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Lucent Technologies
Bell Labs Innovations



WaveStar™

Optical Line System 40G

Release 3

Installation Manual

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About this Document

Purpose

This manual provides instructions for installation, turn-up and testing of the WaveStar™ OLS 40G (Optical Line System) .

This manual is not a service manual. Refer to 365-575-341, WaveStar OLS 40G User/Service Manual for any activity involving circuit turn-up, regular maintenance, or trouble analysis. Refer to 365-575-345, WaveStar OLS 40G Operations Systems Engineering Guide or for any activity using X.25 (TL-1 commands).

Intended Audience

This installation manual is for personnel who will install WaveStar OLS 40G equipment. It emphasizes Release 3.0, 3.0.2 and 3.1.1 practices and procedures where the WaveStar OLS 40G consists of OLS and OT as an integrated system or the OLS and OT are standalone systems.

Reason for Reissue

Inclusion of Release 3.0.2. This document includes updated information and clarifications for all Release 3 applications.

How to Use this Manual

This manual is divided into several sections. The sections are numbered in the order in which they are to be performed except for the Optical Protection Switch (OPS) in Appendix H. **If installing an OPS go directly to Appendix H.**

This manual is intended **ONLY** for use in a central office environment in Network Equipment Building System (NEBS) installations and for installation and testing performed prior to turnover to central office personnel.

The sections in this document provide the following information:

- "About this Document" describes the purpose, intended audience, and organization of this document. Ordering information and procedures to comment on this document are included.
- Section 1, "Overall Installation and Test Considerations", provides a list of required tools and test equipment for WaveStar OLS 40G equipment installation and testing, gives a description of requirements for the Personal Computer to be used as the CenterLink Management Console (CMC), presents safety information, and gives a list of other related documentation. Training, security, and technical support information is also presented.
- Section 2, "Platform Descriptions", introduces the WaveStar OLS 40G platforms and describes the WaveStar OLS 40G equipment. Also introduced are the OLS and OT platforms, including cabinet, miscellaneous mount, and integrated bay options.
- Section 3, "System Installation Planning", discusses system and network level installation and testing issues.
- Section 4, "Equipment Installation", describes how to uncrate and erect WaveStar OLS 40G equipment.
- Section 5, "Power Cable Installation", provides information about power cables related to WaveStar OLS 40G and describes how to install the power cables.
- Section 6, "Wired Cable Installation", provides information about wired cables and the interconnect panel related to WaveStar OLS 40G. It describes how to install the wired cables including the Office Alarms, Serial, Parallel & X.25 Telemetry cables, CIT DTE cables, Line & Section Orderwire, Section User Channel cables, Miscellaneous Mount Intershelf wiring and Miscellaneous Discrete cables.
- Section 7, "WaveStar OLS 40G Fiber And Circuit Pack Installation" describes the Fiber Installation procedures for WaveStar OLS 40G 1A-TX, 1A-RCV, Repeaters, and Dual Facing Shelf applications, Single Optical Amplifier applications as well as Circuit Pack Installation.
- Section 8, "Powering", provides procedures for verifying cabinet/shelf ground and powering the cabinet/shelf for the WaveStar OLS 40G.
- Section 9, "Network Element Start-up And Provisioning", provides procedures for installing circuit packs in the shelves, installing software and logging into the Network Element, and for entering basic provisioning information so that alarms will clear when all end-to-end fiber connections are correctly made.

- Section 10, "Local Installation Testing", describes how to perform WaveStar OLS 40G Auto Turnup tests at end terminals, Repeater, Dual Facing Shelves and Dual Bay stations. These tests are self tests available in the Network Element Software. Tests of cabling and Operations Systems interfaces are also described.
- Section 11, "Fiber Connections" describes how to establish the WaveStar OLS 40G system. General information of Lightwave jumpers and optical Line BuildOuts for quick references is given.
- Section 12, "Connecting SONET/SDH Systems to WaveStar OLS 40G", describes fiber jumper installation and testing between SONET/SDH Systems and the WaveStar OLS 40G End Terminal equipment.
- Section 13, "Troubleshooting", provides guidelines for troubleshooting an out-of-service system during initial start-up.
- Appendix A, "Releases 1.0 & 2.0 LBO Selection Tables" provides the Release 1.0 and 2.0 LBO selection tables for installing OLS/OT/SONET/SDH networks.
- Appendix B, "Pin Repair", describes how to repair backplane pins that need to be replaced.
- Appendix C, "Fiber Cleaning", describes how to clean the optical connectors.
- Appendix D, "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 E, "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 F, "PC Setup & Usage For CenterLink Management Console", describes the setup and use of the Centerlink Management Console (CMC) software for use as the Craft Interface Terminal (CIT) for the WaveStar OLS 40G.
- Appendix G, "Related Equipment", describes the Dantel Orderwire use and connections with the WaveStar OLS 40G.
- Appendix H, "Optical Protection Switch (OPS)", describes the installation and testing of the Optical Protection Switch and its associated circuit packs.
- Appendix I, "Line Buildout (LBO)", describes the various types of buildouts that are available for WaveStar OLS 40G Systems and their properties.

How to Order This Document

Lucent Technologies entities should use Form IND1-80.80 FA, available through the Customer Information Center. Other customers should use the Mail Order or Telephone Order information given below:

Customer	Mail Order	Telephone Order (Monday through Friday)
Commercial Customers*	Lucent Technologies Customer Information Center Attention: Order Entry Section 2855 N. Franklin Road P.O. Box 19901 Indianapolis, IN 46219	Within USA: 1-888-LUCENT-8 (1-888-582-3688) 7:30 a.m. to 6:30 p.m. EST FAX: 1-800-566-9568 From Canada: 1-800-255-1242 Australia and all European Countries: Toll: 1-317-322-6416 All Other Countries: Toll: 1-317-322-6646 Worldwide: FAX: 1-317-322-6699
RBOC/BOC	Process through your Company Documentation Coordinator	

* For commercial customers, a check, money order, purchase order number, or charge card number is required with all orders. Make checks payable to Lucent Technologies.

Onetime orders include a binder (if applicable) and document contents for the issue specified by the unique document order number. Also, you may request placement on a standing order list for all reissues of any document. The standing order list for each document provides automatic distribution for all reissues of the document. RBOC/BOC customers should process document orders or standing order requests through their Company Documentation Coordinator. For questions regarding standing orders, or to be placed on a standing order list, call the applicable Lucent Technologies Customer Information Center number listed above.

How to Comment on This Document

This manual was developed by the Lightwave Customer Technical Support Organization (CTS). The CTS welcomes your comments. A feedback form is located immediately after the title page of this document. Please fill out the form and fax it to 978-960-1665.

If the feedback form is missing, fax your comments on this document to 978-960-1665.

Overall Installation and Test Considerations

1

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Overall Installation and Test Considerations

1

Overview

This section presents: a list of required tools and test equipment for installation of WaveStar OLS 40G cabinets or shelves and OT cabinet or shelves, requirements of the Personal Computer to be used as a CenterLink Management Console, safety instructions including lightwave safety and ESD considerations, lists of WaveStar OLS 40G documents and drawings, a list of documents for related Lucent Technologies equipment, information on training available, system security features, and Technical Support functions.

Information generic to both products is covered first, followed by a section specific to each product.

If installing an Optical Protection Switch (refer to Appendix H), use all three tools and equipment charts since the OPS requires both WaveStar OLS 40G and OT.

Required Tools and Test Equipment

Table 1-1, "Required Tools and Test Equipment for Both Products " on page 1-2, lists the required tools, test sets, and accessories that are common to the installation of *either* the OT or WaveStar OLS 40G Equipment.

Table 1-2, "Required Tools and Test Equipment for WaveStar OLS 40G Only " on page 1-3, lists tools, test sets, and accessories in addition to Table 1 that are required for installation of WaveStar OLS 40G equipment *only*.

Table 1-3, "Required Tools and Test Equipment for OT Only " on page 1-3, lists tools, test sets, and accessories in addition to Table 1 that are required for installation of OT equipment *only*.

Table 1-1. 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 40-60 V DC and ground continuity
Analog Ohm Meter			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 (2 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			For fiber cleaning.
CLETOP Stick Type			Refer to Appendix C for more details.
Optical power meter with LC, ST, FC, and SC adapters 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	Exfo Power Meter (FOT-22AX)		For optical power measurements
Metral Pin Repair Kit (optional, as required)	BERG MT370-01 Kit 106423859		For replacing any damaged METRAL pins Refer to Appendix B for more details.
Insertion/Extraction Tool Kit (optional, as required)	AMP 91261-1		For replacing ACTION PIN contacts in AMPLIMITE HDP-20 connectors (d-sub connectors)

Table 1-2. Required Tools and Test Equipment for WaveStar OLS 40G Only

Description	Commercial or COMCODE	Lucent Technologies Installers Only	Notes
Multi Mode Fiber jumpers with appropriate connectors (2 jumpers for end terminals and 4 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 (2 jumpers for end terminals and 4 jumpers at repeaters)	847265451 (F93AK8573)	847265451 (F93AK8573)	For optical local tests.
Personal Computer	See "Personal Computer for Use as Center-Link Management Console" on page 1-15.	ITE #6795 LIST 2 or ITE #6938	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 WaveStar OLS 40G (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

Table 1-3. Required Tools and Test Equipment for OT Only

Description	Commercial or COMCODE	Lucent Technologies Installers Only	Notes
A SONET OC-48 Signal if testing 41 Type OTU's	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

Table 1-3. Required Tools and Test Equipment for OT Only

Description	Commercial or COMCODE	Lucent Technologies Installers Only	Notes
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 OC3 and ST112 with opt.04 for OC12.	ITE #6384 for OC-3 Testing ITE #6384 equipped with opt.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 Dantel or Harris EMDU.
ST to ST Fiber Optic Coupling (2 needed)	105271142 (C3000A-2)	105271142 (C3000A-2)	

Additional Tools And Test Equipment

Refer to Appendix B for backplane pin repair tool information and Appendix C for optical connector cleaning information.

Safety Instructions

Admonishments

This manual contains admonishments in the form of DANGERS, WARNINGS, and CAUTIONS. These admonishments, listed in order of priority, have the following definitions:

- Danger shows the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.
- Warning shows the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.
- Caution shows the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. Caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.

These admonishments are noted by an alert symbol .

IMPORTANT SAFETY INSTRUCTIONS

READ AND UNDERSTAND ALL INSTRUCTIONS.

When using this telecommunication equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- (1) Follow all warnings and instructions marked on the product.
- (2) Slots and openings in this product at the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.
- (3) Opening or removing rear covers or sheet-metal parts may present exposure to high current or electrical energy levels, or to other risks.
- (4) 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.
- (5) Refer servicing to qualified service personnel.
- (6) Use caution when installing and modifying telecommunications lines.
- (7) Never install telecommunication wiring during a lightning storm.
- (8) Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.
- (9) Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.
- (10) 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.
- (11) This product has two -48V DC  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 when removing power from the system.
- (12) Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.
- (13) For continued protection against risk of fire, replace only with same type and rating of fuse.
- (14) Use only Lucent Technologies manufactured, recognized circuit packs.
- (15) 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.

SAVE THESE INSTRUCTIONS.

Lightwave Safety

Lucent Technologies Lightwave digital transmission systems and associated optical test sets use semiconductor laser transmitters. The lasers emit lightwaves, at or near infrared wavelengths, into lightguide cables. This light is at the red end of the visible spectrum. Direct exposure at close distances should be avoided.

**WARNING:**

Never view any unterminated optical connector with optical instruments other than indirect image-converting devices. Viewing optics tend to focus the energy from an optical connector and, hence, increase the potential risk for injury.

Lasers and laser products are subject to federal and state regulations as well as Lucent Technologies laser safety requirements. The WaveStar OLS 40G uses a Class I or Class IIb laser as a transmitter. Under normal operation, the system is totally enclosed and fully protected by devices such that it presents no hazards to safety or health. Each system has been certified and registered with the National Center for Devices and Radiological Health (NCDRH) under the U.S. Food and Drug Administration (FDA) as a Class I system (exempt lasers and laser systems). All sections of the WaveStar OLS 40G that can be removed and allow potential access to laser radiation have been identified. A warning label is provided on the rear of the shelf.

For safety reasons the equipment comes with the Automatic Power Shutdown (APSD) feature enabled for optical amplifiers (OAs).

**DANGER:**

Disabling the Automatic Power Shut-Down (APSD) feature results in a FDA/IEC Class IIb/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 Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

In addition, a compliance label stating that the system has been certified, along with the manufacturer's name and place of manufacture, is attached to each equipment bay. Figure 1-1 shows an example of a compliance label. The compliance label is located on the rear of the equipment bays (at eye level). Several Cautions, Notices and Danger Indications are also given on the rear label, be sure to read and observe them. The text in these labels now appears in both French and English, for an international market.

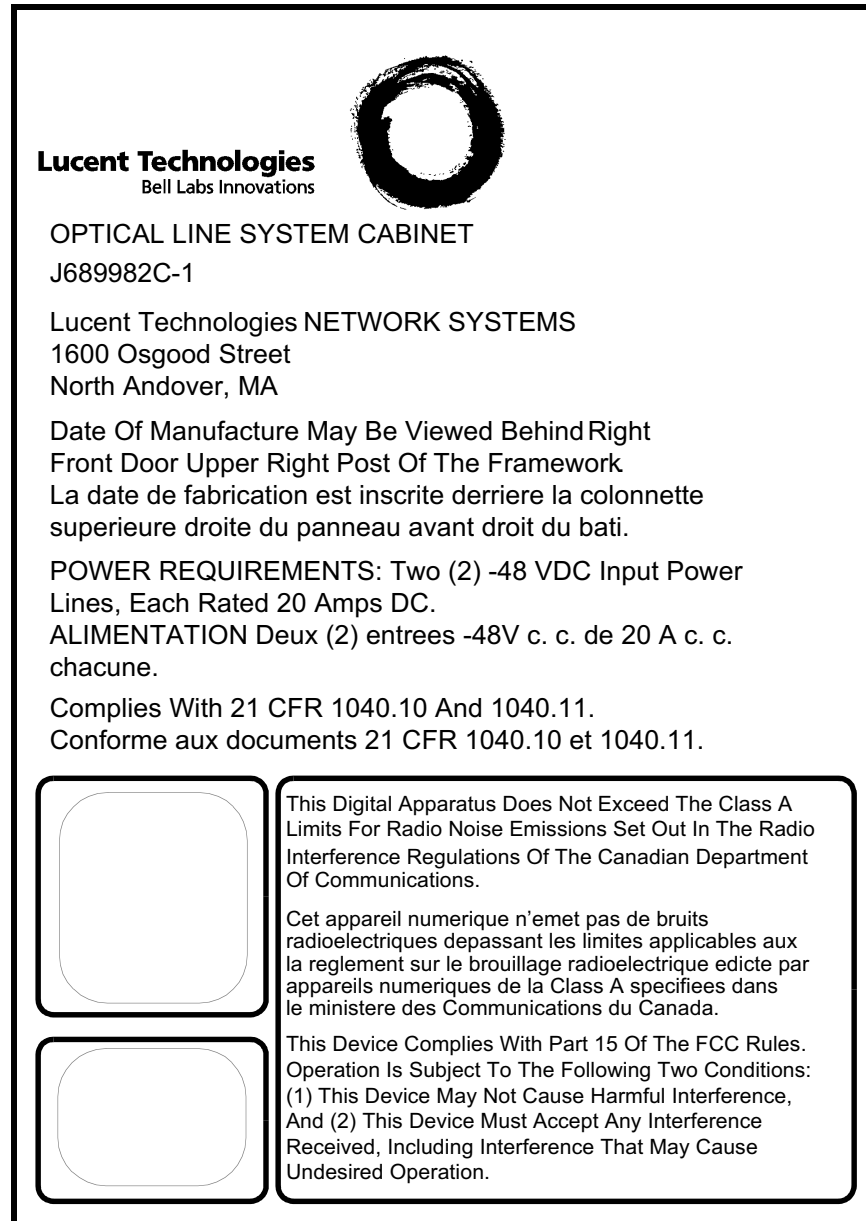


Figure 1-1 Compliance Label

Electrostatic Discharge (ESD) Considerations

**CAUTION:**

Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

Observe the following precautions when handling circuit packs to prevent damage by electrostatic discharge:

- Assume all circuit packs and units contain solid state electronic components that can be damaged by ESD.
- Wear (always) a grounded wrist strap (shown in Figure 1-2) or wear a heel strap and stand on a grounded, static-dissipating, floor mat when handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- Open (if possible) all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats.
- Store and transport (always) circuit packs in static-safe packaging.
- Keep all static-generating materials such as food wrappers, plastics, and styrofoam containers away from all circuit packs. Upon removal from bay, immediately put circuit packs into static-safe packages.
- Maintain (whenever possible) relative humidity above the 20 percent level.
- Keep the electromagnetic interference (EMI)/ESD protective front covers installed at all times except during an upgrade or maintenance procedure. Once a circuit pack is replaced in the shelf, close the front cover immediately.

To reduce the possibility of ESD damage, assemblies are equipped with grounding jacks to enable personnel to ground themselves using wrist straps while handling circuit packs or working on a shelf. The jacks for connection of wrist straps are located at the lower right-hand corner of each user panel and filter panel and at the rear of the bay. These jacks are labeled: Wrist Strap Ground. Wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.

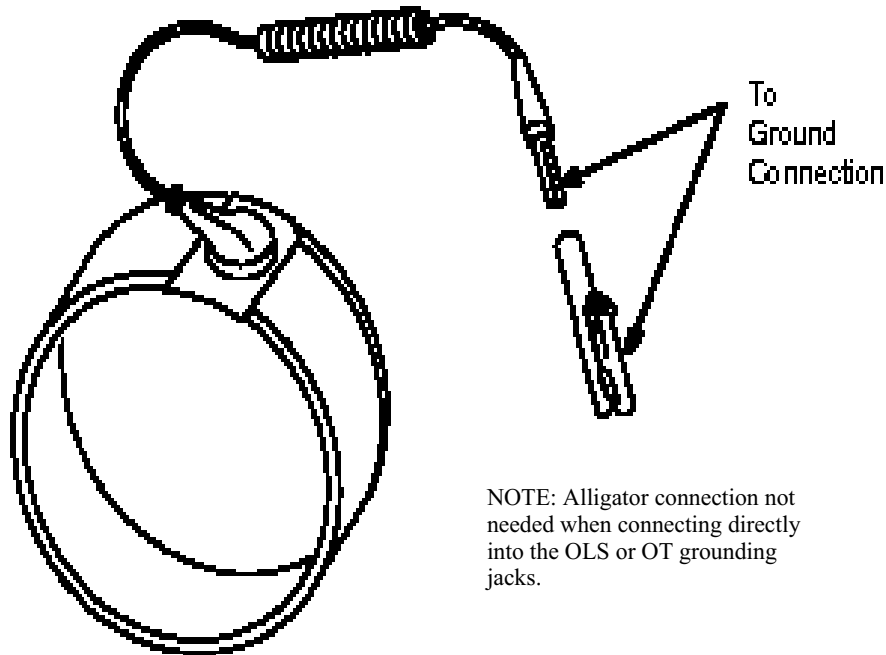


Figure 1-2 Static Control Wrist Strap

Related Documentation

WaveStar OLS 40G Documentation

The following documents provide additional information about the Optical Line System:

■ **Number:** 365-575-340

Title: Optical Line System (OLS), Applications, Planning, and Ordering Guide

Audience: System planners and engineers

Content: Features, applications, general description, system planning/engineering, and ordering information

- Number: 365-575-341
 - Title: Optical Line System (OLS), User/Service Manual
 - Audience: End user maintenance personnel
 - Content: Detailed description, technical specifications, operations and maintenance, and user interface descriptive/tutorial information
- Number: C108066416 Release 3.0.0-OLS
 - Title: Optical Line System (OLS), Software Release Description
 - Audience: End user maintenance personnel
 - Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with OLS software and is not orderable from the Lucent Technologies Customer Information Center.
- Number: C108286477 Release 3.0.1-OLS
 - Title: Optical Line System (OLS), Software Release Description
 - Audience: End user maintenance personnel
 - Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with OLS software and is not orderable from the Lucent Technologies Customer Information Center.
- Number: C108334731 Release 3.0.2-OLS
 - Title: Optical Line System (OLS), Software Release Description
 - Audience: End user maintenance personnel
 - Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with OLS software and is not orderable from the Lucent Technologies Customer Information Center.
- Number: 365-575-345
 - Title: Optical Line System (OLS) Operations Systems Engineering Guide
 - Audience: System planners and engineers
 - Content: Operations systems (X.25/TL-1) engineering information for Optical Line System.

Training

No product offering is complete without a formal training package. The National Product Training Center will provide management courses for system planning, engineering and ordering, as well as training telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses is also available. Contact the Customer

Training and Information Products Organization on 1-888-LUCENT-8 (1-888-582-3688) to enroll in training classes. To arrange suitcase sessions, call 1-614-764-5186.

The following courses are provided by the National Product Training Center:

■ Number: LW2252

Title: Optical Line System-Optical Translator (OLS) Applications, Architecture, Planning and Ordering

Audience: Facility planners, account executives, equipment engineers, private telecommunications network technical consultants and design engineers.

Prerequisite: A basic understanding of digital fundamentals and lightwave transmission systems. Unless the student has experience on a lightwave transmission assignment, the following courses are prerequisite:

- LW2200, Optical Networking Overview (FT-2000 OC-48 and Optical Line System)
- TR0510, Transmission principles, self-paced (for digital fundamentals, needed before the networking overview course)

Content: This two day course provides instruction on the product applications, features and architecture, as well as the office and network planning needed for implementation. Included is instruction and practice on ordering.

■ Number: LW2652

Title: Optical Line System Optical Translator (OLS-OT) Operation and Maintenance (Hands-On)

Audience: This course is designed for technicians, installers, maintenance engineers, technical support personnel, product evaluators, and anyone desiring to learn operation and maintenance procedures for the Optical Line System or Optical Translator.

Prerequisite: A background in telephony and a basic understanding of digital transmission principles is necessary. Unless the student already has experience on a lightwave transmission assignment, the following course is a prerequisite:

- TR0510, Transmission Principles (Self-Paced)

Content: This two-day training course provides the participant with practical hands-on experience with required circuit packs, provisioning appropriate options, conducting turn up and test procedures, and clearing routine cases of trouble. The student performs all of these tasks using standard documentation.

■ Number: LW2451V

Title: Optical Translator (OT) Installation

Audience: Installers and anyone desiring installation information for the Optical Translator (OT). Included is Miscellaneous Mount Information.

Prerequisite: TR2448 or equivalent knowledge

Content: Video presentation covering OT installation and physical design.

Security

Lucent Technologies has designed the CenterLink Management Console (CMC) so that, when properly administered, it will minimize the ability of unauthorized persons to gain access to the network. Each authorized user should be instructed about the proper use of the CMC. Security features are fully described in the Optical Line System User/Service Manual.

Technical Support

Assistance in maintaining your installed system is available through the Regional Technical Assistance Center (RTAC) and the Customer Technical Support (CTS) organization. As shown in Figure 1-3, RTAC is your single point of contact. RTAC personnel troubleshoot field problems 24 hours a day over the phone and, if necessary, on site. For technical assistance, simply call 1-800-225-RTAC. One call guarantees support.

RTAC organizations are supported by a centralized CTS for transmission products. The CTS maintains a close relationship with Bell Laboratories and other Lucent Technologies organizations to expedite resolutions and maintain contact with the development community. This association provides continuous accessibility to every phase of a products life cycle and assures a prompt resolution to all inquiries.

Customer Assistance Request Entry System (CTS CARES)

CTS CARES (Customer Assistance Request Entry System) is a new internal Customer Technical Support tool that allows Lucent engineers to record customer requests for a variety of products. CTS CARES will eventually replace all legacy systems within Lucent Technologies, Inc. such as CAROD, QUES/DIAS, CTSS & 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 NonUS at 1-630-224-4672. Please make sure you ask for a CARES Customer Web Access Login. An agent will create an Assistance request in CTS CARES and forward your request to the appropriate login administrator.

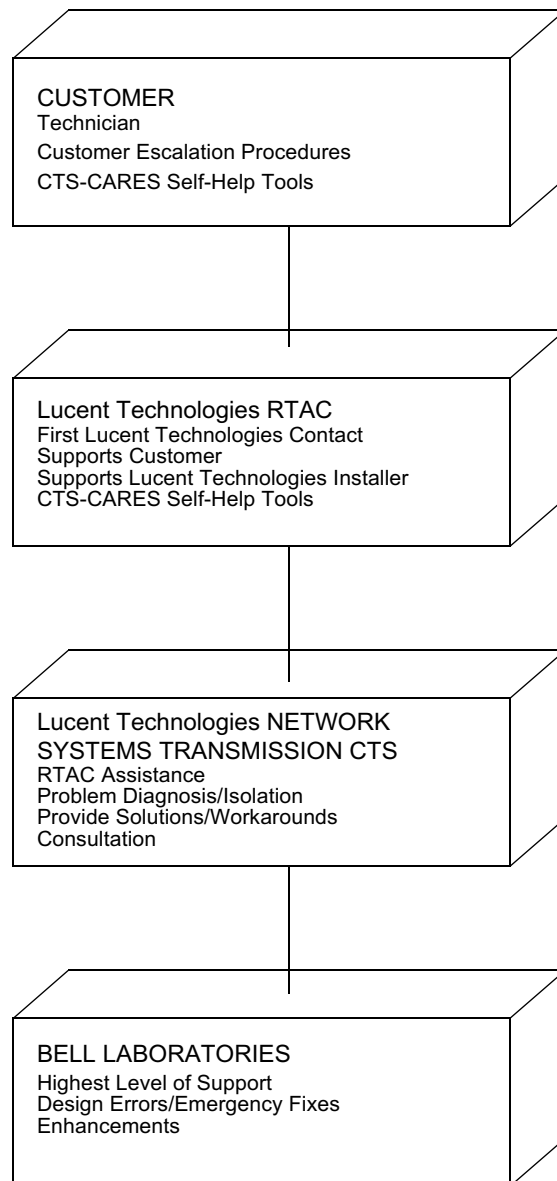


Figure 1-3 Product Support

Optical Line System Specifics

Installation Operations for WaveStar OLS 40G

Table 1-4. Installation Operations for WaveStar OLS 40G

	Procedure	Sections	Details
Standard Installation E, F, & I	Equipment Installation	Section 4	Mount, Drill, Erect, Assemble, and Ground Cabinet
	Power Cable Installation	Section 5	Connect Power Cables to Cabinet
	Wired Cable Installation	Section 6	Connect All Non-Power And Non-Transmission Cables
	Intrashelf, Customer Maintenance, Outside Plant and Low Speed Fiber Installation	Section 7	Connect Fibers.
	Powering	Section 8	Power the Cabinet
	Network Element Start Up and Basic Provisioning	Section 9	Install CMC and NE Software, Install Circuit Packs, and Perform Basic Provisioning.
	Local Installation Testing	Section 10	LED, Auto Turnup, Cable, and Operational Tests
"Turnkey" System Connections	Fiber Connection and End-to-End Verification	Section 11	System Connection and Verification
	Connection to Optical equipment	Section 12	Connection Customer Optics
OPS Installation	Optical Protection Switch Installation & Test	Appendix H	Stand alone instruction for installing OPS

Personal Computer for Use as CenterLink Management Console

The CenterLink Management Console (CMC) for WaveStar OLS 40G is a personal computer (PC). A PC and the WaveStar OLS 40G Software distribution CD-ROM will be necessary to install WaveStar OLS 40G software. The PC must meet certain requirements to ensure proper interaction with the WaveStar OLS 40G. The minimum requirements are as follows:

- Pentium IBM*-compatible desktop or laptop PC

- Disk drive - one 2x CD ROM drive
 - Hard disk with approximately 20 Megabytes of free space
 - 16 Megabytes RAM
 - MS-DOS† operating system using Windows95
(Service pack b recommended)
 - Serial port (EIA-232-D): configured as COM1, COM2,
 - Parallel Port: Configured as LPT1
 - SVGA Active Matrix Color Display 800x600
 - Microsoft Mouse or compatible pointing device.
- * Registered Trademark of International Business Machines Corporation
- † Registered Trademark of Microsoft Corporation

WaveStar OLS 40G Drawings

- J68982C-1 WaveStar OLS 40G Cabinet
(Equipment and Circuit Packs Ordered with Equipment)
- J686982D-1 Optical Networking Cabinet - WaveStar OLS 40G & OT in one cabinet
(Equipment and Circuit Packs Ordered with Equipment)
- J68982CS-1 WaveStar OLS 40G Software
(Software and Documentation)
- T-5G276-33 WaveStar OLS 40G Interconnect Circuit
- T-5G276-30 WaveStar OLS 40G Circuit
- T-5G273-30 WaveStar OLS 40G Shelf Circuit
- ED-7G033-30 WaveStar OLS 40G Cabinet Framework
- ED-7G028-20 WaveStar OLS 40G Cable Assembly
- ED-7G028-22 WaveStar OLS 40G Interconnect Cable Assembly
- ED-7G028-30 WaveStar OLS 40G Shelf Assembly
- ED-7G027-30 User/Fuse Panel/Power Indicating Assembly
- FPD 804-604-161-1 WaveStar OLS 40G Cabinet Floor Plan Data Sheet

Optical Translator Specifics

Table 1-5. Installation Operations

	Procedure	Sections	Details
Standard Installation E, F, & I	Equipment Installation	Section 4	Mount, Drill, Erect, Assemble, and Ground Cabinet
	Power Cable Installation	Section 5	Connect Power Cables to Cabinet
	Wired Cable Installation	Section 6	Connect Power Cables and Non-Transmission Cables
	Fiber Installation	Section 7	Install Fibers
	Powering	Section 8	Power the WaveStar OLS 40G & OT Cabinet
	Start Up and Local Installation Testing	Section 10	Testing of OTUs, QOTUs, OTPMs and Miscellaneous Discrete Alarms.
OPS Installation	Optical Protection Switch Installation & Test	Appendix H	Stand alone instruction for installing OPS

OT Drawings

- J69000C-1 Optical Translator Cabinet
- T-6G156-33 Optical Translator Interconnect Circuit
- T-6G156-30 Optical Translator System Circuit
- T-6G155-30 Optical Translator Shelf Circuit
- ED-7G044-30 Optical Translator Cabinet Framework
- ED-7G045-20 OT Cable Assembly
- ED-7G045-22 OT Interconnect Cable Assembly
- ED-7G045-30 Optical Translator Shelf Assembly
- ED-7G047-30 User/Fuse Panel/Power Indicating Assembly
- FPD 804-604-162 Optical Translator Cabinet Floor Plan Data Sheet
- 847823325 OT Installation Kit

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Overview

This section with its subsections introduces WaveStar™ OLS 40G equipment packages and provides a detailed view of the WaveStar OLS 40G Cabinet physical design, Integration Bay, and miscellaneous mounted shelves.

Also introduced are the OT equipment packages, detailed views of the OT Cabinet physical design and the miscellaneous mount configuration. Applications of the OT are shown along with a description of the miscellaneous discrete alarm operation.

The sections and their contents are listed below:

- Section A - Equipment Descriptions contains a brief descriptions of the capabilities of each type of equipment and the packages available for each.
- Section B - Cabinet Descriptions and Types contains a description of the available cabinet and various types of WaveStar OLS 40G and OT Cabinet set-ups.
- Section C - Cabinet Indicator Strips contains a description of the indicator strips used for each type of equipment and their LEDs.
- Section D - Shelf Descriptions contains a description of each shelf available for the WaveStar OLS 40G and OT. Also covered are the Interconnection Panels and Fuse Panels.
- Section E - Circuit Pack Descriptions and Addresses contains a brief description of each circuit pack and the corresponding addresses.
- Section F - System Block Diagrams and Applications contains block diagrams for both the OT and WaveStar OLS 40G as well as examples of applications.
- Section G - Miscellaneous Discrete Alarms contains information regarding the operation of the miscellaneous discretes associated with the OT and their connection to the WaveStar OLS 40G.

A - Equipment Descriptions

WaveStar OLS 40G Description

The WaveStar OLS 40G is a flexible, high capacity lightwave system that multiplexes digitally encoded information contained in up to sixteen different wavelengths (each in the 1.5 micrometer wavelength range), transmits the resulting combined signal through optical fibers, and then demultiplexes the information at the other end.

WaveStar OLS 40G transmits on optical lines. An **optical line** is a fiber transmission facility, including optical amplifiers, that extends from the output of the optical multiplexing unit (OMU) to the input of the optical demultiplexing unit (ODU). Repeaters may be used to expand the distance between end terminals. The distance between adjacent end terminal and repeater sites or between adjacent repeater sites is referred to as an **optical section** or **span**.

Release 3 is available in the following equipment packages

- Miscellaneously Mounted Shelf (List 10)
- End Terminal for 4 Bidirectional Optical Lines - Cabinet Mounted
- Repeater for 4 Bidirectional Optical Lines - Cabinet Mounted
- Dual End Terminal (2 shelves with 2 bidirectional optical lines each) - Cabinet Mounted
- Dual Repeater (2 shelves with 2 bidirectional optical lines each) - Cabinet Mounted
- End Terminal And Repeater
- WaveStar OLS 40G/OT Miscellaneously Mounted Combinations
- WaveStar OLS 40G/OT Integrated Bay
- Dual Facing Shelf.

OT Description

The Optical Translator (OT) is an addition to the Optical Line System Product Line that will allow for improved economics for applications such as Wavelength Add/ Drop (WAD), multi-vendor compatibility, and extended reach between offices.

The Optical Translator (OT) three-shelf arrangement for a maximum of thirty-two (32) Optical Translator slots. An OTU circuit pack requires one slot, and a Quad OTU pack requires two slots. The SPODU, SPOMU, and OPS circuit packs used with the Optical Protection feature all require two slots. Each OTU/QOTU circuit pack operates independently allowing for maximum system flexibility. The OTU has a broadband input capability allowing it to receive OC-48/STM-16 signals with wavelengths in the 1310 nm

and 1550 nm range. Each OTU outputs an OC-48/STM-16 signal at a code-specific wavelength which is WaveStar OLS 40G compatible.

An OTU may be used to translate an OC-48/ STM-16 optical input to another wavelength or as an optical regenerator of the same wavelength. Being used in this capacity, OTUs are capable of performing Wavelength Add/Drop (WAD) or providing signal regeneration capability.

The Quad Optical Translator Unit (QOTU) allows the combination of up to four Optical Translator Port Modules (OTPMs). The OTPMs are available in three varieties: OC-12 / STM-4, OC-3/STM-1 and Low Speed Broadband. The OTPMs also have a broadband input capability allowing them to receive signals with wavelengths in the 1310 nm and 1550 nm range. The OC-12/STM-4 and OC-3/STM-1 versions may be used to perform Wavelength Add/Drop (WAD) or providing signal regeneration capability. The Low Speed Broadband OTPMs must be terminated at each end terminal.

Release 3 of OT is available in the following equipment configurations:

- System Controller Shelf, Complementary Shelves 1 & 2 mounted in an OT cabinet with interconnecting wiring installed. (List 1)
- Miscellaneously Mounted System Controller Shelf and Complementary Shelves 1 & 2 with interconnecting wiring provided. (List 10)
- Miscellaneously Mounted System Controller Shelf (List 11)
- Miscellaneously Mounted Complementary Shelf 1 (List 12)
- Miscellaneously Mounted Complementary Shelf 2 (List 13)

B - WaveStar OLS 40G & OT Cabinet

Descriptions and Types

Each WaveStar OLS 40G or OT can be equipped in a cabinet that is 6 feet high, 34 inches wide, and 24 inches deep. Each cabinet houses two shelves for the WaveStar OLS 40G and three for the OT. Each WaveStar OLS 40G shelf contains a maximum of two bidirectional optical lines, for a maximum of four bidirectional optical lines per WaveStar OLS 40G cabinet. One shelf of the OT is the system controller shelf and the other two are Complementary Shelf One and Two, combining to provide slots for 32 Optical Translator units (OTUs) or 16 QOTUs. Each OTU has an input and output optical connection. Each QOTU has 4 possible slots for OTPMs each with an input and output for carrying OC-12 / STM-4, OC-3/STM-1 and Broadband signals. The fibers that mate with these connections originate or terminate external to the OT cabinet. A fully loaded OT cabinet will have a total of between 64 and 128 fibers entering/exiting the cabinet.

A heat baffle is located between the each shelf. On the WaveStar OLS 40G cabinet the CenterLink Management Console (CMC) CIT-DCE connector and ESD jack are accessed through a small door located in the right front door. The OT cabinet has its ESD jack accessible through the same right front door and may have a CIT-DCE connector located next to the ESD jack that is essentially an open circuit. The initial cabinets were equipped with this connector to allow for a future craft interface connections to the OT cabinet. The craft interface for the OT was subsequently incorporated into the WaveStar OLS 40G.

Figure 2-1 on page 2-5 shows the WaveStar OLS 40G or OT cabinet with its front doors closed and Figure 2-2 on page 2-6 shows the WaveStar OLS 40G cabinet with the doors open. Figure 2-3 on page 2-7 shows the OT cabinet with the doors removed.

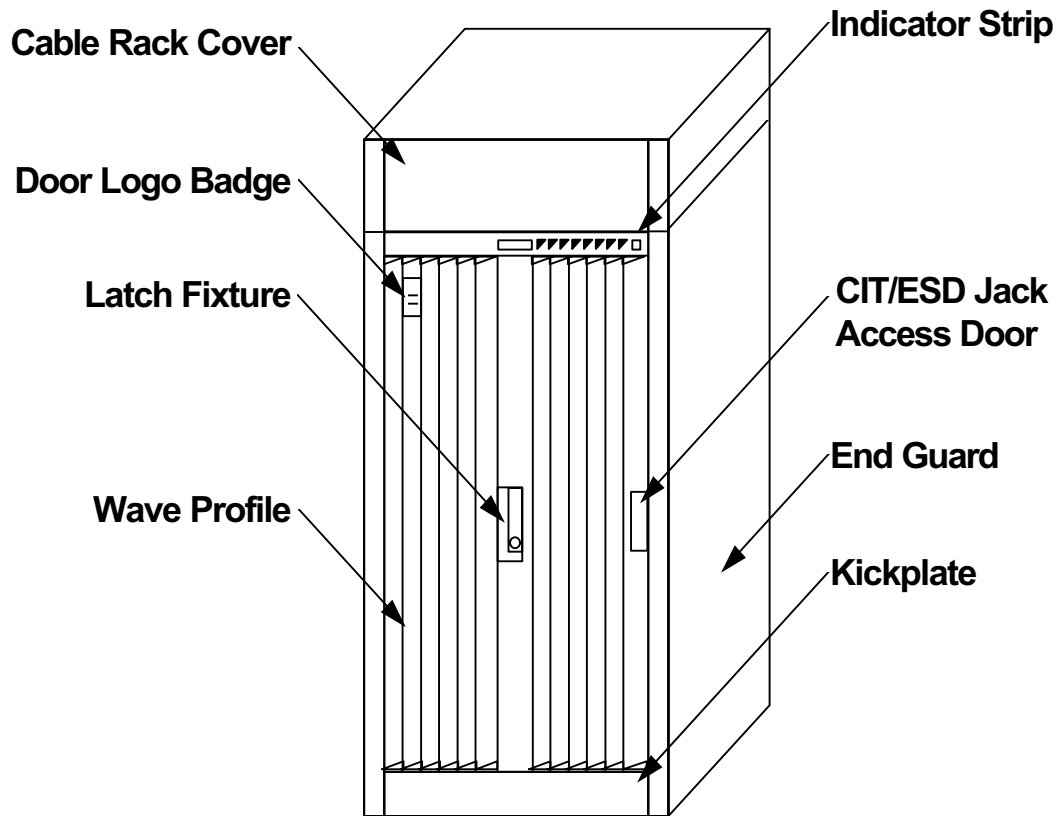


Figure 2-1 WaveStar OLS 40G Cabinet (Doors Closed)

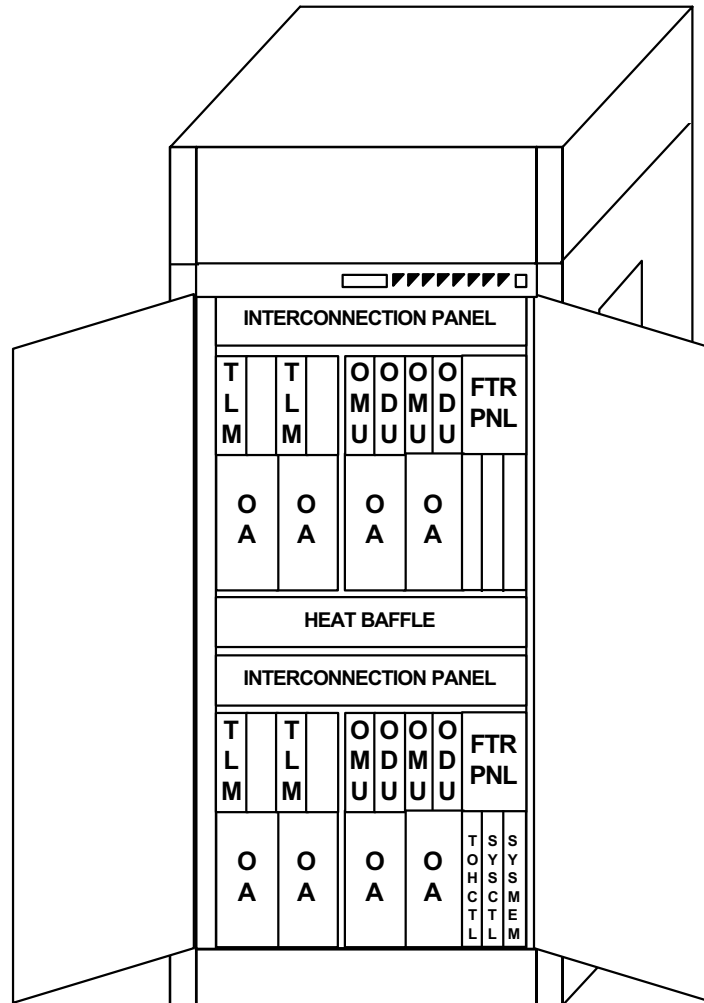


Figure 2-2 WaveStar OLS 40G Cabinet (Doors Open)

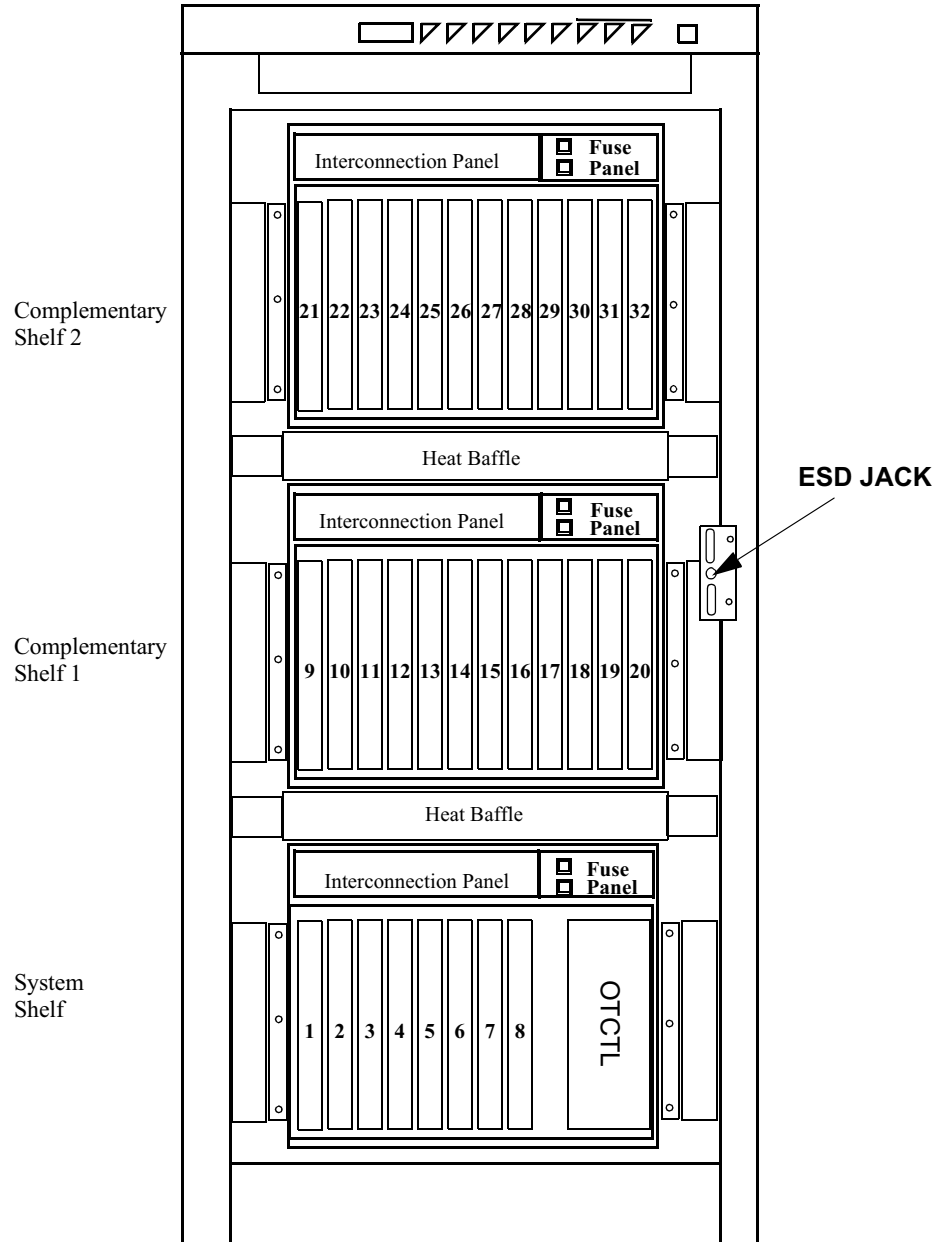


Figure 2-3 OT Cabinet (Doors and EMC Shelf Covers Removed)

WaveStar OLS 40G Cabinet Types

End Terminal for 4 Bidirectional Optical Lines

The WaveStar OLS 40G End Terminal for 4 Bidirectional Optical Lines (Figure 2-4 on page 2-8) consists of the cabinet containing two end terminal shelves that are physically identical, except for the label strips. The lower shelf is equipped with all the control circuit packs; the upper shelf is not equipped with control circuit packs. The lower shelf contains lines 1 and 2 and the upper shelf contains lines 3 and 4.

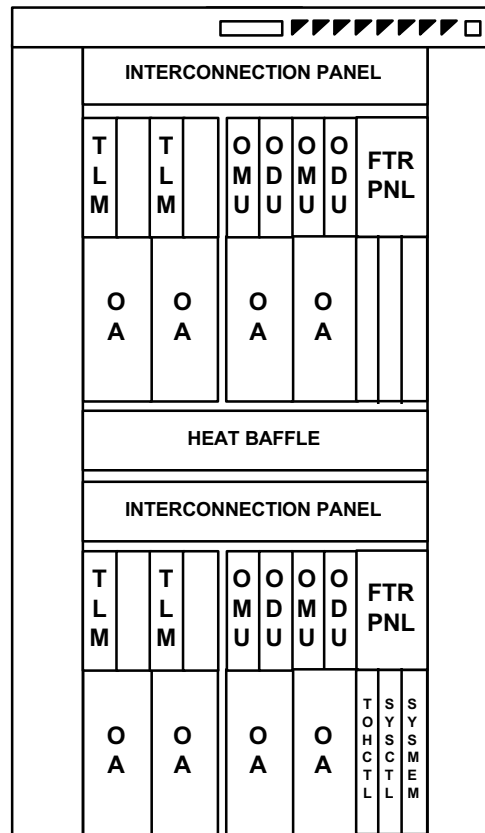


Figure 2-4 End Terminal for 4 Bidirectional Lines (1A-TX Shown)

WaveStar OLS 40G Repeater for 4 Bidirectional Optical Lines

The WaveStar OLS 40G Repeater for 4 Bidirectional Optical Lines (Figure 2-5 on page 2-9) consists of the cabinet containing two repeater shelves that are physically identical, except for the label strips. The lower shelf is equipped with all the control circuit packs; the upper shelf is not equipped with control circuit packs. The lower shelf contains lines 1 and 2 and the upper shelf contains lines 3 and 4.

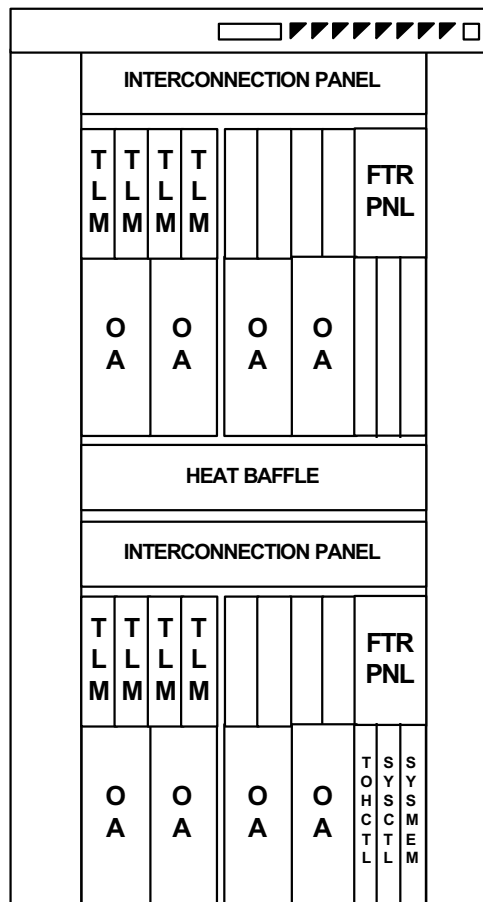


Figure 2-5 Repeater for 4 Bidirectional Lines

WaveStar OLS 40G Dual End Terminal

The WaveStar OLS 40G Dual End Terminal (Figure 2-6 on page 2-10) consists of the cabinet containing two end terminal shelves that are physically identical. Both shelves are equipped with control circuit packs and contain lines 1 and 2 and can be configured independently.

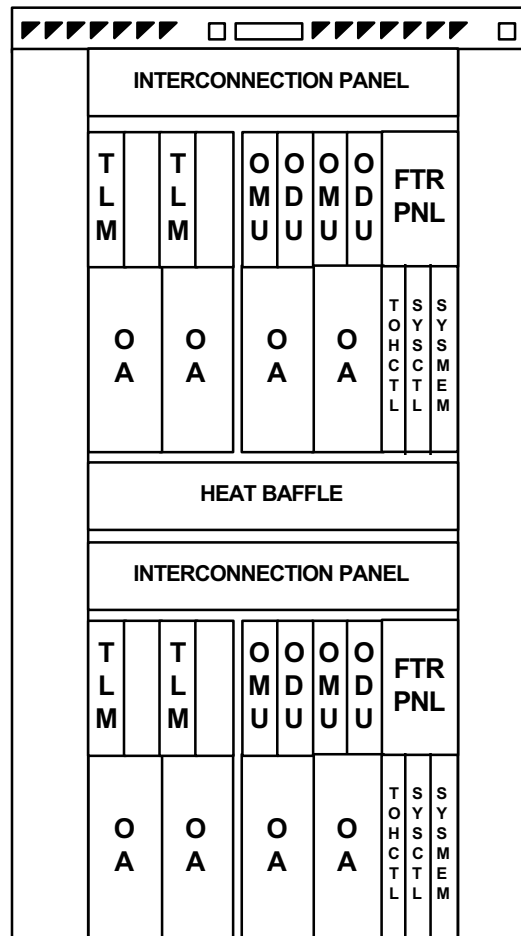


Figure 2-6 Dual End Terminal (1A-TX Shown)

Dual Repeater

The WaveStar OLS 40G Dual Repeater (Figure 2-7 on page 2-11) consists of the cabinet containing two repeater shelves that are physically identical. Both shelves are equipped with control circuit packs and contain lines 1 and 2 and can be configured independently.

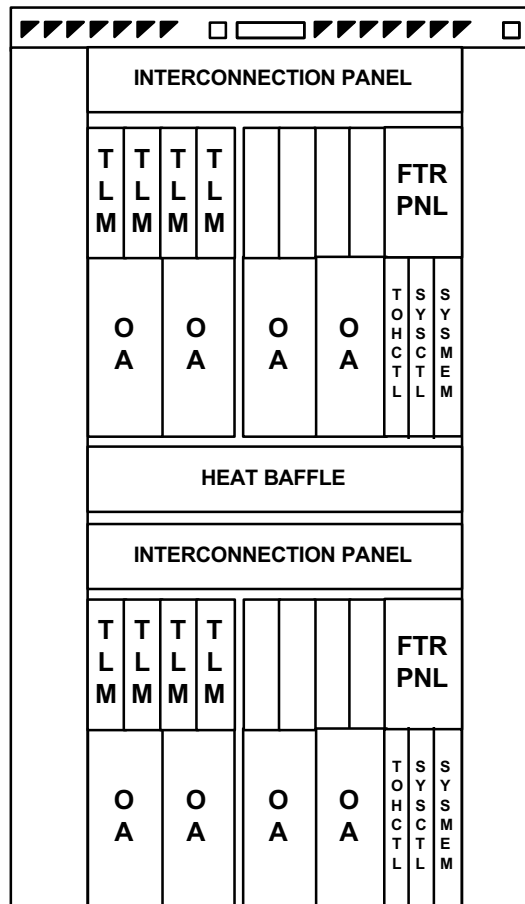


Figure 2-7 Dual Repeater

End Terminal And Repeater

The WaveStar OLS 40G End Terminal and Repeater (Figure 2-8 on page 2-12) consists of the cabinet containing one end terminal shelf and one repeater shelf. Both shelves are equipped with control circuit packs and contain lines 1 and 2 and be configured independently.

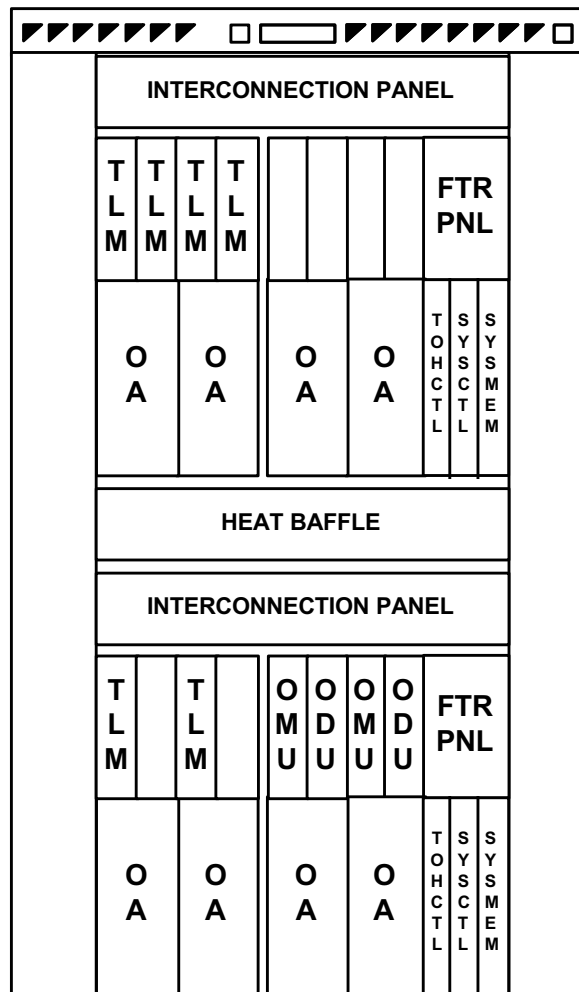


Figure 2-8 End Terminal (1A-TX Shown) And Repeater

Dual Facing Shelf and Repeater

The WaveStar OLS 40G Dual Facing Shelf and Repeater, Figure 2-9 on page 2-13, shows the Dual Facing Shelf on the bottom with a repeater configuration at the top. This is only one of the possible configurations for the Dual Facing shelf. Both top and bottom support lines 1 & 2 and contains control circuit packs for independent configuration.

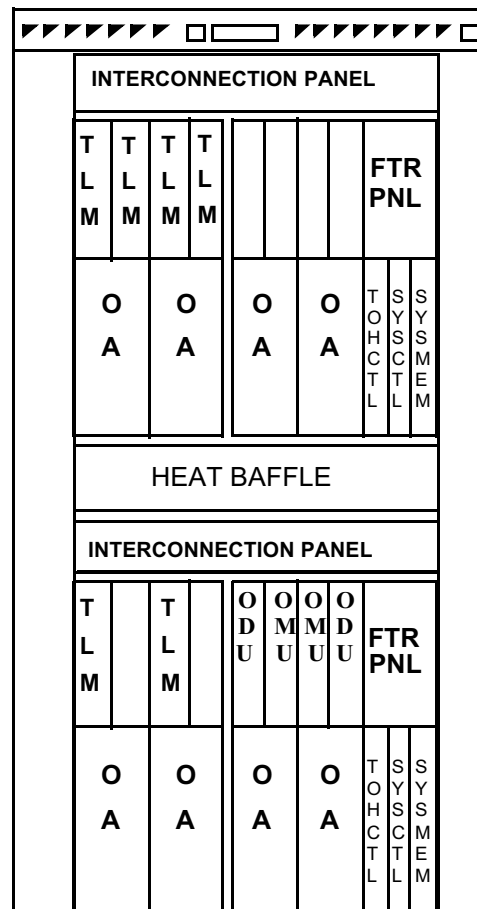


Figure 2-9 Dual Facing Shelf And Repeater

WaveStar OLS 40G/OT Integrated Miscellaneously Mounted Configuration

The WaveStar OLS 40G/OT Integrated Miscellaneously Mounted Configuration, Figure 2-10 on page 2-14, shows a possible configuration with an OLS on the bottom, an OT System Shelf in the middle, and an OT Complementary Shelf 1 at the top. The OT system shelf contains an OT control circuit pack which is interconnected by cabling to the OLS. This makes the combination of the OLS and OT appear as a single NE

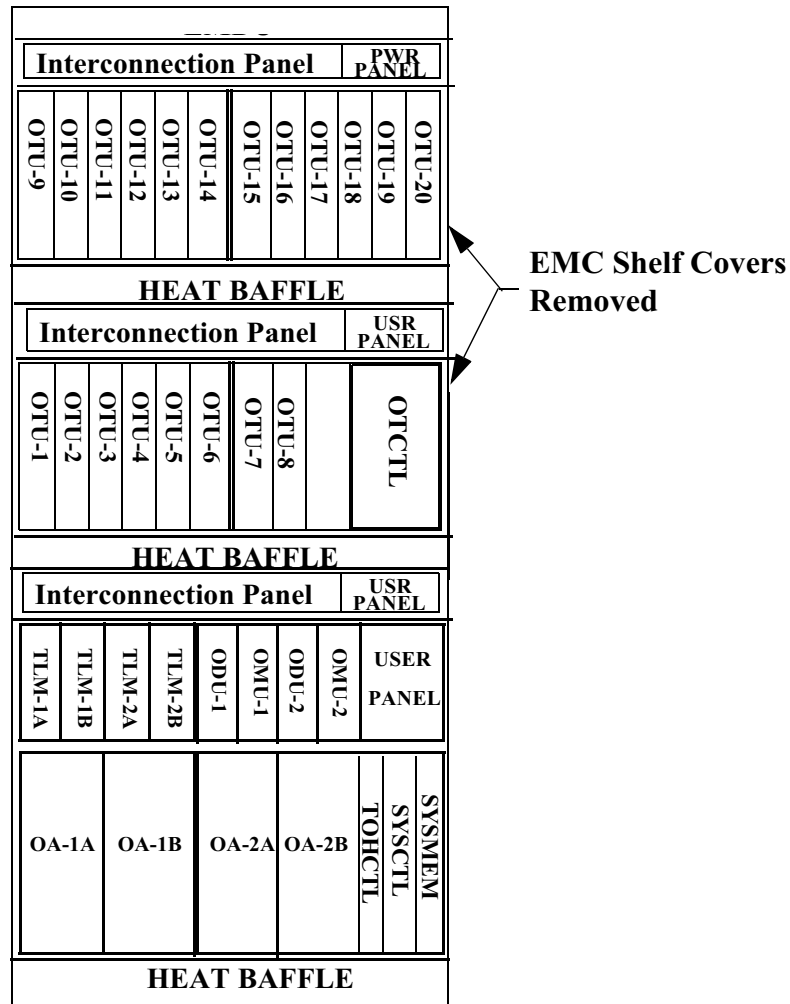


Figure 2-10 WaveStar OLS 40G/OT Integrated Miscellaneously Mounted Configuration

C - Cabinet Indicator Strips

Each cabinet has an indicator strip located at the top of the cabinet for displaying alarm and status information. Connectorized cabling connects the indicator strip to the shelf or shelves.

LED and Push-button Descriptions

The indications of the LEDs located on the user panel are listed in Table 2-1, on page 2-15.

Table 2-1 Indicator Strip LEDs Indications

SONET LED	SDH LED	Indications
Critical (CR) - Red	Critical (CR) Red	For WaveStar OLS 40G, any unprotected incoming signal loss is critical
Major (MJ) - Red	Prompt Red	Non-service-affecting unprotected failure that may mask the reporting of another service-affecting failure. For example, a Controller failure will cause a MJ alarm.
Minor (MN) Yellow	Deferred (DEFR) Yellow	Non-service-affecting failure, protected failure
Alarm Cut-Off (ACO) - Green	Suppress - Green	Audible office alarms are silenced and parallel telemetry indications are turned off
Power On (PWR-ON) Upper Shelf - Green	Power On (PWR-ON) Upper Shelf - Green	Upper Shelf is receiving a -48 volt source
PWR-ON (Lower Shelf) - Green	PWR-ON (Lower Shelf) - Green	Lower Shelf is receiving a -48 volt source
Abnormal (ABN) - Yellow	Abnormal (ABN) - Yellow	Abnormal condition initiated through a CMC (Centerlink Management Console) command. For example, loopback, forced switch
Near End Activity (NE ACTY) Yellow	Information Near End(INFO-N) - Yellow	An alarm or status condition exists at the near-end WaveStar OLS 40G
Far End Activity (FE ACTY) - Yellow	Information Far End (INFO-F) - Yellow	An alarm or status condition exists at a far-end WaveStar OLS 40G

FAULT LED Indication

Each circuit pack has a FAULT LED. When a FAULT LED is steadily lighted, the circuit pack has failed or its communication with the SYSCTL circuit pack has failed.

In general, when a FAULT LED is flashing, the circuit pack has lost its input signal, or the input signal has degraded severely. An exception is when the SYSMEM FAULT LED is flashing; this indicates a software mismatch between the SYSCTL software version and the SYSMEM.

WaveStar OLS 40G Specific Considerations

Four optical line cabinets have a single set of indicators as shown in Figure 2-11 on page 2-16, "Indicator Strip For 4-line WaveStar OLS 40G Cabinets" and dual 2-line cabinets have two sets of indicators as shown in Figure 2-12 on page 2-16, "Indicator Strip For WaveStar OLS 40G Dual 2-line Cabinets".

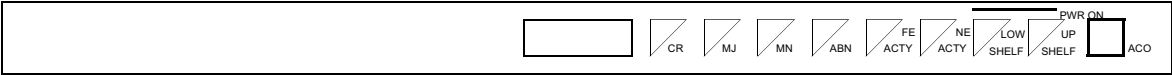


Figure 2-11 Indicator Strip For 4-line WaveStar OLS 40G Cabinets

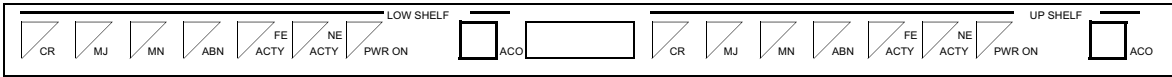


Figure 2-12 Indicator Strip For WaveStar OLS 40G Dual 2-line Cabinets

OT Specific Considerations

The three green PWR-ON LEDs will be the only functional LEDs on the indicator strip for R1-OT. The remaining LEDs on the indicator strip as well as the ACO push-button are

non-functional with R1-OT. The indicator strip for the OT cabinet is shown in Figure 2-13 on page 2-17, "Indicator Strip For OT Cabinet".



Figure 2-13 Indicator Strip For OT Cabinet

D - Shelf and Panel Descriptions

WaveStar OLS 40G Shelf Descriptions

The WaveStar OLS 40G shelves can be configured to provide the following functions:

- End Terminal with Optical Amplifiers for Lines A Transmitting (1A-TX) as shown in Figure 2-14. on page 2-19.
- End Terminal with Optical Amplifiers for Lines A Receiving (1A-RCV) as shown in Figure 2-15. on page 2-20.
- Repeater as shown in Figure 2-16. on page 2-21.
- Dual Facing Shelf as shown in Figure 2-17. on page 2-22.

1A-TX and 1A-RCV Applications

The concept of 1A-TX and 1A-RCV will be used throughout this document. In an WaveStar OLS 40G system, one end terminal will always have lines A (1A, 2A, etc.) transmitting to and the opposite end will have lines A receiving from the outside plant fiber.

1A-TX End Terminal

Figure 2-14, on page 2-19 shows the WaveStar OLS 40G shelf configuration for 1A-TX end terminal applications. As an end terminal there are two telemetry circuit packs (TLM), two optical multiplexer units (OMU), two optical demultiplexer units (ODU), and four optical amplifiers (OA) for transmission. The 1A-TX application places the OMU to the left of the ODU for each line. The system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped based on the cabinet application type (4-line vs. dual 2-line). Mechanical keying prevents the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

1A-TX-THRU End Terminal

This is the same as a 1A-TX End Terminal except that it has two additional telemetry packs in slots 1B and 2B for the 4-fiber Telemetry Feed-Through feature. Or one additional telemetry pack in slot 1B for the 2 fiber Telemetry Feed-Through feature.

1A-RCV End Terminal

Figure 2-15. on page 2-20 shows the WaveStar OLS 40G shelf configuration for 1A-RCV end terminal applications. As an end terminal there are 2 telemetry circuit packs (TLM), 2 optical multiplexer units (OMU), 2 optical demultiplexer units (ODU), and 4 optical amplifiers (OA) for transmission. The 1A-RCV application places the ODU to the left of the OMU for each line. The system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped based on the cabinet application type (4-line vs. dual 2-line). Mechanical keying prevents the SYSMEM, SYSCTL, and TOHCTL circuit packs from being inserted into incorrect slots.

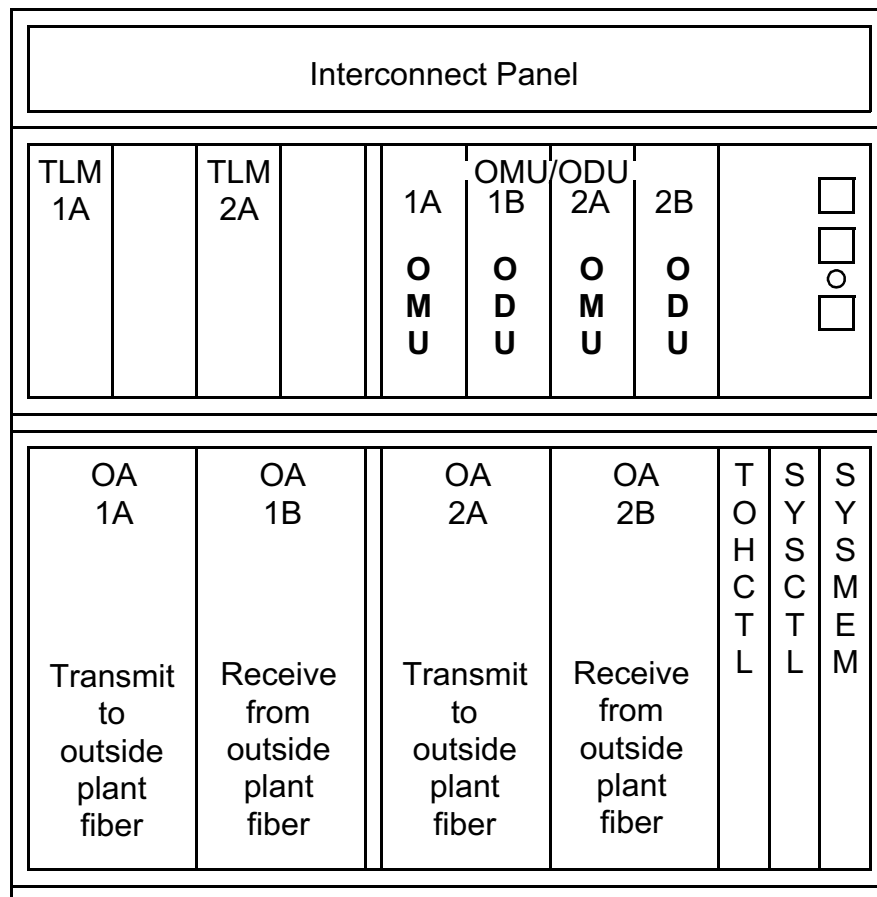


Figure 2-14. End Terminal Configured Shelf (1A-TX)

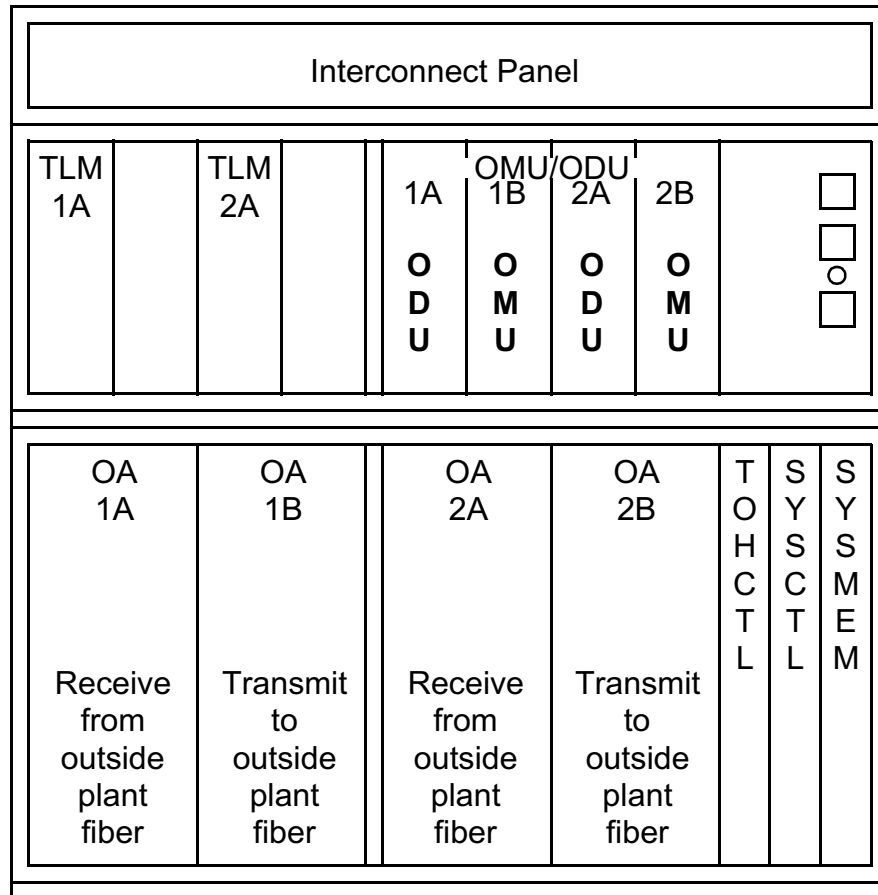


Figure 2-15. End Terminal Configured Shelf (1A-RCV)

1A-RCV-THRU End Terminal

This is the same as a 1A-RCV End Terminal except that it has two additional telemetry packs in slots 1B and 2B for the 4-line Telemetry Feed-Through feature. Or one additional telemetry pack in slot 1B for the 2 fiber Telemetry Feed-Through feature.

Figure 2 - 16 shows the WaveStar OLS 40G shelf configuration for repeater applications. As a repeater there are 4 telemetry circuit packs (TLM) and 4 optical amplifiers (OA) for transmission. The lack of OMU or ODU circuit packs and presence of all 4 TLM circuit packs signify the repeater application. The system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped based on the cabinet application type (4-line vs. dual 2-line). Mechanical keying prevents the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

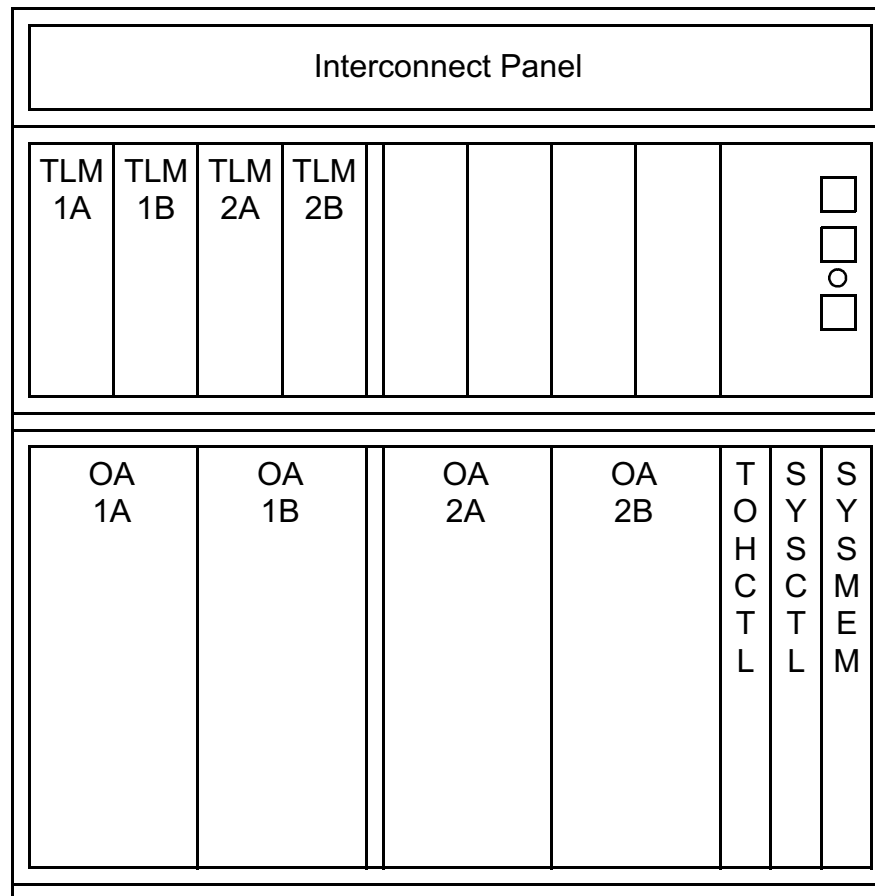


Figure 2-16. Repeater Configured Shelf

Dual Facing Shelf

Figure 2-17. on page 2-22 shows the WaveStar OLS 40G shelf configured as a Dual Facing Shelf. There are 2 telemetry packs, 4 OAs, 2 ODUs and 2 OMUs needed for this application. The system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped. Mechanical keying prevents the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

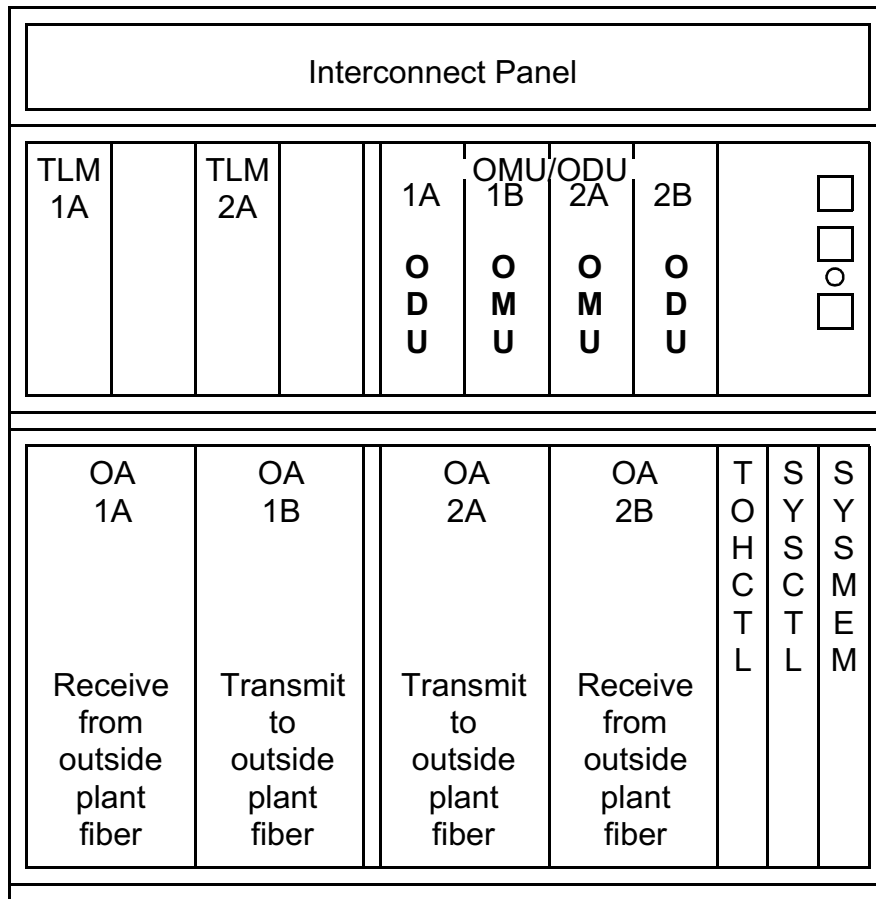


Figure 2-17. Dual Facing Configured Shelf

One OA WaveStar OLS 40G 1A-RCV End Terminal

Figure 2-18. on page 2-24 shows the WaveStar OLS 40G shelf configuration for One OA 1A-RCV end terminal applications. As an end terminal, there are 2 telemetry circuit packs (TLM), 2 optical multiplexer units (OMU), 2 optical demultiplexer units (ODU), and 2 optical amplifiers (OA) for transmission. The 1A-RCV application places the ODU to the left of the OMU for each line. The system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped. Mechanical keying prevents the SYSMEM, SYSCTL, and TOHCTL circuit packs from being inserted into incorrect slots.

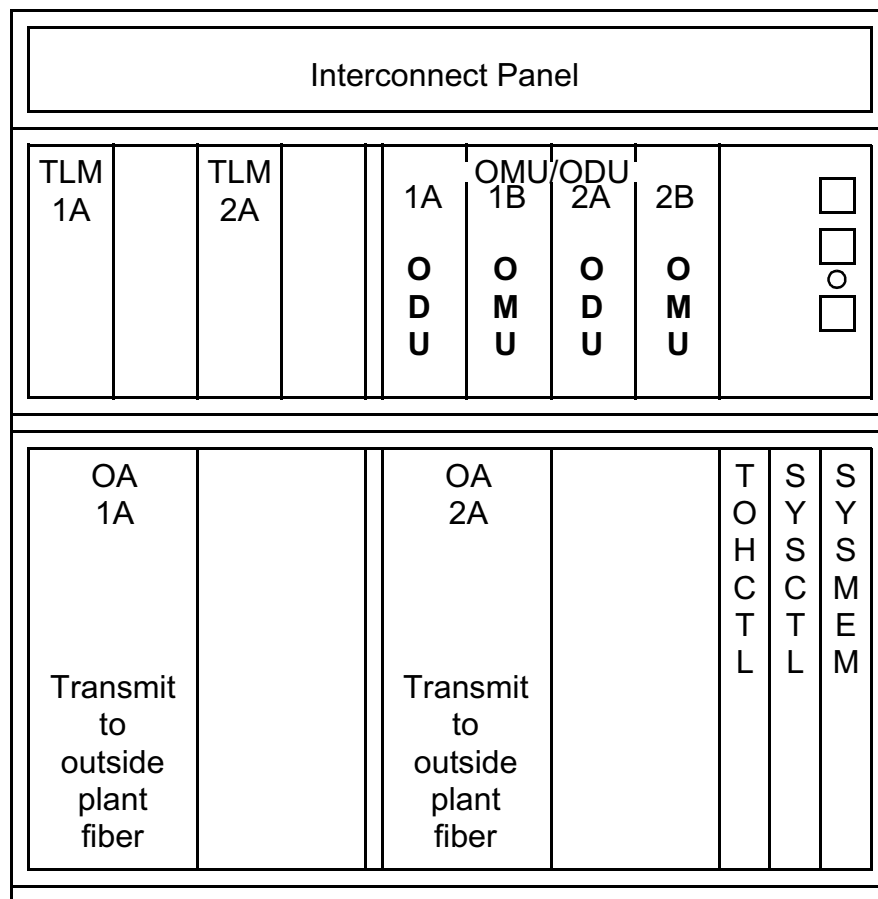


Figure 2-18. One OA End Terminal Configured Shelf (1A-RCV)

One OA WaveStar OLS 40G 1A-Tx End Terminal

Figure 2-19. on page 2-25 shows the WaveStar OLS 40G shelf configuration for One OA 1A-TX end terminal applications. As a single OA end terminal, there are 2 telemetry circuit packs (TLM), 2 OMUs, 2 ODUs, and 2 OAs. The 1A-TX application places the OMU to the left of the ODU for each line. The system controller (SYSCCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are equipped based on the cabinet application type. Mechanical keying prevents the SYSCCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

**NOTE:**

The OAs must be placed in the B slots to provide ODU temperature control.

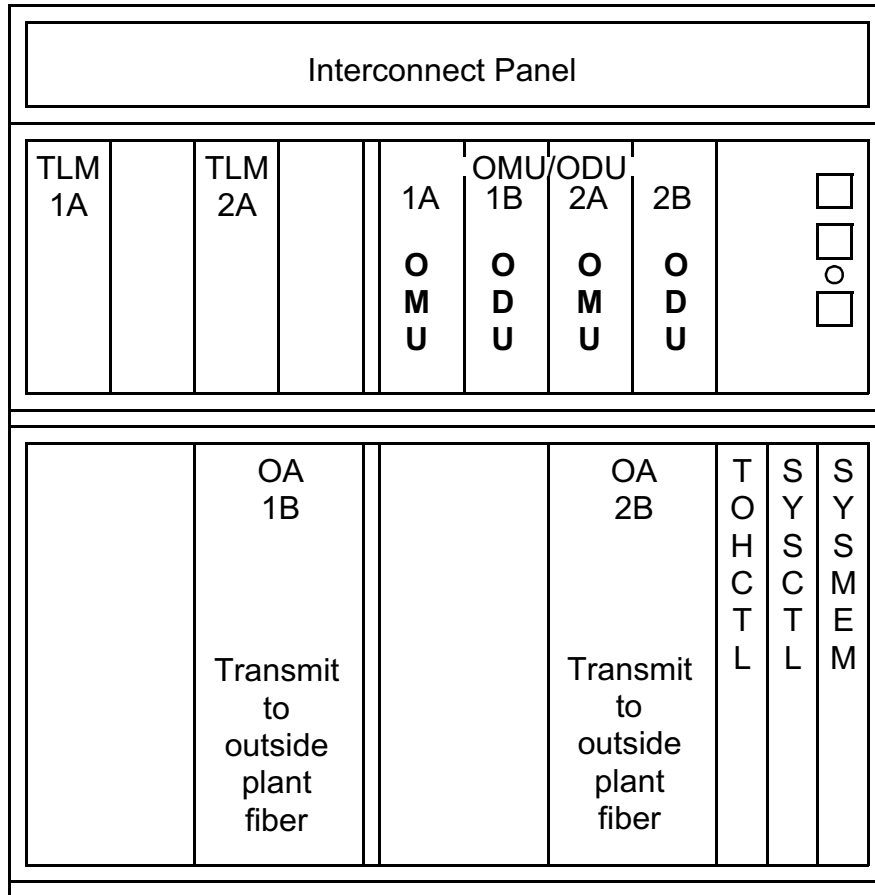


Figure 2-19. One OA End Terminal Configured Shelf (1A-TX)

Two OA/One OA WaveStar OLS 40G Dual Facing Shelf

Figure 2-20. on page 2-26 shows a Dual Facing Shelf configured for Two OA operation on its line-1 side and One OA operation on its line-2 side. As a Dual Facing Shelf, required are 2 Telemetry packs (TLM), 3 OAs (2 for line 1, 1 for line 2), 2 ODUs, and 2 OMUs. The system controller (SYSCTL), system memory (SYSTEM), and tributary overhead controller (TOHCTL) circuit packs are equipped. Mechanical keying prevents

the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

⇒ **NOTE:**

Notice the placement of the OMUs and ODUs and OA 2B.

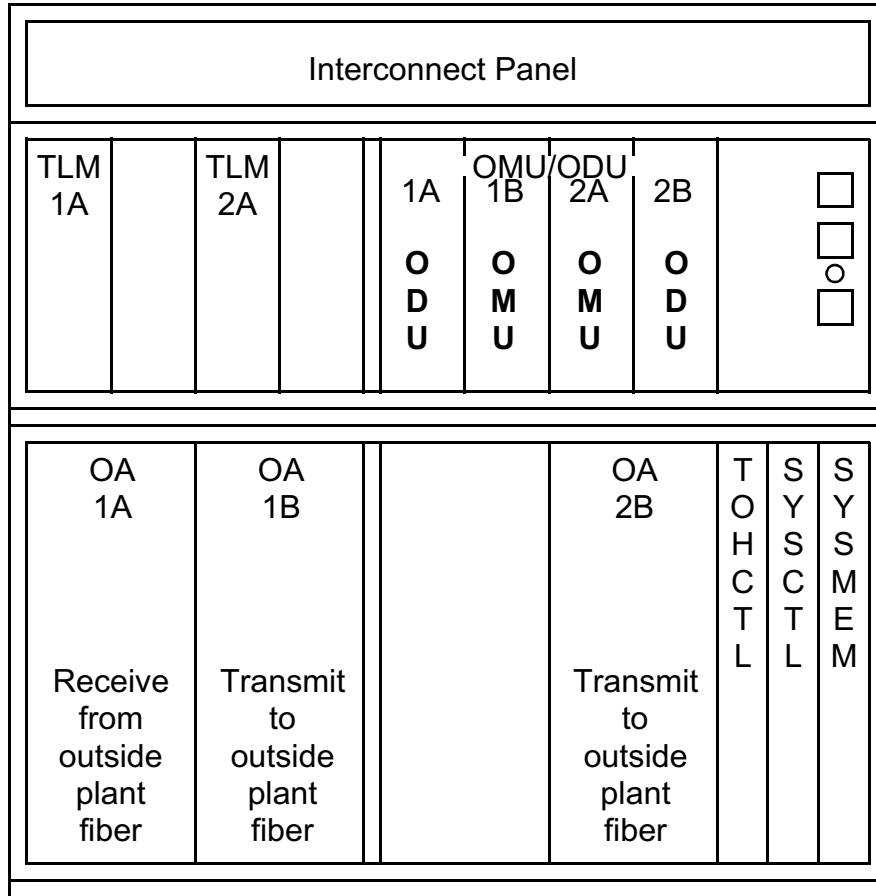


Figure 2-20. Two OA/One OA Dual Facing Configured Shelf

One OA/Two OA WaveStar OLS 40G Dual Facing Shelf

Figure 2-21, on page 2-27 shows a Dual Facing Shelf configured for One OA operation on its line-1 side and Two OA operation on its line-2 side. As a Dual Facing Shelf, 2 Telemetry packs (TLM), 3 OAs (1 for line 1, 2 for line 2), 2 ODUs, and 2 OMUs are required. The system controller (SYSCTL), system memory (SYSMEM), and tributary

overhead controller (TOHCTL) circuit packs are equipped. Mechanical keying prevents the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots.

⇒ NOTE:

Notice the placement of the OMUs and ODUs and OA 1A.

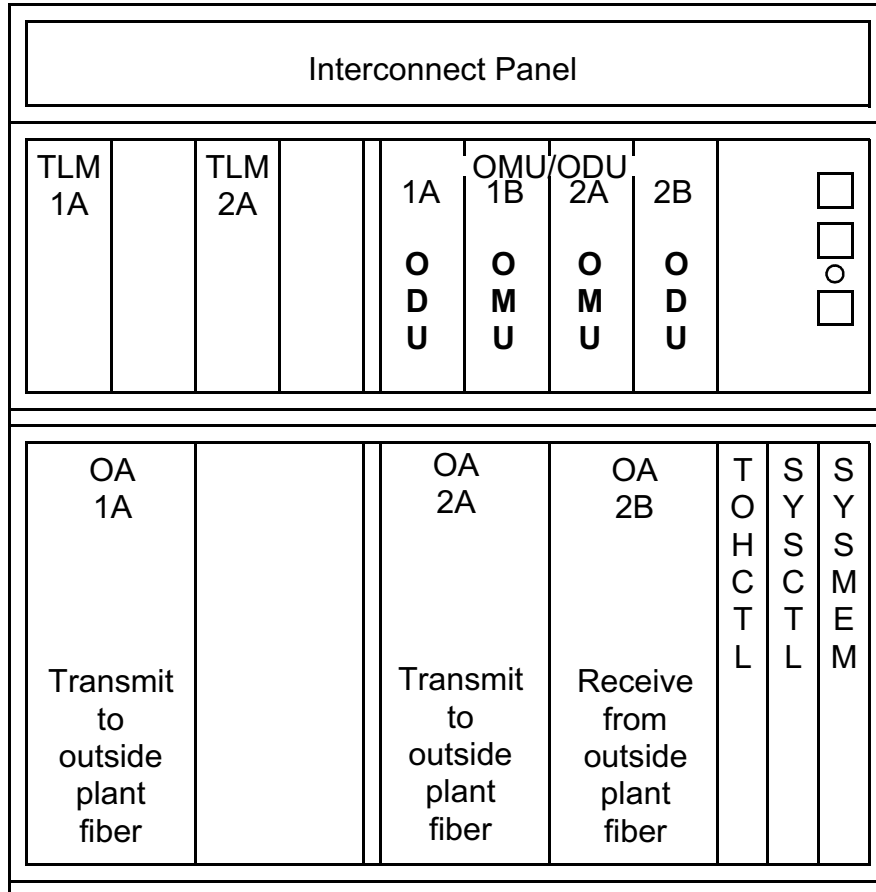


Figure 2-21. One OA/Two OA Dual Facing Configured Shelf

One OA/One OA WaveStar OLS 40G Dual Facing Shelf

Figure 2-22. on page 2-28 shows a Dual Facing Shelf configured for One OA operation on its line-1 side and One OA operation on its line-2 side. As a Dual Facing Shelf, 2 Telemetry packs (TLM), 2 OAs (1 for line 1, 1 for line 2), 2 ODUs, and 2 OMUs. The

system controller (SYSCTL), system memory (SYSMEM), and tributary overhead controller (TOHCTL) circuit packs are also equipped. Mechanical keying prevents the SYSCTL, SYSMEM, and TOHCTL circuit packs from being inserted into incorrect slots. The OAs must be placed in slots to provide ODU temperature control.

NOTE:

Notice the placement of the OMUs and ODUs and OA 1A and OA 2B.

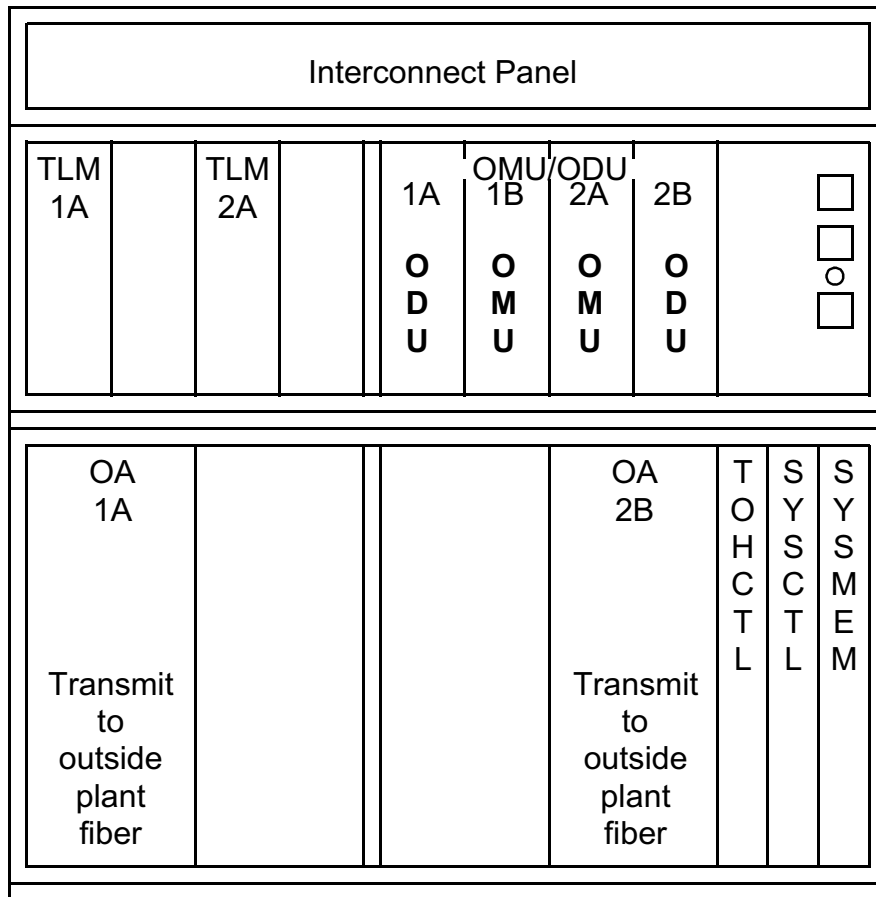


Figure 2-22. One OA/One OA Dual Facing Configured Shelf

WaveStar OLS 40G Interconnection Panel

The top of the WaveStar OLS 40G shelf contains the interconnection panel for Operations, Administration, Maintenance, and Provisioning (OAM&P) connections. Figure 2 - 23 shows the interconnection panel.

Except for power, all the cabling entering the interconnection panel is connectorized with D-subminiature connectors. Power cables are connected using push-on type connectors.

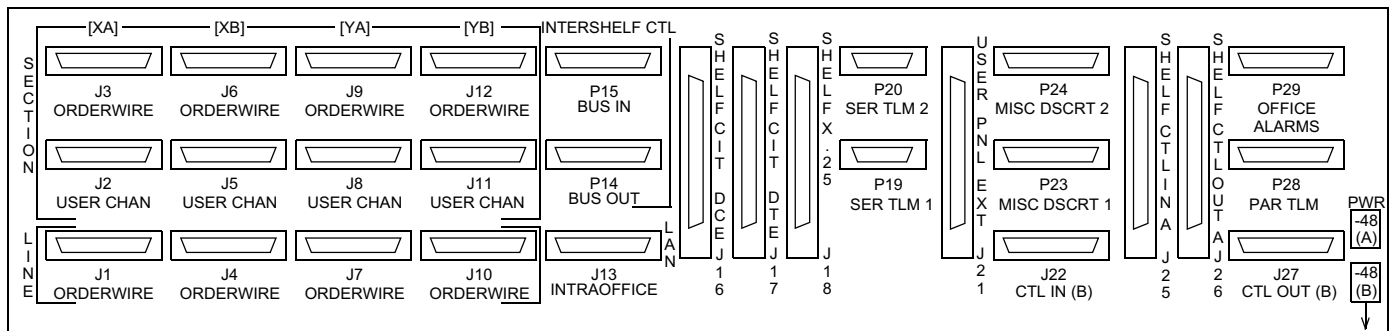


Figure 2-23. OLS Interconnection Panel

Shelf Interfaces

Front cable access is provided through the interconnection panel. The interconnection panel provides the following interfaces:

- **X.25:** 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 and SER TLM 2:** These connectors provide a serial telemetry interface that uses telemetry byte-oriented serial (TBOS) protocol. SER TLM 1 will provide an interface to the External Miscellaneous Discrete Unit (EMDU) for Release 2.0 or later. SER TLM 2 is not currently used.
- **OFFICE ALMS:** This connector provides an interface to the local office audible and visible alarms.
- **PAR TLM:** This connector provides an interface to an operations center for alarm information.
- **MISC DSCRT 1 and MISC DSCRT 2:** 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 WaveStar OLS 40G.

- CIT-(DTE): This connector provides an interface to a modem that allows dial-up CenterLink Management Console (CMC) access.
- CIT-(DCE): This connector provides an interface to the CMC (DCE) port behind the right front door that allows local access.
- USER PNL EXT: This connector provides an interface to the alarm and status indicators and ACO switch on the indicator strip.
- SECTION USER CHAN LINE (XA), LINE (XB), LINE (YA), and LINE (YB): These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-3 supervisory signal.
- SECTION ORDERWIRE LINE (XA), LINE (XB), LINE (YA), and LINE (YB): 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), LINE (XB), LINE (YA), and LINE (YB): 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.
- INTRAOFFICE LAN LINE (X) and LINE (Y): These connectors are reserved for use in a future release.
- PWR: These connectors provide an interface to the -48V DC power filters behind the fuse panel. The power cables are connected to radio frequency (RF) filters on the interconnection panel using push-on type connectors .

WaveStar OLS 40G Shelf Fuse Panel for OLS Cabinets

Figure 2-24 shows the fuse panel from the WaveStar OLS 40G shelf when mounted in a WaveStar OLS 40G cabinet. It contains the A and B bus fuses, an ESD jack, shelf identification label, and the line identification label.

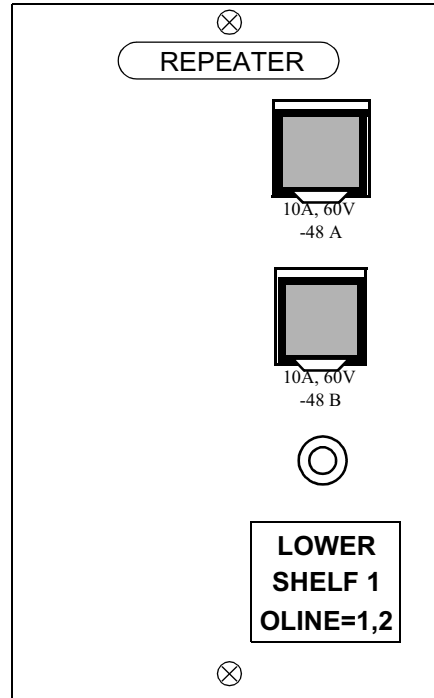


Figure 2-24. Shelf Fuse Panel for WaveStar OLS 40G Cabinets (Repeater Application Shown)

Miscellaneously Mounted OLS Shelf

Figure 2-25, on page 2-32 shows the Miscellaneously Mounted Shelf with its Wave Pattern covers, mounting brackets and associated Heat Baffle.

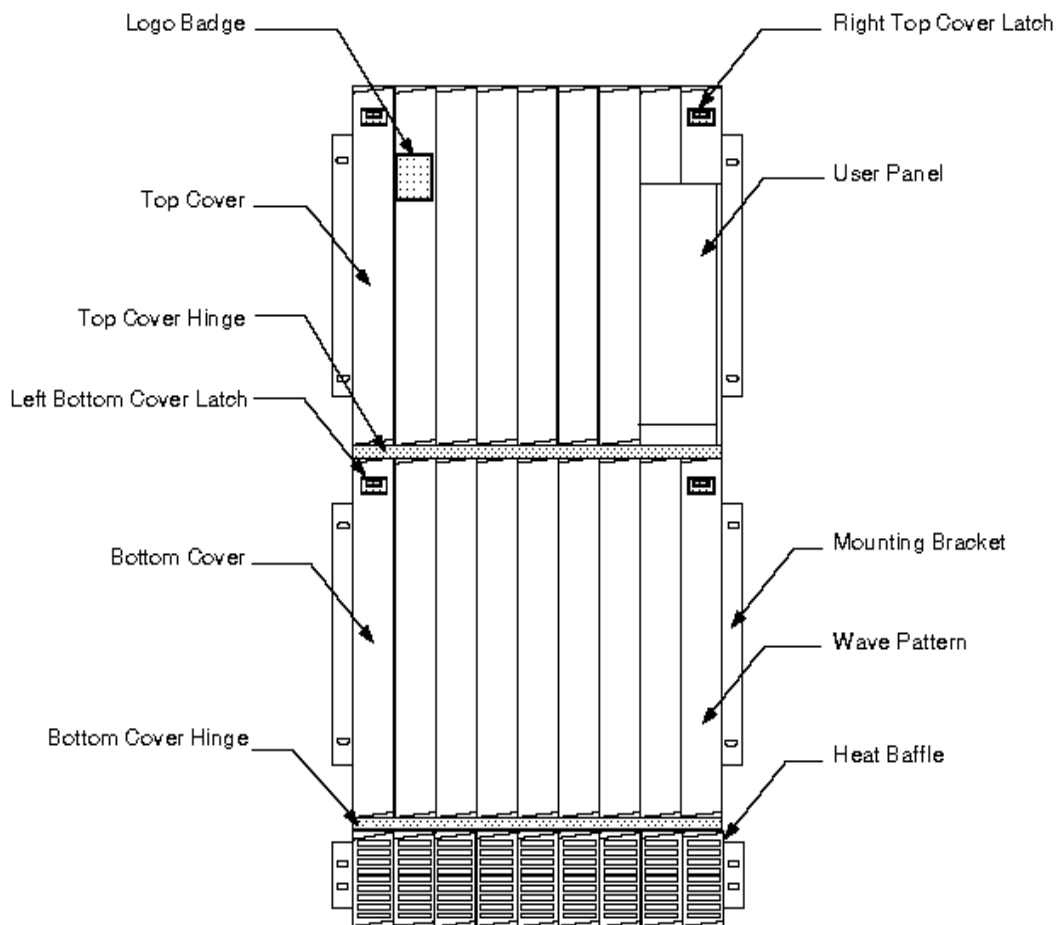


Figure 2-25. Miscellaneously Mounted WaveStar OLS 40G Shelf

WaveStar OLS 40G Miscellaneously Mounted Shelf User Panel

Each miscellaneously mounted shelf has a user panel located at the upper right-hand corner of the shelf. On this user panel are the shelf fuses, LEDs for displaying alarm and status information and an RS232 connector for interfacing with CenterLink Management

Console. Connectorized cabling connects the indicator strip to the shelf or shelves. See Figure 2 - 26.

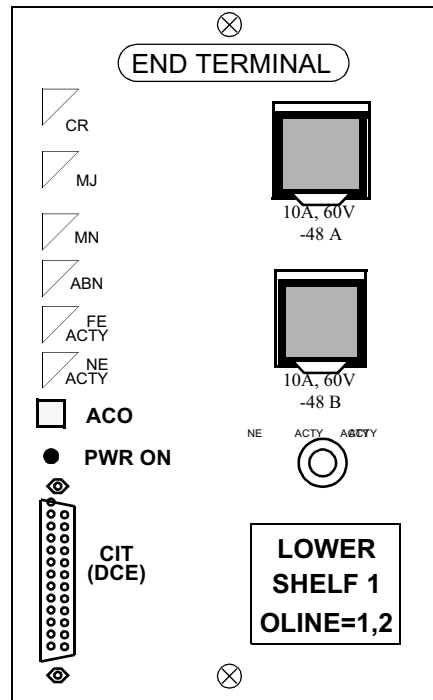


Figure 2-26. OLS Miscellaneous Mount User Panel

OT Shelf Descriptions

The OT cabinet is comprised of the following three (3) shelves: the System Controller Shelf, Complementary Shelf 1 and Complementary Shelf 2.

System Controller Shelf Description

The System Controller Shelf is powered by two independent -48 Volt power sources (A & B), each independently fused for 10 Amps, and each having a power filter with a low voltage shutoff. The low voltage shutoff occurs at a nominal voltage of -38 volts with a turn on of -42 volts nominal. A miscellaneous discrete alarm is provided with each filter to indicate when a fuse failure or a low voltage shutoff occurs.

The shelf provides slots to hold eight (8) OTU or four (4) QOTU circuit packs. Each slot is defined by a numbered designation label. Three additional slots have been provided for the OT control circuit pack. (OTCTL).

The System Controller Shelf is the lowest shelf in the OT cabinet and is shown in Figure 2-27. on page 2-34, "OT System Controller Shelf."

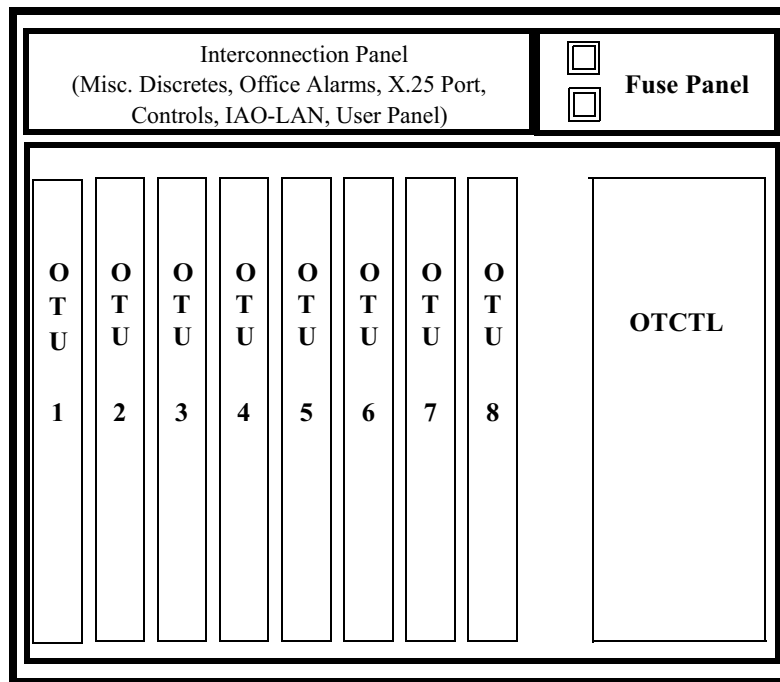


Figure 2-27. OT System Controller Shelf

Complementary Shelf 1 and 2

Each Complementary Shelf is powered by two independent -48 Volt power sources (A&B), each independently fused at 10 Amps, and each having a power filter with a low voltage shutoff. The low voltage shutoff occurs at a nominal voltage of -38 volts with a turn on of -42 volts nominal. A miscellaneous discrete alarm is provided with each filter to indicate when a fuse failure or low voltage shutoff occurs.

Each shelf supplies slots to hold up to twelve (12) OTU or six (6) QOTU circuit packs. On Complementary Shelf 1 the slots are labeled OTU 9 through OTU 20 while Complementary Shelf 2 has slots 21 through 32. Complementary Shelf 1 is the middle shelf within the OT cabinet while Complementary Shelf 2 is the upper shelf.

Complementary Shelf 1 and 2 are shown in Figure 2-28. on page 2-35, "OT Complementary Shelf 1," and Figure 2-29. on page 2-36, "OT Complementary Shelf 2" respectively.

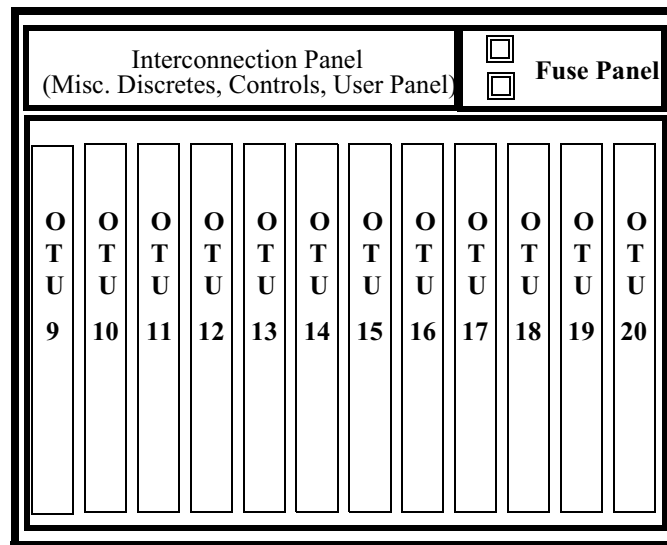


Figure 2-28. OT Complementary Shelf 1

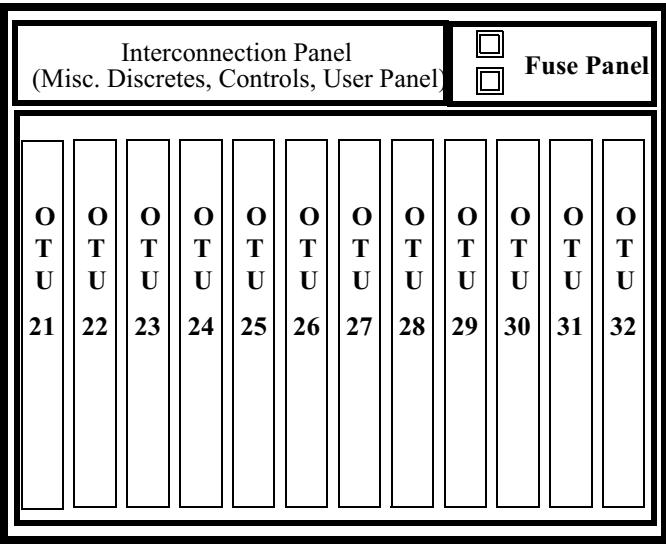


Figure 2-29. OT Complementary Shelf 2

OT Interconnection Panel

The top of each OT shelf contains an interconnection panel to provide interconnections between the three shelves and to provide external interfaces for the OT functions. Except for power, all the cabling entering the interconnection panel is connectorized with D-subminiature connectors. Power cables use a push-on type connector and are factory installed in the OT cabinet (List 1). All access to the connectors is from the front.

Shelf Interfaces

The shelf interfaces for the two Complementary Shelves 1 and 2 are identical and active for R3-WaveStar OLS 40G/OT. The System Shelf has a different interconnection panel with some interfaces active and others available for future releases.

Complementary Shelf Interfaces:

The interconnection panel for Complementary Shelves 1 and 2 is shown in Figure 2-30. on page 2-37, "OT Complementary Shelf Interconnection Panel".

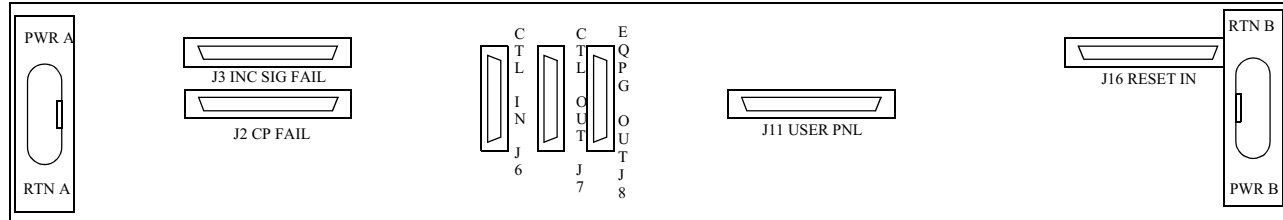


Figure 2-30. OT Complementary Shelf Interconnection Panel

The following external interface connectors are active and used in R3.0:

- **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. If a LUD1 OT Controller is used, the alarms are reported to the OLS negating the need to use this connector.
- **CP FAIL J2:** This connector provides an interface to the Circuit Pack Failure Miscellaneous Discrete relay contacts located on each OTU within the shelf. If a LUD1 OT Controller is used, the alarms are reported to the OLS negating the need to use this connector.
- **PWR:** These connectors provide an interface to the -48V DC power filters from source A and source B. They are installed at the factory for List 1 OT with cabinet.
- **USER PNL J11:** Used to power "PWR ON" LED indicator.
- **OT Shelf Interconnections J6, J7, J8, and J16:** These connectors are used to interconnect to other OT shelves.

System Shelf Interfaces:

The interconnection panel for the System Shelf is shown in Figure 2-31. on page 2-38, "OT System Shelf Interconnection Panel".

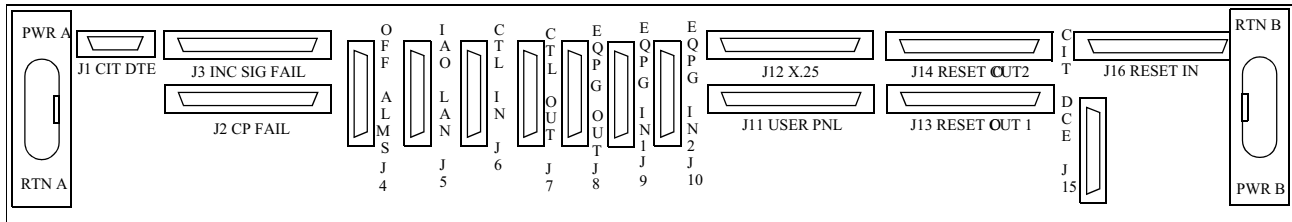


Figure 2-31. OT System Shelf Interconnection Panel

The following external interface connectors are active and used in R3.0.

- **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. If a LUD1 OT Controller is used, the alarms are reported to the OLS negating the need to use this connector.
- **CP FAIL J2:** This connector provides an interface to the Circuit Pack Failure Miscellaneous Discrete relay contacts located on each OTU within the shelf. If a LUD1 OT Controller is used, the alarms are reported to the OLS negating the need to use this connector.
- **PWR:** These connectors provide an interface to the -48V DC power filters from source A and source B. They are installed at the factory.
- **USER PNL J11:** Used to power "PWR ON" LED indicator.
- **OT Shelf Interconnections J7, J9, J10, J13, and J14:** These connectors are used to interconnect the System Shelf to the other two OT shelves.
- **WaveStar OLS 40G/OT Connections J5, J6, J8, and J16:** These connectors are used to interconnect the OT to the WaveStar OLS 40G or another OT bay when using the LUD1 OT Controller.

The following connectors are provided but not used in Release 1 through 3 and are reserved for future applications: X.25 J12, OFF ALMS J4, CIT DCE J15, and CIT DTE J1.

OT Cabinet Fuse Panel

Each shelf in the OT cabinet has its own fuse panel. The fuse panels for each shelf have a common design and are identical. Each fuse panel contains the A and B bus fuses and labeling identifying the fuse amperage and voltage.

Under normal conditions, power is supplied to the shelf from both the A and B supplies. Should there be a fuse failure, the fuse capacity is sufficient to handle the current supplied from one source. The cover on the fuse holder will illuminate during a fuse failure to indicate that the fuse is blown.

The fuse panel is shown in Figure 2-32. on page 2-39, "OT Cabinet Fuse Panel".

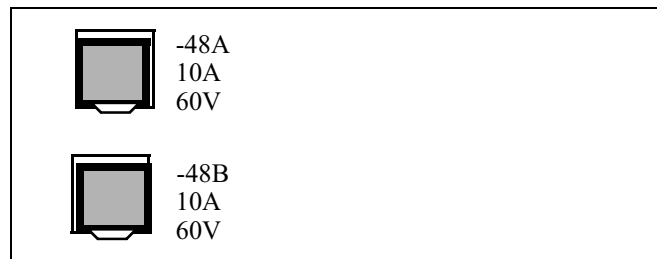


Figure 2-32. OT Cabinet Fuse Panel

OT Power Filter

Power Filters are provided for the A and B power sources on each shelf. they are wired in series with the respective fuses for each source. Each filter has a low voltage cutoff that will operate at a nominal -38 Volts and turn back on at -42 Volts nominal. A miscellaneous discrete contact is provided with each filter so a fuse failure or low voltage cutoff may be reported independently for each power source.

Miscellaneously Mounted OT

The miscellaneously mounted versions of OT (List 10 through List 13) are provided for applications requiring mounting other than an OT cabinet. The bay frame is supplied by the customer or ordered separately. The miscellaneously mounted versions would be used in applications where space is limited. The shelves must be mounted on site and the interconnecting wiring must be installed on site.

The miscellaneously mounted OT shelves are identical to the shelves in the OT cabinet except for the following differences:

- The power on indicators that were on the cabinet indicator strip are incorporated within the fuse panels.
- Each shelf is equipped with a heat baffle mounted below each shelf.

- The ESD jack mounted on the cabinet frame is incorporated within the fuse panel for each shelf.

Figure 2-33. on page 2-40, "Miscellaneously Mounted OT (List 10)," shows a miscellaneously mounted OT mounted to an 800 Type bayframe.

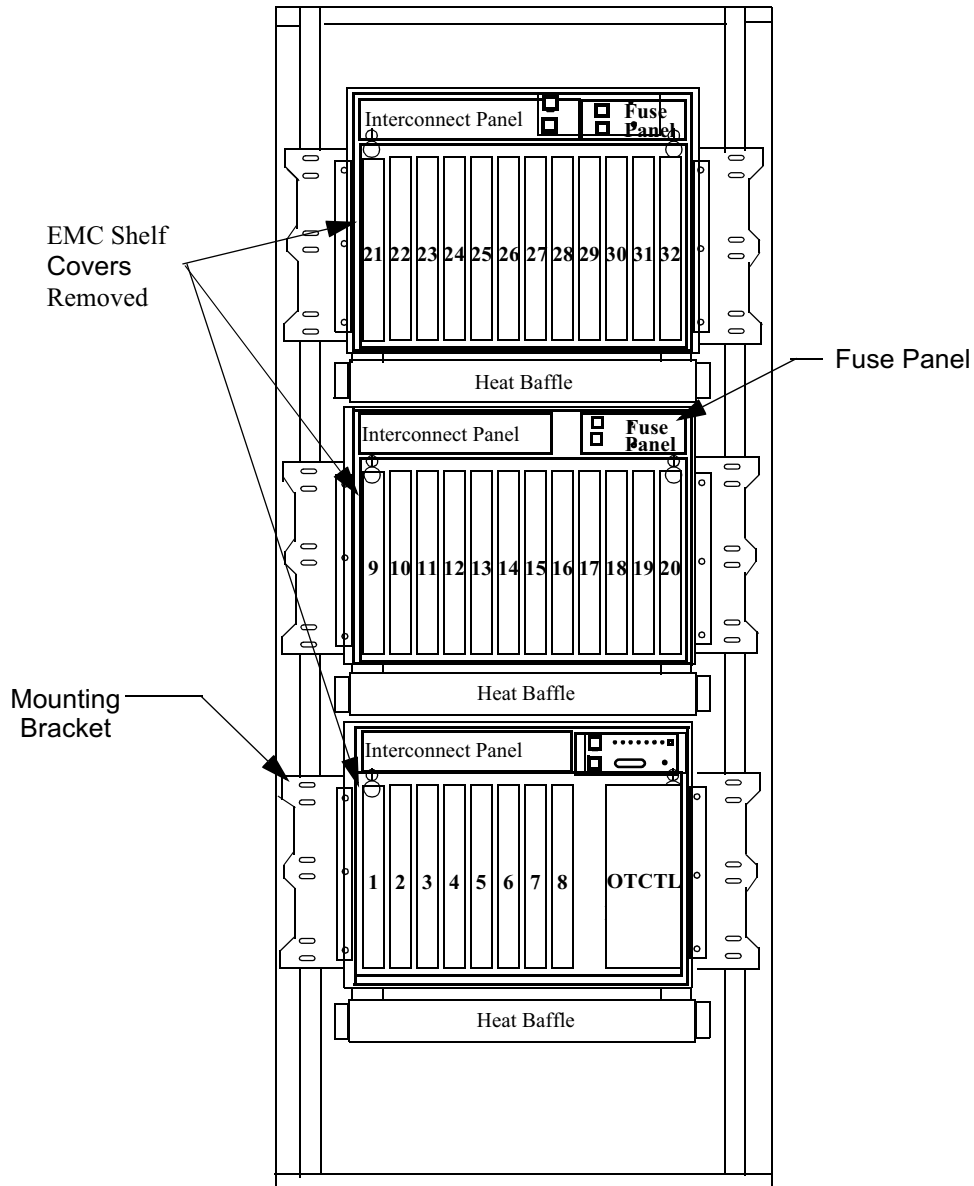


Figure 2-33. Miscellaneously Mounted OT (List 10)

Figure 2 - 34 shows the fuse panel for the miscellaneously mounted OT. The power indicators that were located at the top of the OT cabinet are now located at this panel. An ESD grounding jack is provided with each panel. All three OT shelves have identical fuse panels.

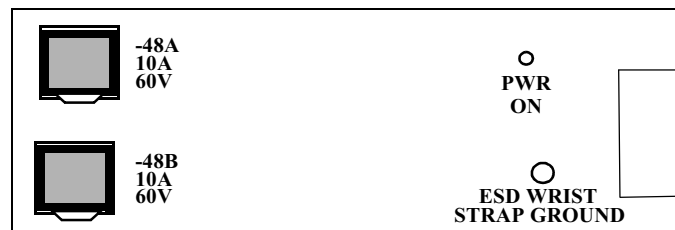


Figure 2-34. OT Miscellaneously Mounted Shelf Fuse Panel

Available Versions of Miscellaneously Mounted Shelves

- List 10 - Includes the System Controller Shelf with Complementary Shelves 1 and 2. Power cables and shelf interconnecting cables are provided.
- List 11 - Includes the System Controller Shelf and single shelf power cables.
- List 12 - Includes Complementary Shelf 1, single shelf power cables, and interconnecting cables to the System Controller Shelf. The List 12 is provided to handle system growth beyond a single System Controller Shelf. It is assumed that the system already has a System Controller Shelf installed.
- List 13 - Includes Complementary Shelf 2, a set of single shelf power cables, and interconnecting cables to the System Controller Shelf and Complementary Shelf 1. The List 13 is provided to handle system growth beyond a System Controller Shelf and Complementary Shelf 1. It is assumed that the system already has a System Controller Shelf and a Complementary Shelf 1 is installed.

E - Circuit Pack Descriptions & Addresses

WaveStar OLS 40G Circuit Pack/Unit Descriptions

System Controller Circuit Pack

The LEA1 SYSCTL circuit pack and the system memory circuit pack provide the highest level of system control for OLS. The SYSCTL provides system-level user and operations systems interfaces and performs system-wide maintenance computations such as performance monitoring. It contains the circuitry for all serial interfaces (X.25, CIT(CMC), TBOS).

System Memory Circuit Pack

The LEA2 SYSMEM circuit pack provides memory support for the system controller. It contains erasable programmable read-only memory (EPROM) for nonvolatile storage of the user-provisioned data and the system state and a flash EPROM for nonvolatile storage of the software for the entire system. The SYSMEM contains the circuitry for the indicator strip, parallel telemetry, miscellaneous discretes, and office alarms.

Tributary Overhead Controller Circuit Pack

The LEA5 TOHCTL circuit pack processes the SONET Section overhead (D1-D3) of the supervisory channel. It interfaces with the transmission overhead on the TLM circuit pack to deliver and receive Data Communications Channel (DCC) data and it interfaces to the system controller complex by means of the Overhead Access Local Area Network (OALAN).

Optical Amplifier Circuit Packs

All of the Optical Amplifier circuit packs do the following:

- provide the power monitors on the optical monitor point provided by the internal amplifier module.
- control the pump lasers which controls the OA output power.
- provide temperature control for the ODUs.

The LEA6 OA circuit pack:

- amplifies the optical signal a maximum of 33 dB for a maximum output power of +17 dBm with 8 wavelengths equipped.

- provides input and output ports for the supervisory signal.

⇒ NOTE:

In Release 3, the Optical Line System can be configured with up to 9 spans. The span loss and number of wavelengths determines which optical amplifiers are used. Refer to Table 2-4 on page 2-60.

The LEA7 OA circuit pack:

- amplifies the optical signal a maximum of 33 dB or 24 dB for a maximum output power of +17 dBm with 16 wavelengths equipped.
- provides input and output ports for the supervisory signal.
- has automatic power shut down.

Figure 2-35 on page 2-45, "Optical Amplifier Faceplates," shows the OA circuit pack faceplate.

The LEA104 OA circuit pack:

- amplifies the optical signal a maximum of 33 dB for a maximum output power of +19.5 dBm with 16 wavelengths equipped.
- provides input and output ports for the supervisory signal
- has automatic power shut down.

The LEA105 OA circuit pack:

- provides a shorter fiber span distance (typically 10 to 40 km) between network elements
- provides an input port only for the supervisory signal.
- has automatic power shut down.
- used for for single amplifier applications.

Telemetry Circuit Pack

The LDA1 TLM circuit pack provides the ninth/seventeenth wavelength used in the WaveStar OLS 40G. This is the supervisory signal and is used for fault location and maintenance functions. In addition, an IS-3 customer maintenance signal interface is provided to allow site-to-site customer specific data. Figure 2-36 on page 2-46, "WaveStar OLS 40G OMU, ODU, And TLM Faceplates," shows the TLM circuit pack faceplate.

Optical Multiplexing Unit

8 Wavelength - The 505A OMU is used at end terminal sites to combine the 8 incoming SONET/SDH signals into one optical signal called the optical line signal. There is no board controller or FAULT LED on the unit. Figure 2-36 on page 2-46 shows the OMU faceplate.

16 Wavelength - The 506A OMU is used at end terminal sites to combine the 16 incoming SONET/SDH signals into one optical signal called the optical line signal. There is no

board controller or FAULT LED on the unit. Figure 2-36 on page 2-46 shows the OMU faceplate.

Optical Demultiplexing Unit

8 Wavelength - The 605A ODU is used at end terminal sites to demultiplex the 8 dropside signals from the optical line signal. There is no board controller or FAULT LED on the unit. The OA unit provides the temperature monitor/control circuit for the ODU unit. Figure 2-36 on page 2-46 shows the ODU faceplate.

16 Wavelength (No supervisory out port) - The 606A ODU is used at end terminal sites to demultiplex 16 dropside signals from the optical line signal. There is no board controller or FAULT LED on the unit. The OA unit provides the temperature monitor/control circuit for the ODU unit. Figure 2-36 on page 2-46 shows the 606A ODU faceplate.

16 Wavelength - The 606B ODU is used at 1_0A end terminal sites to demultiplex the 16 dropside signals from the optical line signal where the LEA105 is used. There is no board controller or FAULT LED on the unit. The transmit OA unit will provide the temperature monitor/control circuit for the ODU unit. Figure 2-36 on page 2-46 show the 606B ODU faceplate.

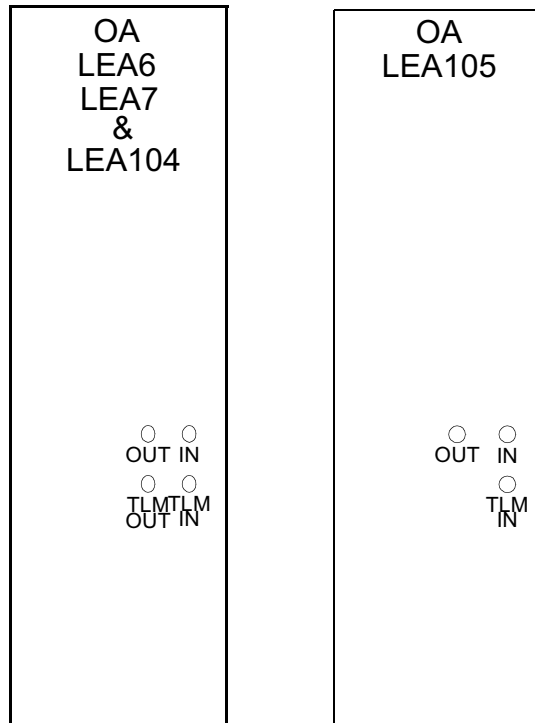


Figure 2-35 Optical Amplifier Faceplates

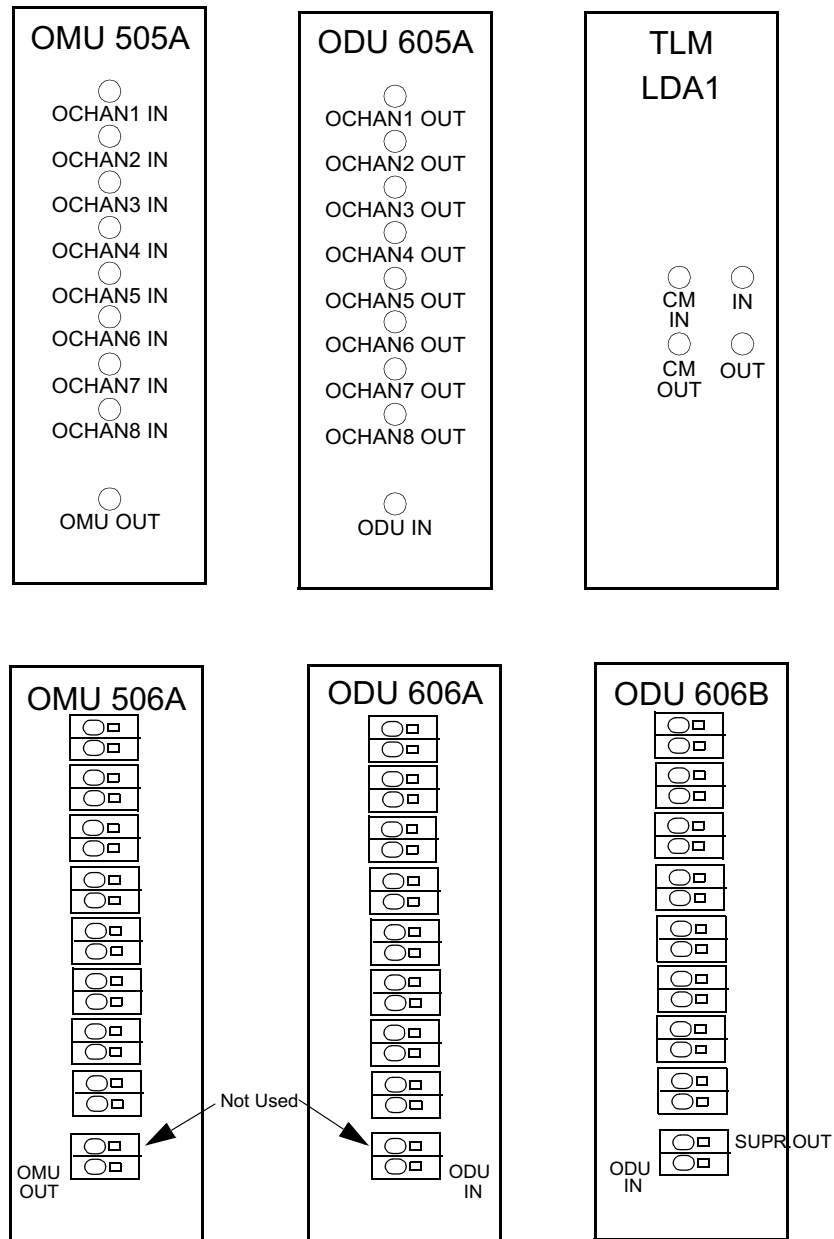


Figure 2-36 WaveStar OLS 40G OMU, ODU, And TLM Faceplates

WaveStar OLS 40G Circuit Pack Addresses

Each circuit pack in the WaveStar OLS 40G (the OMU and ODU are units not circuit packs) has a unique address for the alarm system called an access identifier (AID). Figure 2-37 on page 2-47 shows the AIDs by cabinet type. Another available combination (not shown) is the End Terminal and Repeater Cabinet. This combination uses shelf 1 from an End Terminal cabinet as the lower shelf and shelf 1 from a repeater cabinet as the upper shelf.

UPPER SHELF	UPPER SHELF	UPPER SHELF	UPPER SHELF
Shelf 2	Shelf 2	Shelf 2	Shelf 2
OA-3A, OA-3B OA-4A, OA-4B TLM-3A/B, TLM-4A/B	OA-3A, OA-3B OA-4A, OA-4B TLM-3A/B, TLM-3B/A TLM-4A/B, TLM-4B/A	OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-2A/B SYSCTL SYSTEM TOHCTL	OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-1B/A TLM-2A/B, TLM-2B/A SYSCTL SYSTEM TOHCTL
LOWER SHELF	LOWER SHELF	LOWER SHELF	LOWER SHELF
Shelf 1	Shelf 1	Shelf 1	Shelf 1
OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-2A/B SYSCTL SYSTEM TOHCTL	OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-1B/A TLM-2A/B, TLM-2B/A SYSCTL SYSTEM TOHCTL	OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-2A/B SYSCTL SYSTEM TOHCTL	OA-1A, OA-1B OA-2A, OA-2B TLM-1A/B, TLM-1B/A TLM-2A/B, TLM-2B/A SYSCTL SYSTEM TOHCTL
OLS End Terminal	OLS Repeater	OLS Dual End Terminal	OLS Dual Repeater
4 Bidirectional Lines	4 Bidirectional Lines	2 - 2 Bidirectional Lines	2 - 2 Bidirectional Lines

Figure 2-37 WaveStar OLS 40G Circuit Pack AIDs By Cabinet Type

OT Circuit Pack/Unit Descriptions

41A, 41B, 41C, 41D, & 41E Optical Translator Unit (OTU) Pack

The 41A(1-16)-type, 41C(1-16)-type, and 41D(1-16)-type Optical Translator Units (OTU) receive an OC-48 optical signal at its input, downconverts the signal to a 2.5 Gb/s electrical signal, strips away stray tones caused by intermodulation products, applies a new tone at a code specific frequency, upconverts to an optical signal, and outputs an WaveStar OLS 40G compatible OC-48 optical signal at a wavelength specified by its particular code. The input to all OTUs can receive optical signals in the 1310 nm and 1550 nm range. The WaveStar OLS 40G compatible output wavelength of the unit is specified by its code as shown in Table 2-2, "OTU Code versus Wavelength, Output Power, and Tone Frequency," on page 2-49 along with the output power range and tone frequency. With such a capability, OTUs may be used to regenerate the optical signal or provide Wavelength Add Drop (WAD) capability. The 41B-type, and 41E-type OTU translates a 1550 nm signal to a 1310 nm signal for WAD capability with 1310 nm equipment.

The faceplate of the OTU is shown in Figure 2-38 on page 2-50, "OTU and OTPM Faceplates". The OTU is shipped equipped with a Lightwave Build-out (LBO) for ST-Type connectors on the optical input and output. A fault LED is provided with each unit. When there is a loss of incoming signal or it has degraded severely, the LED is flashing. For software releases prior to Release 3.0, the flashing LED comes ON immediately after the 60 second initialization process and remains ON until an OC-48 or STM-16 signal is applied to the input. With Release 3.0 and beyond using the OT Controller, the OTU must be put "IN SERVICE" by applying an OC-48 or STM-16 signal to the input. When the signal is removed from an "IN SERVICE" OTU the fault light will start flashing. When the LED is on continuously, it indicates circuit pack failure. Each OTU comes equipped with two miscellaneous discrete relay contacts mounted on the board for remote sensing of incoming signal problems and circuit pack failure. Refer to Table 2-8, "Miscellaneous Discrete and Fault LED Conditions," on page 2-70 for more information on the operation of the fault LED and the miscellaneous discretes.

⇒ NOTE:

The 41A(1-16)B, 41C(1-16)B, 41A(1-16)C, 41C(1-16)C and/or 41BB **MUST** be used for Miscellaneous Mount Installations.

⇒ NOTE:

The 41A(1-16)C replaces the 41A(1-16) and 41A(1-16)B; the 41C(1-16)C replaces the 41C(1-16) and 41C(1-16)B.

⇒ NOTE:

Table 2-2 OTU Code versus Wavelength, Output Power, and Tone Frequency

OTU CODE	Center Wavelength (nm)	Output Power (dBm) +/- 0.7 dBm	Approximate Tone Frequency (KHz)
41A1C, 41C1C, 41D1	1549.32	-4.0	5
41A2C, 41C2C, 41D2	1550.92	-5.3	7
41A3C, 41C3C, 41D3	1552.52	-6.5	9
41A4C, 41C4C, 41D4	1554.13	-7.2	11
41A5C, 41C5C, 41D5	1555.75	-7.7	15
41A6C, 41C6C, 41D6	1557.37	-8.2	17
41A7C, 41C7C, 41D7	1558.98	-8.0	19
41A8C, 41C8C, 41D8	1560.61	-6.5	21
41A9C, 41C9C, 41D9	1548.52	-2.0	23
41A10C, 41C10C, 41D10	1550.12	-4.6	24
41A11C, 41C11C, 41D11	1551.72	-5.8	25
41A12C, 41C12C, 41D12	1553.33	-6.8	26
41A13C, 41C13C, 41D13	1554.94	-7.4	27
41A14C, 41C14C, 41D14	1556.56	-7.9	28
41A15C, 41C15C, 41D15	1558.17	-8.1	29
41A16C, 41C16C, 41D16	1559.79	-7.2	30
41BB, 41E	1280 to 1315	-2.0 to 2.5	NA

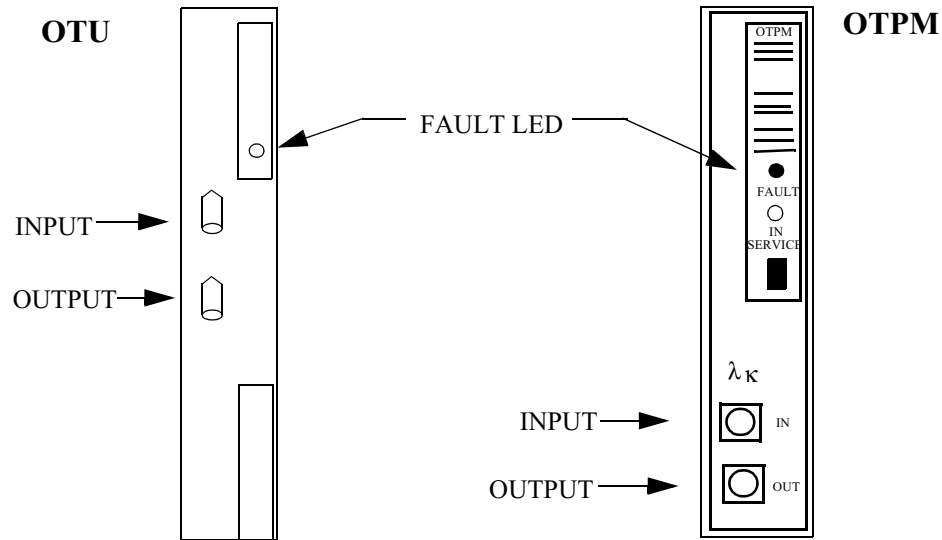


Figure 2-38 OTU and OTPM Faceplates

42A & 42B Type Optical Translator Port Module (OTPM)

Each of these Optical Translator Port Modules (OTPM) electrically regenerates a single input OC-12/STM-4 optical signal and inserts the tone required by WaveStar OLS 40G onto that signal. The sixteen 42Ax OTPM codes support the sixteen 1500 nm wavelengths on WaveStar OLS 40G systems with a total dispersion not exceeding 10,900 ps/nm.

This type of OTPM accepts any OC-12/STM-4 wavelength in the 1280-1335 nm or 1480-1580 nm range and converts it to an electrical STS-12 signal. The electrical STS-12 signal is reshaped, retimed, and amplified.

Each OTPM comes equipped with a green "IN SERVICE" LED on the faceplate which is inactive prior to Release 3.0 (refer to Figure 2-38 or Figure 2-39). With Release 3.0 and subsequent releases that are equipped with the OT Controller, the green "IN SERVICE" LED turns ON only after the seated OTPM has an OC-12/STM-4 signal applied to its input.

A fault LED is provided with each OTPM. When there is a loss of incoming signal or it has degraded severely, the LED is flashing. For software releases prior to Release 3.0, the flashing LED comes ON immediately after the 60 second initialization process and remains ON until an OC-12 or STM-4 signal is applied to the input. With Release 3.0 and

beyond using the OT Controller, the OTPM must first be put "IN SERVICE" by applying an OC-12 or STM-4 signal to the input causing the green "IN SERVICE" LED to be ON. When the signal is removed from an "IN SERVICE" OTPM the fault light will start flashing. When the LED is on continuously, it indicates circuit pack failure.

The 42B OTPM circuit pack generates a OC-12/STM-4 signal in the 1330 nm range for other OC-12/STM-4 receivers. For detailed information, refer to the APOG (Application, Planning and Ordering Guide, Section 10) for further information.

**NOTE:**

The OTPM circuit pack does not change the SONET overhead bytes and is not considered a SONET regenerator.

43A & 43B Type Optical Translator Port Module (OTPM)

Each of these Optical Translator Port Modules (OTPM) electrically regenerates a single input OC-3/STM-1 optical signal and inserts the tone required by WaveStar OLS 40G onto that signal. The sixteen 43Ax OTPM codes support the 1550 nm wavelengths on the WaveStar OLS 40G systems with total dispersion not exceeding 10,900 ps/nm.

This type of OTPM accepts any OC-3/STM-1 wavelength in the 1280-1335 nm or 1480-1580 nm range and converts it to an electrical STS-3 signal. The electrical STS-3 signal is reshaped, retimed, and amplified.

Each OTPM comes equipped with a green "IN SERVICE" LED on the faceplate which is inactive prior to Release 3.0 (refer to Figure 2-38 or Figure 2-39). With Release 3.0 and subsequent releases that are equipped with the OT Controller, the green "IN SERVICE" LED turns ON only after the seated OTPM has an OC-3/STM-1 signal applied to its input.

A fault LED is provided with each OTPM. When there is a loss of incoming signal or it has degraded severely, the LED is flashing. For software releases prior to Release 3.0, the flashing LED comes ON immediately after the 60 second initialization process and remains ON until an OC-3 or STM-1 signal is applied to the input. With Release 3.0 and beyond using the OT Controller, the OTPM must first be put "IN SERVICE" by applying an OC-3 or STM-1 signal to the input causing the green "IN SERVICE" LED to be ON. When the signal is removed from an "IN SERVICE" OTPM the fault light will start flashing. When the LED is on continuously, it indicates circuit pack failure.

The 43B OTPM circuit pack generates an OC-3/STM-1 signal in the 1330 nm range for other OC-3/STM-1 receivers. For more detailed information associated with the 43A and 43B OTPM circuit packs, refer to the Applications, Planning and Ordering Guide (APOG), Section 10, "Technical Specifications."

**NOTE:**

The OTPM circuit pack does not change the SONET overhead bytes and is not considered a SONET regenerator.

44A & 44B Type Optical Translator Port Module (OTPM)

Each of these Low-Speed Broadband (LSBB) Optical Translator Port Modules (OTPM) accepts any OC-3/STM-1, OC-12/STM-4, or 150-725 Mb/s optical signal, converts it to an electrical signal, amplifies the signal, inserts an identification tone required by WaveStar OLS 40G and produces the code specified optical output. The sixteen 44Ax OTPM codes support the 1500 nm wavelengths on the WaveStar OLS 40G systems with a total dispersion not exceeding 10,900 ps/nm. The 44B OTPM circuit pack generates an OC-3/STM-1, OC-12/STM-4, or 150-725 Mb/s signal in the 1330 nm range for other receivers.

Each OTPM comes equipped with a green "IN SERVICE" LED on the faceplate which is inactive prior to Release 3.0 (refer to Figure 2-38 or Figure 2-39). With Release 3.0 and subsequent releases that are equipped with the OT Controller, the green "IN SERVICE" LED turns ON only after the seated OTPM has an OC-3/STM-1, OC-12/STM-4, or 150-725 Mb/s signal applied to its input.

A fault LED is provided with each OTPM. When there is a loss of incoming signal or it has degraded severely, the LED is flashing. For software releases prior to Release 3.0, the flashing LED comes ON immediately after the 60 second initialization process and remains ON until an OC-3/STM-1, OC-12/STM-4, or 150-725 Mb/s signal is applied to the input. With Release 3.0 and beyond using the OT Controller, the OTPM must first be put "IN SERVICE" by applying an OC-3 or STM-1 signal to the input causing the green "IN SERVICE" LED to be ON. When the signal is removed from an "IN SERVICE" OTPM the fault light will start flashing. When the LED is on continuously, it indicates circuit pack failure.

For detailed information, refer to the APOG (Application, Planning and Ordering Guide, Section 10) for further information.

⇒ NOTE:

The LSBB OTPMs do not perform clock recovery on their input data stream and hence have no way to control jitter accumulation. The LSBB OTPMs should not be used to concatenate WaveStar OLS 40G systems. Signals entering an end terminal from an LSBB OTPM must be dropped at the next end terminal.

Table 2-3 OTPM Code verses Wavelength and Output Power

Center Wavelength (nm)	OC-3/STM-1 OTPM CODE	Output Power (+/- 0.7 dBm)	OC-12/STM-4 and LSSB OTPM CODES	Output Power (+/- 0.7 dBm)
1549.32	43A1	-10.0	42A1, 44A1	-7.0

Table 2-3 OTPM Code verses Wavelength and Output Power

Center Wavelength (nm)	OC-3/STM-1 OTPM CODE	Output Power (+/- 0.7 dBm)	OC-12/STM-4 and LSSB OTPM CODES	Output Power (+/- 0.7 dBm)
1550.92	43A2	-11.3	42A2, 44A2	-8.3
1552.52	43A3	-12.5	42A3, 44A3	-9.5
1554.13	43A4	-13.2	42A4, 44A4	-10.2
1555.75	43A5	-13.7	42A5, 44A5	-10.7
1557.37	43A6	-14.2	42A6, 44A6	-11.2
1558.98	43A7	-14.0	42A7, 44A7	-11.0
1560.61	43A8	-12.5	42A8, 44A8	-9.5
1548.52	43A9	-8.0	42A9, 44A9	-5.0
1550.12	43A10	-10.6	42A10, 44A10	-7.6
1551.72	43A11	-11.8	42A11, 44A11	-8.8
1553.33	43A12	-12.8	42A12, 44A12	-9.8
1554.94	43A13	-13.4	42A13, 44A13	-10.4
1556.56	43A14	-13.9	42A14, 44A14	-10.9
1558.17	43A15	-14.1	42A15, 44A15	-11.1
1559.79	43A16	-13.2	42A16, 44A16	-10.2
1310.00	43B	-7.0 to 0.0	42B, 44B	-2.5 to 2.0

**NOTE:**

The tone frequencies for the OTPMs are different than those of the OTUs.

41S Quad Optical Translator Unit (QOTU)

The Quad Optical Translator Unit (QOTU) mounts up to four Optical Translator Port Modules (OTPM). The module carrier contains the common interface circuitry required to mount, power, control, and monitor the four OTPMs.

The QOTU occupies two standard OTU slots on the Optical translator shelf and must be placed in an odd/even pair (for example 1,2 or 9,10). For identification purposes, the ODD numbered slot will be reported as the location of the QOTU. The slot locations within the pack are identified as the bottom left slot being slot 1, slot 2 as the bottom right slot, slot 3 as the upper left slot, and slot 4 as the upper right slot (refer to ()). Example: For an OTPM located in the upper left slot of a QOTU located in OT slot 11 and 12, the OPTM would be identified in reports as 11-3.

The Quad Optical Translator Unit is equipped with a fault light that is on continuously for a QOTU failure and temporarily during initial installation and resetting.

**NOTE:**

The QOTU may be fully or partially loaded with any combination of OPTMs except for the conditions dictated by the following engineering rules.

1. If the 41S Quad OTU is to be fully populated with 4 port modules (42A/B, 43A/B, or 44A/B), no more than one of them can be a B-type module.
2. If the 41S Quad OTU is to have 3 or fewer port modules, they can be any combination, including up to 3 (three) B type port modules.

LUD1 OT Controller (OTCTL)

The Optical Translator Controller (OTCTL) circuit pack occupies the three right most slots of the OT system controller shelf and enables an OT and a WaveStar OLS 40G to be integrated into one Network Element:

- The EMDU is no longer required for the WaveStar OLS 40G to monitor OT faults or 48V power failures; the OTUs/OTPMs appear as WaveStar OLS 40G circuit packs for fault monitoring
- The WaveStar OLS 40G and OT appear as a single Network Element
- One WaveStar OLS 40G shelf with one or two optical lines can control one or two OT systems
- User interfaces to the OT are provided by the WaveStar OLS 40G interconnection panel

The LUD1 OTCTL circuit pack is equipped with a red FAULT LED on its faceplate. The LED is ON during initial start up following the seating of the circuit pack, during a reset condition, when a circuit pack failure is detected, and when the circuit pack loses power. If the circuit pack loses power due to a fuse or power converter failure, a separate path is provided to power the fault LED from the System Controller (SYCTL) circuit pack.

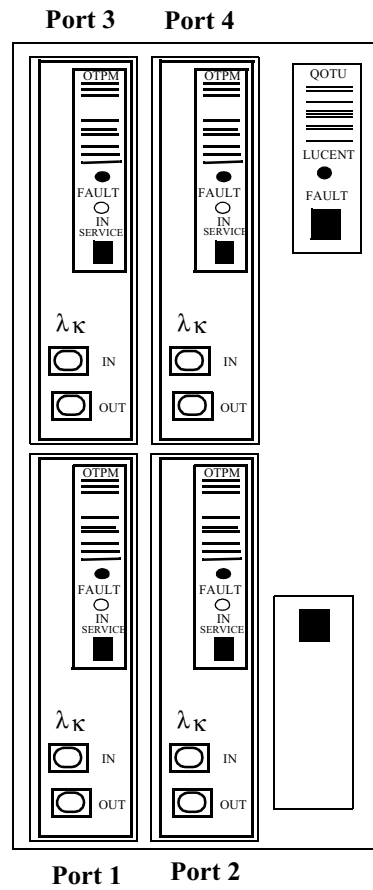


Figure 2-39 QOTU Faceplate

F - System Block Diagrams & Applications

WaveStar OLS 40G System Standard Block Diagram

Figure 2-40 on page 2-56 shows the block diagram for the WaveStar OLS 40G standard configuration. Notice how the 1A OA is transmitting to the outside plant fiber at the 1A-TX site and is receiving from the outside plant fiber at the 1A-RCV site.

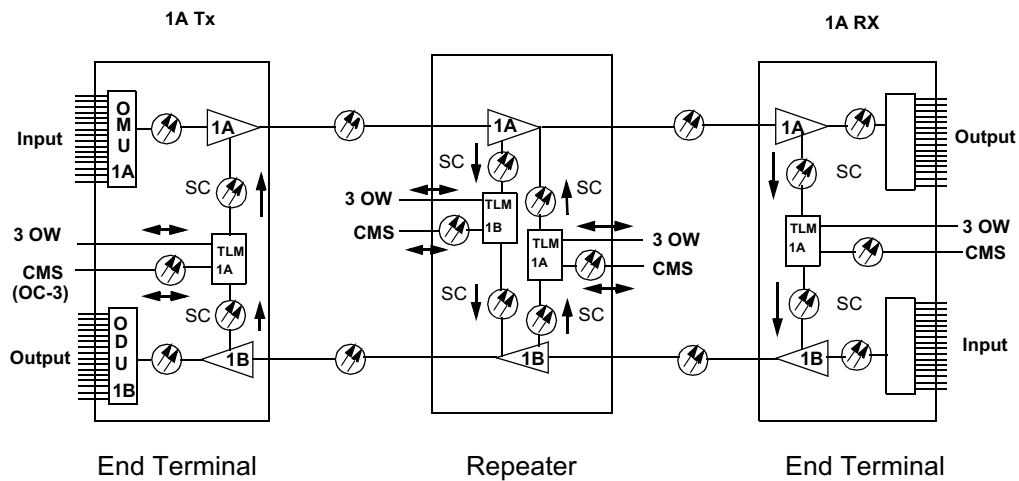


Figure 2-40 WaveStar OLS 40G Standard Configuration Block Diagram

WaveStar OLS 40G Dual Facing System Block Diagram

Figure 2-41 on page 2-57 shows the block diagram for the Dual Facing configuration. Notice how the 2A OA is transmitting to the outside plant fiber and the 1A is receiving. This deviation from the standard configuration is necessary with the Dual Facing Shelf. The 2A OA, however, must feed a 1A RCV in either a repeater or at the receiving end. In this configuration only one DS-NE should be established among the 4 nodes.

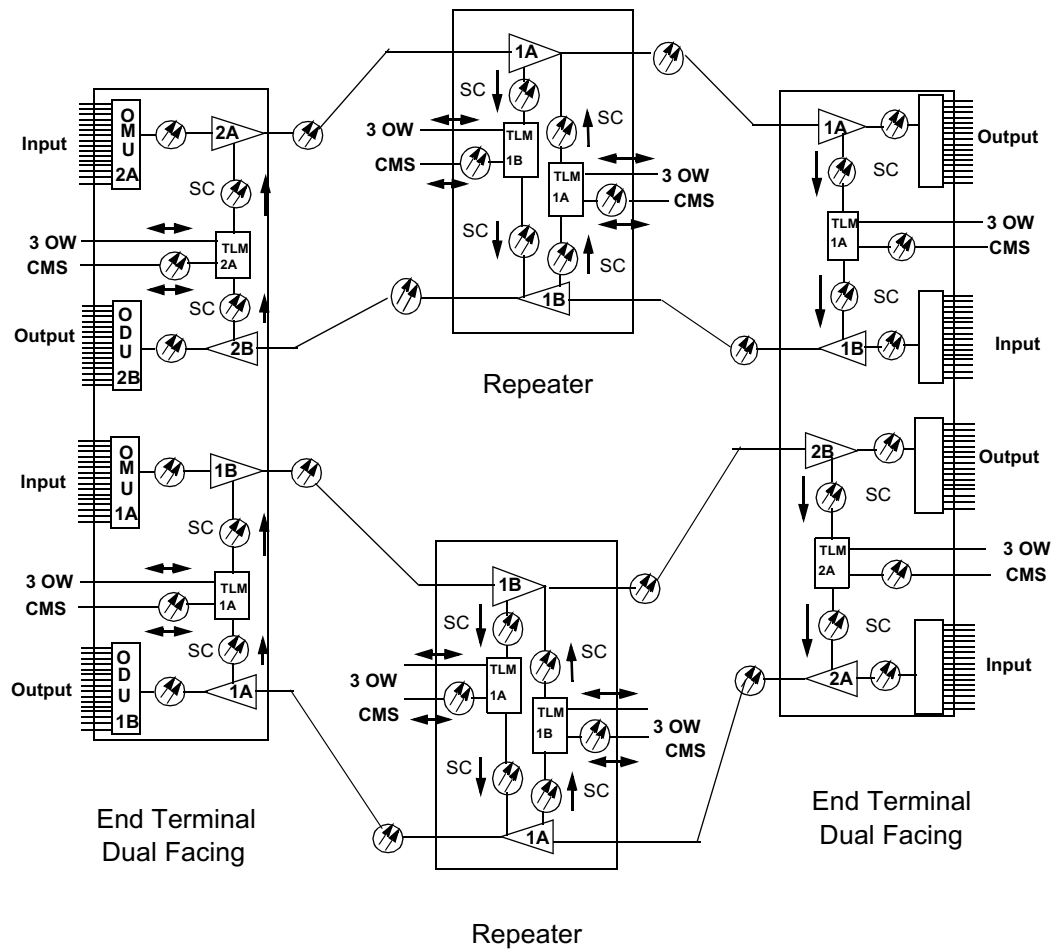


Figure 2-41 WaveStar OLS 40G Dual Facing Shelf Block Diagram

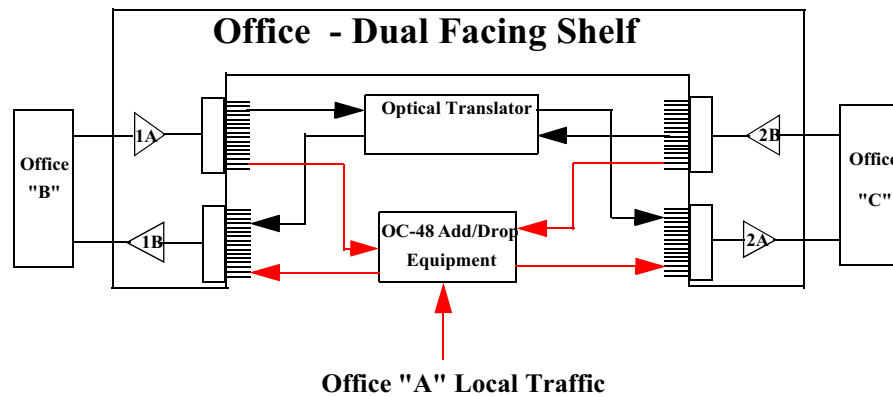


Figure 2-42 Dual Facing Shelf Application

Figure 2-43 on page 2-59, "OT/WaveStar OLS 40G System Block Diagram," shows a block diagram of the Optical Translator fiber connected to two End Terminals. The diagram illustrates a four fiber system (two service, two protection) with four OTU circuit packs being required for each wavelength. For an WaveStar OLS 40G System operating with all sixteen (16) wavelengths 64 OTUs would be required.

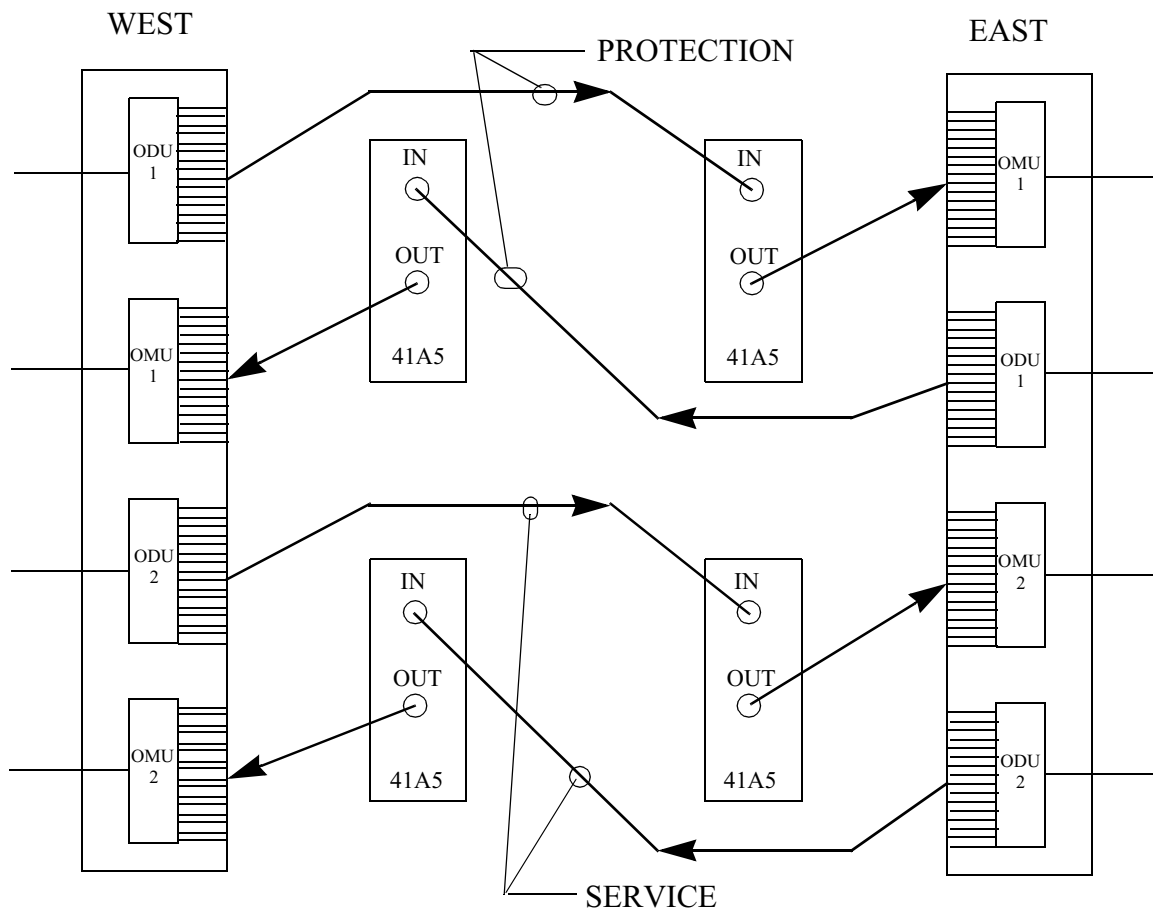


Figure 2-43 OT/WaveStar OLS 40G System Block Diagram

System Applications

WaveStar OLS 40G Applications

The WaveStar OLS 40G is a bit rate independent, point-to-point, optical system that can be used in a variety of applications. In Release 3 the WaveStar OLS 40G can be configured for many different span and wavelength combinations. Table 2-6, "Engineering Rules for Release 2.1 and 3.0 Two-OA Systems," on page 2-61 shows the associated span losses, total reaches and allowable number of spans for the Two-OA

systems. Table 2-7, “Engineering Rules for Single-OA System with LEA105 (Release 2.1),” on page 2-63 shows the associated span losses, total reaches, bit rates, and allowable spans for the One-OA configurations.I

Table 2-4 Engineering Rules for Release 2.0 Systems

Application	OA	No. Chan.	No. Spans	Span Loss (dB)		Total Reach (dB) max	Span Distance (km) Fiber loss=0.25dB/km max	Total Reach (km) max
				min	max ^a			
Long Span	LEA6	8	1	22	33	33	132	132
			2	22	33	66	132	264
			3	22	33	99	132	396
Long Reach	LEA7	8	1	22	33	33	132	132
			2	22	30	60	120	240
			3	22	28	84	112	336
			4	21	27	108	108	432
			5	21	26	130	104	520
			6	21	26	156	104	624
			7	17	22	154	88	616
			8	17	22	176	88	640 ^b

a. Some spans with span loss more than the maximum value may be accommodated.

Lucent provides network engineering support to optimize WaveStar OLS 40G systems for actual network. Please contact your Lucent sales representative for more information.

b. This distance is limited by the dispersion characteristics of standard single-mode fiber (SSMF) (640 km x 17 ps/nm-km=10880 ps/nm).

⇒ NOTE:

In Release 2 and 2.1 the LEA7 Optical Amplifier can be used in either of these configurations. **The LEA6 can only be used in a N x 33 dB configuration**

Table 2-5 Engineering Rules for LEA6 and LEA7 for Releases 1.0 & 2.0

Software Release		OA	System Config.	# of Spans	Span Loss (dB)		Bit Rate
R1	R2				Min ^a	Max	
X	X	LEA6	Nx33	1 to 3	22	33	OC48
	X	LEA7	Nx33	1	22	33	
	X			2	22	30	
	X			3	22	28	
	X		Px25 or Mx24	4	21	26	
	X			5	21	26	
	X			6	21	26	
	X			7	17	22	
	X			8	17	22	

a. Some spans with span loss more than the maximum value may be accommodated. Lucent provides network engineering support to optimize WaveStar OLS 40G systems for actual network. Please contact your Lucent sales representative for more information.

Table 2-6 Engineering Rules for Release 2.1 and 3.0 Two-OA Systems

OA	Power Config -Side	No. Chan.	No. Spans	Span Loss (dB)		Total Reach (dB) max	Span Distance (km) max ^a	Total Reach (km) max ^a
				min	max ^a			
LEA6	A	8	1	22	35	35	140	140
			2	22	34	68	136	272
			3	22	33	99	132	396
	B	8	4	26	31	124	124	496
			5	26	30	150	120	600
	A	16	1	22	33	33	132	132

Table 2-6 Engineering Rules for Release 2.1 and 3.0 Two-OA Systems

OA	Power Config -Side	No. Chan.	No. Spans	Span Loss (dB)		Total Reach (dB)	Span Distance (km)	Total Reach (km)
LEA7	A	16	1	22	33	33	132	132
			2	22	30	60	120	240
			3	22	28	84	112	336
	B	16	4	22	27	108	108	432
			5	21	26	130	104	520
	C	16	6	21	26	156	104	624
			7	17	22	154	88	616
			8	17	22	176	88	640 ^b
LEA105	A	16	1	14	18	18	72	72
	1_OA	16	1		^c			
LEA104 (R3.0 only)	A	16	1	22	35	35	140	140
			2	22	34	68	136	272
			3	22	33	99	132	396
	B	16	4	26	31	124	124	496
			5	26	27 ^d	150	120	600

a. Fiber loss=0.25dB/km. Some spans with span loss more than the maximum value may be accommodated. Lucent provides network engineering support to optimize WaveStar OLS 40G systems for actual network. Please contact your Lucent sales representative for more information.

b. This distance is limited by the dispersion characteristics of standard single-mode fiber (SSMF) (640 km x 17 ps/nm-km = 10880 ps/nm).

c. See Table 2-7, "Engineering Rules for Single-OA System with LEA105 (Release 2.1)," on page 2-63.

d. Each upstream LEA104 must have a 3 dB LBO on its output port.

Table 2-7 Engineering Rules for Single-OA System with LEA105 (Release 2.1)

OA	Max. No. Chan.	No. Span	Span Loss (dB)		Total Reach in (km). Fiber loss=0.25dB/km	Bit Rates
			min	max		
LEA105	16	1	0	12	48	OC-48/12/3, STM-16/4/1 or 400-700 Mb/s
		1	0	12	48	OC-48/12, STM-16/4, or 400-700 Mb/s
		1	0	13	52	OC-48/3 or STM-16/1
		1	0	16	64	OC-12/3, STM-4/1 OR 400-700 mB/S
		1	0	13	52	OC-48, STM-16 alone
		1	0	16	64	OC-12, STM4 alone or 400-700 mB/S
		1	0	20	80	OC-3, STM-1 alone

The WaveStar OLS 40G can be deployed between the FT-2000 OC-48 Large Capacity Terminal (LCT), FT-2000 Add/Drop Rings (ADR) or other OC-48 systems to create point-to-point or ring systems. Figure 2-44 on page 2-64, "WaveStar OLS 40G to LCT Interconnect," shows how the LCT will connect to the WaveStar OLS 40G.

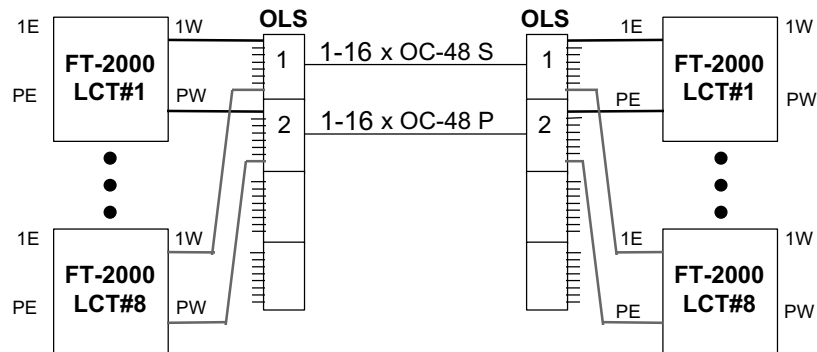


Figure 2-44 WaveStar OLS 40G to LCT Interconnect

OT Applications

The OT may be used in a variety of applications such as a low cost replacement for a regenerator. Figure 2-45 on page 2-65, "OT Replacement of OC-48 Signal Regenerators," shows such an application where three (3) regenerators have been replaced with OTUs. In this four fiber application, four OTU circuit boards are required at each wavelength (λ_1 , λ_2 , and λ_3) for a total of 12 OTUs. Besides obtaining a cost reduction, a SONET node is made available in each of the three rings. A space reduction is achieved in this example going from six regenerator bays (two bays per wavelength) to one OT cabinet.

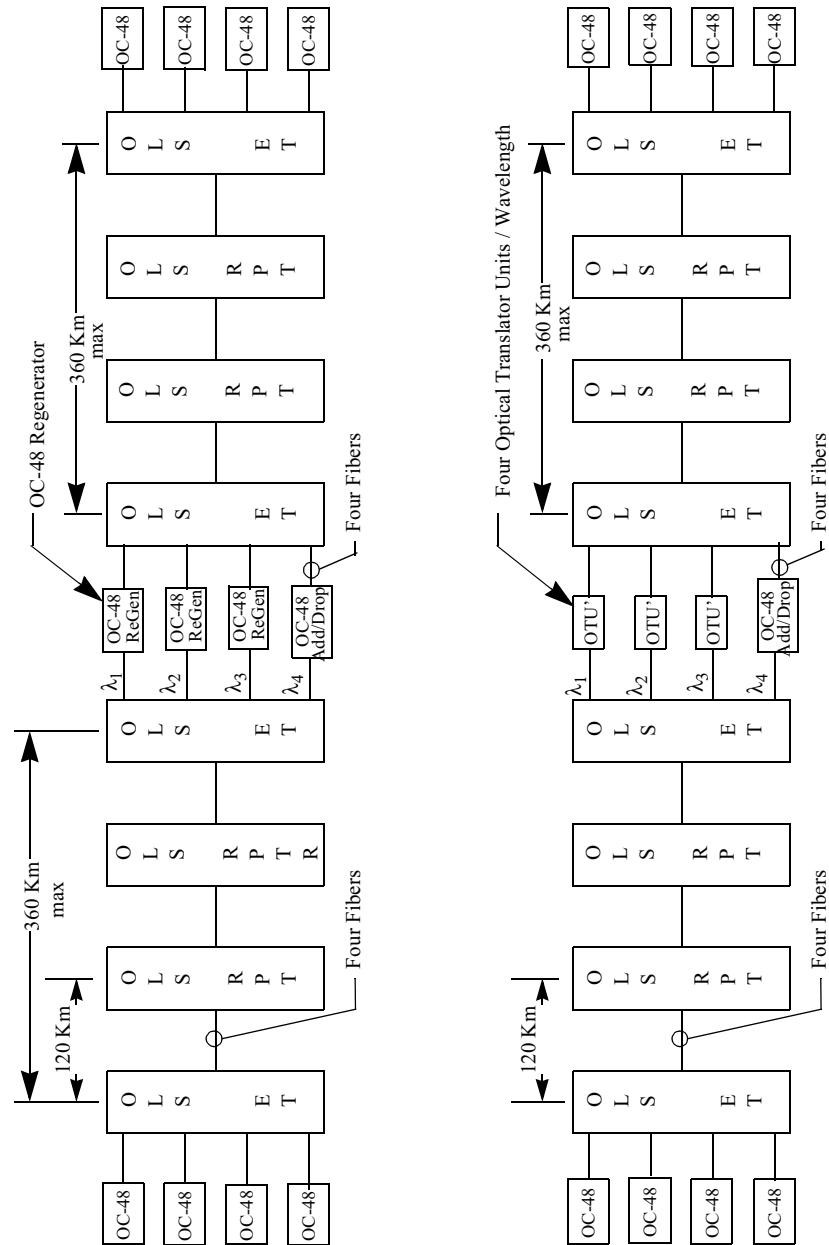


Figure 2-45 OT Replacement of OC-48 Signal Regenerators

Another application for OT is a low cost replacement for a node of OC-48 /STM-16 generating equipment in Wavelength Add/ Drop (WAD) applications where the OC-48 / STM-16 equipment is being used to regenerate signals for through traffic. Figure 2-46 on page 2-66, "Wavelength Add/ Drop Applications shows such an application. The OC-48 / STM-16 equipment on wavelengths 1, 3, and 5 is being used to regenerate the signal so that stray tones may be removed. In a four fiber system, four OTUs at each wavelength mounted in one OT cabinet will be required to replace the three pieces of OC-48 /STM-16 equipment in this example thus saving cost, a SONET /SDH node at each wavelength, and space.

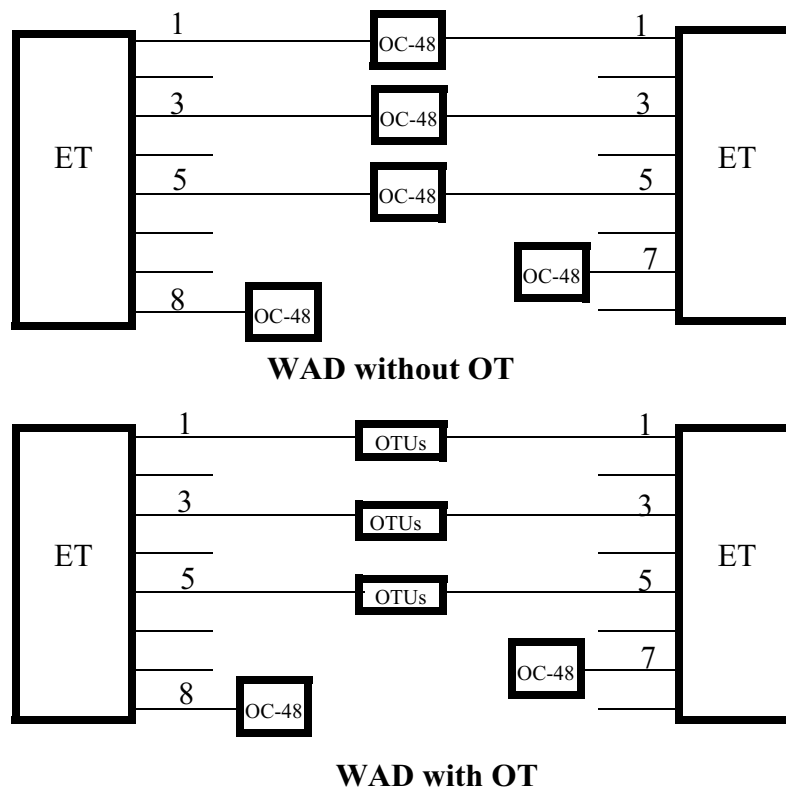


Figure 2-46 Wavelength Add/ Drop Applications

The OT is also used to provide an interface between the WaveStar OLS 40G and optical equipment from Lucent and non-Lucent suppliers that is not WaveStar OLS 40G compatible. The 41A, 41C, 41D, 42A, 43A, and 44A OTUs and OTPMs provide an interface for incoming signals. These circuit packs will accept signals in the 1310 or 1550 nm range over a wide power range and output an WaveStar OLS 40G compatible signal at

a specific 1550 nm wavelength. At the receiving end the same OTUs and OTPMs may be used for the outgoing signals. In addition to these codes the 41BB, 41E, 42B, 43B, and 44B can be used if the receiving equipment will accept a 1310 nm wavelength. Using the Optical Translator with the WaveStar OLS 40G, the equipment is capable of working with other vendors' products at one or both ends of the optical line.

G - Miscellaneous Discrete Alarms (R2.1)

OT Miscellaneous Discrete Alarms

The miscellaneous discrete alarms are the only alarms that can be reported remotely by the OT. There are two miscellaneous discrete alarms per OTU which combine for a total of 64 (2/OTU x 32 OTUs) miscellaneous alarms for a fully populated OT. In addition to the OTU alarms, there are two additional alarms per shelf to report if the A or B source has a loss of power. This power loss may be the result of a fuse failure or a low voltage cutoff. The maximum number of miscellaneous discrete alarms available for a complete OT system would be 70.



NOTE:

With Release 3 and beyond, alarms equivalent to the miscellaneous discrete alarms are reported back to the WaveStar OLS 40G through the LUD1 OT Controller. The miscellaneous alarms should not be used with Release 3 and beyond since it will cause duplication of alarm reporting.

OTU Alarm Operation

The alarms are reported by the OTU through two relay contacts. The alarms are wired out from the OTU circuit pack to the backplane and out to the shelf connectors J2 and J3 as a wired pair for each contact (refer to Figure 2-47 on page 2-69). The two relay contacts on the OTU board are identified as MD1 and MD2. A contact closure signifies an alarm condition.

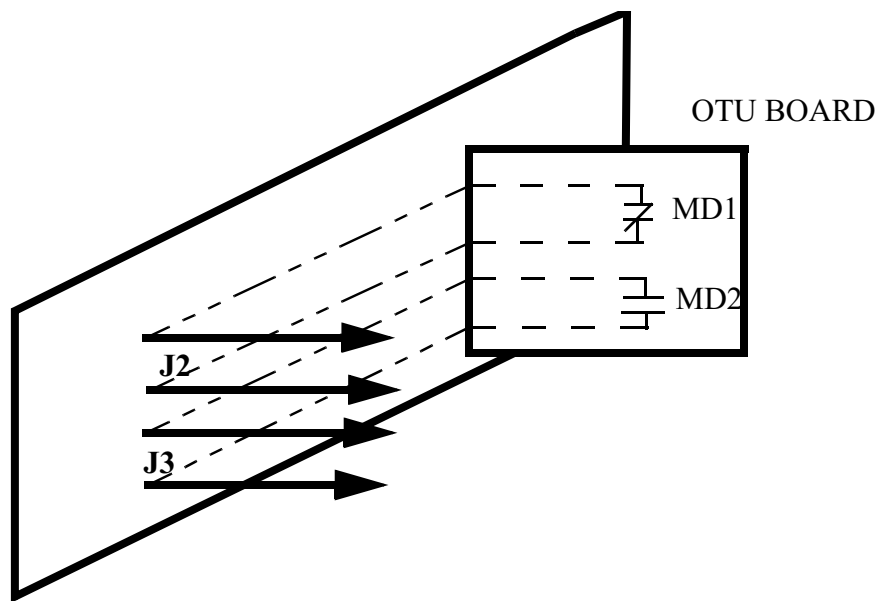


Figure 2-47 Miscellaneous Discrete-Board to Jack Connections

The MD1 relay contact closes whenever there is a circuit pack failure. During initial insertion of the board, the MD-1, being a normally closed contact, will cause an alarm condition. During initialization of the OTU circuit pack a self check is performed. After completing the self check, which takes 15 to 20 seconds, the OTU will open the MD1 contact if the initialization process has been satisfied. Should the pack fail the self check, the contact will remain closed until the condition is corrected.

Contact MD2 is a normally open contact which closes when there is a loss or degradation of incoming signal. The MD2 contact stays open during initialization of the OTU. If after the 15 to 20 second initialization process, the OTU determines that a clean OC-48 signal is present at its input, the MD2 will remain open. If an OC-48 signal is not present or is degraded, the contact will close. Table 2-8, "Miscellaneous Discrete and Fault LED Conditions," on page 2-70 describes the conditions for the operation of MD1 and MD2 and their relation to the fault LED operation.

⇒ NOTE:

The removal of an OTU will not cause a miscellaneous discrete alarm. The insertion of an OTU of a different wavelength will not cause a miscellaneous discrete alarm at the OTU but will cause alarms elsewhere within the network.

Table 2-8 Miscellaneous Discrete and Fault LED Conditions

Condition	Fault LED	MD1	MD2	Laser
No Failures	Off	Open	Open	On
Incoming Signal OC-48 LOS/ LOF	Flashing	Open	Closed	Off
Incoming Signal B ₁ parity error	Flashing (20 Seconds)	Open	Closed	On
Out of Range (OOR) on Laser Bias Current (LBC) or Optical Power Transmit (OPT)	On	Closed	Open	On
Internal defect on OTU	On	Closed	Open	Off
Power converter / fuse failure on OTU	On	Closed	Open	Off
OTU reset / initialization	On	Closed	Open	On
OTU pack insertion	On	Closed	Open	Off
A or B Supply Failure	Off	Closed for all OTUs	Open	On

Power Alarm Operation

Each power filter comes equipped with a miscellaneous discrete alarm to indicate when there is a loss of power due to a fuse failure or voltage cutoff. The alarm does not distinguish between the type of failure but will indicate whether it's the A or B power source and which shelf is involved.

The alarm utilizes an opto-isolator to interface with the EMDU unit. An alarm condition is a low impedance (less than 10 ohms) while a normal condition is indicated by a high impedance.

Connecting Miscellaneous Discretes to WaveStar OLS 40G

The OTU miscellaneous alarms are accessed at the J2 and J3 connectors on each shelf of the OT. Connector J2 carries all the Circuit Pack Failure Alarms (MD1) and J3 carries the Incoming Signal Failures (MD2). With three shelves, this results in six cables required to output all the alarms from the OT cabinet. These cables are brought to an External Miscellaneous Discrete Unit (EMDU). The EMDU adds an additional 128 alarm inputs to the original 16 in the OLS to bring its total to 144 inputs. The EMDU adds an additional 32 control outputs to the original four (4) to bring its total to 36 outputs.

The EMDU is to be located between one of the WaveStar OLS 40G End Terminals and the OT. The EMDU is wired back to the End Terminal with a single cable that uses TBOS protocol to communicate between the two units. The EMDU may be wired to either the 1A-TX or 1A-RCV End Terminal depending upon customer preference. These connections are shown in Figure 2-48 on page 2-71, "Miscellaneous Discrete Cable Connections". The interface between the OT and the WaveStar OLS 40G occurs at the EMDU. The wiring and physical installation of the EMDU and its interface with the WaveStar OLS 40G is located in Appendix D or Appendix E of this manual. A manual is available from DANTEL titled "46220 Alarm and Control Block Installation & Operation Manual". Harris also provides a manual titled "Harris User Guide for C1000 Centurion". Both units are rack mountable. The DANTEL unit may also be wall mounted.

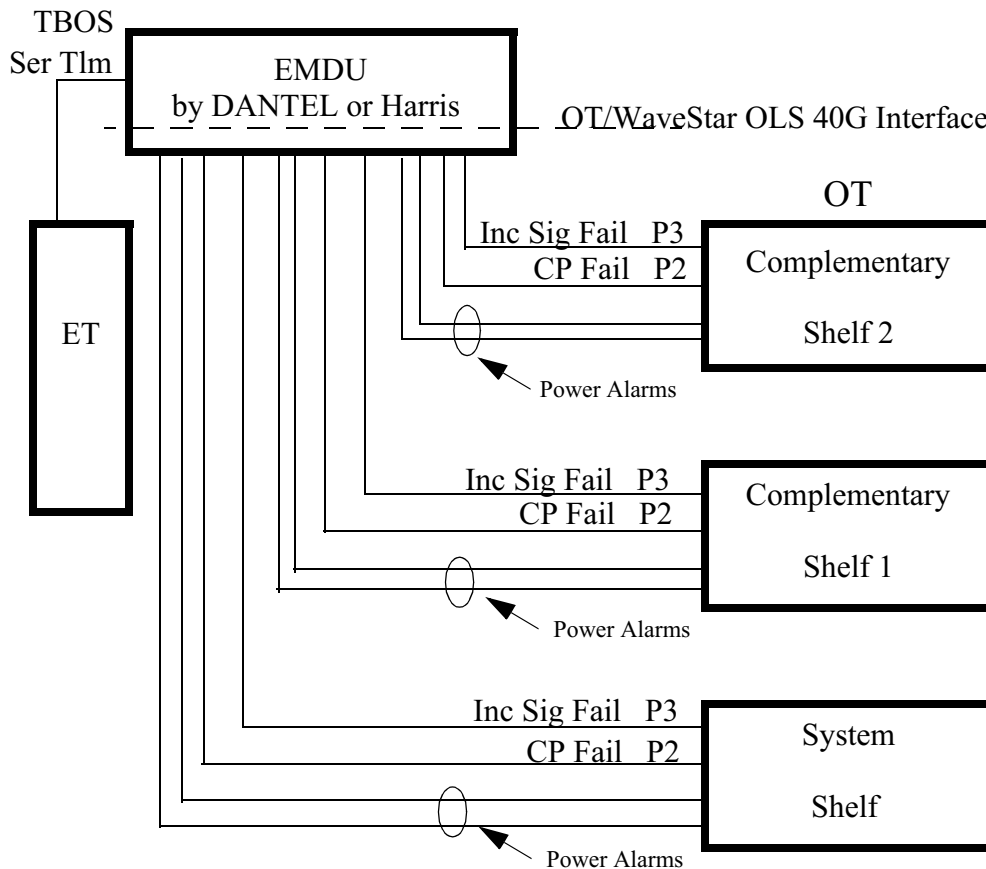


Figure 2-48 Miscellaneous Discrete Cable Connections

H - WaveStar OLS 40G/OT Integration (R3.0)

Description

The WaveStar OLS 40G/OT Integration feature of Release 3.0 provides enhanced operations capabilities for Optical Translator Unit (OTUs) and Quad OTUs (QOTUs) that are used in conjunction with a WaveStar OLS 40G. This feature involves bringing the board controllers of the OT into the control hierarchy of the WaveStar OLS 40G. This is achieved by installing a new Optical Translator Controller (OTCTL) circuit pack in the OT system shelf in the slots marked OTCTL and connecting it to the SYSCTL via the interconnecting cables. The maximum length of these interconnecting cables is 200 feet. The WaveStar OLS 40G and OT appear to the user as a single unit from an operations point of view. Detailed information about the OTUs and OTPMs such as B1 performance monitoring, RCVR TCAs, LOF and LOS alarms, equipment defects, and TCAs for OC-48 OTUs is available.

Configurations

There are four integrated WaveStar OLS 40G/OT configurations:

- one WaveStar OLS 40G shelf with one OT system,
- one WaveStar OLS 40G shelf with two OT systems,
- two interconnected WaveStar OLS 40G shelves with one OT system,
- two interconnected WaveStar OLS 40G shelves with two OT systems.

An OT system can consist of one, two, or three shelves. The description of two WaveStar OLS 40G shelves refers to a three- or four-line system, where the shelves are interconnected and have only one control complex.

Circuit Packs

The OT controller circuit pack (OTCTL) is the LUD1.

I - WaveStar OLS 40G Telemetry Feed-Through

Description

This feature is used mainly for four-fiber applications at sites where two end terminals are co-located back-to-back, each representing an end of an WaveStar OLS 40G subnetwork. Telemetry feed-through allows the DCC to go from one End Terminal through to the other co-located End Terminal .

Circuit Packs

Each optical line of each End Terminal has an additional TLM circuit pack (LDA1) located in the TLM 1B and 2B slots. The two TLM 1Bs are connected together with fiber jumpers, as are the two TLM 2Bs, to allow the DCC to pass from one End Terminal to the other.

Operation

In normal situations, the DCC on Optical Line 1 is used. If Optical Line 2 is available and Optical Line 1 fails, the DCC is protection switched to Optical Line 2. The DCC protection will still work on a per span basis. Here the span can be the span on the left side, the span on the right side, or the fiber jumper span itself. The following operations interworking capabilities between WaveStar OLS 40G subnetworks will be available:

- Remote TL1 access through GNE
- Remote NE Status (remote alarming, alarm groups, AGNE)
- Directory Service Network Element (DSNE)
- Network Map retrieval (RTRV-MAP-NETWORK)

Provisioning

The End Terminals with Telemetry Feed-Through are designated differently than standard four-fiber types. A 1A-TX-THRU or 1A-RX-THRU value must be entered in the "dirn" parameter in the ENT-SYS-TL1 command.

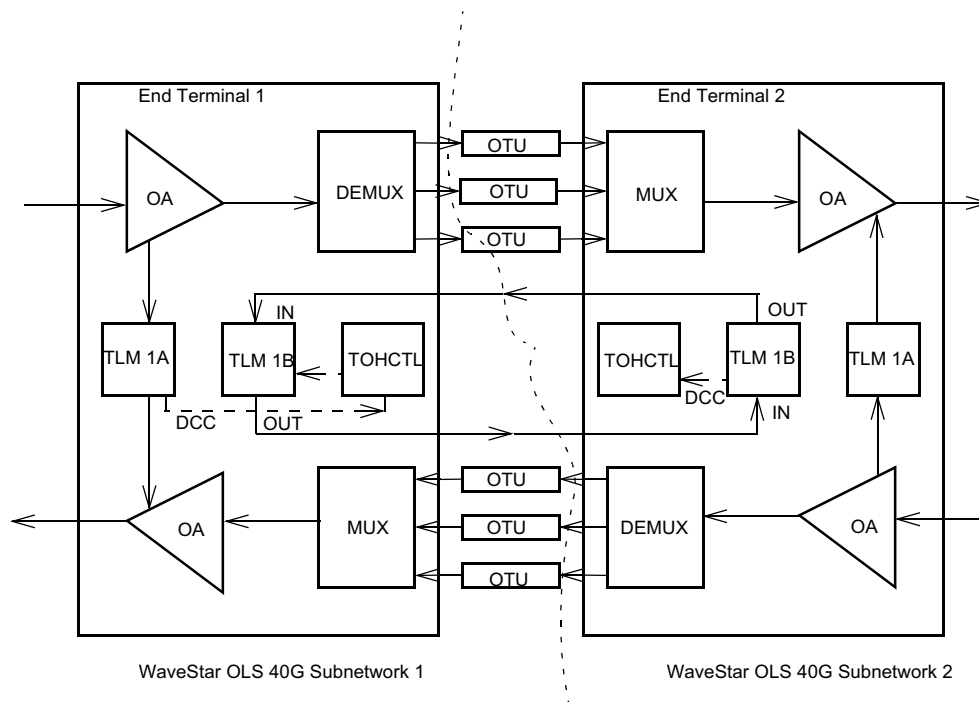


Figure 2-49 Telemetry Feed-Through, One Line

Figure 2-48 shows the telemetry feed-through connections for Optical Line 1 in one direction only. The DCC in the other direction works the same way. The dashed lines show the passage of DCC information from one End Terminal in one subnetwork to another back-to-back End Terminal in another subnetwork via the fiber jumpers connecting the two additional LDA1 packs located in the TLM 1B positions. Each jumper is connected from the OUT port on one LDA1 pack to the IN port on the other LDA1 pack and must be singlemode fiber. An LBO must be installed at each LDA1 IN port to attenuate the incoming signal level to between -18 and -31 dBm.

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Overview

This chapter provides guidelines for establishing SONET/SDH systems connected through WaveStar OLS 40G. It describes procedures to be followed in this book to establish these systems.

WaveStar OLS 40G Basics

Release 1 and 2 Network Architectures

With Releases 1 and 2 the OLS is only a point-to-point system. An OLS can be deployed on a single fiber span to relieve a fiber blockage (Figure 3-1) or can be deployed between any or all nodes of a ring (Figure 3-2). Note that when multiple Optical Line Systems are deployed between different nodes of a ring the systems are independent and cannot communicate between each other. The OLS only exists between the SONET nodes, an entirely different OLS will exist between the other SONET nodes. Other examples of network architectures include point-to-point (Figure 3-3) or linear add/drop systems (Figure 3-4). When an OLS is deployed between two central offices it allows completely independent network architectures to exist on different wavelengths of the same fiber pair. For example, wavelengths 3 and 5 could carry rings, wavelength 4 could carry a point-to-point system, and wavelengths 2 and 7 could carry linear add/drop systems.

Release 2.1 Architecture

In addition to the options outlined in the previous paragraph, Release 2.1 includes another feature for two fiber systems that will allow an OLS system to encompass two or more point-to-point OLS systems. The introduction of the Dual Facing shelf allows the combining of back-to-back co-located single facing shelves in one shelf. The coordination of the SYSMEM and SYSCTL packs in one shelf allows the OSS to communicate across two domains. The operations domain will still not go from the optical networking equipment across to other TDM (Time Division Multiplexing) equipment (SONET/SDH or asynchronous/PDH).

With the operations domain extended, the "Ring" topology is extended as well. The total number of nodes in a "ring" by the old definition is 16, due to the K bits allocated for carrying the node ID by the SONET standards. The new "ring" topology will not use the K bits, thus will allow for more than 16 nodes in the ring. The guaranteed total number of NEs in this release is no more than 32. In these 32 or less nodes, there can be only one DS-NE (Directory Server-Network Element).

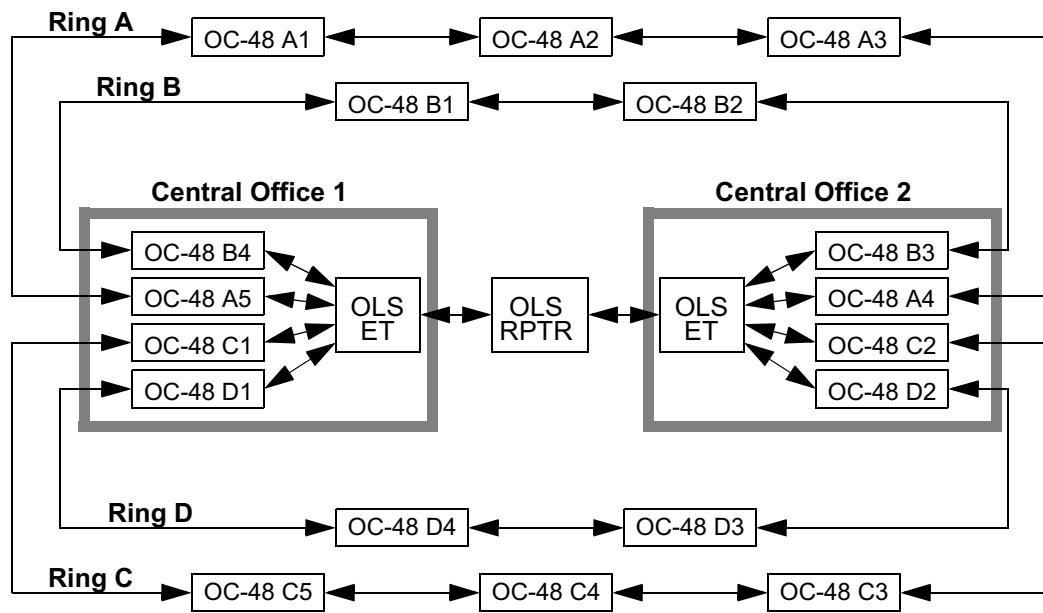


Figure 3-1 Clearing Fiber Blocking

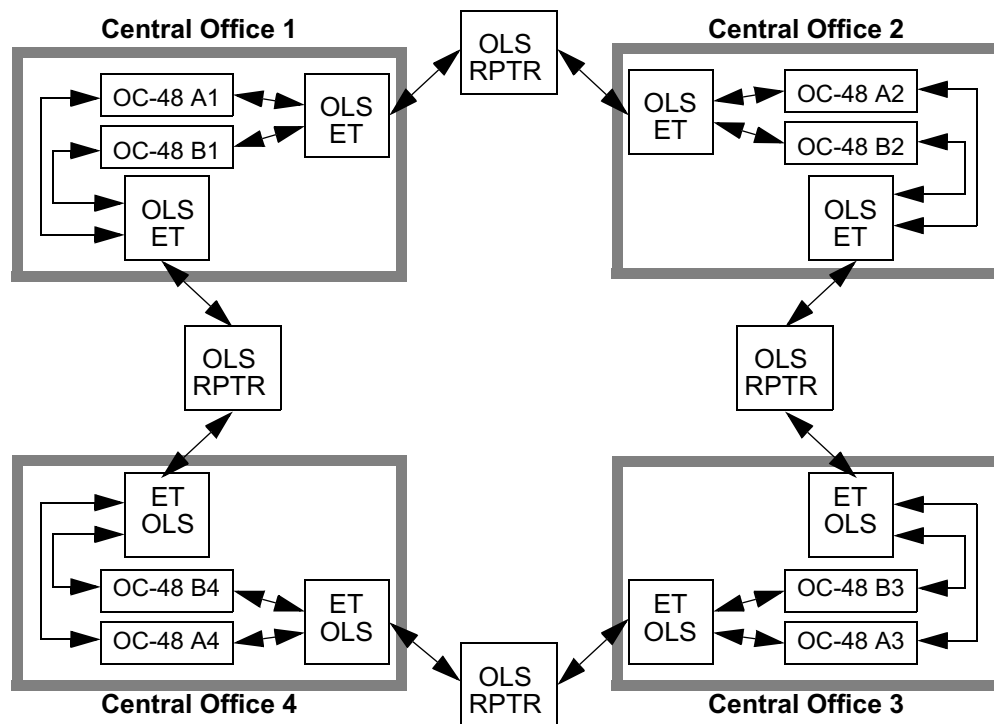


Figure 3-2 Ring Systems

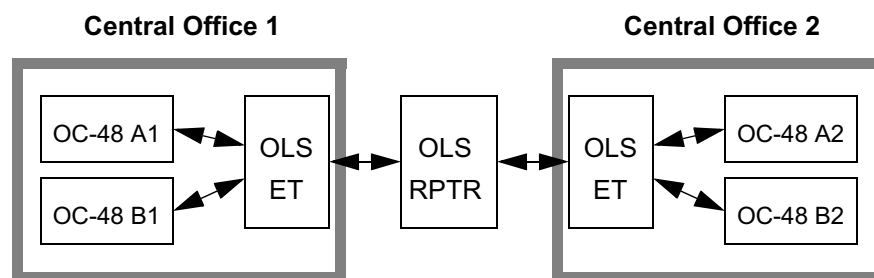


Figure 3-3 Point-To-Point Systems

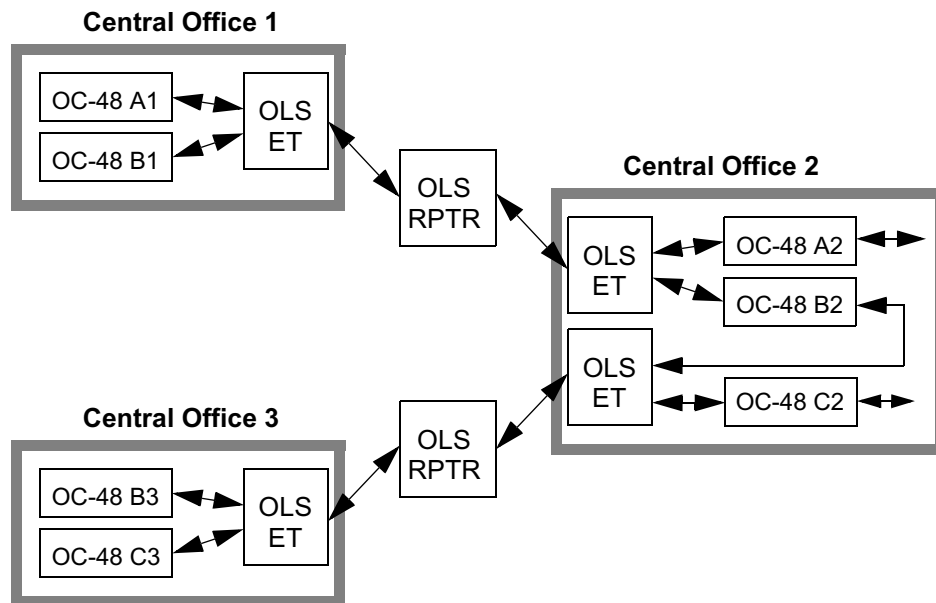


Figure 3-4 Linear Add/Drop Systems

Release 3.0 Architecture

The WaveStar OLS 40G Telemetry Feed-Through feature allows a four-fiber OLS system to encompass two or more point-to-point OLS systems, just as the Release 2.1 Dual-Facing Shelf did for two-fiber systems. Two co-located WaveStar OLS 40G End Terminals, each representing an end of an OLS subnetwork, can be interconnected so that the DCC will pass from one End Terminal to the other. Thus the operations domain for network operators and/or OSS will be extended beyond a single OLS subnetwork and can encompass an entire OLS "Ring" with a single DS-NE.

Release 3.1 Architecture

Release 3.1 provides the Optical Protection Switch (OPS) feature which allows for protection switching between two diverse two fiber lines. The Optical Protection Switch (OPS) provides 1 + 1 non-revertive optical protection switching for all sixteen wavelengths in point to point applications. The OPS provides protection against Optical Amplifier (OA) failures and fiber cuts. The OPS will perform uni-directional or bi-directional, non-revertive switching of all traffic regardless of wavelengths, bit rates and formats. This application is useful in point to point systems where there is no other means of protection such as ring back switching or span switching.

Bi-directional Optical Line

An Optical Line System combines multiple wavelengths called optical channels into a single fiber signal called the optical line. The WaveStar OLS 40G is deployed as a bi-directional optical line shown in Figure 3-5. It consists of optical multiplex and demultiplex units at each end of the system to combine and split out the optical channels, telemetry circuit packs to generate and receive the supervisory channel, and a string of optical amplifiers in each direction. Three types of offices are shown: 1A-TX End Terminal, Repeater, and 1A-RCV End Terminal. Every OLS will at least have a 1A-TX and 1A-RCV End Terminal. A single bi-directional optical line will support a 2-fiber section or a 4-fiber section if service and protection use different optical channels on the same optical line (Figure 3-6). To achieve full equipment diversity 4-fiber systems would use two optical lines, one for service and one for protection (Figure 3-7).

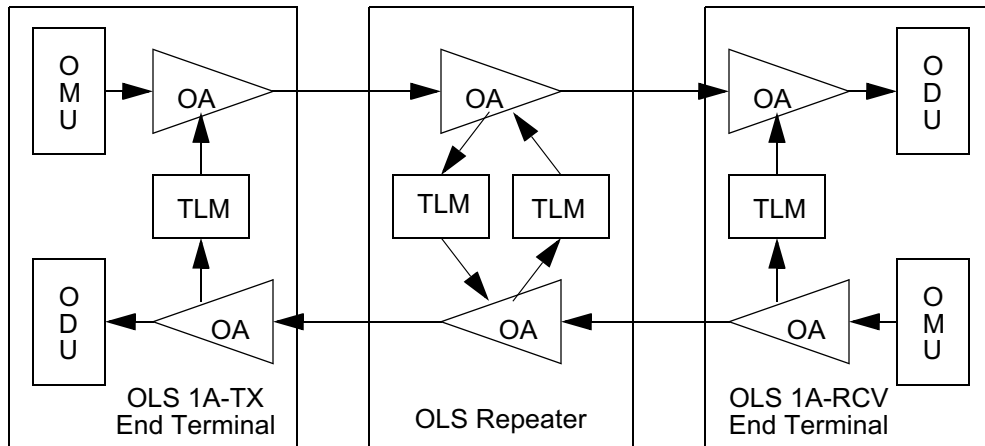


Figure 3-5 Basic Optical Line

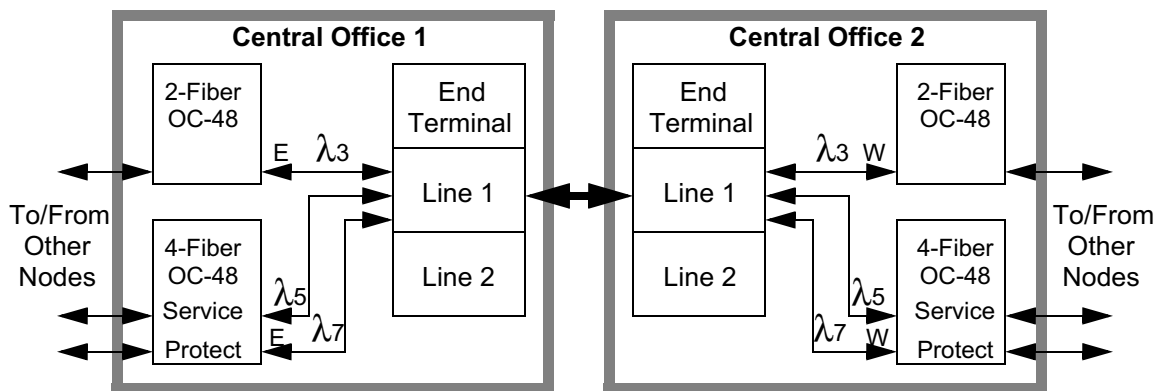


Figure 3-6 Connections To A Single Line

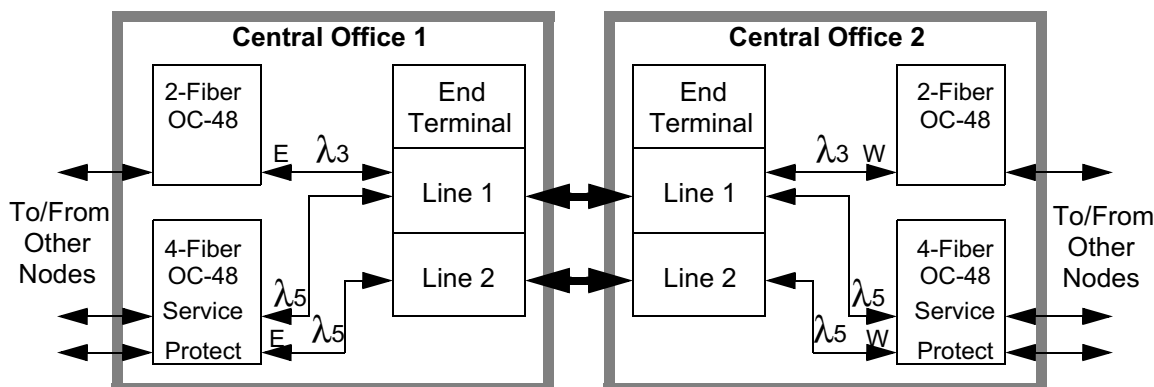


Figure 3-7 Connections To Both One And Two Lines

Basic WaveStar OLS 40G Shelf

The basic WaveStar OLS 40G shelf holds one or two optical lines identified as Line 1 and Line 2. If only one line is needed then either line can be equipped first (i.e. line 2 can be used before line 1). Refer to Figure 3-8 and Figure 3-9. Both lines must connect between the same two locations. At Central Office 2 if one line is equipped using half the shelf to connect to Central Office 1 then the other half of the shelf cannot be used to connect to a different location (Central Office 3). Refer to Figure 3-10. This means that two shelves would have to be equipped and only half of each shelf will be used.

With the use of Release of 2.1 in two fiber systems, the requirement shown in Figure 3-10 on page 3-9 is no longer banned. If a Dual Facing Shelf is used in Central Office 3 with each side facing a different office, this configuration is allowed. Refer to Figure 3-11 on page 3-10.

Multiple WaveStar OLS 40G Shelves

Two WaveStar OLS 40G shelves can be connected together and controlled from a single shelf for high traffic applications between two locations. In this application the shelf with the controllers contains lines 1 and 2, the controlled shelf contains lines 3 and 4. But like the basic shelf, all four lines must connect between the same two locations unless the Dual Facing Shelf configuration is used with R2.1.

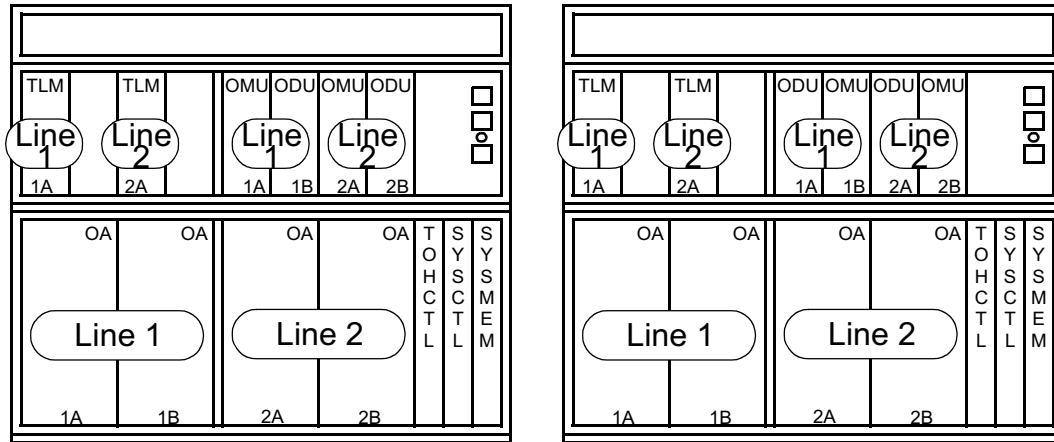


Figure 3-8 End Terminal Shelves (1A-TX at Left/1A-RCV at Right)

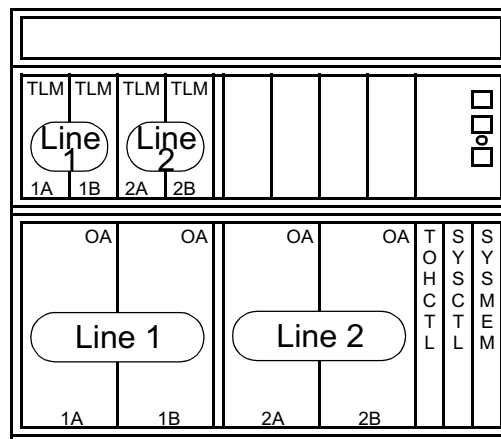


Figure 3-9 Repeater Shelf

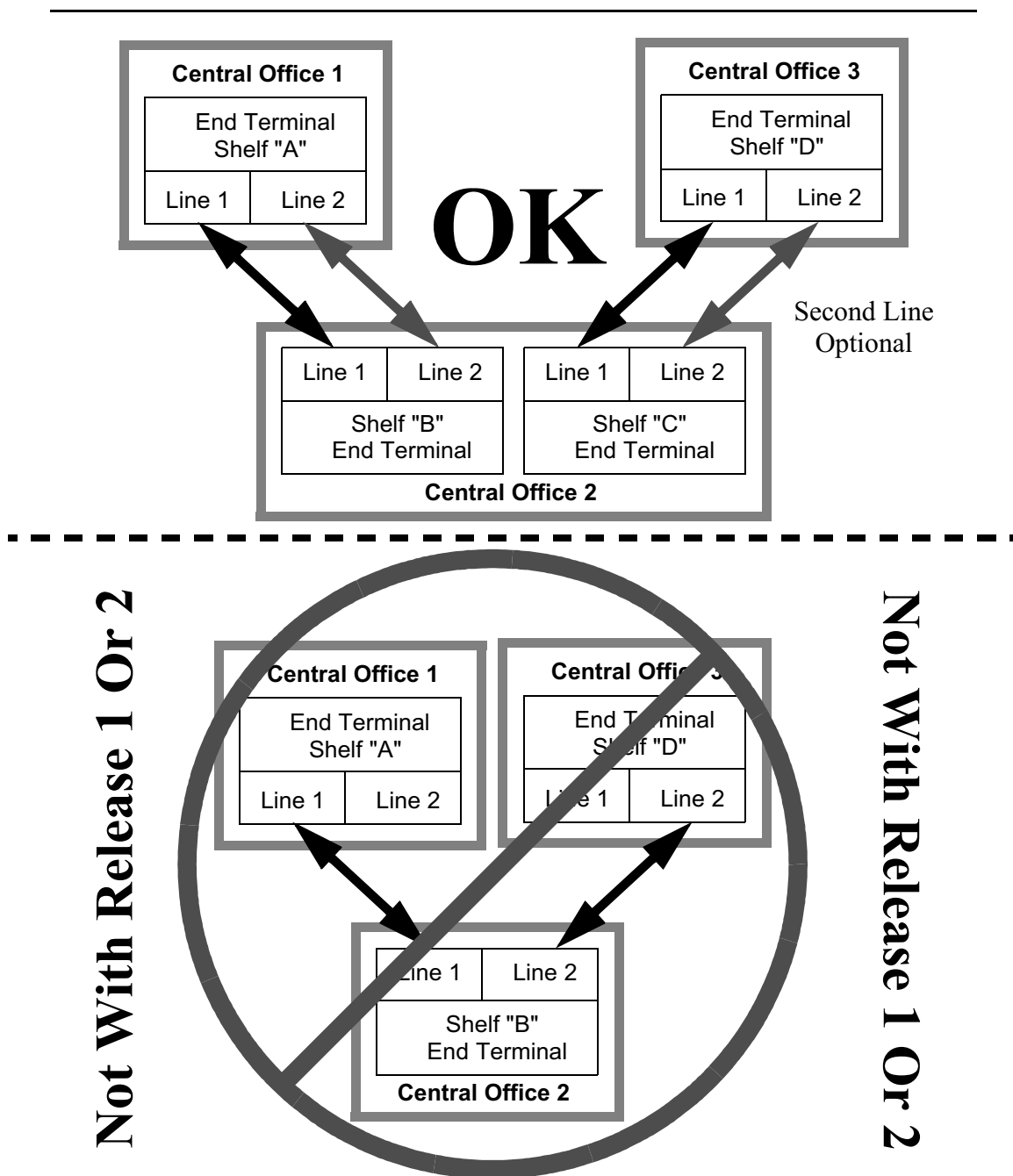


Figure 3-10 Optical Line Connections Between Offices (R1 & 2)

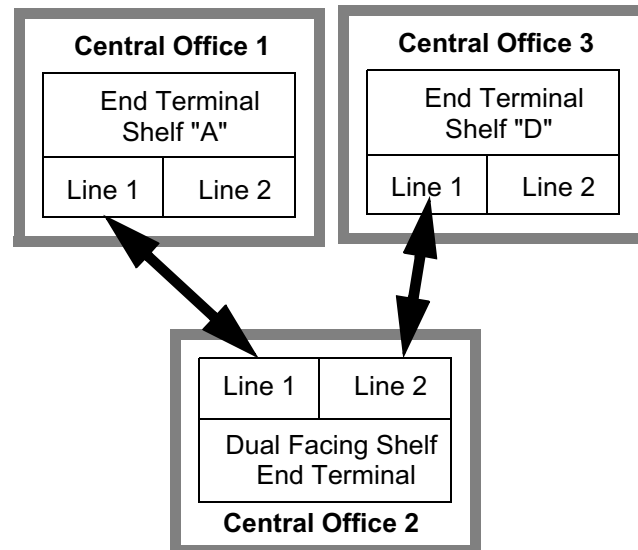


Figure 3-11 Optical Line Connections Between Offices (R2.1 Dual Facing Shelf)



NOTE:

Line 2 of a Dual Facing shelf **MUST** be connected to Line 1 of the OLS next in the Optical Line

Optical Translator Basics

Optical Translator Units are used with Optical Line Systems to perform the following functions:

- Connecting OC-48/STM-16, OC-12/STM-4, OC-3/STM-1, or 150 to 725 Mb/s systems with non-OLS compatible optics to an OLS
- Signal Regeneration between concatenated OLS
- Wavelength Translation between concatenated OLS
- Wavelength Add/Drop between OLS

Connecting Non-OLS Compatible Optics To WaveStar OLS 40G

Optical Translator Units receive any standard optical wavelength with an OC-48, OC-12, OC-3, or 150 to 725 Mb/s signal and apply that signal to an OLS compatible optical wavelength while providing an OLS identification tone. Figure 3-12 shows Optical Translators being used with an OC-48 system.

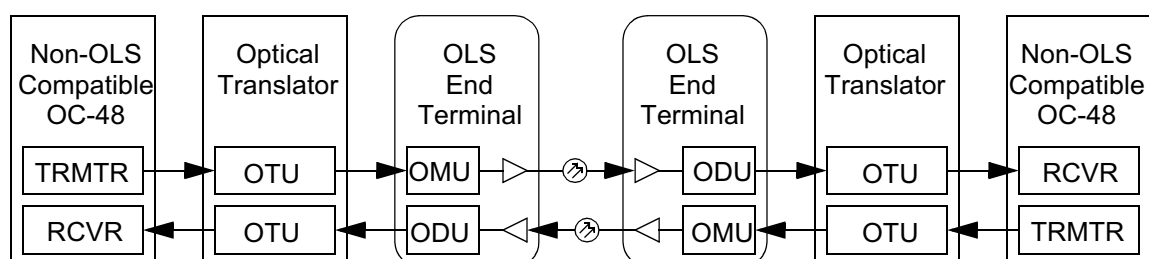


Figure 3-12 OT Connecting Non-OLS Compatible Optics To WaveStar OLS 40G

Signal Regeneration And Wavelength Translation

Optical Translator Units are used between back-to-back OLS to regenerate OC-48, OC-12, or OC-3 signals. The regenerated signal can output the original wavelength or the output can be translated to another wavelength. See Figure 3-13.

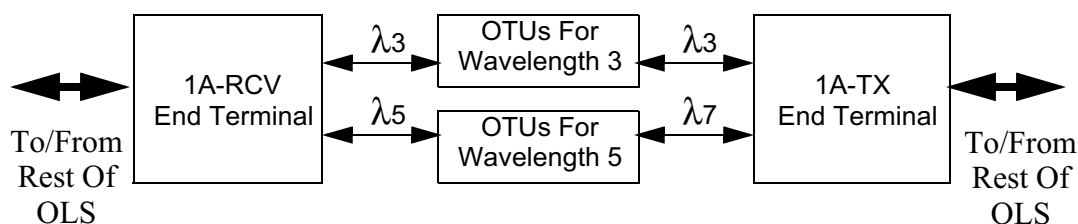


Figure 3-13 OTUs Used For Signal Regeneration And Wavelength Translation

Wavelength Add-Drop

Optical Translator Units are used to add/drop and regenerate the OC-48, OC-12, and OC-3 signals between several OLS. The regenerated signals can output the original wavelength or the output can be translated to another wavelength. See Figure 3-14

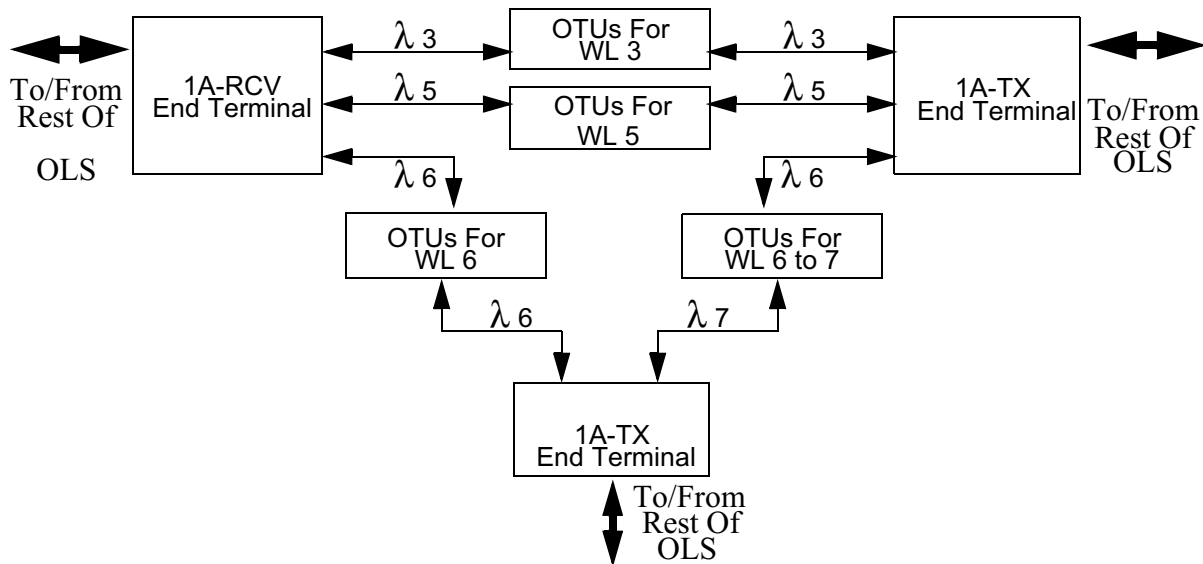


Figure 3-14 OTUs Used For Wavelength Add/Drop

Optical Line System Provisioning

Requirements

The entire Optical Line System consists of one or more subnetworks, each containing 1 to 4 lines, 2 End Terminals, and 0 to 7 Repeaters. Each system may have up to 32 nodes and *must have* the following basic provisioning:

- One and only one DS-NE
- One AGNE per alarm group
- A unique TID for each node

Guidelines

To maintain consistency the following guidelines are *recommended*:

- The DS-NE should be located at a 1A-TX End Terminal
- The AGNE should be located at a 1A-RX End Terminal.
- The “West” side of the OC-48 system should connect to the 1A-TX End Terminal.
- The “East” side of the OC-48 system should connect to the 1A-RCV End Terminal.

Wavelength Usage

Requirements

There are no specific requirements for wavelength equipage on the WaveStar OLS 40G. Wavelengths may be equipped in any random order and wavelengths do not have to be equipped the same in opposite directions.

Guidelines

The following wavelength guidelines will assist in maintaining OC-48/OC-12/OC-3, STM-16/STM-4/STM-1 WaveStar OLS 40G networks:

- Both directions of the OC-48/STM-16, OC-12/STM-4, or OC-3/STM-1 system should be equipped on the same wavelength through an OLS.
- An OC-48/STM-16, OC-12/STM-4, or OC-3/STM-1 system (ring or linear) should use the same wavelength on each OLS between the OC-48/STM-16, OC-12/STM-4, or OC-3/STM-1 nodes.

Fiber Connections To WaveStar OLS 40G/OT

Connecting 2-Fiber SONET/SDH Systems

A 2-fiber SONET/SDH system uses 1 line for transmission as shown in Figure 3-15. The SONET/SDH Terminal shown uses OLS compatible optics to connect directly to the WaveStar OLS 40G.

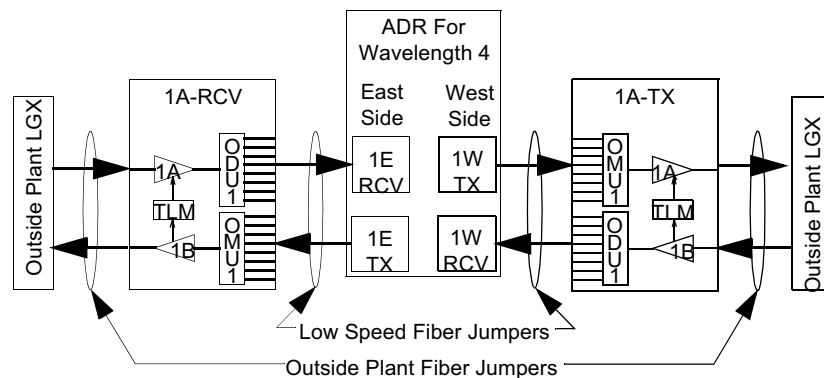


Figure 3-15 Intraoffice Fiber Jumpers For 2-Fiber Systems

Connecting 4-Fiber SONET/SDH Systems

A 4-fiber SONET/SDH system typically uses 2 lines for transmission providing service and protection equipment diversity (shown in Figure 3-16). A 4-fiber SONET/SDH system can place service and protection on different wavelengths of the same optical line if there is a shortage of fibers (shown in Figure 3-17). The SONET/SDH Terminals shown use OLS compatible optics to connect directly to the system.

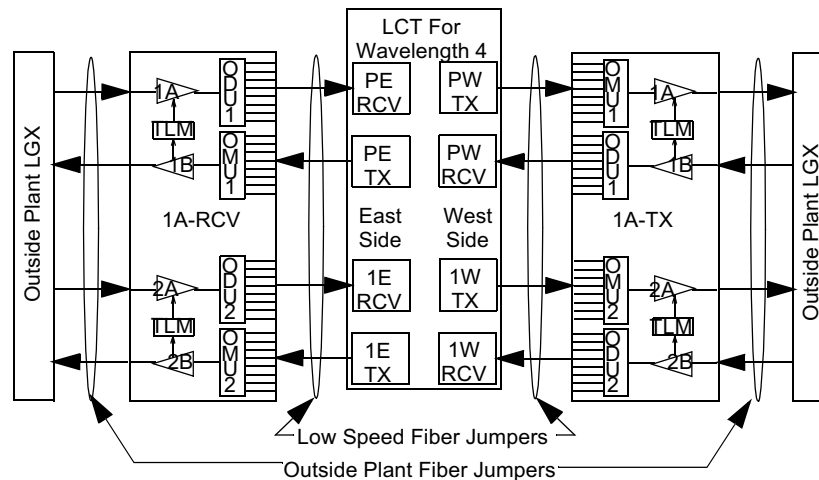


Figure 3-16 Intraoffice Fiber Jumpers For 4-Fiber Systems (Equipment Diversity)

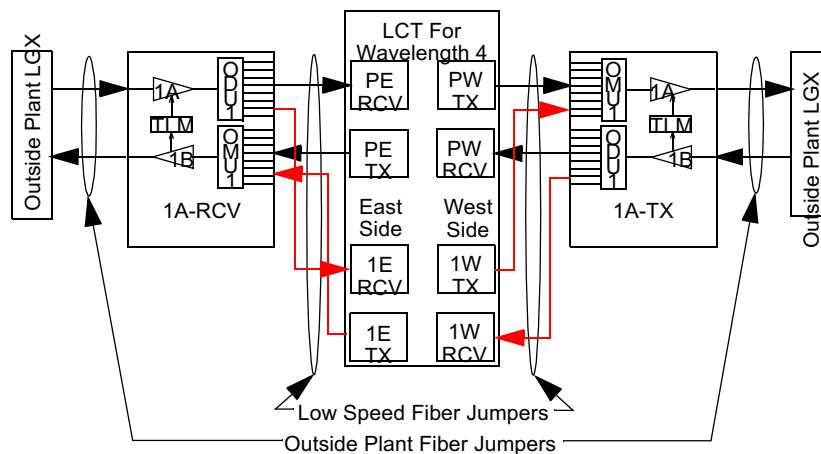


Figure 3-17 Intraoffice Fiber Jumpers For 4-Fiber Systems (Wavelength Diversity)

Connecting Optical Translators

Figure 3-18 shows the fiber connections for using OTUs to regenerate a 2-fiber SONET/SDH system. Figure 3-19 shows the fiber connections for using OTUs to regenerate a 4-fiber SONET/SDH system using 2 lines. Figure 3-20 shows the fiber jumpers for using OTUs to connect an SONET/SDH system without compatible optics to a WaveStar OLS 40G.

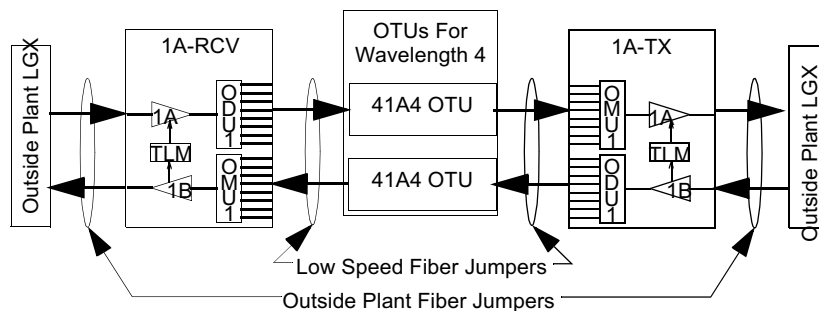


Figure 3-18 Intraoffice Fiber Jumpers For 2-Fiber System OT Regeneration

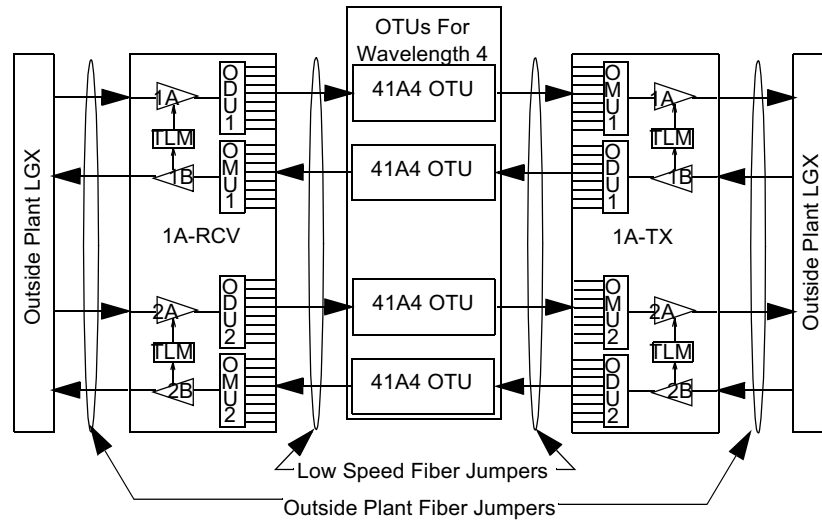


Figure 3-19 Intraoffice Fiber Jumpers For 4-Fiber System OT Regeneration

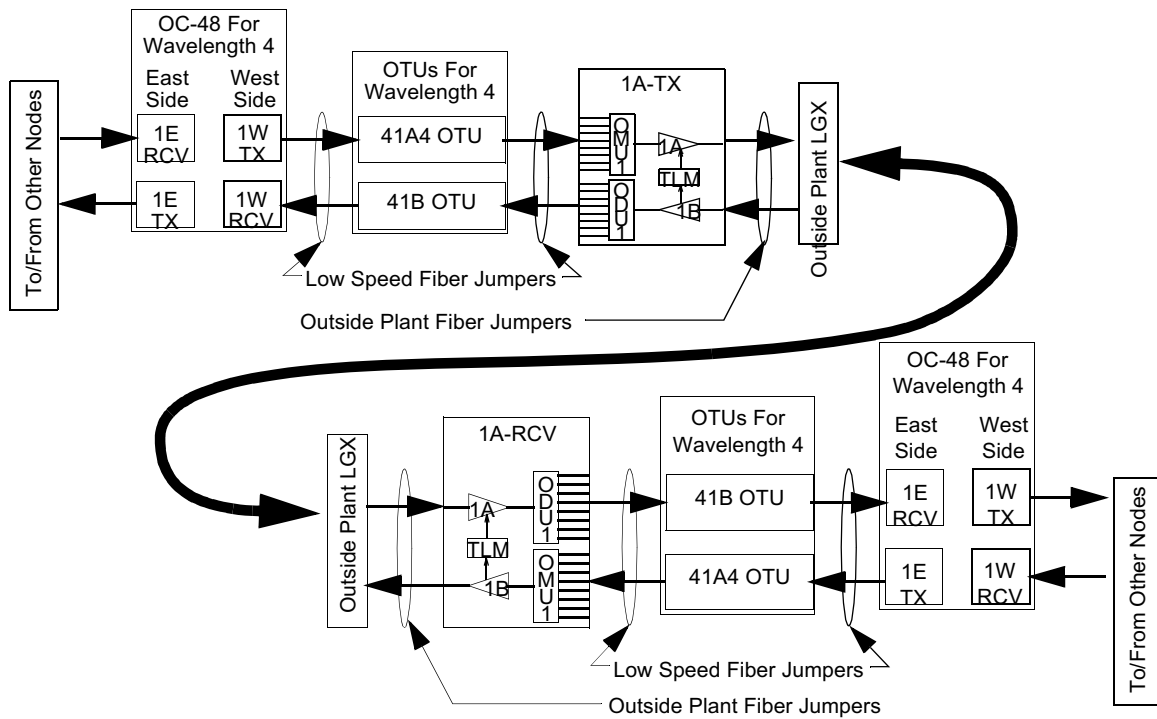


Figure 3-20 Intraoffice Fiber Jumpers For SONET/SDH To WaveStar OLS 40G Through OTUs

Equipment Installation

4

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Equipment Installation

4

Overview

This section covers the general requirements and methods for installing the WaveStar™ OLS 40G cabinet and its associated cable rack and end guard assemblies. It also covers the requirements and methods for installing the OT cabinet and the installation of miscellaneous mounted OT and OLS. The cabinetized version of both the OT and the WaveStar OLS 40G use the same cabinet components as the 5ESS-2000.

Equipment

The procedure for installing the WaveStar OLS 40G or OT equipment is summarized as follows:

- Check material and tools
- Determine earthquake zone
- Install cabinet
- Install cable rack
- Ground framework
- Install door frame assemblies
- Wire cabinet
- Install door assemblies
- Install end guard assemblies

Check Material and Tools

Ship Loose Material

Material shipped includes:

- The cabinet framework equipped with 2 shelves for the OLS or 3 for the OT
- Two 15 ft. power cables (or longer if specified by the order)
- Cabinet front indicator kit (upper door frame, strike, indicator strip and mounting screws)
- Cabinet door kit (air deflector plate with retainers, lower door frames with screws, front doors, and rear doors)
- Cabinet rear (blank) indicator kit (upper door frame, blank indicator strip and mounting screws)
- Installation Kit C848065959 (fiber ID labels, spare shelf grommet, fuses, and fiber protection tubing)
- Lightguide buildout kit per the order
- Circuit packs per the order
- Intrashelf fiber jumpers with ID labels per the order*
- Alarm circuit module
- OT to OLS fiber jumpers with ID labels per the order**

* OLS only

** OT only

Tools

The tools required for installation of the WaveStar OLS 40G and OT are listed below in Table 4-1, "Required Tools for Installation," on page 4-2. Small hand tools normally used are omitted.

Table 4-1 Required Tools for Installation

Quantity	Comcode	Description
1	TK-33	Vacuum
1	TK-76B or TK-66B	Drill or Hammer Drill

Table 4-1 Required Tools for Installation

Quantity	Comcode	Description
1	54720	C-Tap Thomas & Betts or equivalent
1	TBM2 or TMB8	Crimping tool Thomas & Betts or equivalent (use 54720)
1	Die code brown or pink	Thomas & Betts (use with 54720)
1	R-3055	Safety goggles
1	406902049	Anchor Setting Tool for drop-in Anchors
1	406899831	Anchor Setting Tool for Heavy-Duty Anchors
1		3/4" Torque wrench, 25 ft.-lbs. (for 1/2" bolts)
1		19-mm Open End Wrench (or 3/4")

Determine Earthquake Zone

The United States is divided into 5 different earthquake zones. Check which zone your area is classified as before beginning bay installation. In general there are two different floor attachment techniques, one for Zone 0, 1 and 2, and one for Zone 3 and 4.

For stand-alone cabinets in Zones 0, 1 and 2 use two 13mm (1/2") anchors on opposite corners of the cabinet baseplate. For stand-alone cabinets in Zones 3 and 4 use four 12mm (1/2") heavy duty expansion anchors on opposite corners of the cabinet baseplate.

Cabinet Installation

Uncrating and Hauling Precautions

**NOTE:**

Please note the following precautions when uncrating equipment:

- Do NOT ship or store containers in any position other than its marked position.
- Do not stack equipment more than two cabinets high when it is being transported over the road or is being held in a warehouse.
- Move containers in the shipping position only. Verify that containers have not been damaged. It is important that all containers be handled with care and that no units are dropped.
- Uncrate all material in quarters separate from the equipment room so as to keep dust and lint away from other equipment.
- Uncrate the cabinet in its shipping position. All cabinets are shipped in a dust-protective, antistatic plastic bag and placed in a wooden container.
- Care should be exercised when uncrating position so that the equipment will not be damaged. The tools required for uncrating position are standard pinch-bar and claw-type hammers. Use a pinch-bar and/or hammer only in areas that have been nailed. Remove the plastic bag and all foreign material.
- Use the cabinet's square tube framework when lifting and moving the cabinet into position.

Install EMC Cover Plates - OT Only

EMC cover plates are required on both sides of the cabinet. The only exception allowed is for the installation of end guards which is described in the last section of the chapter. End guards may be called out for appearance purposes when one side of the cabinet is exposed at the end of a row or the cabinet is a stand-alone with both sides exposed. Review installation instructions to determine which sides will have end guard installed. Do not install EMC side shields and vertical cable channels to these sides.

Mount the EMC side shields as follows:

- Mount the Vertical Cable Channels to both sides of the cabinet frame using the supplied M6 x 12 Hex Bolts with tooth lock washers. Starting from inside the frame, insert the bolts with lock washers through predrilled holes at top and bottom of the frame. Align bolts with threads on Vertical Cable Channel and secure channel to the frame using four bolts per channel as shown in Figure 4-1 on page 4-6.
- Align the left panel to the left side of the cabinet with folded edges facing inward towards the cabinet. **Verify that the top center mounting screw hole and coupling bolt holes are in alignment** as shown in Figure 4-1 on page 4-6. A hole mismatch indicates that the right panel is being aligned to the left side. Swap panels with the other side panel in the installation kit and verify hole alignment.
- Install left and right side panels using the eleven (11) Phillips head screws (M5 X.8X6MM) per side. Refer to Figure 4-1 on page 4-6.

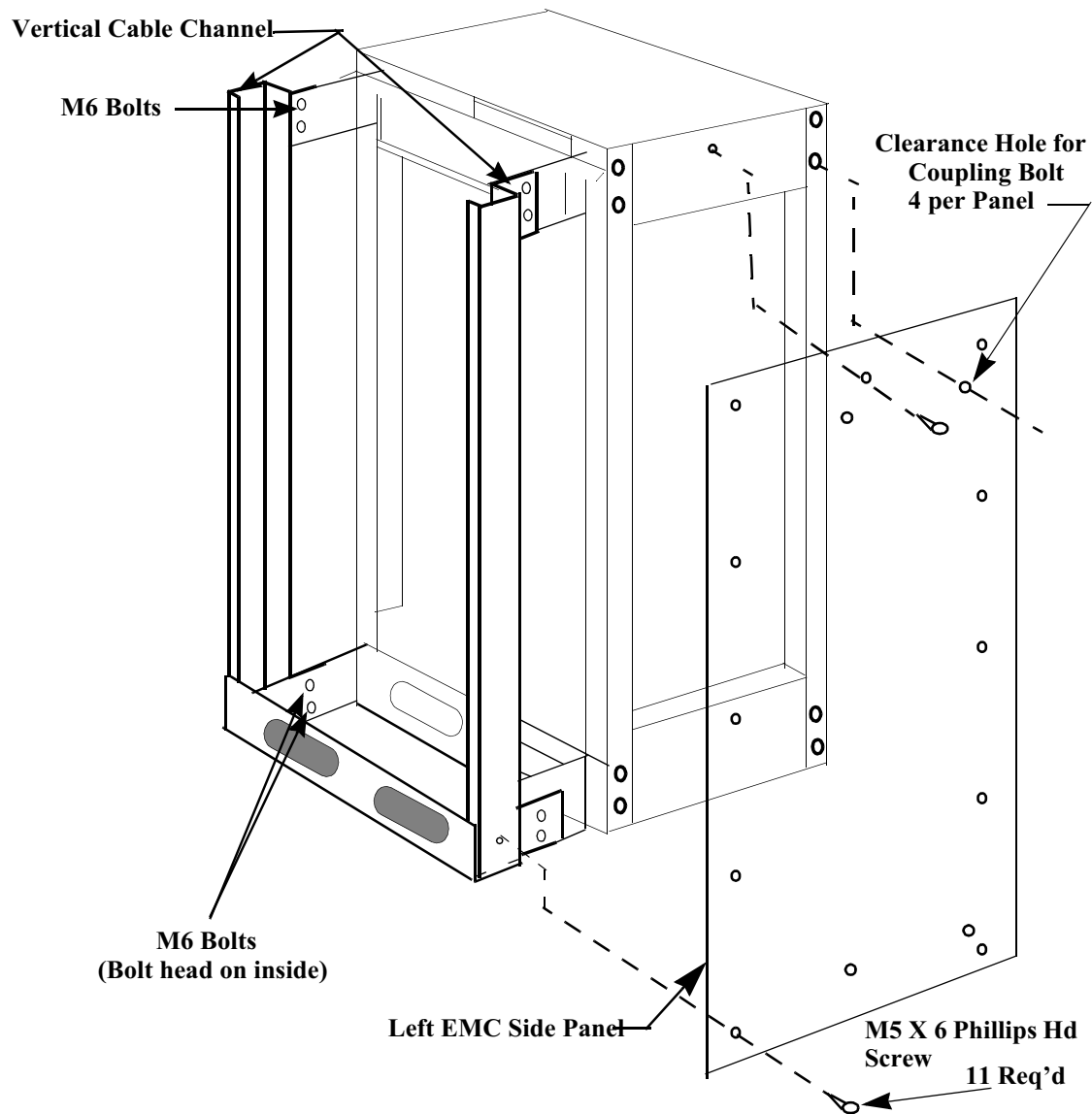


Figure 4-1 EMC Cover Plate Installation - OT Only

Mark Floor Layout

Refer to Figure 4-2 on page 4-7 for cabinet mounting information. Locations 1 are the preferred drilling locations and locations 2 are the secondary. Refer to the job floor plan for cabinet-lineup location, and mark the floor for drilling using a marking pencil or felt pen.

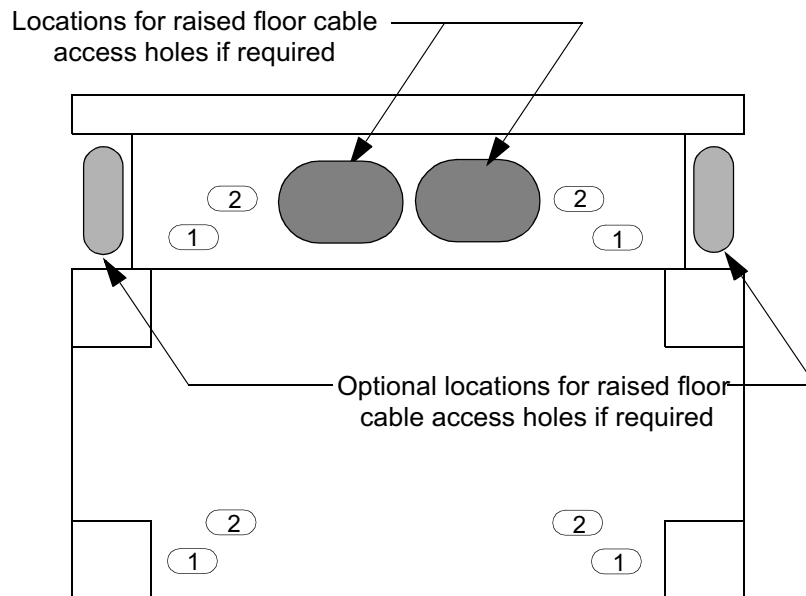


Figure 4-2 Cabinet Framework Footprint

Drill Mounting Holes



CAUTION:

When drilling holes in concrete (or operating any power tools), always wear safety goggles.

Noting the correct earthquake zone for your area, special attention should be paid to the Anchor Installation for Heavy Duty Anchor or Drop-In Anchor to ensure correct floor drilling.



NOTE:

Refer to ED-5D511-31 "Hardware for anchoring 5ESS switch and 5ESS cabinet and cable rack support stanchions" for details.

Erect and Align Cabinets and Framework

To mount and assemble the cabinet, follow the procedure below:

- (1) Move the cabinet to its proper floor location. Exercise care when moving the cabinet and avoid sudden shock or strain to the equipment.
- (2) Use two or more technicians to erect the cabinet into position.
- (3) Lift the cabinet and place it into its proper location in the lineup. Visually inspect for obvious damage.
- (4) Before the cabinet is secured to the floor, verify that it is level so that alignment with adjacent cabinet can occur. Refer to SIG I WW 100 5ESS-2000 Switch Handbook Section 4809, Coupling of Cabinets, for details.
- (5) Assemble the cabinet to the floor using appropriate hardware. Be sure to note earthquake zone requirements. Refer to ED-5D511-31 "Hardware for anchoring 5ESS switch and 5ESS cabinet and cable rack support stanchions" for details.

Install Cable Rack Top

When a cable rack top assembly is required, assemble per the following:

- Verify the cabinet is not grounded.
- Connect the ED5D742-70, G2 and G10 cable rack to the cabinet using the 4 supplied bolts as shown in Figure 4-3 on page 4-9, "Cable Rack Top Installation."

NOTE:

Information on ordering and installation of cable racks is included on ED5D742-10 and ED5D742-70 for the 5ESS-2000 system.

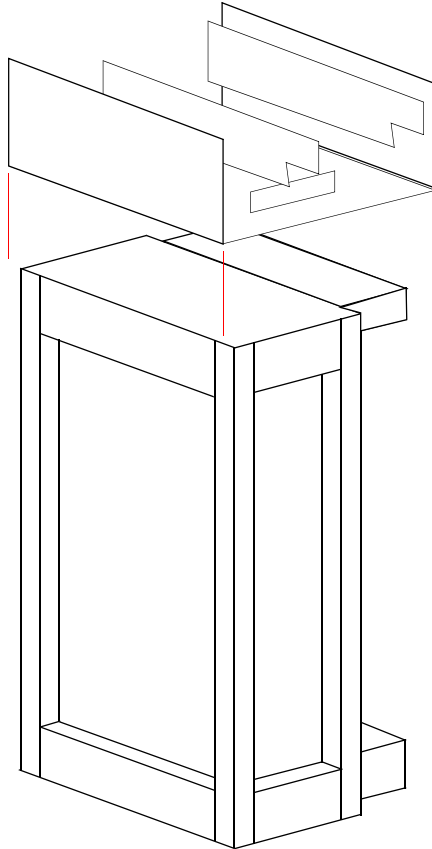


Figure 4-3 Cable Rack Top Installation

Ground Cabinet Framework

Connecting the cabinets to building ground serves two purposes:

- (1) A direct earth ground connection for lightning protection
- (2) A common ground potential for electrostatic discharge (ESD) protection.

When a frame is installed, it should be connected to the building ground as soon as possible after the cable rack is installed.

All WaveStar OLS 40G and OT frames are shipped with ground cable assemblies attached to the frame. It will be necessary to terminate the ground wire in the cable rack.

Install Door Frame Assemblies

Assemble the door frames as follows:

- Mount the lower door frame assemblies to the front and rear of the cabinet using 4 supplied screws. Part A on Figure 4-4 on page 4-10 and Figure 4-5 on page 4-11.
 - Pull the alarm cables through the cable access window (shown in Figure 4-4 on page 4-10) by clipping any necessary factory tie downs.
 - Mount the upper door frame assemblies to the front and rear of the cabinet using 3 supplied screws. Part B on Figure 4-4 on page 4-10 and Figure 4-5 on page 4-11.
-

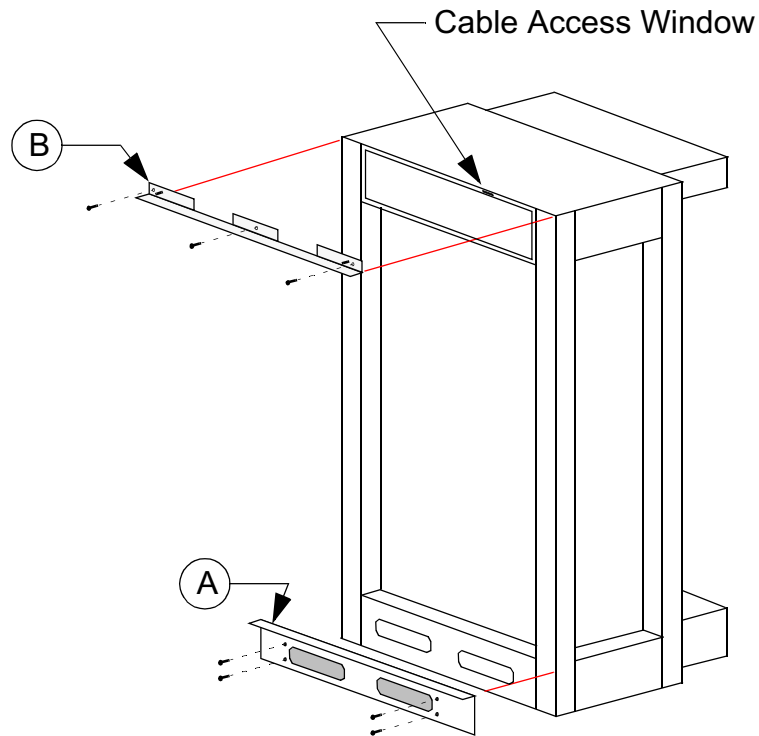


Figure 4-4 Front Door Frame Assembly

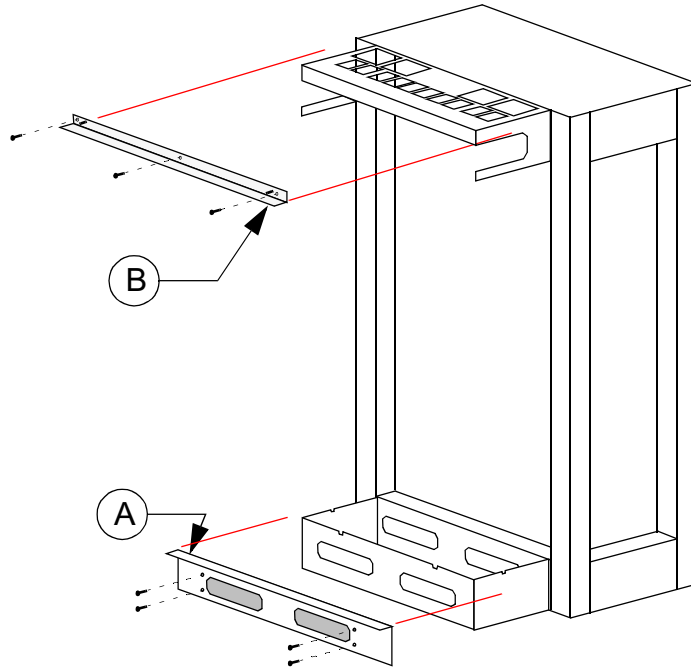


Figure 4-5 Rear Door Frame Assembly

Indicator Strip Wiring

Alarm Circuit Module For WaveStar OLS 40G 4-Line Cabinet

- Dress the alarm cables through the frame cable window and over the notch in the top of the alarm circuit module.
- Install the 481A alarm circuit module using the 3 supplied screws as shown in Figure 4-6 on page 4-12.
- Plug the J1B and J2B connectors into the 481A alarm circuit module and route cables as shown in Figure 4-7 on page 4-12.

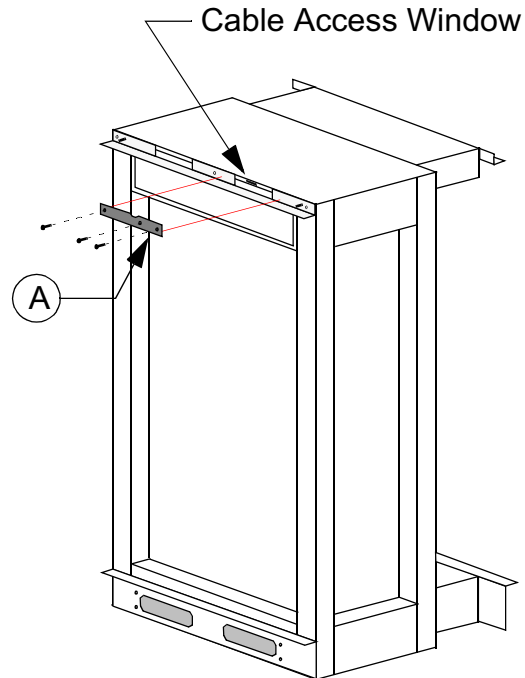


Figure 4-6 Alarm Circuit Module Installation For 4-Line Cabinet

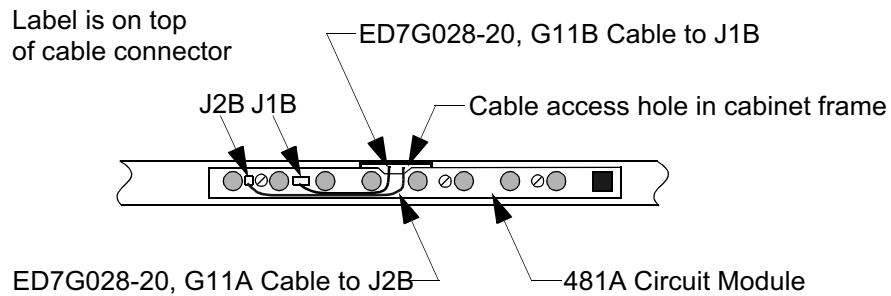


Figure 4-7 Alarm Circuit Module Routing For WaveStar OLS 40G 4-Line Cabinet

Alarm Circuit Module For WaveStar OLS 40G Dual 2-Line Cabinet

- Dress the alarm cables through the frame cable window and over the notch in the top of the alarm circuit module.
 - Install the 481A alarm circuit modules using 3 supplied screws for each as shown in Figure 4-8 on page 4-13.
 - Plug the J1B connectors into the 481A alarm circuit module and route cables as shown in Figure 4-9 on page 4-14.
-

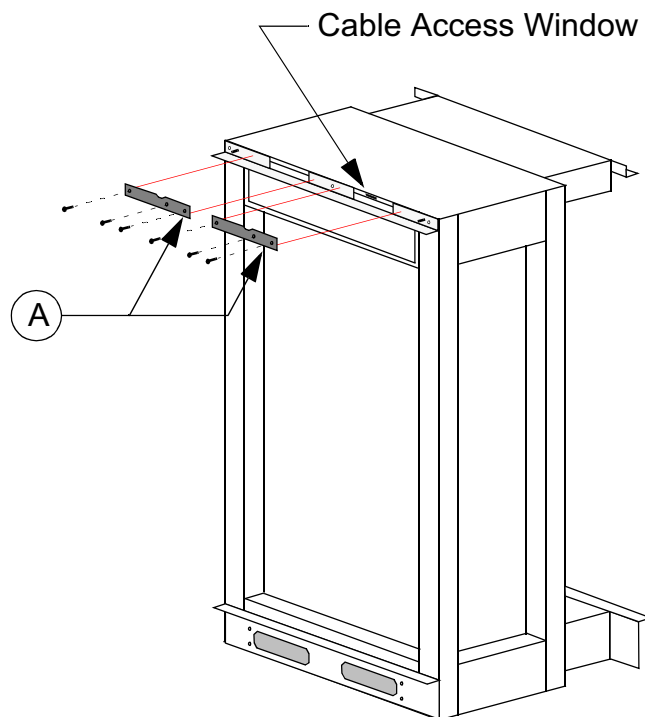


Figure 4-8 Alarm Circuit Module Installation For OLS Dual 2-Line Cabinet

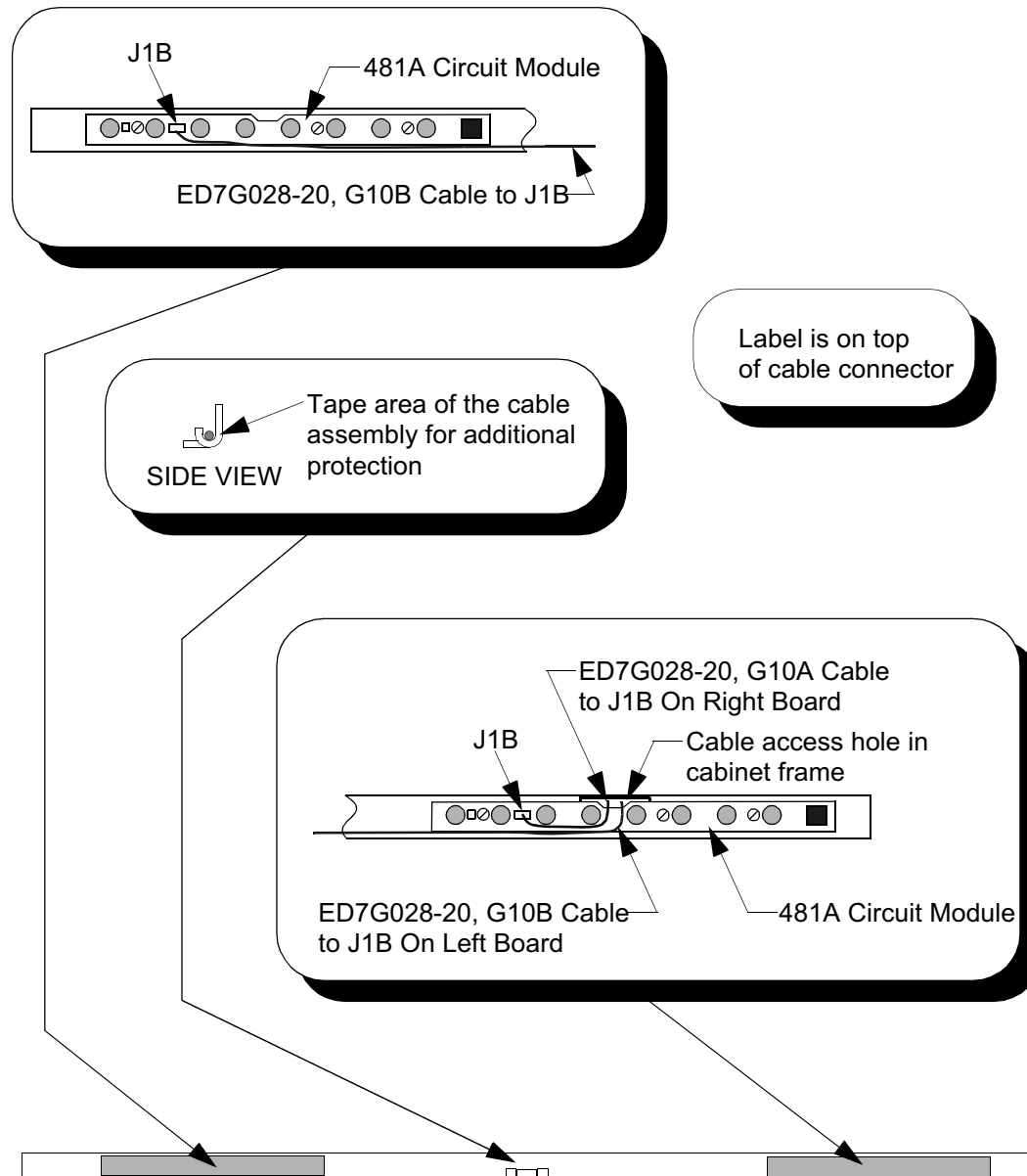


Figure 4-9 Alarm Circuit Module Cable Routing For OLS Dual 2-Line Cabinet

Alarm Circuit Module for OT Cabinet

- Dress the alarm cables through the frame cable window and over the notch in the top of the alarm circuit module.
- Install the 857A alarm circuit module (Part of OT Installation Kit P/N 847814316) using the 3 supplied screws as shown in Figure 4-6 on page 4-12.
- Plug the J1B, J2B and J3B connectors into the 857A alarm circuit module and route the cables as shown in Figure 4-10 on page 4-15

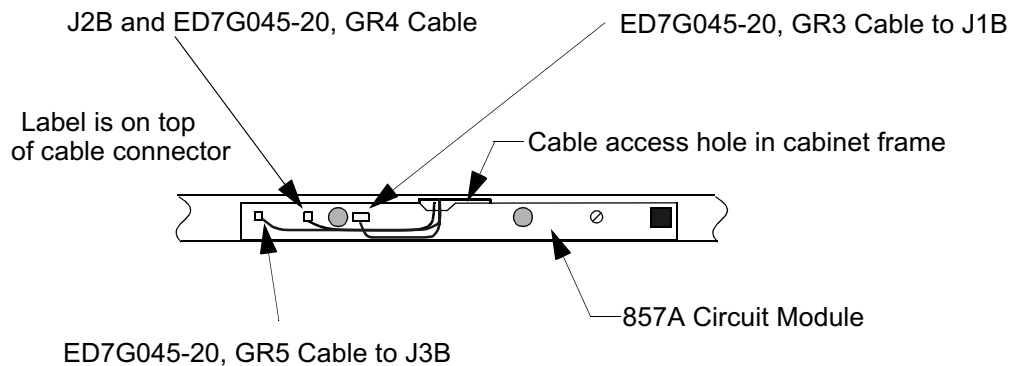


Figure 4-10 Alarm Circuit Module Routing For OT Cabinet

Install Door Assemblies

Assemble the doors as follows:

- Install the OLS or OT indicator strip to the top front of the cabinet by snapping the spring catches to the pins on the upper door frame assembly. Part A on Figure 4-11 on page 4-16.
- Install the OLS or OT blank indicator strip to the top rear of the cabinet by snapping the spring catches to the pins on the upper door frame assembly. Part A on Figure 4-12 on page 4-17.
- Mount the front door assemblies to the front of the cabinet by aligning the bottom pins then pulling the top pins to engage into the upper door frame. The right front door has the CIT access panel. Part B on Figure 4-11 on page 4-16.
- Mount the rear door assemblies to the rear of the cabinet by aligning the bottom pins then pulling the top pins to engage into the upper door frame. Part B on Figure 4-12 on page 4-17.

- Mount the air deflector plate to the bottom rear of the cabinet using 2 supplied plastic insertion plugs. Part C on Figure 4-12 on page 4-17.

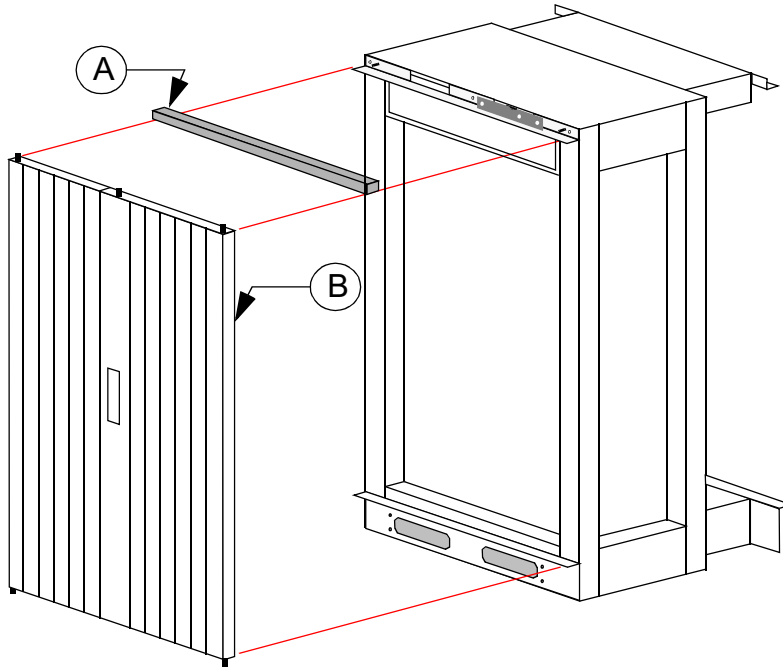


Figure 4-11 Front Door Assembly

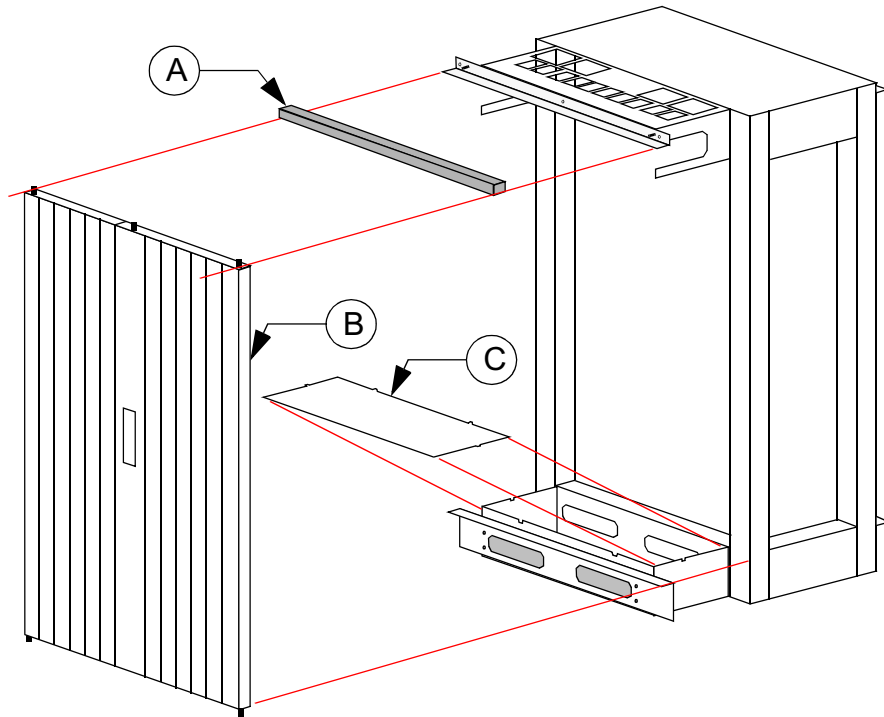


Figure 4-12 Rear Door Assembly

Install Cabinet Door Grounding Cables

Install grounding cable assemblies to door and frame as follows:

- Locate the four(4) grounding cable assemblies in installation kit.
- Install cable assembly to the rear door using M4 screw with lock washer locating it 5.32 inches(13.5 cm) down from the top of door (fourth hole down from top of door) as shown in Figure 4-13 on page 4-18. Torque screw to 10 inch-lbs(1.13 N.M). Do not overtorque.
- Install other end of cable with M6 screw to the cabinet as show in Figure 3-9. Torque screw to 27.0 inch-lbs(3.1 N.M).
- Repeat the process for the other rear door.
- Install cable assembly to front door using M4 screw with lock washer locating cable 23.3 inches down from top of door (16th hole down from top) as shown in Figure 4-14 on page 4-19. Torque screw to 10 inch-lbs (1.13 N.M). Do not overtorque.

- Install other end of cable with M6 screw to the cabinet 46.5 inches (118 cm) up from bottom (two holes up from 45 inch marker on frame) as show in Figure 3-10. Location should be same as vertical center of upper vent. Torque screw to 27.0 inch-lbs (3.1 N.M).
- Repeat the process for the other rear door.

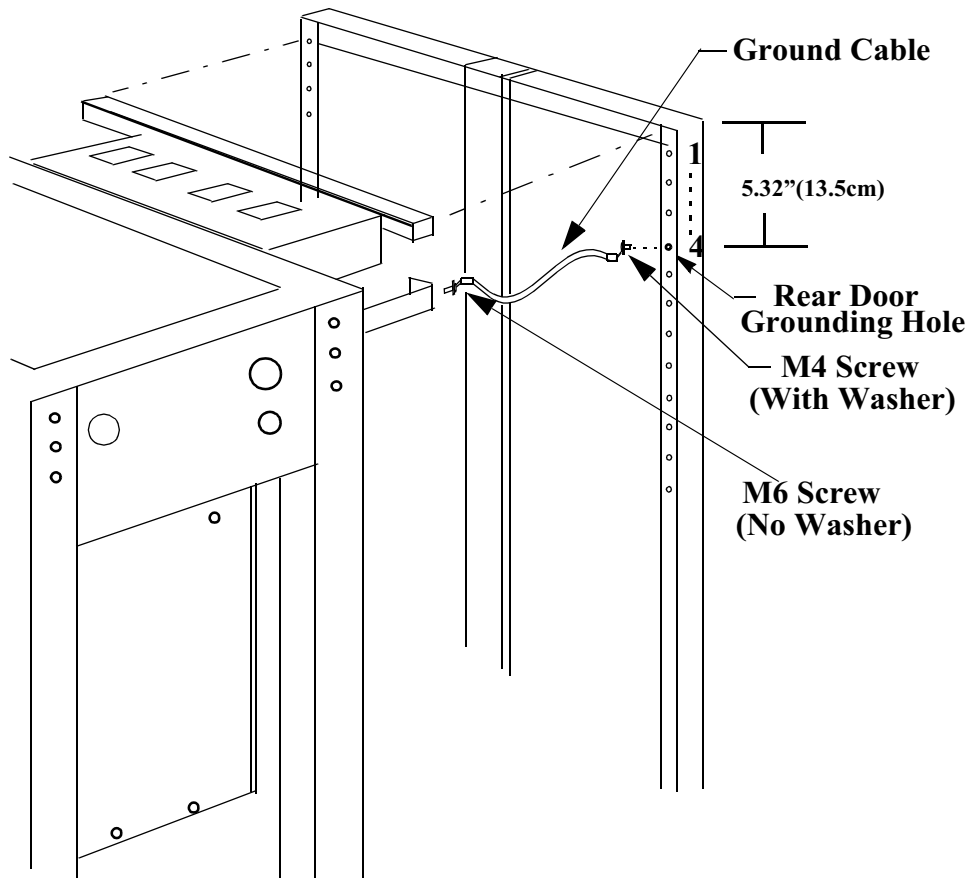


Figure 4-13 Mounting of Rear Door Grounding Cables

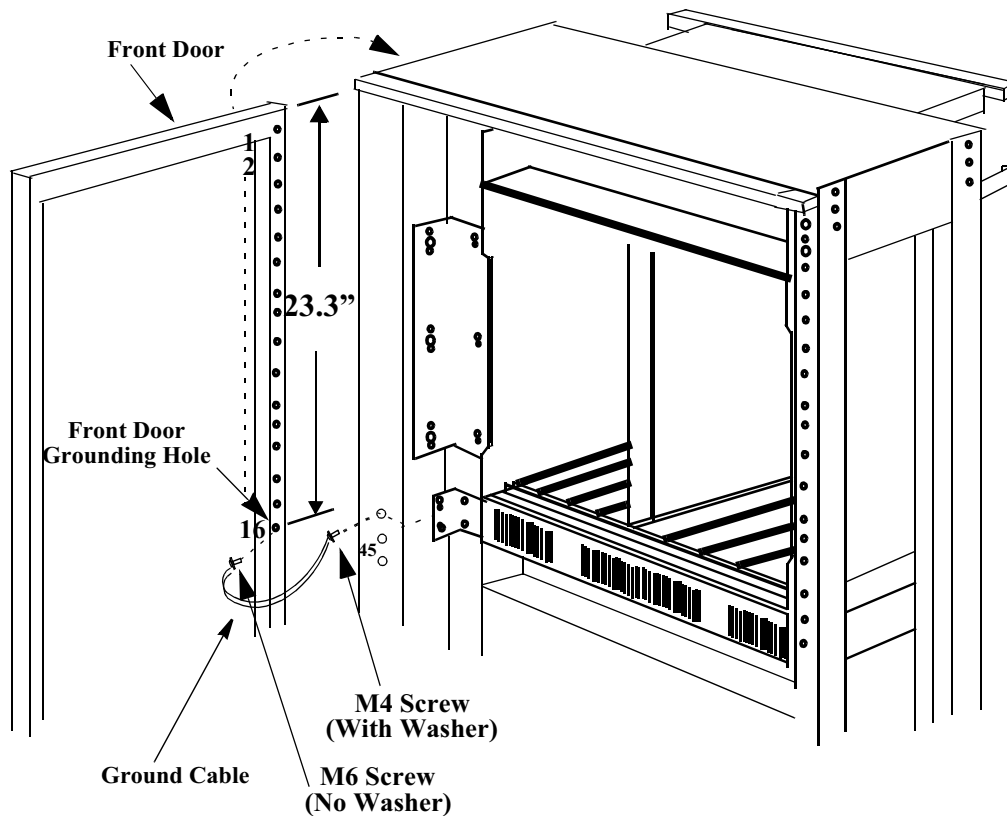


Figure 4-14 Mounting of Front Door Grounding Cables

Install End Guard Assembly

When end guards are required, assemble the ED5D743-70, G21 (left) and G22 (right) end guards to the sides of the cabinet as shown in Figure 4-15 on page 4-20.

⇒ NOTE:

Information on ordering and installation of end guards is included on ED5D743-10 and ED5D743-70 for the 5ESS-2000 system.

⇒ NOTE:

If at a later date the End Guard Assembly is removed for any reason, the EMC Plate must be installed in its place. (See Figure 4-1 on page 4-6.)

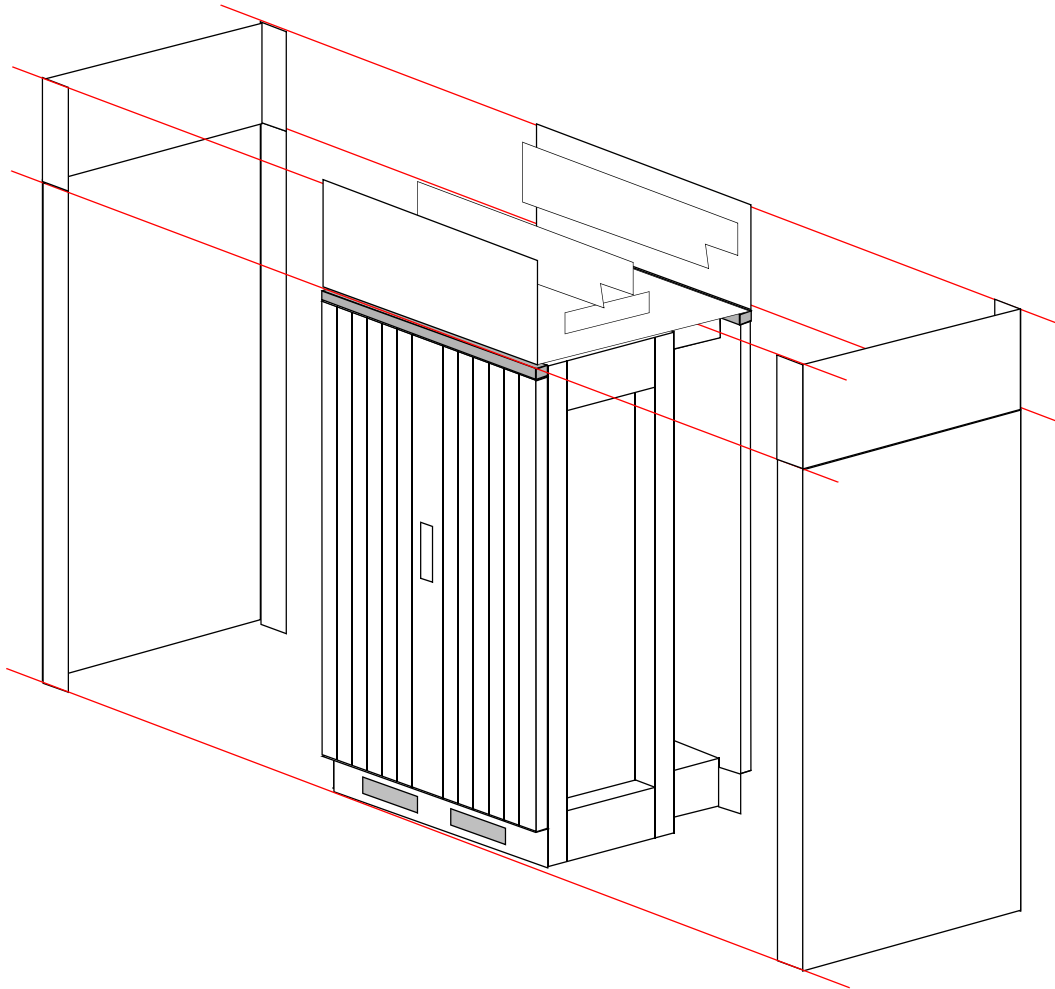


Figure 4-15 End Guard Installation

WaveStar OLS 40G or OT Miscellaneous Mount Installation

Bay Frame and Mounting Requirements

Miscellaneously mounted OLS or OT is designed to mount into customer installed bay frames. It is assumed that the bay frames have been installed properly and meet earthquake zone requirements.

The frames used to mount the miscellaneous mount OLS or OT must meet the following requirements:

- (1) Side to side opening must be 21.5 inches.
- (2) Hole to hole spacing must be 22.312 inches.
- (3) Vertical mounting hole spacing should be one (1) inch on center.

Figure 4-16 on page 4-22, "Miscellaneously Mounted OT," shows a List 10 Miscellaneously Mounted OT mounted to a Lucent Technologies 800 Type bay frame. Figure 4-17 on page 4-23, "Two Miscellaneously Mounted OLS Shelves," shows two Miscellaneously Mounted OLS shelves mounted to a Lucent Technologies 800 Type bay frame. When installing shelves in the bay frame, the following mounting requirements must followed:

- The heat baffle mounted to the bottom of each shelf must be installed with each shelf. The heat baffles are not to be removed from any shelf.
- The mounting bracket hole separation of 11 inches, as shown in Figure 4-16 on page 4-22, must be maintained. The supplied interconnecting cables will not be long enough for a larger separation.
- Either another heat baffle or an open space of three (3) inches is required for cooling at the top of each installation. The shelves may be mounted at any height ranging from the lower heat baffle touching the base of the bay, to any distance above the base, as long as the top clearance of 3 inches or greater is maintained.

The total height required for the various OT List structures is as follows:

Table 4-2 Vertical Space Requirements for OT List Structures

List Number	Vertical Space Required
List 10	66 Inches
List 11	24 Inches
List 12 with List 11	45 Inches
List 13 with List 11 & 12	66 Inches

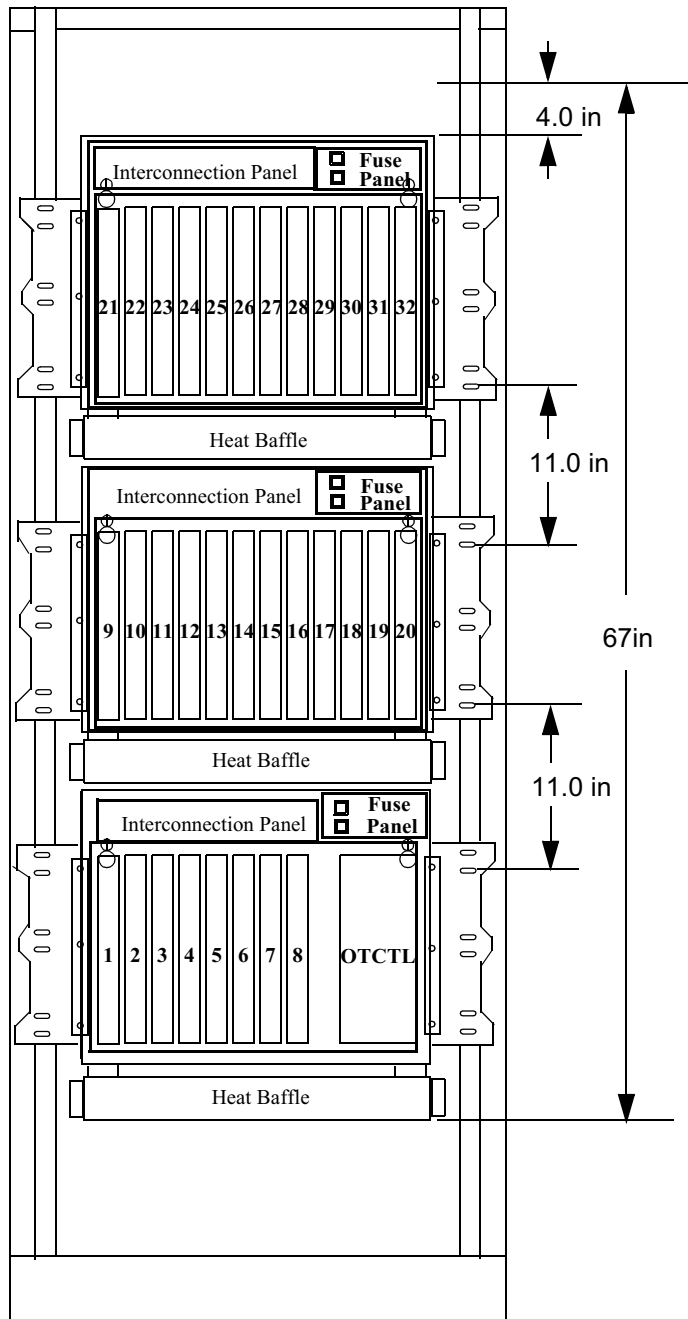


Figure 4-16 Miscellaneously Mounted OT

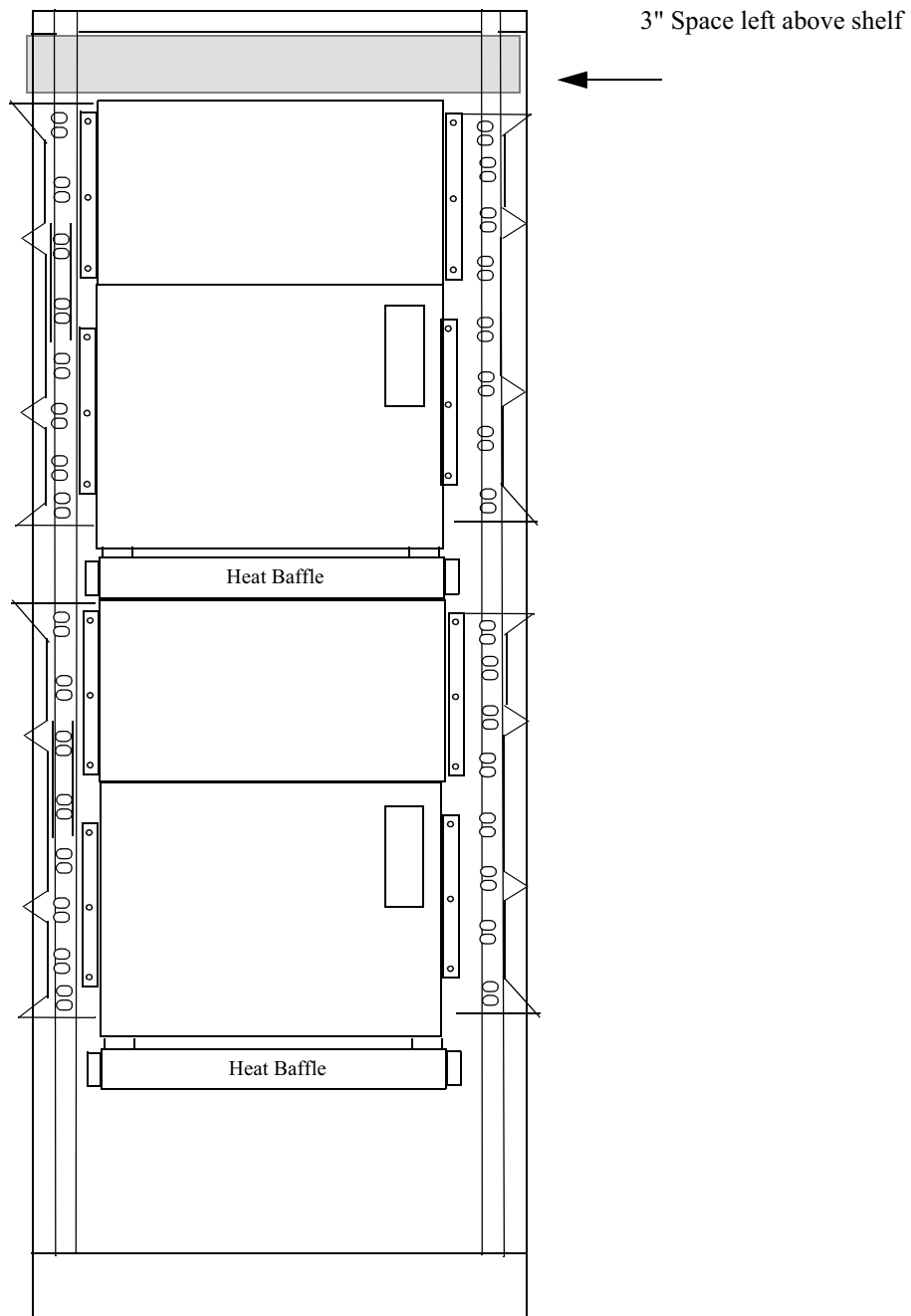


Figure 4-17 Two Miscellaneously Mounted OLS Shelves

Adjustment of OLS & OT Side Mounting Brackets

The side mounting brackets of the OLS and OT shelves are factory installed for mounting to the narrow mounting flange of a Lucent Technologies 800 Type bay frame. These brackets are identified by the letters L and R stamped on them. For mounting to the Lucent Technologies 801 Type frame using the wide mounting flange, the bracket needs to be moved forward to another set of mounting holes. For other bay frame types, the bracket 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, remove the three (3) screws holding the bracket and slide the bracket one inch forward towards the front of the shelf. Align the bracket holes with the new set of mounting holes on the chassis side. The bracket should now be parallel with its previous position, offset by one inch. Install and tighten mounting screws. Perform the same operation with the mounting bracket on the other side of the shelf. Repeat the process for the brackets on any remaining shelves.

Mounting OT Shelves to Bay Frame

Mount the lowest shelf, the System Shelf, to the bay frame using three (3) mounting screws in each bracket on each side. The Lucent Technologies 800 and 801 type bay frames use a No. 12-24 x 3/4 inch long screw for mounting. If using a different bay frame, check mounting hardware requirements for that particular frame. If this is a List 11, System Controller Shelf Only, verify that a three inch space exists above the shelf.

Mount Complementary Shelf 1 above the System Shelf maintaining the 11 inch spacing as shown in Figure 4-16. Complementary Shelf 1 can be identified by the OTU slot label having numbers 9 through 20. Use six (6) mounting screws, three on each side, to mount Complementary Shelf 1 to the bay frame. If this is the last shelf to be installed, verify that a three inch opening exists above the shelf.

Mount Complementary Shelf 2 above Complementary Shelf 1 maintaining the 11 inch spacing as shown in Figure 4-16. Complementary Shelf 2 can be identified by the OTU slot label having numbers 21 through 32. Use six (6) mounting screws, three on each side, to mount Complementary Shelf 2 to the bay frame. Verify that a three (3) inch open space or greater is available above Complementary Shelf 2.

For mounting to an **ETSI 300mm Bay frame**, remove the shelf ground cable and side mounting brackets. Remove shielding plate from each side by removing the three screws holding the plate. Hook mounting flange supplied with installation kit through the side holes and mount to shelf side using the three screws that were used for the shielding plate. Use the installed flange for mounting to front of bay and to provide grounding to bay. If bay is not grounded, use removed ground cable to ground bay frame.

Mounting Miscellaneously Mounted Shelf to Bay Frame

Mount the shelf to the bay frame using 3 mounting screws in each bracket on each side. The Lucent Technologies 800 and 801 type bay frames use a No. 12-24x3/4 inch screw for mounting. If using a different bay frame, check mounting hardware requirements for that particular frame.

For mounting to an **ETSI 300mm Bay frame**, remove the shelf ground cable and side mounting brackets. Use the front flange for mounting and grounding of shelf to bay. If bay is not grounded, use removed ground cable to ground bay frame.

Power Cable Installation

5

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Overview

**CAUTION:**

Procedures in this installation manual are only to be performed by trained personnel.

This section covers WaveStar™ OLS 40G Power (battery A and battery B) cable installation for both cabinet and miscellaneous mount configurations.

General Considerations

**CAUTION:**

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

**CAUTION:**

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.

**WARNING:**

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 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 ED cable drawings listed in the Section 1, “Overall Installation and Test Considerations.”
- For ordering information, refer to 365-575-330, Optical Line System (OLS) Application, Planning, and Ordering Guide, Optical Translator (OT) Application, Planning and Ordering Guide.
- Do not remove the shelf backplane cover during the installation process.

Power Cable Installation for Cabinets

Description

The OLS and the OT are both powered by -48 volt direct current. Since redundant power is used to ensure maximum availability of the terminal, two battery power feeds are required for each terminal (feed A is Red and feed B is Blue).

Power Requirements

The power requirements for OLS and OT are as follows:

- Two feeders (A and B) are required for powering the cabinet.
- Each independent feeder must supply -48 volts direct current and a return.
- Each feeder capacity must be 20 amperes at the battery distribution fuse board (BDFB).

Table 5-1 WaveStar OLS 40G Power Planning

Equipment Package	Maximum Power Dissipation		Current Drains per Feeder*	
	Watts	Watts per Square Foot	Nominal at -48V**	Maximum (List 2)***
End Terminal 4 BiDirectional Optical Lines	252	20.2	2.6	5.9
Repeater 4 BiDirectional Optical Lines	320	25.6	3.3	7.5
Dual End Terminal	276	22.1	2.9	6.5
Dual Repeater	344	27.6	3.6	8.0
End Terminal & Repeater	310	24.8	3.2	7.3
Miscellaneously Mounted End Terminal Shelf	138	NA	1.4	3.2
Miscellaneously Mounted Repeater Shelf	172	NA	1.8	4.0
OT System Controller Shelf	182	14.6	1.7	3.7
OT Complementary Shelf	232	18.6	2.1	4.7
OT Cabinet (3 shelves)	646	51.7	5.9	13.2

* Nominally both feeders share the current equally for the cabinet or shelf. If one feeder fails, the remaining feeder carries the total load for the cabinet.

** In power engineering, List 1 refers to the current drains used to size batteries and rectifiers. To do this, use twice the Nominal (List 1) current drain per feeder. These current drains represent the average busy-hour current at normal operating voltages.

*** In power engineering, List 2 refers to the current drains used to size feeder cables and fuses. To do this, use the Maximum (List 2) current drain per feeder. These current drains represent peak current under worst case operating conditions.

Available Power Cables

Table 5-2 lists power cables available for installing an WaveStar OLS 40G.

Table 5-2 Available Power Cables for Cabinet-Mounted OLS

ED-9C103-22 Cable Group	Cable Type	Cable Length (ft.)	Use With Power Bus	Color
1 or 37	WHICS 2998400000	15	A	Red
2 or 29	WHICS 2998400000	15	B	Blue
11 or 38	WHICS 2998400000	As Required	A	Red
12 or 30	WHICS 2998400000	As Required	B	Blue

Table 5-3 lists power cables available for installing an OT.

Table 5-3 Available Power Cables for Cabinet-Mounted OT

ED-9C103-22 Cable Group	Cable Length (ft.)	Use With Power Bus	Color
5 or 31	15	A	Red
6 or 24	15	B	Blue
15 or 32	As Required	A	Red
16 or 26	As Required	B	Blue

OLS Power Cable Connection

The OLS uses a Y-cable to power both shelves in the cabinet. Install as follows:

- (1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).
- (2) Verify the circuit packs are not installed in the shelves.



WARNING:

Leave the fuses out or breakers off until performing the steps in Section 8, "Powering" of this document.

- (3) Identify the battery feed connections at the battery distribution fuse board or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.

- (4) Check that the supplied ED-9C103-22 power feed cables are labeled for battery A (RED) and battery B (BLUE) use.
- (5) Route the battery cables (A on left, B on right) out of the shelf, up through the cabinet and through the cable restraints mounted in the top of the cabinet, then out through the top of the cabinet. Place the A battery cable down behind the upper top plate of the shelf and retain the cable under the retaining clips. This will keep the cable out of the way when other cables are connected. Refer to Figure 5-1 on page 5-6 or Figure 5-2 on page 5-7.
- (6) The power cables are mechanically keyed to prevent incorrect insertion. Be sure to fully seat the cables until they are locked into the connector on the shelf.
- (7) Connect the power feed cables to the battery feed connections at the appropriate battery A or battery B terminal connectors located in the interconnect panel area of each OLS shelf behind the fuse panel.
See Figure 5-1 on page 5-6 and Figure 5-2 on page 5-7.
- (8) Tighten the power cable restraint clamp screws around the power cable outer jacket to a torque of about 7 inch-pounds.
- (9) Splice feeders from the battery distribution fuse board to the OLS power cables. The red and blue power leads connect to -48V. The white power leads connect to the power feed return.

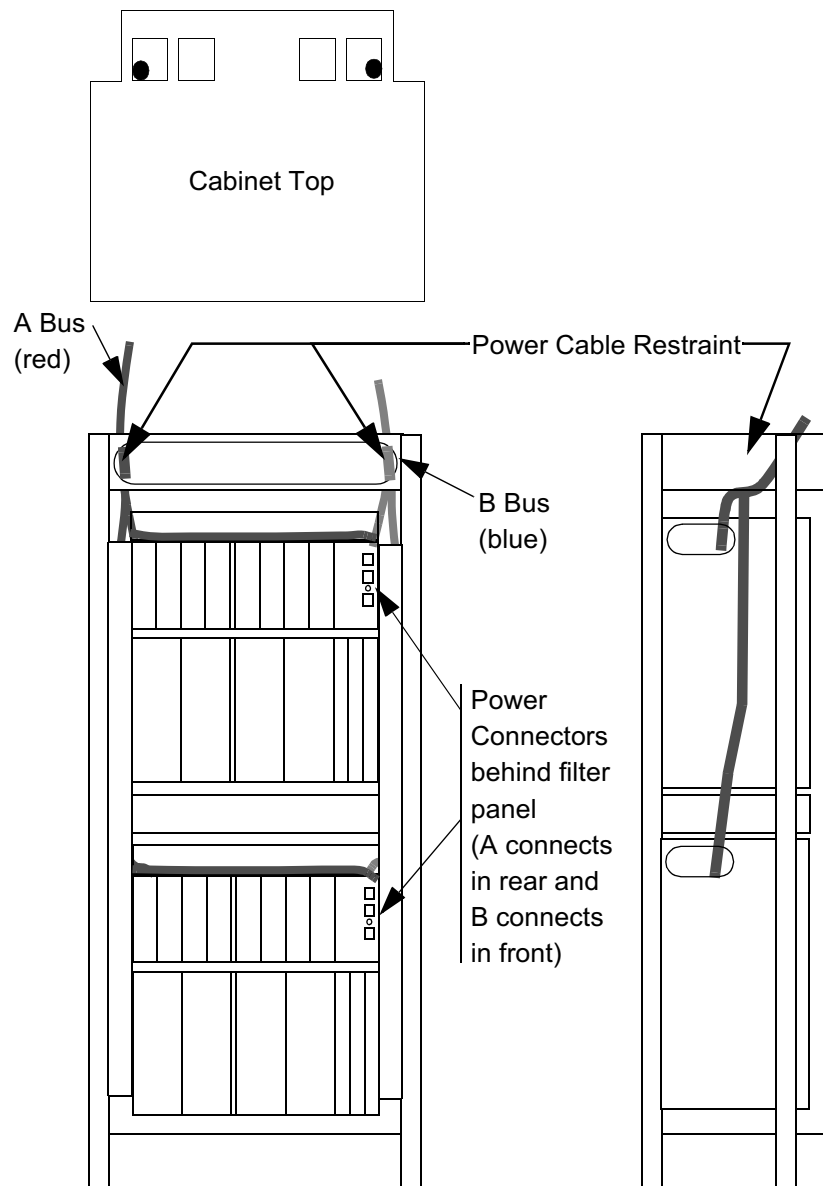


Figure 5-1 OLS Cabinet Power Cable Routing (Cabinet Frame Shown)

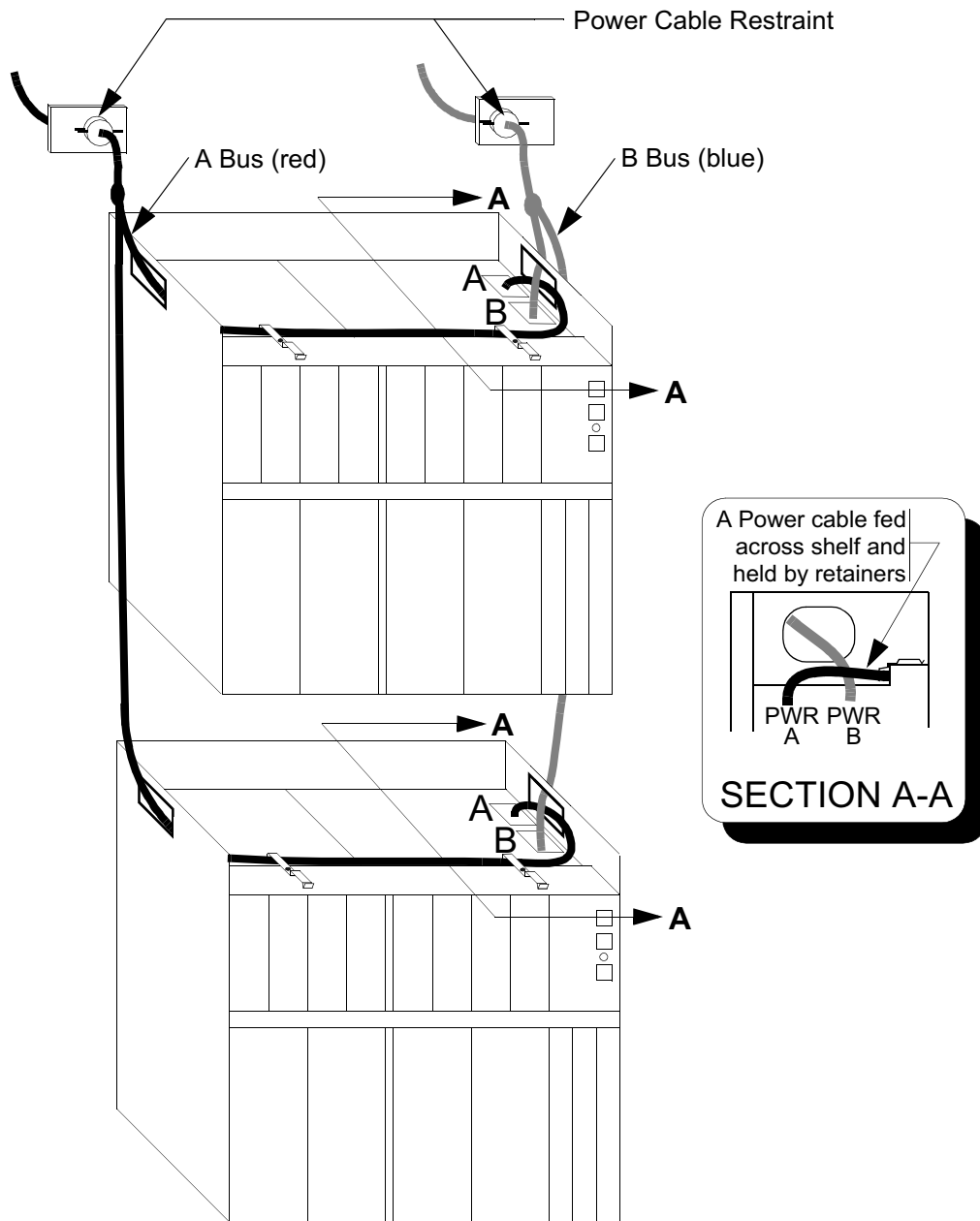


Figure 5-2 OLS Cabinet Power Cable Routing (Cabinet Frame Not Shown)

OT Power Cable Connection

Install as follows:

- (1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).
- (2) Verify the circuit packs are not installed in the shelves.



WARNING:

Leave the BDFB fuses out or breakers off until performing the steps in Section 8, "Powering" of this document.

- (3) If power is being fed by an overhead cable rack, route power cable out through top of bay as shown in Figure 5-3 on page 5-9. If power is being fed from a raised floor storage tray, route power cables as show in Figure 5-4 on page 5-10.
- (4) Identify the battery feed connections at the battery distribution fuse board or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.
- (5) Check that the supplied ED-9C103-22 power feed cables are labeled for battery A (RED) and battery B (BLUE) use.
- (6) Splice feeders from the battery distribution fuse board to the OLS power cables. The red and blue power leads connect to -48V. The white power leads connect to the power feed return.
- (7) Connect equipment ground lead from cabinet or bay to proper ground connection.

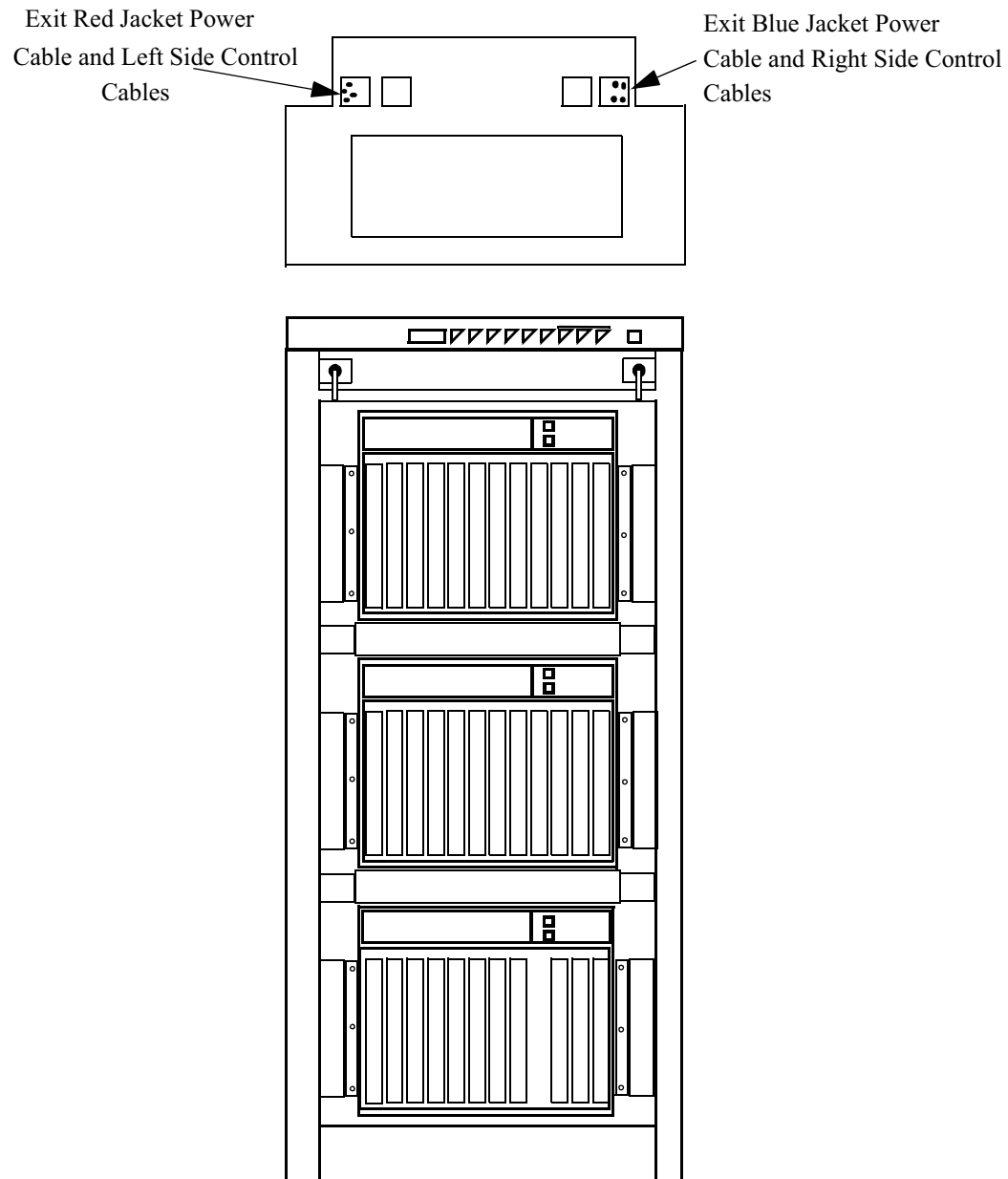


Figure 5-3 OT Cable Routing for Overhead Rack Installations

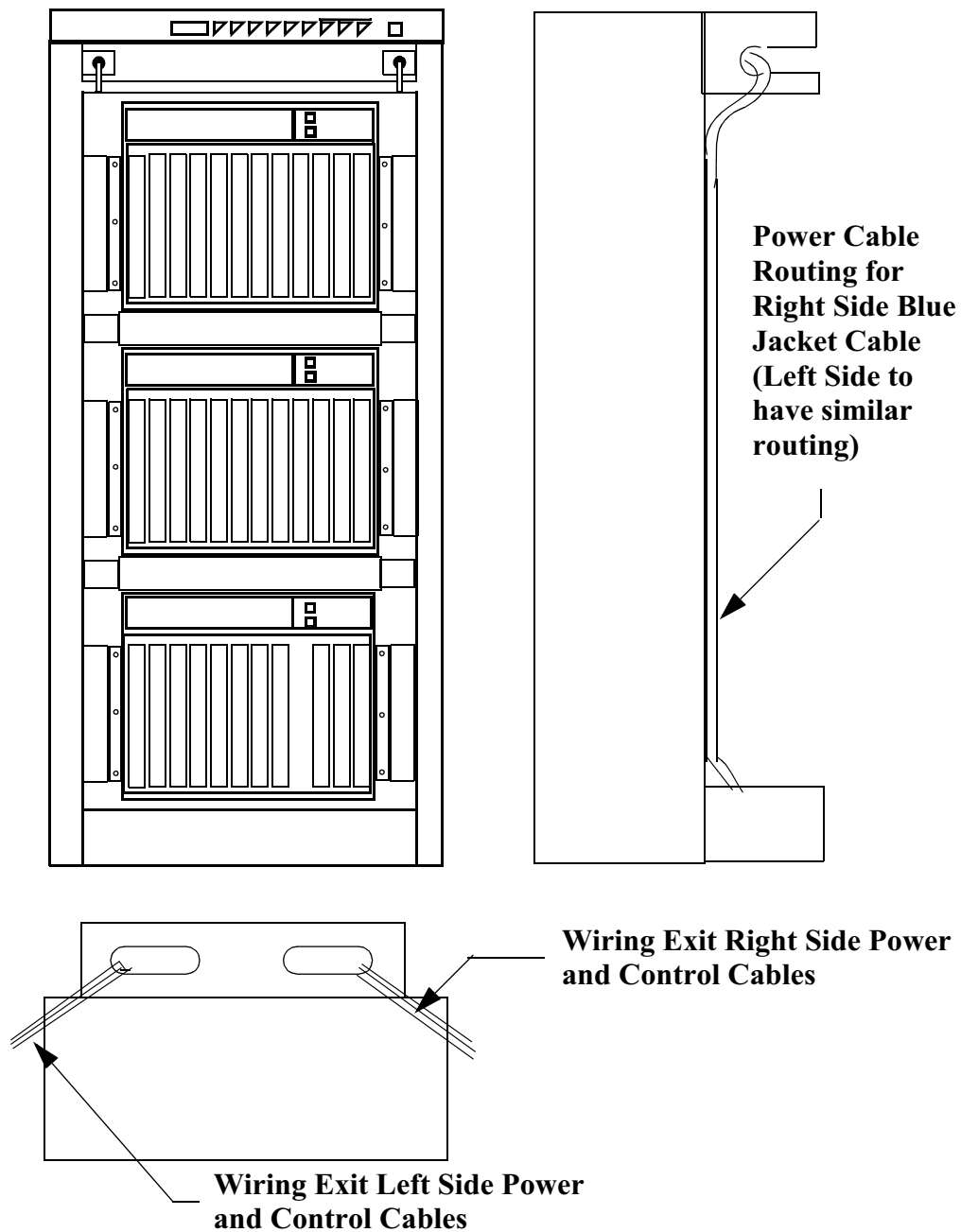


Figure 5-4 OT Cable Routing for Raised Floor Applications

Miscellaneously Mounted Shelves - Power Cables

This section describes the installation of the A and B power cables for the Miscellaneously Mounted Shelves.

**NOTE:**

Each feeder capacity in the miscellaneous mount shelf must be 15 amperes (unless otherwise specified by the customer) at the battery distribution fuse board (BDFB).

Available Power Cables

Table 5-2 lists power cables available for installing an OLS.

Table 5-4 Available Power Cables

ED-9C103-22 Cable Group	Bay Type	Cable Length (ft.)	Use With Power Bus	Color
3	Miscellaneous Mount	15	A	Red
4	Miscellaneous Mount	15	B	Blue
13	Miscellaneous Mount	As Required	A	Red
14	Miscellaneous Mount	As Required	B	Blue

Power Cable Connection

For the Miscellaneous Mounted Shelf, the power cables are a single feed. Each miscellaneous shelf is powered individually. Install as follows:

- (1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).
- (2) Verify the circuit packs are not installed in the shelves.

**WARNING:**

Leave the fuses out or breakers off until performing the steps in Section 8, “Powering” of this document.

- (3) Identify the battery feed connections at the battery distribution fuse board or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.
- (4) Check that the supplied ED-9C103-22 power feed cables are labeled for battery A (RED) and battery B (BLUE) use.
- (5) Route the battery cables (A on left, B on right) out of the miscellaneous mounted shelf, up through the bay and through the cable restraints mounted at the top of the bay, then out through the top of the bay. Place the A battery cable down behind the upper top plate of the shelf and retain the cable under the retaining clips. This will keep the cable out of the way when other cables are connected. See Figure 5-5 or Figure 5-6.
- (6) The power cables are mechanically keyed to prevent incorrect insertion. Be sure to fully seat the cables until they are locked into the connector on the shelf.
- (7) Connect the power feed cables to the battery feed connections at the appropriate battery A or battery B terminal connectors located in the interconnect panel area of each OLS shelf behind the fuse panel.
See Figure 5-5 on page 5-13 or Figure 5-6 on page 5-14.
- (8) Tighten the power cable restraint clamp screws around the power cable outer jacket to a torque of about 7 inch-pounds.
- (9) Splice feeders from the battery distribution fuse board to the OLS power cables. The red and blue power leads connect to -48V. The white power leads connect to the power feed return.

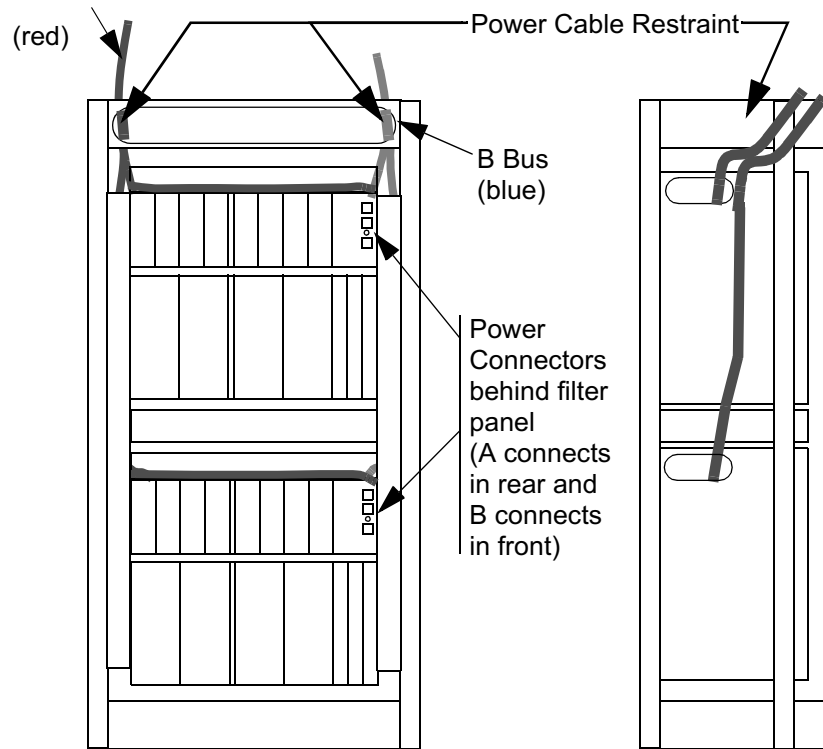


Figure 5-5 OLS Power Cable Routing (Miscellaneous Bay Shown)

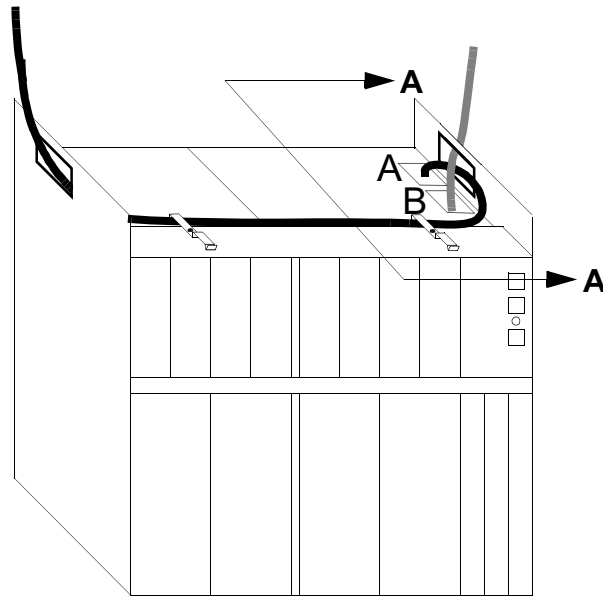


Figure 5-6 OLS Power Cable Routing (Miscellaneous Mount Frame Not Shown)

Miscellaneously Mounted OT - Power Cables

This section describes the installation of the A and B power cables and shelf interconnecting wiring for the four configurations of miscellaneously mounted OT (List 10 through List 13).



NOTE:

Each feeder capacity for the List 11, 12, & 13 miscellaneously mounted shelf must be 15 amperes (unless otherwise specified by the customer) at the battery distribution fuse board (BDFB). The List 10 miscellaneous mount shelf must be 20 amperes.

Miscellaneous Mount Power Cable Installation List 10 OT

The List 10 power cable connections at each shelf are to be installed prior to any other intershef wiring.

Table 5-5 Available OT Miscellaneous Mount Power Cables

ED-9C103-22 Cable Group	Where Used	Cable Length (ft.)	Use With Power Bus	Color
5 or 31	List 10	15	A	Red
6 or 24	List 10	15	B	Blue
15 or 32	List 10	As Required	A	Red
16 or 26	List 10	As Required	B	Blue
7	List 11, 12, & 13	15	A	Red
9	List 11, 12, & 13	15	B	Blue
8	List 11, 12, & 13	As Required	A	Red
10	List 11, 12, & 13	As Required	B	Blue

To install the intershell power cable for the **A supply** perform the following:

- Locate the List 10 power cable for the A supply: ED9C103-22 GR5/31 or GR15/32. The supply end of the cable will have a **RED** jacket.
- Take the connector farthest from the supply end and put it through the left access hole of the System Shelf (lowest shelf). Align plug with PWR A connector checking that the locking clip is on the right side and the RED (-48 V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
- Select the connector of the remaining two that is farthest from the supply end and put it through the left access hole of the Complementary Shelf 1 (middle shelf). Align plug with PWR A connector checking that the locking clip is on the right side and the RED (-48 V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
- Take the remaining connector and put it through the left access hole of the Complementary Shelf 2 (top shelf). Align plug with PWR A connector checking that the locking clip is on the right side and the RED (-48 V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
- Route excess cable into bay frame channel on left side and tie to frame.
- Secure cable at entrance to frame.

To install the intershell power cable for the **B supply** perform the following:

- Locate B supply power cable ED9C103-22 GR6/24 or GR16/26. The supply end of the cable will have a **BLUE** jacket.

- Take the connector farthest from the supply end and put it through the right access hole of the System Shelf (lowest shelf). Align plug with PWR B connector checking that the locking clip is on the left side and the BLUE (-48 V) is at the lower end of the connector. Push connector in until locking tab snaps in place.
- Select the connector of the remaining two that is farthest from the supply end and put it through the right access hole of the Complementary Shelf 1 (middle shelf). Align plug with PWR B connector checking that the locking clip is on the left side and the BLUE (-48 V) is at the lower end of the connector. Push connector in until locking tab snaps in place.
- Take the remaining connector and put it through the right access hole of the Complementary Shelf 2 (top shelf). Align plug with PWR B connector checking that the locking clip is on the left side and the BLUE (-48 V) is at the lower end of the connector. Push connector in until locking tab snaps in place.
- Route excess cable into bay frame channel on right side and tie to frame.
- Secure cable at entrance to top of frame.

Miscellaneous Mount Power Cable Installation

List 11, 12, and 13 ---

The power cable connections at each shelf are to be installed prior to any intershelf wiring. The List 11, 12, and 13 shelves use the same A and B power cables which have a single power connector at each end. It is assumed that the shelves are being installed as single shelves. Each shelf will require a separate power cable.

To install the intershelf power cable for the A supply, perform the following:

- Locate the A supply power cable for List 11, 12, and 13. It is the same cable for all three list numbers: ED9C103-22 GR7 (length=15ft) or GR8 (length as specified). The supply end of the cable will have a **RED** jacket.
- Put the connector through the left access hole of the shelf to be wired. Align the plug with PWR A connector on interconnection panel checking that the locking clip is on the right side and the RED (-48V) wire is at the upper end of the connector. Push connector in until locking tab snaps in place.
- Route excess cable into bay frame channel on right side and tie to frame.
- Secure cable at entrance to top of frame.
- Locate the B supply power cable for List 11, 12, and 13. It is the same cable for all three list numbers: ED9C103-22 GR8 (length=15ft) or GR10 (length as specified). The supply end of the cable will have a **BLUE** jacket.
- Put the connector through the right access hole of the shelf to be wired. Align the plug with PWR B connector on interconnection panel checking that the locking clip is on the left side and the BLUE (-48V) wire is at the lower end of the connector. Push connector in until locking tab snaps in place.

- Route excess cable into bay frame channel on right side and tie to frame.
- Secure cable at entrance to top of frame.

Miscellaneous Mount Power Cable Connection

Install as follows:

- Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).
- Verify the circuit packs are not installed in the shelves.



WARNING:

Leave the BDFB fuses out or breakers off until performing the steps in Section 8, "Powering", of this document.

- If power is being fed by an overhead cable rack, route the cable out through the top of the bay wiring channel. If power is being fed from a raised floor storage tray, route the power cables down the bay wiring channel and out through the raised floor.
- Identify the battery feed connections at the battery distribution fuse board or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.
- Check that the power feed cables are labeled for battery A (RED) and battery B (BLUE) use.
- Splice feeders from the battery distribution fuse board to the OT power cables. The red and blue power leads connect to -48V. The white power leads connect to the power feed return.
- Connect equipment ground lead from cabinet or bay to proper ground connection.

Power Cable Installation for Integrated Bay

Description

The OLS and the OT are both powered by -48 volt direct current. Since redundant power is used to ensure maximum availability of the terminal, two battery power feeds are required for each terminal (feed A is Red and feed B is Blue).

Power Requirements

The power requirements for OLS and OT integrated bay are as follows:

- Two feeders (A and B) are required for powering the cabinet.
- Each independent feeder must supply -48 volts direct current and a return.
- Each feeder capacity must be 20 amperes at the battery distribution fuse board (BDFB).

Available Power Cables

Table 5-6 lists power cables available for installing a WaveStar OLS 40G Integrated Bay.

Table 5-6 Available Power Cables for Integrated OLS/OT

ED-9C103-22 Cable Group	Cable Type	Cable Length (ft.)	Use With Power Bus	Color
23	WHICS 2998400000	15	A	Red
24	WHICS 2998400000	15	B	Blue
25	WHICS 2998400000	100	A	Red
26	WHICS 2998400000	100	B	Blue

Integrated Bay Power Cable Connection

Install as follows:

- (1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).
- (2) Verify the circuit packs are not installed in the shelves.



WARNING:

Leave the BDFB fuses out or breakers off until performing the steps in Section 8, "Powering" of this document.

- (3) If power is being fed by an overhead cable rack, route power cable out through top of bay. If power is being fed from a raised floor storage tray, route power cables through bottom of bay.

- (4) Identify the battery feed connections at the battery distribution fuse board or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.
- (5) Check that the supplied ED-9C103-22 power feed cables are labeled for battery A (RED) and battery B (BLUE) use.
- (6) Splice feeders from the battery distribution fuse board to the OLS power cables. The red and blue power leads connect to -48V. The white power leads connect to the power feed return.
- (7) Connect equipment ground lead from cabinet or bay to proper ground connection.

Final Verification

Perform the following steps to ensure that cables are properly installed:

- (1) Verify that power cables are properly secured and dressed.
- (2) Verify that all power cables are properly labeled.

Wired Cable Installation

6

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Overview

**CAUTION:**

Procedures in this installation manual are only to be performed by trained personnel.

This section covers WaveStar™ OLS 40G cable installation. This section covers general considerations and has been broken out into several subsections listed below:

- Section A - Interconnection Panels covers the physical layout of each panel and a brief discussion of the associated connections.
- Section B - Office Alarms covers available alarms and connection to the interconnection panels.
- Section C - Serial, Parallel and X.25 Telemetry Cable Installation covers the uses and installation of all three types of telemetry cables.
- Section D - CIT-DTE Cables covers the installation of the data terminal equipment (DTE) cable.
- Section E - Line Orderwire, Section Orderwire, Section User Channel, and line growth cables installation covers the installation and application of these cables.
- Section F - Miscellaneous Mount OT Intershelf Wiring covers the installation of the cables necessary to interconnect Lists 11, 12 and 13
- Section G - Miscellaneous Discrete Cables Installation covers the installation of the Miscellaneous discrete cables necessary to communicate alarms from the OT and other outside sources to the OLS.
- Section H - OLS/OT Integration Cables Installation covers the installation of the control cables between the OLS and OT for one or two OT bays.

General Considerations

**CAUTION:**

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

**CAUTION:**

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.

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 ED cable drawings listed in the Section 1, “Overall Installation and Test Considerations.”
- For ordering information, refer to the Optical Line System (OLS) Application, Planning, and Ordering Guide (APOG).
- To simplify installation, install cables starting from the sides of the interconnection panel and work towards the center.
- All shielded cable that is less than 25 feet in length must have its shield grounded. If cables are over 25 feet in length, it is strongly advised to ground the cable shield. Ground at the transmit end of the cable.
- Do not remove the backplane cover during the installation process.
- Any broken pins or bent pins that cannot be straightened on the D-sub connectors must be replaced using the AMP 91261-1 tool.

Final Verification

Perform the following steps at the end of each subsection to ensure that cables are properly installed:

- (1) Verify that cables are properly secured and dressed.
- (2) Verify that all cables are properly labeled.

Interconnection Panel Description

The Interconnection Panel Descriptions of OLS, OT and Miscellaneous Mount OT are covered in this section.

OLS Interconnection Panel

The OLS interconnect panel is shown in Figure 6-1 on page 6-3.

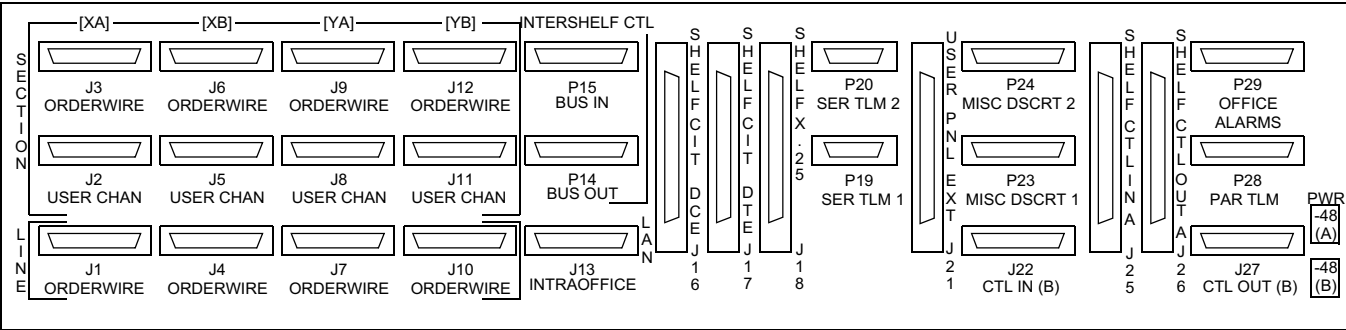


Figure 6-1 OLS Interconnection Panel

Table 6-1, “OLS Interconnection Panel Connectors and Types,” on page 6-3 lists the connector types used on the OLS shelf.

Table 6-1 OLS Interconnection Panel Connectors and Types

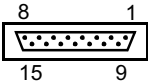
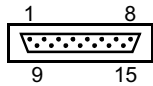
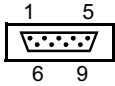
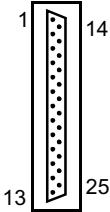
CONNECTOR	TYPE	Connector Orientation
J1-13, J22, J27	dB15 Female	

Table 6-1 OLS Interconnection Panel Connectors and Types

CONNECTOR	TYPE	Connector Orientation	
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:** 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.
- **SECTION ORDERWIRE LINE (XB) J6:** 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.
- **SECTION ORDERWIRE LINE (YA) J9:** 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.
- **SECTION ORDERWIRE LINE (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:** 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.
- **LINE ORDERWIRE LINE (XB) J4:** 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.
- **LINE ORDERWIRE LINE (YA) J7:** 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.

- **LINE ORDERWIRE LINE (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:** These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-3 supervisory signal.
- **SECTION USER CHAN LINE (XB) J5:** These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-3 supervisory signal.
- **SECTION USER CHAN LINE (YA) J8:** These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-3 supervisory signal.
- **SECTION USER CHAN LINE (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. The CIT (DCE) port is located on the side of the OLS cabinet and on the user panel of the Miscellaneously Mounted System Controller Shelf.
- **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 (miscellaneously mounted shelves.)
- **MISC DSCRT 1 P23:** 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 OLS.

- **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 OLS.
- **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 CTL IN 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 Panel

The Interconnection Panel for the two Complementary Shelves 1 and 2 are identical and all connections are utilized in R1-OT. The System Shelf has a different interconnecting panel with some interfaces active and others available for R3.0 and future releases. Installation instructions will be provided for all interconnections whether being used now or in the future.

The Interconnection Panel for Complementary Shelf 1 and 2 is shown Figure 6-2 on page 6-6.

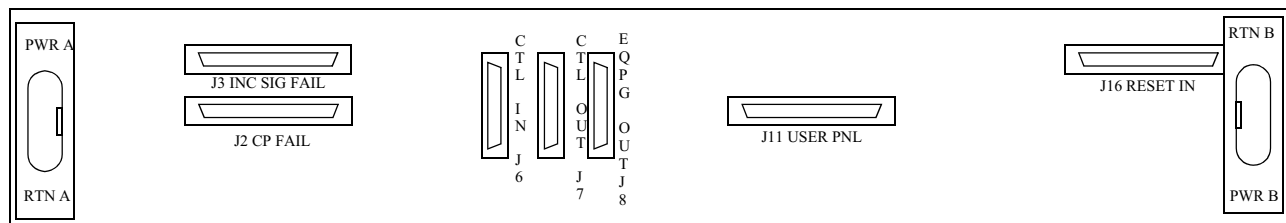


Figure 6-2 Interconnection Panel for OT Complementary Shelf 1 & 2

The external interface connections that are operational for Complementary Shelves 1 and 2 for WaveStar OLS 40G Release 3.0 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.

The Interconnection Panel for the System Shelf is shown Figure 6-3 on page 6-7.

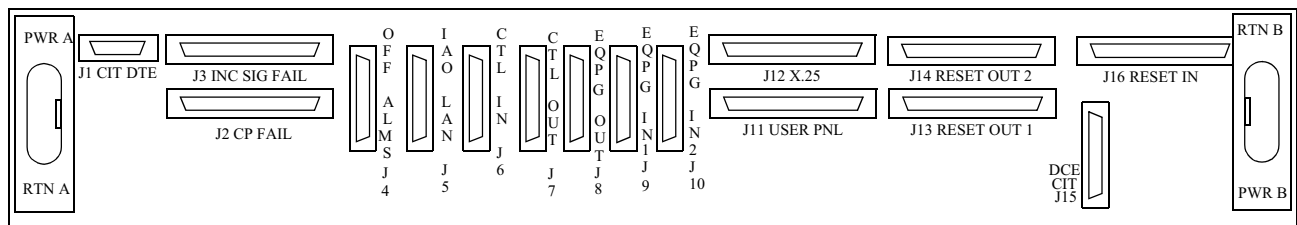


Figure 6-3 Interconnection Panel for OT System Shelf

The System Shelf external interface connections operational for WaveStar OLS 40G Release 3.0 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.
- **IAO LAN J5:** This connector provides an interface for a 10-Mb/s intraoffice local area network (LAN) to the OLS End Terminal 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.
- **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 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.

In WaveStar OLS 40G Release 3, the OT System Shelf connectors **J4, J12, and J15** are not used.

Office Alarm Installation

Description

Office alarms are commonly used by central office maintenance personnel to quickly identify a failed system.

Available WaveStar OLS 40G Office Alarms Discrete Cables

Table 6-2, "WaveStar OLS 40G Office Alarms Cables," on page 6-9 lists cables that are available for office alarms applications. Cables listed may be used for this application as well as for Miscellaneous Discrete and Parallel Telemetry applications.

Table 6-2 WaveStar OLS 40G Office Alarms Cables

ED-7G028-22 Cable Group	Cable Length (ft.)
301	As Req'd
351	150
361	250

Office Alarm Connection to OLS Interconnection Panel

The Office Alarm Connection to the OLS Interconnection Panel is located at **P29**.

OLS Office Alarm Cable Connection

Table 6-3, “WaveStar OLS 40G Office Alarm Cable Connection,” on page 6-9 lists office alarm cable connections and designations.

Table 6-3 WaveStar OLS 40G Office Alarm Cable Connection

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

Table 6-3 WaveStar OLS 40G Office Alarm Cable Connection

Alarm Name	Designation	Pin	Wire Color
Office Alarm Minor Audible Return	OAMNAUDR	13	W-S
Office Alarm Minor Visual Return	OAMNVISR	14	R-BL
No Connection	none	15	R-O

OT Office Alarms Cable Connection - Not Required

Description

The operation of OT office alarm connection has not been supported in previous releases and is not supported in WaveStar OLS 40G Release 3. However, in Release 3, the OT office alarms are reported back to the OLS through the OT Controller (LUD1 OTCTL). These alarms are then reported to the central office through the OLS Office Alarm Cable.

OLS Office Alarm Cable Installation Procedure

During office alarm cable installation, note the following transient current considerations:

- Steady-state current for office alarm connections shall not exceed 0.9 amps at 60 volts or 1.8 amps at 30 volts. The maximum transient currents (20 msec. duration) during initial contact closure shall not exceed 9 amps at 60 volts or 18 amps at 30 volts.
- Use transient noise-suppressing devices to keep within the limits specified above. These devices may include diodes or contact suppression networks. If the protection devices are not adequate, use an external buffer relay.
- Use suppression devices across any external relay coil being driven by the OLS or OT. Selection of transient suppression devices shall be made according to the specific office alarm circuit arrangement.

OLS Office Alarm Connection

Perform the following steps to install the office alarm cable (optional):

- (1) Route the office alarm cable (see Figure 6-1 on page 6-3) through the right opening in the side of the OLS shelf from the office alarm panel.
- (2) Connect the office alarm cable to P29 on the interconnection panel.

- (3) Inspect the office alarm panel. Use a contact suppression network (refer to transient current considerations information above) if required.
- (4) Connect the office alarm cable to the office alarm panel by cutting the cable to length and wire-wrapping the loose ends onto the panel.
- (5) Label the connections that are wire-wrapped.
- (6) Dress and tie the cable.

 NOTE:

If installing the office alarm cable on an End Terminal for 4 Bidirectional Optical Lines or a Repeater for 4 Bidirectional Lines, use the P29 located on the lower shelf. If the upper shelf is used the ACO function will not work properly.

Serial, Parallel & X.25 Telemetry Cable Installation

OLS Serial Telemetry Cables Installation

Description

- Serial telemetry (TBOS) provides information to the maintenance center about that location and remote control over that location from the maintenance center. In Releases 2.0 and 2.1 OLS, the Ser Tlm 1 port will support the **Extended Miscellaneous Discretes** feature. This involves connecting the Ser Tlm 1 port to an Extended Miscellaneous Unit (EMDU) located outside of the OLS system. Appendix D and Appendix E covers the installation of the EMDU to the OLS system. In Release 3.0, the OT and OLS can be integrated as a single network element and the EMDU is no longer necessary to monitor the OT CP Fail and LOS alarms. However, the EMDU may still be used to monitor other Miscellaneous Discrete alarm points to provide an additional means of notifying an operations system (OS) maintenance center of environmental conditions at the OLS site.

 NOTE:

Releases 1.0, 2.0, 2.1, and 3.0 do not support use of the Ser Tlm 2 port (P20).

Available WaveStar OLS 40G Serial Telemetry Cables

Table 6-4 lists available cables for serial telemetry applications.

Table 6-4 WaveStar OLS 40G Serial Telemetry Cables

ED-7G028-22 Cable Group	Cable Length (ft.)
201	As req'd (4000' max)
251	150
261	250

Table 6-5 lists serial telemetry cable connection to the interconnection panel.

Table 6-5 WaveStar OLS 40G Serial Telemetry Cable Connection to Interconnection Panel

Cable Application	Interconnection Panel Location
Serial Telemetry 1	P19
Serial Telemetry 2	P20

WaveStar OLS 40G Serial Telemetry Cable Connection

Table 6-6 lists serial telemetry cable connections and designations.

Table 6-6 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

WaveStar OLS 40G Serial Telemetry Cable Installation Procedure

Perform the following steps to install serial telemetry cables:

- (1) Route the serial telemetry cables out the right side of the OLS shelf to the serial telemetry system.

NOTE:

Refer to Figure 6-1 on page 6-3 for location on the Interconnection panel.

- (2) Connect serial telemetry cable 1 to P19 on the interconnection panel.
- (3) Connect the serial telemetry cable to the serial telemetry system by cutting the cable to length and wire-wrapping the loose ends onto the panel.
- (4) Label the connections that are wire-wrapped.
- (5) Dress and tie the cables.

X.25 (TL-1) Telemetry Cable Installation

Description

X.25 is a synchronous network communication protocol commonly used with operations systems. It utilizes transaction language 1 (TL1) for the message language. The X.25 (TL-1) connection is supported only for OLS. The OT X.25 connection is not supported for any Release of OT or OLS.

Available OLS X.25 Telemetry Cables

Table 6-7 lists cables available for OLS X.25 applications.

Table 6-7 OLS X.25 Telemetry Cable

ED-7G028-22 Cable Group	Cable Length (ft.)	Connector Types F=Female M=Male
602	As Required (150' max)	F-M
652	150'	F-M

X.25 Telemetry Cable Connection

Table 6-8 lists the X.25 telemetry cable connection to the interconnection panel for OLS.

Table 6-8 X.25 Telemetry Cable Connection to Interconnection Panel

System	Cable Application	Interconnection Panel Location
OLS	X.25	J18

Table 6-9 lists pin connections for the X.25 cable (EIA-232D). For more information about the TL1 interface refer to Lucent Technologies 365-575-355 Optical Line System (OLS) Operations Systems Engineering Guide.

Table 6-9 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 OLS is powered. ** OLS will only transmit data via X.25 when CTS is on.	

Table 6-10 lists X.25 cable connections and designations for Group 602 and 652 cables.

Table 6-10 X.25 Telemetry Cable Connection

Name	Designation	P156A Terminal	Wire Color	Datakit End
Protective Ground	GRD	1	BL	1 GRD

Table 6-10 X.25 Telemetry Cable Connection

Name	Designation	P156A Terminal	Wire Color	Datakit End
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	MSRDSTR	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	
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 OLS 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 Procedure

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

⇒ NOTE:

WaveStar OLS 40G Group 602 and 652 Cables have a socket (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 socket (J18) on the OLS. The socket 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.

Refer to Figure 6-1 on page 6-3 for the location on the WaveStar OLS 40G interconnection panel.

- (1) Mark the blank label at the socket (female) end of the cable with the appropriate jack number for the X.25 port on the operation support system.
- (2) Making sure the plug end labeled (P18) of the cable is at the OLS equipment, route the X.25 cable out the right side of the OLS shelf to the X.25 port of the operation support system. See Figure 6-1.
- (3) Connect the X.25 telemetry cable to J18 on the interconnection panel.
- (4) Connect the X.25 telemetry cable to the X.25 port of the operation support system.
- (5) Dress and tie the cables.

WaveStar OLS 40G Parallel Telemetry Cable Installation

Description

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

Available Parallel Telemetry Cables

Table 6-2, “WaveStar OLS 40G Office Alarms Cables,” on page 6-9 list cables that available for use in connecting Parallel Telemetry.

Table 6-11 WaveStar OLS 40G Parallel Telemetry Cables

ED-7G028-22 Cable Group	Cable Length (ft.)
301	As Req'd

Table 6-11 WaveStar OLS 40G Parallel Telemetry Cables

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

WaveStar OLS 40G Parallel Telemetry Cable Connections

Table 6-12, “WaveStar OLS 40G Parallel Telemetry Cable Connections,” on page 6-17 lists parallel telemetry cable connections and designations.

Table 6-12 WaveStar OLS 40G Parallel Telemetry Cable Connections

Alarm Name	Designation	Pin	Wire Color
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

WaveStar OLS 40G Parallel Telemetry Cable Installation Procedure

Perform the following steps to install the parallel telemetry cable:

- (1) Route the cable through the right opening in the side of the OLS shelf from the telemetry system. Refer to Figure 6-1 on page 6-3, OLS Interconnection Panel, to locate the corresponding jack.
- (2) Connect the parallel telemetry cable to P28 on the interconnection panel.
- (3) Connect the parallel telemetry cable to the telemetry processor by cutting the cable to length and wire-wrapping the loose ends onto the telemetry processor.
- (4) Label the connections that are wire-wrapped.
- (5) Dress and tie the cable.

CIT(CMC) DTE Cables Installation

Description

The WaveStar OLS 40G supplies access to remote CenterLink Management Console (CMC) PCs through a local area network or modem connection to the CIT-DTE port.

This connection to the Optical Translator System Shelf is not supported in any of the WaveStar OLS 40G Releases; however in Release 3 information may be transferred from the OT to the OLS provided the OT Controller Option is installed.

Available CIT(CMC) DTE Cables

Table 6-13 lists cables available for CIT(CMC)-DTE applications for WaveStar OLS 40G

Table 6-13 WaveStar OLS 40G CIT(CMC)-DTE Cable

ED-7G028-22 Cable Group	Cable Length (ft.)
702	As Req'd. (150' max)
752	150'

Table 6-18, "Section User Channel Cable Connection," on page 6-23 lists cables available for CIT(CMC)-DTE applications.

CIT(CMC)-DTE Cable Connection to WaveStar OLS 40G Interconnection Panel

The CIT-DTE cable connects from J17 to a local area network or modem which must meet the following requirements:

- Must be able to transmit at 300, 1200, 2400, 4800, or 9600 baud rate
- Must have an RS-232 DCE interface port
- Must be configured for 8 bit data bytes with 1 start bit and 1 stop bit
- Must not use the DSR lead.

CMC DTE Connections and Designations

Table 6-14 lists CIT-DTE cable connections and designations.

Table 6-14 CIT-DTE Cable Connection

Name	Designation	Pin	Wire Color
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

Table 6-14 CIT-DTE Cable Connection

Name	Designation	Pin	Wire Color
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

CIT-DTE Cable Installation Procedure

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

- (1) Both ends of the cable are connectorized. Making sure the socket end of the cable is at the OLS equipment, route the CIT(CMC)-DTE cable out the right side of the OLS shelf to the 25-pin D-type connector on the local area network or modem.
- (2) Connect the CIT(CMC)-DTE cable to J17 on the interconnection panel. Refer to Figure 6-1 on page 6-3 for the location of the connector.
- (3) Connect the CIT(CMC)-DTE cable to the RS232 DCE port on the local area network or modem.
- (4) Dress and tie the cables.

Line Orderwire, Section Orderwire and Section User Channel Cables Installation**Description**

The Optical Translator (OT) does not currently support Line Orderwire, Section Orderwire or Section User Channel capabilities. However, the Optical Line System (OLS) does. The following section describes the cables and their installation for WaveStar OLS 40G.

Line orderwire, section orderwire, and section user channel cables allow for access to SONET overhead bytes. They include:

- Orderwire capabilities
- User channel access

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

Table 6-15 lists the cables that are available for Line Orderwire, Section Orderwire, and Section User Channel.

Table 6-15 Available Line Orderwire, Section Orderwire, and Section User Channel Cables

ED-7G028-22 Cable Group	Cable Length (ft.)
401	As req'd (2850' max*)
451**	150
461**	250
* When used for Line Growth Channel application the limit is 11 ft. ** Not available for Line Growth Channel applications.	

Line and Section Orderwire and Section User Channel Connection to Interconnection Panel

Table 6-16 lists Line Orderwire, Section Orderwire, and Section User Channel cable connection to the interconnection panel. The columns correspond to the associated LDA1 telemetry packs, XA to 1A, XB to 1B, and so forth.

Table 6-16 Line Orderwire, Section Orderwire, and Section User Channel Cable Connection to Interconnection Panel

Cable Application	Interconnect Panel Location			
	XA	XB	YA	YB
Section Orderwire	J3	J6	J9	J12
Section User Channel	J2	J5	J8	J11
Line Orderwire	J1	J4	J7	J10

Table 6-16 Line Orderwire, Section Orderwire, and Section User Channel Cable Connection to Interconnection Panel

Cable Application	Interconnect Panel Location			
	XA	XB	YA	YB
Note: X=Line 1, Y=Line 2				

Line Orderwire Cable Connections

Table 6-17 lists Line Orderwire cable connections and designations.

Table 6-17 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

Line Orderwire Cable Installation Procedure

Perform the following steps to install the Line Orderwire cable:

- (1) Route the cable through the left side of the OLS shelf to the line orderwire equipment. Refer to Figure 6-1 on page 6-3 OLS Interconnection Panel, to locate the corresponding jacks.
- (2) Connect the line orderwire cable to J1, J4, J7, J10 on the interconnection panel.
- (3) Connect line orderwire cable to line orderwire equipment by cutting the cable to length and wire-wrapping the loose ends onto the unit.
- (4) Label the connections that are wire-wrapped.
- (5) Dress and tie the cable.

Section User Channel Cable Connections

Table 6-18 lists Section User Channel cable connections and designations.

Table 6-18 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

Section User Channel Cable Installation

Procedure

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

- (1) Route the cable through the left side of the OLS shelf to the user channel equipment. Refer to Figure 6-1 on page 6-3, OLS Interconnection Panel, to locate the corresponding jacks/plugs.
- (2) Connect the section user channel cable to J2, J5, J8, J11 on the interconnection panel.
- (3) Connect the section user channel cable to the section user channel equipment by cutting the cable to length and wire-wrapping the loose ends onto the user channel unit.
- (4) Label the connections that are wire-wrapped.
- (5) Dress and tie the cable.

Section Orderwire Cable Connections

Table 6-19 lists Section Orderwire cable connections and designations.

Table 6-19 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

Table 6-19 Section Orderwire Cable Connection

Name	Designation	Pin	Wire Color
Overhead E1 Sync Output P	OE1SOP	13	W-S
Overhead E1 Clock Output P	OE1COP	14	R-BL
No Connection	none	15	none

Section Orderwire Cable Installation Procedure

Perform the following steps to install the section orderwire cable:

- (1) Route the cable through the left side of the OLS shelf to the section orderwire equipment. Refer to Figure 6-1 on page 6-3, OLS Interconnection Panel, to locate the corresponding jacks.
- (2) Connect the section orderwire cable to J3, J6, J9, J12 on the interconnection panel.
- (3) Connect the Section Orderwire cable to the Section Orderwire equipment by cutting the cable to length and wire-wrapping the loose ends onto the unit.
- (4) Label the connections that are wire-wrapped.
- (5) Dress and tie the cable.

OT Miscellaneous Mount Intershelf Wiring**OT Miscellaneous Mount Intershelf Wiring**

Intershelf wiring is required for list 10, 12, and 13. The List 11 System Controller Shelf does not require intershelf wiring since it is the initial stand alone shelf.

- List 10 - Includes the System Controller Shelf with Complementary Shelves 1 and 2. Power cables and shelf interconnecting cables are provided.
- List 11 - Includes the System Controller Shelf and single shelf power cables.
- List 12 - Includes Complementary Shelf 1, single shelf power cables, and interconnecting cables to the System Controller Shelf. It is provided to handle system growth beyond a single System Controller shelf. It is assumed that the system already has a System Controller Shelf installed.

- List 13 - Includes Complementary Shelf 2, a set of single shelf power cables, and interconnecting cables to the System Controller Shelf and Complementary Shelf 1. It is provided to handle system growth beyond a System Controller shelf and Complementary Shelf 1. It is assumed that the system already has a System Controller Shelf and Complementary Shelf 1 installed.

⇒ **NOTE:**

If any of the shelf interconnections have not yet be made, complete these before proceeding.

When installing cables, match cable plug designation with jack designation such that a P7 cable designation is connected to a J7 connector designation.

⇒ **NOTE:**

The jack designations for Complementary Shelf 1 and 2 are shown in Figure 6-2 on page 6-6. Figure 6-3 on page 6-7 shows the jack designations for the System Shelf interconnection panel.

Install the List 10 intershelf cables as follows:

- (1) Install intershelf cables as specified in Table 6-20. Refer to Figure 6-4 on page 6-28.
- (2) Route cables out the left or right side access holes as specified in Table 6-20. When all the cables have been installed, tie excess cable into left or right bay frame channels.
- (3) Upon completion of Table 6-20 interconnections, verify that ED7G045-20 GR2 termination connectors were factory installed on System Shelf J6 and Complementary Shelf 2 J7. If missing, install replacement terminations. These are required for proper system performance.
- (4) Using the (J69000C-1, List 161) shelf label kit, apply the identification labels to OT Bay 1 per the following:
 - LOW to System Controller Shelf
 - MID to Complementary Shelf 1
 - UP to Complementary Shelf 2
- (5) If the system has an OT Bay 2, apply labels in same location as listed for OT Bay 1 using the (J69000C-1, List 161) shelf label kit.

Table 6-20 Shelf Interconnecting Cables for List 10

Cable Part No.	Side to Run Cable	From Shelf / Jack	TO Shelf / Jack	Connctor Pin Size
ED7G045-20 GR6	Left	System Shelf / P7 to J7	Compl. Shelf 1 / P6 to J6	15
ED7G045-20 GR7	Left	System Shelf / P9 to J9	Compl. Shelf 1 / P8 to J8	15
ED7G045-20 GR8	Left	System Shelf / P10 to J10	Compl. Shelf 2 / P8 to J8	15
ED7G045-20 GR9	Right	System Shelf / P13 to J13	Compl. Shelf 1 / P16 to J16	25
ED7G045-20 GR10	Right	System Shelf / P14 to J14	Compl. Shelf 2 / P16 to J16	25
ED7G045-20 GR11	Left	Compl. Shelf 1/ P7 to J7	Compl. Shelf 2 / P6 to J6	15

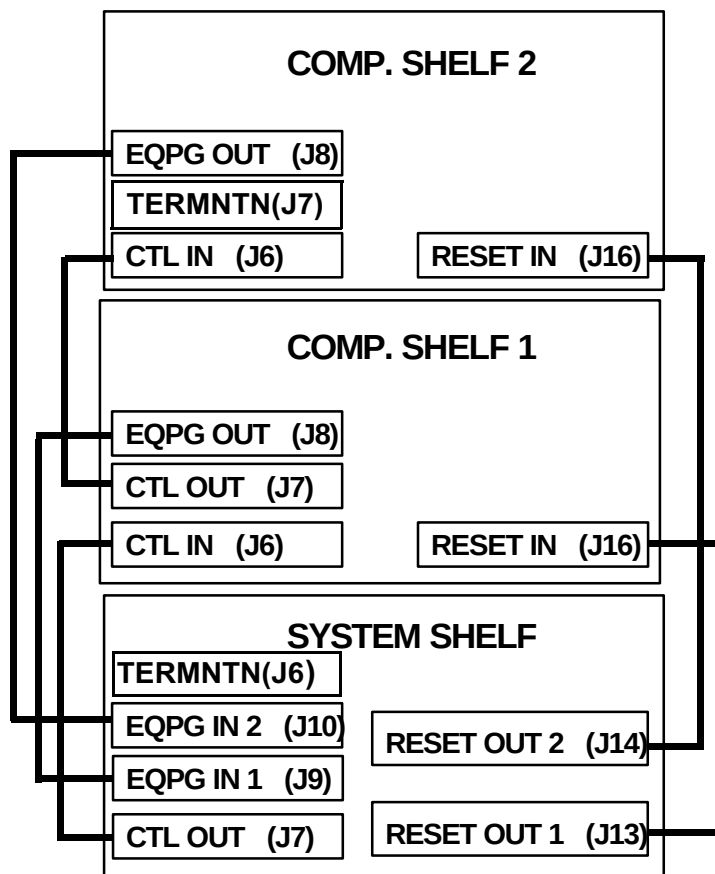


Figure 6-4. Shelf Interconnecting Cables for List 10

Install List 12 intershell cables as follows:

- (1) Remove the ED7G045-20 GR2 termination from the System Controller Shelf Connector J7 and plug it into Complementary Shelf 1 Connector J7.
- (2) Install intershell cables as specified in Table 6-21. Refer to Figure 6-5 on page 6-29.
- (3) Route cables out the left or right side access holes as specified in Table 6-21. When all the cables have been installed, tie excess cable into left or right bay frame channels.
- (4) Upon completion of Table 6-21 interconnections, verify that ED7G045-20 GR2 termination connectors are on System Shelf J6 and Complementary Shelf 1 J7. If missing, install replacement terminations. These are required for proper system performance.

(5) Using the (J69000C-1, List 161) shelf label kit, apply the identification labels to OT Bay 1 per the following:

- LOW to System Controller Shelf
- MID to Complementary Shelf 1

(6) If the system has an OT Bay 2, apply labels in same location as listed for OT Bay 1 using the (J69000C-1, List 161) shelf label kit.

Table 6-21 Shelf Interconnecting Cables for List 12

Cable Part No.	Side to Run Cable	FROM Shelf / Jack	TO Shelf / Jack	Connctor Pin Size
ED7G045-20 GR6	Left	System Shelf / P7 to J7	Compl. Shelf 1 / P6 to J6	15
ED7G045-20 GR7	Left	System Shelf / P9 to J9	Compl. Shelf 1 / P8 to J8	15
ED7G045-20 GR9	Right	System Shelf / P13 to J13	Compl. Shelf 1 / P16 to J16	25

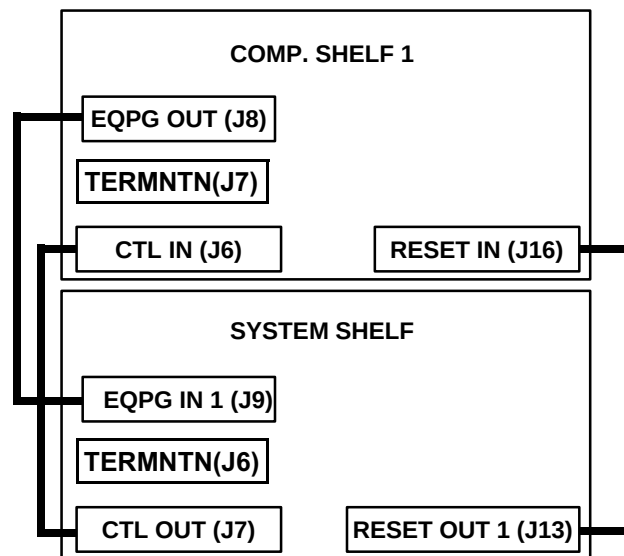


Figure 6-5 Shelf Interconnecting Cables for List 12

Install List 13 intershelf cables as follows:

- (1) Remove the ED7G045-20 GR2 termination from the Complementary Shelf 1 Connector J7 and plug it into Complementary Shelf 2 Connector J7.
- (2) Install intershelf cables as specified in Table 6-22. Refer to Figure 6-6 on page 6-31
- (3) Route cables out the left or right side access holes as specified in Table 6-22. When all the cables have been installed, tie excess cable into left or right bay frame channels.
- (4) Upon completion of Table 6-22 interconnections, verify that ED7G045-20 GR2 termination connectors are on System Shelf J6 and Complementary Shelf 2 J7. If missing, install replacement terminations. These are required for proper system performance.
- (5) Using the (J69000C-1, List 161) shelf label kit, apply the identification labels to OT Bay 1 per the following:
 - UP to Complementary Shelf 2
- (6) If required, using the (J69000C-1, List 161) shelf label kit, apply the identification labels to OT Bay 2 per the following:
 - UP to Complementary Shelf 2

Table 6-22 Shelf Interconnecting Cables for List 13

Cable Part No.	Side to Run Cable	FROM Shelf / Jack	TO Shelf / Jack	Connector Pin Size
ED7G045-20 GR11	Left	Compl. Shelf 1 / P7 to J7	Compl. Shelf 2 / P6 to J6	15
ED7G045-20 GR8	Left	System Shelf / P10 to J10	Compl. Shelf 2 / P8 to J8	15
ED7G045-20 GR10	Right	System Shelf / P14 to J14	Compl. Shelf 2 / P16 to J16	25

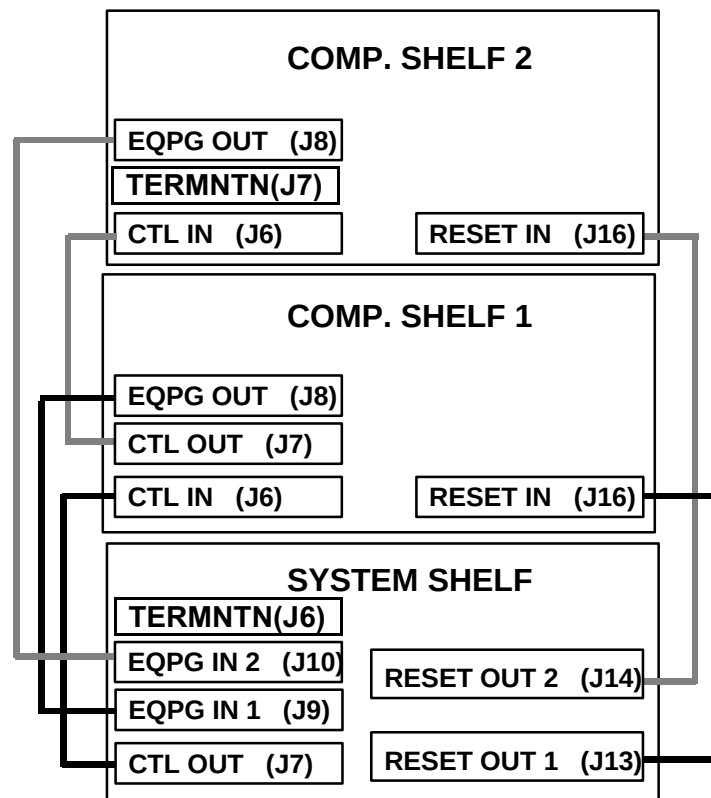


Figure 6-6 Shelf Interconnecting Cables for List 13

The shelf interconnecting wiring is complete.

OLS/OT Integration Cables Installation (Release 3)

Description

Release 3 OLS/OT Integration provides a control interface between the OLS and the OT. An OTCTL (LUD1) pack is inserted in the OT System Shelf, and cables are installed

which connect the OT to the OLS. This integration provides additional maintenance information and control of OT provisioning and administration through existing OLS control interfaces.



WARNING:

The following installation procedures are for new installations. Using these procedures on "In Service" OLS/OT systems will result in a "Loss of Service". For "In Service" upgrades use the appropriate MIP.

Configurations

There are two integrated OLS/OT configurations:

- one OLS shelf with one OT system,
- one OLS shelf with two OT systems.

An OT system can consist of one, two, or three shelves.

One OLS Shelf/One OT System

Table 6-23 lists the cables available for interconnecting one OLS shelf and one OT system.

Table 6-23 One OLS Shelf to One OT System Interconnection Cables

ED-7G028-22 Cable Group	Cable Length (ft.)	Connections:			
		OLS		OT	
801	20	P14	BUS OUT	J5 J6	IAO LAN CTL IN
851	100				
853	200				
855	180				
802	20	J27	CTL OUT B	J8 J16	EQPG OUT RESET IN
852	100				
854	200				

Interconnection Cable Installation Procedure

Perform the following steps to install the interconnecting cables (refer to Figure 6-12):

- (1) Remove the ED-7G028-20 G6 termination from P14 on the OLS interconnection panel.
- (2) Route the J14 end of the ED-7G028-22 G801, 851, 853, or 855 cable through the left side of the OLS shelf and attach to the P14 BUS OUT connector. Refer to Figure 6-1 OLS Interconnection Panel, on page 6-3 to locate the connector.
- (3) Route the P5/P6 ends of the same cable through the left side of the OT System Controller shelf to the interconnection panel.
- (4) Remove the ED-7G045-20 G2 termination from the J6 CTRL IN connector and attach P6.
- (5) Attach P5 to the J5 IAO LAN connector. Refer to Figure 6-3 Interconnection Panel for OT System Shelf, on page 6-5 to locate the connectors.
- (6) Route the P27 end of the ED-7G028-22 G802, 852, or 854 cable through the right side of the OLS shelf and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel. Refer to Figure 6-1 OLS Interconnection Panel, on page 6-3 to locate the connector.
- (7) Route the P8/P16 ends of the same cable through the left side of the OT System Controller shelf to the interconnection panel.
- (8) Attach P8 to the J8 EQPG OUT connector.
- (9) Attach P16 to the J16 RESET IN connector. Refer to Figure 6-3 Interconnection Panel for OT System Shelf, on page 6-5 to locate the connectors.
- (10) Dress and tie the cables.

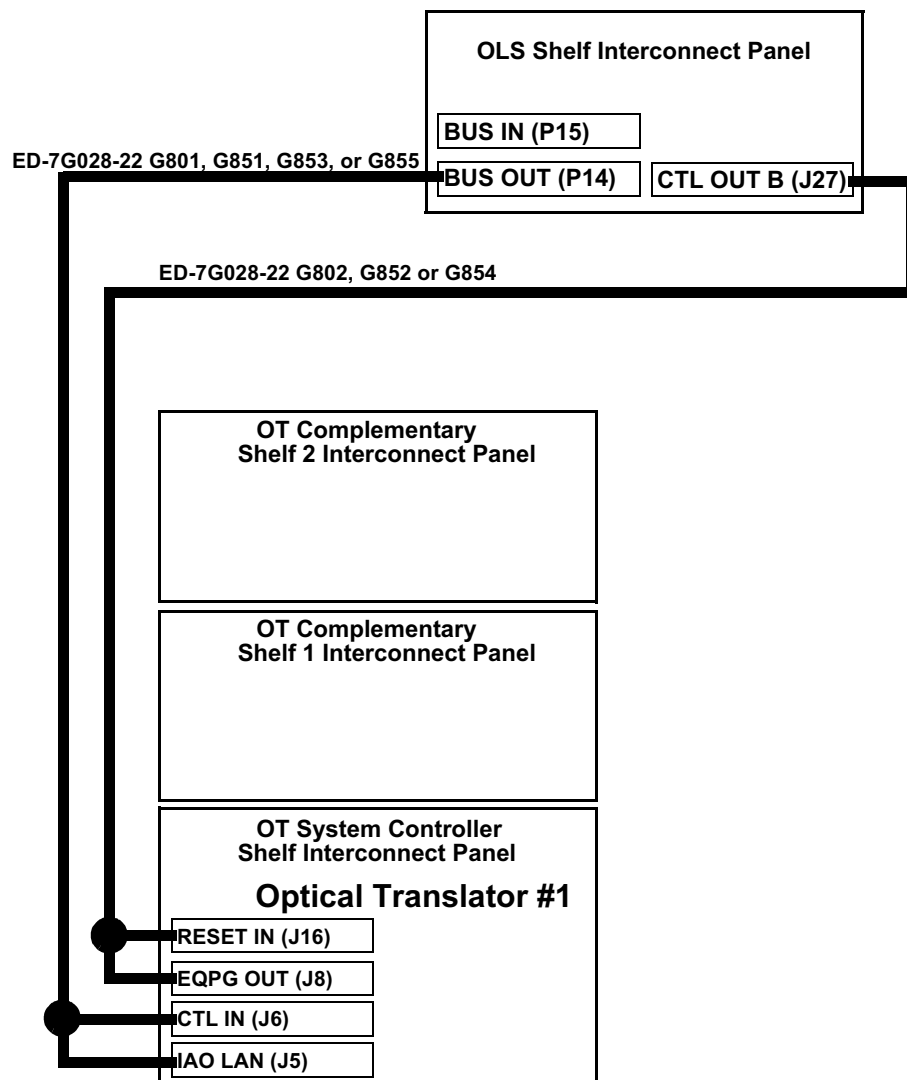


Figure 6-7. OLS Controlling 1 OT System

⇒ NOTE:

For an OLS to be initially equipped with a single OT and later to be expanded to a second OT, the OLS and OT should be installed with the Dual Reset and Equipage cable G812, G813, or G814. The total cable length between the OLS, OT Bay # 1, and the eventual OT Bay # 2 must be planned such that the length of LAN Cable

1 (G801, G851, G853, and G855) and the eventual LAN Cable 2 (G806, G807, G808, G809) will not exceed 200 ft. The appropriate Dual Reset and Equipage cable should be chosen based on the maximum distance between the OLS and either OT Bay # 1 or OT Bay # 2.

When installing the OLS and OT Bay # 1, the LAN path must be terminated at the last OT Bay # 1 shelf at backplane connector J7 using termination plug ED-7G045-20 G2. This termination plug must remain in place for single OT bay operation.

The OT Bay # 1 to OT Bay # 2 LAN cable is to be installed and left un-terminated. The unused branch of the Dual Reset and Equipage cable may be coiled and stored until needed with no special termination required on the other end.

When OT Bay # 2 is installed, the OT Bay # 1 LAN termination plug is removed from J7 on the OT Bay # 1 backplane and the appropriate LAN Cable 2 group is installed. The previous unused branch of the dual reset and equipage cable is connected to OT Bay # 2, and the Group G803, G804, or G805 cable of proper length is installed between the OLS and OT Bay # 2.

One OLS Shelf/Two OT Systems

Table 6-24 lists the cables available for interconnecting one OLS shelf and two OT systems. There are four types of cables, available in three or four different lengths. Only one of each type of cable is needed.

The cable with with group numbers 801,851,853, and 855 and the cable with group numbers 806,807,808,and 809 are both LAN cables. **The combined length of these cables in the system can not exceed 200 feet.**

Table 6-24 One OLS Shelf to Two OT System Interconnection Cables

ED-7G028-22 Cable Group	Cable Length (ft.)	Connections:			
		OLS		OT	
801	20	P14	BUS OUT	J5 J6	IAO LAN CTL IN
851	100				
853	200				
855	180				

Table 6-24 One OLS Shelf to Two OT System Interconnection Cables

ED-7G028-22 Cable Group	Cable Length (ft.)	Connections:			
		OLS		OT	
812	20	J27	CTL OUT B	J8-1	EQPG OUT
813	100			J16-1	RESET IN
814	200			J8-2 J16-2	EQPG OUT RESET IN
803	20	J15	BUS IN	J5	IAO LAN
804	100				
805	200				
-	-	OT-1		OT-2	
806	20	J7	CTRL OUT	J6	CTRL IN
807	100				
808	200				
809	180				

Interconnection Cable Installation Procedure

Perform the following steps to install the interconnecting cables (Refer to Figure 6-13):

- (1) Remove the ED-7G028-20 G6 termination from P14 on the OLS interconnection panel.
- (2) Route the J14 end of the ED-7G028-22 G801, 851, or 853 cable through the left side of the OLS shelf and attach to the P14 BUS OUT connector. Refer to Figure 6-1 OLS Interconnection Panel, on page 6-3 to locate the connector.
- (3) Route the P5/P6 ends of the same cable through the left side of the OT System Controller **#1** shelf to the interconnection panel.
- (4) Remove the ED-7G045-20 G2 termination from the J6 CTRL IN connector of OT System Controller **#1** shelf and attach P6.
- (5) Attach P5 to the J5 IAO LAN connector of OT System Controller **#1** shelf. Refer to Figure 6-3 Interconnection Panel for OT System Shelf, on page 6-5 to locate the connectors.

- (6) Route the P27 end of the ED-7G028-22 G812, 813, or 814 cable through the right side of the OLS shelf and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel. Refer to Figure 6-1 OLS Interconnection Panel, on page 6-3 to locate the connector.
- (7) Route the P8-1/P16-1 ends of the same cable through the left side of the first OT System Controller **#1** shelf to the interconnection panel.
- (8) Attach P8-1 to the J8 EQPG OUT connector on OT System Controller **#1** shelf.
- (9) Attach P16-1 to the J16 RESET IN connector of OT System Controller **#1** shelf. Refer to Figure 6-3 Interconnection Panel for OT System Shelf, on page 6-5 to locate the connectors.
- (10) Route the P8-2/P16-2 ends of the same cable through the left side of the second OT System Controller **#2** shelf to the interconnection panel.
- (11) Attach P8-2 to the J8 EQPG OUT connector of OT System Controller **#2** shelf.
- (12) Attach P16-2 to the J16 RESET IN connector of OT System Controller **#2** shelf. Refer to Figure 6-3 Interconnection Panel for OT System Shelf, on page 6-5 to locate the connectors.
- (13) Remove the ED-7G045-20 G2 termination from J7 on the interconnection panel of the top shelf (Complimentary Shelf 2) of **Optical Translator #1**.
- (14) Route the P7 end of the ED-7G045-20 G806, 807, or 808 cable through the left side of the top shelf of **Optical Translator #1** to the interconnection panel.
- (15) Attach P7 to the J7 CTRL OUT connector on the top shelf (Complimentary Shelf 2) of **Optical Translator #1**.
- (16) Route the P6 end of the same cable through the left side of **Optical Translator #2** System Controller shelf to the interconnection panel.
- (17) Remove the ED-7G045-20 G2 termination from the J6 CTRL IN System Shelf connector of **Optical Translator #2** and attach P6.
- (18) Route the J15 end of the ED-7G028-22 G803, 804, or 805 cable through the left side of the OLS shelf and attach to the P15 BUS IN connector. Refer to Figure 6-1 OLS Interconnection Panel, on page 6-3 to locate the connector.
- (19) Route the P5 end of the same cable through the left side of the **Optical Translator #2** System Controller shelf to the interconnection panel.
- (20) Attach P5 to the J5 IAO LAN connector on the System Controller Shelf of **Optical Translator #2**.
- (21) Dress and tie the cables.

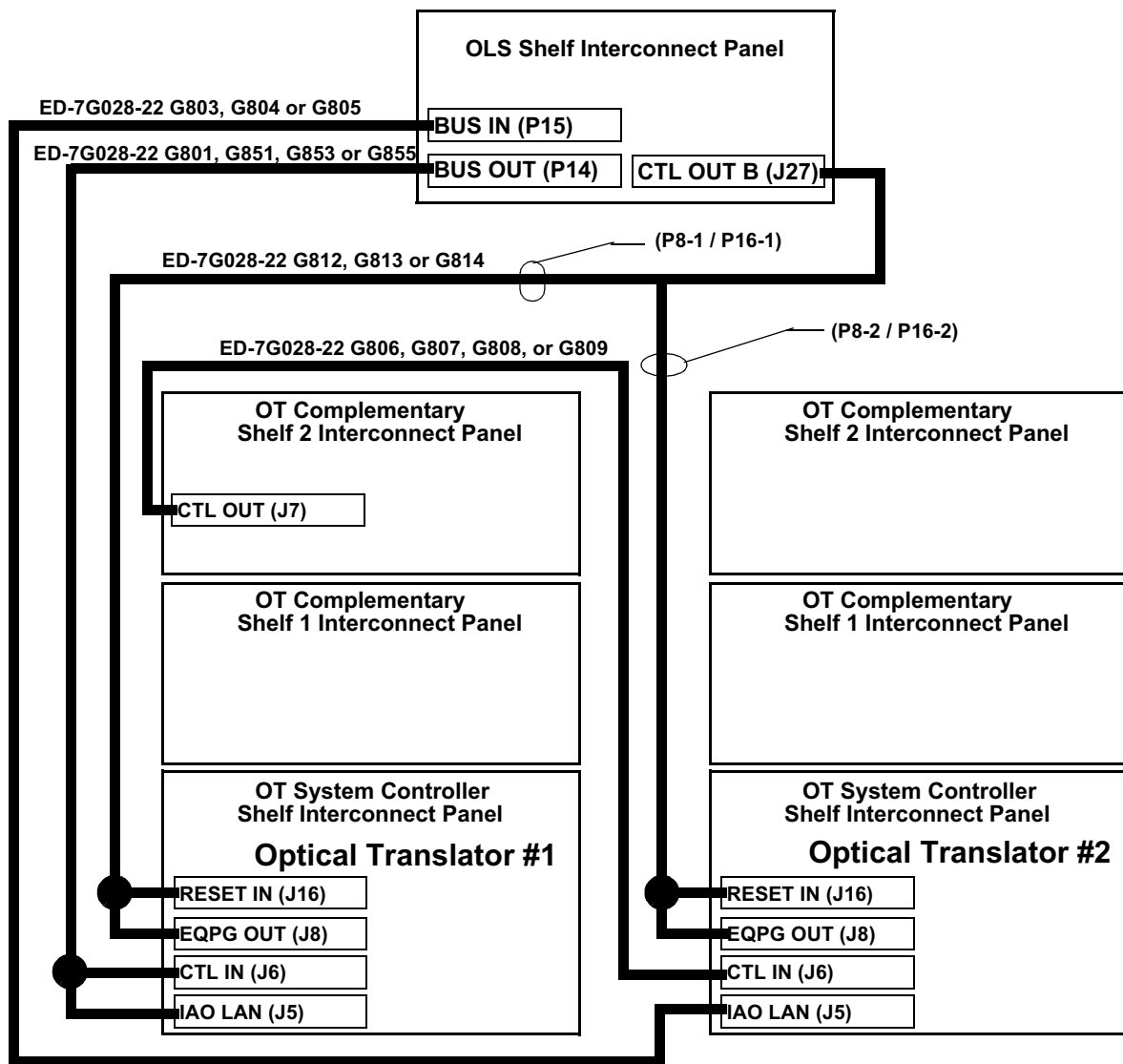


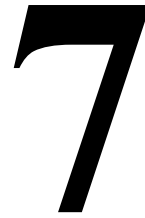
Figure 6-8. OLS Controlling 2 OT Systems

Final Verification

Perform the following steps at the end of each subsection to ensure that cables are properly installed:

- (1) Verify that cables are properly secured and dressed.
- (2) Verify that all cables are properly labeled.

WaveStar™ OLS 40G Fiber and Circuit Pack Installa- tion



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WaveStar™ OLS 40G Fiber and Circuit Pack Installation

7

Overview



CAUTION:

Procedures in this installation manual are only to be performed by trained personnel.

This section covers WaveStar OLS 40G and OT and gives a brief overview of each piece of equipment. It is broken into the 11 subsections listed below:

- *Section A - Generic Information for Fiber Installation*
- *Section B - Transmit End Terminal Specific Installation*
- *Section C - Receive End Terminal Specific Installation*
- *Section D - Repeater Terminal Specific Installation*
- *Section E - One OA Transmit End Terminal Specific Installation*
- *Section F - One OA Receive End Terminal Specific Installation*
- *Section G - Two OA/Two OA Dual Facing Shelf Installation*
- *Section H - Two OA/One OA Dual Facing Shelf Installation*
- *Section I - One OA/Two OA Dual Facing Shelf Installation*
- *Section J - One OA/One OA Dual Facing Shelf Installation*
- *Section K - OT Specific Installation*
- *Section L - Telemetry Feed-Through Installation*

Subsections B - K cover fiber routing, fiber protection, fiber dressing, circuit pack and unit installation and precautions, and fiber installation.

General Considerations

**CAUTION:**

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

**CAUTION:**

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.

**WARNING:**

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.

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 ED cable drawings listed in the Section 1, "Overall Installation and Test Considerations."
- For ordering information for the WaveStar OLS 40G or for the Optical Translator (OT), refer to the WaveStar OLS 40G Application, Planning, and Ordering Guide (APOG).
- Do not use cable ties with the optical fiber.
- Place optical fiber jumpers in protective tube or channel, such as the polyvinyl chloride (PVC) tubing provided in Installation Kit C848065959, when running the cable from the shelves to the cable rack.
- Place optical fiber jumpers in the cable rack in a protective channel with nothing on top of them.
- Maintain a minimum of 1.5 inches of optical fiber bend radius.
- Optical fiber jumpers require ST, FC/PC, or SC type connectors for connection to the WaveStar OLS 40G.
- Do not remove the backplane cover during the installation process.

A - Generic Information for Fiber Installation

End Terminal Description

The WaveStar OLS 40G End Terminal combines and separates up to 16 OC-48/STM-16 signals, transmitting and receiving up to 516,096 voice channels simultaneously on one optical fiber. All WaveStar OLS 40G transmission uses fiber jumpers connected to circuit pack faceplates. Connection is made using a removable Optical Line Build-Out (LBO).

Repeater Description

The WaveStar OLS 40G Repeater provides optical amplification of the combined optical signal. All WaveStar OLS 40G transmission uses fiber jumpers connected to circuit pack faceplates. Connection is made to a removable Optical Line Build-Out (LBO).

Dual Facing Shelf Description

The WaveStar OLS 40G Dual Facing Shelf provides a means of combining back-to-back, co-located, **2-fiber** End Terminals into a single shelf. This allows the DCC to go from one WaveStar OLS 40G subnetwork across to another WaveStar OLS 40G subnetwork, allowing the concatenation of subnetworks. It comes in a variety of configurations supported by Release 2.1 and subsequent releases.

Telemetry Feed-Through

The WaveStar OLS 40G Telemetry Feed-Through provides a means of combining back-to-back, co-located, **4-fiber** End Terminals. This allows the DCC to go from the End Terminal of one WaveStar OLS 40G subnetwork across to the End Terminal of another WaveStar OLS 40G subnetwork, allowing the concatenation of subnetworks. It is a feature of Release 3.0 and subsequent releases.

Optical Translator Description

An Optical Translator system can have up to three shelves: the controller shelf, complimentary shelf 1 and complimentary shelf 2. Each OT system can accommodate up to 32 Optical Translator Units (OTUs). Each one of these circuit

packs requires two fibers, one input and one output. Each system can also accommodate up to 16 Quad Optical Translator Units (QOTUs), each capable of holding up to 4 Optical Port Modules (OTPMs). Each OTPM requires two fibers, one input and one output for a possible total of 8 fibers per QOTU. Connection is made to a removable Optical Line Build-Out (LBO). The input fibers originate from an external source and the output fibers exit the shelf/bay to an external location. In most instances this will be a WaveStar OLS 40G End Terminal.

**CAUTION:**

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.

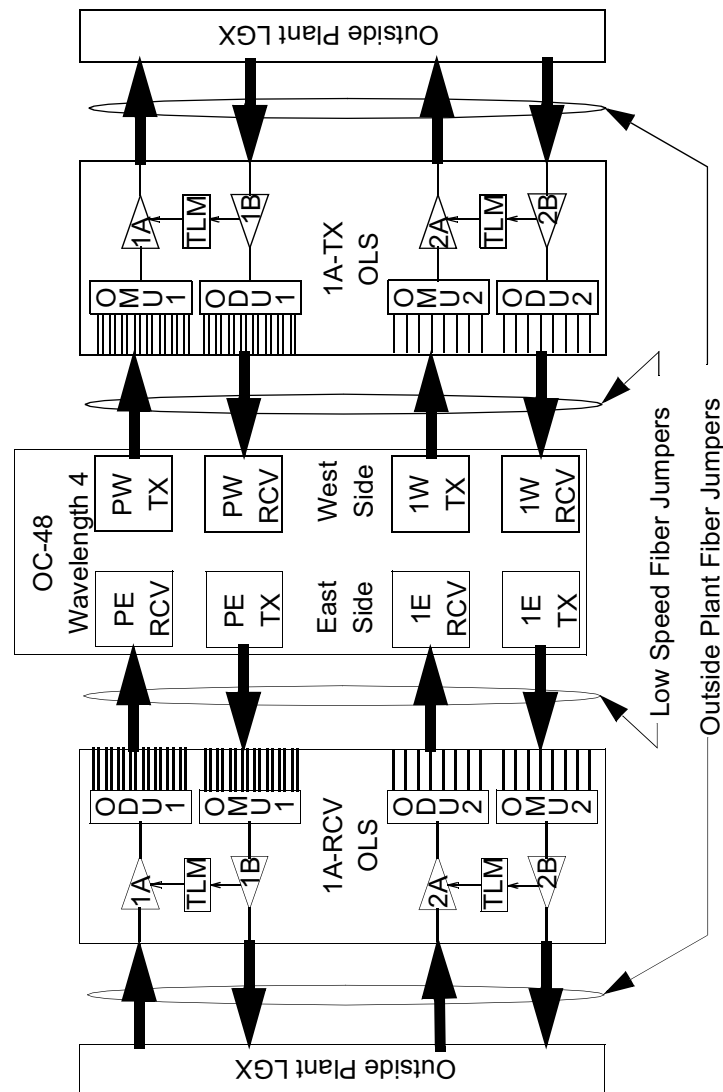


Figure 7-1 Intraoffice Fiber Jumpers

Available Fiber Jumpers

Table 7-1 lists some of the available jumpers for high speed fiber connection for use with the WaveStar OLS 40G.

Table 7-1 Single-Mode Fiber Jumpers

Code	Comcode	Length	Description
FS1EP-EP-02	107149494	2 ft.	ST II+ - ST II+
FS1EP-EP-10	107149536	10 ft.	ST II+ - ST II+
FS1EP-EP-25	107149569	25 ft.	ST II+ - ST II+
FS1EP-EP-50	107149601	50 ft.	ST II+ - ST II+
FS1EP-EP-100	107149627	100 ft.	ST II+ - ST II+
LS1FC-FC-02	107243156	2 ft	FC - FC
LS1FC-FC-10	106593759	10 ft	FC - FC
LS1FC-FC-25	107243222	25 ft	FC - FC
LS1FC-FC-50	107243255	50 ft	FC - FC
LS1FC-FC-100	107243271	100 ft	FC - FC

Table 7-2 lists some of the available jumpers for Intrashelf fiber connection for use with the WaveStar OLS 40G.

Table 7-2 Intrashelf Lightwave Jumpers

List	Max # of Chan.	System Type	Requirement	#/Length/Type
L161	8	2 OA ET	1 per Optical Line	4-50 "-ST to ST 9000A3 fiber
	8/16	Repeater	1 per Optical Line	
L162	16	2 OA ET and Repeater	1 per Optical Line	4-50"-ST to ST 3-50"-LC to ST 1-20"-LC to ST MiniCord fiber
L163	16	1 OA ET	1 per Optical Line	1-50"-ST to ST 1-50"-LC to ST 1-20"-LC to ST Mini Cord fiber
	16	1 OA /1 OA Dual Facing Shelf	1 per Optical Line	
L164	16	2 OA/2 OA Dual Facing Shelf	1 per shelf	4-50"-ST to ST 4-50"-LC to ST MiniCord fiber

Table 7-2 Intrashelf Lightwave Jumpers

List	Max # of Chan.	System Type	Requirement	#/Length/Type
L165	16	2 OA/1 OA, 1 OA/2 OA Dual Facing Shelf	1 per shelf	5-50"-ST to ST 4-50"-LC to ST 2-20"-LC to ST MiniCord fiber

Identification of OLS Cabinet Type

Use the following table to identify what type of OLS cabinet is to be installed and how the circuit packs are equipped.

Table 7-3 OLS Cabinet Types

Type of Cabinet	J68982C-1 List	Circuit Pack and Line Identification Figure	System Configuration
4-Line End Terminal	List 1 + List 101	Figure 7-4 on page 7-15	1X-TX (OA1A transmits to the outside plant fiber)
Dual 2-Line End Terminal	List 2 + List 103	Figure 7-5 on page 7-18	1A-TX (OA1A transmits to the outside plant fiber)
End Terminal and Repeater	List 2 + List 105	Use Figure 7-4 on page 7-15 for bottom shelf and repeater info for top shelf.	1A-TX (OA1A transmits to the outside plant fiber)
Dual Facing Shelf	List 2 + various options	Use Figure 7-20 on page 7-88	Dual (OA2A transmits to the outside plant fiber)
Dual 2-line Repeater	List 1 + List 104	Figure 7-13 on page 7-51	repeater
4-Line Repeater	List 2 + List 102	Figure 7-12 on page 7-49	repeater
End Terminal and Repeater	List 2 + List 105	Use Figure 7-5 on page 7-18 end terminal info for bottom shelf and Figure 7-13 for top shelf.	repeater
4-Line End Terminal	List 1 + List 101	Figure 7-8 on page 7-32	1A-RCV (OA1A receives from the outside plant fiber)

Table 7-3 OLS Cabinet Types

Type of Cabinet	J68982C-1 List	Circuit Pack and Line Identification Figure	System Configuration
Dual 2-Line End Terminal	List 2 + List 103	Figure 7-9 on page 7-35	1A-RCV (OA1A receives from the outside plant fiber)
End Terminal and Repeater	List 2 + List 105	Use Figure 7-8 on page 7-32 for bottom shelf and Figure 7-13 on page 7-51 repeater info for top shelf.	1A-RCV (OA1A receives from the outside plant fiber)

Fiber Cable Routing

The figures that follow illustrate the routing to be used to bring cables from outside plant fiber or other equipment to the appropriate shelf in the WaveStar OLS 40G. Also illustrated is the proper routing for the fibers feeding the OMUs and ODUs from outside plant fiber or other equipment. Note should be made of the fibers passing through the clips at the top and front of the shelf.

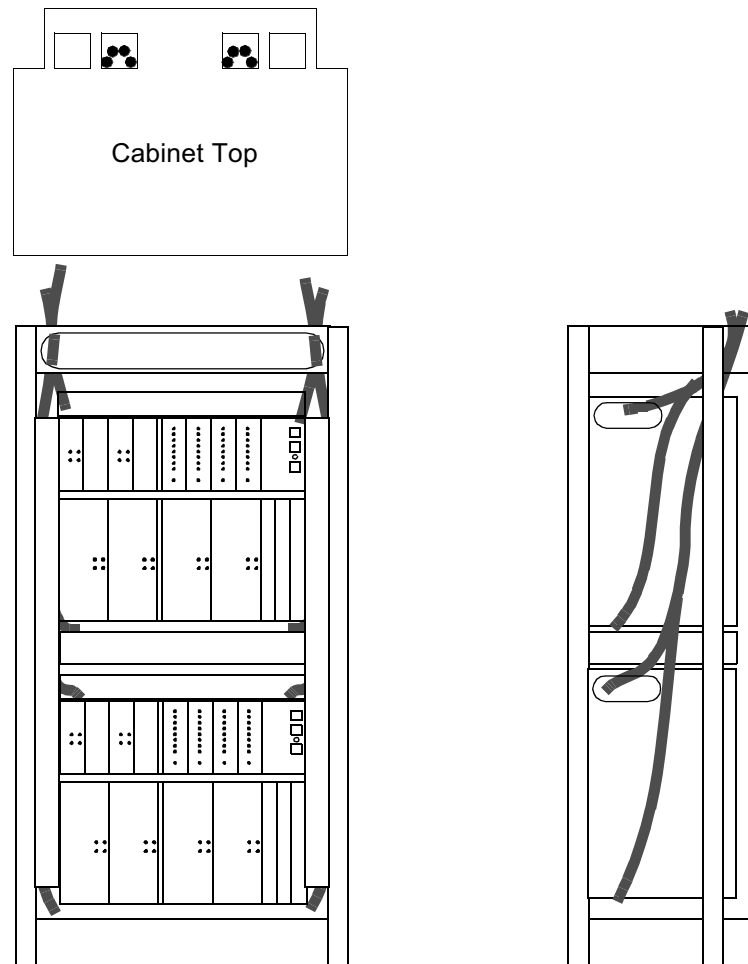
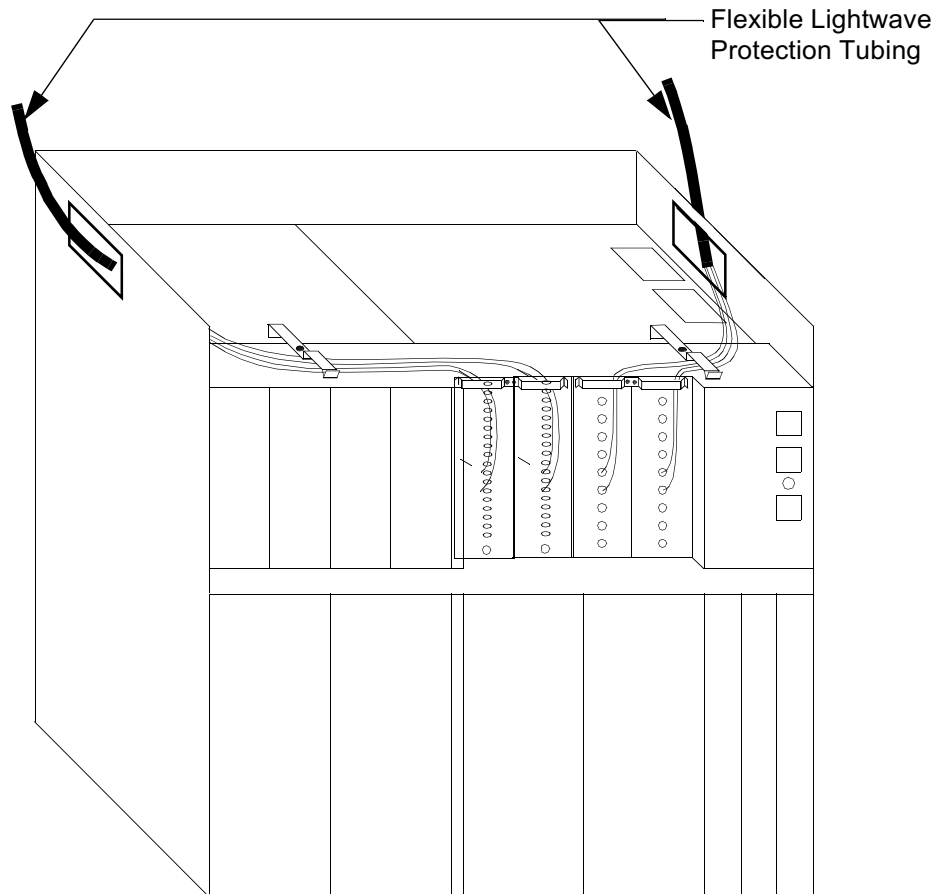


Figure 7-2 OLS Cabinet Fiber Routing



NOTE: Lift the retainer clip high enough for one lightwave fiber to pass through and insert one at a time. Do not lift the clip too high otherwise the clip may overstress.

Figure 7-3 OMU/ODU Fiber Routing (Single Shelf Shown)

Circuit Pack Installation

Circuit pack installation for the WaveStar OLS 40G includes the following:

- Install, but do not seat, all circuit packs and units in their final locations to aid in the installation of the fiber jumpers.
- Move the transmission circuit packs to the highest numbered lines. This will allow the circuit pack and unit slots in the highest numbered lines to be tested.
- After software installation in Section 9, the circuit packs will be moved to their final locations.

General Circuit Pack Installation Considerations

- A wrist strap, connected to the wrist strap ground jack on the user panel or filter panel, must be worn when handling circuit packs or touching the terminal.
- Circuit packs are keyed to prevent being inserted into the wrong shelf position.
- Before installing any circuit packs, 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.
- Any broken pins or bent pins that cannot be straightened must be replaced using the BERG MT370 pin kit for the METRAL pins. Refer to Appendix B "Pin Repair".
- When installing circuit packs, use care to insert them straight to avoid damaging the circuit packs or the backplane pins.
- Fiber connectors on optical circuit packs should always be either connected to fiber or covered by protective covers.



CAUTION:

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.



NOTE:

The 41-type OTUs are keyed the same as the Optical Amplifiers (OAs). However the OTUs have more depth and cannot be fully inserted into the shelf. **Do Not** attempt to seat an OTU into an Optical Amplifier slot.

Circuit Pack Availability

Table 7-4 lists available circuit packs for the WaveStar OLS 40G Packs specific to each configuration will be called out in the individual subsections.

Table 7-4 Available WaveStar OLS 40G Circuit Pack Codes

List	Comcode	Circuit Pack	Description
L35	107272510	LEA1	System Controller (SYSCTL)
L40	107786568	LEA2	System Memory (SYSTEM)
L30	107273328	LEA5	Tributary Overhead Controller (TOHCTL)
L20	107273336	LEA6	Optical Amplifier (OA) - Long Span
L21	107742439	LEA7	Optical Amplifier (OA) - Long Haul
L23	108045394	LEA105	Optical Amplifier (OA) - Short Haul
L22	107976367	LEA104	Optical Amplifier (OA) - 16 λ Very Long Haul
L25	107272569	LDA1	Telemetry (TLM)
L60	107292179	505A	8 λ Optical Multiplexing Unit (OMU)
L61	107727828	506A	16 λ Optical Multiplexing Unit (OMU)
L50	107292187	605A	8 λ Optical Demultiplexing Unit (ODU)
L51	108032814	606A	16 λ Optical Demultiplexing Unit (ODU) without supervisory channel
L52	108032822	606B	16 λ Optical Demultiplexing Unit (ODU) with Supervisory channel

B - 1A-TX End Terminal Installation

This subsection covers the installation of fibers and labels for the 1A-TX End Terminal configuration. Releases 1.0 and 2.0 support only 8 wavelengths. Releases 2.1 and subsequent releases support either 8 or 16 wavelengths. The subsection is divided into six procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- Telemetry Feed-Through Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure for 4-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.

- (2) If the cabinet is a dual 2-line cabinet, See "Circuit Pack Equip Procedure For Dual 2-Line Systems" on page 17.
- (3) Refer to Figure 7-4 on page 7-15 for circuit pack locations

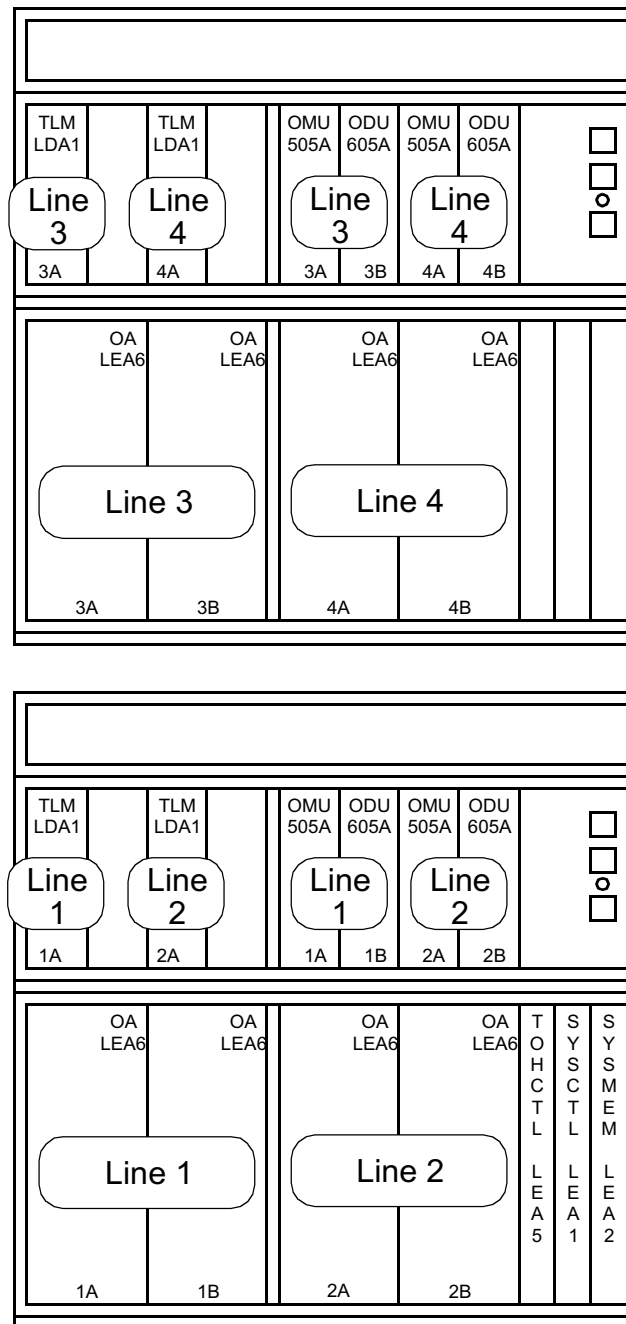


Figure 7-4 4-Line End Terminal 1A-TX

(4) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(5) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(6) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) 505A or 506A OMU (Leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (Leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

 NOTE:

Typically only lines 1 and 2 are equipped on first installations. However, if lines 3 and/or 4 are equipped perform the following step(s). If not equipped go to step 9.

(7) If line 3 is equipped, install, but do not seat, the following transmission circuit packs and units for line 3 in the upper shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM

- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (Leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (Leave the retainer screws for the unit on the shelf at this time.)

⇒ NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(8) If line 4 is equipped, install, but do not seat, the following transmission circuit packs and units for line 4 in the upper shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

⇒ NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(9) Proceed to the Intrashelf Fiber Jumper Installation paragraph (page 20).

Circuit Pack Equip Procedure For Dual 2-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-5 on page 7-18 for circuit pack locations.

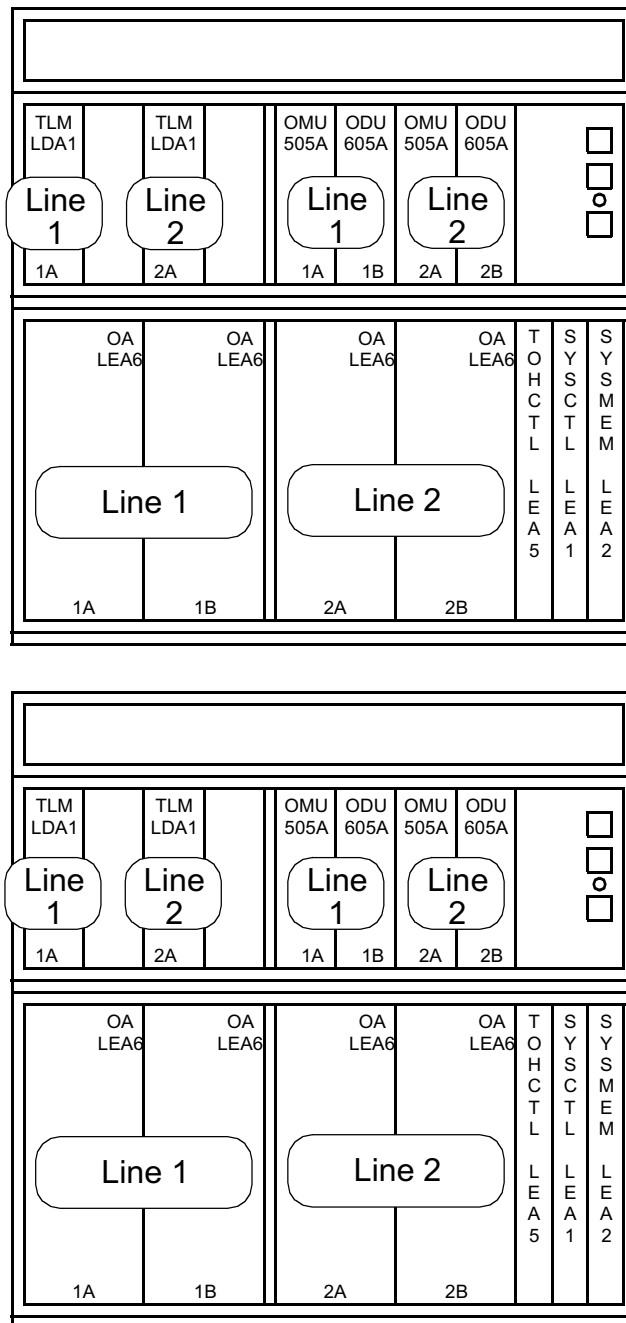


Figure 7-5 Dual 2-Line End Terminal 1A-TX

(3) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(5) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(6) Repeat steps 1 to 5 if the upper shelf is to be equipped.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 4 fiber jumpers per List 161 for 8λ or List 162 for 16λ for **each** line (8 fibers for a 2-line shelf), add the labels from Installation Kit C848065959, then route the fibers by referring to Figure 7-6 and Table 7-5. See Table 7-2 on page 7-6 for more fiber information.



NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

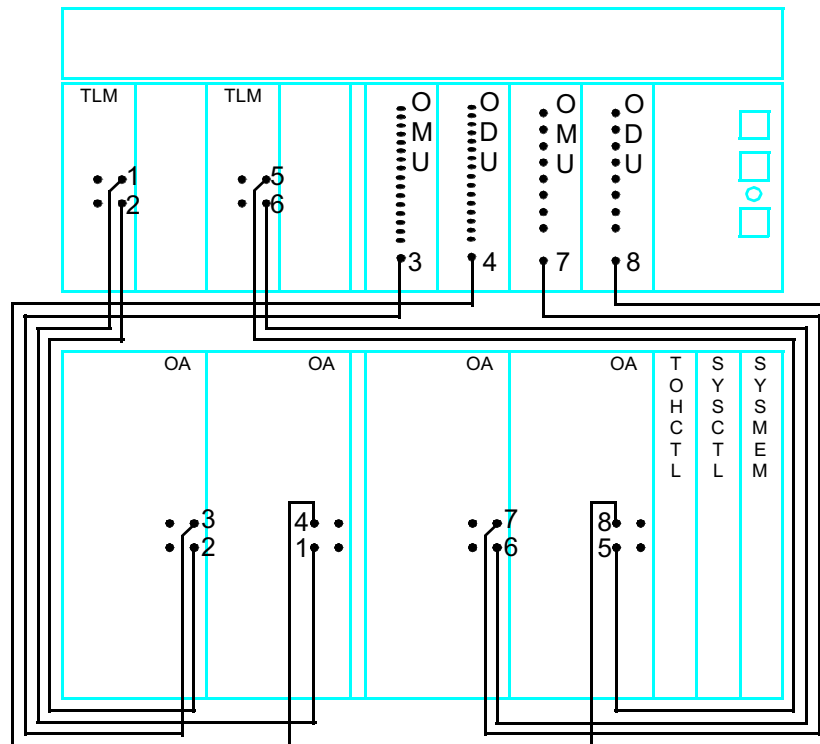


Figure 7-6 1A-TX End Terminal Intrashelf Fiber Jumpers

Table 7-5 Intrashelf Fiber Jumpers For 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-6 on page 7-20 for connection point	1	1	TLM 1A/B	IN	1A-TLM-IN
		1	OA 1B	TLM OUT	1B-OA-TLMOUT
		2	TLM 1A/B	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		3	OMU 1A	OMU OUT	1-OMU-OUT
		3	OA 1A	IN	1A-OA-IN
		4	ODU 1B	ODU IN	1-ODU-IN
		4	OA 1B	OUT	1B-OA-OUT
	2	5	TLM 2A/B	IN	2A-TLM-IN
		5	OA 2B	TLM OUT	2B-OA-TLMOUT
		6	TLM 2A/B	OUT	2A-TLM-OUT
		6	OA 2A	TLM IN	2A-OA-TLMIN
		7	OMU 2A	OMU OUT	2-OMU-OUT
		7	OA 2A	IN	2A-OA-IN
		8	ODU 2B	ODU IN	2-ODU-IN
		8	OA 2B	OUT	2B-OA-OUT
	3	1	TLM 3A/B	IN	3A-TLM-IN
		1	OA 3B	TLM OUT	3B-OA-TLMOUT
		2	TLM 3A/B	OUT	3A-TLM-OUT
		2	OA 3A	TLM IN	3A-OA-TLMIN
		3	OMU 3A	OMU OUT	3-OMU-OUT
		3	OA 3A	IN	3A-OA-IN
		4	ODU 3B	ODU IN	3-ODU-IN
		4	OA 3B	OUT	3B-OA-OUT
	4	5	TLM 4A/B	IN	4A-TLM-IN
		5	OA 4B	TLM OUT	4B-OA-TLMOUT
		6	TLM 4A/B	OUT	4A-TLM-OUT
		6	OA 4A	TLM IN	4A-OA-TLMIN
		7	OMU 4A	OMU OUT	4-OMU-OUT
		7	OA 4A	IN	4A-OA-IN
		8	ODU 4B	ODU IN	4-ODU-IN
		8	OA 4B	OUT	4B-OA-OUT

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from the Installation Kit C848065959 then routing the fibers by referring to Figure 7-3 on page 7-10 and Figure 7-7 on page 7-22. Use Table 7-6 on page 7-23 and Table 7-7 on page 7-24 for Shelves 1 and 2. Use Table 7-8 on page 7-25 and Table 7-9 on page 7-26 for Shelves 3 and 4.



CAUTION:

Do not connect either end of the fiber jumper at this time.

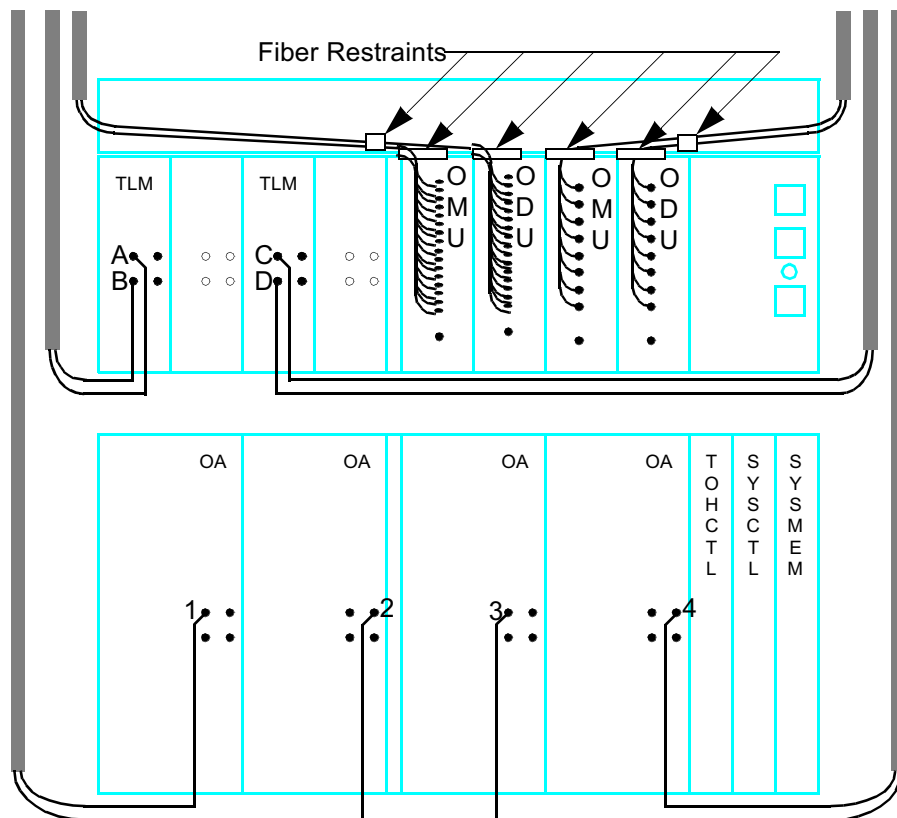


Figure 7-7 1A-TX End Terminal Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-6 1A-TX End Terminal Low Speed Fiber Jumpers - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-7 on page 7-22 for connection points	1	OMU 1A	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1A	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1A	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1A	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1A	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1A	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1A	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1A	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1A	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1A	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1A	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1A	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1A	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1A	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1A	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1A	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1B	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1B	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1B	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1B	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1B	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1B	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1B	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1B	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1B	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1B	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1B	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1B	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1B	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1B	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1B	OCHAN15OUT	LOWER 1D15	UPPER 1D15
		ODU 1B	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-7 1A-TX End Terminal Low Speed Fiber Jumpers - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf
End Terminal 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-7 on page 7-22 for connection points	2	OMU 2A	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2A	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2A	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2A	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2A	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2A	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2A	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2A	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2A	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2A	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2A	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2A	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2A	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2A	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2A	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2A	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2B	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2B	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2B	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2B	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2B	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2B	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2B	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2B	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2B	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2B	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2B	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2B	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2B	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2B	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2B	OCHAN15OUT	LOWER 2D15	UPPER 2D15
		ODU 2B	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Table 7-8 1A-TX End Terminal Low Speed Fiber Jumpers - Line 3

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal 1A-TX 4-Line Refer to Figure 7-7 on page 7-22 for connection points	3	OMU 3A	OCHAN1 IN	UPPER 3M1
		OMU 3A	OCHAN2 IN	UPPER 3M2
		OMU 3A	OCHAN3 IN	UPPER 3M3
		OMU 3A	OCHAN4 IN	UPPER 3M4
		OMU 3A	OCHAN5 IN	UPPER 3M5
		OMU 3A	OCHAN6 IN	UPPER 3M6
		OMU 3A	OCHAN7 IN	UPPER 3M7
		OMU 3A	OCHAN8 IN	UPPER 3M8
		OMU 3A	OCHAN9 IN	UPPER 3M9
		OMU 3A	OCHAN10 IN	UPPER 3M10
		OMU 3A	OCHAN11 IN	UPPER 3M11
		OMU 3	OCHAN12 IN	UPPER 3M12
		OMU 3A	OCHAN13 IN	UPPER 3M13
		OMU 3A	OCHAN14 IN	UPPER 3M14
		OMU 3A	OCHAN15 IN	UPPER 3M15
		OMU 3A	OCHAN16 IN	UPPER 3M16
		ODU 3B	OCHAN1 OUT	UPPER 3D1
		ODU 3B	OCHAN2 OUT	UPPER 3D2
		ODU 3B	OCHAN3 OUT	UPPER 3D3
		ODU 3B	OCHAN4 OUT	UPPER 3D4
		ODU 3B	OCHAN5 OUT	UPPER 3D5
		ODU 3B	OCHAN6 OUT	UPPER 3D6
		ODU 3B	OCHAN7 OUT	UPPER 3D7
		ODU 3B	OCHAN8 OUT	UPPER 3D8
		ODU 3B	OCHAN9 OUT	UPPER 3D9
		ODU 3B	OCHAN10 OUT	UPPER 3D10
		ODU 3B	OCHAN11 OUT	UPPER 3D11
		ODU 3B	OCHAN12 OUT	UPPER 3D12
		ODU 3B	OCHAN13 OUT	UPPER 3D13
		ODU 3B	OCHAN14 OUT	UPPER 3D14
		ODU 3B	OCHAN15OUT	UPPER 3D15
		ODU 3B	OCHAN16 OUT	UPPER 3D16

Table 7-9 1A-TX End Terminal Low Speed Fiber Jumpers - Line 4

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal 1A-TX 4-Line Refer to Figure 7-7 on page 7-22 for connection points	4	OMU 4A	OCHAN1 IN	UPPER 4M1
		OMU 4A	OCHAN2 IN	UPPER 4M2
		OMU 4A	OCHAN3 IN	UPPER 4M3
		OMU 4A	OCHAN4 IN	UPPER 4M4
		OMU 4A	OCHAN5 IN	UPPER 4M5
		OMU 4A	OCHAN6 IN	UPPER 4M6
		OMU 4A	OCHAN7 IN	UPPER 4M7
		OMU 4A	OCHAN8 IN	UPPER 4M8
		OMU 4A	OCHAN9 IN	UPPER 4M9
		OMU 4A	OCHAN10 IN	UPPER 4M10
		OMU 4A	OCHAN11 IN	UPPER 4M11
		OMU 4A	OCHAN12 IN	UPPER 4M12
		OMU 4A	OCHAN13 IN	UPPER 4M13
		OMU 4A	OCHAN14 IN	UPPER 4M14
		OMU 4A	OCHAN15 IN	UPPER 4M15
		OMU 4A	OCHAN16 IN	UPPER 4M16
		ODU 4B	OCHAN1 OUT	UPPER 4D1
		ODU 4B	OCHAN2 OUT	UPPER 4D2
		ODU 4B	OCHAN3 OUT	UPPER 4D3
		ODU 4B	OCHAN4 OUT	UPPER 4D4
		ODU 4B	OCHAN5 OUT	UPPER 4D5
		ODU 4B	OCHAN6 OUT	UPPER 4D6
		ODU 4B	OCHAN7 OUT	UPPER 4D7
		ODU 4B	OCHAN8 OUT	UPPER 4D8
		ODU 4B	OCHAN9 OUT	UPPER 4D9
		ODU 4B	OCHAN10 OUT	UPPER 4D10
		ODU 4B	OCHAN11 OUT	UPPER 4D11
		ODU 4B	OCHAN12 OUT	UPPER 4D12
		ODU 4B	OCHAN13 OUT	UPPER 4D13
		ODU 4B	OCHAN14 OUT	UPPER 4D14
		ODU 4B	OCHAN15OUT	UPPER 4D15
		ODU 4B	OCHAN16 OUT	UPPER 4D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from the Installation Kit C848065959 then routing the fibers by referring to Figure 7-7 on page 7-22 and Table 7-10 on page 7-27.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-10 Outside Plant LGX Fiber Jumpers For 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	OA 1A	OUT	1A-OA-OUT
		2	OA 1B	IN	1B-OA-IN
1A-TX	2	3	OA 2A	OUT	2A-OA-OUT
		4	OA 2B	IN	2B-OA-IN
4-Line or	3	1	OA 3A	OUT	3A-OA-OUT
		2	OA 3B	IN	3B-OA-IN
Dual 2-Line (use lines 1 & 2 for each shelf)	4	3	OA 4A	OUT	4A-OA-OUT
		4	OA 4B	IN	4B-OA-IN

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facilities or LGX by adding the labels from the Installation

Kit C848065959 then routing the fibers by referring to Figure 7-7 on page 7-22 and Table 7-11 on page 7-28.

Table 7-11 Customer Maintenance Fiber Jumpers For End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-TX	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
4-Line or	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
Dual 2-Line (use lines 1 & 2 for each shelf)	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
Refer to Figure 7-7 on page 7-22 for connection points	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Telemetry Feed-Through Fiber Jumper Installation

Refer to Section L of this chapter for more information regarding Telemetry Feed-Through Installation. If Telemetry Feed-Through is being installed, prepare four fiber jumpers for each line which will be equipped. Table 7-12 lists some of the fibers which can be used for this feature.

Table 7-12 Telemetry Feed-Through Fiber Jumpers

Code	Comcode	Length	Description
MS1EP-EP-02	107 306 243	2 ft	ST II+ to ST II+ singlemode
MS1EP-EP-10	107 306 292	10 ft	
MS1EP-EP-25	107 306 326	25 ft	
MS1EP-EP-50	107 306 367	50 ft	
MS1EP-EP-100	107 306 383	100 ft	

Label the jumpers as shown in Table 7-13 and then connect to the corresponding telemetry packs. Use an LBO of the correct value to keep the input to the LDA1 between -18 and -31 dBm.

Table 7-13 Telemetry Feed-Through Fiber Jumper Labels

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 4-Line or Dual 2-Line or Miscellaneous Mount Shelf (use Lines 1 and 2 for each shelf)	1	1	TLM 1B	IN	1B-TLM-IN
		2		OUT	1B-TL:M-OUT
		3		IN	1B-TLM-IN
		4		OUT	1B-TL:M-OUT
	2	1	TLM 2B	IN	2B-TLM-IN
		2		OUT	2B-TL:M-OUT
		3		IN	2B-TLM-IN
		4		OUT	2B-TL:M-OUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down through the sides of the frame. Refer to Figure 7-2 on page 7-9 for cabinets and Figure 7-3 on page 7-10 and Figure 7-7 on page 7-22 for miscellaneous mounted shelf or integrated bay installations.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-6 on page 7-20 and Figure 7-7 on page 7-22.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10.



NOTE:

To place the fibers through the clips, lift the clip and slide one fiber through at a time to prevent overstressing the clip.

Seat OMUs and ODUs Into Shelf

Refer to Figure 7-4 on page 7-15 or Figure 7-5 on page 7-18 and seat the OMU and ODU units in the shelf as follows:

- (1) Remove the screws from the shelf positions and discard if the OMUs and ODUs have captive screws.
- (2) Seat the OMUs and ODUs into the shelf slots.
- (3) If the OMUs and ODUs are not in their final position, do not tighten the captive screws.



CAUTION:

Do not seat any other circuit packs in the shelf at this time.

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify circuit packs/units other than the OMU and ODU are installed but not seated into their backplane connectors.

C - 1A-RCV End Terminal Installation

Releases 1.0 and 2.0 support 8 wavelengths and Releases 2.1 and subsequent releases support either 8 or 16 wavelengths. If any release with 8 wavelengths is being installed, disregard any reference to labeling and fiber wavelengths 9 through 16.

This subsection covers the fiber and label installation for the 1A-RCV End Terminal configuration. It has been broken into six procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- Telemetry Feed-Through Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure for 4-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) If the cabinet is a dual 2-line system, proceed to the Circuit Pack Equip Procedure for Dual 2-Line Systems paragraph.
- (3) Refer to Figure 7-8 on page 7-32 for circuit pack locations.

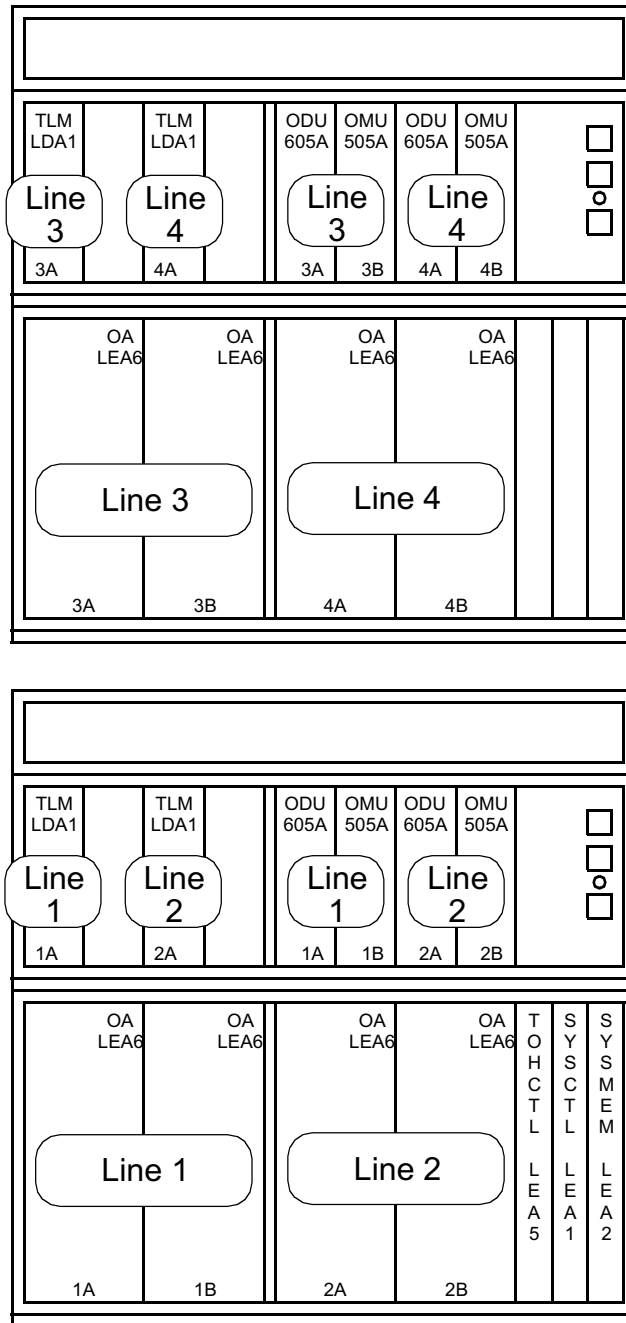


Figure 7-8 4-Line End Terminal 1A-RCV

(4) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(5) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(6) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

 NOTE:

Typically only lines 1 and 2 are equipped on first installations, however, if lines 3 and/or 4 are equipped perform the following step(s). If lines 3 and 4 are not equipped, go to step 9.

(7) If line 3 is equipped, install, but do not seat, the following transmission circuit packs and units for line 3 in the upper shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA

- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(8) If line 4 is equipped, install, but do not seat, the following transmission circuit packs and units for line 4 in the upper shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(9) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Circuit Pack Equip Procedure For Dual 2-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-9 on page 7-35 for circuit pack locations.

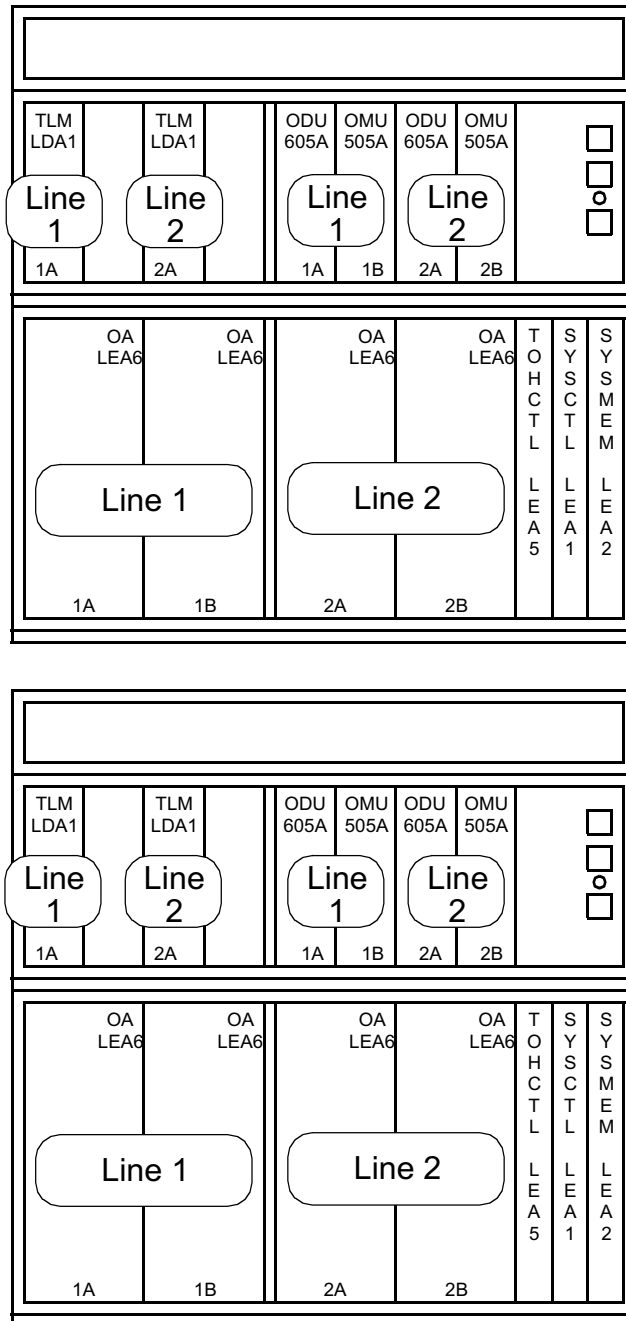


Figure 7-9 Dual 2-Line End Terminal 1A-RCV

(3) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(5) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (2) LEA6, LEA7, LEA104, or LEA105 OA
- (1) LDA1 TLM
- (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed.
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(6) Repeat steps 1 to 4 if the upper shelf is to be equipped.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 4 fiber jumpers per List 161 for 8λ or per L162 for 16λ for **each** line (8 fibers for a 2-line shelf), add the labels, and route the fibers using Figure 7-10 and Table 7-14 on page 7-38. See Table 7-2 on page 7-6 for more information on fiber lists.

➡ NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

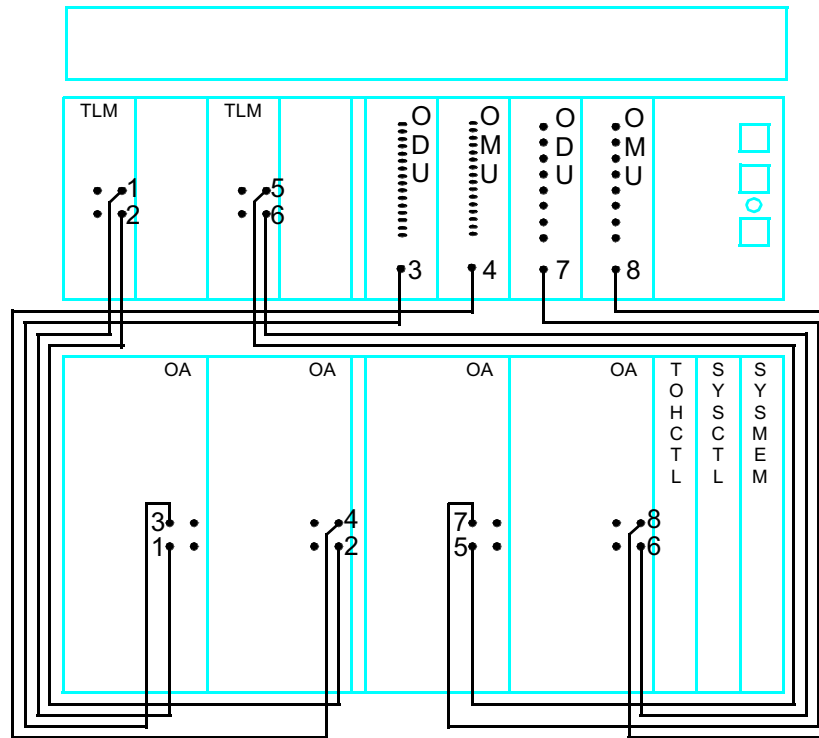


Figure 7-10 1A-RCV End Terminal Intrashelf Fiber Jumpers

Table 7-14 Intrashelf Fiber Jumpers For 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-10 on page 7-37 for connection point	1	1	TLM 1A/B	IN	1A-TLM-IN
		1	OA 1A	TLM OUT	1A-OA-TLMOUT
		2	TLM 1A/B	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		3	ODU 1A	ODU IN	1-ODU-IN
		3	OA 1A	OUT	1A-OA-OUT
		4	OMU 1B	OMU OUT	1-OMU-OUT
		4	OA 1B	IN	1B-OA-IN
	2	5	TLM 2A/B	IN	2A-TLM-IN
		5	OA 2A	TLM OUT	2A-OA-TLMOUT
		6	TLM 2A/B	OUT	2A-TLM-OUT
		6	OA 2B	TLM IN	2B-OA-TLMIN
		7	ODU 2A	ODU IN	2-ODU-IN
		7	OA 2A	OUT	2A-OA-OUT
		8	OMU 2B	OMU OUT	2-OMU-OUT
		8	OA 2B	IN	2B-OA-IN
	3	1	TLM 3A/B	IN	3A-TLM-IN
		1	OA 3A	TLM OUT	3A-OA-TLMOUT
		2	TLM 3A/B	OUT	3A-TLM-OUT
		2	OA 3B	TLM IN	3B-OA-TLMIN
		3	ODU 3A	ODU IN	3-ODU-IN
		3	OA 3A	OUT	3A-OA-OUT
		4	OMU 3B	OMU OUT	3-OMU-OUT
		4	OA 3B	IN	3B-OA-IN
	4	5	TLM 4A/B	IN	4A-TLM-IN
		5	OA 4A	TLM OUT	4A-OA-TLMOUT
		6	TLM 4A/B	OUT	4A-TLM-OUT
		6	OA 4B	TLM IN	4B-OA-TLMIN
		7	ODU 4A	ODU IN	4-ODU-IN
		7	OA 4A	OUT	4A-OA-OUT
		8	OMU 4B	OMU OUT	4-OMU-OUT
		8	OA 4B	IN	4B-OA-IN

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from the installation kit C848065959, then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-11 on page 7-39, and Table 7-15 on page 7-40 through Table 7-18 on page 7-43.



CAUTION:

Do not connect either end of the fiber jumper at this time

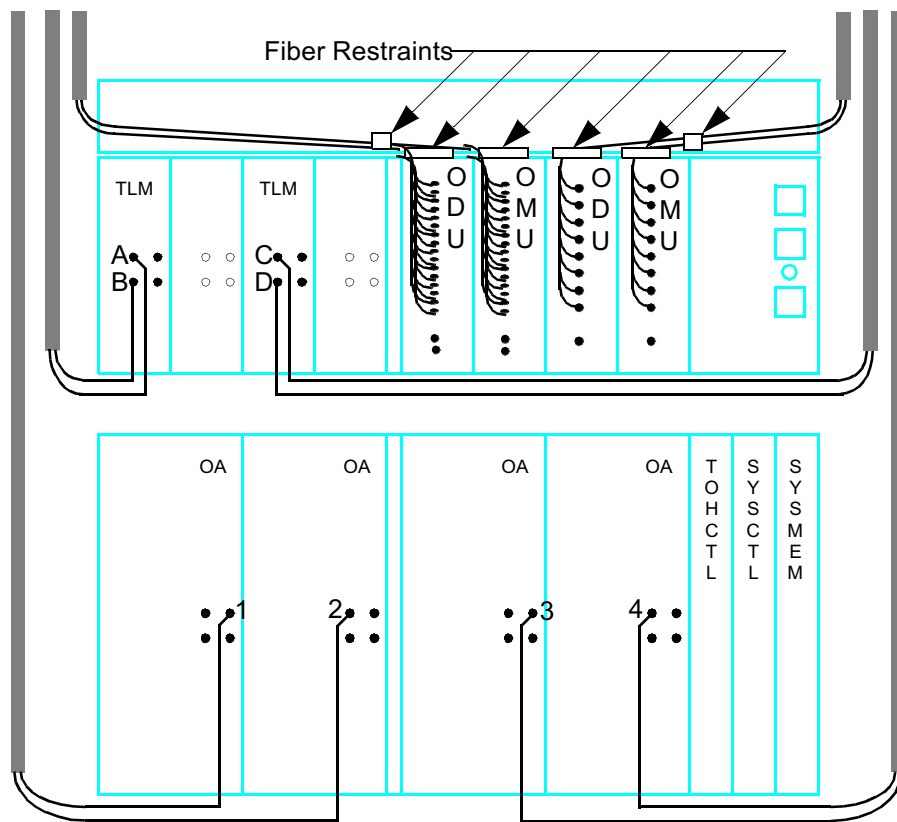


Figure 7-11 1A-RCV End Terminal Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-15 1A-RCV End Terminal Low Speed Fiber Jumpers - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-11 on page 7-39 for connection point	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-16 1A-RCV End Terminal Low Speed Fiber Jumpers - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-11 on page 7-39 for connection point	2	OMU 2B	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2B	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2B	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2B	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2B	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2B	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2B	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2B	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2B	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2B	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2B	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2B	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2B	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2B	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2B	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2B	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2A	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2A	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2A	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2A	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2A	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2A	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2A	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2A	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2A	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2A	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2A	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2A	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2A	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2A	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2A	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2A	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Table 7-17 1A-RCV End Terminal Low Speed Fiber Jumpers - Line 3

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal 1A-RCV 4-Line Refer to Figure 7-11 on page 7-39 for connection point	3	OMU 3B	OCHAN1 IN	UPPER 3M1
		OMU 3B	OCHAN2 IN	UPPER 3M2
		OMU 3B	OCHAN3 IN	UPPER 3M3
		OMU 3B	OCHAN4 IN	UPPER 3M4
		OMU 3B	OCHAN5 IN	UPPER 3M5
		OMU 3B	OCHAN6 IN	UPPER 3M6
		OMU 3B	OCHAN7 IN	UPPER 3M7
		OMU 3B	OCHAN8 IN	UPPER 3M8
		OMU 3B	OCHAN9 IN	UPPER 3M9
		OMU 3B	OCHAN10 IN	UPPER 3M10
		OMU 3B	OCHAN11 IN	UPPER 3M11
		OMU 3B	OCHAN12 IN	UPPER 3M12
		OMU 3B	OCHAN13 IN	UPPER 3M13
		OMU 3B	OCHAN14 IN	UPPER 3M14
		OMU 3B	OCHAN15 IN	UPPER 3M15
		OMU 3B	OCHAN16 IN	UPPER 3M16
		ODU 3A	OCHAN1 OUT	UPPER 3D1
		ODU 3A	OCHAN2 OUT	UPPER 3D2
		ODU 3A	OCHAN3 OUT	UPPER 3D3
		ODU 3A	OCHAN4 OUT	UPPER 3D4
		ODU 3A	OCHAN5 OUT	UPPER 3D5
		ODU 3A	OCHAN6 OUT	UPPER 3D6
		ODU 3A	OCHAN7 OUT	UPPER 3D7
		ODU 3A	OCHAN8 OUT	UPPER 3D8
		ODU 3A	OCHAN9 OUT	UPPER 3D9
		ODU 3A	OCHAN10 OUT	UPPER 3D10
		ODU 3A	OCHAN11 OUT	UPPER 3D11
		ODU 3A	OCHAN12 OUT	UPPER 3D12
		ODU 3A	OCHAN13 OUT	UPPER 3D13
		ODU 3A	OCHAN14 OUT	UPPER 3D14
		ODU 3A	OCHAN15 OUT	UPPER 3D15
		ODU 3A	OCHAN16 OUT	UPPER 3D16

Table 7-18 1A-RCV End Terminal Low Speed Fiber Jumpers - Line 4

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal 1A-RCV 4-Line Refer to Figure 7-11 on page 7-39 for connection point	4	OMU 4B	OCHAN1 IN	UPPER 4M1
		OMU 4B	OCHAN2 IN	UPPER 4M2
		OMU 4B	OCHAN3 IN	UPPER 4M3
		OMU 4B	OCHAN4 IN	UPPER 4M4
		OMU 4B	OCHAN5 IN	UPPER 4M5
		OMU 4B	OCHAN6 IN	UPPER 4M6
		OMU 4B	OCHAN7 IN	UPPER 4M7
		OMU 4B	OCHAN8 IN	UPPER 4M8
		OMU 4B	OCHAN9 IN	UPPER 4M9
		OMU 4B	OCHAN10 IN	UPPER 4M10
		OMU 4B	OCHAN11 IN	UPPER 4M11
		OMU 4B	OCHAN12 IN	UPPER 4M12
		OMU 4B	OCHAN13 IN	UPPER 4M13
		OMU 4B	OCHAN14 IN	UPPER 4M14
		OMU 4B	OCHAN15 IN	UPPER 4M15
		OMU 4B	OCHAN16 IN	UPPER 4M16
		ODU 4A	OCHAN1 OUT	UPPER 4D1
		ODU 4A	OCHAN2 OUT	UPPER 4D2
		ODU 4A	OCHAN3 OUT	UPPER 4D3
		ODU 4A	OCHAN4 OUT	UPPER 4D4
		ODU 4A	OCHAN5 OUT	UPPER 4D5
		ODU 4A	OCHAN6 OUT	UPPER 4D6
		ODU 4A	OCHAN7 OUT	UPPER 4D7
		ODU 4A	OCHAN8 OUT	UPPER 4D8
		ODU 4A	OCHAN9 OUT	UPPER 4D9
		ODU 4A	OCHAN10 OUT	UPPER 4D10
		ODU 4A	OCHAN11 OUT	UPPER 4D11
		ODU 4A	OCHAN12 OUT	UPPER 4D12
		ODU 4A	OCHAN13 OUT	UPPER 4D13
		ODU 4A	OCHAN14 OUT	UPPER 4D14
		ODU 4A	OCHAN15 OUT	UPPER 4D15
		ODU 4A	OCHAN16 OUT	UPPER 4D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-11 on page 7-39 and Table 7-19 on page 7-44.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-19 Outside Plant LGX Fiber Jumpers For 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-11 on page 7-39 for connection point	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
	3	1	OA 3A	IN	3A-OA-IN
		2	OA 3B	OUT	3B-OA-OUT
	4	3	OA 4A	IN	4A-OA-IN
		4	OA 4B	OUT	4B-OA-OUT

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels then routing the fibers by referring to Figure 7-11 on page 7-39 and Table 7-20 on page 7-45.

Table 7-20 Customer Maintenance Fiber Jumpers For 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
1A-RCV	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
4-Line or		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
Dual 2-Line (use lines 1 & 2 for each shelf)	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
Refer to Figure 7-11 on page 7-39for connection point	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Telemetry Feed-Through Fiber Jumper Installation

Refer to Section L of this chapter for more information regarding Telemetry Feed-Through Installation. If Telemetry Feed-Through is being installed, prepare four fiber jumpers for each line which will be equipped. Table 7-12 lists some of the fibers which can be used for this feature.

Table 7-21 Telemetry Feed-Through Fiber Jumpers

Code	Comcode	Length	Description
MS1EP-EP-02	107 306 243	2 ft	ST II+ to ST II+ singlemode
MS1EP-EP-10	107 306 292	10 ft	
MS1EP-EP-25	107 306 326	25 ft	
MS1EP-EP-50	107 306 367	50 ft	
MS1EP-EP-100	107 306 383	100 ft	

Label the jumpers as shown in Table 7-13 and then connect to the corresponding telemetry packs. Use an LBO of the correct value to keep the input to the LDA1 between -18 and -31 dBm.

Table 7-22 Telemetry Feed-Through Fiber Jumper Labels

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 4-Line or Dual 2-Line or Miscellaneous Mount Shelf (use Lines 1 and 2 for each shelf)	1	1	TLM 1B	IN	1B-TLM-IN
		2		OUT	1B-TL:M-OUT
		3		IN	1B-TLM-IN
		4		OUT	1B-TL:M-OUT
	2	1	TLM 2B	IN	2B-TLM-IN
		2		OUT	2B-TL:M-OUT
		3		IN	2B-TLM-IN
		4		OUT	2B-TL:M-OUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down to the sides of the shelf. Refer to Figure 7-2 on page 7-9 for cabinets and Figure 7-3 on page 7-10 for miscellaneous mounted shelves.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-10 on page 7-37 and Figure 7-11 on page 7-39.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-10 on page 7-37.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

Seat OMUs and ODUs Into Shelf

Refer to Figure 7-8 on page 7-32 or Figure 7-9 on page 7-35 and seat the OMU and ODU units in the shelf as follows:

- (1) Remove the screws from the shelf positions and discard if the OMUs and ODUs come with captive screws.
- (2) Seat the OMUs and ODUs into the shelf slots.
- (3) If the OMUs and ODUs are not in their final position, do not tighten the captive screws.



CAUTION:

Do not seat any other circuit packs in the shelf at this time.

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify circuit packs other than the OMU and ODU are installed but not seated into their backplane connectors.

D - Repeater Installation

This configuration is available for use with all releases of WaveStar OLS 40G software. If a single OA configuration is to be installed, there should be no associated repeaters in the transmission line.

This subsection contains information for installing the fibers and circuit packs for the Repeaters. It has been broken into four procedures:

- Intrashelf Fiber Jumper Installation
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- Circuit Pack Installation

Intraoffice Fiber Jumpers

Connections between WaveStar OLS 40G and the outside plant fiber between offices are shown in Figure 7-1 on page 7-5. Assignment of east and west is described in Section 3.

Fiber Routing Through Cabinet

Refer to Figure 7-2 on page 7-9 for the fiber routing information for cabinets.

Circuit Pack Equip Procedure For 4-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) If the system is a dual 2-line system, proceed to the Circuit Pack Equip Procedure for Dual 2-Line Systems paragraph.
- (3) Refer to Figure 7-12 on page 7-49 for circuit pack locations.

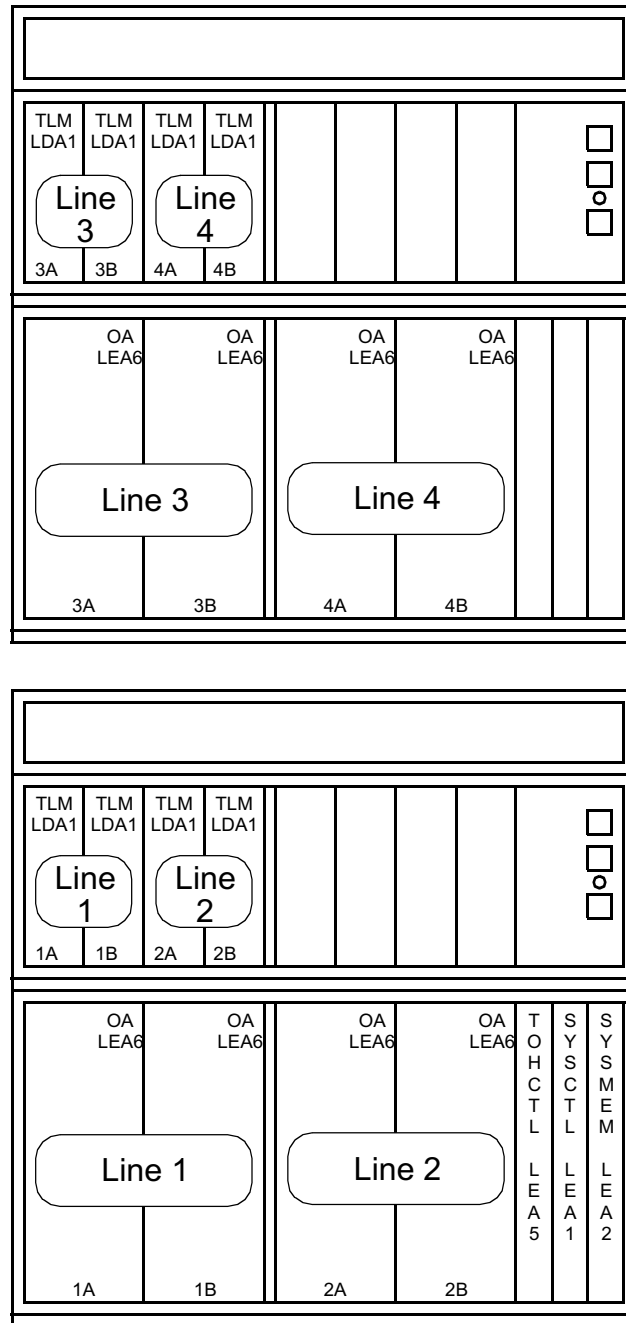


Figure 7-12 4-Line Repeater

(4) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(5) Install, but do not seat, the following transmission circuit packs for line 1 in the lower shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

(6) If line 2 is equipped, install, but do not seat, the following transmission circuit packs for line 2 in the lower shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

 NOTE:

Typically only lines 1 and 2 are equipped on first installations, however, if lines 3 and/or 4 are equipped perform the following step(s). If lines 3 and 4 or not equipped, go to step 9.

(7) If line 3 is equipped, install, but do not seat, the following transmission circuit packs for line 3 in the upper shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

(8) If line 4 is equipped, install, but do not seat, the following transmission circuit packs and units for line 4 in the upper shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

(9) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Circuit Pack Equip Procedure For Dual 2-Line Systems

(1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.

(2) Refer to Figure 7-13 on page 7-51 for circuit pack locations.

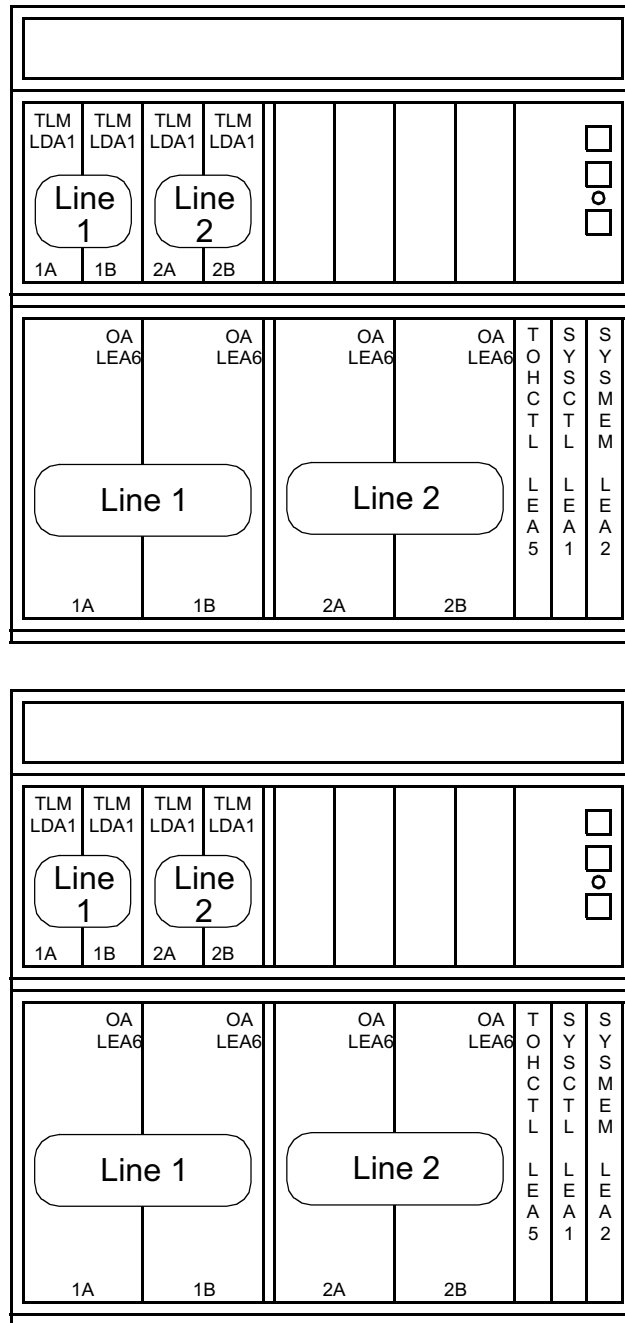


Figure 7-13 Dual 2-Line Repeater

(3) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(4) Install, but do not seat, the following transmission circuit packs for line 1 in the lower shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

(5) If line 2 is equipped, install, but do not seat, the following transmission circuit packs for line 2 in the lower shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (2) LDA1 TLM

(6) Repeat steps 1 to 4 if the upper shelf is to be equipped.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 4 fiber jumpers (50 inches long) per List 161 for each line by adding the labels then routing the fibers by referring to Figure 7-14 on page 7-53 and Table 7-23 on page 7-54. The fibers must pass in front of the shelf bracket to the right of the TLM slots. The fibers should be dressed behind the shelf mounting brackets

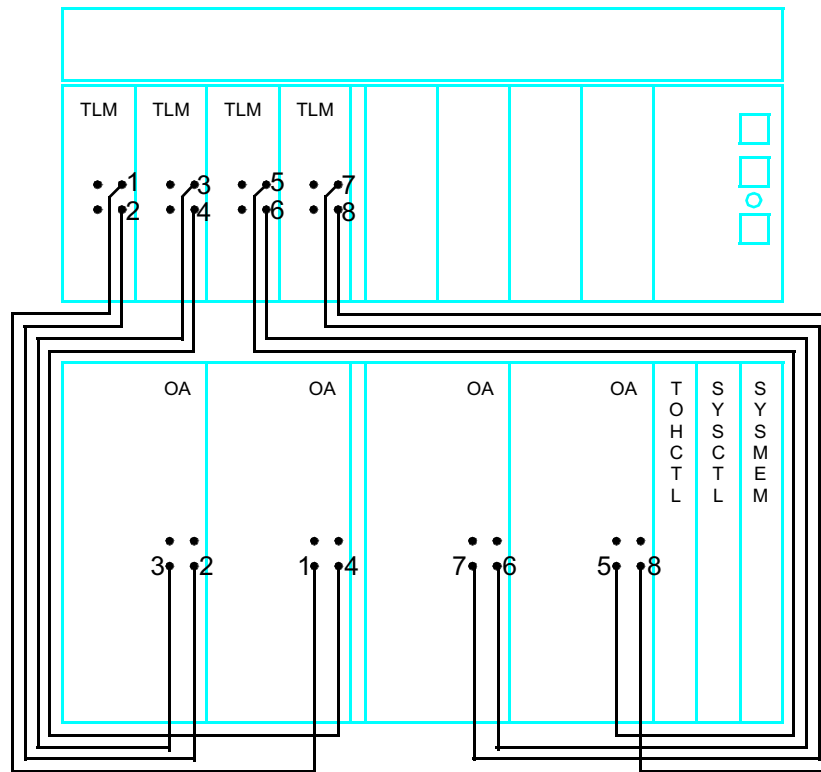
**Figure 7-14 Repeater Intrashelf Fiber Jumpers**

Table 7-23 Intrashelf Fiber Jumpers For Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-14 for connection point	1	1	TLM 1A/B	IN	1A-TLM-IN
		1	OA 1B	TLM OUT	1B-OA-TLMOUT
		2	TLM 1A/B	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		3	TLM 1B/A	IN	1B-TLM-IN
		3	OA 1A	TLM OUT	1A-OA-TLMOUT
		4	TLM 1B/A	OUT	1B-TLM-OUT
		4	OA 1B	TLM IN	1B-OA-TLMIN
	2	5	TLM 2A/B	IN	2A-TLM-IN
		5	OA 2B	TLM OUT	2B-OA-TLMOUT
		6	TLM 2A/B	OUT	2A-TLM-OUT
		6	OA 2A	TLM IN	2A-OA-TLMIN
		7	TLM 2B/A	IN	2B-TLM-IN
		7	OA 2A	TLM OUT	2A-OA-TLMOUT
		8	TLM 2B/A	OUT	2B-TLM-OUT
		8	OA 2B	TLM IN	2B-OA-TLMIN
	3	1	TLM 3A/B	IN	3A-TLM-IN
		1	OA 3B	TLM OUT	3B-OA-TLMOUT
		2	TLM 3A/B	OUT	3A-TLM-OUT
		2	OA 3A	TLM IN	3A-OA-TLMIN
		3	TLM 3B/A	IN	3B-TLM-IN
		3	OA 3A	TLM OUT	3A-OA-TLMOUT
		4	TLM 3B/A	OUT	3B-TLM-OUT
		4	OA 3B	TLM IN	3B-OA-TLMIN
	4	5	TLM 4A/B	IN	4A-TLM-IN
		5	OA 4B	TLM OUT	4B-OA-TLMOUT
		6	TLM 4A/B	OUT	4A-TLM-OUT
		6	OA 4A	TLM IN	4A-OA-TLMIN
		7	TLM 4B/A	IN	4B-TLM-IN
		7	OA 4A	TLM OUT	4A-OA-TLMOUT
		8	TLM 4B/A	OUT	4B-TLM-OUT
		8	OA 4B	TLM IN	4B-OA-TLMIN

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-15 on page 7-56 and Table 7-24 on page 7-55.



CAUTION:

Do not connect either end of the fiber jumper at this time.

Table 7-24 Outside Plant LGX Fiber Jumpers For Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-15 for connection point	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
	3	1	OA 3A	OUT	3A-OA-OUT
		2	OA 3A	IN	3A-OA-IN
		3	OA 3B	OUT	3B-OA-OUT
		4	OA 3B	IN	3B-OA-IN
	4	5	OA 4A	OUT	4A-OA-OUT
		6	OA 4A	IN	4A-OA-IN
		7	OA 4B	OUT	4B-OA-OUT
		8	OA 4B	IN	4B-OA-IN

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels from Installation Kit C848065949 and routing the fibers. Refer to Figure 7-15 on page 7-56 and Table 7-25 on page 7-57.

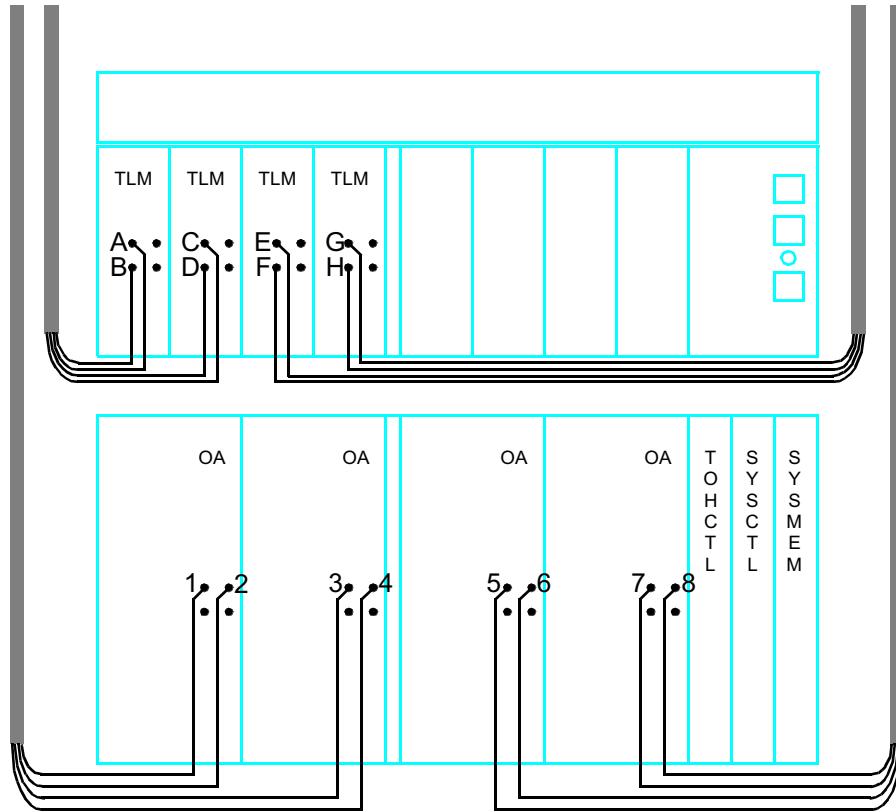


Figure 7-15 Repeater Outside Plant & Customer Maintenance Fiber Jumper

Table 7-25 Customer Maintenance Fiber Jumpers For Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater 4-Line or Refer to Figure 7-15 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
		C	TLM 1B/A	CM IN	1B-TLM-CMIN
		D	TLM 1B/A	CM OUT	1B-TLM-CMOUT
	2	E	TLM 2A/B	CM IN	2A-TLM-CMIN
		F	TLM 2A/B	CM OUT	2A-TLM-CMOUT
		G	TLM 2B/A	CM IN	2B-TLM-CMIN
		H	TLM 2B/A	CM OUT	2B-TLM-CMOUT
Repeater 4-Liner Refer to Figure 7-15 for connection point	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
		C	TLM 3B/A	CM IN	3B-TLM-CMIN
		D	TLM 3B/A	CM OUT	3B-TLM-CMOUT
	4	E	TLM 4A/B	CM IN	4A-TLM-CMIN
		F	TLM 4A/B	CM OUT	4A-TLM-CMOUT
		G	TLM 4B/A	CM IN	4B-TLM-CMIN
		H	TLM 4B/A	CM OUT	4B-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the installation kit C848065959 to protect the fibers that run down to the sides of the shelf. Refer to Figure 7-2 on page 7-9 or Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-14 on page 7-53 and Figure 7-15 on page 7-56.



NOTE:

Place the fibers through the fiber clips one at a time to avoid overstressing the clips and possibly damaging the fibers.

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify circuit packs are installed, but not seated, into the backplane connectors.

E - One OA 1A-TX End Terminal Installation

This configuration is support by Releases 2.1 and subsequent releases of software only.

This configuration is most commonly used as a stand-alone shelf or coupled with another configuration in a Dual shelf bay, however this section covers the possibility that it could be fibered for a 4 line One-OA 1A-TX End Terminal. If the upper 2 lines are to be configured using a different option, refer to the appropriate subsection for the fiber of those lines. If lines 3 and 4 are not to be fibered with this configuration, disregard any references to those lines.

This subsection covers the fiber and label installation for the One OA 1A-TX End Terminal configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 4-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) If the system is a dual 2-line system, proceed to the Circuit Pack Equip Procedure for Dual 2-Line Systems paragraph.
- (3) Refer to Figure 7-8 on page 7-32 and Figure 7-10 on page 7-37 for circuit pack locations.

(4) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(5) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (1) LEA105 OA in the 1B slot
- (1) LDA1 TLM
- (1) 506A OMU in the 1A slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 1B slot (leave the retainer screws for the unit on the shelf at this time.)

(6) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (1) LEA105 OA in the 2B slot
- (1) LDA1 TLM
- (1) 506A OMU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

Typically only lines 1 and 2 are equipped on first installations, however, if lines 3 and/or 4 are equipped using the same configuration, perform the following step(s). If another configuration is used, go to the appropriate section for fiber and circuit packs installation located elsewhere in Section 7 of this manual. If lines 3 and 4 are not equipped, go to step 9.

(7) If line 3 is equipped, install, but do not seat, the following transmission circuit packs and units for line 3 in the upper shelf:

- (1) LEA105 OA in the 3B slot
- (1) LDA1 TLM
- (1) 506A OMU in the 3A slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 3B slot (leave the retainer screws for the unit on the shelf at this time.)

(8) If line 4 is equipped, install, but do not seat, the following transmission circuit packs and units for line 4 in the upper shelf:

- (1) LEA105A OA in the 4B slot

- (1) LDA1 TLM
- (1) 506A OMU in the 4A slot (Leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 4B slot (Leave the retainer screws for the unit on the shelf at this time.)

(9) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Circuit Pack Equip Procedure For Dual 2-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-9 on page 7-35 for circuit pack locations.
- (3) Install, but do not seat, the following controller circuit packs in the lower shelf:
 - (1) LEA1 SYSCTL
 - (1) LEA2 SYSMEM
 - (1) LEA5 TOHCTL
- (4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:
 - (1) LEA105 OA in the 1A slot
 - (1) LDA1 TLM
 - (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
 - (1) 506A OMU in the 1A slot (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606B ODU in the 1B slot (leave the retainer screws for the unit on the shelf at this time.)
- (5) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:
 - (1) LEA105 OA in the 2B slot
 - (1) LDA1 TLM
 - (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
 - (1) 506A OMU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)

- (1) 606B ODU in the 2B slot (leave the retainer screws for the unit on the shelf at this time.)

(6) Repeat steps 1 to 5 if the upper shelf is to be equipped.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 3 fiber jumpers per List 163 for **each** line (6 fibers for a fully equipped 2-line shelf), add the labels provided in the installation kit C848065959, and route the fibers by referring to Figure 7-10 and Table 7-14 on page 7-38. See Table 7-2 on page 7-6 for more fiber List information.



NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

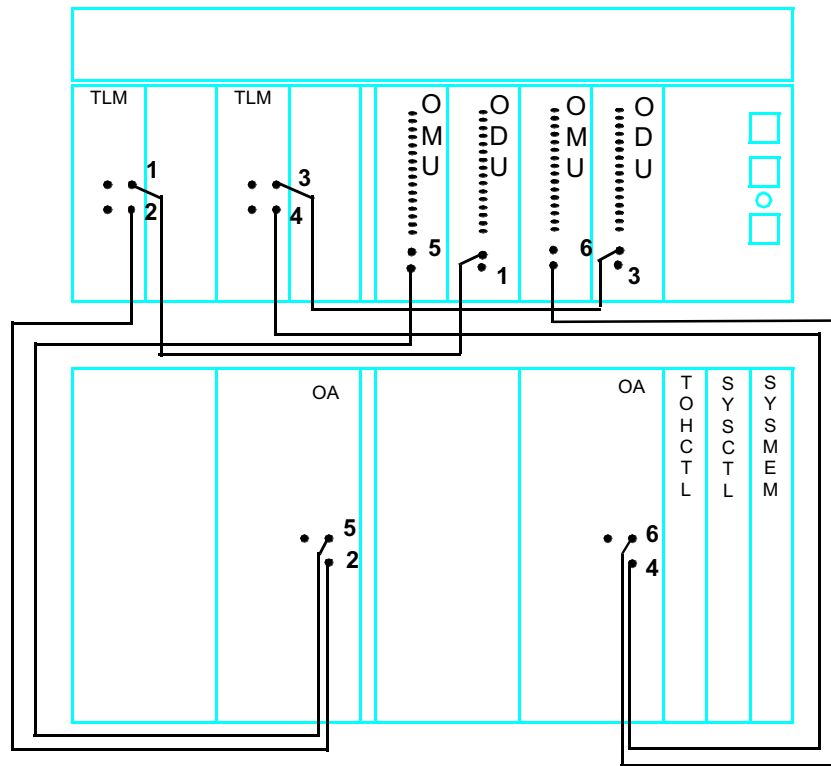


Table 7-26 Intrashelf Fiber Jumpers For One OA 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-16 on page 7-63 for connection point	1	1	TLM 1A	IN	1A-TLM-IN
		1	ODU 1A	SUPR. OUT	
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		5	OMU 1A	OMU OUT	1-OMU-OUT
		5	OA 1B	IN	1B-OA-IN
	2	3	TLM 2A	IN	2A-TLM-IN
		3	ODU 2A	SUPR.OUT	
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2B	TLM IN	2B-OA-TLMIN
		6	OMU 2A	OMU OUT	2A-OMU-IN
		6	OA 2B	IN	2B-OA-IN
	3	1	TLM 3A	IN	3A-TLM-IN
		1	ODU 3A	SUPR. OUT	
		2	TLM 3A	OUT	3A-TLM-OUT
		2	OA 3B	TLM IN	3B-OA-TLMIN
		5	OMU 3A	OMU OUT	3-OMU-OUT
		5	OA 3B	IN	3B-OA-IN
	4	3	TLM 4A	IN	4A-TLM-IN
		3	ODU 4A	SUPR.OUT	
		4	TLM 4A	OUT	4A-TLM-OUT
		4	OA 4B	TLM IN	4B-OA-TLMIN
		6	OMU 4A	OMU OUT	4A-OMU-IN
		6	OA 4B	IN	4B-OA-IN

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-17 on page 7-65, Table 7-27 on page 7-66 through Table 7-30 on page 7-69 and Table 7-27 on page 7-66.

CAUTION:
Do not connect either end of the fiber jumper at this time.

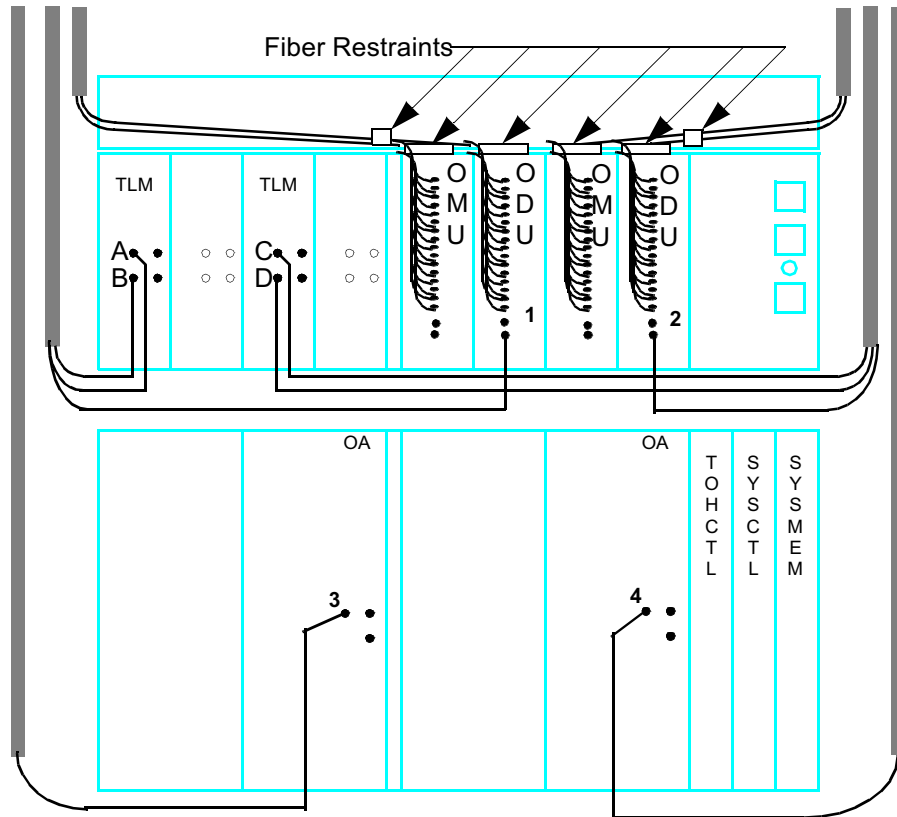


Figure 7-17 1A-TX End Terminal Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-27 One OA 1A-TX End Terminal Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal One OA 1A-TX Dual 2-line (uses line 1& 2 for each shelf) Refer to Fig- ure 7-17 on page 7-65 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-28 One OA 1A-TX End Terminal Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal One OA 1A-TX 4-Line or Dual 2-Line (use lines 1&2 for each shelf) Refer to Figure 7-17 on page 7-65 for connection points	2	OMU 2B	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2B	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2B	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2B	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2B	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2B	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2B	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2B	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2B	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2B	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2B	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2B	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2B	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2B	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2B	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2B	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2A	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2A	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2A	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2A	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2A	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2A	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2A	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2A	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2A	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2A	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2A	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2A	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2A	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2A	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2A	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2A	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Table 7-29 One OA 1A-TX End Terminal Low Speed Fiber Jumper - Line 3

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal One OA 1A-TX 4-Line Refer to Figure 7-17 on page 7-65 for connection points	3	OMU 3B	OCHAN1 IN	UPPER 3M1
		OMU 3B	OCHAN2 IN	UPPER 3M2
		OMU 3B	OCHAN3 IN	UPPER 3M3
		OMU 3B	OCHAN4 IN	UPPER 3M4
		OMU 3B	OCHAN5 IN	UPPER 3M5
		OMU 3B	OCHAN6 IN	UPPER 3M6
		OMU 3B	OCHAN7 IN	UPPER 3M7
		OMU 3B	OCHAN8 IN	UPPER 3M8
		OMU 3B	OCHAN9 IN	UPPER 3M9
		OMU 3B	OCHAN10 IN	UPPER 3M10
		OMU 3B	OCHAN11 IN	UPPER 3M11
		OMU 3B	OCHAN12 IN	UPPER 3M12
		OMU 3B	OCHAN13 IN	UPPER 3M13
		OMU 3B	OCHAN14 IN	UPPER 3M14
		OMU 3B	OCHAN15 IN	UPPER 3M15
		OMU 3B	OCHAN16 IN	UPPER 2M16
		ODU 3A	OCHAN1 OUT	UPPER 3D1
		ODU 3A	OCHAN2 OUT	UPPER 3D2
		ODU 3A	OCHAN3 OUT	UPPER 3D3
		ODU 3A	OCHAN4 OUT	UPPER 3D4
		ODU 3A	OCHAN5 OUT	UPPER 3D5
		ODU 3A	OCHAN6 OUT	UPPER 3D6
		ODU 3A	OCHAN7 OUT	UPPER 3D7
		ODU 3A	OCHAN8 OUT	UPPER 3D8
		ODU 3A	OCHAN9 OUT	UPPER 3D9
		ODU 3A	OCHAN10 OUT	UPPER 3D10
		ODU 3A	OCHAN11 OUT	UPPER 2311
		ODU 3A	OCHAN12 OUT	UPPER 3D12
		ODU 3A	OCHAN13 OUT	UPPER 3D13
		ODU 3A	OCHAN14 OUT	UPPER 3D14
		ODU 3A	OCHAN15 OUT	UPPER 3D15
		ODU 3A	OCHAN16 OUT	UPPER 3D16

Table 7-30 One OA 1A-TX End Terminal Low Speed Fiber Jumper - Line 4

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal One OA 1A-TX 4-Line Refer to Figure 7-17 on page 7-65 for connection points	4	OMU 4B	OCHAN1 IN	UPPER 4M1
		OMU 4B	OCHAN2 IN	UPPER 4M2
		OMU 4B	OCHAN3 IN	UPPER 4M3
		OMU 4B	OCHAN4 IN	UPPER 4M4
		OMU 4B	OCHAN5 IN	UPPER 4M5
		OMU 4B	OCHAN6 IN	UPPER 4M6
		OMU 4B	OCHAN7 IN	UPPER 4M7
		OMU 4B	OCHAN8 IN	UPPER 4M8
		OMU 4B	OCHAN9 IN	UPPER 4M9
		OMU 4B	OCHAN10 IN	UPPER 4M10
		OMU 4B	OCHAN11 IN	UPPER 4M11
		OMU 4B	OCHAN12 IN	UPPER 4M12
		OMU 4B	OCHAN13 IN	UPPER 4M13
		OMU 4B	OCHAN14 IN	UPPER 4M14
		OMU 4B	OCHAN15 IN	UPPER 4M15
		OMU 4B	OCHAN16 IN	UPPER 4M16
		ODU 4A	OCHAN1 OUT	UPPER 4D1
		ODU 4A	OCHAN2 OUT	UPPER 4D2
		ODU 4A	OCHAN3 OUT	UPPER 4D3
		ODU 4A	OCHAN4 OUT	UPPER 4D4
		ODU 4A	OCHAN5 OUT	UPPER 4D5
		ODU 4A	OCHAN6 OUT	UPPER 4D6
		ODU 4A	OCHAN7 OUT	UPPER 4D7
		ODU 4A	OCHAN8 OUT	UPPER 4D8
		ODU 4A	OCHAN9 OUT	UPPER 4D9
		ODU 4A	OCHAN10 OUT	UPPER 4D10
		ODU 4A	OCHAN11 OUT	UPPER 4D11
		ODU 4A	OCHAN12 OUT	UPPER 4D12
		ODU 4A	OCHAN13 OUT	UPPER 4D13
		ODU 4A	OCHAN14 OUT	UPPER 4D14
		ODU 4A	OCHAN15 OUT	UPPER 4D15
		ODU43A	OCHAN16 OUT	UPPER 4D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-17 on page 7-65 and Table 7-31 on page 7-70.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-31 Outside Plant LGX Fiber Jumpers For One OA 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal ONE OA 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-17 on page 7-65 for connection point	1	1	ODU-1A	IN	1A-ODU-IN
		3	1B-OA	OUT	1B-OA-OUT
	2	2	ODU-2A	IN	2A-ODU-IN
		4	2B-OA	OUT	2B-OA-OUT
	3	1	ODU-3A	IN	3A-ODU-IN
		3	3B-OA	OUT	3B-OA-OUT
	4	2	ODU-4A	IN	4A-ODU-IN
		4	4B-OA	OUT	4B-OA-OUT

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-17 on page 7-65 and Table 7-32 on page 7-71.

Table 7-32 Customer Maintenance Fiber Jumpers For End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-TX 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-17 on page 7-65 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down through the sides of the frame. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-10 on page 7-37 and Figure 7-11 on page 7-39.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-10 on page 7-37.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

Seat OMUs and ODUs Into Shelf

Refer to Figure 7-8 on page 7-32 or Figure 7-9 on page 7-35 and seat the OMU and ODU units in the shelf as follows:

- (1) Remove the screws from the shelf positions and discard if OMUs and ODUs are equipped with captive screws.
- (2) Seat the OMUs and ODUs into the shelf slots.
- (3) If the OMUs and ODUs are not in their final position, do not tighten the captive screws.



CAUTION:

Do not seat any other circuit packs in the shelf at this time.

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify circuit packs other than the OMU and ODU are installed but not seated into their backplane connectors.

F - One OA 1A-RCV End Terminal Installation

This configuration is available only in Releases 2.1 and subsequent releases.

The installation of a single One OA 1A-RCV End Terminal Shelf is the more common application for this configuration, however this subsection does address the installation of a four line application. It is possible to install either the top two lines or bottom lines as another configuration. If this is the case, refer to the appropriate section to fiber the lines NOT configured as a One OA 1A-RCV End Terminal. For single shelf applications, disregard any references to lines 3 and 4.

This subsection covers the fiber and label installation for the One OA 1A-RCV End Terminal configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 4-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) If the cabinet is a Dual 2-line system, proceed to the Circuit Pack Equip Procedure for Dual 2-Line Systems paragraph.
- (3) Refer to Figure 7-8 on page 7-32 and Figure 7-10 on page 7-37 for circuit pack locations.

(4) Install, but do not seat, the following controller circuit packs in the lower shelf:

- (1) LEA1 SYSCTL
- (1) LEA2 SYSMEM
- (1) LEA5 TOHCTL

(5) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:

- (1) LEA105 OA in the 1A slot
- (1) LDA1 TLM
- (1) 506A OMU in the 1B slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 1A slot (leave the retainer screws for the unit on the shelf at this time.)

(6) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:

- (1) LEA105 OA in the 2A slot
- (1) LDA1 TLM
- (1) 506A OMU in the 2B slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

Typically only lines 1 and 2 are equipped on first installations, however, if lines 3 and/or 4 are equipped using the same configuration, perform the following step(s). If another configuration is used, go to the appropriate section for fiber and circuit packs installation located elsewhere in Section 7 of this manual. If lines 3 and 4 are not equipped, go to step 9.

(7) If line 3 is equipped, install, but do not seat, the following transmission circuit packs and units for line 3 in the upper shelf:

- (1) LEA105A OA in the 3A slot
- (1) LDA1 TLM
- (1) 506A OMU in the 3B slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 3A slot (leave the retainer screws for the unit on the shelf at this time.)

(8) If line 4 is equipped, install, but do not seat, the following transmission circuit packs and units for line 4 in the upper shelf:

- (1) LEA105A OA in the 4A slot

- (1) LDA1 TLM
- (1) 506A OMU in the 4B slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 4A slot (leave the retainer screws for the unit on the shelf at this time.)

(9) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Circuit Pack Equip Procedure For Dual 2-Line Systems

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-9 on page 7-35 and Figure 7-10 on page 7-37 for circuit pack locations.
- (3) Install, but do not seat, the following controller circuit packs in the lower shelf:
 - (1) LEA1 SYSCTL
 - (1) LEA2 SYSMEM
 - (1) LEA5 TOHCTL
- (4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the lower shelf:
 - (1) LEA105 OA in the 1A slot
 - (1) LDA1 TLM
 - (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
 - (1) 506A OMU in the 1B slot (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606B ODU in the 1A slot (leave the retainer screws for the unit on the shelf at this time.)
- (5) If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the lower shelf:
 - (1) LEA105 OA in the 2A slot
 - (1) LDA1 TLM
 - (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed
 - (1) 506A OMU in the 2B slot (leave the retainer screws for the unit on the shelf at this time.)

- (1) 606B ODU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)

(6) Repeat steps 1 to 5 if the upper shelf is to be equipped.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 3 fiber jumpers per List 163 for **each** line (6 fibers for a fully equipped 2-line shelf), add the labels from Installation Kit C848065959, then route the fibers by referring to Figure 7-10 and Table 7-14 on page 7-38. See Table 7-2 on page 7-6 for more fiber information.



NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

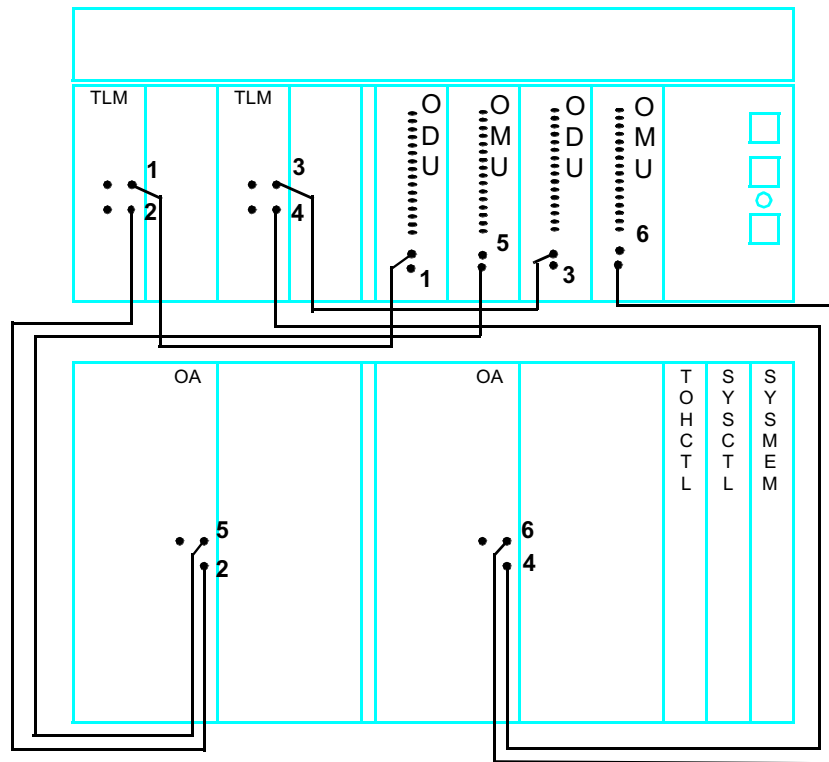


Figure 7-18 One OA 1A-RCV End Terminal Intrashelf Fiber Installation

Table 7-33 Intrashelf Fiber Jumpers For One OA 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-18 on page 7-77 for connection point	1	1	TLM 1A	IN	1A-TLM-IN
		1	ODU 1A	SUPR. OUT	
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		5	OMU 1A	OMU OUT	1-OMU-OUT
		5	OA 1A	IN	1A-OA-IN
	2	3	TLM 2A	IN	2A-TLM-IN
		3	ODU 2A	SUPR.OUT	
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLMIN
		6	OMU 2A	OMU OUT	2A-OMU-IN
		6	OA 2A	IN	2A-OA-IN
	3	1	TLM 3A	IN	3A-TLM-IN
		1	ODU 3A	SUPR. OUT	
		2	TLM 3A	OUT	3A-TLM-OUT
		2	OA 3A	TLM IN	3A-OA-TLMIN
		5	OMU 3A	OMU OUT	3-OMU-OUT
		5	OA 3A	IN	3A-OA-IN
	4	3	TLM 4A	IN	4A-TLM-IN
		3	ODU 4A	SUPR.OUT	
		4	TLM 4A	OUT	4A-TLM-OUT
		4	OA 4A	TLM IN	4A-OA-TLMIN
		6	OMU 4A	OMU OUT	4A-OMU-IN
		6	OA 4A	IN	4A-OA-IN

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from the installation kit (C848065959) then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-19 on page 7-79, Table 7-34 on page 7-80 through Table 7-37 on page 7-83 and Table 7-38 on page 7-84.

CAUTION:
Do not connect either end of the fiber jumper at this time.

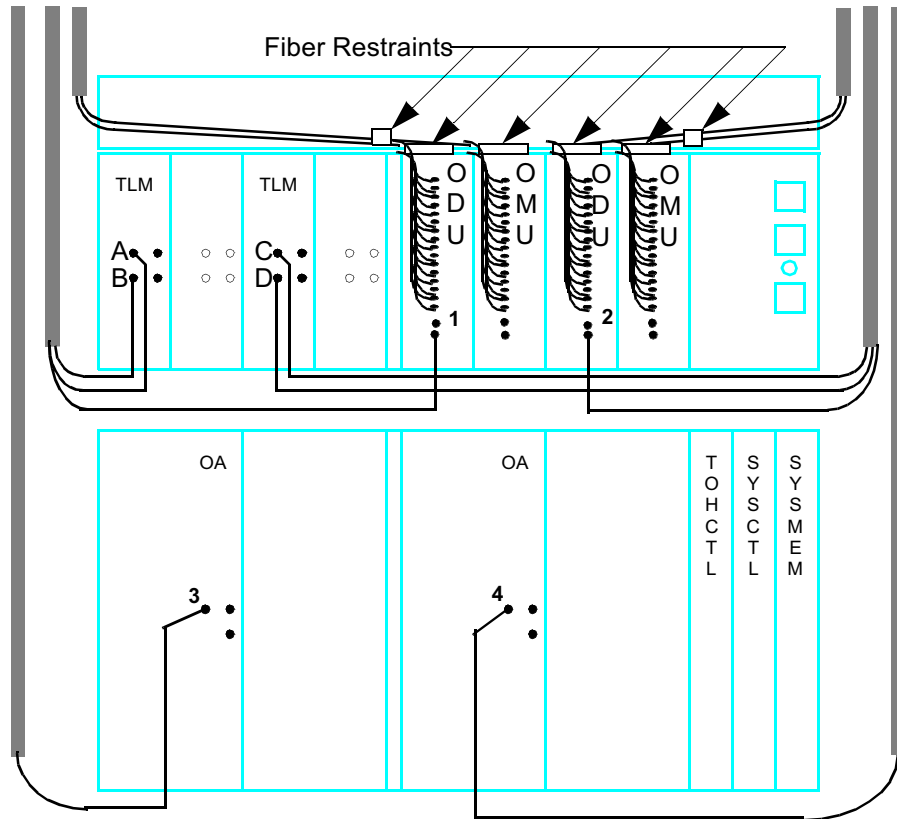


Figure 7-19 One OA 1A-RCV End Terminal Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-34 One OA 1A-RCV End Terminal Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal One OA 1A-RCV Dual 2-line (uses line 1& 2 for each shelf) Refer to Figure 7-19 on page 7-79 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-35 One OA 1A-RCV End Terminal Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal One OA 1A-RCV 4-Line or Dual 2-Line (use lines 1&2 for each shelf) Refer to Figure 7-19 on page 7-79 for connection points	2	OMU 2B	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2B	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2B	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2B	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2B	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2B	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2B	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2B	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2B	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2B	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2B	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2B	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2B	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2B	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2B	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2B	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2A	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2A	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2A	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2A	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2A	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2A	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2A	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2A	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2A	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2A	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2A	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2A	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2A	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2A	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2A	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2A	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Table 7-36 One OA 1A-RCV End Terminal Low Speed Fiber Jumper - Line 3

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal One OA 1A-RCV 4-Line Refer to Figure 7-19 on page 7-79 for connection points	3	OMU 3B	OCHAN1 IN	UPPER 3M1
		OMU 3B	OCHAN2 IN	UPPER 3M2
		OMU 3B	OCHAN3 IN	UPPER 3M3
		OMU 3B	OCHAN4 IN	UPPER 3M4
		OMU 3B	OCHAN5 IN	UPPER 3M5
		OMU 3B	OCHAN6 IN	UPPER 3M6
		OMU 3B	OCHAN7 IN	UPPER 3M7
		OMU 3B	OCHAN8 IN	UPPER 3M8
		OMU 3B	OCHAN9 IN	UPPER 3M9
		OMU 3B	OCHAN10 IN	UPPER 3M10
		OMU 3B	OCHAN11 IN	UPPER 3M11
		OMU 3B	OCHAN12 IN	UPPER 3M12
		OMU 3B	OCHAN13 IN	UPPER 3M13
		OMU 3B	OCHAN14 IN	UPPER 3M14
		OMU 3B	OCHAN15 IN	UPPER 3M15
		OMU 3B	OCHAN16 IN	UPPER 2M16
		ODU 3A	OCHAN1 OUT	UPPER 3D1
		ODU 3A	OCHAN2 OUT	UPPER 3D2
		ODU 3A	OCHAN3 OUT	UPPER 3D3
		ODU 3A	OCHAN4 OUT	UPPER 3D4
		ODU 3A	OCHAN5 OUT	UPPER 3D5
		ODU 3A	OCHAN6 OUT	UPPER 3D6
		ODU 3A	OCHAN7 OUT	UPPER 3D7
		ODU 3A	OCHAN8 OUT	UPPER 3D8
		ODU 3A	OCHAN9 OUT	UPPER 3D9
		ODU 3A	OCHAN10 OUT	UPPER 3D10
		ODU 3A	OCHAN11 OUT	UPPER 2311
		ODU 3A	OCHAN12 OUT	UPPER 3D12
		ODU 3A	OCHAN13 OUT	UPPER 3D13
		ODU 3A	OCHAN14 OUT	UPPER 3D14
		ODU 3A	OCHAN15 OUT	UPPER 3D15
		ODU 3A	OCHAN16 OUT	UPPER 3D16

Table 7-37 One OA 1A-RCV End Terminal Low Speed Fiber Jumper - Line 4

Application	Line	Circuit Pack	Connector	Label to Install For Upper Shelf
End Terminal One OA 1A-RCV 4-Line Refer to Figure 7-19 on page 7-79 for connection points	4	OMU 4B	OCHAN1 IN	UPPER 4M1
		OMU 4B	OCHAN2 IN	UPPER 4M2
		OMU 4B	OCHAN3 IN	UPPER 4M3
		OMU 4B	OCHAN4 IN	UPPER 4M4
		OMU 4B	OCHAN5 IN	UPPER 4M5
		OMU 4B	OCHAN6 IN	UPPER 4M6
		OMU 4B	OCHAN7 IN	UPPER 4M7
		OMU 4B	OCHAN8 IN	UPPER 4M8
		OMU 4B	OCHAN9 IN	UPPER 4M9
		OMU 4B	OCHAN10 IN	UPPER 4M10
		OMU 4B	OCHAN11 IN	UPPER 4M11
		OMU 4B	OCHAN12 IN	UPPER 4M12
		OMU 4B	OCHAN13 IN	UPPER 4M13
		OMU 4B	OCHAN14 IN	UPPER 4M14
		OMU 4B	OCHAN15 IN	UPPER 4M15
		OMU 4B	OCHAN16 IN	UPPER 4M16
		ODU 4A	OCHAN1 OUT	UPPER 4D1
		ODU 4A	OCHAN2 OUT	UPPER 4D2
		ODU 4A	OCHAN3 OUT	UPPER 4D3
		ODU 4A	OCHAN4 OUT	UPPER 4D4
		ODU 4A	OCHAN5 OUT	UPPER 4D5
		ODU 4A	OCHAN6 OUT	UPPER 4D6
		ODU 4A	OCHAN7 OUT	UPPER 4D7
		ODU 4A	OCHAN8 OUT	UPPER 4D8
		ODU 4A	OCHAN9 OUT	UPPER 4D9
		ODU 4A	OCHAN10 OUT	UPPER 4D10
		ODU 4A	OCHAN11 OUT	UPPER 4D11
		ODU 4A	OCHAN12 OUT	UPPER 4D12
		ODU 4A	OCHAN13 OUT	UPPER 4D13
		ODU 4A	OCHAN14 OUT	UPPER 4D14
		ODU 4A	OCHAN15 OUT	UPPER 4D15
		ODU43A	OCHAN16 OUT	UPPER 4D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-19 on page 7-79 and Table 7-38 on page 7-84.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-38 Outside Plant LGX Fiber Jumpers For One OA 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-19 on page 7-79 for connection point	1	1	ODU-1A	IN	1A-ODU-IN
		3	1A-OA	OUT	1A-OA-OUT
	2	2	ODU-2A	IN	2A-ODU-IN
		4	2A-OA	OUT	2A-OA-OUT
	3	1	ODU-3A	IN	3A-ODU-IN
		3	3A-OA	OUT	3A-OA-OUT
	4	2	ODU-4A	IN	4A-ODU-IN
		4	4A-OA	OUT	4A-OA-OUT

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels then routing the fibers by referring to Figure 7-19 on page 7-79 and Table 7-39 on page 7-85.

Table 7-39 Customer Maintenance Fiber Jumpers For One OA 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA 1A-RCV 4-Line or Dual 2-Line (use lines 1 & 2 for each shelf) Refer to Figure 7-19 on page 7-79 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down through the sides of the cabinet. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-10 on page 7-37 and Figure 7-11 on page 7-39.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-19 on page 7-79.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

Seat OMUs and ODUs Into Shelf

Refer to Figure 7-18 on page 7-77 or Figure 7-19 on page 7-79 and seat the OMU and ODU units in the shelf as follows:

- (1) Remove the screws from the shelf positions and discard if OMUs and ODUs are equipped with captive screws.
- (2) Seat the OMUs and ODUs into the shelf slots.
- (3) If the OMUs and ODUs are not in their final position, do not tighten the captive screws.



CAUTION:

Do not seat any other circuit packs in the shelf at this time.

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify circuit packs other than the OMU and ODU are installed but not seated into their backplane connectors.

G - Two OA/Two OA Dual Facing Shelf Installation

This configuration is available with Release 2.1 and subsequent releases only.

Covered in this subsection is the fiber, circuit pack and label installation for a stand-alone Two OA Dual Facing Shelf. It is possible that this shelf will be coupled with another shelf in the same bay frame. If that is the case, refer to the appropriate subsection for the installation of the other shelf. With Releases 2.1 and subsequent releases, either 8 or 16 wavelengths is possible. If using only 8 wavelengths, disregard any references to wavelengths 9 to 16.

This subsection covers the installation of the Two OA Dual Facing Shelf Configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 2-Line Shelf

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-20 on page 7-88 for circuit pack locations.

- (2) LEA6, LEA7, or LEA104 OA
- (1) LDA1 TLM
- (1) 506A or 505A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

⇒ NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(5) Install, but do not seat, the following transmission circuit packs and units for line 2 in the shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (1) LDA1 TLM
- (1) 505A or 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 605A or 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

⇒ NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(6) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Fiber Jumper Installation.

Intrashelf Fiber Jumper Installation

Install the 8 fiber jumpers per List 164 by adding the labels From Installation Kit C848065959 then routing the fibers by referring to Figure 7-21 and Table 7-40 on page 7-91. For more information on Fiber Lists, refer to Table 7-2 on page 7-6.

⇒ NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

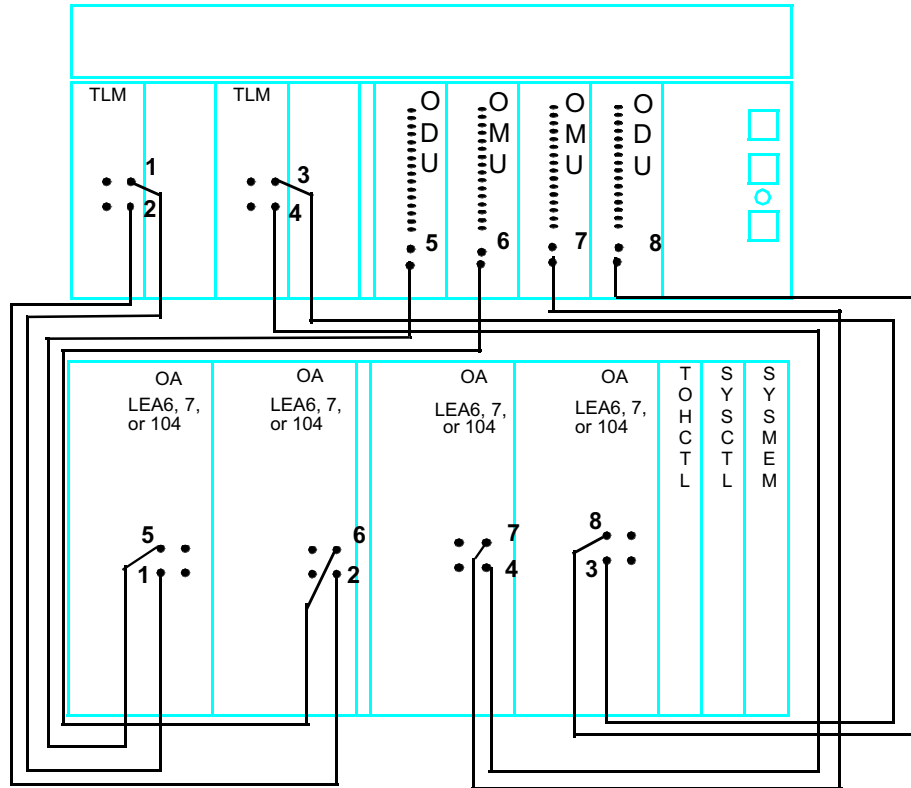


Figure 7-21 Two OA Dual Facing Shelf Intrashelf Fiber Jumpers

Table 7-40 Intrashelf Fiber Jumpers For Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal Two OA Dual Facing Shelf Refer to Figure 7-21 on page 7-90 for connection point	1	1	TLM 1A	IN	1A-TLM-IN
		1	1A -OA	OUT	1A-OA-OUT
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		5	ODU 1A	IN	1A-ODU-IN
		5	OA 1A	OUT	1A-OA-OUT
		6	OMU - 1B	OUT	1B-OMU-OUT
		6	OA-1B	OUT	1B-OA-OUT
	2	3	TLM 2A	IN	2A-TLM-IN
		3	OA 2B	TLM OUT	2B-OA-TLMOUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLMIN
		7	OMU 2A	OMU OUT	2A-OMU-OUT
		7	OA 2A	IN	2A-OA-IN
		8	ODU 2B	IN	2-ODU-IN
		8	OA 2B	OUT	2B-OA-OUT

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-22 on page 7-92, Table 7-41 on page 7-93, Table 7-42 on page 7-94 and Table 7-43 on page 7-95.

CAUTION:
Do not connect either end of the fiber jumper at this time.

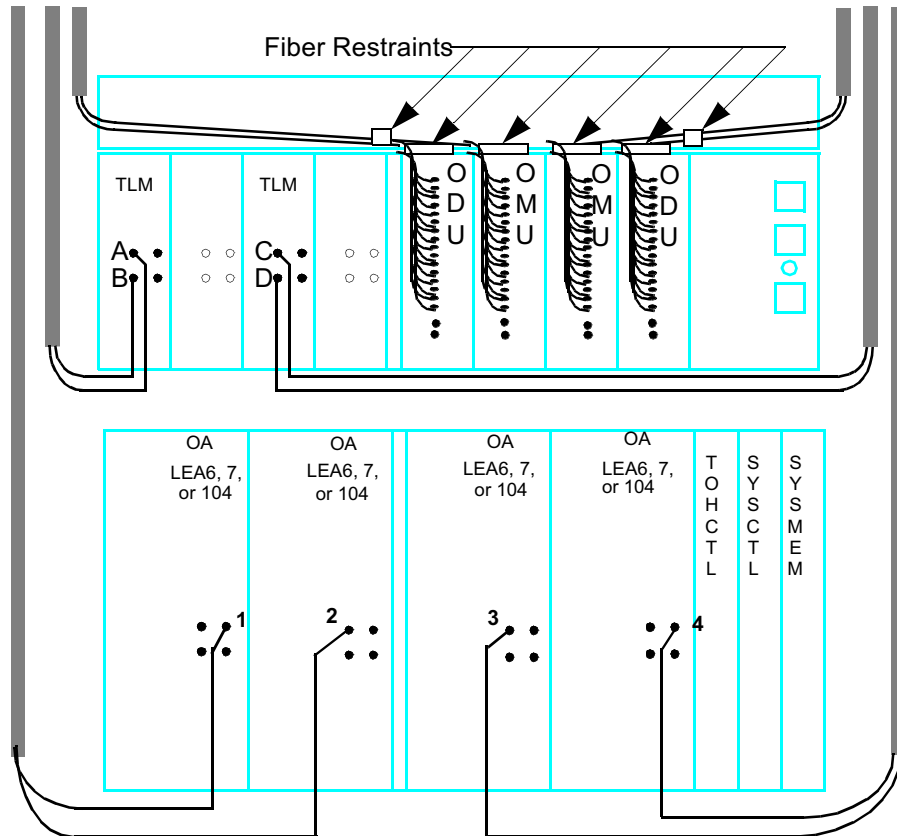


Figure 7-22 Two OA Dual Facing Shelf Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-41 Two OA Dual Facing Shelf Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal Two OA Dual Facing Shelf Refer to Figure 7-22 on page 7-92 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-42 Two OA Dual Facing Shelf Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
Two OA Dual Facing Shelf Refer to Figure 7-22 on page 7-92 for connection points	2	OMU 2A	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2A	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2A	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2A	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2A	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2A	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2A	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2A	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2A	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2A	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2A	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2A	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2A	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2A	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2A	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2A	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2B	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2B	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2B	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2B	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2B	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2B	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2B	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2B	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2B	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2B	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2B	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2B	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2B	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2B	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2B	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2B	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-22 on page 7-92 and Table 7-43 on page 7-95.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-43 Outside Plant LGX Fiber Jumpers For Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Two OA Dual Facing Shelf Refer to Figure 7-22 on page 7-92 for connection point	1	1	OA-1A	IN	1A-OA-IN
		2	OA-1B	OUT	1B-OA-OUT
	2	3	2A-OA	OUT	2A-OA-OUT
		4	2B-OA	IN	2B-OA-IN

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels then routing the fibers by referring to Figure 7-22 on page 7-92 and Table 7-44 on page 7-95.

Table 7-44 Customer Maintenance Fiber Jumpers For Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Two OA Dual Facing Shelf Refer to Figure 7-22 on page 7-92 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down through the sides of the cabinet. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-21 on page 7-90 and Figure 7-22 on page 7-92.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-21 on page 7-90.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

H - Two OA/One OA Dual Facing Shelf Installation

This configuration is supported by Releases 2.1 and subsequent releases only.

The information in this subsection contains the information to fiber a 2 line Dual Facing shelf. It is possible that there will be two shelves in the bay being installed. Refer to the appropriate subsection to fiber the other shelf contained within such a bay.

This subsection covers the fiber and label installation for the Two OA/One OA Dual Facing Shelf Configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 2-Line Shelf

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-23 on page 7-99 and Figure 7-10 on page 7-37 for circuit pack locations.
- (3) Install, but do not seat, the following controller circuit packs in the shelf:
 - (1) LEA1 SYSCTL
 - (1) LEA2 SYSMEM

- (1) LEA5 TOHCTL

(4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the shelf:

- (2) LEA6, LEA7, or LEA104 OA
- (1) LDA1 TLM
- (1) 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

 NOTE:

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

(5) Install, but do not seat, the following transmission circuit packs and units for line 2 in the shelf:

- (1) LEA105 OA in slot 2B
- (1) LDA1 TLM
- (1) 506A OMU in the 2A slot (leave the retainer screws for the unit on the shelf at this time.)
- (1) 606B ODU in the 2B slot (leave the retainer screws for the unit on the shelf at this time.)

(6) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 7 fiber jumpers per List 161 for **each** line by adding the labels from the installation kit (C848065959) then routing the fibers by referring to Figure 7-23 and Table 7-45 on page 7-100. See Table 7-2 on page 7-6 for more information on fiber lists.

 NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

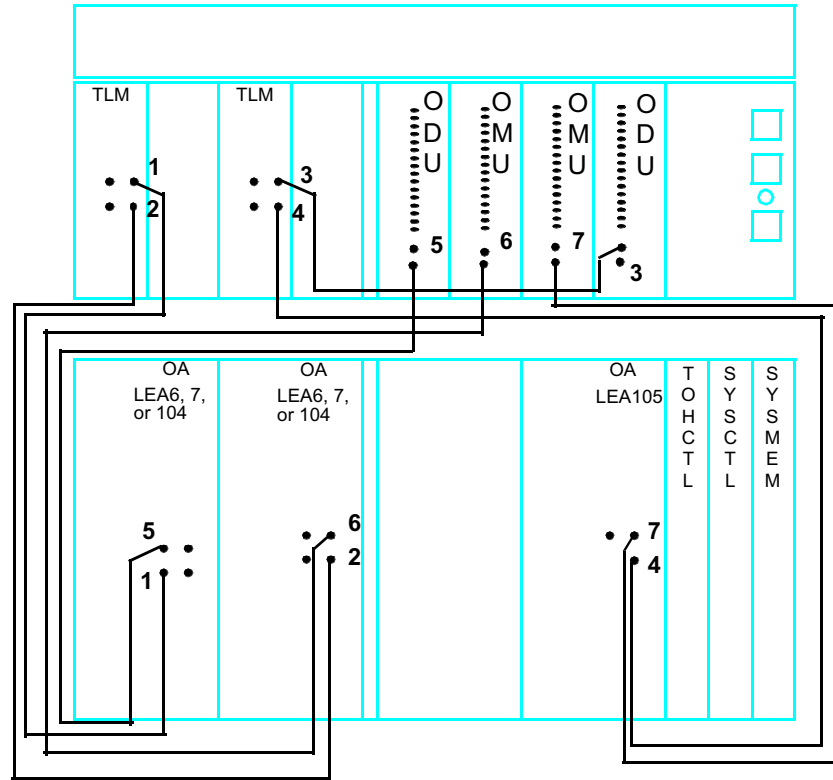


Figure 7-23 Two OA/One OA Dual Facing Shelf Intrashelf Fiber Jumpers

Table 7-45 Intrashelf Fiber Jumpers For Two OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal Two OA/One OA Dual Facing Shelf Refer to Figure 7-23 on page 7-99 for connection point	1	1	TLM 1A	IN	1A-TLM-IN
		1	1A-OA	TLM-OUT	1A-OA-TLMOUT
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		5	ODU 1A	ODU IN	1-ODU-IN
		5	OA 1A	OUT	1A-OA-OUT
		6	OA 1B	IN	1B-OA-IN
		6	OMU1	OUT	1-OMU-OUT
	2	3	TLM 2A	IN	2A-TLM-IN
		3	ODU 2A	SUPR.OUT	
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2B	TLM IN	2B-OA-TLMIN
		7	OMU 2A	OMU OUT	2A-OMU-OUT
		7	OA 2B	IN	2B-OA-IN

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from installation kit C848065959 then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-24 on page 7-101, Table 7-46 on page 7-102, Table 7-47 on page 7-103 and Table 7-48 on page 7-104.

CAUTION:
Do not connect either end of the fiber jumper at this time.

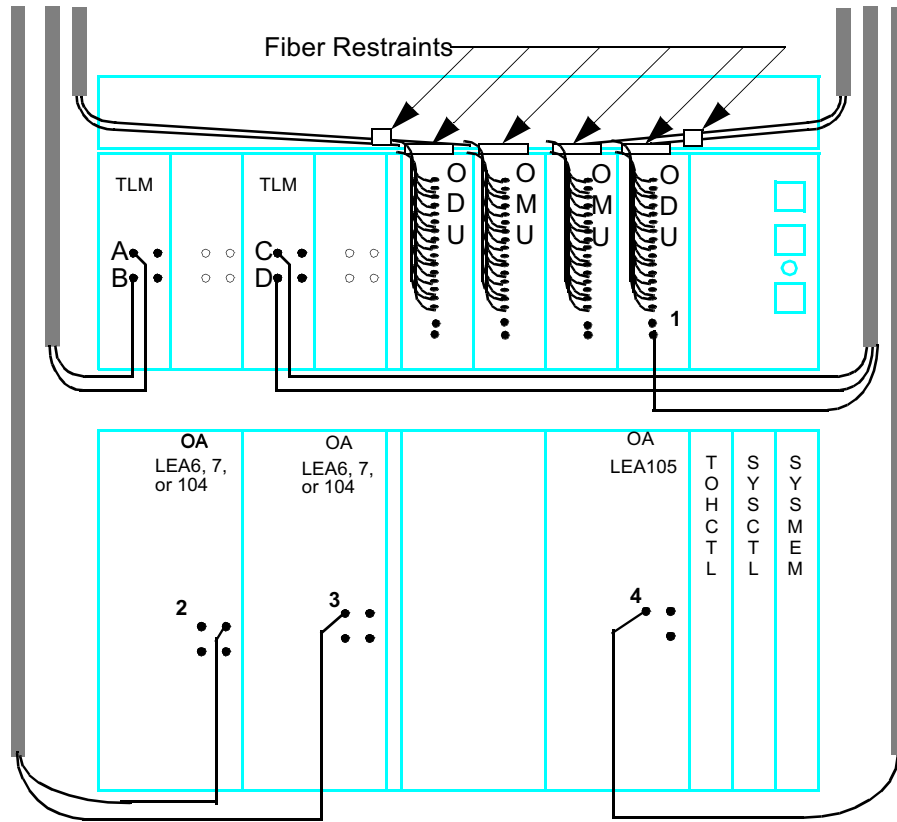


Figure 7-24 . Two OA/One OA Dual Facing Shelf Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-46 Two OA/One OA Dual Facing Shelf Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal Two OA/One OA Dual Facing Shelf Refer to Figure 7-24 on page 7-101 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-47 Two OA/One OA Dual Facing Shelf Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal Two OA/One OA Dual Facing Shelf Dual 2-Line (use lines 1&2 for each shelf) Refer to Figure 7-24 on page 7-101 for connection points	2	OMU 2B	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2B	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2B	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2B	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2B	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2B	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2B	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2B	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2B	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2B	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2B	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2B	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2B	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2B	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2B	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2B	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2A	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2A	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2A	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2A	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2A	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2A	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2A	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2A	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2A	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2A	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2A	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2A	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2A	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2A	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2A	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2A	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-24 on page 7-101 and Table 7-48 on page 7-104.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-48 Outside Plant LGX Fiber Jumpers For Two OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Two OA/One OA Dual Facing Shelf Refer to Figure 7-24 on page 7-101 for connection point	1	2	1A-OA	IN	1A-OA-IN
		3	1B-OA	OUT	1B-OA-OUT
	2	1	ODU-2B	IN	2B-ODU-IN
		4	2B-OA	OUT	2B-OA-OUT

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-24 on page 7-101 and Table 7-49 on page 7-104.

Table 7-49 Customer Maintenance Fiber Jumpers For End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Two OA/One OA Dual Facing Shelf Refer to Figure 7-24 on page 7-101 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down to the sides of the shelf. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-23 on page 7-99 and Figure 7-24 on page 7-101.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-21 on page 7-90.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

I - One OA/Two OA Dual Facing Shelf Installation

This configuration is supported by Releases 2.1 and subsequent releases only.

This subsection covers the installation of a stand-alone Dual Facing Shelf. It is possible for a second shelf to be installed in the same bay, yet configured differently. If this is the case, refer to the appropriate subsection for the fiber of the other shelf.

This subsection covers the fiber and label installation for the One OA/Two OA Dual Facing Shelf Configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 2-Line Shelf

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-25 on page 7-108 and Figure 7-26 on page 7-110 for circuit pack locations.
- (3) Install, but do not seat, the following controller circuit packs in the shelf:
 - (1) LEA1 SYSCTL
 - (1) LEA2 SYSMEM

- (1) LEA5 TOHCTL
- (4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the shelf:
- (1) LEA105 OA in slot 1A
 - (1) LDA1 TLM
 - (1) 506A OMU in slot 1B (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606B ODU in slot 1A (leave the retainer screws for the unit on the shelf at this time.)
- (5) Install, but do not seat, the following transmission circuit packs and units for line 2 in the shelf:
- (2) LEA6, LEA7, or LEA104 OA
 - (1) LDA1 TLM
 - (1) 506A OMU (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606A ODU (leave the retainer screws for the unit on the shelf at this time.)

**NOTE:**

For 16 wavelength systems, remove the 0 dB LBO from the receive OA OUT and replace it with a 7 dB LBO included with the OA LBO kit.

- (6) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 7 fiber jumpers per List 165 by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-25 and Table 7-50 on page 7-109. See Table 7-2 on page 7-6 for more information on fiber Lists.

**NOTE:**

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

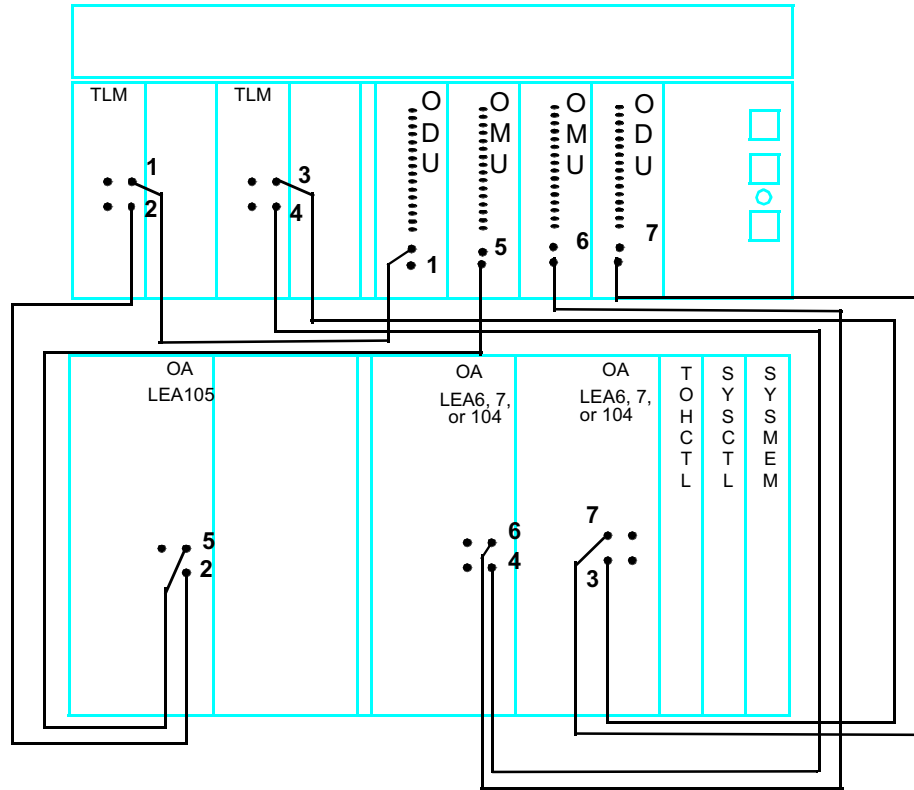


Figure 7-25 One OA/Two OA Dual Facing Shelf Intrashelf Fiber Jumpers

Table 7-50 Intrashelf Fiber Jumpers For One OA/Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA/Two OA Dual Facing Shelf Refer to Figure 7-25 on page 7-108 for connection point	1	1	TLM 1A	IN	1A-TLM-IN
		1	ODU-1	SUPR.OUT	
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		5	OMU 1B	OMU OUT	1-OMU-OUT
		5	OA 1A	IN	1A-OA-IN
	2	3	TLM 2A	IN	2A-TLM-IN
		3	OA 2A	TLM OUT	2A-OA-TLMOUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLMIN
		6	OMU 2A	OMU OUT	2A-OMU-OUT
		6	OA 2A	IN	2A-OA-IN
		7	ODU 2B	IN	2-ODU-IN
		7	OA 2B	OUT	2B-OA-OUT

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-26 on page 7-110, Table 7-51 on page 7-111, Table 7-52 on page 7-112 and Table 7-53 on page 7-113.

CAUTION:
Do not connect either end of the fiber jumper at this time.

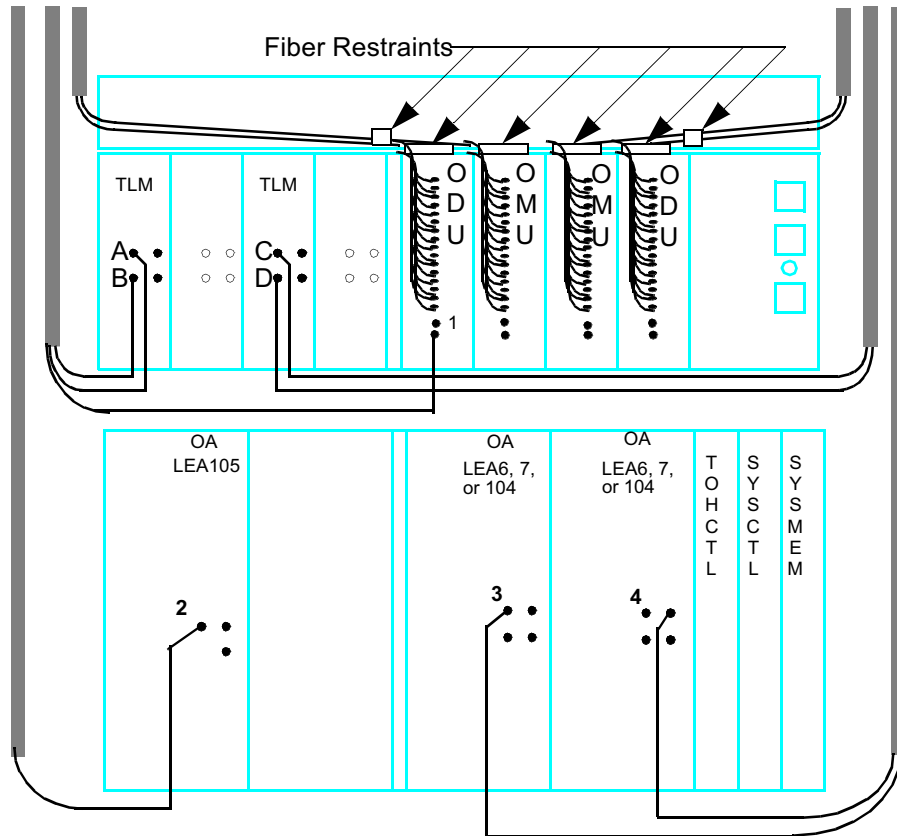


Figure 7-26 One OA/Two OA Dual Facing Shelf Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-51 One OA/Two OA Dual Facing Shelf Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal One OA/Two OA Dual Facing Shelf Refer to Figure 7-26 on page 7-110 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-52 One OA/Two OA Dual Facing Shelf Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
End Terminal One OA/Two OA Dual Facing Shelf Refer to Figure 7-26 on page 7-110 for connection points	2	OMU 2A	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2A	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2A	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2A	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2A	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2A	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2A	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2A	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2A	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2A	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2A	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2A	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2A	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2A	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2A	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2A	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2B	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2B	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2B	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2B	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2B	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2B	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2B	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2B	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2B	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2B	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2B	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2B	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2B	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2B	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2B	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2B	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-26 on page 7-110 and Table 7-53 on page 7-113.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-53 Outside Plant LGX Fiber Jumpers For One OA/Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
ONE OA/Two OA Dual Facing Shelf Refer to Figure 7-26 on page 7-110 for connection point	1	1	ODU-1	IN	1A-ODU-IN
		2	1A-OA	OUT	1A-OA-OUT
	2	3	2A-OA	OUT	2A-OA-OUT
		4	2B-OA	IN	2B-OA-IN

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-26 on page 7-110 and Table 7-54 on page 7-114.

Table 7-54 Customer Maintenance Fiber Jumpers For One OA/Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
One OA/Two OA Dual Facing Shelf Refer to Figure 7-26 on page 7-110 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT
	3	A	TLM 3A/B	CM IN	3A-TLM-CMIN
		B	TLM 3A/B	CM OUT	3A-TLM-CMOUT
	4	C	TLM 4A/B	CM IN	4A-TLM-CMIN
		D	TLM 4A/B	CM OUT	4A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the Installation Kit C848065959 to protect the fibers that run down through the sides of the cabinet. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure 7-25 on page 7-108 and Figure 7-26 on page 7-110.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-25 on page 7-108.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

J - One OA/One OA Dual Facing Shelf Installation

This configuration is supported by Releases 2.1 and subsequent releases only.

Covered in this subsection is the fiber and circuit pack installation for a stand-alone One OA/One OA Dual Facing Shelf. It is possible that another shelf will be installed in the bay. Refer to the appropriate subsection for the installation of the second shelf.

This subsection covers the fiber, circuit pack and label installation for the One OA/One OA Dual Facing Shelf Configuration. It has been broken into five procedures:

- Intrashelf Fiber Jumper Installation
- Low Speed Fiber Jumper Installation to SONET/SDH equipment
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation
- End Terminal Circuit Pack and Unit Installation



CAUTION:

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.

Fiber Routing Through Cabinet

For the fiber routing information for the cabinet refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Circuit Pack Equip Procedure For 2-Line Shelf

- (1) Review information on "OLS Fiber Cable Routing" on page 7-8 and "Circuit Pack Installation" on page 7-11 before beginning this procedure.
- (2) Refer to Figure 7-27 on page 7-117 and Figure 7-28 on page 7-119 for circuit pack locations.
- (3) Install, but do not seat, the following controller circuit packs in the shelf:
 - (1) LEA1 SYSCTL
 - (1) LEA2 SYSMEM

- (1) LEA5 TOHCTL
- (4) Install, but do not seat, the following transmission circuit packs and units for line 1 in the shelf:
- (1) LEA105 OA in slot 1A
 - (1) LDA1 TLM
 - (1) 506A OMU in slot 1B (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606B ODU in slot 1A (leave the retainer screws for the unit on the shelf at this time.)
- (5) Install, but do not seat, the following transmission circuit packs and units for line 2 in the shelf:
- (1) LEA105 OA in slot 2B
 - (1) LDA1 TLM
 - (1) 506A OMU in slot 2A (leave the retainer screws for the unit on the shelf at this time.)
 - (1) 606B ODU in slot 2B (leave the retainer screws for the unit on the shelf at this time.)
- (6) Proceed to the Intrashelf Fiber Jumper Installation paragraph.

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 3 fiber jumpers per List 163 for **each** line (6 fibers for a fully equipped 2-line shelf) by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-27 and Table 7-55 on page 7-118. For more information on fiber lists refer to Table 7-2 on page 7-6.



NOTE:

The fibers must pass in front of the bracket between the TLM and OMU/ODU slots. The fibers should be dressed behind the shelf mounting brackets.

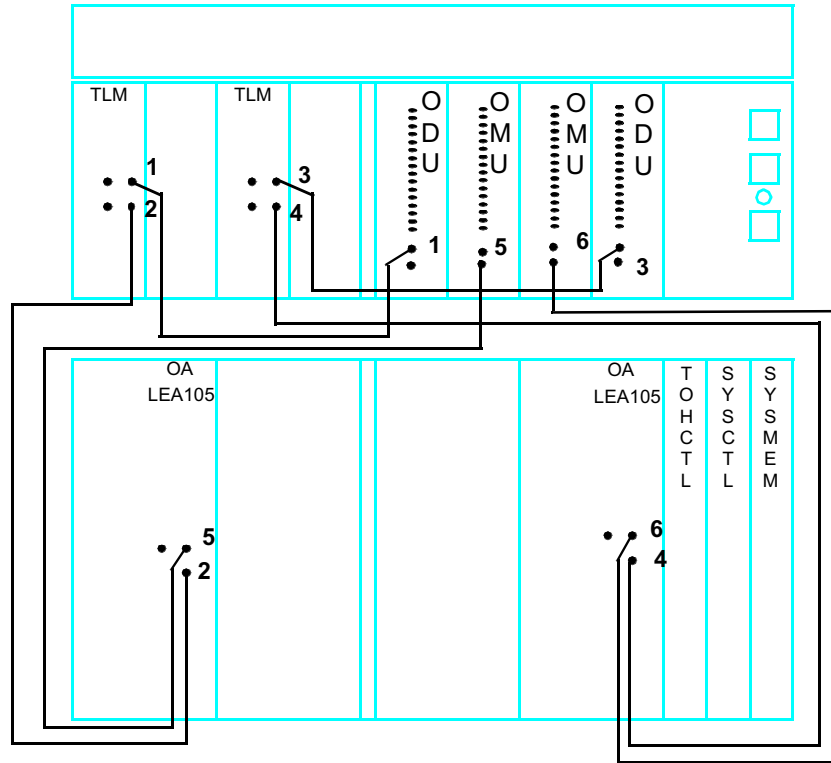


Figure 7-27 One OA/One OA Dual Facing Shelf Intrashelf Fiber Jumpers

Table 7-55 Intrashelf Fiber Jumpers For One OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1A	IN	1A-TLM-IN
One OA/One OA Dual Facing Shelf		1	ODU-1	SUPR.OUT	
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		5	OMU 1A	OMU OUT	1-OMU-OUT
		5	OA 1A	IN	1A-OA-IN
Refer to Figure 7-27 on page 7-117 for connection point	2	3	TLM 2A	IN	2A-TLM-IN
		3	ODU 2B	SUPR.OUT	
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2B	TLM IN	2B-OA-TLMIN
		6	OMU 2A	OMU OUT	2A-OMU-OUT
		6	OA 2B	IN	2B-OA-IN

Low Speed Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the SONET/SDH equipment by adding the labels from Installation Kit C848065959 then routing the fibers by referring to Figure 7-3 on page 7-10, Figure 7-28 on page 7-119, Table 7-56 on page 7-120, Table 7-57 on page 7-121 and Table 7-58 on page 7-122.

CAUTION:
Do not connect either end of the fiber jumper at this time.

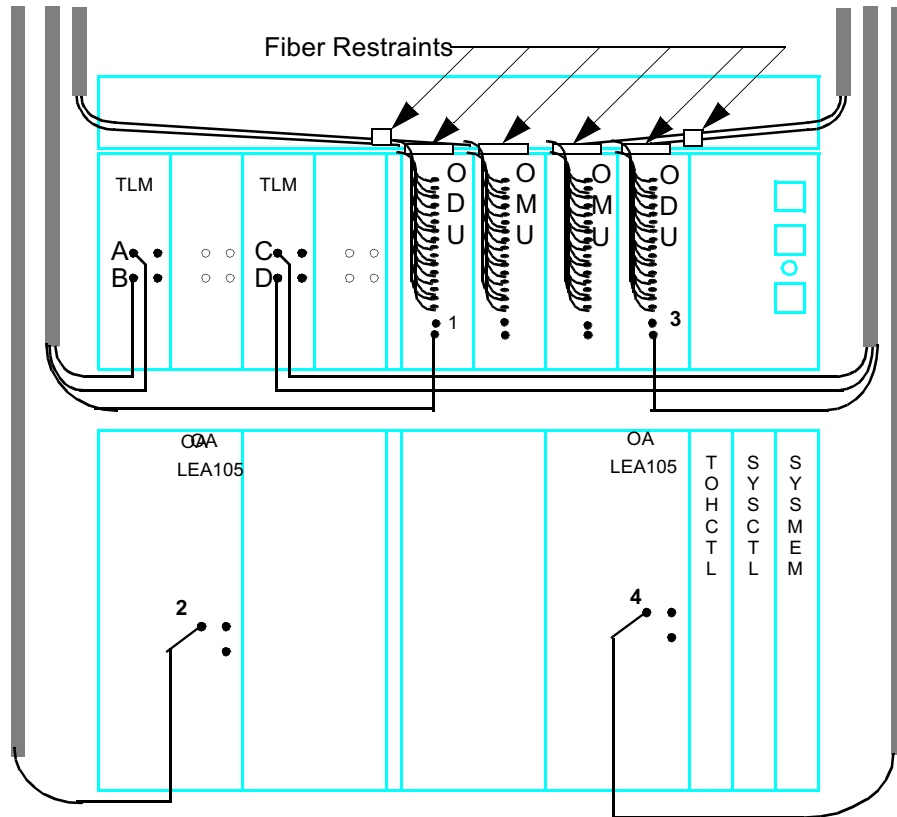


Figure 7-28 One OA/One OA Dual Facing Shelf Outside Plant, Low Speed, & Customer Maintenance Signal Fiber Jumpers

Table 7-56 One OA/One OA Dual Facing Shelf Low Speed Fiber Jumper - Line 1

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Top Shelf Dual 2-Line
End Terminal One OA/One OA Dual Facing Shelf Refer to Figure 7-28 on page 7-119 for connection points.	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
		OMU 1B	OCHAN6 IN	LOWER 1M6	UPPER 1M6
		OMU 1B	OCHAN7 IN	LOWER 1M7	UPPER 1M7
		OMU 1B	OCHAN8 IN	LOWER 1M8	UPPER 1M8
		OMU 1B	OCHAN9 IN	LOWER 1M9	UPPER 1M9
		OMU 1B	OCHAN10 IN	LOWER 1M10	UPPER 1M10
		OMU 1B	OCHAN11 IN	LOWER 1M11	UPPER 1M11
		OMU 1B	OCHAN12 IN	LOWER 1M12	UPPER 1M12
		OMU 1B	OCHAN13 IN	LOWER 1M13	UPPER 1M13
		OMU 1B	OCHAN14 IN	LOWER 1M14	UPPER 1M14
		OMU 1B	OCHAN15 IN	LOWER 1M15	UPPER 1M15
		OMU 1B	OCHAN16 IN	LOWER 1M16	UPPER 1M16
		ODU 1A	OCHAN1 OUT	LOWER 1D1	UPPER 1D1
		ODU 1A	OCHAN2 OUT	LOWER 1D2	UPPER 1D2
		ODU 1A	OCHAN3 OUT	LOWER 1D3	UPPER 1D3
		ODU 1A	OCHAN4 OUT	LOWER 1D4	UPPER 1D4
		ODU 1A	OCHAN5 OUT	LOWER 1D5	UPPER 1D5
		ODU 1A	OCHAN6 OUT	LOWER 1D6	UPPER 1D6
		ODU 1A	OCHAN7 OUT	LOWER 1D7	UPPER 1D7
		ODU 1A	OCHAN8 OUT	LOWER 1D8	UPPER 1D8
		ODU 1A	OCHAN9 OUT	LOWER 1D9	UPPER 1D9
		ODU 1A	OCHAN10 OUT	LOWER 1D10	UPPER 1D10
		ODU 1A	OCHAN11 OUT	LOWER 1D11	UPPER 1D11
		ODU 1A	OCHAN12 OUT	LOWER 1D12	UPPER 1D12
		ODU 1A	OCHAN13 OUT	LOWER 1D13	UPPER 1D13
		ODU 1A	OCHAN14 OUT	LOWER 1D14	UPPER 1D14
		ODU 1A	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1A	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

Table 7-57 One OA/One OA Dual Facing Shelf Low Speed Fiber Jumper - Line 2

Application	Line	Circuit Pack	Connector	Label to Install For Lower Shelf	Label to Install For Upper Shelf Dual 2-Line
One OA/One OA Dual Facing Shelf Refer to Figure 7-28 on page 7-119 for connection points	2	OMU 2A	OCHAN1 IN	LOWER 2M1	UPPER 2M1
		OMU 2A	OCHAN2 IN	LOWER 2M2	UPPER 2M2
		OMU 2A	OCHAN3 IN	LOWER 2M3	UPPER 2M3
		OMU 2A	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2A	OCHAN5 IN	LOWER 2M5	UPPER 2M5
		OMU 2A	OCHAN6 IN	LOWER 2M6	UPPER 2M6
		OMU 2A	OCHAN7 IN	LOWER 2M7	UPPER 2M7
		OMU 2A	OCHAN8 IN	LOWER 2M8	UPPER 2M8
		OMU 2A	OCHAN9 IN	LOWER 2M9	UPPER 2M9
		OMU 2A	OCHAN10 IN	LOWER 2M10	UPPER 2M10
		OMU 2A	OCHAN11 IN	LOWER 2M11	UPPER 2M11
		OMU 2A	OCHAN12 IN	LOWER 2M12	UPPER 2M12
		OMU 2A	OCHAN13 IN	LOWER 2M13	UPPER 2M13
		OMU 2A	OCHAN14 IN	LOWER 2M14	UPPER 2M14
		OMU 2A	OCHAN15 IN	LOWER 2M15	UPPER 2M15
		OMU 2A	OCHAN16 IN	LOWER 2M16	UPPER 2M16
		ODU 2B	OCHAN1 OUT	LOWER 2D1	UPPER 2D1
		ODU 2B	OCHAN2 OUT	LOWER 2D2	UPPER 2D2
		ODU 2B	OCHAN3 OUT	LOWER 2D3	UPPER 2D3
		ODU 2B	OCHAN4 OUT	LOWER 2D4	UPPER 2D4
		ODU 2B	OCHAN5 OUT	LOWER 2D5	UPPER 2D5
		ODU 2B	OCHAN6 OUT	LOWER 2D6	UPPER 2D6
		ODU 2B	OCHAN7 OUT	LOWER 2D7	UPPER 2D7
		ODU 2B	OCHAN8 OUT	LOWER 2D8	UPPER 2D8
		ODU 2B	OCHAN9 OUT	LOWER 2D9	UPPER 2D9
		ODU 2B	OCHAN10 OUT	LOWER 2D10	UPPER 2D10
		ODU 2B	OCHAN11 OUT	LOWER 2D11	UPPER 2D11
		ODU 2B	OCHAN12 OUT	LOWER 2D12	UPPER 2D12
		ODU 2B	OCHAN13 OUT	LOWER 2D13	UPPER 2D13
		ODU 2B	OCHAN14 OUT	LOWER 2D14	UPPER 2D14
		ODU 2B	OCHAN15 OUT	LOWER 2D15	UPPER 2D15
		ODU 2B	OCHAN16 OUT	LOWER 2D16	UPPER 2D16

Outside Plant LGX Fiber Jumper Installation

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels provided in the installation kit (C848065959) then routing the fibers by referring to Figure 7-28 on page 7-119 and Table 7-58 on page 7-122.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table 7-58 Outside Plant LGX Fiber Jumpers For One OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
One OA/One OA Dual Facing Shelf Refer to Figure 7-28 on page 7-119 for connection point	1	1	ODU-1	IN	1A-ODU-IN
		2	1A-OA	OUT	1B-OA-OUT
	2	3	ODU-2B	IN	2B-ODU-IN
		4	2B-OA	OUT	2B-OA-OUT

Customer Maintenance Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels provided in the installation kit (C848065959) then routing the fibers by referring to Figure 7-28 on page 7-119 and Table 7-59 on page 7-122.

Table 7-59 Customer Maintenance Fiber Jumpers For One OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
One OA/One OA Dual Facing Shelf Refer to Figure 7-28 on page 7-119 for connection point	1	A	TLM 1A/B	CM IN	1A-TLM-CMIN
		B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A/B	CM IN	2A-TLM-CMIN
		D	TLM 2A/B	CM OUT	2A-TLM-CMOUT

Fiber Protection

Use the split polyethylene fiber protection tubing supplied in the installation kit (C848065959) to protect the fibers that run down through the sides of the cabinet. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except OMU inputs and ODU outputs) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf through to the appropriate side as shown in Figure 7-27 on page 7-117 and Figure 7-28 on page 7-119.

Fiber jumpers for OMU inputs and ODU outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 on page 7-10 and Figure 7-27 on page 7-117.



NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

K - Optical Translator Fiber Installation

Overview

This section covers OT fiber installation. Included is fiber routing, fiber protection, and labeling.

Fiber Jumper And Label Installation

Fiber Routing and Installation

The following guidelines should be followed when installing fibers in the OT shelves.

- (1) Fibers are to enter and exit from the side of the shelf that the OTU is located. For OTUs located left of center, the fiber should be routed to the left. For OTUs located right of center, the fiber should be routed to the right
- (2) Run fibers into split polyethylene tubes provided in the OT installation kit. Using cable ties to fasten them, run the tubes to the side of cabinet/frame in the space between the shelves and the frame. For cabinet installations, if exiting at the top of cabinet run tubing through innermost rectangular hole at top of cabinet. See Figure 7-29 on page 7-126. For raised floor applications run the tube out through the bottom of the cabinet, exiting through large holes in cabinet frame.
- (3) When routing fibers, do not remove protective covers at end of connector.
- (4) Before routing fibers, verify which OTU locations are to be used for the initial installation. Install fibers only at slot locations that are to be used for this installation.
- (5) To determine the approximate length of fiber required from the bottom of the shelf to the OTU input and OTU output, slide an OTU circuit pack into a shelf without seating it and use it as gauge to determine fiber length. After determining the lengths for the input and output, remove OTU circuit pack.



CAUTION:

Do not connect fibers to OTU circuit packs at this time. Fibers may have power levels that could damage OTU receivers.

- (6) All fibers should dress from their OTU connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side.

Fiber Protection

For protection, place the installed fibers in the split polyethylene fiber protection tubing supplied in the installation kit. Refer to Figure 7-29 on page 7-126 for OT cabinets or Figure 7-3 on page 7-10 for individual shelves.

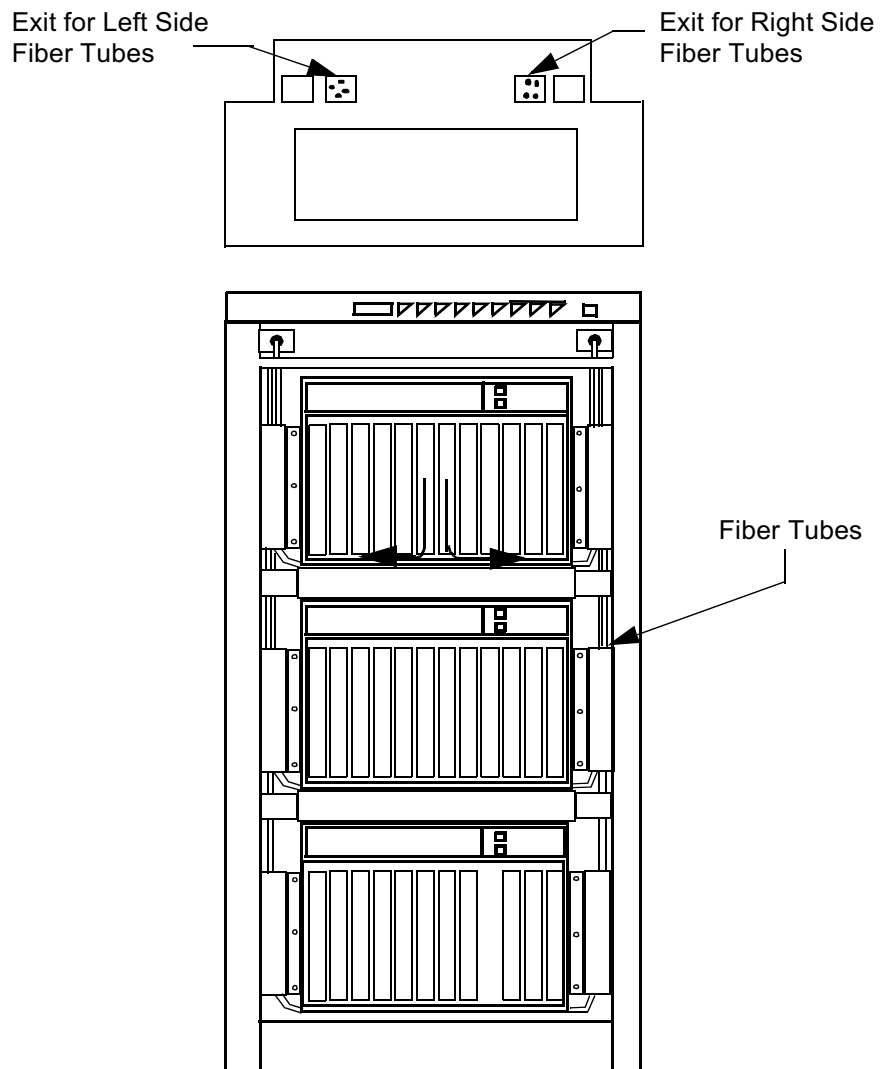


Figure 7-29 Cabinet Fiber Routing for Overhead Rack Installations

OTU Fiber Labeling

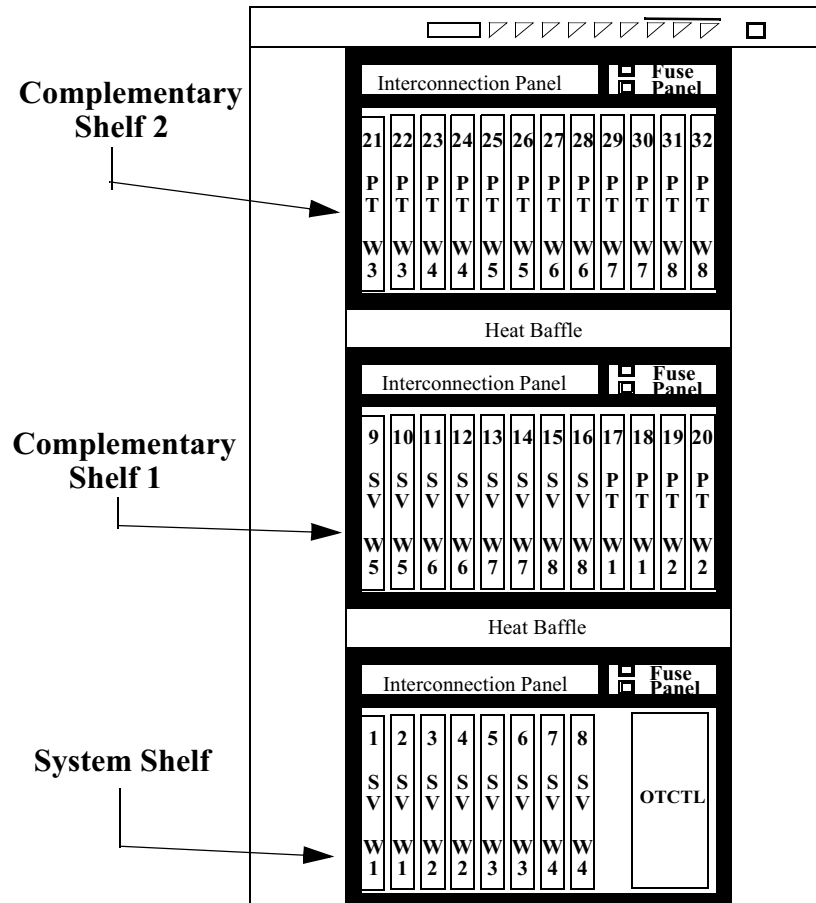


Figure 7-30 Fiber Labeling Example, 8λ, Service & Protection

The fibers are to be labelled by the numbered OTU slot where they reside. The input fiber will have the OTU number followed by IN and the output fiber will have the OTU number followed by out.

For Example: Two fibers are connected to an OTU at slot 26 in Complementary Shelf 2. The input fiber, which should be the longest fiber, will be labelled **OTU 26 IN** while the output fiber will be labelled **OTU 26 OUT**.

Follow the instructions on the label card provided in the installation kit for location of fiber connector and avoid running the label over embossed lettering on the connector.

QOTU Fiber Labeling

Each Quad Optical Translator Unit (QOTU) spans two slots in the OT in odd/even matched pairs. (25,26 or 3,4 for example). Each QOTU can contain up to four Optical Translator Port Modules each with an input and output. The labeling configuration for the fibers for the QOTU is illustrated in Figure 7-31.

⇒ NOTE:

The fiber to all OTPMs in a QOTU should be disconnected before the carrier is engaged or disengaged from the backplane. It should also be disconnected from the OTPMs when the OTPM is inserted or removed from the QOTU. All fibers should be disconnected if power is removed or applied to the shelf itself.

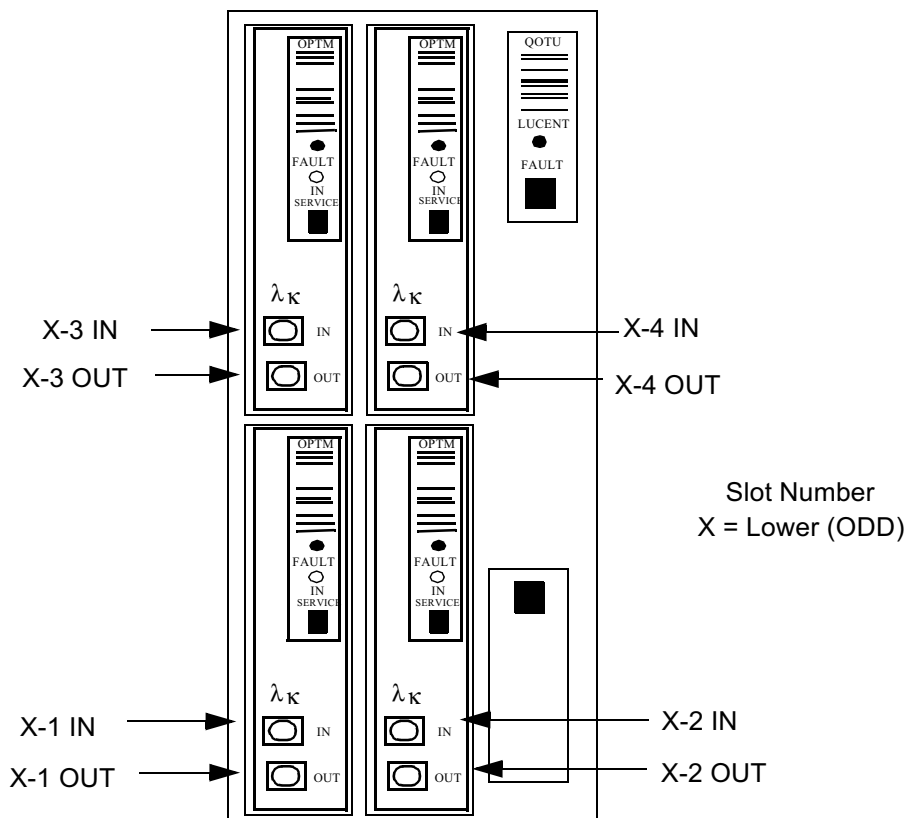


Figure 7-31 QOTU Input & Output Fiber Labeling

Final Verification

Perform the following steps to ensure that fibers are properly installed:

- (1) Verify that fibers are properly secured and dressed.
- (2) Verify that optical fiber is protected properly.
- (3) Verify that all fibers are properly labeled.
- (4) Verify that fibers are not connected at the OT cabinet.

L - Telemetry Feed-Through Installation

Overview

With the current WaveStar OLS 40G design, the operations domain is limited in scope to a system that consists of two End Terminals and zero or more repeaters in between. This domain is often referred to as a WaveStar OLS 40G subnetwork.

In a SONET/SDH ring network there can be multiple concatenated OLS subnetworks, each one on a span of the ring. Each subnetwork is isolated from the others and requires a separate control link from the central monitoring system.

At a site where two WaveStar OLS 40G End Terminals are co-located, each representing an end of an OLS subnetwork, the Telemetry Feed-Through feature provides a DCC path from the End Terminal of one subnetwork to the End Terminal of the next subnetwork. This in effect combines all the OLS subnetworks into a single network with regard to the operations domain.

The following operations interworking functions are now available from a single access point:

- Remote TL1 access through GNE
- Remote NE status
- Remote software copy
- Single DS-NE
- Network Map Retrieval

The DCC protection switching will still work on a per-span basis. Here, the span can be the side-1 span, the side-2 span, or the fiber jumpers interconnecting the co-located End Terminals.

Circuit Pack Installation

Two additional LDA1 telemetry packs are required per End Terminal shelf, four in all. They are inserted in the 1B and 2B telemetry slots of the two end terminals. Refer to Figure 7-32 on page 7-131.

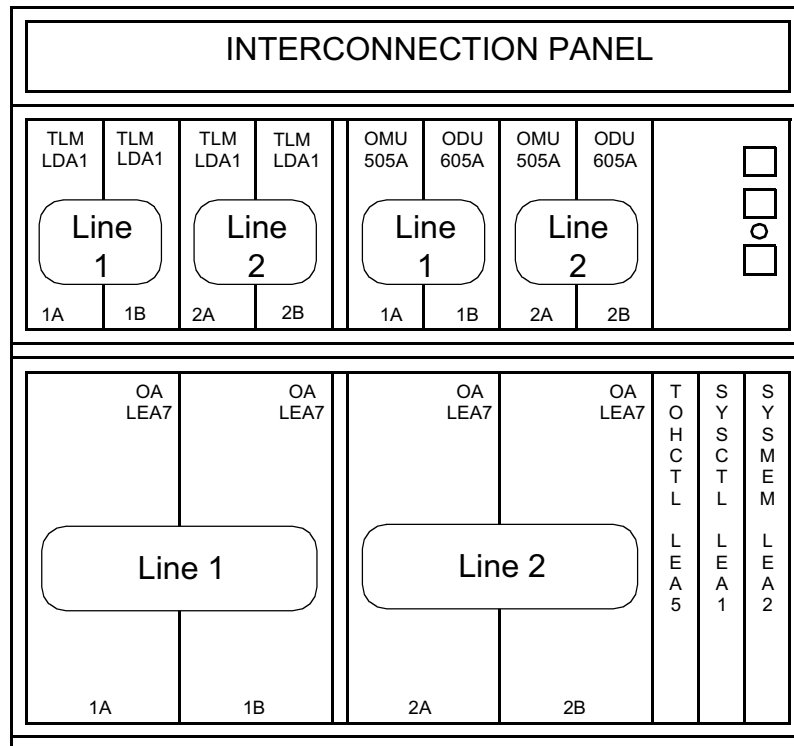


Figure 7-32 2-Line End Terminal 1A-TX-THRU

NOTE:

The 2-Line End Terminal 1A-Rx-THRU is the same except the ODUs are in the A slots and the OMUs are in the B slots.

Fiber Interconnecting

Four fibers are required for interconnecting each pair of End Terminals. The B-slot LDA1 OUT ports of one End Terminal are connected to the respective B-slot LDA1 IN ports of the other End Terminal, and vice versa.

Table 7-60 LDA1 Connections for Telemetry Feed-Through

Telemetry Slot and Port	
End Terminal 1	End Terminal 2
1B OUT	1B IN
1B IN	1B OUT
2B OUT	2B IN
2B IN	2B OUT

The LDA1 IN port requires a power level of -18 to -31 dBm. The LDA1 OUT port output level is between -4 and 0 dBm. Use the following procedures to connect the two End Terminals:

- (1) Connect a singlemode fiber jumper connector at End Terminal 1, Telemetry slot 1B, to the LDA1 OUT port.

⇒ NOTE:

Clean each jumper connector before attaching it to its port or a power meter. Refer to Appendix C, "Fiber Cleaning" if necessary.

- (2) Measure the power level at the End Terminal 2 end of the same jumper.
- (3) Select an LBO to set the input power between -18 and -31 dBm.
- (4) Insert the LBO into the End Terminal 2 Telemetry slot 1B LDA1 IN port.
- (5) Attach the fiber jumper to the LBO.
- (6) Repeat for the remaining three fiber jumpers.

Provisioning

Each former End Terminal which now has additional TLM circuit packs in the B slot(s) must be provisioned as a 1A-RCV-THRU or a 1A-TX-THRU. If the interconnected subnetworks are still in a linear (not ring) configuration, one node will still be a 1A-TX and one will be the 1A-RCV. Only one terminal of all the interconnected OLS subnetworks may be provisioned as a DS-NE, and one different node must be provisioned as the AGNE. The combined total of network

elements in the interconnected subnetworks cannot exceed 32, due to limitations on the DCC.

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Overview

This section describes procedures to:

- Power WaveStar™ OLS 40G Equipment
- Power OT Equipment

General Considerations

- Disconnect the office alarms from the WaveStar OLS 40G Network Element before performing any tests. Reconnect the office alarms after completing the testing.

Tools, Test Sets, and Accessories

The following equipment is required to complete the procedures in this section:

- Multimeter capable of measuring resistance (ohms) and DC volts from -40 to -60 volts.
- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.
- Analog Ohm Meter for measuring resistance of Battery Return cable.

WaveStar OLS 40G & OT Powering

Description

Two -48V DC power feeders connect to the WaveStar OLS 40G shelf fuses. From the fuses, power is channeled through a filter to the backplane of the shelf and to the circuit packs.

Cabinet Powering

WaveStar OLS 40G/OT multiple shelf combinations mounted in cabinets have two power feeders to the Battery Distribution and Fuse Bay (BDFB), an A and a B feeder. Each feeder has breakouts in the cabinet for each shelf.

Miscellaneously Mounted Shelf Powering

WaveStar OLS 40G and OT miscellaneously mounted shelves have two power feeders to the BDFB for each shelf (with one exception), an A and a B feeder. The OT List 10 has two feeders with breakouts for each shelf.



NOTE:

The red power lead connects to -48V DC source. The white power lead connects to battery return. If a black lead with a red band near the connector is provided, this lead connects to -48V DC source.

Integrated Bay Powering

The integrated bay consists of three shelves: one WaveStar OLS 40G shelf, one OT system shelf, and one OT complimentary 1 shelf. The integrated bay has two power feeders to the BDFB, an A and a B feeder. Each feeder has three breakouts, one for each shelf.

Powering Procedure

Perform the following steps to power the WaveStar OLS 40G or OT shelf:

- (1) Verify that all packing material has been removed from the cabinet and shelf.

(2) Verify the following:

- Breakers at the Battery Distribution and Fuse Bay (BDFB) are in the OFF position, or
- Fuses on the BDFB are not yet installed.

(3) Verify all circuit packs are unseated from all shelves. (WaveStar OLS 40G note: The OMU and ODUs may be seated at this time. They are not connected to battery voltage.)

(4) Remove the fuses from both fuse holders on both shelves by opening the retainer by lifting up on the bottom edge of the retainer, then press lightly down on the top edge of the fuse cap. The fuse cap will pop out.

Check Battery Not Grounded

(5) Using an ohmmeter, measure the resistance from the top terminal, inside each fuse holder to frame ground. For WaveStar OLS 40G, refer Figure 8-1 on page 8-4 which shows where to take the measurement from the front of the shelf. For OT, refer to Figure 8-2 on page 8-4 which shows where to take the measurement from the front of the shelf. For an Integrated Bay, follow the steps for both the WaveStar OLS 40G shelf and for the OT shelves.

Requirement: The resistance should show an open circuit (more than a megaohm reading) for each fuse. If the resistance measurement requirement is not met then check the battery cables.

⇒ NOTE:

Measure the voltage at the top of the fuse holder, not at the rear.

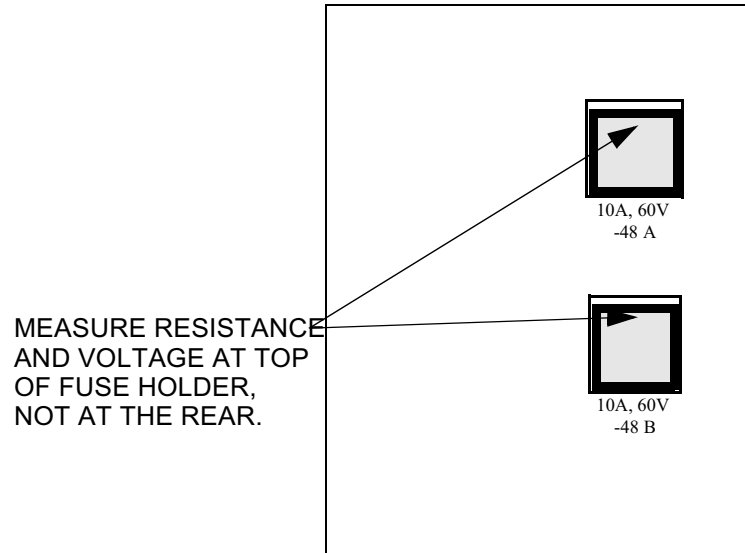


Figure 8-1 WaveStar OLS 40G Fuse Panel Measurement Point

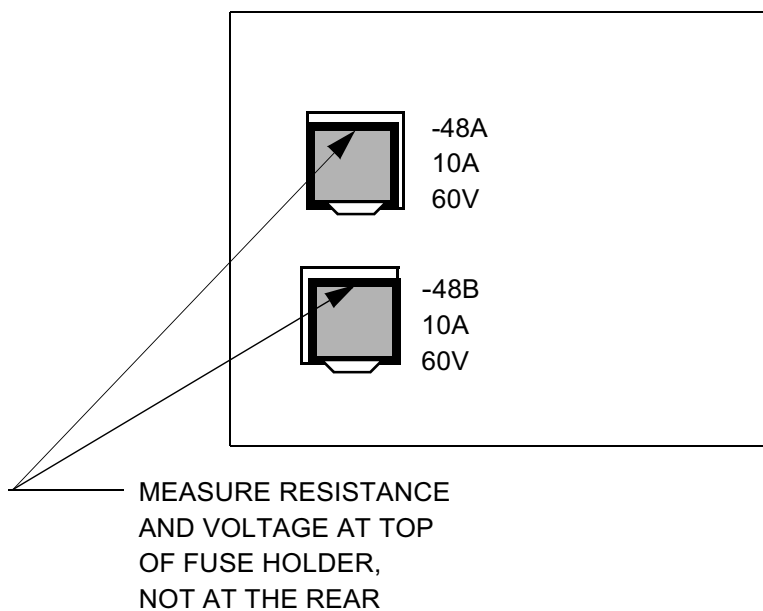


Figure 8-2 OT Fuse Panel Measurement Point

WaveStar OLS 40G Check Battery Return Cable Connection

⇒ NOTE:

For OT only installation, proceed to Step 9.

- (6) On the Lower shelf, remove the two screws from the fuse panel cover. Remove the cover. This will allow access to the two Power Filters. Power Filter A is on the top; Power Filter B is located below it.
- (7) Remove the spade lug terminal from the bottom terminal of the A (Top) Power Filter. The wire color is BLACK and the end terminal is labeled -48VR. Using an Analog Ohmmeter, measure the resistance from the wire end to the unpainted cabinet frame ground (Note: Digital Multimeter may cause erroneous readings).

Requirement: The resistance shall measure less than one (1) ohm. After completing the measurement, restore connection to the Power Filter.

- (8) Remove the spade lug terminal from the bottom terminal of the B (Bottom) Power Filter. The wire color is SLATE/BLACK and the terminal is labeled -48VR. Using an Analog Ohmmeter, measure the resistance from the wire end to the unpainted cabinet frame ground (Note: Digital Multimeter may cause erroneous readings).

Requirement: The resistance shall measure less than one (1) ohm. After completing the measurement, restore connection to the Power Filter. Replace the fuse cover panel and tighten with the two screws holding the panel in place.

⇒ NOTE:

For WaveStar OLS 40G Only: Since the power cable is tied together for both shelves, the battery return measurement only needs to be done on the Lower Shelf.

⇒ NOTE:

For WaveStar OLS 40G only installations, proceed to Step 11.

OT Check Battery Return Cable Connection

- (9) Locate the Supply A Power Filter at the left side of the interconnection panel on Complementary Shelf 2 (Top Shelf of three-shelf OT cabinet) or Complimentary Shelf 1 (Top Shelf of an Integrated Bay) Remove the spade lug terminal from the **top** terminal of the filter. The wire color is **black** and the

terminal is labeled -48VR. Using an Analog Ohmmeter, measure the resistance from the wire end to the unpainted cabinet frame ground (Note: Digital Multimeter may cause erroneous readings).

Requirement: The resistance shall measure less than one(1) ohm. After completing the measurement, restore connection to power filter.

- (10) At the top right side of Complementary Shelf 2, remove the screw that holds the fuse panel cover in place and swing out the fuse panel door. Locate the Supply B Power Filter at the right side of the interconnection panel. Remove the spade lug terminal from the **bottom** terminal of the filter. The wire color is **SLATE/BLACK** and the terminal is labeled -48VR. Using an Analog Ohmmeter, measure the resistance from the wire end to the unpainted cabinet frame ground (Note: Digital Multimeter may cause erroneous readings).

Requirement: The resistance shall measure less than one (1) ohm. After completing the measurement, restore connection to power filter. Close fuse panel door and tighten holding screw.

 NOTE:

FOR OT ONLY: Since the power cable is tied together for all three shelves, the battery return measurement need only be done at one of the three shelves.

Power Cabinet/Check Voltage

- (11) Insert 20 amp fuses into the WaveStar OLS 40G or OT power feeds at the BDFB. If breakers are being used, put them in the ON position.
- (12) Using the voltmeter, measure the voltage from the top terminal of each fuse holder on both shelves to the terminal grounding cable. For WaveStar OLS 40G, refer to Figure 8-1 on page 8-4 which shows where to take the measurement from a front view of the terminal. For OT, refer to Figure 8-2 on page 8-4 which shows where to take the measurement from the front of the terminal.

Requirement: The voltage should be -48 volts (between -41.75 and -60.0 VDC) at each fuse holder.

Power Shelves

- (13) Insert two 10 amp fuses into the fuse holders of the lower shelf per the following:
- 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.

c. Push up and in gently on the bottom edge of the fuse. The fuse will secure in place.

d. Close the retainer over the fuse cap and snap it in place.

Requirement: The PWR ON LED is illuminated on the indicator strip for the lower shelf.

(14) **For OT or Integrated Bays only:** Insert two 10 amp fuses into the fuse holders of the middle shelf per the following:

a. Open the retainer from the bottom edge and swing it up and out of the way.

b. 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.

c. Push up and in gently on the bottom edge of the fuse. The fuse will secure in place.

d. Close the retainer over the fuse cap and snap it in place.

Requirement: The PWR ON LED is illuminated on the indicator strip for the upper shelf.

(15) Insert two 10 amp fuses into the fuse holders of the top shelf per the following:

a. Open the retainer from the bottom edge and swing it up and out of the way.

b. 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.

c. Push up and in gently on the bottom edge of the fuse. The fuse will secure in place.

d. Close the retainer over the fuse cap and snap it in place.

Requirement: The PWR ON LED is illuminated on the indicator strip for the upper shelf.

Verify A Feed

(16) Disconnect the B power feed by turning the breaker off or removing the fuse for the B power feed at the BDFB.

Requirement: The PWR ON LED for both shelves should remain illuminated.

- (17) Remove the B fuse from the lower shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the lower shelf.

If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

- (18) **For OT or Integrated Bays Only:** Remove the B fuse from the middle shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the upper shelf.

If the LED is not on, then the A and B power feeders to the OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

Requirement: Verify that the PWR ON LED is still on for the middle shelf.

- (19) Remove the B fuse from the top shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the upper shelf.

If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

- (20) Reinsert the B fuse into the fuse panel for all shelves.

- (21) Turn the breaker on or replace the fuse for the B power feed at the BDFB.

Verify B Feed

- (22) Disconnect the A power feed by turning the breaker off or removing the fuse for the A power feed at the BDFB.

Requirement: The PWR ON LED for both shelves should remain illuminated.

- (23) Remove the A fuse from the lower shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the lower shelf.

If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

- (24) **For OT or Integrated Bays Only:** Remove the A fuse from the middle shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the middle shelf.

If the LED is not on, then the A and B power feeders to the OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

- (25) Remove the A fuse from the upper shelf fuse panel.

Requirement: Verify that the PWR ON LED is still on for the upper shelf.

If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

- (26) Reinsert the A fuse into the fuse panel for all shelves.

- (27) Turn the breaker on or replace the fuse for the A power feed at the BDFB.

- Proceed to Section 9 for software installation.

Network Element Start Up and Provisioning

9

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Network Element Start Up and Provisioning

9

Overview

This section describes procedures to:

- Install software into the SYSMEM circuit pack of the WaveStar™ OLS 40G Network Element
- Install circuit packs into the Network Element
- Perform basic provisioning of the Network Element so that installation testing can be performed

⇒ NOTE:

It is assumed that the installer is familiar with the personal computer and its use as a CenterLink Console Manager. If instruction in this area is needed, refer to Appendix F for information including: performing software installation, setting up a PC for use with the WaveStar OLS 40G, logging in to the system using a CMC (CenterLink Management Console) PC, selecting commands, and basic provisioning. More information is also available in the WaveStar OLS 40G User/Service Manual (365-575-341).

General Considerations

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.
- Required equipment is given in Section 1 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.

Tools, Test Sets, and Accessories

The following equipment is required to complete the procedures in this section:

- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.
- A CD-ROM of Release 3.0.2-WaveStar OLS 40G network software and CMC **OR** a set of Diskettes containing Release 3.0.2-WaveStar OLS 40G network software and CMC.
- Personal computer for use as CMC. See requirements in Section 2.
- An "AT modem cable" RS-232 cable. The cable must have a DB25 male connector at one end to mate with FT-2000 DCE CIT port, and a DB9 female connector at the other end to mate with the PC serial port. Table 9-1, "Serial Port Pinout information," on page 9-2 may be used to determine pin numbers to connect.

Table 9-1 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

NOTE: Network Element (bay) CIT DCE port is DCE.

Network Element (bay) CIT DTE port is DTE.

PC serial port (com port) is DTE.

Modem ports are DCE.

Use straight through cable between unlike ports, use null modem between like ports.

Software Installation

Description

The software installation procedure for the WaveStar OLS 40G is provided below. Use this procedure only for new installations. The upgrade of software to in-service terminals should follow procedures given in the *Software Release Description* shipped with the diskettes or CD-ROM. The *Software Release Description* contains the most up-to-date instructions.

General Software Installation Considerations

- Read the entire software installation procedure 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 WaveStar OLS 40G 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 CMC software to the hard drive of the PC takes about 3 minutes.
- Copying the Network Element software to the PC hard drive takes about 1 minute.
- Installation of the Network Element (NE) software to the NE takes approximately 70-120 minutes, dependent upon the baud selected.
- The person(s) performing the software installation should be trained and have an understanding of the WaveStar OLS 40G.
- 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. Make use of 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 or diskettes. 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 the trouble shooting Section 13 of this manual to correct the problem.

Setting Up the PC for CenterLink Software Installation

- (1) Be sure you have the proper CD-ROM or diskettes for WaveStar OLS 40G Release 3.0.2 CenterLink Console Manager.



NOTE:

Power the PC from an AC source. Battery power of laptops may not last long enough to complete the installation.



NOTE:

For complete directions for installing the CenterLink Console Management software onto the PC from diskettes, go to Appendix F.

- (2) Insert the CD-ROM drive of the computer (typically drive D). The CD will automatically start Centerlink.
- (3) Follow the prompts to install Centerlink and the CMC software to your hard drive.
 - CenterLink Installation Program will load Microsoft Internet Explorer 3.0.2 software. Accept program if not loaded on PC or you have an earlier version. **Do not load this program if you have this release or a higher release.**
 - CenterLink Installation Program will load the Acrobat Reader software.

- (4) Run the Internet Explorer from the desktop icon or using the Start Menu.



NOTE:

Cancel any error messages about being unable to connect to URL.

- a. Select View-Options menu.
- b. Select advanced tab.
- c. Deselect "Disable Java JIT Compiler" (Make sure there is no check in the box).
- d. Select the "Settings" button in the Temporary Internet files section of the screen.

- e. Verify the circle next to "Every time you start Internet Explorer" is filled.
- f. Click on OK.
- g. Click on the Connection tab.
- h. Disable "Connect through a proxy server" (Verify there is no check in the box).
- i. Click Apply, then OK
- j. Select File-Open and type **http://localhost/Lucent3/** then the Enter key.
- k. The CenterLink Introduction screen will be displayed. See Figure 9-1 on page 9-6. Listed below is a key to the parts of the CenterLink Management Console screen.

CenterLink Management Console Screen Elements

Figure 9-1 on page 9-6 shows the Centerlink main screen and identifies the screen locations described below:

- (1) Web Address - Displays the CenterLink home page on the PC that is being accessed using the Personal Web Server Software.
- (2) Options Button - Clicking accesses the CenterLink options.
- (3) Help Button - Clicking accesses CenterLink on-line help.
- (4) Exit Button - Clicking Exits CenterLink.
- (5) NE Command Manager - Clicking opens a command manager window and establishes a connection to a network element.
- (6) NE SmartManual Manager - Clicking opens the SmartManual window.
- (7) Software Installation Manager - Clicking begins the process of installing network element software into a blank system. Used during initial equipment installation only. A separate DOS Install application may be necessary when upgrading a system running an existing release.
- (8) Reference Library - Clicking opens a window displaying an index of the documentation available.
- (9) Notepad - Clicking opens a user note storage utility.
- (10) NESERVER application - A Windows95 application that transfers data between the CenterLink Management Console software running on the web browser and the serial port of the PC. MUST be running for CenterLink to operate.
- (11) Personal Web Server Application - A Windows95 application which allows the PC to operate as a web server. Needed to execute the JAVA scripts the CenterLink Management Console software uses.

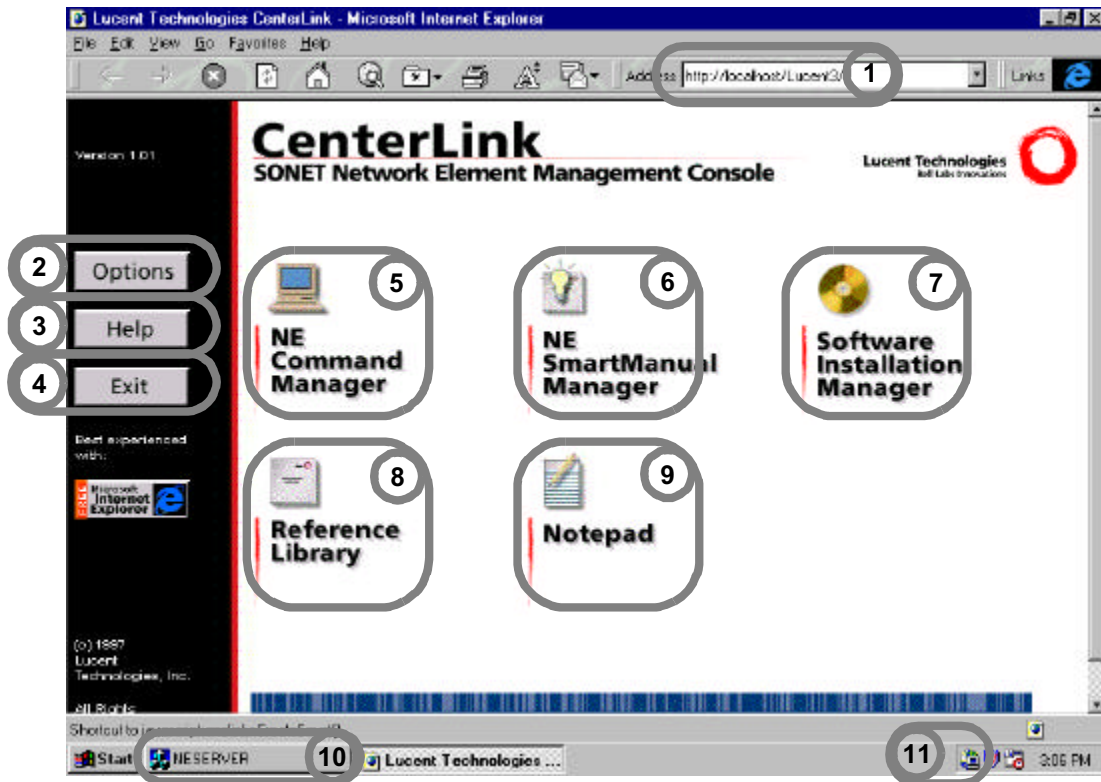


Figure 9-1 CenterLink Management Console

- I. Still in the Internet Explorer, Select View-Options and the Navigation tab.
- m. Click "Use Current" button.
- n. Click Apply and then OK.
- o. Close the Internet Explorer.
- p. Exit the CenterLink Application

Network Element Software Installation

The operation will use the Software Installation Manager from the CenterLink Management Console.

- (1) Verify that the LEA2 SYSMEM circuit pack is seated in the lower WaveStar OLS 40G shelf at the slot marked SYSMEM.

Requirement: The FAULT LED remains illuminated and the MJ LED is lit on the alarm panel.

- (2) Verify that the LEA1 SYSCTL circuit pack is seated in the lower WaveStar OLS 40G shelf at the slot marked SYSCTL.
- (3) Click on the Software Installation Manager from the Management Console.

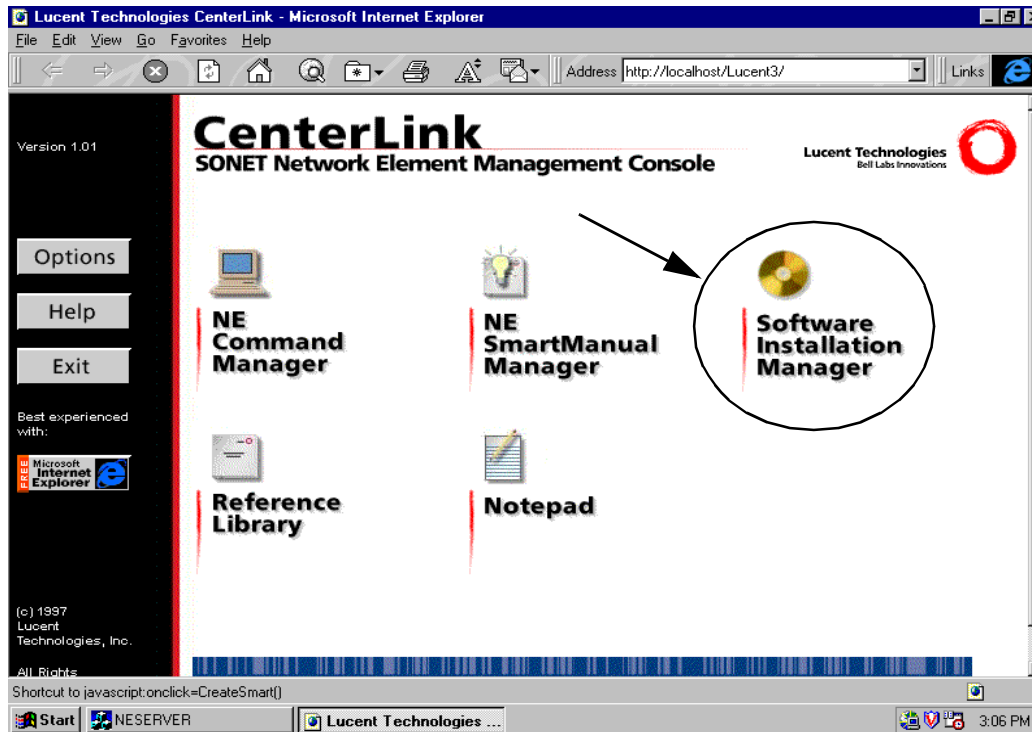


Figure 9-2 Software Installation Manager Selection

(4) Select the NE Software “3.0.2-OLS” from the drop down window.

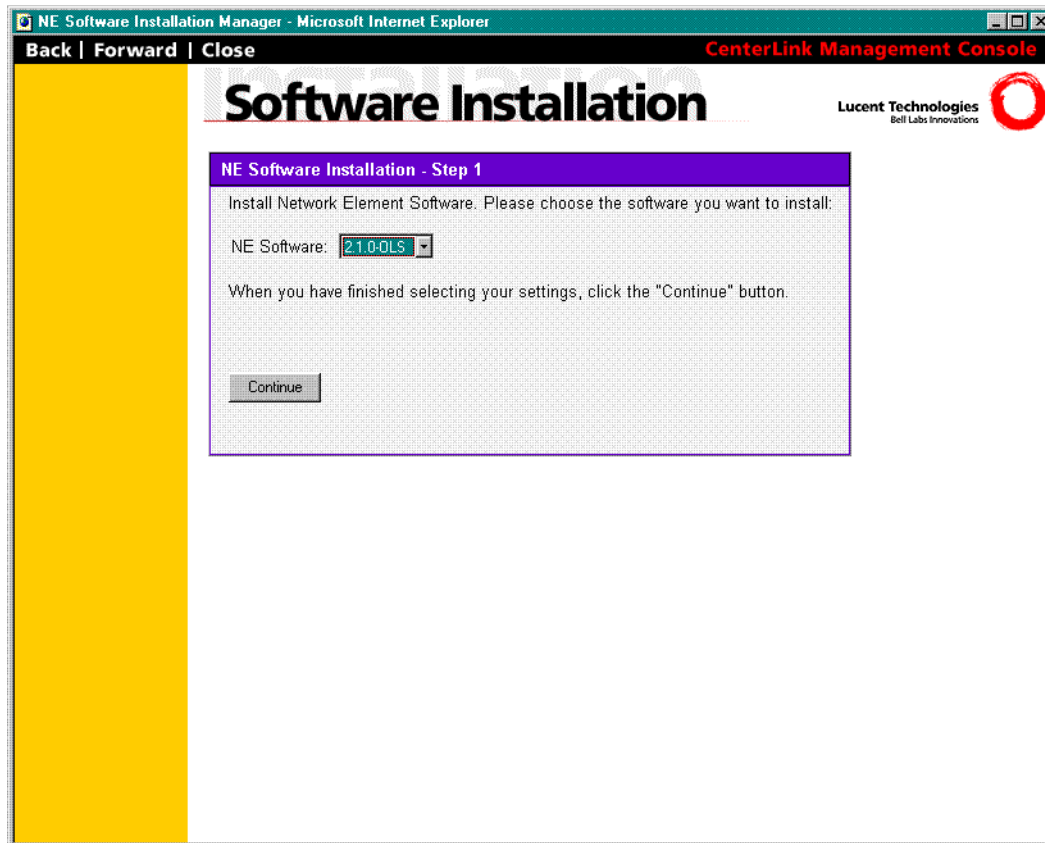


Figure 9-3 NE Software Installation Step 1

(5) The CenterLink Management Console (CMC) will connect to the network element and the screen shown below will be displayed.

- If a connection **is** established, click “Continue” to proceed.
- If a connection **is not** established:
 - Verify that the RS-232 cable is connected properly between the selected COM port (COM1 or COM2) and the DCE connector.
 - Verify NESERVER is running and using proper com port.
 - Close and restart the Software Installation Manager and attempt to connect 30 seconds after reseating the SYSCTL.

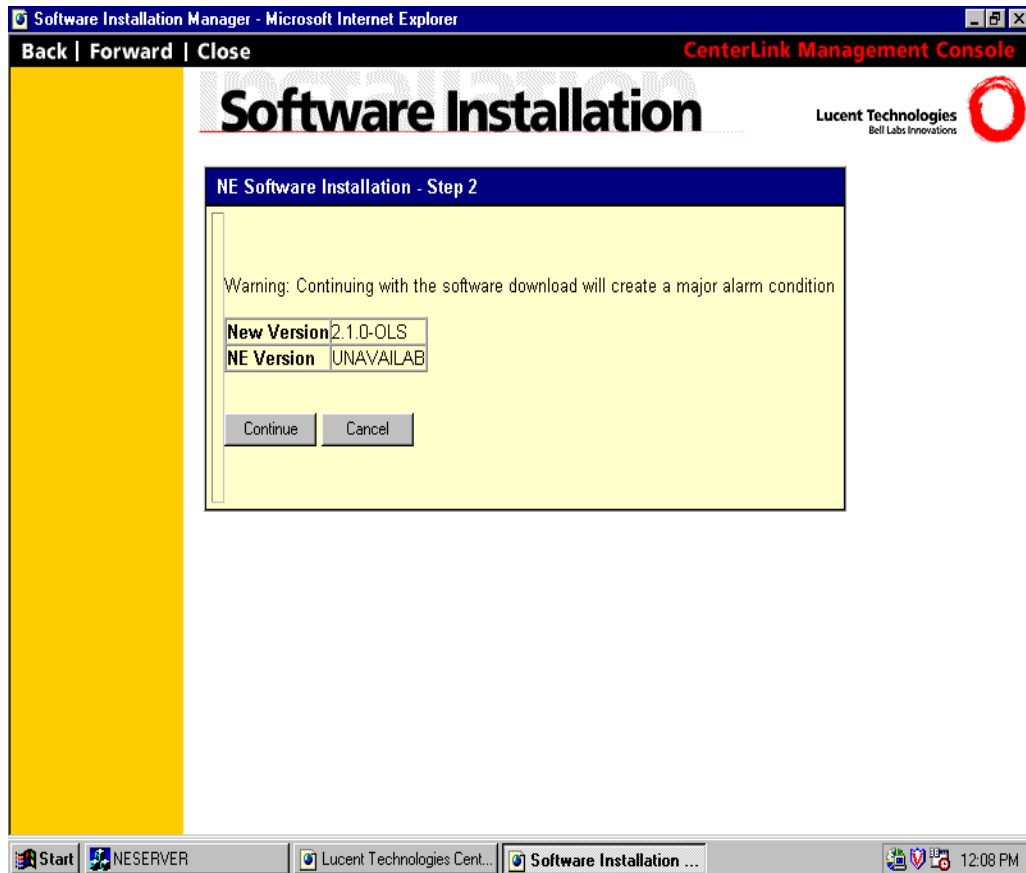


Figure 9-4 NE Software Installation Step 2

- (6) The flash memory will be erased as described on the following screen. This step takes about 2 minutes.

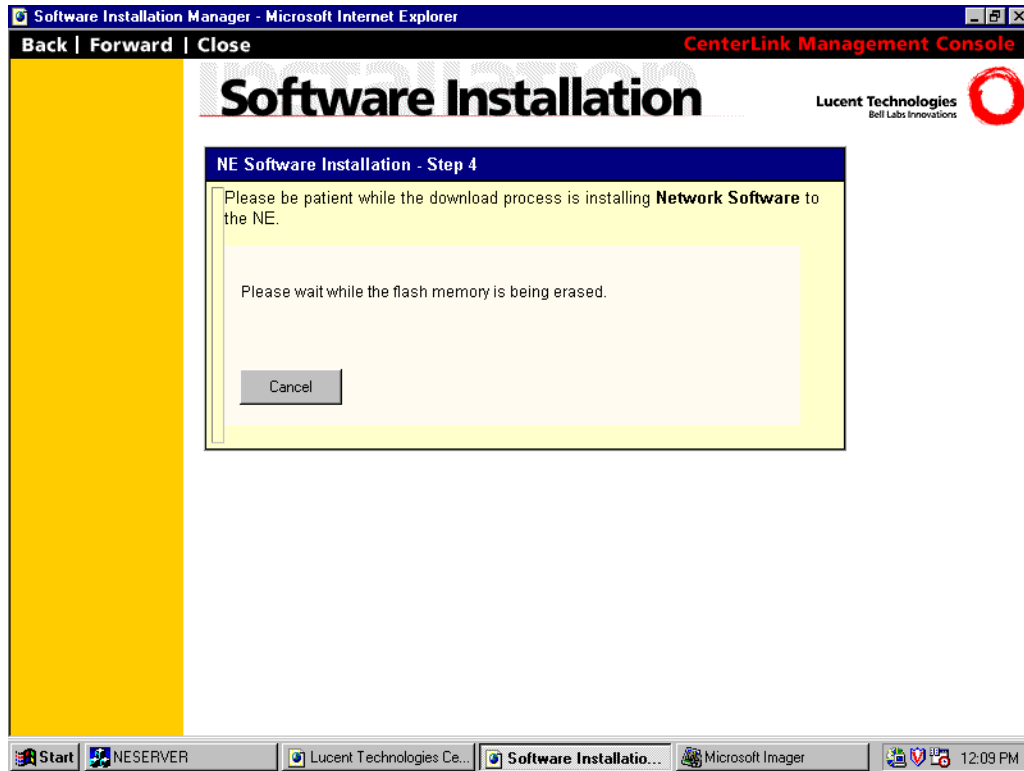


Figure 9-5 Flash Memory Screen

(7) After the erase is complete, the download will start as shown in Figure 9-6.

⇒ **NOTE:**

Both the SYSMEM and SYSCTL leds will stay on until the download is complete and the system resets itself.

The time for the download will be displayed on the screen. When the download is complete, proceed to the next step.

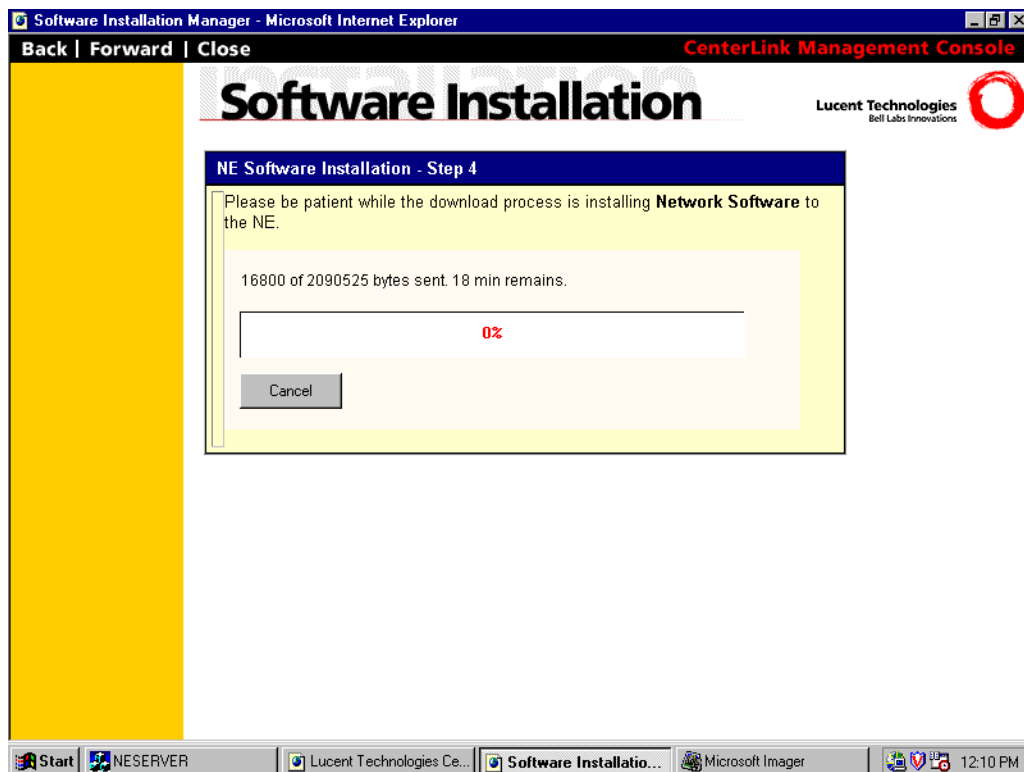


Figure 9-6 Network Element Download

(8) When the download completes, the following screen will be shown and the following actions will occur:

- The system will automatically initiate a reset.
- LEDs on the SYSMEM and SYSCTL will go off after being reset.

Proceed to the next step.

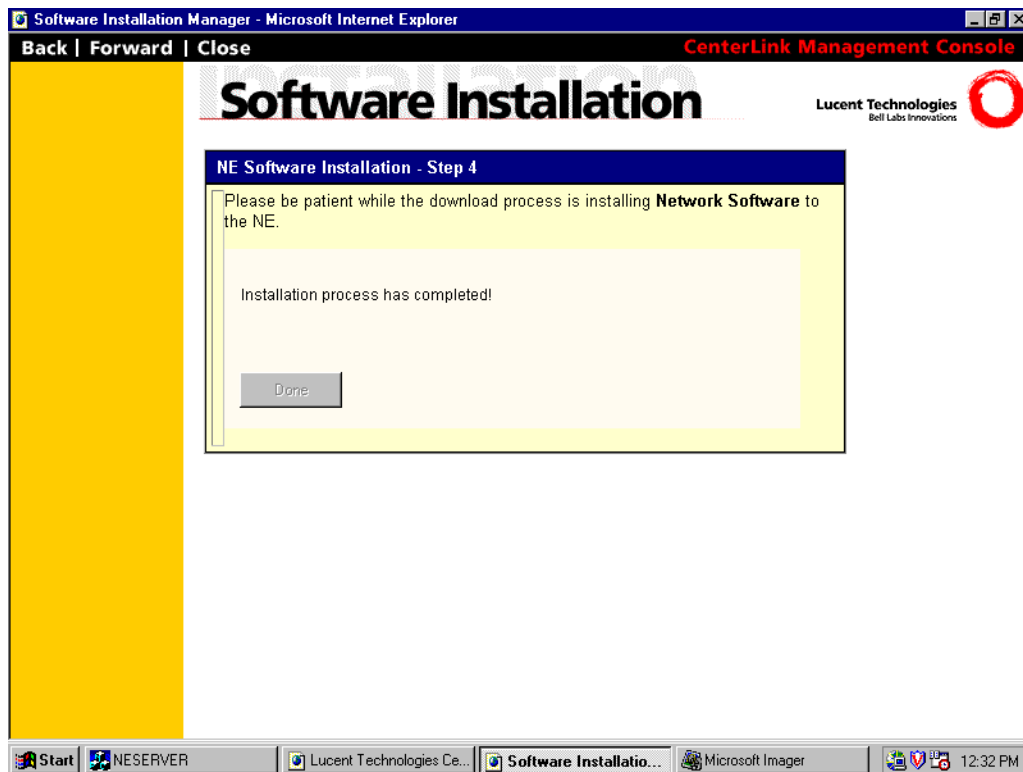


Figure 9-7 Network Element Download Completion

- (9) Click "Close" to exit the Software Installation Manager.
- (10) Enable the windows screen saver if desired.
- (11) This completes the Blank System Software Installation Procedure.

Connecting to the Network Element

- (1) Select Start-Programs-Lucent Technologies-NESERVER.

➤ NOTE:

The NEServer application provides the connection between the web browser and the COM port on the PC. It will automatically load whenever Windows restarts because of its placement in the Start-up directory.

- (2) Select Start-Programs-Lucent Technologies-Centerlink Home Page to start Centerlink Management Console.
- (3) Click on the NE Command Manager Icon. See Figure 9-1 on page 9-6 for location.
- (4) Enter the default Target Identifier (TID): LT-FT-2000 (Use capital letters and zeros.)

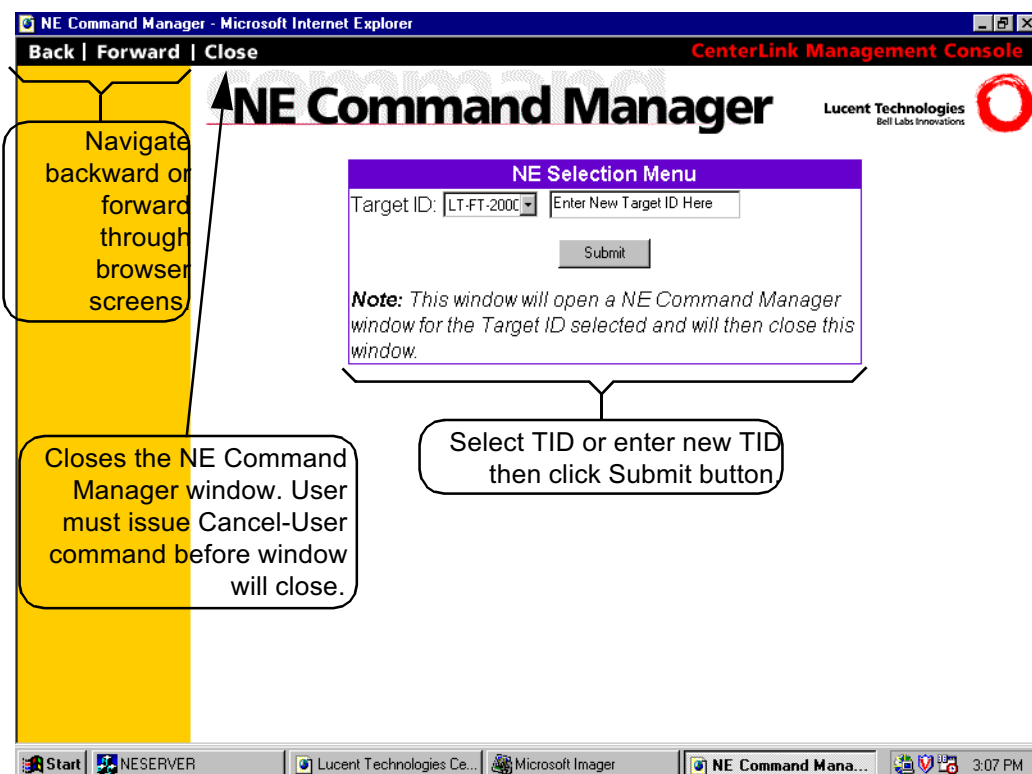


Figure 9-8 NE Selection Menu window

(5) Enter the User ID, Password, and Privilege Level, then click Enter button:

- Default User ID: LT01 (All caps with a zero.)
- Default Password: FT-2000 (All caps with zeros.)
- To set the Privilege Level, click on the downward arrow and click on expert.

OLSTERM2 - Microsoft Internet Explorer

Back | Forward | Close

CenterLink Management Console

NE Command Manager

Lucent Technologies
Bell Labs Innovations

Network Element Login

TID (Target ID)	OLSTERM2
UID (User Identifier)	default=LT01
PID (Private ID)	default=FT-2000

Fault	REPORTS	Configuration	REPORTS
Performance	REPORTS	Security	REPORTS

Enter Clear Help

Click Enter to proceed

select appropriate security levels

Start NESERVER Lucent Technologies Ce... Microsoft Imager OLSTERM2 - Micro... 3:09 PM

Figure 9-9 Network Element Login window

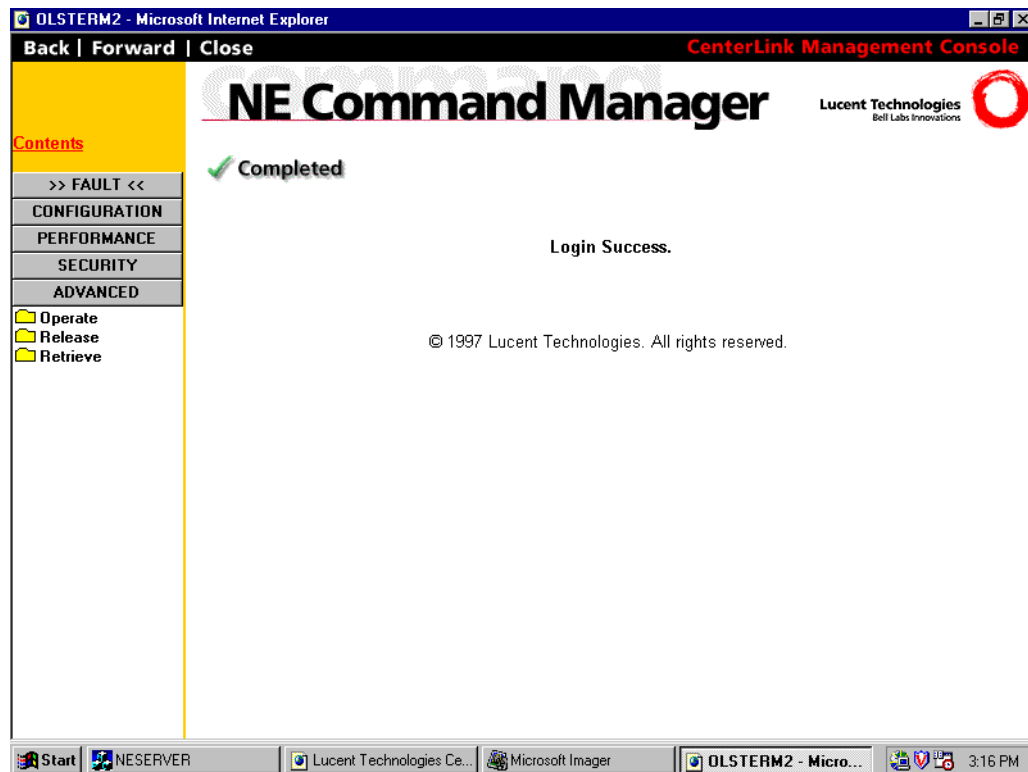


Figure 9-10 Successful Network Element Login window

- (6) CenterLink will connect to the Network Element and a Login Successful confirmation will be received.

If no connection is established:

- Verify that the RS-232 cable is connected properly between the selected COM port (COM 1 or COM2) and the DCE connector.
- Verify NEServer is running.
- Return to the login command and try again.

- (7) This completes the Login to the Network Element using the CenterLink Procedure.

Initial Circuit Pack Insertion

General Circuit Pack Installation Consideration

- A wrist strap, connected to the 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 installing any circuit packs, 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.
- 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 B "Pin Repair".
- When installing circuit packs, use care to insert them straight to avoid damaging the circuit packs or the backplane pins.
- Fiber connectors on optical circuit packs should always be either connected to fiber or covered by protective covers. Note that the fibers should not be connected to the circuit packs or units at this time.

Install TOHCTL Circuit Pack

- Insert the LEA5 TOHCTL into its slot in the lower shelf

Requirement: After a 5 minute reset the FAULT LED will extinguish.

Transmission Circuit Pack Insertion Procedure - Test Positions

- Verify the transmission circuit packs were placed, but not seated, in the high numbered line locations in Section 7 for each shelf type.



NOTE:

To prevent potential damage to the Optical Amplifiers (LEA6, LEA104, LEA105, LEA7), connect the attenuated fiber to the "IN" and "OUT" ports **before** seating these transmission packs into the shelf or shelves.

 NOTE:

After Optical Amplifier circuit packs have been inserted it may be necessary to remove the fiber jumper before unseating the unit.

- Seat the transmission circuit packs (OA and TLM packs) into the shelf or shelves.

Requirement: Verify that all the circuit pack FAULT LEDs are extinguished, except for the LEDs on OA circuit packs. 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, all of the OA circuit pack FAULT LEDs will be flashing.

Initial Login And Provisioning

Description

This procedure provisions the basic Network Element values for:

- Target Identifier (TID)
- Directory Services-Network Element (DSNE)
- X.25 packet size
- Alarm Group
- Alarm Gateway Network Element (AGNE)
- End Terminal Direction (1A-TX, 1A-RCV, 1A-TX-THRU, 1A-RX-THRU, Dual)
- A, B, C, or 1_OA Power Attenuation Configuration (Side1_SYS, Side2_SYS)
- Far end communications
- Automatic Power Shut Down (APSD)
- Time and date

This procedure should be done immediately after the software installation has taken place so there is no need to travel to all the sites repeatedly.

(1) **Execute CONFIGURATION.Initialize.System, AID=All, PH=3 (Reset)**

Requirement: The command completes. The full reset time is about 10 minutes. The reset will cause the CMC to be disconnected from the network element.

 NOTE:

Under certain circumstances, a CONFIGURATION.Initialize.System, AID=All, PH=3 will cause an erroneous OA-1A alarm. This alarm can be cleared with a CONFIGURATION.Update command.

 NOTE:

Failure to Initialize the system using the above command could cause problems trying to provision the parameters listed below.

(2) Log back into the network element.

Basic Network Element Provisioning

Using the CMC PC, perform the following steps:

(1) SECURITY.Enter.System: Use this command to:

- set the new Target ID (TID) of the network element,
- set the alarm-reporting standard to SONET or SDH,
- set the Alarm Group,
- set the X.25 Packet size,
- specify if this NE is the Alarm Gateway Network Element (AGNE),
- specify if this NE is the Directory Server-Network Element (DS-NE),
- specify if this NE is a 1A-TX, 1A-TX-THRU, 1A-RCV, 1A-RCV-THRU, or Dual Facing Shelf (**RPTR is an automatic setting and need not be specified**),
- specify the OA pump power setting, A, B, C, or 1_OA.
- specify if the APSD is enabled or disabled (default is ENABLED)

 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.

- a. TID: Enter the new TID into the box provided. Hit the tab key or move the mouse pointer to the next box.

- b. STANDARD: Select SONET or SDH from the pull-down box. Hit the tab key or move the mouse pointer to the next box.
- c. DS-NE: Select either yes or no from the pull-down box. Hit the tab key or move the mouse pointer to the next box.
- d. AGNE: Select either the yes or no from the pull-down box. Hit the tab key or move the mouse pointer to the next appropriate box.

 NOTE:

A MJ alarm will result if this NE and another NE in the ring have the same TID. A Near End Activity Condition (DS-NE not reachable) will result if one NE in the ring is not specified as the DS-NE or if the specified DS-NE is not reachable for some reason. A MJ alarm (multiple DS-NEs defined) will result if this NE and one or more other NEs on the ring are specified as the DS-NE.

- e. ALMGRP: Enter the appropriate alarm group if not using the default value. Hit the tab key or move the mouse pointer to the next appropriate box.
- f. X25PS: Click on the appropriate packet size. Hit the tab key or move the mouse pointer to the next appropriate box.
- g. ASPD: Click on the desired selection enabled or disabled. The default is ENABLED. Do not disable APSD at this time.

 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.

- h. DIRN: Click on the appropriate selection, 1A-TX, 1A-TX-THRU, 1A-RCV, 1A-RCV-THRU, or Dual. Hit the tab key or move the mouse pointer to the next appropriate box. Leave this value blank if the NE is a repeater; the direction will be provisioned automatically.
- i. SIDE1_SYS: Select the appropriate power configuration based on Table 9-2, "OA Pump Power Settings," on page 9-20. To use this table, determine the type of OA being used, the maximum number of wavelengths possible with the equipped OMU/ODUs, and the number of spans

between the two end terminals. Find the appropriate setting, A, B, C, or 1_OA, from the table and select it from the SIDE1_SYS pull-down box. Hit the tab key or move the mouse pointer to the next appropriate box.

Table 9-2 OA Pump Power Settings

OA	OA Pump Setting	# of Spans	Max. No. of Wavelengths
LEA6	A	1	8
		2	
		3	
	B	4	
		5	
	A	1	16
LEA7	A	1	16
		2	
		3	
	B	4	
		5	
	C	6	
		7	
		8	
LEA104	A	1	16
		2	
		3	
	B	4	
		5	
LEA105	A	1	16
	1_OA	1	16

- j. SIDE2_SYS: If the DIRN selection is Dual, select the appropriate power setting for side 2 from Table 9-2 and select it from the SIDE2_SYS pull-down box.
- k. When all entries have been made and verified, click on the enter button. If corrections need to be made, click on clear and reenter the information from Step A.

I. If this command is not executed, the following default factory values will remain in place:

Table 9-3 Factory NE Default Values

Option	Default
TID	LT-FT-2000
Alarm Group	255
Packet Size	256
Alarm Gateway Network Element (AGNE)	No
Directory Server-Network Element (DS-NE)	No
Automatic Power Shut Down (APSD)	Enabled

Figure 9-11 SECURITY.Enter.System

Requirement: The command completes, the TID now appears in the heading of all output from the bay. If the DS-NE value was changed, the TOHCTL will take about 5 minutes to reset.

NOTE:

If the network element is not the DS-NE, the TID will not be completely changed in the SYMMEM until communication with the DS-NE is established.

- (2) Enable far end communications: SECURITY.Enter.Far End Communications. Click on RAR (Remote Alarm Reporting) Enabled.
- (3) CONFIGURATION.Edit.Date_And_Time: 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 in most

of the U.S.; STRTDST is the start of daylight savings time date (use actual date, Month and Day MM-DD); STOPDST is end of daylight savings time date (use actual date, Month and Day MM-DD); and DSTZ, the Daylight Savings Time Zone, is EDT, CDT, MDT, or PDT in most of the U.S. If daylight savings time is not used, leave both the start and stop dates with the same date.

Figure 9-12 CONFIGURATION.Edit.Date_and_time

Requirement: Output from the bay now displays the correct date and time in the headings.

- (4) Execute FAULT.Retrieve.Condition.All to view alarms. Click on Enter.

Requirement: Verify the alarms shown (alarms may vary depending upon AGNE & DS-NE selections):

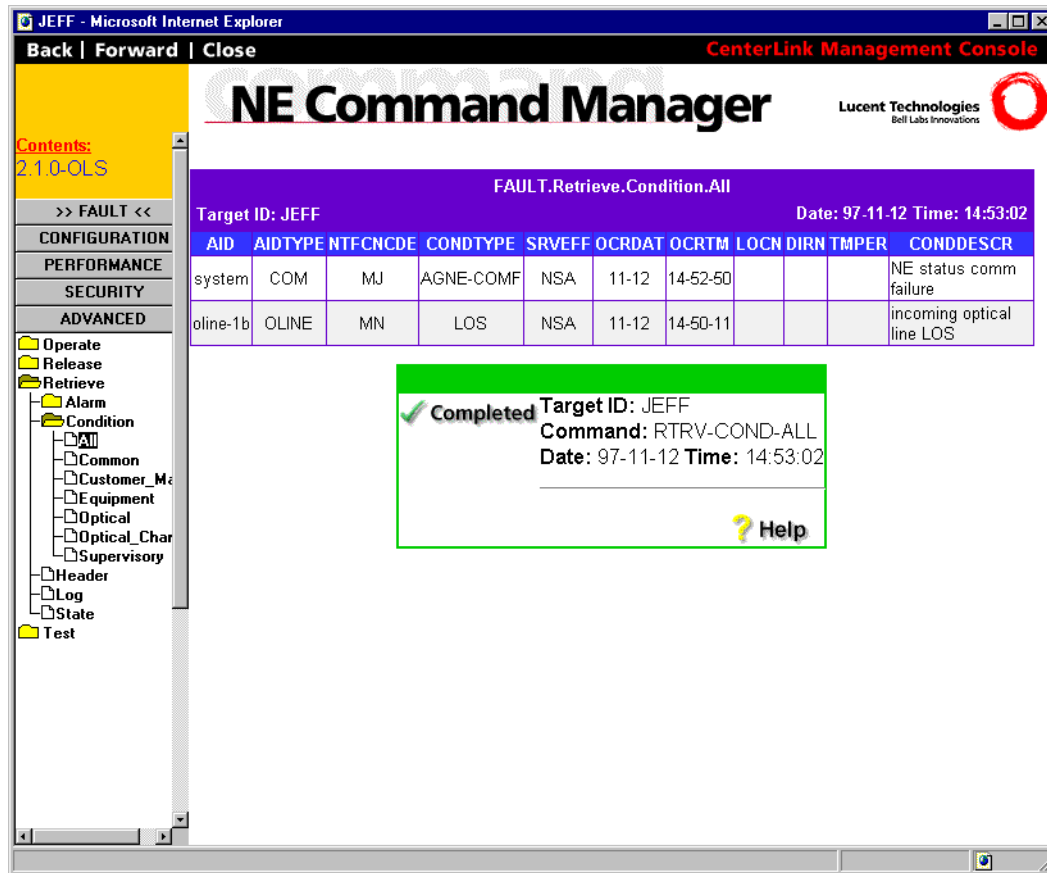


Figure 9-13 FAULT.Retrieve.Condition.All

Transmission Circuit Pack Insertion Procedure - Final Positions

- (1) If the transmission circuit packs are in their final positions, proceed to the "Fiber Connection To Circuit Packs" procedure. **For 4-line systems with only lines 1 and 2 being used**, proceed with the steps below to test lines 3 and 4.
- (2) At end terminal offices, remove and discard the screws from the OMU and ODU slots for lines 1 and 2 if it was not done in Section 7.

- (3) Seat the transmission circuit packs into the shelf or shelves. **For 4-line systems with only lines 1 and 2 being used** initially, first seat the transmission circuit packs into the slots for lines 3 and 4.

Requirement: Verify all the circuit pack FAULT LEDs are extinguished, except for the flashing LEDs on OA circuit packs resulting from the lack of an optical signal input.

- (4) **For 4-line systems with only lines 1 and 2 being used** initially, move the transmission circuit packs from lines 3 and 4 to lines 1 and 2.

Requirement: Verify all the circuit pack FAULT LEDs are extinguished, except for the flashing LEDs on OA circuit packs resulting from the lack of an optical signal input.

- (5) At end terminal offices seat the OMUs and ODUs and tighten the captive screws for these units for all lines.

- (6) Execute CONFIGURATION.Update.

- (7) Execute FAULT.Retrieve.Condition.All to view alarms.

Requirement: Verify the alarms shown for testing lines 1 and 2.

 NOTE:

If the system alarms a circuit pack unequipped in lines 3 or 4 after the update has been performed, check for a short in the equipped lead cable running between shelves (P25-P26).

Final Hardware Installation Items

Fiber Connection To Circuit Packs

Verify the intrashelf fiber jumpers were dressed into place in Section 7 for each system type.



CAUTION:

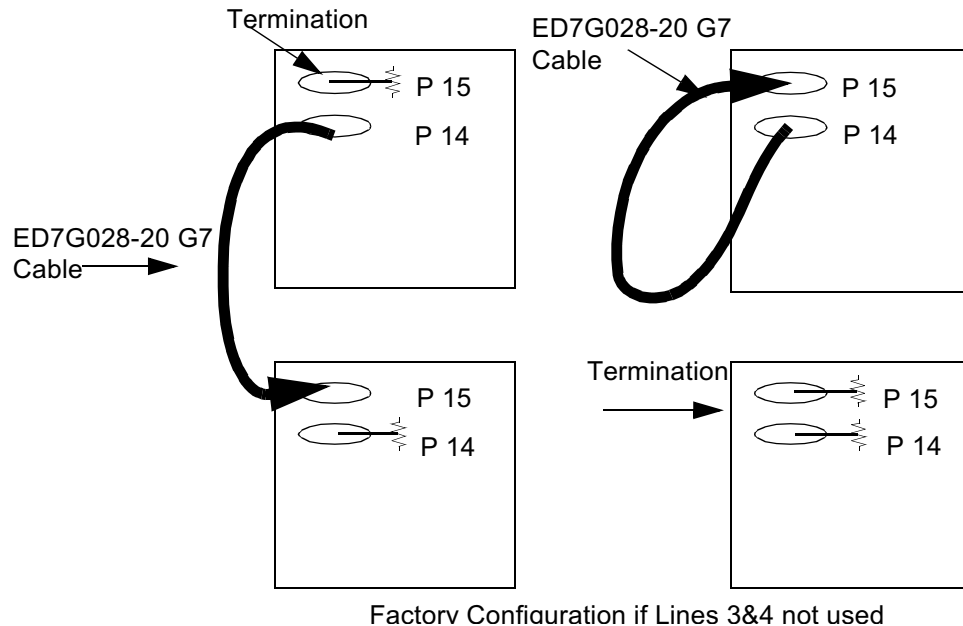
To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105), connect the fibers to the "IN" and "OUT" ports **before** seating these transmission packs into each shelf.

Board Controller LAN Cable

On 4-Line systems the ED7G028-20, G6 and G7 cable assemblies are equipped for the SYSCTL to communicate with lines 3 and 4. If lines 3 or 4 are not equipped

with transmission circuit packs then terminate this LAN connection after line 2 as follows:

- (1) Disconnect the ED7G028-20, G7 cable from P15 of the lower shelf.
- (2) Remove the ED7G028-20, G6 (termination plug) from P15 of the upper shelf and connect it to P15 of the lower shelf.
- (3) Cut cable tie(s) as necessary and connect the ED7G028-20 G7 cable end removed from P15 of the lower shelf to P15 of the upper shelf. See below



Factory Configuration if Lines 3&4 not used

Figure 9-14 Cable and Termination Re-configuration if Lines 3 & 4 Unused

NOTE:

If line 3 or 4 is added in the future then this cable and termination will need to be returned to their original locations.

Final Operations

Proceed to Chapter 10 for testing End Terminals, Dual Facing Shelves, or Repeaters.

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Overview

This section describes the LED test, ODU and OMU Verification tests, and Installation Auto Turnup tests for the WaveStar™ OLS 40G at end terminal, dual facing terminal, and repeater offices. Tests described in this section must be performed on each shelf.

It also describes testing of:

- the Optical Translator (OT),
- the OTU slots,
- the miscellaneous discretes on each OTU and associated wiring to the EMDU (for Release 2.1 and earlier)
- the WaveStar OLS 40G/OT integration,
- the optical output of each OTU/OTPM.

Tests described in the OT subsection must be performed on each OTU/OTPM and OT cabinet.

General Considerations



CAUTION:

Installation Auto Turnup tests are performed only out of service. If these tests are performed in service, service will be interrupted.

**WARNING:**

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

Note the following before starting installation Auto Turnup tests:

- Disconnect the office alarm cable from the WaveStar OLS 40G shelf and/or OT before performing any tests. Reconnect the office alarm cable after completing testing.
- This procedure requires that the SYSCTL and the SYSMEM circuit packs have WaveStar OLS 40G software installed. Additionally, all circuit packs must be installed, with their FAULT LEDs off, except the OAs which have flashing LEDs. Software Installation and Circuit Pack Insertion procedures are in Section 9, "Network Element Start Up and Provisioning".
- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress.

Tools, Test Sets and Accessories

The following equipment is required for performing installation tests at end terminal, dual facing shelf, repeater or OT offices:

Table 10-1 Local Installation Test Equipment

Equipment	# for End Term. or Dual Face	# for Repeater	# 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 (see Note below)	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 ^g			1
OC-3/STM-1 and/or OC-12/STM-4 optical signal source or test set			1

- a. 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.

Testing Setup Procedure

Perform the following steps to connect the CMC computer to the WaveStar OLS 40G.

⇒ NOTE:

The detailed CMC connection and login procedure is given in "Login Procedure Overview" in Appendix F.

- (1) Log back into the Network Element in **expert** mode as described in the previous chapter if not currently logged in.

⇒ NOTE:

For OT ONLY: If testing an OT only, proceed to "OT Miscellaneous Discrete Tests" on page 10-22. It is assumed that the OT is to be connected to a WaveStar OLS 40G system. If this is not the case, contact your next level of support for the proper procedure.

LED Tests

LED Test Description

The LED test verifies proper operation of LEDs in the WaveStar OLS 40G. Proper LED operation is necessary to assist in trouble isolation. If failed LEDs are indicated (they do not light), replace the circuit pack or module they are in. Only the PWR ON green LEDs are in sockets. Repeat the test 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.

LED Test Procedure

Perform the following steps to test all LEDs on the WaveStar OLS 40G:

- (1) Select FAULT.Test.LED, enter 2 in the Repeat Value box and hit enter.

Requirement: Observe that all LEDs light for 10 seconds, then turn off for 10 seconds. The 20 second sequence repeats, then LEDs revert to their initial state.

**NOTE:**

If the site under test is a repeater only site, proceed to "Auto Turnup Local" on page 10-10.

ODU Tests

ODU Test Description

The optical amplifier output noise is used as a broadband signal source. The purpose of this test is to verify continuity through the ODU.

**NOTE:**

The ODU and its associated OA must have been powered for at least 15 minutes prior to making any tests.

**CAUTION:**

To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105) or the fiber jumpers themselves, unseat these packs before connecting or disconnecting the fiber jumpers to the "IN" and "OUT" ports; then reseat the pack.

**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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

- (1) To perform the following ODU tests, APSD must be disabled to produce a valid OA signal. Disable APSD at this time using the SECURITY.Enter.System command.

**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 33 dB attenuator cable between the optical source and the meter.

Line 1 Test

(2) Open the input to the test source amplifier as follows:

- a. For 1A-TX end terminals, verify the fiber is removed from OA 1B IN to verify no signal is driving the OA (refer to Figure 10-1 on page 10-6 for a 1A-TX configuration).
- b. For 1A-RCV end terminals, verify the fiber is removed from OA 1A IN to verify no signal is driving the OA (refer to Figure 10-2 on page 10-7 for a 1A-RCV configuration).

⇒ NOTE:

For a dual facing shelf, consider line 1 a 1A-RCV configuration, and line 2 a 2A-TX configuration.

(3) Connect the output of the source OA to the INPUT port of the ODU for line 1. Refer to Figure 10-1 or to Figure 10-2.

(4) Connect the optical power meter to OCHAN1 OUT of the ODU. Note the power meter reading.

Requirement: The power meter should show a power level greater than -36 dB.

(5) Move the optical power meter to the next OCHAN_ OUT and measure the power level.

Requirement: The power meter should show a power level greater than -36 dB.

(6) Repeat for each successive OCHAN_ OUT.

(7) Return the intrashelf fiber jumpers to their original positions when complete.

Lines 2, 3 & 4 Tests

Repeat the test for Line 1 for all other lines, using the appropriate ODUs and OAs for each line.

- When finished testing, enter the SECURITY.Enter.System command in the CMC to ENABLE the APSD feature. APSD must be enabled for safety purposes.

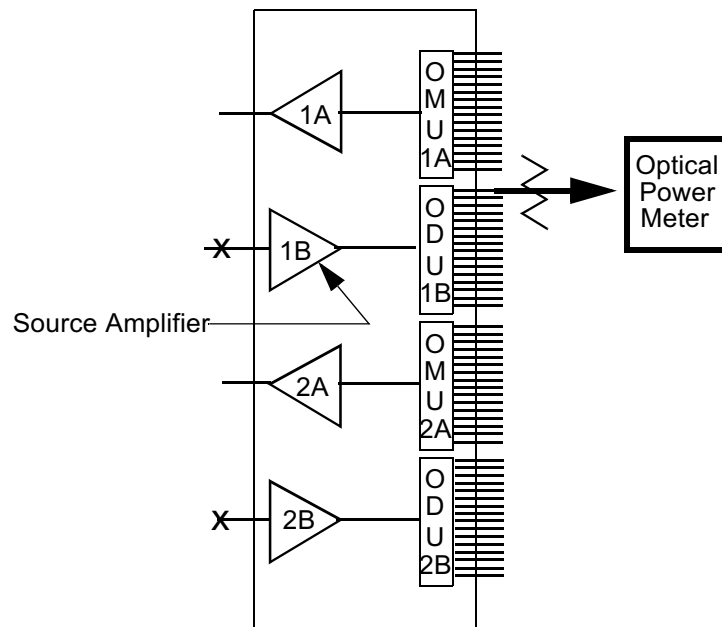


Figure 10-1 ODU Line 1 Verification Connections (1A-TX)

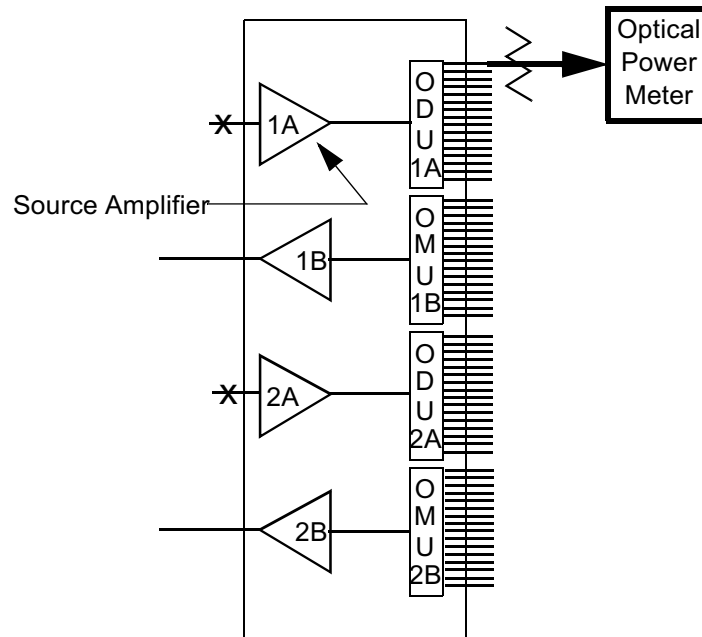


Figure 10-2 ODU Line 1 Verification Connections (1A-RCV)

OMU Tests

OMU Test Description

The optical amplifier output noise is used as a signal source to verify continuity through the OMU. The ODU is used to filter the wide-band noise into a narrow band. The OMU inputs are not wavelength-sensitive, so the ODU OCHAN1 output is used for convenience.

OMU Test Procedure

**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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

- (1) To perform the following OMU tests, APSD must be disabled to provide a valid amplifier signal. Disable APSD at this time.

Line 1 Test

As shown in Figure 10-3 on page 10-9, use the output of the ODU from line 1 to test the OMU for line 1 as follows:

- (2) Open the input to the test source amplifier by removing the fiber at the OA input. (Any OA can be used in the Single OA configuration.)
- (3) Connect the output of that OA to the INPUT of an ODU.
- (4) Connect the optical power meter to OCHAN1 OUT of the ODU. Use a 33 dB attenuated test cable if necessary.

**NOTE:**

If you are using a power meter capable of +16 dBm or greater input level, the 33 dB test cable will not be needed.

- (5) Note the power meter reading or zero the power meter for relative power measurement.
- (6) Disconnect the power meter from the ODU and connect it to OMU OUT of Line 1 OMU (the first OMU to be tested).
- (7) Connect OCHAN1 OUT of the ODU with a fiber jumper to OCHAN1 IN of Line 1 OMU.
- (8) **For the 8 wavelength OMU (505A):** Verify a power level difference from the first reading of between -8 and -13 dB.
For the 16 wavelength OMU (506A): Verify a power level difference from the first reading of between -12 and -19 dB.

⇒ NOTE:

The purpose of this test is to verify a single channel loss through the OMU of between 8.5 and 12.5 dB for the 8 wavelength OMU (505A), and between 12.5 and 18.5 dB for the 16 wavelength OMU (506A). If the loss is greater than 13 dB for the 505A or greater than 19 dB for the 506A, clean the optical connections and retest. If the loss is still greater than these values, contact your next level of support.

(9) Verify optical channels 2 through 8/16 by moving the connection on Line 1 OMU from the measured OCHAN OUT to the next OCHAN OUT and repeating step 7.

(10) Return the intrashelf fiber jumpers to their original positions when complete.

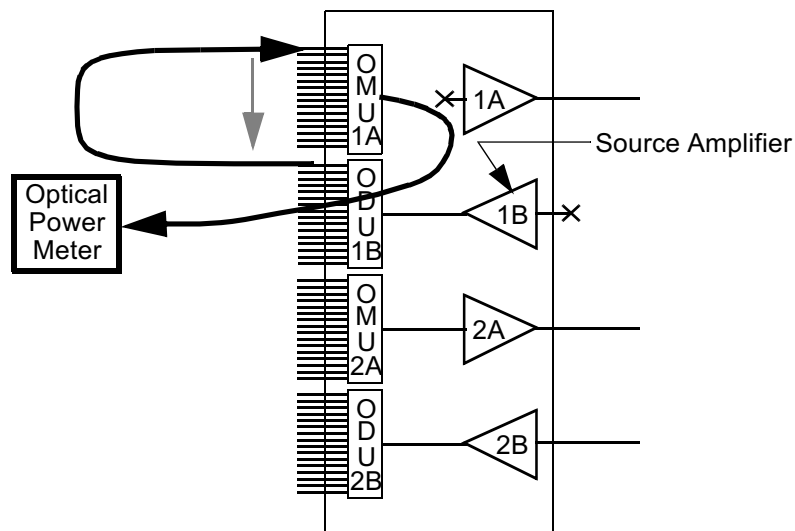


Figure 10-3 OMU Line 1 Verification Connections (1A-TX)

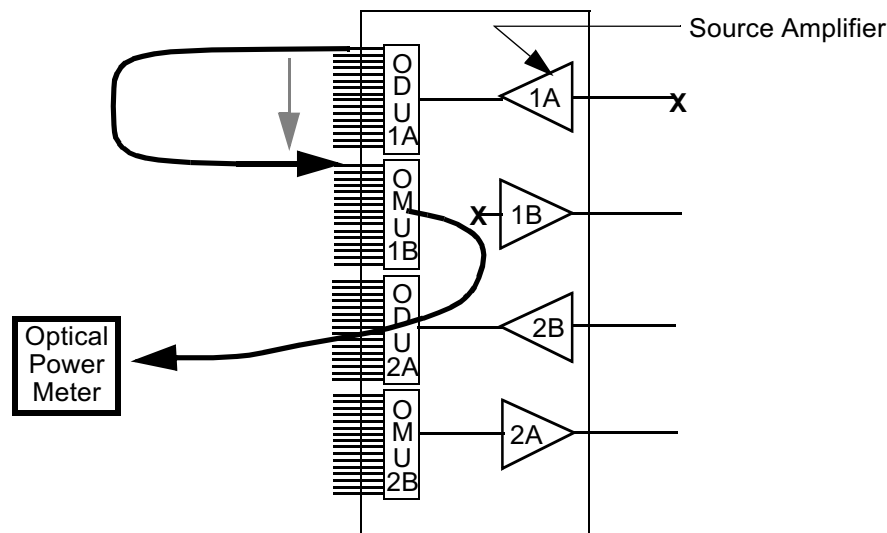


Figure 10-4 OMU Line 1 Verification Connections (1A-RCV)

Lines 2, 3 & 4 Test

Repeat the previous test for any other equipped lines

- When finished performing the OMU tests, enter the SECURITY.Enter. System command to ENABLE the APSD. The APSD feature must be enabled for safety purposes.

Auto Turnup Local

Auto Turnup (local) Test Description

This test verifies the customer maintenance signal (CMS) connections on the TLM packs and verifies the supervisory (SUPR) signal path through the TLM and OA units and the intrashelf jumpers. The test may take up to 5 minutes to complete. A more detailed description of the test is given in Chapter 13.

If failed slots are indicated, replace the circuit pack. Repeat the test until all lines pass the test. If the line is not fully equipped, move circuit packs into unequipped lines and repeat the test. If many different circuit packs fail in the same slot, there may be a wiring problem on the shelf. If so, contact your next level of support.

Also, since an optical loopback is required, this test verifies proper operation of the jumpers to the LGX.

Auto Turnup Local CMS Test Procedure

Perform the following steps for Auto Turnup Local CMS test:

- (1) Verify there are no fiber connections to the OA input and output connectors at the LGX panel.
- (2) Loop the customer maintenance signal connectors (CM IN to CM OUT) using **multimode** fiber jumpers. (These are usually colored grey or orange.)

For End Terminals, loop both lines as shown in Figure 10-5 on page 10-11.

For Repeaters, loop both lines (2 loops per line) as shown in Figure 10-6 on page 10-12.

For an Example of Single OA configurations, see Figure 10-7 on page 10-12.

- (3) Execute CONFIGURATION.Update.

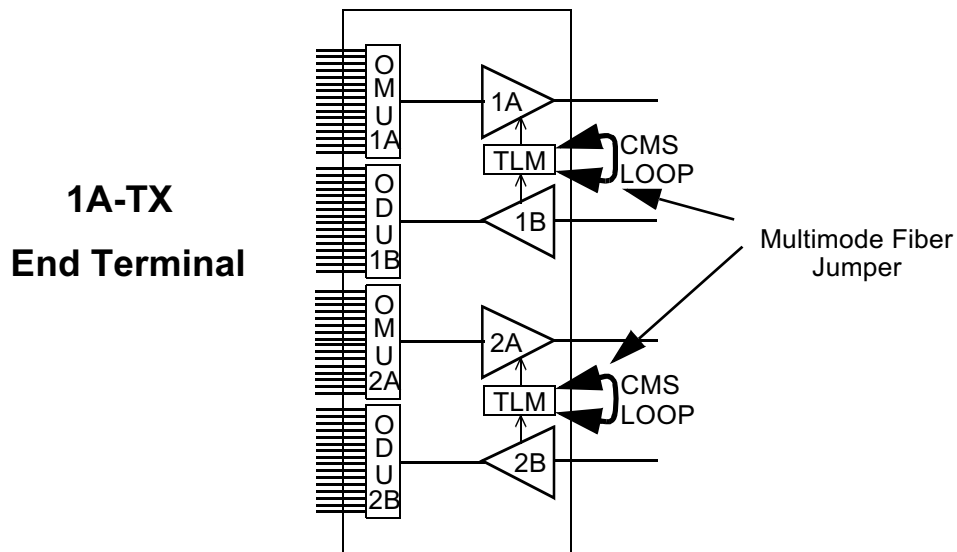


Figure 10-5 Auto-Turnup-Local CMS Connections(1A-TX shown)

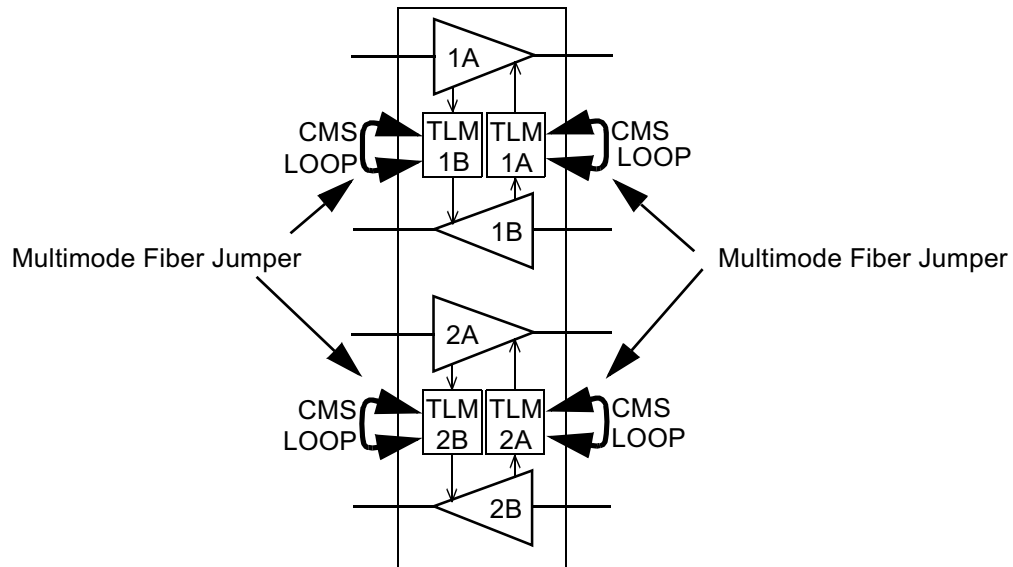


Figure 10-6 Auto-Turnup-Local CMS Connections for Repeaters

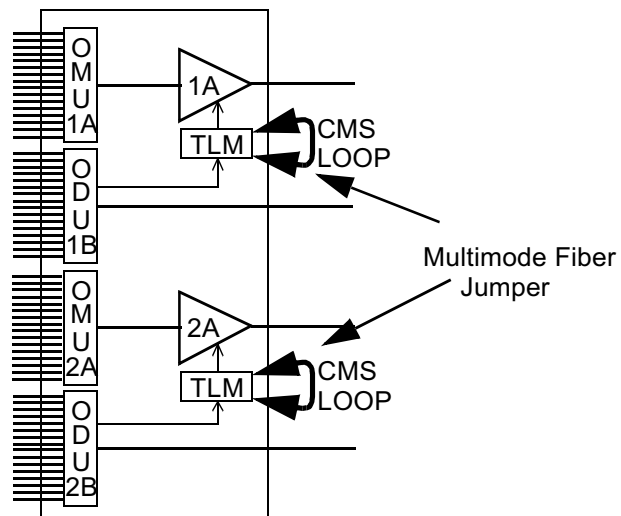


Figure 10-7 Auto-Turnup-Local CMS Connections for Single OAs

- (4) Select the command `FAULT.Test.Auto.Local` and press Enter. In the box provided, type in the words CMS, ALL. This test will take up to 5 minutes, depending on how many lines are equipped. Login in expert mode if the command is not found.

Requirement: Results will be displayed on the CMC screen. Good slots will report as Good. Failed slots will report as Fail. A "-" represents an untested slot (not equipped). If any slot fails, move its circuit pack to a known good slot and retest. If the failure moves with the pack, it indicates a bad pack. If the slot fails when equipped with a known good circuit pack, it indicates a possible backplane problem. Contact your next level of support.

- (5) Remove optical CMS loopback cables.
- (6) Repeat steps 1 to 5 for any other equipped lines until all lines are tested.
- (7) Execute `CONFIGURATION.Update`.

Requirement: The command clears CMS loss of signal alarms.

Auto Turnup Local SUPR Test Procedure - End Terminals

For Repeater Installations, proceed to "Auto Turnup Local SUPR Test Procedure - Repeaters" on page 10-16.



CAUTION:

To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105) or the fiber jumpers themselves, connect the fiber jumpers to the "IN" and "OUT" ports with these transmission packs **unseated**, then latch them into the shelf.



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 Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

To perform the following tests, the APSD feature must now be disabled to provide a valid OA signal.

Perform the following steps for Auto Turnup Local SUPR test:

- (1) Loop back the line 1 high speed signal as follows:
 - a. Connect OA OUT of the transmitting OA to OA IN of the receiving OA through 33 dB of attenuation as shown in Figure 10-8.
 - b. For Single OA applications, connect the transmit OA OUT to the ODU directly as shown in Figure 10-9 on page 10-16. There will be no receive OA for these applications. Use a 10 dB LBO on the OA OUT and a 5 dB LBO on the TLM IN and a fiber jumper in between; do not use the 33 dB cable.
- (2) Loop back the line 2 high speed signal as follows:
 - a. Connect OA OUT of the transmitting OA to OA IN of the receiving OA through 33 dB of attenuation as shown in Figure 10-8.
 - b. For Single OA applications, connect the transmit OA for Line 2 to the ODU directly, as shown in Figure 10-9 on page 10-16. There will be no receive OA for these applications. Use a 10 dB LBO on the OA OUT and a 5 dB LBO on the TLM IN and a fiber jumper in between; do not use the 33 dB cable.
- (3) Verify the customer maintenance signal connectors (CM IN/CM OUT) are not looped.
- (4) Execute CONFIGURATION.Update.

Requirement: The command clears loss of signal alarms. FAULT LEDs on all OAs are off and are not flashing.
- (5) Execute FAULT.Test.Auto.Local. Enter SUPR-All in the box provided. This test will take up to 5 minutes, depending on how many lines are equipped (typically less than 1 minute).

Requirement: Results will be displayed on the CMC screen. A good slot will report Good. A failed slot will report FAIL. A "-" represents an untested slot (no circuit pack equipped). If any slot fails, move it's circuit pack to a good slot and verify the test again. Replace the circuit pack in the failed slot if indicated that the failure moves with the pack.
- (6) Remove the 33 dB and non-attenuated optical loopback cables, the 10 dB LBOs on the OA OUT ports, and the 5 dB LBOs on the TLM IN ports.
- (7) Execute CONFIGURATION.Update.
- (8) Repeat steps 1 to 8 for any other equipped lines (3 or 4) until all lines are tested.

- (9) When finished testing, enter the SECURITY. Enter.System command to enable APSD. The APSD feature must be enabled for safety purposes.

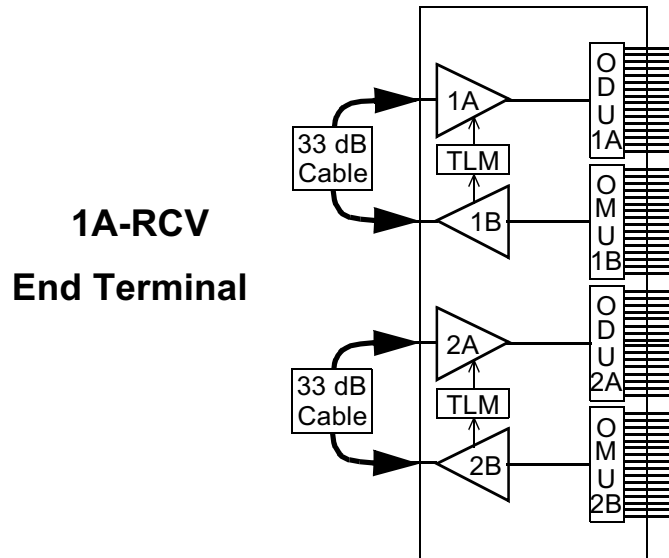


Figure 10-8 Auto-Turnup-Local SUPR Connections for 2 OAs (1A-RCV)

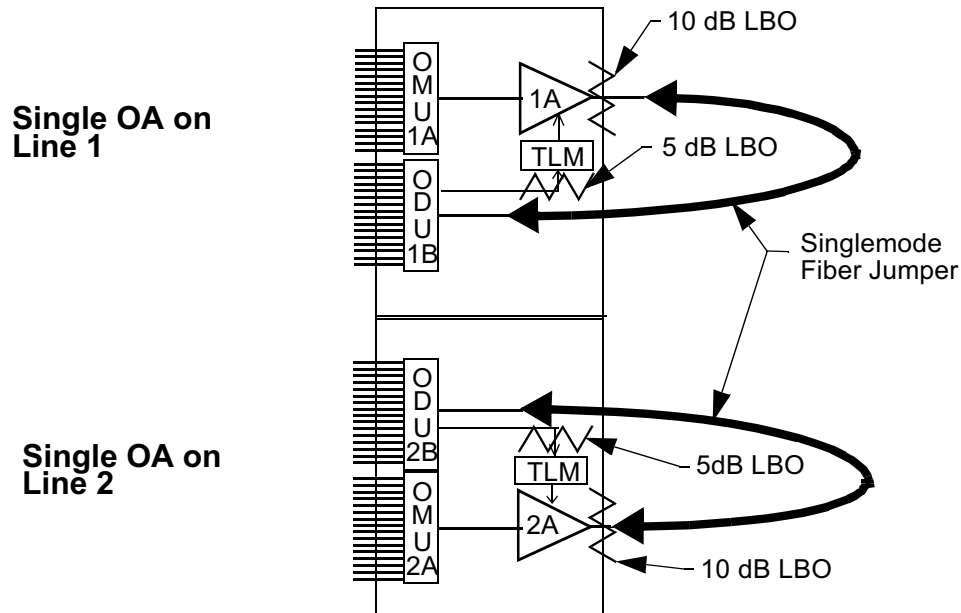


Figure 10-9 Auto-Turnup-Local SUPR Connections for Single OAs

Auto Turnup Local SUPR Test Procedure - Repeaters

Perform the following steps for Auto Turnup Local SUPR test:



CAUTION:

To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105) or the fiber jumpers themselves, connect the fiber jumpers to the "IN" and "OUT" ports with these transmission packs **unseated**, then latch them into the shelf.



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 Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

To perform the following tests, the APSD feature must be disabled.

- (1) Loop back the line 1 high speed signals by connecting the OA 1A output to the OA 1B input through 33 dB of attenuation and the OA 1B output to the OA 1A input through 33 dB of attenuation as shown in Figure 10-10.
- (2) Loop back the line 2 high speed signals by connecting the OA 1A output to the OA 1B input through 33 dB of attenuation and the OA 1B output to the OA 1A input through 33 dB of attenuation as shown in Figure 10-10 on page 10-18.
- (3) Verify the customer maintenance signal connectors are not looped.
- (4) Execute CONFIGURATION.Update.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both OAs are off and are not flashing.

- (5) Execute FAULT.Test.Auto.Local. Enter SUPR-ALL in the provided box and click on enter. This test will take up to 5 minutes, depending on how many lines are equipped.

Requirement: Results will be displayed on the CMC screen. A GOOD represents a good slot. A FAIL represents a failed slot. A "-" represents an untested slot (no circuit pack equipped). If any slot fails, move its circuit pack to a good slot and verify the test again. Replace the circuit pack in the failed slot if indicated that the failure moves with the pack.

- (6) Remove optical loopback cables.
- (7) Execute CONFIGURATION.Update.
- (8) Repeat steps 1 to 7 for any other equipped lines (3 or 4) until all lines are tested.

- (9) When finished with this test, enter the SECURITY.Enter.System command to ENABLE the APSD. The APSD feature must be enabled for safety purposes.

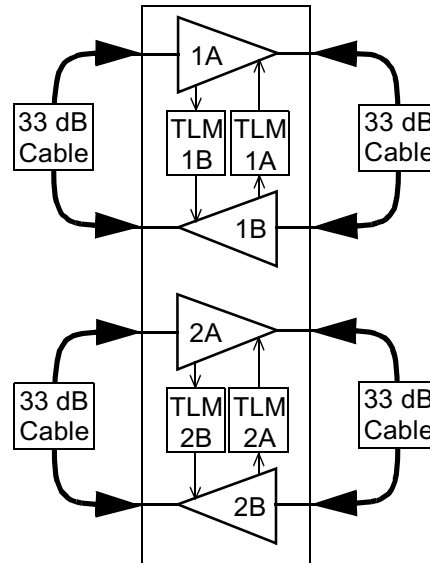


Figure 10-10 Auto-Turnup-Local SUPR Connections for Repeaters

Local Operational Tests

Local Operational Tests Description

The local operational tests verify that the office alarms and CIT-DTE connections are operating properly.

Local Alarm Test Procedure

- (1) Notify alarm monitoring personnel that testing is taking place on the office alarm systems.
- (2) Connect local alarm cable to P29 (OFFICE ALARMS) on the interconnecton panel.

 NOTE:

If installing the office alarm cable on an End Terminal for 4 Bidirectional Optical Lines or a Repeater for 4 Bidirectional Lines, use the P29 connector located on the lower shelf. If the upper shelf is used, the ACO function will not work properly.

(3) Select FAULT.Test.Alarm, enter "all" in the first box, enter "2" in the Repeat Value box, and hit Enter. The test will cycle through each alarm state and then repeat. The alarm states are tested in this order:

- c. CR alarm
- d. MJ/Prompt alarm
- e. MN/Deferred alarm
- f. All alarm LEDs off

Requirement: Verify that the office audible alarms, visual alarms, and the LEDs on the indicator strip are reflecting the correct alarm status. The NE ACTY will be lighted throughout the test.

 NOTE:

This tests the CR, MJ/Prompt, and MN/DEFR alarms. The ABN, FE ACTY (INFO-F), and NE ACTY (INFO-N) are not tested.

(4) Select FAULT.Test.Alarm, enter MJ from the drop down menu and hit enter. During the alarmed 10 seconds, 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.

Parallel Telemetry Test Procedure

If parallel telemetry is used, perform the following steps to verify parallel telemetry.

(1) Select FAULT.Test.Telemetry.Parallel, select "all" and hit Enter.

Requirement: Parallel telemetry alarm is activated.

Miscellaneous Discrete and Extended Miscellaneous Discrete Alarm 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 FAULT.Retreive.Condition, enter "all" and hit Enter.

Requirement: Verify the environmental alarm shows in the report.

CIT(CMC)-DTE Port Test Procedure

NOTE:

This procedure requires the use of a null modem, since like ports (DTE and DTE) are to be connected together. Null-Handshake null modem wiring is given in Figure 10-11 on page 10-20. Also, refer to the troubleshooting section for the minimum CIT (CMC) Connection information. This type of connector is required for this test. Be sure to obtain a connector with the correct mating pins or sockets required for your cable and WaveStar OLS 40G DTE port.

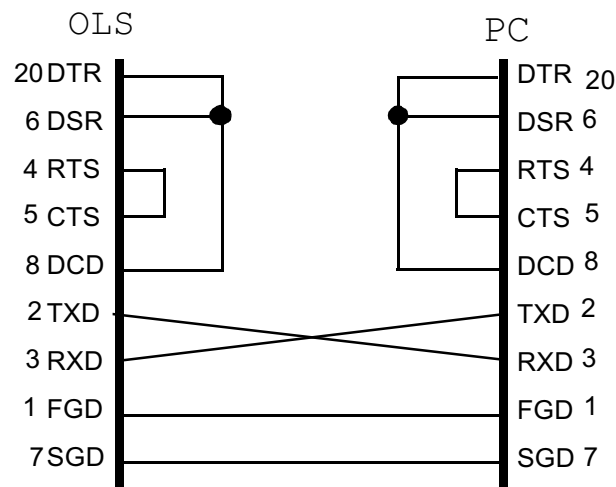


Figure 10-11 Null Handshake Null Modem Wiring

Serial Interface port signals and connector pinouts for DB9, DB25, and RJ45- 8 pin ports are given in Table 10-2, "Serial Port Pinout information," on page 10-21 for reference.

Table 10-2 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

Perform the following steps to verify DTE port operation.

- (1) Remove the CIT (CMC) cable from the user panel.
- (2) Using the null modem adapter, connect the CIT (CMC) cable to the DTE connector on the interconnection panel.

**NOTE:**

For additional information regarding logging in to the Network Element, refer to the Software Release Description.

- (3) Follow the steps listed in the section, "Connecting to the Network Element" on page 9-13 to login to the NE.
- (4) When finished with that procedure, logout from the CMC.
- (5) Remove the null modem from the cable.

Final Operations

Perform the following to complete the testing of the WaveStar OLS 40G:

- Place protective covers on all optical connectors.

- If the WaveStar OLS 40G is to be a stand alone system (i.e. no OT installation at this time), proceed to Section 11, otherwise continue with procedure for testing the OT system.

**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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

- Verify the APSD feature is ENABLED. To enable the APSD, enter the SECURITY.Enter.System command.

OT Miscellaneous Discrete Tests

**NOTE:**

This test does not apply to Release 3.0 and subsequent releases using integrated OLS/OT systems.

The testing of the miscellaneous discrete contacts is performed as a combined OT/OLS test using a fully tested OLS. The test verifies:

- The operation of the miscellaneous discretes on each OTU circuit board and at each OT slot connector
- The wiring to the EMDU
- The EMDU itself
- The TBOS link to the WaveStar OLS 40G
- The WaveStar OLS 40G software

To start testing of miscellaneous discretes the following steps must have been completed:

- The WaveStar OLS 40G must be installed and tested.
- The WaveStar OLS 40G must be loaded with Release 2.0 or greater software.
- Wiring to the EMDU from the OT must be complete as described in Appendix D for Dantel EMDU information, or Appendix E for Harris EMDU information.

- Wiring to the EMDU from the WaveStar OLS 40G and the -48 Volt supply voltage must be complete as specified in Appendix D or E.
- Switch and strap settings on the EMDU must be completed as described in Appendix D or E. If switch setting must be changed, the DANTEL EMDU must be powered down for the new settings to be activated.
- The OLS and OT are **not** integrated as defined in OLS R3.0 and subsequent releases.

Testing OT Miscellaneous Discrete Alarms on Non-Integrated OLS/OT Systems

The procedure for testing miscellaneous discrete alarms is as follows:

1. Enable the Serial Telemetry Port by selecting the following command through the CMC. Select SECURITY.Enter.Channel_Identifier.Security. In the AID box select, SER_TLM1, in the PORTACC box click on enable.

If a SER-TLM alarm comes on after enabling the port, communications is not being made with the EMDU (DANTEL or Harris). Check that the serial telemetry cable from the EMDU is connected to the SER TLM 1 port of the WaveStar OLS 40G. Check that the WaveStar OLS 40G end terminal that is receiving the Serial Telemetry cable has been activated. Verify wiring and switch setting at the EMDU. Check that EMDU is powered.

2. Verify the WaveStar OLS 40G is alarm free using the command:

FAULT.Retrieve.Condition - all

3. If environmental alarms exist, clear the environmental alarms before proceeding. Use Table 10-3 on page 10-23 to identify the OT slot associated with each alarm. The presence of an environmental alarm indicates that the alarm wiring has a short. Locate and repair short.

Table 10-3 OLS Alarm Numbers verses OT Slot Number

OT SLOT Number	Circuit Pack Fail OLS Alarm Number	Incoming Signal Failure OLS Alarm Number	OT SLOT Number	Circuit Pack Fail OLS Alarm Number	Incoming Signal Failure OLS Alarm Number
1	17	49	17	33	65
2	18	50	18	34	66
3	19	51	19	35	67
4	20	52	20	36	68
5	21	53	21	37	69

OT SLOT Number	Circuit Pack Fail OLS Alarm Number	Incoming Signal Failure OLS Alarm Number	OT SLOT Number	Circuit Pack Fail OLS Alarm Number	Incoming Signal Failure OLS Alarm Number
6	22	54	22	38	70
7	23	55	23	39	71
8	24	56	24	40	71
9	25	57	25	41	73
10	26	58	26	42	74
11	27	59	27	43	75
12	28	60	28	44	76
13	29	61	29	45	77
14	30	62	30	46	78
15	31	63	31	47	79
16	32	64	32	48	80

4. Install, but do not seat OT circuit packs into the Complementary Shelf 2 (top shelf) starting with OT Slot 32 continuing in a decreasing numerical sequence. If the Complementary Shelf 2 becomes full, continue loading into Complementary Shelf 1 starting with OT slot 20 and continuing to the next lowest slot number until all the OTUs have been installed. The OT code location is not important at this time.
5. Following the general circuit pack installation considerations given at the beginning of this section, seat the OTU mounted in slot 32.

Requirement: The fault LED should be on continuously at initial circuit pack installation. Less than one minute after insertion, the fault LED will change to flashing and remain flashing.

6. Apply a SONET/SDH signal (-27 to -11 dBm) to the input of the OTU/OTPM in slot 32. This signal may be obtained from any SONET/SDH equipment or an appropriate test set.

Requirement: Less than one minute after applying a signal to the input of the OTU/OTPM, the flashing LED will turn OFF.

7. One minute after the LED turns OFF, unseat the OTU/OTPM while keeping the fiber connected to the input of the pack. This fiber may be disconnected from the input once the pack is unseated.

8. Verify the operation of the miscellaneous discrete alarms by reviewing the Alarm History report using the command: `FAULT.Retrieve.Log`. A sample report is shown in Figure 10-12 on page 10-25.

FAULT.Retrieve.Log				
Target ID: MUTT				Date: 97-11-12 Time: 15:30:39
AID	DATE	TIME	ALMLVL	EVT_DESC
env-70	11-12	15-30-30	MN	environment 70
env-45	11-12	15-30-28	MN	environment 45
env-38	11-12	15-30-27	MN	environment 38
ATT01	11-12	15-30-25	-	Enter-Channel ID-Security:ser_tlm1-COMPL
ATT02	11-12	15-22-43	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-42	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-41	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-40	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-39	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-39	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-38	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-37	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-36	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-36	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-35	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-34	-	Set-PM Th-SUPR:supr-4a-COMPLD
ATT02	11-12	15-22-33	-	Set-PM Th-SUPR:supr-3a-COMPLD
ATT02	11-12	15-22-32	-	Set-PM Th-SUPR:supr-3a-COMPLD
ATT02	11-12	15-22-32	-	Set-PM Th-SUPR:supr-3a-COMPLD
tlf-dcc	11-12	15-22-32	-	Login:ATT01
ATT02	11-12	15-22-31	-	Set-PM Th-SUPR:supr-3a-COMPLD
ATT02	11-12	15-22-30	-	Set-PM Th-SUPR:supr-3a-COMPLD
ATT02	11-12	15-22-29	-	Set-PM Th-SUPR:supr-3a-COMPLD
ATT02	11-12	15-22-29	-	Set-PM Th-SUPR:supr-3a-COMPLD

Figure 10-12 FAULT.Retrieve.Log Sample Report

Requirement: The history report must show environment 48 ON and environment 80 ON. They must be followed by an environment 48 Cleared and environment 80 Cleared. The order in which the alarms clear is not a requirement. All other alarms must be OFF. If another environment alarm is ON, it may be shorted to one of the OT slot 32 alarms (env 48 or env 80).

9. Repeat steps 5 through 8 at the next lowest OT slot until all the OTU/OTPMs that were installed have been tested. After testing the last OTU/OTPM, remove it from its slot and move it down to the next lowest numbered slot. Repeat steps 5 through 8. Repeat this sequence until all 32 slots have been tested.

10. Request a history report using the command:

FAULT.Retrieve.Log.**CRITICAL** - Verify proper operation of all the alarms. Report will be similar to an abbreviated report shown in Figure 10-12 on page 10-25.

Installing OTU/QOTU/OTPMs into Final Positions

The installation instructions will specify the location of each OTU/QOTU/OTPM circuit pack.

Following the precautions previously listed at the beginning of this section, install and seat all OTU/OTPM circuit packs into their final positions. All OTU/OTPMs at this time should have their faceplate LEDs flashing.

Provisioning of Miscellaneous Discretes

The miscellaneous discretes alarms (environmental alarms with an assigned number) will be assigned appropriate descriptions. Environmental alarms 17 through 48 will be CP FAIL OTU #. Environmental Alarms 49 through 80 will be identified as LOS OTU "N" where "N" is the associated OTU slot number. Only slots with OTUs in them need to be provisioned. Refer to Table 10-3 on page 10-23 to obtain the alarms associated with each OTU slot and its function.

In addition to the OTU miscellaneous discrete alarms, each shelf has two alarms to indicate an A or B power failure for a total of 6 alarms. The power fail alarms are environmental alarms 81 through 86. They are listed in Table 10-4 on page 10-26 along with their descriptions for provisioning.

Table 10-4 Power Fail Miscellaneous Discrete Alarms

Environmental Alarm No.	Alarm Description	Provisioned Description
81	A Power Fail - System Shelf	A PWR FAIL SYS
82	B Power Fail - System Shelf	B PWR FAIL SYS
83	A Power Fail - Complementary Shelf 1	A PWR FAIL CMP 1
84	B Power Fail - Complementary Shelf 1	B PWR FAIL CMP 1
85	A Power Fail - Complementary Shelf 2	A PWR FAIL CMP 2
86	B Power Fail - Complementary Shelf 2	B PWR FAIL CMP 2

To explain the provisioning process an example is presented.

Example: Provision an OTU/QOTU mounted in slot 12.

Go to Table 10-3, "OLS Alarm Numbers verses OT Slot Number," on page 10-23 and look up the alarms associated with OTU Slot 12. They are environmental alarm 28 (CP Fail) and 60 (LOS).

To provision each alarm enter the following command through the CMC:

CONFIGURATION.Set.Attribute.Environment, enter env in the AID box, select 28 in the second box.

In the ALarm Level Box, select MN_deferred.

In the ALMMSG box, type in capital letters CP FAIL OTU 12.

Click on Enter.

MUTT - Microsoft Internet Explorer

Back | Forward | Close

CenterLink Management Console

NE Command Manager

Lucent Technologies
Bell Labs innovations

Contents:
2.1.0-OLS

- FAULT
- >> CONFIGURATION
- PERFORMANCE
- SECURITY
- ADVANCED
 - Copy
 - Delete
 - Edit
 - Enter
 - Initialize
 - Retrieve
 - Set
 - Attribute
 - Alarm
 - Control
 - Environment
 - Update

CONFIGURATION.Set.Attribute.Environment

TID (Target Identifier)	MUTT
AID (Access Identifier)	ENV 28
NTFCNCDE (Notification Code)	MN_Deferred
ALMMSG (Alarm Message)	CP FAIL OTU 12

Enter Clear Help

Repeat the process for environmental alarm 60 so that it will be provisioned LOS OTU 12.

Repeat the process until the alarms for all installed OTU/QOTUs have been provisioned. OTU slots that are without OTU circuit packs need not to be provisioned at this time.

When the alarm provisioning has been completed, request a listing of the provisioned alarms using the following command:

CONFIGURATION.Retrieve.Attribute. Select Env and All. Click on Enter.

Table 10-5 on page 10-28 shows a partial listing of all the provisioned alarms. Compare the sample provisioned alarm descriptions on the CMC screen with those given in Table 10-6, "OTU Code vs. Wavelength, Output Power, and Tone Frequency," on page 10-30.

Table 10-5 Provision Alarm Descriptions

Address	Alarm Level	Description
env-46	MN/DEFR	CP FAIL OTU 30
env-47	MN/DEFR	CP FAIL OTU 31
env-48	MN/DEFR	CP FAIL OTU 32
env-49	MN/DEFR	LOS OTU 1
env-50	MN/DEFR	LOS OTU 2
env-51	MN/DEFR	LOS OTU 3

Final Testing of OTU Circuit Packs

Test Description

The purpose of this test will be to determine that the OTU/OTPM receiver is operational and the transmitter output power is within specification. A SONET/SDH signal appropriate to the type of pack is required to perform this task. The OTU/OTPM transmitter will not turn ON unless it is receiving a signal at its input.

NOTE:

If the Quad Optical Translator Unit is used the following should be considered:

- disconnect the fibers to all OTPMs in a QOTU before the QOTU is engaged or disengaged from the backplane,
- disconnect the fibers from an OTPM before inserting or removing it from a QOTU,

- disconnect the 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.

Test Procedure

Perform the following steps to test the OTU/OTPMs:



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 33 dB attenuator cable between the optical source and the meter.



NOTE:

The following engineering rules must be followed when using the 41S Quad OT.

1. If the 41S Quad OTU is to be fully populated with 4 port modules (42A/B, 43A/B, or 44A/B), no more than one of them can be a B-type module.
2. If the 41S Quad OTU is to have 3 or fewer port modules, they can be any combination, including up to 3 (three) B type port modules.



NOTE:

The 41A(1-16)B, 41C(1-16)B, 41A(1-16)C, 41C(1-16)C and/or 41BB **MUST** be used for Miscellaneously Mounted Installations.



NOTE:

The 41A(1-16)C replaces the 41A(1-16) and 41A(1-16)B; the 41C(1-16)C replaces the 41C(1-16) and 41C(1-16)B.

- (1) Obtain an appropriate signal from the associated SONET/SDH transmission equipment or a SONET/SDH test set. Verify with an optical power meter that the source is within the input specification of the OTU/OTPM (-27 to -11 dBm).
- (2) Connect the 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.

Requirement: The output power from the OTU/OTPM Code shall be between the minimum and maximum power specified in Table 10-6 on page 10-30 and the fault LED shall be OFF.

⇒ NOTE:

The 42-, 43-, and 44-Type OTPMs have the same wavelength as the 41-type OTUs shown in the table below. The tone frequency and output power, however, are different. The output power of the 42-type is 3 dB less than the output of the 41-type at each wavelength. The 43-type is 6 dB less than the output of the 41-type at each wavelength. The 44-type is either 3 dB or 6 dB less, depending on its power setting.

(3) If the OTU/OTPM meets requirement, replace the protective INPUT and OUTPUT caps. Do not install input or output fibers.

(4) Repeat steps two and three until all the OTU/OTPMs have been tested.

Table 10-6 OTU Code vs. Wavelength, Output Power, and Tone Frequency

OTU CODE (Includes no-suffix, B-suffix, and C-suffix OTUs)	Center Wavelength (nm)	Output Power Range (dBm)	Approximate Tone Frequency (KHz)
41A1, 41C1, 41D1	1549.31	-5.0 to -3.0	5
41A2, 41C2, 41D2	1550.91	-6.3 to -4.3	7
41A3, 41C3, 41D3	1552.52	-7.5 to -5.5	9
41A4, 41C4, 41D4	1554.13	-8.2 to -6.2	11
41A5, 41C5, 41D5	1555.75	-8.7 to -6.7	15
41A6, 41C6, 41D6	1557.36	-9.2 to -7.2	17
41A7, 41C7, 41D7	1558.98	-9.0 to -7.0	19
41A8, 41C8, 41D8	1560.61	-7.5 to -5.5	21
41A9, 41C9, 41D9	1548.51	-1.3 to -2.7	23
41A10, 41C10, 41D10	1550.11	-4.9 to -5.3	24
41A11, 41C11, 41D11	1551.72	-5.1 to -6.5	25
41A12, 41C12, 41D12	1553.33	-6.1 to -7.5	26
41A13, 41C13, 41D13	1554.94	-6.7 to -8.1	27
41A14, 41C14, 41D14	1556.55	-7.2 to -8.6	28
41A15, 41C15, 41D15	1558.17	-7.4 to -8.9	29
41A16, 41C16, 41D16	1559.79	-6.5 to -7.9	30

OTU CODE (Includes no-suffix, B-suffix, and C-suffix OTUs)	Center Wavelength (nm)	Output Power Range (dBm)	Approximate Tone Frequency (KHz)
41B, 41E	1310.00	0.0 to 2.0	NA

Miscellaneous Discrete Power Fail Test - Non-integrated OLS/OT Systems

The miscellaneous discrete Circuit Pack Fail Alarm is required to turn ON for all OTUs within a shelf when there is either an A or B supply failure. In addition, each shelf will have two miscellaneous discrete Power Fail alarms, one for the A power source and the other for the B power source.

The procedure for testing this alarm operation is as follows:

1. Verify that all OTU/QOTU/OTPMs are seated in their slots and are powered. All OTU/OTPMs should have their faceplate LEDs flashing.
2. Verify by using the CMC command FAULT-RETRIEVE-ALARM-ALL that the slots with OTU/OTPMs have only Incoming Signal Fail (LOS) Alarm (alarms 49 through 72). Alarm numbers 17 through 48 (CP FAIL) are to be OFF. Power Fail alarms, 81 through 86 are to Off.
3. Remove the A fuse from the System Shelf.
4. Verify using the CMC that the correct Power Fail Alarm has turned ON (refer to Table 10-4 on page 10-24). All other Power Fail alarms are to be OFF.
5. Verify that the circuit pack fail alarms (CP FAIL) turn ON for all the OTU/QOTUs plugged into the System Shelf. These circuit pack fail alarms will only appear on the CMC terminal. The circuit pack faceplate LEDs will remain flashing during this test.
6. Replace the A fuse and **WAIT** until the alarms clear on the CMC.
7. Repeat the test for the B fuse on the System Shelf.
8. Repeat steps 3 and 7 for Complementary Shelves 1 and 2 if installed.
9. When completed, unplug OTU/QOTUs and leave in slots.

Final Operations

Complete the following checks before proceeding to integration testing.

- Verify the APSD feature is ENABLED by entering the command:
SECURITY.Retrieve.System. If it is disabled, enable it at this time using the
SECURITY.Enter.System command.
- Verify that the OTU/QOTUs are mounted in the correct slots
- Verify that the correct codes are in these slots.
- All OTU/QOTUs should be unseated in their slots.
- All fibers are disconnected from the OTU/OTPMs.
- Dust caps are on the input and output ports of each OTU/OTPM.
- OTU/OTPM fibers have protective caps on them.

This completes the start up and local installation testing of the WaveStar OLS 40G and OT. Proceed to the next section for further installation and testing.

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Overview

This section describes how to establish the optical line system. Some general information on Lightwave jumpers, and optical line buildouts is given in the following sections as a quick reference. Refer to 365-575-341 WaveStar OLS 40G User/Service Manual for complete details. Read and understand the optical line buildout selection procedure before starting to connect fibers.

General Considerations



WARNING:

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

Note the following before starting the procedures which follow:

- Disconnect the office alarms cable at the WaveStar OLS 40G Network Element before performing any tests. Reconnect the office alarms cable after completing tests.
- Be sure each Network Element has completely passed all of the tests in the previous sections of this document.
- Required equipment is listed in Section 1 of this document, "Overall Installation and Test Considerations". An optical power meter is needed to perform the steps in this section.
- A general familiarity with the CMC is assumed, each and every key stroke is not detailed. Refer to the 365-575-341 WaveStar OLS 40G User/Service Manual, Tab 11, "Craft Interface Terminal Usage", or Appendix F of this document for complete CMC use instructions.

- Do not use cable ties with the optical fiber.
- Place optical fiber jumpers in protective tube or channel, such as polyvinyl chloride (PVC) tubing when running the cable from the WaveStar OLS 40G to the cable rack. Protective tubing is supplied in the Installation Kit (C848065959).
- Place optical fiber jumpers in the cable rack in a protective channel with nothing on top of them.
- Maintain a minimum of 1.5 inches of optical fiber bend radius.
- Optical fiber jumpers require ST, FC/PC, LC, or SC type connectors for connection to the WaveStar OLS 40G.
- Before removing a fiber jumper from an OA output connector, the safest way to avoid damage and minimize the power level is to first unseat the OA.

Table 11-1 lists some of the available jumpers for high speed fiber connection.

Table 11-1 Lightwave Jumpers

Code	Comcode	Length	Description
FS1EP-EP-02	107 149 494	2 ft.	ST II+ -ST II+
FS1EP-EP-10	107 149 536	10 ft.	ST II+ -ST II+
FS1EP-EP-25	107 149 569	25 ft.	ST II+ -ST II+
FS1EP-EP-50	107 149 601	50 ft.	ST II+ -ST II+
FS1EP-EP-100	107 149 627	100 ft.	ST II+ -ST II+
LS1FC-FC-02	107243156	2 ft.	FC - FC
LS1FC-FC-10	106593759	10 ft.	FC - FC
LS1FC-FC-25	107243222	25 ft.	FC - FC
LS1FC-FC-50	107243255	50 ft.	FC - FC
LS1FC-FC-100	107243271	100 ft.	FC - FC

Optical Line Buildouts (LBO)

Faceplate LBOs must be chosen during installation for some OA inputs and outputs. All other inputs and outputs should always be equipped with a 0 dB LBO.

For Releases 1.0 and 2.0, the available LBO values are 0, 3, 5, 7, 10, 15, and 20 dB, corresponding to the nominal LBO attenuation at 1310 nm. These LBOs are yellow colored, except the 0 dB which is white. The actual attenuation of each LBO depends on the wavelength of the attenuated optical signal. For wavelengths

in the range of the WaveStar OLS 40G channels (1555 nm), the actual LBO attenuation is given in Table 11-2.

A wide variety of LBOs are available for Release 2.1. A new family of Green colored single-mode to single-mode LBOs designed for 1550 nm with higher power capability is available. To handle the transition from single-mode to multi-mode another family of LBOs was developed and is Gray colored. **All inputs to OTPMs must use this Gray LBO.**

Refer to Appendix I to obtain tolerances, power ratings, and further data on LBOs.



WARNING:

The 15dB 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.

Table 11-2 ST Connector LBO Values for Releases 1.0 & 2.0

LBO Size	Part No. for Lucent ST Buildout	Actual Attenuation at 1555 nm (dB)	Attenuation Range at 1555 nm (dB)
0	106795354	0.25 +/- 0.25	0.0 to 0.5
3	107380438	2.7 +/- 0.3	2.4 to 3.0
5	107406183	4.7 +/- 0.3	4.4 to 5.0
7	107107740	6.1 +/- 0.4	5.7 to 6.5
10	107408191	9.0 +/- 0.7	8.3 to 9.7
15	107406209	14.0 +/- 0.7	13.3 to 14.7
20	107406217	18.0 +/- 1.0	17.0 to 19.0



NOTE:

These LBOs are yellow-colored except the 0 dB which is white.

Optical LBO Selection Procedure

This procedure is used to select the proper value of Line Build Out to be used on the faceplate of the OA IN jack based on received optical power. The Optical LBO selection procedure is to be used in conjunction with the Receive OA Connection Procedures. Read and understand the procedure now so you will be familiar with it.

- (1) Measure, and record for office records, the received optical power from the far end. Be sure to set the optical power meter for the wavelength of the light (1550nm) to be measured.
- (2) Remove the 0 dB line buildout from the IN connector on the faceplate of the OA. To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the buildout out along the angle it is installed in the faceplate.
- (3) Install the chosen buildout. To install, remove the protective covers from the chosen buildout. Clean the buildout connection of any material or dust. With the tab facing up towards you, slide the buildout into the faceplate of the OA over the fiber end in the faceplate at the angle of the connector block in the faceplate. The buildout will be fully inserted when the tab is very slightly rotated counterclockwise. To lock the buildout in position, rotate the buildout clockwise until a small click is heard. Check that the buildout is locked in position by lightly tugging at it.

Description of Procedures

This section contains procedures to start at the WaveStar OLS 40G DS-NE (assumed to be the 1A Transmit) office and connect sites sequentially to the AGNE (assumed to be the 1A Receive) office. The following procedures are included in this section:

- DS-NE Office Transmit OA Connection Procedure
- Repeater A Direction Connection Procedure
- AGNE Office Receive OA Connection Procedure
- AGNE Office Transmit OA Connection Procedure
- Repeater B Direction Connection Procedure
- DS-NE Office Receive OA Connection Procedure

Sequence of Operations

Operations in this section start at the DS-NE site (1A Transmit) and proceed in the A direction to the other end terminal (AGNE/1A Receive) as shown in Figure 11-1.

Once the installation team reaches the AGNE site again they will proceed back in the B direction to the DS-NE site.

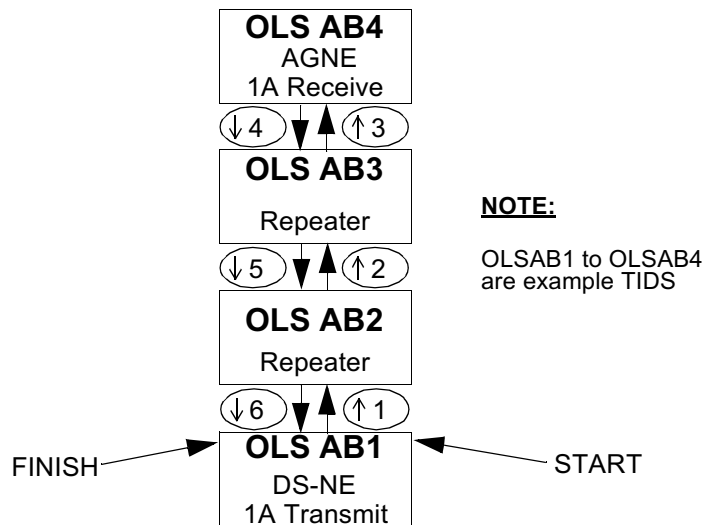


Figure 11-1. System Turnup Sequence of Example System

Critical Considerations

- (1) **Release 2.0 or higher:** For 7 & 8 span applications using LEA7 OAs, place a 3 dB LBO on the output of each Optical Amplifier except those feeding the ODU.
- (2) **Release 3.0 or higher:** For 5 span applications using LEA104 OAs, place a 3 dB LBO on the output of each Optical Amplifier except those feeding the ODU.
- (3) **Release 2.1 or higher:** For 16 wavelength systems, verify the placement of a 7 dB LBO on the receive OA output (between the OA OUT and the ODU IN.)

DS-NE Office Transmit OA Connection Procedure

NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.

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 Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect 1A OA OUT to optical power meter. Use attenuated test cable if necessary. Test point 1P on Figure 11-2.

NOTE:

At any time throughout the test procedure remove attenuated test cable if measured power is within the range of the optical power meter.

- (2) Verify the OA Output Power by referring to the following tables:

- For Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and subsequent releases, refer to Table 11-3 on page 11-7.

Table 11-3 Output Levels for Releases 2.1 and Subsequent Releases

# of equipped wavelengths	OA Type	Side Power Configuration	OA Output Power
0	LEA6	A	8 to 12dB
		B	7 to 11dB
	LEA7	A	8 to 12dB
		B	7 to 11dB
		C	4 to 8dB
	LEA104 (Release 3.0 only)	A	8 to 12dB
		B	7 to 11dB
	LEA105	A	4 to 8dB
		1_OA	4 to 8dB

- (3) Clean then connect the fiber jumper to 1A OA OUT and to the outside plant fiber at the LGX. (Test point 1P on Figure 11-2. on page 11-8). For 7-8 span applications, place a 3dB LBO on the OA OUT port before connecting the fiber.

Line 2 Connections

- (4) Clean then connect 2A OA OUT to optical power meter. Test point 1S on Figure 11-2.
- (5) Verify the OA Output Power by referring to the following tables:
- For Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, refer to Table 11-3 on page 11-7.
- (6) Clean then connect the fiber jumper to 2A OA OUT and to the outside plant fiber at the LGX. Test point 1S on the figure below

If the next office is:	Then perform:
Repeater	Repeater A Direction Connection Procedure
AGNE End Terminal Office	AGNE Office Receive OA Connection Procedure

- (7) For 7-8 span applications, place a 3 dB LBO on the OA OUT port before fiberling.
- (8) For Releases 2.1 and 3.0, execute the CONFIGURATION.Retreive.
Optical_Line command and record the CLF (Channel Loading Factor) for both lines for use in downstream office LBO calculations.

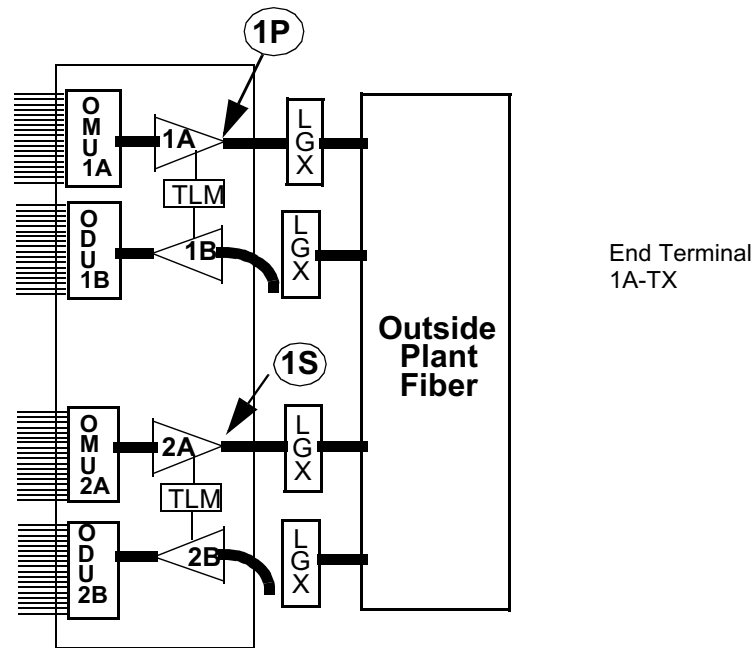


Figure 11-2. DS-NE Office Transmit OA Connection Points

- (9) For safety purposes, the APSD must be ENABLED when power measurements have been taken. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD feature.

Repeater "A" Direction Connection Procedure



NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.

**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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect fiber assigned to 1A OA IN to optical power meter. Test point 1P on Figure 11-3.

**NOTE:**

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

- (2) Clean then connect the other end of the above jumper to its assigned LGX location.
- (3) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.
 - For OA Input LBO Selection tables for Releases 1.0 and 2.0 refer to Appendix A.
 - For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on the Software Release Number
 - d. Click on Installation
 - e. Click on Tasks
 - f. Click on Optical Amplifier Input Line BuildOut Selection
 - g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click Continue.

- h. Enter the System Type i.e. A, B, C, 1_OA and click Continue.
- i. Enter the CLF (Channel Loading Factor) obtained at the previous office and click Continue
- j. The target power 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.

 NOTE:

The LBOs supplied with Release 2.1 and subsequent release installations come in two colors, green and dark grey. The green are for singlemode applications and are used in this procedure. The grey are for multimode applications.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(4) Install the appropriate LBO in 1A OA IN connector if necessary.

(5) Connect the jumper to the 1A OA IN connector.

Requirement: The 1A OA FAULT LED shall stop flashing within 1 minute.

(6) Clean then connect 1A OA OUT to optical power meter. Test point 2P on Figure 11-3.

(7) Verify the OA Output Power by referring to the following tables:

- Table A-1, LEA6 OA Output Levels For Release 1.0, on page A-2.
- Table A-2, LEA6 OA Output Levels For Release 2.0, on page A-2.
- For Releases 2.1 and 3.0, refer to Table 11-3 on page 11-7.

(8) Clean then connect the jumper from OA 1A OUT to the LGX. Test point 2P on Figure 11-3. If the application is for 7-8 spans, install a 3 dB LBO on OA 1A OUT port prior to installing the fiber.

Line 2 Connections

(9) Clean then connect fiber assigned to 2A OA IN to optical power meter. Test point 1S on Figure 11-3.

 NOTE:

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

(10) Clean then connect the other end of the jumper above to its assigned LGX location.

(11) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.

- For OA Input LBO Selection tables for Releases 1.0 and 2.0 refer to Appendix A.
- For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on the Software Release number
 - d. Click on Installation
 - e. Click on Tasks
 - f. Click on Optical Amplifier Input Line BuildOut Selection
 - g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click Continue.
 - h. Enter the System Type i.e. A, B, C, 1_OA and click Continue.
 - i. Enter the Channel Loading Factor obtained at the previous office and click Continue.
 - j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(12) Install the appropriate LBO in 2A OA IN connector if necessary.

(13) Connect the jumper to the 2A OA IN connector.

Requirement: The 2A OA FAULT LED shall stop flashing within 1 minute.

(14) Clean then connect 2A OA OUT to optical power meter. Test point 1S on Figure 11-2.

(15) Verify the OA Output Power by referring to the following tables:

- For Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and 3.0, refer to Table 11-3 on page 11-7.

(16) If this is a 7-8 span application, install a 3dB LBO on the OA 2A OUT. Clean then connect the jumper from OA 2A OUT port to the LGX. Test point 2S on Figure 11-3.

(17) When finished selecting the attenuation, enter the SECURITY.Enter.System command to ENABLE the APSD feature. APSD must be enabled for safety purposes.

If the next office is:	Then perform:
Repeater	Repeater A Direction Connection Procedure (repeat this procedure)
AGNE End Terminal Office	AGNE Office Receive OA Connection Procedure

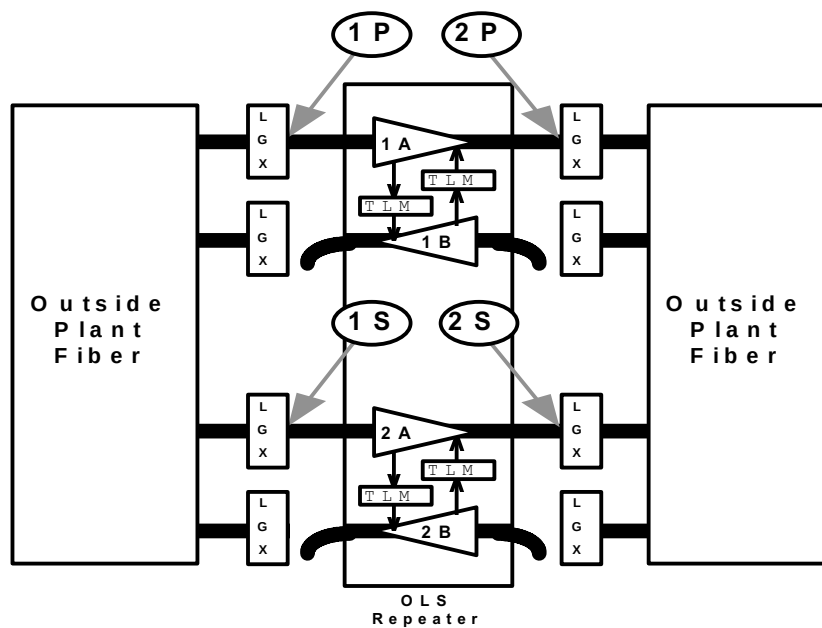


Figure 11-3. Repeater "A" Direction Connection Points

AGNE Office Receive OA Connection Procedure

NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.

**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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect fiber assigned to 1A OA IN to optical power meter. Test point 1P on Figure 11-4.

**NOTE:**

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

**NOTE:**

For Single OA applications (no receive OA), you will need a LC-to-LC adapter and a short LC-to-ST or LC-to-FC to connect to the power meter.

**NOTE:**

For Single OA applications there will be no LBO used on the ODU. Connect the LC jumper to the ODU and proceed to Step 6.

- (2) Clean then connect the other end of the above jumper to the LGX location.
- (3) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.
 - For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)

- c. Click on Software Release number
- d. Click on Installation
- e. Click on Tasks
- f. Click on Optical Amplifier Input Line BuildOut Selection
- g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
- h. Enter the System Type i.e. A, B, C, 1_OA and click continue.
- i. Enter the Channel Loading Factor obtained at the previous office and click continue
- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(4) Install the appropriate LBO in 1A OA IN connector if necessary.

 NOTE:

For Single OA applications (no receive OA), there will be no LBO used on the ODU. Connect the jumper to the ODU and proceed to the next office.

(5) Connect the jumper to the 1A OA IN connector.

Requirement: The 1A OA FAULT LED shall stop flashing within 1 minute.

Line 2 Connections

- (6) Clean then connect fiber assigned to 2A OA IN to optical power meter. Test point 1S on Figure 11-4.
- (7) Clean then connect the other end of the jumper above to the LGX location.
- (8) Select an OA IN LBO based on the measured power and the number of wavelengths (channels) present.
 - For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on Software Release number

- d. Click on Installation
- e. Click on Tasks
- f. Click on Optical Amplifier Input Line BuildOut Selection
- g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
- h. Enter the System Type i.e. A, B, C, 1_OA and click continue.
- i. Enter the Channel Loading Factor obtained at the previous office and click continue
- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(9) Install the appropriate LBO in 2A OA IN connector if necessary.

 NOTE:

For Single OA applications (no receive OA), there will be no LBO used on the ODU. Connect the jumper to the ODU and proceed to the next office.

(10) Connect the jumper to the 2A OA IN connector.

Requirement: The 2A OA FAULT LED shall stop flashing within 1 minute.

(11) When finished selecting the attenuation for the receive OA, the APSD must be ENABLED at the transmitting NE for safety purposes. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD feature.

If the Present office is:	Then perform:
AGNE Office	AGNE Office Transmit OA Connection Procedure

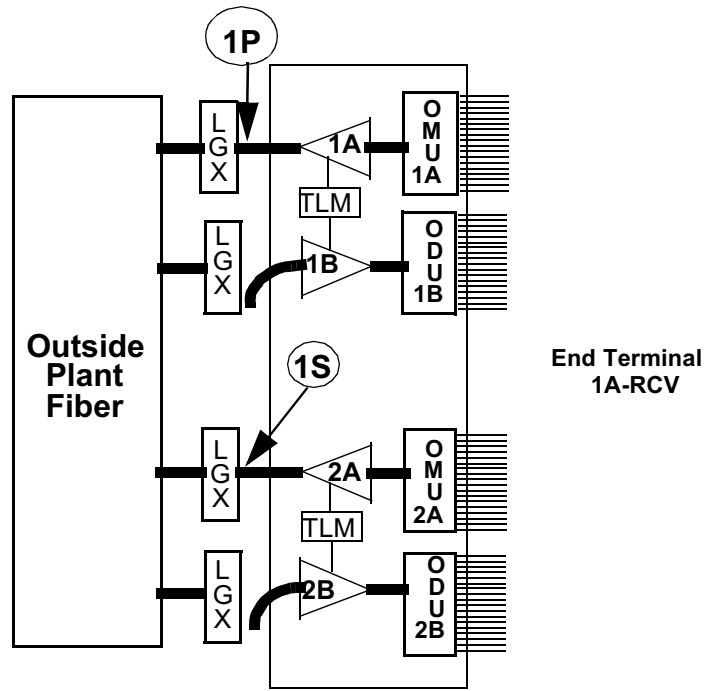


Figure 11-4. AGNE Office Receive OA Connection Points

AGNE Office Transmit OA Connection Procedure

NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.

⚠ 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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect 1B OA OUT to optical power meter. Test point 1P on Figure 11-5.

**NOTE:**

At any time throughout test procedure remove, attenuated test cable if measured power is within the range of the optical power meter.

- (2) Verify the OA Output Power by referring to the following tables:

- For Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and subsequent releases, refer to Table 11-3 on page 11-7.

- (3) For 7-8 span applications, install a 3 dB LBO in the 1B OA OUT. Clean then connect the fiber jumper to 1B OA OUT and the outside plant fiber at the LGX. Test point 1P on Figure 11-5. on page 11-19.

Line 2 Connections

- (4) Clean then connect 2B OA OUT to optical power meter. Test point 1S on Figure 11-5.

- (5) Verify the OA Output Power by referring to the following tables:

- For Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and subsequent releases, refer to Table 11-3 on page 11-7.

- (6) For 7-8 span applications, install a 3 dB LBO in 2B OA OUT. Clean then connect the fiber jumper to 2B OA OUT and the outside plant fiber at the LGX. Test point 1S on Figure 11-5. on page 11-19

- (7) Execute the CONFIGURATION.Retrieve.Optical_Line command and record the Channel Loading Factor for use in downstream offices.

- (8) When finished selecting the attenuation, the APSD must be ENABLED for safety purposes. Perform the SECURITY.Enter.System command at this time to ENABLE the APSD feature.

If the next office is:	Then perform:
Repeater	Repeater B Direction Connection Procedure
DS-NE End Terminal Office	DS-NE Office Receive OA Connection Procedure

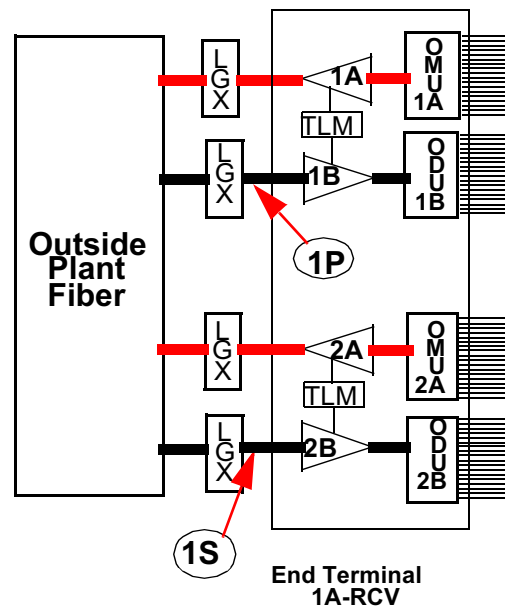


Figure 11-5. AGNE Office Transmit OA Connection Points

Repeater B Direction Connection Procedure

➡ NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.

! DANGER:

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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect fiber assigned to 1B OA IN to optical power meter. Test point 1P on Figure 11-6.

**NOTE:**

At any time throughout test procedure remove attenuated test cable if measured power is within the range of the optical power meter.

- (2) Clean then connect the other end of the jumper above to its assigned LGX location.
- (3) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.
 - For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on Software Release number
 - d. Click on Installation
 - e. Click on Tasks
 - f. Click on Optical Amplifier Input Line BuildOut Selection
 - g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
 - h. Enter the System Type i.e. A, B, C, 1_OA and click continue.
 - i. Enter the Channel Loading Factor obtained at the previous office and click continue

- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

- (4) Install the appropriate LBO in 1B OA IN connector if necessary.
(5) Connect the jumper to the 1B OA IN connector.

Requirement: The 1B OA FAULT LED shall stop flashing within 1 minute.

- (6) Clean then connect 1B OA OUT to optical power meter. Test point 2P on Figure 11-6.
(7) Verify the OA Output Power by referring to the following tables:
- For Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, refer to Table 11-3 on page 11-7.
- (8) For 7-8 span applications, install a 3 dB LBO in the OA 1B OUT. Clean then connect the jumper from OA 1B OUT to the LGX. Test point 2P on Figure 11-6.

Line 2 Connections

- (9) Clean then connect fiber assigned to 2B OA IN to optical power meter through attenuated test cable. Test point 1S on Figure 11-6.
(10) Clean then connect the other end of the jumper above to its assigned LGX location.
(11) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.
- For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A.
 - For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on Software Release number
 - d. Click on Installation
 - e. Click on Tasks

- f. Click on Optical Amplifier Input Line BuildOut Selection
- g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
- h. Enter the System Type i.e. A, B, C, 1_OA and click continue.
- i. Enter the Channel Loading Factor obtained at the previous office and click continue
- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(12) Install the appropriate LBO in 2B OA IN connector if necessary.

(13) Connect the jumper to the 2B OA IN connector.

Requirement: The 2B OA FAULT LED shall stop flashing within 1 minute.

(14) Clean then connect 2B OA OUT to optical power meter through attenuated test cable. Test point 2S on Figure 11-2.

(15) Verify the OA Output Power by referring to the following tables:

- For Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and 3.0, refer to Table 11-3 on page 11-7.

(16) For 7-8 span applications, install a 3dB LBO in the OA 2B OUT. Clean then connect the jumper from OA 2B OUT to the LGX. Test point 2S on Figure 11-6.

(17) For safety purposes, the APSD feature must be ENABLED. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD.

If the next office is:	Then perform:
Repeater	Repeater B Direction Connection Procedure (repeat this procedure)
DS-NE End Terminal Office	DS-NE Office Receive OA Connection Procedure

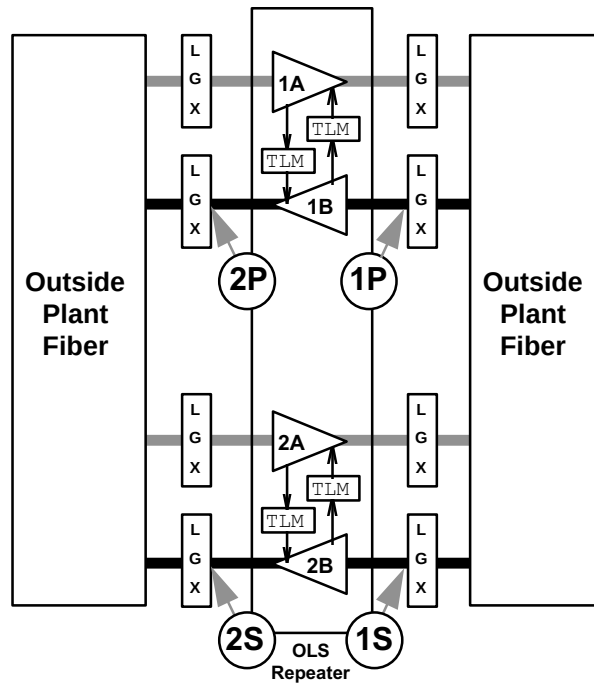


Figure 11-6. Repeater B Direction Connection Points

DS-NE Office Receive OA Connection Procedure



NOTE:

The following procedure assumes lines 1 and 2 are both equipped. Ignore the procedures for unequipped lines.



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.

**CAUTION:**

To comply with IEC regulations, systems containing an IEC Class 3B laser hazard must be installed in a controlled environment. Please refer to applicable IEC standards.

The APSD feature must be disabled in order to measure the OA receive power and select the appropriate attenuation for the receiving amplifier. Disable the APSD at this time.

Line 1 Connections

- (1) Clean then connect fiber assigned to 1B OA IN to optical power meter. Test point 1P on Figure 11-7.

**NOTE:**

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

- (2) Clean then connect the other end of the jumper above to its assigned LGX location.

**NOTE:**

For Single OA applications (no receive OA), there will be no LBO used on the ODU. Connect the jumper to ODU and proceed to Step 6.

- (3) Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.

- For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A
- For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on Software Release number.
 - d. Click on Installation
 - e. Click on Tasks
 - f. Click on Optical Amplifier Input Line BuildOut Selection
 - g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
 - h. Enter the System Type i.e. A, B, C, 1_OA and click continue.

- i. Enter the Channel Loading Factor obtained at the previous office and click continue
- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(4) Install the appropriate LBO in 1B OA IN connector if necessary.

(5) Connect the jumper to the 1B OA IN connector.

Requirement: The 1B OA FAULT LED shall stop flashing within 1 minute.

Line 2 Connections

- (6) Clean then connect fiber assigned to 2B OA IN to optical power meter through attenuated test cable. Test point 1S on Figure 11-7.

 NOTE:

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

 NOTE:

For Single OA applications you will need a LC-to-LC adapter and a short LC fiber to connect to the power meter.

- (7) Clean then connect the other end of the jumper above to its assigned LGX location.

 NOTE:

For Single OA applications there will be no LBO used on the ODU. Connect the jumper to the ODU and proceed to "Ring Closure Verification Procedure".

- (8) Select an OA IN LBO based on the measured power and the number of wavelengths (channels) present.

- For OA Input LBO Selection tables for Releases 1.0 and 2.0, refer to Appendix A.
- For Releases 2.1 and subsequent releases, follow the steps listed below to select the appropriate LBO.
 - a. Login in to the Network Element.
 - b. Click on the Smart Manual Manager to open. (Ignore the Future application notice.)
 - c. Click on Software Release number

- d. Click on Installation
- e. Click on Tasks
- f. Click on Optical Amplifier Input Line BuildOut Selection
- g. Enter the OA type i.e. LEA6, LEA7, LEA104 and click continue
- h. Enter the System Type i.e. A, B, C, 1_OA and click continue.
- i. Enter the Channel Loading Factor obtained at the previous office and click continue
- j. The target power 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.

 NOTE:

If the power measurement is not within range, clean the fiber and remeasure. If it is still out of range, contact your next level of support.

(9) Install the appropriate LBO in 2B OA IN connector if necessary.

(10) Connect the jumper to the 2B OA IN connector.

Requirement: The 2B OA FAULT LED shall stop flashing within 1 minute.

(11) For safety purposes, the APSD must be ENABLED. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD feature.

(12) Proceed to "Ring Closure Verification Procedure".

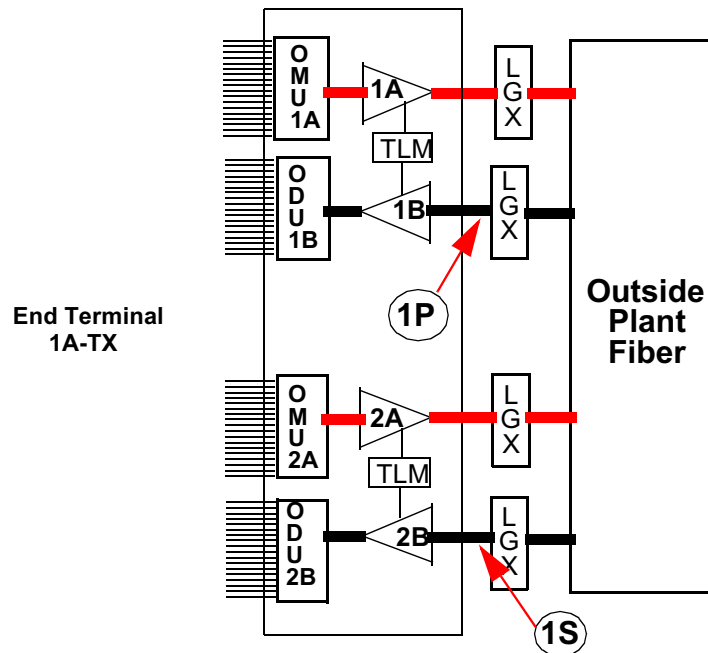


Figure 11-7. DS-NE Office Receive OA Connection Points

Ring Closure Verification Procedure

Description

Line verification procedures check optical line continuity between WaveStar OLS 40G sites. This procedure assumes that the fiber has been connected at each WaveStar OLS 40G site as detailed earlier in this chapter.

Line Verification Procedure

Perform the following steps to verify that the fiber is properly connected and the WaveStar OLS 40G sites are communicating with each other.

 NOTE:

If at any step the requirements are not met, resolve the problem using procedures in the 365-575-341 WaveStar OLS 40G User/Service Manual before proceeding.

(1) Login to any WaveStar OLS 40G site using the CMC PC.

(2) Execute CONFIGURATION.Retrieve.Ring.Map.

Requirement: Verify that the TIDs are all listed correctly. Verify that the communication status is good for each site.

(3) Execute FAULT.Retrieve.Alarms.Network.

Requirement: Verify that there are no alarms at the requested level.

(4) Execute FAULT.Retrieve.Alarms.All.

Requirement: Verify there are no local alarms.

(5) Execute SECURITY.Retrieve.System.

Requirement: Verify the APSD state is ENABLED. If it is not, use the SECURITY.Enter.System command to ENABLE the APSD.

(6) Login to another site using the correct TID.

Requirement: Verify the Alarm and Status Report displayed upon logging in reports no alarms.

(7) Execute SECURITY.Retrieve.System at the remote site.

Requirement: Verify the APSD state is ENABLED. If it is not, use the SECURITY.Enter.System command to ENABLE the APSD.

(8) Repeat Steps 6 and 7 for all sites in the optical line system.

Performance Monitor Bit Error Tests

Description

This procedure will verify that performance monitoring reports show proper optical power and zero B2 parity error rates. Login to any terminal node in the ring and perform the following:

 NOTE:

If at any step the requirements are not met, resolve the problem using procedures in the 365-575-341 WaveStar OLS 40G User/Service Manual before proceeding.

Performance Monitors Bit Error Test Procedure

- (1) Execute the PERFORMANCE.Retrieve-Performance Monitoring-Supervisory command and fill in the AID with SUPR-ALL.

Requirement: The report should not indicate OUT OF RANGE for the last fifteen minutes.

 NOTE:

The previous 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) Execute the PERFORMANCE.Retrieve-Performance Monitoring-Optical Line command and fill in the AID with OLINE ALL.

Requirement: The report should indicate 0 B2 errors in the last fifteen minutes.

 NOTE:

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 fiber connections. There are 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 Installation Operations

Verify at each WaveStar OLS 40G node the APSD feature has been enabled. It is a safety requirement that the APSD is in the enabled state.

This completes the turnup procedures for the WaveStar OLS 40G. Proceed to Chapter 12 to connect SONET/SDH systems to the WaveStar OLS 40G.

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Overview

This chapter covers fiber jumper installation and testing between SONET/SDH Systems and the WaveStar OLS 40G at the OLS End Terminal offices.



CAUTION:

Procedures in this installation manual are only to be performed by trained personnel.

General Considerations



WARNING:

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 beam.

Keep the following information under consideration during cable installation:

- Do not use cable ties with the optical fiber.
- Place optical fiber jumpers in protective tube or channel, such as the polyvinyl chloride (PVC) tubing provided in the installation kit (C848065959) when running the cable from the WaveStar OLS 40G to the cable rack.
- Place optical fiber jumpers in the cable rack in a protective channel with nothing on top of them.
- Maintain a minimum of 1.5 inches of optical fiber bend radius.

- Optical fiber jumpers require ST, FC/PC, LC, or SC type connectors for connection to the WaveStar OLS 40G.
- Before removing a fiber jumper from an OA output connector, the safest way to avoid damage and minimize the power level is to first unseat the OA. An alternate procedure is:

To disconnect the output jumper:

1. Allow the pack to boot (that is the LED is off)
2. Remove the INPUT jumper
3. Wait for the software to respond to the loss of signal (within about 5 seconds)
4. Remove the OUTPUT jumper
5. Insert port protector
6. Insert INPUT jumper

To insert the output jumper:

1. Allow the pack to boot (that is the LED is off)
2. Remove the INPUT jumper
3. Wait for the software to respond to the loss of signal (within about 5 seconds)
4. Remove the port protector
5. Insert the OUTPUT jumper
6. Insert INPUT jumper

- For Optical Amplifier Output Power Level requirements, refer to the following tables:
 - Table A-1, entitled "LEA6 OA Output Levels For Release 1.0" on page A-2.
 - Table A-2, entitled "LEA6 OA Output Levels For Release 2.0" on page A-2.
 - For Releases 2.1 and 3.0, refer to the SmartManual furnished with the CMC.

LBO Information

Faceplate LBOs must be chosen during installation for some OA inputs and outputs, all TLM CM inputs, some ODU outputs, some TRMTR outputs, and some RCVR inputs. All other inputs and outputs should always be equipped with a 0 dB LBO.

The available LBO values for Releases 1.0 & 2.0 are 0, 3, 5, 7, 10, 15, and 20 dB, corresponding to the nominal LBO attenuation at 1310 nm. The actual attenuation of each LBO depends on the wavelength of the attenuated optical signal. For wavelengths in the range of the optical channels (1555 nm), the actual LBO attenuation is given in Table 12-1. These LBOs are colored yellow except for the 0 dB LBO which is white.

A wide variety of LBOs are available for Release 2.1. A new family of Green colored single-mode to single-mode LBOs designed for 1550 nm with higher power capability is available. To handle the transition from single-mode to multi-mode another family of LBOs was developed and is Gray colored. **All inputs to OTPMs must use this Gray LBO.**

Refer to Appendix I to obtain tolerances, power ratings, and further data on LBOs.



WARNING:

The 15dB 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 the 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.

Table 12-1 ST LBO Values for Releases 1.0 & 2.0

LBO Size	Part No. for ST Buildout	Attenuation Range at 1555 nm (dB)
0	106 795 354	0.0 to 0.5
3	107 380 438	2.4 to 3.0
5	107 406 183	4.4 to 5.0
7	107 107 740	5.7 to 6.5
10	107 408 191	8.3 to 9.7
15	107 406 209	13.3 to 14.7
20	107 406 217	17.0 to 19.0



NOTE:

These LBOs are yellow-colored except the 0 dB which is white.

Connect SONET/SDH To Optical Line System

This procedure is broken into two parts:

- Connect Generic SONET/SDH transmitters to Optical Translator and
- Connect Compatible SONET/SDH transmitters to Optical Line System.
As of this writing, OLS-compatible transmitters include:
 - OC-48/STM-16 Optical Translator Units - 41A(), 41A()B, 41A()C, 41C(), 41C()B, 41C()C, and 41D()
 - OC-3/STM-1 Optical Translator Port Modules - 43A()
 - OC-12/STM-4 Optical Translator Port Modules - 42A()
 - Low-Speed Broadband Optical Translator Port Modules - 44A()
 - OC-48 FT-2000 Add/Drop-Rings Terminal with Release 7.2 or later - 739E() or 739G()
 - OC-48 FT-2000 Large Capacity Terminal with Release 1.0 or later - 739D() or 739F()

Connect Generic SONET/SDH Transmitters To OT

For SONET/SDH systems with WaveStar OLS 40G compatible transmitters, proceed to the "Connect Compatible SONET/SDH Transmitter to Optical Line System" paragraph on page 12-6.

Measure Level Into OT

- (1) At the SONET/SDH system, clean and connect the assigned jumper to the proper output jack.
- (2) At the OTU or OTPM, clean then connect the fiber jumper from SONET/SDH system to an optical power meter.

NOTE:

At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

- (3) Momentarily remove then reconnect the fiber on the SONET/SDH system output jack.

Requirement: The optical power meter shows a momentary loss of optical power. (Power drops at least 25 dB on the meter.)

- (4) Select an optical LBO (5, 10, 15, or 20 dB) that will attenuate the measured signal to provide a signal into the OTU/OTPM of between -12 and -22 dB.

If an attenuated LBO is needed, install it as follows:

- a. Remove the 0 dB LBO in the faceplate of the OTU/OTPM. To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the LBO out along the angle it is installed in the faceplate.
- b. Install the chosen LBO. To install, remove the protective cover and clean the LBO. With the tab facing up towards you, slide the LBO into the faceplate of the OTU/OTPM over the fiber end in the faceplate at the angle of the connector block in the faceplate. To lock the LBO in position, rotate the LBO clockwise until a small click is heard. Check that the LBO is locked by lightly tugging on it.

- (5) At the OTU/OTPM, connect the measured jumper to the IN jack.

Requirement: The OTU/OTPM FAULT LED shall stop flashing within 1 minute. (Loss of Signal (LOS) alarm extinguishes.)

- (6) Proceed to the next paragraph.

Connect Compatible SONET/SDH Transmitter to Optical Line System

- (1) At transmitter or OTU/OTPM, verify proper LBO is installed on the output jack as listed on the faceplate label.
- (2) At transmitter or OTU/OTPM, clean then connect assigned fiber jumper to OUT jack.
- (3) At the WaveStar OLS 40G, clean then connect fiber jumper from the transmitter or OTU/OTPM to an optical power meter.

Requirement: Refer to Table 12-2 for OC-48/STM-16 or Table 12-3 for other signals.

Table 12-2 OLS-Compatible OC-48/STM-16 Transmitter Output Levels

FT-2000 ADR Transmitters	FT-2000 LCT Transmitters	41-type OTU	Output Connector Power Level
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 12-3 OLS-Compatible Low Speed Transmitter 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 -13.0dBm	-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

- (4) Momentarily remove then reconnect the fiber on the transmitter or OTU/OTPM OUT jack.

Requirement: The optical power meter shows a momentary loss of optical power. (Power drops at least 25 dB on the meter.)

- (5) At the WaveStar OLS 40G, connect the measured jumper to the corresponding OMU Port, i.e. the fiber from a wavelength-1 transmitter goes to OMU OCHAN1 IN, the fiber from a wavelength-2 transmitter goes to OMU OCHAN2, etc.

Requirement: The FAULT LED shall extinguish on the transmitting OA when the first channel is added.

- (6) Proceed to “Connect Optical Line System To SONET/SDH” paragraph to confirm the new wavelength end-to-end.

Connect Optical Line System To SONET/SDH

This procedure is broken into two parts:

- Connect Optical Line System to compatible SONET/SDH receivers.
As of this writing, OLS-compatible SONET/SDH receivers include:
 - OC-48/STM-16 Optical Translator Units - 41B or 41BB
 - STM-16 Optical Translator Units - 41E
 - OC-3/STM-1 Optical Translator Port Module - 43B
 - OC-12/STM-4 Optical Translator Port Module - 42B
 - Low-speed Broadband Optical Translator Port Module - 44B
 - OC-48 FT-2000 Add/Drop-Rings Terminal with Release 7.2 or later - 839E5
 - OC-48 FT-2000 Large Capacity Terminal with Release 1.0 or later - 839B4 or 839B4B
- Connect OTU/OTPM output to generic SONET/SDH receiver input.

Connect WaveStar OLS 40G To Compatible SONET/SDH Receivers

Procedures in this paragraph connect the WaveStar OLS 40G output to the SONET/SDH system.

- (1) At the WaveStar OLS 40G, clean and connect the assigned jumper to the proper ODU output Port, i.e. ODU OCHAN1 OUT jack goes to channel 1 receiver or OTU/OTPM, ODU OCHAN2 OUT jack goes to channel 2 receiver or OTU/OTPM, etc.
- (2) At receiver or OTU/OTPM, clean then connect fiber jumper from the ODU to an optical power meter.
- (3) Momentarily remove then reconnect the fiber on the ODU OUT jack.
Requirement: The optical power meter shows a momentary loss of optical power. (Power drops at least 25 dB on the meter.)
- (4) For Release 1.0 or 2.0, select and install ODU output and Receiver input LBOs based upon the measured power, number of equipped wavelengths, wavelength being installed, and type of OLS installed by referring to Appendix A.
- (5) For Releases 2.1 and subsequent releases, refer to the SmartManual furnished by the CMC.

- (6) At the receiver or OTU/OTPM, connect the measured jumper to the input connector.

Requirement: The FAULT LED shall stop flashing within 1 minute. (Loss of Signal (LOS) alarm extinguishes.)

- (7) At the transmitting end of the WaveStar OLS 40G (the previous SONET/SDH), momentarily remove then reconnect the fiber from the SONET/SDH transmitter.

Requirement: The optical power meter shows a momentary loss of optical power. (Power drops at least 25 dB on the meter.)

- (8) Proceed to “Add Additional Wavelengths” for systems with OLS compatible receivers. Proceed to “Connect OT/OTPM To Generic SONET Receivers” for systems without OLS compatible receivers.

Connect OT/OTPM To Generic SONET/SDH Receivers

- (9) Connect the optical power meter to the output of the 41B or 41E OTU, 42B, 43B, or 44B OTPM.

Requirement: 0.0 to 2.0 dBm.

- (10) Connect a fiber jumper to the output of the OTU/OTPM.
- (11) At the SONET/SDH receiver end of the jumper from the OTU/OTPM, measure and adjust the level as appropriate for the SONET/SDH system.
- (12) Verify the SONET/SDH loss of signal clears when the jumper is connected at the appropriate level.

Add Additional Wavelengths

- (13) Repeat this chapter up to this point for all remaining wavelengths (channels) being installed.
- (14) Proceed to “System Verification” when all wavelengths have been installed.

System Verification

SONET/SDH to WaveStar OLS 40G Verification

- (1) Momentarily remove the fiber from a SONET/SDH transmitter.
Requirement: Verify the SONET/SDH receiver at the other end FAULT LED begins flashing (Loss of Signal (LOS) alarm) and the WaveStar OLS 40G has an optical channel loss of signal for the wavelength disconnected.
- (2) Reconnect the fiber to the transmitter.
Requirement: The receiver FAULT LED shall stop flashing and the WaveStar OLS 40G optical channel loss of signal will extinguish within 1 minute.
- (3) Repeat steps 1 and 2 for all transmitter/receiver pairs equipped.

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Overview

This section provides basic troubleshooting information for the WaveStar OLS 40G.

Troubleshooting Table

Troubleshooting an Optical Line System begins by referencing the 365-575-341 WaveStar OLS 40G User/Service Manual. GTSIP login access will also have news bulletins and diagnostic dictionary listings of the most up-to-date issues and solutions. See “Technical Support” on page 1-12 for information on obtaining a GTSIP Customer Web Access Login. A quick trouble shooting reference is given here in Table 13-1, “Installation Trouble Shooting,” on page 13-1 for problems which may come up during installation.

Table 13-1 Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
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 improper type.	Inspect cable connection, review Table 10-2, “Serial Port Pinout information,” on page 10-20 and Figure 10-11 on page 10-19 for CMC minimum connections. Also see the CMC Connection Requirements paragraph later in this section.

Table 13-1 Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
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 improper type (not null modem)	Inspect cable connection, review Figure 10-11 on page 10-19 and Table 10-2, "Serial Port Pinout information," on page 10-20. Also see the CMC Connection Requirements paragraph later in this section.
Communication with NE cannot be established (To CIT-DCE or DTE).	SYSCTL and SYSMEM circuits have not finished resetting.	Wait up to 6 minutes or until LEDs of circuit packs and User Panel stop changing. Also see the CMC Connection Requirements paragraph later in this section.
	PC serial port not powered.	Check PC hardware manual for power saver instructions. Also see the CMC Connection Requirements paragraph later in this section.
	PC serial port BAUD rate does not operate below 9600 BAUD.	Check PC hardware manual. Also see the CMC Connection Requirements paragraph later in this section.
	PC has background processes running.	Refer to Appendix F for examples on clearing. Also see the CMC Connection Requirements paragraph later in this section.
	PC is not detecting CTS and DSR leads as high.	Check hardware manual for PC from PC back to CTS and DSR. Also see the CMC Connection Requirements paragraph later in this section.
	STSCTL failure.	Rule out other causes: Replace SYSCTL. Also see the CMC Connection Requirements paragraph later in this section.
Flash EEPROM write error, during software installation.	Power saver feature of PC has powered down serial port.	Check PC hardware setup and disable power saver feature.
	SYSMEM failure.	Rule out other causes: Replace SYSMEM.

Table 13-1 Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
FAULT LED on after Reset, Alarm report says Unrecognized 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's wanted. Otherwise restore original type circuit pack.
	Failed circuit pack.	Replace circuit pack.
An incorrect disk was inserted, during software installation.	Disks are not stored in order.	Check disk labeling, insert disk requested.
	Disks are labeled incorrectly.	Workaround Only: obtain disks from another site of SAME GENERIC and use those. To correct: Contact Customer service for replacement disks.
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 (games) on disk. Or, Install NE software from distribution diskettes.

Troubleshooting Information

The following paragraphs are called out by other procedures throughout this manual.

CMC Connection Requirements

This paragraph describes the minimum requirements for the physical connection between the CMC PC and the WaveStar OLS 40G.

Figure 13-1 on page 13-4 shows the minimum cabling needed. The RS-232 control lead values are listed for the DCE (user panel) and DTE (backplane) connectors. The WaveStar OLS 40G terminal 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 both 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 garbled. If a local area network is used to connect the CMC PC to the WaveStar OLS 40G, XON/XOFF handshaking must be disabled at both ends of the network connection.

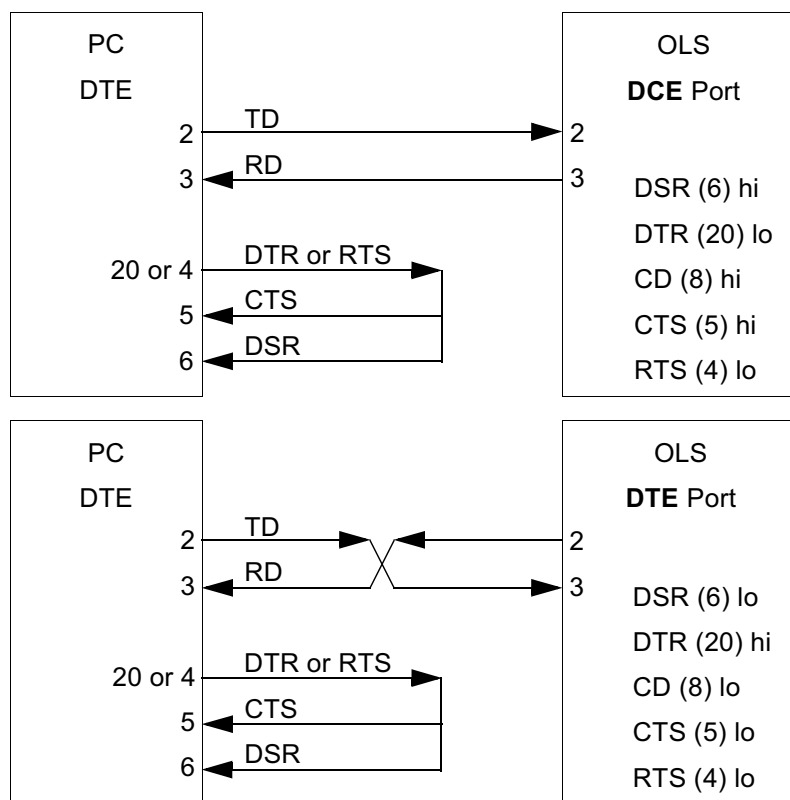


Figure 13-1 CIT(CMC) Minimum Connections

Test-Auto Turnup-Local Description

The Auto Turnup-Local test is an automated test which verifies an Optical Line System (OLS) has been installed properly. The test detects cabling 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 packs within a WaveStar OLS 40G End Terminal or Repeater Bay:

- (1) The Telemetry Pack-to-Optical Amplifier Pack (Supervisory) Channel, or
- (2) 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 WaveStar OLS 40G End Terminals, tests are performed on A-TLM slots only, while for WaveStar OLS 40G Repeater Bays, A and B TLM slots are reported. If an OA pack within a Supervisory Channel loop fails, then the TLM pack involved in the Supervisory Channel loop under test is marked failed. The CMS Port involves only the TLM pack itself. There is no self-test of the OMU, ODU, or TOHCTL. The OMU/ODU is tested manually with noise measurements; the TOHCTL and cabling between terminals is tested via system level verification.

This test is invoked at the CMC in EXPERT mode 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 10 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:

- OLS system incomplete
- DS-NE 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 DS-NEs 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

Figure 13-2 on page 13-7 is a block diagram showing the Supervisory Channel test configuration for a TLM circuit pack within an Optical line under test. After the optical line fibers from OA(out)-to-OA(in) have been looped (via the LGX), attenuators inserted in the loops, 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-STS13BP device insert PATH AIS signal in the transmit direction of the Supervisory Signal carried over the Supervisory Channel under test.

WaveStar OLS 40G 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.

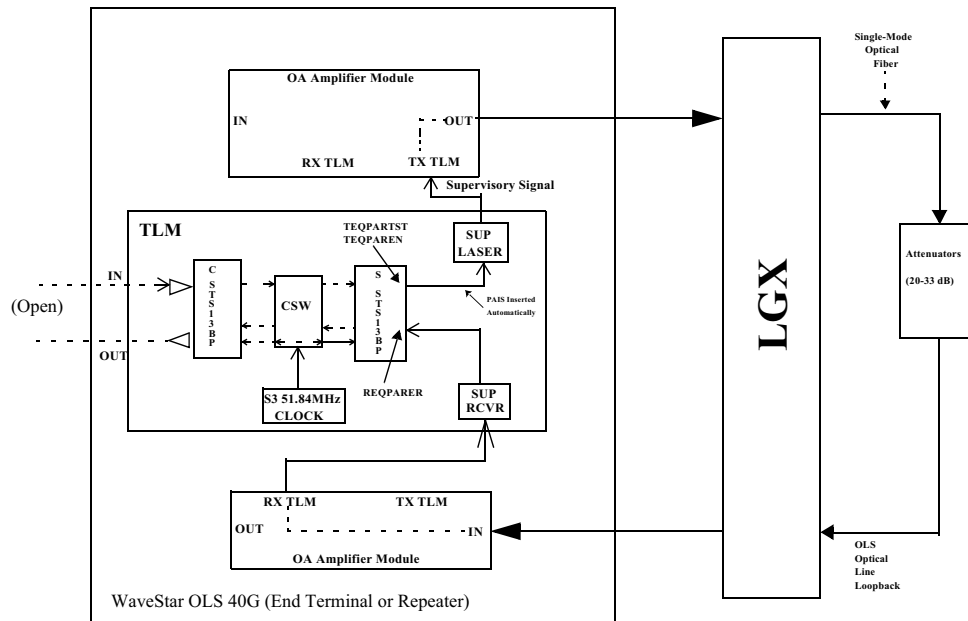


Figure 13-2 Auto-Turnup-Local SUPR Test

CMS In/Out Port Automatic Setup

Figure 13-2 on page 13-7 is a block diagram showing the CMS In/Out Port test configuration for a TLM circuit pack within an Optical line under 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-STS13BP device insert PATH AIS signal in the Out direction of the CMS In/Out Port.

CMS In/Out Port Continuity Test Operation

Once setup and initialization are complete, the following operations are performed to confirm CMS In/Out Port continuity per TLM slot:

- (1) Verify no C1 parity error is detected at the C-ST513BP 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 C-ST513BP device of the TLM pack via TEQPARTST function.
- (3) Verify C1 parity error is detected at the C-ST513BP by reading REQPARER.
- (4) Remove C1 parity error at the C-ST513BP via TEQPARTST function.
- (5) Verify no C1 parity error detected at the C-ST513BP by reading REQPARER.

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.

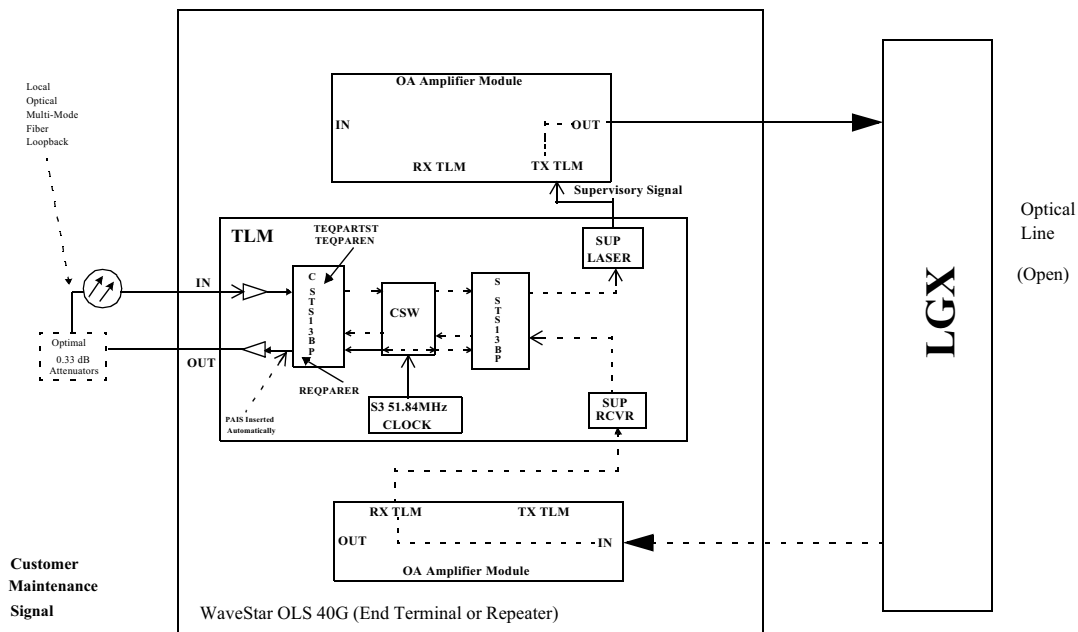


Figure 13-3 Auto-Turnup-Local CMS Test

Releases 1.0 & 2.0 LBO Selection Tables



Overview

This chapter provides the LBO selection tables for installing OLS/OT/SONET/SDH networks.

For selection of LBOs for Releases 2.1 and 3.0 refer to the SmartManual furnished with the CMC software.

The following tables are included in this chapter:

- Table A-1, entitled "LEA6 OA Output Levels For Release 1.0" on page A-2.
- Table A-2, entitled "LEA6 OA Output Levels For Release 2.0" on page A-2.
- Table A-3, entitled "LEA6 OA Input LBO Input Selection Guide for Nx33 Systems" on page A-3.
- Table A-4, entitled "LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 1 span" on page A-6.
- Table A-5, entitled "LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 2 spans" on page A-8.
- Table A-6, entitled "LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 3 spans" on page A-11.
- Table A-7, entitled "LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 4-6 spans" on page A-13.
- Table A-8, entitled "LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 7-8 spans" on page A-17.

- Table A-9, entitled "RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 1 or 2 for Nx33 Systems" on page A-21.
- Table A-10, entitled "RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 3 through 8 for Nx33 Systems" on page A-23.
- Table A-11, entitled "RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelength 1 for Mx24 and Px25 Systems" on page A-27.
- Table A-12, entitled "RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 2 through 8 for Mx24 and Px25 Systems" on page A-28.

Table A-1 LEA6 OA Output Levels For Release 1.0

	Output Power (dBm) for 3x33dB Systems	
Number of Equipped Wavelengths	OA Output Power (dBm)	Measured Value After 33 dB Test Cable (dBm)
0	+11.0 to +12.8	-22.0 to -20.2
1	+11.7 to +13.1	-21.3 to -19.9
2	+11.7 to +13.1	-21.3 to -19.9
3	+13.0 to +14.4	-20.0 to -18.6
4	+13.8 to +15.2	-19.2 to -17.8
5	+14.5 to +15.9	-18.5 to -17.1
6	+15.0 to +16.4	-18.0 to -16.6
7	+15.3 to +16.7	-17.7 to -16.3
8	+15.3 to +16.7	-17.7 to -16.3

Table A-2 LEA6 OA Output Levels For Release 2.0

	Output Power (dBm) for 3x33dB Systems	
Number of Equipped Wavelengths	OA Output Power (dBm)	Measured Value After 33 dB Test Cable (dBm)
0	+9.1 to +10.9	-23.9 to -22.1
1	+11.6 to +13.0	-22.4 to -20.0
2	+11.6 to +13.0	-22.4 to -20.0

Table A-2 LEA6 OA Output Levels For Release 2.0

	Output Power (dBm) for 3x33dB Systems	
3	+13.0 to +14.4	-20.0 to -18.6
4	+13.8 to +15.2	-19.2 to -17.8
5	+14.5 to +15.9	-18.5 to -17.1
6	+15.0 to +16.4	-18.0 to -16.6
7	+15.3 to +16.7	-17.7 to -16.3
8	+15.3 to +16.7	-17.7 to -16.3

Table A-3 LEA6 OA Input LBO Input Selection Guide for Nx33 Systems

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after Faceplate LBO	Measured OA Input (dBm) before Faceplate LBO (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for OA Input LBO (dB)
0-2	-14.0 to -9.0	-22.0(-55.0) to - 9.0(-42.0)	0
		-9.0(-42.0) to - 4.5(-37.5)	5
		-4.5(-37.5) to - 0.5(-33.5)	10
		>-0.5(-33.5)	Put 10 dB LBO in output of upstream OA output and remea- sure input power. If input power is still greater than -0.5 dBm, contact your next level of support.

Table A-3 LEA6 OA Input LBO Input Selection Guide for Nx33 Systems

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after Faceplate LBO	Measured OA Input (dBm) before Faceplate LBO (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for OA Input LBO (dB)
3	-13.0 to -8.0	-20.0(-53.0) to -8.0(-41.0)	0
		-8.0(-41.0) to -3.5(-36.5)	5
		-3.5(-36.5) to +0.5(-32.5)	10
		>+0.5(-32.5)	Put 10 dB LBO in output of upstream OA output and remeasure input power. If input power is still greater than +0.5 dBm, contact your next level of support
4	-12.0 to -7.0	-19.2(-52.2) to -7.0(-40.0)	0
		-7.0(-40.0) to -2.5(-35.5)	5
		-2.5(-35.5) to +1.5(-31.5)	10
		>+1.5(-31.5)	Put 10 dB LBO in output of upstream OA output and remeasure input power. If input power is still greater than +1.5 dBm, contact your next level of support.
5	-11.5 to -6.5	-18.5(-51.5) to -6.5(-39.5)	0
		-6.5(-39.5) to -2.0(-35.0)	5
		-2.0(-35.0) to +2.0(-31.0)	10
		>+2.0(-31.0)	Put 10 dB LBO in output of upstream OA output and remeasure input power. If input power is still greater than +2.0 dBm, contact your next level of support.

Table A-3 LEA6 OA Input LBO Input Selection Guide for Nx33 Systems

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after Faceplate LBO	Measured OA Input (dBm) before Faceplate LBO (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for OA Input LBO (dB)
6	-11.0 to -6.0	-18.0(-51.0) to -6.0(-39.0)	0
		-6.0(-39.0) to -1.5(-34.5)	5
		-1.5(-34.5) to +2.5(-30.5)	10
		>+2.5(-30.5)	Put 10 dB LBO in output of upstream OA output and remeasure input power. If input power is still greater than +2.5 dBm, contact your next level of support.
7-8	-10.0 to -5.0	-17.4(-50.4) to -5.0(-38.0)	0
		-5.0(-38.0) to -0.5(-33.5)	5
		-0.5(-33.5) to +3.5(-29.5)	10
		>+3.5(-29.5)	Put 10 dB LBO in output of upstream OA output and remeasure input power. If input power is still greater than +3.5 dBm, contact your next level of support.

1. Use measured value stamped on test cable.

Table A-4 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 1 span

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
0	-12.0 to -18.0	less than -23.5	Span Loss Too High
		-23.5 to -12.0	0
		-12.0 to -8.0	5
		-8.0 to -3.7	10
		-3.7 or greater	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -3.7 dBm, some attenuation must be added to the outside plant.
1-2	-9.6 to -15.6	less than -21.1	Span Loss Too High
		-21.1 to -9.6	0
		-9.6 to -5.5	5
		-5.5 to -1.3	10
		-1.3 or greater	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -1.3 dBm, some attenuation must be added to the outside plant.
3	-8.3 to -14.3	less than -19.8	Span Loss Too High
		-19.8 to -8.3	0
		-8.3 to -4.2	5
		-4.2 to 0.0	10
		0.0 or greater	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.0 dBm, some attenuation must be added to the outside plant.

Table A-4 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 1 span

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
4	-7.5 to -13.5	less than -19.0	Span Loss Too High
		-19.0 to -7.5	0
		-7.5 to -3.4	5
		-3.4 to 0.8	10
		0.8 or greater	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.8 dBm, some attenuation must be added to the outside plant.
5	-6.8 to -12.8	less than -18.3	Span Loss Too high
		-18.3 to -6.8	0
		-6.8 to -2.7	5
		-2.7 to 1.5	10
		1.5 or greater	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 1.5 dBm, some attenuation must be added to the outside plant.
6	-6.3 to -12.3	less than -17.8	Span Loss Too High
		-17.8 to -6.3	0
		-6.3 to -2.2	5
		-2.2 to 2.0	10
		greater than 2.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.0 dBm, some attenuation must be added to the outside plant

Table A-4 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 1 span

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
7-8	-5.5 to -11.5	less than -17.0	Span Loss Too High
		-17.0 to -5.5	0
		-5.5 to -1.4	5
		-1.4 to 2.8	10
		less than 2.8	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.8 dBm, some attenuation must be added to the outside plant

NOTE:

The LEA7 Nx33 configuration with 2 spans is not a true 33dB span. The maximum span loss is 30dB.

Table A-5 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 2 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
0	-12.0 to -18.0	less than -20.5	Span Loss too High
		-20.5 to -12.0	0
		-12.0 to -8.0	5
		-8.0 to -3.7	10
		greater than -3.7	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater then -3.7 dBm, some attenuation must be added to the outside plant.

Table A-5 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 2 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
1-2	-9.6 to -15.6	less than -18.1	Span Loss Too High
		-18.1 to -9.6	0
		-9.6 to -5.5	5
		-5.5 to -1.3	10
		greater than -1.3	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -1.3 dBm, some attenuation must be added to the outside plant.
3	-8.3 to -14.3	less than -16.8	Span Loss Too High
		-16.8 to -8.3	0
		-8.3 to -4.2	5
		-4.2 to 0.0	10
		greater than 0.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.0 dBm, some attenuation must be added to the outside plant.
4	-7.5 to -13.5	less than -16.0	Span Loss Too High
		-16.0 to -7.5	0
		-7.5 to -3.4	5
		-3.4 to 0.8	10
		greater than 0.8	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.8 dBm, some attenuation must be added to the outside plant.

Table A-5 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 2 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
5	-6.8 to -12.8	less than -15.3	Span Loss Too high
		-15.3 to -6.8	0
		-6.8 to -2.7	5
		-2.7 to 1.5	10
		greater than 1.5	Put a 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 1.5 dBm, some attenuation must be added to the outside plant.
6	-6.3 to -12.3	less than -14.8	Span Loss Too High
		-14.8 to -6.3	0
		-6.3 to -2.2	5
		-2.2 to 2.0	10
		greater than 2.0	Put a 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.0 dBm, some attenuation must be added to the outside plant
7-8	-5.5 to -11.5	less than -14.0	Span Loss Too High
		-14.0 to -5.5	0
		-5.5 to -1.4	5
		-1.4 to 2.8	10
		less than 2.8	Put a 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.8 dBm, some attenuation must be added to the outside plant

⇒ NOTE:

The LEA7 Nx33 Configuration with 3 spans does not support a 33 dB loss. The maximum span loss for LEA7 Nx33 with 3 spans is 28 dB.

Table A-6 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 3 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
0	-12.0 to -18.0	less than -18.5	Span Loss too High
		-18.5 to -12.0	0
		-12.0 to -8.0	5
		-8.0 to -3.7	10
		greater than -3.7	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater then -3.7 dBm, some attenuation must be added to the outside plant.
1-2	-9.6 to -15.6	less than -16.1	Span Loss Too High
		-16.1 to -9.6	0
		-9.6 to -5.5	5
		-5.5 to -1.3	10
		greater than -1.3	Put a 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -1.3 dBm, some attenuation must be added to the outside plant.
3	-8.3 to -14.3	less than -14.8	Span Loss Too High
		-14.8 to -8.3	0
		-8.3 to -4.2	5
		-4.2 to 0.0	10
		greater than 0.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.0 dBm, some attenuation must be added to the outside plant.

Table A-6 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 3 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
4	-7.5 to -13.5	less than -14.0	Span Loss Too High
		-14.0 to -7.5	0
		-7.5 to -3.4	5
		-3.4 to 0.8	10
		greater than 0.8	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.8 dBm, some attenuation must be added to the outside plant.
5	-6.8 to -12.8	less than -13.3	Span Loss Too high
		-13.3 to -6.8	0
		-6.8 to -2.7	5
		-2.7 to 1.5	10
		greater than 1.5	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 1.5 dBm, some attenuation must be added to the outside plant.
6	-6.3 to -12.3	less than -12.8	Span Loss Too High
		-12.8 to -6.3	0
		-6.3 to -2.2	5
		-2.2 to 2.0	10
		greater than 2.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.0 dBm, some attenuation must be added to the outside plant

Table A-6 LEA7 OA Input LBO Selection Guide for Nx33 Configurations with 3 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
7-8	-5.5 to -11.5	less than -12.0	Span Loss Too High
		-12.0 to -5.5	0
		-5.5 to -1.4	5
		-1.4 to 2.8	10
		less than 2.8	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 2.8 dBm, some attenuation must be added to the outside plant

Table A-7 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 4-6 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
0	-15.0 to -20.0	less than -20.7	Span Loss too High
		-20.7 to -15.0	0
		-15.0 to -12.0	5
		-12.0 to -9.8	7
		-9.8 to -6.7	10
		greater than -6.7	Put 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater then -3.7 dBm, some attenuation must be added to the outside plant.

Table A-7 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 4-6 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
1	-12.4 to -17.4	less than -18.1	Span Loss Too High
		-18.1 to -12.4	0
		-12.4 to -9.4	5
		-9.4 to -7.2	7
		-7.2 to -4.1	10
		greater than -4.1	Put 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -4.1 dBm, some attenuation must be added to the outside plant.
2	-11.9 to -16.9	less than -17.6	Span Loss Too High
		-17.6 to -11.9	0
		-11.9 to -8.9	5
		-8.9 to -6.7	7
		-6.7 to -3.6	10
		greater than -3.6	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than -3.6 dBm, some attenuation must be added to the outside plant.
3	-10.2 to -15.2	less than -15.9	Span Loss Too High
		-15.9 to -10.2	0
		-10.2 to -7.2	5
		-7.2 to -5.0	7
		-5.0 to -1.9	10
		greater than -1.9	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than -1.9 dBm, some attenuation must be added to the outside plant.

Table A-7 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 4-6 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
4	-9.2 to -14.2	less than -14.9	Span Loss Too high
		-14.9 to -9.2	0
		-9.2 to -6.2	5
		-6.2 to -4.0	7
		-4.0 to -0.9	10
		greater than -0.9	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than -0.9 dBm, some attenuation must be added to the outside plant.
5	-8.3 to -13.3	less than -14.0	Span Loss Too High
		-14.0 to -8.3	0
		-8.3 to -5.3	5
		-5.3 to -3.1	7
		-3.1 to 0.0	10
		greater than 0.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.0 dBm, some attenuation must be added to the outside plant
6	-7.7 to -12.7	less than -13.4	Span Loss Too High
		-13.4 to -7.7	0
		-7.7 to -4.7	5
		-4.7 to -2.5	7
		-2.5 to +0.6	10
		greater than +0.6	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +0.6 dBm, some attenuation must be added to the outside plant

Table A-7 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 4-6 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
7	-7.1 to -12.1	less than -12.8	Span Loss Too High
		-12.8 to -7.1	0
		-7.1 to -4.1	5
		-4.1 to -1.9	7
		-1.9 to +1.2	10
		greater than +1.2	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +1.2 dBm, some attenuation must be added to the outside plant.
8	-6.9 to -11.9	less than -12.6	Span Loss Too High
		-12.6 to -6.9	0
		-6.9 to -3.9	5
		-3.9 to -1.7	7
		-1.7 to +1.4	10
		greater than +1.4	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +1.4 dBm, some attenuation must be added to the outside plant.

⇒ NOTE:

A 3dB LBO must be installed on the OUT port of all OAs in 7 & 8 span configurations. This 3 dB LBO must be in place in the upstream OA before using the following table.

Table A-8 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 7-8 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
0	-14.0 to -19.0	less than -19.7	Span Loss Too High
		-19.7 to -14.0	0
		-14.0 to -11.0	5
		-11.0 to -8.8	7
		-8.8 to -5.7	10
		greater than -5.7	Put 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -5.7 dBm, some attenuation must be added to the outside plant.
1	-11.4 to -16.4	less than -17.1	Span Loss Too High
		-17.1 to -11.4	0
		-11.4 to -8.4	5
		-8.4 to -6.2	7
		-6.2 to -3.1	10
		greater than -3.1	Put 10 dB LBO in the output of upstream OA and re-measure input power. If input power is still greater than -3.1 dBm, some attenuation must be added to the outside plant.

Table A-8 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 7-8 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
2	-10.9 to -15.9	less than -16.6	Span Loss Too High
		-16.6 to -10.9	0
		-10.9 to -7.9	5
		-7.9 to -5.7	7
		-5.7 to -2.6	10
		greater than -2.6	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than -2.6 dBm, some attenuation must be added to the outside plant.
3	-9.2 to -14.2	less than -14.9	Span Loss Too High
		-14.9 to -9.2	0
		-9.2 to -6.2	5
		-6.2 to -4.0	7
		-4.0 to -0.9	10
		greater than -0.9	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than -0.9 dBm, some attenuation must be added to the outside plant.
4	-8.2 to -13.2	less than -13.9	Span Loss Too high
		-13.9 to -8.2	0
		-8.2 to -5.2	5
		-5.2 to -3.0	7
		-3.0 to +0.1	10
		greater than +0.1	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 0.1 dBm, some attenuation must be added to the outside plant.

Table A-8 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 7-8 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
5	-7.3 to -12.3	less than -13.0	Span Loss Too High
		-13.0 to -7.3	0
		-7.3 to -4.3	5
		-4.3 to -2.1	7
		-2.1 to +1.0	10
		greater than +1.0	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than 1.0 dBm, some attenuation must be added to the outside plant
6	-6.7 to -11.7	less than -12.4	Span Loss Too High
		-12.4 to -6.7	0
		-6.7 to -3.7	5
		-3.7 to -1.5	7
		-1.5 to +1.6	10
		greater than +1.6	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +1.6 dBm, some attenuation must be added to the outside plant
7	-6.1 to -11.1	less than -11.8	Span Loss Too High
		-11.8 to -6.1	0
		-6.1 to -3.1	5
		-3.1 to -0.9	7
		-0.9 to +2.2	10
		greater than +2.2	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +2.2 dBm, some attenuation must be added to the outside plant.

Table A-8 LEA7 OA Input LBO Selection Guide for Px25/Mx24 Configurations with 7-8 spans

Total Number of Equipped OLS Channels	Target OA Input Power (dBm) after faceplate LBO	Measured OA Input Power (dBm) before faceplate LBO	Recommended Size for OA Input LBO (dB)
8	-5.9 to -10.9	less than -11.6	Span Loss Too High
		-11.6 to -5.9	0
		-5.9 to -2.9	5
		-2.9 to -0.7	7
		-0.7 to +2.4	10
		greater than +2.4	Put 10 dB LBO in output of upstream OA and re-measure input power. If input power is still greater than +2.4 dBm, some attenuation must be added to the outside plant.

Table A-9 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 1 or 2 for Nx33 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable)¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
1	-3.3(-36.3) to -2.0(-35.0)	7	5
	-2.0(-35.0) to -1.2(-34.2)	10	3
	-1.2(-34.2) to -0.2(-33.2)	7	7
	-0.2(-33.2) to +1.5(-31.5)	15	0
	+1.5(-31.5) to +2.6(-30.4)	10	7
	+2.6(-30.4) to +4.3(-28.7)	15	3
	+4.3(-28.7) to +4.9(-28.7)	10	10
	+4.9(-28.7) to +6.2(-26.8)	15	5
	>+6.2(-26.8)	15	7
2	-11.1(-44.1) to -9.4(-42.4)	10	0
	-9.4(-42.4) to -8.1(-41.1)	7	5
	-8.1(-41.1) to -7.5(-40.5)	10	3
	-7.5(-40.5) to -6.3(-39.3)	7	7
	-6.3(-39.3) to -4.7(-37.7)	15	0
	-4.7(-37.7) to -3.5(-36.5)	10	7
	-3.5(-36.5) to -1.9(-34.9)	15	3
	-1.9(-34.9) to -1.1(-34.1)	10	10
	>-1.1(-34.1)	15	5

Table A-9 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 1 or 2 for Nx33 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
3	-12.1(-45.1) to 10.4(-43.4)	10	0
	-10.4(-43.4) to -9.1(-42.1)	7	5
	-9.1(-42.1) to -8.5(-41.5)	10	3
	-8.5(-41.5) to -7.3(-40.3)	7	7
	-7.3(-40.3) to -5.7(-38.7)	15	0
	-5.7(-38.7) to -4.5(-37.5)	10	7
	-4.5(-37.5) to -2.9(-35.9)	15	3
	-2.9(-35.9) to -2.1(-35.1)	10	10
	>-2.1(-35.1)	15	5
4-8	-14.5(-47.5) to -13.1(-46.1)	5	3
	-13.1(-46.1) to -11.4(-44.4)	10	0
	-11.4(-44.4) to -10.1(-43.1)	7	5
	-10.1(-43.1) to -9.5(-42.5)	10	3
	-9.5(-42.5) to -8.3(-41.3)	7	7
	-8.3(-41.3) to -6.7(-39.7)	15	0
	-6.7(-39.7) to -5.5(-38.5)	10	7
	-5.5(-38.5) to -3.9(-36.9)	15	3
	-3.9(-36.9) to -3.1(-36.1)	10	10
	>-3.1(-36.1)	15	5

1. Use measured value stamped on test cable.

Table A-10 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 3 through 8 for Nx33 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
1	-2.6(-35.6) to -2.0(-35.0)	10	3
	-2.0(-35.0) to -0.8(-33.8)	7	7
	-0.8(-33.8) to +0.8(-32.2)	15	0
	+0.8(-32.2) to +2.0(-31.0)	10	7
	+2.0(-31.0) to +3.6(-29.4)	15	3
	+3.6(-29.4) to +4.4(-28.6)	10	10
	+4.4(-28.6) to +5.5(-27.5)	15	5
	>+5.5(-27.5)	15	7
2	-5.6(-38.5) to -5.0(-38.0)	10	3
	-5.0(-38.0) to -3.8(-36.8)	7	7
	-3.8(-36.8) to -2.2(-35.2)	15	0
	-2.2(-35.2) to -1.0(-34.0)	10	7
	-1.0(-34.0) to +0.6(-32.4)	15	3
	+0.6(-32.4) to +1.4(-31.6)	10	10
	+1.4(-31.6) to +2.5(-30.5)	15	5
	+2.5(-30.5) to +4.8(-28.2)	15	7
	>+4.8(-28.2)	15	10

Table A-10 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 3 through 8 for Nx33 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
3	-7.4(-40.4) to -6.1(-39.1)	7	5
	-6.1(-39.1) to -5.5(-38.5)	10	3
	-5.5(-38.5) to -4.3(-37.3)	7	7
	-4.3(-37.3) to -2.7(-35.7)	15	0
	-2.7(-35.7) to -1.5(-34.5)	10	7
	-1.5(-34.5) to +0.1(-32.9)	15	3
	+0.1(-32.9) to +0.9(-32.1)	10	10
	+0.9(-32.1) to +2.0(-31.0)	15	5
	+2.0(-31.0) to +4.3(-28.7)	15	7
	>+4.3(-28.7)	15	10
4	-9.6(-42.6) to -7.9(-40.9)	10	0
	-7.9(-40.9) to -6.6(-39.6)	7	5
	-6.6(-39.6) to -6.0(-39.0)	10	3
	-6.0(-39.0) to -4.8(-37.8)	7	7
	-4.8(-37.8) to -3.2(-36.2)	15	0
	-3.2(-36.2) to -2.0(-35.0)	10	7
	-2.0(-35.0) to -0.4(-33.4)	15	3
	-0.4(-33.4) to +0.4(-32.6)	10	10
	+0.4(-32.6) to +1.5(-31.5)	15	5
	+1.5(-31.5) to +3.8(-29.2)	15	7
	>+3.8(-29.2)	15	10

**Table A-10 RCVR/OTU Input and ODU Output LBO Selection Guide
for Wavelengths 3 through 8 for Nx33 Systems**

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
5	-11.5(-44.5) to -10.1(-43.1)	5	3
	-10.1(-43.1) to -8.4(-41.4)	10	0
	-8.4(-41.4) to -7.1(-40.1)	7	5
	-7.1(-40.1) to -6.5(-39.5)	10	3
	-6.5(-39.5) to -5.3(-38.3)	7	7
	-5.3(-38.3) to -3.7(-36.7)	15	0
	-3.7(-36.7) to -2.5(-35.5)	10	7
	-2.5(-35.5) to -0.9(-33.9)	15	3
	-0.9(-33.9) to -0.1(-33.1)	10	10
	-0.1(-33.1) to +1.0(-32.0)	15	5
	+1.0(-32.0) to +3.3(-29.7)	15	7
	>+3.3(-29.7)	15	10
6	-13.3(-46.3) to -12.0(-45.0)	7	0
	-12.0(-45.0) to -10.6(-43.6)	5	3
	-10.6(-43.6) to -8.9(-41.9)	10	0
	-8.9(-41.9) to -7.6(-40.6)	7	5
	-7.6(-40.6) to -7.0(-40.0)	10	3
	-7.0(-40.0) to -5.8(-38.8)	7	7
	-5.8(-38.8) to -4.2(-37.2)	15	0
	-4.2(-37.2) to -3.0(-36.0)	10	7
	-3.0(-36.0) to -1.4(-34.4)	15	3
	-1.4(-34.4) to -0.6(-33.6)	10	10
	-0.6(-33.6) to +0.5(-32.5)	15	5
	+0.5(-32.5) to +2.8(-30.2)	15	7
	>+2.8(-30.2)	15	10

Table A-10 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 3 through 8 for Nx33 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
7	-13.5(-46.5) to -12.5(-45.5)	7	0
	-12.5(-45.5) to -11.1(-44.1)	5	3
	-11.1(-44.1) to -9.4(-42.4)	10	0
	-9.4(-42.4) to -8.1(-41.1)	7	5
	-8.1(-41.1) to -7.5(-40.5)	10	3
	-7.5(-40.5) to -6.3(-39.3)	7	7
	-6.3(-39.3) to -4.7(-37.7)	15	0
	-4.7(-37.7) to -3.5(-36.5)	10	7
	-3.5(-36.5) to -1.9(-34.9)	15	3
	-1.9(-34.9) to -1.1(-34.1)	10	10
	-1.1(-34.1) to 0.0(-33.0)	15	5
	0.0(-33.0) to +2.3(-31.7)	15	7
	>+2.3(-31.7)	15	10
8	-13.5(-46.5) to -12.1(-45.1)	5	3
	-12.1(-45.1) to -10.4(-43.4)	10	0
	-10.4(-43.4) to -9.1(-42.1)	7	5
	-9.1(-42.1) to -8.5(-41.5)	10	3
	-8.5(-41.5) to -7.3(-40.3)	7	7
	-7.3(-40.3) to -5.7(-38.7)	15	0
	-5.7(-38.7) to -4.5(-37.5)	10	7
	-4.5(-37.5) to -2.9(-35.9)	15	3
	-2.9(-35.9) to -2.1(-35.1)	10	10
	-2.1(-35.1) to -1.0(-34.0)	15	5
	-1.0(-34.0) to +1.3(-31.7)	15	7
	>+1.3(-31.7)	15	10

1. Use measured value stamped on test cable.

Table A-11 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelength 1 for Mx24 and Px25 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable)¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
1	-6.5(-39.5) to -5.0(-38.0)	5	3
	-5.0(-38.0) to -3.4(-36.4)	10	0
	-3.4(-36.4) to -2.1(-35.1)	7	5
	-2.1(-35.1) to -1.5(-34.5)	10	3
	-1.5(-34.5) to -0.3(-33.3)	7	7
	-0.3(-33.3) to +1.3(-31.7)	15	0
	+1.3(-31.7) to +1.8(-31.2)	10	7
	+1.8(-31.2) to +4.1(-28.9)	15	3
	>+4.1(-28.9)	10	10
2-8	-17.0(-50.0) to -15.3(-48.3)	5	0
	-15.3(-48.3) to -14.0(-47.0)	7	0
	-14.0(-47.0) to -12.6(-45.6)	5	3
	-12.6(-45.6) to -10.9(-43.9)	10	0
	-10.9(-43.9) to -9.6(-42.6)	7	5
	-9.6(-42.6) to -9.0(-42.0)	10	3
	-9.0(-42.0) to -7.8(-40.8)	7	7
	-7.8(-40.8) to -6.2(-39.2)	15	0
	-6.2(-39.2) to -5.0(-38.0)	10	7
	-5.0(-38.0) to -3.4(-36.4)	15	3
	-3.4(-36.4) to -2.6(-35.6)	10	10
	-2.6(-35.6) to -1.5(-24.5)	15	5
	>-1.5(-24.5)	15	7

1. Use measured value stamped on test cable.

Table A-12 RCVR/OTU Input and ODU Output LBO Selection Guide for Wavelengths 2 through 8 for Mx24 and Px25 Systems

Total Number of Equipped OLS Channels	Measured Receiver Input Power (dBm) before Faceplate LBO with 0 dB LBO on ODU Output (value in () is power measured after 33 dB Test Cable) ¹	Recommended Size for RCVR Input LBO (dB)	Recommended Size for ODU Output LBO (dB)
1	-7.0(-40.0) to -5.5(-38.5)	5	3
	-5.5(-38.5) to -3.9(-36.9)	10	0
	-3.9(-36.9) to -2.6(-35.6)	7	5
	-2.6(-35.6) to -2.0(-35.0)	10	3
	-2.0(-35.0) to -0.8(-33.8)	7	7
	-0.8(-33.8) to +0.8(-32.2)	15	0
	+0.8(-32.2) to +2.0(-31.0)	10	7
	+2.0(-31.0) to +3.6(-29.4)	15	3
	>+3.6(-29.4)	10	10
2-8	-15.0(-48.0) to -13.3(-46.3)	5	0
	-13.3(-46.3) to -12.0(-45.0)	7	0
	-12.0(-45.0) to -10.6(-43.6)	5	3
	-10.6(-43.6) to -8.9(-41.9)	10	0
	-8.9(-41.9) to -7.6(-40.6)	7	5
	-7.6(-40.6) to -7.0(-40.0)	10	3
	-7.0(-40.0) to -5.8(-38.8)	7	7
	-5.8(-38.8) to 46.2(-37.2)	15	0
	-4.2(-37.2) to -3.0(-36.0)	10	7
	-3.0(-36.0) to -1.4(-34.4)	15	3
	-1.4(-34.4) to -0.6(-33.6)	10	10
	-0.6(-33.6) to +0.5(-32.5)	15	5
	+0.5(-32.5) to +2.8(-30.2)	15	7
	>+2.8(-30.2)	15	10

1. Use measured value stamped on test cable.

General

This section describes the procedures for terminal repair in FASTECH and METRAL technology using the KS-22876, L6 Pin Repair Kit for the FASTECH technology and the BERG MT370-01 Tool Kit for the METRAL technology. The tools were designed to remove and replace pins in MLPWB (Multilayer Printed Wiring Board) backplane areas equipped with or without spacer aligners.

Tool Kit Descriptions

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 Instructions
- 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 B-1 on page B-3
- Ordering Information: See Step 7 on page B-7

Pin Designations

Table B-1. FASTECH Pin Codes

PIN ID	Comcode	Pin Type or Commercial Code	FASTECH/ METRAL
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 B-2. METRAL Pin Codes

A		88929-102	METRAL
C		88929-119	METRAL
D		88930-101	METRAL
F		88929-106	METRAL
X		88929-120	METRAL

LCT Circuit Pack and Equipment Location

Table B-3. LCT Equipment Location (Switch Fabric Shelf)

Circuit Pack	Backplane Location	
SYSMEM	20-554	Controller Shelf Only
SYSCTL	20-534	Controller Shelf Only
TG1/2	20-504	Backplane Designation Only
USER PNL	43-505	Backplane Designation Only
SWICO (1-8)	20-123, 173, 223,273,323, 377,427, 477	
PWR A	44-551	Backplane Designation Only
PWR B	39-551	Backplane Designation Only
MCTL	20-554	Complimentary Shelf Only

Table B-4. LCT Equipment Location (Low Speed Shelf)

Circuit Pack	Backplane Location	
LSINTFC 1A-8B	07-026, 032, 038, 044, 050, 056, 062, 068, 122, 128, 134, 140, 146, 152, 158, 164	
LSSWIN	07-086	
LSSWOUT	07-092	
TG1	07-108	
TG2	07-116	
LS INTFC P1	07-074	
LS INTFC P2	07-080	
SYSCTL	07-172	Backplane Designation Only
SYSMEM	07-178	Backplane Designation Only
TOHCTL	07-100	
PWR A	17-173	Backplane Designation Only
PWR B	15-173	Backplane Designation Only

Table B-4. LCT Equipment Location (Low Speed Shelf)

Circuit Pack	Backplane Location	
USER PNL	16-159	Backplane Designation Only

Table B-5. LCT Equipment Location (Enhanced High Speed Shelf)

Circuit Pack	Backplane Location	
SWX	07-126	Backplane Designation Only
TS1	07-041	Backplane Designation Only
TRMTRX	07-062	
TS2	07-072	Backplane Designation Only
RCVRX	07-080	
SWY	07-088	Backplane Designation Only
TS3	07-105	Backplane Designation Only
TRMTRY	07-126	
TS4	07-132	Backplane Designation Only
TS5	07-137	Backplane Designation Only
RCVRY	07-144	
LNCTLX	07-150	
LNCTLY	07-156	
OHCTLX	07-162	
OHCTLY	07-168	
LOHCTL	07-174	Backplane Designation Only
EQL	07-180	Backplane Designation Only
PWR A	17-173	Backplane Designation Only
PWR B	15-173	Backplane Designation Only
USER PNL	16-159	Backplane Designation Only

WaveStar OLS 40G Circuit Pack and Equipment Location

Table B-6. WaveStar OLS 40G Equipment Location

Circuit Pack	Backplane Location	
SYSMEM (LEA2)	20-604	
SYSCTL (LEA1)	20-584	
TOHCTL (LEA5) (LEA102)	20-554	
OA (LEA6/LEA6B)	20-534, 20-434, 20-330,20-230	
TLM (LDA1)	52-180, 52-230 52-280, 52-330	
OMU/ODU (505A/605A)	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

Table B-7. OT Equipment Location

Circuit Pack	Backplane Location	
SYSMEM	20-605	
SYSCTL	20-565	
TOHCTL	20-525	
OTU (System Shelf)	20-163 20-203 20-243 20-283 20-323 20-363 20-405 20-445 20-485	Note: Location 20-485 is not populated with any circuit pack at this time. Its inclusion is for accuracy.

Table B-7. OT Equipment Location

Circuit Pack	Backplane Location	
OTU (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

**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 WaveStar OLS 40G, OT or an LCT Bay.
- (2) Determine the shelf in which the bent or broken pin resides (ex. Switch Fabric Shelf).
- (3) Determine the circuit pack slot in which the pin resides.
- (4) Determine the number and column location of the pin.
- (5) Refer to the correct figure (Figures B-1 through B-19 on pages B-8 through B-26) to determine the letter pin code associated with the pin.
- (6) Using Table B-1, "FASTECH Pin Codes," on page B-3, determine the type of pin (either METRAL or FASTECH) and the correct comcode for the replacement pin.
- (7) Obtain the correct replacement pin (See the Applications, Planning, and Ordering Guide for ordering information).

- (8) 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.
- (9) 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.

Reference Notes:

- (1) 1-Type contacts shall be press fit from the component side.
- (2) 1D1 contacts shall be broken off on the component side after insertion.
- (3) 1B32, 1B33, 1B34, and 1C6 contacts shall be broken off on the noncomponent side after insertion.

High Speed Shelf notes:

- (4) The C847324282 backplane assembly is shown on pages 18 and 19. This was discontinued approximately 12-96. The current backplane assembly is C847779808. It is similar in all respects except that some pin fields are not populated. The List tag on the top of the bay will call out which backplane is used when correlated with the respective J-drawing.
- (5) Pin substitutions (for High Speed Shelf only):
 - The 1B32SG may be used for the 1B26SG.
 - The 1B34SG may be used for the 1B27SG.
 - The 1B33SG may be used for the 1B28SG.

:

Large Capacity Terminal (LCT) - Pin Type Location

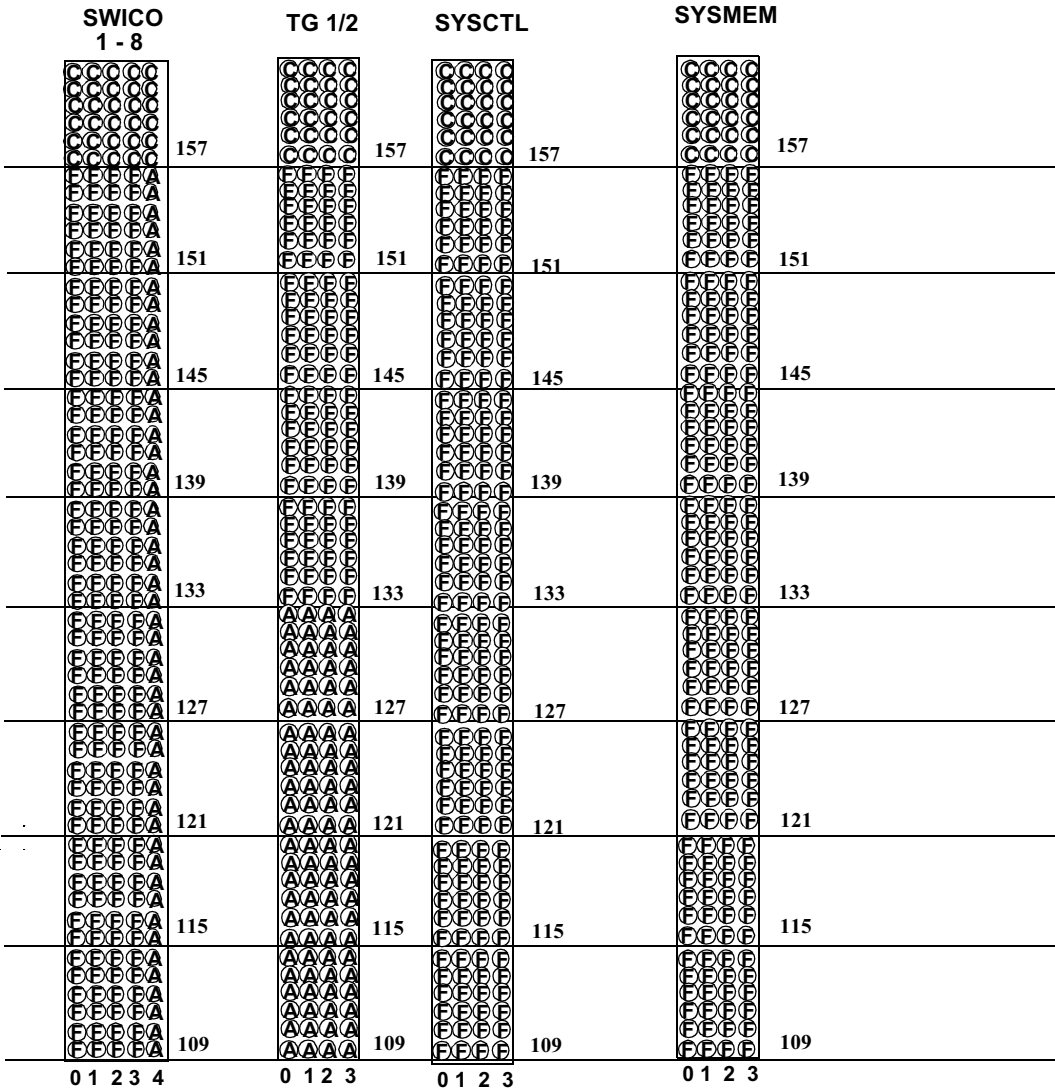


Figure B-1. LCT Switch Fabric Shelf - System Controller (Upper) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

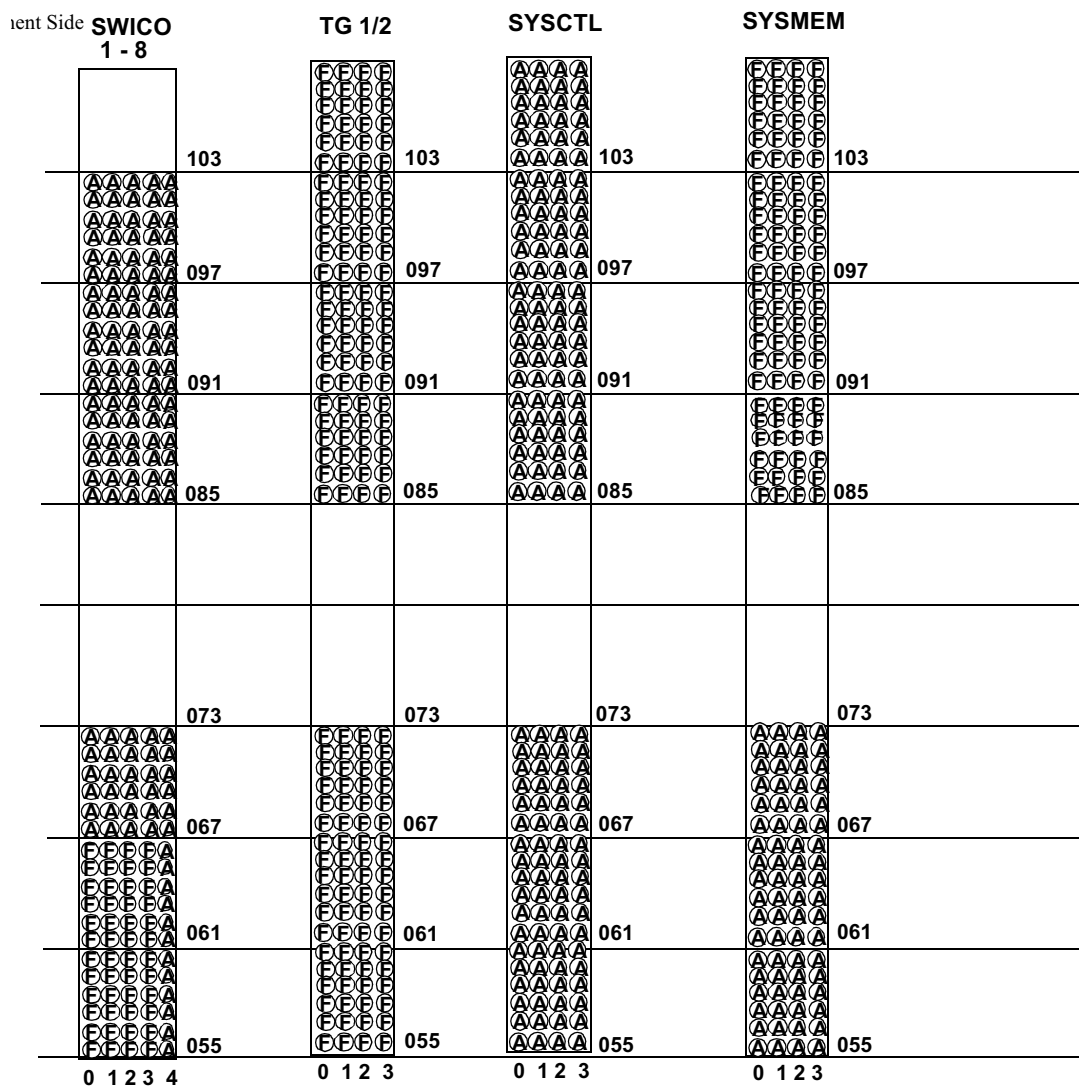


Figure B-2. LCT Switch Fabric Shelf System Controller (Middle) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

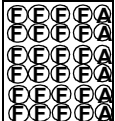
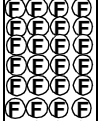
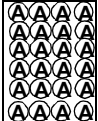
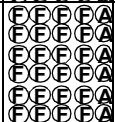
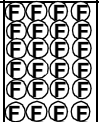
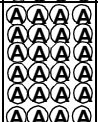
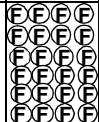
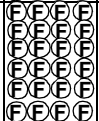
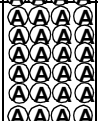
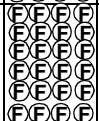
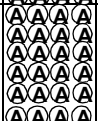
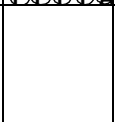
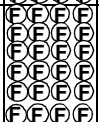
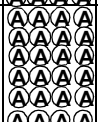
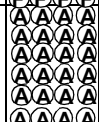
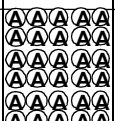
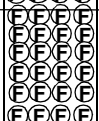
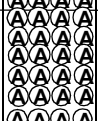
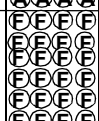
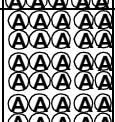
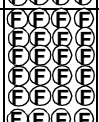
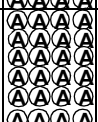
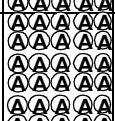
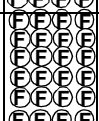
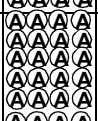
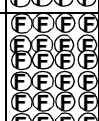
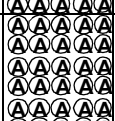
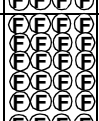
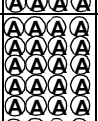
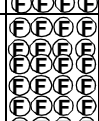
Component Side Label	SWICO 1 - 8	TG 1/2	SYSCTL	SYSTEM
				
	049	049	049	049
				
	043	043	043	043
				
	037	037	037	037
				
	031	031	031	031
				
	025	025	025	025
				
	019	019	019	019
				
	013	013	013	013
				
	007	007	007	007
				
	001	001	001	001
	0 1 2 3 4	0 1 2 3	0 1 2 3	0 1 2 3

Figure B-3. LCT Switch Fabric Shelf System Controller (Lower) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

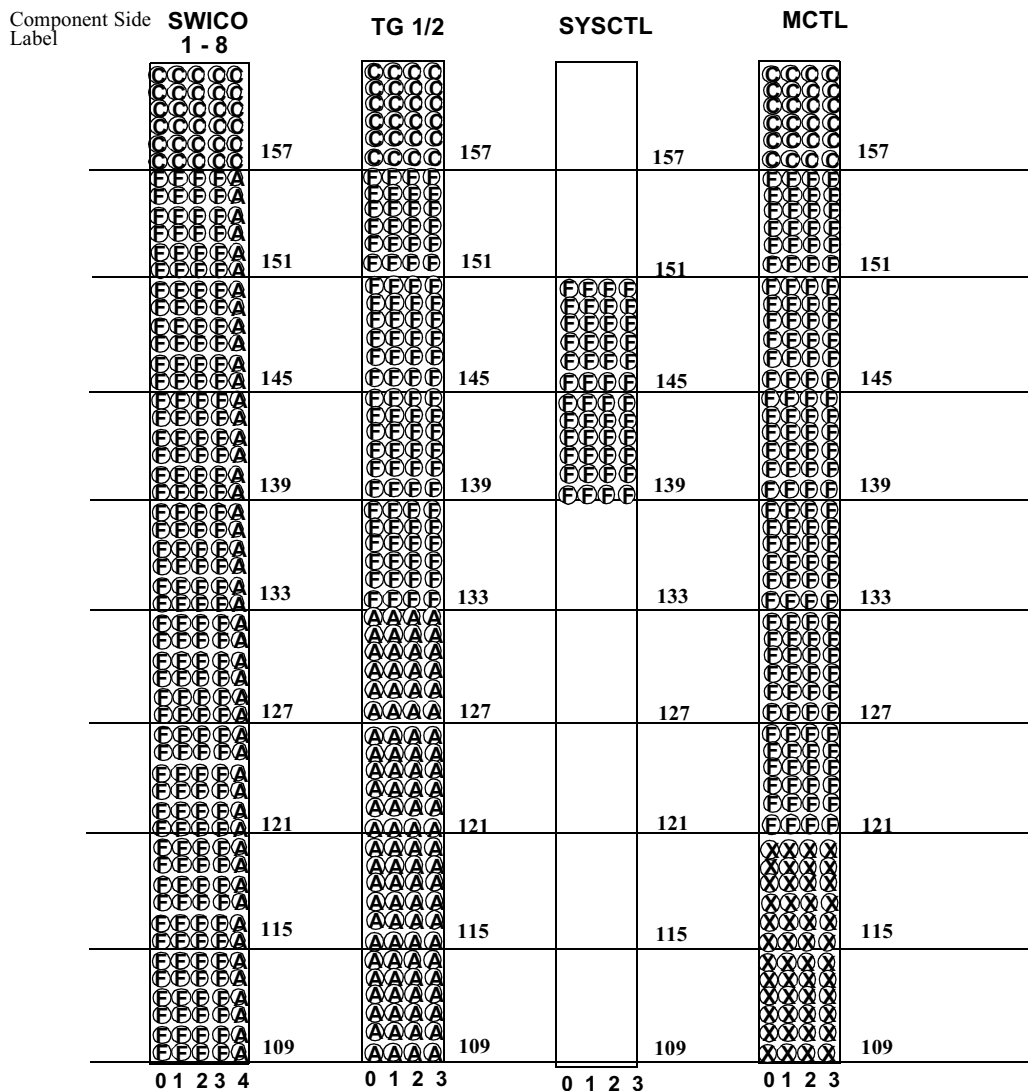


Figure B-4. LCT Switch Fabric Shelf Complementary (Upper) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

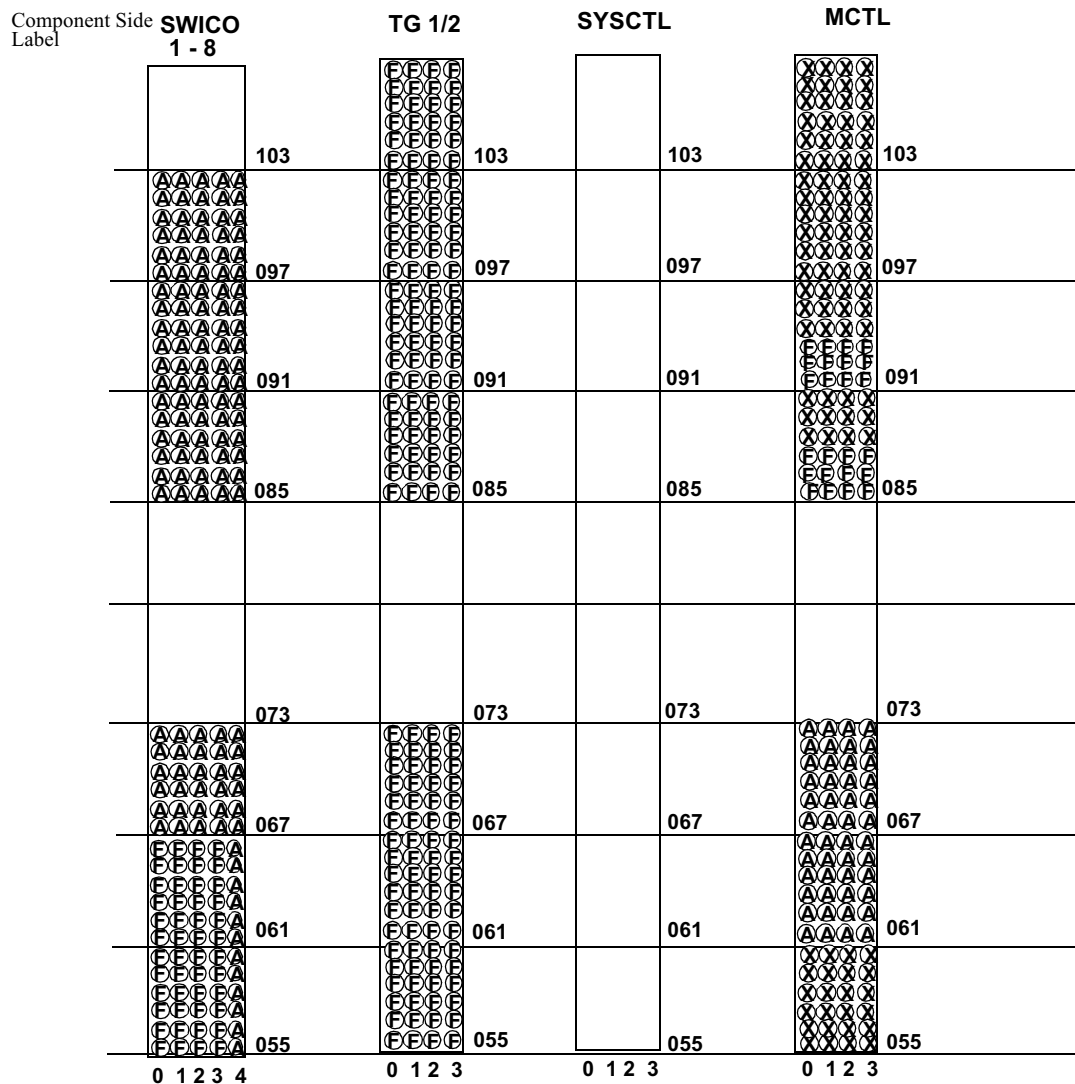


Figure B-5. LCT Switch Fabric Shelf Complementary (Middle) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

Component Side Label	SWICO 1 - 8	TG 1/2	SYSCTL	MCTL
	0 1 2 3 4	0 1 2 3	0 1 2 3	0 1 2 3

Figure B-6. LCT Switch Fabric Shelf Complementary (Lower) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

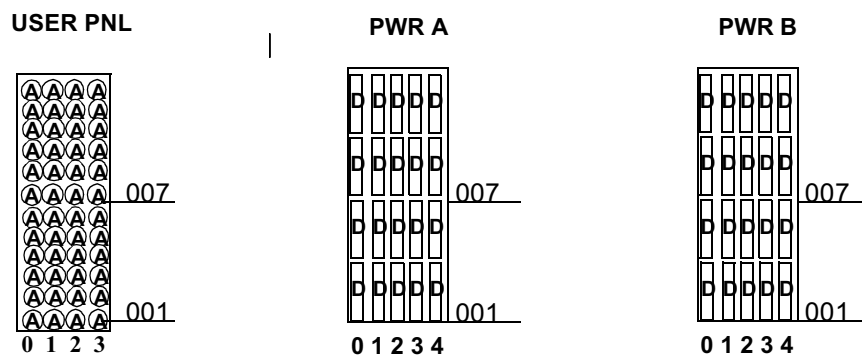


Figure B-7. LCT User and Power Panel - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

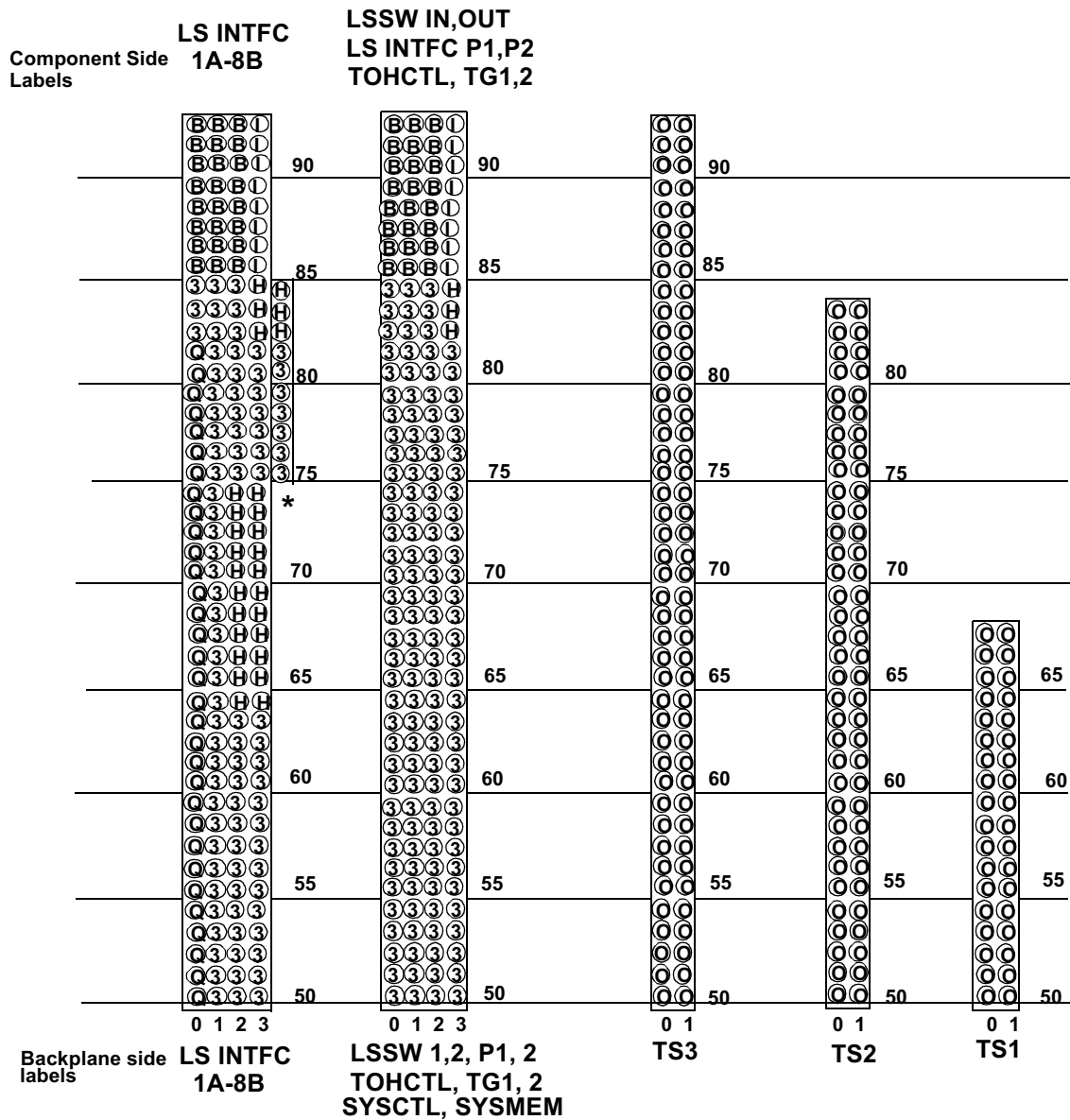


Figure B-8. Low Speed Shelf (Complementary) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

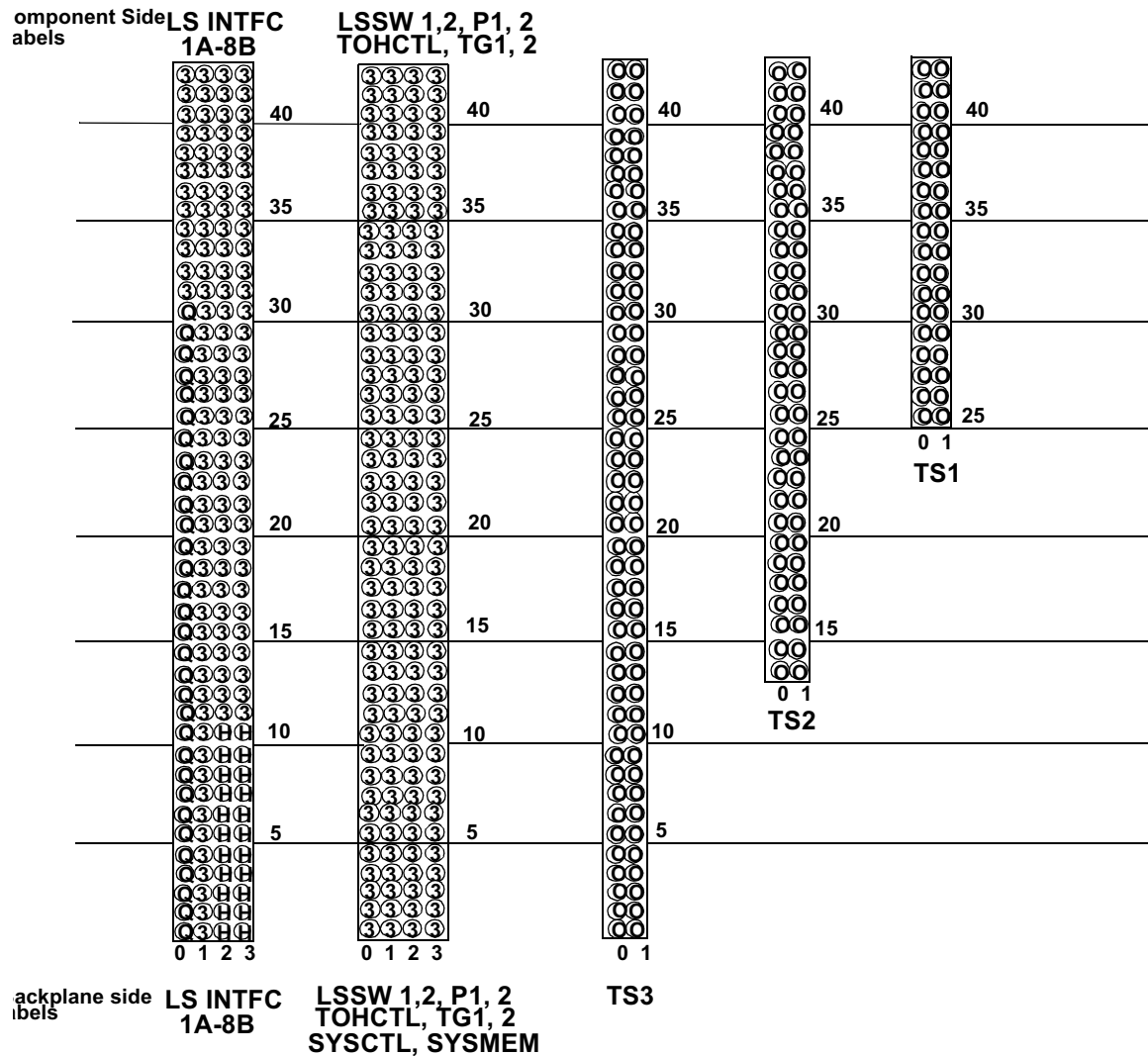


Figure B-9. Low Speed Shelf (Complementary) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

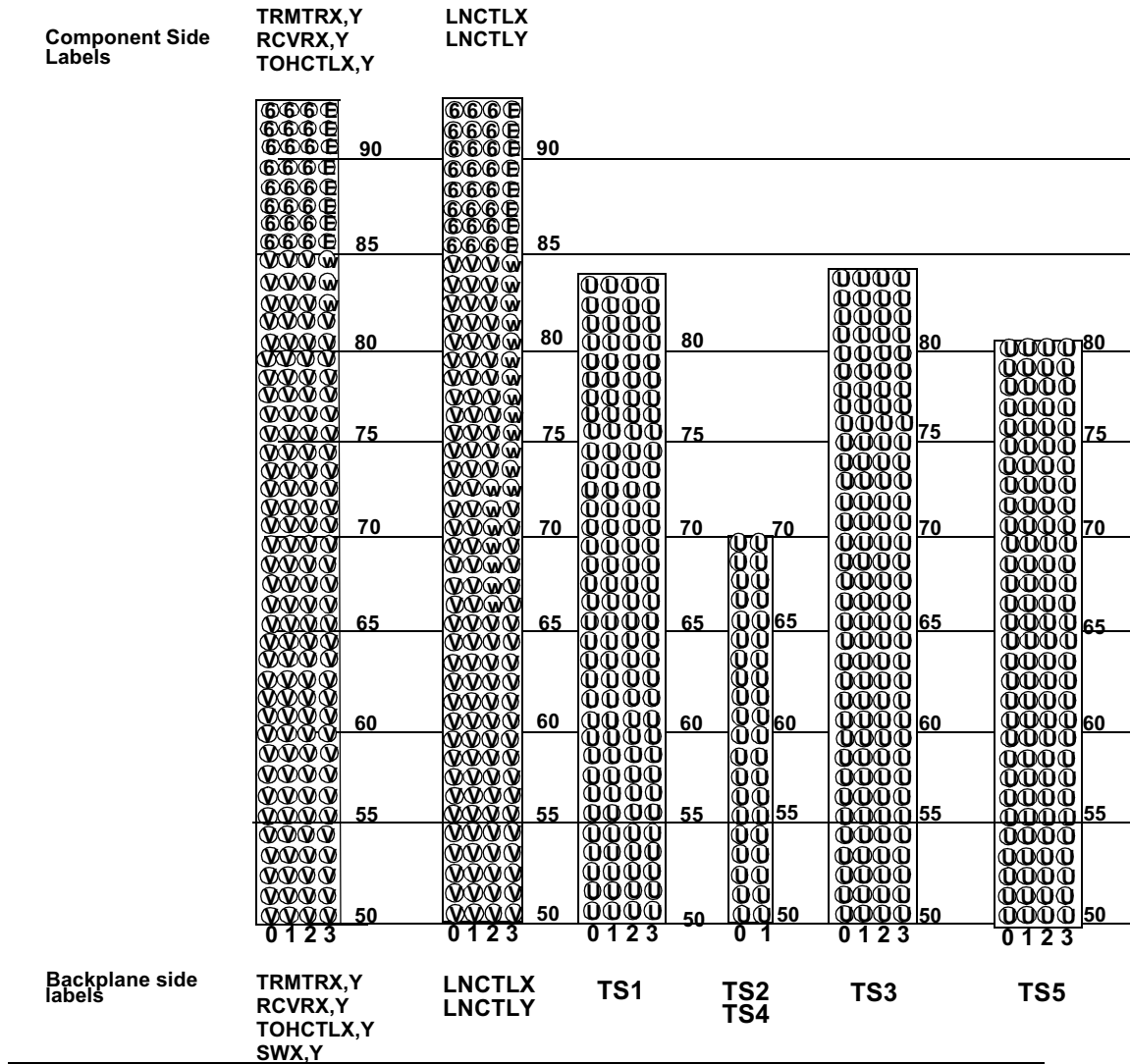


Figure B-10. LCT High Speed Shelf (Upper) - Component Side View

Large Capacity Terminal (LCT) - Pin Type Location

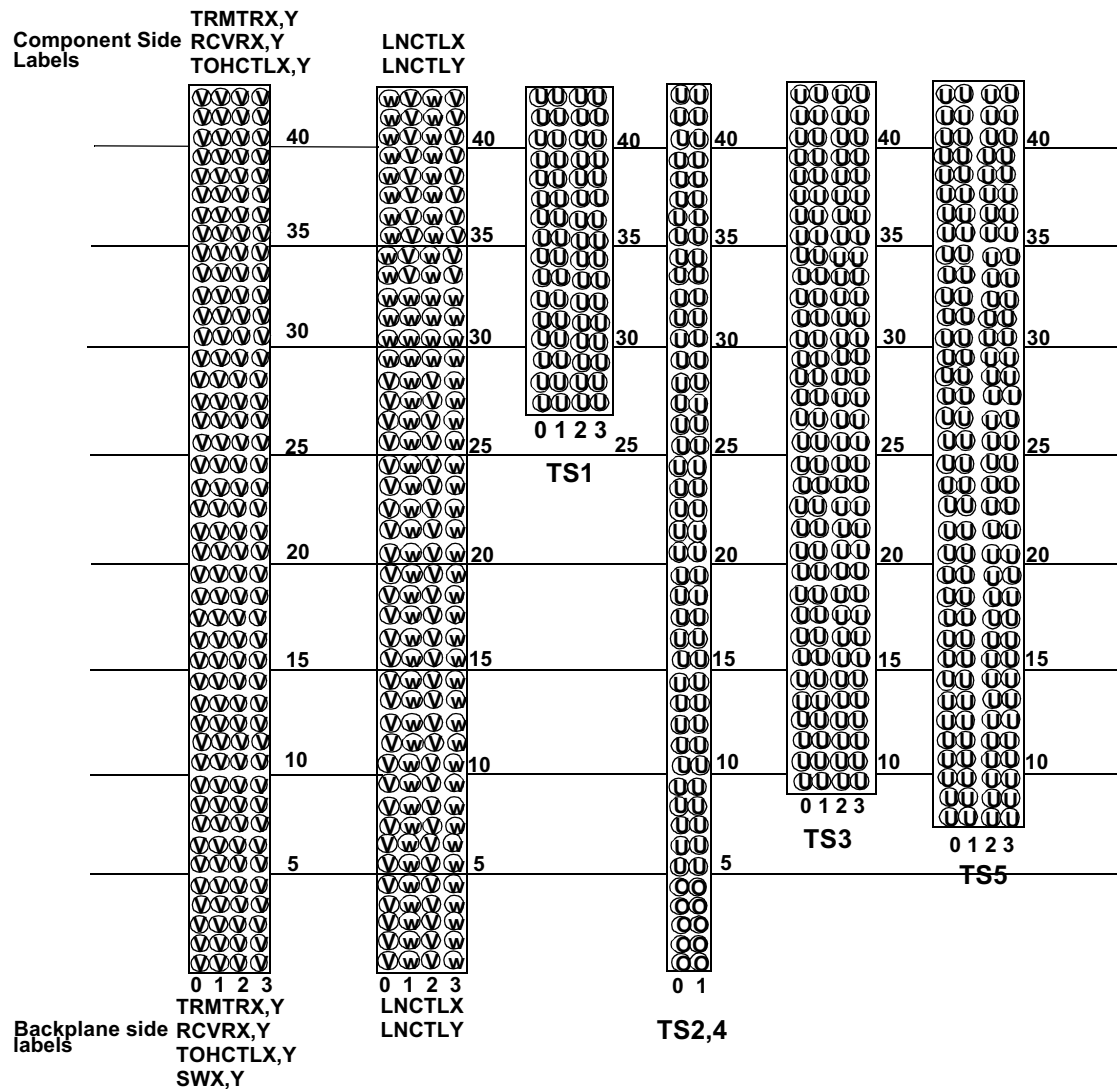


Figure B-11. LCT High Speed Shelf (Lower) - Component Side View

WaveStar OLS 40G - Pin Type Location

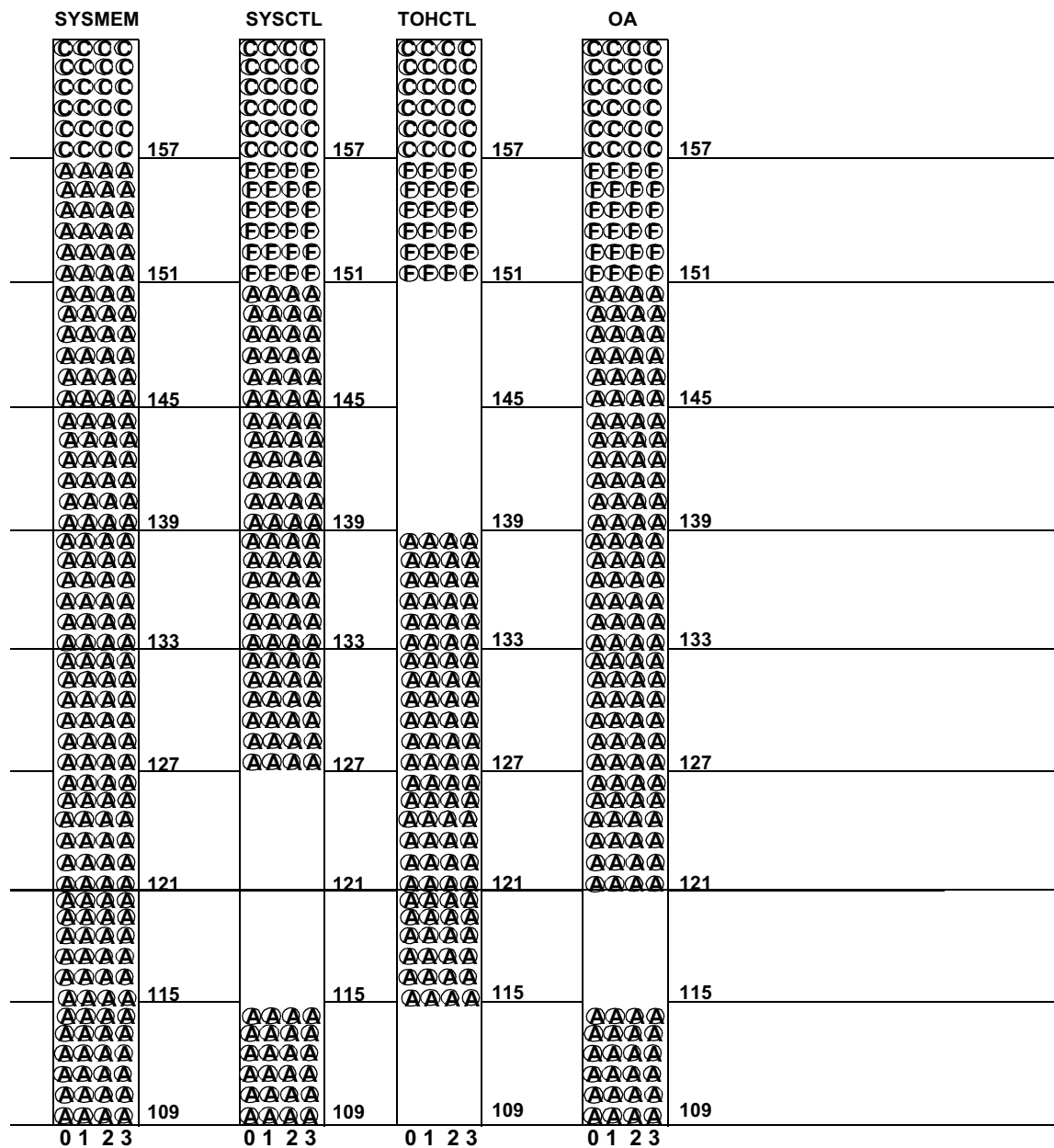


Figure B-12. Optical Line System All Shelves - Component Side View

WaveStar OLS 40G- Pin Type Location

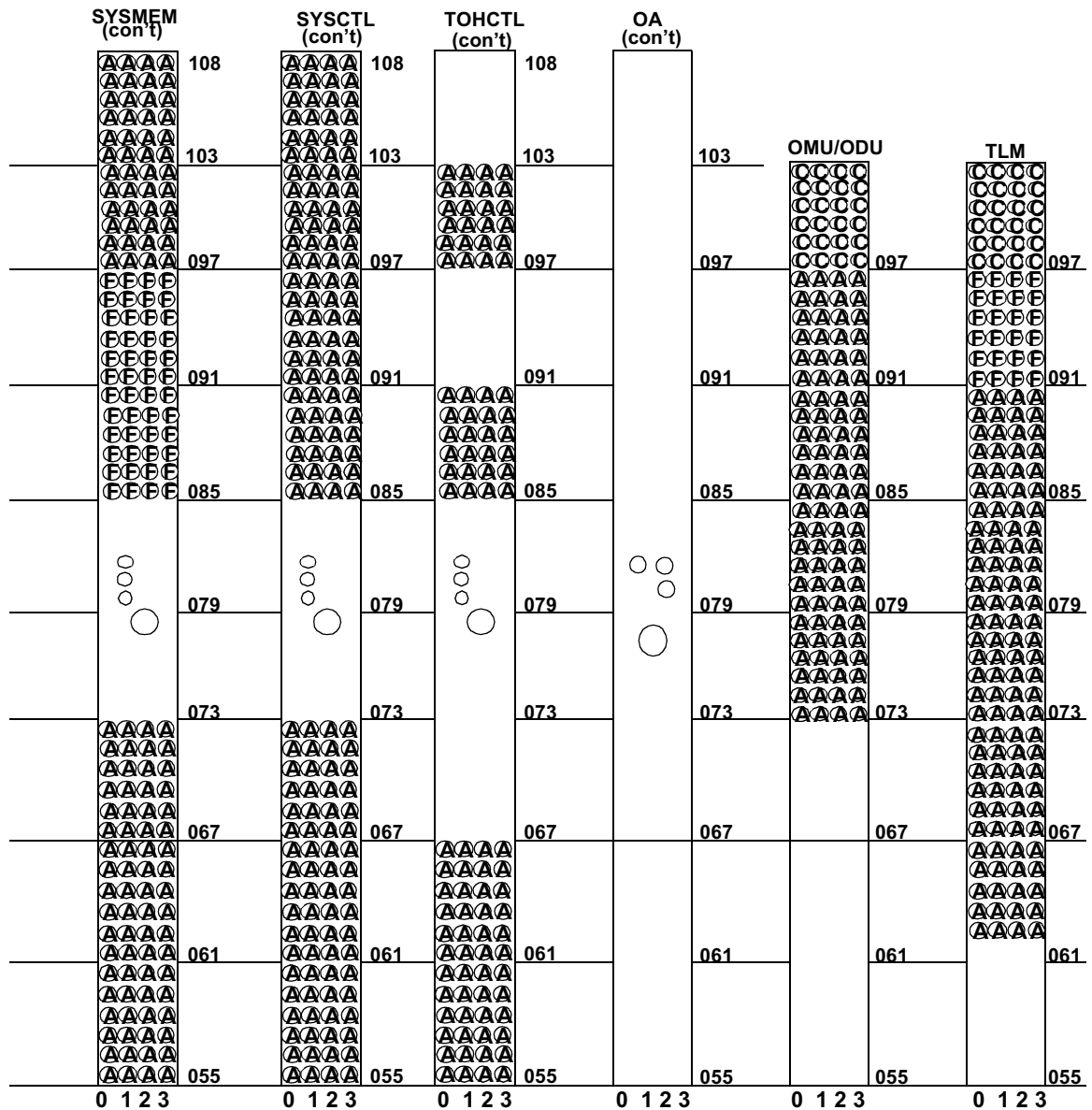


Figure B-13. Optical Line System (Middle) - Component Side View

WaveStar OLS 40G - Pin Type Location

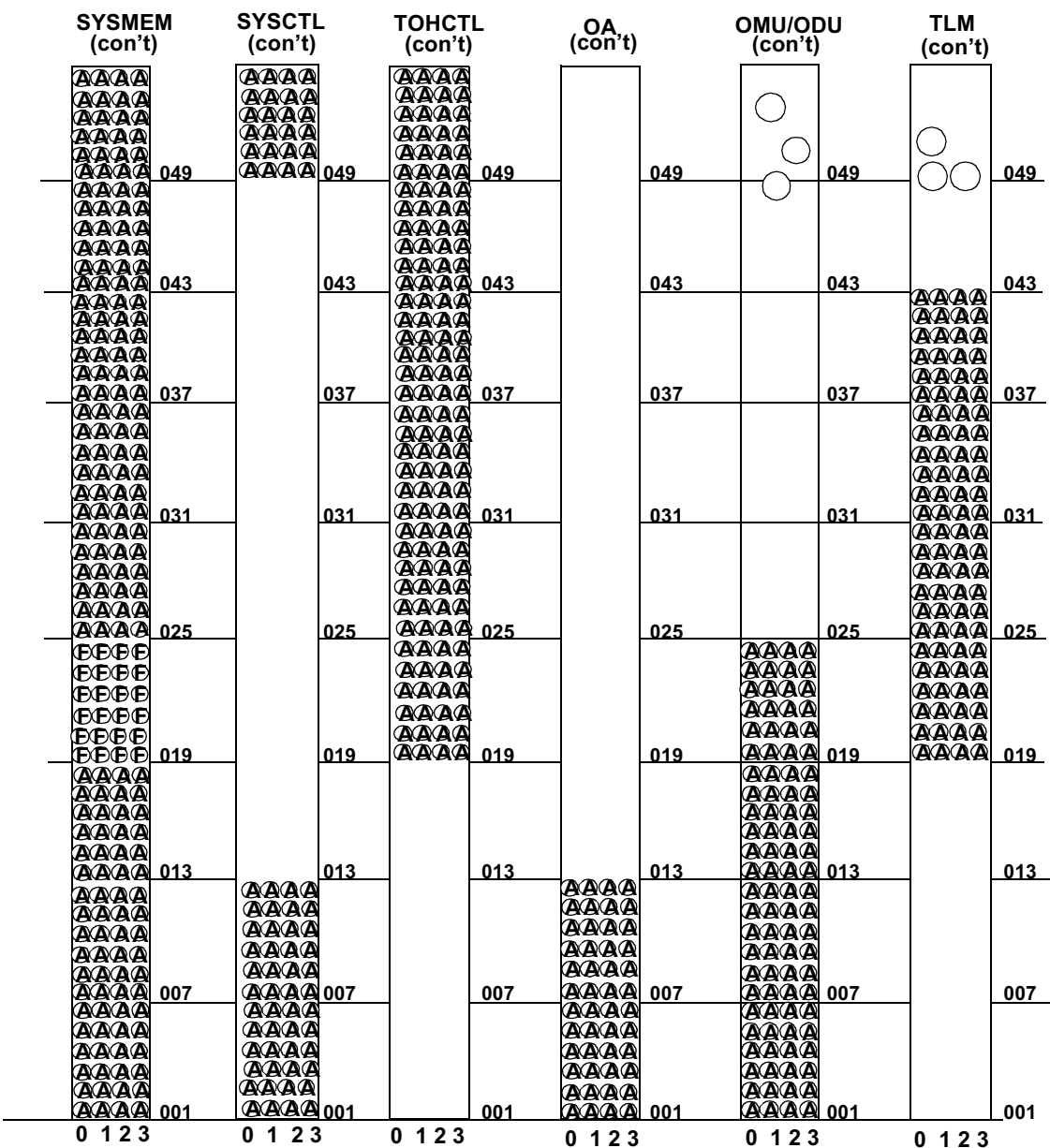


Figure B-14. WaveStar OLS 40G (Lower) - Component Side View

WaveStar OLS 40G - Pin Type Location

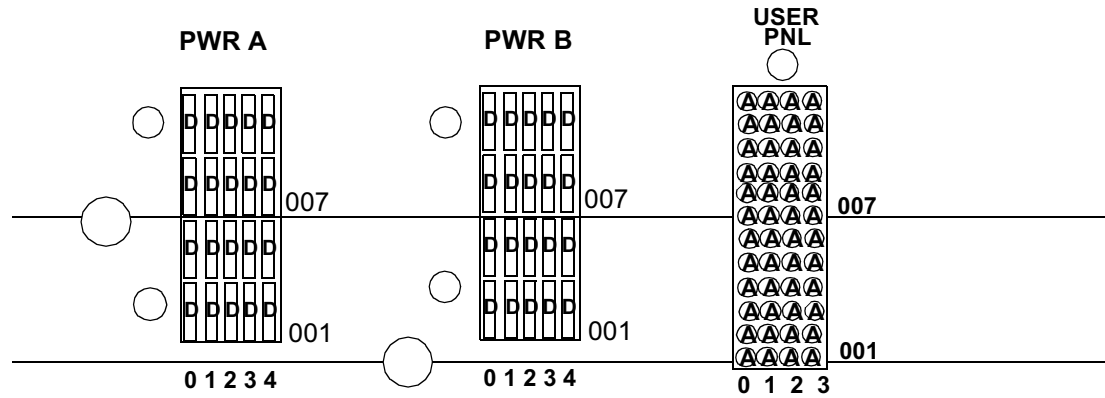


Figure B-15. WaveStar OLS 40G - Power and User Panel - Component Side View

Optical Translator (OT) - Pin Type Location

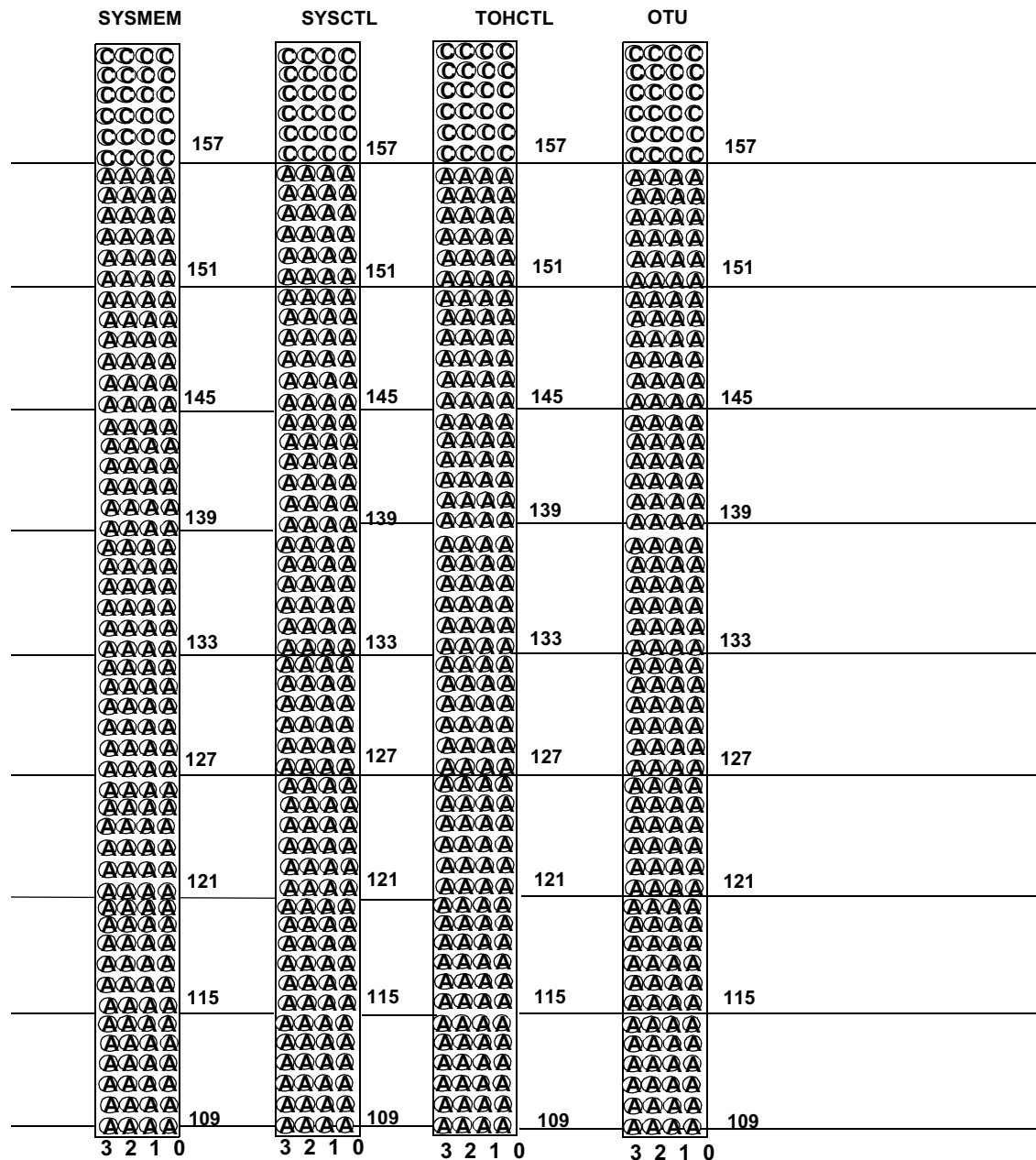


Figure B-16. Optical Translator (Upper) - Component Side View

Optical Translator (OT) - Pin Type Location

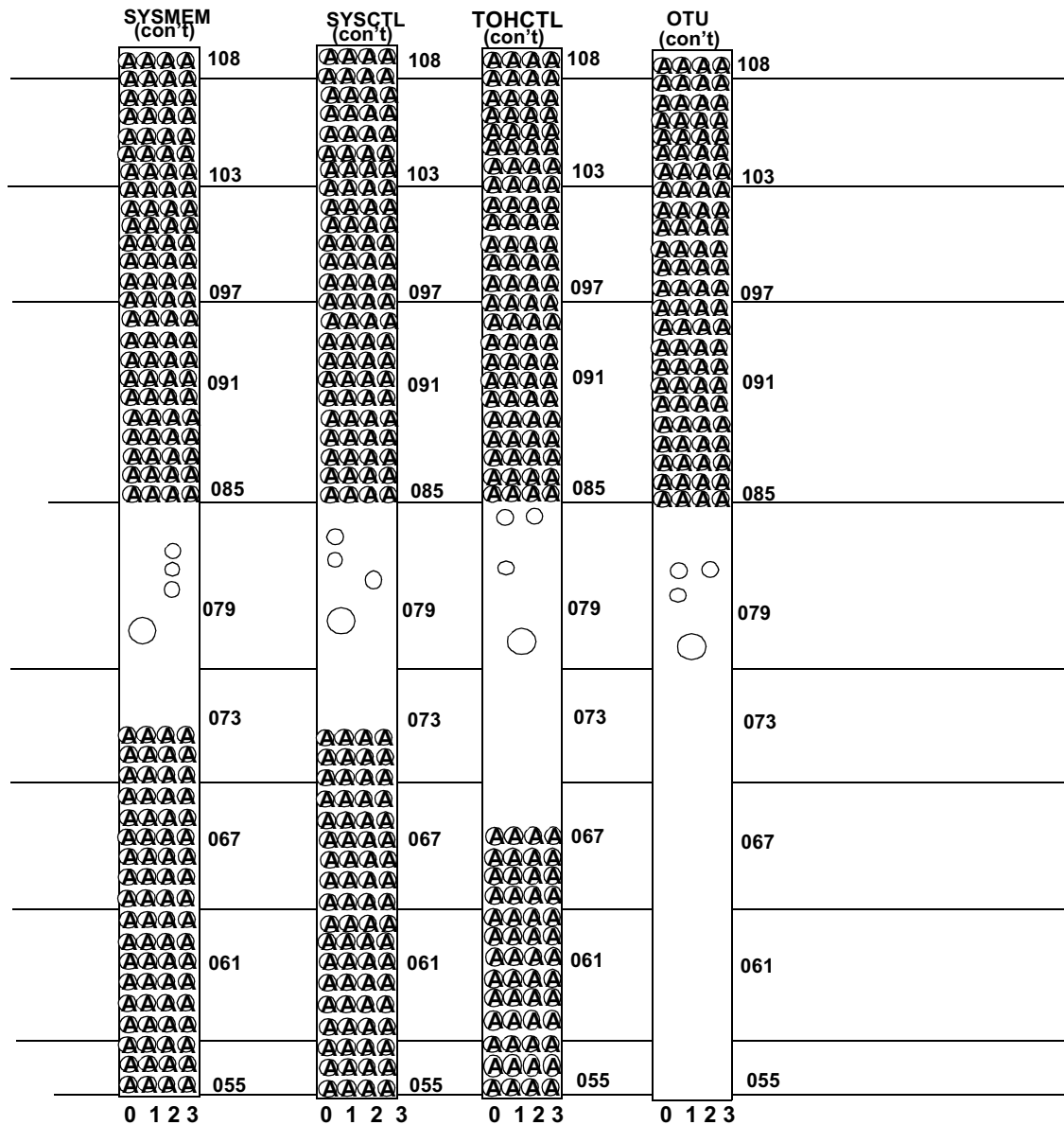


Figure B-17. Optical Translator (Middle) - Component Side View

OPTICAL TRANSLATOR (OT) - Pin Type Location

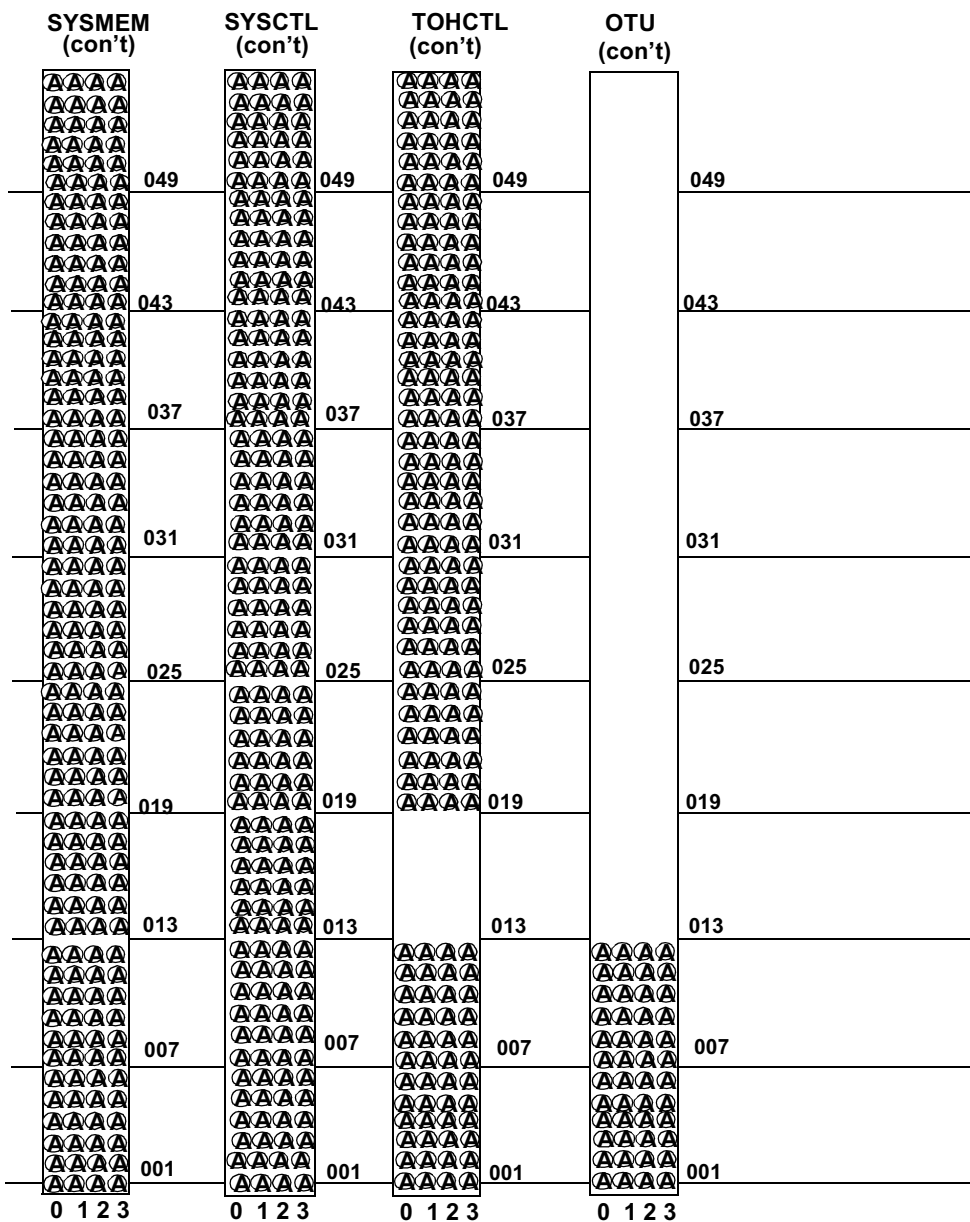


Figure B-18. Optical Translator (Lower) - Component Side View

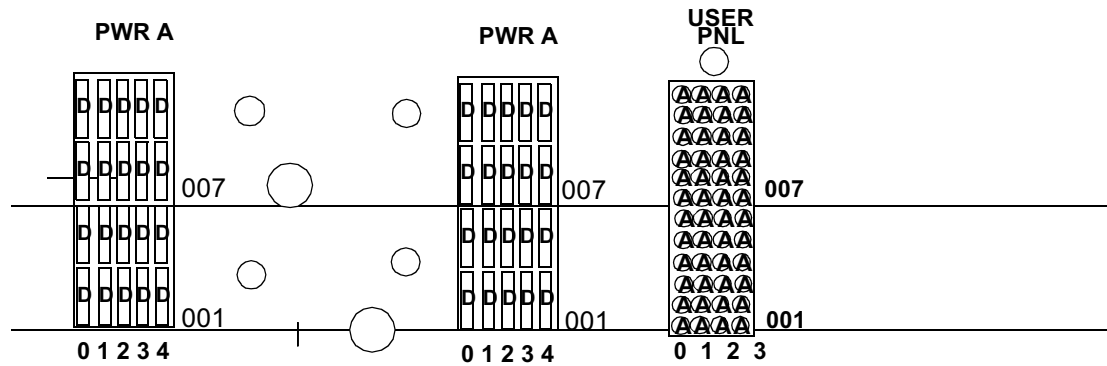
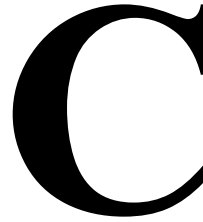
OPTICAL TRANSLATOR SYSTEM (OT) - Pin Type Location

Figure B-19. Optical Translator - Power and User Panel - Component Side View

Fiber Cleaning



Description

It is critical that optical connectors be kept clean to avoid connector damage.

The presence of hydrocarbons and other contaminants on optical connectors has been related to catastrophic damage at high optical power levels such as those encountered in the optical line system.



WARNING:

Disconnected or separated optical connectors may emit invisible laser radiation. Do not view the lightwave beam with an optical instrument. Avoid direct exposure to the beam.



NOTE:

All optical fiber connectors (ST, FC/PC, LC, and SC types), lightguide buildouts, and buildout blocks or equivalents should be cleaned before making initial connections or reconnections per the following instructions. Only the components being assembled at this particular time should be cleaned.

Keep all dust caps and plugs in place until time to make connections.

Equipment Required

Recommended Procedure:

- CLETOP Reel Type A¹

1. Available from Speer Fiber Optics, 18 Pierson Drive, Belle Mead, NJ 08502, Phone (908) 359-1173 or Fico, Inc., 2 Bridgeview Circle, Tyngsboro, MA 01879, 1-800-700-4946

- CLETOP Stick Type
- Optical quality tissue
- Isopropyl (Reagent Grade) alcohol

Fiber Cleaning Procedure

Disassemble

- (1) Remove (if necessary) lightguide jumper from buildout, or remove dustcap (if necessary) from the optical connector.
- (2) Remove (if necessary) lightguide buildout from buildout block. Unlock the tab by depressing the locking beam on the buildout and pushing in and rotate in counterclockwise direction and separate from the buildout block by sliding apart.



CAUTION:

Locking beam must only be pushed along a line perpendicular to buildout body in direction towards the buildout in order to avoid damage to the locking beam.

Cleaning

Optical jumpers and pigtails



NOTE:

All disconnected fiber optic connectors should be capped. All optical connectors should be cleaned before each use and before being assembled in the line buildout.

- (1) Remove (if necessary) lightguide jumper from buildout, or remove dustcap (if necessary) from the optical connector.
- (2) Remove (if necessary) lightguide buildout from buildout block. Unlock the tab by depressing the locking beam on the buildout and pushing in and rotate in counterclockwise direction and separate from the buildout block by sliding apart.



CAUTION:

Locking beam must only be pushed along a line perpendicular to buildout body in direction towards the buildout in order to avoid damage to the locking beam.

- (3) Clean (if necessary) the cylindrical surface of the connector ferrule with a tissue dampened with isopropyl (reagent grade) alcohol.
- (4) Hold CLETOP Reel Type A cleaner in the palm of your left hand and rotate the lever with your thumb. This opens the shutter and winds the cleaning cloth.
- (5) While holding the lever down, press the optical ferrule endface against the cleaning cloth and drag the plug towards you.
- (6) Rotate the connector 90°, press the optical ferrule endface against the cleaning cloth in the right slot and drag it toward you.
- (7) Be sure the optical plug is pressed firmly against the cleaning tape surface while dragging the plug. Insufficient cleaning may result from lack of pressure.
- (8) Release the lever, allowing it to return to its initial position. The shutter will close when this is done.

Optical connectors inside the faceplate and other receptacled devices



NOTE:

To prevent contamination, the optical port should be covered with a dust cap when not in use.

- (1) Remove (if necessary) the Line Buildout.
- (2) Use the stick type CLETOP cleaners to clean connector ferrule endfaces in hard to reach places such as inside of LBOs by first wiping the cleaning cloth on the tip of the CLETOP stick against the ferrule end face.
- (3) Replace the line buildout.

Reassemble

- (1) Insert the buildout into the block by aligning the buildout with the slot in the block.
- (2) Align the buildout with the slot in the buildout block, push in, and rotate clockwise until locked into position.
- (3) Slide the connector onto the buildout and rotate it clockwise until locked into position.

CMC Dantel Alarm and Control Block Installation, Extended Miscellaneous Discretes

D

Description

The Extended Miscellaneous Discretes feature for the Optical Line System Release 2.0 & 2.1 - OLS 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.

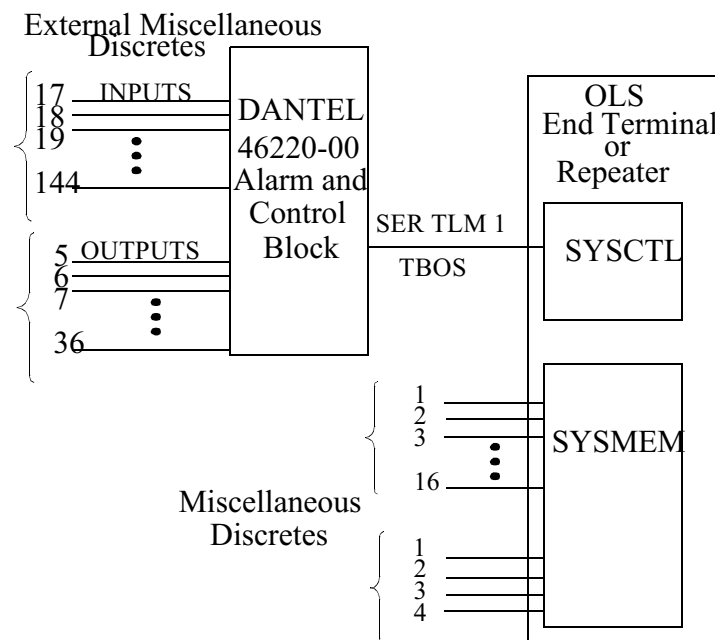


Figure D-1 Miscellaneous Discretes Applications

Ordering Information

Table D-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	ED7G028-22	

Tools Required

- Phillips Screwdriver
- Small standard screwdriver
- 11/32-inch wrench

Equipment Required

- Alarm Control Block
- 23" Mounting Bar
- Standard WECO Distribution Frame
- ED7G028-22 Cable

Installation Procedure

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 Lucent's Release 2.0 & 2.1 Optical Line System.

Assemble

- (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 ED7G028-22 cable from the SER TLM1 port of the OLS to the Alarm Control Block.
- (4) The SER TLM1 Cable needs to be wired to the Alarm and Control block.

Wiring

- (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 D-3 on page D-4.

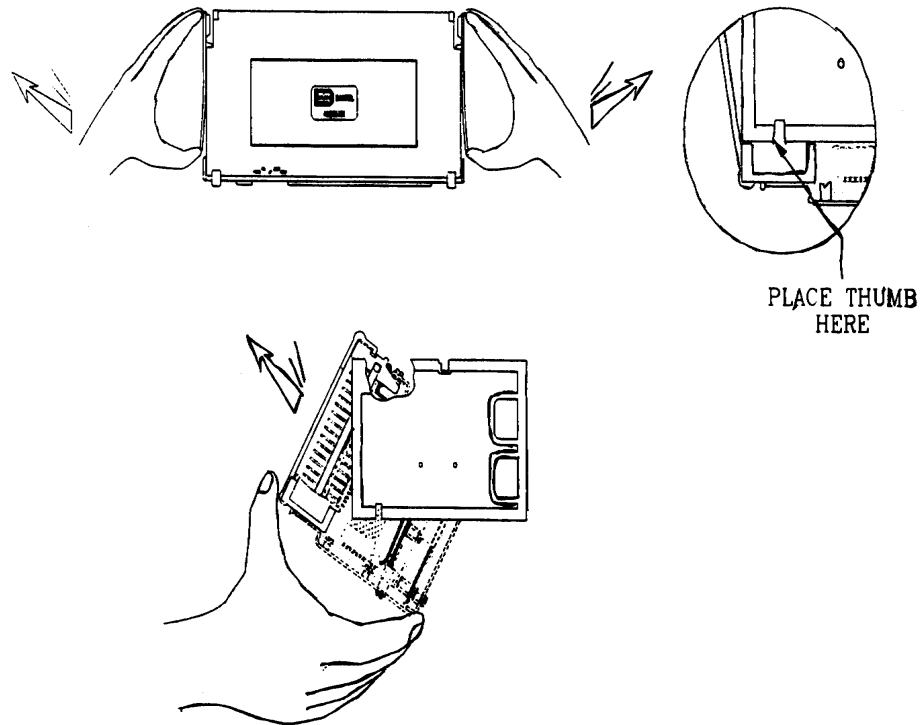


Figure D-2 Opening the Dantel Alarm Block

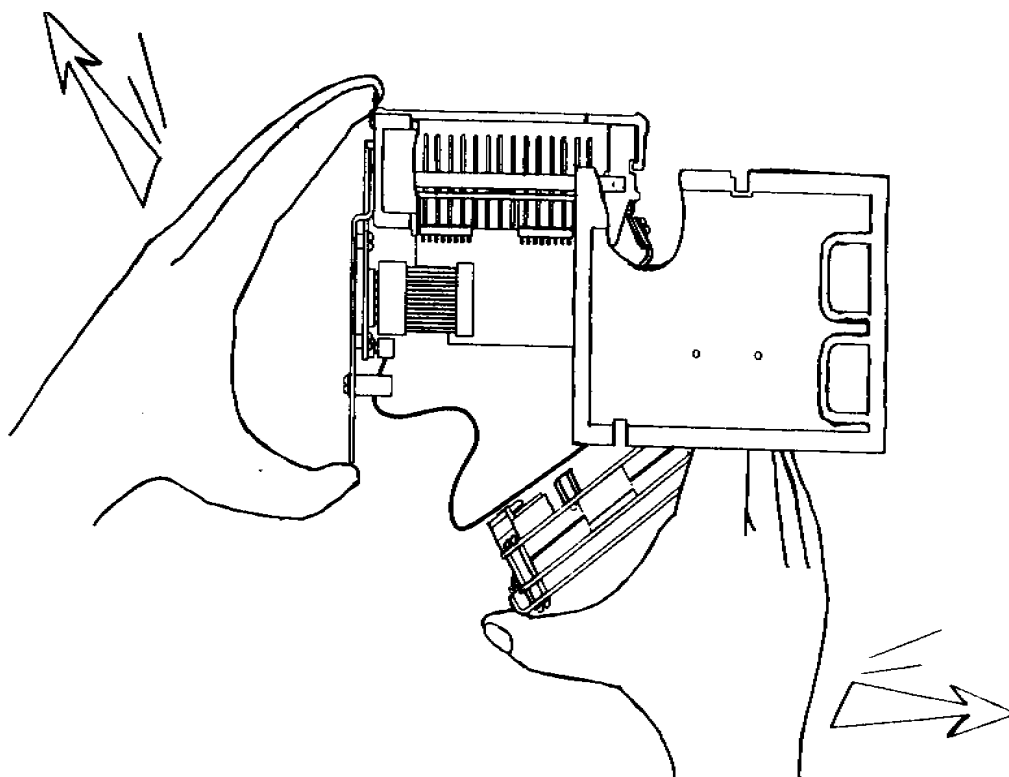


Figure D-3 Pulling Down the Power Supply and CPU

- (2) Pull the Power Supply board and CPU board down. Refer to Figure D-3 on page D-4.
- (3) On the power supply board, wire negative battery (-21 to -56 VDC) to connector TB1 (Refer to Figure D-4 on page D-5).

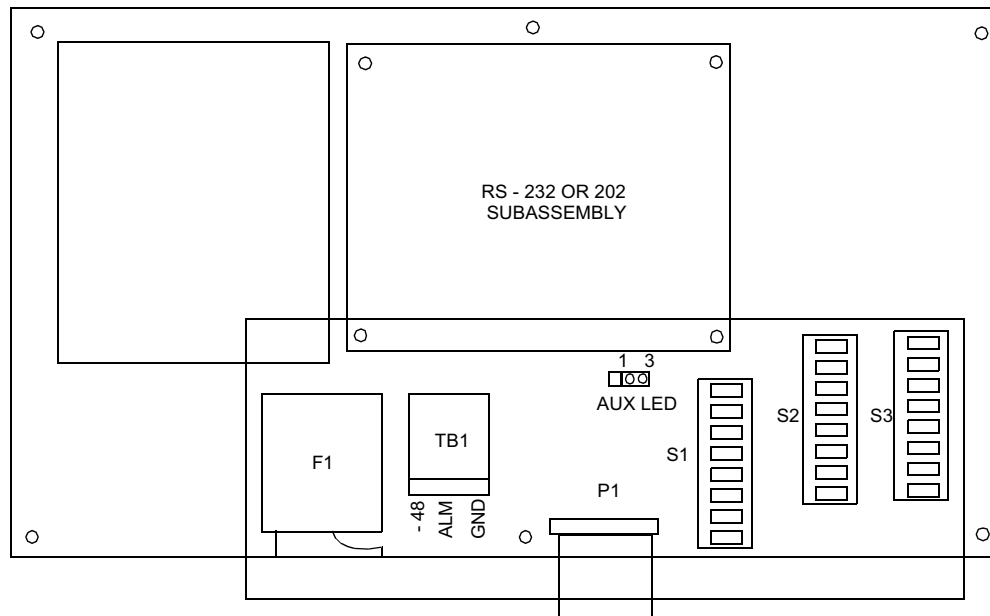


Figure D-4 Power Supply Board Component Location

- (4) Wire the alarm inputs (refer to Figure 5). 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 D-4 on page D-5). Pin 1 will begin with Input Point 17 (See Figure D-5 on page D-6). Table D-2, on page D-6 list the SER TLM1 cable connections and designations and the Dantel Pin designations.
- (5) The TBOS Transmit and Receive Positive and Negative (see Table D-2 on page D-6) need to be wire-wrapped to pins 32 E-H on the Alarm and Control Block (See Figure D-5 on page D-6).

CABLE 1

1. TBASTXP (W) to 32-E
2. TBASTXN (BL) to 32-F

CABLE 2

3. TBASRXP (W) to 32-G
4. TBASRXN (O) to 32-H

Figure D-5 Dantel Wire Wrap Pin Designations

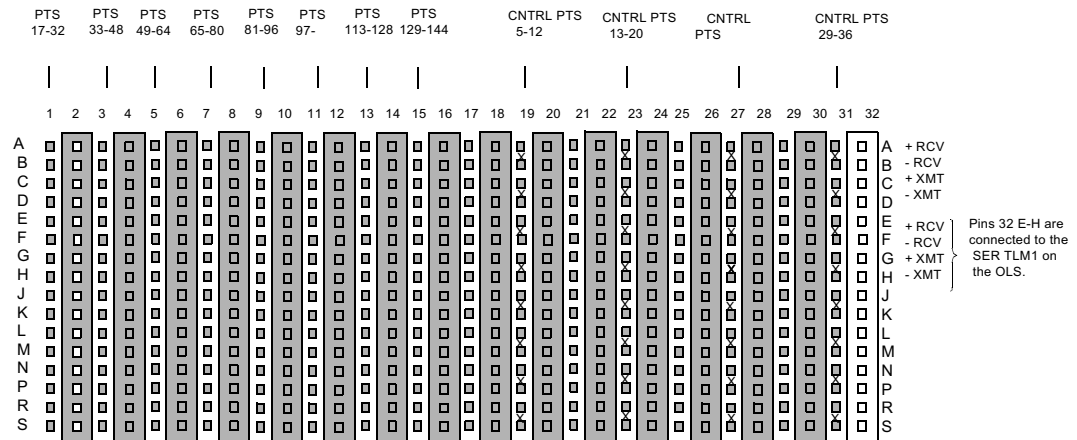
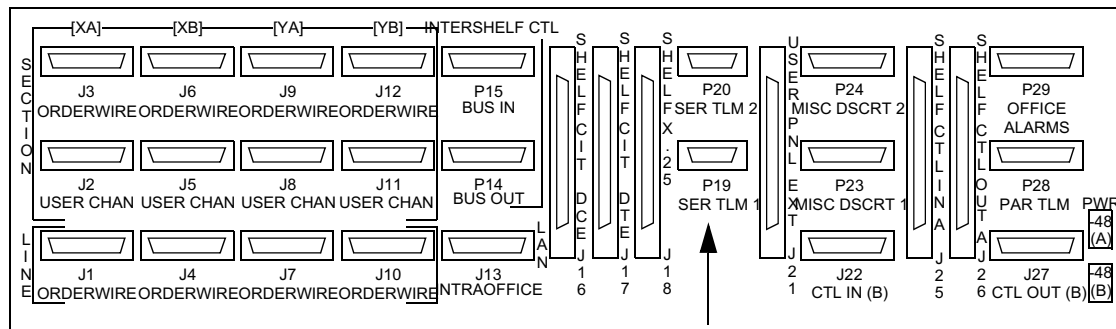


Table D-2 SER TLM 1 Cable Connections and Designations

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 D-5 on page D-6 for location.



OLS Interconnection Panel (SER TLM1 at arrow)

Switch and Strap Settings

On the Dantel Alarm and Control Block there are three (3) switches located on the Power Supply Board (Figure D-4 on page D-5). With Lucent's Optical Line System the following switch settings must be made:

Table D-3 Switch Settings for Lucent OLS

	S1 Switch Settings	S2 Switch Settings	S3 Switch Settings
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

NOTE:

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.

Extended Miscellaneous Discrete Assignments used to Monitor the Optical Translator

When used to monitor the Optical Translator (OT), Miscellaneous Discrete Points 17-80 (1-64 on the DANTEL Alarm and Control Block) will be provisioned with the description parameters assigned in the following Table:

Table D-4 Miscellaneous Discrete Assignments - Monitoring OT

Point No.	Description	Point No.	Description	Point No.	Description
17.	CP Fail OTU 1	40.	CP Fail OTU 24	63.	I S Fail OTU 15
18.	CP Fail OTU 2	41.	CP Fail OTU 25	64.	I S Fail OTU 16
19.	CP Fail OTU 3	42.	CP Fail OTU 26	65.	I S Fail OTU 17
20.	CP Fail OTU 4	43.	CP Fail OTU 27	66.	I S Fail OTU 18
21.	CP Fail OTU 5	44.	CP Fail OTU 28	67.	I S Fail OTU 19
22.	CP Fail OTU 6	45.	CP Fail OTU 29	68.	I S Fail OTU 20
23.	CP Fail OTU 7	46.	CP Fail OTU 30	69.	I S Fail OTU 21
24.	CP Fail OTU 8	47.	CP Fail OTU 31	70.	I S Fail OTU 22
25.	CP Fail OTU 9	48.	CP Fail OTU 32	71.	I S Fail OTU 23
26.	CP Fail OTU 10	49.	I S Fail OTU 1	72.	I S Fail OTU 24
27.	CP Fail OTU 11	50.	I S Fail OTU 2	73.	I S Fail OTU 25
28.	CP Fail OTU 12	51.	I S Fail OTU 3	74.	I S Fail OTU 26
29.	CP Fail OTU 13	52.	I S Fail OTU 4	75.	I S Fail OTU 27
30.	CP Fail OTU 14	53.	I S Fail OTU 5	76.	I S Fail OTU 28
31.	CP Fail OTU 15	54.	I S Fail OTU 6	77.	I S Fail OTU 29
32.	CP Fail OTU 16	55.	I S Fail OTU 7	78.	I S Fail OTU 30
33.	CP Fail OTU 17	56.	I S Fail OTU 8	79.	I S Fail OTU 31
34.	CP Fail OTU 18	57.	I S Fail OTU 9	80.	I S Fail OTU 32
35.	CP Fail OTU 19	58.	I S Fail OTU 10		
36.	CP Fail OTU 20	59.	I S Fail OTU 11		
37.	CP Fail OTU 21	60.	I S Fail OTU 12		
38.	CP Fail OTU 22	61.	I S Fail OTU 13		
39.	CP Fail OTU 23	62.	I S Fail OTU 14		

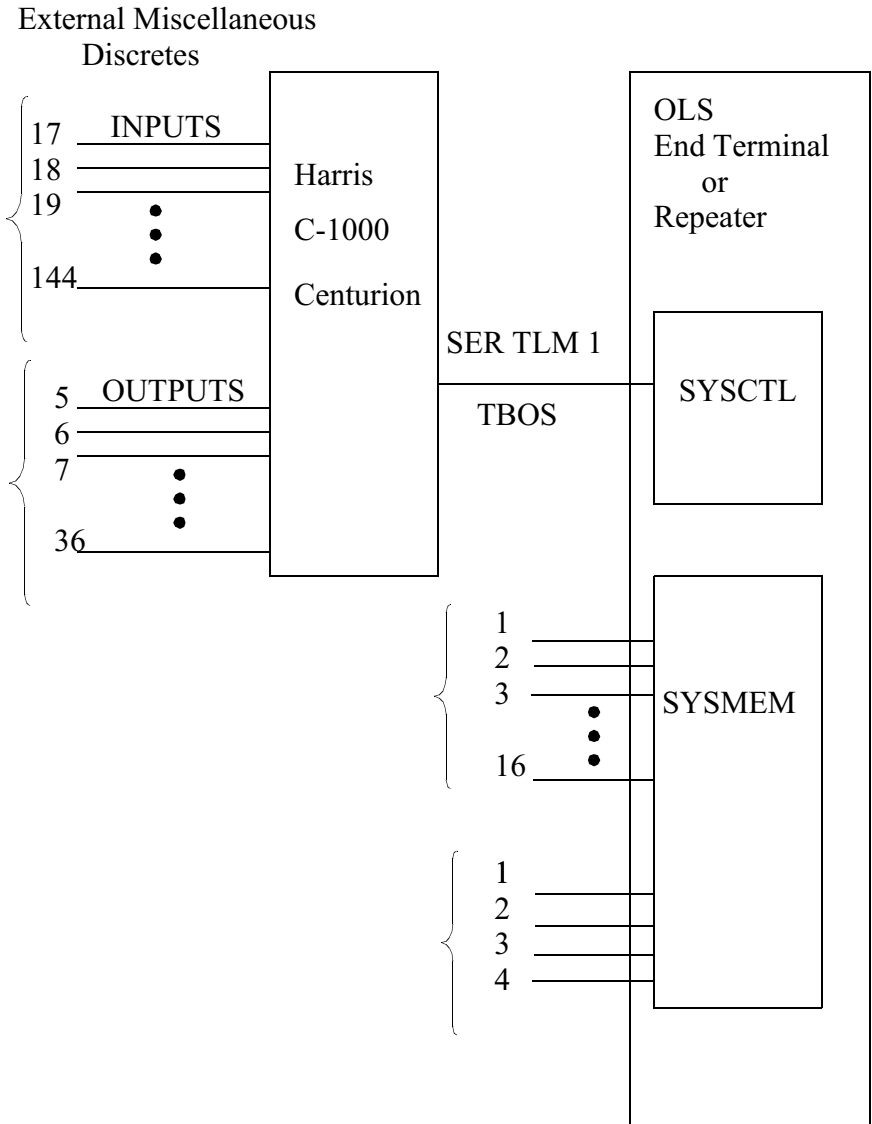
Harris C-1000 Centurion Installation - Extended Miscellaneous Discretes



Description

The Extended Miscellaneous Discretes feature for the Optical Line System Release 2.0 and later provides additional miscellaneous discrete inputs and outputs to supplement the OLS Release 1.0 miscellaneous discretes feature. It consists of an additional 128 alarm and status input points and an additional 32 control output points (See Figure E-1 on page E-2). This will bring the total number of miscellaneous discrete inputs for the network element to 144 inputs and 36 outputs.

Figure E-1 Miscellaneous Discrete Applications



Ordering Information

Table E-1 Ordering Information

Description	Order Number	Commcode Number
C-1000 Centurion	594-T043	407567932
Rer Access Wire Wrap Connector	620-T030	407532217
SER TLM1 Cable	ED7G028-22	

Tools Required

- Phillips Screwdriver
- Small standard screwdriver
- 11/32-inch wrench

Equipment Required

- C-1000 Centurion
- Mounting Brackets
- Standard WECO Distribution Frame
- ED7G028-22 Cable

OT Connections to the Harris Centurion EMDU

The Harris Centurion EMDU utilizes D-Subminiature 50 pin connectors for its inputs. Each 50 pin connector on the Harris unit provides for 32 alarm inputs, 4 control outputs using wired pair, and ten ground connections. The OT uses 25 pin D-Subminiature connectors with all connections being used for wired pair alarms requiring a pair of wires (two connections). With these incompatibilities, a connectorized cable connection is not possible.

Refer to Figure E-2 on page E-4 and Figure E-3 on page E-4 when wiring power fail miscellaneous discretes from the power filter to the Harris EMDU.

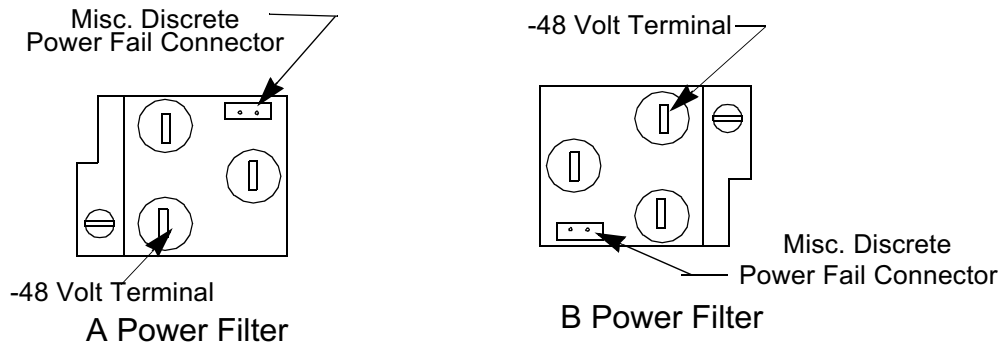


Figure E-2 Miscellaneous Discrete Power Filter Connections

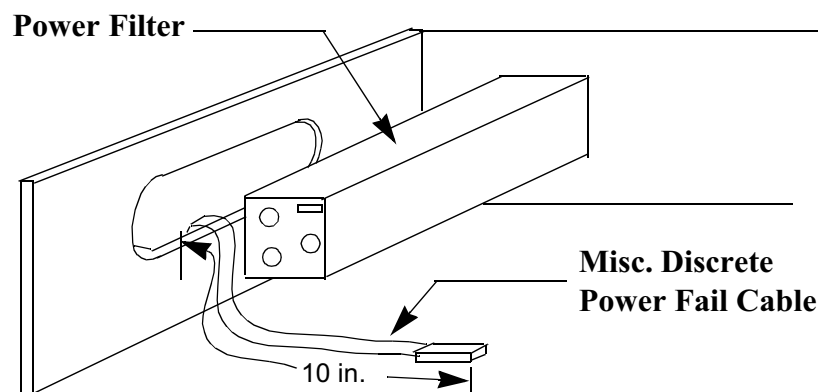


Figure E-3 Required Length for Misc. Discrete Power Fail Cables

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.

Table E-2 OT Misc. Disc. Cable Wiring / OT to Harris EMDU

OLS Alrm No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg)	WIRE COLORS	OT CABLE PIN Numbers
17	CP Fail OTU 1	P2 / System	1 (J1-10 & J1-5-RTN)	W-BL/BL-W	12 & 25(RTN)
18	C P Fail OTU 2	P2 / System	2 (J1-35 & J1-5-RTN)	W-O / O-W	11 & 24(RTN)
19	C P Fail OTU 3	P2 / System	3 (J1-11 & J1-6-RTN)	W-G / G-W	10 & 23(RTN)
20	C P Fail OTU 4	P2 / System	4 (J1-36 & J1-6-RTN)	W-BR / BR-W	9 & 22(RTN)
21	C P Fail OTU 5	P2 / System	5 (J1-12 & J1-7-RTN)	W-S / S-W	8 & 21(RTN)
22	C P Fail OTU 6	P2 / System	6 (J1-37 & J1-7-RTN)	R-BL / BL-R	7 & 20(RTN)
23	C P Fail OTU 7	P2 / System	7 (J1-13 & J1-8-RTN)	R-O / O-R	6 & 19(RTN)
24	C P Fail OTU 8	P2 / System	8 (J1-38 & J1-8-RTN)	R-G / G-R	5 & 18(RTN)
		P2 / System	No Connection		1, 2, 3, 4, 13, 14, 15, 16, 17
25	C P Fail OTU 9	P2 / Compl S1	9 (J1-14 & J1-9-RTN)	W-BL / BL-W	12 & 25(RTN)
26	C P Fail OTU 10	P2 / Compl S1	10 (J1-39 & J1-9-RTN)	W-O / O-W	11 & 24(RTN)
27	C P Fail OTU 11	P2 / Compl S1	11 (J1-15 & J1-30-RTN)	W-G / G-W	10 & 23(RTN)
28	C P Fail OTU 12	P2 / Compl S1	12 (J1-40 & J1-30-RTN)	W-BR / BR-W	9 & 22(RTN)
29	C P Fail OTU 13	P2 / Compl S1	13 (J1-16 & J1-31-RTN)	W-S / S-W	8 & 21(RTN)
30	C P Fail OTU 14	P2 / Compl S1	14 (J1-41 & J1-31-RTN)	R-BL / BL-R	7 & 20(RTN)
31	C P Fail OTU 15	P2 / Compl S1	15 (J1-17 & J1-32-RTN)	R-O / O-R	6 & 19(RTN)
32	C P Fail OTU 16	P2 / Compl S1	16 (J1-42 & J1-32-RTN)	R-G / G-R	5 & 18(RTN)
33	C P Fail OTU 17	P2 / Compl S1	17 (J1-18 & J1-33-RTN)	R-BR / BR-R	4 & 17(RTN)
34	C P Fail OTU 18	P2 / Compl S1	18 (J1-43 & J1-33-RTN)	R-S / S-R	3 & 16(RTN)
35	C P Fail OTU 19	P2 / Compl S1	19 (J1-19 & J1-34-RTN)	BK-BL/BL-BK	2 & 15(RTN)
36	C P Fail OTU 20	P2 / Compl S1	20 (J1-44 & J1-34-RTN)	BK-O / O-BK	1 & 14(RTN)
		P2 / Compl S1	No Connection		13
37	C P Fail OTU 21	P2 / Compl S2	21 (J1-20 & J3-5-RTN)	W-BL / BL-W	12 & 25(RTN)

Table E-2 OT Misc. Disc. Cable Wiring / OT to Harris EMDU

OLS Alrm No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg)	WIRE COLORS	OT CABLE PIN Numbers
38	C P Fail OTU 22	P2 / Compl S2	22 (J1-45 & J3-5-RTN)	W-O / O-W	11 & 24(RTN)
39	C P Fail OTU 23	P2 / Compl S2	23 (J1-21 & J3-6-RTN)	W-G / G-W	10 & 23(RTN)
40	C P Fail OTU 24	P2 / Compl S2	24 (J1-46 & J3-6-RTN)	W-BR / BR-W	9 & 22(RTN)
41	C P Fail OTU 25	P2 / Compl S2	25 (J1-22 & J3-7-RTN)	W-S / S-W	8 & 21(RTN)
42	C P Fail OTU 26	P2 / Compl S2	26 (J1-47 & J3-7-RTN)	R-BL / BL-R	7 & 20(RTN)
43	C P Fail OTU 27	P2 / Compl S2	27 (J1-23 & J3-8-RTN)	R-O / O-R	6 & 19(RTN)
44	C P Fail OTU 28	P2 / Compl S2	28 (J1-48 & J3-8-RTN)	R-G / G-R	5 & 18(RTN)
45	C P Fail OTU 29	P2 / Compl S2	29 (J1-24 & J3-9-RTN)	R-BR / BR-R	4 & 17(RTN)
46	C P Fail OTU 30	P2 / Compl S2	30 (J1-49 & J3-9-RTN)	R-S / S-R	3 & 16(RTN)
47	C P Fail OTU 31	P2 / Compl S2	31 (J1-25 & J3-30-RTN)	BK-BL/BL-BK	2 & 15(RTN)
48	C P Fail OTU 32	P2 / Compl S2	32 (J1-50 & J3-30-RTN)	BK-O / O-BK	1 & 14(RTN)
		P2 / Compl S2	No Connection		13
49	I S Fail OTU 1	P2 / Compl S2	33 (J2-10 & J2-5-RTN)	W-BL / BL-W	12 & 25(RTN)
50	I S Fail OTU 2	P3 / System	34 (J2-35 & J2-5-RTN)	W-O / O-W	11 & 24(RTN)
51	I S Fail OTU 3	P3 / System	35 (J2-11 & J2-6-RTN)	W-G / G-W	10 & 23(RTN)
52	I S Fail OTU 4	P3 / System	36 (J2-36 & J2-6-RTN)	W-BR / BR-W	9 & 22(RTN)
53	I S Fail OTU 5	P3 / System	37 (J2-12 & J2-7-RTN)	W-S / S-W	8 & 21(RTN)
54	I S Fail OTU 6	P3 / System	38 (J2-37 & J2-7-RTN)	R-BL / BL-R	7 & 20(RTN)
55	I S Fail OTU 7	P3 / System	39 (J2-13 & J2-8-RTN)	R-O / O-R	6 & 19(RTN)
56	I S Fail OTU 8	P3 / System	40 (J2-38 & J2-8-RTN)	R-G / G-R	5 & 18(RTN)
		P3 / System	No Connection		1, 2, 3, 4,13, 14, 15, 16, 17,
57	I S Fail OTU 9	P3 / System	41 (J2-14 & J2-9-RTN)	W-BL / BL-W	12 & 25(RTN)
58	I S Fail OTU 10	P3 / Compl S1	42 (J2-39 & J2-9-RTN)	W-O / O-W	11 & 24(RTN)
59	I S Fail OTU 11	P3 / Compl S1	43 (J2-15 & J2-30-RTN)	W-G / G-W	10 & 23(RTN)
60	I S Fail OTU 12	P3 / Compl S1	44 (J2-40 & J2-30-RTN)	W-BR / BR-W	9 & 22(RTN)
61	I S Fail OTU 13	P3 / Compl S1	45 (J2-16 & J2-31-RTN)	W-S / S-W	8 & 21(RTN)
62	I S Fail OTU 14	P3 / Compl S1	46 (J2-41 & J2-31-RTN)	R-BL / BL-R	7 & 20(RTN)

Table E-2 OT Misc. Disc. Cable Wiring / OT to Harris EMDU

OLS Alrm No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg)	WIRE COLORS	OT CABLE PIN Numbers
63	I S Fail OTU 15	P3 / Compl S1	47 (J2-17 & J2-32-RTN)	R-O / O-R	6 & 19(RTN)
64	I S Fail OTU 16	P3 / Compl S1	48 (J2-42 & J2-32-RTN)	R-G / G-R	5 & 18(RTN)
65	I S Fail OTU 17	P3 / Compl S1	49 (J2-18 & J2-33-RTN)	R-BR / BR-R	4 & 17(RTN)
66	I S Fail OTU 18	P3 / Compl S1	50 (J2-43 & J2-33-RTN)	R-S / S-R	3 & 16(RTN)
67	I S Fail OTU 19	P3 / Compl S1	51 (J2-19 & J2-34-RTN)	BK-BL / BL-BK	2 & 15(RTN)
68	I S Fail OTU 20	P3 / Compl S1	52 (J2-44 & J2-34RTN)	BK-O / O-BK	1 & 14(RTN)
		P3 / Compl S1			13
69	I S Fail OTU 21	P3 / Compl S2	53 (J2-20 & J4-5-RTN)	W-BL / BL-W	12 & 25(RTN)
70	I S Fail OTU 22	P3 / Compl S2	54 (J2-45 & J4-5-RTN)	W-O / O-W	11 & 24(RTN)
71	I S Fail OTU 23	P3 / Compl S2	55 (J2-21 & J4-6-RTN)	W-G / G-W	10 & 23(RTN)
72	I S Fail OTU 24	P3 / Compl S2	56 (J2-46 & J4-6-RTN)	W-BR / BR-W	9 & 22(RTN)
73	I S Fail OTU 25	P3 / Compl S2	57 (J2-22 & J4-7-RTN)	W-S / S-W	8 & 21(RTN)
74	I S Fail OTU 26	P3 / Compl S2	58 (J2-47 & J4-7-RTN)	R-BL / BL-R	7 & 20(RTN)
75	I S Fail OTU 27	P3 / Compl S2	59 (J2-23 & J4-8-RTN)	R-O / O-R	6 & 19(RTN)
76	I S Fail OTU 28	P3 / Compl S2	60 (J2-48 & J4-8-RTN)	R-G / G-R	5 & 18(RTN)
77	I S Fail OTU 29	P3 / Compl S2	61 (J2-24 & J4-9-RTN)	R-BR / BR-R	4 & 17(RTN)
78	I S Fail OTU 30	P3 / Compl S2	62 (J2-49 & J4-9-RTN)	R-S / S-R	3 & 16(RTN)
79	I S Fail OTU 31	P3 / Compl S2	63 (J2-25 & J4-30-RTN)	BK-BL/BL-BK	2 & 15(RTN)
80	I S Fail OTU 32	P3 / Compl S2	64 (J2-50 & J4-30-RTN)	BK-O / O-BK	1 & 14(RTN)
		P3 / Compl S2	No connection		13
81	A Pwr Fail-Sys.Shelf	A Pwr/ System	65 (J3-10 & J3-31-RTN)	W-BL/BL-W	1 & 2(RTN)
82	B Pwr Fail-Sys.Shelf	B Pwr / System	66 (J3-35 & J3-31-RTN)	W-BL/BL-W	1 & 2(RTN)
83	A Pwr Fail-Compl 1 Shelf	A Pwr/Compl S1	67 (J3-11 & J3-32-RTN)	W-BL/BL-W	1 & 2(RTN)
84	B Pwr Fail-Compl 1 Shelf	B Pwr/Compl S1	68 (J3-36 & J3-32 RTN)	W-BL/BL-W	1 & 2(RTN)
85	A Pwr Fail - Compl 2 Shelf	A Pwr / Compl S2	69 (J3-12 & J3-33-RTN)	W-BL/BL-W	1 & 2(RTN)
86	B Pwr Fail - Compl 2 Shelf	B Pwr / Compl S2	70 (j3-37 & J3-33-RTN)	W-BL/BL-W	1 & 2(RTN)

Installation Procedure

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 Lucent's Release 2.0 and subsequent releases of Optical Line System.

Assembly

- (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 ED7G028-22 cable from the SER TLM1 port of the OLS to J9 on the rear of the C-1000 Centurion (See Figure 2-1 of the C-1000 Centurion User Guide).
- (3) J1 - J8 are the ports to be used for inputs and control outputs (See Table 2-1 of the C-1000 Centurion User Guide).

Powering the Unit

- (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 Figure 2-1 in the C-1000 Centurion User Guide). The Positive and Negative connections are marked at J11 (See also Figure 2-2 in the C-1000 Centurion User Guide).

Switch Settings

- (1) Each C1000 unit is configured by using Configuration DIP switches on the front of the unit (See Figure 1-1 in the C-1000 Centurion User Guide). Units, such as the 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:
 1. S1-1 to S1-8 OFF (down)
 2. S1-9 to S1-10 ON (up)
 3. S2-1 to S1-10 OFF (down)

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. 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

NOTE:

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.

Extended Miscellaneous Discrete Assignments used to Monitor the Optical Translator

When used to monitor the Optical Translator (OT), Miscellaneous Discrete Points 17-80 (1-64 on the DANTEL Alarm and Control Block) will be assigned with the description parameter provisioned in the following Table:

Table E-3 Miscellaneous Discrete Assignments - Monitoring OT

Point No.	Description	Point No.	Description	Point No.	Description
17.	CP Fail OTU 1	40.	CP Fail OTU 24	63.	I S Fail OTU 15
18.	CP Fail OTU 2	41.	CP Fail OTU 25	64.	I S Fail OTU 16
19.	CP Fail OTU 3	42.	CP Fail OTU 26	65.	I S Fail OTU 17
20.	CP Fail OTU 4	43.	CP Fail OTU 27	66.	I S Fail OTU 18
21.	CP Fail OTU 5	44.	CP Fail OTU 28	67.	I S Fail OTU 19
22.	CP Fail OTU 6	45.	CP Fail OTU 29	68.	I S Fail OTU 20
23.	CP Fail OTU 7	46.	CP Fail OTU 30	69.	I S Fail OTU 21
24.	CP Fail OTU 8	47.	CP Fail OTU 31	70.	I S Fail OTU 22
25.	CP Fail OTU 9	48.	CP Fail OTU 32	71.	I S Fail OTU 23
26.	CP Fail OTU 10	49.	I S Fail OTU 1	72.	I S Fail OTU 24
27.	CP Fail OTU 11	50.	I S Fail OTU 2	73.	I S Fail OTU 25
28.	CP Fail OTU 12	51.	I S Fail OTU 3	74.	I S Fail OTU 26
29.	CP Fail OTU 13	52.	I S Fail OTU 4	75.	I S Fail OTU 27
30.	CP Fail OTU 14	53.	I S Fail OTU 5	76.	I S Fail OTU 28
31.	CP Fail OTU 15	54.	I S Fail OTU 6	77.	I S Fail OTU 29
32.	CP Fail OTU 16	55.	I S Fail OTU 7	78.	I S Fail OTU 30
33.	CP Fail OTU 17	56.	I S Fail OTU 8	79.	I S Fail OTU 31
34.	CP Fail OTU 18	57.	I S Fail OTU 9	80.	I S Fail OTU 32
35.	CP Fail OTU 19	58.	I S Fail OTU 10		
36.	CP Fail OTU 20	59.	I S Fail OTU 11		
37.	CP Fail OTU 21	60.	I S Fail OTU 12		
38.	CP Fail OTU 22	61.	I S Fail OTU 13		
39.	CP Fail OTU 23	62.	I S Fail OTU 14		

PC Setup & Usage For CenterLink Management Console



Introduction

This chapter provides procedures to set up a personal computer to run the CenterLink Management Console software.

PC Requirements

PC Hardware Requirements

The following are the recommended minimum hardware requirements for running the CenterLink Management Console:

- CPU: Pentium 66 MHz
- RAM: 16 Mbyte
- Available Hard Disk Space: 20 Mbyte
- Display: 800x600 (256 Color) SVGA
- Network Interface Card or Modem
- Optional: 16-bit Sound Card, Printer
- EIA RS-232 straight through cable to connect PC COM port (9 or 25 pin) to the DB25 CIT-DCE port.

PC Software Requirements

The following software is required for running the CenterLink Management Console:

- Microsoft Windows 95 - The original master disks or CD-ROM may be needed to load operating system components.
- Microsoft TCP/IP (available with Windows 95)
- Microsoft Personal Web Server v1.0a - Included on the R3.0.2-OLS CD-ROM, R3.0.2-OLS floppies, or with Windows 95 on newer PCs.
- Microsoft Internet Explorer v3.0.2 - Included on the R3.0.2-OLS CD-ROM or with Windows 95 on newer PCs.
- Adobe Acrobat Exchange or Reader V2.1 or later - Reader Version 3.0.1 is included on the R3.0.2-OLS CD-ROM or it is available from the Adobe Web site at <http://www.adobe.com/acrobat>.

Precautions and Recommendations

- Read the entire setup procedure before beginning.
- The person(s) performing the software loading must be trained and have an understanding of Windows 95 operation.
- Perform the software installation procedure in the sequence provided.

Verify PC Capability

Use Table F-1 to verify the PC is capable of running the CenterLink software.

Table F-1 Verify PC Capability For CenterLink

Use the boxes to check off the steps as they are completed

-
☐	1	Verify the PC hardware requirements listed on page F-1.
-
☐	2	Verify the PC software requirements listed on page F-2 The software should already be loaded or should be available for installing as instructed in this chapter.
-
☐	3	Using Windows Explorer or another file manager utility, check for a directory C:\webshare\wwwroot\Lucent3. If one does not exist, proceed to the next step. If one does exist, it should be moved or renamed because the CenterLink installation will create this directory if the release 3.0 upgrade is installed.
-

Windows 95 Networking Verification

Use Table F-2 to verify and set up the PC for Windows 95 networking. The procedures included show a typical PC setup. Other Windows components may already be installed prior to this setup.

Table F-2 Verify Windows 95 Networking

Use the boxes to check off the steps as they are completed

- ☐ 1 Select Start->Settings->Control Panel. A typical Control Panel window is shown below:



- ☐ 2  Open Network Icon to observe the Network Dialog Box with the Configuration tab highlighted. The Network Dialog Box (Configuration) is shown in Figure F-1

Table F-2 Verify Windows 95 Networking

- ❑ 3 Verify "TCP/IP" protocol is listed as a network component. Refer to point 1 in Figure F-1.

If TCP/IP is not listed, refer to Windows Help or Table F-3 on page F-10 to install.

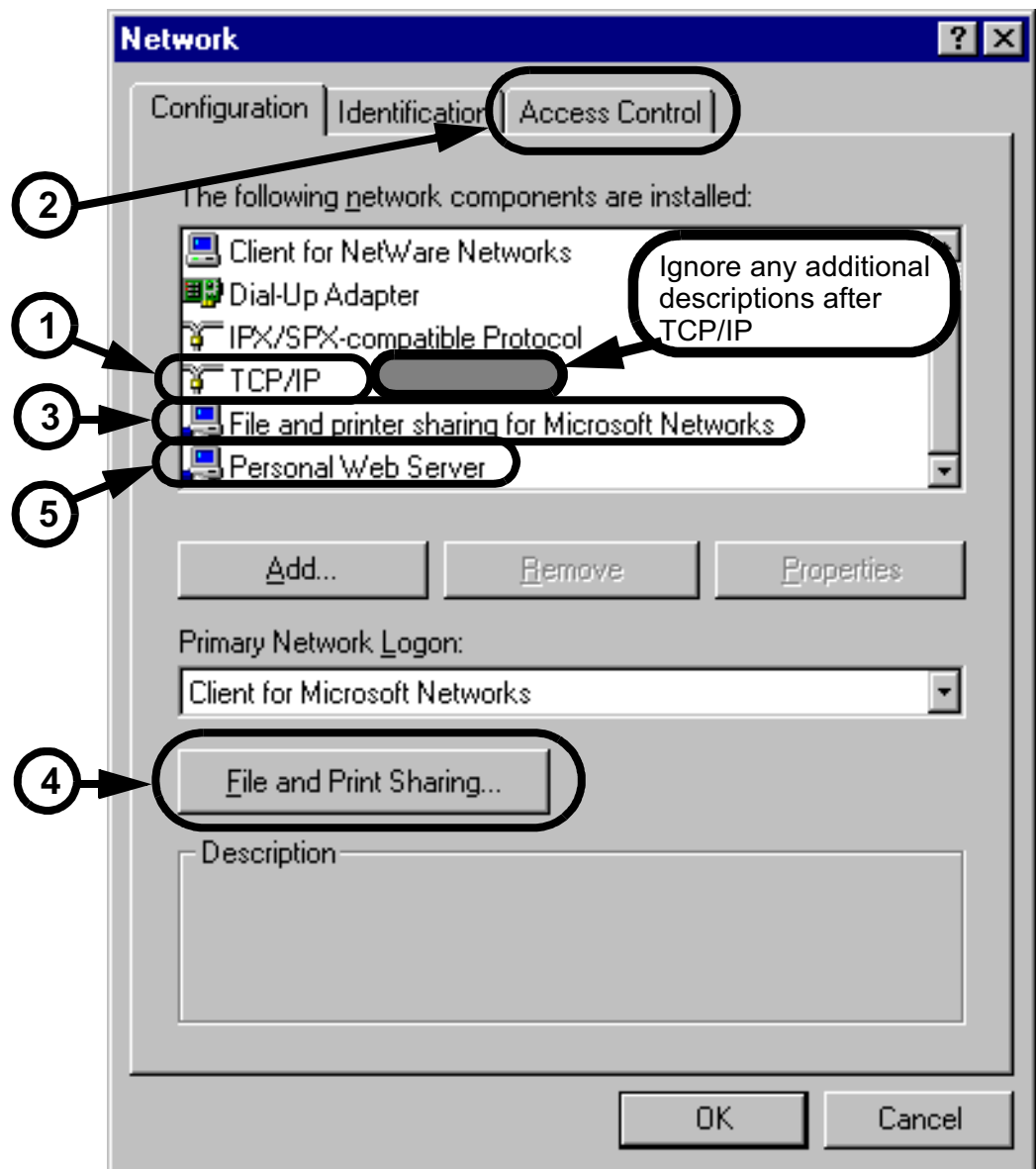


Figure F-1 Network Dialog Box (Configuration)

Table F-2 Verify Windows 95 Networking

- ❑ 4 Select the Access Control tab. Refer to point 2 in Figure F-1 The Network Dialog Box (Access Control) will open as shown in Figure F-2.

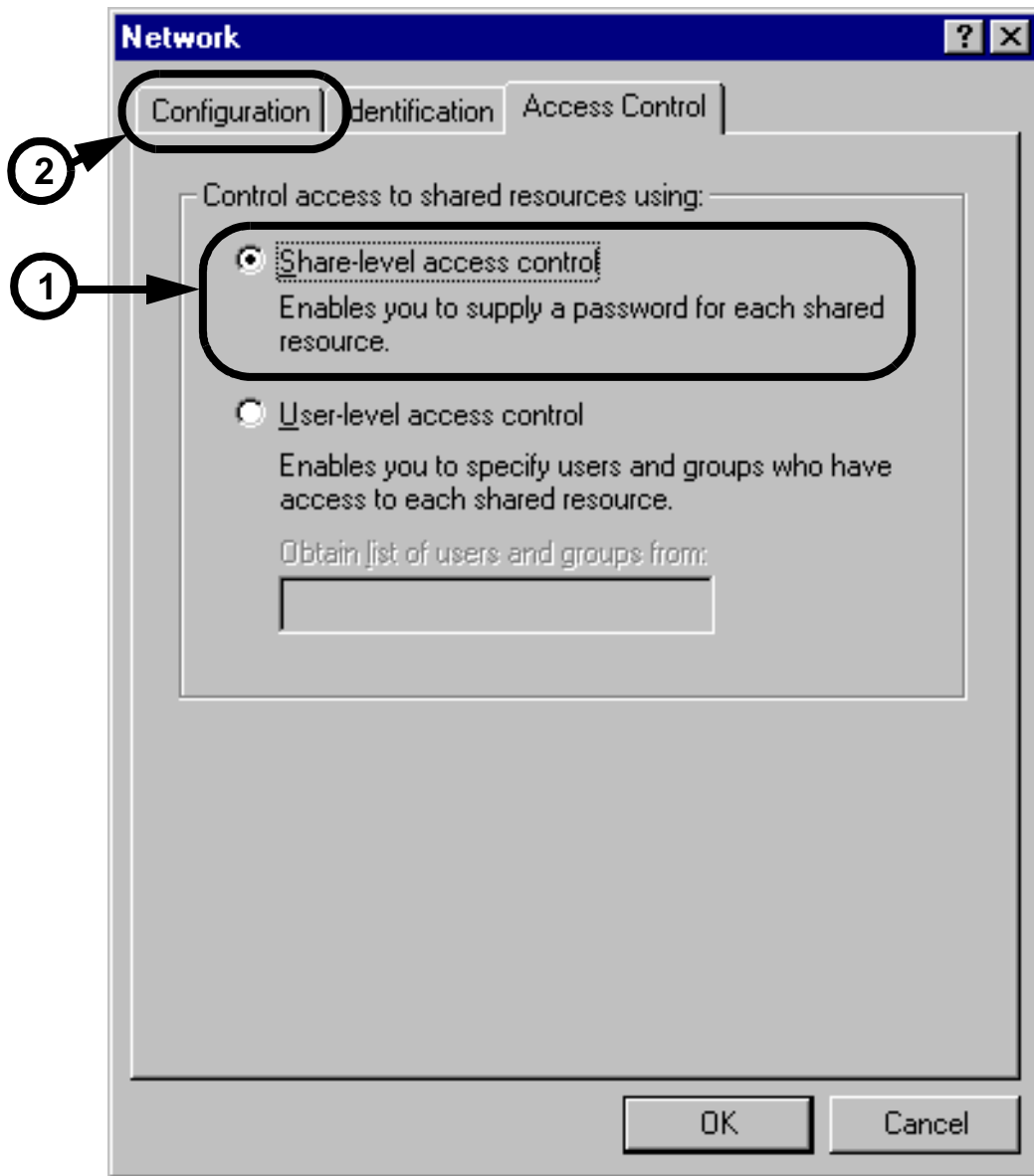


Figure F-2 Network Dialog Box (Access Control)

Table F-2 Verify Windows 95 Networking

-
☐	5	Verify Share-level access control is selected. Refer to point 1 in Figure F-2.

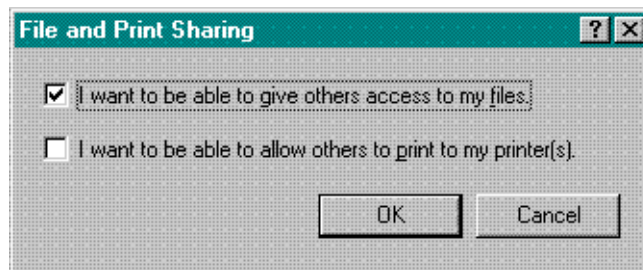
If Share-level access control is not selected, select it.

-
☐	6	Select the Configuration Control tab. Refer to point 2 in Figure F-2

-
☐	7	Verify "File and printer sharing for Microsoft Networks" is listed as a network component. Refer to point 3 in Figure F-1.

If "File and printer sharing for Microsoft Networks" is not listed, click the "File and Print Sharing..." button. Refer to point 4 in Figure F-1.

On the File and Print Sharing dialog box as shown below, select "I want to be able to give others access to my files" (printer access is optional) and click "OK".



-
☐	8	Click the "OK" button for the Network dialog box to accept the network components.

-
☐	9	If Windows does not ask for master disks, proceed to the next step.

If Windows does ask for master disks to be inserted at this time:

- Use your original Windows floppies or CD-ROM, or the images of these disks may be located on your hard drive in C:\WINDOWS\CABS.
 - If Windows asks to keep newer files and not load older files click "Yes".
 - After Windows has loaded the files it is looking for, it will ask to reboot, click "Yes". Remove any floppy disk in the A drive.
 - Repeat this table from the beginning to confirm the new settings.
-

Table F-2 Verify Windows 95 Networking

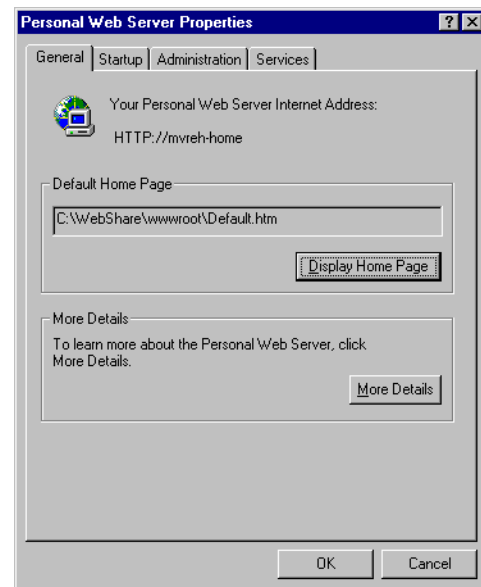
-
☐	10	Verify Dial-Up Networking is installed by selecting Start->Programs->Accessories menu and observe if "Dial-Up Networking" is present. If Dial-Up Networking is not installed, refer to Windows help or Table F-4 on page F-14 to install it.
-
☐	11	If the Control Panel is not open on the desktop, open it by selecting Start->Settings->Control Panel.
-
☐	12	Open the Network icon and verify Personal Web Server is listed as a network component. It may be necessary to scroll the list. Refer to point 5 in Figure F-1 If "Personal Web Server" is not present install as follows: — CD-ROM: (1) Insert the CD-ROM into the PC. The autorun feature will open the CenterLink CD Browser. (Or run setup.exe on the CD-ROM.) (2) Click on the Installation icon. Then click on "Personal Web Server" under "3rd Party Applications" to start the installation. — Floppy: (1) Insert the Personal Web Server floppy into the PC. (2) Run Setup.exe on the floppy to start the installation. — Windows may need the master disks to load driver files. — Restart PC after software installed. Remove any floppy from the disk drive.
-
☐	13	Click "OK" to close the Network dialog box.
-

Table F-2 Verify Windows 95 Networking

❑ 14



Open the Personal Web Server icon to get the Personal Web Server Properties dialog box.



❑ 15 Click the Startup tab and verify:

- Under “Web Server State” verify “The Web server is Running” is displayed and the “Start” button is grayed out. If not, click on the “Start” button.
- Under “Options” verify both are checked.

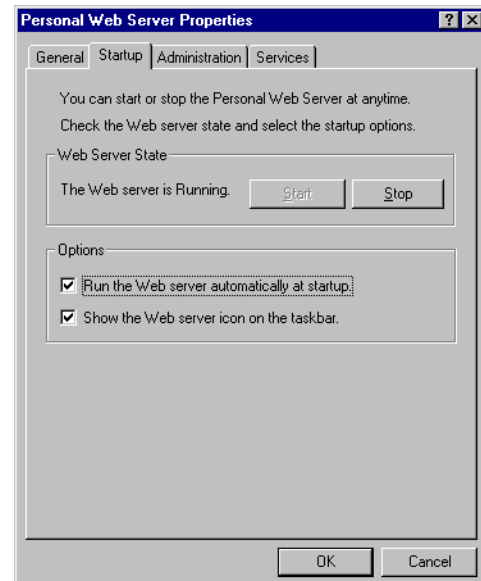
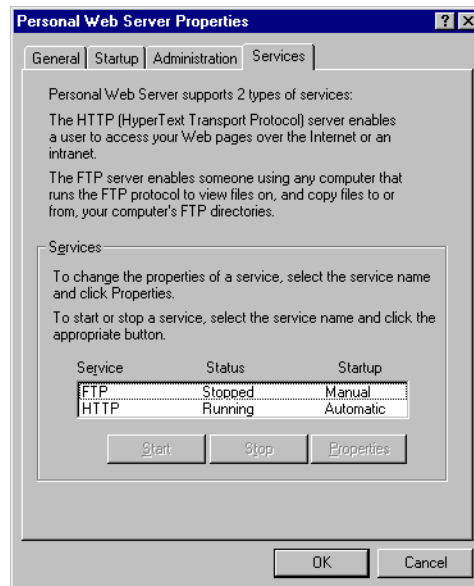


Table F-2 Verify Windows 95 Networking

- ❑ 16 Click the Services tab and verify the HTTP Service has the following properties:

Status: Running
Startup: Automatic

If not, follow the instructions on the dialog box.



- ❑ 17 Click the "OK" button to accept the settings and close the dialog box.
- ❑ 18 Close the Control Panel window.
- ❑ 19 This completes the Verify Windows 95 Networking Procedure. If you do not have enough time to complete the next procedure, this is considered to be a **SAFE-STOP**.

If continuing, proceed to Table F-5 on page F-18 to verify and setup Microsoft Internet Explorer.

Install TCP/IP Protocol

Use Table F-3 to install the TCP/IP protocol.

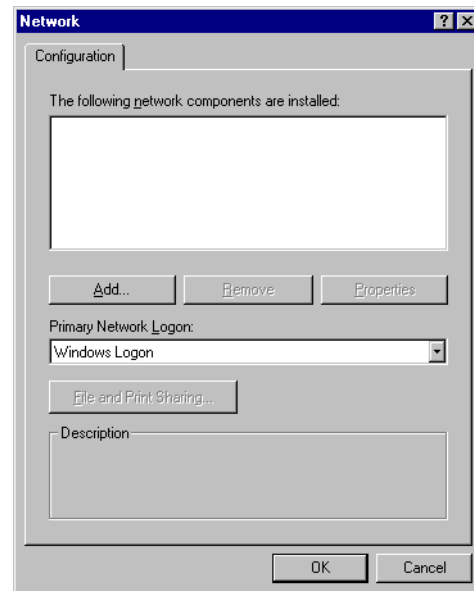
Table F-3 Install TCP/IP Protocol

Use the boxes to check off the steps as they are completed

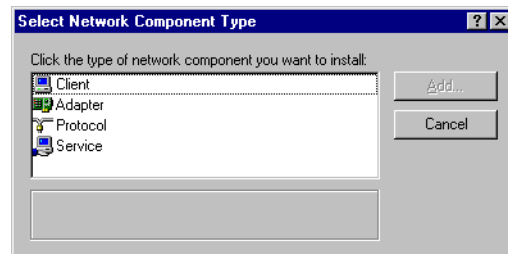
Table F-3 Install TCP/IP Protocol

- ❑ 1 With no network components installed the Network Dialog Box will look like that shown at right:

⇒ **NOTE:**
There may already be some network components listed other than TCP/IP, which we will add in the next few steps.



- ❑ 2 Click the “Add...” button. The Select Network Component Type Dialog Box will open.



- ❑ 3 Highlight “Protocol” then click the “Add...” button. The Select Network Protocol Dialog Box will open.

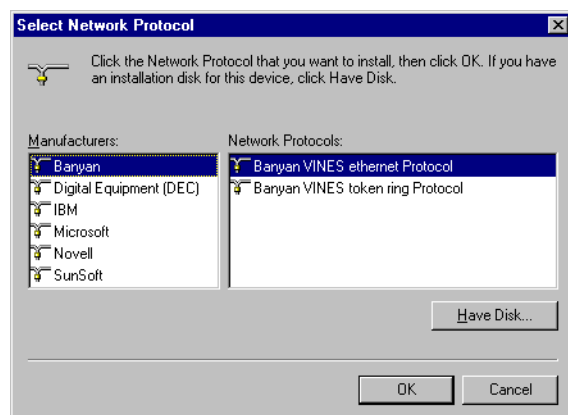
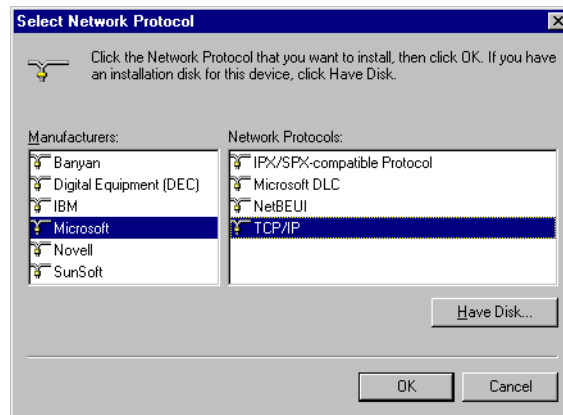


Table F-3 Install TCP/IP Protocol

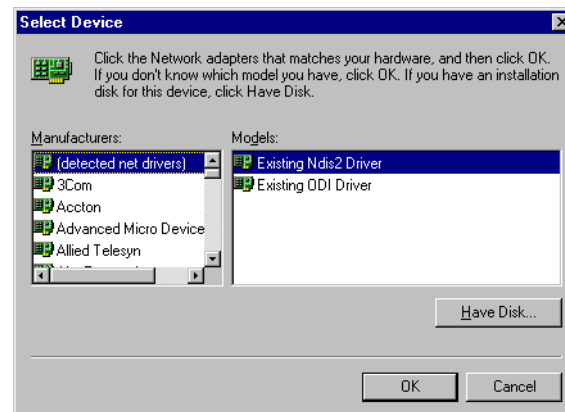
- ❑ 4 Highlight “Manufacturers: Microsoft” then highlight “Network Protocols: TCP/IP”. The Select Network Protocol Dialog Box is shown at right.



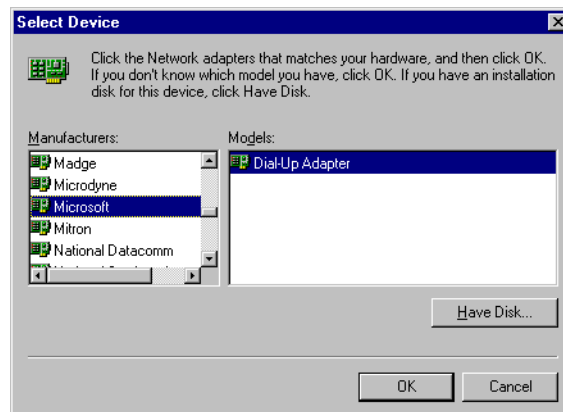
- ❑ 5 Click the “OK” button.

If no network adapter has been installed, the Select Device dialog box will open.

If a network adapter was previously installed proceed to Step 8



- ❑ 6 Scroll to highlight “Manufacturers: Microsoft” then highlight “Models: Dial-Up Adapter”. The Select Device Dialog Box is shown at right.



- ❑ 7 Click the “OK” button for the Select Device dialog box.

Table F-3 Install TCP/IP Protocol

-
- ❑ 8 The Network dialog box will now be displayed with the new network components listed.



NOTE:

Windows may have added network components in addition to those asked for in this procedure. Ignore these additional components.

-
- ❑ 9 Select the Access Control tab. Refer to point 2 in Figure F-1. The Network Dialog Box (Access Control) will open as shown in Figure F-2.

-
- ❑ 10 Verify “Share-level access control” is selected. Refer to point 1 in Figure F-2.

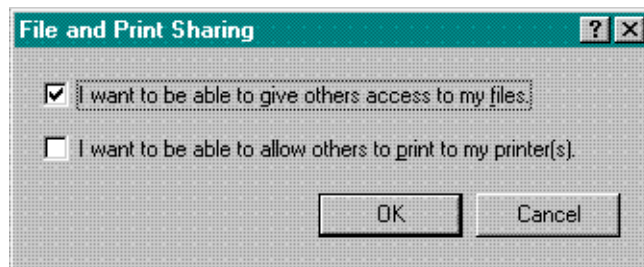
If “Share-level access control” is not selected, select it.

-
- ❑ 11 Select the Configuration Control tab. Refer to point 2 in Figure F-2.

-
- ❑ 12 Verify “File and printer sharing for Microsoft Networks” is listed as a network component. Refer to point 3 in Figure F-1.

If “File and printer sharing for Microsoft Networks” is not listed, click the “File and Print Sharing...” button. Refer to point 4 in Figure F-1.

On the File and Print Sharing dialog box as shown below, select “I want to be able to give others access to my files” (printer access is optional) and click “OK”.



-
- ❑ 13 Click the “OK” button for the Network dialog box to accept the network components. Windows will now ask for master disks to be inserted. These may be your original Windows floppies or CD-ROM, or the images of these disks may be located on your hard drive in C:\WINDOWS\CABS.

-
- ❑ 14 If Windows asks to keep newer files and not load older files click “Yes”.
-

Table F-3 Install TCP/IP Protocol

-
☐	15	After Windows has loaded the files it is looking for it will ask to reboot, click "Yes". Remove any floppy disk in the A drive.
☐	16	Windows may ask for a login and password on reboot. Enter as desired. leaving the password field blank will avoid the questions on later reboots.
☐	17	This completes the Install TCP/IP Protocol Procedure. If you do not have enough time to complete the next procedure, this is considered to be a SAFE-STOP .
-

If continuing, repeat Table F-2 on page F-4 to verify settings.

Install Dial-Up Networking

Use Table F-4 to install the Dial-Up Networking.

Table F-4 Install Dial-Up Networking

Use the boxes to check off the steps as they are completed

Table F-4 Install Dial-Up Networking

- ❑ 1 Select Start->Settings->Control Panel.

A typical Control Panel window is shown below:



- ❑ 2  Open Add/Remove Programs Icon to observe the Add/Remove Programs Properties Dialog Box with the Install/Uninstall tab highlighted.

Table F-4 Install Dial-Up Networking

- ❑ 3 Click the “Windows Setup” tab and highlight “Communications” as shown at right.

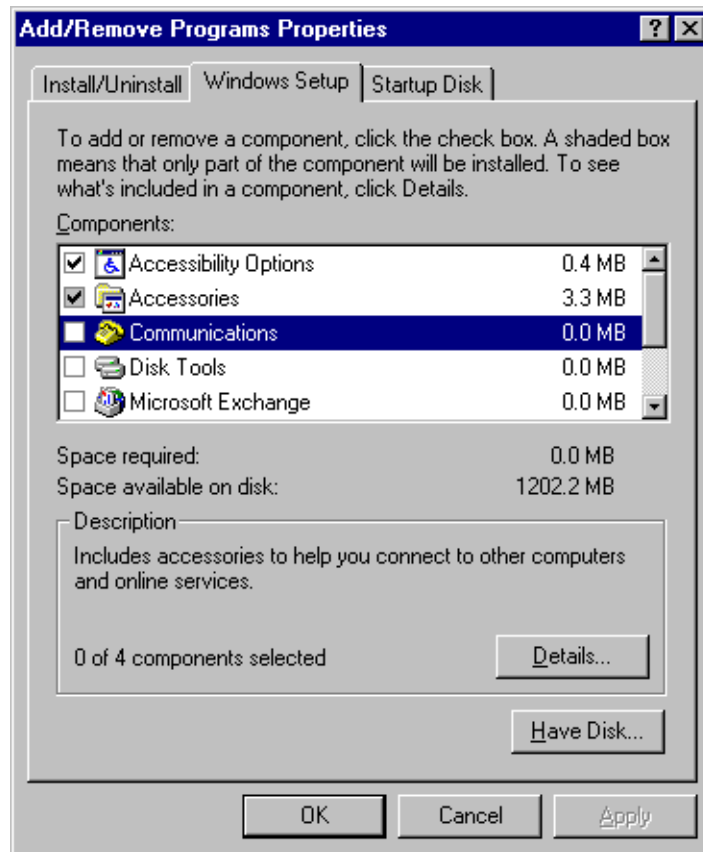
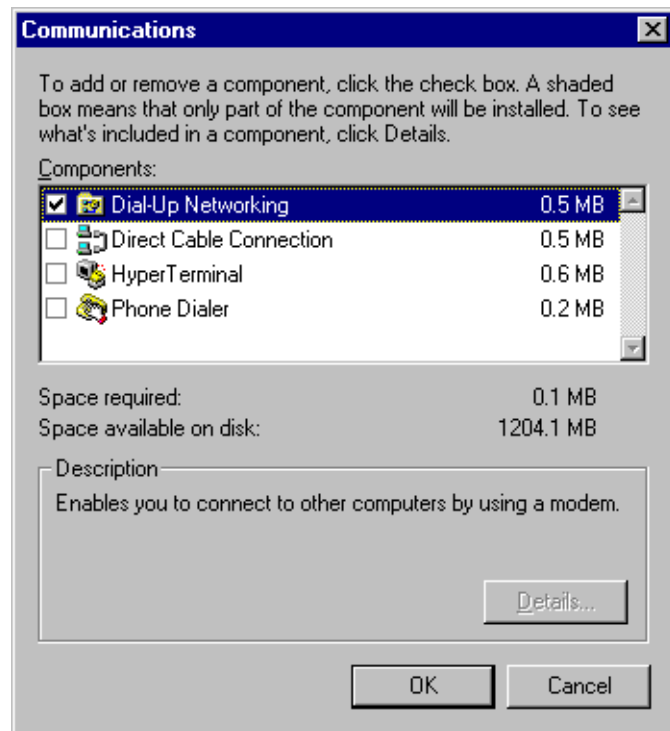


Table F-4 Install Dial-Up Networking

- ❑ 4 Click the “Details...” button and the Communications dialog box will open.



- ❑ 5 Select “Dial-Up Networking” (a check in the box appears).
- ❑ 6 Click on the “OK” button and return to the Add/Remove Programs Properties dialog box.
- ❑ 7 Click the “OK” button for the Add/Remove Programs Properties dialog box. Windows will now ask for master disks to be inserted. These may be your original Windows floppies or CD-ROM, or the images of these disks may be located on your hard drive in C:\WINDOWS\CABS.
- ❑ 8 If Windows asks to keep newer files and not load older files click “Yes”.
- ❑ 9 If Windows asks to reboot, click “Yes”. If Windows does not ask restart the PC manually. Remove any floppy disk in the A drive.
- ❑ 10 This completes the Install Dial-Up Networking Procedure. If you do not have enough time to complete the next procedure, this is considered to be a **SAFE-STOP**.

If continuing, repeat Table F-2 on page F-4 to verify settings.

Microsoft Internet Explorer Setup

Internet Explorer Installation

Use Table F-5 to verify and set up the PC for Internet Explorer.

Table F-5 Microsoft Internet Explorer Installation

Use the boxes to check off the steps as they are completed

- ☐ 1 Determine if Microsoft Internet Explorer v 3.02 or v4.0 is loaded onto the PC. Look on the Start->Programs menu. Or typically there will be a icon similar to that at right on the desktop.



⇒ NOTE:

The icon at right needs to be on the desktop (background of the display), not in the control panel.

⇒ NOTE:

R3.0.2-OLS supports Microsoft Internet Explorer v3.02 and v4.0, but only v3.02 is supplied with R3.0.2-OLS.

If Microsoft Internet Explorer v 3.02 or v4.0 is not loaded, proceed to the next step.

If Microsoft Internet Explorer v 3.02 or v 4.0 is loaded, proceed to Table F-6 on page F-24.

-
- ☐ 2 For R3.0.2-OLS software purchased on CD-ROM, proceed to the next step to load Internet Explorer from CD-ROM.

For R3.0.2-OLS software purchased on floppy disk, load Internet Explorer from another source. Refer to "PC Software Requirements" on page F-2 for additional information. Go to Step 6 on page F-20 for loading guidelines.

Table F-5 Microsoft Internet Explorer Installation

- ❑ 3 Insert the CD-ROM into the PC. The autorun feature will open the CenterLink CD Browser as shown below.



NOTE:

If the Windows autorun feature is disabled, run the setup.exe file on the CD-ROM.

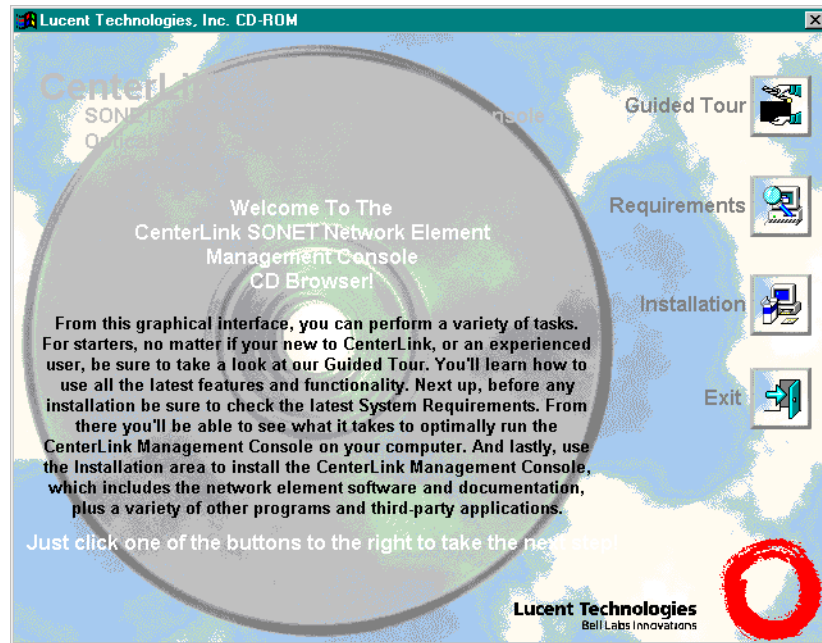
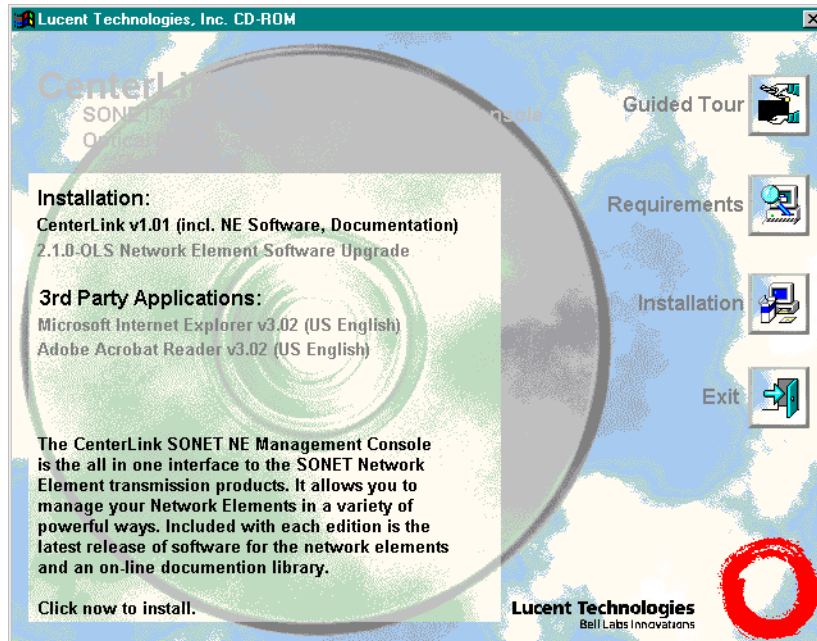


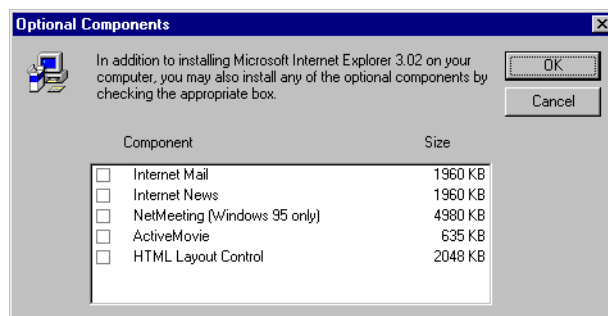
Table F-5 Microsoft Internet Explorer Installation

- ☐ 4 Click on the Installation icon to get the window shown below.



- ☐ 5 Click on "Microsoft Internet Explorer v3.02" under "3rd Party Applications" to start the installation.
- ☐ 6 Click "Yes" to confirm license conditions.
- ☐ 7 When asked "Would you like to select which optional Internet Components are installed?" click "Yes".

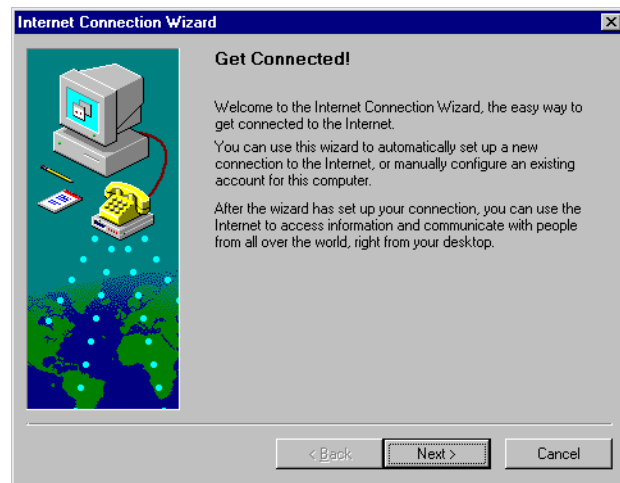
- ☐ 8 Deselect all components as shown at right then click "OK".



- ☐ 9 After Windows has loaded the files it is looking for it will ask to reboot, click "Yes". Remove any floppy disk in the A drive.
- ☐ 10 When the PC has finished rebooting, proceed to the next step.

Table F-5 Microsoft Internet Explorer Installation

- ❑ 11 Run Internet Explorer from the desktop icon or using the Start menu. When run for the first time the following window will open.



- ❑ 12 Click "Next" to get the following window.

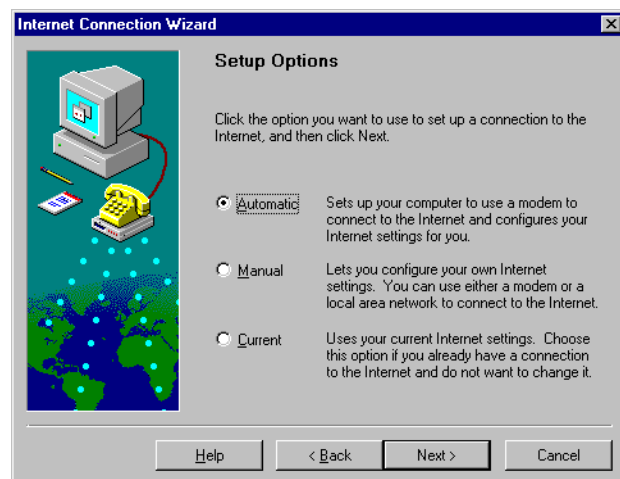
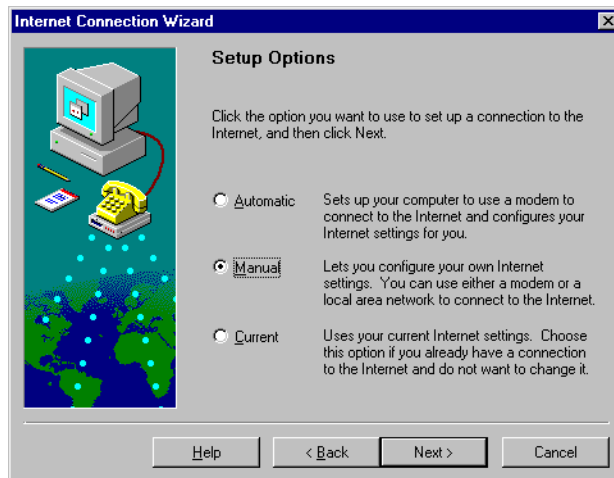


Table F-5 Microsoft Internet Explorer Installation

- ❑ 13 Select “Manual” as shown at right.



- ❑ 14 Click “Next” to get the following window.



- ❑ 15 Click “Next”.
Select “Connect using my Local Area Network” to get the following window.



Table F-5 Microsoft Internet Explorer Installation

- ❑ 16 Click “Next”.

Select “No, I don’t want to use Windows Messaging” to get the following window.



- ❑ 17 Click “Next” to get the following window.



- ❑ 18 Click “Next” to get the following window.



- ❑ 19 Click “Finish”.

Table F-5 Microsoft Internet Explorer Installation

-
- ☐ 20 This completes the Microsoft Internet Explorer Installation Procedure. If you do not have enough time to complete the next procedure, this is considered to be a **SAFE-STOP**.

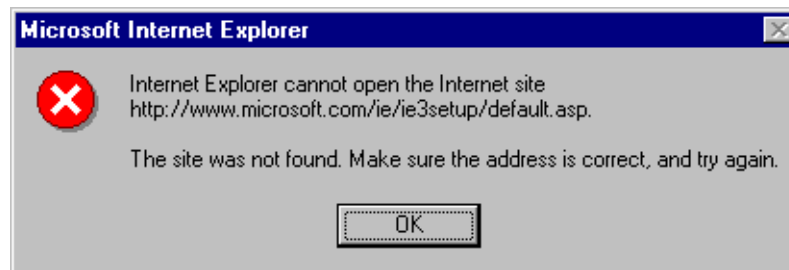
If continuing, proceed to Table F-6 on page F-24.

Internet Explorer Configuration

Use Table F-6 to configure the Internet Explorer.

Table F-6 Microsoft Internet Explorer Configuration

-
- ☐ 1 Run Internet Explorer from the desktop icon or using the Start menu.
 - ☐ 2 Click "OK" to cancel any error message about unable to connect like that shown at right.

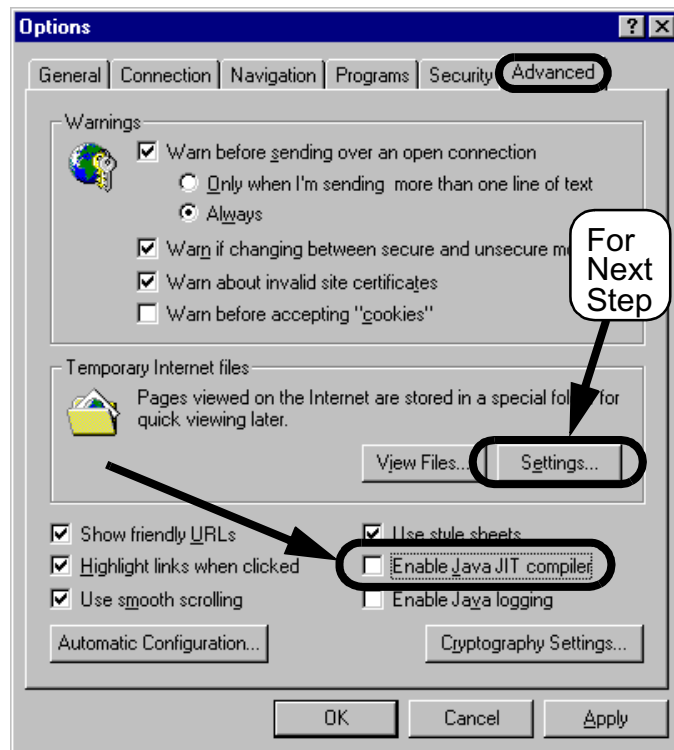


-
- ☐ 3 Select the View->Options menu.
-

Table F-6 Microsoft Internet Explorer Configuration

- ❑ 4 Under the Advanced tab, verify the “Enable Java JIT Compiler” is not checked.

If it is, deselect and ignore the restart request at this time.



- ❑ 5 Under the Advanced tab, click the “Temporary Internet Files” “Settings” button and verify “Every time you start Internet Explorer” is selected. Click “OK”

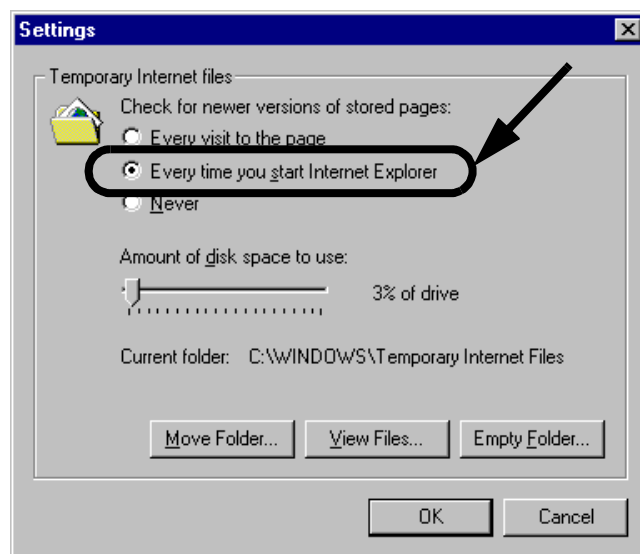


Table F-6 Microsoft Internet Explorer Configuration

- ❑ 6 Under the Connection tab, verify “Connect through a proxy server” is disabled. Click “Apply” and “OK”.

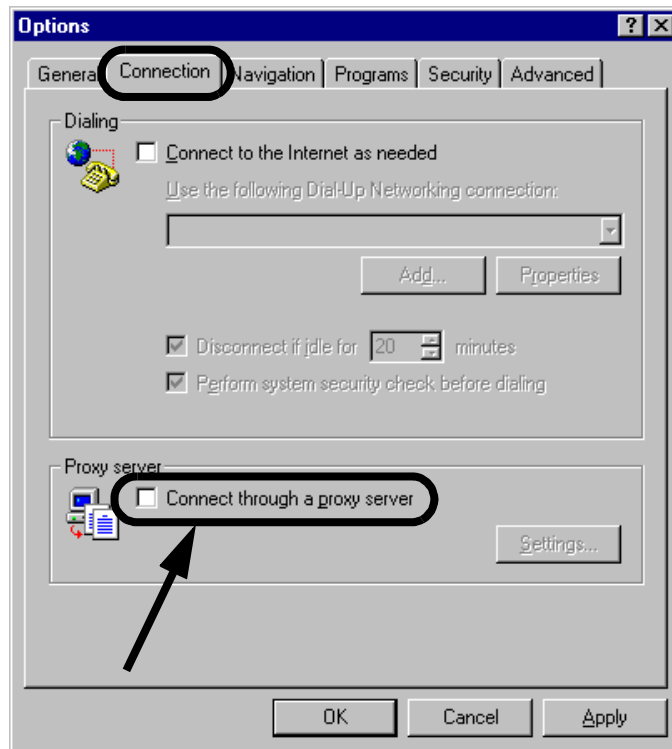
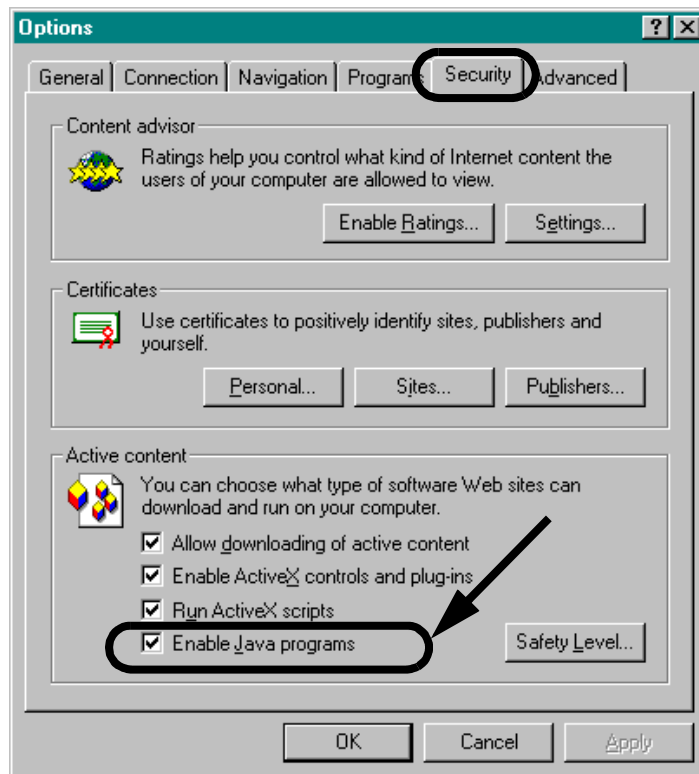


Table F-6 Microsoft Internet Explorer Configuration

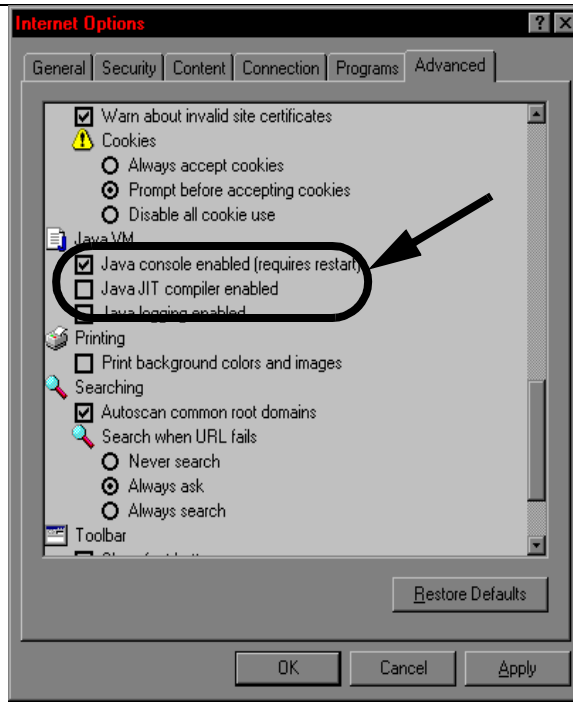
- ❑ 7 Under the Security tab, verify “Enable Java Programs” is enabled.
If not, enable it.
Click “Apply” and “OK”.



- ❑ 8 Close Internet Explorer.
- ❑ 9 This completes the Microsoft Internet Explorer v3.02 Configuration Procedure. If you do not have enough time to complete the next procedure, this is considered to be a **SAFE-STOP**.
If continuing, proceed to Table F-8 on page F-29.

Table F-7. Microsoft Internet Explorer 4.0 Configuration

- ❑ 1 Under the
Advanced tab,
verify the
Java Console
is enabled,
and the
Java Jit
Compiler is
not enabled.



- ❑ 2 Under the
connection tab,
verify “Access
to internet using
a proxy server”
is disabled

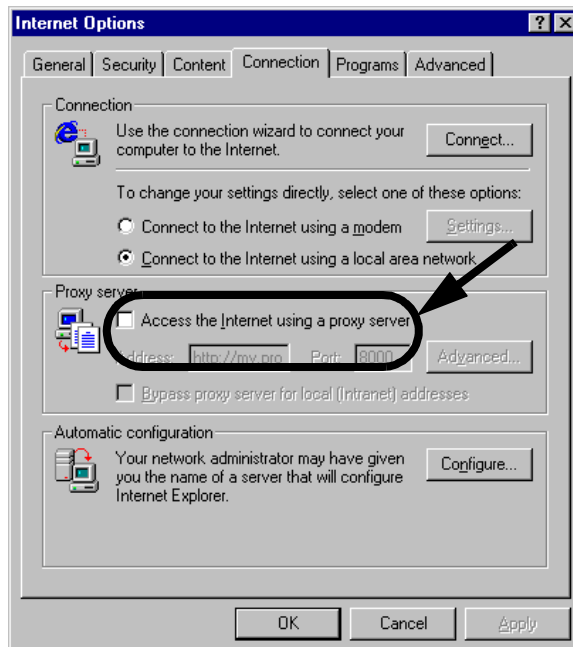


Table F-7. Microsoft Internet Explorer 4.0 Configuration

☐	3	Close Internet Explorer

☐	4	This completes Microsoft Internet Explorer 4.0 Configuration Procedure. If you do not have enough time to complete the next procedure, this is considered to be a Safe-Stop . If continuing, proceed to Table A8 on page A-29.

Adobe Acrobat Setup

Installation

Use Table F-8 to verify and set up the PC for Adobe Acrobat.

Table F-8 Adobe Acrobat Installation

Use the boxes to check off the steps as they are completed

-
☐	1	Determine if Adobe Acrobat Reader or Exchange is loaded onto the PC. Typically there will be a Start->Programs->Adobe Acrobat menu. If Adobe Acrobat Reader or Exchange is not loaded, proceed to the next step. If Adobe Acrobat Reader or Exchange is loaded, this chapter is complete.
-



NOTE:

If the PC already has Acrobat Exchange loaded do not load Reader. Exchange handles all Reader's functions plus more.

Table F-8 Adobe Acrobat Installation

- ❑ 2 For R3.0.2-OLS software purchased on CD-ROM, proceed to the next step to load Adobe Acrobat Reader from CD-ROM.

For R3.0.2-OLS software purchased on floppy disk, load Adobe Acrobat Reader or Exchange from another source. Refer to "PC Software Requirements" on page F-2 for additional information. Refer to Section 9 of this document for instructions for installing Network Element software.

- ❑ 3 Insert the CD-ROM into the PC. The autorun feature will open the CenterLink CD Browser as shown below.

⇒ NOTE:

If the Windows autorun feature is disabled, run the setup.exe file on the CD-ROM.

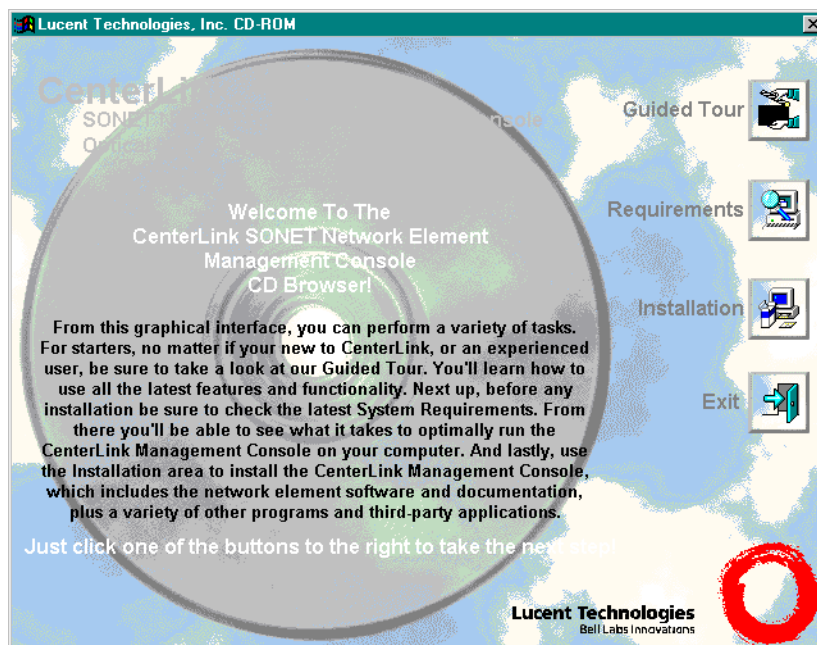
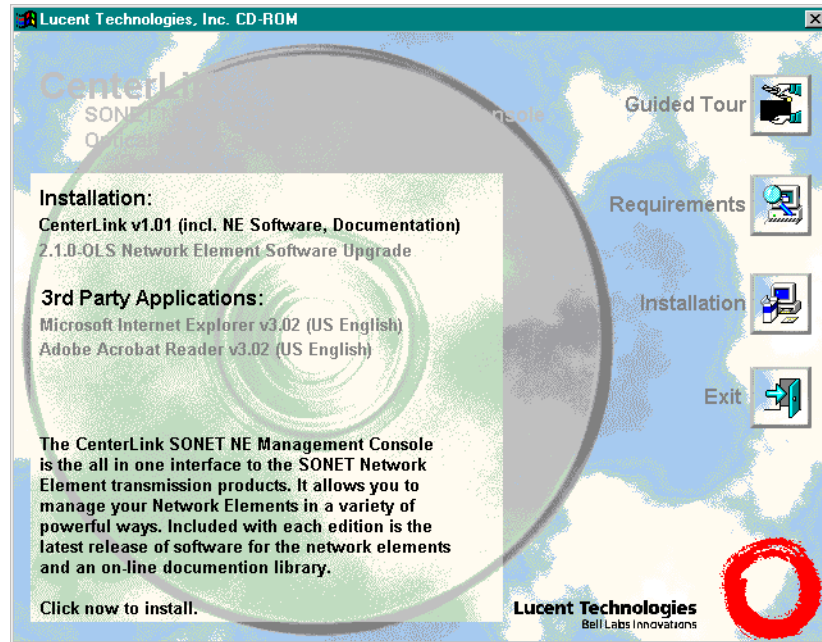


Table F-8 Adobe Acrobat Installation

- ☐ 4 Click on the Installation icon to get the window shown below.



- ☐ 5 Click on Adobe Acrobat Reader v4.0 under 3rd Party Applications to start the installation.
Accept the default values when asked for information.
- ☐ 6 After Windows has loaded the files it is looking for it will ask to reboot, click "Yes". Remove any floppy disk in the A drive.
- ☐ 7 Click "Exit" to close the CD Browser.
- ☐ 8 This completes the Adobe Acrobat Reader Installation Procedure. This is considered to be a **SAFE-STOP**.
This completes the PC Setup for CenterLink chapter. Refer to Chapter 4 of the Software Release Description for installing or upgrading R3.0.0-OLS network element software.

Centerlink Management Console Usage

Software Components

The CenterLink Management Console software uses several software components to operate as described below:

- **CenterLink Management Console**

A series of HTML files and JAVA scripts running on a web browser which provides the graphical user interface to the user for communicating to the network element. Available on the Release 3.0.0-OLS CD-ROM or floppies.

- **NESERVER**

A Windows95 application that transfers data between the CenterLink Management Console software running on the web browser and the serial port of the PC. Available on the Release 3.0.0-OLS CD-ROM or floppies.

- **Microsoft Internet Explorer v4.0**

Microsoft Corporation's standard web browser. Available on the Release 3.X-OLS CD-ROM, from the Microsoft web site, or supplied with newer PCs equipped with Windows95.

- **Microsoft Personal Web Server**

Microsoft Corporation's add-on to Windows95 that turns any PC into a web server. Needed to execute the JAVA scripts the CenterLink Management Console software uses. PWS is included with most new Windows95 PCs or is available from the Microsoft web site.

- **Windows95 Networking**

Dial-Up Networking or other networking components of Windows95 must be installed to provide the operating system support for the rest of the software.

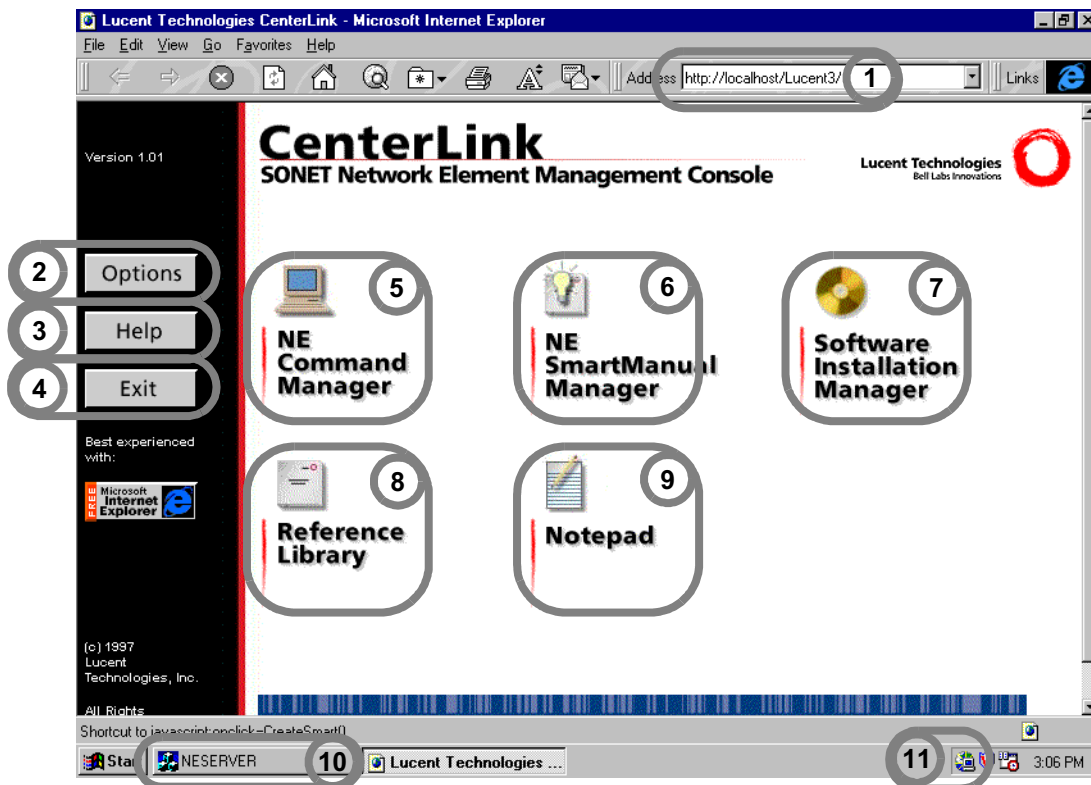
■ Adobe Acrobat Reader

Used to read the customer documentation included on the CD-ROM which are distributed using Reader pdf format.

CenterLink Management Console Screen Elements

Figure F-3 shows the Centerlink main screen and identifies the screen locations described below:

- (1). Web Address - Displays the CenterLink home page on the PC that is being accessed using the Personal Web Server Software.
- (2) Options Button - Clicking accesses the CenterLink options.
- (3) Help Button - Clicking accesses CenterLink on-line help.
- (4) Exit Button - Clicking Exits CenterLink.
- (5) NE Command Manager - Clicking opens a command manager window and establishes a connection to a network element.
- (6) NE SmartManual Manager - Clicking opens the SmartManual window.
- (7) Software Installation Manager - Clicking begins the process of installing network element software into a blank system.
- (8) Reference Library - Clicking opens a window displaying an index of the documentation available.
- (9) Notepad - Clicking opens a user note storage utility.
- (10) NESERVER application - A Windows95 application that transfers data between the CenterLink Management Console software running on the web browser and the serial port of the PC. MUST be running for CenterLink to operate.
- (11) Personal Web Server Application - A Windows95 application which allows the PC to operate as a web server. Needed to execute the JAVA scripts the CenterLink Management Console software uses.



CenterLink Management Console Operations

The following paragraphs describe using the CenterLink Management Console to log into a network element and run an example command.

Network Element Login Procedure

- (1). Verify the PC is connected to the network element CIT port.

- (2) Verify the NESERVER application com port assignment is correct by opening the NESERVER application and using the Settings->Com Port Selection menu.

- (3) From the CenterLink Network Element Console window (Figure F-3) click on the NE Command Manager icon.



- (4) A NE Command Manager window will open with the NE Selection Menu displayed as shown in Figure F-4.
- (5) Select the target TID from the drop down list or enter a new TID. Click on the Submit button to proceed.
- (6) The NE Command Manager window will then display the Network Element Login request as shown in Figure F-5.
- (7) Enter the appropriate TID, User ID, Password, and Privilege Level (Expert) then click Enter.

For new installations use:

Default TID:	LT-FT-2000	(three zeros)
Default User ID:	LT01	(that's a zero, not a capital letter "o")
Default Password:	FT-2000	(three zeros)

For existing systems use the TID, User ID, and Password assigned by the system login administrator.

- (8) The NE Command Manager will then display the Login Success window as shown in Figure F-6.

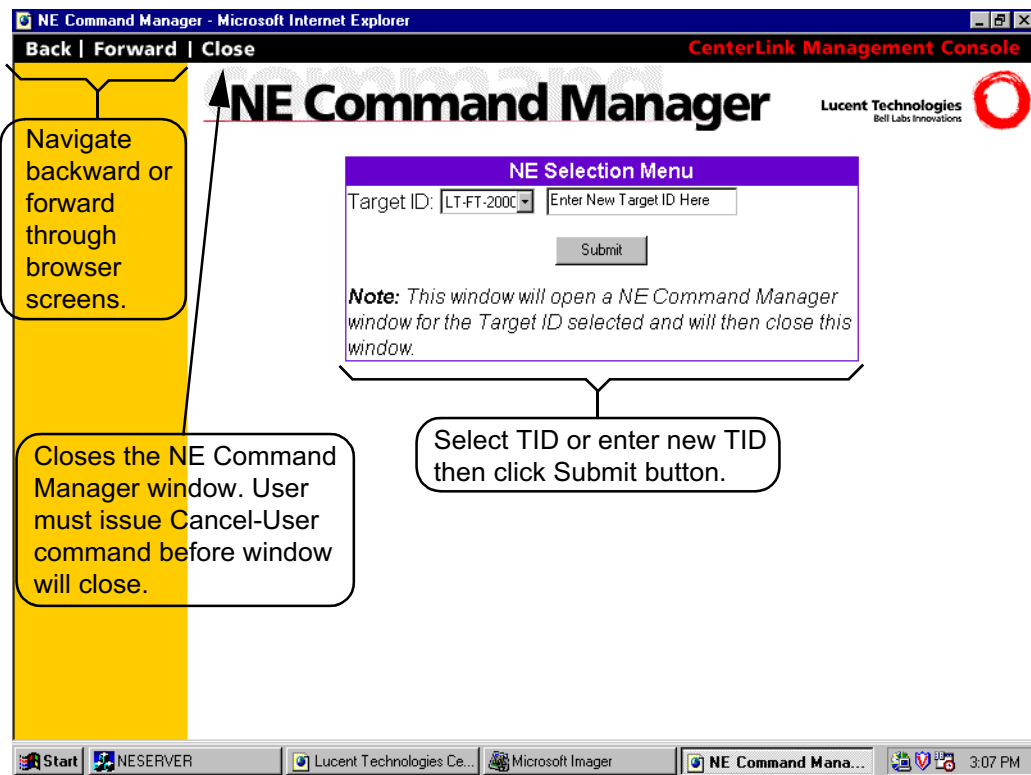


Figure F-4 NE Selection Menu window

OLSTERM2 - Microsoft Internet Explorer

Back | Forward | Close

CenterLink Management Console

NE Command Manager

Lucent Technologies
Bell Labs Innovations

Network Element Login

TID (Target ID) OLSTERM2

UID (User Identifier) default=LT01

PID (Private ID) default=FT-2000

Fault Configuration

Performance Security

select appropriate security levels

Click Enter to proceed

Start NESERVER Lucent Technologies Ce... Microsoft Imager OLSTERM2 - Micro... 3:09 PM

Figure F-5 Network Element Login window

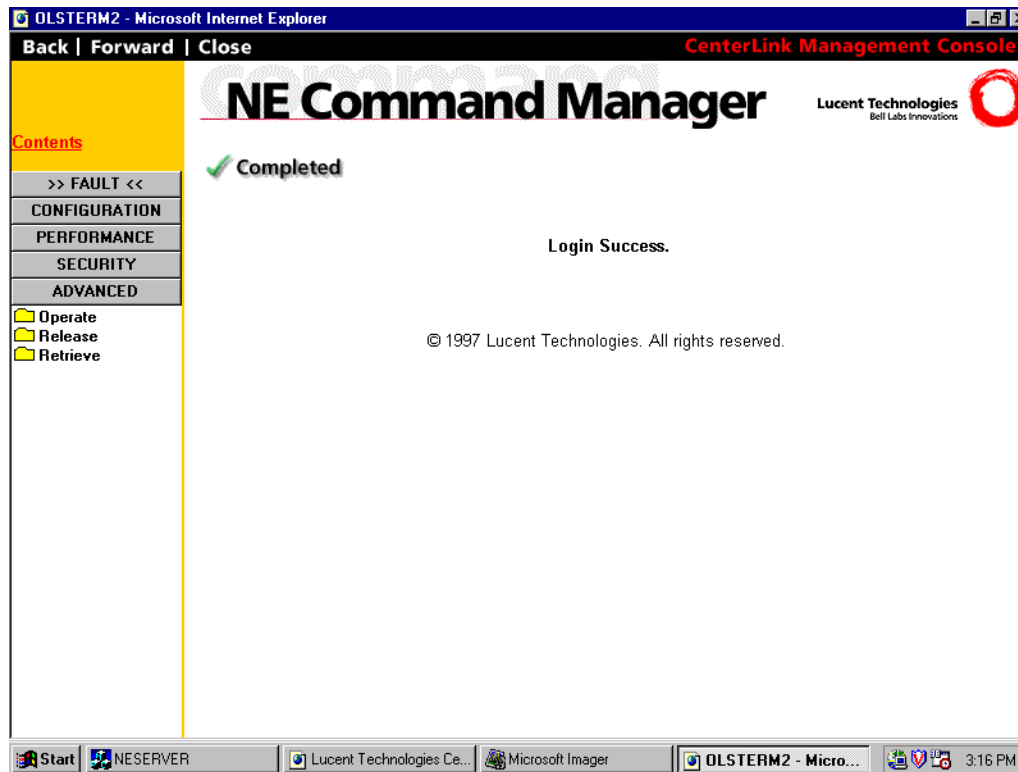


Figure F-6 Successful Network Element Login window

Network Element Command Execution

When the NE Command Manager is logged onto the network element the window will look similar to Figure F-7 or Figure F-8. These figures show the input and output screens from the CONFIGURATION.Retrieve.Map.Network command.

In general, the larger right frame area will display the input parameters to commands or output results from commands. The smaller left frame area will display the five command categories (FAULT, CONFIGURATION, PERFORMANCE, SECURITY, and ADVANCED) at the top of the frame and will display the commands available for the selected category at the bottom of the left frame. Open a folder to access the commands available. For example, clicking on retrieve opens commands and additional folders under it.

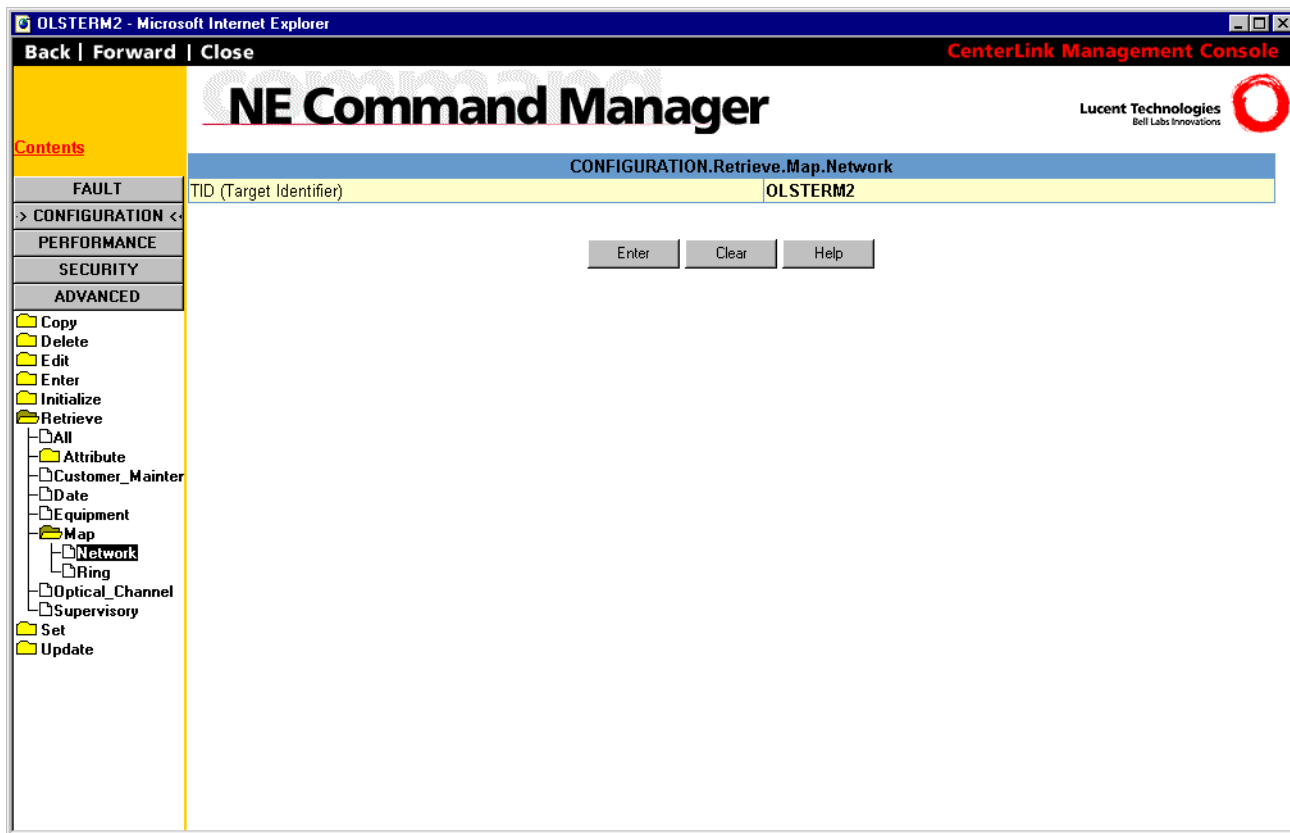


Figure F-7 NE Command Manager - Command Input

OLSTERM2 - Microsoft Internet Explorer

Back | Forward | Close

CenterLink Management Console

NE Command Manager

Lucent Technologies
Bell Labs Innovations

Contents

- FAULT
- > CONFIGURATION <
- PERFORMANCE
- SECURITY
- ADVANCED
 - Copy
 - Delete
 - Edit
 - Enter
 - Initialize
 - Retrieve
 - All
 - Attribute
 - Customer_Maintainer
 - Date
 - Equipment
 - Map
 - Network
 - Ring
 - Optical_Channel
 - Supervisory
 - Set
 - Update

CONFIGURATION.Retrieve.Map.Network

Target ID: OLSTERM2 Date: 97-10-03 Time: 13:54:03

TID	DCCSTATUS	PRODTYPE	NETYPE	ALARMGRP
TID=OLSTERM1	DCCSTATUS=good	PRODTYPE=OLS	NETYPE=DSNE	ALARMGRP=255
TID=OLSRPTR1	DCCSTATUS=good	PRODTYPE=OLS	NETYPE=-	ALARMGRP=255
TID=OLSTERM2	DCCSTATUS=good	PRODTYPE=OLS	NETYPE=-	ALARMGRP=255

Completed Target ID: OLSTERM2
Command: RTRV-MAP-NETWORK
Date: 97-10-03 Time: 13:54:03

? Help

Figure F-8 NE Command Manager - Command Output

Related Equipment



Dantel Orderwire Overview

OLS fully supports 64 kb/s Orderwire use. Line and Section Orderwire channels (E2 and E1 bytes) are supported by 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 G-1 shows an example application of the current orderwire system in an 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 the other 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 mode¹ 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.

1. The switch and strap settings for terminal mode will be described in the final version of the Dantel practice.

For voice application, the system operates as a standard order-wire when you pick up the handset on the front of the order-wire 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 data circuit works as listed below:

- (1) Select channel 1 on the 41096 order-wire panel, then pick up the handset and call the remote terminal (station 2 code).

At the remote end, the 00330 order-wire terminal pack answers the call and operates an M lead driver that opens a communications channel through the 44202 202 Compatible Modem pack.

- (2) Select both channels 1 and 2 on the 41096 panel. This connects the computer and external modem to the system. At the same time the optical coupler (O.C.) circuit disables the side tone in the 00330 order-wire terminal so that the modem does not receive its own data.
- (3) Hang up the handset and start sending or receiving digital data.
- (4) When done, press the # key to disconnect the modem at the remote terminal. Release the channel 2 push button. The channel 2 button can be released or left pushed in since it is used for both voice and data communications.

Recommended Orderwire System

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 new 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.

Orderwire Shelf Mounting and Powering

The Dantel Orderwire shelf ships separately from the bay. It may be mounted in, or powered from the Miscellaneously Mounted OLS or OT bays. Consult Dantel documentation for powering and mechanical mounting information.

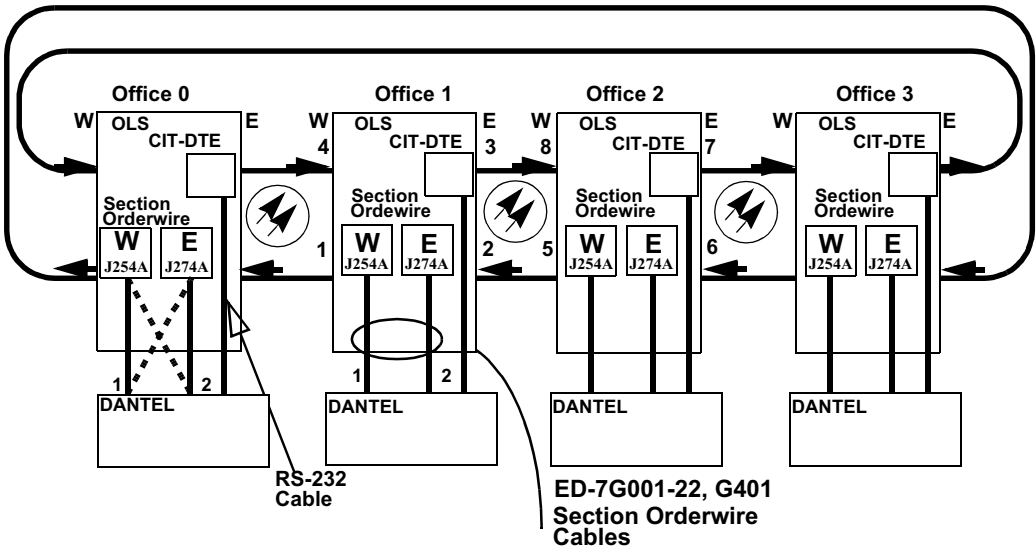
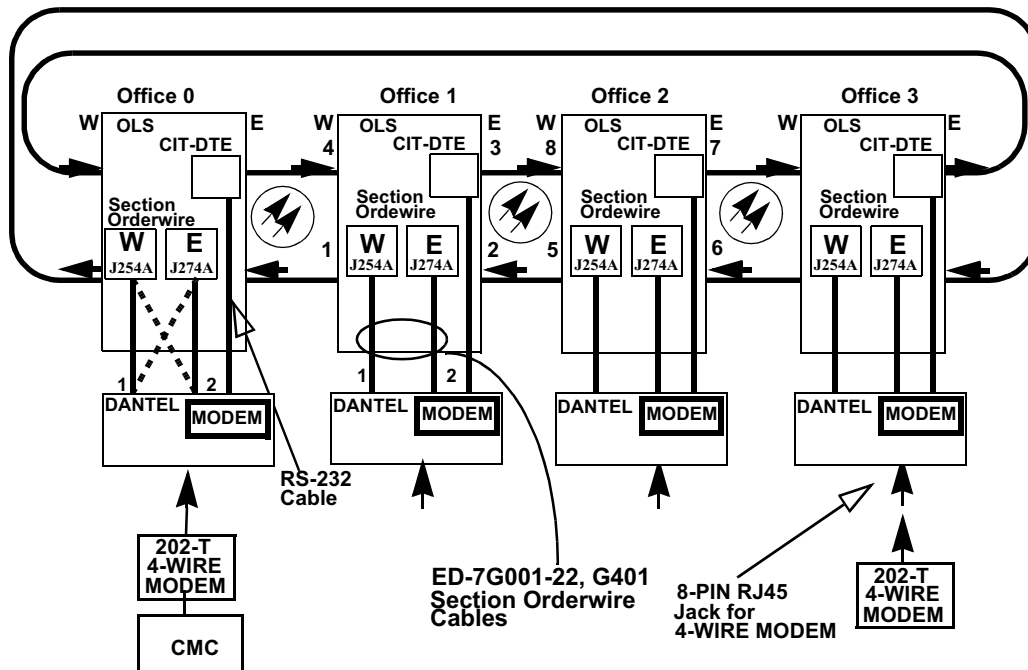


Figure F-1 Orderwire for Voice Communication



Note: The Dantel Shelf at the breakpoint (DSNE Office 0) is configured in Terminal mode.
All other Dantel Shelves are in Repeater mode.

Figure F-2 Orderwire for Voice and Data Communication

Dantel Options Setting

The shelf consists of several Plug-in Modules. Switch and strap settings compatible with FT-2000 use are given in Table G-1 and Table G-2 for each Module.

Table F-1 Dantel Orderwire Options Settings For Voice Communications

Module	Settings
Backplane	Set S1 to BRIDGE Set S2 to IN Set S3 to IN.
41096	Set CTL LMT A strap, to IN position to prevent the ALL CHAN volume control knob from turning off the speaker. Set CTL LMT A strap, to OUT position to allow the ALL CHAN volume control knob to turn off the speaker. Set CTL LMT B strap, to IN position to prevent the CHAN SELECT volume control knob from turning off the speaker. Set CTL LMT B strap, to OUT position to allow the CHAN SELECT volume control knob to turn off the speaker.
46105	Set S1 (BRDG) switch, to TERM at the breakpoint (DSNE Office 0) Terminal site. Set S1 (BRDG) switch, to RPTR at all repeater and all other Terminal sites. Set S2 (LPBK 1) in OFF. Set S101 (LPBL 2) in OFF. Set the XMT CLK 1 and XMT CLK 2 straps in TERM. Set the RCV CLK 1 and RCV CLK 2 straps in TERM. Set the RCV DATA 1 and RCV DATA 2 2 straps in TERM. Set the M LEAD 1 and M LEAD 2 straps in YES. Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site. Set the MODE strap, set to RPTR at all Repeater and all other Terminal sites. Reinstall the module in the left slot in the top equipment shelf.
44020	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). 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. Reinstall the module in the left slot in the bottom equipment shelf.
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.

Table F-2 Dantel Orderwire Options Settings For Voice and Data Communications

Module	Settings
Backplane	Set S1 to BRIDGE Set S2 to OUT Set S3 to IN.
41096	Set CTL LMT A strap, to IN position to prevent the ALL CHAN volume control knob from turning off the speaker. Set CTL LMT A strap, to OUT position to allow the ALL CHAN volume control knob to turn off the speaker. Set CTL LMT B strap, to IN position to prevent the CHAN SELECT volume control knob from turning off the speaker. Set CTL LMT B strap, to OUT position to allow the CHAN SELECT volume control knob to turn off the speaker.
46105	Set S1 (BRDG) switch, to TERM at the breakpoint (DSNE Office 0) Terminal site. Set S1 (BRDG) switch, to RPTR at all Repeater and all other Terminal sites. Set S2 (LPBK 1) in OFF. Set S101 (LPBL 2) in OFF. Set the XMT CLK 1 and XMT CLK 2 straps in TERM. Set the RCV CLK 1 and RCV CLK 2 straps in TERM. Set the RCV DATA 1 and RCV DATA 2 straps in TERM. Set the M LEAD 1 and M LEAD 2 straps in YES. Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site. Set the MODE strap, set to RPTR at all Repeater and all other Terminal sites. Reinstall the module in the left slot in the top equipment shelf.
44202 202	Set the TEST, ALB, and DLB switches in the DOWN positions on faceplate. Set the 2W/4W switch to 4w. set the S5 dip switch as follows: S5-1, S5-3, and S5-4 ON. S5-2 and S5-5 OFF. Set the RCV GAIN strap to HIGH. Set the XMT GAIN strap to LOW. Set XMT and RCV straps to MASTER. Set 485TD, 422RTS, and 422TD straps to O (OUT). Reinstall the module in the middle slot in the top equipment shelf.
44020	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). 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. Reinstall the module in the left slot in the bottom equipment shelf.
44022	Set the 2W/4W switch to 4w Set the 0 OHM/600 OHM to 600 OHMs. Set the Remote Lead to OUT. 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.

Cabling to OLS

Basic cable information is given in Section 6, "Wired Cable Installation" of this document. This appendix provides information about connections at the Dantel Orderwire Shelf.

Table G-3 Gives Channel 1 wire connection information.

Table F-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 G-4 Gives Channel 2 wire connection information

Table F-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 G-3 diagrams the Dantel connector.

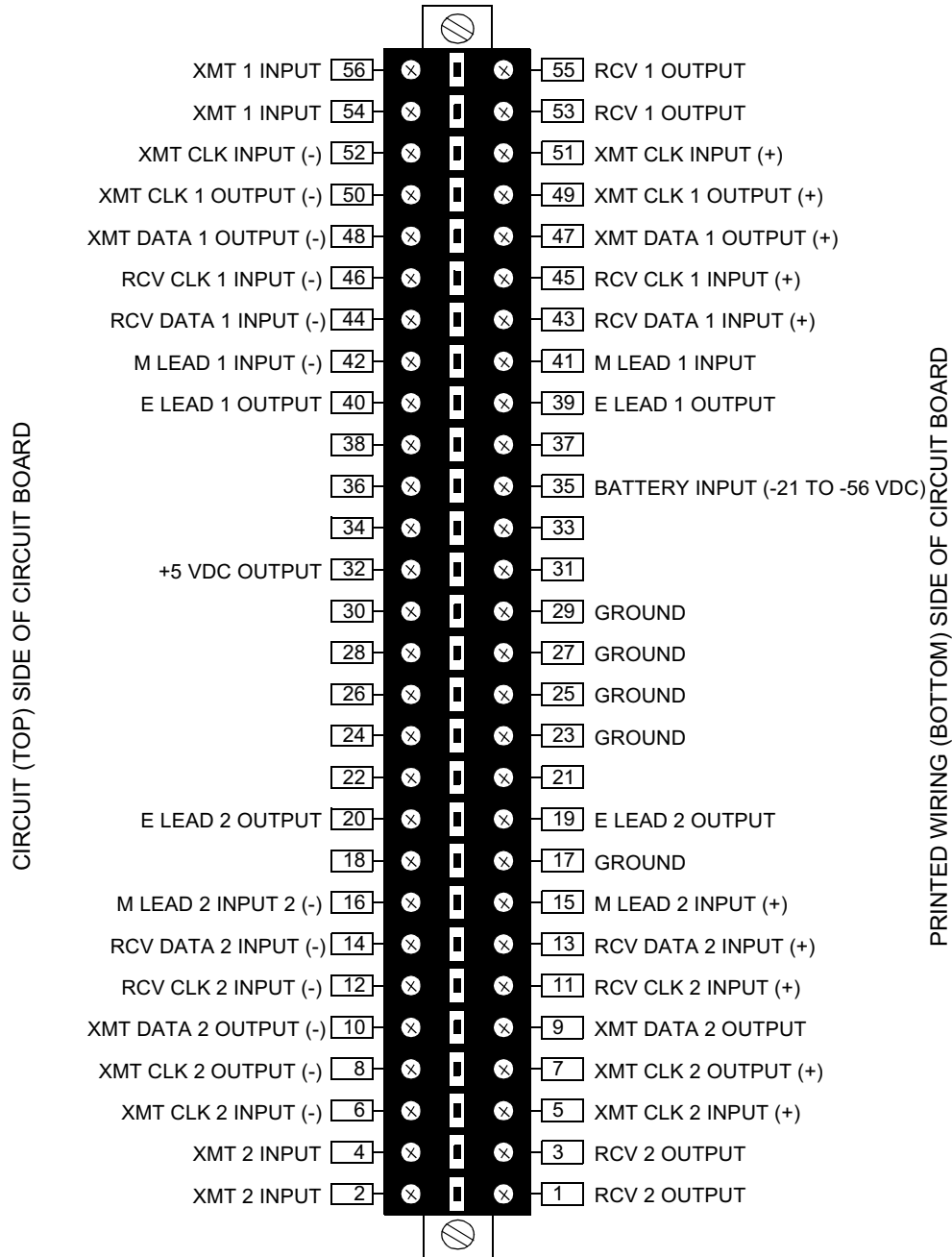


Figure F-3 View of 46105 Edge Connector from Backplane

Optical Protection Switch (OPS)

H

Overview

The Optical Protection Switch (OPS) is a specialized application of WaveStar™ OLS 40G and is the primary feature added for release 3.1. This Appendix describes the Platform used for the Optical Protection Switch, references other parts of this manual required for the installation, and details those items unique to installation and testing of the Optical Protection Switch. This allows the reader to focus upon this specialized application and disregard other platforms which are not applicable to the Optical Protection Switch feature.

Introduction

The Optical Protection Switch (OPS) provides 1 + 1 non-revertive optical protection switching for all sixteen wavelengths in point to point applications. The OPS provides protection against Optical Amplifier (OA) failures and fiber cuts where diversely routed fibers with the same or different spans (with a variation of not more than one span) are used. The OPS can be used in any WaveStar OLS 40G two fiber, two amplifier (transmit and receive) system application by utilizing the Dual Facing Shelf configuration. Single OA applications are not supported.

The OPS will perform uni-directional or bi-directional, non-revertive switching of all traffic regardless of wavelengths, bit rates and formats. When a line switch occurs, traffic is selected from the line in the standby state, causing this line to be defined as the new active line. The previous active line becomes the standby line. Since the switch has been defined as non-revertive, the switch will remain in its present state until a manual switch is performed by the craft or a Loss of Signal is detected, at which time a switch to standby may occur. The OPS will simultaneously monitor the signal on the standby and receive fibers, and will not switch to the standby line if Loss of Signal is detected on both lines.

Optical Protection Switch Circuit Packs

The Optical Protection Switch introduces three new circuit packs. They are:

- Optical Protection Switch (OPS) - LEP1 - One required for each end terminal. Circuit pack installed in Optical Translator bay.
- Self Powered Optical Demultiplexor Unit (SPODU) - BSY1- One required for each end terminal. Circuit pack installed in Optical Translator bay.
- Self Powered Optical Multiplexor Unit (SPOMU) - BSY2 - Only required for applications using 7x22 and 8x22dB. In these applications one unit is required for each end terminal. Circuit pack installed in Optical Translator bay.

Optical Protection Switch (OPS) - LEP1

The Optical Protection Switch (OPS) samples the incoming signals from both the active and standby lines and switches to the standby line if there is a detected Loss of Signal (LOS) on the active line and an available signal on the standby line. If a Loss of Signal (LOS) is detected on both lines, the switch will not switch to standby.

A schematic diagram of the switch is shown in Figure H-1. Since the active line can become the standby line and the standby the active due to non-revertive switching, the two lines are labelled Primary and Secondary lines on the schematic to provide a fixed identification.

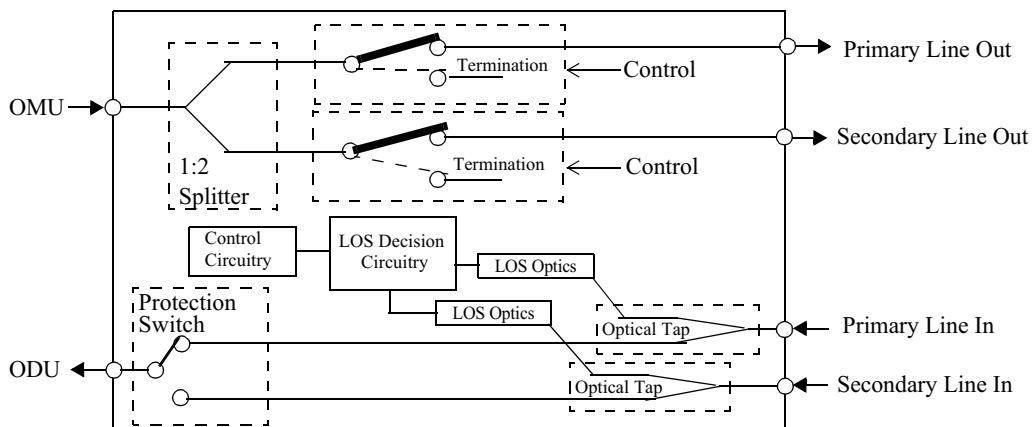


Figure H-1 OPS Circuit Pack Block Diagram

On the transmission side of the switch the signal enters from the OMU and is split evenly into two paths by an optical splitter. Each side passes through two normally closed switches and out to the Optical Amplifiers (OA) for the active and standby lines. The normally closed switches in the two transmit paths are used to cause bi-directional switching. If the OPS is programmed for bi-directional operation and the OPS starts to perform a protection switch, the normally closed switch carrying the active signal will open for four seconds causing the OPS at the far end to sense a LOS and to perform a switch. If the OPS is programmed for uni-directional operation, the normally closed switches on the transmit side remain closed during protection switching. The OPS may be provisioned for bi-directional or uni-directional operation, however, both switches at each end of the system must be provisioned the same.

On the receive side of the switch, both signals are monitored for LOS. The OPS will determine LOS in less than 10 ms. and will perform a switch from active to standby line provided that a signal is available on the standby line. The time between the fault occurrence and connection to the standby line will be less than 50 ms. not including the programmable hold-off time. Hold-off time defines the duration of the delay that will begin from the time LOS is initially declared to the time switching begins. Protection switching hold-off time is programmable from 0 to 3 seconds in 50 ms. intervals. The additional time provided by the hold-off time will allow for additional checking of the LOS and verification of a signal on the standby line. If the signal is restored during the hold-off time, the pending switch to the standby line will be cancelled. A time line diagram for the receive and transmit lines is shown in Figure H-2

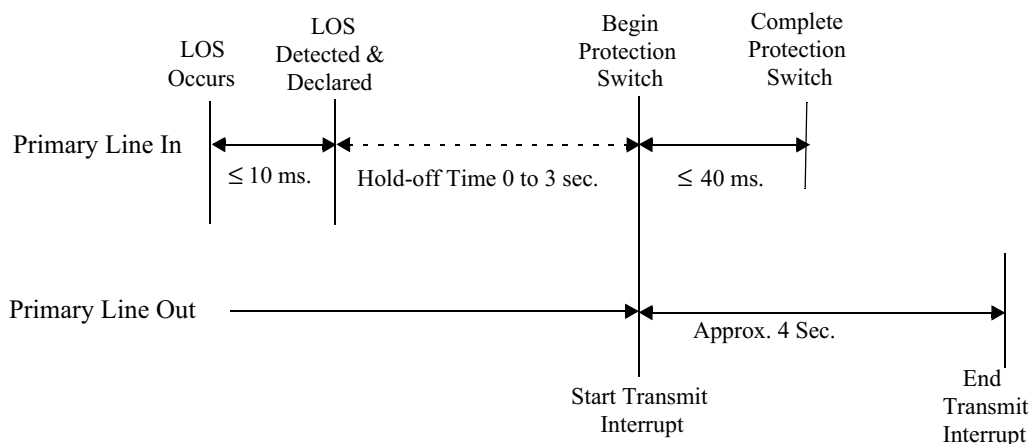


Figure H-2 OPS Timing Diagram

The OPS circuit pack (LEP1) is designed to mount in an Optical Translator Bay that is under integrated control from a WaveStar OLS 40G shelf. The OT Bay(s) System shelf will require an Optical Translator Controller (LUD1) mounted in its System Shelf and be cabled for control from the WaveStar OLS 40G shelf. The OPS circuit pack is the width of two OT slots and may be mounted in any OT shelf or slot. If a two OT bay configuration is being controlled by the , the OPS may be mounted in either bay at any slot location. The OPS circuit pack (LEP1) is shown in Figure H-3. The LEP1 comes equipped with an LED fault light on its faceplate. It will normally be off but will be ON for conditions described in Table H-1.

Table H-1. OPS LED Operation

Condition	OPS Fault Light
OPS Primary Line LOS	Flashing
OPS Secondary Line LOS	Flashing
Internal Defect	ON
Power Converter	ON
Fuse Failure	ON
Single Fuse Failure -48V Feeders	ON
Pack Reset	ON
Pack Insertion	ON

The six optical connections are made to the OPS (LEP1) using **LC** connectors. The connections are: Primary In, Primary Out, Secondary In, Secondary Out, From OMU, To ODU. These connector ports are shown in Figure H-3.

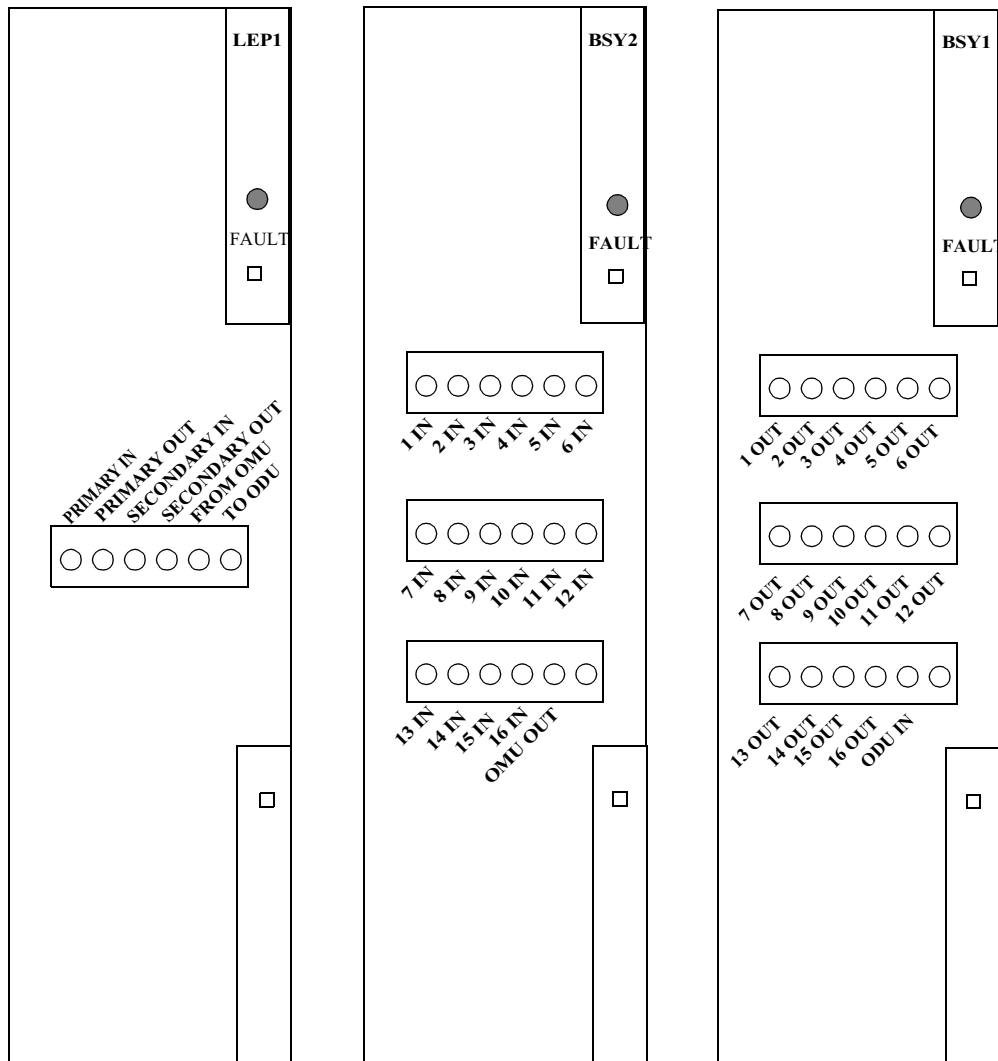


Figure H-3 OPS (LEP1), SMOMU (BSY2), & SMODU (BSY1) Circuit Packs

Self Powered Optical Demultiplexor Unit (SPODU) BSY1

When using the OPS, the standard 606A ODU is replaced by the BSY1 ODU. The BSY1 ODU is a 16 wavelength ODU that mounts in the OT bay rather than the WaveStar OLS 40G shelf. The BSY1 is self powered and not dependent upon an Optical Amplifier.

(OA) for its heater and alarm control. This allows for OA maintenance or changeout to be performed without effecting the ODU and disrupting service.

The SPODU (BSY1) circuit pack is the width of two OT slots and may be mounted in any OT shelf or slot under integrated control of the WaveStar OLS shelf using the LUD1 Optical Translator Controller. If a two bay OT configuration is being controlled by the, the SPODU may be mounted in either bay at any slot location. The SPODU circuit pack (BSY1) is shown in Figure H-3. The BSY1 comes equipped with an LED fault light on its faceplate. It will normally be off but will be ON for conditions described in Table H-2

Table H-2. SPODU (BSY1) & SPOMU (BSY2) LED Operation

Condition	OPS Fault Light
Internal Defect	ON
Power Converter	ON
Fuse Failure	ON
Single Fuse Failure -48V Feeders	ON
Pack Reset	ON
Pack Insertion	ON

The optical connections for the 16 wavelength outputs and the one ODU input are made using **LC** connectors. In order to allow for routing of these 17 fibers down through the retaining notches and into the horizontal fiber shelf, a new OT shelf design has been issued which has 24 retaining notches. A support tab in the middle of the horizontal fiber shelf has been modified to allow additional fiber space. When configuring a system for the Optical Protection Switch (OPS) the incoming fibers must be sized to reach the OT bay rather than the WaveStar OLS 40G bay.

Self powered Optical Multiplexor Unit (SPOMU) BSY2

The Self Powered Optical Multiplexor Unit (SPOMU) - BSY2 is only required with the Optical Protection Switch (OPS) when 7 or 8 spans of 22dB are used. All other systems will use the standard 506A 16 wavelength OMU. When required the SPOMU (BST2), which has lower loss, will replace the 506A OMU.

The SPOMU (BSY2) circuit pack is the width of two OT slots and may be mounted in any OT shelf or slot under integrated control of the WaveStar OLS 40G shelf using the LUD1 Optical Translator Controller. If a two bay OT configuration is being controlled by the WaveStar OLS 40G, the SPOMU may be mounted in either bay in any slot location. The SPOMU circuit pack (BSY2) is shown in Figure H-3. The BSY2 comes equipped with an LED fault light on its faceplate. It will normally be off but will be ON for conditions described in Table H-2.

The optical connections for the 16 wavelength inputs and the one OMU output are made using **LC** connectors. In order to allow for routing of these 17 fibers down through the retaining notches and into the horizontal fiber shelf, a new OT shelf design has been issued which has 24 retaining notches. A support tab in the middle of the horizontal fiber shelf has been modified to allow additional fiber space. The SPODU and SPOMU may be mounted in any slot, however, when mounting these units in the same shelf it is recommended that these units be installed either side of center. Fibers to these units can then be routed out the opposite sides of the bay eliminating overcrowding in the shelf fiber tray. When configuring a system for the Optical Protection Switch (OPS), the incoming fibers must be sized to reach the OT bay rather than the WaveStar OLS 40G bay.

Optical Protection Switch System Operation

The Optical Protection Switch (OPS) along with its associated SPODU and SPOMU circuit packs have been designed to work with the WaveStar OLS 40G and the OT when using release WaveStar OLS 40G 3.1 software. This combination provides the following system features:

- System may use one to sixteen wavelengths per line.
- System may use from one to eight spans per line where the number of spans on the Primary and Secondary lines may be equal or differ by one span if required for route diversity.
- Operation independent of tones used on the WaveStar OLS 40G system.
- Operation independent of signal formats and bit rates.

The OPS system has been designed to operate with following system requirements.

- The end terminals must be a Dual Facing Shelf Configuration.
- Single OA applications are not supported. Two OAs (transmit and receive) are required.
- Only applications using two fibers are supported.

System Diagram

Following the system requirements listed above, a system diagram of the Optical Protection Switch (OPS) incorporated with the WaveStar OLS 40G/OT system is shown in Figure H-4. An WaveStar OLS 40G Dual Facing Shelf configuration with an OPS and SPODU is at each end of the point to point system. The only options within the system are the number of spans in the Primary and Secondary Line and whether a standard OMU or SDOMU is to be used. Both optical multiplexors are shown with a dash line in the diagram to indicate this option. It should be noted that one is located in the WaveStar OLS 40G and the other in the OT cabinet. The diagram is drawn with equal spans in the

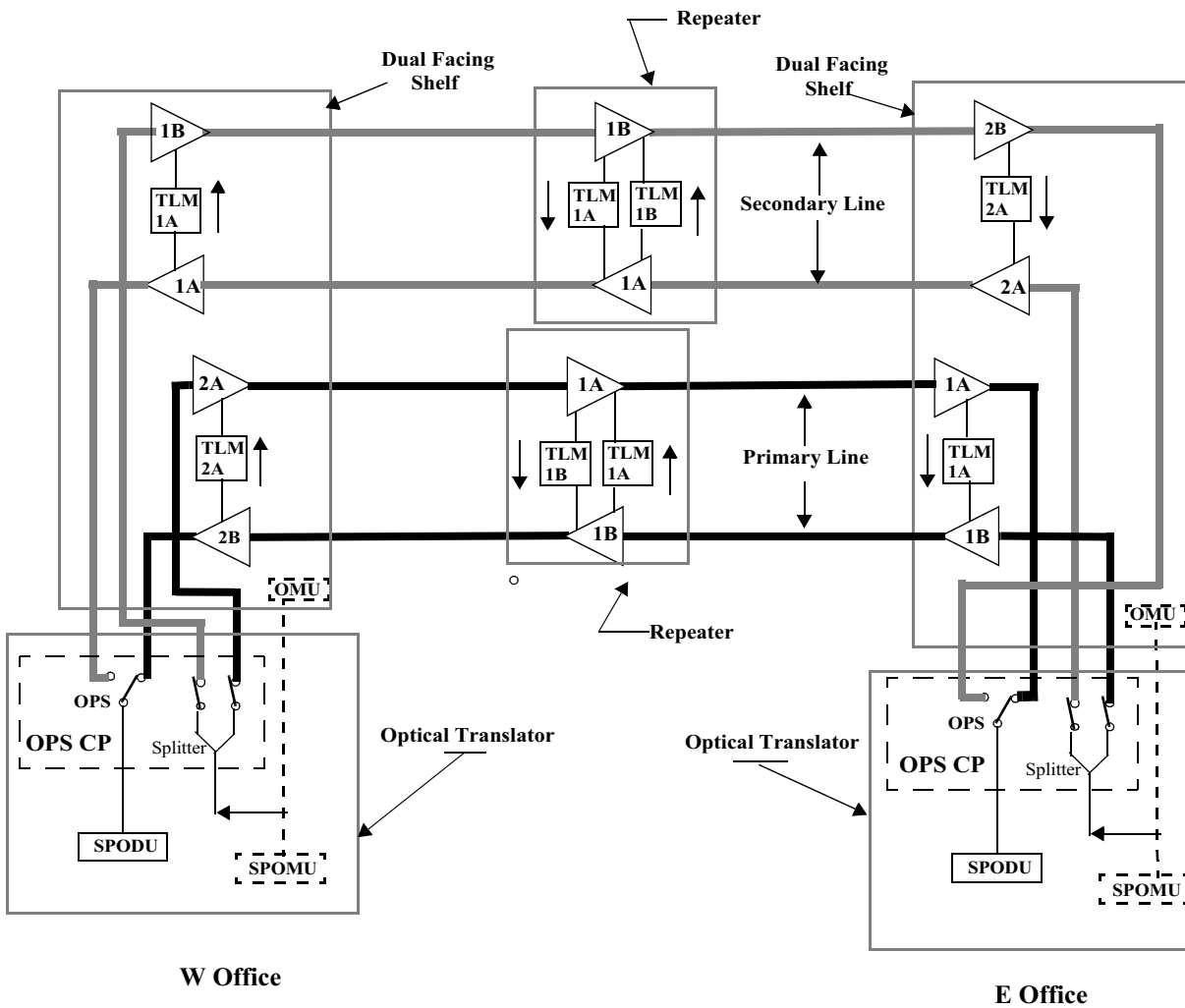


Figure H-4 OPS System Diagram

The system diagram will be essentially the same for all OPS systems and will be referred to for fiber installation and testing keeping component references consistent with those in the diagram.

System Installation

Installation of the OPS System can be accomplished by following the steps listed within this Appendix. Certain parts of the installation that are common to the OPS and other installations will be directed to other sections within this manual. Parts of the installation that are unique to the OPS installation will be provided within this Appendix.

Equipment Installation

The WaveStar OLS 40G and OT may be ordered mounted in a 5ESS-2000 Cabinet. Certain combinations of WaveStar OLS 40G and OT may be ordered factory mounted in an ED8C800 Type frame (refer to the WaveStar OLS 40G Applications, Planning, and Ordering Guide). The WaveStar OLS 40G and OT may be ordered as miscellaneous mounted shelves to be mounted in ED8C800 and ED8C801 type frames (mounting hole centers 22.312 inches). The miscellaneous mount WaveStar OLS 40G will mount in the ETSI 300mm Bay frame by removing the side mounting brackets and using the front flange for mounting. The OT miscellaneous mount shelves will mount in the ETSI 300mm Bay using the ETSI bracket mounting kit. Instructions for installing bays and mounting shelves is provided in Section 4 of this manual.

The OPS installation requires the cable or fiber length between the WaveStar OLS 40G and the OT which contains the OPS **not to exceed 100 feet**. The OT shelves must be the 848177887 OT Shelf Assembly Designation. This shelf can be easily identified by the 24 fiber retaining notches located at the bottom of the shelf versus the 12 retaining notches on the older shelf.

Power Cable Installation

The power cable installation for the OPS is identical to any other installation of WaveStar OLS 40G and OT. Refer to Section 5 in this manual and locate the system to be installed, WaveStar OLS 40G or OT, and type of equipment, cabinet, bay or miscellaneous shelf. Follow the power cable installation instructions for the specific system and type of equipment to be installed.

Wired Cable Installation

Section 6 provides instructions for wired cable installation. Since the OPS System has the OT under integrated control of the WaveStar OLS 40G shelf, the wiring of the External Miscellaneous Discrete Unit (EMDU) in section 6-G may be ignored. Conversely, since the OT is integrated with the e, some combination of the specified cables in section 6-H must be installed. The 200 hundred foot cable option is not allowed with the OPS switch. Install remaining cables in Section 6 as requested by the customer.

Circuit Pack and Fiber Installation

Before starting the circuit pack and fiber installation review the general instructions at the beginning of Section 7 and Section 7-A. The circuit pack location will be consistent with Figure H-4. Circuit packs are to be installed but not seated in their slots to determined fiber lengths and allow for the dressing and labelling of fibers.

OT - W Office

The OPS, SPODU, and SPOMU are to be mounted in any OT slot on any OT shelf. If a SPOMU is being used and it is mounted in the same shelf as the SPODU, each should be mounted on the opposite side of the shelf center with their fibers exiting opposite sides of the shelf. This will prevent overcrowding of the OT shelf fiber tray.

Install but do not seat these circuit packs into the OT

WaveStar OLS 40G Dual Facing Shelf - W Office

The OPS System utilizes an WaveStar OLS 40G Dual Facing Shelf at each end of the point to point path. The End Terminals may be with or without an OMU depending whether a SPOMU has been installed. The installation of a SPOMU negates the need for an OMU. Figure H-5 shows the location of circuit packs for the **W Office** WaveStar OLS 40G Dual Facing Shelf as it relates to the System Diagram in Figure H-4.

Install but do not seat circuit packs in the W Office WaveStar OLS 40G.

NOTE:

The 7 dB LBO that usually is installed at the output of the receive amplifier has been has been purposely left unchanged due to the OPS added loss of 3.4 dB. The outputs of OA's 1A and 2B are to be equipped with 0 dB LBOs at the outputs.

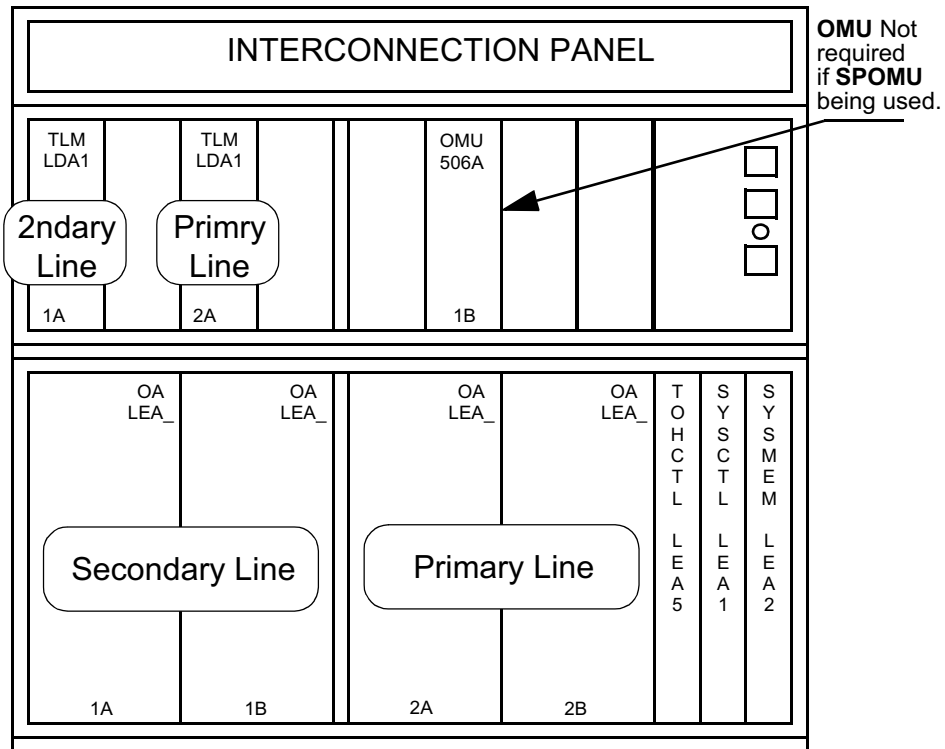


Figure H-5 W Office Dual Facing Shelf Circuit Pack Locations

Fiber Installation - General Requirements

Fiber Installation at each end office location has been divided into four procedures:

- WaveStar OLS 40G/OT Intra-connecting Fiber Jumper Installation
- WaveStar OLS 40G/OT Optical Multiplexor and Demultiplexor Fiber Jumper Installation.
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation

Fiber Protection

Using the blue fiber protection tubing supplied in the installation kit, protect the fibers that run down through the sides of the cabinet. Refer to Figure 7-2 on page 7-9 and Figure 7-3 on page 7-10.

Fiber Dressing

All fiber jumpers (except WaveStar OLS 40G OMU) should dress from their circuit pack or unit connectors down through the notches immediately below the connectors at the bottom edge of the shelf then horizontally along the shelf trough to the appropriate side as shown in Figure H-6 and H-7.

Fiber jumpers for the WaveStar OLS 40G OMU inputs outputs should dress up through the clips located at the top of the units then horizontally out of the shelf as shown in Figure 7-3 and Figure H-7.

NOTE:

The fibers should be placed through the clips one at a time to avoid overstressing the clips.

Fiber Installation - W Office

WaveStar OLS 40G/OT Intra-connecting Fiber Jumper Installation - W Office

Ten (10) fiber jumpers are required for the WaveStar OLS 40G/OT intra-connections. Four (4) of the fiber jumpers need to be 50 inches long for connections within the WaveStar OLS 40G shelf. These four fibers are available in WaveStar OLS 40G List 161 for Systems with ST connectors or may be ordered individually. A description of WaveStar OLS 40G fiber lists and other individual fibers is provided in Section 7-A of this manual. The remaining six (6) fibers require LC to ST fibers with their length dependent upon the distance between the WaveStar OLS 40G and the OT shelves. This fiber length can not exceed 100 feet. Using Table H-1 label the fibers at each end. Route and connect fibers per Figure H-6.

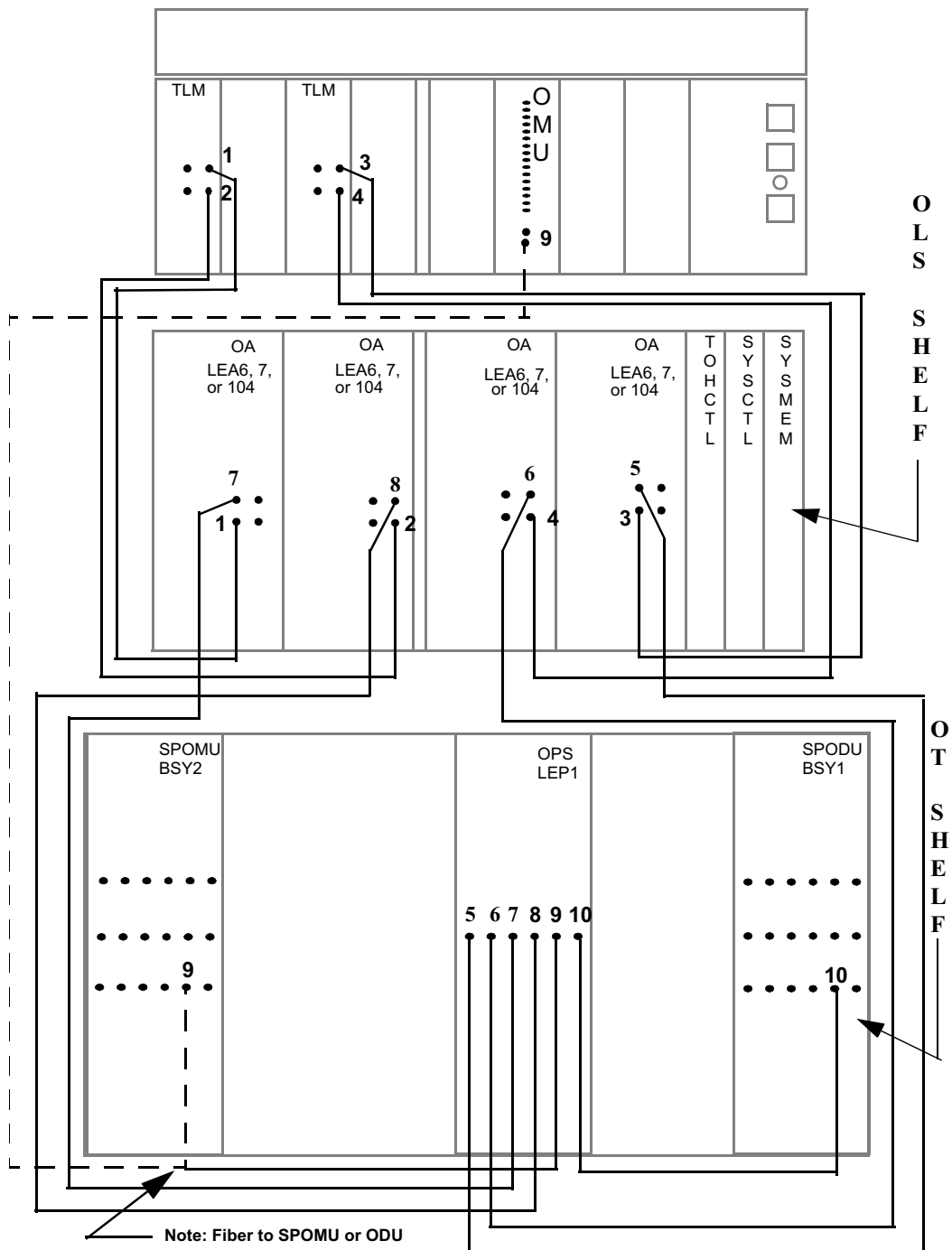


Figure H-6 WaveStar OLS 40G/OT W Office Intra-connecting Fiber

Table H-1 Intra-connecting Fiber Jumpers - WaveStar OLS 40G/OT W Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal W - Office Dual Facing Shelf Refer to Figure H-6 for connection point	S e c o n d a r y	1	TLM 1A	IN	1A-TLM-IN
		1	OA-1A	TLM OUT	1A-OA-TLMOUT
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		7	OA-1A	OUT	1A-OA-OUT
		7	OPS	SECONDARY IN	OPS-SECY-IN
		8	OA-1B	IN	1B-OA-IN
		8	OPS	SECONDARY OUT	OPS-SECY-OUT
	P r i m a r y	3	TLM 2A	IN	2A-TLM-IN
		3	OA 2B	TLM OUT	2B-OA-TLMOUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLMIN
		5	OA 2B	OUT	2B-OA-OUT
		5	OPS	PRIMARY IN	OPS-PRI-IN
		6	OA-2A	IN	2A-OA-IN
		6	OPS	PRIMARY OUT	OPS-PRI-OUT
	C o m m n	9	SPOMU or OMU	SPOMU OUT or OMU OUT	OMU OUT or 1-OMU-OUT
		9	OPS	FROM OMU	FROM OMU
		10	SPODU	ODU IN	ODU IN
		10	OPS	TO ODU	TO ODU

NOTE:

If preprinted labels are not available for the OPS, SPODU, and SPOMU circuit packs, print label description on blank labels from pre-printed label sheets.

WaveStar OLS 40G/OT Optical Multiplexor and Demultiplexor Fiber Jumper Installation - W Office

Install fiber jumpers that connect from the SPODU, SPOMU or WaveStar OLS 40G OMU to the Optical Translators or other optical equipment by applying labels then routing fibers per Figure H-7, Table H-2 and Figure 7-3,. Refer to Section 7-K for information with regard to routing and labeling fibers to the OTUs in the Optical Translator.

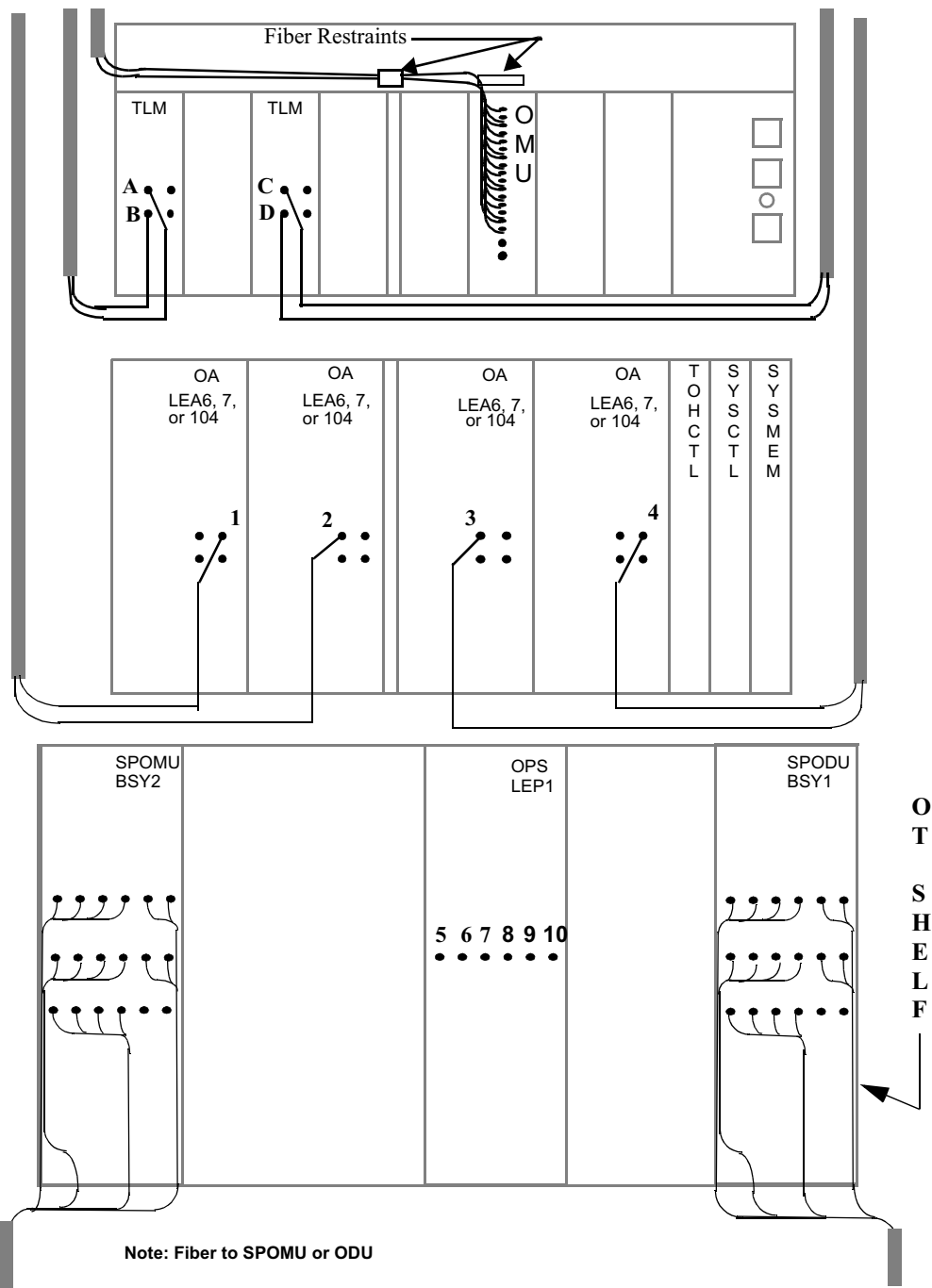


Figure H-7 WaveStar OLS 40G/OT W & E Office Multiplexor, Demultiplexor, Outside Plant, & Customer Maintenance Signal Fiber

**Table H-2 WaveStar OLS 40G/OT Optical Multiplexor and Demultiplexor
Fiber Jumpers - W & E - Offices**

Application	Circuit Pack	Connector	Label to Install For Lower Shelf
End Terminal Regard to OMU and SPOMUS: Only one to be installed. OMU 1B installed in Shelf. SPOMU installed in OT Shelf. SPODU installed in OT Shelf. Refer to Figure H-7 for connection points.	OMU 1B or SPOMU	1 IN	UPPER 1M1
	OMU 1B or SPOMU	2 IN	UPPER 1M2
	OMU 1B or SPOMU	3 IN	UPPER 1M3
	OMU 1B or SPOMU	4 IN	UPPER 1M4
	OMU 1B or SPOMU	5 IN	UPPER 1M5
	OMU 1B or SPOMU	6 IN	UPPER 1M6
	OMU 1B or SPOMU	7 IN	UPPER 1M7
	OMU 1B or SPOMU	8 IN	UPPER 1M8
	OMU 1B or SPOMU	9 IN	UPPER 1M9
	OMU 1B or SPOMU	10 IN	UPPER 1M10
	OMU 1B or SPOMU	11 IN	UPPER 1M11
	OMU 1B or SPOMU	12 IN	UPPER 1M12
	OMU 1B or SPOMU	13 IN	UPPER 1M13
	OMU 1B or SPOMU	14 IN	UPPER 1M14
	OMU 1B or SPOMU	15 IN	UPPER 1M15
	OMU 1B or SPOMU	16 IN	UPPER 1M16
	SPODU	1 OUT	UPPER 1D1
	SPODU	2 OUT	UPPER 1D2
	SPODU	3 OUT	UPPER 1D3
	SPODU	4 OUT	UPPER 1D4
	SPODU	5 OUT	UPPER 1D5
	SPODU	6 OUT	UPPER 1D6
	SPODU	7 OUT	UPPER 1D7
	SPODU	8 OUT	UPPER 1D8
	SPODU	9 OUT	UPPER 1D9
	SPODU	10 OUT	UPPER 1D10
	SPODU	11 OUT	UPPER 1D11
	SPODU	12 OUT	UPPER 1D12
	SPODU	13 OUT	UPPER 1D13
	SPODU	14 OUT	UPPER 1D14
	SPODU	15 OUT	UPPER 1D15
	SPODU	16 OUT	UPPER 1D16

Outside Plant Fiber Jumper Installation to LGX - W Office

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels then routing the fibers by referring to Figure H-7 and Table H-3.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table H-3 Outside Plant LGX to OA Fiber Jumpers - W Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Dual Facing Shelf - W Office Refer to Figure H-7 for connection point	2ndary	1	OA-1A	IN	1A-OA-IN
		2	OA-1B	OUT	1B-OA-OUT
	Primary	3	2A-OA	OUT	2A-OA-OUT
		4	2B-OA	IN	2B-OA-IN

Customer Maintenance Signal Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels then routing the fibers by referring to Figure H-7 and Table H-4.

Table H-4 Customer Maintenance Fiber Jumpers - W Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Dual Facing Shelf W - Office Refer to Figure H-7 for connection points	2ndary	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
	Primary	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

WaveStar OLS 40G Dual Facing Shelf - E Office

At the other end of the OPS System the **E Office** is very similar to having an WaveStar OLS 40G Dual Facing Shelf. Again the E Office end terminal may be with or without an OMU depending whether a SPOMU has been installed. The installation of a SPOMU negates the need for an OMU. The Optical Amplifier (OA) codes have not been specified since they would be a function of the number of spans and the distance of the span. Figure H-8 shows the location of circuit packs for the **E Office** WaveStar OLS 40G Dual Facing Shelf as it relates to the System Diagram in Figure H-4.

Install but do not seat circuit packs in the **E Office** WaveStar OLS 40G.

NOTE:

The 7 dB LBO that usually is installed at the output of the receive amplifier has been purposely left unchanged due to the OPS added loss of 3.4 dB. The outputs of OA's 1A and 2B are to be equipped with 0 dB LBOs at the outputs.

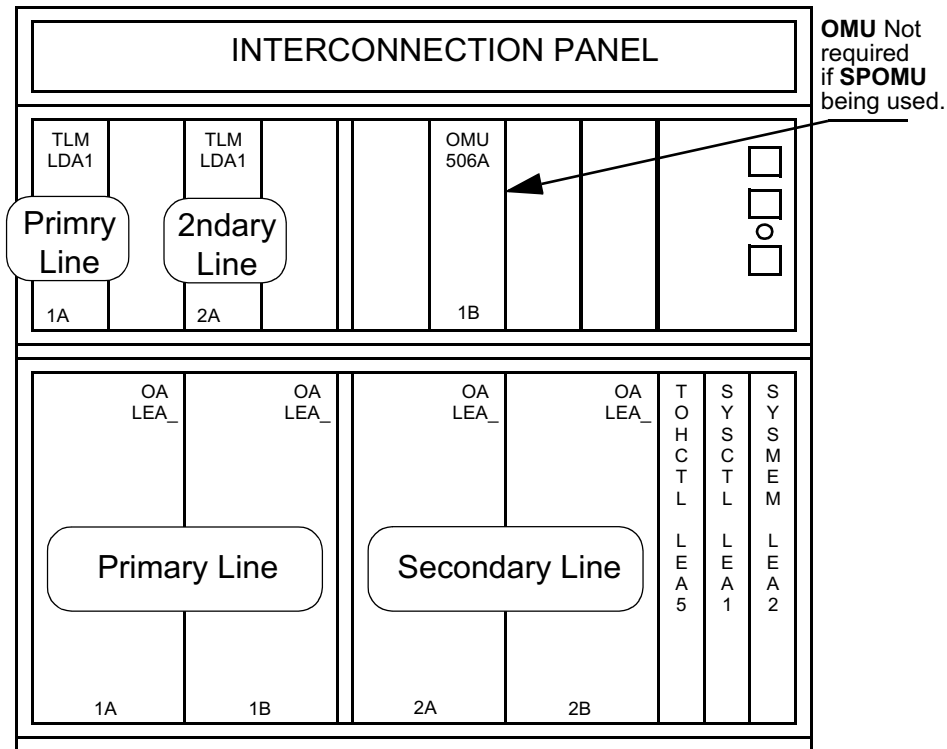


Figure H-8 E Office Dual Facing Shelf Circuit Pack Locations

Fiber Installation - W Office

WaveStar OLS 40G/OT Intra-connecting Fiber Jumper Installation - E Office

Ten (10) fiber jumpers are required for the WaveStar OLS 40G/OT intra-connections. Four (4) of the fiber jumpers need to be 50 inches long for connections within the WaveStar OLS 40G shelf. These four fibers are available in WaveStar OLS 40G List 161 for Systems with ST connectors or may be ordered individually. A description of fiber lists and other individual fibers is provided in Section 7-A of this manual. The remaining six (6) fibers require LC to ST fibers with their length dependent upon the distance between the WaveStar OLS 40G and the OT shelves. This fiber length can not exceed 100 feet. Using Table H-5 label the fibers at each end. Route and connect fibers per Figure H-9.

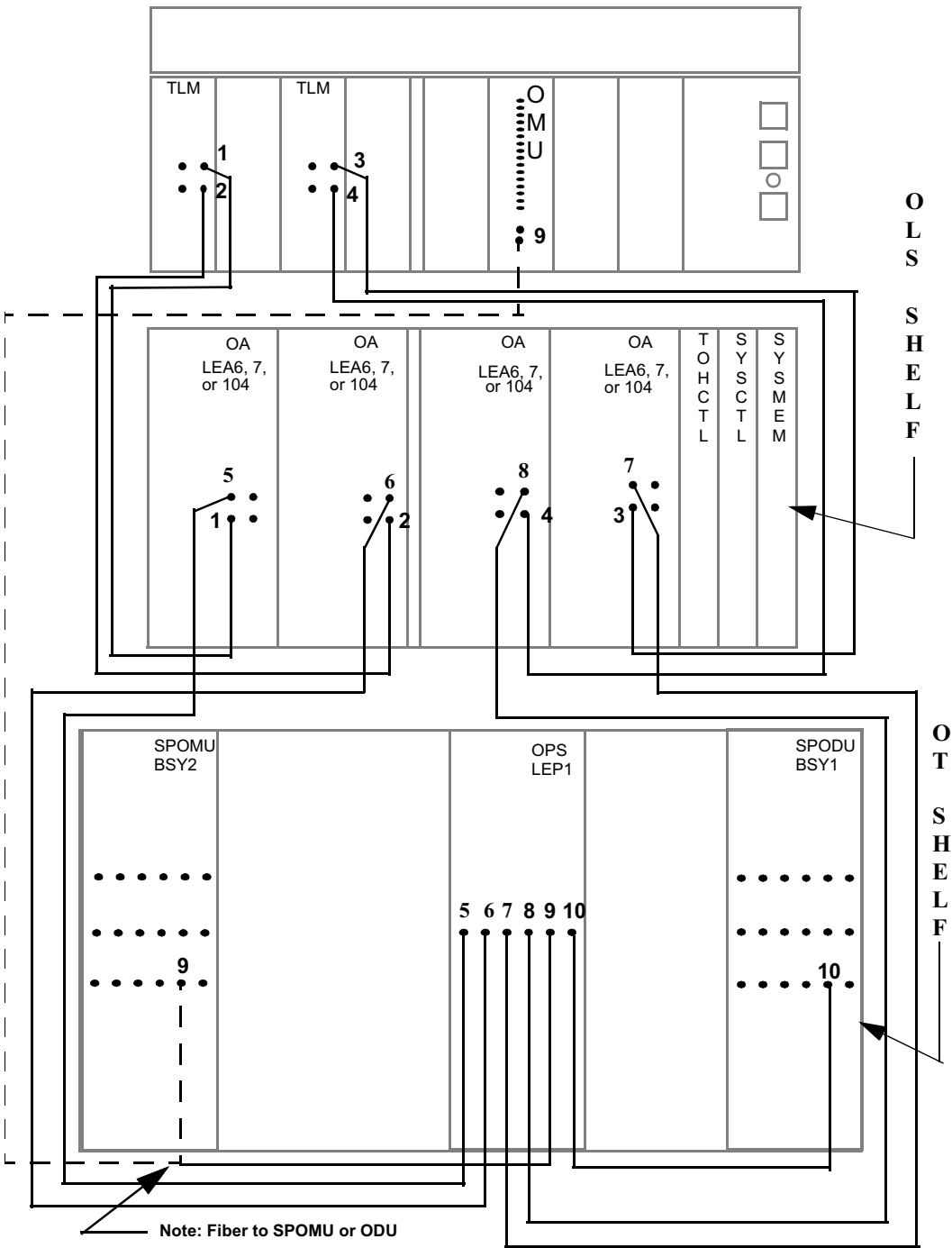


Figure H-9 WaveStar OLS 40G/OT E Office Intra-connecting Fiber

Table H-5 Intra-connecting Fiber Jumpers For WaveStar OLS 40G/OT E Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal W - Office Dual Facing Shelf Refer to Figure H-6 for connection point	S e c o n d a r y	1	TLM 1A	IN	1A-TLM-IN
		1	OA-1A	TLM OUT	1A-OA-TLMOUT
		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
		7	OA-2B	OUT	2B-OA-OUT
		7	OPS	SECONDARY IN	OPS-SECY-IN
		8	OA-2A	IN	2A-OA-IN
		8	OPS	SECONDARY OUT	OPS-SECY-OUT
	P r i m a r y	3	TLM 2A	IN	2A-TLM-IN
		3	OA 2B	TLM OUT	2B-OA-TLMOUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLMIN
		5	OA 1A	OUT	1A-OA-OUT
		5	OPS	PRIMARY IN	OPS-PRI-IN
		6	OA-1B	IN	1B-OA-IN
		6	OPS	PRIMARY OUT	OPS-PRI-OUT
	C o m m n	9	SPOMU or OMU	SPOMU OUT or OMU OUT	SPOMU OUT or 1-OMU-OUT
		9	OPS	FROM OMU	FROM OMU
		10	SPODU	ODU IN	ODU IN
		10	OPS	TO ODU	TO ODU

NOTE:

If preprinted labels are not available for the OPS, SPODU, and SPOMU circuit packs, print label description on blank labels from pre-printed label sheets.

WaveStar OLS 40G/OT Optical Multiplexor and Demultiplexor Fiber Jumper Installation - E Office

Install fiber jumpers that connect from the SPODU, SPOMU or WaveStar OLS 40G OMU to the Optical Translators or other optical equipment by applying labels then routing fibers per Figure H-7, Table H-2 and Figure 7-3,. Refer to Section 7-K for information with regard to routing and labeling fibers to the OTUs in the Optical Translator.

Outside Plant Fiber Jumper Installation to LGX - E Office

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels then routing the fibers by referring to Figure H-7 and Table H-6.



CAUTION:

Do not connect either end to the fiber jumper at this time.

Table H-6 Outside Plant LGX to OA Fiber Jumpers - E Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Dual Facing Shelf - W Office Refer to Figure H-7 for connection point	Primary	1	OA-1A	IN	1A-OA-IN
		2	OA-1B	OUT	1B-OA-OUT
	2ndary	3	2A-OA	OUT	2A-OA-OUT
		4	2B-OA	IN	2B-OA-IN

Customer Maintenance Signal Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels then routing the fibers by referring to Figure H-7 and Table H-7.

Table H-7 Customer Maintenance Fiber Jumpers - E Office

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Dual Facing Shelf W - Office Refer to Figure H-7 for connection points	Primary	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
	2ndary	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

WaveStar OLS 40G Repeaters

The location of the Repeater circuit packs will be identical for both the Primary and Secondary lines and any additional spans (refer to Figure H-4). The installed circuit packs are shown in Figure H-10.

Install but do not seat circuit packs in WaveStar OLS 40G Repeater Bay.

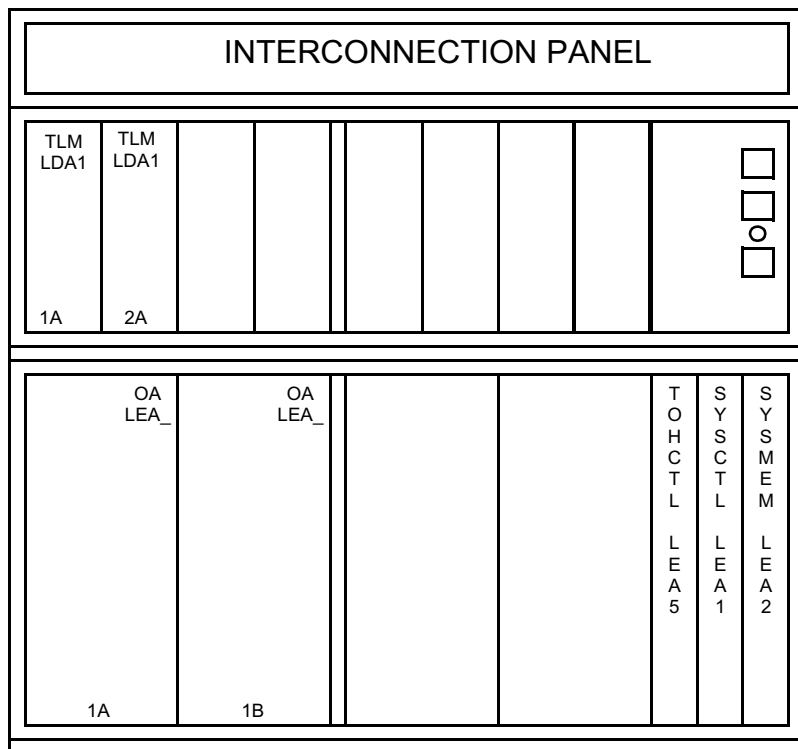


Figure H-10 Repeater Circuit Locations

Fiber Installation - Primary & Secondary Line Repeater Sites

Fiber installation will be identical for Primary and Secondary Line Repeaters. Repeater bay installations will be divided into three (3) procedures.

- Intrashelf Fiber Jumper Installation
- Outside Plant Fiber Jumper Installation to LGX
- Customer Maintenance Signal Fiber Jumper Installation

Intrashelf Fiber Jumper Installation - Repeater

Install the 4 fiber jumpers (50 inches long) per List 161 for each line by adding the labels then routing the fibers and referring to Figure H-11 and Table H-8. The fibers must pass in front of the shelf bracket to the right of the TLM slots. The fibers should be dressed behind the shelf mounting brackets

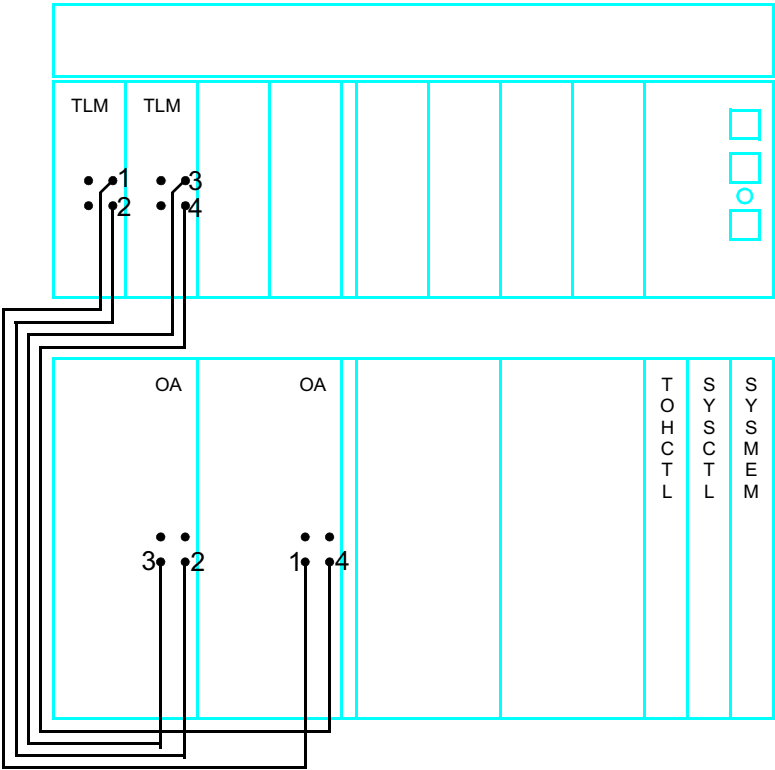


Figure H-11 Repeater Intrashelf Fiber Jumpers

Table H-8 Intrashelf Fiber Jumpers For Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure H-11 for connection point	1	1	TLM 1A/B	IN	1A-TLM-IN
		1	OA 1B	TLM OUT	1B-OA-TLMOUT
		2	TLM 1A/B	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLMIN
		3	TLM 1B/A	IN	1B-TLM-IN
		3	OA 1A	TLM OUT	1A-OA-TLMOUT
		4	TLM 1B/A	OUT	1B-TLM-OUT
		4	OA 1B	TLM IN	1B-OA-TLMIN

Outside Plant LGX Fiber Jumper - Repeaters

Install the fiber jumpers from the WaveStar OLS 40G to the outside plant LGX for each line by adding the labels then routing the fibers by referring to Figure H-11 and H-9.



CAUTION:

Do not connect either end to the fiber jumper at this time

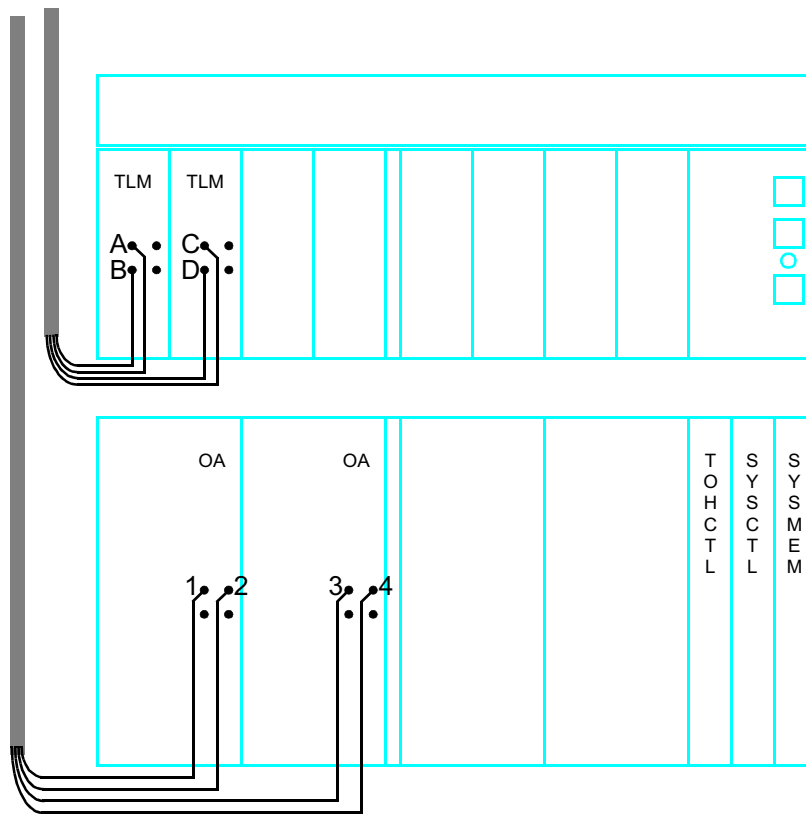


Figure H-12 Repeater Outside Plant & Customer Maintenance Fiber Jumpers

Table H-9 Outside Plant LGX Fiber Jumpers For Repeaters

Application	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure H-12 for connection point	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

Customer Maintenance Signal Fiber Jumper Installation

If equipped, install the fiber jumpers from the WaveStar OLS 40G to any equipped customer maintenance facility or LGX by adding the labels and routing the fibers. Refer to Figure H-12 and Table H-10.

Table H-10 Customer Maintenance Fiber Jumpers For Repeaters

Application	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure H-12 for connection point	A	TLM 1A/B	CM IN	1A-TLM-CMIN
	B	TLM 1A/B	CM OUT	1A-TLM-CMOUT
	C	TLM 1B/A	CM IN	1B-TLM-CMIN
	D	TLM 1B/A	CM OUT	1B-TLM-CMOUT

Powering

The WaveStar OLS 40G and OT Cabinets or miscellaneous mount shelves used for the Optical Protection Switch are powered in the same manner as any other WaveStar OLS 40G and OT system. Refer to Section 8 and follow the instructions for powering.

WaveStar OLS 40G/OT Network Element Start UP and Provisioning

Section 9 of this manual provides instructions for the Network Element Start Up and Provisioning. **Follow these instructions in Section 9 substituting 3.1 for 3.0 for the following steps:**

- Setup PC for installation of CenterLink software.
- Install WaveStar OLS 40G 3.1 CenterLink Software to the PC which will include the network element software
- Seat the LEA2 SYSMEM and LEA1 SYSCTL.
- Install 3.1 software to the Network Element.
- Connect to the Network Element and login.
- Install TOHCTL.
- Insert OA and TLM circuit packs for the WaveStar OLS 40G.
- With the WaveStar OLS 40G terminal being equipped for OPS it may have one OMU in slot 1B if the SPOMU is not being used. The remaining slots in the shelf will remain empty.
Install the OMU in slot 1B if SPOMU not being used.
- Enter the basic network element provisioning as described using the command SECURITY.Enter.System.
As part of this procedure the OA pump power setting, A, B, or C must be entered. Use the charts in Chapter 9 to determine the setting based upon the number of spans. **Both the Primary and Secondary pump powers must be set equal. For systems where the number of spans in the Primary and Secondary lines are not equal, the pump power setting A, B, or C will be determined by the line with the most spans.**
- Enable the far end communications and set the date and time.
- When checking alarms, alarms stating ODU or OMU mismatch will come up due to missing ODUs and OMU(s) from the shelf. These will alarms will go away once the OPS switch has been enabled.

OPS Local Installation Testing

Since the procedure for Local Installation Testing of the OPS System is different than the WaveStar OLS 40G/OT testing, the local testing procedure for the OPS end terminals will be specified in this Appendix.

General Considerations



CAUTION:

Installation Auto Turnup tests are performed only out of service. If these tests are performed in service, service will be interrupted.



WARNING:

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

Note the following before starting installation Auto Turnup tests:

- Disconnect the office alarm cable from the WaveStar OLS 40G and/or OT before performing any tests. Reconnect the office alarm cable after completing testing.
- This procedure requires that the SYSCTL and the SYSMEM circuit packs have software installed. Additionally, all circuit packs must be installed, with their FAULT LEDs off, except the OAs which have flashing LEDs. Software Installation and Circuit Pack Insertion procedures are in Section 9, "Network Element Start Up and Provisioning".
- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress.

Tools, Test Sets and Accessories

The following equipment is required for performing installation tests at end terminal, repeater or OT offices:

Table H-11 Local Installation Test Equipment

Equipment	# for End Term.	# for Repeater	# 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 (see Note below)	2	4	1

Table H-11 Local Installation Test Equipment

Equipment	# for End Term.	# for Repeater	# for OT
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 ^a			1
OC-3/STM-1 and/or OC-12/STM-4 optical signal source or test set			1

a. 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.

Testing Setup Procedure

Perform the following steps to connect the CMC computer to the WaveStar OLS 40G.

⇒ NOTE:

The detailed CMC connection and login procedure is given in "WaveStar OLS 40G Login Procedure Overview" in Appendix F.

- (1) Log back into the Network Element in **expert** mode as described in Section 9 if not currently logged in.

LED Tests

LED Test Description

The LED test verifies proper operation of LEDs in the WaveStar OLS 40G and OT. Proper LED operation is necessary to assist in trouble isolation. If failed LEDs are indicated (they do not light), replace the circuit pack or module they are in. Only the PWR ON green LEDs are in sockets. Repeat the test 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. This test to be performed for end terminals and repeaters

With the LUD1 (OTCTL) OT controller pack installed, exercising the LED test at the WaveStar OLS 40G will also perform the LED test simultaneously on the OT.

LED Test Procedure

Perform the following steps to test the LEDs on the WaveStar OLS 40G and OT:

- (1) Seat but do not fiber OT circuit packs into slots.
- (2) Select **FAULT.Test.LED**, enter **2** in the **Repeat Value box** and hit enter.

Requirement: Observe that all LEDs light for 10 seconds, then turn off for 10 seconds. The 20 second sequence repeats, then LEDs revert to their initial state. Repeat the test if necessary until operation of all LEDs has been verified.

Auto Turnup Local

Auto Turnup (local) Test Description

This test verifies the customer maintenance signal (CMS) connections on the TLM packs and verifies the supervisory (SUPR) signal path through the TLM and OA units and the intrashelf jumpers. The test may take up to 5 minutes to complete. A more detailed description of the test is given in Chapter 13.

If failed slots are indicated, replace the circuit pack. Repeat the test until all lines pass the test. If the line is not fully equipped, move circuit packs into unequipped lines and repeat the test. If many different circuit packs fail in the same slot, there may be a wiring problem on the shelf. If so, contact your next level of support. Also, since an optical loopback is required, this test verifies proper operation of the jumpers to the LGX.

Auto Turnup Local CMS Test Procedure

Perform the following steps for Auto Turnup Local CMS test:

- (1) Verify there are no fiber connections to the OA input and output connectors at the LGX panel.
- (2) Install OPS, SPODU, and SPOMU or OMU in their slots. **NOTE:** The Auto turnup tests may be run at this time without the OPS, SPODU, SPOMU or OMU at this time. However, if available it is recommended they be installed.
- (3) Enable the OPSRMD (OPS Provision Mode) by entering CONFIGURATION.Enter.OPS command and providing the following provisioning data (See Figure H-13).

Hold off time: Set to 0.

Protection Mode: Set to bidirectional

Primary Line: Set to 2 for W Office - 1 for E Office

OPS_AID: enter "otu - bay number - otu slot number".

SPODU_AID: enter "otu - bay number - otu slot number".

OMU_AID: enter ou-1b if in WaveStar OLS 40G otherwise enter "otu - bay number - otu slot"

OPS Provisioned Mode: Set to enable

(See Figure H-14 for entered values).

Enter command by clicking on Enter button.

The screenshot shows the NE Command Manager interface within a Microsoft Internet Explorer window titled "SNOWMASS2 - Microsoft Internet Explorer". The browser address bar shows "CenterLink Management Console". The main title is "NE Command Manager" with the Lucent Technologies logo. On the left is a navigation pane with a tree view containing folders like FAULT, CONFIGURATION, PERFORMANCE, SECURITY, and ADVANCED. The CONFIGURATION folder is expanded, showing sub-items like Copy, Delete, Edit, Enter, Association, Customer_Mainte, OPS, OT_Port_Signal, Optical_Channel, Section_Trace, Supervisory, Initialize, and Retrieve. The OPS item is selected. The main content area displays the "CONFIGURATION.Enter.OPS" form. The form has a table with the following fields:

CONFIGURATION.Enter.OPS	
TID (Target Identifier)	SNOWMASS2
hold off time	0
Protection Mode	☐ unidirectional ☒ bidirectional
Primary Line	☒ 1 ☐ 2
OPS_AID (Access Identifier)	
SPODU_AID (Access Identifier)	
OMU_AID (Access Identifier)	
OPS Provisioned Mode	☒ enabled ☐ disabled

Below the form, there is a caution message: "CAUTION: Execution of this command may affect service." and a note: "NOTE: System Initialization (phase=3) is required to activate OPS Operating Mode changes made by execution of this command." At the bottom of the form are three buttons: "Enter", "Clear", and "Help".

Figure H-13 CONFIGURATION.Enter.OPS Command

The screenshot shows the NE Command Manager interface within a Microsoft Internet Explorer browser window. The title bar reads "SNOWMASS2 - Microsoft Internet Explorer". The browser address bar shows "Back | Forward | Close" and "CenterLink Management Console". The main title is "NE Command Manager" with the Lucent Technologies logo. On the left is a tree view with categories: SECURITY, ADVANCED, and a list of commands including Association, Customer_Maintenance, OPS, OT_Port_Signal, Optical_Channel, Section_Trace, Supervisory, Initialize, and Retrieve. The "OPS" command is selected. The main area displays the "CONFIGURATION.Enter.OPS" form. The form fields are: TID (Target Identifier) set to "SNOWMASS2"; hold off time set to "0"; Protection Mode with radio buttons for "unidirectional" and "bidirectional" (selected); Primary Line with radio buttons for "1" and "2" (selected); OPS_AID (Access Identifier) set to "DTU" and "1" and "3"; SPODU_AID (Access Identifier) set to "DTU" and "1" and "5"; OMU_AID (Access Identifier) set to "OU-18"; and OPS Provisioned Mode with radio buttons for "enabled" (selected) and "disabled". Below the form is a "CAUTION: Execution of this command may affect service." message and a "NOTE: System Initialization (phase=3) is required to activate OPS Operating Mode changes made by execution of this command." At the bottom are "Enter", "Clear", and "Help" buttons.

CONFIGURATION.Enter.OPS	
TID (Target Identifier)	SNOWMASS2
hold off time	0
Protection Mode	☐ unidirectional ☒ bidirectional
Primary Line	☐ 1 ☒ 2
OPS_AID (Access Identifier)	DTU 1 3
SPODU_AID (Access Identifier)	DTU 1 5
OMU_AID (Access Identifier)	OU-18
OPS Provisioned Mode	☒ enabled ☐ disabled

CAUTION: Execution of this command may affect service.

NOTE: System Initialization (phase=3) is required to activate OPS Operating Mode changes made by execution of this command.

Enter Clear Help

Figure H-14 CONFIGURATION.Enter.OPS Command after data entry

- (4) Perform CONFIGURATION.Initialize.System with phase=3. This will cause the OPSOPMD (OPS Operation Mode) to go from disabled to enabled. The status of the switch may be reviewed by entering the command CONFIGURATION.Retrieve.OPS command (refer to Figure H-15).

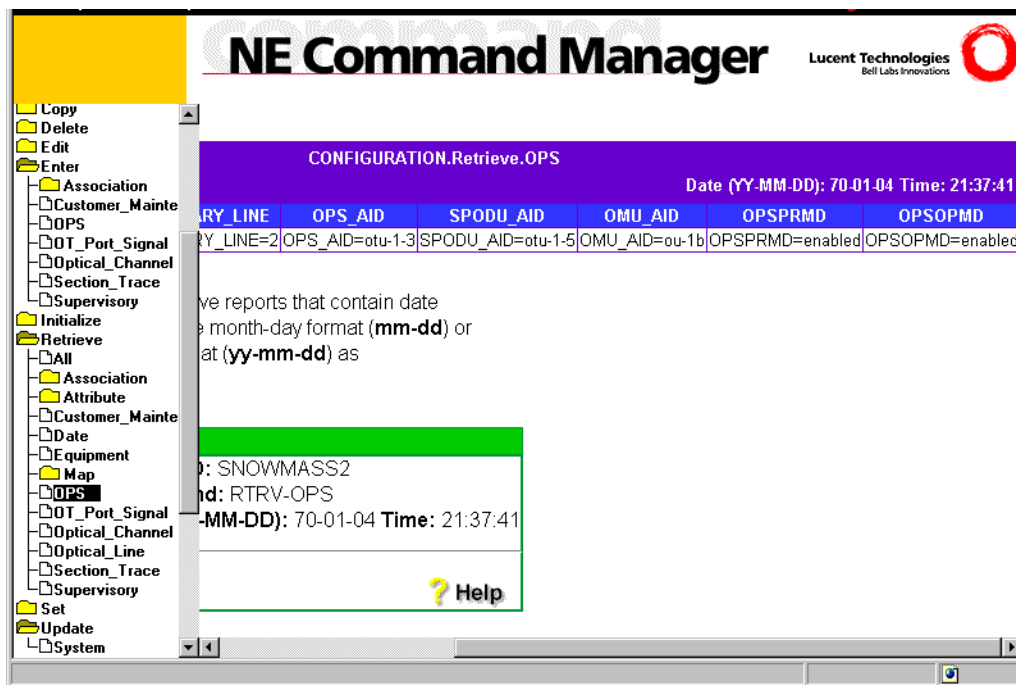


Figure H-15 CONFIGURATION.Retrieve.OPS Command

- (5) Loop the customer maintenance signal connectors (CM IN to CM OUT) using **multimode** fiber jumpers. (These are usually colored grey or orange.)

For End Terminals, loop both lines as shown in Figure H-16.

For Repeaters, loop both telemetry packs as shown in Figure H-17.

- (6) Execute CONFIGURATION.UPDATE.SYSTEM.
- (7) Select the command FAULT.Test.Auto.Local. In the box provided, enter the command CMS-ALL. This test will take up to 5 minutes, depending on how many lines are equipped. Login in expert mode if the command is not found.

Requirement: Results will be displayed on the CMC screen. Good slots will report as Good. Failed slots will report as Fail. A "-" represents an untested slot (not equipped). If any slot fails, move its circuit pack to a known good slot and retest. If the failure moves with the pack, it indicates a bad pack. If the slot fails when equipped with a known good circuit pack, it indicates a possible back-plane problem. Contact your next level of support.

- (8) Remove optical CMS loopback cables.

(9) Execute CONFIGURATION.UPDATE.SYSTEM.

Requirement: The command clears CMS loss of signal alarms.

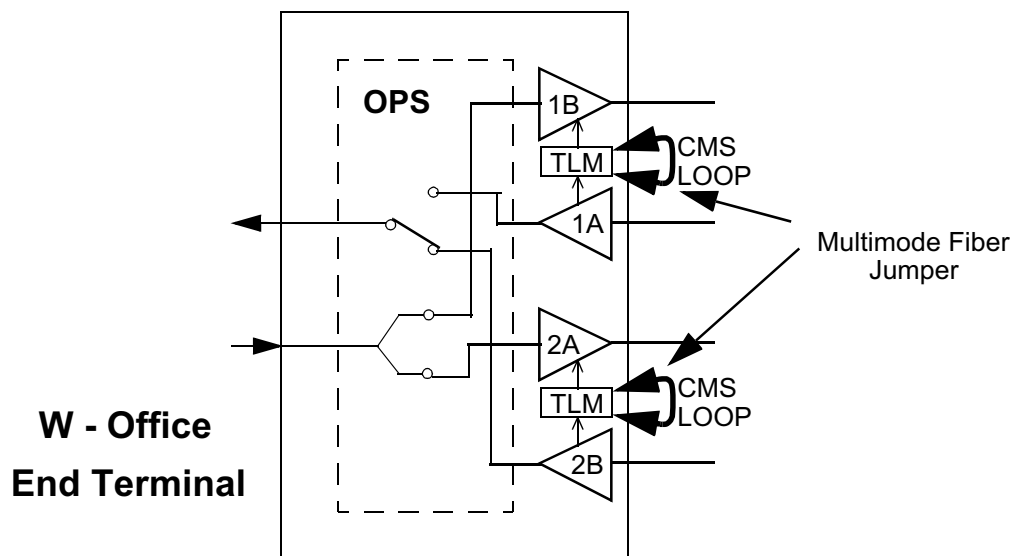


Figure H-16 Auto-Turnup-Local CMS Connections - W Office

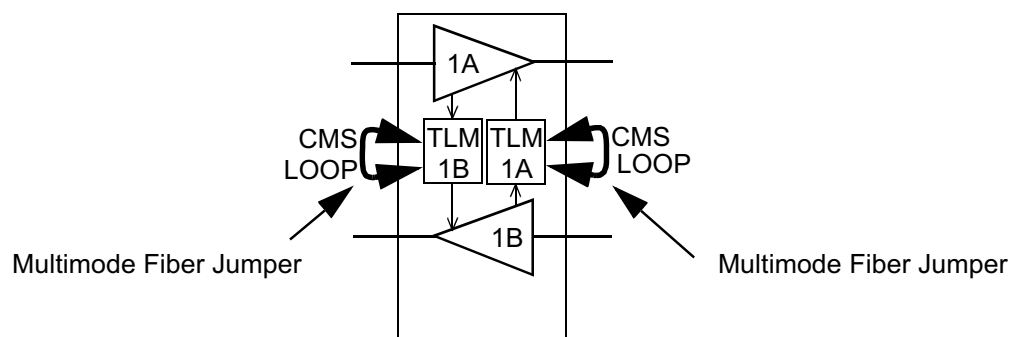


Figure H-17 Auto-Turnup-Local CMS Connections for Repeaters

Auto Turnup Local SUPR Test Procedure - End Terminals

For Repeater Installations, proceed to "Auto Turnup Local SUPR Test Procedure - Repeaters" on page H-37.



CAUTION:

To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105) or the fiber jumpers themselves, connect the fiber jumpers to the "IN" and "OUT" ports with these transmission packs **unseated**; then latch them into the shelf.

Perform the following steps for Auto Turnup Local SUPR test:

- (1) Loop back the Primary Line high speed signal as follows:
 - a. Connect OA OUT of the transmitting OA to OA IN of the receiving OA through 33 dB of attenuation as shown in Figure H-18.
- (2) Loop back the Secondary Line high speed signal as follows:
 - a. Connect OA OUT of the transmitting OA to OA IN of the receiving OA through 33 dB of attenuation as shown in Figure H-18.
- (3) Verify the customer maintenance signal connectors (CM IN/CM OUT) are not looped.
- (4) Execute CONFIGURATION.Update.

Requirement: The command clears loss of signal alarms. FAULT LEDs on all OAs are off and are not flashing.
- (5) Execute FAULT.Test.Auto.Local. Enter SUPR-All in the box provided. This test will take up to 5 minutes, depending on how many lines are equipped (typically less than 1 minute).

Requirement: Results will be displayed on the CMC screen. A good slot will report Good. A failed slot will report FAIL. A "-" represents an untested slot (no circuit pack equipped). If any slot fails, move it's circuit pack to a good slot and verify the test again. Replace the circuit pack in the failed slot if indicated that the failure moves with the pack.
- (6) Remove the 33 dB loopback cables.
- (7) Execute CONFIGURATION.Update.

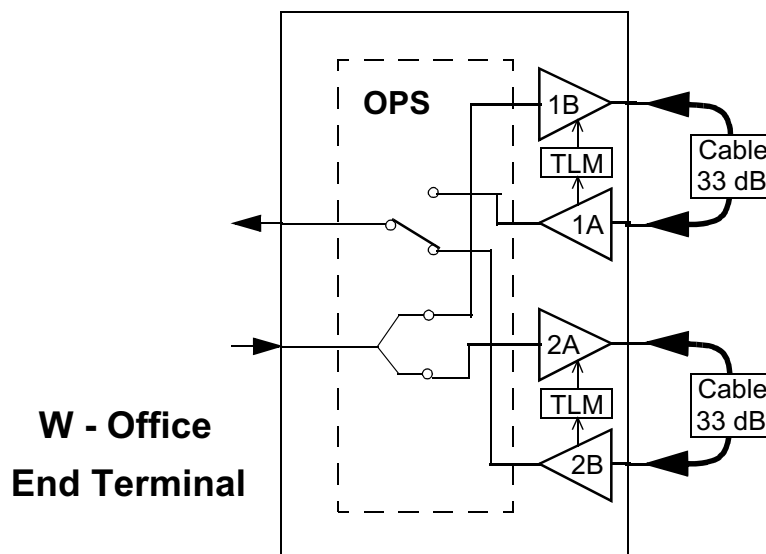


Figure H-18 Auto-Turnup-Local SUPR Connections W - Office

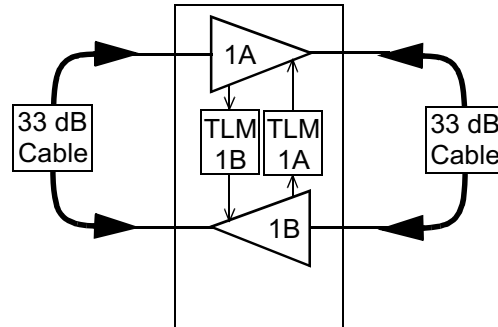


Figure H-19 Auto-Turnup-Local SUPR Connections for Repeaters

Auto Turnup Local SUPR Test Procedure - Repeaters

Perform the following steps for Auto Turnup Local SUPR test:



CAUTION:

To prevent potential damage to the Optical Amplifiers (LEA6, LEA7, LEA104, or LEA105) or the fiber jumpers themselves, connect the fiber jumpers to the “IN” and “OUT” ports with these transmission packs **unseated**; then latch them into the shelf.

- (1) Loop back the high speed signals by connecting the OA 1A output to the OA 1B input through 33 dB of attenuation and the OA 1B output to the OA 1A input through 33 dB of attenuation as shown in Figure H-19.
- (2) Verify the customer maintenance signal connectors are not looped.
- (3) Execute CONFIGURATION.Update.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both OAs are off and are not flashing.

- (4) Execute FAULT.Test.Auto.Local. Enter SUPR-ALL in the provided box and click on enter. This test will take up to 5 minutes, depending on how many lines are equipped.

Requirement: Results will be displayed on the CMC screen. A GOOD represents a good slot. A FAIL represents a failed slot. A "-" represents an untested slot (no circuit pack equipped). If any slot fails, move its circuit pack to a good slot and verify the test again. Replace the circuit pack in the failed slot if indicated that the failure moves with the pack.

- (5) Remove optical loopback cables.
- (6) Execute CONFIGURATION.Update.

Local Operational Tests

Return to Section 10 for information with regard to Local Operational Tests. Follow test instructions through to OT Miscellaneous Discrete Tests. The OT Miscellaneous Discrete Tests which follow are not applicable to WaveStar OLS 40G 3.1 and the OPS Configuration. Bypass these tests and proceed to Final Testing of OTU Circuit Packs.

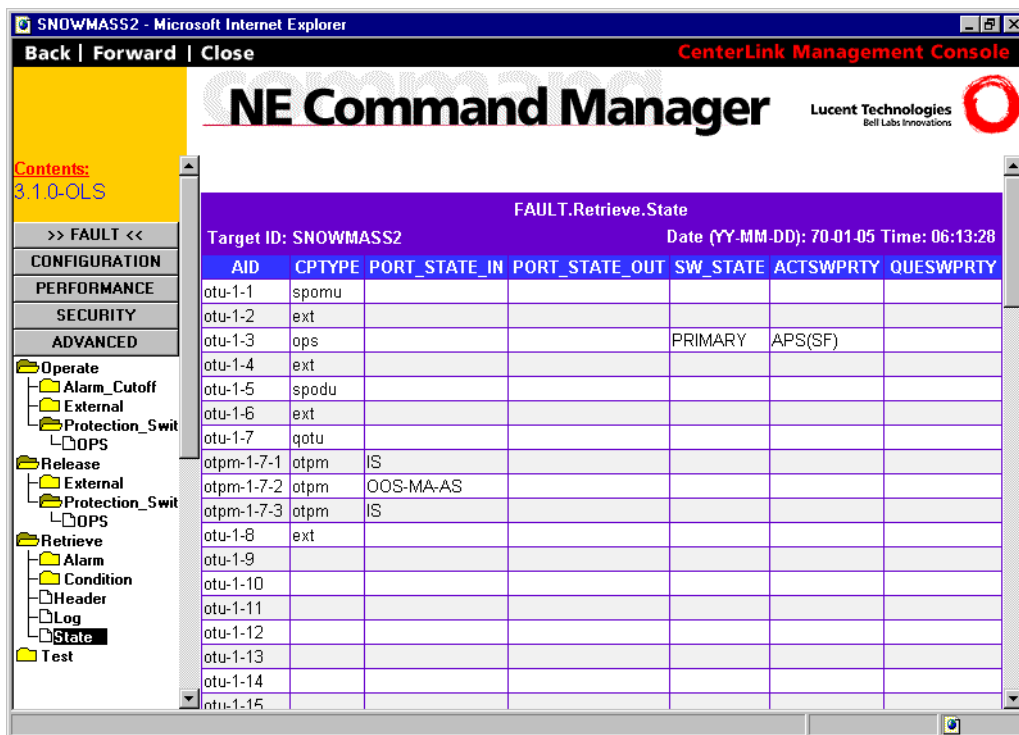
Operation of OPS

To verify operation of the Optical Protection Switch (OPS) at this time, a forced switch of the OPS will be performed. Prior to causing the switch to take place, the position the switch will be verified using the command `FAULT.Retrieve.State` with `OTU=All`. The status of the switch will be either `PRIMARY` or `SECONDARY`. An example of the `FAULT.Retrieve.State` command is shown in Figure H-20 where the status of the OPS is shown as switched to the Primary Line.

⇒ NOTE:

The following tests may effect service and should be performed out of service.

To cause a forced switch the OPS must have the OPSOPMD enabled. If it is disabled refer back to previous instructions to enable the OPSOPMD. Perform the `FAULT.Retrieve.State` command and record the state of the switch.



The screenshot shows the NE Command Manager interface in a Microsoft Internet Explorer window. The title bar reads "SNOWMASS2 - Microsoft Internet Explorer". The browser address bar shows "Back | Forward | Close" and "CenterLink Management Console". The main title is "NE Command Manager" with the Lucent Technologies logo. The left sidebar contains a "Contents" menu with "3.1.0-OLS" selected. Below it are buttons for ">> FAULT <<", "CONFIGURATION", "PERFORMANCE", "SECURITY", and "ADVANCED". The "ADVANCED" section is expanded, showing a tree view with "Operate", "Release", "Retrieve", and "Test". The "Retrieve" section is expanded, showing "Alarm", "Condition", "Header", "Log", and "State". The "State" option is selected. The main content area displays the results of the `FAULT.Retrieve.State` command. The title bar of the results window is "FAULT.Retrieve.State". The target ID is "SNOWMASS2" and the date/time is "70-01-05 Time: 06:13:28". The results are presented in a table with the following columns: AID, CPTYPE, PORT_STATE_IN, PORT_STATE_OUT, SW_STATE, ACTSWPRTY, and QUESWPRTY. The table contains 15 rows of data, with the first row showing "otu-1-1" and "spomu". The "SW_STATE" column for "otu-1-3" is "PRIMARY".

AID	CPTYPE	PORT_STATE_IN	PORT_STATE_OUT	SW_STATE	ACTSWPRTY	QUESWPRTY
otu-1-1	spomu					
otu-1-2	ext					
otu-1-3	ops			PRIMARY	APS(SF)	
otu-1-4	ext					
otu-1-5	spodu					
otu-1-6	ext					
otu-1-7	qotu					
otpm-1-7-1	otpm	IS				
otpm-1-7-2	otpm	OOS-MA-AS				
otpm-1-7-3	otpm	IS				
otu-1-8	ext					
otu-1-9						
otu-1-10						
otu-1-11						
otu-1-12						
otu-1-13						
otu-1-14						
otu-1-15						

Figure H-20 `FAULT.Retrieve.State` Command Showing State of Switch.

To cause a forced switch to take place, enter the command `FAULT.Operate.Protection_Switch.OPS`. The Command Manager window for this command requires the location of the OPS to be entered and the switch command to be selected from the drop down menu. Figure H-21 shows the command window with fields of entry completed. Enter the switch location and select FRCD TO. Then enter the command.

Figure H-21 FAULT.Operate.Protection_Switch.OPS Command.

Enter the command `FAULT.Retrieve.State, OTU=ALL`.

Requirement: The state of the switch must be opposite its previous state prior to entering the forced switch command.

Perform the `FAULT.Operate.Protection_Switch.OPS` once again to force the switch back to its initial position. Verify that the switch has taken place and that its back to its original state using the command `FAULT.Retrieve.State, OTU=ALL`.

Primary & Secondary Line Equalization

The end terminals and repeaters have been tested as individual network elements. The OPS System shown in Figure H-4 is now ready to be interconnected. For the system to operate properly the Primary and Secondary lines must be equalized and the OA input levels must be set using LBOs. This procedure will start from one end terminal and proceed to the other end terminal equalizing the levels of adjacent spans by setting the input levels to the OAs. In order to describe this process an example will be provided along with diagrams that will highlight the procedure.

Span Equalization Procedure

Equalization of the system must be performed using an OC48/STM-16 signal at any one of the 16 channels. Perform the following steps to equalize the spans.

- (1) Start the testing at one of the end terminals by applying an OC48/STM-16 signal to the input of an Optical Translator and fiber the OT output to the OMU or SPOMU. Fiber the output of the SPOMU or OMU to the input of the OPS.
- (2) Proceed from the end terminal to the first repeater site on the Primary Line. If starting from an end terminal office where the transmitting amplifier is a 2A amplifier unseat the 1A amplifier at the repeater site and remove the input fiber. If starting from an end terminal office where the transmitting amplifier is a 1B amplifier unseat the 1B amplifier at the repeater site and remove the input fiber (refer to Figure H-4). NOTE: Do not remove fibers from OAs unless pack is first unseated. Verify that the proper amplifier has been selected since both amplifiers will have "light" on their input fibers. One having the signal and the other having white noise which will not be discernible with a standard optical power meter.
- (3) Clean the removed fiber and take an optical power measurement. Record the power level as $PwrLINE_{Primary\ 1}$.
- (4) Select the proper LBO for the Optical Amplifier input using the Smart Manual. Refer to Chapter 11 for details in using the Smart Manual for LBO selections. When using the Smart Manual, use the System Type such as A, B, or C as was previously entered in this Appendix under the title *WaveStar OLS 40G/OT Network Element Start Up and Provisioning*. When entering the number of spans, enter the number of spans that are in the Primary Line. Record the LBO value as $LBO_{Primary\ 1}$. If the LBO value is other than zero, remove the zero dB LBO from the OA input and replace it with the calculated LBO value. NOTE: The color of the LBO used for this equalization procedure must be GREEN. Refer to Appendix I for properties of LBOs.

- (5) Calculate the power to the OA input as follows:

$$\text{PwrOA}_{\text{Primary 1}} = (\text{PwrLINE}_{\text{Primary 1}}) - (\text{LBO}_{\text{Primary 1}}).$$
 Record these values. Clean fiber previously removed and connect it to input of the OA.
 Reseat the OA.
- (6) Proceed to the first repeater site from the same end terminal for the Secondary Line. If starting from an end terminal office where the transmitting amplifier is a 2A amplifier unseat the 1A amplifier at the repeater site and remove the input fiber. If starting from an end terminal office where the transmitting amplifier is a 1B amplifier unseat the 1B amplifier at the repeater site and remove the input fiber (refer to Figure H-4). NOTE: Do not remove fibers from OAs unless pack is first unseated. Verify that the proper amplifier has been selected since both amplifiers will have "light" on their input fibers. One having the signal and the other having white noise which will not be discernible with a standard optical power meter.
- (7) Clean the removed fiber and take an optical power measurement. Record the power level as $\text{PwrLINE}_{\text{Secondary 1}}$.
- (8) Select the proper LBO for the Optical Amplifier input using the Smart Manual. Refer to Chapter 11 for details in using the Smart Manual for LBO selections. When using the Smart Manual, use the System Type such as A, B, or C as was previously entered in this Appendix under the title *WaveStar OLS 40G/OT Network Element Start Up and Provisioning*.
 When entering the number of spans, enter the number of spans that are in the Secondary Line.
 Record the LBO value ($\text{LBO}_{\text{Secondary 1}}$). If the LBO value is other than zero, remove the zero dB LBO from the OA input and replace it with the calculated LBO value.
- (9) Calculate the power to the OA input as follows:

$$\text{PwrOA}_{\text{Secondary 1}} = (\text{PwrLINE}_{\text{Secondary 1}}) - (\text{LBO}_{\text{Secondary 1}}).$$
 Record these values. Clean fiber previously removed and connect it to input of the OA.
 Reseat the OA.
- (10) Calculate the absolute value of the difference between the two PwrOA power levels. Perform the calculation as follows:

$$\Delta \text{Pwr} = |(\text{PwrOA}_{\text{Primary 1}}) - (\text{PwrOA}_{\text{Secondary 1}})|$$

If ΔPwr is less than 2.5 dB, no further action is required.

If ΔPwr is greater than or equal to 2.5 dB, the span with the higher power will be required to have its attenuation increased by increasing the LBO value for that span. Refer to Table H-12 to determine the proper replacement LBO. Replace the previously installed LBO with the replacement LBO. If the Primary Line has the higher power level, this will require a return to the Primary Line repeater site.

Table H-12. Replacement LBO values for Span Equalization

Smart Manual LBO Value (dB) for Line with Highest Measured Power	Δ Pwr (dB)	Use this LBO Value (dB) Instead of Value from Column 1 to Equalize the Spans.
0	2.6-4.5	3
0	4.6-6.5	5
0	6.6-8.5	7
0	8.6-9.0	7.5
0	9.1-11.5	10
3	2.6-3.5	5
3	3.6-5.5	7
3	5.6-6.0	7.5
3	6.1-8.5	10
3	8.6-11.5	13
5	2.6-3.5	7
5	3.6-5.5	7.5
5	5.6-6.0	10
5	6.1-8.5	13
5	8.6-11.5	15
7	2.6-4.5	10
7	4.6-7.5	13
7	7.6-9.5	15
7	9.6-12.5	18
7.5	2.6-4.0	10
7.5	4.1-7.0	13
7.5	7.1-9.0	15
7.5	9.1-12.0	18
10	2.6-4.5	13
10	4.6-6.5	15
10	6.6-9.5	18
10	9.6-11.5	20
13	2.6-3.5	15
13	3.6-6.5	18
13	6.6-8.5	20
15	2.6-4.5	18
15	4.6-6.5	20
18	2.6-3.5	20

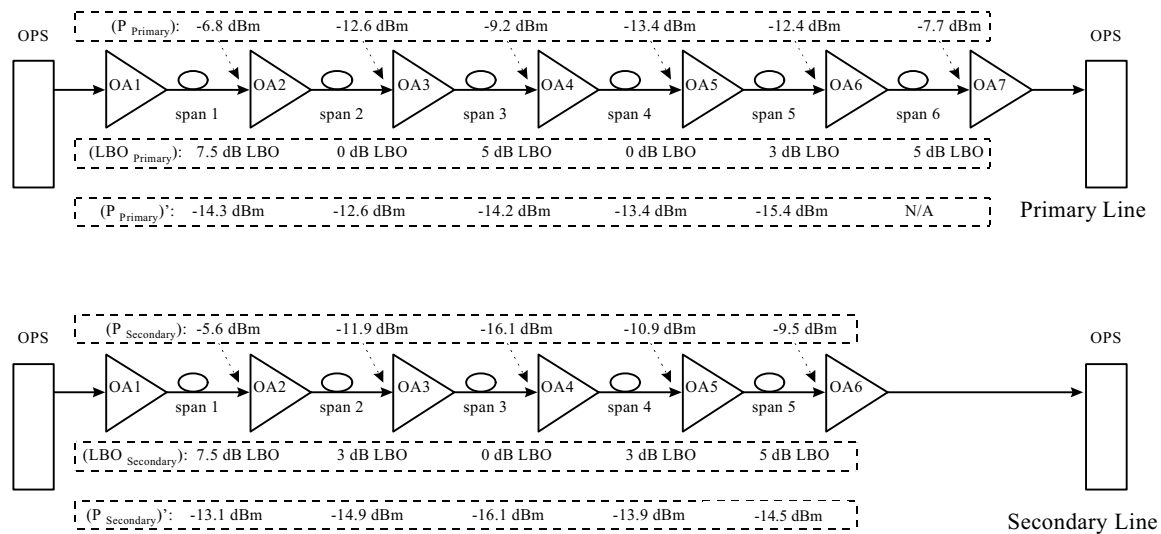
- (11) The equalization of span one is complete. Record the measured values and the repeater site OA, 1A or 1B, associated with the Primary and Secondary lines. This relationship will be maintained throughout the route for all the remaining spans in this same direction.

Proceed to the next Primary Line repeater site and repeat the procedure for span 2 starting with Step 3.

- (12) Repeat the procedure until all the spans in this same direction have been completed. If one route, Primary or Secondary, has a greater number of spans than the other, the final span will be installed as per the SmartManual recommendations and will not require span equalization.

Figure H-22 shows an example of the span equalization procedure.

Proceed to the next procedure OPS Output Power Equalization Procedure.



RESULT: Since $|\Delta P| < 2.5\text{dB}$ for spans 1,2,3,4, and 5, no additional span loss adjustments are necessary for those spans.

Figure H-22 Example of Span Equalization Procedure

OPS Output Power Equalization Procedure

This procedure will equalize the output power of the OPS when switched to Primary or Secondary to within +/- 1 dB of each other.

Perform the following steps to equalize the OPS output power.

- Verify that the previous span equalization procedure has been completed.
- As with the previous procedure an OC48/STM-16 signal must be applied to the input of the OPS at the far end.
- Verify that the OPS is switched to Primary Line. Otherwise perform a manual switch back to the Primary Line. Refer to *Operation of OPS* within this Appendix for details on determining switch state and commands for switching.

- Remove Fiber from optical connector labelled TO ODU on the OPS and clean fiber.
- Measure the optical power at the TO ODU connection on the OPS and record value as P_{Primary} in dBm.
- Perform a manual switch to the Secondary Line.
- Measure the optical power at the TO ODU connection on the OPS and record value as $P_{\text{Secondary}}$ in dBm.
- Release the manual switch.
- Calculate ΔP using: $\Delta P = (P_{\text{Primary}}) - (P_{\text{Secondary}})$. Record the results.

Using Table H-13 and the calculated value of ΔP , determine the LBOs that have to be added to the **outputs** of the receive OAs. Unseat the receive OAs, 1A and 2B (Refer to Figure H-4). NOTE: Do not remove fibers from OAs unless pack is initially unseated. Remove fibers from OA **outputs** and add LBO(s) as required to the **outputs** of the Primary and/or Secondary Line OAs. Since the 1A and 2B OA receivers reverse their Primary and Secondary line allocation at the two opposite end terminals, it is important to verify their Primary and Secondary OA assignments at the terminal being equalized prior to installing the LBO(s). Refer to Figure H-4.

Table H-13. LBO Values for OPS Output Equalization.

ΔP (dB)	Add LBO(s)
from -3.1 to -4.0	Add 3 dB LBO to output of OA on the Secondary line.
from -2.1 to -3.0	Add 5 dB LBO to output of OA on the Secondary line. Add 3 dB LBO to output of OA on the Primary line.
from -1.1 to -2.0	Add 4 dB LBO to output of OA on the Secondary line. Add 3 dB LBO to output of OA on the Primary line.
from +1.0 to -1.0	No change: Install 0 dB LBO on the output of both OAs
from +1.1 to +2.0	Add 4 dB LBO to output of OA on the Primary line. Add 3 dB LBO to output of OA on the Secondary line.
from +2.1 to +3.0	Add 5 dB LBO to output of OA on the Primary line. Add 3 dB LBO to output of OA on the Secondary line.
from +3.1 to +4.0	Add 3 dB LBO to output of OA on the Primary line.

- Clean fibers and reconnect to OAs. Reseat OAs.

- This will complete the equalization process in one direction. Repeat the entire process starting with the span equalization procedure for the other direction.

OPS Switching at LOS

To test the OPS for switching on LOS, apply at least one signal to the system in each direction. This can be done by inputting an appropriate SONET/SDH signal to an OTU or OTPM input that is fibered to the system. A different wavelength for each direction is recommended for this test. The signals at the two ends are to be monitored by receive OTUs.

NOTE:

The following tests may effect service and should be performed out of service.

Perform the following steps to test the OPS switching.

- (1) Verify that the OPS has the OPSOPMD as enabled and that the PROTNMODE is set bidirectional for the near end (W Office) OPS using the command CONFIGURATION.Retrieve.OPS.
- (2) If the OPSOPMD is disabled or the switch has been set to bidirectional, use the CONFIGURATION.Enter.OPS command to enable the switch or change to bidirectional followed by a CONFIGURATION.Initialize.System.
- (3) Perform a remote login to the node at the far end (E-Office) with the other OPS. Using the CONFIGURATION.Retrieve.OPS command verify that the OPSOPMD at the far is also enabled and that the switch is set for bidirectional. If disabled follow instructions in step 2.
- (4) Verify the switch status at near end and far end using the command FAULT.Retrieve.State with OTU=All. Both switches should be set for PRIMARY switch state. If different, perform a manual switch changing the SECONDARY settings to PRIMARY so that both switches are set to the PRIMARY line. Use the command FAULT.Operate.Protection_Switch.OPS using Manual switch from the switch menu.
- (5) With switches set to PRIMARY switch state, remove the input signal to OA 2B at the W office by removing fiber at the LGX.
- (6) Requirement: The receive OTU(s) status at the W office is In Service.
- (7) Using the command FAULT.Retrieve.State, OTU=ALL, verify that the Switch State for the W office OPS is now SECONDARY. Using the same command, verify that the E office is also SECONDARY.
- (8) Reconnect removed OA 2B fiber at the LGX.
- (9) Perform CONFIGURATION.Update.System command.

- (10) With switches set to SECONDARY switch state, remove the input signal to OA 1A at the W office by removing fiber at the LGX.
- (11) Requirement: The status of receive OTU(s) at the W office is "In Service".
- (12) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the W office OPS is now PRIMARY. Using the same command, verify that the E office is also PRIMARY.
- (13) At the W Office OPS Circuit Pack remove the PRIMARY OUT cable (input to OA 2A).
- (14) Requirement: The status of receive OTU(s) at the E and W office is "In Service".
- (15) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the E office OPS is now SECONDARY. Also verify that the W office is also SECONDARY.
- (16) Reconnect fiber to W Office OPS Circuit Pack PRIMARY OUT connection.
- (17) At the W Office OPS Circuit Pack remove the SECONDARY OUT cable (input to OA 1B).
- (18) Requirement: The status of receive OTU(s) at the E and W office is "In Service".
- (19) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the E office OPS is now PRIMARY. Also verify that the W office is also PRIMARY.
- (20) Change the Protection Mode from bidirectional to unidirectional at the E and W office using the `CONFIGURATION.Enter.OPS` command.
- (21) With switches set to PRIMARY switch state, remove the input signal to OA 2B at the W office by removing fiber at the LGX.
- (22) Requirement: The receive OTU(s) status at the W office is In Service.
- (23) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the W office OPS is now SECONDARY. Using the same command, verify that the E office did not switch and its state remains PRIMARY.
- (24) Reconnect removed OA 2B fiber at the LGX.
- (25) Perform `CONFIGURATION.Update.System` command.
- (26) With W Office switch set to SECONDARY switch state, remove the input signal to OA 1A at the W office by removing fiber at the LGX.
- (27) Requirement: The receive OTU(s) status at the W office is In Service.
- (28) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the W office OPS is now PRIMARY. Using the same command, verify that the E office is also PRIMARY.
- (29) At the W Office OPS Circuit Pack remove the PRIMARY OUT cable (input to OA 2A).
- (30) Requirement: The status of receive OTU(s) at the E and W office is "In Service".

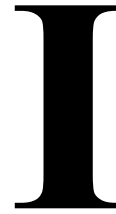
- (31) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the E office OPS is now **SECONDARY**. Also verify that the W office is **PRIMARY**.
 - (32) Reconnect fiber to W Office OPS Circuit Pack **PRIMARY OUT** connection.
 - (33) At the W Office OPS Circuit Pack remove the **SECONDARY OUT** cable (input to OA 1B).
 - (34) Requirement: The status of receive OTU(s) at the E and W office is "In Service".
 - (35) Using the command `FAULT.Retrieve.State, OTU=ALL`, verify that the Switch State for the E office OPS is now **PRIMARY**. Also verify that the W office is **PRIMARY**.
 - (36) Go to the E office and repeat the sequence of tests for the E Office OPS substituting OA 1A for OA 2B and OA 2B for OA 1A and E office for W office in the instructions.
- This completes the Installation Testing of the Optical Protection Switch.

Connecting WaveStar OLS 40G to Sonet Systems

When connecting to other optical systems refer to Section 12 within this manual. When performing fiber connections from the SPODU to receiver inputs, the power settings into these receivers is critical. LBOs values are provided by the SmartManual. However, in order to select the proper LBO group, the type of fiber, single mode or multimode, at the receiver input must be known. Typically, Lucent receivers for OC-3 and OC-12 are multimode. Receivers for OC-48 are singlemode while receivers for STM-16 are multimode. Internal WaveStar OLS 40G system connections are singlemode.

It is just as important that the correct LBO group as well the value be selected for receiver inputs. For more information with regard to LBOs refer to Appendix I.

Line Buildout (LBO)



Overview

The Lucent Technologies Line Buildouts (LBOs) provide an optical transition from the circuit pack output block to a standard optical connector. The WaveStar OLS 40G circuit packs utilize the Universal type output block and the LBOs referred to here are those that transition from a Universal block to a standard optical connector. 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.

Prior to the development of the WaveStar OLS 40G, there were a few basic variations in LBOs. With the development of the WaveStar OLS 40G, new demands were placed upon LBOs for improved attenuation tolerances, higher power levels, additional granularity, and singlemode to multimode transitions. This has created several new designs with different properties and applications. The purpose of this Appendix will be to provide the specifications and suggest applications for each LBO type.

There are four basic types of LBOs used with WaveStar OLS 40G and they are identified by the colors white or blue, yellow, green, and gray. Each 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. In the field, the distance between the LBO and its shipping bag and the time since separation is both large and long for this small device. Thus the emphasis on color identification.

Zero dB Attenuators - White or Blue LBOs

LBOs with zero 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 (see Figure 1) is left blank. Table I-1 lists the specifications for this type of LBO.

Table I-1. Zero dB LBO Specifications

Zero dB LBO - Color: White for ST & FC Blue for SC	
Connector Types	ST, FC, and SC
Connection Types	Single Mode (SM) to Single Mode (SM) Multi Mode (MM) to Multi Mode (MM) Single Mode (SM) to Multi Mode (MM) (1)
Power	Tested to 20 dBm.
Internal Element	None
Attenuation (dB)	Zero dB (1)
Attenuation Tolerance	N.A.
Operating Temperature	-40°C to +75°C
Wavelength	1310 nm & 1550 nm
1. Zero 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.	

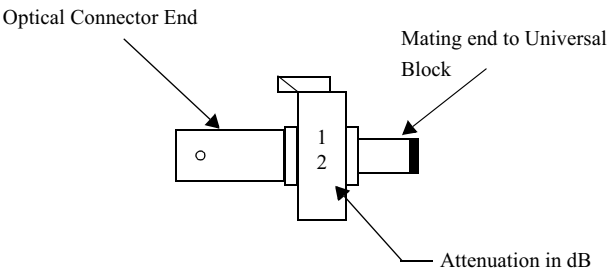


Figure I-1 LBO Orientation for Reading Attenuation Values.

Broadband Single Mode Attenuators - Yellow LBOs

The Yellow LBOs have been designed to operate over the 1310 and 1550 nm ranges for Single Mode to Single Mode operation. Operating over such a wide band results in an attenuation tolerance penalty. These LBO attenuators have been the attenuators used in the FT-2000, LCT-2000, and the initial OLS program. Table I-2 lists the specifications for this type of LBO.

Table I-2. Broadband Attenuators Specifications

Broadband Attenuators - Color: Yellow	
Connector Types	ST, FC, and SC
Connection Type	Single Mode (SM) to Single Mode (SM)
Power	Tested to 20 dBm. 3 to 10 db > 10 dB Atten. 5 dBm Max.
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 to 1550 nm

1550 nm Single Mode Attenuators - Green LBOs

A family of Single Mode to Single Mode LBOs was developed to operate at 1550 nm. The improvements achieved over the broadband design were in attenuation tolerance, power handling, and attenuation selectivity. These attenuators are to be used with circuit packs having single mode (SM) inputs and are an excellent choice to be used with DWDM Systems where precise attenuation and higher power levels are required. **Using these attenuators with OC-3 or OC-12 Multi Mode inputs will negate the value of the attenuator.** A single mode to multi mode transition attenuator (Gray in color) must be used (refer to Table I-3).

Table I-3 lists the specifications for this type of LBO.

Table I-3. 1550 nm Single Mode Attenuators Specifications

1550nm Single Mode Attenuator - Color: Green	
Connector Types	ST, and FC
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, & 20 dB NOTE: 0.5 dB indicated by + : ex. 6+ = 6.5 dB NOTE: Use Figure I-1 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 $\pm$ 0.3 dB] [16 db $\pm$ 0.5 dB] [18 to 20 dB $\pm$ 1 dB]
Operating Temperature	-40°C to +75°C
Wavelength of Ratings	1550 nm

1550 nm Single Mode to Multi Mode Attenuators - Color: Gray

This family of LBOs was designed to attenuate the input signal levels to the OTPM for WaveStar OLS 40G applications. The OTPM's utilize a single mode fiber at the transmitter output but receive using a multi mode 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 Multi Mode LBO (Gray) must be used.** Using a Green LBO will negate most of the rated attenuation for that LBO.

Table I-4 lists the specifications for this type of LBO.

Table I-4. 1550 nm Single Mode to Multi Mode Attenuator Specifications

1550nm Single Mode to Multi Mode Attenuator - Color: Gray	
Connector Types	ST and FC
Connection Type	Single Mode (SM) to Multi Mode (MM)
Power	5 dBm. 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	1550 nm

Glossary

1A-TX

1A-Transmit. A dual or 4 line end terminal whose optical amplifier "A" lines are used in the transmit direction.

1A-RCV

1A-Receive. A dual or 4 line end terminal whose optical amplifier "A" lines are used in the receive direction.

0x1 Line Operation

A 0x1 protection system has one service line and no protection line.

1+1 Line Protection

A 1+1 protection system has two OC-48 high speed lines. The transmitting terminal transmits the same signal on two lines. The receiving terminal monitors two lines independently and chooses one line as the active line and the other line as the standby line. When a protection switch occurs, the receiving terminal selects the signal from the standby line which causes the standby line to be the new active line. The original active line becomes the standby line. This status remains the same (nonrevertive) after the fault clears.

1x1 Line Protection

A 1x1 protection system has two OC-48 high speed lines. One line is designated as the service line, and the other line is designated as the protection line. The service line normally carries traffic. When a protection switch occurs, the protection line is selected to carry traffic. When the fault clears, the original service line is selected (revertive). Also see Revertive Switching.

A

ABN

Abnormal - An LED on the user panel that is lighted when a temporary condition potentially affecting transmission, exists; for example, a CIT-initiated protection switch or lockout, or loopback.

ACO

Alarm Cutoff - A push-button switch on the user panel that can be used to retire an audible office alarm. The alarm cutoff function is also available from the CIT and from an operations system.

AGNE

Alarm Gateway Network Element

AID

Access Identifier — A unique identifier used to address equipment slots and ports, as well as facility tributaries, that are defined for the OLS architecture.

AIS

Alarm Indication Signal - A maintenance signal transmitted downstream in a digital network that shows that an upstream failure has been detected and alarmed.

ANSI

American National Standards Institute - An organization consisting of producer, consumer, and general interest groups that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States.

APD

Avalanche Photodiode - A highly sensitive optical detector.

APS

Automatic Protection Switch

AS&C

Alarm, Status, and Control

ASCII

American Standard Code for Information Interchange - A standard 8-bit code used for exchanging information among data processing systems and associated equipment.

ASN.1

Abstract Syntax Notation 1

Asynchronous

Refers to network elements that are not timed from references traceable to a single timing source.

AUTO

Automatic - One possible state of a low speed port or slot. When a port is in the automatic state and the presence of a good signal is detected, the port is automatically placed in the IS (in service) state. When a slot is in the automatic state and the presence of a circuit pack is detected, the slot is automatically placed in the EQ (equipped) state.

Autonomous Indicators

Autonomous indicators are those indicators that are subject to incoming signal alarm delay. These include office alarm outputs, parallel telemetry outputs, TL1 autonomous messages, the alarm LEDs (CR, MJ, and MN) on the user panel, and the network element status field in the upper left-hand corner of the CIT.

B

BCLAN

Board Controller Local Area Network - The internal local area network that provides communications between the System Controller circuit pack and board controllers on the circuit packs.

BDFB

Battery Distribution and Fuse Bay

BER

Bit Error Rate - The ratio of bits received in error to bits sent.

BIP

Bit Interleaved Parity - A method of error monitoring over a specified number of bits (BIP-3 or BIP-8).

BIP-N

Bit Interleaved Parity - N - A method of error monitoring. With even parity, an N-bit code is generated by the transmitting equipment over a specified portion of the signal in such a way that the first bit of the code provides even parity over the first bit of all N-bit sequences in the covered portion of the signal. The second bit provides even parity over the second bits of all the N-bit sequences within the specified portion, etc. Even parity is generated by setting the BIP-N bits so that there are an even number of ones in each of all the N-bit sequences including the BIP-N.

BITS

Building Integrated Timing Supply - A single clock that provides all the DS1 and DS0 synchronization references required by clocks in a building.

BOC

Bell Operating Company

BRT

Business Remote Terminal

C

CC

Clear Channel - A provisionable mode for the DS3 output that causes parity violations to not be monitored or corrected before the DS3 signal is B3ZS-encoded.

CCITT

International Telephone and Telegraph Consultative Committee - An international advisory committee under United Nations sponsorship that has composed and recommended for adoption worldwide standards for international communications.

CIT

Craft Interface Terminal - A personal computer that meets OLS minimum requirements loaded with the OLS CIT-PC software.

CLEI

Common Language Equipment Identifier

CMS

See customer maintenance signal

CO

Central Office - A telephone company building where switching and/or transmission system equipment is located.

COACH

A set of software tools designed to assist Lucent Technologies Network Systems provide quality service to our customers for a variety of transmission products. Customers can proactively use the tools to keep abreast of the latest product information and to communicate with the Technical Support groups and product designers.

Condition

Conditions persist in time and indicate that there is something not normal about the system. Conditions appear in the Retrieve-Alarm Report.

CR

Critical (alarm)

CS&O

Customer Support and Operations

CTS

Customer Technical Support - An Lucent Technologies organization that helps customers maintain installed systems.

Current Value

The value currently assigned to a provisionable parameter.

Customer Maintenance Signal

A 155Mb/s optical signal originating from customer supplied equipment, which is used for customer maintenance activities. It is carried as part of the supervisory signal.

CV

Coding Violation

D

DACS

Digital Access and Cross-Connect System

DACS III-2000

One of Lucent Technologies' Digital Access and Cross-connect Systems.

DACS IV-2000

One of Lucent Technologies' Digital Access and Cross-connect Systems.

Data

A collection of system parameters and their associated values.

DCC

Data Communications Channel - The embedded overhead communications channel in the SONET line. This is used for end-to-end communications and maintenance. It carries alarm, control, and status information between network elements in a SONET network.

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.

DDM-2000

Lucent Technologies' SONET network multiplexer that can function as a lightwave terminal. It is designed primarily for loop feeder and interoffice applications that will work in existing asynchronous as well as the emerging SONET networks.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

DM

Degraded Minutes

Doping

The addition of impurities in a substance to achieve desired properties.

DPLL

Digital Phase-Locked Loop

DRAM

Dynamic Random Access Memory - Semiconductor random-access memory that requires short interval refreshing to retain its contents.

Drop Side Signal

An optical signal suitable for transmission over OLS, an OC-48 signal.

DS-NE

Directory Service Network Element — A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses (NSAPs). There can be only one DS-NE per ring.

DTE

Data Terminating Equipment - The equipment that originates data for transmission and accepts transmitted data.

DWDM

Dense Wave Division Multiplexing

E

ECI

Equipment Catalog Item

EEPROM

Electrically Erasable Programmable Read-Only Memory - Readable memory that is nonvolatile in nature, erased electrically, and programmed externally from the processor that uses it.

EIA

Electronic Industries Association - A trade association of the electronics industry that establishes electrical and functional standards.

EMC

Electromagnetic Compatibility

EMI

Electromagnetic Interference - High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

EPROM

Erasable Programmable Read-Only Memory - Readable memory that is nonvolatile in nature, erased by exposure to intense ultraviolet light, and programmed externally from the processor that uses it.

EQ

Equipped - A memory administrative state for slots. EQ refers to a slot that is fully monitored and alarmed.

Erbium

A soft rare earth element used in metallurgy and nuclear research.

Erbium Doped Fiber Amplifier (EDFA)

A form of optical amplification by which the light signal passes through a section of erbium doped fiber and is amplified by a laser pump diode.

ES

Errored Seconds - A second in which one or more parity violation are detected.
Errored seconds are monitored for the OC-48 line, OC-48 section, and STS-1 path.

ESD

Electrostatic Discharge - The discharge of static electricity into equipment that potentially causes component damage and logic errors.

Event

Events happen at a particular time (do not persist in time) and appear in the Retrieve-History Report.

ET

End Terminal — Equipment that terminates optical line signals.

F

FDA

Food and Drug Administration

FE ACTY

Far-End Activity - An LED on the user panel that is lighted when an alarm or status condition exists at a remote FT-2000 OC-48 Network Element.

FEBE

Far-End-Block Error - An indication returned to the transmitting terminal that an errored block has been detected at the receiving terminal. A block is a specified grouping of bits.

FERF

Far-End-Receive Failure - An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure.

Flash EPROM

A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

FLS

Frame Loss Seconds

G

Gb/s

Gigabits (10^9 bits) per Second

GNE

Gateway Network Element - A network element that passes information between other network elements and operations systems via a data communication network.

I

IEC

International Electrotechnology Commission or Interexchange Carrier

I/O

Input/Output

IR

Intermediate Reach

IS

In Service - A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

ITCO

Independent Telephone Company

IXC

Interexchange Carrier

J

Jitter

Timing jitter is defined as short-term variations of the significant instants of a digital signal from their ideal positions in time.

K

Krypton line

1547.82 nm — the wavelength used in a standard laser source.

L

LAN

Local Area Network

LBO

See Optical Line Build-out.

LCT

FT-2000 OC-48 Lightwave System Large Capacity System

LEC

Local Exchange Carrier

LED

Light-Emitting Diode

LGX

Lightguide Cross-connect

Line

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 of which originates the line signal and the other terminates the line signal.

LOF

Loss of Frame - A failure to synchronize to an incoming signal.

LOP

Loss of Pointer - A failure to extract good data from an STS-1 payload.

LOS

Loss of Signal - The complete absence of an incoming signal.

M

mm

Micrometer (micron) - 10^{-6} meters

Menu

A set of possible values for a parameter.

Midspan Meet

The capability to interface between two lightwave terminals of different vendors. This applies to high speed optical interfaces.

Miscellaneous Discretes

A user settable interface which allows an OS to monitor and control equipment external to OLS such as open doors or fire alarms.

MJ

Major (alarm)

MML

Human-Machine Language

MM Fiber

Multi-mode fiber.

MN

Minor (alarm)

MTBF

Mean Time Between Failures

MTBMA

Mean Time Between Maintenance Activities

Multiplexing

The process of combining several distinct digital signals into a single composite digital signal.

N

NCDRH

National Center for Devices and Radiological Health

NE

Network Element - Refers to an OLS node in a network.

NE ACTY

Near-End Activity - An LED on the user panel that is lighted when an alarm or status condition exists at the local FT-2000 OC-48 Network Element.

NEBS

Network Equipment-Building System

nm

Nanometer - 10^{-9} meters

NMA

Network Monitoring and Analysis System - Bellcore's alarm surveillance operations system.

NMON

Not Monitored - A memory administrative state for ports. This refers to a port that is not monitored and will not transition to the IS state if a good signal is detected.

Nonautonomous Indicators

The nonautonomous indicators are those indicators that are not subject to incoming signal alarm delay. These indicators include the circuit pack FAULT LEDs, all CIT reports, TL1 command response messages, and the LEDs on the user panel (except CR, MJ, and MN).

Nonrevertive switching

In nonrevertive switching, there is a active and standby high speed line, circuit pack, etc. When a protection switch occurs, the standby line, circuit pack, etc., is selected causing the old standby line, circuit pack, etc., to be used for the new active line, circuit pack, etc. The original active line, circuit pack, etc., becomes the standby line, circuit pack, etc. This status remains in effect when the fault clears. Therefore, this protections scheme is nonrevertive in that there is no switch back to the original status in effect before the fault occurred. Also see 1+1 Line Protection.

NRZ

Nonreturn to Zero

NSA

Non-Service 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

OA

Optical Amplifier

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 Overhead Controller circuit pack.

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 OLS optical signal and separates it into the 8 OC-48 signals.

OLS

Optical Line System

OMU

Optical Multiplexer — takes up to 8 OC-48 signals and combines them into 1 optical signal.

OOF

Out-of-Frame

Operations Interface

Any interface that provides 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 CIT access from any site in a SONET network or from a centralized operations system.

Optical Channel

A single OC-48 signal within the optical line signal. There are 8 channels in one line signal.

Optical Line

A fiber transmission facility extending from the output of the OMU to the input of the ODU.

Optical Line Build-out (LBO)

An attenuator placed on the faceplate of optics units to attenuate the optical signals as needed.

Optical Line ID

A portion of the supervisory signal that identifies optical lines to prevent misconnections between sites. Optical Line Signal A wavelength division multiplexed optical signal.

Optical Section

A portion of OLS between adjacent network elements.

Orderwire

A section of the supervisory signal that is used for communication between sites.

Original Value

The value given to a CIT provisionable parameter at the factory.

Original Value Provisioning

The original values are the values given to CIT provisionable parameters at the factory. At system start-up, the original values are copied and become the current values. These current values can be changed using local or remote provisioning. The original values can never be changed.

OS

Operations System - A central computer-based system used to provide operations, administration, and maintenance functions.

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.

PC

Personal Computer

Phase Locked

An operating condition of a network element in which it is locked to an external reference.

Platform

In OLS, a platform is a family of equipment and software configurations designed to support a particular set of applications.

PLL

Phase Locked Loop

PM

Performance Monitoring - Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

POH

Path Overhead - Overhead assigned to and transported with the payload until the payload is demultiplexed. It is used for functions that are necessary to transport the payload.

Provisioning

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.

PROTN

Protection

Provisioning

Assigning a value to a parameter in memory.

PWR

Power

R

RCV

Receive

RDI

Remote Defect Indication - An indication returned to a transmitting terminal that the receiving terminal has detected an incoming failure. Also refer to far-end-receive-failure (FERF).

Repeater

Equipment that repeats optical line signals.

Reactive Maintenance

Refers to detecting defects/failures and clearing them.

Regeneration

The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

Revertive Switching

In revertive switching, there is a service and protection high speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service reverts back to the original service line. Also see 1x1 Line Protection.

RF

Radio Frequency

RFI

Remote failure indication — (Previously called yellow signals.) A signal that alerts upstream STS-1 path terminating equipment that a down stream failure has been alarmed along the STS-1 path. This action prevents multiple alarms from being activated for the same failure and ensures that craft will be dispatched to the correct location of the failure.

RPP

Reliability Prediction Procedure

RTAC

Regional Technical Assistance Center - A Lucent organization that helps customers maintain installed systems.

S

SA

Service Affecting

SD

Signal Degrade - A provisionable parameter for the incoming OC-48 high speed signal and DS3 signal (from cross-connect panel) that determines the threshold at which a signal degrade condition is declared.

SDH

Synchronous Digital Hierarchy — a European standard

SEFS

Severely Errored Frame Seconds - The number of seconds during which an out-of-frame event occurred.

SES

Severely Errored Seconds - A second in which the parity violations detected reach a fixed threshold.

SF

Signal Fail - Refers to a condition when an incoming signal's bit error rate exceeds a fixed value.

SM Fiber

Single Mode Fiber

SONET

Synchronous Optical Network - The American National Standards Institute's optical signal standard for broadband transmission.

SNR

Signal to Noise ratio

Span

See Optical Section

Span Growth

A type of growth in which one wavelength is added to all lines before the next wavelength is added.

SPE

Synchronous Payload Envelope - A 125-microsecond frame structure composed of STS path overhead and bandwidth for the payload.

Status

Status means a condition that does not raise an alarm.

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.

STM-n

Synchronous Transport Module level n — the basic building block of SDH.

Supervisory Signal

An optical signal originating with the TLM circuit pack that is used to communicate maintenance information from node to node.

SUPR

See Supervisory Signal

Synchronous

Refers to network elements that are timed from references traceable to a single timing source.

Synchronous Network

The synchronization of synchronous transmission systems with synchronous payloads to a master (network clock that can be traced to a single reference clock).

SYSCTL

The System Controller and System Memory circuit packs provide the highest level of system control for the OLS. The System Controller circuit pack provides overall administrative control of the system.

SYSTEMEM

The System Memory and System Controller circuit packs provide the highest level of system control for the OLS. The System Memory circuit pack provides memory support for the SYSCTL circuit pack.

T

T1X1 and T1M1

The ANSI committees responsible for telecommunications standards.

TA

Technical Advisory

TBOS

Telemetry Byte-Oriented Serial (Protocol) - Defines one physical interface for direct connection between the telemetry remote and the monitored equipment. An EIA-422 port is used to provide the operations system with enough alarm and status information to localize a problem and determine the severity.

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.

TEC

Thermo-Electric Cooler

TID

Target Identifier - A provisionable parameter used to identify an FT-2000 OC-48 Lightwave System.

TL1

Transaction Language 1 - A machine-to-machine communications language that is a subset of CCITT's human-machine language.

TLM

Telemetry circuit pack

TOHCTL

Tributary Overhead Controller. This circuit pack provides access to the SONET Section DCC (D1 - D3) bytes present in OC-3 low speed interfaces that terminate in the Low Speed Shelf - System Controller. The TOHCTL processes both the transmit and receive directions of the DCC.

Tone

An AM signal in the 5 - 30 kHz range that is superimposed on the drop side signal for power measurements.

TR

Technical Reference

Tributary

A 51.84 Mb/s signal (STS-1 level) or 155 Mb/s signal (STS-3 level) within the FT-2000 OC-48 Lightwave System. The maximum capacity of an OC-48 signal is forty-eight 51.84 Mb/s tributaries (or sixteen 155 Mb/s tributaries).

TX

Transmit

U

UAS

Unavailable Seconds - A second during which the STS-1 path is unavailable.

Upgrade

An upgrade is the addition of new capabilities (features) to an existing platform. This requires new software and may require new hardware.

V

Value

A number, text string, or other menu selection associated with a parameter.

VM

Violation Monitor - A provisionable mode for the DS3 output that causes parity violations to be monitored but not corrected before the DS3 signal is B3ZS encoded.

VMR

Violation, Monitor, and Removal - A provisionable mode for the DS3 output that causes parity violations to be monitored and corrected before the DS3 signal is B3ZS encoded.

VT

Virtual Tributary - A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

VT-G

Virtual Tributary Group - A 9-row by 12-column structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte interleaved with the VT-organized synchronous payload envelope.

W

Wavelength growth

A type of growth in which all eight wavelengths are added to a single line before more lines are added.

X

X.25

Communications protocol.

Z

Zero Code Suppression

A technique used to reduce the number of consecutive zeros in a line-codes signal (B3ZS for DS3 signals).

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