 32-channel-ready Network Element configuration and the Optical Amplifiers or Line Units, and ODU and OMU units equipped in the EON (OLS) Shelf.
- 
- 2 Obtain a pre-Release Optical Amplifier to be used as a wideband optical source.
- 
- 3 Disconnect any optical fibers and remove the Optical Amplifier or Line Unit that was previously installed in the Receive OA/Line Unit slot position. (This is the 1B slot position for 1A-TX type End Terminals and the 1A slot position for 1A-RCV type End Terminals.)  
  
If slot position 2B is unequipped, place but not seat this circuit pack in the 2B slot position. Otherwise, place this circuit pack in an ESD-safe container.
- 
- 4 Place but not seat the pre-Release 8 Optical Amplifier in the Receive OA/Line Unit slot position. Connect this OA to the 1-32 IN port of the ODU16 by cleaning and connecting the optical fiber labeled 1A or 1B-OA-OUT to the OUT port of this OA. Refer to Figure 8-5. Observe the Caution notice on page 8-13.
- 
- 5 Seat the pre-Release 8 OA and log into the Network Element. Enter the **CONFIGURATION->Update->System** command to allow the Network Element software to recognize this pre-Release 8 OA.

- 6 Enter the **SECURITY->Enter->System** command and disable APSD to allow a sufficient wideband optical output power from the pre-Release 8 OA.

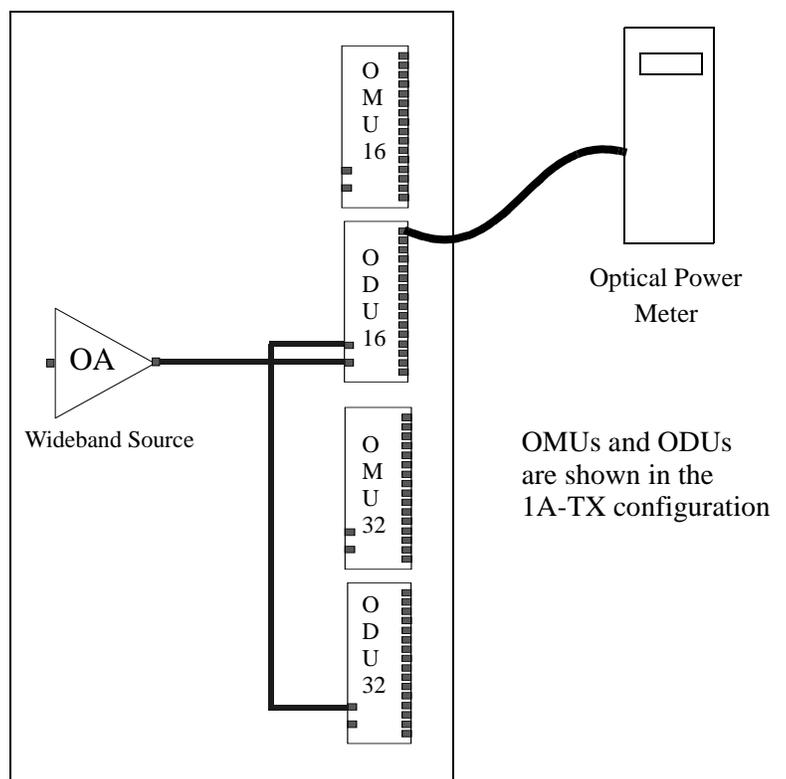
Wait 15 minutes to allow the OA and ODU units to stabilize with temperature.



**DANGER**

*Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC Class IIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*

**Figure 8-5 ODU Continuity Test Configuration**



- 
- 7** Measure and record the optical power at the 1 OUT port of the ODU16 unit by connecting an optical power meter with a clean optical fiber jumper.

**Requirement:** The optical power level should be greater than -36 dBm.

---

- 8** Repeat the optical power measurement of Step 7 for each channel output port (1-16) of the ODU16. Repeat also for each channel (17-32) output port of the ODU32, if equipped. If the ODU32 is not equipped, measure the optical power at the 17-32 OUT port of the ODU16.

**Requirement:** The optical power level should be greater than -36 dBm and within 10 dB of the initial power measurement for channel 1. The power level at the 17-32 OUT port should be at least 10 dB higher than the power at a single channel output port.

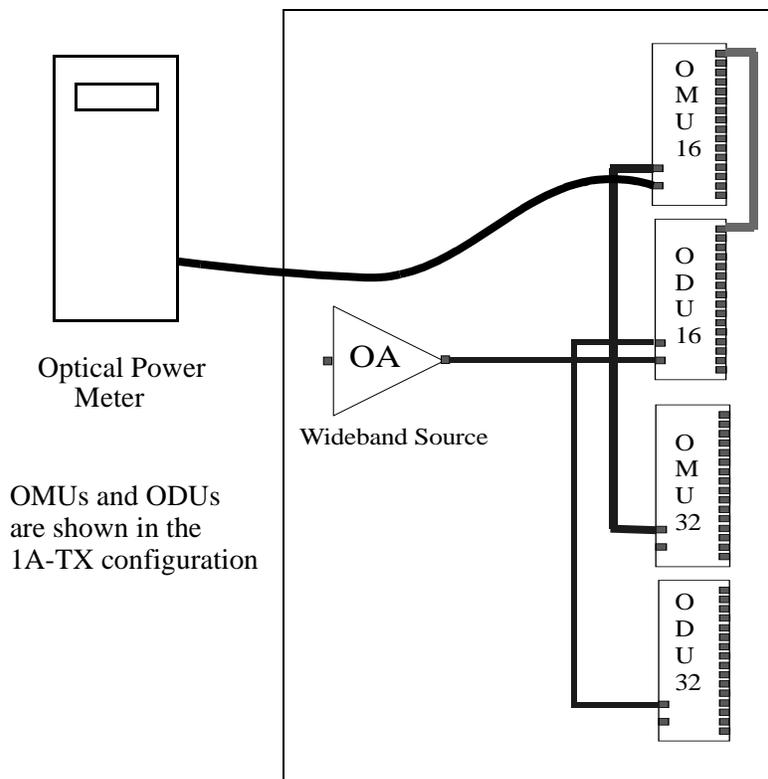
**Table 8-1 Optical Power at ODU Output Ports**

ODU16 Ports	Power (dBm)	ODU32 Ports	Power (dBm)
1 OUT		17 OUT	
2 OUT		18 OUT	
3 OUT		19 OUT	
4 OUT		20 OUT	
5 OUT		21 OUT	
6 OUT		22 OUT	
7 OUT		23 OUT	
8 OUT		24 OUT	
9 OUT		25 OUT	
10 OUT		26 OUT	
11 OUT		27 OUT	
12 OUT		28 OUT	
13 OUT		29 OUT	
14 OUT		30 OUT	
15 OUT		31OUT	
16 OUT		32 OUT	
17-32 OUT			

- 9 Continue with the OMU continuity test by cleaning and connecting an optical fiber jumper from the ODU16 1 OUT port to the OMU16 1 IN port. Measure and record the optical power at the OMU16 1-32 OUT port with a clean optical fiber jumper. Refer to Figure 8-6.

**Requirement:** The difference between the optical power level previously measured at the ODU 1 OUT port and the power level at the OMU16 1-32 OUT port for channel 1 IN should be less than 10 dB for 507A OMU16 or less than 7 dB for 507B OMU16.

**Figure 8-6 OMU Continuity Test Configuration**



- 
- 10 Repeat the optical power measurement of Step 9 for each channel input port (1-16) of the OMU16 by moving the optical fiber jumper to the corresponding channel out ports on the ODU16 and the channel in ports on the OMU16. Repeat also for each channel input port (17-32) of the OMU32, if equipped, by moving the optical fiber jumper to the corresponding channel out ports on the ODU32 and the channel in ports on the OMU32.

**Requirement:** The difference between the per channel optical power level previously measured at the ODU ( ) OUT port and the power level at the OMU16 1-32 OUT port for ( ) IN should be less than 10 dB for 507A OMU16 and 508A OMU32 or less than 7 dB for 507B OMU16 and 508B OMU32.

**Table 8-2 Single Channel Optical Power at OMU Output**

OMU16 ( ) IN PORT	1-32OUT (dBm)	Difference ODU-OMU	OMU32 ( ) IN PORT	1-32OUT (dBm)	Difference ODU-OMU
1 IN			17 IN		
2 IN			18 IN		
3 IN			19 IN		
4 IN			20 IN		
5 IN			21 IN		
6 IN			22 IN		
7 IN			23 IN		
8 IN			24 IN		
9 IN			25 IN		
10 IN			26 IN		
11 IN			27 IN		
12 IN			28 IN		
13 IN			29 IN		
14 IN			30 IN		
15 IN			31 IN		
16 IN			32 IN		

Refer to entries in Table 8-1 for ODU ( ) OUT power measurements.

- 
- 11** After completing the OMU optical continuity measurements, restore the Network Element by:
- Disconnect the power meter optical fiber jumper from the OMU16 and the optical fiber jumper between the ODU and OMU units.
  - Enter the **SECURITY->Enter->System** command and enable APSD.
  - Remove the pre-Release 8 OA from the Receive OA slot position and reinstall the Optical Amplifier or LIRCV unit previously removed.
  - Clean and reconnect the optical fiber between the 1-32 OUT port on the OMU16 unit and the transmit OA or LITX unit.
  - Clean and reconnect the optical fiber between the receive OA or LIRCV unit and the 1-32 IN port on the ODU16 unit.
  - Enter the **CONFIGURATION->Update->System** command to allow the Network Element software to recognize the Optical Amplifier or LIRCV unit.

## Local Operational Tests

---

**Description** The local operational tests verify that the office alarms and CIT-DTE connections are operating properly.

Perform the following steps to test the Local Alarms:

---

**1** Notify customer alarm monitoring personnel that testing is taking place on the office alarm systems.

---

**2** Connect local alarm cable to P29 (OFFICE ALARMS) on the EON (OLS) Shelf interconnection panel.

**Important!** If installing the office alarm cable on an End Terminal for 4-Line System with 2 EON (OLS) Shelves in a cabinet, use the P29 connector located on the lower shelf. If the upper shelf is used, the ACO function will not work properly.

---

**3** Select the **FAULT->Test->Alarm** command. Enter “all” in the first box and enter “2” in the Repeat Value box. Click on Enter to start the test sequence. The test will cycle 2 times through each alarm state. The alarm states are tested in the following order: CR, MJ/Prompt. MN/Deferred, and all alarm LEDs off.

**Requirement:** Verify that the office audible alarms, visual alarms, and the LEDs on the User Panel (or cabinet indicator strip) are indicating the correct alarm status sequence. The NE ACTY LED will be lighted throughout the test.

**Important!** (The ABN, FE ACTY (INFO-F), and NE ACTY (INFO-N) LEDs are not tested.

---

**4** Select the **FAULT->Test->Alarm** command. Enter MJ from the drop down menu and click on Enter. During the 10-second alarmed period, press the ACO/Suppress button on the User Panel.

**Requirement:** The audible alarms are silenced and the ACO/Suppress button is lighted.

---

- 
- 5 Disconnect the local alarm cable from P29.

END OF STEPS

---

### Parallel Telemetry Test Procedure

If parallel telemetry is used, perform the following steps to verify parallel telemetry.

---

- 1 Select the **FAULT->Test->Telemetry->Parallel** command. Select “all” and click on Enter.

**Requirement:** Parallel telemetry alarm is activated.

END OF STEPS

---

### Miscellaneous Discrete and Extended Miscellaneous Discrete (EMDU) Alarms Tests

If miscellaneous and/or extended miscellaneous discretes are equipped, perform the following steps to verify the miscellaneous discrete points:

---

- 1 Activate the alarm closure to be tested (open door, smoke alarm, etc.).
- 

- 2 Select the **FAULT->Retrieve->Condition** command. Enter “all” and click on Enter.

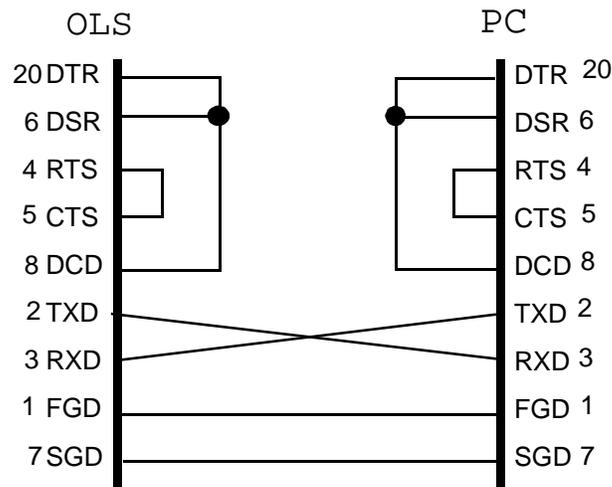
**Requirement:** Verify the environmental alarm shows in the report.

END OF STEPS

---

### CIT(CMC)-DTE Port Test Background

This procedure requires the use of a null modem, since like ports (DTE and DTE) are to be connected together. The Null-Handshake null modem wiring is given in Figure 8-7. Also, refer to the troubleshooting section for the minimum CIT (CMC) connection information. Be sure to obtain a connector with the correct mating pins or sockets required for your cable and Metropolis® EON (OLS) DTE port.

**Figure 8-7 Null Handshake Null Modem Wiring**

Serial Interface port signals and connector pinouts for DB9, DB25, and RJ45- 8 pin ports are provided in Table 8-1 for reference.

### Verifying DTE Port Operation

Perform the following steps to verify DTE port operation:

- 1 Remove the RS232 (CIT) cable from the CIT (DCE) port on the User Panel located on the EON (OLS) Shelf.

- 2 Using a null modem adapter, connect the RS232 (CIT) cable to the DTE connector (J17) on the EON (OLS) Shelf interconnection panel.

- 3 Follow the procedures in Chapter 7 to log into the Network Element.

**Important!** For additional information regarding logging in to the Network Element, refer to the *Software Release Description*.

- 4 After receiving a successful Login notification, log out from the CMC.

- 5 Remove the null modem and RS232 (CIT) cable from J17 on the interconnection panel.

**Table 8-3 Serial Port Pinout Information**

<b>Signal</b>	<b>Name</b>	<b>DB9 Pin</b>	<b>DB25 Pin</b>	<b>RJ45-8 Pin</b>	<b>DCE I/O</b>	<b>DTE I/O</b>
DCD	Data Carrier Detect	1	8	6	O	I
RXD	Received Data	2	3	5	O	I
TXD	Transmitted Data	3	2	3	I	O
DTR	Data Terminal Ready	4	20	4	I	O
SGD	Signal Ground	5	7	7	NA	NA
DSR	Data Set Ready	6	6	Not present	O	I
RTS	Request to Send	7	4	2	I	O
CTS	Clear to Send	8	5	8	O	I
RI	Ring Indicator	9	22	Not present	O	I
FGD	Frame Ground	Not present	1	1	NA	NA



# Final Metropolis<sup>®</sup> EON (OLS) Operations

---

**Procedures** Perform the following to complete the local installation testing of the Metropolis<sup>®</sup> EON (OLS):

---

- 1 Place protective covers or dust caps on all optical port and fiber connectors.

---

- 2 Verify the APSD feature is ENABLED. Enter the **SECURITY->Retrieve->System** command and view the report. If necessary to enable the APSD feature, enter the **SECURITY->Enter->System** command and select Enable in the drop-down window.



## **DANGER**

*Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC ClassIIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*

---

- 3 If the Metropolis<sup>®</sup> EON (OLS) Shelf is to be a repeater (i.e., no associated OT system), proceed to Chapter 9, Network Element Connections; otherwise continue with next procedure for testing the associated OT system.

END OF STEPS

---



# Final OT Operations

---

**Important!** The following OTU/OTPM test procedures will be duplicated in Chapter 10 when connecting the DWDM wavelengths to the Metropolis<sup>®</sup> EON system. These test procedures should be completed at this time if the customer is accepting the Metropolis<sup>®</sup> EON system without any DWDM wavelengths connected.

## Install OTUs into final positions

The customer engineer will specify the location of each OTU/QOTU/OTPM circuit pack in the Network Element equipment configuration.

Following the precautions previously listed at the beginning of this section, verify that all OTU/OTPM circuit packs are seated into their designated slot positions.

## Test Description

The purpose of this test will be to determine that each OTU/OTPM receiver is operational and the transmitter output power is within specification. A valid SONET/SDH or data test signal appropriate to the type of OTU/OTPM is required to perform this task. The OTU/OTPM transmitter will not turn on the output laser unless it is receiving a valid input signal.

**Important!** If the Quad Optical Translator Unit is used the following should be considered:

- Disconnect the optical fibers to all OTPMs in a QOTU before the QOTU is engaged or disengaged from the backplane,
- Disconnect the optical fibers from an OTPM before inserting or removing it from a QOTU,
- Disconnect the optical fibers from all OTPMs in a shelf before applying or removing power from the shelf,
- Transmission hits on other channels being carried on the same optical line may result if these precautions are not taken.



## CAUTION

*High power optical signal levels may be present during the following testing. If using an optical power meter that is not rated for +16 dBm, use a attenuated optical fiber between the optical source and the meter.*

## Final OT Test Procedures

Perform the following steps to final test the OTU/OTPMs:

- 
- 1 Obtain an appropriate valid signal from the associated SONET/SDH transmission equipment or a SONET/SDH test set or data test set. Verify with an optical power meter that the source is within the input specification of each OTU/OTPM. Refer to the receive input power ranges provided in Chapter 10, page 10-10.

---

  - 2 Connect a valid signal to the input of the first OTU/OTPM to be checked. Connect an optical power meter to the OTU/OTPM output using a fiber jumper with appropriate connectors. Refer to Chapter 10, pages 10-15 and 10-16, for the “add” and “drop” OTU/OTPM output power ranges.
 

**Requirement:** The output power from the OTU/OTPM shall be between the minimum and maximum power levels specified in Chapter 10, the red LED (FAULT) shall be OFF and, for OTPMs, the green LED (ACTIVE) shall be illuminated.

---

  - 3 If the OTU/OTPM meets requirement, replace the protective dust caps on the IN and OUT ports. Do not install input or output optical fibers.

---

  - 4 Repeat Steps 2 and 3 until all the OTU/OTPMs have been tested.
 

**Important!** If a loopback is used to reduce the amount of test equipment needed while testing 41F-type Gigabit Ethernet OTUs, remove the loopback before removing the test signal. While the loopback is in place, if a loss of signal condition is introduced by removing the test signal, a circuit pack failure may be seen on the pack with the loopback in place. Restoring the signal may not clear the failure and the 41F-type circuit pack may require reseating.

---

  - 5 After testing each OTU/OTPM, enter the **Configuration->Update->System** command to clear all OTU/OTPM LOS alarms introduced by this test.

END OF STEPS

---

# Final Verification

---

## Final Installation Test Checklist

Verify the following items were completed in this chapter before proceeding with the next chapter:

Check When Done	Item to check
	LED test performed
	Auto Turnup Local test completed
	ODU/OMU Optical Continuity test completed
	Local alarm test completed, if applicable
	Parallel telemetry test completed, if applicable
	Miscellaneous discrete test performed, if applicable
	CIT DTE test completed, if applicable
	OTU/OTPM output power levels verified
	OTUs and OTPMs in their designated positions
	Disconnected optical fibers have protective dust caps
	Alarms cleared (updated)
	Network element provisioning verified (Security->Retrieve->System)
	APSD feature ENABLED. If not, enter the Security->Enter->System command to enable the APSD feature at this time.
	Before leaving the equipment in a powered state, install the covers (doors) on the shelves and operate the latches to the locked position. (This is important to insure electrical contact for EMI protection.)







# 9 Network Element Connections

## Overview

---

<b>Purpose</b>	This chapter provides the general requirements and methods for connecting Metropolis <sup>®</sup> EON Network Elements with each other to establish an optical line system.
<b>Reason for revision</b>	This is Issue 3.0 of the Metropolis <sup>®</sup> EON Installation Guide for Release 8.2 applications.
<b>Objectives</b>	This chapter provides the installer with the necessary information and procedures for connecting Network Elements (NEs) in the Metropolis <sup>®</sup> EON system. Successful connections of all the NEs will result in ring closure and the ring map available with CenterLink.
<b>Engineering Rules and Span Loss Limits</b>	<p>The Metropolis<sup>®</sup> EON Engineering Rules are provided in the System Planning and Engineering section of the Applications and Planning Guide, 365-575-558. The customer engineer is responsible for designing the linear or ring system using the Engineering Rules. There are several key parameters for proper connection of NEs on each span:</p> <ul style="list-style-type: none"><li>• The NE type (2-OA, 1-OA or 0-OA). Only 2-OA configurations may have more than one span between End Terminals.</li><li>• The type of Optical Amplifier used with the NE type.</li><li>• The maximum signal/data rate for any channel on the system.</li><li>• The number of spans between End Terminals.</li></ul>

- System Detail Information** The customer engineer shall provide the installer with detailed information concerning the Network Elements to be connected, including:
- The system configuration, linear or ring.
  - The location of each Network Element in the system.
  - The type of each Network Element in the system.
  - The TID assigned to each Network Element.
  - A listing or diagram showing the order of adjacent Network Elements in the system.
  - Specific instructions concerning the Engineering Rules to be applied for span loss limits on each span on this system.
- Installation Recommendations** The following items should be verified at the site to support the Metropolis<sup>®</sup> EON Network Element connections:
- The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.
  - The procedures in Chapters 2 through 8 have been completed and the final verification checklists completed.
  - A Personal Computer (PC) is available with Metropolis<sup>®</sup> EON Release 8.2 software loaded.
  - There are no unexpected alarms present at the Metropolis<sup>®</sup> EON Network Elements.
  - AC power is available for use by installer.
- General Considerations**
- The recommended installation tools and test equipment are listed in Appendix G.
  - The customer-designated engineer shall specify and order all the optical fibers and LBO kits; and shall provide the installer with an optical fiber list and fiber routing information for each shelf.
  - An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
  - Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
  - Do not remove the shelf backplane cover.

**DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

- The optical fiber information provided in this chapter is the latest information available at the time of the issue. To verify current information, refer to the appropriate application schematics (SD-6G156-01 and SD-6G157-01).
- Carefully place optical fibers in a protective tube, channel or duct when routing the optical fibers between shelves or the customer's terminating equipment.
- Carefully place optical fibers in a customer-designated duct or cable rack with nothing on top of them.
- Always maintain a minimum of 1.5-inch bend radius when routing optical fibers.
- Some optical fiber connections between Metropolis<sup>®</sup> EON circuit packs will use LC-type fiber connectors. Other optical fiber connections may have ST, FC, or SC-type fiber connectors as specified by the customer.
- Information concerning LBO types and installation procedures is provided in Appendix F.
- Disconnect the office alarms cable at the Metropolis<sup>®</sup> EON (OLS) Network Element before performing any tests. Reconnect the office alarms cable after completing tests.

**Contents** This chapter contains the following:

Linear and Ring System Configurations	<a href="#">9-4</a>
NE Connections with Release 8 Equipment	<a href="#">9-7</a>
NE Connections with Pre-Release 8 Equipment	<a href="#">9-15</a>
Ring Closure Verification	<a href="#">9-22</a>
Supervisory Performance Monitoring Check	<a href="#">9-24</a>
Final Verification	<a href="#">9-25</a>
Reference Information	<a href="#">9-26</a>

# Linear and Ring System Configurations

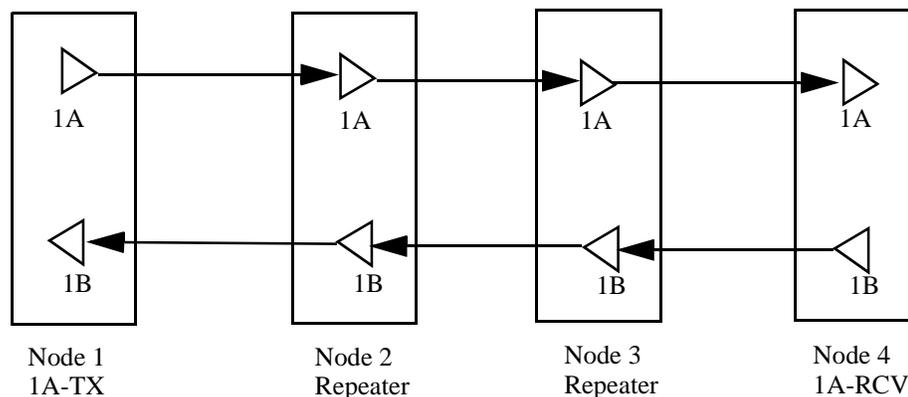
---

**Description** The Metropolis<sup>®</sup> EON system may be connected in one of the two basic configurations, as a linear system or as a ring system. Several combinations of Network Elements may be used to create either type of system. Each NE may be referred to as a Node after the NEs have been connected to create a system. Also, each NE or Node will have a unique TID for identification within the system.

This section provides a general overview of the two basic system configurations as background information for connecting NEs to create either type of system.

**Linear System** A linear system configuration, also called point-to-point, is a connection of NEs that starts at one End Terminal, continues through one or more NEs and completes at another End Terminal. The NEs between the End Terminals may be Repeaters, Dual-facing Terminals or other End Terminals configured back-to-back with telemetry feed-through or LAN interconnection. The optical line connections in the A direction will begin at the transmit output of a 1A-TX NE and end at the receive input of a 1A-RCV NE. The optical line connections in the B direction will begin at the transmit output of the 1A-RCV NE and end at the receive input of the 1A-TX NE. A 4-Node linear system is shown in Figure 9-1.

**Figure 9-1 4-Node Metropolis<sup>®</sup> EON Linear System**



There are 3 spans in this 4-Node Linear System

The 1A-TX Node is recommended to be designated as the DSNE for a linear system configuration.

**Ring System** A ring system may be created by connecting the extreme End Terminals on a linear system together using telemetry feed-through or a LAN interconnection. There is no starting Node and no ending Node in a ring system.

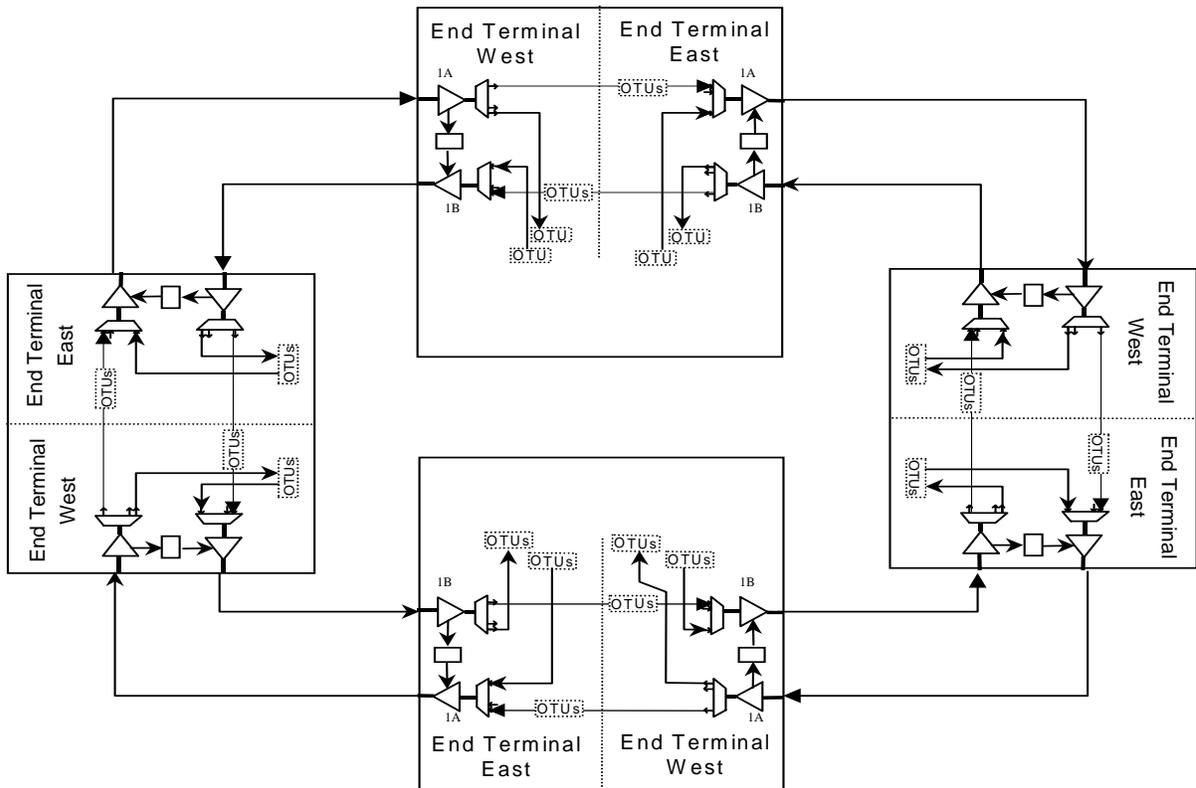
A Ring Terminal in the Metropolis<sup>®</sup> EON system may be created with back-to-back End Terminals, one configured as 1A-TX-type and the other as 1A-RCV-type. The Ring Terminal is actually two NEs installed at the same location linked together via the Supervisory channel. (A Dual-facing Terminal may also be considered as a Ring Terminal, however, the Dual-facing Terminal does not support all the Metropolis<sup>®</sup> EON system features.)

A ring system may be defined using the generic direction terms, East and West. These do not mean actual compass directions but they are used to describe relative directions around the ring system. For the Metropolis<sup>®</sup> EON system documentation, the ring direction convention is the 1A-TX End Terminal designed as East and the 1A-RCV End Terminal designated as West. The customer may choose to designate relative directions in a different manner. Always refer to the customer engineer's information when connecting Network Elements into a system.

The NEs between the Ring Terminal locations may be Repeaters or Dual-facing Terminals. The optical line connections in the A direction (East-to-West) will begin at the transmit output of a 1A-TX NE and end at the receive input of a 1A-RCV NE. The optical line connections in the B direction (West-to-East) will begin at the transmit output of the 1A-RCV NE and end at the receive input of the 1A-TX NE.

A ring system with 4 Ring Terminals is shown in Figure 9-2. There are actually 8 NEs (or Nodes) in this ring system. Each Ring Terminal will have 2 separate and distinct TIDs, one for the 1A-TX (East) End Terminal and the second for the 1A-RCV (West) End Terminal.

**Figure 9-2 4-Ring Terminal Metropolis® EON Ring System**



There is only a single span between each End Terminal in this ring system

Customer traffic signals may be added or dropped or passed-through at each Ring Terminal.

Any of the 8 End Terminals may be designated as the DSNE Node for the ring system.



## NE Connections with Release 8 Equipment

---

**Description** This section provides methods and procedures for connecting Metropolis<sup>®</sup> EON Network Elements that are equipped with Release 8 optical transmission circuit packs. These circuit packs include Optical Amplifiers LEA207 (OA2) or LEA307 (OA3), LEA209 Line Receive Unit (LIRCV) and LEA211 Line Transmit Unit (LITX).

**Important!** The methods and procedures for connecting Metropolis<sup>®</sup> EON Network Elements that are equipped with pre-Release 8 optical transmission circuit packs is provided in the next section of this chapter beginning on page 9-15.

The procedures for connecting Metropolis<sup>®</sup> EON NEs includes measuring the span loss between adjacent NEs and, if necessary, adjusting the total span loss with LBOs.

With no DWDM wavelengths connected to the optical transmission circuit packs, only the Supervisory Channel signal from the Telemetry Control (TLM) circuit pack is available for measuring the span loss between NEs. (The procedures for connecting the DWDM wavelengths to linear and ring systems are provided in Chapter 10.)

When all the NEs have been successfully connected together, system control information may be communicated between NEs using the Supervisory Channel signal.

**Important!** It is not necessary to disable the APSD feature when connecting the Metropolis<sup>®</sup> EON Network Elements together. The APSD conditions will clear after the ring map has been established with just the Supervisory Channel signal present between the Nodes.



### **DANGER**

***Disabling the Automatic Power Shut-Down (APSD) feature may result in a FDA/IEC ClassIIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.***

**NE Connection Procedures** The recommended installation procedure for connecting Metropolis<sup>®</sup> EON NEs to create a linear or a ring system is to begin at the NE that has been designated by the customer engineer as the DSNE. These procedures will require the installer to move sequentially from one NE to the next NE, measuring span loss and connecting the transmit output at one NE to the receive input at the next NE. The procedures in this section start with the A-direction; and when completed, go back in the B-direction to complete the linear or ring system.

---

- 1 Verify the detailed instructions provided by the customer engineer for this system configuration.
    - The system configuration, linear or ring.
    - The location of each Network Element in the system.
    - The type of each Network Element in the system.
    - The TID assigned to each Network Element.
    - A listing or diagram showing the order of adjacent Network Elements in the system.
    - Specific instructions concerning the Engineering Rules to be applied for span loss limits on each span on this system. Tables 9-2, 9-3 and 9-4 provide span loss limit summaries for reference.
- 

- 2 Determine the NE and direction to begin the connection procedures.

#### **Transmit Output Connection**

---

- 3 Determine if a 3-dB LBO is required at the output of all the transmit LEA207 or LEA307 OAs in the system. (The Engineering Rules specify a 3-dB LBO for each OA in a 7 or 8-span system.)

If 3-dB LBO is required, remove the 0-dB LBO at the transmit OA OUT port and replace it with a 3-dB LBO of the same type (ST, SC or FC) matching the customer's outside plant optical fiber connection.



## CAUTION

*The OA3 Optical Amplifier (LEA307) is capable of Class IIIB/3B operation when more than 16 channels are equipped. The OA3 may be damaged if a dirty optical fiber or LBO is connected to the OUT port. Clean and/or inspect optical fibers and LBOs before installing them at an OA3 Optical Amplifier. In addition, clean the OUT port of the OA3 using a stick cleaner as per instructions in Appendix B.*

**Important!** Access to the OUT port of the OA3 is protected by a cover connected to the circuit board latch.

**Figure 9-3 Protected OUT Port on OA3**



- 
- 4** Measure the 1510-nm Supervisory Channel optical power at the transmit OA (or LITX) OUT port. Record the NE TID and measured Transmit power in Table 9-1 (or other installation record).

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseat the OA.

- 
- 5** Verify the outside plant optical fiber connection path to the next or adjacent NE has been installed and properly labeled. (Refer to Outside Plant Connections procedures in Chapter 6.)
- 
- 6** Notify the customer and installer at the next or adjacent NE that an optical signal will be connected to the outside plant optical fiber.

- 
- 7 Clean and connect the outside plant optical fiber to the transmit OA (or LITX) OUT port.

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseal the OA.

---

- 8 Proceed to the next or adjacent NE on the span - or - hand off the connection procedure to the installer at the next or adjacent NE.

### Receive Input Connection

---

- 9 Verify the outside plant optical fiber connection path from the previous or adjacent NE has been installed and properly labeled. (Refer to Outside Plant Connections procedures in Chapter 6.
- 

- 10 Clean the assigned outside plant optical fiber to be connected to the receive OA (or LIRCV) IN port.
- 

- 11 Measure the 1510-nm Supervisory Channel optical power in the outside plant optical fiber to be connected to the receive OA (or LITX) IN port. Record the NE TID and measured Receive power in Table 9-1 (or other installation record).
- 

- 12 Subtract the measured received power from the measured transmit power and record the result as the Span Loss in Table 9-1.
- 

- 13 Verify the transmit-to-receive span type as 2-OA, 1-OA or 0-OA, the OA type, the maximum signal/data rate, and the number of spans between End Terminals. Compare the span loss determined in Step 12 to the customer engineer's information and refer to the minimum and maximum span loss ranges in Table 9-2 or Table 9-3 or Table 9-4.

---

**14** If the span loss determined in Step 4 is greater than the maximum span loss allowed for this span, **stop** and contact your next level of support for further instructions.

---

**15** An LBO may be required for 2-OA span types, if the span loss is less than the minimum span loss allowed for this span. Select an LBO value that will provide enough additional loss to meet the minimum span loss requirement.

If an LBO is required, remove the 0-dB LBO provided at receive OA IN port and replace it with the selected value LBO of the same type (ST, SC, or FC) matching the customer's outside plant optical fiber connection.

---

**16** Clean the assigned outside plant optical fiber and connect it to the receive OA (or LIRCV) IN port

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseal the OA.

---

**17** Verify that the FAULT LED on the receive OA (or LIRCV) is extinguished after the outside plant optical fiber is connected. The LOS alarm condition at the receive OA (or LIRCV) and the TLM LOS alarm condition should clear after the Supervisory Channel signal has been detected.

---

**18** Repeat Steps 3 through 17 for each transmit-to-receive span in the system in both the A and B directions.

---

**19** After all the transmit-to-receive spans have been connected, continue with Ring Closure Verification on page 9-22.



**Table 9-2 Span Loss Limits for 2-OA 32-Channel NE Types**

OA Type	Max Data Rate	No. of Spans	Span Loss (dB)		Max Single Span (dB)	TX OA LBO
			Min	Max		
LEA207 TX and RCV	2.5 Gb/s	1	19	26	26	0
		2	19	25	25	0
		3	19	23	23	0
		4	18	21	21	0
		5	17	20	20	0
		6	16	19	19	0
		7	14	17	17	3
		8	14	15	15	3
	10 Gb/s	1	19	23	23	0
		2	18	22	22	0
		3	17	20	20	0
LEA207 TX and LEA307 normal gain RPTR/RCV	10 Gb/s	1	19	25	25	0
		2	19	23	24	0
		3	18	22	23	0
		4	17	20	21	0
LEA307 normal gain TX and RCV	10 Gb/s	1	19	26	26	0
		2	19	25	25	0
		3	19	23	23	0
		4	18	21	21	0
		5	17	20	20	0
		6	16	19	19	0
		7	14	17	17	3
		8	15	15	15	3

OA Type	Max Data Rate	No. of Spans	Span Loss (dB)		Max Single Span (dB)	TX OA LBO
			Min	Max		
LEA307 high gain Tx and RCV	10 Gb/s	1	22	33	33	0
		2	22	32	33	0
		3	22	30	32	0
		4	22	28	30	0
		5	21	26	28	0
		6	21	25	26	0
		7	17	24	24	3
		8	17	22	22	3

**Table 9-3 Span Loss Limits for 1-OA 32-Channel NE Type**

OA Type	Max Data Rate	No. of Spans	OMU/ODU Max Through Loss (dB)	Span Loss (dB)	
				Min	Max
LEA207  or  LEA307 normal gain	2.5 Gb/s	1	8/8	0	15
		1	5.5/5.5	0	17
	10 Gb/s	1	8/8	0	9
		1	5.5/5.5	0	11
LEA307 high gain	2.5 Gb/s	1	8/8	0	17
		1	5.5/5.5	0	19
	10 Gb/s	1	8/8	0	14
		1	5.5/5.5	0	16

**Table 9-4 Span Loss Limits for 0-OA 32-Channel NE Type**

Max Data Rate	No. of Spans	OMU/ODU Max Through Loss (dB)	Span Loss (dB)	
			Min	Max
2.5 Gb/s	1	5.5/5.5	0	9

## NE Connections with Pre-Release 8 Equipment

---

**Description** This section provides methods and procedures for connecting Metropolis<sup>®</sup> EON Network Elements that are equipped with pre-Release 8 optical transmission circuit packs. These circuit packs include the LEA7, LEA7B, LEA104, LEA107B and LEA105 Optical Amplifiers. See the previous section for connecting NEs with LEA207 and LEA307 Optical Amplifiers.

The procedures for connecting Metropolis<sup>®</sup> EON NEs includes measuring the span loss between adjacent NEs and, if necessary, adjusting the total span loss with LBOs. The procedures for pre-Release 8 equipment are similar to the procedures in the previous section, however, the Smart Manual may be used for selecting LBO values for span loss adjustments.

With no DWDM wavelengths connected to the optical transmission circuit packs, only the Supervisory Channel signal from the Telemetry Control (TLM) circuit pack and the ASE noise from the transmit OA is available for measuring the span loss between NEs. (the procedures for connecting the DWDM wavelengths to linear and ring systems are provided in Chapter 10.)

When all the NEs have been successfully connected together, system control information may be communicated between NEs using the Supervisory Channel signal.

If the Smart Manual software application is used for determining the value of a LBO at the receive end of a span when connecting the Metropolis<sup>®</sup> EON Network Elements together, then the APSD feature will need to be temporarily disabled.



### **DANGER**

*Disabling the Automatic Power Shut-Down (APSD) feature may result in a FDA/IEC ClassIIIb/3B laser hazard. APSD is a safety feature. Do not attempt to defeat or disable APSD. Defeating APSD may result in harm to personnel exposed to disconnected or cut optical fibers.*

**NE Connection Procedures** The recommended procedure for connecting Metropolis® EON NEs to create a linear or a ring system is to begin at the NE that has been designated by the customer engineer as the DSNE Node. The procedures will require the installer to move sequentially from one NE to the next NE, measuring span loss and connecting the transmit output at one NE to the receive input at the next NE. The procedures in this section start with the A-direction; and when completed, go back in the B-direction to complete the linear or ring system.

---

- 1 Verify the detailed instructions provided by the customer engineer for this system configuration.
    - The type of system configuration, linear or ring.
    - The location of each Network Element.
    - The TID assigned to each Network Element.
    - A listing or diagram showing the order of adjacent Network Elements in the system.
    - Specific instructions concerning the Engineering Rules to be applied for span loss limits on each span on this system. Tables 9-6 and 9-7 provide span loss limit summaries for reference.
- 

- 2 Determine the NE and direction to begin the connection procedures.

### Transmit Output Connection

---

- 3 Disable the APSD feature at this Network Element.

**Security->Enter ->System (APSD ->Disable)**

**Important!** The APSD feature needs to be disabled so that the transmitting OA will provide the ASE optical noise power expected for the Smart Manual calculation of LBO value for OA type and span loss. With no DWDM wavelengths connected to the Metropolis® EON system, the OA output should be less than +12 dBm.

See DANGER information for disabled APSD on previous page.

- 
- 4** Determine if a 3-dB LBO is required at the output of all the transmit OAs in the system.
- Engineering Rules specify a 3-dB LBO for each LEA7 or LEA7B OA in a 7- or 8-span system.
  - Engineering Rules specify a 3-dB LBO for each LEA104 or LEA107B OA in a 5-span system

If 3-dB LBO is required, remove the 0-dB LBO at the transmit OA OUT port and replace it with a 3-dB LBO of the same type (ST, SC, or FC) matching the customer's outside plant optical fiber connection.

---

- 5** Measure the total optical power at the transmit OA OUT port. Record the NE TID and measured transmit power in Table 9-1 (or other installation record).

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseal the OA.

**Reference:** With APSD disabled, the total optical power at the OA OUT port should be between the values shown in the Table 9-5.

**Table 9-5 Expected OA Output Levels (No DWDM Wavelengths)**

OA Code	Side System Type	OA Output Power
LEA7	A	+8 to 12 dBm
LEA7B	B	+7 to 11dBm
	C	+4 to 8 dBm
LEA104	A	+8 to 12 dBm
	B	+7 to 11dBm
LEA105	A	+4 to 8 dBm
	1_OA	+4 to 8 dBm

---

**6** Verify the outside plant optical fiber connection path to the next or adjacent NE has been installed and properly labeled. (Refer to Outside Plant Connections procedures in Chapter 6.)

---

**7** Notify the customer and installer at the next or adjacent NE that an optical signal will be connected to the outside plant optical fiber.

---

**8** Clean and connect the outside plant optical fiber to the transmit OA OUT port.

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseal the OA.

---

**9** Proceed to the next or adjacent NE on the span - or - hand off the procedure to installer at the next or adjacent NE.

### Receive Input Connection

---

**10** Verify the outside plant connection path from the previous or adjacent NE has been installed and properly labeled. (Refer to Outside Plant Connections procedures in Chapter 6.)

---

**11** Clean the assigned outside plant optical fiber to be connected to the receive OA (or ODU) IN port.

---

**12** Measure the total optical power in the outside plant optical fiber to be connected to the receive OA (or ODU) IN port. Record the NE TID and measured receive power in Table 9-1 (or other installation record).

---

**13** Subtract the measured received power from the measured transmit power and record the result as the Span Loss in Table 9-1.

- 
- 14 Open the Smart Manual application on the CIT. Verify the OA code used on this span and the Side System type (A, B or C or 1-OA). Enter the total optical power measured in step 12 and note the attenuation value calculated by the Smart Manual.

### LBO Selection using Smart Manual

---

- 1 Login to the Network Element which is receiving the outside plant signal.
- 2 Click on the Smart Manual Manager from the CenterLink Management Console screen to open.
- 3 Click on the Software Release number from the selection on the left.
- 4 Click on Installation, then on Tasks.
- 5 Click on Optical Amplifier Input Line BuildOut Selection.
- 6 Enter the OA type i.e. LEA7, LEA7B, LEA104, or LEA105 and click Continue.
- 7 Enter the System Type i.e. A, B, C or 1-OA and click Continue.
- 8 Enter the Channel Loading Factor obtained at the previous office and click Continue. (The CLF should be zero with no DWDM wavelengths present.)
- 9 The target OA input power level will be displayed. Measure the power from the incoming fiber and enter in the box. The appropriate LBO value will be calculated and displayed on the screen.

**Important!** If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, **stop** and contact your next level of technical support.

---

**15** If an LBO is specified by the Smart Manual, remove the 0-dB LBO provided at receive OA IN port and replace it with the selected value LBO of the same type (ST, SC or FC) matching the customer's outside plant optical fiber connection.

---

**16** Clean the assigned outside plant optical fiber and connect it to the receive OA IN port

**Important!** The recommended procedure for connecting or disconnecting an optical fiber at the OA OUT port is to first unseat the OA, connect or disconnect the fiber, and then reseal the OA.

---

**17** Verify that the FAULT LED on the receive OA is extinguished after the outside plant optical fiber is connected. The LOS alarm condition at the receive OA and the TLM LOS alarm condition should clear after the Supervisory Channel signal has been detected.

---

**18** Repeat steps 3 through 17 for each transmit-to-receive span in the system in both the A and B directions.

---

**19** After all the transmit-to-receive spans have been connected, continue with the Ring Closure Verification: page 9-22.

END OF STEPS

---

**Table 9-6 Span Loss Limits for 2-OA 16-Channel NE Types**

OA Type	Max Data Rate	No. of Spans	Span Loss (dB)		Max Single Span (dB)	TX OA LBO
			Min	Max		
LEA7 or LEA7B	2.5 Gb/s	1	22	33	33	0
		2	22	30	30	0
		3	22	28	28	0
		4	22	27	27	0
		5	21	26	26	0
		6	21	26	26	0
		7	17	22	22	3
		8	17	22	22	3
LEA104 or LEA107B	2.5 Gb/s	1	22	35	35	0
		2	22	34	34	0
		3	22	33	33	0
		4	22	31	31	0
		5	22	27	27	0
LEA105	2.5 Gb/s	1	14	18	18	0

**Table 9-7 Span Loss Limits for 1-OA 16-Channel NE Type**

OA Type	Max Data Rate	No. of Spans	OMU/ODU Max Through Loss (dB)	Span Loss (dB)	
				Min	Max
LEA105, LEA7 or LEA7B	2.5 Gb/s	1	15/12	0	12
		1	8/8	0	16
LEA7B	2.5 Gb/s	1	8/8	0	16
		1	5.5/5.5	0	19

## Ring Closure Verification

---

**Description** After all the transmit-to-receive spans in a linear or ring system have been connected in both the A and B directions, the control system will be able to communicate to each Node using the Supervisory Channel. The Supervisory Channel connection from the DSNE Node along the A and B directions connecting back to the DSNE Node results a control system ring. The Ring Map for the linear or ring system can be completed when the control system ring has been closed. The Metropolis<sup>®</sup> EON (OLS) system may need some time to build its Ring Map as the communication links between each Node are verified internally. APSD should be enabled if it had been disabled during the NE connection procedures.

**Verification Procedure** The proper connection of the linear or ring system is verified by the following procedure:

**Important!** If at any step the requirements are not met, resolve the problem using procedures in the *365-575-560, Metropolis<sup>®</sup> EON (OLS 40/80G) Alarm, Maintenance and Trouble Clearing Guide* before proceeding.

---

**1** Verify the type of Metropolis<sup>®</sup> EON (OLS) system, linear or ring, and the TID assigned to each Network Element in the system.

---

**2** Log into any Metropolis<sup>®</sup> EON Node using the CIT.

---

**3** Enter the **CONFIGURATION->Retrieve->Ring->Map ->Network** command.

**Requirement:** Verify the TIDs are all listed in agreement with the information provided by the customer engineer. Verify the DCC Status is reported as good for each site. If all sites are not listed, wait 5 minutes and enter the command again.

Note that control signal information with the LDA4 (or LDA1) TLM circuit pack is carried on an internal DCC channel and the terms DCC and Supervisory Channel may be used interchangeably.

- 
- 4** Enter the **FAULT->Retrieve->Alarms->Network** command.  
**Requirement:** Verify there are no unexpected network alarms reported.
- 
- 5** Enter the **FAULT->Retrieve->Alarms ->All** command.  
**Requirement:** Verify there are no unexpected local alarms.
- 
- 6** Enter the **SECURITY->Retrieve->System** command.  
**Requirement:** Verify the APSD state is ENABLED. If it is not, use the **SECURITY->Enter->System** command to ENABLE the APSD feature.
- 
- 7** Log into remotely to another Node using the designated TID, as listed in the Ring Map retrieved in Step 3.  
**Requirement:** Login is successful.
- 
- 8** Enter the **Fault->Retrieve->Condition->All** command and verify there are no unexpected alarms or conditions at the remote Node site.
- 
- 9** Enter the **SECURITY->Retrieve->System** command at the remote Node.  
**Requirement:** Verify the APSD state is ENABLED. If it is not, use the **SECURITY->Enter ->System** command to ENABLE the APSD feature.
- 
- 10** Repeat Steps 7, 8, and 9 for all Nodes in the system to verify Supervisory Channel communication throughout the system.

END OF STEPS

---



# Supervisory Performance Monitoring Check

---

**Description** This procedure will verify that performance monitoring reports show proper optical power and zero B2 parity error rates associated with the DCC-Supervisory Channel.

**Procedure** Perform the steps in the following table to complete the Supervisory Performance Monitor check:

**Important!** If at any step the requirements are not met, resolve the problem using procedures in the 365-575-559, *Metropolis® EON (OLS 40/80G) User Operations Guide* before proceeding.

---

- 1 Select the **PERFORMANCE->Retrieve->Performance Monitoring->Supervisory** command and fill in the AID box with SUPR-ALL. Click on Enter.

**Requirement:** The report should not indicate OUT OF RANGE for the last 15 minutes.

**Important!** The requirement assumes the ring has been established for at least 15 minutes. If the ring is newly established, the 24 hour report may indicate Out of Range.

---

- 2 Select the **PERFORMANCE->Retrieve->Performance Monitoring->Optical Line** command and fill in the AID with OLINE ALL. Click on Enter.

**Requirement:** The report should indicate 0 B2 errors in the last 15 minutes.

**Important!** If the ring is newly established there will be a “?” in the 24 hour report. A “0?” indicates that the data is not valid, wait for another fifteen minute interval to elapse. Errors in the last fifteen minutes could be due to faulty OAs, TLMs, or dirty optical fiber connections. There may be other causes as well. Remember that PM data is given for incoming signals only, but the problem could be at the transmitting end or the receiving end.



## Final Verification

---

### Fiber Connections Checklist

Verify the following items were completed in this chapter before proceeding with the next chapter:

<b>Check When Done</b>	<b>Item to check</b>
	All outside plant optical fibers have been connected and properly labeled.
	The Metropolis <sup>®</sup> EON (OLS) ring map has built and remote logins are possible to all Nodes in the linear or ring system.
	APSD has been ENABLED at all Nodes in the linear or ring system.
	Supervisory Performance Monitoring check has been successfully completed.
	Verify there are no unexpected alarms on the system.
	Before leaving the equipment in a powered state, install the covers (doors) on the shelves and operate the latches to the locked position. (This is important to insure electrical contact for EMI protection.)



## Reference Information

---

The following section provides some additional reference information for this chapter.

### **Optical Fiber Connections at Optical Amplifiers**

When removing an optical fiber from an OA OUT port connector, the safest way to avoid damage and minimize the power level is to first unseat the OA. An alternate procedure is the following:

- To remove an optical fiber from OA OUT port:
  1. Allow the OA to boot completely (LED is off).
  2. Remove the optical fiber from the OA IN port.
  3. Wait about 5 seconds for the software to respond to the loss of input signal. (LED will flash due to LOS)
  4. Remove the optical fiber from OA OUT port.
  5. Insert port protector (dust cap) at OA OUT port.
  6. Reconnect the optical fiber at the OA IN port.
- To connect an optical fiber at the OA OUT port:
  1. Allow the OA to boot completely (LED is off).
  2. Remove the optical fiber from the OA IN port
  3. Wait about 5 seconds for the software to respond to the loss of input signal. (LED will flash due to LOS)
  4. Remove the OA OUT port protector (dust cap).
  5. Connect the optical fiber to the OA OUT port.
  6. Reconnect the optical fiber at the OA IN port.
- For Optical Amplifier Output Powering Level requirements, refer to the Smart Manual furnished with the CMC

### **LBO Information**

A wide variety of LBOs are available. Refer to Appendix F to obtain tolerances, power ratings, and further data on LBOs.





# 10 DWDM Wavelength Connections

## Overview

---

- Purpose** This chapter provides the general requirements and methods for connecting customer optical signals as DWDM wavelengths at a Metropolis<sup>®</sup> EON End Terminal in the following configurations:
- Directly from (add) or to (drop) EON-compatible customer terminal equipment.
  - Through OTU/OTPM units from (add) or to (drop) customer terminal equipment.
  - Through OUPSR units as add and drop connections.
  - Directly from a companion Metropolis<sup>®</sup> EON End Terminal (pass-through) in a Ring Terminal configuration.

**Reason for revision** This is Issue 3.0 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This chapter provides the installer with the necessary information and procedures for connecting DWDM wavelengths (or optical channels) in the Metropolis<sup>®</sup> EON system.

**Important!** The DWDM wavelength connection procedures in this chapter are provided for the 32-channel OAs, OMUs and ODUs installed with **new** Release 8.2 Metropolis<sup>®</sup> EON systems. Refer to procedures provided in pre-Release 8 OLS 40G/80G Installation Manuals for DWDM wavelength connections with other pre-Release 8 OA and OMU/ODU combinations.

## Installation Recommendations

The following items should be verified at the site to support the Metropolis<sup>®</sup> EON DWDM wavelength connections:

- The Metropolis<sup>®</sup> EON Integrated Bay or miscellaneous-mounted shelves have been installed properly.
- The procedures in Chapters 2 through 9 have been completed and the final verification checklists completed.
- A Personal Computer (PC) is available with Metropolis<sup>®</sup> EON Release 8.2 software loaded.
- The DCC Ring Map is complete and there are no unexpected alarms present on the Metropolis<sup>®</sup> EON system.
- AC power is available for use by installer.

## General Considerations

- The recommended installation tools and test equipment are listed in Appendix G.
- The customer-designated engineer shall specify and order all the optical fibers and LBO kits; and shall provide the installer with an optical fiber list and fiber routing information for each shelf.
- An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
- Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
- Do not remove the shelf backplane cover.



### **DANGER**

*Unterminated optical connectors may emit laser radiation and should not be viewed with optical instruments (other than indirect image-converting devices). Avoid direct exposure to beam.*

- The optical fiber information provided in this chapter is the latest information available at the time of the issue. To verify current information, refer to the appropriate application schematics (SD-6G156-01 and SD-6G157-01).
- Carefully place optical fibers in a protective tube, channel or duct when routing the optical fibers between shelves or the customer's terminating equipment.

- Carefully place optical fibers in a customer-designated duct or cable rack with nothing on top of them.
- Always maintain a minimum of 1.5-inch bend radius when routing optical fibers.
- Some optical fiber connections between Metropolis® EON circuit packs will use LC-type fiber connectors. Other optical fiber connections may have ST, FC or SC-type fiber connectors as specified by the customer.

### Add - Drop Connection Order or Sequence

Clearly, a wavelength must be added to the Metropolis® EON system before it can be dropped. For a Linear System Configuration, the installer can add wavelengths at one End Terminal and then make the drop connections on the other End Terminal. For a Ring System Configuration with pass-through connections, the installer will need to plan the order or sequence of visits to the Nodes when connecting DWDM wavelengths. Similar to the Network Element Connection procedures in Chapter 9, connecting DWDM wavelengths may require the installer to move sequentially from one Node to the next Node, first in the A direction and then in the B direction.

### Procedures for Pre-Release 8 (OLS 40G/80G) Equipment

The procedures provided in this chapter are for adding and dropping customer optical signals to **new** R8.2 Metropolis® EON systems equipped with 32-channel OAs, OMUs and ODUs.

OLS 40G/80G systems that have been upgraded to operate EON Release 8.2 software may be equipped with OAs, OMUs and ODUs with different gain or insertion loss characteristics. Refer to the installation procedures provided with Release 7.0 (OLS 40G) or Release 7.5 (OLS 80G) for adding and dropping customer signals to upgraded Metropolis® EON systems using the pre-Release 8 (OLS 40G/80G) equipment. Contact the next level of technical support if pass-through wavelengths are specified.

### Contents

This chapter contains the following:

Customer Add Traffic Connections	<a href="#">10-4</a>
Customer Drop Traffic Connections	<a href="#">10-19</a>
Final Verification	<a href="#">10-29</a>



## Customer Add Traffic Connections

---

**Description** A valid optical signal must be available to perform the procedure for adding a DWDM wavelength (or optical channel) at a Metropolis<sup>®</sup> EON End Terminal. A valid signal may be provided at installation by test equipment or by the customer's terminal equipment.

The optical fibers for customer optical signal connections were installed, but not connected, using the procedures in Chapter 6.

The optical power of the customer traffic signal or equivalent test signal will be measured and adjusted using LBOs prior to connection into the circuit packs in the "add" path of the End Terminal.

The customer engineer shall provide the installer with a listing of all customer optical signals to be added at this time. The customer may have requested some optical fiber connections for future use that will be installed but not connected during the initial installation.

The target optical power level for 2.5 Gb/s and 10Gb/s signals (OC-48 {STM-16}, OC-192 {STM-64} and 1 Gb Ethernet) into the LEA207 or LEA307 Optical Amplifier is -21 dBm. The target levels for signals at the OC-12 rate (less than 1 Gb/s) and OC-3 rate (less than 500 Mb/s) are -24 dBm and -27 dBm, respectively.

**Important!** When connecting customer add traffic signals at an End Terminal configured for 0-OA operation, refer to the specific procedures and target values for 0-OA NEs on page 10-16.

The procedures in this section will use optical power input requirements at the input to the OMU to achieve the target values at the LEA207 or LEA307 OA input. The insertion loss specification for each wavelength in the 507A/508A OMU (Series 1:2) is 8 dB and the insertion loss specification for each wavelength in the 507B/508B OMU (Series 1:2) is 5.5 dB.

If the Metropolis<sup>®</sup> EON system is not carrying live customer traffic, the input power at the LEA207 or LEA307 may be measured directly. The optical monitor port (OMON) may also be used with a multi-wavelength meter or optical spectrum analyzer to compare optical signal levels without disturbing live customer traffic.

Refer to the Traffic Provisioning Tasks in the User Operations Guide (365-575-559) for additional information.

**EON-Compatible Customer Terminal Direct Connection**

An EON-compatible customer terminal transmitter operates at an Metropolis<sup>®</sup> EON wavelength and is not required to connect through an add OTU. These customer optical signals may be connected directly to an OMU in an End Terminal.

---

- 1 Verify that the transmitter at the customer's terminal equipment is compatible with the Metropolis<sup>®</sup> EON system. (Refer to Table 10-1 on page 10-19 for FT-2000 type compatible transmitters.)

The customer engineer has the responsibility to specify that the terminal equipment is compatible for direct connection into the OMU. Contact the next level of technical support if there is any question concerning terminal equipment compatibility.

---

- 2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OMU at this time.
- 

- 3 Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.
- 

- 4 Clean the optical fiber to be connected at the OMU. Measure the optical power in this fiber from the customer's terminal equipment. If the optical power measured at the OMU is less than the power requirement range listed below, the customer's terminal equipment signal may not be acceptable for direct connection. Contact the next level of technical support.

**Requirement:** The per-wavelength optical power of 2.5 Gb/s or 10 Gb/s signals (OC-48 {STM-16}, OC-192 {STM-64} and 1 Gb Ethernet) into the OMU shall be between:

- -12.0 dBm and - 14.0 dBm for the 507A/508A OMU.
- - 14.5 dBm and -16.5 dBm for the 507B/508B OMU.

**Requirement:** The per-wavelength optical power of OC-12/OC-3 and LSSB signals into the OMU are given in Table 10-3 on page 10-20.

- 
- 5 Adjust the optical power level to meet the requirement of step 4 by selecting an LBO value and installing it at the customer's terminal equipment. Label the customer's terminal equipment to note the change in LBO value for connection to the Metropolis<sup>®</sup> EON system.

**Important!** If an LBO cannot be installed at the customer's terminal equipment - or if the proper value LBO is not available, it is permissible to change the LC-type LBO at the channel input port on the OMU. Note this change to the customer, record the OMU port identification and value of LBO removed, and save the LBO from the OMU for future reuse at this specific OMU.

---

- 6 After verifying that the input power requirement at the OMU has been met, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis<sup>®</sup> EON system.

**Important!** The OA input power for each channel addition may be checked directly before the Metropolis<sup>®</sup> EON system has been turned over to the customer for live traffic applications.

---

- 7 Log into CenterLink at the End Terminal to verify that the Metropolis<sup>®</sup> EON system recognizes this wavelength is detected as In-Service (IS).

**CONFIGURATION->Retrieve->Optical Channel**

---

- 8 Verify that the reported relative signal power (RELSPR\_C) for this channel (wavelength) is greater than or equal to 60.

**PERFORMANCE->Retrieve->Relative Signal Power**

The optical power level into the OMU may need to be increased by reducing the attenuation value of the LBO (placed in Step 5) to increase the RELSPR\_C to at least 60.

---

- 9 Repeat Steps 1 through 8 for each direct EON-compatible wavelength connection.

END OF STEPS

---

**Customer Terminal to OTU/  
OTPM Connection**

Customer terminal transmitters that are not EON-compatible are required to connect to the Metropolis<sup>®</sup> EON system through an add OTU or OTPM unit. The OTU/OTPM translates the optical wavelength of the customer's traffic signal to an EON system wavelength and provides a tone recognition signal for wavelength (optical channel) identification and monitoring in the Metropolis<sup>®</sup> EON system.

- 
- 1** Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OTU/OTPM at this time.

---

  - 2** Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

---

  - 3** Clean the optical fiber to be connected at the OTU/OTPM. Measure the optical power in this fiber from the customer's terminal equipment. If the optical power measured at the OTU/OTPM is less than the power requirement range listed below, the customer's terminal equipment may not be acceptable for OTU/OTPM connection. Contact the next level of technical support.

**Requirement:**

<b>Add OTU/OTPM Code</b>	<b>Input Power Range</b>
41A/C/D(1-16) OC-48	-12 dBm to -22 dBm
41F(1-16) GbE	-12 dBm to -22 dBm
41H(1-32)A/C OC-192	-2 dBm to -12 dBm
42A(1-16)B OC-12	-12 dBm to -24 dBm
43A(1-16)B OC-3	-12 dBm to -30 dBm
44A/C(1-16)B LSBB	-12 dBm to -22 dBm
46A(1-32) OC-48 OTPM	-12 dBm to -22 dBm
47A(1-32) UBB OTPM	-12 dBm to -22 dBm

(The above are target ranges for installation. The maximum OTU/OTPM receiver power range may be greater than listed here.)

- 
- 4 Adjust the optical power level to meet the target level requirement of Step 3 by selecting an LBO value and installing it at the input port of the OTU/OTPM.

**Important!** The 42, 43 and 44-type OTPMs have a multimode receiver and gray multimode LBOs must be used at the input.

---

- 5 Measure the optical power level at the output of the OTU/OTPM after a valid customer optical signal has been connected at the input.

**Requirement:** The optical power for 41H-type OTUs and 46-type & 47-type OTPMs and (other new Release 8 OTU codes) shall be between -14.6 dBm and -16.0 dBm. Refer to Tables 10-1 and 10-2 for optical power output from pre-Release 8 OTU and OTPM codes.

**Important!** 46-type OTPMs prior to Series 1:2 may not meet the above requirement with the LBO equipped at the factory. The LBO value may need to be changed as in Steps 7 and 8 below.

---

- 6 Verify that the optical fiber assigned between the OTU/OTPM output port and the OMU input port has been installed and labeled. The optical fiber should not be connected to the OMU at this time.
- 

- 7 Clean and connect the assigned optical fiber to the OTU/OTPM output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

**Requirement:** The per-wavelength optical power of OC-48/STM-16/1-Gb Ethernet signals into the OMU shall be between:

- -12.0 dBm and -14.0 dBm for the 507A/508A OMU.
- -14.5 dBm and -16.5 dBm for the 507B/508B OMU.

**Requirement:** The per-wavelength optical power of OC-12/OC-3 and LSSB signals into the OMU are given in Table 10-3.

- 
- 8** If necessary, adjust the optical power level to meet the requirement of Step 7 by selecting an LBO value and installing it at the OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for connection to the Metropolis<sup>®</sup> EON system.
- 

- 9** After verifying that the input power requirement at the OMU has been met, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis<sup>®</sup> EON system.

**Important!** The OA input power for each channel addition may be measured directly at the OMU OUT port before the Metropolis<sup>®</sup> EON system has been turned over to the customer for live traffic applications. An optical power meter may be used to measure one wavelength (channel) at a time. A multi-wavelength meter or an optical spectrum analyzer may be used to measure power when more than one wavelength (channel) is present.

---

- 10** Log into CenterLink at the End Terminal to verify that the Metropolis<sup>®</sup> EON system recognizes this wavelength is detected as In-Service (IS).

**CONFIGURATION->Retrieve->Optical Channel**

---

- 11** Verify that the reported relative signal power (RELSPR\_C) for this channel (wavelength) is greater than or equal to 60.

**PERFORMANCE->Retrieve->Relative Signal Power**

The optical power level into the OMU may need to be increased by reducing the attenuation value of the LBO (placed in Step 8) to increase the RELSPR\_C to at least 60.

---

- 12** Repeat steps 1 through 11 for each customer traffic signal wavelength connection through add OTU/OTPM units.

END OF STEPS

---

**Customer Terminal to  
OUPSR Connection  
(Protected Add/Drop OTUs/  
OTPMs)**

Customer traffic signals may be routed through OUPSR units to provide optical path protection. The customer traffic signal connected to the OUPSR unit will be split into two outputs for transmission on separate paths in the Metropolis® EON system. The two outputs from the OUPSR unit are to be connected to OTU/OTPM units associated with diverse optical paths. Refer to Figure 6-29 for optical fiber connections.

- 
- 1** Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The optical fiber should not be connected to the OUPSR at this time.

- 
- 2** Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

- 
- 3** Clean the optical fiber to be connected to the SIG IN port at the OUPSR. Measure the optical power in this fiber from the customer's terminal equipment.

**Requirement:** The optical power for a single wavelength into an OUPSR shall be greater than -18 dBm.

**Important!** Note the LEP2 unit has single-mode inputs and outputs; and the LEP3 unit has multi-mode inputs and outputs.

- 
- 4** Verify that the optical path connection between the OUPSR A OUT and B OUT ports and the associated OTU/OTPM units have been installed and labeled. These optical fibers should not be connected to the OTU/OTPM units at this time.

- 
- 5** If the requirement of Step 3 is met, clean and connect the optical fiber with the customer's traffic signal to the SIG IN port of the OUPSR.

If the input power requirement cannot be met, contact the next level of technical support.

- 
- 6** Clean the optical fiber to be connected at each associated add OTU/OTPM. Measure the optical power in this fiber from the OUPSR.

**Requirement:**

Add OTU/OTPM Code	Input Power Range
41A/C/D(1-16) OC-48	-12 dBm to -22 dBm
41F(1-16) GbE	-12 dBm to -22 dBm
41H(1-32)A/C OC-192	-2 dBm to -12 dBm
42A(1-16)B OC-12	-12 dBm to -24 dBm
43A(1-16)B OC-3	-12 dBm to -30 dBm
44A/C(1-16)B LSBB	-12 dBm to -22 dBm
46A(1-32) OC-48 OTPM	-12 dBm to -22 dBm
47A(1-32) UBB OTPM	-12 dBm to -22 dBm

---

- 7** Adjust the optical power level to meet the requirement of Step 6 by selecting an LBO value and installing it at the input port of the add OTU/OTPM.

**Important!** The 42, 43 and 44-type OTPMs have a multimode receiver and gray multimode LBOs must be used at the input.

---

- 8** Measure the optical power level at the output of each OTU/OTPM after a valid customer traffic signal has been connected from the OUPSR.

**Requirement:** The optical power for 41H-type OTUs and 46-type & 47-type OTPMs and (other new Release 8 OTU codes) shall be between -14.6 dBm and -16.0 dBm. Refer to Tables 10-1 and 10-2 for optical power output from pre-Release 8 OTU and OTPM codes.

- 
- 9 Verify that the optical fiber assigned between each OTU/OTPM output and its associated OMU input has been installed and labeled. These optical fibers should not be connected to the OMUs at this time.

**Important!** The OMU/OTPMs associated with an OUPSR are most likely located in separate End Terminals.

---

- 10 Clean and connect the assigned optical fiber to the OTU/OTPM output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

**Requirement:** The per-wavelength optical power of 2.5 Gb/s and 10 Gb/s signals into the OMU shall be between:

- -12.0 dBm and -14.0 dBm for the 507A/508A OMU.
- -14.5 dBm and -16.5 dBm for the 507B/508B OMU.

**Requirement:** The per-wavelength optical power of OC-12/OC-3 and LSSB signals into the OMU are given in Table 10-3.

---

- 11 Adjust the optical power level to meet the requirement of Step 10 by selecting an LBO value and installing it at the OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for connection to the Metropolis<sup>®</sup> EON system.
- 

- 12 After verifying that the input power requirement at the OMU has been met, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis<sup>®</sup> EON system.

**Important!** The OA input power for each channel addition may be checked directly before the Metropolis<sup>®</sup> EON system has been turned over to the customer for live traffic applications. An optical power meter may be used to measure one wavelength (channel) at a time. A multi-wavelength meter or an optical spectrum analyzer may be used to measure power when more than one wavelength (channel) is present.

- 
- 13** Log into CenterLink at the End Terminal to verify that the Metropolis® EON system recognizes this wavelength is detected as In-Service (IS).

**CONFIGURATION->Retrieve->Optical Channel**

---

- 14** Verify that the reported relative signal power (RELSPR\_C) for this channel (wavelength) is greater than or equal to 60.

**PERFORMANCE->Retrieve->Relative Signal Power**

The optical power level into the OMU may need to be increased by reducing the attenuation value of the LBO (placed in Step 11) to increase the RELSPR\_C to at least 60.

---

- 15** Repeat Steps 10 through 14 for the other OMU associated with the OUPSR unit.
- 

- 16** Repeat Steps 1 through 15 for each additional customer traffic wavelength connection to an OUPSR unit (protected Add/Drop OTUs/OTPMs).

END OF STEPS

---

**OUPSR Add Connection  
(Unprotected Add/Drop  
OTUs/OTPMs)**

The OUPSR may also be installed in the path between OMUs and OTUs/OTPMs. The customer traffic signal will be connected to an Add OTU in the same manner as described on page 10-7. The output of the OTU/OTPM is then connected to an OUPSR unit and will be split into two outputs for transmission on separate paths in the Metropolis® EON system. Refer to Figure 6-30 for optical fiber connections.

---

- 1 Follow the procedures to connect customer terminal equipment to an OTU/OTPM unit on page 10-7. Verify that the OTU/OTPM unit meets its output power level requirement.
- 

- 2 Verify that the optical fiber between the OTU/OTPM unit and the OUPSR unit has been installed and labeled.
- 

- 3 Clean the optical fiber to be connected to the SIG IN port at the OUPSR. Measure the optical power in this fiber from the OTU/OTPM unit.

**Requirement:** The optical power for a single wavelength into an OUPSR shall be greater than -15 dBm for connection to 507A/508A OMU units - or - be greater than -18 dBm for connection to 507B/508B OMU units.

**Important!** Note the LEP2 unit has single-mode inputs and outputs; and the LEP3 unit has multi-mode inputs and outputs.

---

- 4 Measure the optical power at the OUPSR A OUT and B OUT ports.

**Requirement:** The per-wavelength optical power of 2.5 Gb/s and 10 Gb/s signals into the OMU shall be between:

- -12.0 dBm and - 14.0 dBm for the 507A/508A OMU.
- - 14.5 dBm and -16.5 dBm for the 507B/508B OMU.

**Requirement:** The per-wavelength optical power of OC-12/OC-3 and LSSB signals into the OMU are given in Table 10-3.

- 
- 5 Adjust the optical power level to meet the requirement of Step 4 by selecting an LBO value and installing it at the OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for connection to the Metropolis<sup>®</sup> EON system.
- 

- 6 After verifying that the input power requirement at the OMU has been met, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis<sup>®</sup> EON system.

**Important!** The OA input power for each channel addition may be checked directly before the Metropolis<sup>®</sup> EON system has been turned over to the customer for live traffic applications. An optical power meter may be used to measure one wavelength (channel) at a time. A multi-wavelength meter or an optical spectrum analyzer may be used to measure power when more than one wavelength (channel) is present.

---

- 7 Log into CenterLink at the End Terminal to verify that the Metropolis<sup>®</sup> EON system recognizes this wavelength is detected as In-Service (IS).

**CONFIGURATION->Retrieve->Optical Channel**

---

- 8 Verify that the reported relative signal power (RELSPR\_C) for this channel (wavelength) is greater than or equal to 60.

**PERFORMANCE->Retrieve->Relative Signal Power**

The optical power level into the OMU may need to be increased by reducing the attenuation value of the LBO (placed in Step 11) to increase the RELSPR\_C to at least 60.

---

- 9 Repeat Steps 6 through 8 for the other OMU associated with the OUPSR unit.
- 

- 10 Repeat Steps 1 through 9 for each additional customer traffic wavelength connection to an OUPSR unit (unprotected Add/Drop OTUs/OTPMs).
-

**Pass-Through Connections** A wavelength on the Metropolis<sup>®</sup> EON system may be connected directly from the ODU output at one End Terminal of a Ring Terminal configuration to the OMU input at the other End Terminal. This wavelength connection is referred to as *pass-through*. An OTU may be added in the pass-through connection path if required by the system engineering rules.

---

- 1 Log into CenterLink at the receiving End Terminal to verify that this wavelength has been added upstream and the Metropolis<sup>®</sup> EON system recognizes this wavelength as being In-Service (IS).

**CONFIGURATION -> Retrieve -> Optical Channel**

---

- 2 Verify that the optical path connection between the ODU in one End Terminal and the OMU in the other End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OMU at this time.
- 
- 3 Clean and connect the assigned optical fiber to the ODU output port. Measure the optical power at the other end of this fiber to be connected to the OMU. If the optical power measured at the OMU is less than the power requirement range listed below, the optical signal may not be acceptable for pass-through. Contact the next level of technical support.

**Requirement:** The per-wavelength optical power of OC-48/STM-16/ 1Gb Ethernet signals into the OMU shall be between:

- -12.0 dBm and - 14.0 dBm for the 507A OMU.
- - 14.5 dBm and -16.5 dBm for the 507B OMU.

**Requirement:** The per-wavelength optical power of OC-12/OC-3 and LSSB signals into the OMU are given in Table 10-3.

- 
- 4 Adjust the optical power level to meet the requirement of Step 3 by selecting an LBO value and installing it at the ODU output port. Label the ODU output port to note the change in LBO value for connection to the Metropolis<sup>®</sup> EON system. Note this change to the customer, record the ODU port identification and value of LBO removed, and save the LBO from the ODU for future reuse at this specific ODU.
- 

- 5 After verifying that the input power requirement at the OMU has been met, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis<sup>®</sup> EON system.

**Important!** The OA input power for each channel addition may be checked directly before the Metropolis<sup>®</sup> EON system has been turned over to the customer for live traffic applications. An optical power meter may be used to measure one wavelength (channel) at a time. A multi-wavelength meter or an optical spectrum analyzer may be used to measure power when more than one wavelength (channel) is present.

---

- 6 Log into CenterLink at the End Terminal to verify that the Metropolis<sup>®</sup> EON system recognizes this wavelength as In-Service (IS).

**CONFIGURATION->Retrieve->Optical Channel**

---

- 7 Verify that the reported relative signal power (RELSPR\_C) for this channel (wavelength) is greater than or equal to 60.

**PERFORMANCE->Retrieve->Relative Signal Power**

The optical power level into the OMU may need to be increased by reducing the attenuation value of the LBO (placed in Step 4) to increase the RELSPR\_C to at least 60.

---

- 8 Repeat Steps 1 through 7 for each customer traffic pass-through wavelength connection.

END OF STEPS

---

**0-OA End Terminal - Add Traffic Connections**

A Metropolis<sup>®</sup> EON End Terminal configured for 0-OA operation will not be equipped with a transmitting optical amplifier. The output from the required 507B/508B OMU will be connected through the Line Interface Transmit Unit directly to the outside plant path. Remove any LBO attenuation from OTU/OTPM outputs and replace with a 0-dB LBOs to allow the full available optical power to be connected through the OMU to the optical line.

Follow the procedures for adding customer traffic signals for EON-compatible direct connections, OTU/OTPM connections or OUPSR connections with the exception that the target optical power levels into the 507B OMU are:

- -4 dBm for 2.5 Gb/s and 10 Gb/s signals
- -7 dBm for OC-12 and LSBB signals
- -10 dBm for OC-3 signals

**Table 10-1 EON-Compatible OC-48/STM-16/1-Gb Ethernet Transmitter and 41-Type OTU Output Levels**

<b>FT-2000 ADR Transmitters</b>	<b>FT-2000 LCT Transmitters</b>	<b>41-Type OTU</b>	<b>Output Power Level</b>
739E1/739G1	739D1/739F1	Wavelength 1	-5.0 to -3.0 dBm
739E2/739G2	739D2/739F2	Wavelength 2	-6.3 to -4.3 dBm
739E3/739G3	739D3/739F3	Wavelength 3	-7.5 to -5.5 dBm
739E4/739G4	739D4/739F4	Wavelength 4	-8.2 to -6.2 dBm
739E5/739G5	739D5/739F5	Wavelength 5	-8.7 to -6.7 dBm
739E6/739G6	739D6/739F6	Wavelength 6	-9.2 to -7.2 dBm
739E7/739G7	739D7/739F7	Wavelength 7	-9.0 to -7.0 dBm
739E8/739G8	739D8/739F8	Wavelength 8	-7.5 to -5.5 dBm
739E9/739G9	739D9/739F9	Wavelength 9	-1.0 to -3.0 dBm
739E10/739G10	739D10/739F10	Wavelength 10	-3.6 to -5.6 dBm
739E11/739G11	739D11/739F11	Wavelength 11	-4.8 to -6.8 dBm
739E12/739G12	739D12/739F12	Wavelength 12	-5.8 to -7.8 dBm
739E13/739G13	739D13/739F13	Wavelength 13	-6.4 to -8.4 dBm
739E14/739G14	739D41/739F14	Wavelength 14	-6.9 to -8.9 dBm
739E15/739G15	739D15/739F15	Wavelength 15	-7.1 to -9.1 dBm
739E16/739G16	739D16/739F16	Wavelength 16	-6.2 to -8.2 dBm

**Table 10-2 EON-Compatible Low-Speed OTPM Output Levels**

Tx Channel	Output Connector Power Levels		
	42-Type OTU	43-Type OTU	44-Type OTU
Wavelength 1	-8.0 to -6.0 dBm	-11.0 to -9.0 dBm	-8.0 to -6.0 dBm
Wavelength 2	-9.3 to -7.3 dBm	-12.3 to -10.3 dBm	-9.3 to -7.3 dBm
Wavelength 3	-10.5 to -8.5 dBm	-13.5 to -11.5 dBm	-10.5 to -8.5 dBm
Wavelength 4	-11.2 to -9.2 dBm	-14.2 to -12.2 dBm	-11.2 to -9.2 dBm
Wavelength 5	-11.7 to -9.7 dBm	-14.7 to -12.7 dBm	-11.7 to -9.7 dBm
Wavelength 6	-12.2 to -10.2 dBm	-15.2 to -13.2 dBm	-12.2 to -10.2 dBm
Wavelength 7	-12.0 to -10.0 dBm	-15.0 to -13.0 dBm	-12.0 to -10.0 dBm
Wavelength 8	-10.5 to -8.5 dBm	-13.5 to -11.5 dBm	-10.5 to -8.5 dBm
Wavelength 9	-6.0 to -4.0 dBm	-9.0 to -7.0 dBm	-6.0 to -4.0 dBm
Wavelength 10	-8.6 to -6.6 dBm	-11.6 to -9.6 dBm	-8.6 to -6.6 dBm
Wavelength 11	-9.8 to -7.8 dBm	-12.8 to -10.8 dBm	-9.8 to -7.8 dBm
Wavelength 12	-10.8 to -8.8 dBm	-13.8 to -11.8 dBm	-10.8 to -8.8 dBm
Wavelength 13	-11.4 to -9.4 dBm	-14.4 to -12.4 dBm	-11.4 to -9.4 dBm
Wavelength 14	-11.9 to -9.9 dBm	-14.9 to -12.9 dBm	-11.9 to -9.9 dBm
Wavelength 15	-12.1 to -10.1 dBm	-15.1 to -13.1 dBm	-12.1 to -10.1 dBm
Wavelength 16	-11.2 to -9.2 dBm	-14.2 to -12.2 dBm	-11.2 to -9.2 dBm

**Table 10-3 OMU Input Requirements for OC-12/OC-3/LSBB**

OMU Code	Customer Signal	Input Power Requirement
507A/508A	OC-12 (STM-4)	-15.0 dBm to - 17.0 dBm
	OC-3 (STM-1)	-18.0 dBm to - 20.0 dBm
	LSBB/ELSSB	-15.0 dBm to - 17.0 dBm
507B/508B	OC-12 (STM-4)	- 17.5 dBm to -19.5 dBm
	OC-3 (STM-1)	- 20.5 dBm to -22.5 dBm
	LSBB/ELSSB	- 17.5 dBm to -19.5 dBm



## Customer Drop Traffic Connections

---

**Description** A valid customer traffic signal must have already been added as a DWDM wavelength on the optical line to perform the procedure for dropping a DWDM wavelength at a Metropolis® EON End Terminal. A valid optical signal may be provided at installation by test equipment or by the customer's terminal equipment.

The optical fibers for customer traffic connections were installed, but not connected, using the procedures in Chapter 6.

The the optical power of the customer traffic signal or equivalent test signal will be measured and adjusted using LBOs prior to connection into the circuit packs in the “drop” path of the End Terminal.

The customer engineer shall provide the installer with a listing of all customer traffic signals to be dropped at this time. The customer may have requested some optical fiber connections for future use that will be installed but not connected during the initial installation.

### Procedures for Pre-Release 8 (OLS 40G/80G) Equipment

The procedures in this section are for dropping customer traffic signals from new Metropolis® EON End Terminals equipped with LEA207 or LEA307 Optical Amplifiers; and 607A/B and 608A/B ODU. The insertion loss specification for each wavelength in the 607A/608A ODU (Series 1:2) is 8 dB and the insertion loss specification for each wavelength in the 607B/608B ODU (Series 1:2) is 5.5 dB.

OLS 40G/80G systems that have been upgraded to operate EON Release 8.2 software may be equipped with OAs, OMUs and ODUs with different gain or insertion loss characteristics. Refer to the installation procedures provided with Release 7 (OLS 40G) or Release 7.5 (OLS 80G) for adding customer traffic to systems using the pre-Release 8 equipment.

In particular, the SmartManual software application is **not** used for determining target levels at drop OTU/OTPMs. The LEA207 and LEA307 OAs have constant per-wavelength gain which is independent of the number of wavelengths connected to the Metropolis® EON system.

Refer to the Traffic Provisioning Tasks in the User Operations Guide (365-575-559) for additional information

**EON-Compatible Customer Terminal Direct Connection**

An EON-compatible customer terminal receiver operates with the Metropolis® EON wavelengths and is not required to connect through a drop OTU/OTPM unit. These customer traffic signals may be connected directly from an ODU in an End Terminal.

---

- 1 Verify that the receiver at the customer's terminal equipment is compatible with the Metropolis® EON system and verify the input optical power specification limits of the receiver, as provided by the customer.

The customer engineer has the responsibility to specify that the terminal equipment is compatible for direct connection from the ODU. Contact the next level of technical support if there is any question concerning terminal equipment compatibility.

---

- 2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the ODU or to the customer terminal receiver at this time.
- 

- 3 Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal.
- 

- 4 Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the ODU in the End Terminal.

**Requirement:** The optical power of a single wavelength into the customer's terminal receiver shall be within the optical power limits of the customer's terminal equipment as verified in Step 1.

- 
- 5** If necessary, adjust the optical power to meet the requirement of Step 4.

If instructed by the customer's engineer, select an LBO value and install the LBO at the designated ODU output port. Label the ODU output port to note the change in LBO value for the Metropolis® EON system. Note this change to the customer, record the ODU port identification and value of LBO removed, and save the LBO from the ODU for future reuse at this specific ODU.

---

- 6** After verifying that the input power requirements at the customer's terminal receiver have been met, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.
- 

- 7** Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis® EON system.
- 

- 8** Repeat Steps 1-7 for each EON-compatible drop wavelength connection.

END OF STEPS

---

**OTU/OTPM Connection to Customer Terminal**

Customer terminals that are not EON-compatible are required to connect the wavelength drop path through an OTU/OTPM. The drop OTU/OTPM translates the EON system wavelength to a nominal 1310-nm optical signal at the appropriate power level for intra-office transmission.

.....

- 1** Verify the input optical power specification limits of the customer's terminal equipment receiver, as provided by the customer.  
  
.....
- 2** Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the drop OTU/OTPM output port or to the customer terminal receiver at this time.  
  
.....
- 3** Verify that the optical fiber between the designated drop OTU/OTPM and the ODU in the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the drop OTU/OTPM input port or to the ODU at this time.  
  
.....
- 4** Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal.

- 
- 5** Clean the assigned optical fiber to be connected to the input port of the drop OTU/OTPM. Measure the optical power in this fiber from the ODU output port.

**Requirement:**

Drop OTU/OTPM Code	Input Power Range (2-OA Span Type)	Min Power (1-OA Span)	Min Power (0-OA Span)
41BB (OC-48)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41G (GbE)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41HB (OC-192)	-12 dBm to -20 dBm	-21 dBm	n/a
42B (OC-12)	-10 dBm to -25 dBm	-27 dBm	-29 dBm
43B (OC-3)	-9 dBm to -28 dBm	-30 dBm	-32 dBm
44B/BC (LSBB/ELSBB)	-10 dBm to -24 dBm	-26 dBm	-28 dBm
46B (OC-48 OTPM)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
47B (UBB)	-12 dBm to -22 dBm	-23 dBm	-25 dBm

(The above are target ranges for installation. The maximum OTU/OTPM receiver power range may be greater than listed here.)

---

- 6** Adjust the optical power level to meet the requirement of Step 5 by selecting an LBO value and installing the LBO at the input port of the designated drop OTU/OTPM.

**Important!** The 42, 43 and 44-type OTPMs have a multimode receiver and gray multimode LBOs must be used at the input.

- 
- 7 Measure the optical power level at the output of the OTU/OTPM after the customer signal from the ODU has been connected.

**Requirement:**

Drop OTU/OTPM Code	Output Power Range
41BB (OC-48)	+2.5 dBm to -2.0 dBm
41G (GbE)	+2.5 dBm to -2.0 dBm
41HB (OC-192)	+2.5 dBm to -2.0 dBm
42B (OC-12)	+2.0 dBm to -2.5 dBm
43B (OC-3)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB - low)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB- high)	+2.0 dBm to -2.5 dBm
46B (OC-48 OTPM)	+2.5 dBm to -2.0 dBm
47B (UBB)	+2.5 dBm to -2.0 dBm

---

- 8 Clean and connect the assigned optical fiber to the designated OTU/OTPM output port at the End Terminal.
- 
- 9 Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the OTU/OTPM in the End Terminal.

**Requirement:** The optical power of a single wavelength into the customer's terminal receiver shall be within the limits verified in Step 1.

---

- 10 If necessary, adjust the optical power to meet the requirement of Step 9 by selecting an LBO value and installing the LBO at the designated OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for the Metropolis<sup>®</sup> EON system.
- 
- 11 After meeting the customer's terminal receiver input power requirement, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.

---

**12** Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis<sup>®</sup> EON system.

---

**13** Repeat Steps 1-12 for each OTU/OTPM drop wavelength connection.

END OF STEPS

---

**OUPSR Connection to  
Customer Terminal  
(Protected Add/Drop OTUs/  
OTPMs)**

Customer signals may be routed through OUPSR units to provide path protection. At the receive end, the OUPSR switch selects and routes the best of two input signals to the customer terminal receiver. Refer to Figure 6-29 for optical fiber connections.

---

**1** Verify the input optical power specification limits of the customer's terminal equipment receiver, as provided by the customer.

---

**2** Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OUPSR SIG OUT port or to the customer terminal receiver at this time.

---

**3** Verify that the optical fibers between both of the designated drop OTUs/OTPMs and the ODUs in the End Terminals have been installed and labeled. The assigned optical fibers should not be connected to the drop input port of the OTUs/OTPMs or to the ODUs at this time.

---

**4** Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal that is associated with the OUPSR A IN optical path.

- 
- 5** Clean the assigned optical fiber to be connected to the input port of the drop OTU/OTPM. Measure the optical power in this fiber from the ODU output port.

**Requirement:**

Drop OTU/OTPM Code	Input Power Range (2-OA Span Type)	Min Power (1-OA Span)	Min Power (0-OA Span)
41BB (OC-48)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41G (GbE)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41HB (OC-192)	-12 dBm to -20 dBm	-21 dBm	n/a
42B (OC-12)	-10 dBm to -25 dBm	-27 dBm	-29 dBm
43B (OC-3)	-9 dBm to -28 dBm	-30 dBm	-32 dBm
44B/BC (LSBB/ELSBB)	-10 dBm to -24 dBm	-26 dBm	-28 dBm
46B (OC-48 OTPM)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
47B (UBB)	-12 dBm to -22 dBm	-23 dBm	-25 dBm

(The above are target ranges for installation. The maximum OTU/OTPM receiver power range may be greater than listed here.)

---

- 6** Adjust the optical power level to meet the requirement of Step 5 by selecting an LBO value and installing the LBO at the input port of the designated drop OTU/OTPM.

**Important!** The 42, 43 and 44-type OTPMs have a multimode receiver and gray multimode LBOs must be used at the input.

- 
- 7 Measure the optical power level at the output of the OTU/OTPM after the customer signal from the ODU has been connected.

**Requirement:**

Drop OTU/OTPM Code	Output Power Range
41BB (OC-48)	+2.5 dBm to -2.0 dBm
41G (GbE)	+2.5 dBm to -2.0 dBm
41HB (OC-192)	+2.5 dBm to -2.0 dBm
42B (OC-12)	+2.0 dBm to -2.5 dBm
43B (OC-3)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB - low)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB- high)	+2.0 dBm to -2.5 dBm
46B (OC-48 OTPM)	+2.5 dBm to -2.0 dBm
47B (UBB)	+2.5 dBm to -2.0 dBm

---

- 8 Clean and connect the assigned optical fiber between the designated OTU/OTPM output port and the OUPSR A IN port. (Note that the OUPSR may be located in the other End Terminal.)
- 
- 9 Measure and record the optical power from the OUPSR SIG OUT port.  
 SIG OUT power: \_\_\_\_\_ (with A IN) \_\_\_\_\_ (with B IN)
- Requirement:** The optical power at the SIG OUT port should be within 1 dB of the input optical power measured in Step 7.
- 
- 10 Remove the optical fiber connection from the A IN port. Repeat Steps 4 through 9 for the other ODU to OTU/OTPM to B IN OUPSR optical fiber connections.

- 
- 11** Clean and reconnect the optical fiber to the A IN port on the OUPSR. Both the A IN and B IN optical fibers should be connected at this time.
- 

- 12** Monitor the optical power at the OUPSR SIG OUT port. Remove the optical fiber from the B IN port. Observe that the optical power is at the same level as previously measured with only the A IN optical fiber connected. Reconnect the optical fiber to the B IN port. Remove the optical fiber from the A IN port. Observe that the optical power is at the same level as previously measured with only the B IN optical fiber connected. Reconnect the optical fiber to the A IN port.

**Important!** The A STATUS or B STATUS LED should change from green to red when the optical signal is removed from the A IN or B IN ports.

---

- 13** Clean and connect the assigned optical fiber to the designated OUPSR SIG OUT port at the End Terminal.
- 

- 14** Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the OTU/OTPM in the End Terminal.

**Requirement:** The optical power of a single wavelength into the customer's terminal receiver shall be within the limits verified in Step 1.

---

- 15** If necessary, adjust the optical power to meet the requirement of Step 9 by selecting LBO values and installing the LBOs at the designated OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for the Metropolis<sup>®</sup> EON system.

**Important!** The optical power from both OTU/OTPM inputs to the OUPSR must be adjusted. Remove the optical fiber from the B IN port when adjusting the optical power in the A IN path; and remove the optical fiber from the A IN port when adjusting the optical power in the B IN path.

- 
- 16** After verifying that the input power requirement at the customer's terminal receiver has been met, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.
- 
- 17** Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis<sup>®</sup> EON system.
- 
- 18** Repeat Steps 1-17 for each OUPSR drop wavelength connection with protected OTUs/OTPMs.

END OF STEPS

---

**OUPSR Drop Connection  
(Unprotected Add/Drop  
OTUs/OTPMs)**

The OUPSR may also be installed in the path between ODUs and drop OTUs/OTPMs. The customer traffic signal will be connected through a drop OTU/OTPM to the customer terminal equipment in the same manner as described on page 10-24. The outputs from ODUs in separate transmission paths will be connected to the OUPSR for switching onto the path connecting to the OTU/OTPM. Refer to Figure 6-30 for optical fiber connections.

- 
- 1** Verify that the optical fibers between the OUPSR and the ODUs in the End Terminals have been installed and labeled. The assigned fibers should not be connected at this time.
- 
- 2** Clean and connect the optical fiber from the designated ODU and the OUPSR A IN port. Measure the optical power in this fiber from the ODU output port. Since the insertion loss between the A IN port and the SIG OUT port is approximately 1 dB, the customer signal from the ODU should be at least 1 dB greater than the minimum signal levels previously listed for direct connection to the OTUs/OTPMs

**Requirement:**

Drop OTU/OTPM Code	Min Power (2-OA Span)	Min Power (1-OA Span)	Min Power (0-OA Span)
41BB (OC-48)	-21 dBm	-22 dBm	-24 dBm
41G (GbE)	-21 dBm	-22 dBm	-24 dBm
41HB (OC-192)	-19 dBm	-20 dBm	n/a
42B (OC-12)	-24 dBm	-26 dBm	-28 dBm
43B (OC-3)	-27 dBm	-29 dBm	-31 dBm
44B/BC (LSBB/ELSBB)	-23 dBm	-25 dBm	-27 dBm
46B (OC-48 OTPM)	-21 dBm	-22 dBm	-24 dBm
47B (UBB)	-21 dBm	-22 dBm	-24 dBm

- .....
- 3** Clean and connect the optical fiber to the A IN port. Measure the optical power from the OUPSR SIG OUT port to verify that the output power is within 1 dB of the input power measured in the previous step.
- .....

- 4** Verify that the optical fiber between the OUPSR and the designated drop OTU/OTPM has been installed and labeled. Clean and connect this fiber to OUPSR SIG OUT. Verify the power measurement of Step 3 meets the input power range requirements for the OTU/OTPM unit.

**Requirement:**

Drop OTU/OTPM Code	Input Power Range (2-OA Span Type)	Min Power (1-OA Span)	Min Power (0-OA Span)
41BB (OC-48)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41G (GbE)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
41HB (OC-192)	-12 dBm to -20 dBm	-21 dBm	n/a
42B (OC-12)	-10 dBm to -25 dBm	-27 dBm	-29 dBm
43B (OC-3)	-9 dBm to -28 dBm	-30 dBm	-32 dBm
44B/BC (LSBB/ELSBB)	-10 dBm to -24 dBm	-26 dBm	-28 dBm
46B (OC-48 OTPM)	-12 dBm to -22 dBm	-23 dBm	-25 dBm
47B (UBB)	-12 dBm to -22 dBm	-23 dBm	-25 dBm

(The above are target ranges for installation. The maximum OTU/OTPM receiver power range may be greater than listed here.)

- 
- 5 If necessary, adjust the optical power level into the OTU/OTPM to meet the requirement of Step 4 by selecting an LBO value and installing the LBO at the input port of the designated drop OTU/OTPM.

**Important!** The 42, 43 and 44-type OTPMs have a multimode receiver and gray multimode LBOs must be used at the input.

---

- 6 Measure the optical power level at the output of the OTU/OTPM after the customer signal from the OUPSR SIG OUT has been connected.

**Requirement:**

Drop OTU/OTPM Code	Output Power Range
41BB (OC-48)	+2.5 dBm to -2.0 dBm
41G (GbE)	+2.5 dBm to -2.0 dBm
41HB (OC-192)	+2.5 dBm to -2.0 dBm
42B (OC-12)	+2.0 dBm to -2.5 dBm
43B (OC-3)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB - low)	0 dBm to -7.0 dBm
44B/BC (LSBB/ELSSB- high)	+2.0 dBm to -2.5 dBm
46B (OC-48 OTPM)	+2.5 dBm to -2.0 dBm
47B (UBB)	+2.5 dBm to -2.0 dBm

---

- 7 Repeat Steps 2 through 6 for the B IN signal path with the OUPSR unit.

**Important!** The optical power from both A IN and B IN inputs to the OUPSR must be adjusted. Remove the optical fiber from the B IN port when adjusting the optical power in the A IN path; and remove the optical fiber from the A IN port when adjusting the optical power in the B IN path.

- 
- 8** Clean and connect the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the drop OTU/OTPM in the End Terminal.
- 
- 9** Verify the input power requirements at the customer's terminal equipment.
- 
- 10** If necessary, adjust the optical power to meet the requirement of Step 9 by selecting an LBO value and installing the LBO at the designated OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for the Metropolis<sup>®</sup> EON system.
- 
- 11** After meeting the customer's terminal receiver input power requirement, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.
- 
- 12** Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis<sup>®</sup> EON system.
- 
- 13** Repeat Steps 1-12 for each OUPSR drop wavelength connection with unprotected OTUs/OTPMs.

END OF STEPS

---

## Final Verification

---

### Add & Drop Traffic Checklist

Verify the following items have been completed after connecting customer traffic signals to the Metropolis<sup>®</sup> EON system:

Check When Done	Items to Check
	OTU/OTPM output power verified for all OTUs/OTPMs equipped
	All customer traffic wavelengths (optical channels) detected ( <b>CONFIGURATION-&gt;Retrieve-&gt;Optical Channel</b> )
	Optical power level at ODU output going into OTU/OTPM or compatible optics have been adjusted
	Optical power level going from drop OTU/OTPM adjusted according to receiving equipment's specifications.
	No unexpected alarms on the Metropolis <sup>®</sup> EON system.
	Before leaving the equipment in a powered state, install the covers (doors) on the shelves and operate the latches to the locked position. (This is important to insure electrical contact for EMI protection.)







# 11 Trouble Clearing

## Overview

---

**Purpose** This chapter provides general Trouble Clearing information for the Metropolis<sup>®</sup> EON (OLS) system.

**Reason for revision** This is Issue 3.0 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This chapter provides the installer with some basic Trouble Clearing information to address problems that may be encountered during installation.

**Contents** This chapter contains the following:

Trouble Clearing Table	<a href="#">11-2</a>
Trouble Clearing Reference Information	<a href="#">11-7</a>



# Trouble Clearing Table

---

**Description**    Trouble clearing on a Metropolis® EON system begins with referencing the *Metropolis™ EON, Alarm Messages and Troubleclearing Guide, 365-575-560 R8.2.* in response to any trouble conditions.

A quick trouble clearing reference is provided with Table 11-1 for problems which may occur during installation procedures.

**Table 11-1    Installation Trouble Clearing**

Trouble or Error Message	Probable Cause	Suggested Solution
CMC connect failed. Network Element not responding to the connect request. (CIT-DCE port to PC Serial Port)	Serial Port Cable is not connected, or is not the proper type.	Inspect cable connection, review Table G-4 for CMC minimum connections.  Also see CMC Connection Requirements on page 11-5.
Connect failed. Network Element not responding to the connect request. (CIT-DTE port to PC serial Port)	Serial Port Cable is not connected, or is not the proper type (not a null modem)	Inspect cable connection, review Table G-4.  Also see CMC Connection Requirements on page 11-5.

Trouble or Error Message	Probable Cause	Suggested Solution
<p>Communication with NE cannot be established (To CIT-DCE or DTE).</p>	<p>SYSCTL and SYSMEM circuits have not finished resetting.</p>	<p>Wait up to 6 minutes or until LEDs of circuit packs and User Panel stop changing.</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
	<p>PC serial port not powered.</p>	<p>Check PC hardware manual for power saver instructions.</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
	<p>PC serial port BAUD rate does not operate below 9600 BAUD.</p>	<p>Check PC hardware manual</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
	<p>PC has background processes running.</p>	<p>Refer to PC Setup &amp; Usage for CenterLink Management Console for examples on clearing.</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
	<p>PC is not detecting CTS and DSR leads as high.</p>	<p>Check hardware manual for PC from PC back to CTS and DSR.</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
	<p>SYSCTL failure.</p>	<p>Rule out other causes: Replace SYSCTL.</p> <p>Also see CMC Connection Requirements on page 11-5.</p>
<p>Flash EEPROM write error, during software installation.</p>	<p>Power saver feature of PC has powered down serial port.</p>	<p>Check PC hardware setup and disable power saver feature.</p>
	<p>SYSTEMEM failure.</p>	<p>Rule out other causes: Replace SYSTEMEM.</p>

Trouble or Error Message	Probable Cause	Suggested Solution
FAULT LED on after Reset, Alarm report says Unrecognized Circuit Pack Type.	Slot had circuit pack in it before and circuit pack has been changed to new type.	Use Update command from CMC if new type circuit is what is wanted. Otherwise, restore original type circuit pack.
	Failed circuit pack.	Replace circuit pack.
FAULT LED flashing	On transmission circuit pack, input signal not present or not proper format.	Check presence and format of input signal. If input is not supposed to be present, use Update command to clear trouble.
	On SYSMEM.	Software mismatch between SYSCTL and SYSMEM. If version in SYSMEM is to be used, use Reset command. If version in SYSCTL is to be used, use Install program to load that version into SYSMEM.
Not enough Disk space to copy Centerlink Management Console program on Hard Drive.	PC has limited hard-drive capacity.	Delete unneeded files (such as games) on disk.
<b>Security-&gt;Enter-&gt;System</b> command fails	OMU/ODU not seated completely (node has default direction as Repeater)	Enter the <b>Configuration-&gt;Retrieve-&gt;Equipment</b> command to see if OMU/ODU are present. If not, seat these packs completely into the backplane using the captive screws provided. Enter the <b>Configuration-&gt;Initialize-&gt;System, PH 3</b> command. When completed, retrieve the equipment list again. If the OMU/ODU are visible, re-enter the <b>Security-&gt;Enter-&gt;System</b> command.
	Too many simultaneous changes overloads controller	Change only one or two fields at a time, then enter the <b>Security-&gt;Retrieve-&gt;System</b> command to verify the new provisioning is in place.



# Trouble Clearing Reference Information

---

<b>Introduction</b>	This section provides additional reference information for installation trouble clearing.
<b>User Operations Guide</b>	Reference information and procedures concerning the normal operation of the Metropolis <sup>®</sup> EON (OLS) system is provided in the User Operations Guide document (365-575-559). The installer should have some training or practical experience with the normal operation of the Metropolis <sup>®</sup> EON system.
<b>CTS-CARES</b>	Login access to the CTS-CARES web application also provides news bulletins and diagnostic dictionary listings of the most up-to-date issues and solutions. See “About This Document” for information on obtaining a CTS-CARES Customer Web Access Login.
<b>Detail References for Installation Procedures</b>	The following sections are references to Metropolis <sup>®</sup> EON installation procedures.

## **CenterLink Connection Requirements**

This section describes the minimum requirements for the physical connection between the CMC PC (CIT) and the Metropolis<sup>®</sup> EON system for CenterLink Management Console operation.

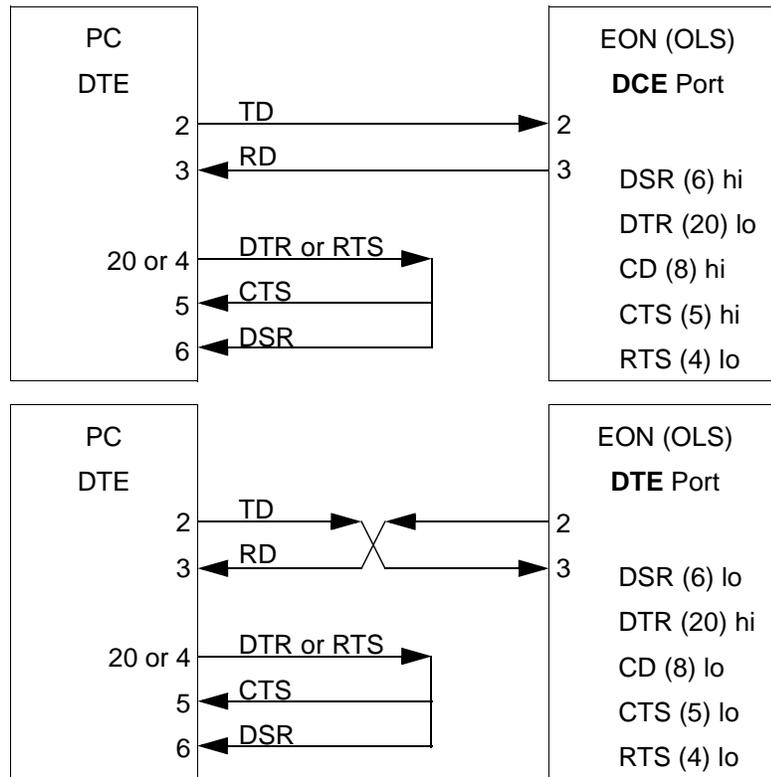
The minimum connections between the PC and Metropolis<sup>®</sup> EON equipment are shown in Figure 11-1. The RS-232 control lead values are listed for the DCE (User Panel) and DTE (Interconnect Panel) connectors. The Metropolis<sup>®</sup> EON equipment does not change these control lead values or do any active handshaking during communications sessions. The CMC program does actively handshake as follows:

- When a carriage return is entered from the product selection menu of the CMC program prior to the login screen, the PC DTR and RTS leads go high.
- After the DTR and RTS leads are set to high the CMC program expects the CTS and DSR leads to go high.

If the CTS and DSR leads do not go high on the correct COM port then the CMC program will immediately issue a “Communication with the NE cannot be established” error message. If the error message is reported after several seconds then the handshaking is probably correct

and the problem is with the data transmission being corrupted. If a local area network is used to connect the CMC PC to the Metropolis® EON (OLS), XON/XOFF handshaking must be disabled at both ends of the network connection.

**Figure 11-1 CIT (CMC) Minimum Connections**



### Test-Auto-Turnup — Local Description

The Auto Turnup-Local test is an automated test which verifies an Metropolis<sup>®</sup> EON (OLS) has been installed properly. The test detects optical fiber connection errors that might otherwise not be detected until customer traffic is placed on the system. The **FAULT->Test->Auto Turnup->Local** test verifies continuity through one of two possible paths emanating from Telemetry circuit packs within a Metropolis<sup>®</sup> EON (OLS) End Terminal or Repeater:

- The Telemetry-to-Optical Amplifier (Supervisory) Channel, or
- The Customer Maintenance Signal (CMS) In/Out Port.

LOCAL Installation Self-Test is divided into two "types" according to the channel type under test: CMS Ports (CMS) or Supervisory Channels (SUPR). Within each Optical Line under test, the entities tested and reported to the CMC are equipped TLM packs. For Metropolis<sup>®</sup> EON (OLS) End Terminals, tests are performed on A-TLM slots only, while for Metropolis<sup>®</sup> EON (OLS) Repeater the A and B TLM slots are reported. If an OA circuit pack within a Supervisory Channel loop fails, then the TLM circuit pack connected in the Supervisory Channel loop under test is marked failed. The CMS Port involves only the TLM circuit pack itself. There is no self-test of the OMU, ODU, or TOHCTL. The OMU/ODU may be tested manually with wide-band signal measurements; the TOHCTL and cabling between terminals is tested via system level verification.

This test is executed at the CMC using the LT01 UID (Expert privilege level) with the **Test->Auto-Turnup->Local** command. Installation Self-Test requires the user to manually configure optical fibers and insert, if necessary, the proper optical attenuation. The details of user setup, user commands, and operation of the "Local" test are covered in *Chapter 8, Local Installation Testing* of this document.

No active conditions (as indicated by the **FAULT->Retrieve->Alarm** command) can be present for the NE-under-test, except for conditions that arise as a result of test setup. The following are conditions that could be caused by the test setup in preparation for self-test:

- System incomplete
- DSNE not reachable
- Test auto turnup in progress
- Inc. (from Supr.) DCC Failure
- Incoming CMS LOF

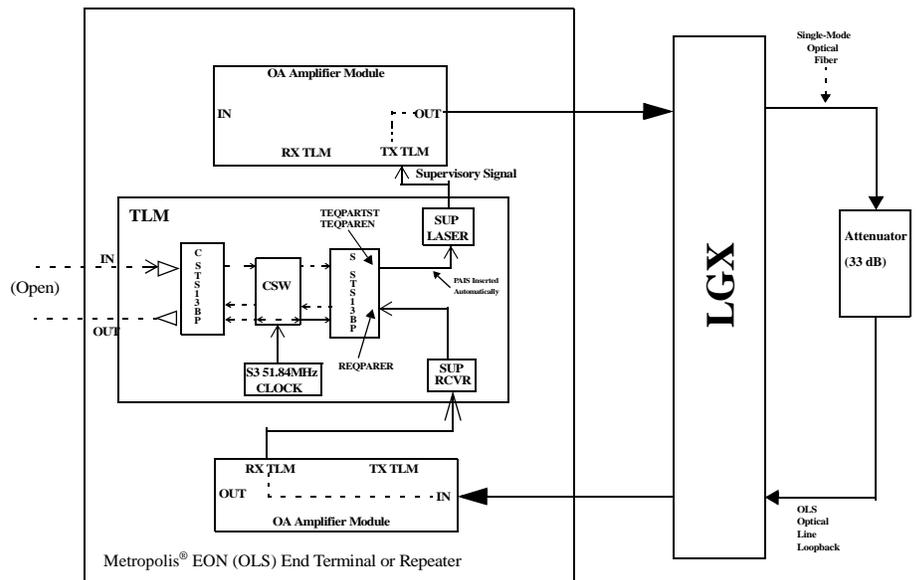
- Incoming CMS SD
- Incoming supr chnl LOF
- Incoming supr chnl SD
- Incoming optical channel LOS
- Incoming optical channel SNR
- Optical line ID error
- Multiple DSNEs defined
- NE status comm failure
- Incoming optical line LOS (CMS Port Test Only)
- Incoming Optical Protection Switch Primary or Secondary LOS
- Optical Protection Switch Configuration Error

The self-test request is denied if conditions other than those listed above are active.

### Supervisory Channel Automatic Setup

A block diagram showing the Supervisory Channel test configuration for a TLM circuit pack is shown in Figure 11-2.

**Figure 11-2 Auto-Turnup-Local SUPR Test**



After the optical line fibers from OA (out)-to-OA (in) have been looped (via the LGX), with 33 dB of attenuation, the CMS Ports opened, and CONFIGURATION.Update command issued at the CMC, the board controller for each TLM pack of the Optical Line(s) under test will automatically:

- Switch TLM pack synchronization source to the internal 51.84-MHz Stratum 3 Clock Generator
- Have the S-ST513BP device insert PATH AIS signal in the transmit direction of the Supervisory Signal carried over the Supervisory Channel under test.

Metropolis® EON (OLS) Installation Self-Test uses the PAIS signals as controllable "good" signal sources for both the Supervisory Channel and CMS Port continuity tests.

### Supervisory Channel Continuity Test Operation

Once setup and initialization are complete, the following operations are performed to confirm Supervisory Channel continuity per TLM slot:

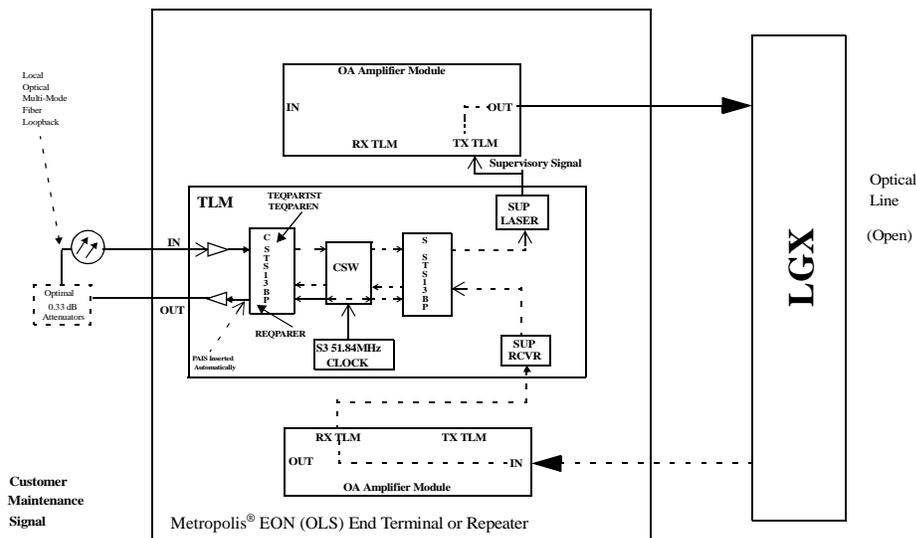
- 1 Verify no C1 parity error is detected at the S-STS13BP device of the TLM pack by enabling parity error insertion via TEQPAREN function, sending good parity via TEQPARTST function, and reading REQPARER.  
.....
- 2 Insert C1 parity error at the S-STS13BP device of the TLM pack via TEQPARTST function.  
.....
- 3 Verify C1 parity error is detected at the S-STS13BP by reading REQPARER.  
.....
- 4 Remove C1 parity error at the S-STS13BP via TEQPARTST function.  
.....
- 5 Verify no C1 parity error detected at the S-STS13BP by reading REQPARER.

END OF STEPS  
.....

### CMS In/Out Port Automatic Setup

A block diagram showing the CMS In/Out Port test configuration for a TLM circuit pack is shown in Figure 11-3.

**Figure 11-3 Auto-Turnup-Local CMS Test\**



Upon completion of the Supervisory Channel Test, the Optical Line fibers from transmit OA (out)-to-OA (in) are opened, and the CMS fibers (and optional attenuators) looped. After issuing the CONFIGURATION->Update command at the CMC, the board controller for each TLM pack of the Optical Line(s) under test will automatically:

- Switch TLM pack synchronization source to the internal 51.84-MHz Stratum 3 Clock Generator
- Have the C-ST13BP device insert PATH AIS signal in the Out direction of the CMS In/Out Port.

### CMS In/Out Port Continuity Test Operation

1 Once setup and initialization are complete, the following operations are performed to confirm CMS In/Out Port continuity per TLM slot:

2 Verify no C1 parity error is detected at the C-ST13BP device of the TLM pack by enabling parity error insertion via TEQPAREN function,

sending good parity via TEQPARTST function, and reading REQPARER.

---

- 3 Insert C1 parity error at the C-ST513BP device of the TLM pack via TEQPARTST function.
- 

- 4 Verify C1 parity error is detected at the C-ST513BP by reading REQPARER.
- 

- 5 Remove C1 parity error at the C-ST513BP via TEQPARTST function
- 

- 6 Verify no C1 parity error detected at the C-ST513BP by reading REQPARER.

END OF STEPS

---

### **User Test Termination**

After the user invokes a self-test, the CMC does not accept any commands until the test completes. A self-test can be aborted by the user via the CMC at any time. A self-test can also terminate prematurely if a condition arises that prevents the self-test from completing.

**Auto Turnup Local CMS  
Test Procedures**

Note that the local CMS test can **only** be performed when LDA1 TLM circuit packs are equipped in the EON (OLS) Shelf. Perform the following steps for the Auto Turnup Local CMS test:

---

- 1** Verify there are no optical fiber connections to the input and output ports of the OAs, LIRCV or LITX units.  

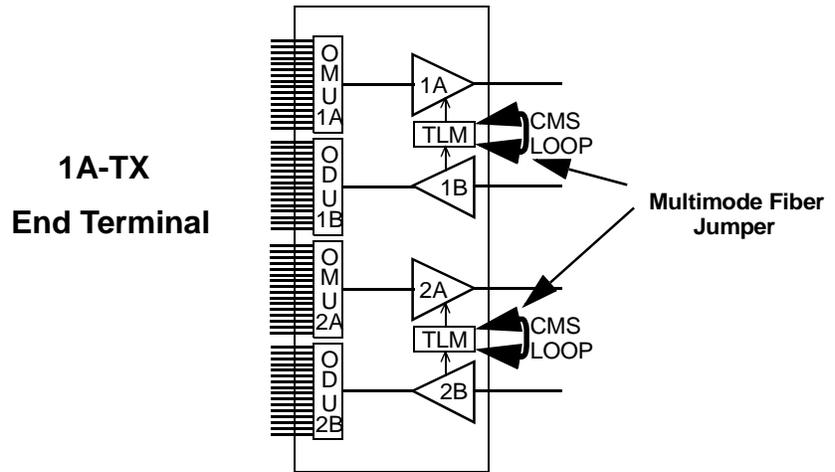
---
- 2** Loop the Customer Maintenance Signal connectors (CM IN to CM OUT) using **multimode** optical fibers. (These fibers usually have outer jackets colored grey or orange.) See Figures 11-4, 11-5 and 11-6.  

---
- 3** Enter the **CONFIGURATION->Update->System** command after connecting the multimode optical fiber test jumpers.  

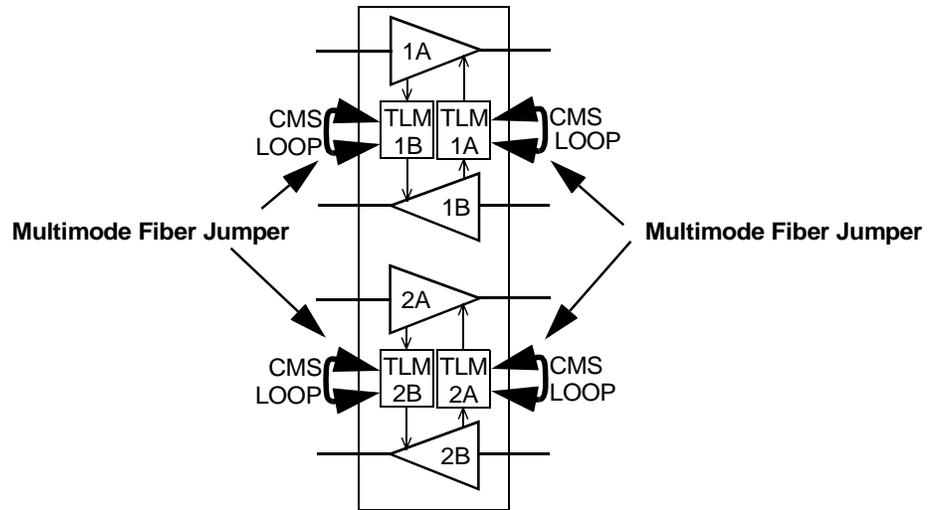
---
- 4** Select the command **FAULT->Test->Auto->Local** and select CMS-ALL in the box provided. Click on ENTER to start the test sequence.  

**Requirement:** Report as Good for equipped TLM slot positions. Failed TLMs will report as Fail. An untested slot (not equipped) reports as “-”. If any TLM fails, move the circuit pack to a known good slot position and retest. If the failure moves with the circuit pack, it indicates a failed unit. If the slot fails when equipped with a known good circuit pack, a possible backplane problem is indicated. Contact your next level of support.

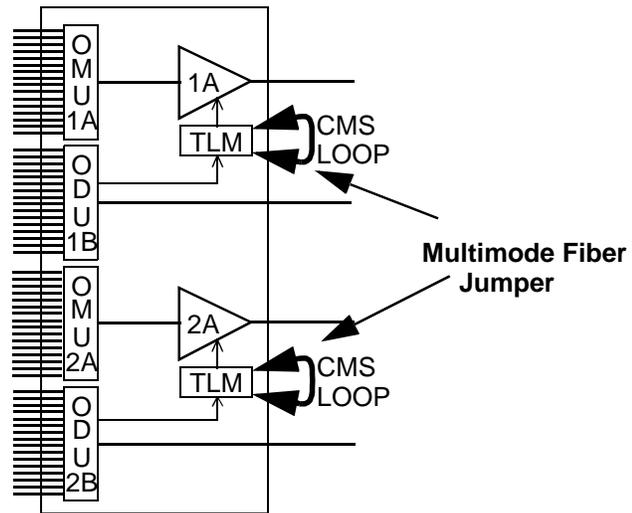
**Figure 11-4 Auto Turnup Local CMS Connections (1A-TX)**



**Figure 11-5 Auto Turnup Local CMS Connections for Repeaters**



**Figure 11-6 Auto Turnup Local CMS Connections for Single OAs**



- 
- 5 Remove the CMS loopback optical fiber jumpers.
- 
- 6 Repeat Steps 1 to 5 for any other equipped lines until all lines have been tested.
- 
- 7 Enter the **CONFIGURATION->Update->System** command.  
**Requirement:** The command clears CMS loss of signal alarms.

END OF STEPS

---





# A Pin Repair

## Overview

---

**Purpose** This section describes the procedures for terminal repair in FASTECH technology using the KS-22876, L6 Pin Repair Kit; in METRAL technology using the BERG MT370-01 Tool Kit; and for subminiature D-type technology using the AMP 91261-1 Insertion/Extraction Tool Kit. The tools are designed to remove and replace pins in MLPWB (Multilayer Printed Wiring Board) backplane areas equipped with or without spacer aligners.

**Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** Bent or broken pins will be located, the replacement pin type determined, and the damaged pin removed and replaced.

**Contents** This appendix contains the following:

Tool Kit Descriptions	<a href="#">A-3</a>
Pin Designations	<a href="#">A-5</a>
Metropolis <sup>®</sup> EON Circuit Pack and Equipment Location	<a href="#">A-7</a>
OT Circuit Pack and Equipment Location	<a href="#">A-8</a>
Procedures for Pin Replacement	<a href="#">A-10</a>
Metropolis <sup>®</sup> EON (OLS) — Pin Type Location	<a href="#">A-12</a>
Optical Translator (OT) — Pin Type Location	<a href="#">A-15</a>



## Tool Kit Descriptions

---

### Description **KS-22876, L6 Pin Replacement Kit — Comcode 406984641**

L101 Handle Assembly	
L102 Extension Rod	
L103 Head No. 1	Inserts pins in spacer aligner areas from circuit pack side
L104 Head No. 2W	Inserts pins in areas without spacer aligners from circuit pack side
L105 Head No. 3	Removes pins from wiring side
L106 Head No. 4	Removes stub of broken pins from wiring side
L107 Head No. 5	Removes pins from circuit pack side
L110 Pin Gauge	
L112 Case	
L113 Instruction	
L114 Deburring Head	
L115 Drill Bit	
L116 Pin Vise	
AT-7860 D Long Nose Pliers (Insulated)	

### **METRAL Press-Fit Repair Kit**

Repair Tool Kit	BERG MT370-01
Individual Pins	See Table A-1 on page A-5
Pin Repair Kit	Metral R-6004 (C407959881)

**AMP 91261-1 Pin Repair Kit 91261-1**

Certi-Lok Tool	380392-8
Pin Insertion Tip	543507-1
Socket Insertion Tip	543133-1
Extraction Tip	126961-2
Repair Kit	543135-1



# Pin Designations

---

**Description      Table A-1      FASTECH Pin Codes**

<b>Pin ID</b>	<b>Comcode</b>	<b>Pin Type or Commercial Code</b>	<b>FASTECH/ METRAL</b>
B	106918477	1B32SG	FASTECH
E	105672729	1B27SG	FASTECH
H	103624987	1B14SG	FASTECH
I	106918485	1B33SG	FASTECH
J	407423524	1B34SG	FASTECH
O	103180287	1D1SG	FASTECH
Q	106918493	1C5SG	FASTECH
U	105424238	1D4SG	FASTECH
V	105396436	1B21SG	FASTECH
W	105396444	1B22SG	FASTECH
Y	408675594	1C6SG	FASTECH
3	103055943	1B3SG	FASTECH
6	105672711	1B26SG	FASTECH

**Table A-2      METRAL Pin Codes**

<b>Pin ID</b>	<b>Comcode</b>	<b>Pin Type or Commercial Code</b>	<b>FASTECH/ METRAL</b>
A		88929-102	METRAL
C		88929-119	METRAL
D		88930-101	METRAL
F		88929-106	METRAL
X		88929-120	METRAL

**Table A-3 Subminiature D-Type Pin Codes**

<b>Pin Type</b>	<b>AMP Code</b>
Male Pin	745633-5
Female (Socket)	1-745574-0



# Metropolis<sup>®</sup> EON Circuit Pack and Equipment Location

---

**Description      Table A-4      Metropolis<sup>®</sup> EON (OLS) Shelf Equipment Location**

<b>Circuit Pack</b>	<b>Backplane Location</b>	
SYSTEMEM	20-604	
SYSCTL	20-584	
TOHCTL	20-554	
OA/LITX/LIRCV	20-534, 20-434, 20-330,20-230	
TLM	52-180, 52-230 52-280, 52-330	
OMU/ODU	52-382, 52-430 52-478, 52-526	
USER PNL	45-557	Backplane Designation Only
PWR A	50-597	
PWR B	44-597	



## OT Circuit Pack and Equipment Location

---

**Description      Table A-5      OT Shelf Equipment Location**

<b>Circuit Pack</b>	<b>Backplane Location</b>	
OTCTL	20-605	
	20-565	
	20-525	
OTU/QOTU carrier/OUPSR  (OT System Controller Shelf)	20-163	<b>Important!</b> Location 20-485 is not populated with any circuit pack at this time. Its inclusion is for completeness.
	20-203	
	20-243	
	20-283	
	20-323	
	20-363	
	20-405	
	20-445	
20-485		

Circuit Pack	Backplane Location	
OTU/QOTU carrier/OUPSR  (OT Complimentary Shelves 1&2)	20-163	
	20-203	
	20-243	
	20-283	
	20-323	
	20-363	
	20-405	
	20-445	
	20-485	
	20-525	
	20-565	
	20-605	
PWR A	39-184	
PWR B	39-570	



## Procedures for Pin Replacement

---

### Description



#### CAUTION

*This procedure must be done with the shelf out of service and powered down to insure no further damage to the equipment or to the person doing the pin replacement.*



#### CAUTION

*Proper ESD precautions must be used.*

- 
- 1 Determine if the bent or broken pin is in an Metropolis<sup>®</sup> EON (OLS) or OT shelf.

---

  - 2 Determine the shelf in which the bent or broken pin resides (ex. Metropolis<sup>®</sup> EON (OLS) or OT).

---

  - 3 If the bent or broken pin is in a subminiature D-type connector in the cable interconnection panel, use the AMP Insertion/Extraction Tool Kit documentation for proper procedures to remove and replace the bent or broken pin.
 

**Important!** The D-type subminiature connectors on newer vintage backplanes are pressed into the backplane and are not repairable or replaceable on site.

---

  - 4 If the bent or broken pin is located in a circuit pack position of the Metropolis<sup>®</sup> EON (OLS) or OT shelf, determine the circuit pack slot in which the pin resides.

---

  - 5 Determine the number and column location of the pin.

- 
- 6** Refer to the correct figure (Figure A-1 through Figure A-8) to determine the letter pin code associated with the pin.

---

  - 7** Using Table A-1 on page A-5, determine the type of pin (either METRAL or FASTECH) and the correct comcode for the replacement pin.

---

  - 8** Obtain the correct replacement pin.

---

  - 9** If the pin to be replaced is a METRAL type pin, refer to “METRAL Press-Fit Repair Kit MT370-01” documentation for proper procedures to remove and replace the bent or broken pin.

---

  - 10** If the pin to be replaced is a FASTECH type pin, refer to “KS-22876, L513 Instruction Pin Replacement for FASTECH Technology Using the KS-22876 L6 Pin Kit” documentation for proper procedures to remove and replace the bent or broken pin.

END OF STEPS

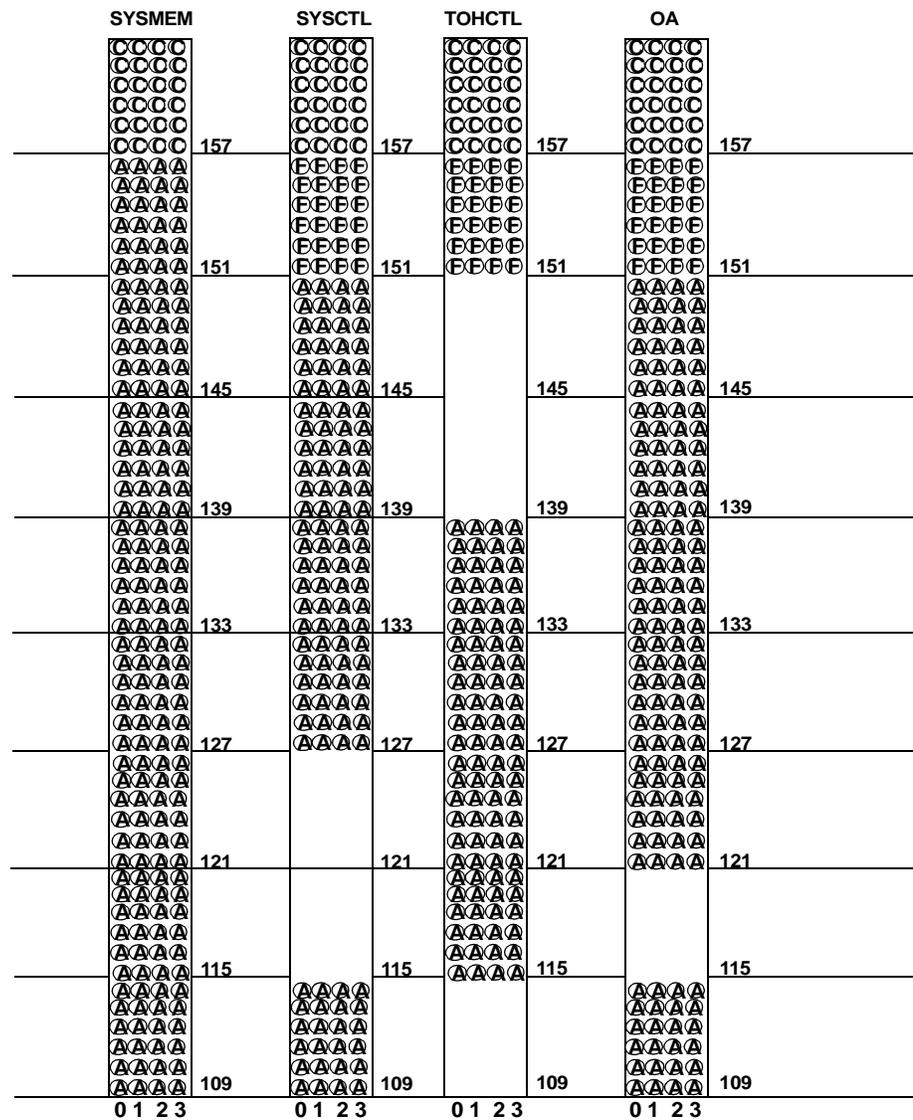
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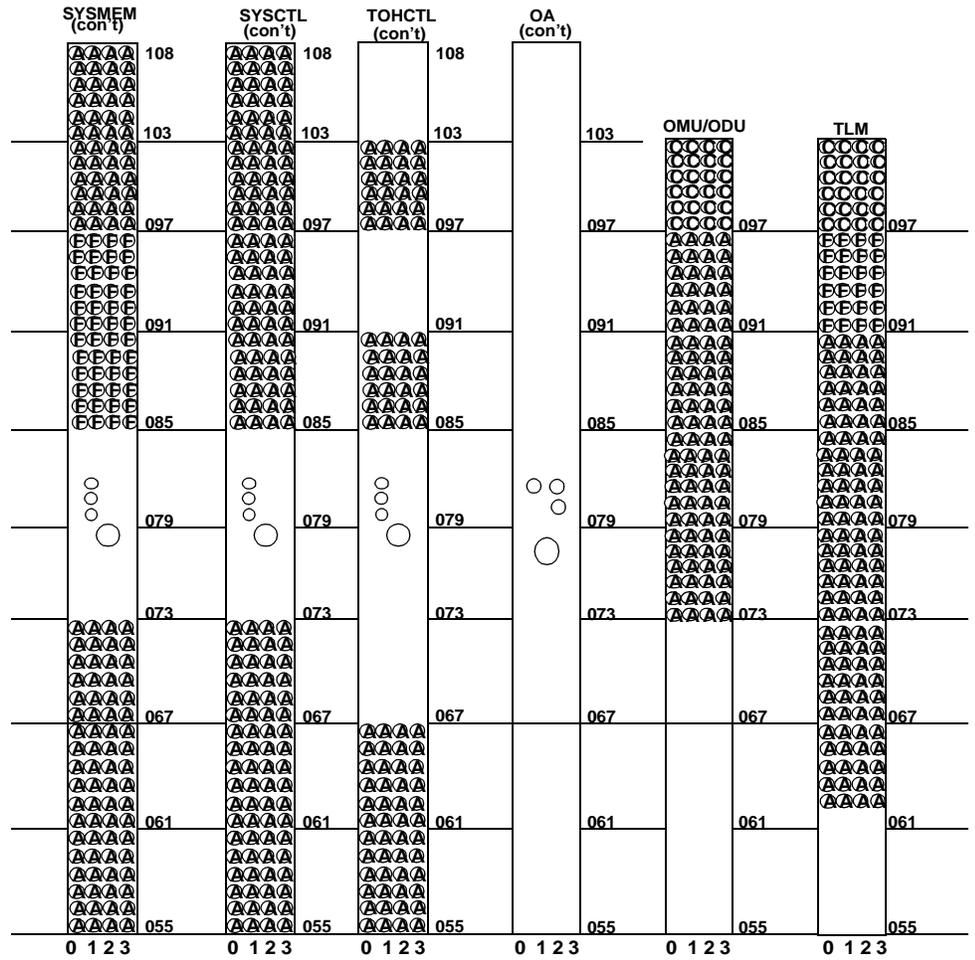
# Metropolis® EON (OLS) — Pin Type Location

- Reference Notes**
- 1-type contacts shall be press fit from the component side.
  - 1D1 contacts shall be broken off on the component side after insertion.
  - 1B32, 1B33, 1B34, and 1C6 contacts shall be broken off on the noncomponent side after insertion.

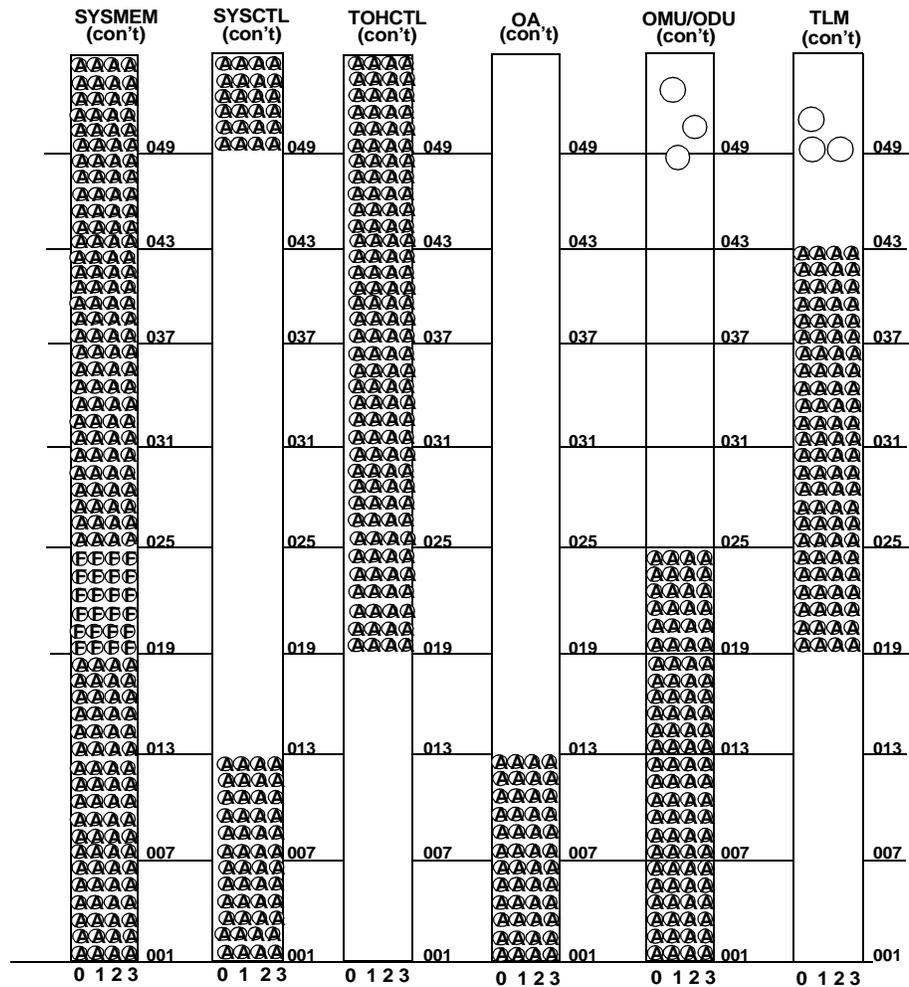
**Pin Type Locations**     **Figure A-1**     **Metropolis® EON (OLS) — Component Side View**



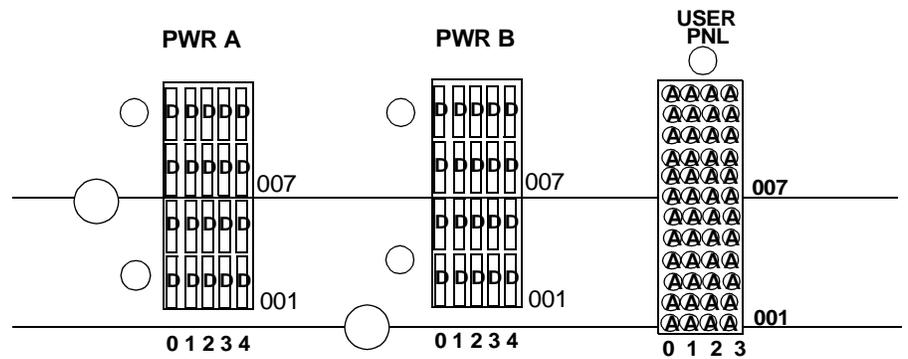
**Figure A-2 Metropolis® EON (OLS) (Middle) — Component Side View**



**Figure A-3 Metropolis® EON (OLS) (Lower) — Component Side View**



**Figure A-4 Metropolis® EON (OLS) — Power and User Panel — Component Side View**



# Optical Translator (OT) — Pin Type Location

**Pin Type Locations    Figure A-5    Optical Translator (Upper) — Component Side View**

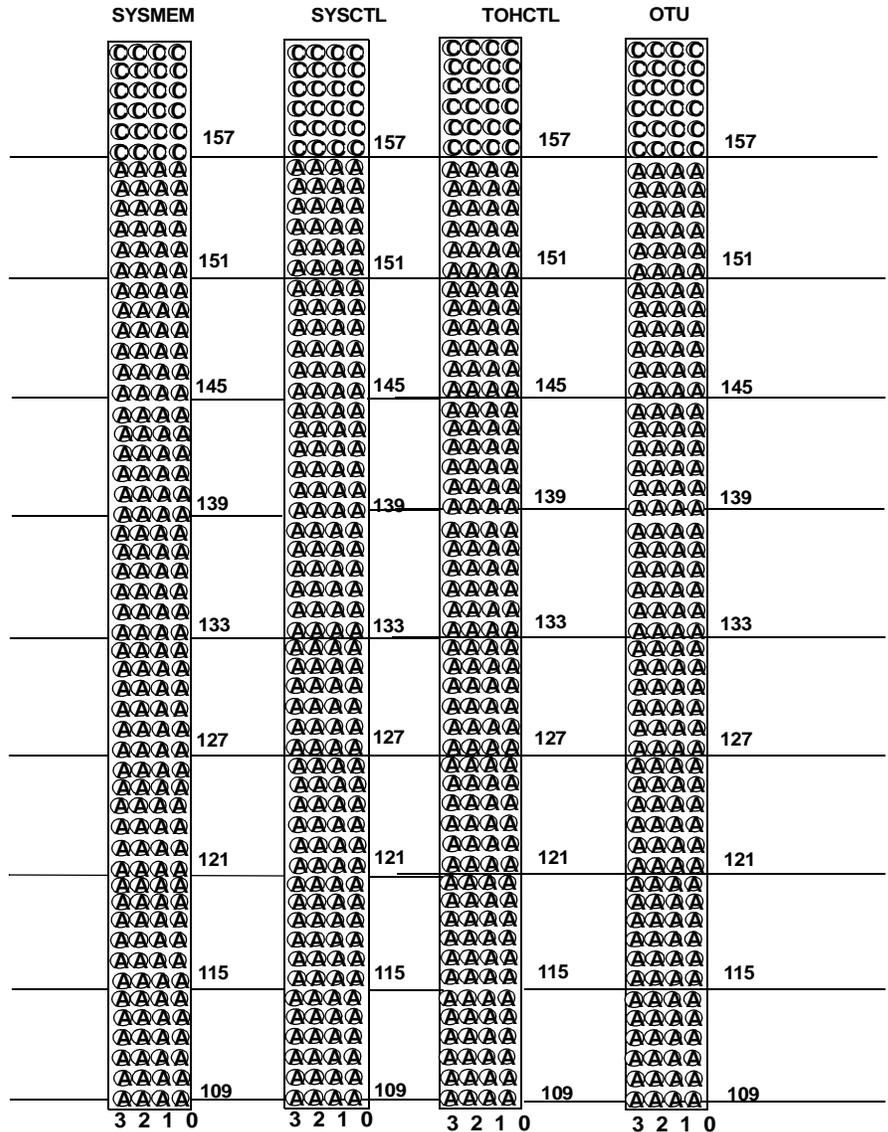
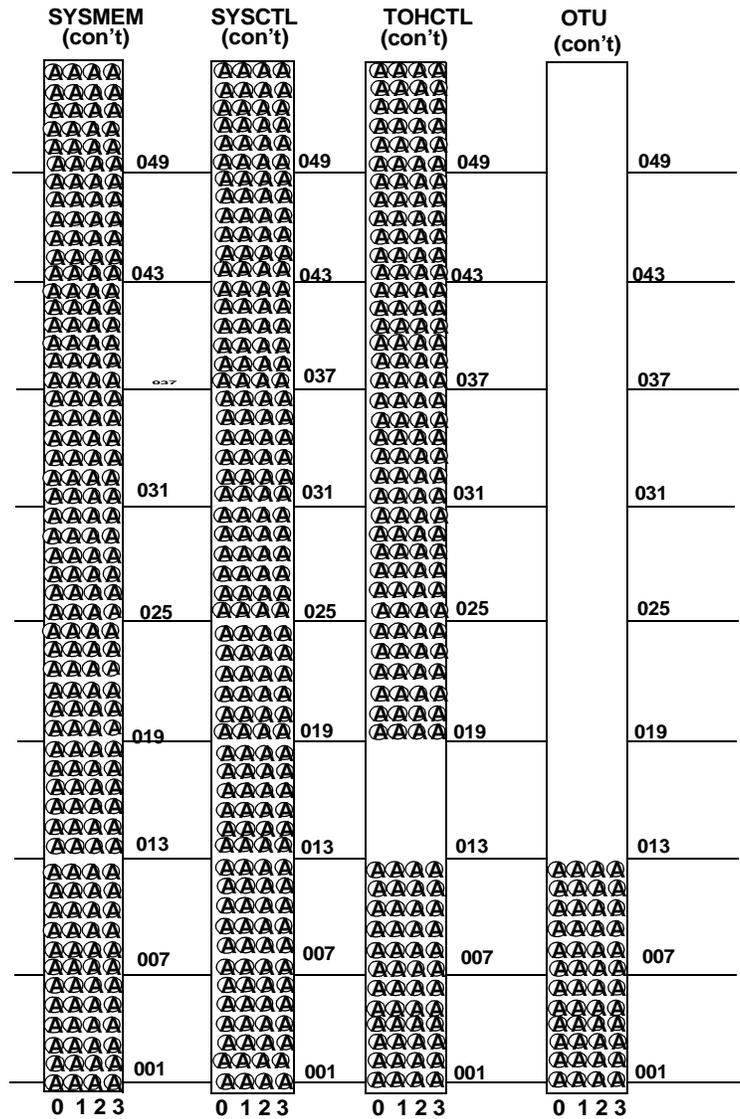
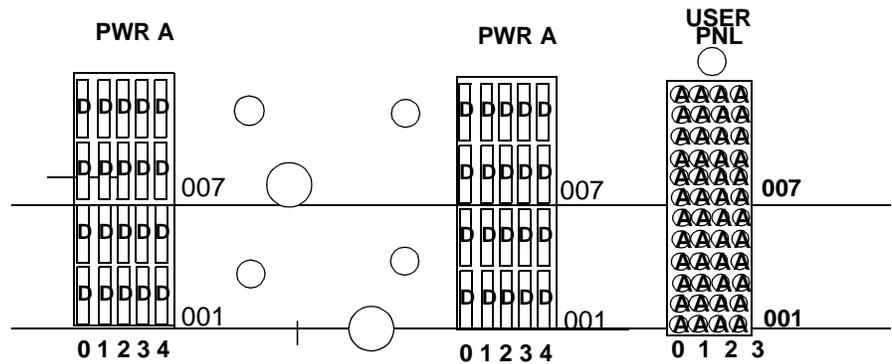




Figure A-7 Optical Translator (Lower) — Component Side View



**Figure A-8 Optical Translator — Power and User Panel — Component Side View**





# B Fiber Cleaning

## Overview

---

**Purpose** This procedure describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment. It is critical that the connector endfaces are clean and free from particular contamination to assure proper performance and reliability of lightwave systems. With the modern high speed, high power and wider bandwidth optical transmission systems, clean connectors along the optical path are absolutely essential for successful operation.

**Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This chapter provides information to perform the following:

1. Properly clean an optical connector
2. Inspect an optical connector for cleanliness

**Contents** This appendix contains the following:

Equipment Required	<a href="#">B-3</a>
Safety Instructions	<a href="#">B-5</a>
Cleaning/Inspecting Optical Connectors	<a href="#">B-6</a>

**Related Information**

A course on connector cleaning and the connector inspection process is now offered through Lucent Technologies Learning and Performance Center, Course Code: LMC214H “Understanding Fiber Optic Cleaning, Inspection and Testing.” To learn more about this course, consult your local Lucent Account Representative.



## Equipment Required

---

**Description** For proper cleaning, the following equipment and materials are recommended:

Product	Model	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
2.5mm Universal adapter cap	for use with Noyes OFS 300-200X	408197044	ITE-7129D1	33712901
1.25mm Universal adapter cap	for use with Noyes OFS 300-200X	408197069	ITE-7129D2	33712902
SC angled adapter	for use with Noyes OFS 300-200X	408376812	ITE-7129D3	33712903
Individual pre-saturated alcohol wipes	99% pure isopropyl alcohol	901375147	ITE-7136	33713600
CLETOP Cleaning Cassette	Type A Reel	901375154	ITE-7137	33713700
CLETOP Cleaning Cassette Replacement Reel	Type A Reel	901375014	ITE-7137 D1	33713701
Luminex Stick port cleaners	1.25 mm	901375030	ITE-7134	33713400
Luminex Stick port cleaners	2.5 mm	901375022	ITE-7135	33713500
Luminex Cloth	5.5" x 5.5"	408201226	R6033	23603300
Video Optical Fiber Inspection Microscope	Noyes VFS-1	408356830	ITE-7146	41714600
FC adapter	for use with Noyes VFS-1	408356863	ITE-7146D3	33714603
1.25 mm adapter	for use with Noyes VFS-1	408356848	ITE-7146D1	33714601
2.5 mm adapter	for use with Noyes VFS-1	408356855	ITE-7146D2	33714602
LC adapter	for use with Noyes VFS-1	408356889	ITE-7146D4	33714604

<b>Product</b>	<b>Model</b>	<b>Comcode</b>	<b>ITE #</b>	<b>Installation Order #</b>
SC adapter	for use with Noyes VFS-1	408356954	ITE-7146D5	33714605
ST adapter	for use with Noyes VFS-1	408356962	ITE-7146D6	33714606

**Important!** The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended by Lucent.



# Safety Instructions

---

## Description



### **DANGER**

*Never view an energized optical cable with the naked eye or with an optical magnifying instrument. Disconnected or separated optical connectors may emit invisible laser radiation and direct exposure can severely injure the eye. If inspecting the endface of a connector with a fiberscope, be absolutely certain that the system is deactivated.*



### **WARNING**

*Alcohol is flammable and is harmful if swallowed, inhaled or absorbed through the skin. Keep alcohol away from heat, sparks, or flame. Avoid contact with eyes, skin and clothing.*



# Cleaning/Inspecting Optical Connectors

---

**Introduction** The procedure that follows utilizes the "Wet/Dry" method for connector cleaning. This method first applies a "wet" solvent (high purity alcohol) to the connector endface to dissolve/remove any organic particulate or oily films, followed by a "dry" double clean wipe using the CLETOP cleaning cassette.

This procedure is recommended for connector ferrules 2.5 mm and 1.25 mm in diameter associated with ST, SC, FC, and LC connectors. The ferrule of a fiber optic connector consists of a ceramic or stainless steel cylinder with a hole located longitudinally down the center of its axis, allowing enough tolerance for a fiber to pass through.

All optical connectors should be cleaned prior to connectorization. Keep the protective ferrule dust cap in place on the connector until initiating the cleaning process.

**Cleaning Process** The following cleaning procedure is acceptable for field service/installation activities.

---

**1** Remove the dust cap from the connector ferrule exposing the endface of the connector.

---

**2** Open an individual foil packet of pre-saturated isopropyl alcohol (99% pure) wipe. Grasp the connector housing and place the connector ferrule endface perpendicular to the alcohol wipe. Drag it against the wipe three (3) times in a figure eight pattern. This action applies the alcohol solvent to the endface and initially loosens and scrubs away organic/solid contaminants.



- 3 If a CLETOP cassette cleaner is not available, proceed with step 7. Otherwise, hold the CLETOP cassette cleaner in the palm of your hand with the cassette shutter door facing up. Rotate the cassette lever all the way down with your thumb. Do not release the lever. The lever advances the "dry" Luminex cleaning cloth inside the case and simultaneously opens the shutter. The CLETOP cassette shutter door is now open and ready for cleaning the connector.



- 
- 4** Insert and press the connector ferrule endface perpendicular against the cleaning cloth in the first of two slots of the cleaner. Drag it down in the direction indicated by the arrows on the cleaner. Do not release the lever of the cassette.

---

  - 5** Lift the connector from the first slot and rotate it 90 degrees and repeat the wiping procedure using the second slot. Be sure the ferrule is pressed snug against the cleaning cloth while dragging the ferrule to assure the proper cleaning action.

---

  - 6** Release the cassette lever allowing the shutter door to close to its initial position. Continue with Step 8.

---

  - 7** Wrap a Luminex cleaning cloth around the ferrule and rotate the connector housing, cleaning the outside periphery of ferrule. Follow this by folding an unused portion of the cloth over the end of the ferrule endface and then with light pressure from the thumb, slightly drag the cloth from the center of the ferrule to the edge while rotating the connector 360 degrees. If the Luminex cleaning cloth is not available, a lint free cleanroom optic wipe can be used. The Luminex cleaning cloth is washable and can be used multiple times. The optic wipes are single use and disposable.

---

  - 8** Inspect the connector for cleanliness. If necessary, repeat the cleaning process.

END OF STEPS

---

**Connector Inspection** After cleaning the connector, inspect the ferrule endface to ensure that it is free from significant particulate contamination using an optical fiber inspection scope of at least 200X magnification. When using an optical fiber scope (for example, the Noyes OFS 300-200X) exercise extreme caution to assure fiber being examined is de-energized.



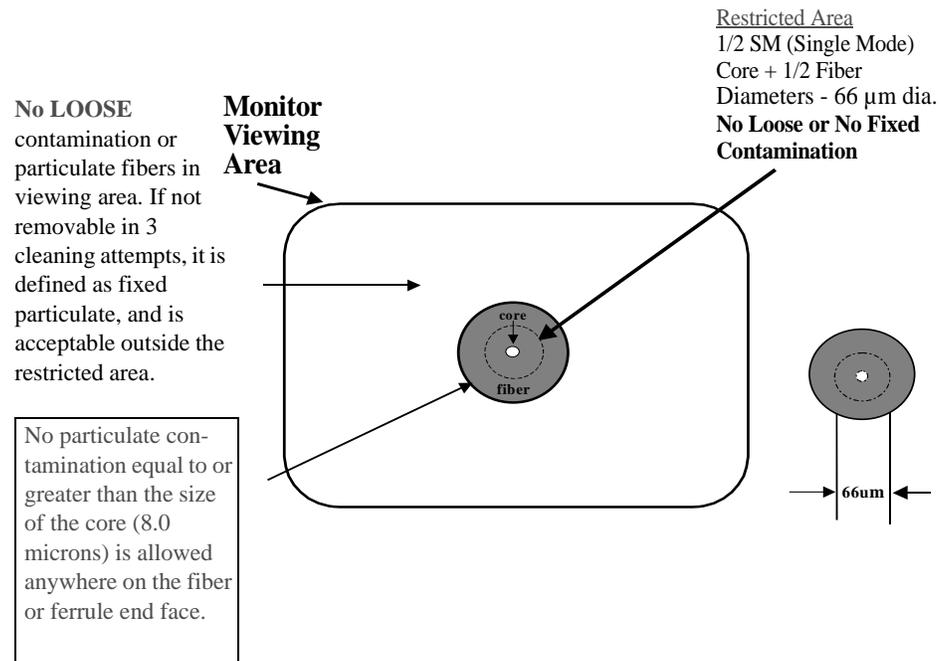
## WARNING

*Use an optical power meter to verify the connector and fiber to be cleaned has been de-energized/deactivated before viewing.*

- 
- 1 Follow the instructions in the manual provided with the Optical Fiber Scope to view the ferrule endface of the fiber under inspection.
- 
- 2 The visual area of the ferrule endface (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminants (see Figure B-1 on page B-10).

**Requirement:** No fixed type of contamination (contaminants which after 3 wet-dry cleaning operations remain at the same location on the connector endface), regardless of size, is allowed in the restricted area of the glass fiber endface as determined after 3 successive wet-dry cleaning attempts. The restricted area is defined as ~66 micron (um) diameter for both single-mode and multimode fibers. Chips, cracks, and scratches are not allowed near the core of the glass fiber endface. No large floating (loose) contaminants are allowed on the glass fiber and ceramic ferrule endface. If after 3 successive wet-dry cleaning attempts, particulate that is less than 8 um in size remains *fixed* on the ceramic ferrule endface and *outside* the defined restricted area on the fiber glass endface, it will be acceptable.

**Figure B-1 Acceptability Criteria: Single-Mode and Multimode Fibers**



- 3 After the connector has been verified to be cleaned, it should be immediately inserted into the adapter buildout of the optical component. This will assure maximum cleanliness and effectiveness of the connector.

- 4 If the cleaned connector can not be "connectorized" with a corresponding adapter, the connector ferrule must be protected with a connector dust cap. Before placing the cap on the ferrule, make sure the cap is clean. This can be accomplished by inserting a CLETOP stick cleaner (swab) of the same inside diameter as the cap (either 2.5 or 1.25 mm) and rotate the stick 360 degrees three (3) times. Following this procedure, carefully place the cap over the ferrule. When the cleaned connector is ready for assembly, it should be re-inspected for cleanliness prior to connectorization.

END OF STEPS

**Optical Fiber Adapters and  
Circuit Pack Connectors**

During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter and the circuit pack connector.

**Important!** Do not attempt to clean ports equipped with yellow lightguide buildout (LBO) attenuators. Attenuators contain a thin glass lens that is extremely fragile and would be damaged by cleaning by a mechanical means. Discard any contaminated LBOs.

The following procedure is recommended.

- 
- 1 Using the appropriate CLETOP stick cleaner (2.5 mm for SC, ST, and FC connectors, 1.25 mm for LC connectors) dampen the stick cleaner with Ethyl alcohol using the alcohol wipe. Insert the stick cleaner into the adapter rotating the stick 360 degrees while inserting. Push/rotate stick until the stick cleaner makes contact with the ferrule end face. Apply slight pressure upon contact and rotate stick 360 degrees at least three (3) times.

---

  - 2 Remove the stick cleaner rotating it upon removal.

---

  - 3 Using a dry CLETOP stick cleaner of appropriate diameter, repeat the above cleaning procedure. This procedure will clean the sidewalls of the adapter and the endface of the circuit pack connector.

END OF STEPS

---







# C CMC Dantel Alarm and Control Block Installation, Extended Miscellaneous Discretes

## Overview

---

**Purpose** The Extended Miscellaneous Discretes feature provides additional miscellaneous discrete inputs and outputs to supplement the miscellaneous discretes feature. It consists of an additional 128 alarm and status input points and 32 control output points, bringing the total number of miscellaneous discrete inputs for the network element to 144 inputs and 36 outputs.

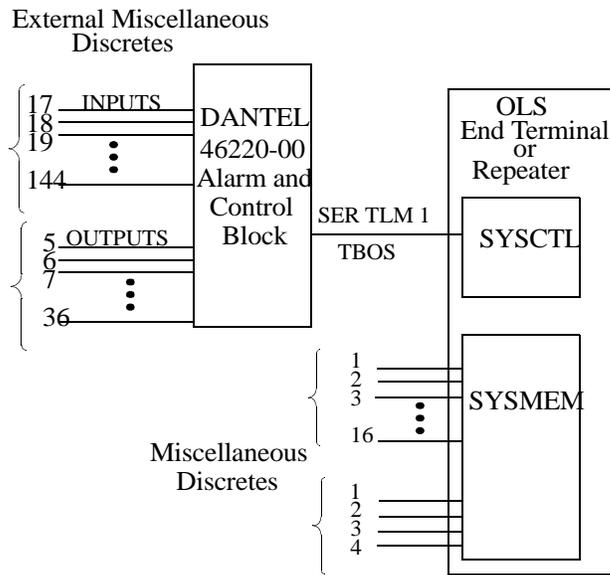
**Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This appendix provides the installer with information and procedures for installing and connecting the Dantel Alarm Control Block for miscellaneous discrete applications.

**Contents** This appendix contains the following:

Installation Procedure	<a href="#">C-3</a>
Provisioning Extended Miscellaneous Discretes	<a href="#">C-8</a>

**Figure C-1 Miscellaneous Discretes Applications**



**Ordering Information**

**Table C-1 Ordering Information**

Description	Order Number	Comcode Number
Alarm Control Block	Model No. 46220-00	407567924
Mounting Bar	A25-00508-01	406863621
SER TLM1 Cable	ED-7G028-22	

**Tools and Equipment Required**

The following tools are required:

- Phillips Screwdriver
- Small Standard Screwdriver
- 11/32-Inch Wrench

The following equipment is required:

- Alarm Control Box
- 23” Mounting Bar
- Standard WECO Distribution Frame
- ED-7G028-22 Cable

END OF STEPS



# Installation Procedure

---

**Description** A detailed installation procedure is provided in the DANTEL Installation & Operation Manual provided with the 46220-00 Alarm and Control Block. The following procedure is provided to facilitate its use with Metropolis<sup>®</sup> EON (OLS).

**Assembly** Proceed as follows:

- 
- 1** Attach the Alarm and Control Block to the Mounting Bar.

---

  - 2** Attach the mounting bar to the distribution frame. The mounting bar is rear-mounted to the distribution frame.

---

  - 3** Run the ED-7G028-22 cable from the SER TLM1 port of the Metropolis<sup>®</sup> EON (OLS) to the Alarm Control Block.

---

  - 4** The SER TLM1 Cable needs to be wired to the Alarm Control Block.

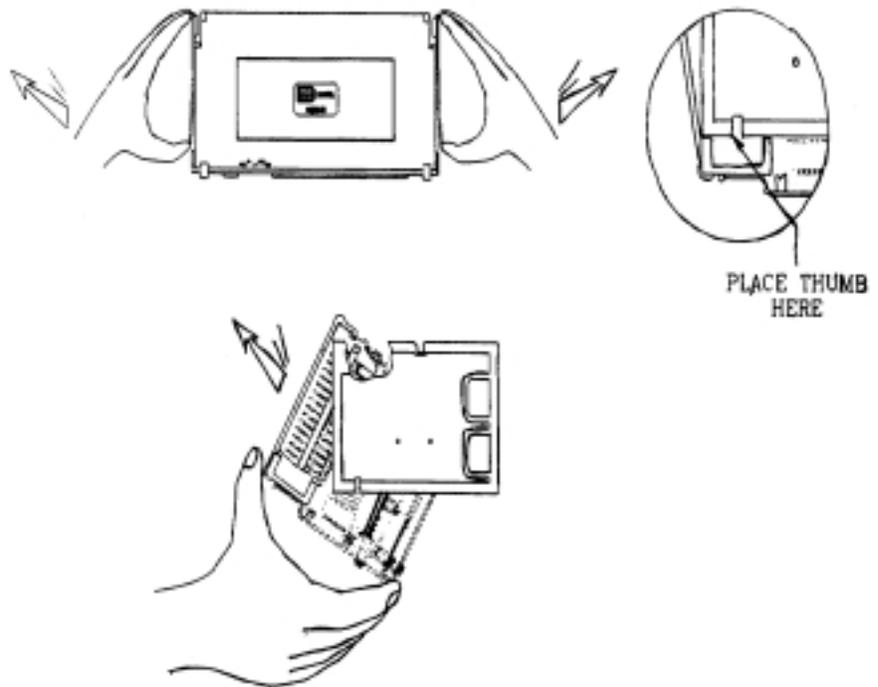
END OF STEPS

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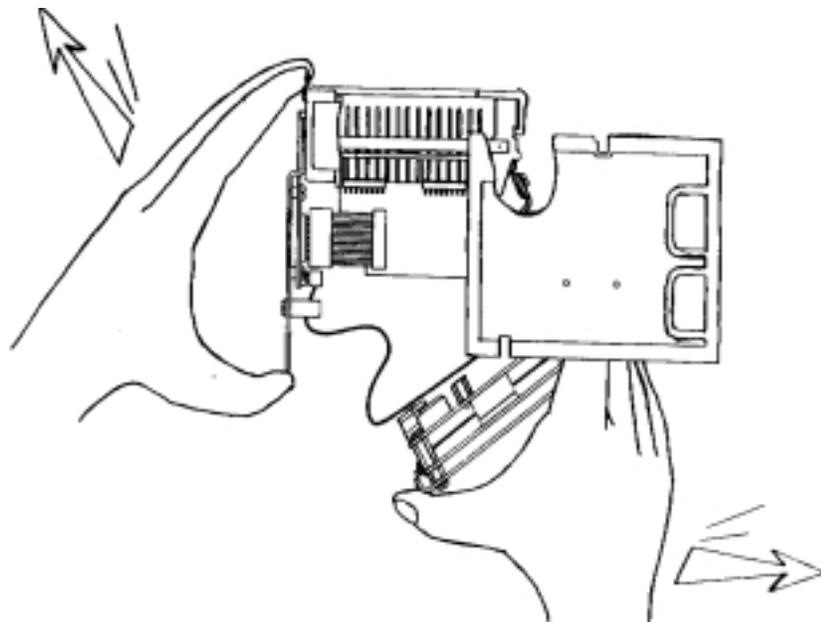
**Wiring** Proceed as follows

- 
- 1** In order to access the power supply board of the Dantel Alarm Block, the unit must be opened by placing your thumbs under the sides of the unit and gently pushing outwards as in Figure C-3 on page C-4.

**Figure C-2 Opening the Dantel Alarm Block**



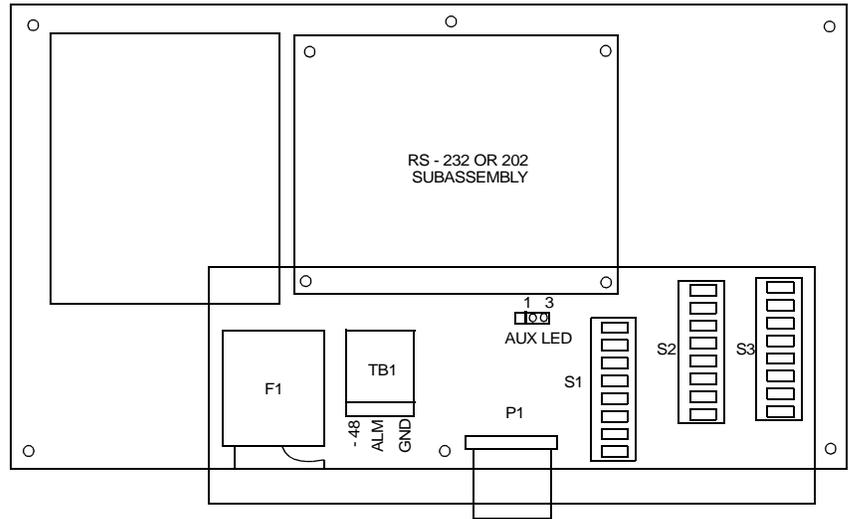
**Figure C-3 Pulling Down the Power Supply and CPU**



- 
- 2** Pull the Power Supply board and CPU board down. Refer to Figure C-3 on page C-4.

- 3 On the power supply board, wire negative battery (-21 to -56 VDC) to connector TB1 (Refer to Figure C-4 on page C-5).

**Figure C-4 Power Supply Board Component Location**



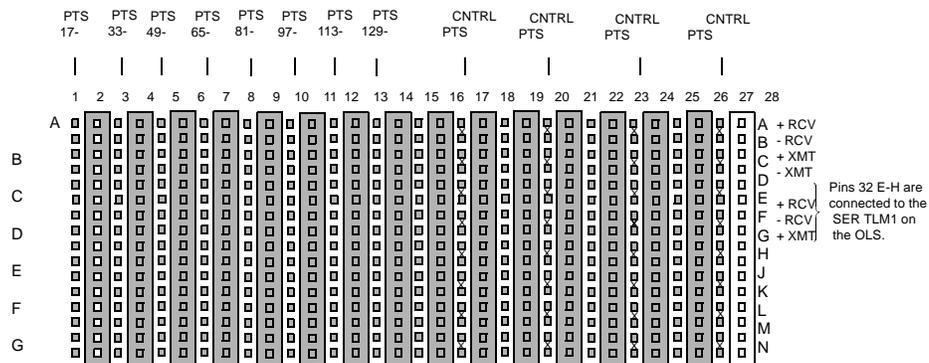
- 4 Wire the alarm inputs (refer to Figure C-5 on page C-6). There are two pins for each alarm input. One is for ground and the other is for alarm input. The dark-colored columns are grounds and are wired together. Wire Pin 30 S back to the Battery return ground terminal (GND) on TB-1 (refer to Figure C-4 on page C-5). Pin 1 will begin with Input Point 17 (See Figure C-5 on page C-6). Table C-2 on page C-6 lists the SER TLM1 cable connections and designations and the Dantel Pin designations.

- 5 The TBOS Transmit and Receive Positive and Negative (see Table C-2 on page C-6) need to be wire-wrapped to pins 32 E-H on the Alarm and Control Block (See Figure C-5 on page C-6).

Cable 1	Cable 2
1. TBASTXP (W) to 32-E	3. TBASRXP (W) to 32-G
2. TBASTXN (BL) to 32-F	4. TBASRXN (O) to 32-H

END OF STEPS

**Figure C-5 Dantel Wire Wrap Pin Designations**

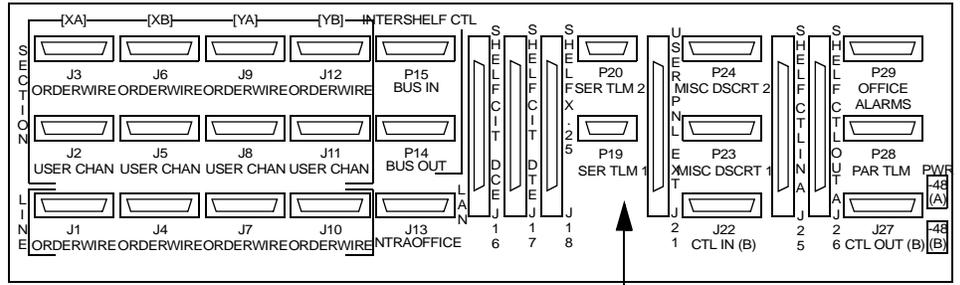


**Table C-2 SER TLM 1 Cable Connections and Designations**

Name	Designation	Pin	Wire Color	Dantel Pin Designation*
TBOS TRM Transmit N	TBASTXN	1	BL (CA1)	32-F (-RCV)
No Connection	None	2	None	
TBOS TRM Receive N	TBASRXN	3	O (CA2)	32-H (-XMT)
No Connection	None	4	None	
No Connection	None	5	None	
TBOS TRM Transmit P	TBASTXP	6	W (CA1)	32-E (+RCV)
No Connection	None	7	none	
TBOS TRM Receive P	TBASRXP	8	W (CA2)	32-G (+XMT)
No Connection	None	9	None	

\* See Figure C-5 on page C-6 for location.

**Figure C-6 Metropolis® EON (OLS) Interconnection Panel (SER TLM1 at Arrow)**



**Switch and Strap Settings**

On the Dantel Alarm and Control Block there are three (3) switches (S1-S3) located on the Power Supply Board (see Figure C-4 on page C-5). With Lucent’s Optical Line System, the following switch settings must be made.

**Table C-3 Switch settings for Lucent Metropolis® EON (OLS)**

	<b>S1 Switch Settings</b>	<b>S2 Switch Settings</b>	<b>S3 Switch Settings</b>
1	OFF	OFF	OFF
2	OFF	ON	ON
3	OFF	OFF	OFF
4	ON	OFF	ON
5	OFF	OFF	ON
6	OFF	OFF	OFF
7	OFF	OFF	OFF
8	OFF	ON	OFF



## Provisioning Extended Miscellaneous Discretes

---

**Enabling SER TLM 1 Port** The SER TLM Port must first be enabled through the CMC by using the following Command:

- SECURITY-ENTER-Channel Identifier-Security,  
AID=SER\_TLM1, PORT ACC=enable

**Extended Miscellaneous Discrete Assignments** The Miscellaneous Discrete Assignments are provisioned by using the following command through the CMC:

CONFIGURATION\_Set\_Attribute\_Environment\_

This input sets the Descriptions and Alarm Levels for the miscellaneous discrete inputs.

- The Point parameter selects the miscellaneous discrete input point to provision

**Important!** The miscellaneous discrete points 1-16 are assigned to the original miscellaneous discrete ports. Therefore the extended miscellaneous discretes will begin their assignment with point number 17 and continue through point number 144.

- The Alarm Level Parameter provisions the severity of the condition associated with the closing of the selected miscellaneous discrete input point. The choices are:
  - "CR": critical
  - "MJ": major
  - "MN": minor
  - "NA": status not alarmed
  - "NR": status not alarmed and not reported to the OS.

The Description parameter is the text string associated with the selected miscellaneous discrete environmental input point. It is character string of up to 26 characters, where the characters are letters, digits, or spaces. It is used to identify the point in the FAULT-RETRIEVE-LOG and FAULT-RETRIEVE-ALARMS reports.





# D Harris C-1000 Centurion Installation —Extended Miscellaneous Discretes

## Overview

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**Purpose** The Extended Miscellaneous Discretes feature provides additional miscellaneous discrete inputs and outputs to supplement the Metropolis<sup>®</sup> EON (OLS) miscellaneous discretes feature. It consists of an additional 128 alarm and status input points and an additional 32 control output points (See Figure D-1 on page D-2). This will bring the total number of miscellaneous discrete inputs for the network element to 144 inputs and 36 outputs.

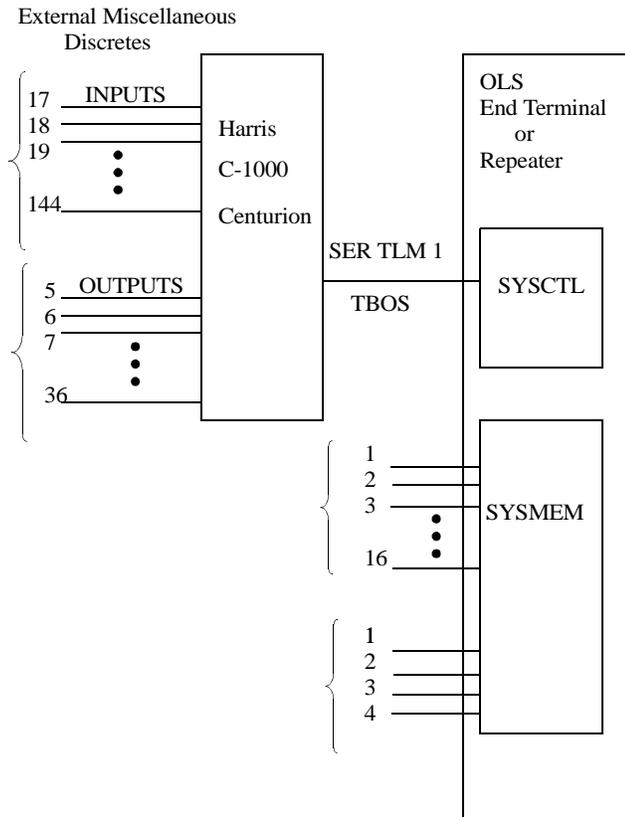
**Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.

**Objectives** This appendix provides the installer with information and procedures for installing and connecting the Harris C-1000 Centurion for miscellaneous discrete applications.

**Contents** This appendix contains the following:

OT Connections to the Harris Centurion EMDU	<a href="#">D-4</a>
Installation Procedure	<a href="#">D-5</a>
Provisioning Extended Miscellaneous Discretes	<a href="#">D-7</a>

**Figure D-1 Miscellaneous Discrete Applications**



**Ordering Information**

**Table D-1 Ordering Information**

Description	Order Number	Comcode Number
C-1000 Centurion	594-T043	407567932
Rear Access Wire Wrap Connector	620-T030	407532217
SER TLM1 Cable	ED-7G028-22	

**Tools and Equipment Required**

The following tools are required:

- Phillips Screwdriver
- Small Standard Screwdriver
- 11/32-Inch Wrench

The following equipment is required:

- C-1000 Centurion
- Mounting Brackets
- Standard WECO Distribution Frame
- ED-7C028-22 Cable



## OT Connections to the Harris Centurion EMDU

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**Description** The Harris unit is shipped equipped with adapters that connect with D-Subminiature connector on the Harris unit and provide a 50-pin wire wrap terminal on the other side of the adapter. This allows the Harris unit to be connectorized for easy replacement without requiring any wiring.

Since the Harris unit has limited wire wrap connections to ground, some wire wrap terminals will be required to handle two wire wraps per terminal. When wire wrapping the first connections to pins 5 through 9 and 30 through 34, install the first connection at the bottom of the pin to allow space for the second wire wrap. When these terminals are filled, the wiring table will call out ground connections to be used on J3 and J4 connectors which are located directly above connectors J1 and J2.



# Installation Procedure

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**Description** A complete and detailed installation procedure is provided in the Harris C1000 User Guide provided with the Centurion C-1000. The following procedure is provided to facilitate its use with Metropolis<sup>®</sup> EON (OLS).

**Assembly** Proceed as follows:

---

- 1** Attach the Mounting Brackets to the Harris C-1000 Centurion. The Mounting Brackets are then front mounted to the distribution frame.

---

- 2** Run the ED-7G028-22 cable from the SER TLM1 port of the Metropolis<sup>®</sup> EON (OLS) to J9 on the rear of the C-1000 Centurion (See the C-1000 Centurion User Guide).

---

- 3** J1 - J8 are the ports to be used for inputs and control outputs (See the C-1000 Centurion User Guide).

END OF STEPS

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**Powering the Unit** Proceed as follows:

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- 1** Power must be provided from a fuse panel using #14 to #24 (#20 is optimum) AWG power and ground wire. The input voltage range is –20 to –60 VDC. Fuse protection should be removed before inserting or removing power wires.

---

- 2** Power connections are located at J11 on the rear panel of the C1000 Centurion (See the C-1000 Centurion User Guide). The Positive and

Negative connections are marked at J11 (See the C-1000 Centurion User Guide).

END OF STEPS

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**Switch Settings** Proceed as follows:

---

- 1 Each C1000 unit is configured by using Configuration DIP switches on the front of the unit (See the C-1000 Centurion User Guide). Units, such as the Metropolis<sup>®</sup> EON (OLS), that can handle 128 or less discrete points use the 10-switch block on the Left (S1). The 10-switch block on the right (S2) is not used. The settings should be as follows:
  - S1-1 to S1-8 OFF (down)
  - S1-9 to S1-10 ON (up)
  - S2-1 to S2-10 OFF (down)

END OF STEPS

---



## Provisioning Extended Miscellaneous Discretes

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### Enable SER TLM 1 Port

The SER TLM Port must first be enabled through the CMC by using the following command: SECURITY -> ENTER -> Channel Identifier -> SECURITY. Enter: SER\_TLM1 in the AID and at Port ACC enter ACC.

### Extended Miscellaneous Discrete Assignments

The Miscellaneous Discrete Assignments are provisioned by using the following command through the CMC:

CONFIGURATION-SET-ATTRIBUTE-ENVIRONMENT.

Enter the Alarm number (i.e., 28) in the blank AID box.

This input sets the Descriptions and Alarm Levels for the miscellaneous discrete inputs.

- The Point parameter selects the miscellaneous discrete input point to provision

**Important!** The miscellaneous discrete points 1-16 are assigned to the original miscellaneous discrete ports. Therefore the extended miscellaneous discretes will begin their assignment with point number 17 and continue through point number 144.

- The Alarm Level Parameter provisions the severity of the condition associated with the closing of the selected miscellaneous discrete input point. The choices are:
  - "CR": critical
  - "MJ": major
  - "MN": minor
  - "NA": status not alarmed
  - "NR": status not alarmed and not reported to the OS.
- The Description parameter is the text string associated with the selected miscellaneous discrete environmental input point. It is character string of up to 26 characters, where the characters are letter, digits or spaces. It is used to identify the point in the Fault -> Retrieve -> Log and Fault -> Retrieve -> Alarms reports.

□





# E Related Equipment

## Overview

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- Purpose** This Appendix describes the Dantel Orderwire equipment and its connection to the Metropolis<sup>®</sup> EON equipment.
- Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.
- Objectives** This appendix provides the installer with information and procedures to install and provision the Dantel Orderwire unit.
- Contents** This appendix contains the following:

Orderwire Shelf Mounting and Powering	<a href="#">E-4</a>
Dantel Options Setting	<a href="#">E-6</a>
Cabling to Metropolis <sup>™</sup> EON (OLS)	<a href="#">E-13</a>

- Dantel Orderwire** The voice only Dantel Orderwire system recommended is orderable as J68974L-1 L300 for a Terminal Office, equivalent to part number A18-04588-02 from Dantel. The voice and data Dantel Orderwire system recommended is orderable as J68974L-1, L301 for a Terminal Office, equivalent to part number A18-05547-01 from Dantel.

Metropolis<sup>®</sup> EON (OLS) fully supports 64-kb/s orderwire use. Line and Section Orderwire channels (E2 and E1 bytes) are supported by the Metropolis<sup>®</sup> EON (OLS). Line Orderwire is carried between adjacent nodes.

The current Section or Line Orderwire system provides basic party-line service; any person can pick up the handset from the front of the Dantel unit and immediately speak to anyone else on the system. Voice party-line capability is the nominal state of this system and is operational as long as the fiber line between the Orderwire sites is good. Figure E-1 on page E-4 shows an example application of the current orderwire system in a Metropolis<sup>®</sup> EON (OLS). Unlike the section DCC and payload, the E1 byte of the section overhead is not automatically protected from fiber cuts or other transmission-affecting impairments. The Orderwire Sets can also provide bridging between orderwire channels in the East and West directions that allows for orderwire connectivity around the ring.

Remote CMC access is also possible from any site to another site over the orderwire by using the internal and external 1200 baud modems. The orderwire cannot be used for voice and CMC access simultaneously.

In ring applications, one of the nodes should be chosen as the break point (it is recommended the TID associated with the DS-NE be the break point) to avoid oscillating audio in the system. At this node, the Dantel is configured in terminal mode\* so that the Dantel channel 1 is the operational channel and channels 1 and 2 (East and West directions) are not bridged. The SONET section orderwire (E1 byte) is not automatically protected from fiber cuts or other transmission failures so a transmission failure somewhere in the ring can cut off the orderwire service to some nodes. For most single failures in a ring, orderwire access to nodes that have been cut off by the failure can be accessed by simply swapping the East and West orderwire connectors.

For voice application, the system operates as a standard orderwire when you pick up the handset on the front of the orderwire panel and call someone at a remote terminal (station 1 code). The voice circuit uses channel 1 of the system. For data circuit applications, dial a different number (station 2 code) to call the same remote terminal to set up a data communications path.

\* The switch and strap settings for terminal mode will be described in the final version of the Dantel practice.

## Orderwire Shelf Mounting and Powering

---

**Description** The Dantel Orderwire shelf ships separately from the bay. It may be mounted with, or powered from, the Miscellaneously Mounted Metropolis<sup>®</sup> EON (OLS) equipment. Consult Dantel documentation for powering and mechanical mounting information.

Figure E-1 shows the Orderwire installation and connection for voice communications. Figure E-2 shows the Orderwire installation and connection for voice and data communications.

Figure E-1 Orderwire for Voice Communication

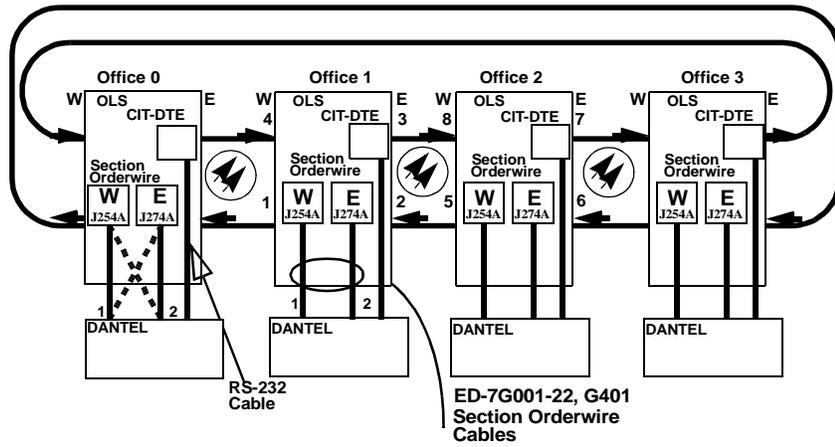
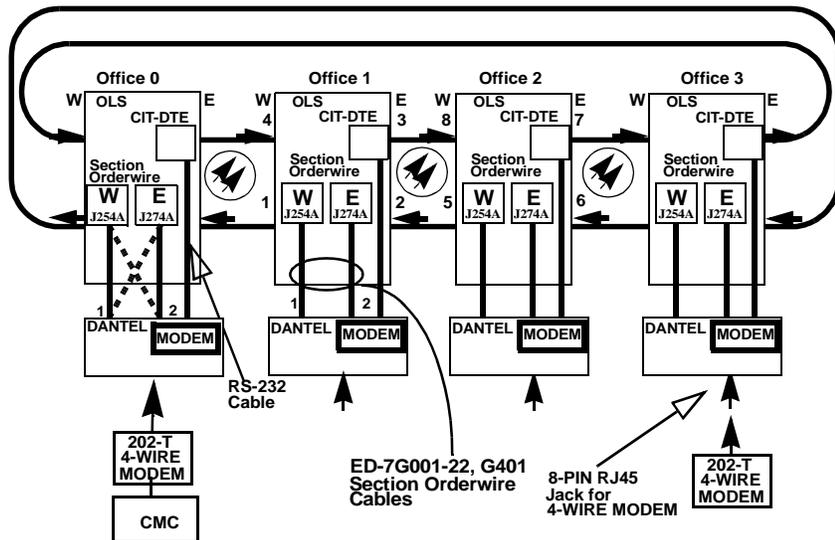


Figure E-2 Orderwire for Voice and Data Communications



Note: The Dantel Shelf at the breakpoint (DSNE Office 0) is configured in Terminal mode. All other Dantel Shelves are in Repeater mode.



## Dantel Options Setting

---

**Description** The shelf consists of several Plug-in Modules. Switch and strap settings compatible with Metropolis<sup>®</sup> EON (OLS) use are given in Table E-1 and Table E-2 for each module.

### Settings for Voice Communications

**Table E-1 Dantel Orderwire Options Settings for Voice Communications**

Module	Settings
Backplane	<p>Set S1 to BRIDGE</p> <p>Set S2 to IN</p> <p>Set S3 to IN.</p>
41096	<p>Set CTL LMT A strap, to IN position to prevent the ALL CHAN volume control knob from turning off the speaker.</p> <p>Set CTL LMT A strap, to OUT position to allow the ALL CHAN volume control knob to turn off the speaker.</p> <p>Set CTL LMT B strap, to IN position to prevent the CHAN SELECT volume control knob from turning off the speaker.</p> <p>Set CTL LMT B strap, to OUT position to allow the CHAN SELECT volume control knob to turn off the speaker.</p>

Module	Settings
46105	<p>Set S1 (BRDG) switch, to TERM at the breakpoint (DSNE Office 0) Terminal site.</p> <p>Set S1 (BRDG) switch, to RPTR at all repeater and all other Terminal sites.</p> <p>Set S2 (LPBK 1) in OFF.</p> <p>Set S101 (LPBL 2) in OFF.</p> <p>Set the XMT CLK 1 and XMT CLK 2 straps in TERM.</p> <p>Set the RCV CLK 1 and RCV CLK 2 straps in TERM.</p> <p>Set the RCV DATA 1 and RCV DATA 2 2 straps in TERM.</p> <p>Set the M LEAD 1 and M LEAD 2 straps in YES.</p> <p>Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site.</p> <p>Set the MODE strap, set to RPTR at all Repeater and all other Terminal sites.</p> <p>Reinstall the module in the left slot in the top equipment shelf.</p>
44020	<p>49018 child board, set the station 1 code with S1, S2 and S3 = three digit address for primary voice Orderwire. S1 is the first digit. Each site must have a unique address, it is recommended to use the Target ID (TID).</p> <p>49018 child board S4, S5 and S6 = three digit address for All-Call. This address must be unique from all the primary voice Orderwire addresses assigned in the ring.</p> <p>Reinstall the module in the left slot in the bottom equipment shelf.</p>

<b>Module</b>	<b>Settings</b>
44022	Set the 2W/4W switch to 4w  Set the 0 OHM/600 OHM to 600 OHMs.  Reinstall the module in the middle slot in the bottom equipment shelf.
49920	Set RING-BACK TONE STRAPS to ON  Set INTERRUPT STRAPS to NORM  Set S2 switch to ON.  Reinstall the module in the right slot in the bottom equipment shelf.

**Settings for Voice and Data Communications**

**Table E-2 Dantel Orderwire Options Settings for Voice and Data Communications**

Module	Settings
Backplane	<p>Set S1 to BRIDGE.</p> <p>Set S2 to OUT.</p> <p>Set S3 to IN.</p>
41096	<p>Set CTL LMT A strap, to IN position to prevent the ALL CHAN volume control knob from turning off the speaker.</p> <p>Set CTL LMT A strap, to OUT position to allow the ALL CHAN volume control knob to turn off the speaker.</p> <p>Set CTL LMT B strap, to IN position to prevent the CHAN SELECT volume control knob from turning off the speaker.</p> <p>Set CTL LMT B strap, to OUT position to allow the CHAN SELECT volume control knob to turn off the speaker.</p>

Module	Settings
46105	<p>Set S1 (BRDG) switch, to TERM at the breakpoint (DSNE Office 0) Terminal site.</p> <p>Set S1 (BRDG) switch, to RPTR at all Repeater and all other Terminal sites.</p> <p>Set S2 (LPBK 1) in OFF.</p> <p>Set S101 (LPBL 2) in OFF.</p> <p>Set the XMT CLK 1 and XMT CLK 2 straps in TERM.</p> <p>Set the RCV CLK 1 and RCV CLK 2 straps in TERM.</p> <p>Set the RCV DATA 1 and RCV DATA 2 2 straps in TERM.</p> <p>Set the M LEAD 1 and M LEAD 2 straps in YES.</p> <p>Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site.</p> <p>Set the MODE strap, set to RPTR at all Repeater and all other Terminal sites.</p> <p>Reinstall the module in the left slot in the top equipment shelf.</p>

Module	Settings
44202 202	<p>Set the TEST, ALB, and DLB switches in the DOWN positions on faceplate.</p> <p>Set the 2W/4W switch to 4W.</p> <p>set the S5 dip switch as follows:</p> <p style="padding-left: 40px;">S5-1, S5-3, and S5-4 ON.</p> <p style="padding-left: 40px;">S5-2 and S5-5 OFF.</p> <p>Set the RCV GAIN strap to HIGH.</p> <p>Set the XMT GAIN strap to LOW.</p> <p>Set XMT and RCV straps to MASTER.</p> <p>Set 485TD, 422RTS, and 422TD straps to O (OUT).</p> <p>Reinstall the module in the middle slot in the top equipment shelf.</p>
44020	<p>49018 child board, set the station 1 code with S1, S2 and S3 = unique three-digit voice orderwire address (000-999) for each site. S1 is the first digit. It is recommended to use the Target ID (TID).</p> <p>49018 child board S4, S5 and S6 = unique three-digit (and other) modem address (000-999) for each site. This address must be unique from all the primary voice Orderwire addresses assigned in the ring.</p> <p>Reinstall the module in the left slot in the bottom equipment shelf.</p>
44022	<p>Set the 2W/4W switch to 4W.</p> <p>Set the 0 OHM/600 OHM to 600 OHMs.</p> <p>Set the Remote Lead to OUT.</p> <p>Reinstall the module in the middle slot in the bottom equipment shelf.</p>

<b>Module</b>	<b>Settings</b>
49920	Set RING-BACK TONE STRAPS to ON.  Set INTERRUPT STRAPS to NORM.  Set S2 switch to ON.  Reinstall the module in the right slot in the bottom equipment shelf.



## Cabling to Metropolis<sup>®</sup> EON (OLS)

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**Description** Basic cable information is given in Chapter 4 of this manual. This appendix provides information about connections at the Dantel Orderwire shelf.

Table E-3 gives Channel 1 wire connection information.

**Table E-3 Channel 1 Dantel Orderwire Connections (For Reference Only)**

Wire Color	BL-W	W-BL	G-W	W-G	BL-R	R-BL	BR-W	W-BR
ED-7G028-22, G401	1	9	3	11	6	14	4	12
Dantel 46105 Connector End	52	51	48	47	46	45	44	43

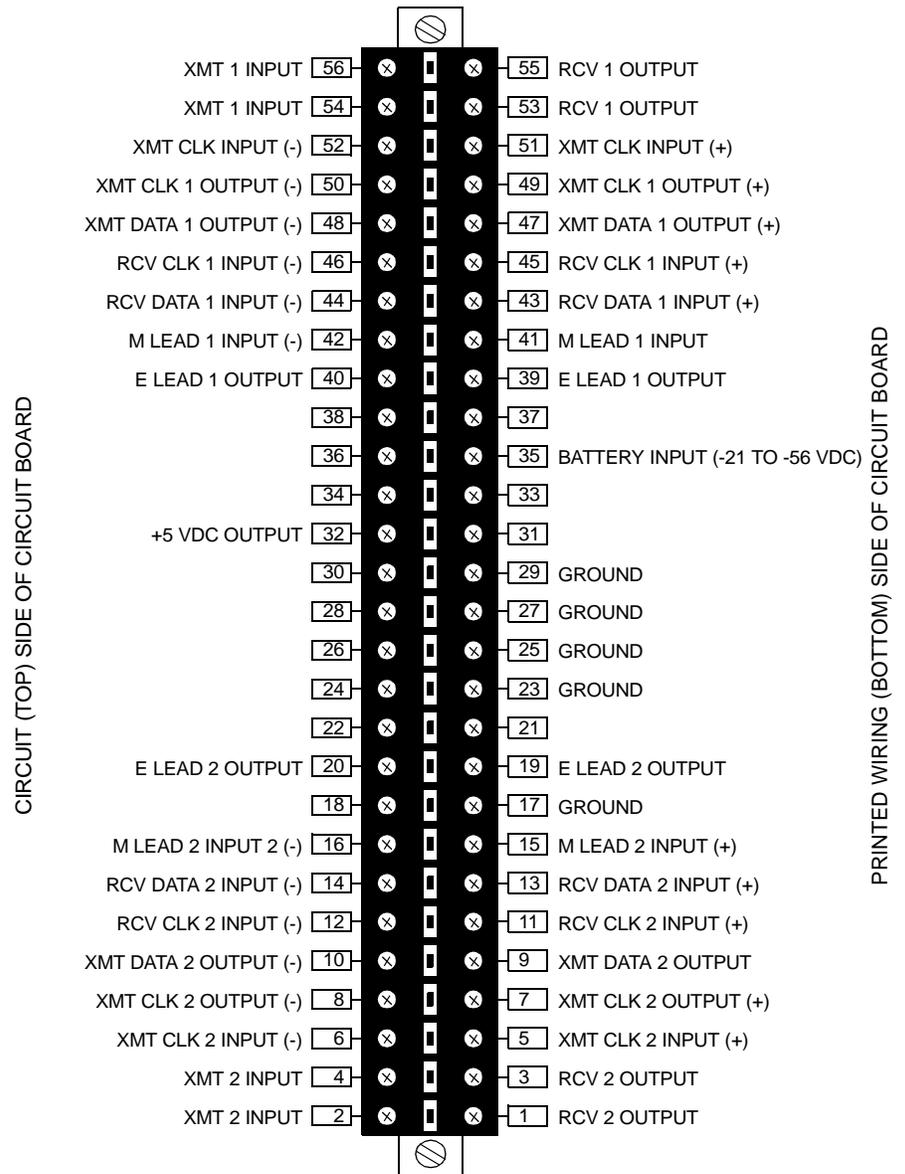
Table E-4 gives Channel 2 wire connection information.

**Table E-4 Channel 2 Dantel Orderwire Connections (For Reference Only)**

Wire Color	BL-W	W-BL	G-W	W-G	BL-R	R-BL	BR-W	W-BR
ED-7G028-22, G401	1	9	3	11	6	14	4	12
Dantel 46105 Connector End	6	5	10	9	12	11	14	13

Figure E-3 on page E-13 diagrams the Dantel connector.

**Figure E-3 View of 46105 Edge Connector From Backplane**







# F Line Build-Out (LBO)

## Overview

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- Purpose** This appendix provides information concerning the Line Build-Out (LBO) types used with the Metropolis<sup>®</sup> EON system.
- Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.
- Objectives** This appendix provides the installer with information for selecting and procedures for installing and removing LBOs in the Metropolis<sup>®</sup> EON system.

**General** The Lucent Technologies LBOs provide an optical transition from the circuit pack output port to a standard optical connector. Many of the Metropolis<sup>®</sup> EON circuit packs utilize the Universal buildout block and the LBOs referred to here are those that transition from a Universal block to a standard optical connector. FC, SC and ST-type LBOs may be installed interchangeably in the Universal buildout block. In addition to providing a transition, the line buildouts or LBOs can provide from zero to 20 dB of attenuation as an in-line attenuator. Input and output ports on the OMU and ODU units are equipped with LC-type optical connectors and only use the LC-type LBOs.

There are four basic types of LBOs used with Metropolis<sup>®</sup> EON system and they are identified by the body colors white or blue, yellow, green, and gray. Each non-zero value LBO has its attenuation value printed in black numerals on its side. Once the LBO has been removed from its shipping bag, its type can only be identified by its color, connector type and attenuation value.

**Contents** This appendix contains the following:

Universal Buildout Block Connectors	F-3
LC LBOs	F-10
Fiber Connections to LBOs	F-12

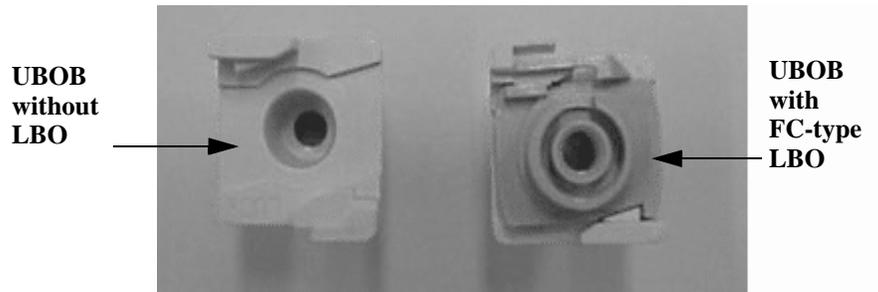


# Universal Buildout Block Connectors

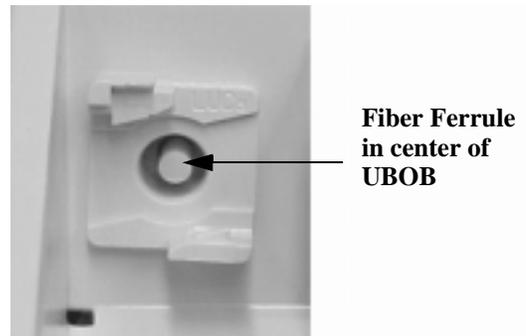
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**UBOB Connections** The Universal Build Out Block (UBOB) may be equipped on Metropolis<sup>®</sup> EON circuit pack input and output ports. The UBOB connector block provides a fiber connection internal to the circuit pack and a mounting surface to accept ST, FC or SC-type LBOs for external fiber connections. Figure F-1 shows a UBOB connector not mounted in a circuit pack (with and without an LBO). Figure F-2 shows a UBOB connector (without an LBO) mounted on a circuit pack port.

**Figure F-1 UBOB - With and Without LBO**



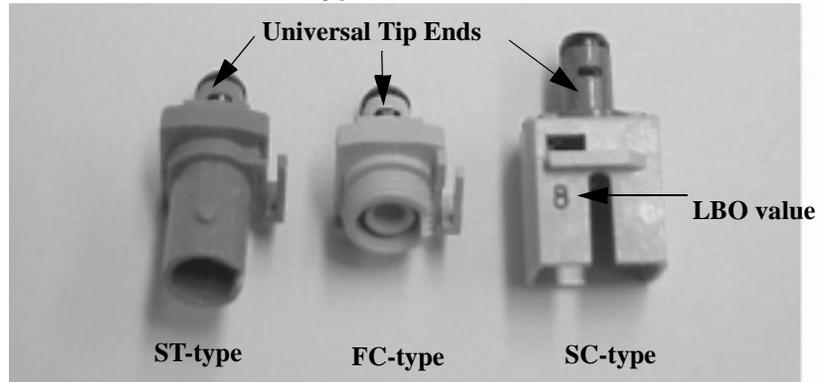
**Figure F-2 UBOB Mounted on a Circuit Pack**



**ST,FC and SC-type LBOs**

Fixed-value ST, FC and SC-type LBOs may be ordered in kits or individually by comcode. The plastic material color of the these LBOs is used to identify their usage. The 0-dB value ST and FC LBOs are white. The 0-dB value SC LBO is blue. Green plastic LBO values are marked for use in the 1550-nm range and should be used for Metropolis® EON wavelength connection applications. Yellow plastic LBOs are marked for use in the 1310-nm range and may be used with drop OTU/OTPM output applications. Gray plastic LBOs are used for multimode input and output applications. Attenuation values are stamped on the LBOs, except for the white and blue 0-dB LBOs.

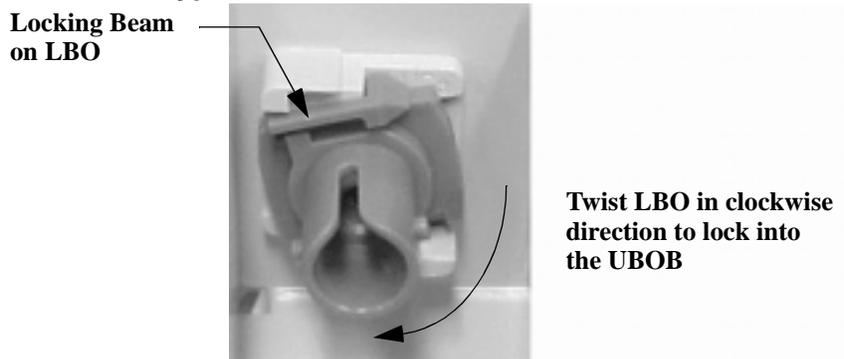
**Figure F-3 ST, FC and CS-type LBOs.**



**Assembly of ST, FC and SC-type LBOs into UBOB**

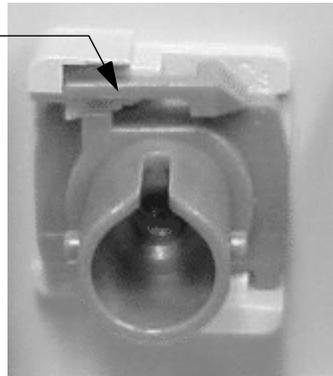
The ST, FC and SC-type LBOs are assembled onto the UBOB by inserting the universal tip end into the UBOB block and twisting in a clockwise direction to capture the small plastic locking beam. An audible click should be heard as the locking beam snaps into place. See the Figures F-4 and F-5.

**Figure F-4 ST-type LBO inserted into UBOB**



**Figure F-5 ST-type LBO locked in UBOB**

Locking Beam  
snapped into place

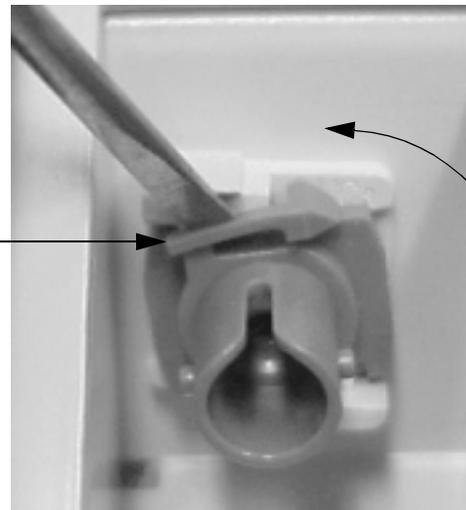


**Removal of ST, FC and SC-type LBOs from UBOB**

The ST, FC and SC-type LBOs are removed from the UBOB by using a small flat blade to push the small plastic beam down and then twisting in a counterclockwise direction to release the beam from the UBOB structure. The LBO then can be removed by pulling it straight out from the UBOB. Refer to Figure F-6.

**Figure F-6 ST-type LBO removal from UBOB**

Locking Beam  
pressed down  
with flat blade



Twist LBO in  
counterclockwise  
direction to  
release from  
UBOB

**ST, FC and SC 0-dB LBO Specifications**

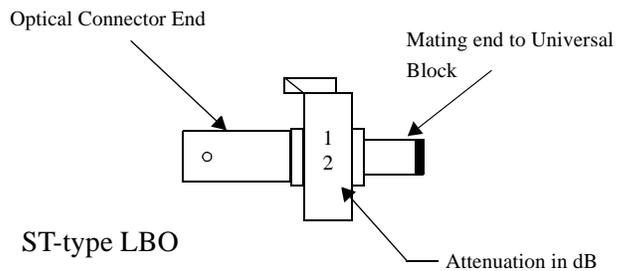
LBOs with 0-dB attenuation are white in color for ST and FC connectors and blue for SC. The area on the LBO where the numeric attenuation is printed is left blank. Table F-1 lists the specifications for this type of LBO.

**Table F-1 0-dB LBO Specifications**

<b>0-dB LBO — Color: White for ST &amp; FC — Blue for SC</b>	
Connector Types	ST, FC, and SC
Connection Types	Single-Mode (SM) to Single Mode (SM) Multimode (MM) to Multimode (MM)
Power	Tested to 20 dBm
Internal Element	None
Attenuation (dB)	0 dB*
Attenuation Tolerance	NA
Operating Temperature	-40°C to +75°C
Wavelength	1310 nm and 1550 nm

\* 0-dB attenuation when connecting SM to SM, and SM to MM, and MM to MM. However, connecting MM to SM will result in high attenuation levels due to the core diameter mismatch of MM to SM optical fibers.

**Figure F-7 LBO Orientation for Reading Attenuation Values**



**Broadband Single-Mode Attenuators — Yellow LBOs**

The Yellow-color LBOs have been designed to operate over the 1310-nm range for Single-Mode to Single Mode operation. Operating over such a wide band results in an attenuation tolerance penalty. The yellow-color LBO attenuation values are calibrated for 1310-nm signals but may be used in less critical 1550-nm range applications. These LBO attenuators have been used in the FT-2000, LCT-2000, and the early release OLS 40G/80G equipment. Table F-2 lists the specifications for these LBO types:

**Table F-2 Broadband Attenuators Specification**

<b>Broadband Attenuators — Color: Yellow</b>	
Connector Types	ST, FC, and SC
Connection Type	Single-Mode (SM) to Single Mode (SM)
Power	Tested to +20 dBm for 3 to 10-dB Atten. +5 dBm Max. for > 10-dB Atten.
Internal Element	3- to 10-dB Atten: Clear Plastic > 10-dB Atten: Carbon-Loaded Plastic
Attenuation Values (dB)	3, 5, 7, 10, 15, and 20 dB
Attenuation Tolerance	+/-15% of value in dB
Operating Temperature	-40°C to +75°C
Wavelength of Ratings	1310 nm (may be used with 1550 nm signals but attenuation may be less than stamped value)



**CAUTION**

*The 15-dB and higher Yellow colored LBOs are made using a carbon-loaded plastic element instead of the clear plastic element used in LBOs of lower attenuation. The carbon-loaded plastic element experiences localized heating that tends to increase their attenuation at input powers above 0 dBm. To minimize the long-term reliability risk and provide predictable attenuation, the 15 dB and up LBOs should not be used to attenuate signals of greater than +3 dBm.*

**Important!** Single-mode LBO attenuators should not be used at multi-mode optical inputs. Single-mode LBOs attenuate optical signals by defocusing and are not effective at multi-mode inputs.

**1550-nm Single-Mode Attenuators — Green LBOs**

A family of Single-Mode to Single-Mode LBOs are calibrated to operate in the 1550-nm range. The improvements achieved over the earlier broadband design were in attenuation tolerance, power handling, and attenuation selectivity. These attenuators are to be used with circuit packs having single mode (SM) optical inputs and are an excellent choice to be used with DWDM Systems where precise attenuation and higher power levels are required. Table F-3 lists the specifications for these LBO types:

**Table F-3 1550-nm Single-Mode Attenuators Specifications**

<b>1550-nm Single-Mode Attenuator — Color: Green</b>	
Connector Types	ST, FC and SC
Connection Type	Single Mode (SM) to Single Mode (SM)
Power	Tested to +20 dBm for all values of attenuation
Internal Element	Clear plastic for all values of attenuation
Attenuation Values (dB)	3 to 15 dB in 0.5-dB steps, and 16, 18, and 20 dB  Note: 0.5-dB indicated by +: ex. 6+ = 6.5 dB  Note: Use Figure F-7 for orientation when reading 6 or 9 dB.  Attenuation values are 5% to 10% in dB greater at 1310 nm.
Attenuation Tolerance	[3 to 15 dB: +/-0.3 dB] [16 dB: +/-0.5 dB]  [18 to 20 dB: +/-1 dB]
Operating Temperature	-40°C to +75°C
Wavelength of Ratings	1550 nm

Single-mode LBO attenuators should not be used at multi-mode optical inputs. Single-mode LBOs attenuate optical signals by defocusing and are not effective at multi-mode inputs. A single-mode to multimode transition attenuator (Gray in color) must be used (refer to Table F-4).

**1550-nm Single-Mode to Multimode Attenuators — Color: Gray**

This family of LBOs was designed to attenuate the signal levels in multimode receivers for Metropolis<sup>®</sup> EON (OLS) applications. The 42, 43 and 44-type OTPMs utilize a single-mode fiber at the transmitter output but receive using an internal multimode fiber. To attenuate the transmitter output, a Single-Mode to Single-Mode LBO (Green or Yellow) must be used. **To attenuate the OTPM receiver input a Single-Mode to Multimode LBO (Gray) must be used with the single-mode optical fiber.** Table F-4 lists the specifications for these LBO types:

**Table F-4 1310-nm Single-Mode to Multimode Attenuator**

<b>1310-nm Single-Mode to Multimode Attenuator — Color: Gray</b>	
Connector Types	ST, FC and SC
Connection Type	Single Mode (SM) to Multimode (MM)
Power	5 dB Max. for all values of attenuation
Internal Element	Carbon-Loaded element for all values of attenuation
Attenuation Values (dB)	5, 7, 10, 12, 15, 17, 20 dB
Attenuation Tolerance	+/-2 dB for all values of attenuation
Operating Temperature	-40°C to +75°C
Wavelength of Ratings	calibrated at 1310 nm (may be used at 1550 nm)



## LC LBOs

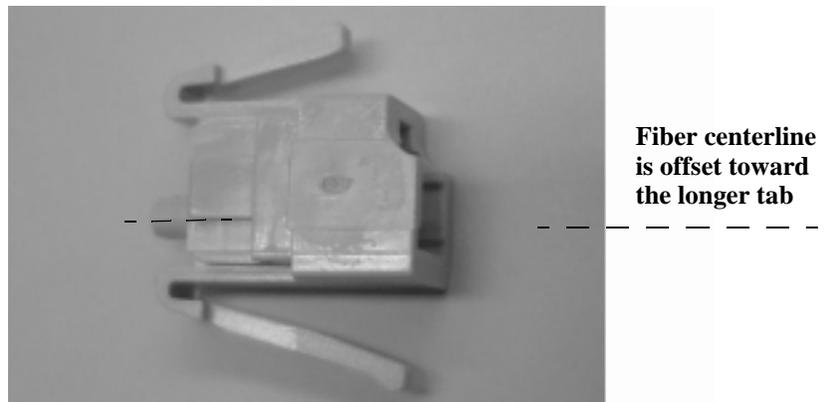
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**Description** LC-type LBOs are used on the input and output ports of the OMU and ODU units in the Metropolis<sup>®</sup> EON (OLS) system.

0-dB LC LBOs are blue in color, with no numeric text on the side indicating attenuation value.

Attenuated LC LBOs are yellow in color and are calibrated for operation in the 1550-nm range. The specific attenuation value in dB is noted on the side of the LBO.

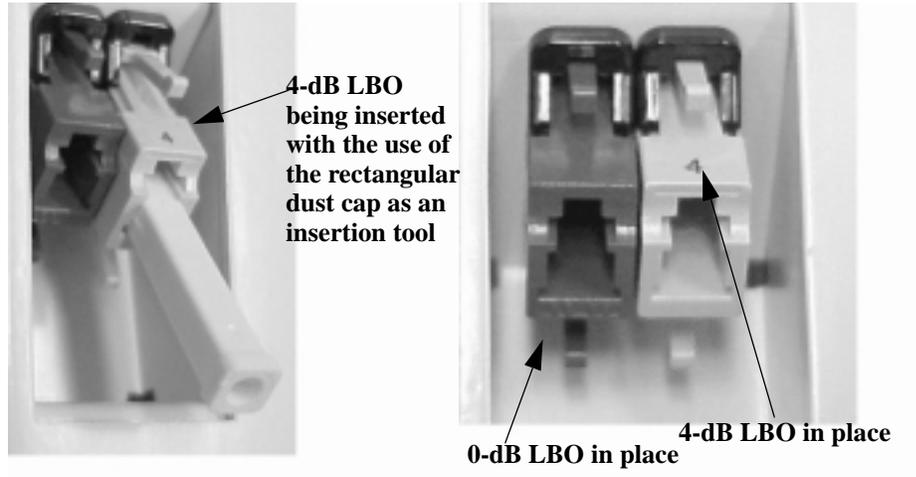
**Figure F-8 LC-type LBO.**



**Assembly of LC-type LBO into LC Block**

The LC-type LBOs are assembled into an LC-type connector port by aligning the fiber centerline and inserting the LBO until it snaps into place. The long rectangular dust cap may be used as an insertion tool for this procedure as shown in Figure F-9.

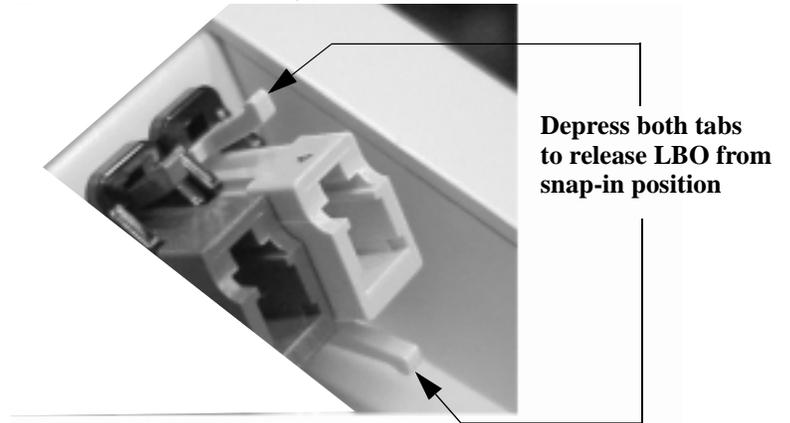
**Figure F-9 LC-type LBO inserted into LC-type Connector Port**



**Removal of LC-type LBO from LC Block**

The LC-type LBOs are removed from the LC-type Connector Port by depressing both tabs to release the LBO and then pulling straight out.

**Figure F-10 Removal of LC-type LBO**



□

## Fiber Connections to LBOs

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**General** The ST, FC, SC and LC-type fiber connectors are designed to align the very small single mode fiber in the center of the much larger fiber ferrule with a mating connector. These fiber connectors use different methods of mechanical alignment and locking to bring the fiber ferrules in the fiber connector and in the port connector together. These fiber connections are called “physical contact” to describe the connection of the mating fiber ferrules by the mechanical design of the connector system.

The single-mode fiber in the center of the ferrule has a 9-um core diameter and an outside diameter of 125 um. Single-mode fibers are mounted in the center of a 2.5-mm ferrule with the ST, FC and SC-type fiber connectors.

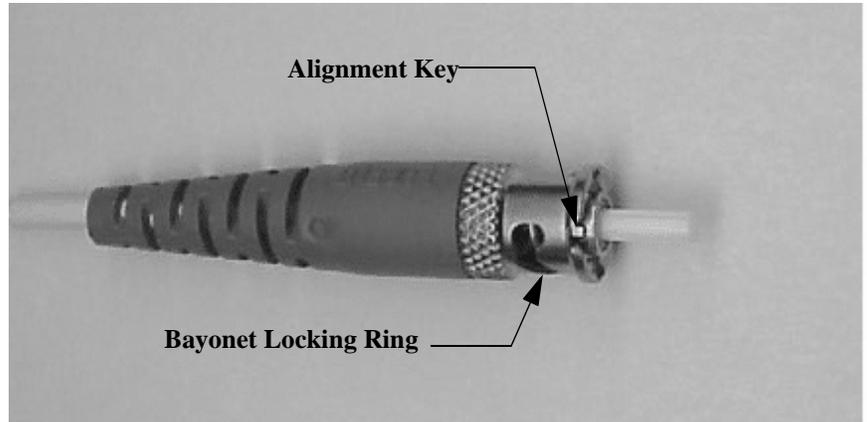
LC-type fiber connectors use a 1.25-mm ferrule and are approximately half the size of the ST, FC and SC-type fiber connectors. The LC-type fiber connector is often used where many fiber connections need to be made in a small physical area.

All fiber connectors should be cleaned and inspected before assembling into connector ports. Refer to Appendix B for Fiber Cleaning information. Dust caps should be applied to all fiber connectors when not installed in a connector port.

**ST-type Connections**

ST-type fiber connectors use a bayonet style locking method to join the fiber connector to the port connector. Figures F-11 and F-12 illustrate the ST-type fiber connection.

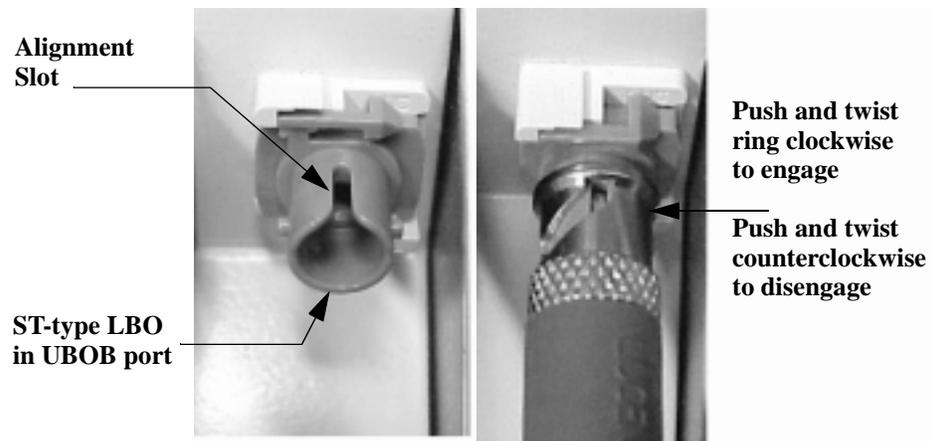
**Figure F-11 ST-type Fiber Connector**



The ST-type fiber connector is assembled onto an ST-type connector port (usually an ST-type LBO) by aligning the alignment key with the slot in the connector port, pressing the fiber connector onto the port, and twisting in a clockwise direction to engage the spring-loaded bayonet locking ring.

The ST-type fiber connector is removed from a connector port by lightly pressing in the connector to release the bayonet locking ring and twisting counter-clockwise to disengage the fiber connector.

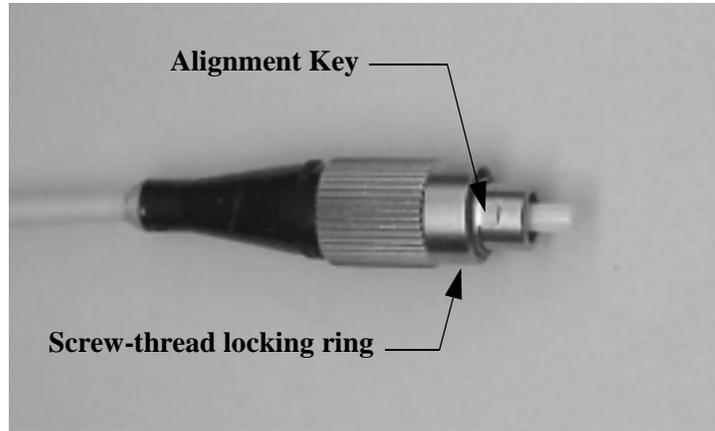
**Figure F-12 ST-type Fiber Connection to LBO**



**FC-type Connections**

FT-type fiber connectors use a screw-thread style locking method to join the fiber connector to the port connector. Figures F-13 and F-14 illustrate the FC-type fiber connection.

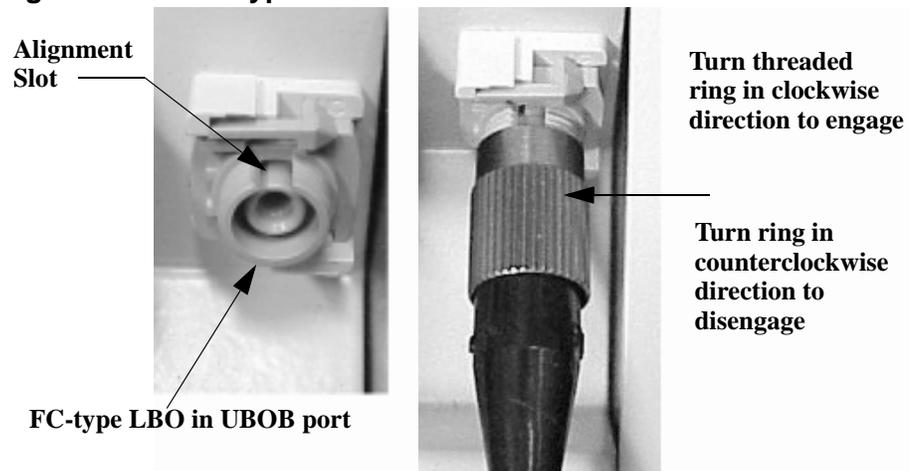
**Figure F-13 FC-type Fiber Connector**



The FC-type fiber connector is assembled onto an FC-type connector port (usually an FC-type LBO) by aligning the alignment key with the alignment slot in the connector port, screwing the fiber connector onto the port in a clockwise direction.

The FC-type fiber connector is removed from a connector port by unscrewing in a counter-clockwise direction to disengage the fiber connector.

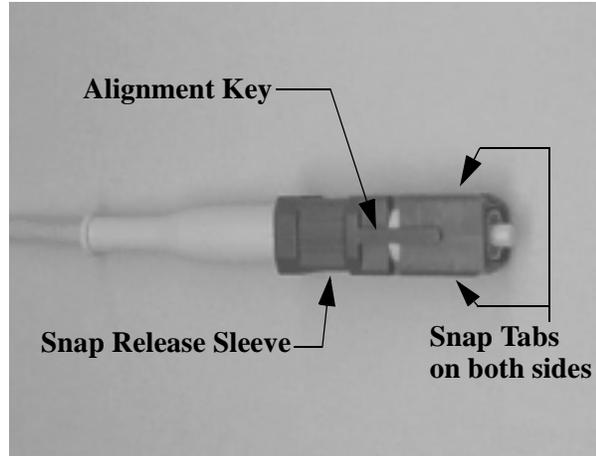
**Figure F-14 FC-type Fiber Connection**



**SC-type Connections**

SC-type fiber connectors use a dual plastic-tab, snap-action locking method to join the fiber connector to the port connector. Figures F-15 and F-16 illustrate the SC-type fiber connection.

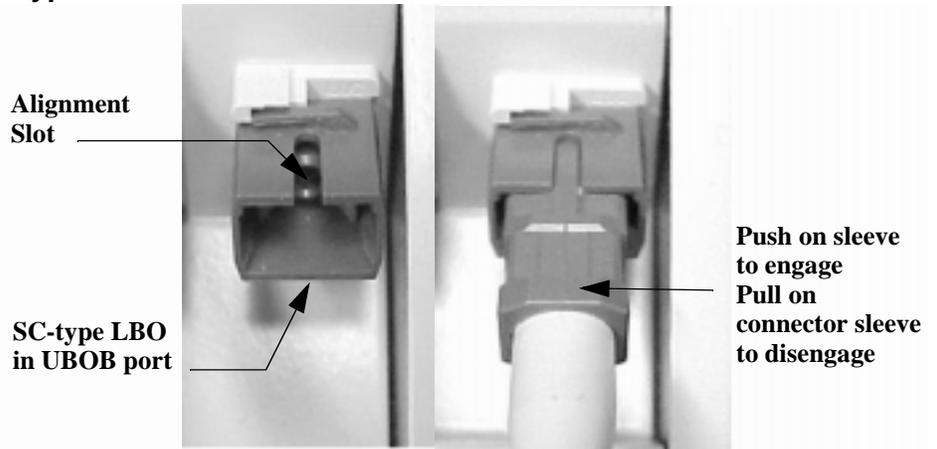
**Figure F-15 SC-type Fiber Connector**



The SC-type fiber connector is assembled onto an SC-type connector port (usually an SC-type LBO) by aligning the alignment key with the alignment slot in the connector port and pushing the connector into the port until it snaps into place.

The SC-type fiber connector is removed from a connector port by pulling back on the snap release sleeve to disengage the fiber connector.

**SC-type Fiber Connection.**



□





# G Tools and Test Equipment

## Overview

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- Purpose** This appendix provides a listing of tools and test equipment required for each section of this Installation Guide.
- Reason for revision** This is Issue 3 of the Metropolis<sup>®</sup> EON Installation Guide for Release 8.2 applications.
- Objectives** This appendix provides the installer with informatin to identify the tools and test equipment needed to perform the tasks of each section of this installation guide.
- Contents** This appendix contains the following information:

General Installation Tools and Equipment	<a href="#">G-2</a>
Tools Required for Chapter 2, Equipment Installation	<a href="#">G-6</a>
Tools Required for Chapter 3	<a href="#">G-7</a>
Tools Required for Chapter 7, Network Element Startup and Provisioning	<a href="#">G-8</a>
Tools Required for Chapter 8, Local Installation Testing	<a href="#">G-10</a>



## General Installation Tools and Equipment

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### Tools and Test Equipment for Both Products

Table G-1 on page G-2 lists the required tools, test sets, and accessories that are common to the installation of *either* the OT or Metropolis<sup>®</sup> EON (OLS) equipment.

**Table G-1 Required Tools and Test Equipment for Both Products**

Description	Commercial or Comcode	Lucent Technologies Installers Only	Notes
Multimeter	Fluke 8060A	ITE #5632 or ITE #6379A	For measuring 40 to 60 VDC and ground continuity.
Analog Ohmmeter			For measuring battery ground return resistance.
Anti-Oxidation Material	NO-OX-ID "A" Compound	NO-OX-ID "A" Compound	Only if cabinet or shelf has been scraped to make ground connection.
ESD Wrist Strap	900486994	R TOOL #4987B	For ESD protection.
Single-Mode Fiber Jumpers with appropriate connectors (two jumpers needed)	107149494 (FS1EP-EP-02) or 107306243 (MS1EP-EP-02)	107149494 (FS1EP-EP-02) or 107306243 (MS1EP-EP-02)	For optical local tests (minimum 2 ft. length) with yellow cladding.
CLETOP Reel Type A		ITE #7137	For fiber cleaning.
CLETOP Stick Type		ITE #7135	Refer to <i>Appendix A, Pin Repair</i> for more details.

<b>Description</b>	<b>Commercial or Comcode</b>	<b>Lucent Technologies Installers Only</b>	<b>Notes</b>
<p>Optical power meter with LC, ST, FC, and SC adapters.</p> <p>Note: If the LC adapter is not available, use a 108072489 female-to-female LC coupler with a hybrid cable with LC to ST connectors (MS1LC-ST) C108161266 1.3 meters</p>	<p>Exfo Power Meter (FOT-22AX) OR Noyes Power Meter (OPM4B)</p>	<p>ITE #7116</p>	<p>For optical power measurements.</p>
<p>Metral Pin Repair Kit (optional, as required)</p>	<p>BERG MT370-01 Kit 106423859</p>		<p>For replacing any damaged Metral pins. Refer to <i>Appendix A, Pin Repair</i> for more details.</p>
<p>Optical Multi-Wavelength Meter (optional as required)</p>	<p>HP 86120B or equivalent</p>	<p>ITE # 7123</p>	<p>For verifying flatness of OA input</p>

**Tools and Test Equipment  
for Metropolis<sup>®</sup> EON (OLS)  
Only**

Table G-2 on page G-4 lists tools, test sets, and accessories in addition to Table 1-1 that are required for installation of Metropolis<sup>®</sup> EON (OLS) equipment only.

**Table G-2 Required Tools and Test Equipment for Metropolis<sup>®</sup> EON (OLS) Only**

<b>Description</b>	<b>Commercial or Comcode</b>	<b>Lucent Technologies Installers Only</b>	<b>Notes</b>
Multi-Mode Fiber Jumpers with appropriate connectors (two jumpers for end terminals and four jumpers at repeaters)	105618755 (FA1E-E-02)	105618755 (FA1E-E-02)	For optical local tests (minimum 2 ft. length) 50-mm fiber with orange cladding.
Single-Mode 33-dB Attenuated Fiber Jumpers with appropriate connectors (two jumpers for end terminals and four jumpers at repeaters)	847265451 (F93AK8573)	847265451 (F93AK8573)	For optical local tests.
Personal Computer: See "Personal Computer for Use as CenterLink Management Console"		ITE #6795 List 2 to ITE #6938 or ITE #4389	For use as CMC on DCE port.
Straight through RS-232 cable 25-pin to 25-pin OR 25-pin to 9-pin depending on the PC serial port	Black Box Corp. RM-BC00301 OR RM-BC00401	Part of ITE #6795 LIST 2 or ITE #6938	For providing the connection between the PC (25 or 9 pin) and Metropolis <sup>®</sup> Metropolis <sup>®</sup> EON (OLS) (25 pin)
Shorting Contact Insertion Tool	Berg Electronics 409298-001		For replacing Metral shorting contacts
Null Modem Adapter	Black Box Corp. RM-ME202	Black Box Corp. RM-ME202	For testing DTE port.

**Tools and Test Equipment for OT Only**

Table G-3 lists tools test sets, and accessories in addition to Table G-1 that are required for installation of OT equipment *only*.

**Table G-3 Required Tools and Test Equipment for OT Only**

<b>Description</b>	<b>Commercial or Comcode</b>	<b>Lucent Technologies Installers Only</b>	<b>Notes</b>
A SONET OC-48 Signal if testing 41-Type OTUs	May be obtained from an OC-48 incoming signal. Also available from Tektronix ST2400 with option 12	ITE-7089 (if required)	For testing output of OTUs
A SONET OC-3 signal if testing 43 and 44 type OTPMs and an OC-12 signal if testing 42 type OTPMs	May be obtained from an OC-3/OC-12 incoming signal. Also available from Tektronix ST112 for OC-3 and ST112 with option 04 for OC-12	ITE-6384 for OC-3 testing. ITE-6384 equipped with option 04 for OC-12 and OC-3 testing.	For testing output of OTPMs
Wire-Wrap Tool with bit for 26-gauge wire			For wire wrapping miscellaneous discrete cables from OT to the Dantal or Harris EMDU.
ST-to-ST Fiber Optic Coupling (two needed)	105271142 (C3000A-2)	105271142 (C3000A-2)	



## Tools Required for Chapter 2, Equipment Installation

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**Equipment Installation** Suggested tools for use in *Chapter 2, Equipment Installation*, in addition to small hand tools that an installer may normally have on hand, are listed in the table below:

Quantity	Description
1	Vacuum for cleaning up drilling debris
1	Drilling hammer for 5/8" drill (for use with concrete floors)
1	#54720 C-Tap connector Thomas & Betts™ or equivalent
1	TBM5 or TBM5S Crimping tool Thomas & Betts or equivalent
1	Brown or Pink Die Code Crimping Die Thomas & Betts or equivalent
1	Torque Wrench with minimum 25 ft.-lb. capacity
1	Anchor Setting Tool for Drop-In Anchors (comcode 406902049)
1	Anchor Setting Tool for Heavy-Duty Anchors (comcode 406899831)
1	Safety Goggles
1	Pinch-bar for uncrating the bay
1	Claw-type hammer for uncrating the bay
1	Lifting and/or transporting device for moving the bay into position



## Tools Required for Chapter 3

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The following equipment is required to complete the procedures in *Chapter 3, Power Cable Installation and Powering*:

- Analog Ohm Meter (Volt Ohm Milliammeter (VOM)) for measuring resistance of Battery Return cable.
- Multimeter capable of measuring resistance (ohms) and DC voltage from -40 to -60 volts.
- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.



## Tools Required for Chapter 7, Network Element Startup and Provisioning

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### Network Element Startup and Provisioning

The following equipment is required to complete the procedures in *Chapter 7, Network Element Start-up and Provisioning*:

- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.
- A CD-ROM of Release 8.0.2- Metropolis<sup>®</sup> EON (OLS) network software and CMC.
- Personal computer for use as CMC.
- An “AT modem cable” RS-232 cable. The cable must have a DB25 male connector at one end to mate with the Metropolis<sup>®</sup> Metropolis<sup>®</sup> EON (OLS) DCE CIT port, and a DB9 female connector at the other end to mate with the PC serial port. Table G-4 may be used to determine pin numbers to connect.

**Table G-4 Serial Port Pinout Information**

Signal	Name	DB9 Pin	DB25 Pin	RJ45-8 Pin	DCE I/O	DTE I/O
DCD	Data Carrier Detect	1	8	6	O	I
RXD	Received Data	2	3	5	O	I
TXD	Transmitted Data	3	2	3	I	O
DTR	Data Terminal Ready	4	20	4	I	O
SGD	Signal Ground	5	7	7	NA	NA
DSR	Data Set Ready	6	6	Not present	O	I
RTS	Request to Send	7	4	2	I	O
CTS	Clear to Send	8	5	8	O	I
RI	Ring Indicator	9	22	Not present	O	I
FGD	Frame Ground	Not present	1	1	NA	NA

**Important!** Use straight-through cable between unlike DCE-DTE ports and use a null modem between like ports (DTE-DTE)

- Network Element CIT port (at EON shelf User Panel) is DCE
- PC serial port (com port) is DTE
- Modem ports are DCE



## Tools Required for Chapter 8, Local Installation Testing

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**Local Installation Testing** The following equipment is required for performing installation tests at all Metropolis<sup>®</sup> EON (OLS) offices per *Chapter 8, Local Installation Testing*:

**Table G-5 Local Installation Test Equipment**

Equipment	No. Needed for End Term. or Dual Face	No. Needed for Repeater	No. for OT
Wrist Strap connected to wrist strap ground jack on user panel	1	1	1
Single Mode Optical Fiber Cable with appropriate connectors on each end. Recommended length 2-4 feet	2		
Multi-mode Optical Fiber Cable with appropriate connectors on each end. Recommended length 2-4 feet	2	4	
Optical 93AK8573 33dB Test cables for loopback testing and power Measurements	2	4	1
Optical Power Meter	1	1	1
PC for use as CMC (CenterLink Management Console) with CMC software loaded and straight and null modem cables	1	1	
Optical connector cleaning accessories (see Appendix C)	1	1	1
OC-48/STM-16 optical signal source or test set*			1
OC-3/STM-1 and/or OC-12/STM-4 optical signal source or test set			1
Optical Multi-Wavelength Meter (optional as required)	1		

\* A signal source such as the Lucent Technologies OC-48 Optical Signal Source (ITE-7089), a Tektronix Test Set ST2400 with option 12, or any other OC-48/STM-16 source.





# Glossary

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## **A ABN**

Abnormal (condition).

## **ACO**

Alarm CutOff — A push-button switch on the EON shelf User Panel (or cabinet indicator strip) that can be used to silence an audible office alarm.

## **AID**

Access Identifier — A unique identifier used to address equipment slots and ports, as well as facility tributaries, that are defined for the Metropolis<sup>®</sup> EON (OLS) system architecture.

## **AIS**

Alarm Indication Signal — A code transmitted downstream in a digital network indicating that an upstream failure has been detected and alarmed if the upstream alarm has not been suppressed.

## **AGNE**

Alarm Gateway Network Element — One or more network elements in a system, which receive network alarms information and route this information and Far End activity status to other network elements in the ring or subnetwork. There must be at least one AGNE per ring, but more than one AGNE per ring is allowed.

## **APSD**

Automatic Power Shutdown — A safety procedure automatically performed by the Metropolis<sup>®</sup> EON (OLS) when a loss of optical power occurs. APSD powers down the Optical Amplifier to safe, Class 1 levels then restarts it once the system has been repaired or links have been re-established.

## **Asynchronous**

Refers to network elements that are not timed from references traceable to a single Stratum-1 source.

## **AUTO**

Automatic — One possible state of a port or slot. When a port is in the AUTO state and a good signal is detected, the port automatically enters the IS (in-

service) state. When a slot is in the AUTO state and a circuit pack is detected, the slot automatically enters the EQ (equipped) state.

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## **B BCLAN**

Board Controller Local Area Network — The internal local area network that provides communications between the System Controller or Tributary OverHead Controller circuit pack and board controllers on the transmission circuit packs.

### **Bidirectional Line**

A transmission path consisting of 2 optical fibers that connect optical signals in both the transmit and receive directions.

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## **C CIT**

Craft Interface Terminal — A personal computer that meets Metropolis® EON (OLS) minimum requirements and has Metropolis® EON software installed.

### **Closed Ring Network**

A network formed of a ring-shaped configuration of systems

### **CMS**

Customer maintenance signal

### **CO**

Central Office

### **Collocated**

Located in the same Central Office

### **CMC**

CenterLink Management Console - Graphical User Interface for the user to communicate with the Network Element using the CIT.

### **CMISE**

Common Management Information Service Element

### **CR**

Critical (alarm)

### **Current Value**

The value currently assigned to a provisionable parameter.

### **CV**

Coding Violation

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**D Data**

A collection of system parameters and their associated values.

**dB**

Decibels — dB is the difference between two power measurements ( $\text{dBm}_1 - \text{dBm}_2$ ) and is defined as ten times the log of the ratio of output power to input power in Watts or milliWatts ( $\text{dB} = 10 \log (P_{\text{out}}/P_{\text{in}})$ )

**dBm**

Power - dBm is an absolute power measurement defined as ten times the log of the received power intensity in milliWatts ( $\text{dBm} = 10 \log (P_{\text{mW}})$ ).

**DCE**

Data Communications Equipment — The equipment that provides the signal conversion and coding between the data terminating equipment and the line. The DCE may be separate equipment or a part of the data terminating equipment.

**DCM**

Dispersion Compensation Module.

**Demultiplexing**

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

**Dispersion**

Time-broadening of a transmitted light pulse

**Divergence**

When the OA provides unequal amplification of incoming wavelengths, the result is a power divergence between wavelengths.

**Doping**

The addition of impurities to a substance in order to attain desired properties.

**Drop Side Signal**

An optical signal transmitted from the Metropolis<sup>®</sup> Metropolis<sup>®</sup> EON (OLS), to be received back into SONET/SDH or data traffic equipment.

**DS3**

Digital Signal Level 3 (44.736 Mb/s)

**DSNE**

Directory Service Network Element — A designated network element that is responsible for administering a database that maps network element names

(TIDs) to addresses [NSAPs (network service access points)]. There must be at least one, but no more than one DSNE per ring.

**DTE**

Data Terminating Equipment — The equipment that originates data for transmission and accepts transmitted data.

**Dual Facing Shelf**

A configuration of Metropolis<sup>®</sup> Metropolis<sup>®</sup> EON (OLS) which allows back-to-back end terminals to reside in the same shelf.

**DWDM**

Dense Wavelength Division Multiplexing — Increasing fiber transmission capacity by transmitting wavelengths spaced at 200GHz or less down a fiber simultaneously.

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**E EEPROM**

Electrically Erasable Programmable Read-Only Memory

**EMC**

Electromagnetic Compatibility

**EMI**

Electromagnetic Interference — High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

**End Terminal**

The Metropolis<sup>®</sup> EON (OLS) equipment that terminates up to sixteen optical channel signals.

**EQ**

Equipped — A memory administrative state for slots.

**Erbium**

A soft rare earth element used in metallurgy and nuclear research.

**Erbium Doped Fiber Amplifier (EDFA)**

An amplifier that performs by having a light signal pass through a section of erbium-doped fiber and uses the laser pump diode to amplify the signal.

**ES**

Errored Seconds — A performance monitoring parameter.

**ESD**

Electrostatic Discharge

**ET**

End Terminal — Equipment that terminates optical line signals. See Metropolis® EON (OLS) End Terminal

**Express Traffic**

Wavelengths going between two co-located Metropolis® EON (OLS) end terminals or between the two sides of a dual facing shelf, without regeneration.

**F FE ACTY**

Far-End Activity

**FERF**

See RDI.

**FIT**

Failures in Time — Circuit pack failure rates per 10<sup>9</sup> hours as calculated using the method described in *Reliability Prediction Procedure for Electronic Equipment*, Issue 4, September 1992. FIT information for the Metropolis® EON (OLS) can be found in the Application and Planning Guide.

**G Gb/s**

Gigabits per second

**GHz**

Gigahertz — 10<sup>9</sup> cycles per second

**GNE**

Gateway Network Element — A network element that passes information between other network elements and operations systems through a data communication network.

**H Hazard Level**

Output power level of an Metropolis® EON (OLS) system or device that poses safety risks to personnel. For 1550-nm wavelengths, hazard levels are defined as follows:

Level 1= ≤ 10 dBm

Level 3A= ≤ 17 dBm,

Level 3B= ≤ 27 dBm

Level 4 = > 27 dBm.

**I IS**

In Service — A memory administrative state for ports. IS refers to a port that

is fully monitored and alarmed.

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**J Jitter**

Jitter is defined as short-term variations of the significant instants of a digital signal from its ideal positions in time.

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**K Krypton line**

1547.82 nm —wavelength used in a standard laser source.

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**L LBC**

Laser bias current

**LBFC**

Laser backface currents

**LBO**

Lightguide Build-Out or Line Build-Out— An adapter for the lightguide fiber jumpers between the LGX, Metropolis<sup>®</sup> EON (OLS), and OT equipment. It is also used on equipment within the network element. It performs signal attenuation and guarantees the proper signal level to Metropolis<sup>®</sup> EON (OLS) and OT equipment.

**LED**

Light-emitting diode — Located on each circuit pack to indicate faults, and also on the user panel to indicate alarm status

**LGX**

Lightguide cross-connect — An optical fiber patch panel where outside plant optical fiber connections and inter-equipment optical fiber connections are made.

**Line**

**1.** An optical transmission line. In T1/Bellcore terminology, “line” refers to a transmission medium, together with the associated high-speed equipment, required to provide the means of transporting information between two consecutive network elements; one originates the line signal while the other terminates it. **2.** “Line” also indicates an optical fiber pair. When used in this document, the following is assumed: 1 line = 2 optical fibers, 4 line = 8 optical fibers.

**Local Traffic**

All wavelengths being added/dropped at a customer site.

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**LOF**

Loss of Frame

**LOS**

Loss of Signal

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**M**

**µm**

Micrometer or micron, defined as  $10^{-6}$  meters

**Menu**

A set of possible values for a parameter.

**MJ**

Major (alarm)

**MN**

Minor (alarm)

**Multiplexing**

The process of combining several distinct optical signals into a single composite optical signal.

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**N**

**NARTAC**

North American Regional Technical Assistance Center — Tier One technical support for Lucent transmission equipment

**NE**

Network Element — one node in a system

**NE ACTY**

Near-End Activity

**NEBS**

Network Equipment-Building System

**nm**

Nanometer ( $10^{-9}$  meters)

**NMA**

Network Monitoring and Analysis System

**NMON**

Not Monitored — A memory administrative state for ports.

**Non-revertive switching**

In non-revertive switching, a working and stand-by line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the working line. The original working line then becomes the stand-by line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

**NSA**

Nonservice Affecting

**NSAP Address**

Network Service Access Point Address — An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

**O O&M**

Operation and Maintenance

**OALAN**

Overhead Access Local Area Network — The internal local area network that provides communications between the System Controller circuit pack and the Tributary Overhead Controller and OT Controller circuit packs.

**OAM&P**

Operations, Administration, Maintenance, and Provisioning

**OC, OC-n**

Optical Carrier — The optical signal that results from an optical conversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

**ODU**

Optical Demultiplexer — takes the Metropolis<sup>®</sup> EON (OLS) optical signal and separates it into its component signals; up to eighty (80) discrete signals may be extracted.

**OLS End Terminal**

Terminal equipment consisting of a co-located Optical Multiplexer Unit (OMU) and Optical Demultiplexer Unit (ODU) for bidirectional transmission, Optical Amplifiers (OA), and Telemetry packs.

**OLS Repeater**

Bidirectional node consisting of a pair of Optical Amplifiers (OA) and the corresponding telemetry packs.

**OLS Subnetwork**

All dual-facing end terminals and repeaters interconnected with each other. The dual-facing shelf feature extends the access domain beyond the end terminals.

**OLS System**

Two Metropolis<sup>®</sup> EON (OLS) End Terminals and the Metropolis<sup>®</sup> EON (OLS) Repeaters between them.

**OMU**

Optical Multiplexer Unit— takes up to sixteen Low Speed Broadband (LSBB), OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or 1-Gigabit Ethernet signals and combines them into a single optical signal.

**OOF**

Out-of-Frame

**Open Ring Network**

Network formed of a point-to-point configuration of systems.

**Operations Interface**

Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, CIT, office alarms, and all telemetry interfaces.

**Operations Interworking**

The capability to access, operate, provision, and administer remote systems through craft interface access from any site in the network or from a centralized operations system.

**Optical Channel**

A Low Speed Broadband (LSBB), OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or 1-Gigabit Ethernet wavelength within an optical line signal. There can be up to sixteen such wavelengths, or channels, carried within one optical line signal.

**Optical Line Build-out (LBO)**

Lightguide Build-Out — An adapter for the lightguide fiber jumpers between the LGX, Metropolis<sup>®</sup> EON (OLS), and OT equipment. It is also used on equipment within the network element. It performs signal attenuation to adjust the proper signal level to Metropolis<sup>®</sup> EON (OLS) and OT equipment.

**Optical Line ID**

A portion of the supervisory signal that identifies optical lines to prevent misconnections between nodes.

**Optical Line Signal**

A multiplexed optical signal containing up to sixteen wavelengths or channels.

**Optical Line System (OLS)**

A lightwave transmission system that multiplexes up to sixteen wavelengths, transmits the resulting multiplexed signal, and then demultiplexes the signal at the other end.

**Optical Section**

See Span.

**Optical Translator (OT)**

A unit that electrically regenerates any incoming Low Speed Broadband (LSBB), OC-3/STM-1, OC-12/STM4, OC-48/STM-16, or 1-Gigabit Ethernet wavelength in the 1.3-1.5 micrometer range into a specific outgoing wavelength of the same, respective rate.

**Optical WAD**

See Wavelength Add/Drop.

**Orderwire**

A feature of the supervisory signal that is used for communication between sites.

**Original Value Provisioning**

The original (or default) values are preprogrammed at the factory. These values can be overridden using local or remote provisioning.

**OS**

Operations System or Operating System — A central computer-based system used to provide operations, administration, and maintenance functions, such as SNMS, ITM-SC, ITM-SNC, etc.

**OTCTL**

Optical Translator Controller — LUD1 circuit pack which resides in the OT Controller shelf

**OTPM**

Optical Translator Port Module — Small Optical Translator which mounts in a quad carrier. One quad carrier occupies two slots per OT shelf and holds four OTPMs, hence two OTPMs occupy one OT slot.

**OTU**

Optical Translator Unit — Large Optical Translator, occupies one OT slot.

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**P Parallel Telemetry**

A set of alarms and status information reported to an operations center.

**Parameter**

A characteristic of the system that affects its operation.

**Platform**

In Metropolis<sup>®</sup> EON (OLS), a platform is a family of equipment and software configurations designed to support a particular application.

**PM**

Performance Monitoring — Measures the quality of service and identifies any degrading or marginally operating systems (before an alarm would be generated).

**Preprovisioning**

The capability to provision a slot before installing a circuit pack.

**Proactive Maintenance**

Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect.

**Protection Switching**

The switching of traffic from a malfunctioning line to one that is working.

**PROTN**

Protection

**Provisioning**

Assigning a value to a system parameter.

**PWR**

Power

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**Q No Entries for Q**

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**R RCV**

Receive

**RDI**

Remote defect indicator — [Previously called far-end-receive failure (FERF)]  
An indication returned to a transmitting terminal that the receiving terminal has

detected an incoming section failure.

**Repeater**

See OLS Repeater

**Reactive Maintenance**

Refers to discovering defects/failures and then clearing them.

**Regeneration**

The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

**RTAC**

See NARTAC

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**S SA**  
Service Affecting

**SD**  
Signal Degrade

**SDH**  
Synchronous Digital Hierarchy

**SEFS**  
Severely Errored Frame Seconds — A performance-monitoring parameter.

**SES**  
Severely Errored Seconds — A performance-monitoring parameter.

**SESP**  
P-bit Severely Errored Seconds — A performance-monitoring parameter.

**SF**  
Signal Fail

**Single-ended Operations**

The single-ended operations capability provides operations support from a single location to remote network elements (NEs) in the same SONET subnetwork. With this capability you can perform operations, administration, maintenance, and provisioning on a centralized basis. The remote NEs can be those that are specified for the current release.

**Site Address**

The unique address for each regenerator or terminal in a repeater span.

**SNR**

Signal to Noise ratio; the relative strength of signal compared to noise.

**SONET**

Synchronous Optical Network

**Span**

An uninterrupted bidirectional fiber section between two network elements.

**Span Growth**

A type of growth in which one wavelength is added to all lines before the next wavelength is added.

**Span Loss**

Loss (in dB) of optical power due to the span transmission medium (includes optical fiber loss and splice losses).

**STM-n**

Synchronous Transport Module level n — the basic building block of SDH.

**STS, STS-n**

Synchronous Transport Signal — The basic logical building block signal with a rate of 51.840 Mb/s for an STS-1 signal and a rate of n times 51.840 Mb/s for an STS-n signal.

**Subnetwork**

A group of interconnected/interrelated network elements which have DCC connectivity.

**Supervisory Signal**

An optical signal originating with the telemetry circuit pack that is used to communicate maintenance information.

**Synchronous**

Refers to network elements that are timed from references traceable to a single Stratum-1 source.

**Synchronous Network**

The synchronization of transmission systems with payloads to a master (network clock that can be traced to a single reference clock).

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**T TCA**

Threshold-Crossing Alert — A condition set when a counter exceeds a user-selected high or low threshold. A TCA does not generate an alarm but is available on demand through the CIT.

**TID**

Target Identifier — A provisionable parameter used to identify an Metropolis® EON (OLS) network element.

**TL1**

Transaction Language 1 — A machine-to-machine communications language that is a subset of CCITT's human-machine language.

**TrueWave® Fiber**

Non-zero dispersion-shifted fiber manufactured by Lucent Technologies (previously referred to as DEB fiber).

**TX**

Transmit

**U UAS**

Unavailable Seconds — A Performance Monitoring Parameter

**Upgrade**

An upgrade is the addition of new capabilities (features). This requires new software and may require new hardware.

**V Value**

A number, text string, or other menu selection associated with a parameter.

**VOM**

Volt Ohmmeter — Device used to measure resistance

**W WAD**

See Wavelength Add/Drop

**Wavelength Add/Drop (WAD)**

The process of adding and dropping wavelengths to provide more efficient transmission. For example, a central office contains two or more Metropolis® EON (OLS) end terminals, some wavelengths can be added and dropped locally while others go express between the end terminals

**Wavelength Blocking**

At a WAD site with branching, if a wavelength goes express between two co-located Metropolis® EON (OLS) end terminals, that wavelength can only be added or dropped at the third co-located end terminal. Wavelength interchange permits the wavelength on the third end terminal to be converted into an available wavelength at the other two end terminals.

**Wavelength Growth**

A type of growth in which all sixteen wavelengths are added to a single line before more lines are added.

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**X No Entries for X**

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**Y No Entries for Y**

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**Z No Entries for Z**

