Lucent Technologies
Bell Labs Innovations

WaveStar^{TM} Optical Line System (OLS) 40G
Installation Manual

Release 7

an InfoWare® Product

Notice

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Federal Communications Commission (FCC) Notification and Repair Information[1]

NOTE: This equipment is designed to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. Operation of this equipment in a residence is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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For terms and conditions of sale, see your Lucent Technologies Account Executive for details.

This document was developed by the Dense Wave Division Multiplexing (DWDM) Customer Technical Support Organization.

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1. Language of statute.

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Document Title: **WaveStar^{TM}** Optical Line System (OLS) 40G
                            Installation Manual

Document Number: *365-575-389*   *Issue 1.0*   Publication Date: *March 2001*

Please check the ways you feel we could improve this document:

❏ Improve the preface
❏ Improve the table of contents
❏ Improve the organization
❏ Improve the index
❏ Include more figures
❏ Add more examples

❏ Make it more concise/brief
❏ Simplify the ordering information
❏ Add more detail
❏ Make it less technical
❏ Add more/better quick reference aids
❏ Fonts
❏ Other

Please provide details for the suggested improvement.

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About This Document

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Purpose of This Section

Introduction

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 365-575-387, WaveStar™ OLS 40G User/Service Manual, for any activity involving circuit turn-up, regular maintenance, or trouble analysis. Refer to 365-575-388, WaveStar™ OLS 40G Operations Systems Engineering Guide, or for any activity using X.25 (TL-1 commands).

Objectives

This chapter provides information about the following:

1. The reason for issue of the document

2. The intended audience

3. How to use the manual

4. How to order this document

5. A method for commenting on the document

Reason for Reissue

The purpose of this document is to allow an installer to install, turn up, and test an out-of-service WaveStar OLS 40G System. It is being reissued to cover Release 7. This document includes updated information and clarifications for all Release 7 applications. Information on the new hardware and hardware features is also presented.

Intended Audience

This installation manual is for personnel who will install WaveStar OLS 40G equipment. It emphasizes Release 7 practices and procedures where the WaveStar OLS 40G consists of OLS and OT as an integrated system or where the OLS is stand-alone system.

How to Use This Manual

Introduction   This manual is divided into several chapters. The chapters are numbered in the order in which they are to be performed.

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.

Section Descriptions   The chapters in this document provide the following information:

Chapter Number and Title	Description
About This Document	Describes the purpose, intended audience, and organization of this document. Ordering information and procedures to comment on this document are included.
Chapter 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.
Chapter 2, "System Installation Planning"	Discusses system and network level installation and testing issues.
Chapter 3, "Equipment Installation"	Describes how to uncrate and erect WaveStar OLS 40G equipment bay frames or cabinets. Also covered is the installation of miscellaneously mounted OLS and OT shelves.
Chapter 4, "Power Cable Installation"	Provides information about power cables related to WaveStar OLS 40G and describes how to install the power cables.

How to Use This Manual (Continued)

**Section
Descriptions
(continued)**

Chapter Number and Title	Description
Chapter 5, "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 and Section Orderwire, Section User Channel Cables, Miscellaneous Mount Intershelf Wiring, and Miscellaneous Discrete Cables.
Chapter 6, "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 Placement.
Chapter 7, "Powering"	Provides procedures for verifying cabinet/shelf ground and powering the cabinet/shelf for the WaveStar OLS 40G.
Chapter 8, "Network Element Startup 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.
Chapter 9, "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.
Chapter 10, "Fiber Connections"	Describes how to establish the optical line system. General information of Lightwave jumpers and optical Line Buildouts (LBOs) for quick references is given.

How to Use This Manual (Continued)

**Section
Descriptions
(continued)**

Chapter Number and Title	Description
Chapter 11, "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.
Chapter 12, "Troubleshooting"	Provides guidelines for troubleshooting an out-of-service system during initial start-up.
Appendix A, "Releases 1.0 and 2.0 LBO Selection Tables"	Provides the information for LBO selection tables when installing R 1.0 and R 2.0 OLS/OT.
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.

How to Use This Manual (Continued)

**Section
Descriptions
(continued)**

Chapter Number and Title	Description
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

Introduction   Included in this section is the ordering information for the various documents available for the WaveStar OLS 40G equipment.

Ordering Information   Lucent Technologies entities should access the Customer Information Center (CIC) at http://www.cic.lucent.com/infobase.html. Other customers should use the Mail Order or Telephone Order information given below:

Customer	Mail Order	Telephone Order (Monday through Friday)
Commercial Customers (Check, money order, purchase order number, or charge card number required)	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	

One-Time and Standing Orders   One-time orders include a binder (if applicable) and document contents for the issue specified by the unique document order number.

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 Dense Wave Division Multiplexing (DWDM) Customer Technical Support Organization (CTS). The CTS group 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) 960-1992.

If the feedback form is missing, fax your comments on this document to +1 (978) 960-1992.

Overall Installation and Test Considerations

1

Contents

Background

Introduction   The purpose of this chapter is to provide the information needed to plan the installation of a WaveStar™ OLS 40G System.

This chapter 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.

Objectives   This chapter provides information to perform the following:

1.   Overall installation job planning

2.   Identify required tools and test equipement

3.   List safety instructions

4.   Identify documents and drawings

5.   Identify available training classes

6.   Identify technical support functions

Releated Information   For related information, see the WaveStar OLS 40G Application, Planning, and Ordering Guide (APOG), 365-575-340.

Tools and Test Equipment

General

Included in this section are the tools and test equipment needed for installing and testing WaveStar OLS 40G cabinets or shelves and OT cabinets or shelves.

lTable 1-1 on page 1-3 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 on page 1-5 lists tools, test sets, and accessories in addition to Table 1-1 that are required for installation of WaveStar OLS 40G equipment only.

Table 1-3 on page 1-7 lists tools test sets, and accessories in addition to Table 1-1 that are required for installation of OT equipment *only.*

Tools and Test Equipment for Both Products

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 to 60 VDC and ground continuity.
Analog Ohmmeter			For measuring battery ground return resistance.
Anti-Oxidation Material	NO-OX-ID "A" Compound	NO-OX-ID "A" Compound	Only if cabinet or shelf has been scraped to make ground connection.
ESD Wrist Strap	900486994	R TOOL #4987B	For ESD protection.

Tools and Test Equipment (Continued)

Tools and Test Equipment for Both Products (continued)

Table 1-1.   Required Tools and Test Equipment for Both Products (continued)

Description	Commercial or Comcode	Lucent Technologies Installers Only	Notes
Single-Mode Fiber Jumpers with appropriate connectors (two jumpers needed)	107149494 (FS1EP-EP-02) or 107306243 (MS1EP-EP-02)	107149494 (FS1EP-EP-02) or 107306243 (MS1EP-EP-02)	For optical local tests (minimum 2 ft. length) with yellow cladding.
CLETOP Reel Type A		ITE #7137	For fiber cleaning.
CLETOP Stick Type		ITE #7135	Refer to 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) OR Noyes Power Meter (OPM4B)	ITE #7116	For optical power measurements.
Metral Pin Repair Kit (optional, as required)	BERG MT370-01 Kit 106423859		For replacing any damaged Metral pins. Refer to Appendex B for more details.

Tools and Test Equipment (Continued)

Tools and Test Equipment for Both Products (continued)

Table 1-1.   Required Tools and Test Equipment for Both Products (continued)

Description	Commercial or Comcode	Lucent Technologies Installers Only	Notes
Insertion/Extraction Tool Kit (optional, as required)	AMP 91261-1		For replacing ACTION PIN contacts in AMPLIMITE HDP-20 connectors (d-sub connectors)
Optical Multi-Wavelength Meter (optional as required)	HP 86120B or equivalent	ITE # 7123	For verifying flatness of OA input

Tools and Test Equipment for WaveStar OLS 40G Only

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 (two jumpers for end terminals and four jumpers at repeaters)	105618755 (FA1E-E-02)	105618755 (FA1E-E-02)	For optical local tests (minimum 2 ft. length) 50-mm fiber with orange cladding.
Single-Mode 33-dB Attenuated Fiber Jumpers with appropriate connectors (two jumpers for end terminals and four jumpers at repeaters)	847265451 (F93AK8573)	847265451 (F93AK8573)	For optical local tests.

Tools and Test Equipment (Continued)

Tools and Test Equipment for WaveStar OLS 40G Only (continued)

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

Description	Commercial or Comcode	Lucent Technologies Installers Only	Notes
Personal Computer: See "Personal Computer for Use as CenterLink Management Console"		ITE #6795 List 2 to ITE #6938 or ITE #4389	For use as CMC on DCE port.
Straight through RS-232 cable 25-pin to 25-pin OR 25-pin to 9-pin depending on the PC serial port	Black Box Corp. RM-BC00301 OR RM-BC00401	Part of ITE #6795 LIST 2 or ITE #6938	For providing the connection between the PC (25 or 9 pin) and 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.

Tools and Test Equipment (Continued)

Tools and Test Equipment for OT Only

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 OTUs	May be obtained from an OC-48 incoming signal. Also available from Tektronix ST2400 with option 12	ITE-7089 (if required)	For testing output of OTUs
A SONET OC-3 signal if testing 43 and 44 type OTPMs and an OC-12 signal if testing 42 type OTPMs	May be obtained from an OC-3/OC-12 incoming signal. Also available from Tektronix ST112 for OC-3 and ST112 with option 04 for OC-12	ITE-6384 for OC-3 testing. ITE-6384 equipped with option 04 for OC-12 and OC-3 testing.	For testing output of OTPMs
Wire-Wrap Tool with bit for 26-gauge wire			For wire wrapping miscellaneous discrete cables from OT to the Dantal or Harris EMDU.
ST-to-ST Fiber Optic Coupling (two needed)	105271142 (C3000A-2)	105271142 (C3000A-2)	

Tools and Test Equipment (Continued)

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 the product 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.

Safety Instructions (Continued)

IMPORTANT SAFETY INSTRUCTIONS (continued)

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 –48 VDC input power feeders. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect the two power supply cables to remove power from the system.

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 tends to focus the energy from an optical connector increasing the potential risk for injury.

Safety Instructions (Continued)

Lightwave Safety (continued)

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 IIIb 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 Shutdown (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.

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. The compliance label is located on the rear of the equipment bays. 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.

Safety Instructions (Continued)

Lightwave Safety (continued)

Figure 1-1.   Compliance Label

Lucent Technologies
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OPTICAL LINE SYSTEM CABINET

J689982C-1

Lucent Technologies NETWORK SYSTEMS
1600 Osgood Street
North Andover, MA

Date Of Manufacture May Be Viewed Behind Right
Front Door Upper Right Post Of The Framework.
La date de fabrication est inscrite derriere la colonnette
superieure droite du panneau avant droit du bati.

POWER REQUIREMENTS: Two (2) –48 VDC Input Power
Lines, Each Rated 20 Amps DC.
ALIMENTATION Deux (2) entrees –48V c. c. de 20 A c. c.
chacune.

Complies With 21 CFR 1040.10 And 1040.11.
Conforme aux documents 21 CFR 1040.10 et 1040.11.

This Digital Apparatus Does Not Exceed The Class A
Limits For Radio Noise Emissions Set Out In The Radio
Interference Regulations Of The Canadian Department
Of Communications.

Cet appareil numerique n'emet pas de bruits
radioelectriques depassant les limites applicables aux
la reglement sur le brouillage radioelectrique edicte par
appareils numeriques de la Class A specifiees dans
le ministere des Communications du Canada.

This Device Complies With Part 15 Of The FCC Rules.
Operation Is Subject To The Following Two Conditions:
(1) This Device May Not Cause Harmful Interference,
And (2) This Device Must Accept Any Interference
Received, Including Interference That May Cause
Undesired Operation.

Safety Instructions (Continued)

Electrostatic Discharge (ESD) Considerations

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

⚠️ **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.

■ 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.

■ Always store and transport 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.

Safety Instructions (Continued)

Electrostatic Discharge (ESD) Considerations (continued)

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 Gound. 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

To
Ground
Connection

NOTE: Alligator connection not needed when connecting directly into the OLS or OT grounding jacks.
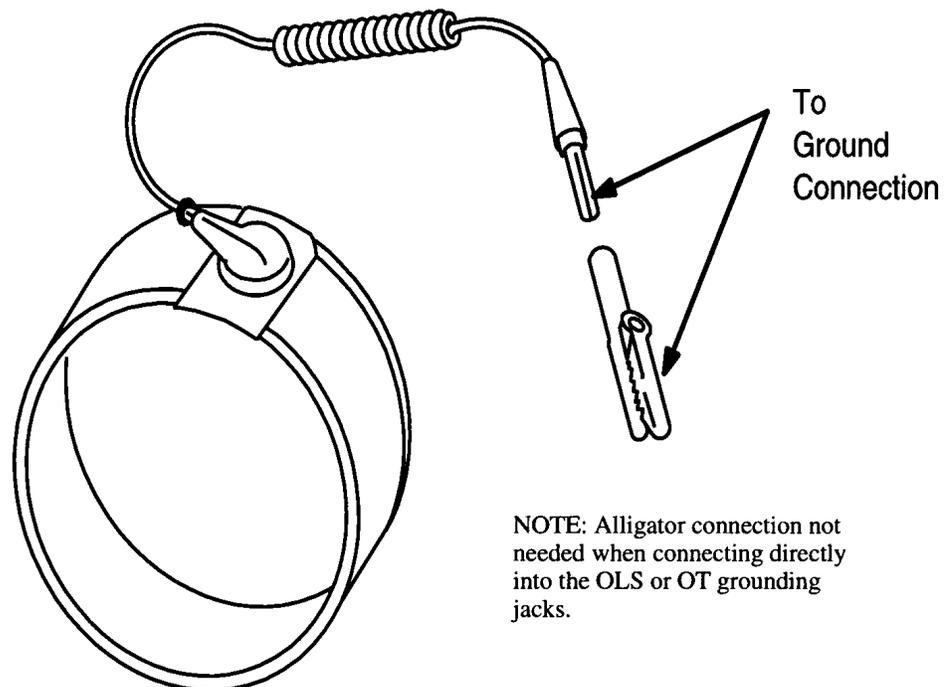
Related Documentation

WaveStar OLS 40G Documentation

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

- Number: 365-575-386

  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: 365-575-387

  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: C109074484 Release 7.0-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: 365-575-388

  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.

Related Documentation (Continued)

WaveStar OLS 40G Documentation (continued)

■ Drawing NT-00405-30

  Title: WaveStar 40G Installation Document

  Audience: System Installers

  Content: Specific information corresponding to the installation of Rack and Stack configurations. Contains bay placement, inter shelf cabling, and fiber connection and routing information for 2-Bay, 3-Bay, and 5-Bay systems.

■ Drawing ED-8C509-50

  Title: Frame Base Raceway Assemblies and Associated Equipment for Use With Network Bay Frames ED-8C500-50 and ED-8C501-50

  Audience: System Installers

  Content: Installation information and drawings for the installation of ED-8C509-50 G11, G12, and G13 conduit, appliance outlet raceway assembly, and raceway extender bracket.

Training

Philosophy   No product offering is complete without a formal training package. The Customer Traiing and Information Products (CTIP) Organization provides management courses for system planning, engineering, and ordering, as well as courses to train telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses is also available. Contact the CTIP Organization on 1-888-LUCENT-8 (1-888-582-3688) to enroll in training classes. To arrange suitcase sessions, call the Product Training Manager at 1-800-432-6317 (within USA) or +1-614-764-5542 (worldwide). For a list of available courses, see the CTIP website at http://www.lucent.product-training.com.

Available Courses   The following training courses are provided by the CTIP Organization:

- **WaveStar™ Optical Line System 40G Applications, Architecture, Planning and Ordering (LW2252)**

  Audience: Network planners, product managers, equipment engineers, technical consultants, account representatives, and personnel requiring a high-level description of Optical Line System (OLS) network and fiber route planning.

  Prerequisites: A general knowledge of transmission principles and a good working knowledge of OLS systems, applications, and architecture.

  TR0510 — Transmission Principles

  TR9203 — Synchronous Optical Network Overview

  Content: This course provides in-depth discussions of OLS network planning and equipment configuration options utilizing the engineering rules set forth in the WaveStar 40G OLS Applications, Planning, and Ordering Guide (APOG). The course also includes "how to" lessons for engineering OLS-based Dense Wavelength Division Multiplexing (DWDM) networks and detailed discussions of route selection, end terminal and repeater spacing, loss budget calculations, and associated ordering information for wired equipment, circuit packs, and cabling.

  Course Length: This is a 2-day course.

Training (Continued)

Available Courses (continued)

■ **WaveStar™ Optical Line System 40G Operations and Maintenance (LW2652)**

Audience: Technicians responsible for the operations and maintenance of the WaveStar Optical Line System (OLS) 40G, technical support personnel, and other personnel needing a working knowledge of the equipment.

Content: This course prepares students to operate and maintain the WaveStar OLS 40G. The course provides an in-depth description of the equipment and how it is used with other lightwave equipment. The course is based on the contents of the User/Service Manual.

Prerequisites: A general knowledge of transmission principles and a good basic understanding of digital fundamentals and lightwave transmission systems.

TR0510 — Transmission Principles

TR9203 — Synchronous Optical Network Overview, or previous transmission experience

Course Length: This is a 3-day course

■ **Optical Translator (OT) Installation (LW2451V)**

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

Content: Video presentation covering OT installation and physical design.

Prerequisites: TR2448 or equivalent knowledge

Schedule and Registration

For a complete and up-to-date schedule of the available training courses, refer to the WaveStar Curstomer Documentation and Training homepage on teh Lucent Intranet at http://www.mv.lucent.com/APPL/wscdocs/training.html.

For more information or to register for any of these courses, call

1-888-LUCENT8 and select option 2

Fax: 1-407-767-2677

Or write to:

Lucent Technologies
Customer Training and Information Products
307 North Lake Blvd.
Altamonte Springs, FL 32701

Security

**CenterLink
Management
Console (CMC)**

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

Technical Assistance

Assistance in maintaining your installed system is available through the North American Regional Technical Assistance Center (NARTAC) and the Customer Technical Support (CTS) organization. As shown in Figure 1-3, NARTAC is your single point of contact. NARTAC 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.

NARTAC 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, and GTSIP.

The Customer Web Access tools provide customers an easy method to access data about Lucent Products using the World Wide Web. Customers can choose to search for data in three different applications:

■ Assistance Request

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

■ Solutions

The Solutions access tool allows customers to view and search known problems and solutions for products. Entries are created within CARES by a Lucent engineer. Customers using the web access can search for solutions using a number of fields such as product, subproduct, created date or description. Only solutions with a state of active will be returned.

Technical Support (Continued)

**Customer
Assistance
Request Entry
System (CTS
Cares) (continued)**

■ 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**
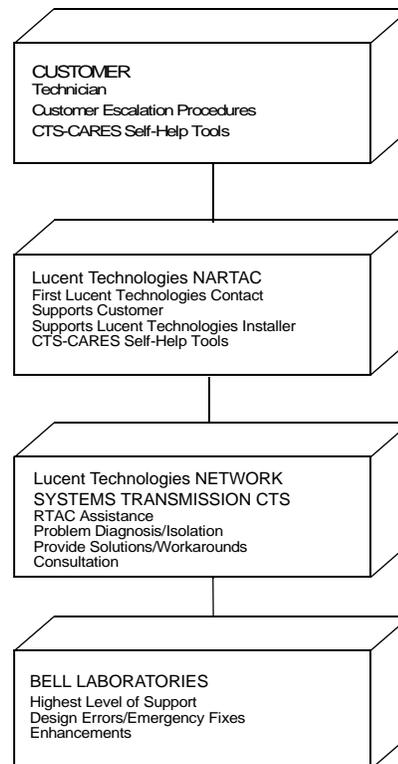
CUSTOMER
Technician
Customer Escalation Procedures
CTS-CARES Self-Help Tools

Lucent Technologies NARTAC
First Lucent Technologies Contact
Supports Customer
Supports Lucent Technologies Installer
CTS-CARES Self-Help Tools

Lucent Technologies NETWORK
SYSTEMS TRANSMISSION CTS
RTAC Assistance
Problem Diagnosis/Isolation
Provide Solutions/Workarounds
Consultation

BELL LABORATORIES
Highest Level of Support
Design Errors/Emergency Fixes
Enhancements

System Installation Planning

2

Contents

Background

Introduction   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

Bidirectional 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 2-1.

Figure 2-**1.   Basic Optical Line**
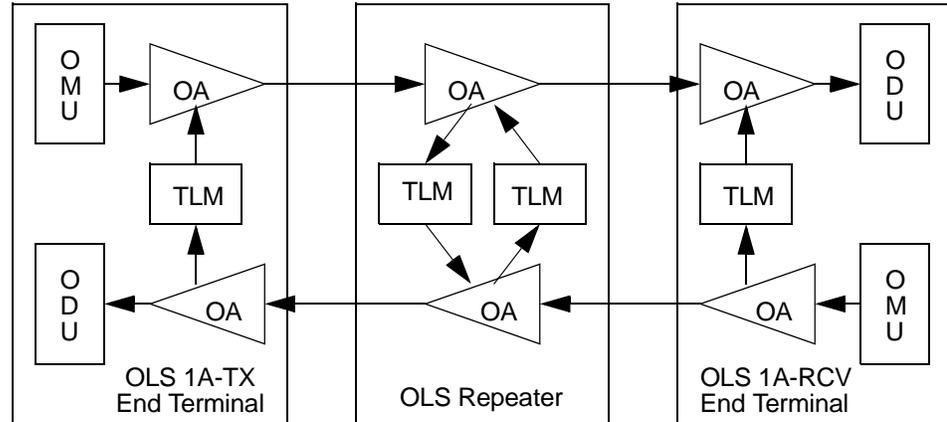
It consists of optical multiplex and demultiplex units at each end of the system to combine and split out the optical channels, telemetry circuit packs to generate and receive the supervisory channel, and a string of optical amplifiers in each direction. Three types of offices are shown: 1A-TX End Terminal, Repeater, and 1A-RCV End Terminal. Every OLS will at least have a 1A-TX and 1A-RCV End Terminal, or be comprised of dual facing shelves to create a ring topology. 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 2-2).

Figure 2-**2.   Connections to a Single Line**
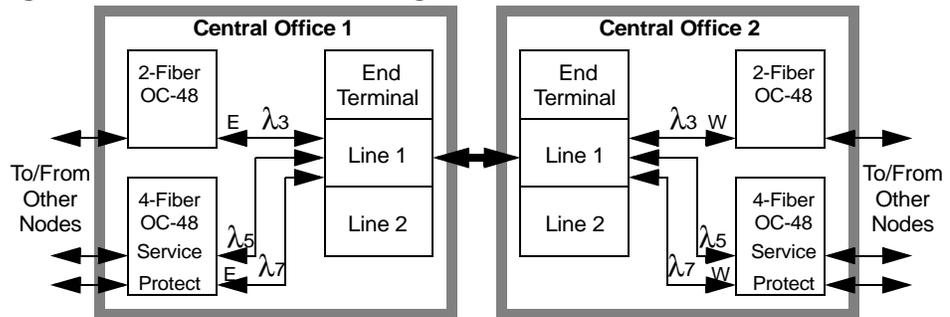
(Continued on next page)

WaveStar OLS 40G Basics (Continued)

Bidirectional Optical Line (continued)

To achieve full equipment diversity 4-fiber systems would use two optical lines, one for service and one for protection (Figure 2-3).

Figure 2-3.   Connection to Both One and Two Lines
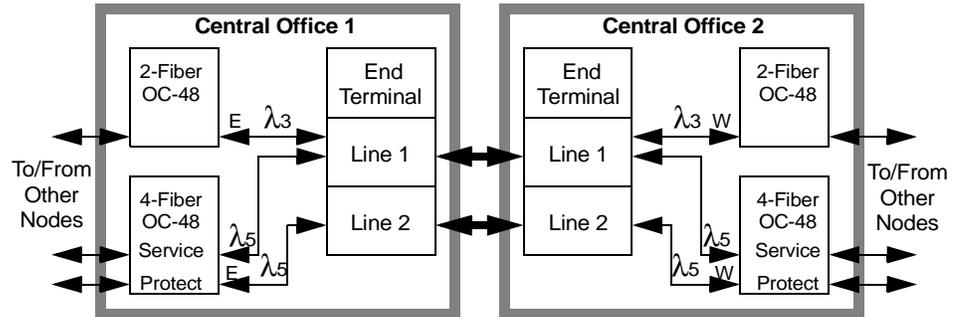
Basic WaveStar OLS 40G Shelf

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 2-4 and Figure 2-5.

Figure 2-4.   End Terminal Shelves (1A-TX at Left/1A-RCV at Right)
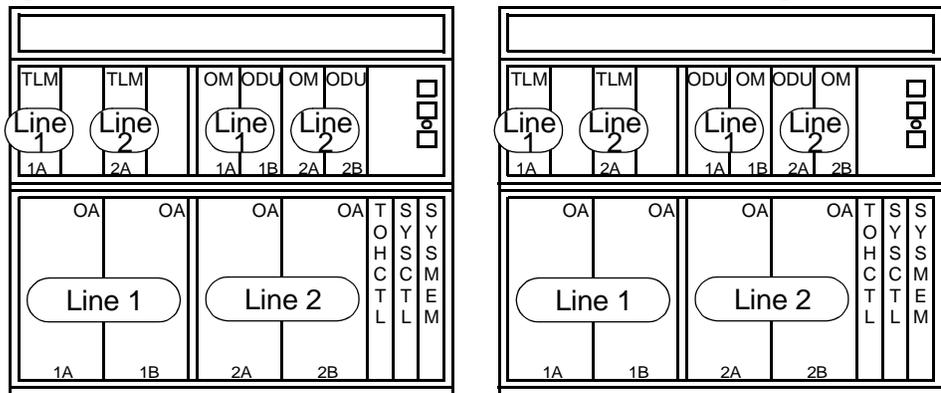
WaveStar OLS 40G Basics (Continued)

Basic WaveStar OLS 40G Shelf (continued)

Figure 2-5.   Repeater Shelf
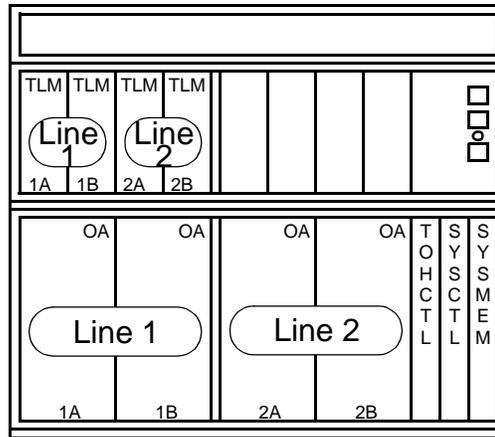
Both lines must connect between the same two locations. At Central Office 2, if one line is equipped using half the shelf to connect to Central Office 1, then the other half of the shelf cannot be used to connect to a different location (Central Office 3). Refer to Figure 2-6. This means that two shelves would have to be equipped and only half of each shelf will be used.

With the use of Release of 2.1 in 2-fiber systems, the requirement shown in Figure 2-6 on page 2-6 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 2-7 on page 2-7.

WaveStar OLS 40G Basics (Continued)

**Basic WaveStar
OLS 40G Shelf
(continued)**

Figure 2-6.   Optical Line Connections Between Offices (R1 and R2)
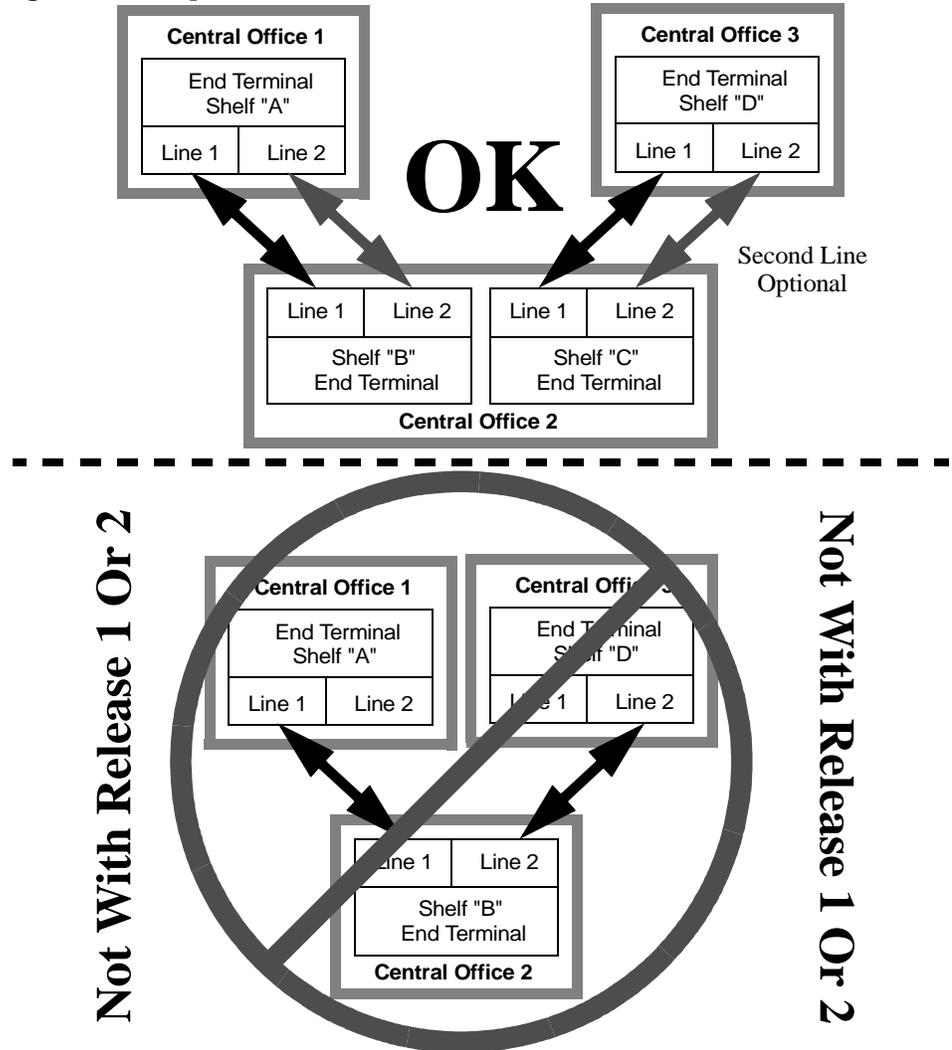
WaveStar OLS 40G Basics (Continued)

Basic WaveStar OLS 40G Shelf (continued)

Figure 2-7.   Optical Line Connections Between Offices (R2.1 Dual Facing Shelf)
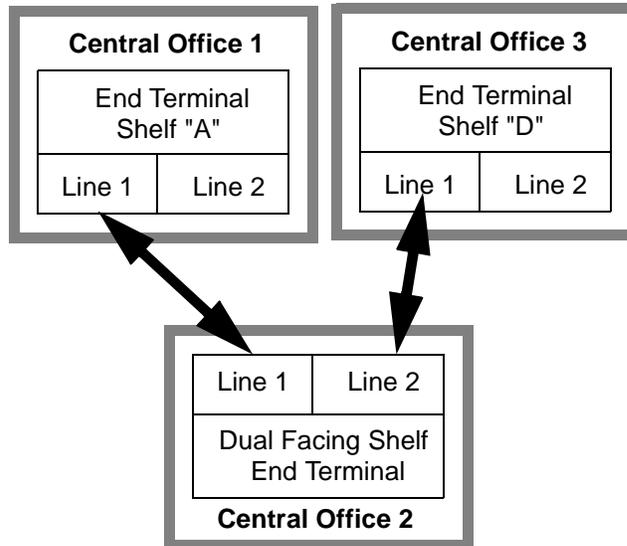
NOTE:
Line 2 of a dual facing shelf MUST be connected to Line 1 of the OLS next in the Optical Line.

WaveStar OLS 40G Basics (Continued)

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 2-8) or can be deployed between any or all nodes of a ring (Figure 2-9).

Figure 2-8.   Clearing Fiber Congestion
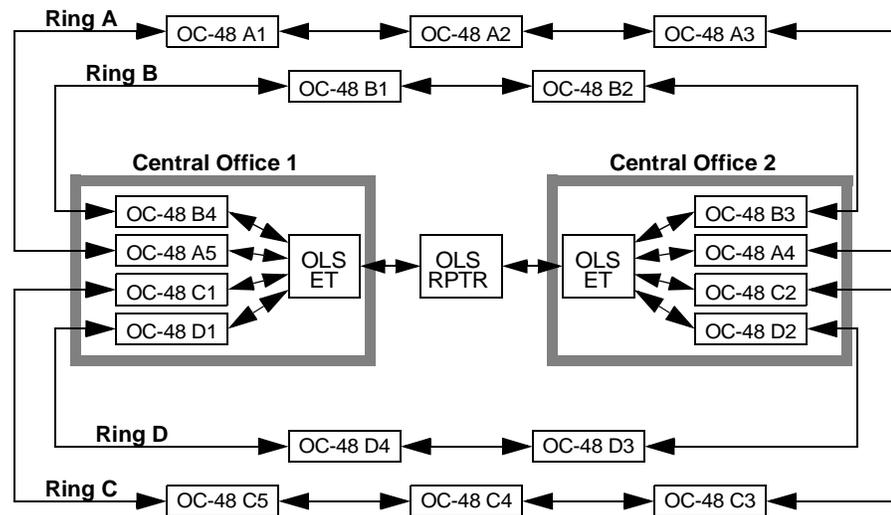
Note that when multiple Optical Line Systems are deployed between different nodes of a ring, the systems are independent and cannot communicate between each other. As an OLS only exists between the SONET nodes, an entirely different OLS will exist between the other SONET nodes. The OLS end terminals which are co-located in the same central office may be connected with telemetry feed-through, forming an effective DCC ring.

WaveStar OLS 40G Basics (Continued)

**Release 1 and 2
Network
Architectures
(continued)**

Figure 2-9.   Ring Systems
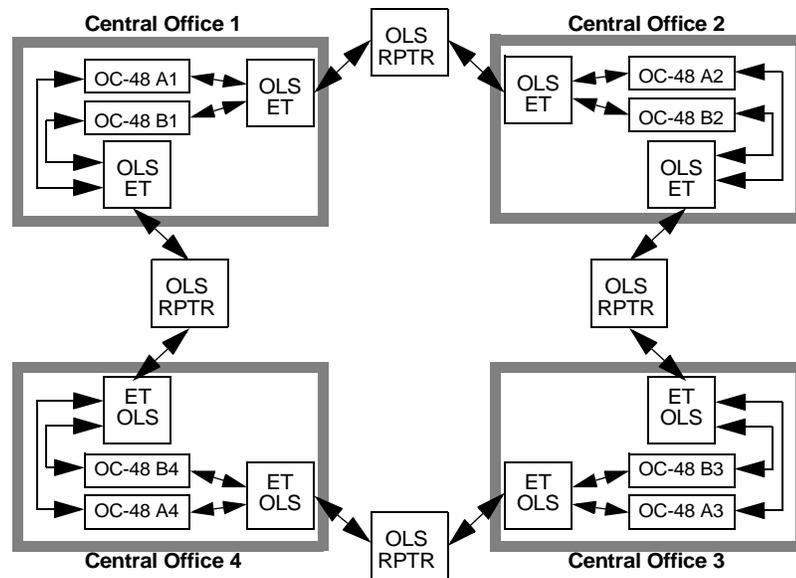
Other examples of network architectures include point-to-point (Figure 2-10) or linear add/drop systems (Figure 2-11). When an OLS is deployed between two central offices, it allows completely independent network architectures to exist on different wavelengths of the same fiber pair. For example, wavelengths 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.

Figure 2-10.   Point-to-Point Systems
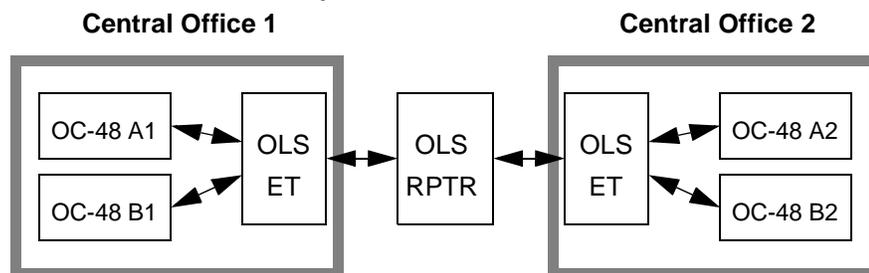
WaveStar OLS 40G Basics (Continued)

**Release 1 and 2
Network
Architectures
(continued)**

Figure 2-11. Linear Add/Drop Systems

WaveStar OLS 40G Basics (Continued)

**Release 1 and 2
Network
Architectures
(continued)**

Figure 2-11.   Linear Add/Drop Systems

Central Office 1

OC-48 A1 — OLS ET
OC-48 B1 — OLS ET

OLS RPTR

Central Office 2

OLS ET — OC-48 A2
OLS ET — OC-48 B2
OLS ET — OC-48 C2

Central Office 3

OC-48 B3 — OLS ET
OC-48 C3 — OLS ET

OLS RPTR
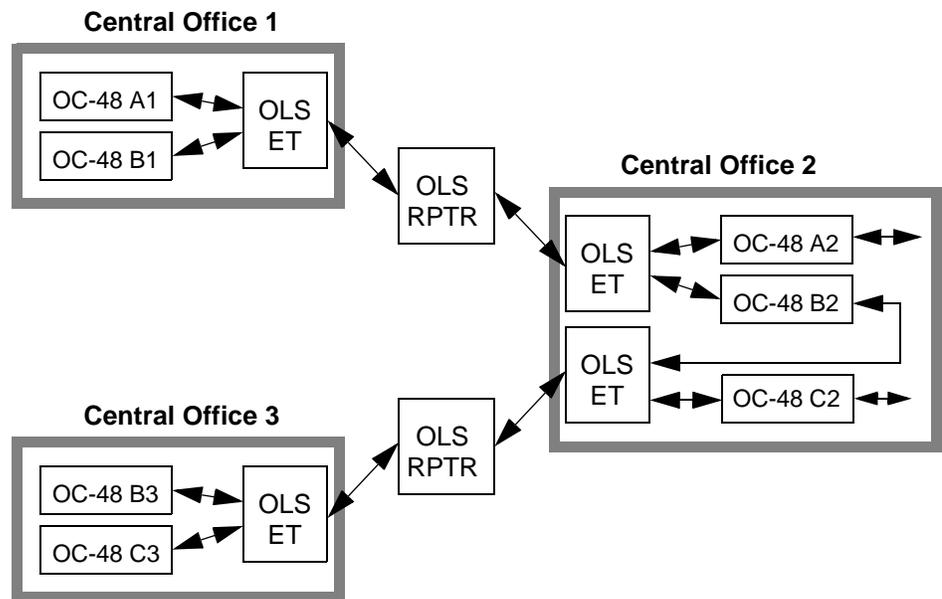
WaveStar OLS 40G Basics (Continued)

**Release 2.1
Architecture**

In addition to the options outlined in the previous section, Release 2.1 includes another feature for 2-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).

**Release 3
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 2-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 and 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 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.

WaveStar OLS 40G Basics (Continued)

Release 7 Architecture

Release 7 offers optical add-drop multiplexer (OADM) capabilities. Two components of OADM are add-drop flexibility and flexible amplification. Add-drop flexibility enables the add-drop of one or more channels without requiring the through traffic pay the penalty of regeneration. In this case, an OADM node would allow through, or express, traffic to pass through the node from ODU to OMU without passing through an OTU for regeneration. See Figure 2-12. To avoid jitter, all traffic must be regenerated in the fourth OADM node. For instance, in a ring with 6 nodes, all traffic would require regeneration once. In a ring with 4 OADM nodes and a number of repeaters, the traffic would not require signal regeneration with OTUs. The nodes shown in Figure 2-12. can be either dual end terminals or dual facing shelves. The engineering rules for through traffic can be found in the Applications, Planning, and Ordering Guide (365-575-384).

Figure 2-12.   Network Diagram with Wavelength Add/Drop and Through Channels
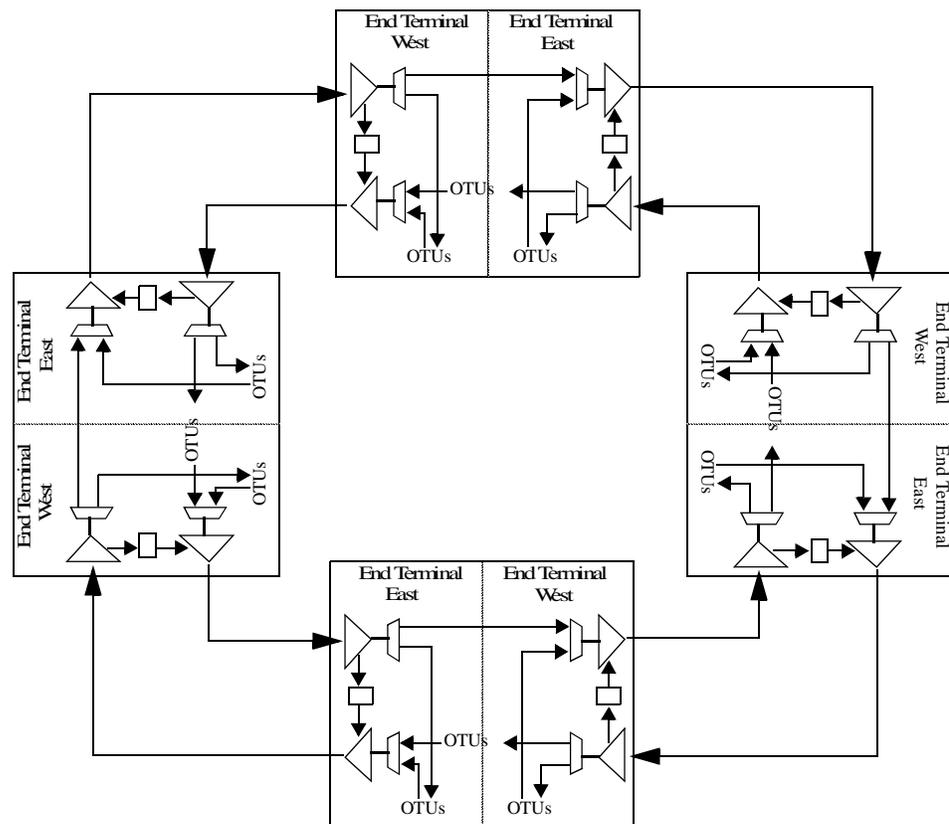
WaveStar OLS 40G Basics (Continued)

**Release 7
Architecture
(continued)**

There are currently 4 different amplifiers available that may be deployed in two-amplifier or single-amplifier applications to achieve the necessary distance and amplification requirements of the ring. This flexible amplification is necessary in ring applications where span distance between add-drop sites may vary greatly. The four different amplifiers offer a variety of short-haul and long-haul options between OADM nodes. Two of the amplifiers offer optical monitoring ports, which presents an advantage when using low loss OMU/ODUs for making through wavelength connections, because additional channels connecting to the OMU can be balanced appropriately without potential disruption to existing traffic.

Optical Line System Provisioning

Requirements   The entire Optical Line System consists of one or more subnetworks, each containing 1 or 2 lines, 2 End Terminals or ring (dual facing) 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 or dual facing shelf

- The AGNE should be located at a 1A-RX End Terminal or dual facing shelf

- 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

Optical Translator Basics

Description   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, 100 to 750 Mb/s or 1-Gb Ethernet 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, 100 to 750 Mb/s, or 1-Gb Ethernet signal and apply that signal to an OLS compatable optical wavelength while providing an OLS identification tone. Figure 2-13 shows Optical Translators being used with an OC-48 system.

Figure 2-13.   OT Connecting Non-OLS-Compatible Optics to WaveStar OLS 40G
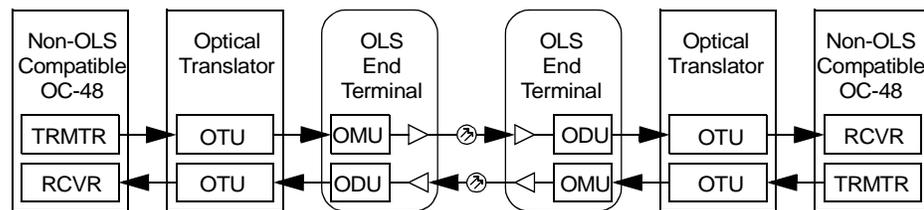
In OLS 40G systems with many repeater amplifiers, drop OTUs or OLS-compatible receivers are always required to guarantee performance. For shorter OLS 40G systems performing fiber congestion relief or metro/regional distribution, the existing customer standard receivers may perform sufficiently so the drop OTU is not needed.

The following requirements must be met to omit the drop OTU:

- The receiving equipment must be co-located with the OLS 40G equipment. The fiber jumper loss between the ODU on the OLS and the receiver must have less than 0.5 dB loss. If the receiving equipment is not co-located with the OLS 40G, then a drop OTU is required.

Optical Translator Basics (Continued)

Connecting Non-OLS-Compatible Optics to WaveStar OLS 40G (continued)

■ The receiver on the customer equipment must operate in the 1550nm band and meet the input power range and signal-to-noise requirements that the drop OTU would meet as specified in the Technical Specifications in the Applications, Ordering, and Planning Guide (APOG, 365-575-386). Not all receivers from all manufacturers will meet these requirements. Customers must evaluate the various receivers they wish to directly connect to the OLS 40G.

■ In the case of fiber congestion relief, if the OLS 40G system is inserted into a direct fiber span that previously carried the customer signal between transmitter and receiver, then no drop OTU is needed. In other words, if the customer equipment operated over the existing span, then it should also operate through the OLS 40G system using the same span.

■ For OLS 40G systems with more than one span, typically the drop OTU is required because the fiber dispersion or signal-to-noise performance exceeds the existing receiver capability.

Signal Regeneration and Wavelength Translation

Optical Translator Units are used between back-to-back OLS end terminals or in dual facing shelves 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 2-14.

Figure 2-14. OTUs Used for Signal Regeneration and Wavelength Translation
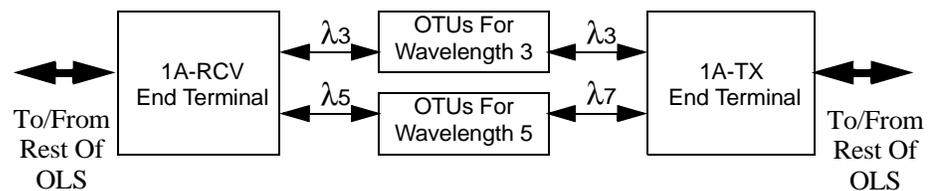
Wavelength Add-Drop

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 2-15.

Optical Translator Basics (Continued)

Wavelength Add-Drop (continued)

Figure 2-15. OTUs Used for Wavelength Add/Drop
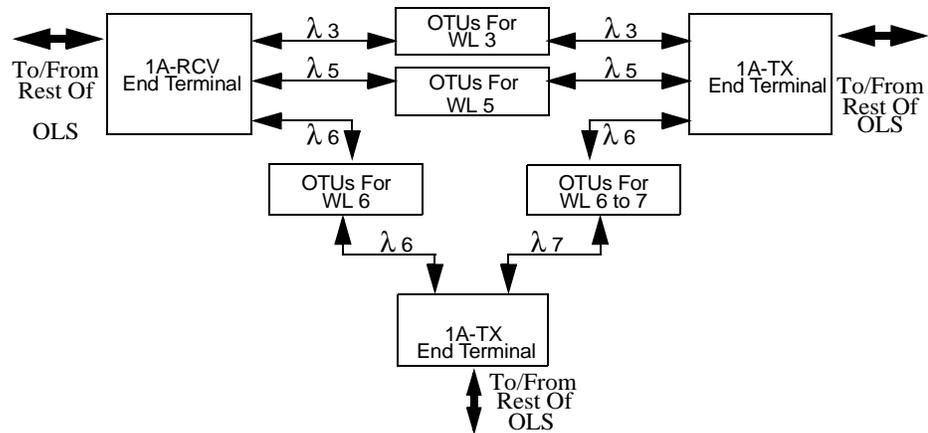
Wavelength Usage

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, and 1-Gb Ethernet WaveStar OLS 40G networks:

- Both directions of the OC-48/STM-16, OC-12/STM-4, OC-3/STM-1, or 1-
  Gb Ethernet system should be equipped on the same wavelength through
  an OLS.

- An OC-48/STM-16, OC-12/STM-4, OC-3/STM-1 or 1-Gb Ethernet 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 one line for transmission as shown in Figure 2-16. The SONET/SDH Terminal shown uses OLS compatible optics to connect directly to the WaveStar OLS 40G (no OTUs required).

Figure 2-16. Intraoffice Fiber Jumpers for 2-Fiber Systems
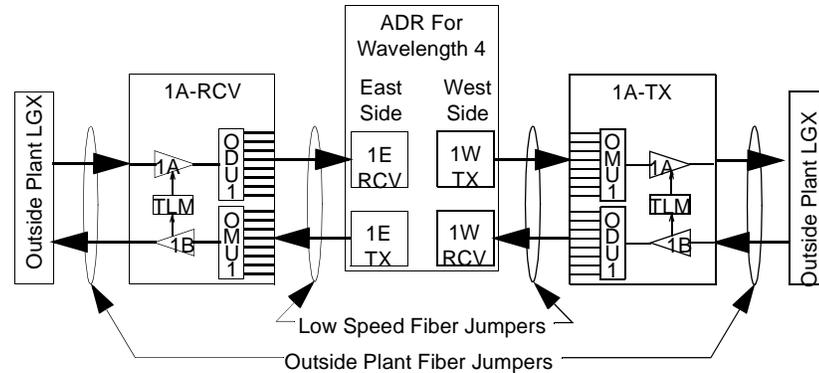
Connecting 4-Fiber SONET/SDH Systems

A 4-fiber SONET/SDH system typically uses two lines for transmission providing service and protection equipment diversity (shown in Figure 2-17). 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 2-18). The SONET/SDH Terminals shown use OLS compatible optics to connect directly to the system

Fiber Connections to WaveStar OLS
40G/OT (Continued)

Connecting 4-Fiber SONET/SDH Systems

Figure 2-17. Intraoffice Fiber Jumpers for 4-Fiber Systems (Equipment Diversity)
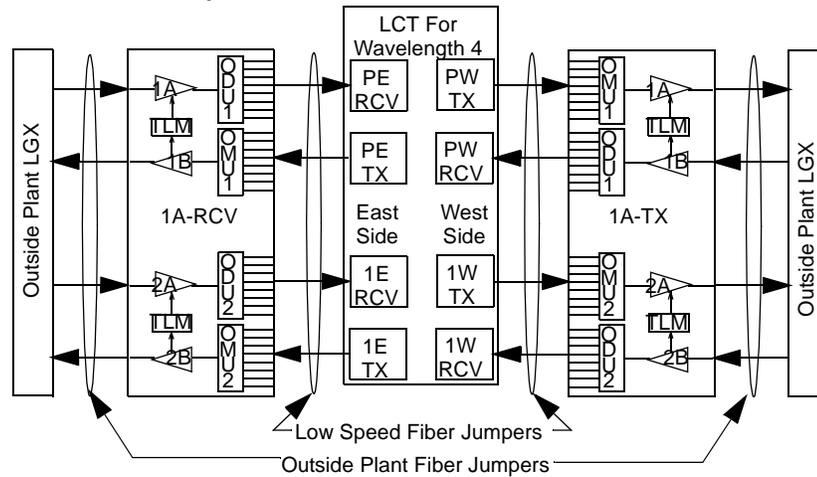
Figure 2-18. Intraoffice Fiber Jumpers for 4-Fiber Systems (Wavelength Diversity)
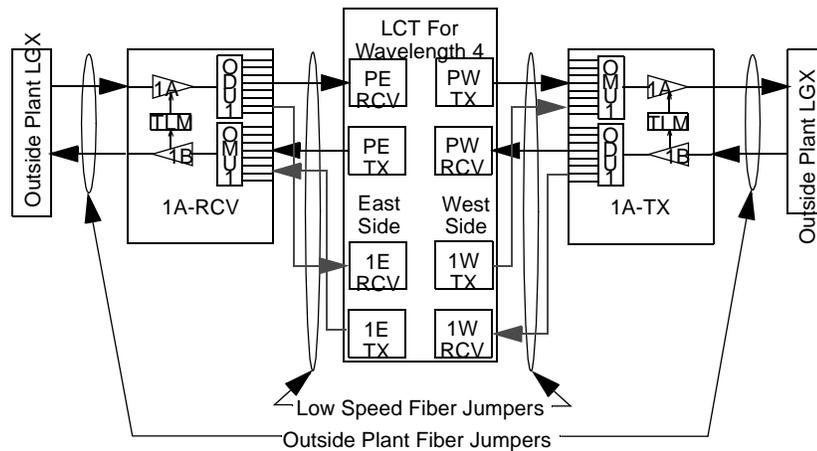
Fiber Connections to WaveStar OLS 40G/OT (Continued)

Connecting Optical Translators

Figure 2-19 shows the fiber jumpers for using OTUs to connect an SONET/SDH system without compatible optics to a WaveStar OLS 40G. The drop OTUs may be omitted if the system requirements described in Connecting Non-OLS-Compatible Optics to WaveStar OLS 40G: page 2-15, are met.

Figure 2-19. **Intraoffice Fiber Jumpers for SONET/SDH to WaveStar OLS 40G Through OTUs**
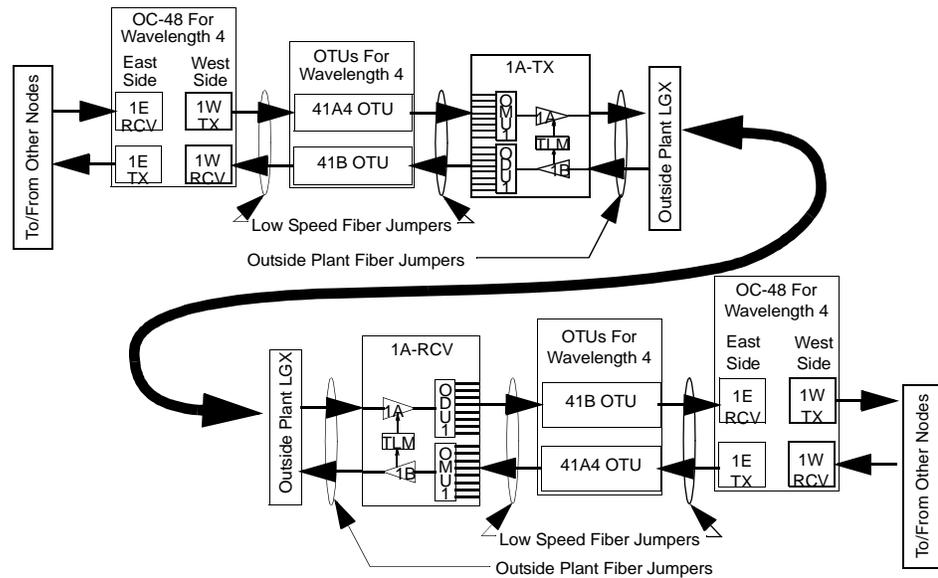
Fiber Connections to WaveStar OLS 40G/OT (Continued)

Connecting Optical Translators (continued)

Additionally, OTUs can be used to regenerate signals between Optical Line System end terminals. Figure 2-20 shows the fiber connections for using OTUs to regenerate a 2-fiber SONET/SDH system. Figure 2-21 shows the fiber connections for using OTUs to regenerate a 4-fiber SONET/SDH system using two lines.

Figure 2-20.   Intraoffice Fiber Jumpers for 2-Fiber System OT Regeneration
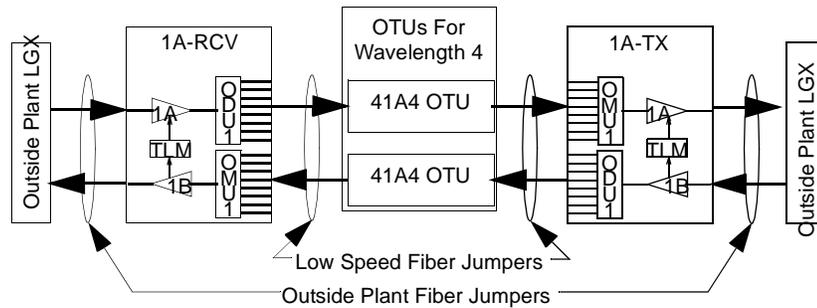
Figure 2-21.   Intraoffice Fiber Jumpers for 4-Fiber System OT Regeneration
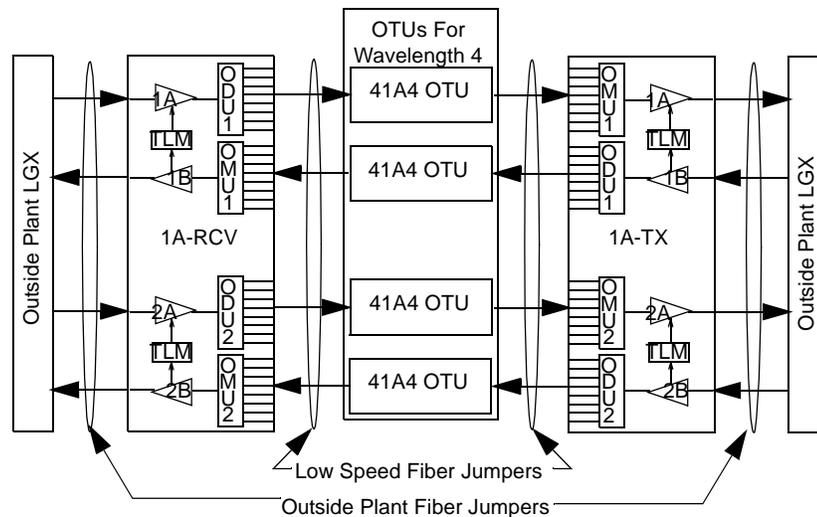
Equipment Installation

3

Contents

Overview

Introduction

This section covers the general requirements and methods for installing the WaveStar^{TM} OLS 40G equipment bay frames or 40G cabinet and its associated cable rack and end guard assemblies. It also covers the requirements and methods for installing the Optical Translator equipment bay frames or cabinet and the installation of miscellaneously 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.

Each bay is shipped with its wired shelves assembled, but without the circuit packs in place. Circuit packs are shipped separately for their protection.

Objectives

This chapter provides the following information:

1.   Required materials and tools for installation

2.   Procedures for:

    a.   Layout and drilling of mounting holes

    b.   Uncrating equipment bays

    c.   Moving equipment bays to mounting position

    d.   Erecting and mounting the frame

    e.   Connecting the frame to building ground

    f.   Installing associated bay frame assembly parts

Customer Installation Requirements

The WaveStar OLS 40G equipment bay frames or cabinets may be mounted on either concrete or raised floors and may accept power and network connections from either above or below the frames.

The customer is responsible for engineering the site in accordance with the WaveStar OLS 40G system engineering guidelines and determining the seismic rating for the location.

Background (Continued)

**Customer
Installation
Requirements
(continued)**

The mounting recommendations for Lucent Seismic Frames are:

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

➡ **NOTE:**
The customer shall provide mounting recommendations for use with the raised floor system at their location.

**Installer
Information**

The customer is responsible for providing the installer with:

■ Floor plan locations for mounting the WaveStar OLS 40G equipment bay frames or cabinets

■ Physical mounting arrangements based on the specific office requirements

Equipment Bays, Frames, and Cabinets

Equipment Bays   Common equipment bay and shelf configurations used with WaveStar OLS 40G installations are:

1. Integrated bay: consists of one OLS shelf, one OT system shelf, and one OT complimentary shelf premounted in the bay frame

2. OT bay: consists of one OT system shelf and two OT complimentary shelves premounted in the bay frame

3. Miscellaneously mounted OLS shelf used for Repeater applications

4. Miscellaneously mounted OT shelves used to complete OT capacity at end terminals or wavelength add/drop (dual facing) terminals

5. Rack and Stack Configurations consisting of 2-Bay, 3-Bay, or 5-Bay systems

Refer to Chapter 7, Ordering; OLS Package Descriptions, of the Application Planning Ordering Guide (APOG) for additional descriptions of the WaveStar OLS 40G equipment bays and shelves.

Frame Types   The WaveStar OLS 40G equipment bays may be ordered in the Lucent Seismic Network Bay Frame (ED-8C800-50 or ED8C801) or in the Lucent cabinets. Additionally, the equipment may be miscellaneously mounted in the Seismic Network Bay Frame, Lucent Cabinets, the Newton Instrument Seismic Network Frame (#0047011110), the Lucent ETSI Frame (comcode 848292264) or ETSI compatible racks.

Equipment Bays and Frames (Continued)

Related Information

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

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

Floor Plan Data References

The Floor Plan Data information for the four equipment bay configurations can be found in the documents listed below:

Frame Type	Lucent FPD Documents
Lucent Seismic Frame	804-604-163-001 (002), (003) & (004)
Newton Seismic Frame	804-604-163-006 (007), (008) & (009)
Lucent ETSI Frame	804-604-163-011 (012), (013) & (014)
Miscellaneous Mount Repeater Shelf	804-604-163-020

Materials and Tools

Equipment   Verify the WaveStar OLS 40G equipment bays or cabinets shipped to the location match the customer order.

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

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

Installation Tools   The installer is expected to have access to small hand tools normally used for assembling equipment frame hardware (see Section 1, Overall Installation and Test Considerations). Other suggested tools are listed in the table below:

Quantity	Description
1	Vacuum for cleaning up drilling debris
1	Drilling hammer for 5/8" drill (for use with concrete floors)
1	#54720 C-Tap connector Thomas & Betts™ or equivalent
1	TBM5 or TBM5S Crimping tool Thomas & Betts or equivalent
1	Brown or Pink Die Code Crimping Die Thomas & Betts or equivalent
1	Torque Wrench with minimum 25 ft.-lb. capacity
1	Anchor Setting Tool for Drop-In Anchors (comcode 406902049)
1	Anchor Setting Tool for Heavy-Duty Anchors (comcode 406899831)
1	Safety Goggles

Equipment Bay Frame Installation

Marking and Drilling Mounting Holes

Introduction

Marking and drilling the floor for the erection of bay frames is covered in this section.

⇒ **NOTE:**
For instructions regarding installation of Lucent Cabinets, proceed to Cabinet Installation: page 3-16.

Customer Provided Information

The customer must provide a floor layout or job floor plan showing the positions of the WaveStar OLS 40G equipment bays. This information will be used to mark the floor for drilling.

For raised floor installations, mark and drill mounting holes per the customer's instructions. Additional cutout areas may be designated to allow for power and network connections to be routed below the raised floor.

Special Considerations

It is recommended that a 1/8" clearance between adjacent bay frames be provided.

Equipment Bay Frame Installation (Continued)

Marking and Drilling Mounting Holes (continued)

Procedures

Listed below are the steps for marking the floor and drilling the holes in concrete floors:

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

Uncrating and Moving the Equipment Bay

Introduction

Covered in this section will be cautions and procedures necessary for uncrating the bays and moving them to the specified location.

Cautions ⚠

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

Do NOT stack equipment more than two bays high.

Equipment Bay Frame Installation (Continued)

Uncrating and Moving the Equipment Bay (continued)

Move container in shipping position only.

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

Use care during uncrating to avoid damage to equipment bay.

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

Physical size and weight may create hazards for installation personnel.

Tools and/or Equipment required

Listed in the table below are tools needed for uncrating and moving the bay frames into position:

Tool/Equipment	Purpose
Pinch-bar	Uncrating the bays
Claw-type Hammer	Uncrating the bays
Lifting and/or transporting device	Moving the bay into position

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

Equipment Bay Frame Installation (Continued)

Uncrating and Moving the Equipment Bay (Continued)

Uncrating the Bay

Listed below are the steps used to uncrate the bay:

Step	Action
1	Using a pinch-bar and claw type hammer in areas that have been nailed, uncrate the bay in its shipping position. The bottom plate where the bay rests may remain until the equipment bay is at its final position.
2	Remove the plastic bag and all foreign materials.
3	Remove the stile strips secured to the sides of the bay and set aside, if equipped.
4	Remove any guard rail covers from the base of the bay and set aside.

Moving the Bay - **Supplementary Information**

This section includes supplementary information for moving the bay to the designated site.

⚠ **CAUTION:**
The weight of an uncrated WaveStar OLS 40G equipment bay may exceed 450 pounds. Verify that all lifting and transporting devices are rated to accept the weight of the equipment bay. Two or more installers should be used to move a WaveStar OLS 40G equipment bay.

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

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

Equipment Bay Frame Installation (Continued)

Uncrating and Moving the Equipment Bay (continued)

Moving the Bay - Supplementary Information

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

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

Procedures for Moving the Bay

Below are listed the steps for moving the equipment bay to the specified location:

Step	Action
1	Plan out the moving procedure before starting to move the equipment. Two or more installers should be used for this operation.
2	Move the equipment bay to the designated location.

Equipment Bay Frame Installation (Continued)

Erecting and Mounting the Equipment Bay Frame

Introduction

Included in this section is the information to erect and mount the equipment bay frames.

Frame Extender

If the addition of frame extenders is required by the customer, assemble these before erecting and mounting the WaveStar OLS 40G equipment bays. Refer to Section 9 of Lucent 065-215-250 *Installation Guide for 500/800 Type Bay Frame* "Frame Extender Assembly" for mounting information.

Special Instructions

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

Bay Mounting and Line Up Assembly Procedure

Follow the steps outlined below to mount and assemble the equipment bay into a line up. Observe all moving cautions identified in the previous sections.

Step	Action
1	Lift the bay and place it into the proper location.
2	Visually inspect the bay and shelves for any physical damage.

Equipment Bay Frame Installation (Continued)

Erecting and Mounting the Equipment Bay Frame (Continued)

Equipment bay mounting and line up assembly continues:

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

⇒ **NOTE:**
For Rack and Stack Configurations, the distance between adjacent bays is 2 1/2" and between the end bay and endguard 5" is allowed. Use the spacing material supplied in ED8C806-50 G16.

Step	Action
4	Trial fit three 2" x 1 3/4" junction plates (top, middle and bottom) between the wide flange of the frame and frame of adjacent bays. Use the provided four 12-24x1/4 screws. Do not fully tighten the screws. When the junction plates can be assembled onto an adjacent bay and the equipment is level, the bay is ready to be assembled to the floor.
5	Assemble the bay to the floor using the mounting hardware specified on the customer order.
6	After hold down plates, studs, washers and nuts have been placed in position, tighten the nuts to a torque of 25 ft.-lbs. **Requirement:** Nuts to be tightened to a torque of 25 ft.-lbs.
7	Tighten the screws connecting the three junction plates between the equipment bay and any adjacent bay.

Equipment Bay Frame Installation (Continued)

Connecting the Equipment Bay Frame to Building Ground

Introduction

The following section provides the procedures necessary to connect the frames to building or office ground to:

- provide a direct earth ground connection for lightning protection.

- provide a common ground potential for electrostatic discharge (ESD) protection.

Additional information

All WaveStar OLS 40G equipment bay frames are shipped with a ground cable assembly. The ground cable should be connected between the bay frame ground connection point and a suitable building ground connection point immediately after the bay frame has been mounted to the floor.

Connecting the Bay Frame to Building Ground

Follow the steps listed below to connect the Bay Frame to building ground:

Step	Action
1	If not already attached, connect the ground cable lug to the bay frame at the unpainted area in the upper left front corner on the frame with two (2) #12-24 x 1/4 screws. (See note below for installation on raised floors.)
2	Connect the 6-gauge stranded ground wire to the building ground cable using a crimped Thomas & Betts 54720 C-tap lug. The recommended crimping tool is a Thomas & Betts TBM5S with die code "brown."

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

Installing Associated Bay Frame Assembly Parts

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

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

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

Cabinet Installation

Marking and Drilling Mounting Holes

Introduction

Marking and drilling the floor for the erection of Lucent Cabinets is covered in this section.

⇒ **NOTE:**
For instructions regarding installation of bay frames, proceed to Equipment Bay Frame Installation: page 3-7.

Customer Provided Information

The customer must provide a floor layout or job floor plan showing the positions of the WaveStar OLS 40G cabinets. This information will be used to mark the floor for drilling.

For raised floor installations, mark and drill mounting holes per the customer's instructions. Additional cutout areas may be designated to allow for power and network connections to be routed below the raised floor.

Special Considerations

It is recommended that a 1/8" clearance between adjacent cabinets be provided.

Cabinet Installation (Continued)

Marking and Drilling Mounting Holed (continued)

Procedures

Listed below are the steps for marking the floor and drilling the holes in concrete floors:

Step	Action
1	Obtain or create a template to match the four mounting holes in the base of the bay frame. Refer to Figure 3-1 on page 3-17 for cabinet mounting information. Location 1 is the preferred drilling location and location 2 is the secondary.

Figure 3-1.   Cabinet Framework Footprint

Cabinet Installation (Continued)

**Marking and
Drilling Mounting
Holed (continued)**

Step	Action
2	Refer to the job floor plan for cabinet-lineup location and, using a marking pencil or felt pen, mark the location of the mounting holes on the floor using the template
3	Drill four holes in the floor at the locations marked for the anchors ⚠ **CAUTION:** *Always wear safety glasses when drilling holes in concrete.*
4	Insert the drop-in anchors or heavy duty anchors as specified by job requirements
5	Follow the anchor manufacturer's assembly and setting instructions ⇛ **NOTE:** Refer to ED-5D511-31, "Hardware for Anchoring 5ESS Switch and 5ESS Cabinet and Cable Rack Support Stanchions" for details
6	Remove all debris from the mounting area
7	Determine if floor mounting area is level and if shims may be needed.

Cabinet Installation (Continued)

**Uncrating and
Moving the
Cabinet**

Introduction

Covered in this section will be cautions and procedures necessary for uncrating
the cabinets and moving them to the specified location.

Cautions ⚠

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

Do NOT stack equipment more than two cabinets high.

Move container in shipping position only.

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

Use care during uncrating to avoid damage to equipment bay.

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

Physical size and weight may create hazards for installation personnel.

Cabinet Installation (Continued)

**Uncrating and
Moving the
Cabinet
(continued)**

Tools and/or Equipment required

Listed in the table below are tools needed for uncrating and moving the cabinet into position:

Tool/Equipment	Purpose
Pinch-bar	Uncrating the cabinet
Claw-type Hammer	Uncrating the cabinet
Lifting and/or transporting device	Moving the cabinet into position

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

Uncrating the Bay

Listed below are the steps used to uncrate the bay:

Step	Action
1	Using a pinch-bar and claw type hammer in areas that have been nailed, uncrate the bay in its shipping position. The bottom plate where the bay rests may remain until the equipment bay is at its final position.
2	Remove the plastic bag and all foreign materials.
3	Remove any guard rail covers from the base of the bay and set aside.

Cabinet Installation (Continued)

Uncrating and Moving the Cabinet (continued)

Moving the Cabinet - Supplementary Information

This section includes supplementary information for moving the cabinet to the designated site.

⚠ **CAUTION:**
The weight of an uncrated WaveStar OLS 40G cabinet may exceed 450 pounds. Verify that all lifting and transporting devices are rated to accept the weight of the cabinet. Two or more installers should be used to move a WaveStar OLS 40G cabinet.

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

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

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

Procedures for Moving the Bay

Below are listed the steps for moving the equipment bay to the specified location:

Step	Action
1	Plan out the moving procedure before starting to move the cabinet. Two or more installers should be used for this operation.
2	Move the cabinet to the designated location.

Cabinet Installation (Continued)

**Install EMC
Coverplates - OT
Cabinet Only**

Introduction

EMC coverplates are required on both sides of the OT cabinet. The only exception allowed is for the installation of end guards which is described later in this section. 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 standing alone with both sides exposed. Review installation instructions to determine which sides will have end guards installed. Do not install EMC side shields and vertical cable channels to these sides.

Procedure

Follow the steps outlined below to mount and assemble the EMC Coverplates on the OT cabinet.

Step	Action
1	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 the top and bottom of the frame. Align bolts with threads on the Vertical Cable Channel, and secure the channel to the frame using four bolts per channel as shown in Figure 3-2 on page 3-23.
2	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 3-2 on page 3-23. 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.
3	Install left and right side panels using the eleven (11) Phillips head screws (M5 X 0.8 X 6 mm) per side. Refer to Figure 3-2 on page 3-23.

Cabinet Installation (Continued)

**Install EMC
Coverplates - OT
Cabinet Only
(Continued)**

Figure 3-2.   EMC Coverplate Information — OT Only

Vertical Cable Channel

M6 Bolts

Clearance Hole for
Coupling Bolt
4 per Panel

M6 Bolts
(Bolt head on inside)

Left EMC Side Panel

M5 X 6 Phillips Hd
Screw
11 Req'd
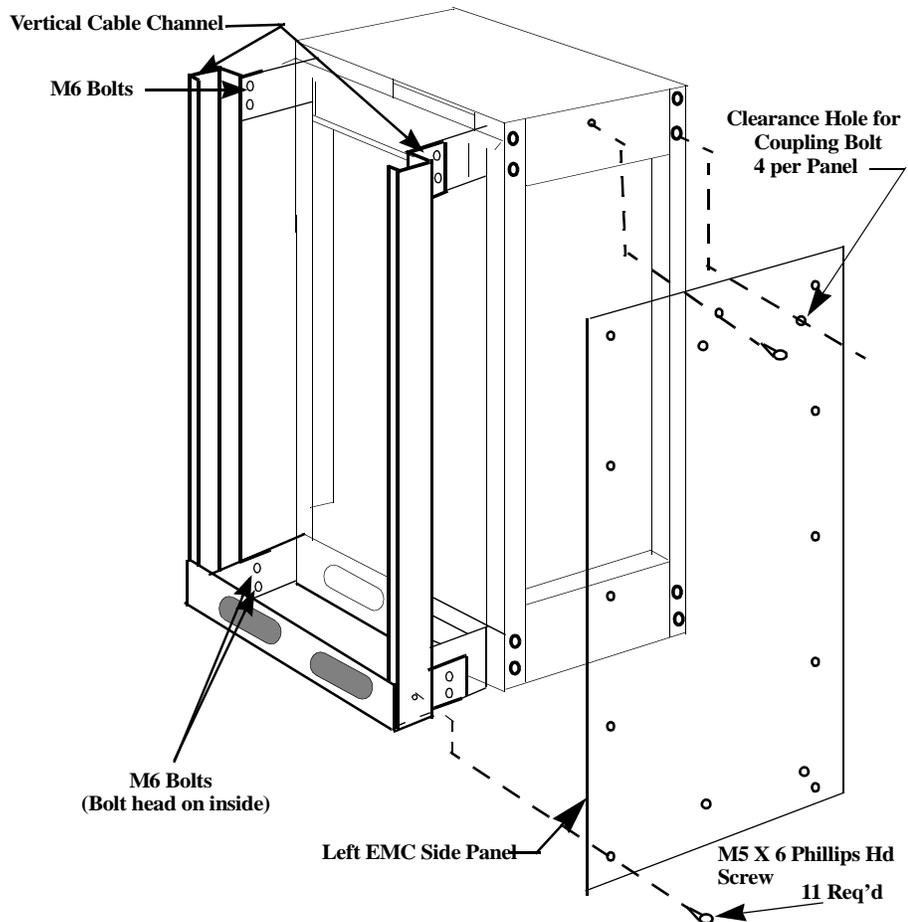
Cabinet Installation (Continued)

Erecting and Mounting the Cabinet

Introduction

Included in this section is the information to erect and mount the cabinet.

Special Instructions

Do not remove any of the premounted shelves from the cabinet. These parts may be interconnected and require precise alignment.

Cabinet Mounting and Line Up Assembly Procedure

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

Step	Action
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. Refer to ED-5D511-31, "Hardware for Anchoring 5ESS Switch and 5ESS Cabinet and Cable Rack Support Stanchions" for details.

Cabinet Installation (Continued)

**Erecting and
Mounting the
Cabinet
(continued)**

Install Cable Rack Top

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

Step	Action
1	Verify the cabinet is not grounded.
2	Connect the ED-5D742-70, G2 and G10 cable rack to the cabinet using the four supplied bolts as shown in Figure 3-3, "Cable Rack Top Installation."

> **NOTE:**
> Information on ordering and installation of cable racks is included on
> ED-5D742-10 and ED-5D742-70 for the 5ESS-2000 system.

Cabinet Installation (Continued)

**Erecting and
Mounting the
Cabinet
(Continued)**

Figure 3-3.   Cable Rack Top Installation
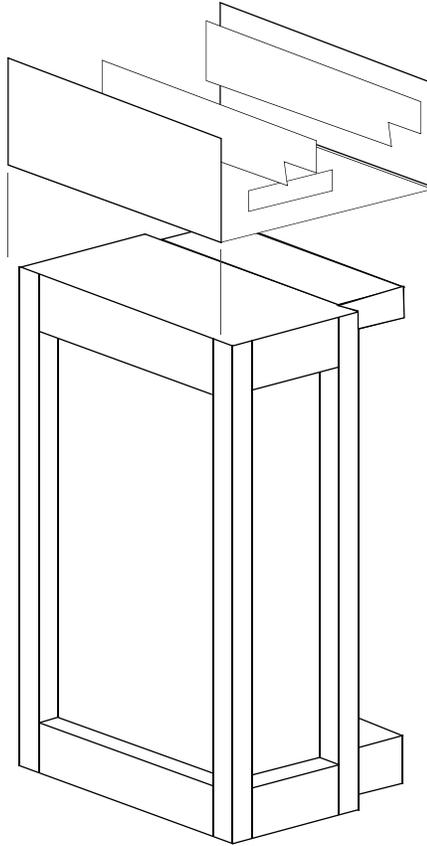
Cabinet Installation (Continued)

Connecting the Cabinet to Building Ground

Introduction

The following section provides the procedures necessary to connect the cabinets to building or office ground to:

1. provide a direct earth ground connection for lightning protection.

2. provide a common ground potential for electrostatic discharge (ESD) protection.

Additional Information

All WaveStar OLS 40G and OT cabinets are shipped with ground cable assemblies attached to the frame. It will be necessary to terminate the ground wire in the cable rack. When a cabinet is installed, it should be connected to the building ground as soon as possible after the cable rack is installed.

Connecting the Cabinet to Building Ground

Follow the steps listed below to connect the Cabinet to building ground:

Step	Action
1	Connect the ground cable lug to the bay frame at the unpainted area in the upper back right corner on the frame with two (2) #12-24 x 1/4 screws. (See note below for installation on raised floors.)
2	Connect the 6-gauge stranded ground wire to the building ground cable using a crimped Thomas & Betts 54720 C-tap lug. The recommended crimping tool is a Thomas & Betts TBM5S with die code "brown."

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

Cabinet Installation (Continued)

Additional Cabinet Assembly

Introduction

The following section provides the procedures necessary to perform additional cabinet assembly, such as:

- installation of door frame and door assemblies
- assembly and installation of the alarm indicator strip
- installation of end guards

Install Door Frame Procedure

Assemble the door frames as follows:

Step	Action
1	Mount the lower door frame assemblies to the front and rear of the cabinet using four supplied screws. Part A on Figure 3-4 on page 3-29 and Figure 3-5 on page 3-30.
2	Pull the alarm cables through the cable access window (shown in Figure 3-4 on page 3-29) by clipping any necessary factory tie downs.
3	Mount the upper door frame assemblies to the front and rear of the cabinet using three supplied screws. Part B on Figure 3-4 on page 3-29 and Figure 3-5 on page 3-30.

Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(Continued)**

Figure 3-4.   Front Door Frame Assembly
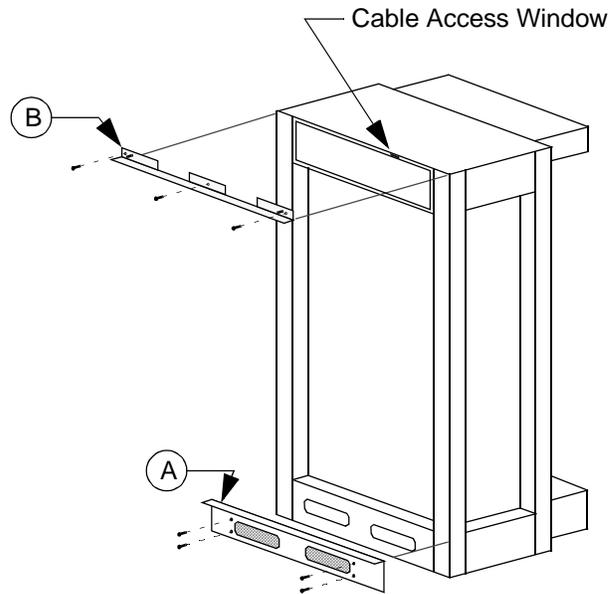
Cable Access Window

(Continued on next page)

Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(continued)**

Figure 3-5.   Rear Door Frame Assembly
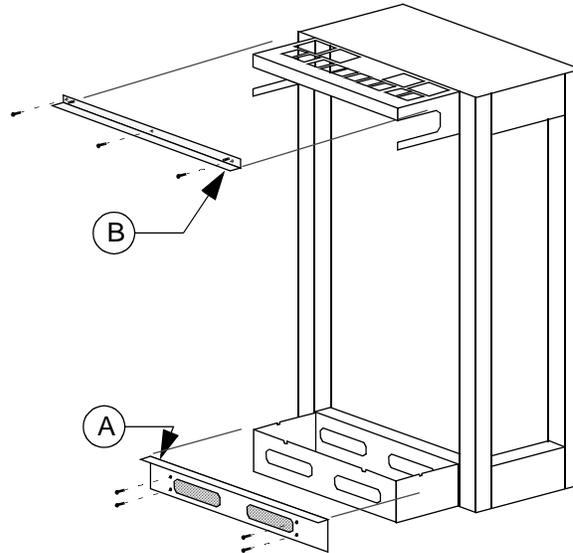
(Continued on next page)

Cabinet Installation (Continued)

Additional Cabinet Assembly (Continued)

Indicator Strip Wiring - Dual 2-Line Cabinet

Follow the steps in the table below to install the Alarm Circuit Module for WaveStar OLS 40G Dual 2-Line Cabinet:

Step	Action
1	Dress the alarm cables through the frame cable window and over the notch in the top of the alarm circuit module.
2	Install the 481A alarm circuit modules using three supplied screws for each as shown in Figure 3-6.
3	Plug the J1B connectors into the 481A alarm circuit module and route cables as shown in Figure 3-7.

Figure 3-6.   Alarm Circuit Module Installation for OLS Dual 2-Line Cabinet
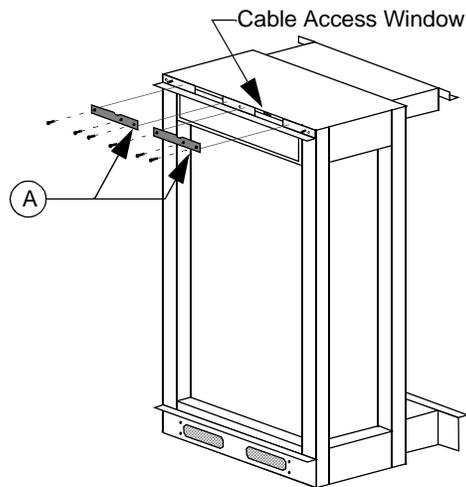
Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(continued)**

**Figure 3-7.   Alarm Circuit Module Cable Routing for OLS Dual 2-Line
Cabinet**
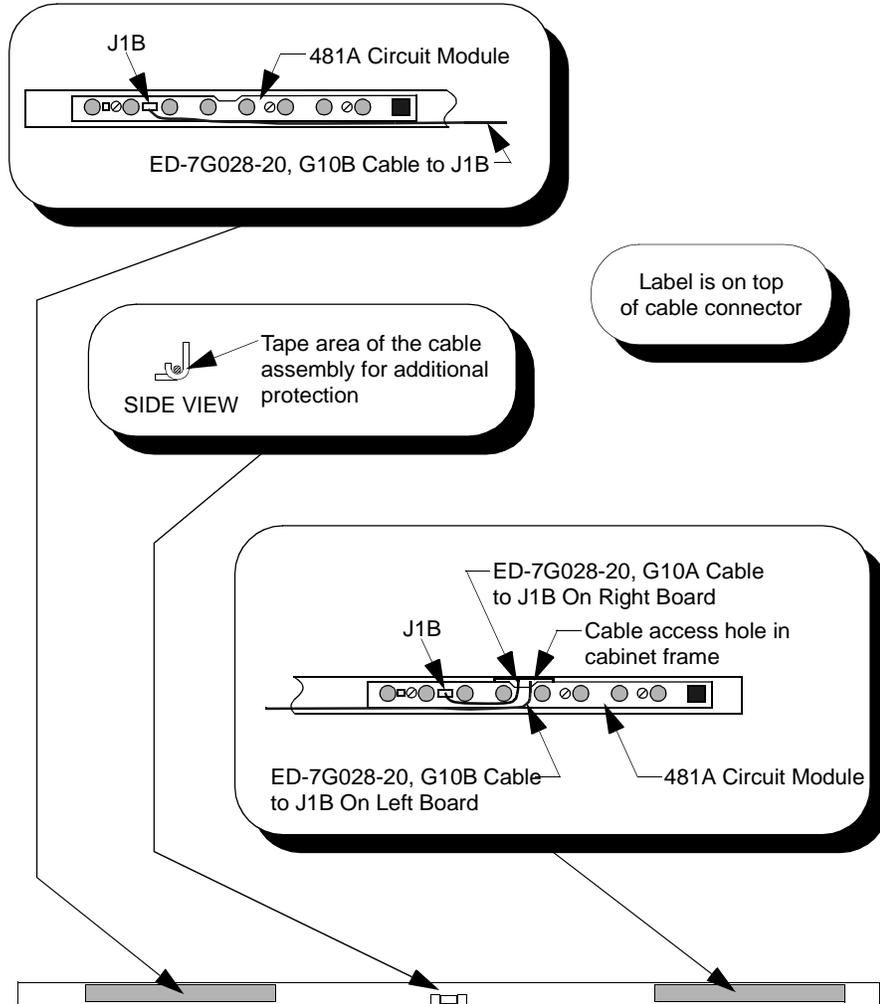
J1B

481A Circuit Module

ED-7G028-20, G10B Cable to J1B

Label is on top
of cable connector

Tape area of the cable
assembly for additional
protection

SIDE VIEW

ED-7G028-20, G10A Cable
to J1B On Right Board

J1B

Cable access hole in
cabinet frame

ED-7G028-20, G10B Cable
to J1B On Left Board

481A Circuit Module

Cabinet Installation (Continued)

Additional Cabinet Assembly (Continued)

Indicator Strip Wiring - OT Cabinet

Use the steps in the table below to install the Alarm Circuit Module for OT Cabinet:

Step	Action
1	Dress the alarm cables through the frame cable window and over the notch in the top of the alarm circuit module.
2	Install the 857A alarm circuit module (Part of OT Installation Kit P/N 847814316) using the three supplied screws as shown in Figure 3-6.
3	Plug the J1B, J2B and J3B connectors into the 857A alarm circuit module and route the cables as shown in Figure 3-8

Figure 3-8.   Alarm Circuit Module Routing for OT Cabinet
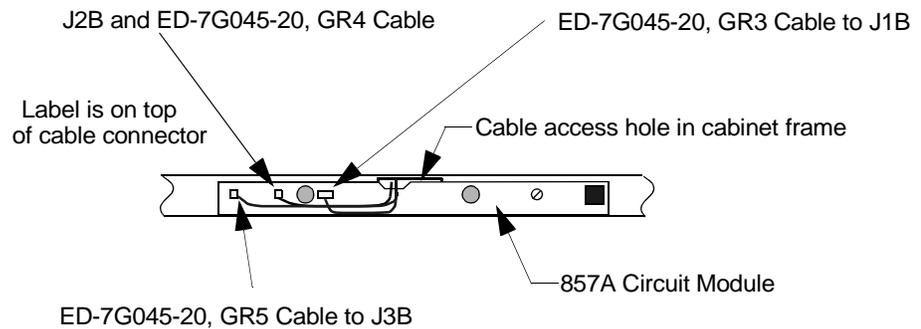
J2B and ED-7G045-20, GR4 Cable

ED-7G045-20, GR3 Cable to J1B

Label is on top of cable connector

Cable access hole in cabinet frame

857A Circuit Module

ED-7G045-20, GR5 Cable to J3B

Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(Continued)**

Install Door Procedure

Assemble the doors as follows:

Step	Action
1	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 3-9 on page 3-35.
2	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 3-10.
3	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 3-9.
4	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 3-10

Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(continued)**

Figure 3-9.   Front Door Assembly
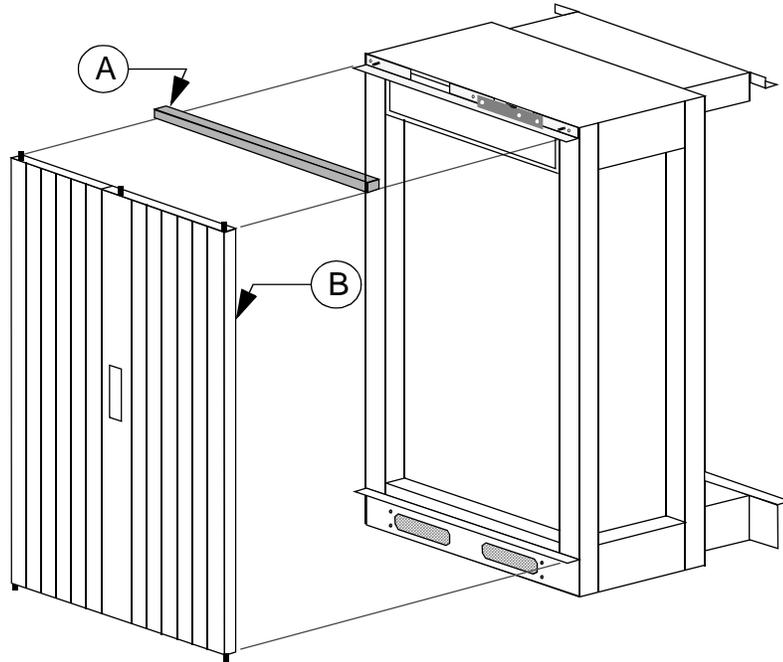
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Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(Continued)**

Figure 3-10.   Rear Door Assembly
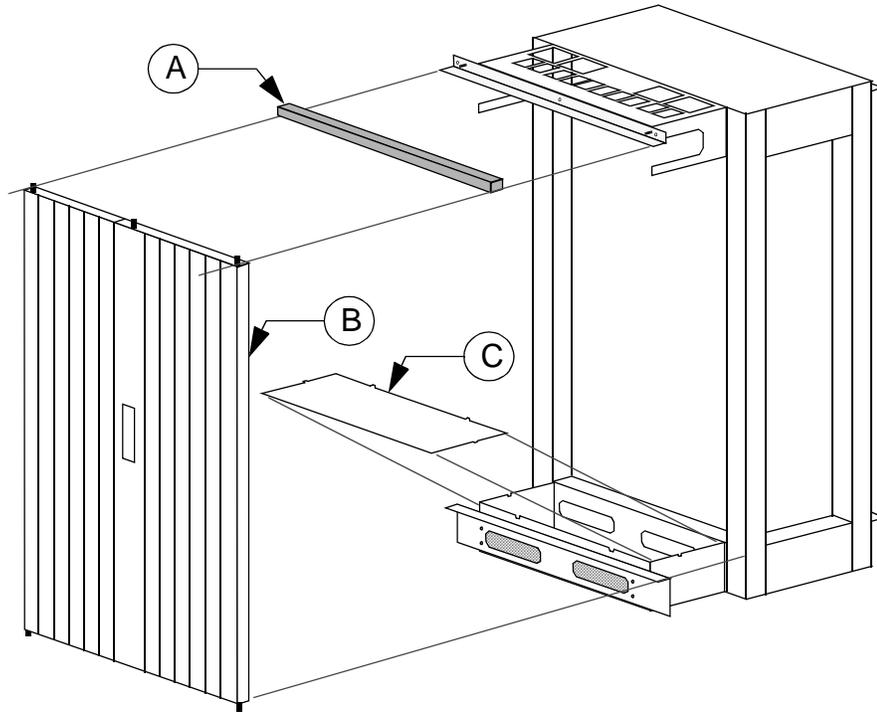
Cabinet Installation (Continued)

Additional Cabinet Assembly (continued)

Install Cabinet Door Grounding Cables Procedure

Install grounding cable assemblies to door and frame as follows:

Step	Action
1	Locate the four (4) grounding cable assemblies in installation kit.
2	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 3-11 on page 3-38. Torque screw to 10 inch-lbs (1.13 nm). Do not overtorque.
3	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 nm).
4	Repeat the process for the other rear door.
5	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 3-12 on page 3-39. Torque screw to 10 inch-lbs (1.13 nm). Do not overtorque.
6	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 Nm).
7	Repeat the process for the other rear door.

Cabinet Installation (Continued)

Additional Cabinet Assembly (continued)

Figure 3-11.   Mounting of Rear Door Grounding Cables
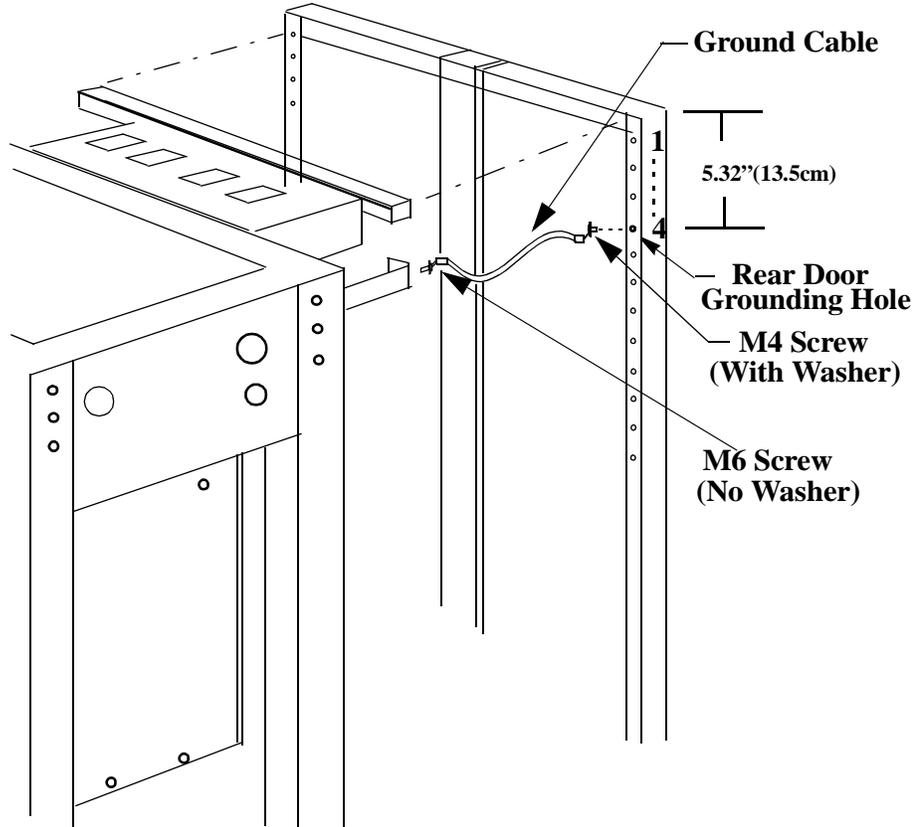
Ground Cable

1

5.32"(13.5cm)

4

Rear Door Grounding Hole

M4 Screw (With Washer)

M6 Screw (No Washer)

Cabinet Installation (Continued)

Additional Cabinet Assembly (Continued)

Figure 3-12. Mounting of Front Door Grounding Cables
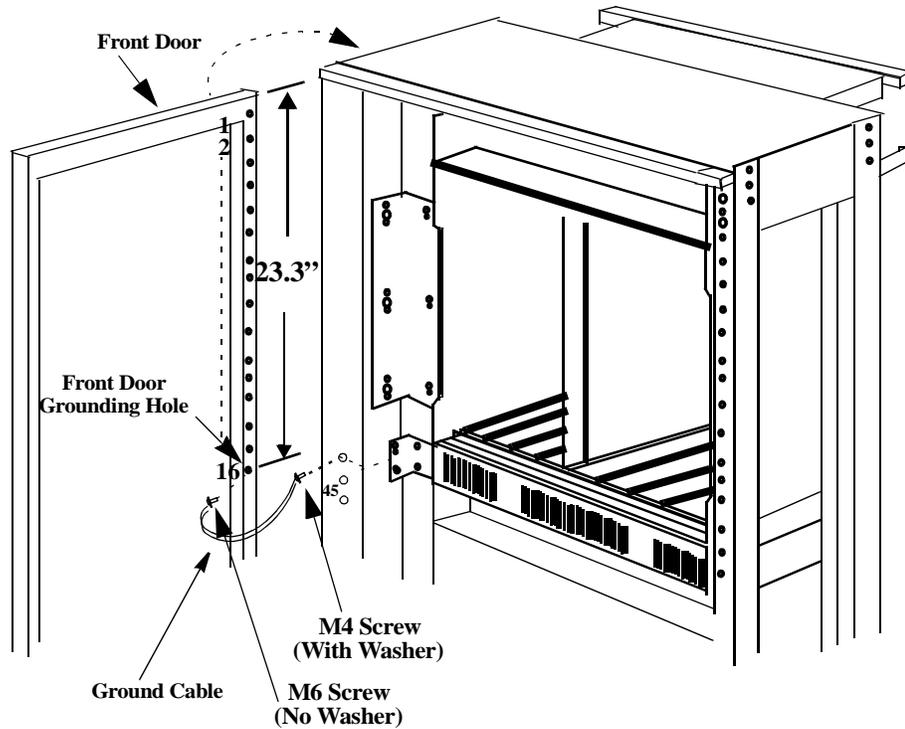
Front Door

1
2

23.3"

Front Door Grounding Hole

16

45

M4 Screw (With Washer)

Ground Cable

M6 Screw (No Washer)

Cabinet Installation (Continued)

**Additional
Cabinet Assembly
(Continued)**

Install End Guard Assembly

When end guards are required, assemble the ED-5D743-70, G21 (left) and G22 (right) end guards to the sides of the cabinet as shown in Figure 3-13. Additional information on ordering and installing end guards is included on ED-5D743-10 and ED-5D743-70 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 3-2).

Figure 3-13.   End Guard Installation
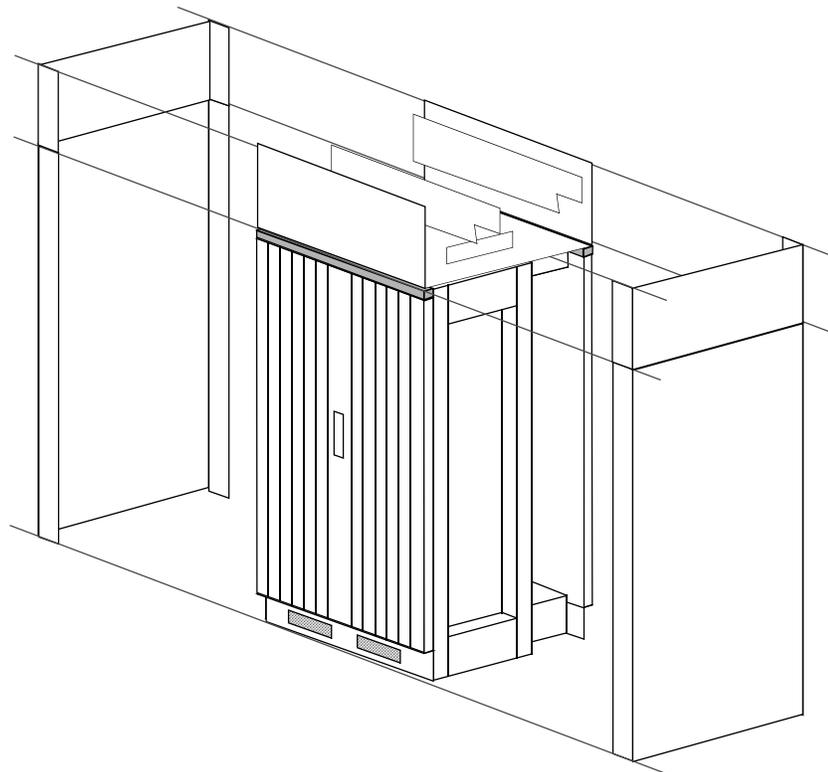
Miscellaneous Mount Installation

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

Bay Frame Requirements   The frames used to mount the miscellaneous OLS or OT shelves must meet the following requirements:.

Frame Feature	Dimension
Side to Side Horizontal Opening	21.5 inches
Hole to Hole Horizontal Spacing	22.312 inches
Vertical Mounting Holes Spacing	1.0 inch on center

Figure 3-14 shows a List 10 Miscellaneously Mounted OT mounted to a Lucent Technologies 800 Type bay frame. Figure 3-15 shows two Miscellaneously Mounted OLS shelves mounted to a Lucent Technologies 800 Type bay frame.

> **NOTE:**
> A three-inch high heat baffle kit may be substituted for the open space at the top of the OT bay.

Miscellaneous Mount Installation (Continued)

Bay Frame Requirements (continued)

Figure 3-14.   Miscellaneously Mounted OT
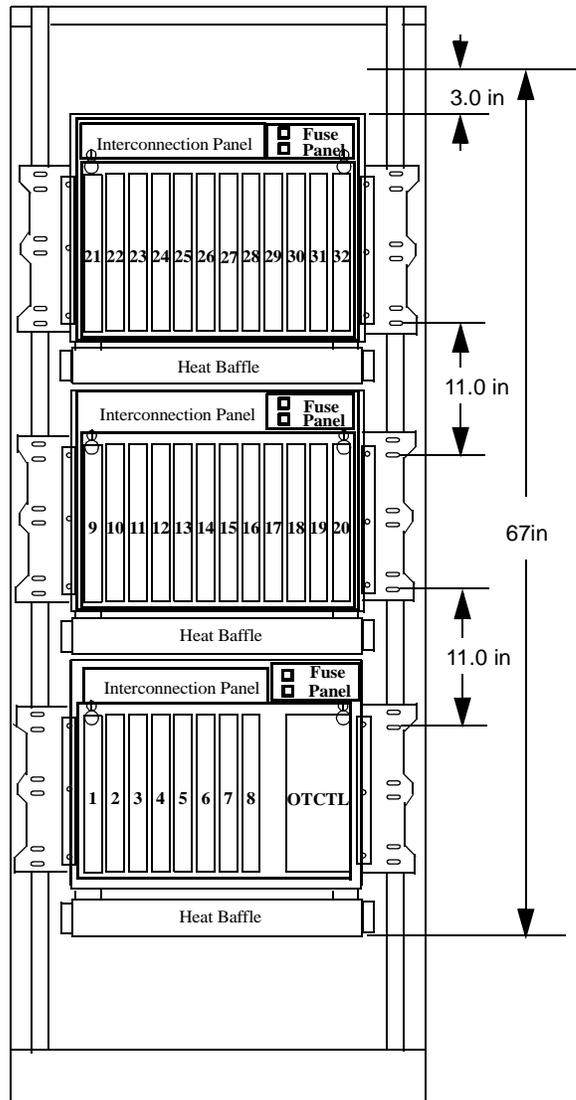
Miscellaneous Mount Installation (Continued)

Bay Frame Requirements (continued)

Figure 3-15.   Two Miscellaneously Mounted OLS Shelves

3" Space Left Above Shelf or Heat Baffle

Heat Baffle
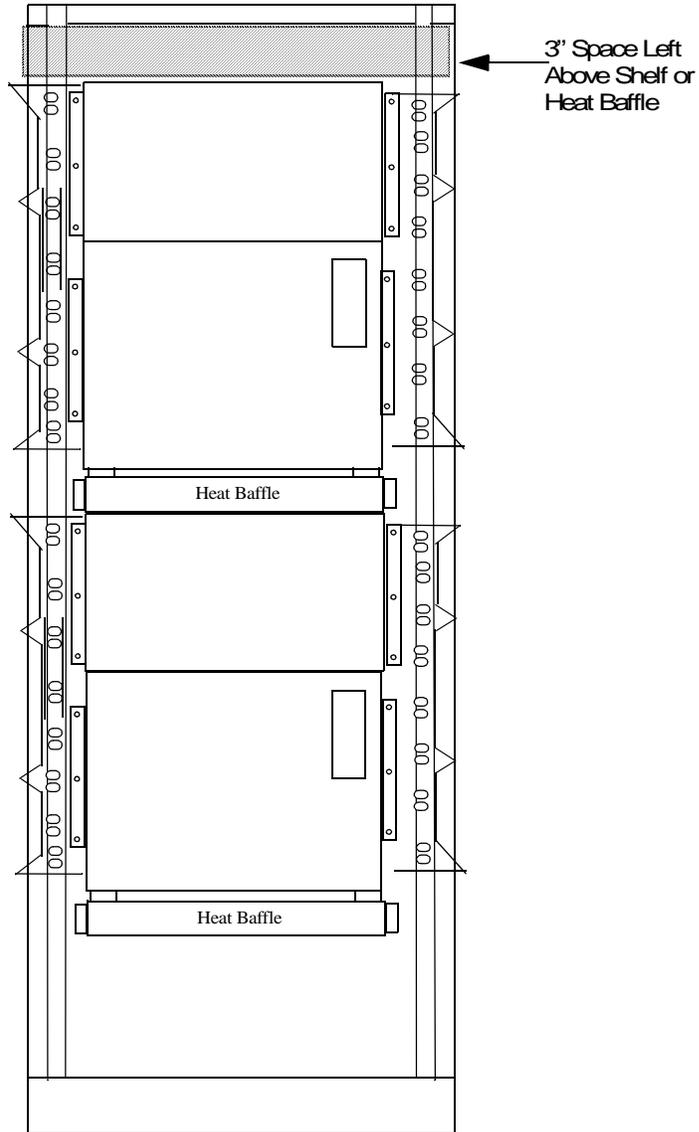
Heat Baffle

Miscellaneous Mount Installation (Continued)

Vertical Space Requirements

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 3-14 on page 3-42, must be maintained for the miscellaneous OT shelves. 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 OLS or OT miscellaneously mounted shelf 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:

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 and 12	66 Inches

Adjustment of 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.

Miscellaneous Mount Installation (Continued)

**Adjustment of
Side Mounting
Brackets
(continued)**

If the mounting bracket needs to be moved, follow the procedures in the table below:

Step	Action
1	Remove the three (3) screws holding the bracket
2	Slide the bracket one inch forward towards the front of the shelf
3	Align the bracket holes with the new set of mounting holes on the chassis side. **Result:** The bracket should now be parallel with its previous position, offset by one inch.
4	Install and tighten the mounting screws
5	Perform the same operation with the mounting bracket on the other side of the shelf
6	Repeat the process for the brackets on any remaining shelves

**Mounting Shelves
to Bay Frame**

Mount the 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. Verify a three (3) inch or greater open space is available above the shelf.

Miscellaneous Mount Installation (Continued)

Mounting Shelves to Bay Frame (continued)

For mounting an OT shelf in an **ETSI 300mm Bay frame**, follow the steps listed in the table:

Step	Action
1	Remove the shelf ground cable and side mounting brackets
2	remove shielding plate from each side by removing the three screws holding the plate
3	Hook mounting flange supplied with the installation kit (C848065959) through the side holed and mount to shelf side using the three screws that were used for the shielding plate
4	Use the installed flange for mounting shelf to the front of the bay and to provide grounding to bay
5	If the bay is not grounded, use the removed ground cable to ground bay frame

For mounting an OLS shelf in an **ETSI 300mm Bay frame**, follow the steps outlined below:

Step	Action
1	Remove the shelf ground cable and side mounting brackets
2	Use the front flange for mounting and grounding shelf to bay
3	If bay is not grounded, use removed ground cable to ground bay frame

Rack and Stack Configurations

Description   Rack and Stack configurations can come as 2-Bay, 3-Bay or 5-Bay systems. The installation of the frames and shelves, plus additional accessories is covered in this subsection.

Bay Installation   The bay configurations for a 2-Bay system are an integrated bay and a bay of miscellaneously mounted OT shelves. The integrated bay occupies position one (Bay 1) which is the left-most position, and the second bay (Bay 2) will house the two OT shelves. See Figure 3-16.

Figure 3-16.   Bay and Shelf Positions: 2-Bay Rack and Stack

Bay 1	Bay 2
OT Comp. 1	
OT System Controller	OT Comp. 1
OLS	OT System Controller

The bay configurations for a 3-Bay system consists of a integrated bay in position 1 (Bay 1), an OT bay in position 2 (Bay 2) and a miscellaneously mounted OT shelf in the top of Bay 3. Bay 2 contains three OT shelves. In the 5-Bay configuration Bays 1 and 2 are identical to the 3-Bay system. Additionally, the 5-Bay system has an integrated bay as Bay 5 and another OT bay for Bay 4. Bay 3 contains two miscellaneouly mounted OT shelves. See Figure 3-17 on page 3-48.

Rack and Stack Configurations (Continued)

Bay Installation (continued)

Figure 3-17.   Bay and Shelf Positions: 3-Bay and 5-Bay Rack and Stack

	Fuse/LGX		Fuse/LGX	
OT Comp. 1	OT Comp. 2	OT Comp. 2	OT Comp. 2	OT Comp. 1
OT Controller	OT Comp. 1		OT Comp. 1	OT Controller
OLS	OT Controller	OT Comp. 2	OT Controller	OLS
Bay 1	Bay 2	Bay 3	Bay 4	Bay 5

Use the appropriate subsections of this chapter for installation materials and tools required, marking and drilling mounting holes, uncrating and moving the equipment, and connecting the bay to building ground:

- Refer to Materials and Tools: page 3-6 for the materials and tools required to install the rack and stack equipment

- Refer to Equipment Bay Frame Installation: page 3-7 for instructions on marking and drilling the mounting holes, uncrating and moving the equipment, erecting the bay frames, and connecting the bay frame to building ground. This applies to integrated bays, OT bays, and empty frames for miscellaneously mounted shelves.

- Refer to Installing Associated Bay Frame Assembly Parts: page 3-15 if additional bay frame assembly parts are require installation

- Refer to Miscellaneous Mount Installation: page 3-41 for the installation of miscellaneously mounted OT shelves that are required.

Rack and Stack Configurations (Continued)

Installing Associated Assembly Parts

Fiber Ducts

If the rack and stack configuration will have fiber ducts installed, additional space will be allowed between bays to accomodate the ductwork. See Equipment Bay Frame Installation: page 3-7 or Drawing NT-00405-30.

Currently, the method of routing the intershelf fibers is via 4" x 2" fiber duct, which is installed between bays and the end cap at the ends of the line-up using Z brackets. Ninety degree (90º) elbows will be mounted at the top of the bays at the ends of the line-up. A "T" is mounted between successive bays in the line-up. If more bays are added to a line-up, replace the 90º elbow with a "T". Refer to Drawing NT-00405-30 for further details.

AC Outlets

If AC outlets will be required on the bay frames, the installer will need ED8C509-50 G11, G12, and G13. The G11 material is for bridging frame gaps in the line-up using liquid-tight conduit. The method for running this conduit is described in ED8C509-50. Group 12 is an appliance outlet raceway assembly, and G13 is the extender bracket used to mount the G12 raceway to the bay frame. Further detail can be found in ED8C509-50.

Power Cable Installation

4

Contents

Background

Introduction

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

This section covers WaveStar™ Optical Line System (OLS) 40G Power (battery A and battery B) cable installation for cabinets, integrated bays, multi-shelf bays, miscellaneous mount configurations.

General Considerations

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

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

⚠ **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 the beam.

Keep the following information under consideration during cable installation:

■ This cable information is the latest cable information available at the time of the issue. For up-to-date information, refer to the ED cable drawings listed in Chapter 1, Overall Installation and Test Considerations.

■ For ordering information, refer to 365-575-380, Optical Line System (OLS) Application, Planning, and Ordering Guide (APOG) and the Optical Translator (OT) Application, Planning, and Ordering Guide.

■ Do not remove the shelf backplane cover during the installation process.

Power Requirements

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).

Specific Power Requirements

The power requirements for OLS and OT are as follows:

- Two feeders (A and B) are required for powering the equipment.

- 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).

For information on maximum power dissipation and current drains per feeder for the OT and OLS shelves, refer to the Applications, Planning and Ordering Guide.

Multiple OLS Shelf Configurations

Introduction   This section describes the power cable selection and installation for systems with multiple OLS shelves in the same cabinet or equipment bay frame.

For power cable installation information of OT shelves, OLS shelves and OT shelves in the same bay, or single OLS shelves, refer to the appropriate section of this chapter.

Available Power Cables   Table 4-1 on page 4-4 lists power cables available for installing a multiple WaveStar OLS 40G shelf arrangement.

Table 4-1.   Available Power Cables for Multiple OLS in Same Bay/Cabinet

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

OLS Power Cable Connection   The OLS uses a Y-cable to power both shelves in the bay or cabinet. Install as follows:

Step	Action
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.

⚠ **CAUTION:**
Leave the fuses out or breakers off until performing the steps in Chapter 7, Powering, of this manual.

Multiple OLS Shelf Configurations (Continued)

OLS Power Cable Connection (continued)

Step	Action
3	Identify the battery feed connections at the BDFB. 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 bay/cabinet, and out through the top of the bay/cabinet. If a cabinet is being used, pass the cables through the cable restraints mounted in the top of the cabinet before exiting 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 4-1 on page 4-6 or Figure 4-2 on page 4-7.
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 4-1 on page 4-6 and Figure 4-2 on page 4-7.
8	Tighten the power cable restraint clamp screws around the power cable outer jack to a torque of about 7 inch-pounds.
9	Splice feeders from the BDFB to the OLS power cables. The red and blue power leads connect to –48V. The white power leads connect to the power feed return.

Multiple OLS Shelf Configurations (Continued)

OLS Power Cable Connection (continued)

Figure 4-1.   OLS Power Cable Routing, Multiple OLS Shelves (Cabinet Frame Shown)
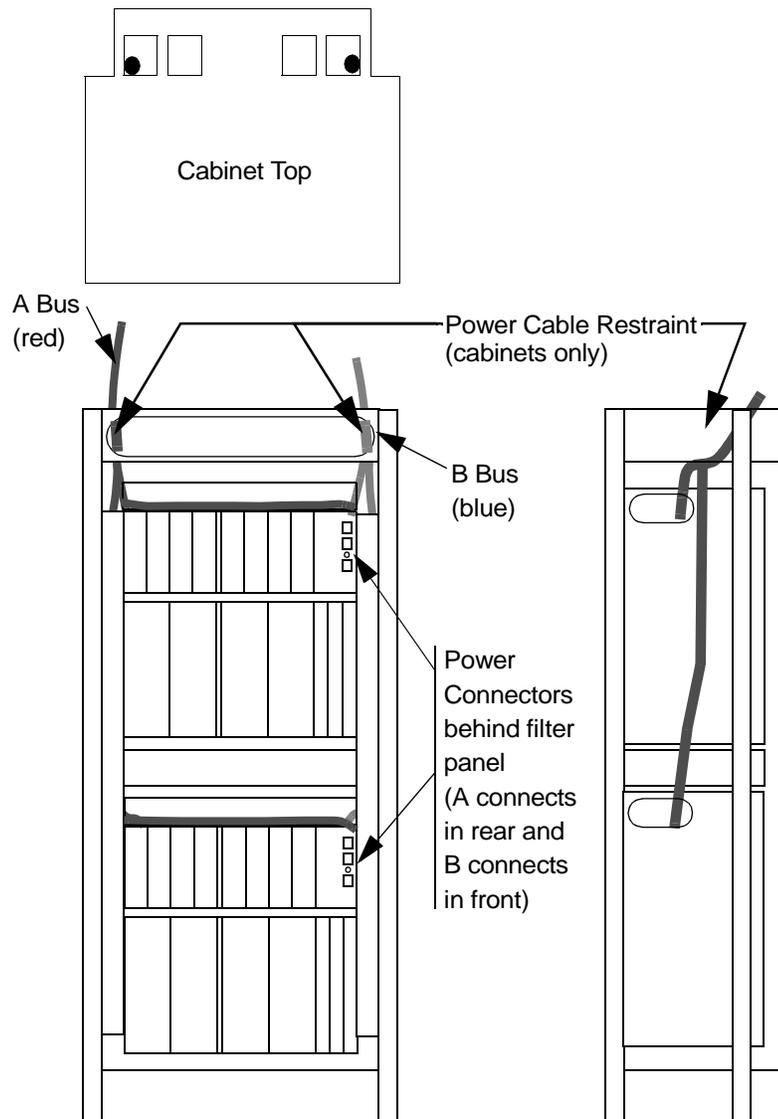
Cabinet Top

A Bus (red)

Power Cable Restraint (cabinets only)

B Bus (blue)

Power Connectors behind filter panel (A connects in rear and B connects in front)

Multiple OLS Shelf Configurations (Continued)

OLS Power Cable Connection (continued)

Figure 4-2.   OLS Power Cable Routing (Bay/Cabinet Frame Not Shown)
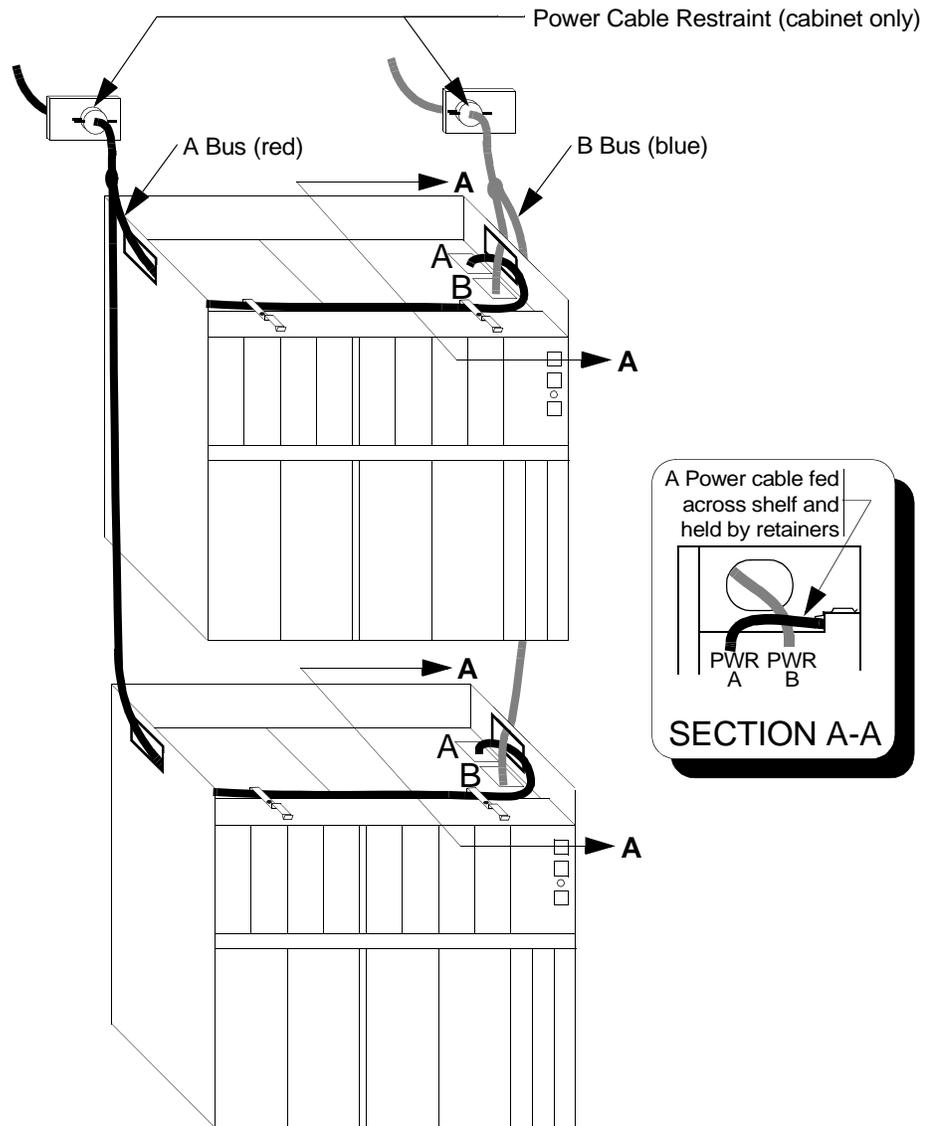
Power Cable Restraint (cabinet only)

A Bus (red)

B Bus (blue)

A

A
B

A

A Power cable fed across shelf and held by retainers

PWR A   PWR B

SECTION A-A

A

A
B

A

Multiple OT Shelf Configurations

Introduction   This section describes the power cable selection and installation for systems with multiple OT shelves in the same cabinet or equipment bay frame.

For power cable installation information of OLS shelves, OLS shelf with OT shelves in the same bay, or single OLS shelves, refer to the appropriate section of this chapter.

OT Power Cable Connection

Table 4-2.   Available Power Cables for Multiple OT Shelf Configurations

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

Install as follows:

Step	Action
1	Turn the power breakers off, or do not install fuses, at the BDFB.
2	Verify the circuit packs are not installed in the shelves. Leave the BDFB fuses out or breakers off until performing the steps in Chapter 8, "Powering" of this manual.
3	If power is being fed by an overhead cable rack, route power cable out through the top of the bay/cabinet as shown in Figure 4-3 on page 4-10. If power is being fed from a raised floor storage tray, route power cables as shown in Figure 4-4 on page 4-11.

Multiple OT Shelf Configurations (Continued)

OT Power Cable Connection (continued)

Step	Action
4	Identify the battery feed connections at the BDFB 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 BDFB 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.

Multiple OT Shelf Configurations (Continued)

OT Power Cable Connection (continued)

Figure 4-3.   OT Cable Routing for Overhead Rack Installations

Exit Red Jacket Power Cable and Left Side Control Cables

Exit Blue Jacket Power Cable and Right Side Control Cables
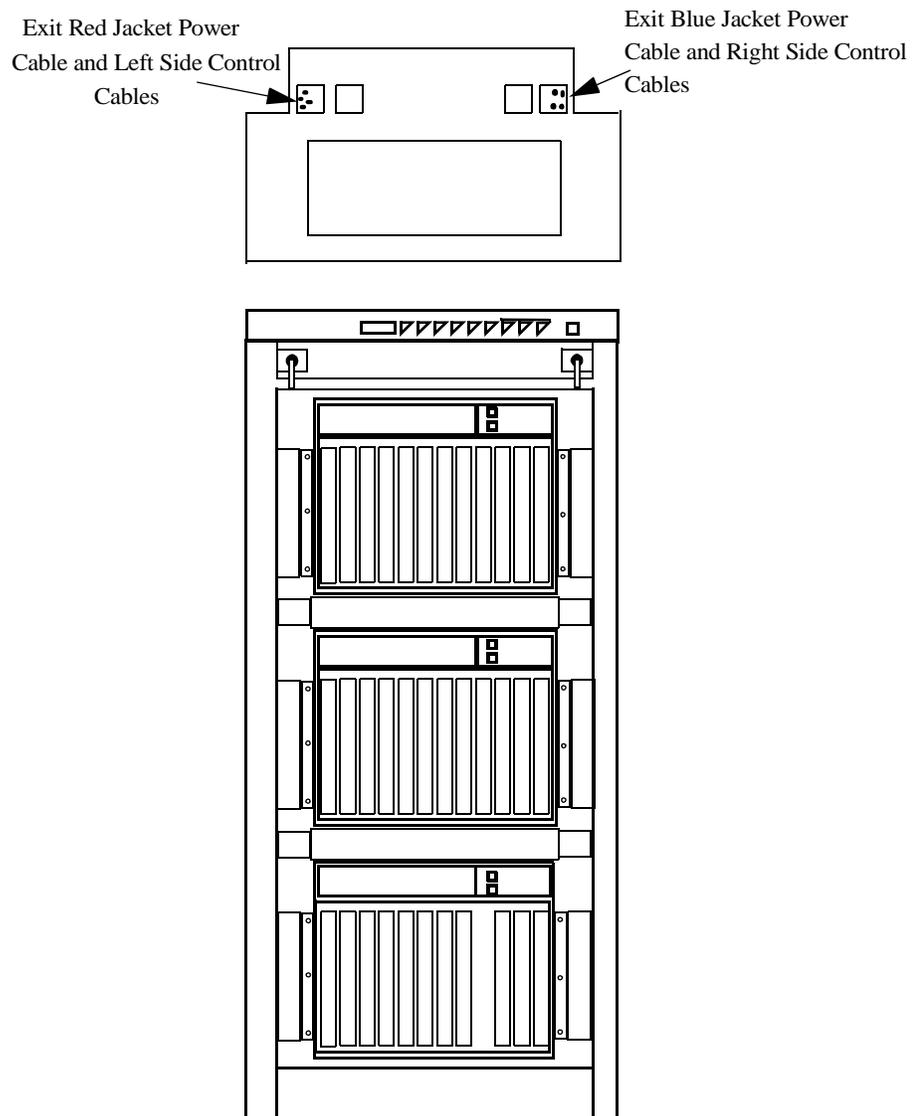
(Continued on next page)

Multiple OT Shelf Configurations (Continued)

OT Power Cable Connection (continued)

Figure 4-4.   OT Cable Routing for Raised Floor Applications

Power Cable Routing for Right Side Blue Jacket Cable (Left Side to have similar routing)

Wiring Exit Right Side Power and Control Cables

Wiring Exit Left Side Power and Control Cables
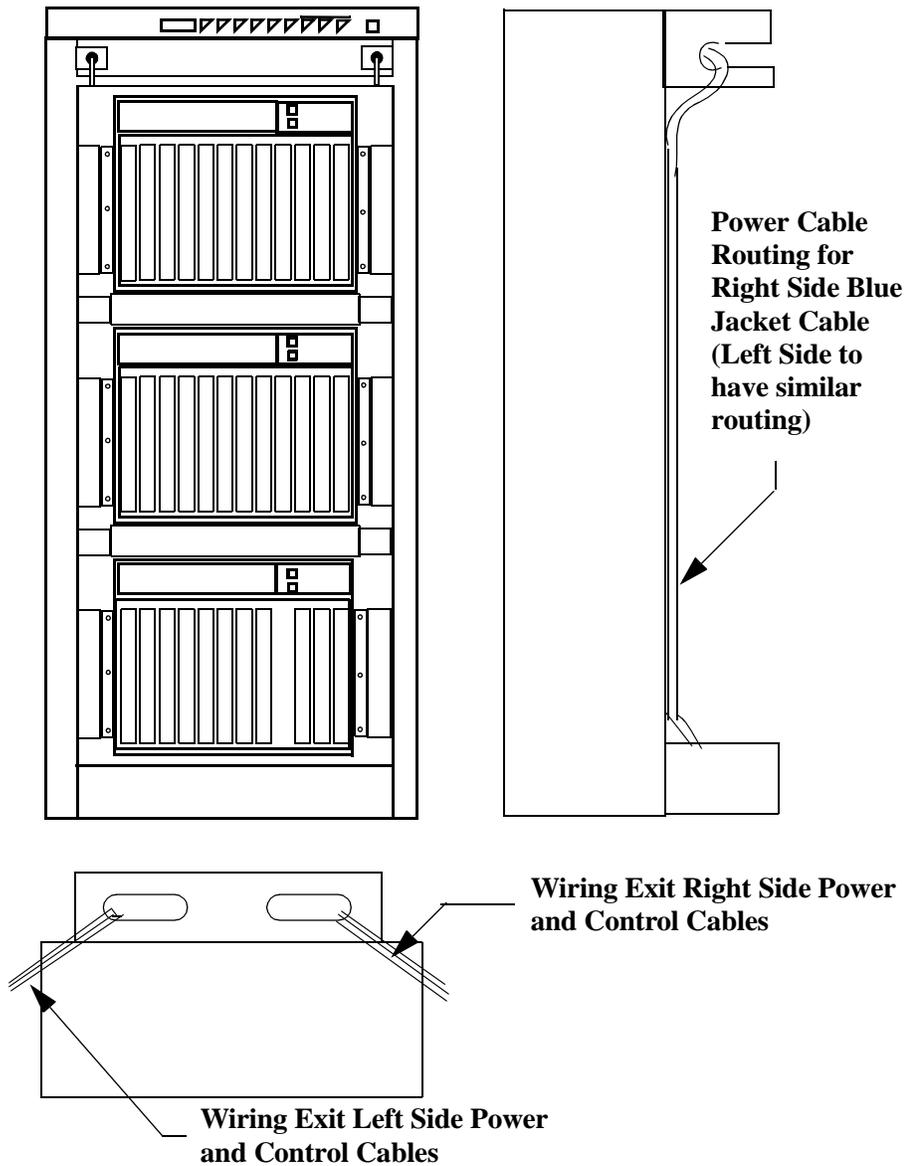
Miscellaneously Mounted OLS Shelves

Introduction

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

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

For power cable installation information of multiple OLS shelves in a single bay, OLS shelf with OT shelves in the same bay, single OLS or OT shelves, or multiple OT shelves in the same bay, refer to the appropriate section of this chapter.

Available Power Cables

Table 4-3 lists power cables available for installing a miscellaneous OLS shelf.

Table 4-3.   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 Installation

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

Step	Action
1	Turn the power breakers off, or do not install fuses, at the BDFB.
2	Verify the circuit packs are not installed in the shelves. Leave the fuses out or breakers off until performing the steps in Chapter 7, Powering, of this manual.

Miscellaneously Mounted OLS Shelves (Continued)

Power Cable Installation (continued)

Step	Action
3	Identify the battery feed connections at the BDFB. 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	Remove the battery cables (A on the left, B on the 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 4-5 or Figure 4-6.
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 connection 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 4-5 or Figure 4-6.
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 BDFB to the OLS power cables. The red and blue power leads connect to –48V. The white power leads connect to the power feed return.

Miscellaneously Mounted OLS Shelves (Continued)

Power Cable Installation (continued)

Figure 4-5.   OLS Power Cable Routing (Miscellaneous Bay Shown)

(red)

Power Cable Restraint

B Bus (blue)

Power Connectors behind filter panel (A connects in rear and B connects in front)

Miscellaneously Mounted OLS Shelves (Continued)

**Power Cable
Installation
(continued)**

Figure 4-6.   OLS Power Cable Routing (Miscellaneous Mount Frame Not Shown)
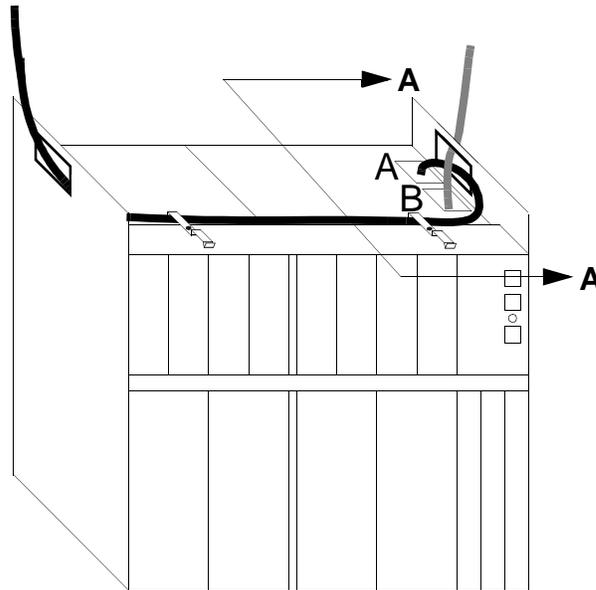
Miscellaneously Mounted OT Shelves

Introduction
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, and 13 miscellaneously mounted shelf must be 15 amperes (unless otherwise specified by the customer) at the BDFB.The List 10 miscellaneous mount shelf must be 20 amperes.

For power cable installation information of multiple OLS shelves in a single bay, OLS shelf with OT shelves in the same bay, single OLS or OT shelves, or multiple OT shelves in the same bay, refer to the appropriate section of this chapter.

Available OT Power Cables

Table 4-4.   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, and 13	15	A	Red
9	List 11, 12, and 13	15	B	Blue
8	List 11, 12, and 13	As Required	A	Red
10	List 11, 12, and 13	As Required	B	Blue

(Continued on next page)

Miscellaneously Mounted OT Shelves (Continued)

List 10 OT Cable Installation

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

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

Step	Action
1	Locate the List 10 power cable for the A supply: ED-9C103-22, GR5/31 or GR15/32. The supply end of the cable will have a **RED** jacket.
2	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 (–48V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
3	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 (–48V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
4	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 (–48V) is at the upper end of the connector. Push connector in until locking tab snaps in place.
5	Route excess cable into bay frame channel on left side and tie to frame.
6	Secure cable at entrance to frame.

Miscellaneously Mounted OT Shelves (Continued)

List 10 OT Cable Installation (continued)

To install the intershelf power cable for the B supply perform the following:

Step	Action
1	Locate B supply power cable ED-9C103-22 GR6/24 or GR16/26. The supply end of the cable will have a **BLUE** jacket.
2	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.
3	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.
4	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.
5	Route excess cable into bay frame channel on right side and tie to frame.
6	Secure cable at entrance to top of frame.

Miscellaneously Mounted OT Shelves (Continued)

List 11, 12, and 13 OT Cable Installation

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 and B supplies, perform the following:

Step	Action
1	Locate the A supply power cable for List 11, 12, and 13. It is the same cable for all three list numbers: ED-9C103-22, GR7 (length = 15 ft.) or GR8 (length as specified). The supply end of the cable will have a **RED** jacket.
2	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.
3	Route excess cable into bay frame channel on right side and tie to frame.
4	Secure cable at entrance to top of frame.
5	Locate the B supply power cable for List 11, 12, and 13. It is the same cable for all three list numbers: ED-9C103-22, GR8 (length = 15 ft.) or GR10 (length as specified). The supply end of the cable will have a **BLUE** jacket.
6	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.
7	Route excess cable into bay frame channel on right side and tie to frame.
8	Secure cable at entrance to top of frame.

Miscellaneously Mounted OT Shelves (Continued)

OT Shelf Power Cable Connection

Connect the power cables for the OT shelves to the power source as follows:

Step	Action
1	Turn the power breakers off, or do not install fuses, at the BDFB.
2	Verify the circuit packs are not installed in the shelves.
	Leave the BDFB fuses out or breakers off until performing the steps in Chapter 8, Powering, of this manual.
3	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.
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 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 OT 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.

Integrated Bay

Introduction   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).

For power cable installation information of multiple OLS shelves in a single bay, single OLS or OT shelves, or multiple OT shelves in the same bay, refer to the appropriate section of this chapter.

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 BDFB.

Available Power Cables   Table 4-5 lists power cables available for installing a WaveStar OLS 40G Integrated Bay.

Table 4-5.   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 (Continued)

**Integrated Bay
Power Cable
Installation**

Install the appropriate power cable as follows:

Step	Action
1	Turn the power breakers off, or do not install fuses, as the BDFB.
2	Verify the circuit packs are not installed in the shelves.
	Leave the BDFB fuses out or breakers off until performing the steps in Chapter 8, "Powering" of this manual.
3	If power is being fed by an overhead cable rack, route power cable out through the top of the bay. If power is being fed from a raised floor storage tray, route power cables through the bottom of the bay.
4	Identify the battery feed connections at the BDFB 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 BDFB to the OLS power cables. The red and blue power leads connects 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.

Rack and Stack Configurations

Introduction

There are currently three configurations available as Rack and Stack configurations. The power cabling for these configurations is different than previously mentioned configurations.

Types of Configurations

The three available Rack and Stack configurations are:

- Two-Bay System: Bay 1 is an integrated bay containing one OLS shelf, one OT system controller shelf, and one OT complimentary 1 shelf. Bay 2 contains one miscellaneously mounted OT system controller shelf, one OT complimentary 1 shelf, a fuse panel, and an LGX.

- Three-Bay System: Bay 1 is an integrated by identical to Bay 1 in the Two-Bay System. Bay 2 contains one OT system controller shelf, one OT complimentary 1 shelf, one OT complimentary 2 shelf, a fuse panel, and an LGX. Shelf 3 contains one OT complimentary 2 shelf.

- The Five-Bay System: Bays 1 and 5 are identical to Bay 1 in the Three-Bay System. Bays 2 and 4 are identical to Bay 2 in the Three-Bay System. Bay 3 contains two OT complimentary 2 shelves.

Special Considerations

Power is supplied via a 60 AMP feed to the fuse and alarm panel mounted in Bay 2 and Bay 4. The OLS and OT shelves are then powered individually from 10 AMP fuses of this same panel.

Rack and Stack Configurations (Continued)

Power Cable Connection

Follow the procedures below for installing and connecting the power cables to the bays in a Rack and Stack configuration.

Step	Action
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.
3	Identify the battery feed connections at the BDFB or other protection equipment. They should be labeled BAT A, BAT A RTN, BAT B, and BAT B RTN.
4	Discard any power cables supplied with the shelves, including the harness mounted in the integrated bay.
5	Install the 12 AWG connectorized power feeders supplied as comcode 848633871 from A and B loads of the shelves to the fuse panel. For a Two-Bay or Three-Bay System, the fuse panel in Bay 2 is used for all shelves. For a Five-Bay System, use the fuse panel in Bay 2 for the shelves in Bays 1 and 2 and for the upper OT Complimentary Shelf 2 in Bay 3; use the fuse panel in Bay 4 for the shelves in Bays 4 and 5 and for the lower OT Complimentary Shelf 2 in Bay 3. See Table 4-6 through Table 4-7
6	Install the 12 AWG connectorized power feeders supplied as comcode 848633871 from A and B loads of the shelves to the fuse panel. For a Two-Bay or Three-Bay System, the fuse panel in Bay 2 is used for all shelves. For a Five-Bay System, use the fuse panel in Bay 2 for the shelves in Bays 1 and 2 and for the upper OT Complimentary Shelf 2 in Bay 3; use the fuse panel in Bay 4 for the shelves in Bays 4 and 5 and for the lower OT Complimentary Shelf 2 in Bay 3. See Table 4-6 through Table 4-7

Rack and Stack Configurations (Continued)

**Power Cable
Connection
(continued)**

Table 4-6.   Fuse Assignments for Bay 2, Load A

BAY 2		APEX 10/10 DUAL LOAD FUSE ASSIGNMENT TABLE P/N AX-010-221		
BLK	POS	DRAWING	AMP	CIRCUIT
LD A	1A	T-5G276-33	10	OLS SHELF BAY 1
	2A	T-6G156-33	10	OT CONTROL SHELF BAY 1
	3A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 1
	4A	T-6G156-33	10	OT CONTROL SHELF BAY 2
	5A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 2
	6A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 2
	7A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 3
	8A			
	9A			
	10A			

Rack and Stack Configurations (Continued)

Power Cable Connection (continued)

Table 4-7.   Fuse Assignments for Bay 2, Load B

BAY 2		APEX 10/10 DUAL LOAD FUSE ASSIGNMENT TABLE P/N AX-010-221		
BLK	POS	DRAWING	AMP	CIRCUIT
LD B	1B	T-5G276-33	10	OLS SHELF BAY 1
	2B	T-6G156-33	10	OT CONTROL SHELF BAY 1
	3B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 1
	4B	T-6G156-33	10	OT CONTROL SHELF BAY 2
	5B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 2
	6B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 2
	7B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 3
	8B			
	9B			
	10B			

Rack and Stack Configurations (Continued)

Power Cable Connection (continued)

Table 4-8.   Fuse Assignments for Bay 4, Loads A and B

BAY 4		APEX 10/10 DUAL LOAD FUSE ASSIGNMENT TABLE P/N AX-010-221		
BLK	POS	DRAWING	AMP	CIRCUIT
LD A	1A	T-5G276-33	10	OLS SHELF BAY 5
	2A	T-6G156-33	10	OT CONTROL SHELF BAY 5
	3A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 5
	4A	T-6G156-33	10	OT CONTROL SHELF BAY 4
	5A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 4
	6A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 4
	7A	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 3
	8A			
	9A			
	10A			
LD B	1B	T-5G276-33	10	OLS SHELF BAY 5
	2B	T-6G156-33	10	OT CONTROL SHELF BAY 5
	3B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 5
	4B	T-6G156-33	10	OT CONTROL SHELF BAY 4
	5B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 4
	6B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 4
	7B	T-6G156-33	10	OT COMPLEMENTARY SHELF BAY 3
	8B			
	9B			
	10B			

Rack and Stack Configurations
(Continued)

**Power Cable
Connection
(continued)**

Installation of the A and B power cables continues:

Step	Action
7	Terminate the power cables in the fuse panel with the supplied terminal lugs.

Final Verification

Description

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

Step	Action
1	Verify the power cables are properly secured and dressed.
2	Verify all power cables are properly labeled.

Wired Cable Installation

5

Contents

Background

Introduction

> ⚠ **CAUTION:**
> *Procedures in this installation manual are only to be performed by trained personnel.*

This section covers WaveStar™ Optical Line System (OLS) 40G cable installation. This section covers general considerations. The other sections of this chapter are as follows:

Title	Description
Interconnection Panel Description	Interconnection panels covers the physical layout of each panel and a brief discussion of the associated connections.
Office Alarm Installation	This section covers available alarms and connections to the interconnection panels.
Serial, Parallel, and X.25 Telemetry Cable Installation	This section covers the uses and installation of all three types of telemetry cables.
CIT (CMC) DTE Cable Installation	This section covers the installation of the data terminal equipment (DTE) cable.
Line Orderwire, Section Orderwire, and Section User Channel Cables Installation	This section covers the installation and application of these cables.
OT Miscellaneous Mount Intershelf Wiring	This section covers the installation of the cables necessary to interconnect Lists 11, 12 and 13.
OLS/OT Integration Cables Installation (Release 3)	This section covers the installation of the control cables between the OLS and OT for one or two OT bays. It also includes specific information for the installation of 2-Bay, 3-Bay, and 5-Bay Rack and Stack configurations

Background (Continued)

**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 interconnection 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 Chapter 1, Overall Installation and Test Considerations.

■ For ordering information, refer to 365-575-386, 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.

■ Do not remove the backplane cover during the installation process.

■ Any broken or bent pins 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.

Interconnect Panel Description

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

**OLS
Interconnection
Panel**   The OLS interconnect panel is shown in Figure 5-1

Figure 5-1.   OLS Interconnection Panel
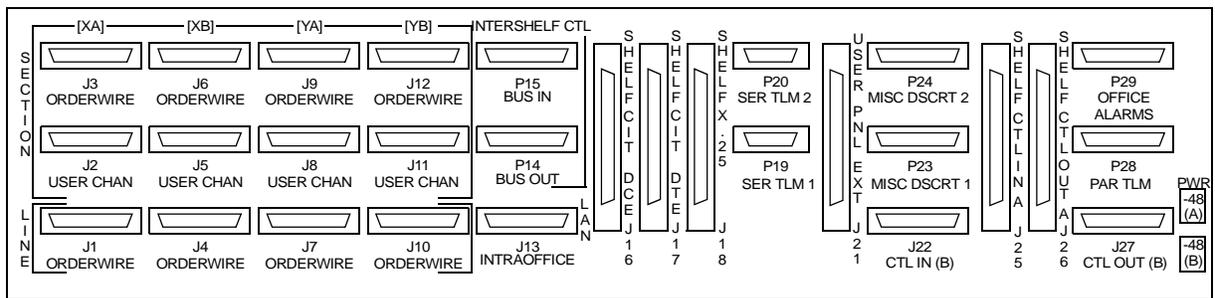
Table 5-1 on page 5-4 lists the connector types used on the OLS shelf.

Table 5-1.   OLS Interconnection Panel Connectors and Types

Connector	Type	Connector Orientation
J1-13, J22, J27	DB15 Female	

Interconnection Panel Description (Continued)

OLS Interconnection Panel (continued)

Table 5-1.   OLS Interconnection Panel Connectors and Types (continued)

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		
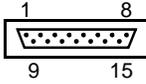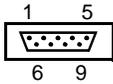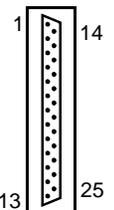
The interconnection panel provides the following interfaces:

■ **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.

Interconnection Panel Description (Continued)

OLS Interconnection Panel (continued)

■ **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.

Interconnection Panel Description (Continued)

OLS Interconnection Panel (continued)

- **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.

Interconnection Panel Description
(Continued)

**OLS
Interconnection
Panel (continued)**

- **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 in Figure 5-2.

Figure 5-2.   Interconnection Panel for OT Complementary Shelf 1 & 2
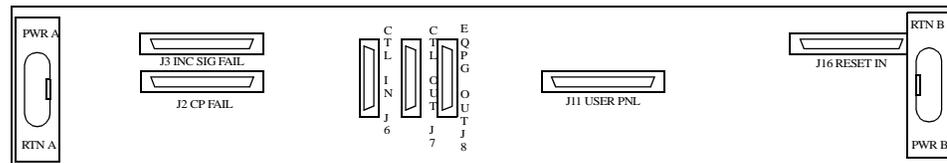
The external interface connections that are operational for Complementary Shelves 1 and 2 for WaveStar OLS 40G Release 3.0 are as follows:

- **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.

Interconnection Panel Description (Continued)

OT Interconnection Panel (continued)

- **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 as Figure 5-3 on page 5-9.

Figure 5-3.   Interconnection Panel for OT System Shelf
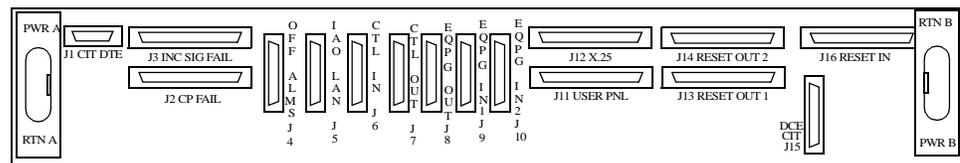
The System Shelf external interface connections operational for WaveStar OLS 40G Release 3.0 are as follows:

- **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 OUT J7:** This connector provides shelf-to-shelf local area network connections.

- **EQUIP OUT J8:** This connector provides an interface to the System Controller Shelf for equipage information.

(Continued on next page)

Interconnection Panel Description (Continued)

OT Interconnection Panel (continued)

■ **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 5-2 on page 5-11 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 5-2.   WaveStar OLS 40G Office Alarms Cables

ED-7G028-22 Cable Group	Cable Length (ft.)
301	As Required
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 5-3 lists office alarm cable connections and designations.

Table 5-3.   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 Installation (Continued)

OLS Office Alarm Cable Connection (continued)

Table 5-3.   WaveStar OLS 40G Office Alarm Cable Connection (continued)

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

OT Office Alarms Cable Connection — Not Required

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.

Office Alarm Installation (Continued)

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 5-1 on page 5-4) 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.

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, and X.25 Telemetry Cable Installation

OLS Serial Telemetry Cables Installation

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.

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 5-4 lists available cables for serial telemetry applications

Table 5-4. WaveStar OLS 40G Serial Telemetry Cables

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

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

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

OLS Serial Telemetry Cables Installation (continued)

Table 5-5. 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 5-6 lists serial telemetry cable connections and designations.

Table 5-6. 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

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

OLS Serial Telemetry Cables Installation (continued)

WaveStar OLS 40G Serial Telemetry Cable Installation Procedure

Perform the following steps to install serial telemetry cables:

Step	Action
1	Route the serial telemetry cables out of the right side of the OLS shelf to the serial telemetry system.
	Refer to Figure 5-1 on page 5-4 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

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 5-7 lists cables available for OLS X.25 applications.

Table 5-7.   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

Wired Cable Installation   Installation Manual

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

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

X.25 Telemetry Cable Connection

Table 5-8 lists the X.25 telemetry cable connection to the interconnection panel for OLS.

Table 5-8.   X.25 Telemetry Cable Connection to Interconnection Panel

System	Cable Application	Interconnection Panel Location
OLS	X.25	J18

Table 5-9 lists pin connections for the X.25 cable (EIA-232D). For more information about the TL1 interface, refer to Lucent Technologies 365-575-385, Optical Line System (OLS) Operations Systems Engineering Guide.

Table 5-9.   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.

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

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

Table 5-10 lists X.25 cable connections and designations for Group 602 and 652 cables.

Table 5-10.   X.25 Telemetry Cable Connection

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

* 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.

(Continued on next page)

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

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

Table 5-10.   X.25 Telemetry Cable Connection (continued)

Name	Designation	P156A Terminal	Wire Color	Datakit End
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	

X.25 Telemetry Cable Installation Procedure

Perform the following steps to install 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.

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

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

Refer to Figure 5-1 for the location on the WaveStar OLS 40G interconnection panel.

Step	Action
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 5-1.
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

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

Available Parallel Telemetry Cables

Table 5-2 lists the cables that are available for use in connecting Parallel Telemetry.

Table 5-11.   WaveStar OLS 40G Parallel Telemetry Cables.

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

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

WaveStar OLS 40G Parallel Telemetry Cable Installation (continued)

WaveStar OLS 40G Parallel Telemetry Cable Connections

Table 5-12 lists parallel telemetry cable connections and designations.

Table 5-12.   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

Serial, Parallel, and X.25 Telemetry Cable Installation (Continued)

WaveStar OLS 40G Parallel Telemetry Cable Installation (continued)

WaveStar OLS 40G Parallel Telemetry Cable Installation Procedure

Perform the following steps to install the parallel telemetry cable:

Step	Action
1	Route the cable through the right opening in the side of the OLS shelf from the telemetry system. Refer to Figure 5-1to 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   Table 5-13 lists cables available for CIT (CMC) DTE applications for WaveStar
(CMC) DTE   OLS 40G.
Cables**

Table 5-13.   WaveStar OLS 40G CIT (CMC) DTE Cable

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

                         Table 5-18 lists cables available for CIT (CMC) DTE applications.

**CIT (CMC) DTE   The CIT-DTE cable connects from J17 to a local area network or modem which
Cable Connections   must meet the following requirements:
to WaveStar OLS
40G   ■   Must be able to transmit at 300, 1200, 2400, 4800, or 9600 baud.
Interconnection
Panel**   ■   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.

CIT (CMC) DTE Cables Installation (Continued)

CMC DTE Connections and Designations

Table 5-14 lists CIT-DTE cable connections and designations.

Table 5-14.   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
No Connection	None	18	None
No Connection	None	19	None
CT Data Terminal Ready	CTDTR	20	W/S
No Connection	None	21	None

(Continued on next page)

CIT (CMC) DTE Cables Installation (Continued)

CMC DTE Connections and Designation (continued)

Table 5-14.   CIT-DTE Cable Connection (continued)

Name	Designation	Pin	Wire Color
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:

Step	Action
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 5-1 for the location of the connector.
3	Connect the CIT (CMC) DTE cable to the RS-232 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 5-15 lists the cables that are available for the Line Orderwire, Section Orderwire, and Section User Channel.

Table 5-15.   Available Line Orderwire, Section Orderwire, and Section User Cable Channels

ED-7G028-22 Cable Group	Cable Length (ft.)
401	As Required (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 Orderwire, Section Orderwire, and Section User Channel Cables Installation (Continued)

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

Table 5-16 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 5-16.   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
Note: X = Line 1, Y = Line 2				

Line Orderwire Cable Connection

Table 5-17 lists the Line Orderwire Cable connections and designations.

Table 5-17.   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

Line Orderwire, Section Orderwire, and Section User Channel Cables Installation (Continued)

Line Orderwire Cable Connection (continued)

Table 5-17.   Line Orderwire Cable Connection (continued)

Name	Designation	Pin	Wire Color
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	N one

Line Orderwire Cable Installation Procedure

Perform the following steps to install the Line Orderwire cable:

Step	Action
1	Route the cable through the left side of the OLS shelf to the line orderwire equipment. Refer to Figure 5-1 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.

Line Orderwire, Section Orderwire, and Section User Channel Cables Installation (Continued)

Section User Channel Cable Connection

Table 5-18 lists Section User Channel cable connections and designations.

Table 5-18. 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

Line Orderwire, Section Orderwire, and Section User Channel Cables Installation (Continued)

Section User Channel Cable Connection (continued)

Section User Channel Cable Installation Procedure

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

Step	Action
1	Route the cable through the left side of the OLS shelf to the user channel equipment. Refer to Figure 5-1 on page 5-4, OLS Interconnection Panel, to locate the corresponding jacks/plugs.
2	Connect the section user channel cable to J2, J5, J8, and 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 Connection

Table 5-19 lists Section Orderwire cable connections and designations:

Table 5-19.   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

Line Orderwire, Section Orderwire, and Section User Channel Cables Installation (Continued)

Section Orderwire Cable Connection (continued)

Table 5-19.   Section Orderwire Cable Connection (continued)

Name	Designation	Pin	Wire Color
Overhead E1 Clock Input P	OE1CIP	9	W-BL
Overhead E1 Sync Input P	OE1SIP	10	W-O
Overhead E1 Data Input P	OE1DIP	11	W-G
Overhead E1 Data Output P	OE1DOP	12	W-BR
Overhead E1 Sync Output P	OE1SOP	13	W-S
Overhead E1 Clock Output P	OE1COP	14	R-BL
No Connection	None	15	None

Section Orderwire Cable Installation Procedure

Perform the following steps to install the section orderwire cable:

Step	Action
1	Route the cable through the left side of the OLS shelf to the section orderwire equipment. Refer to Figure 5-1 to locate the corresponding jacks.
2	Connect the section user channel cable to J3, J6, J9, and 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 Miscellaneously Mount Intershelf Wiring

Description

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.

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

$\Longrightarrow$ **NOTE:**
When installing cables, match cable plug designation with jack designation such that a P7 cable designation is connected to a J7 connector designation.

The jack designations for Complementary Shelf 1 and 2 are shown in Figure 5-2. Figure 5-3 shows the jack designations for the System Shelf interconnection panel.

$\Longrightarrow$ **NOTE:**
Do not intermix ED-7G045-20 G6 and ED-7G045-20 G11 cables, which both have P6 and P7 labels on the connector boots. The cables are wired differently and are not interchangeable. Refer to the shelf interconnecting tables for proper connection locations.

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Install the List 10 intershelf cables as follows:

Step	Action
1	Install inter shelf cables as specified in Table 5-20. Refer to Figure 5-4.
2	Route cables out the left or right side access holes as specified in Table 5-20. When all the cables have been installed, tie excess cable into left or right bay frame channels.
3	Upon completion of Table 5-20 interconnections, verify that ED-7G045-20, 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 the same location as listed for OT Bay 1 using the (J69000C-1, List 161) shelf label kit.

Table 5-20.   Shelf Interconnecting Cables for List 10

Cable Part No.	Side to Run Cable	From Shelf/Jack	To Shelf/Jack	Connector Pin Size
ED-7G045-20, GR6	Left	System Shelf/ P7 to J7	Compl. Shelf 1/ P6 to J6	15
ED-7G045-20, GR7	Left	System Shelf/ P9 to J9	Compl. Shelf 1/ P8 to J8	15
ED-7G045-20, GR8	Left	System Shelf/ P10 to J10	Compl. Shelf 2/ P8 to J8	15

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Table 5-20.   Shelf Interconnecting Cables for List 10 (continued)

Cable Part No.	Side to Run Cable	From Shelf/Jack	To Shelf/Jack	Connector Pin Size
ED-7G045-20, GR9	Right	System Shelf P13 to J13	Compl. Shelf 1/ P16 to J16	25
ED-7G045-20, GR10	Right	System Shelf P14 to J14	Compl. Shelf 2/ P16 to J16	25
ED-7G045-20, GR11	Left	Compl. Shelf 1/ P7 to J7	Compl. Shelf 2/ P6 to J6	15

Figure 5-4.   Shelf Interconnecting Cables for List 10
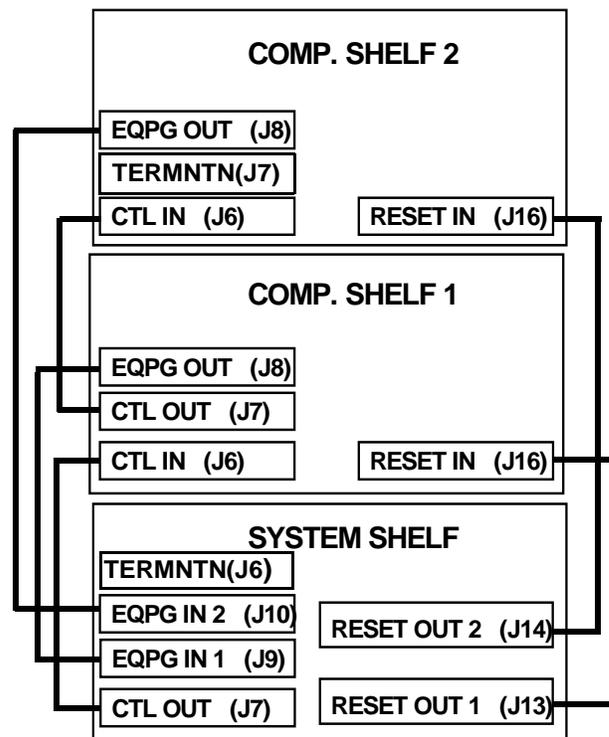
(Continued on next page)

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Install List 12 intershelf cables as follows:

Step	Action
1	Remove the ED-7G045-20 GR2 termination from the System Controller Shelf Connector J7 and plug it into Complementary Shelf 1 Connector J7.
2	Install intershelf cables as specified in Table 5-21. Refer to Figure 5-5.
3	Route cables out the left or right side access holes as specified in Table 5-21. When all the cables have been installed, tie excess cable into left or right bay frame channels.
4	Upon completion of Table 5-21 interconnections, verify that ED-7G045-20, 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 5-21.   Shelf Interconnecting Cables for List 12

Cable Part No.	Side to Run Cable	From Shelf/Jack	To Shelf/Jack	Connector Pin Size
ED-7G045-20, GR6	Left	System Shelf/ P7 to J7	Compl. Shelf 1/ P6 to J6	15
ED-7G045-20, GR7	Left	System Shelf/ P9 to J9	Compl. Shelf 1/ P8 to J8	15
ED-7G045-20, GR9	Right	System Shelf/ P13 to J13	Compl. Shelf 1/ P16 to J16	25

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Figure 5-5.   Shelf Interconnecting Cables for List 12
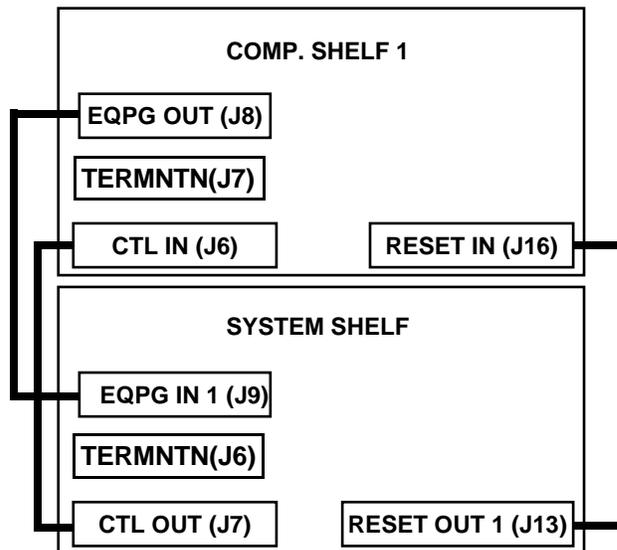
Install List 13 intershelf cables as follows:

Step	Action
1	Remove the ED-7G045-20 GR2 termination from the Complementary Shelf 1 Connector J7 and plug it into Complementary Shelf 2 Connector J7.
2	Install inter shelf cables as specified in Table 5-22. Refer to Figure 5-6.
3	Route cables out the left or right side access holes as specified in Table 5-22. When all the cables have been installed, tie excess cable into left or right bay frame channels.

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Step	Action
4	Upon completion of Table 5-22 interconnections, verify that ED-7G045-20, 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 5-22. Shelf Interconnecting Cables for List 13

Cable Part No.	Side to Run Cable	From Shelf/Jack	To Shelf/Jack	Connector Pin Size
ED-7G045-20, GR11	Left	Compl. Shelf 1/ P7 to J7	Compl. Shelf 2/ P6 to J6	15
ED-7G045-20, GR8	Left	System Shelf/ P10 to J10	Compl. Shelf 2/ P8 to J8	15
ED-7G045-20, GR10	Right	System Shelf/ P14 to J14	Compl. Shelf 2/ P16 to J16	25

OT Miscellaneous Mount Intershelf Wiring (Continued)

Description (continued)

Figure 5-6.   Shelf Interconnecting Cables for List 13
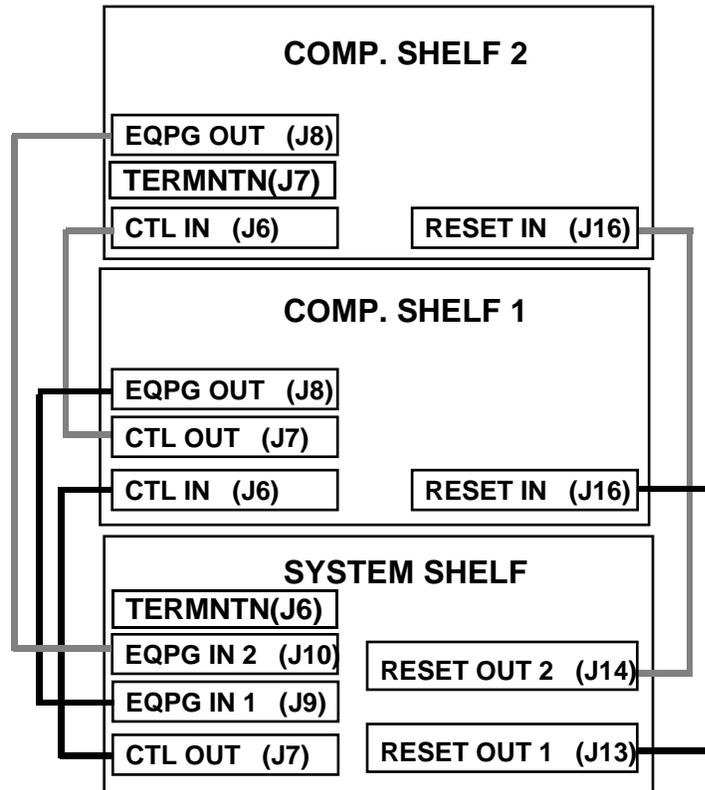
The shelf interconnecting wiring is complete.

OLS/OT Integration Cables Installation

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 5-23 lists the cables available for interconnecting one OLS shelf and one OT system.

Table 5-23.   One OLS Shelf to One OT System Interconnection Cables

ED-7C028-22 Cable Group	Cable Length (ft.)	Connections			
		OLS		OT	
801	20	P14	BUS OUT	J5	IAO LAN
851	100			J6	CTL IN
853	200				
855	180				

OLS/OT Integration Cables Installation (Continued)

**One OLS Shelf/
One OT System
(continued)**

Table 5-23.   One OLS Shelf to One OT System Interconnection Cables (continued)

ED-7C028-22 Cable Group	Cable Length (ft.)	Connections			
		OLS		OT	
802	20	J27	CTL OUT B	J8	EQPG OUT
852	100			J16	RESET IN
854	200				

Interconnection Cable Installation Procedure

Perform the following steps to install the interconnecting cables (refer to Figure 5-7).

Step	Action
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 5-1 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 5-3 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 5-1 to locate the connector.

OLS/OT Integration Cables Installation (Continued)

**One OLS Shelf/
One OT System
(continued)**

Step	Action
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 5-3 to locate the connectors.
10	Dress and tie the cables.

Figure 5-7.   OLS Controlling 1 OT System
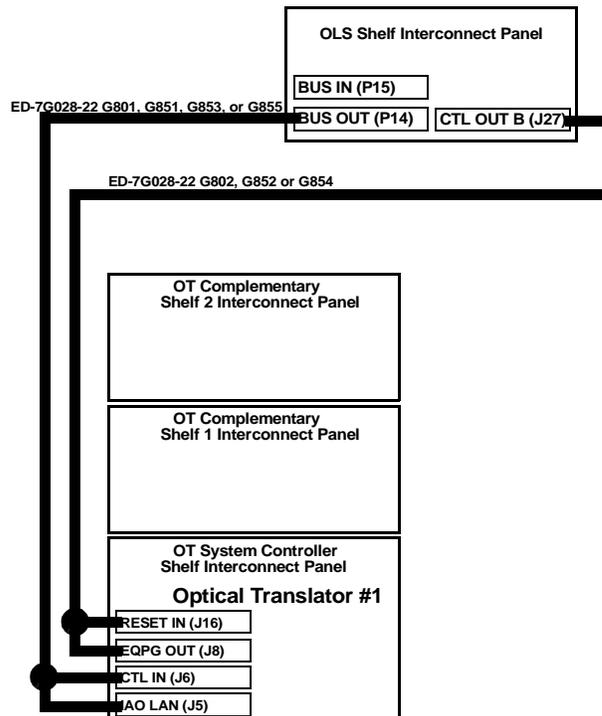
OLS/OT Integration Cables Installation (Continued)

**One OLS Shelf/
One OT System
(continued)**

➡ **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 routed and left unconnected. 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 an OT Bay # 2.

**One OLS Shelf/
Two OT Systems**

Table 5-24 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 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.**

OLS/OT Integration Cables Installation (Continued)

One OLS Shelf/ Two OT System (continued)

Table 5-24.   One OLS Shelf to Two OT System Interconnection Cables

ED-7C028-22 Cable Group	Cable Length (ft.)	Connections			
		OLS		OT	
801	20	P14	BUS OUT	J5	IAO LAN
851	100			J6	CTL IN
853	200				
855	180				
812	20	J27	CTL OUT B	J8-1	EQPG OUT
813	100			J16-1	RESET IN
814	200			J8-2	EQPG OUT
				J16-2	RESET IN
803	20	J15	BUD 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 5-8).

Step	Action
1	Remove the ED-7G028-20 G6 termination from P14 on the OLS interconnection panel.

OLS/OT Integration Cables
Installation (Continued)

**One OLS Shelf/
Two OT System
(continued)**

Step	Action
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 5-1to 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 5-3 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 5-1 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 5-3 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 5-3 to locate the connectors.

OLS/OT Integration Cables Installation (Continued)

**One OLS Shelf/
Two OT System
(continued)**

Step	Action
13	Remove the ED-7G045-20 G2 termination from J7 on the interconnection panel of the top shelf 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 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 5-1 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.

OLS/OT Integration Cables Installation (Continued)

One OLS Shelf/ Two OT System (continued)

Figure 5-8.   OLS Controlling 2 OT Systems

OLS Shelf Interconnect Panel

ED-7G028-22 G803, G804 or G805

BUS IN (P15)

ED-7G028-22 G801, G851, G853 or G855

BUS OUT (P14)   CTL OUT B (J27)

(P8-1 / P16-1)

ED-7G028-22 G812, G813 or G814

(P8-2 / P16-2)

ED-7G028-22 G806, G807, G808, or G809

OT Complementary
Shelf 2 Interconnect Panel

OT Complementary
Shelf 2 Interconnect Panel

CTL OUT (J7)

OT Complementary
Shelf 1 Interconnect Panel

OT Complementary
Shelf 1 Interconnect Panel

OT System Controller
Shelf Interconnect Panel

Optical Translator #1

OT System Controller
Shelf Interconnect Panel

Optical Translator #2

RESET IN (J16)

RESET IN (J16)

EQPG OUT (J8)

EQPG OUT (J8)

CTL IN (J6)

CTL IN (J6)

IAO LAN (J5)

IAO LAN (J5)

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations

Two-Bay Configuration

The Two-Bay System for the Rack and Stack Configuration consists of one integrated bay and an additional bay containing two OT shelves: one OT control shelf and one OT Comp. 1 shelf.

Bay 1, the Integrated Bay should come pre-cabled from the factory with the following cables:

Table 5-25. Integrated Bay Cables for Bay 1 of Rack and Stack

ED	Cable Group	Connections			
		OLS		OT-Control	
7G028-20	28	P14	BUS OUT	J5 J6	IAO LAN CTL IN
7G028-20	29	J27	CTL OUT	J8 J16	EQPG OUT RESET IN
		OT-Control		OT-Comp. 1	
7G045-20	6	J7	CTL OUT	J6	CTRL IN
7G045-20	7	J9	EQPG IN 1	J8	EQPG OUT
7G045-20	9	J13	RESET OUT	J16	RESET IN

Additionally, the miscellaneous OT System Controller Shelf (List 11) and OT Complimentary Shelf 1 (List 12) will be installed in Bay 2. The List 12 shelf is supplied with the following cables, however they will not be pre-installed:

Table 5-26. Cables supplied with OT Comp. 1 Shelf (List 12)

ED	Cable Group	Connectors			
7G045-20	6	J7	CTL OUT	J6	CTL IN
7G045-20	7	J9	EQPG IN	J8	EQPG OUT
7G045-20	9	J13	RESET OUT 1	J16	RESET IN

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Three additional cables are required for the Two-Bay Rack and Stack configuration:

Table 5-27.   Additional Cables Required for Two-Bay Rack and Stack

ED	Cable Group	Connectors			
7G028-22	803	J15	BUS IN	J5	IAO LAN
7G028-22	806	J7	CTL OUT	J6	CTL IN
7G028-22	812	J27	CTL OUT	J16-1 J8-1 J16-2 J8-2	RESET IN EQPG OUT RESET IN EQPG OUT

Interconnection Cable Installation Procedure

For the installation of the integration cables required for the Two-Bay Rack and Stack configuration, it is necessary that the Integrated Bay be installed in position 1 as Bay 1 (left-most position) and that the second bay, in position 2, have an OT System Controller Shelf (List 11) and an OT Complimentary Shelf 1 (List 12). The OT System Controller Shelf (List 11) is to be mounted with its intake baffle flush with the bottom of the bay. The OT Comp. 1 shelf should be mounted above the OT Controller shelf.

Refer to Figure 5-9 for bay placement and cabling.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Figure 5-9.   Bay and Cable Positions for Two Bay Rack and Stack Configuration
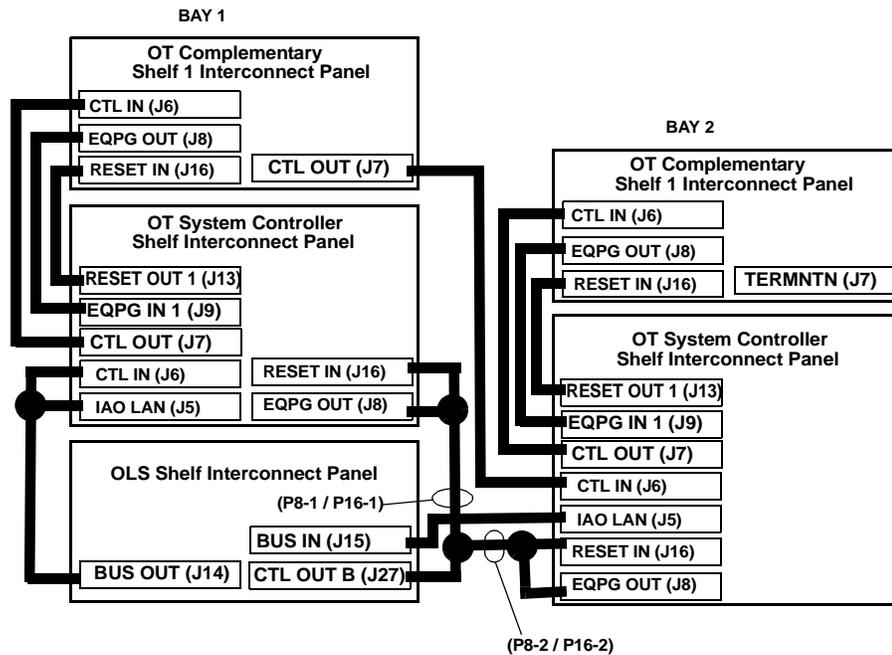
Follow the steps below to install the inter shelf cables.

Step	Action
1	Remove the ED-7G028-20 Group 29 cable from the Bay 1, OLS J27 and OT System Controller Shelf J8 and J16.
2	Route the P27 end of the E-7G028-22 Group 812 cable through the right side of the OLS shelf of Bay 1 and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel from which the G29 cable was removed in Step 1.
3	Route the P8-**1**/P16-**1** ends of the same cable through the right side of the OT System Controller Shelf (middle shelf of Bay **1**) to the interconnection panel.

(Continued on next page)

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Step	Action
4	Attach P8-**1** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **1** (middle shelf).
5	Attach P16-**1** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **1**.
6	Route the P8-**2** and P16-**2** ends of the same cable through the left side of the second OT System Controller shelf in Bay **2**, to the interconnection panel.
7	Attach P8-**2** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **2**.
8	Attach P16-**2** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **2**.
9	Remove the ED-7G045-20 G2 Termination from J7 on the interconnection panel of the top shelf, OT Complimentary 1 Shelf in Bay **1**.
10	Route the P7 end of the ED-7G028-22 G806 cable through the right side of the OT Complimentary 1 Shelf in Bay **1** (top shelf) and attach to the J7 CTL OUT connector .
11	Route the P6 end of the same cable through the left side of the OT System Controller Shelf in Bay **2**.
12	Remove the ED-7G045-20 G2 termination from the J6 CTL IN of the OT System Controller Shelf in Bay **2** and attach P6 to the J6 connector.
13	Remove the ED-7G028-20 G6 termination from J15 on the OLS shelf in Bay **1** and discard.
14	Route the P15 end of the ED-7G028-22 G803 cable through the right side of the OLS shelf in Bay **1** and attach to the J15 BUS IN connector.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Step	Action
15	Route the P5 end of the same ED-7G028-22 G803 cable through the left side of the OT System Controller Shelf of Bay **2**.
16	Attach P5 to the J5 IAO LAN connector on the OT System Controller Shelf of Bay **2**.
17	Remove the ED-7G045-20 G2 Termination from the OT System Controller Shelf of Bay **2** and attach it to the J7 CTL OUT connector of the OT Comp. 1 Shelf in Bay **2**.
18	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P7 to the J7 CTL OUT connector.
19	Route the P6 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
20	Route the P9 end of the ED-7G045-20 G7 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P9 to the J9 EQPG IN 1 connector.
21	Route the P8 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P8 to the J8 EQPG OUT connector.
22	Route the P13 end of ED-7G045-20 G9 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P13 to J13 RESET OUT 1 connector.
23	Route the P16 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P16 to the J16 RESET IN connector.
24	Tie excess cable into left or right bay frame channels.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Three-Bay Configuration

The Three-Bay System for the Rack and Stack Configuration consists of one integrated bay, one three-shelf OT bay and an additional bay containing one OT Complimentary 2 shelf.

Bay 1, the Integrated Bay should come pre-cabled from the factory with the following cables:

Table 5-28. Integrated Bay Cables for Bay 1 of Rack and Stack

ED	Cable Group	Connections			
		OLS		OT-Control	
7G028-20	28	P14	BUS OUT	J5 J6	IAO LAN CTL IN
7G028-20	29	J27	CTL OUT	J8 J16	EQPG OUT RESET IN
		OT-Control		OT-Comp. 1	
7G045-20	6	J7	CTL OUT	J6	CTRL IN
7G045-20	7	J9	EQPG IN 1	J8	EQPG OUT
7G045-20	9	J13	RESET OUT 1	J16	RESET IN

The OT Complimentary Shelf 1 (List 12) installed as the middle shelf in Bay 2 will be supplied with the following cables, however they may not be pre-installed:

Table 5-29. Cables supplied with OT Comp. 1 Shelf (List 12)

ED	Cable Group	Connectors			
7G045-20	6	J7	CTL OUT	J6	CTL IN
7G045-20	7	J9	EQPG IN	J8	EQPG OUT
7G045-20	9	J13	RESET OUT 1	J16	RESET IN

OLS/OT Integration Cables
Installation (Continued)

Rack and Stack Configurations (continued)

The OT Complimentary Shelf 2 (List 13) installed as the top shelf in Bay 2 will be supplied with the following cables, however they may not be pre installed:

Table 5-30.   Cables supplied with OT Comp. 2 Shelf (List 13), Bay 2

ED	Cable Group	Connectors			
7G045-20	6	J7	CTL OUT	J6	CTL IN
7G045-20	8	J10	EQPG IN 2	J8	EQPG OUT
7G045-20	10	J14	RESET OUT 2	J16	RESET IN

The OT Complimentary Shelf 2 (List 13) installed as the top shelf in Bay 3 will be supplied with the following cables:

Table 5-31.   Cables supplied with OT Comp. 2 Shelf (List 13), Bay 3

ED	Cable Group (see note)	Connectors			
7G045-20	11/11A/11B	J7	CTL OUT	J6	CTL IN
7G045-20	8/8A/8B	J10	EQPG IN 2	J8	EQPG OUT
7G045-20	10/10A/10B	J14	RESET OUT 2	J16	RESET IN

NOTE:
The varying group number suffixes indicate different lengths of the cable, which may change depending on the physical mounting location of the shelf. No suffix indicates a seven foot cable (7'), an "A" suffix indicates a 9' (nine foot) cable and the "B" suffix indicates an 11'6" cable (eleven foot, six inches).

Three additional cables are required for the Three-Bay Rack and Stack configuration, and are listed in Table 5-32.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

Table 5-32.   Additional Cables Required for Three-Bay Rack and Stack

ED	Cable Group	Connectors			
7G028-22	803	J15	BUS IN	J5	IAO LAN
7G028-22	806	J7	CTL OUT	J6	CTL IN
7G028-22	812	J27	CTL OUT	J16-1 J8-1 J16-2 J8-2	RESET IN EQPG OUT RESET IN EQPG OUT

Follow the steps below to install the inter shelf cables.

Step	Action
1	Remove the ED-7G028-20 Group 29 cable from the OLS shelf J27 and OT System Controller Shelf J8 and J16 in Bay **1**.
2	Route the P27 end of the ED-7G028-22 Group 812 cable through the right side of the OLS shelf of Bay **1** and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel from which the G29 cable was removed in Step 1.
3	Route the P8-**1**/P16-**1** ends of the same cable through the right side of the OT System Controller Shelf (middle shelf of Bay **1**) to the interconnection panel.
4	Attach P8-**1** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **1** (middle shelf).
5	Attach P16-**1** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **1**.
6	Route the P8-**2** and P16-**2** ends of the same cable through the left side of the second OT System Controller shelf in Bay **2**, to the interconnection panel.
7	Attach P8-**2** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **2.**
8	Attach P16-**2** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **2**.

(Continued on next page)

OLS/OT Integration Cables
Installation (Continued)

Rack and Stack
Configurations
(continued)

Step	Action
9	Remove the ED-7G045-20 G2 Termination from J7 on the interconnection panel of the top shelf, OT Complimentary 1 Shelf in Bay **1.**
10	Remove the ED-7G045-20 G6 termination from the J15 connector on the OLS shelf in Bay **1** and discard.
11	Route the P15 end of the ED-7G028-22 G803 cable through the right side of the OLS shelf in Bay **1** and attach to the J15 BUS IN connector.
12	Route the P5 end of the same ED-7G028-22 G803 cable through the left side of the OT System Controller Shelf of Bay **2** and connect to the J5 IAOLAN connector.
13	Remove the ED-7G045-20 G2 termination from J7 of the OT System Controller Shelf of Bay **2**.
14	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P7 to the J7 CTL OUT connector.
15	Route the P6 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
16	Route the P9 end of the ED-7G045-20 G7 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P9 to the J9 EQPG IN 1 connector.
17	Route the P8 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P8 to the J8 EQPG OUT connector
18	Route the P13 end of ED7G045-20 G9 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P13 to J13 RESET OUT 1 connector.
19	Route the P16 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P16 to the J16 RESET IN connector.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

Step	Action
20	Remove the ED7G045-20 Group 2 Termination from the Complementary Shelf 1 connector J7 of Bay **2** and plug it into Complementary Shelf 2 connector J7 of Bay **2.**
21	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT Complimentary 1 Shelf of Bay **2** and attach P7 to the J7 CTL OUT connector.
22	Route the P6 end of the same cable through the left side of the OT Complimentary 2 shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
23	Route the P10 end of the ED-7G045-20 G8 cable through the right side of the OT System Controller Shelf of Bay **2** and attach P10 to the J10 EQPG IN 2 connector.
24	Route the P8 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **2** and attach P8 to the J8 EQPG OUT connector.
25	Route the P14 end of the ED-7G045-20 G10 cable through the right side of the OT System Controller Shelf of Bay **2** and attach P14 to the J14 RESET OUT 2 connector.
26	Route the P16 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **2** and attach P16 to the J16 RESET IN connector.
27	Route the P7 end of the ED-7G045-20 G11A (or G11, G11B) cable through the left side of the OT Complimentary 1 Shelf of Bay **1** (top shelf) and attach P7 to the J7 CTL OUT connector.
28	Route the P6 end of the same cable through the left side of the OT Complimentary 2 shelf in Bay **3** and attach P6 to the J6 CTL IN connector.
29	Route the P10 end of the ED-7G045-20 G8A (or G8, G8B) cable through the right side of the OT System Controller Shelf of Bay **1** (middle shelf) and attach P10 to the J10 EQPG IN 2 connector.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Step	Action
30	Route the P8 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **3** and attach P8 to the J8 EQPG OUT connector.
31	Route the P14 end of the ED7G045-20 G10A (or G10, G10B) cable through the right side of the OT System Controller Shelf of Bay **1** (middle shelf) and attach P14 to the J14 RESET OUT 2 connector.
32	Route the P16 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **3** and attach P16 to the J16 RESET IN connector.
33	Route the P7 end of the ED-7G045-20 G806 cable through the right side of the OT Complimentary 2 Shelf of Bay **3** and attach P7 to the J7 CTL OUT connector.
34	Remove the termination from J6 of the OT System Controller shelf in Bay **2.**
35	Route the P6 end of the same cable through the left side of the OT System Controller shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
36	Tie excess cable into left or right bay frame channels.
37	Verify the ED7G045-20 G2 Termination connector is on OT Complementary Shelf 2 J7 connector of Bay **2**.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Figure 5-10.   Cable Positions for Three Bay Rack and Stack Configuration

The actual positions of the bays are represented in Figure 5-11.

(Continued on next page)

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Figure 5-11.   Bay Positions for Three Bay Rack and Stack Configuration

OT Comp. 1	Fuse/LGX
	OT Comp. 2	OT Comp. 2
OT Controller	OT Comp. 1
OLS	OT Controller
Bay 1	Bay 2	Bay 3

Five-Bay Configuration

The Five-Bay System for the Rack and Stack Configuration consists of two integrated bays, two multi-shelf OT bays and an additional bay containing two OT Complimentary 2 shelves.

Bays 1 and 5, the Integrated Bays should come pre-cabled from the factory with the following cables:

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Table 5-33. Integrated Bay Cables for Bays 1 and 5 of Rack and Stack

ED	Cable Group	Connections			
		OLS		OT-Control	
7G028-20	28	P14	BUS OUT	J5 J6	IAO LAN CTL IN
7G028-20	29	J27	CTL OUT	J8 J16	EQPG OUT RESET IN
		OT-Control		OT-Comp. 1	
7G045-20	6	J7	CTL OUT	J6	CTRL IN
7G045-20	7	J9	EQPG IN 1	J8	EQPG OUT
7G045-20	9	J13	RESET OUT 1	J16	RESET IN

The OT Complimentary Shelf 1 (List 12) installed as the middle shelf in Bay 2 or 4 will be supplied with the following cables, however they may not be pre-installed:

Table 5-34. Cables supplied with OT Comp. 1 Shelf (List 12), Bay 2 or Bay 4

ED	Cable Group	Connectors			
7G045-20	6	J7	CTL OUT	J6	CTL IN
7G045-20	7	J9	EQPG IN	J8	EQPG OUT
7G045-20	9	J13	RESET OUT 1	J16	RESET IN

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Each of the OT Complimentary Shelf 2 (List 13) installed as the top shelf in Bay 2 or Bay 4 will be supplied with the following cables, however they may not be pre installed:

Table 5-35.   Cables supplied with OT Comp. 2 Shelf (List 13), Bay 2 or Bay 4

ED	Cable Group	Connectors			
7G045-20	6	J7	CTL OUT	J6	CTL IN
7G045-20	8	J10	EQPG IN 2	J8	EQPG OUT
7G045-20	10	J14	RESET OUT 2	J16	RESET IN

Each of the OT Complimentary Shelf 2 (List 13) installed as the top or bottom shelves in Bay 3 will be supplied with the following cables:

Table 5-36.   Cables supplied with OT Comp. 2 Shelf (List 13), Bay 3

ED	Cable Group (see note)	Connectors			
7G045-20	11/11A/11B	J7	CTL OUT	J6	CTL IN
7G045-20	8/8A/8B	J10	EQPG IN 2	J8	EQPG OUT
7G045-20	10/10A/10B	J14	RESET OUT 2	J16	RESET IN

⇒ **NOTE:**
The varying group number suffixes indicate different lengths of the cable, which may change depending on the physical mounting location of the shelf. No suffix indicates a seven foot cable (7'), an "A" suffix indicates a 9' (nine foot) cable and the "B" suffix indicates an 11'6" cable (eleven foot, six inches).

Two each of three additional cables are required for the Five-Bay Rack and Stack configuration, and are listed in Table 5-32.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Table 5-37. Additional Cables Required for Five-Bay Rack and Stack

ED	Cable Group	Connectors			
7G028-22	803	J15	BUS IN	J5	IAO LAN
7G028-22	806	J7	CTL OUT	J6	CTL IN
7G028-22	812	J27	CTL OUT	J16-1 J8-1 J16-2 J8-2	RESET IN EQPG OUT RESET IN EQPG OUT

Follow the steps below to install the inter shelf cables for Bays 1-3.

Step	Action
1	Remove the ED7G028-20 Group 29 cable from the Bay **1** OLS shelf J27 and OT System Controller shelf J8 and J16 connectors.
2	Route the P27 end of the E-D7G028-22 Group 812 cable through the right side of the OLS shelf of Bay **1** and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel from which the G29 cable was removed in Step 1.
3	Route the P8-**1**/P16-**1** ends of the same cable through the right side of the OT System Controller Shelf (middle shelf of Bay **1**) to the interconnection panel.
4	Attach P8-**1** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **1** (middle shelf).
5	Attach P16-**1** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **1**.
6	Route the P8-**2** and P16-**2** ends of the same cable through the left side of the second OT System Controller shelf in Bay **2**, to the interconnection panel.
7	Attach P8-**2** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **2**.
8	Attach P16-**2** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **2**.

OLS/OT Integration Cables
Installation (Continued)

Rack and Stack Configurations (continued)

Cable installation for Bays 1-3 continues:

Step	Action
9	Remove the ED-7G045-20 G2 Termination from J7 on the interconnection panel of the top shelf, OT Complimentary 1 Shelf in Bay **1**.
10	Remove the ED-7G045-20 G6 termination from the J15 connector of the OLS shelf in Bay **1** and discard.
11	Route the P15 end of the ED-7G028-22 G803 cable through the right side of the OLS shelf in Bay **1** and attach to the J15 BUS IN connector.
12	Route the P5 end of the same ED-7G028-22 G803 cable through the left side of the OT System Controller Shelf of Bay **2** and connect to the J5 IAOLAN connector.
13	Remove the termination from the J7 connector of the OT System Controller Shelf of Bay **2**.
14	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P7 to the J7 CTL OUT connector.
15	Route the P6 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
16	Route the P9 end of the ED-7G045-20 G7 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P9 to the J9 EQPG IN 1 connector.
17	Route the P8 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P8 to the J8 EQPG OUT connector.
18	Route the P13 end of ED-7G045-20 G9 cable through the left side of the OT System Controller Shelf of Bay **2** and attach P13 to J13 RESET OUT 1 connector.
19	Route the P16 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **2** and attach P16 to the J16 RESET IN connector.

OLS/OT Integration Cables
Installation (Continued)

Rack and Stack Configurations (continued)

Cable installation for Bays 1-3 continues:

Step	Action
20	Remove the ED-7G045-20 Group 2 Termination from the Complementary Shelf 1 connector J7 of Bay **2** and plug it into Complementary Shelf 2 connector J7 of Bay **2**.
21	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT Complimentary 1 Shelf of Bay **2** and attach P7 to the J7 CTL OUT connector.
22	Route the P6 end of the same cable through the left side of the OT Complimentary 2 shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
23	Route the P10 end of the ED-7G045-20 G8 cable through the right side of the OT System Controller Shelf of Bay **2** and attach P10 to the J10 EQPG IN 2 connector.
24	Route the P8 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **2** and attach P8 to the J8 EQPG OUT connector.
25	Route the P14 end of the ED-7G045-20 G10 cable through the right side of the OT System Controller Shelf of Bay **2** and attach P14 to the J14 RESET OUT 2 connector.
26	Route the P16 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **2** and attach P16 to the J16 RESET IN connector.
27	Route the P7 end of the ED-7G045-20 G11A (or G11, G11B) cable through the left side of the OT Complimentary 1 Shelf of Bay **1** (top shelf) and attach P7 to the J7 CTL OUT connector.
28	Route the P6 end of the same cable through the left side of the top OT Complimentary 2 shelf in Bay **3** and attach P6 to the J6 CTL IN connector.
29	Route the P10 end of the ED-7G045-20 G8A (or G8, G8B) cable through the right side of the OT System Controller Shelf of Bay **1** (middle shelf) and attach P10 to the J10 EQPG IN 2 connector.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

Cable installation for Bays 1-3 continues:

Step	Action
30	Route the P8 end of the same cable through the right side of the top OT Complimentary 2 shelf in Bay **3** and attach P8 to the J8 EQPG OUT connector.
31	Route the P14 end of the ED7G045-20 G10A (or G10, G10B) cable through the right side of the OT System Controller Shelf of Bay **1** (middle shelf) and attach P14 to the J14 RESET OUT 2 connector.
32	Route the P16 end of the same cable through the right side of the top OT Complimentary 2 shelf in Bay **3** and attach P16 to the J16 RESET IN connector.
33	Route the P7 end of the ED-7G045-20 G806 cable through the right side of the top OT Complimentary 2 Shelf of Bay **3** and attach P7 to the J7 CTL OUT connector.
34	Remove the termination from J6 of the OT System Controller shelf in Bay **2**.
35	Route the P6 end of the same cable through the left side of the OT System Controller shelf in Bay **2** and attach P6 to the J6 CTL IN connector.
36	Tie excess cable into left or right bay frame channels.
37	Verify the ED7G045-20 G2 Termination connector is on OT Complementary Shelf 2 J7 connector of Bay **2**.

Follow the steps below to install the inter shelf cables for Bays 3-5.

Step	Action
1	Remove the ED-7G028-20 Group 29 cable from the Bay **5** OLS shelf J27 and OT System Controller shelf J8 and J16 connectors.

OLS/OT Integration Cables
Installation (Continued)

Rack and Stack Configurations (continued)

Cable installation for Bays 3-5 continues:

Step	Action
2	Route the P27 end of the ED7G028-22 Group 812 cable through the right side of the OLS shelf of Bay **5** and attach to the J27 CTL OUT (B) connector on the OLS interconnection panel from which the G29 cable was removed in Step 1.
3	Route the P8-**1**/P16-**1** ends of the same cable through the right side of the OT System Controller Shelf (middle shelf of Bay **5**) to the interconnection panel.
4	Attach P8-**1** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **5** (middle shelf).
5	Attach P16-**1** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **5**.
6	Route the P8-**2** and P16-**2** ends of the same cable through the left side of the second OT System Controller shelf in Bay **4**, to the interconnection panel.
7	Attach P8-**2** to the J8 EQPG OUT connector on the OT System Controller Shelf in Bay **4**.
8	Attach P16-**2** to the J16 RESET IN connector on the OT System Controller Shelf in Bay **4**.
9	Remove the ED-7G045-20 G2 Termination from J7 on the interconnection panel of the top shelf, OT Complimentary 1 Shelf in Bay **5**.
10	Remove the ED-7G045-20 G6 termination from the J15 connector of the OLS shelf in Bay **5**.
11	Route the P15 end of the ED7G028-22 G803 cable through the right side of the OLS shelf in Bay **5** and attach to the J15 BUS IN connector.
12	Route the P5 end of the same ED7G028-22 G803 cable through the left side of the OT System Controller Shelf of Bay **4**.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

Cable installation for Bays 3-5 continues:

Step	Action
13	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT System Controller Shelf of Bay **4** and attach P7 to the J7 CTL OUT connector.
14	Route the P6 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **4** and attach P6 to the J6 CTL IN connector.
15	Route the P9 end of the ED-7G045-20 G7 cable through the left side of the OT System Controller Shelf of Bay **4** and attach P9 to the J9 EQPG IN 1 connector.
16	Route the P8 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **4** and attach P8 to the J8 EQPG OUT connector.
17	Route the P13 end of ED-7G045-20 G9 cable through the left side of the OT System Controller Shelf of Bay **4** and attach P13 to J13 RESET OUT 1 connector.
18	Route the P16 end of the same cable through the left side of the OT Complimentary 1 shelf in Bay **4** and attach P16 to the J16 RESET IN connector.
19	Remove the ED-7G045-20 Group 2 Termination from the Complimentary Shelf 1 connector J7 of Bay **4** and plug it into Complementary Shelf 2 connector J7 of Bay **4**.
20	Route the P7 end of the ED-7G045-20 G6 cable through the left side of the OT Complimentary 1 Shelf of Bay **4** and attach P7 to the J7 CTL OUT connector.
21	Route the P6 end of the same cable through the left side of the OT Complimentary 2 shelf in Bay **4** and attach P6 to the J6 CTL IN connector.
22	Route the P10 end of the ED-7G045-20 G8 cable through the right side of the OT System Controller Shelf of Bay **4** and attach P10 to the J10 EQPG IN 2 connector.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

Cable installation for Bays 3-5 continues:

Step	Action
23	Route the P8 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **4** and attach P8 to the J8 EQPG OUT connector.
24	Route the P14 end of the ED-7G045-20 G10 cable through the right side of the OT System Controller Shelf of Bay **4** and attach P14 to the J14 RESET OUT 2 connector.
25	Route the P16 end of the same cable through the right side of the OT Complimentary 2 shelf in Bay **4** and attach P16 to the J16 RESET IN connector.
26	Route the P7 end of the ED-7G045-20 G11A (or G11, G11B) cable through the left side of the OT Complimentary 1 Shelf of Bay **5** (top shelf) and attach P7 to the J7 CTL OUT connector.
27	Route the P6 end of the same cable through the left side of the bottom OT Complimentary 2 shelf in Bay **3** and attach P6 to the J6 CTL IN connector.
28	Route the P10 end of the ED-7G045-20 G8A (or G8, G8B) cable through the right side of the OT System Controller Shelf of Bay **5** (middle shelf) and attach P10 to the J10 EQPG IN 2 connector.
29	Route the P8 end of the same cable through the right side of the bottom OT Complimentary 2 shelf in Bay **3** and attach P8 to the J8 EQPG OUT connector.
30	Route the P14 end of the ED-7G045-20 G10A (or G10, G10B) cable through the right side of the OT System Controller Shelf of Bay **5** (middle shelf) and attach P14 to the J14 RESET OUT 2 connector.
31	Route the P16 end of the same cable through the right side of the bottom OT Complimentary 2 shelf in Bay **3** and attach P16 to the J16 RESET IN connector.

OLS/OT Integration Cables
Installation (Continued)

**Rack and Stack
Configurations
(continued)**

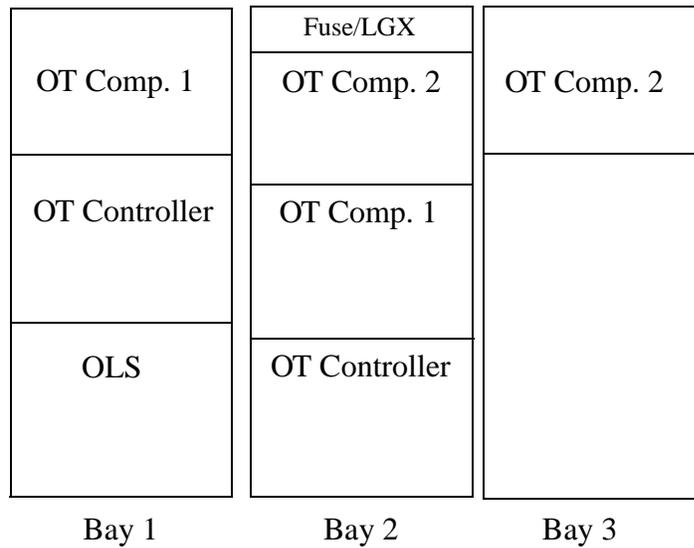| Step	Action
32	Route the P7 end of the ED-7G045-20 G806 cable through the right side of the bottom OT Complimentary 2 Shelf of Bay **3** and attach P7 to the J7 CTL OUT connector.
33	Route the P6 end of the same cable through the left side of the OT System Controller shelf in Bay **4** and attach P6 to the J6 CTL IN connector.
34	Tie excess cable into left or right bay frame channels.
35	Verify the ED-7G045-20 G2 Termination connector is on OT Complementary Shelf 2 J7 connector of Bay **4**.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Figure 5-12.   Cable Positions for Five Bay Rack and Stack Configuration

The actual positions of the bays are represented in Figure 5-11.

OLS/OT Integration Cables Installation (Continued)

Rack and Stack Configurations (continued)

Figure 5-13.   Bay Positions for Five Bay Rack and Stack Configuration

Bay 1	Bay 2	Bay 3	Bay 4	Bay 5
OT Comp. 1	Fuse/LGX	OT Comp. 2	Fuse/LGX	OT Comp. 1
	OT Comp. 2		OT Comp. 2	
OT Controller				OT Controller
	OT Comp. 1		OT Comp. 1	
OLS	OT Controller	OT Comp. 2	OT Controller	OLS

Final Verification

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

Step	Action
1	Verify that cables are properly secured and dressed.
2	Verify that all cables are properly labeled.

WaveStar OLS 40G Fiber and Circuit Pack Installation

6

Contents

Background

Introduction

> ⚠ **CAUTION:**
> *Procedures in this installation manual are only to be performed by trained personnel.*

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

- Generic Information for Fiber Installation

- 1A-TX End Terminal Specific Installation

- 1A-RCV End Terminal Specific Installation

- Repeater Terminal Specific Installation

- One OA 1A-TX End Terminal Specific Installation

- One OA 1A-RCV End Terminal Specific Installation

- Two OA/Two OA Dual Facing Shelf Installation

- Two OA/One OA Dual Facing Shelf Installation

- One OA/Two OA Dual Facing Shelf Installation

- One OA/One OA Dual Facing Shelf Installation

- Rack and Stack Configuration Installation

- OT Specific Installation

- Rack and Stack Configurations

- Telemetry Feed-Through Installation

All sections except for the Generic Information for Fiber Installation cover fiber routing, fiber protection, fiber dressing, circuit pack and unit installation and precautions, and fiber installation.

Background **(Continued)**

**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 Chapter 1, Overall Installation and Test Considerations.

- For ordering information for the WaveStar OLS 40G or for the Optical Translator (OT), refer to the 365-575-386 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, channel, or duct, 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, or SC type connectors for connection to the WaveStar OLS 40G.

- Do not remove the backplane cover during the installation process.

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.

Generic Information for Fiber Installation (Continued)

Optical Translator Description

An Optical Translator system can have up to three shelves: the controller shelf, complementary shelf 1 and complementary 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).

⚠ 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.

Generic Information for Fiber Installation (Continued)

Intraoffice Fiber Jumpers

Connections between WaveStar OLS 40G shelves and both the SONET/SDH equipment and outside plant fiber are shown in Figure 6-1.

Figure 6-1.   Intraoffice Fiber Jumpers
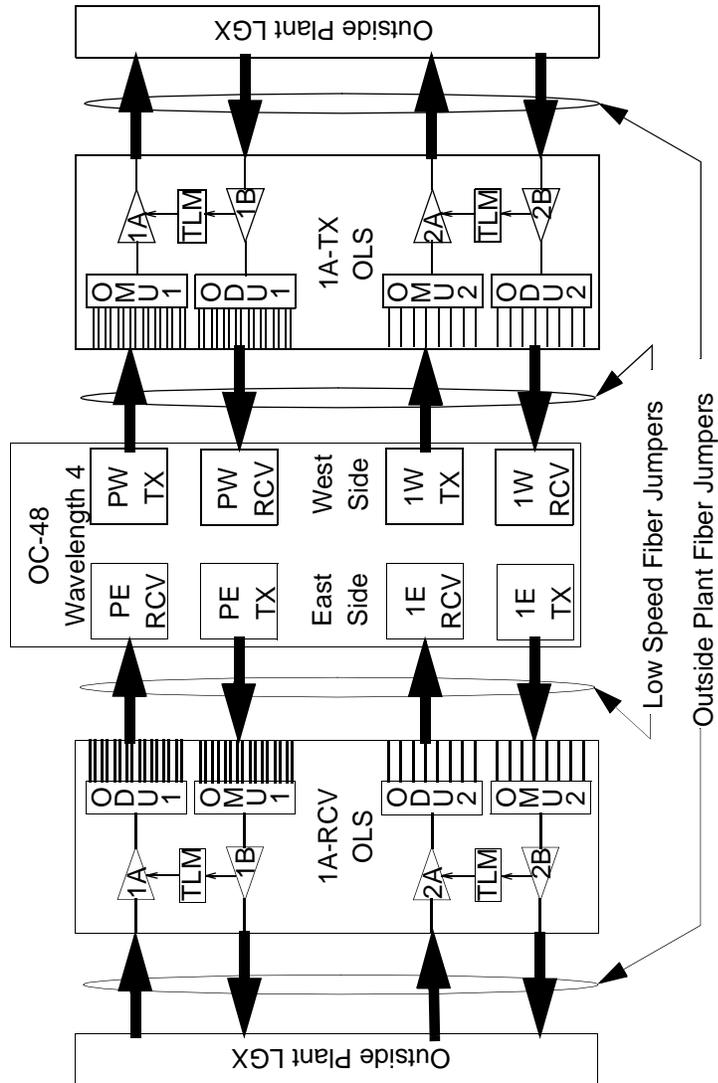
Generic Information for Fiber Installation (Continued)

Available Fiber Jumpers

Table 6-1 lists some of the available jumpers for high-speed fiber connection for use with the WaveStar OLS 40G. For additional fiber jumpers available in the Rack and Stack configuration, refer to the Rack and Stack subsection of this chapter.

Table 6-1.   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 6-2 lists some of the available jumpers for Intrashelf fiber connection for use with the WaveStar OLS 40G.

Table 6-2.   Intrashelf Lightwave Jumpers

List	Max. No. of Chan.	System Type	Requirement	No./Length/Type
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

Generic Information for Fiber Installation (Continued)

Available Fiber Jumpers (continued)

Table 6-2.   Intrashelf Lightwave Jumpers (continued)

List	Max. No. of Chan.	System Type	Requirement	No./Length/Type
L163	16	1 OA ET	1 per Optical Line	1-50"-ST to ST
	16	1 OA /1 OA Dual Facing Shelf	1 per Optical Line	1-50"-LC to ST 1-20"-LC to ST Mini Cord fiber
L164	16	2 OA/2 OA Dual Facing Shelf	1 per Shelf	4-50"-ST to ST 4-50"-LC to ST MiniCord fiber
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

Generic Information for Fiber Installation (Continued)

Fiber Cable Routing

The figure that follows illustrates 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 6-2.   Fiber Routing (Single Shelf Shown)

Flexible Lightwave
Protection Tubing
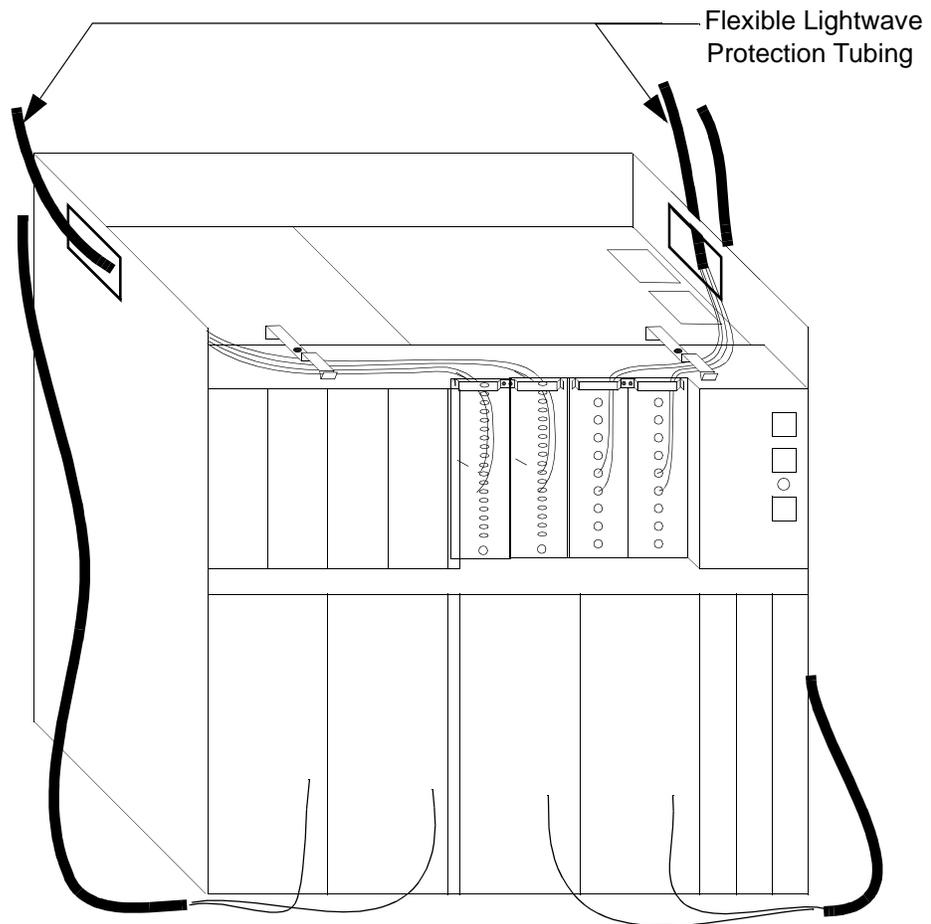
Generic Information for Fiber
Installation (Continued)

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.

- After software installation in Chapter 9, Local Installation Testing, 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 MT370-01 pin kit for the METRAL pins, or the KS-22876 L6 Pin Repair Kit for the FASTECH technology. 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.

Generic Information for Fiber Installation (Continued)

Circuit Pack Installation (continued)

Circuit Pack Availability

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

Table 6-3.   Available WaveStar OLS 40G Circuit Pack Codes

List	Comcode	Circuit Pack	Description
L35	107272510	LEA1	System Controller (SYSCTL)
L40	107786568	LEA2	System Memory (SYSMEM)
L30	107273328	LEA5	Tributary Overhead Controller (TOHCTL)
L21	107742439	LEA7	Optical Amplifier (OA) — Long Haul
		LEA7B	Optical Amplifier (OA) — Long Haul with optical monitoring port
L23	108045394	LEA105	Optical Amplifier (OA) — Short Haul
L22	107976367	LEA104	Optical Amplifier (OA) — 16 λ Very Long Haul
L25	107272569	LDA1	Telemetry (TLM)
L61	107727828	506A	16 λ Optical Multiplexing Unit (OMU)
L51	108032814	606A	16 λ Optical Demultiplexing Unit (ODU) without Supervisory Channel
L52	108032822	606B	16 λ Optical Demultiplexing Unit (ODU) with Supervisory Channel

1A-TX End Terminal Installation

Description   This subsection covers the installation of fibers and labels for the 1A-TX End Terminal configuration. 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.

- 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.*

Circuit Pack Equip Procedure for 2-Line Systems

Step	Action
1	Review information in Fiber Cable Routing: page 6-9 and Circuit Pack Installation: page 6-10 before beginning this procedure.
2	Refer to Figure 6-3 for circuit pack locations.

> ⇒ **NOTE:**
> A particular bay or cabinet may be equipped with two OLS shelves to be configured as a Dual 2-Line system. Each of the two shelves can be represented by Figure 6-3 and should be equipped and fibered individually.

1A-TX End Terminal Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
3	Install, but do not seat, the following controller circuit packs in the OLS 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 OLS shelf: ■ (2) LEA7, LEA7B, LEA104, or LEA105 OA ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed. ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C 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.

1A-TX End Terminal Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
5	If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the OLS shelf: ■ (2) LEA7, LEA7B, LEA104, or LEA105 OA ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C 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.

Step	Action
6	Repeat Steps 1 to 5 if an additional OLS shelf is to be equipped in the same bay.

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the 4 fiber jumpers per List 162 for 16 λ 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 6-3 and Table 6-4. See Table 6-2 for more fiber information.

⟹ **NOTE:**
    The fibers must pass in front of the bracket between the TLM and OMU/ODU slots.

Figure 6-3.   1A-TX End Terminal Intrashelf Fiber Jumpers
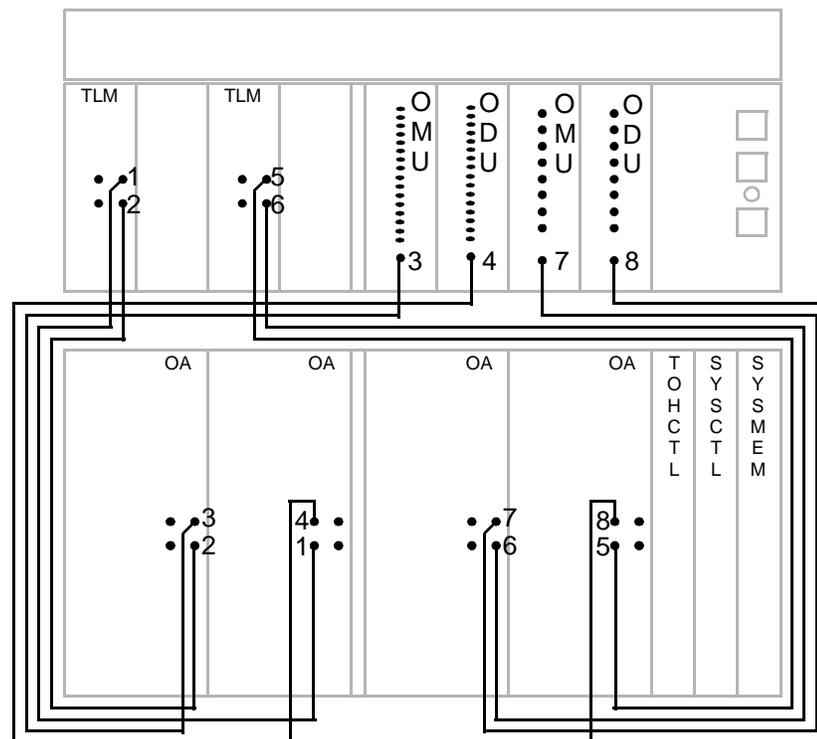
1A-TX End Terminal Installation
(Continued)

Fiber Jumper Installation (continued)

Table 6-4.   Intrashelf Fiber Jumpers for 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal 1A-TX Dual 2-Line (use Lines 1 & 2 for each shelf) Refer to Figure 6-3 for connection point.	1	1	TLM 1A	IN	1A-TLM-IN
		1	OA 1B	TLM OUT	1B-OA-TLMOUT
		2	TLM 1A	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	IN	2A-TLM-IN
		5	OA 2B	TLM OUT	2B-OA-TLMOUT
		6	TLM 2A	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

(Continued on next page)

1A-TX End Terminal Installation (Continued)

**Fiber Jumper
Installation
(continued)**

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 6-2 and Table 6-4. Use Table 6-5 for Line 1 and
Table 6-6 for Line 2.

⚠ **CAUTION:**
   Do not connect either end of the fiber jumper at this time.

**Figure 6-4.   1A-TX End Terminal Outside Plant, Low-Speed, and Customer
            Maintenance Signal Fiber Jumpers**

(Continued on next page)

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-5.   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	1	OMU 1A	OCHAN1 IN	LOWER 1M1	UPPER 1M1
1A-TX		OMU 1A	OCHAN2 IN	LOWER 1M2	UPPER 1M2
Dual 2-Line (use Lines 1 & 2 for each shelf)		OMU 1A	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1A	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1A	OCHAN5 IN	LOWER 1M5	UPPER 1M5
Refer to Figure 6-4 for connection points.		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

\   (Continued on next page)

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-5.   1A-TX End Terminal Low-Speed Fiber Jumpers — Line 1 (continued)

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Upper Shelf Dual 2-Line
End Terminal 1A-TX Dual 2-Line (use Lines 1 & 2 for each shelf) Refer to Figure 6-4 for connection points.	1	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	OCHAN15 OUT	LOWER 1D15	UPPER 1D15
		ODU 1B	OCHAN16 OUT	LOWER 1D16	UPPER 1D16

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-6.   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	2	OMU 2A	OCHAN1 IN	LOWER 2M1	UPPER 2M1
1A-TX		OMU 2A	OCHAN2 IN	LOWER 2M2	UPPER 2M2
Dual 2-Line		OMU 2A	OCHAN3 IN	LOWER 2M3	UPPER 2M3
(use Lines 1 & 2 for each shelf)		OMU 2A	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2A	OCHAN5 IN	LOWER 2M5	UPPER 2M5
Refer to		OMU 2A	OCHAN6 IN	LOWER 2M6	UPPER 2M6
Figure 6-4 for		OMU 2A	OCHAN7 IN	LOWER 2M7	UPPER 2M7
connection		OMU 2A	OCHAN8 IN	LOWER 2M8	UPPER 2M8
points.		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

1A-TX End Terminal Installation
(Continued)

Fiber Jumper Installation (continued)

Table 6-6. 1A-TX End Terminal Low-Speed Fiber Jumpers — Line 2 (continued)

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Upper Shelf
End Terminal 1A-TX Dual 2-Line (use Lines 1 & 2 for each shelf) Refer to Figure 6-4 for connection points.	2	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

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

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 6-4 and Table 6-7.

> ⚠ **CAUTION:**
> *Do not connect either end to the fiber jumper at this time.*

Table 6-7.   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
1A-TX		2	OA 1B	IN	1B-OA-IN
Refer to Figure 6-4 for connection points	2	3	OA 2A	OUT	2A-OA-OUT
		4	OA 2B	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 facilities or LGX by adding the labels from the Installation Kit C848065959 then routing the fibers by referring to Figure 6-4 and Table 6-8.

(Continued on next page)

1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-8.   Customer Maintenance Fiber Jumpers for End Terminal

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	A	TLM 1A	CM IN	1A-TLM-CMIN
1A-TX		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-4 for connection points	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	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 frame. Refer to Figure 6-2 and Figure 6-4 for miscellaneously mounted shelf or integrated bay installations.

1A-TX End Terminal Installation (Continued)

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 6-3 and Figure 6-4. For OLS circuit packs located in Line 1 positions, all fibers should dress to the left. For OLS circuit packs located in Line 2, all fibers should dress to the right.

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 6-4.

> **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 6-3 to seat the OMU and ODU units in the shelf as follows:

Step	Action
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.

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

1A-TX End Terminal Installation (Continued)

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

Step	Action
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.

1A-RCV End Terminal Installation

Description

This subsection covers the installation of fibers and labels for the 1A-RCV End Terminal configuration. 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.

- 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.

Circuit Pack Equip Procedure for 2-Line Systems

Step	Action
1	Review information on Fiber Cable Routing: page 6-9 and Circuit Pack Installation: page 6-10 before beginning this procedure
2	Refer to Figure 6-5 for circuit pack locations.

⇒ NOTE:
A particular bay or cabinet may be equipped with two OLS shelves to be configured as a Dual 2-Line system. Each of the two shelves can be represented by Figure 6-5, and should be equipped and fibered individually.

1A-RCV End Terminal Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
3	Install, but do not seat, the following controller circuit packs in the OLS 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 OLS shelf: ■ (2) LEA7, LEA7B, LEA104, or LEA105 OA ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed. ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C 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.

1A-RCV End Terminal Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
5	If line 2 is equipped, install, but do not seat, the following transmission circuit packs and units for line 2 in the OLS shelf: ■ (2) LEA7, LEA7B, LEA104, or LEA105 OA ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed. ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C 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.

Step	Action
6	Repeat Steps 1 to 5 for the second shelf, if an additional OLS shelf is to be equipped in the same bay or cabinet.

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the four fiber jumpers per List 162 for 16 λ for *each* line (8 fibers for a 2-line shelf), add the labels, and route the fibers using Figure 6-5 and Table 6-9. See Table 6-2 for more information on fiber lists.

➤ **NOTE:**
The fibers must pass in front of the bracket between the TLM and OMU/ODU slots.

Figure 6-5. **1A-RCV End Terminal Intrashelf Fiber Jumpers**

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-9.   Intrashelf Fiber Jumpers for 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1A	IN	1A-TLM-IN
1A-RCV		1	OA 1A	TLM OUT	1A-OA-TLMOUT
Dual 2-Line (use Lines 1 & 2 for each shelf)		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLMIN
Refer to Figure 6-5 on page 6-29 for connection point.		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	IN	2A-TLM-IN
		5	OA 2A	TLM OUT	2A-OA-TLM-OUT
		6	TLM 2A	OUT	2A-TLM-OUT
		6	OA 2B	TLM IN	2B-OA-TLM-IN
		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

(Continued on next page)

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

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 6-2, Figure 6-6, and Table 6-10 for Line 1, and Table 6-11 on page 6-34 for Line 2 if it is equipped.

> ⚠ **CAUTION:**
> *Do not connect either end of the fiber jumper at this time.*

Figure 6-6.   1A-RCV End Terminal Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-10.   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	1	OMU 1B	OCHAN1 IN	LOWER 1M1	UPPER 1M1
1A-RCV		OMU 1B	OCHAN2 IN	LOWER 1M2	UPPER 1M2
Dual 2-Line (use Lines 1 & 2 for each shelf)		OMU 1B	OCHAN3 IN	LOWER 1M3	UPPER 1M3
		OMU 1B	OCHAN4 IN	LOWER 1M4	UPPER 1M4
		OMU 1B	OCHAN5 IN	LOWER 1M5	UPPER 1M5
Refer to Figure 6-6 on page 6-31 for connection points.		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

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-10.   1A-RCV End Terminal Low-Speed Fiber Jumpers — Line 1 (continued)

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Upper Shelf Dual 2-Line
End Terminal 1A-TX Dual 2-Line (use Lines 1 & 2 for each shelf) Refer to Figure 6-6 on page 6-31 for connection points.	1	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

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-11.   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
End Terminal	2	OMU 2B	OCHAN1 IN	LOWER 2M1	UPPER 2M1
1A-RCV		OMU 2B	OCHAN2 IN	LOWER 2M2	UPPER 2M2
Dual 2-Line		OMU 2B	OCHAN3 IN	LOWER 2M3	UPPER 2M3
(use Lines 1 & 2 for each shelf)		OMU 2B	OCHAN4 IN	LOWER 2M4	UPPER 2M4
		OMU 2B	OCHAN5 IN	LOWER 2M5	UPPER 2M5
Refer to Figure 6-6 on page 6-31 for connection points.		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

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-11. **1A-RCV End Terminal Low-Speed Fiber Jumpers — Line 2 (continued)**

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Upper Shelf
End Terminal 1A-TX Dual 2-Line (use Lines 1 & 2 for each shelf) Refer to Figure 6-6 for connection points.	2	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

1A-RCV End Terminal Installation (Continued)

**Fiber Jumper
Installation
(continued)**

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 6-6 on page 6-31 and Table 6-12 on page 6-36.

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

Table 6-12. Outside Plant LGX Fiber Jumpers for 1A-RCV End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	OA 1A	IN	1A-OA-IN
1A-RCV		2	OA 1B	OUT	1B-OA-OUT
Refer to	2	3	OA 2A	IN	2A-OA-IN
Figure 6-6 on page 6-31 for connection points		4	OA 2B	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 facilities or LGX by adding the labels then routing the fibers by referring to Figure 6-6 and Table 6-13.

1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-13.   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	CM IN	1A-TLM-CMIN
1A-RCV		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-6 on page 6-31 for connection points	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	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 frame. Refer to Figure 6-2 and Figure 6-6 for miscellaneously 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 6-5 and Figure 6-6.

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 6-2 and Figure 6-6.

$\Longrightarrow$ **NOTE:**
To place the fibers through the clips, lift the clip and slide one fiber through at a time to prevent overstressing the clips.

1A-RCV End Terminal Installation (Continued)

Seat OMUs and ODUs Into Shelf

Refer to Figure 6-5, and seat the OMU and ODU units in the shelf as follows:

Step	Action
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.

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:

Step	Action
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.

Repeater Installation

Description

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 6-1.

Circuit Pack Equip Procedure for 2-Line Systems

➡ **NOTE:**
A particular bay or cabinet may be equipped with two OLS shelves to be configured as a Dual 2-Line system. Each of the two shelves can be represented by Figure 6-7, and should be equipped and fibered individually.

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 section and the Circuit Pack Installation: page 6-10 section before beginning this procedure
2	Refer to Figure 6-7 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

(Continued on next page)

Repeater Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
4	Install, but do not seat, the following transmission circuit packs for line 1 in the lower shelf: ■ (2) LEA7, LEA7B, 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) LEA7, LEA7B, or LEA104 OA ■ (2) LDA1 TLM
6	Repeat Steps 1 to 5 if an additional OLS repeater shelf is to be equipped in the same bay.

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 6-7 and Table 6-14. 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.

Repeater Installation (Continued)

Fiber Jumper Installation (continued)

Figure 6-7.   Repeater Intrashelf Fiber Jumpers
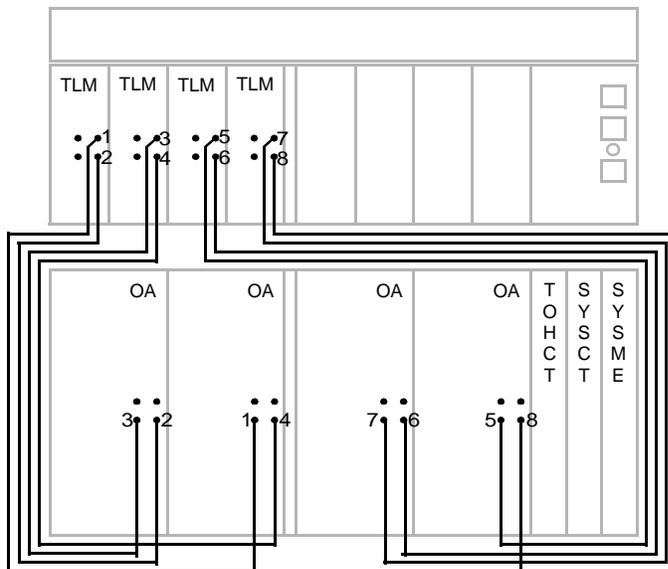
Repeater Installation (Continued)

**Fiber Jumper
Installation
(continued)**

Table 6-14.   Intrashelf Fiber Jumpers for Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure 6-7 on page 6-41 for connection point.	1	1	TLM 1A	IN	1A-TLM-IN
		1	OA 1B	TLM OUT	1B-OA-TLMOUT
		2	TLM 1A	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-TLM-OUT
		4	TLM 1B	OUT	1B-TLM-OUT
		4	OA 1B	TLM IN	1B-OA-TLM-IN
	2	5	TLM 2A	IN	2A-TLM-IN
		5	OA 2B	TLM OUT	2B-OA-TLM-OUT
		6	TLM 2A	OUT	2A-TLM-OUT
		6	OA 2A	TLM IN	2A-OA-TLM-IN
		7	TLM 2B	IN	2B-TLM-IN
		7	OA 2A	TLM OUT	2A-OA-TLM-OUT
		8	TLM 2B	OUT	2B-TLM-OUT
		8	OA 2B	TLM IN	2B-OA-TLM-IN

(Continued on next page)

Repeater Installation (Continued)

Fiber Jumper Installation (continued)

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 6-8 and Table 6-15.

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

Table 6-15.   Outside Plant LGX Fiber Jumpers for Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure 6-8 for connection points	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

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. Refer to Figure 6-8 and Table 6-16.

Repeater Installation (Continued)

**Fiber Jumper
Installation
(continued)**

Figure 6-8. Repeater Outside Plant and Customer Maintenance Fiber Jumpers
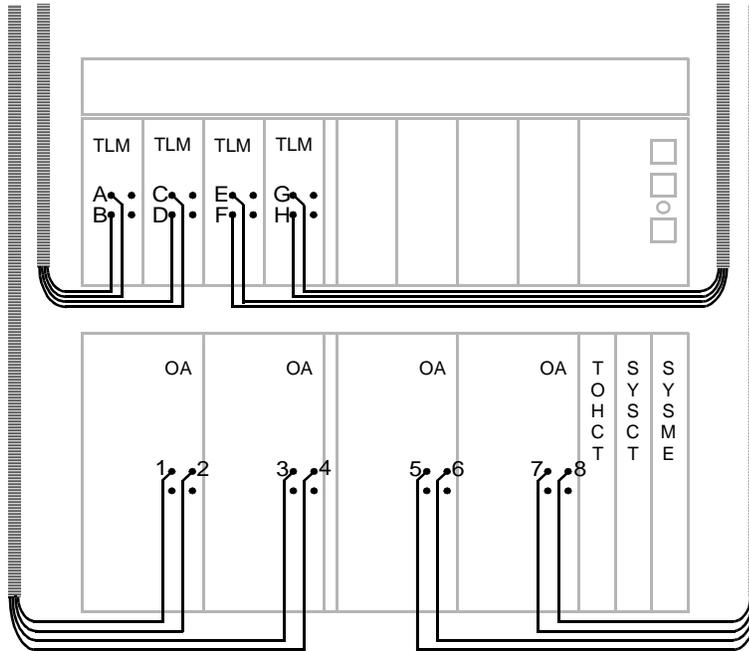
Repeater Installation (Continued)

Fiber Jumper
Installation
(continued)

Table 6-16. Customer Maintenance Fiber Jumpers for Repeaters

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
Repeater Refer to Figure 6-8 on page 6-44 for connection point	1	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
		C	TLM 1B	CM IN	1B-TLM-CMIN
		D	TLM 1B	CM OUT	1B-TLM-CMOUT
	2	E	TLM 2A	CM IN	2A-TLM-CMIN
		F	TLM 2A	CM OUT	2A-TLM-CMOUT
		G	TLM 2B	CM IN	2B-TLM-CMIN
		H	TLM 2B	CM OUT	2B-TLM-CMOUT

Fiber Protection   If fiber duct is not installed, 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 shelf. Refer to Figure 6-2 or Figure 6-8.

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 6-7 and Figure 6-8.

⇒ **NOTE:**
Place the fibers through the fiber clips one at a time to avoid overstressing the clips and possibly damaging the fibers.

Repeater Installation (Continued)

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

Step	Action
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.

One OA 1A-TX End Terminal Installation

Description   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.

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.

Circuit Pack Equip Procedure for 2-Line Systems

⟹ **NOTE:**
A particular bay or cabinet may be equipped with two OLS shelves to be configured as a Dual 2-Line system. Each of the two shelves can be represented by Figure 6-9, and should be equipped and fibered individually.

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 section and the Circuit Pack Installation: page 6-10 section before beginning this procedure.
2	Refer to Figure 6-9 for circuit pack locations.

One OA 1A-TX End Terminal Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Systems (continued)

Step	Action
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	If line 1 is equipped, install, but do not seat, the following transmission circuit packs and units for line 1 in the OLS shelf: ■ (1) LEA105, LEA7, or LEA7B OA in the 1B slot ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed ■ (1) 506A or 506B OMU in the 1A slot (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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 OLS shelf: ■ (1) LEA105, LEA7, or LEA7B OA in the 2B slot ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed ■ (1) 506A or 506B OMU in the 2A slot (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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 an additional OLS shelf is to be equipped in the same bay or cabinet.

One OA 1A-TX End Terminal
Installation (Continued)

**Fiber Jumper
Installation**

Intrashelf Fiber Jumper Installation

Install the three 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 6-9 and Table 6-17. See Table 6-2 for
more fiber List information.

⇒ **NOTE:**
The fibers must pass in front of the bracket between the TLM and OMU/
ODU slots.

Figure 6-9.   One OA 1A-TX End Terminal Intrashelf Fiber Jumpers
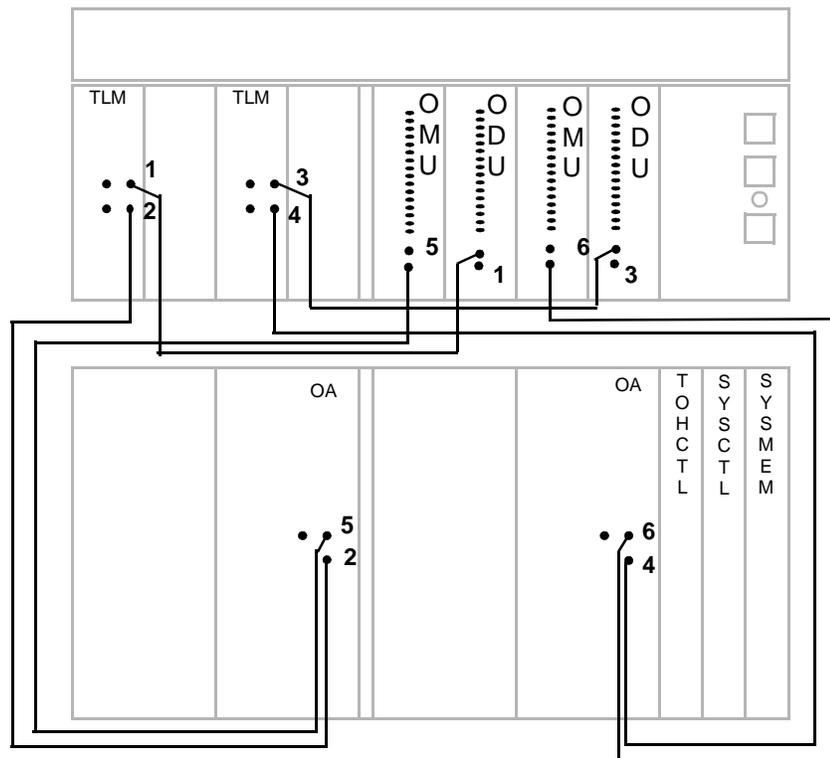
One OA 1A-TX End Terminal
Installation (Continued)

**Fiber Jumper
Installation
(continued)**

Table 6-17.   Intrashelf Fiber Jumpers for One OA 1A-TX End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1A	IN	1A-TLM-IN
One OA 1A-TX		1	ODU 1A	SUPR OUT	
Dual 2-Line		2	TLM 1A	OUT	1A-TLM-OUT
(use Lines 1 & 2 for each shelf)		2	OA 1B	TLM IN	1B-OA-TLM-IN
		5	OMU 1A	OMU OUT	1-OMU-OUT
Refer to Figure 6-9 for connection point.		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-TLM-IN
		6	OMU 2A	OMU OUT	2-OMU-OUT
		6	OA 2B	IN	2B-OA-IN

⚠ **CAUTION:**
Do not connect either end of the fiber jumper at this time.

One OA 1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Figure 6-10. 1A-TX End Terminal Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers
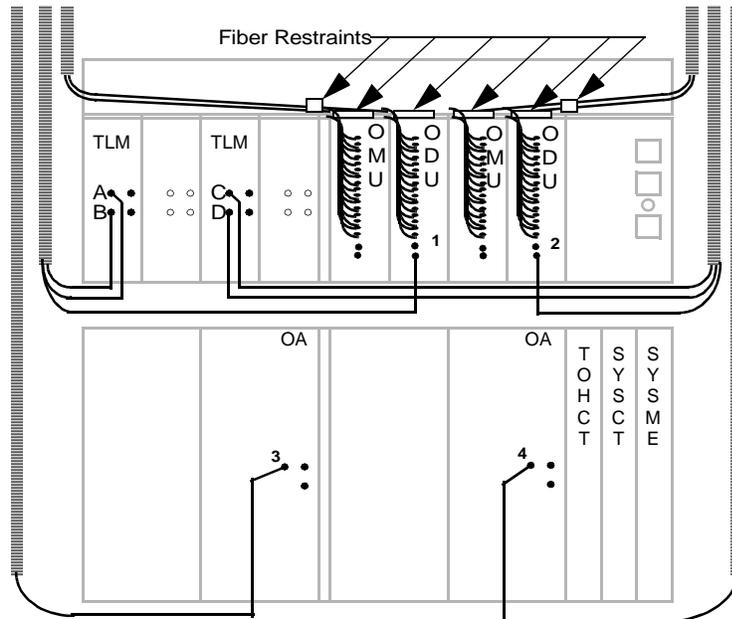
Low Speed Fiber Jumpers

The low speed fiber jumpers and labels for a one OA 1A-TX application are identical to a regular two OA 1A-Tx application. Refer to Table 6-5 and Table 6-6 for the connections and labels for low speed fiber jumpers.

One OA 1A-TX End Terminal
Installation (Continued)

Fiber Jumper
Installation
(continued)

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 6-10 and Table 6-18.

> ⚠ **CAUTION:**
> *Do not connect either end to the fiber jumper at this time.*

Table 6-18. Outside Plant LGX Fiber Jumpers for One OA 1A-TX End Terminal

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA 1A-TX	1	1	ODU-1A	IN	1A-ODU-IN
		3	1B-OA	OUT	1B-OA-OUT
Refer to Figure 6-10 on page 6-51 for connection point	2	2	ODU-2A	IN	2A-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 6-10 and Table 6-19.

One OA 1A-TX End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-19.   Customer Maintenance Fiber Jumpers for End Terminals

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	A	TLM 1A	CM IN	1A-TLM-CMIN
1A-TX		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-10 on page 6-51 for connection point	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-10.

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 6-9 and Figure 6-10.

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 6-2 and Figure 6-10.

⊟> **NOTE:**
The fibers should be placed through the clips one at a time to avoid overstressing the clips.

One OA 1A-TX End Terminal Installation (Continued)

Seat OMUs and ODUs Into Shelf

Refer to Figure 6-9 to seat the OMU and ODU units in the shelf as follows:

Step	Action
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:

Step	Action
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.

One OA 1A-RCV End Terminal Installation

Description

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.

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.

Circuit Pack Equip Procedure for 2-Line Systems

⟹ **NOTE:**
A particular bay or cabinet may be equipped with two OLS shelves to be configured as a Dual 2-Line system. Each of the two shelves can be represented by Figure 6-11, and should be equipped and fibered individually.

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 section and the Circuit Pack Installation: page 6-10 section before beginning this procedure.
2	Refer to Figure 6-11 for circuit pack locations.

One OA 1A-RCV End Terminal
Installation (Continued)

**Circuit Pack Equip
Procedure for 2-
Line Systems
(continued)**

Step	Action
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 OLS shelf: ■ (1) LEA105, LEA7, or LEA7B OA in the 1A slot ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed ■ (1) 506A or 506B OMU in the 1B slot (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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 OLS shelf: ■ (1) LEA105, LEA7, or LEA7B OA in the 2A slot ■ (1) LDA1 TLM ■ (1) LDA1 TLM if R3.0 and later Telemetry Feed-Through is being installed ■ (1) 506A or 506B OMU in the 2B slot (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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 an additional OLS shelf is to be equipped in the same bay or cabinet.

One OA 1A-RCV End Terminal
Installation (Continued)

**Fiber Jumper
Installation**

Intrashelf Fiber Jumper Installation

Install the three 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 6-11 and Table 6-20. See Table 6-2 for
more fiber List information.

⇒ **NOTE:**
The fibers must pass in front of the bracket between the TLM and OMU/
ODU slots.

Figure 6-11.   One OA 1A-RCV End Terminal Intrashelf Fiber Installation
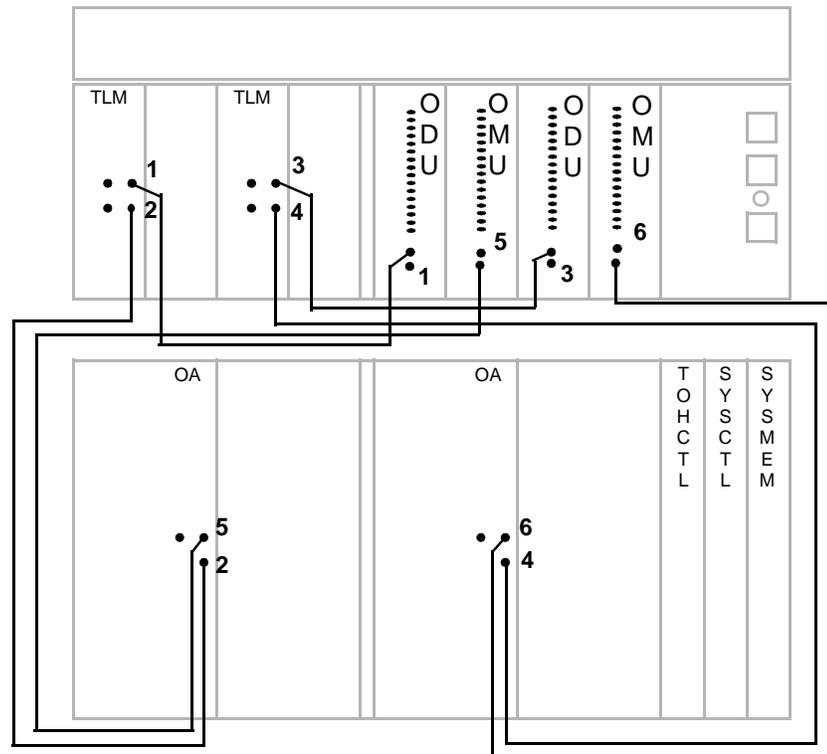
One OA 1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-20.   Intrashelf Fiber Jumpers for One OA 1A-RCV End Terminal

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1A	IN	1A-TLM-IN
One OA 1A-RCV		1	ODU 1A	SUPR OUT	
Dual 2-Line (use Lines 1 & 2 for each shelf)		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1A	TLM IN	1A-OA-TLM-IN
		5	OMU 1B	OMU OUT	1-OMU-OUT
Refer to Figure 6-11 for connection point.		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-TLM-IN
		6	OMU 2B	OMU OUT	2-OMU-OUT
		6	OA 2A	IN	2B-OA-IN

Low-Speed Fiber Jumper Installation

⚠ **CAUTION:**
Do not connect either end of the fiber jumper at this time

One OA 1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Figure 6-12. **One OA 1A-RCV End Terminal Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers.**
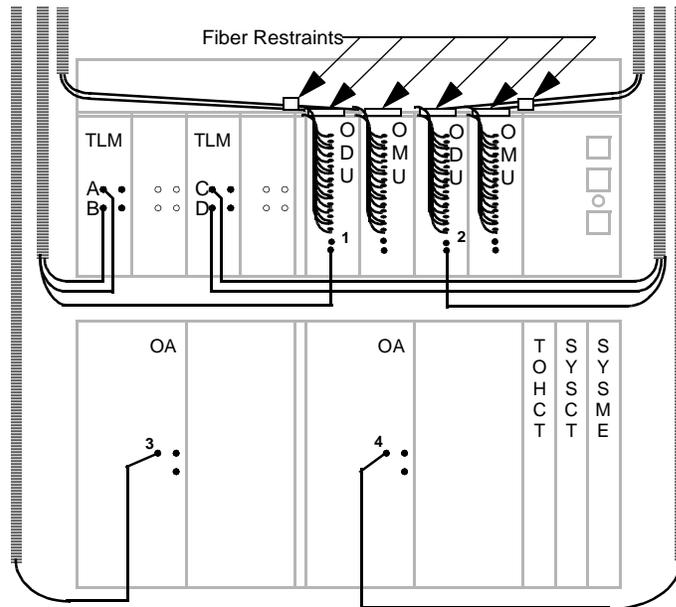
Low Speed Fiber Jumpers

The low speed fiber jumpers and labels for a one OA 1A-RCV application are identical to a regular two OA 1A-RCV application. Refer to Table 6-10 and Table 6-11 for the connections and labels for low speed fiber jumpers.

One OA 1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

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 6-12 and Table 6-21.

⚠ **CAUTION:**
Do not connect either end to the fiber jumper at this time.

Table 6-21. Outside Plant LGX Fiber Jumpers for One OA 1A-RCV End Terminal

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	ODU-1A	IN	1A-ODU-IN
One OA 1A-RCV		3	1A-OA	OUT	1A-OA-OUT
	2	2	ODU-2A	IN	2A-ODU-IN
Refer to Figure 6-12 on page 6-59 for connection point		4	2A-OA	OUT	2A-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 6-12 and Table 6-22.

One OA 1A-RCV End Terminal Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-22.   Customer Maintenance Fiber Jumpers for One OA 1A-RCV End Terminal

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	A	TLM 1A	CM IN	1A-TLM-CMIN
One OA 1A-RCV		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-12 on page 6-59 for connection point	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-12.

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 6-11 and Figure 6-12.

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 6-2 and Figure 6-12.

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

One OA 1A-RCV End Terminal
Installation (Continued)

Seat OMUs and ODUs Into Shelf

Refer to Figure 6-11 or Figure 6-12, and seat the OMU and ODU units in the shelf as follows:

Step	Action
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:

Step	Action
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.

Two OA/Two OA Dual Facing Shelf Installation

Description   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.

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.

Circuit Pack Equip Procedure for 2-Line Shelf

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 section and the Circuit Pack Installation: page 6-10 section before beginning this procedure.
2	Refer to Figure 6-13 for circuit pack locations.

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Shelf (continued)

Step	Action
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 shelf: ■ (2) LEA7, LEA7B, LEA105 or LEA104 OA ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C ODU (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) LEA7, LEA7B, LEA105, or LEA104 OA ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C ODU (Leave the retainer screws for the unit on the shelf at this time.)
6	Proceed to the Intrashelf Fiber Jumper Installation: page 6-65 section.

⇒ **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.

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the eight (8) fiber jumpers per List 164 by adding the labels from installation kit C848065959, and the routing the fibers by referring to Figure 6-13 and Table 6-23. For more information on Fiber Lists, refer to Table 6-2.

Figure 6-13.   Two OA Dual Facing Shelf Intrashelf Fiber Jumpers

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

⇒ **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 6-23.   Intrashelf Fiber Jumpers for Two OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1A	IN	1A-TLM-IN
Two OA Dual Facing Shelf		1	1A OA	TLM OUT	1A-OA-TLM-OUT
Refer to Figure 6-13 for connection point.		2	TLM 1A	OUT	1A-TLM-OUT
		2	OA 1B	TLM IN	1B-OA-TLM-IN
		5	ODU 1A	IN	1-ODU-IN
		5	OA 1A	OUT	1A-OA-OUT
		6	OMU 1B	OUT	1-OMU-OUT
		6	OA 1B	IN	1B-OA-IN
	2	3	TLM 2A	IN	2A-TLM-IN
		3	OA 2B	TLM OUT	2B-OA-TLM-OUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLM-IN
		7	OMU 2A	OMU OUT	2-OMU-OUT
		7	OA 2A	IN	2A-OA-IN
		8	ODU 2B	IN	2-ODU-IN
		8	OA 2B	OUT	2B-OA-OUT

(Continued on next page)

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

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 6-2, Figure 6-14, and Table 6-24 through Table 6-25.

> ⚠ **CAUTION:**
> *Do not connect either end of the fiber jumper at this times.*

Figure 6-14. Two OA Dual Facing Shelf Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-24.   Two OA Dual Facing Shelf Low-Speed Fiber Jumpers — Line 1

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Top Shelf Dual 2-Line
Two OA Dual Facing Shelf	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
Refer to Figure 6-14 for connection points.		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

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-24.   Two OA Dual Facing Shelf Low-Speed Fiber Jumper — Line 1 (continued)

Application	Line	Circuit Pack	Connector	Label to Install for Lower Shelf	Label to Install for Top Shelf Dual 2-Line
Two OA Dual Facing Shelf Refer to Figure 6-14 for connection points.	1	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

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-25.   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
Two OA Dual Facing Shelf Refer to Figure 6-14 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

Two OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-25.   Two OA Dual Facing Shelf Low-Speed Fiber Jumper — Line 2 (continued)

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 6-14 for connection points.	2	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 6-14 and Table 6-26.

⚠️ **CAUTION:**
Do not connect either end to the fiber jumper at this time.

Two OA/Two OA Dual Facing Shelf
Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-26.   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	1	1	OA-1A	IN	1A-OA-IN
		2	OA-1B	OUT	1B-OA-OUT
Refer to Figure 6-14 for connection point	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 6-14 and Table 6-27.

Table 6-27.   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	1	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-14 for connection point	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-14.

Two OA/Two OA Dual Facing Shelf Installation (Continued)

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 6-2 and Figure 6-14.

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 6-2 and Figure 6-14.

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

Two OA/One OA Dual Facing Shelf Installation

Description

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.

Circuit Pack Equip Procedure for 2-Line Shelf

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 and the Circuit Pack Installation: page 6-10 sections before beginning this procedure.
2	Refer to Figure 6-15 for circuit pack locations.

(Continued on next page)

Two OA/One OA Dual Facing Shelf Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Shelf (continued)

Step	Action
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) LEA7, LEA7B, LEA 105 or LEA104 OA ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C ODU (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, LEA7, or LEA7B OA in slot 2B ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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: page 6-76 section.

$\Longrightarrow$ **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.

Two OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation

Intrashelf Fiber Jumper Installation

Install the seven (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 6-15 and Table 6-28. See Table 6-2 for more information on fiber lists.

Figure 6-15.   Two OA/One OA Dual Facing Shelf Intrashelf Fiber Jumpers
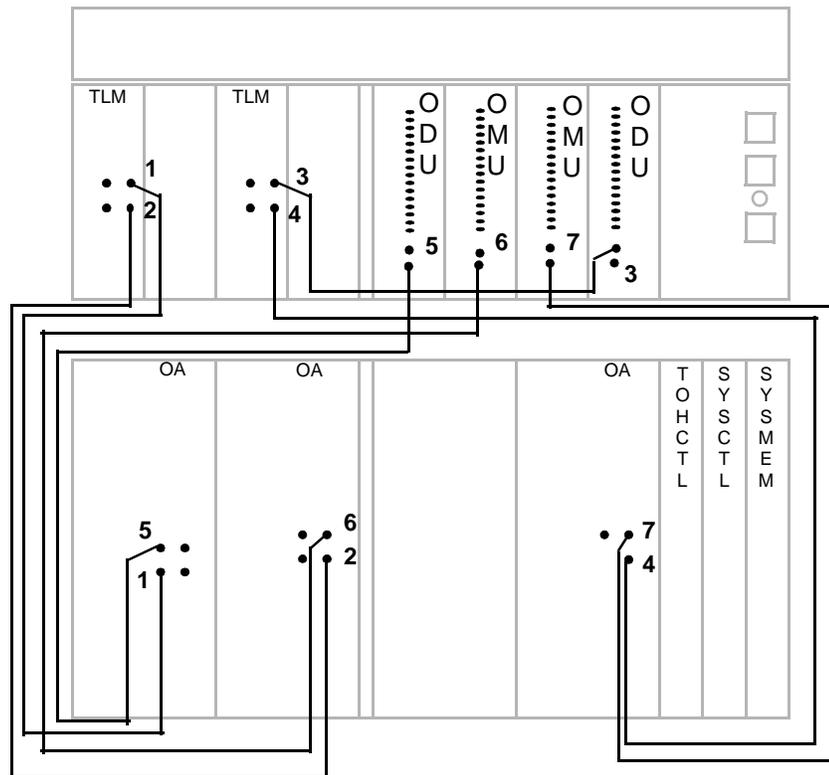
(Continued on next page)

Two OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

⇒ **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 6-28.   Intrashelf Fiber Jumpers for Two 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
Two OA One OA Dual Facing Shelf		1	1A OA	TLM OUT	1A-OA-TLM-OUT
		2	TLM 1A	OUT	1A-TLM-OUT
Refer to Figure 6-15 for connection point.		2	OA 1B	TLM IN	1B-OA-TLM-IN
		5	ODU 1A	ODU IN	1-ODU-IN
		5	OA 1A	OUT	1A-OA-OUT
		6	OA 1B	IN	1B-OA-IN
		6	OMU 1B	OUT	1-OMU-OUT
	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-TLM-IN
		7	OMU 2A	OMU OUT	2-OMU-OUT
		7	OA 2B	IN	2B-OA-IN

Two OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Low-Speed Fiber Jumper Installation

The low speed fiber jumpers and labels for a Two OA/One OA Dual Facing Shelf application are identical to a regular Two OA/Two OA Dual Facing Shelf application. Refer to Table 6-24 and Table 6-25 for the connections and labels for low speed fiber jumpers.

> ⚠️ **CAUTION:**
> *Do not connect either end of the fiber jumper at this time.*

Figure 6-16.   Two OA/One OA Dual Facing Shelf Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers
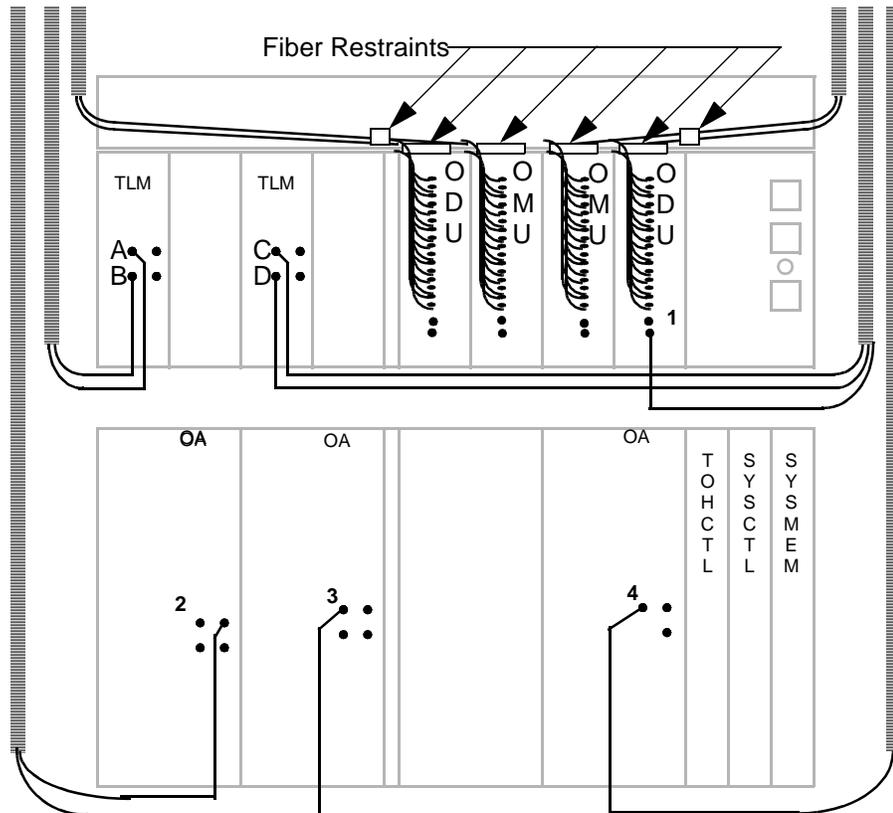
Two OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

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 6-16 and Table 6-29.

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

Table 6-29. 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	1	2	1A-OA	IN	1A-OA-IN
		3	1B-OA	OUT	1B-OA-OUT
Refer to Figure 6-16 for connection point	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 then routing the fibers by referring to Figure 6-16 and Table 6-30.

Two OA/One OA Dual Facing Shelf
Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-30.   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 6-16 for connection point	1	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-16.

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 6-15 and Figure 6-16.

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 6-2 and Figure 6-16.

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

One OA/Two OA Dual Facing Shelf Installation

Description   This configuration is supported by Releases 2.1 and subsequent releases only.

This section 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 fibering of the other shelf.

This section also 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.

Circuit Pack Equip Procedure For 2-Line Shelf

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 and Circuit Pack Installation: page 6-10 sections before beginning this procedure.
2	Refer to Figure 6-17 for circuit pack locations.

One OA/Two OA Dual Facing Shelf Installation (Continued)

Circuit Pack Equip Procedure For 2-Line Shelf (Continued)

Step	Action
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, LEA7, or LEA7B OA in slot 1A ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU in slot 1B (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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) LEA7, LEA7B, LEA105 or LEA104 OA ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606A or 606C ODU (Leave the retainer screws for the unit on the shelf at this time.)
6	Proceed to the Intrashelf Fiber Jumper Installation: page 6-83 section.

⟹ **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.

One OA/Two OA Dual Facing Shelf
Installation (Continued)

**Fiber Jumper
Installation**

Intrashelf Fiber Jumper Installation

Install the seven (7) fiber jumpers per List 165 by adding the labels from
Installation Kit C848065959 then routing the fibers by referring to Figure 6-17 and
Table 6-31. See Table 6-2 for more information on fiber Lists.

⟹ **NOTE:**
The fibers must pass in front of the bracket between the TLM and OMU/
ODU slots.

Figure 6-17.   One OA/Two OA Dual Facing Shelf Intrashelf Fiber Jumpers
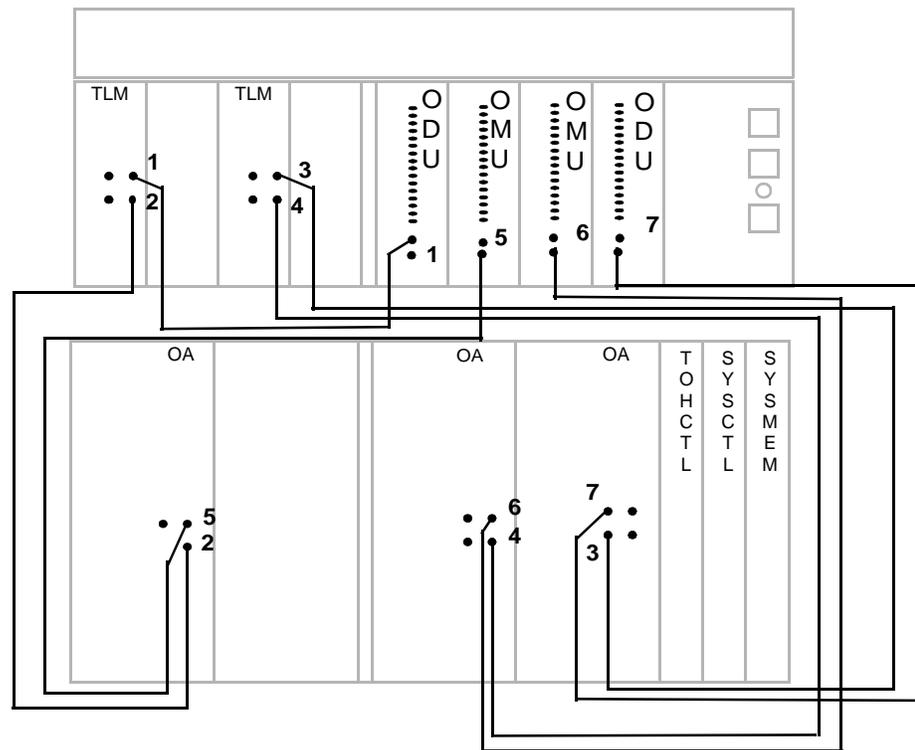
One OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-31. Intrashelf 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 6-17 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-TLM-IN
		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 2B	TLM OUT	2B-OA-TLMOUT
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2A	TLM IN	2A-OA-TLM-IN
		6	OMU 2A	OMU OUT	2-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

The low speed fiber jumpers and labels for a One OA/Two OA Dual Facing Shelf application are identical to a regular Two OA/Two OA Dual Facing Shelf application. Refer to Table 6-24 and Table 6-25 for the connections and labels for low-speed fiber jumpers.

One OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

⚠ **CAUTION:**
  Do not connect either end of the fiber jumper at this time.

Figure 6-18. **One OA/Two OA Dual Facing Shelf Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers**

One OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Outside Plant LBX 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 6-18 and Table 6-32.

> ⚠ **CAUTION:**
> *Do not connect either end to the fiber jumper at this time.*

Table 6-32.   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	1	1	ODU-1	IN	1A-ODU-IN
		2	1A-OA	OUT	1A-OA-OUT
Refer to Figure 6-18 for connection point	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 6-18 and Table 6-33.

One OA/Two OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-33. Customer Maintenance Fiber Jumper 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	1	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-18 on page 6-85 for connection point	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-18.

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 6-17 and Figure 6-18.

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 6-2 and Figure 6-18.

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

One OA/One OA Dual Facing Shelf Installation

Description

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.

Circuit Pack Equip Procedure for 2-Line Shelf

Step	Action
1	Review information in the Fiber Cable Routing: page 6-9 and Circuit Pack Installation: page 6-10 sections before beginning this procedure.
2	Refer to Figure 6-19 for circuit pack locations.

One OA/One OA Dual Facing Shelf Installation (Continued)

Circuit Pack Equip Procedure for 2-Line Shelf (continued)

Step	Action
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, LEA7, and LEA7B OA in slot 1A ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU in slot 1B (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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, LEA7, and LEA7B OA in slot 2B ■ (1) LDA1 TLM ■ (1) 506A or 506B OMU in slot 2A (Leave the retainer screws for the unit on the shelf at this time.) ■ (1) 606B or 606D 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: page 6-90 section.

One OA/One OA Dual Facing Shelf Installation (Continued)

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 6-19 and Table 6-34. For more information on fiber lists refer to Table 6-2.

➡ **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 6-19. One OA/One OA Dual Facing Shelf Intrashelf Fiber Jumpers
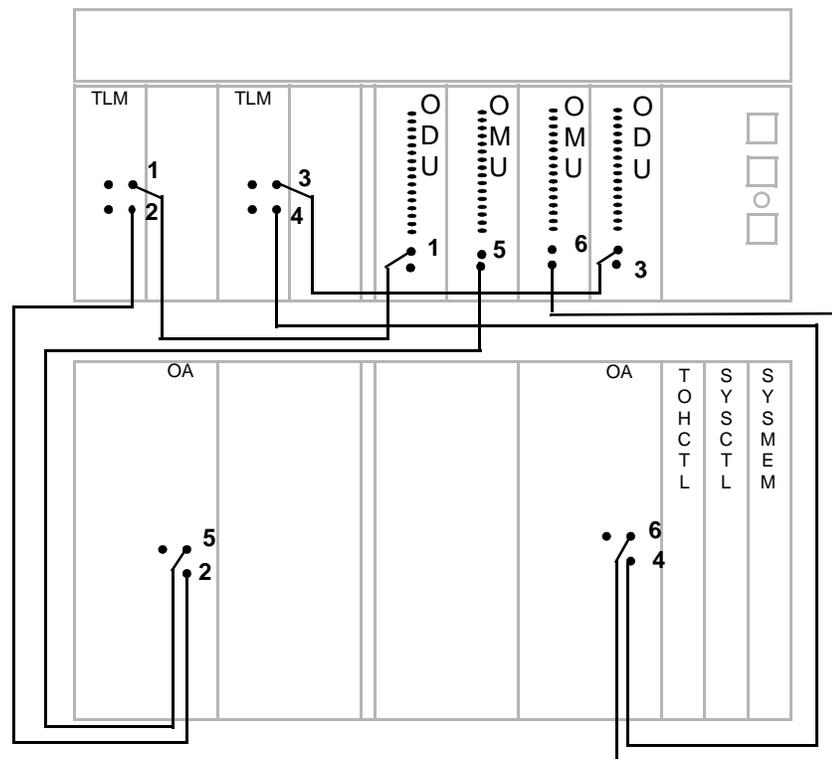
One OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-34.   Intrashelf Fiber Jumpers for One OA/One OA Dual Facing Shelf

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal One OA/One OA Dual Facing Shelf Refer to Figure 6-19 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-TLM-IN
		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 2B	SUPR OUT	
		4	TLM 2A	OUT	2A-TLM-OUT
		4	OA 2B	TLM IN	2B-OA-TLM-IN
		6	OMU 2A	OMU OUT	2-OMU-OUT
		6	OA 2B	IN	2B-OA-IN

Low-Speed Fiber Jumper Installation

The low speed fiber jumpers and labels for a One OA/One OA Dual Facing Shelf application are identical to a regular Two OA/Two OA Dual Facing Shelf application. Refer to Table 6-24 and Table 6-25 for the connections and labels for low-speed fiber jumpers.
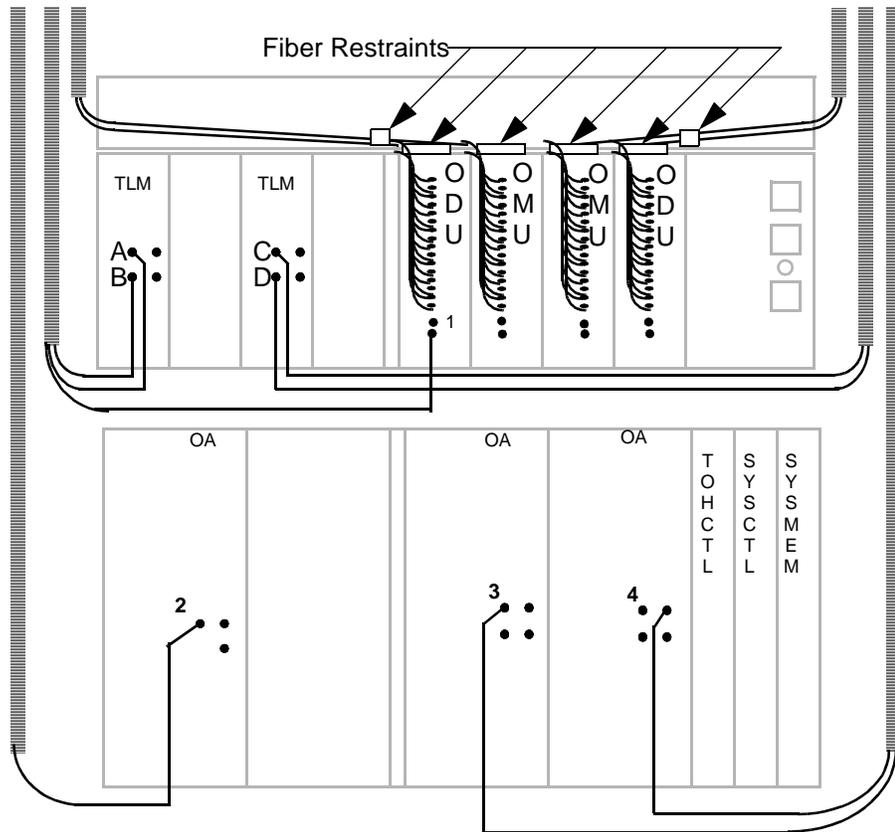
One OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

⚠ **CAUTION:**
Do not connect either end of the fiber jumper at this time.

Figure 6-20. One OA/One OA Dual Facing Shelf Outside Plant, Low-Speed, and Customer Maintenance Signal Fiber Jumpers

One OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

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 6-20 and Table 6-35.

⚠ **CAUTION:**
Do not connect either end to the fiber jumper at this time.

Table 6-35.   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	1	1	ODU-1A	IN	1A-ODU-IN
		2	1A-OA	OUT	1A-OA-OUT
Refer to Figure 6-20 for connection point	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 6-20 and Table 6-36.

One OA/One OA Dual Facing Shelf Installation (Continued)

Fiber Jumper Installation (continued)

Table 6-36.   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	1	A	TLM 1A	CM IN	1A-TLM-CMIN
		B	TLM 1A	CM OUT	1A-TLM-CMOUT
Refer to Figure 6-20 for connection point	2	C	TLM 2A	CM IN	2A-TLM-CMIN
		D	TLM 2A	CM OUT	2A-TLM-CMOUT

Fiber Protection

If fiber duct is not installed, 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 6-2 and Figure 6-20.

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 6-19 and Figure 6-20.

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 6-2 and Figure 6-20.

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

Optical Translator Fiber Installation

Overview   This section covers OT fiber installation. Included is fiber routing, fiber protection, and labeling.

Fiber Jumper and   **Fiber Routing and Installation**
Label Installation

The following guidelines should be followed when installing the fibers in the OT shelves.

Step	Action
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 6-21. For raised floor applications run the tube out through the bottom of the cabinet, exiting through large holes in cabinet frame.
3	While 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.

(Continued on next page)

Optical Translator Fiber Installation (Continued)

Fiber Jumper and Label Installation (continued)

> ⚠ **CAUTION:**
> *Do not connect fibers to OTU circuit packs at this time. Fibers may have power levels that could damage OTU receivers.*

Step	Action
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.
7	After fibers are dressed, insert a fiber protective strip (fiber gasket comcode 848757720) into the fiber trough. Make sure all fibers are behind this strip, not under it, as to avoid pinching the fibers. Verify all fibers are away from the hinge of the shelf before closing the shelf cover.

Fiber Protection

For protection, place the installed fibers in the split polyethylene fiber protection tubing supplied in the installation kit. Refer to Figure 6-21 and Figure 6-2 for individual OT shelf fiber routing.

Figure 6-21.   Fiber Routing for Individual OT Shelf
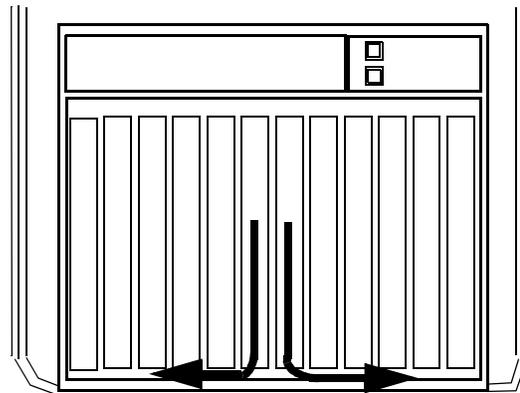
Optical Translator Fiber Installation (Continued)

Fiber Labeling

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.

Optical Translator Fiber Installation (Continued)

Fiber Labeling (continued)

Figure 6-22.   Fiber Labeling Example: 16λ, Add and Drop
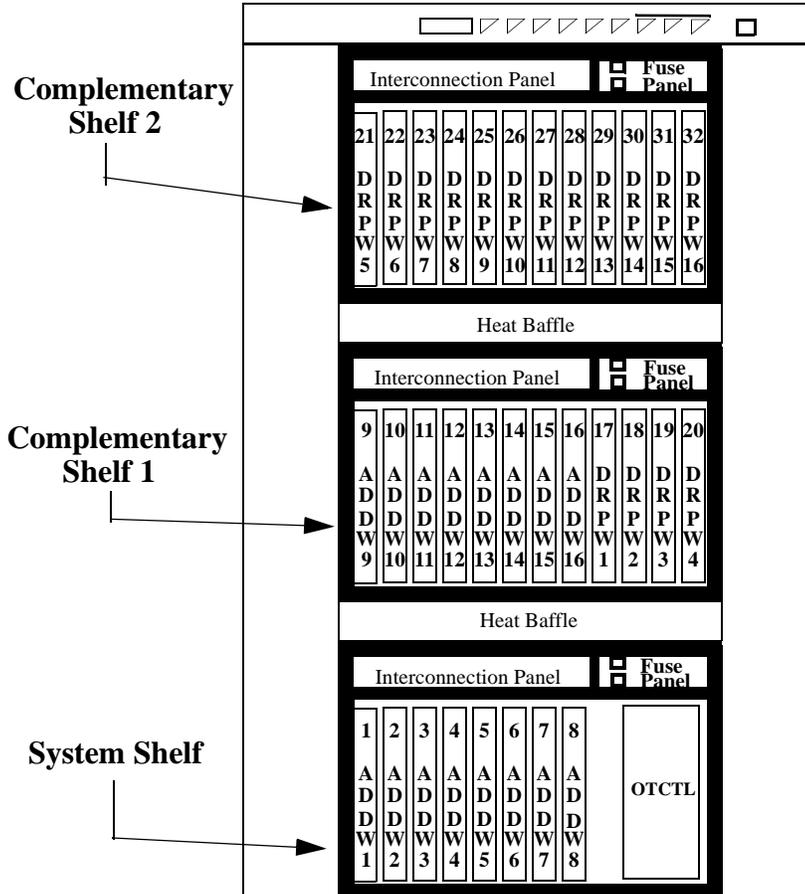
Optical Translator Fiber Installation (Continued)

**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 6-23.

> **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 into or removed from the QOTU. All fibers should be disconnected if power is removed or applied to the shelf itself.

Figure 6-23.   QOTU Input and Output Fiber Labeling
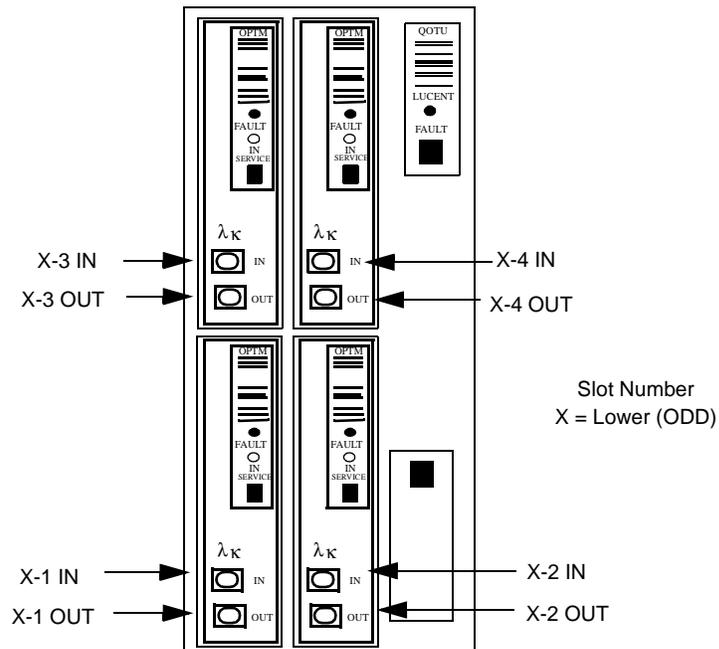
Optical Translator Fiber Installation (Continued)

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

Step	Action
1	Verify the fibers are properly secured and dressed.
2	Verify the optical fiber is protected properly.
3	Verify the all fibers are properly labeled.
4	Verify the fibers are not connected at the OT cabinet.
5	Verify the fiber gasket (848757720) is in place.
6	Verify the fibers are away from the hinges on the OT shelves.

Rack and Stack Configuration

Description This subsection covers the installation of fibers, fiber labels, and circuit packs for OLS systems that have been installed in a two-bay, three-bay, or five-bay rack and stack configuration.

It is presumed that the installer is familiar with the rack and stack configuration and the bay locations and designations for the given configuration. In summary, a two-bay configuration contains an integrated OLS/OT bay in position one and a bay with two OT shelves in bay position two. A three-bay system is comprised of an integrated OLS/OT bay in position one, three OT shelves in the bay in position two, and an additional OT Complimentary Shelf 2 in bay 3. A five-bay system contains the same first two bays as the three-bay system, plus has an OLS/OT integrated bay in position 5 and another OT bay (of three OT shelves) in bay position 4, but has two OT Complimentary 2 Shelves in bay 3. If additional information is required, refer to the Drawings: NT-00405-30, or to the chapter of this manual which covers the physical installation of the rack and stack bays.

Circuit Pack Equip Refer to the appropriate subsection of this chapter for circuit pack placement for the different types of possible configurations of the rack and stack system. Do not install fibers at this time.

■ 1A-TX End Terminal Installation: page 6-12

■ 1A-RCV End Terminal Installation: page 6-26

■ One OA 1A-TX End Terminal Installation: page 6-47

■ One OA 1A-RCV End Terminal Installation: page 6-55

■ Two OA/Two OA Dual Facing Shelf Installation: page 6-63

■ Two OA/Two OA Dual Facing Shelf Installation: page 6-63

■ One OA/Two OA Dual Facing Shelf Installation: page 6-81

■ One OA/One OA Dual Facing Shelf Installation: page 6-88

Refer to the section, Optical Translator Fiber Installation: page 6-95 to position the Optical Translator circuit packs in their appropriate positions. Do not install the OT fibers at this time.

Rack and Stack Configuration (Continued)

Fiber Jumper Installation

There are several different fiber jumper kits available for the rack and stack systems, some of which include blue fiber jumpers. These blue jumpers are standard single mode jumpers whose outer protective cover has been colored blue to indicate to all personnel that the fiber is carrying high-speed traffic, up to 16 channels of 2.5 Gigabits (40Gbits) of data/voice.

The fiber labels that are to be used are the following:

Comcode	Description
847740495	Labels for internal OLS fiber connections
847740503	Labels for OT channels 1-8
848027694	Labels for OT channels 9-16

The three sets of labels are all included in each of the fiber jumper kits. The kits, their comcodes, and contents are listed below. See drawing NT00405-30 for further details.

Two-Bay Rack and Stack Fiber Kits

For a two-bay Rack and Stack configuration, the following fiber kits (Kits 1, 2, and 5) will be needed for Line 1:

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993502	1	108845819	MSB1LC-SC	1.67 FT
Kit # 2	2	108845793	MSB1LC-SC	4.17 FT
Line 1 fibers for OA/ODU/OMU connections	2	108845801	MSB1SC-SC	4.17 FT
	1	108989609	MSB1LC-SC	7 FT
	1	108989633	MSB1SC-SC	12 FT
Blue fibers	1	108989641	MSB1SC-SC	13 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configuration (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993098	4	107265209	MS1SC-SC	4 FT
Kit # 1	5	108113853	MS1LC-SC	4 FT
Line 1 fibers for OMU/OT/ODU connections wavelengths 1-20	4	107198228	MS1SC-SC	5 FT
	3	108113861	MS1LC-SC	5 FT
	12	108113879	MS1LC-SC	6 FT
	2	108988478	MS1SC-SC	6 FT
Yellow fibers	2	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
	6	107198236	MS1SC-SC	10 FT
	16	108989567	MS1LC-SC	11 FT
	2	108113903	MS1LC-SC	15 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configuration (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993635	4	108989500	MS1SC-SC	3 FT
Kit # 5	8	107265209	MS1SC-SC	4 FT
Line 1 fibers for OMU/OT/ODU connections wavelengths 17-32	7	108989575	MS1LC-SC	14 FT
	2	108113903	MS1LC-SC	15 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
Yellow fibers	1	848027694	Labels for OT channels 9-16	

For a two-bay Rack and Stack configuration, the following fiber kits (Kits 3, 4, and 6) will be needed for Line 2 if Line 2 is to be populated:

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993619	1	108845819	MSB1LC-SC	1.67 FT
Kit # 4	2	108845793	MSB1LC-SC	4.17 FT
Line 2 fibers for OA/ODU/OMU connections	2	108845801	MSB1SC-SC	4.17 FT
	1	108989609	MSB1LC-SC	7 FT
Blue fibers	2	108989625	MSB1SC-SC	9 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configuration (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993577 **Kit # 3** Line 2 fibers for OMU/OT/ODU connections wavelengths 1-20 Yellow fibers	8	108113853	MS1LC-SC	4 FT
	6	108113861	MS1LC-SC	5 FT
	6	108113879	MS1LC-SC	6 FT
	16	108989559	MS1LC-SC	7 FT
	8	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
	8	108989542	MS1SC-SC	9 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993643 **Kit # 6** Line 2 fibers for OMU/OT/ODU connections wavelengths 17-32 Yellow fibers	6	107198228	MS1SC-SC	5 FT
	6	108113861	MS1LC-SC	5 FT
	6	108113879	MS1LC-SC	6 FT
	5	108988478	MS1SC-SC	6 FT
	1	108989518	MS1SC-SC	7 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configuration (Continued)

Fiber Jumper Installation (continued)

Three-Bay and Five-Bay Rack and Stack Fiber Kits

For Three-Bay and Five-Bay Rack and Stack configurations, the following fiber kits (Kits 7 and 8) will be needed for Line 1 (Bays 1 and 3):

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993668 **Kit # 8** Line 1 fibers for OA/ODU/OMU connections Blue fibers	1	108845819	MSB1LC-SC	1.67 FT
	2	108845793	MSB1LC-SC	4.17 FT
	2	108845801	MSB1SC-SC	4.17 FT
	1	108989609	MSB1LC-SC	7 FT
	1	108989633	MSB1SC-SC	12 FT
	1	108989641	MSB1SC-SC	13 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configuration (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993650	4	108989500	MS1SC-SC	3 FT
Kit # 7	12	107265209	MS1SC-SC	4 FT
Line 1 fibers for OMU/OT/ODU connections wavelengths 1-20	5	108113853	MS1LC-SC	4 FT
	4	107198228	MS1SC-SC	5 FT
	3	108113861	MS1LC-SC	5 FT
Yellow fibers	12	108113879	MS1LC-SC	6 FT
	2	108988478	MS1SC-SC	6 FT
	2	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
	6	107198236	MS1SC-SC	10 FT
	16	108989567	MS1LC-SC	11 FT
	7	108989575	MS1LC-SC	14 FT
	7	108113903	MS1LC-SC	15 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Additionally, the Five-Bay Rack and Stack Configuration will require the following kits (Kits 11 and 12) for Line 1 of the second system (Bays 5 and 3):

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993718	1	108845819	MSB1LC-SC	1.67 FT
Kit # 12	2	108845793	MSB1LC-SC	4.17 FT
Line 1 fibers for OA/ODU/OMU connections of System 2	2	108845801	MSB1SC-SC	4.17 FT
	1	108989617	MSB1LC-SC	11 FT
	2	108989641	MSB1SC-SC	13 FT
Blue fibers	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

**Fiber Jumper
Installation
(continued)**

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993700	8	108113853	MS1LC-SC	4 FT
Kit # 11	8	107198228	MS1SC-SC	5 FT
Line 1 fibers for OMU/OT/ODU connections system 2 wavelengths 1-32	2	108113861	MS1LC-SC	5 FT
	10	108113879	MS1LC-SC	6 FT
	4	108988478	MS1SC-SC	6 FT
	8	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
Yellow fibers	8	108989542	MS1SC-SC	9 FT
	2	108989583	MS1LC-SC	18 FT
	10	108989591	MS1LC-SC	19 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

For Three-Bay and Five-Bay Rack and Stack configurations, the following fiber kits (Kits 9 and 10) will be needed for Line 2 (Bays 1 and 2) if Line 2 is to be equipped:

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993684	1	108845819	MSB1LC-SC	1.67 FT
Kit # 10	2	108845793	MSB1LC-SC	4.17 FT
Line 2 fibers for	2	108845801	MSB1SC-SC	4.17 FT
OA/ODU/OMU connections	1	108989609	MSB1LC-SC	7 FT
System 1	2	108989625	MSB1SC-SC	9 FT
Blue fibers	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993676	8	108113853	MS1LC-SC	4 FT
Kit # 9	6	107198228	MS1SC-SC	5 FT
Line 2 fibers for OMU/OT/ODU connections System 1 wavelengths 1-32	12	108113861	MS1LC-SC	5 FT
	12	108113879	MS1LC-SC	6 FT
	5	108988478	MS1SC-SC	6 FT
Yellow fibers	16	108989559	MS1LC-SC	7 FT
	9	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
	8	108989542	MS1SC-SC	9 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Additionally, the Five-Bay Rack and Stack Configuration will require the following kits (Kits 13 and 14) for Line 2 of the second system (Bays 5 and 4):

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993734	1	108845819	MSB1LC-SC	1.67 FT
Kit # 14	2	108845793	MSB1LC-SC	4.17 FT
Line 2 fibers for	2	108845801	MSB1SC-SC	4.17 FT
OA/ODU/OMU connections of	1	108989617	MSB1LC-SC	11 FT
System 2	2	108989633	MSB1SC-SC	12 FT
Blue fibers	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Kit Comcode and Desc.	Item Qty.	Item Comcode	Item Description	Length
108993726	5	107265209	MS1LC-SC	4 FT
Kit # 13	6	107198228	MS1SC-SC	5 FT
Line 2 fibers for OMU/OT/ODU connections System 2 wavelengths 1-32	6	108113861	MS1LC-SC	5 FT
	18	108113879	MS1LC-SC	6 FT
	6	108988478	MS1SC-SC	6 FT
	8	108989559	MS1LC-SC	7 FT
Yellow fibers	7	108989518	MS1SC-SC	7 FT
	4	108989534	MS1SC-SC	8 FT
	4	108989542	MS1SC-SC	9 FT
	1	847740495	Labels for OLS packs	
	1	847740503	Labels for OT channels 1-8	
	1	848027694	Labels for OT channels 9-16	

OLS IntraShelf Fiber Installation

The OLS intrashelf fibers for the Rack and Stack configurations are connected the same as for other installations. Although the connections are the same, they are routed differently, and the labels used are the ones cited in the fiber kits supplied for rack and stack configurations. Use the guidelines below to install the OLS intrashelf blue fibers.

■ Route all OA-TLM fibers, for both Lines 1 and 2, to the left

■ Route all OA-ODU/OMU fibers, for both Lines 1 and 2, to the right

■ Use the labels supplied in Kits 1-14 for labelling all IntraShelf fibers

(Continued on next page)

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Figure 6-24.   Rack and Stack OLS IntraShelf Fiber Routing, 1A-TX Shown
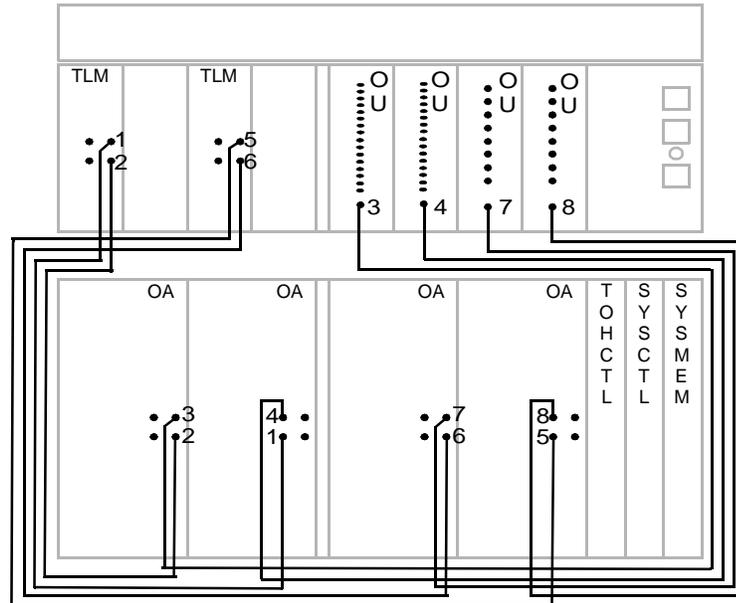
$\Longrightarrow$ **NOTE:**
The units in Figure 6-24 which are labelled "OU" are the optical units representing either the OMUs or ODUs.

Refer to the following figures to verify connections of the OLS intrashelf fibers for specific configurations:

■   For 1A-TX fiber connections see Figure 6-3 and use Table 6-4

■   For 1A-RCV fiber connections see Figure 6-5 and use Table 6-9

■   For One OA 1A-TX fiber connections see Figure 6-9 and use Table 6-17

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

- For One OA 1A-RCV fiber connections see Figure 6-11 and use Table 6-20

- For Two OA/Two OA Dual Facing Shelves see Figure 6-13 and use Table 6-23

- For Two OA/One OA Dual Facing Shelves see Figure 6-15 and use Table 6-28

- For One OA/Two OA Dual Facing Shelves see Figure 6-17 and use Table 6-31

- For One OA/One OA Dual Facing Shelves see Figure 6-19 and use Table 6-34

> **NOTE:**
> When using the above fiber connection tables, remember to use the labels provided in the rack and stack fiber kits, not the labels noted in the particular fiber connection tables.

Outside Plant Fiber

When connecting the OAs or ODUs to outside plant fiber, the fibers must connect to the LGX panel provided in Bay 2 or Bay 4. Refer to drawing NT00405-30 for further details.

Outside plant fibers connecting to the OAs for Bay 1 (in a Two-Bay, Three-Bay, or Five-Bay configuration) will connect to the LGX panel in Bay 2. Outside plant fibers connecting to OAs in Bay 5 for a Five-Bay configuration will connect to the LGX panel in Bay 4. For two-OA systems, where two optical amplifiers are used in Line 1 or Line 2 of Bay 1, the outside plant fibers will be routed to the left of the bay for Line 1, and to the right for Line 2. For a Five-Bay configuration, the outside plant fibers connecting to a two OA system in Bay 5 will dress to the right of the bay, for both Line 1 and Line 2. In a single OA application, the outside plant fibers connecting to the ODUs will dress to the right in Bay 1, and to the left in Bay 5, for both Lines 1 and 2.

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

Low Speed Fiber Connections: 2-Bay Configurations

The low speed fiber connections from the LGX panel in Bay 2 to/from the OTUs, and from the OTUs to/from the OMU and ODU required the fiber jumpers listed in the fiber kits in the subsection, Two-Bay Rack and Stack Fiber Kits: page 6-102. These fiber jumpers are routed differently than described in the section, Optical Translator Fiber Installation, so use the guidelines below for routing these jumpers for each shelf.

- Bay 1, OT System Controller Shelf (middle shelf): all fibers route out the left side of the shelf

- Bay 1, OT Complimentary Shelf 1 (top shelf): fibers for slots 9-16 route to the left, fibers for slots 17-20 route to the right

- Bay 2, OT System Controller Shelf (bottom shelf): all fibers route to the left

- Bay 2, OT Complimentary Shelf 1 (upper shelf): all fibers, for slots 9-20 route to the left

> **NOTE:**
> Refer to Tables 1 and 2 in drawing NT00405-30 for further information on low speed fiber jumper kits and routing schemes.

Low-Speed Fiber Connections: 3-Bay and 5-Bay Configurations

The low speed fiber connections from the LGX panel in Bay 2 to/from the OTUs, and from the OTUs to/from the OMU and ODU required the fiber jumpers listed in the fiber kits in the subsection, Three-Bay and Five-Bay Rack and Stack Fiber Kits: page 6-106. These fiber jumpers are routed differently than described in the section, Optical Translator Fiber Installation, so use the guidelines below for routing these jumpers for each shelf.

- Bay 1, OT System Controller Shelf (middle shelf): all fibers route out the left side of the shelf

- Bay 1, OT Complimentary Shelf 1 (top shelf): fibers for slots 9-16 route to the left, fibers for slots 17-20 route to the right

- Bay 2, OT System Controller Shelf (bottom shelf): all fibers route to the left

Rack and Stack Configurations (Continued)

Fiber Jumper Installation (continued)

■ Bay 2, OT Complimentary Shelf 1 (middle shelf): all fibers, for slots 9-20 route to the left

■ Bay 2, OT Complimentary Shelf 2 (top shelf): all fibers for slots 21-32 route to the right

■ Bay 3, OT Complimentary Shelf 2 for System One (top shelf): all fibers for slots 21-32 route to the left

■ Bay 3, OT Complimentary Shelf 2 for System Two (bottom shelf): all fibers for slots 21-32 route to the right

■ Bay 4, OT System Controller Shelf (bottom shelf): all fibers route to the left

■ Bay 4, OT Complimentary Shelf 1 (middle shelf): all fibers route to the right

■ Bay 4, OT Complimentary Shelf 2 (top shelf): all fibers route to the right

■ Bay 5, OT System Controller Shelf (middle shelf): all fibers route to the left

■ Bay 5, OT Complimentary Shelf 1 (top shelf): all fibers route to the left.

⇒ **NOTE:**
Refer to Tables 4 -7 in drawing NT00405-30 for further information on low speed fiber jumper kits and routing schemes.

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

In order to install the Telemetry Feed-Through application, a 1A-TX (one or two OAs) or a 1A-RCV (one or two OAs) must already by installed. If this has not yet been done, refer to the subsection of this chapter to install the 1A-TX or 1A-RCV end terminal before proceeding.

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 6-25.

Telemetry Feed-Through Installation (Continued)

Circuit Pack Installation (continued)

Figure 6-25.   Line End Terminal 1A-TX-THRU
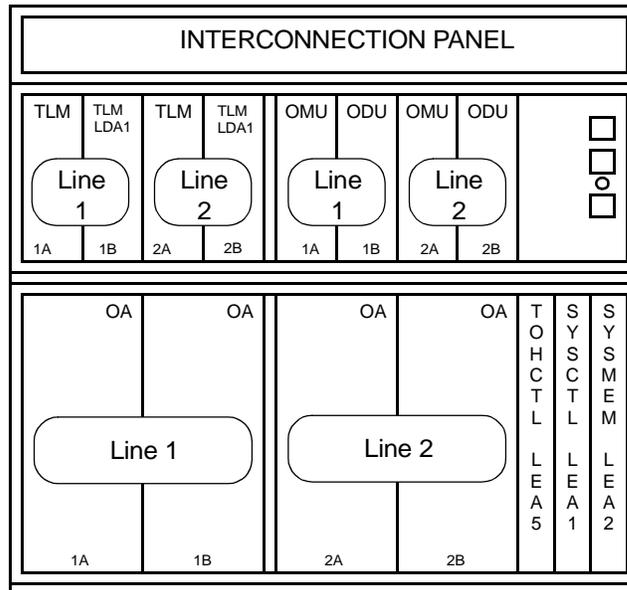
> **⇒ NOTE:**
> The 2-line end terminal 1A-RX-THRU is the same except the ODUs are in the A slots and the OMUs are in the B slots.

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.

Possible fiber jumpers are listed in Table 6-37.

Telemetry Feed-Through Installation (Continued)

Circuit Pack Installation (continued)

Table 6-37.   Telemetry Feed-Through Fiber Jumpers

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

Fiber Connections

The specific fiber connections are given in Table 6-38.

Table 6-38.   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

Label the jumpers as shown in Table 6-39 before connecting to the corresponding telemetry packs.

Telemetry Feed-Through Installation (Continued)

Fiber Connections (continued)

Table 6-39.   Telemetry Feed-Through Fiber Jumper Labels

Application	Line	Connect Point	Circuit Pack	Connector	Label to Install
End Terminal	1	1	TLM 1B	IN	1B-TLM-IN
(Use Lines 1 and 2 for each shelf)		2		OUT	1B-TLM-OUT
		3		IN	1B-TLM-IN
		4		OUT	1B-TLM-OUT
	2	1	TLM 2B	IN	2B-TLM-IN
		2		OUT	2B-TLM-OUT
		3		IN	2B-TLM-IN
		4		OUT	2B-TLM-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:

Step	Action
1	Clean and connect a single-mode 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 to a power meter. Refer to Appendix C, Fiber Cleaning if necessary.

Telemetry Feed-Through Installation (Continued)

Fiber Connections (continued)

Step	Action
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	Replace the zero dB LBO (white LBO supplied on the faceplate of the LDA1 circuit pack) with the newly selected LBO in the LDA1 IN port of the Telemetry pack in slot 1B.
5	Clean and 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. Use the CenterLink CIT to enter the command **Security.Enter.System** command to change the provisioning of the direction (1A-TX/1A-TX-THRU/1A-RCV/1A-RCV-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.

Powering

7

Contents

Background

Introduction   This chapter describes the procedures to power WaveStar™ OLS 40G Equipment and to power the Optical Translator equipment.

General Considerations   Disconnect the office alarms from the WaveStar OLS 40G Network Element before performing any tests. Reconnect the office alarms upon test completion.

Tools, Test Sets and Accessories   The following equipment is required to complete the procedures in this section:

- Analog Ohm Meter for measuring resistance of Battery Return cable.

- Multimeter capable of measuring resistance (ohms) and DC voltage from −40 to −60 volts.

- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.

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 complementary 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.

Rack and Stack Powering
The rack and stack configurations have A and B power feeders leading from the BDFB to a fuse panel in Bays 2 and 4. From the fuse panels, cables are run to the individual shelves in each bay.

Powering and Testing Procedures

Powering & Battery Grounding   Perform the following steps listed in the table below to power the WaveStar OLS 40G or OT shelf:

Step	Action	Reference
1	Verify that all packing material has been removed from the cabinet and shelf.	
2	Verify that the breakers at the Battery Distribution and Fuse Bay (BDFB) are in the OFF position, or if fuses are utilized, verify that the fuses are not installed.	
3	Verify all circuit packs are unseated from all shelves. ⇒ **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 each shelf. a. Open the retainer by lifting up on the bottom edge of the retainer. b. Press lightly down on the top edge of the fuse cap. c. The fuse cap will pop out.	
5	Using an ohmmeter, measure the resistance from the top terminal inside each fuse holder to frame ground. ⇒ **NOTE:** 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 holder. If the resistance measurement requirement is not met then check the battery cables.	For OLS, see Figure 7-1. For OT, see Figure 7-2.

Powering & Testing Procedures (Continued)

Powering & Battery Grounding (continued)

⟹ **NOTE:**
Measure the voltage at the top of the fuse holder, not at the rear.

Figure 7-1.   WaveStar OLS 40G Fuse Panel Measurement Point

Measure resistance and voltage at the top of fuse holder, not at the rear.

10A, 60V
-48 A

10A, 60V
-48 B
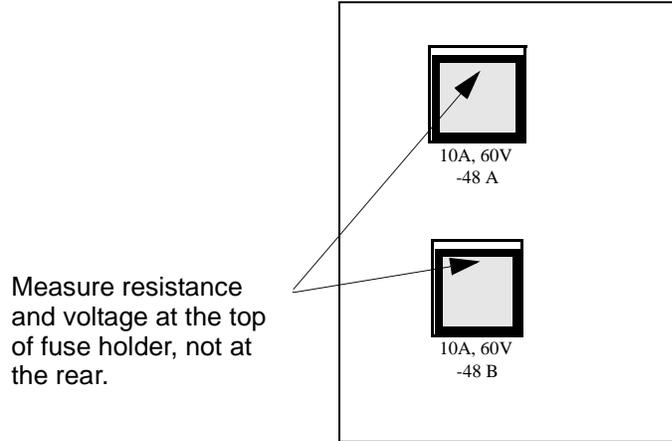
Figure 7-2.   OT Fuse Panel Measurement Point

Measure resistance and voltage at the top of fuse holder, not at the rear.

-48A
10A
60V

-48B
10A
60V
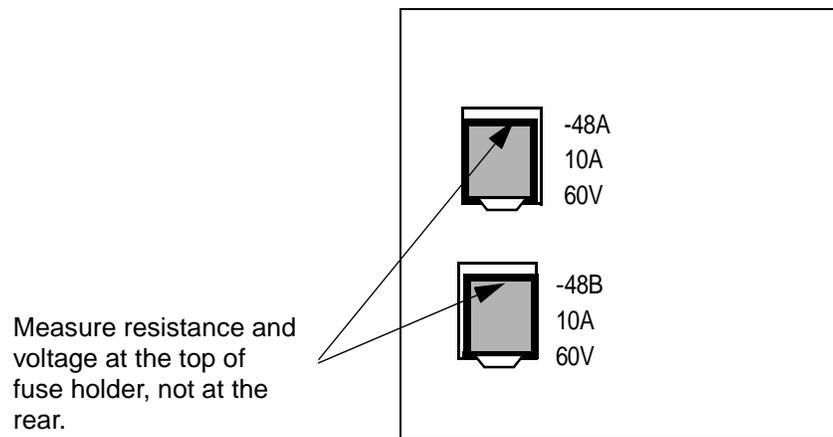
Powering & Testing Procedures
(Continued)

WaveStar OLS 40G Check Battery Return Cable Connection

Follow the procedures listed below to check the Battery Return Cable Connection for OLS only installations:

⇒ **NOTE:**
Since the power cable is tied together for both shelves if there are two OLS shelves in the same equipment bay frame, the battery return measurement only needs to be taken on the Lower Shelf.

⇒ **NOTE:**
For OT only installation, proceed to the OT Check Battery Return Cable Connection Section.

Step	Action	Reference
1	On the lower shelf (if there is more than one shelf in the same bay), 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.	
2	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.	
3	After completing the measurement, restore connection to the Power Filter	

(Continued on next page)

Powering & Testing Procedures
(Continued)

**40G Check Battery
Return Cable
Connection
(continued)**

Step	Action	Reference
4	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.	
5	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.	

Powering & Testing Procedures
(Continued)

OT Check Battery Return Cable Connection

Follow the procedures listed below to check the Battery Return Cable Connection for OT only installations:

> ⇒ **NOTE:**
> Since the power cable is tied together for all three shelves in a 3-shelf OT bay, the battery return measurement needs only be taken at one of the three shelves.

> ⇒ **NOTE:**
> For OLS ONLY Installations, go to the Procedures: page 7-10 section.

Step	Action	Reference
1	Locate the Supply A Power Filter at the left side of the interconnection panel on Complementary Shelf 2 (Top Shelf of three-shelf OT bay) or Complementary Shelf 1 (Top Shelf of an Integrated Bay).	
2	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.	
3	After completing the measurement, restore connection to power filter.	
4	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.	
5	Locate the Supply B Power Filter at the right side of the interconnection panel.	

(Continued on next page)

Powering & Testing Procedures (Continued)

OT Check Battery Return Cable Connection (continued)

Step	Action	Reference
6	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.	
7	After completing the measurement, restore connection to power filter. Close fuse panel door and tighten holding screw.	

Fuse Insertion

Procedures

The following procedures are used to determine the value of the fuse and its placement:

Step	Action	Reference
1	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.	
2	For Rack and Stack configurations, insert one 10-amp fuse in each of the designated A and B fuse positions, for each shelf in the bay, in the fuse panel located in Bay 2 or Bay 4.	Chapter 3, Equipment Installation
3	Using the voltmeter, measure the voltage from the top terminal of each fuse holder on each shelf to the terminal grounding cable. **Requirement:** The voltage should be –48 volts (between –41.75 and –60.0 VDC) at each fuse holder.	For OLS, see Figure 7-1. For OT, see Figure 7-2.

4	Insert two 10-amp fuses into the fuse holders of the lower 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 lower shelf.	

Fuse Insertion (Continued)

**Procedures
(continued)**

Step	Action	Reference
5	**For Integrated and OT 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 middle shelf.	
6	Insert two 10-amp fuses into the fuse holders of the upper 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 & B Feeds

Verify A Feed   Follow the procedures listed below to verify the A feed:

Step	Action	Reference
1	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 all shelves should remain illuminated.	
2	Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the B power feed of the lower shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
3	Remove the B fuse from the lower shelf fuse panel. **Requirement:** Verify that the PWR ON LED is still on for the lower shelf. ⮕ **NOTE:** If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	
4	**For OT or Integrated Bays Only:** Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the B power feed of the middle shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
5	**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 all shelves. ⮕ **NOTE:** If the LED is not on, then the A and B power feeders to the OLS or OT are swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	

Verify A & B Feeds (Continued)

**Verify A Feed
(continued)**

Step	Action	Reference
6	Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the B power feed of the top shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
7	Remove the B fuse from the top shelf fuse panel. **Requirement:** Verify that the PWR ON LED is still on for the upper shelf. ⇒ **NOTE:** If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	
8	Reinsert the B fuses into the fuse panel for all shelves.	
9	Turn the breaker on or replace the fuse for the B power feed at the BDFB.	

Verify A & B Feeds (Continued)

Verify B Feed   Follow the procedures listed below to verify the A feed:

Step	Action	Reference
1	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.	
2	Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the A power feed of the lower shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
3	Remove the A fuse from the lower shelf fuse panel. **Requirement:** Verify that the PWR ON LED is still on for the lower shelf. ⇒ **NOTE:** If the LED is not on, then the A and B power feeders to the WaveStar OLS 40G or OT are swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	
4	**For OT or Integrated Bays Only:** Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the A power feed of the middle shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
5	**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. ⇒ **NOTE:** If the LED is not on, then the A and B power feeders are swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	

Verify A & B Feeds (Continued)

**Verify B Feed
(continued)**

Step	Action	Reference
6	Remove the 10-amp fuse located in the fuse panel of Bay 2 or Bay 4, for the A power feed of the top shelf. **Requirement:** The PWR ON LED for all shelves should remain illuminated.	
7	Remove the A fuse from the upper shelf fuse panel. **Requirement:** Verify that the PWR ON LED is still on for the upper shelf. ⟹ **NOTE:** If the LED is not on, then the A and B power feeders have been swapped. The shelf should still have power from battery B. Correct the error as needed and re-test.	
8	Reinsert the A fuses into the fuse panel for all shelves.	
9	Turn the breaker on or replace the fuse for the A power feed at the BDFB.	

Network Element Startup and Provisioning

8

Contents

Background

Introduction   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 the R7 Software Release Description C109074484 for information including: performing software installation, setting up a PC for use with the WaveStar OLS 40G, and logging in to the system using a CMC (CenterLink Management Console) PC. More information is also available in the WaveStar OLS 40G User/Service Manual (365-575-387).

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 7-WaveStar OLS 40G network software and CMC.

- Personal computer for use as CMC.

Background (Continued)

Tools, Test Sets, and Accessories (Continued)

■ An "AT modem cable" RS-232 cable. The cable must have a DB25 male connector at one end to mate with the WaveStar OLS 40G DCE CIT port, and a DB9 female connector at the other end to mate with the PC serial port. Table 8-1 may be used to determine pin numbers to connect.

Table 8-1.   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

Software Installation

Description   The software installation procedure for new WaveStar OLS 40G is provided in the *Software Release Description* that came with the CD-ROM. The upgrade of software to in-service terminals should follow procedures given in the *Software Release Description* shipped with the diskettes or CD-ROM. Due to the frequently changing installation information, 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 3rd party software to the hard drive of the PC takes about 3 minutes.

- Installation of the CMC Network Element software to the PC hard drive takes about 5 minutes.

- Installation of the Network Element (NE) software to the NE takes approximately 45-55 minutes.

- The person(s) performing the software installation should be trained and have an understanding of the 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. Use care when handling the CD-ROM to avoid fingerprints on the mirror finish and possible breakage.

Software Installation (Continued)

General Software Installation Considerations (continued)

- If any mistakes are made while making selections, press the displayed cancel button on the screen to back up and re-enter the selection(s).

- If any error message windows are displayed, refer to Chapter 11, Connecting SONET/SDH Systems to WaveStar OLS 40G of this manual to correct the problem.

Setting Up the PC

Follow the procedures listed in the *Software Release Description* C109074484 to set up the PC for CenterLink Software Installation.

⇛ **NOTE:**
Power the PC from an AC source. Battery power of laptops may not last long enough to complete the installation.

CenterLink Management Console Screen Elements

Figure 8-1 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 — Currently not used. The Download Manager has replaced the functionality of the Software Installation Manager.

8. Reference Library — Clicking opens a window displaying an index of the documentation available.

Software Installation (Continued)

**CenterLink
Management
Console Screen
Elements
(continued)**

Figure 8-1.   CenterLink Management Console
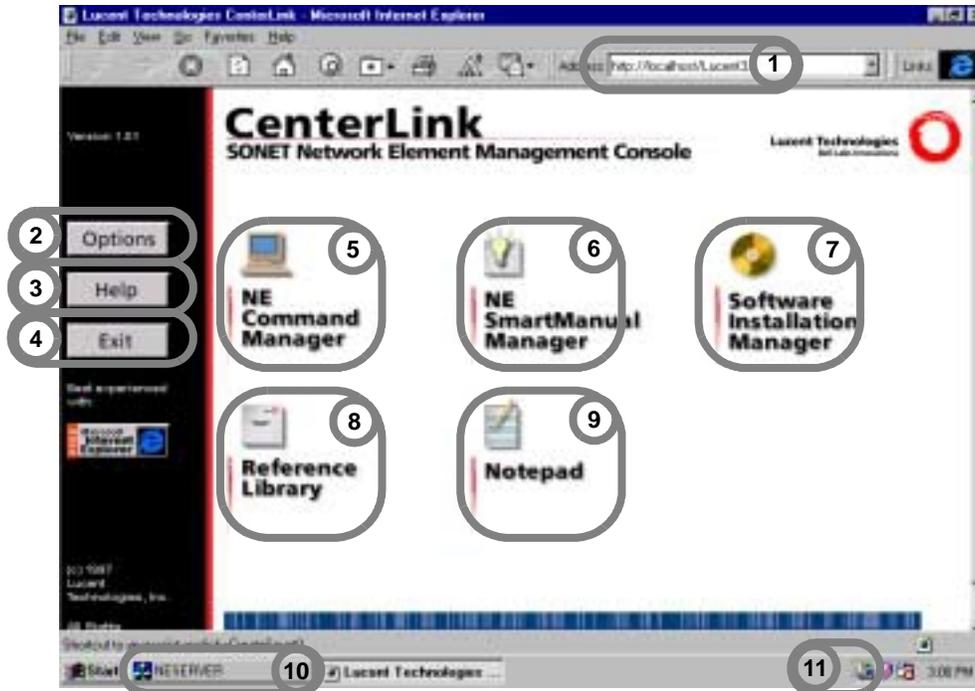
(Continued on next page)

Software Installation (Continued)

**CenterLink
Management
Console Screen
Elements
(continued)**

9. Notepad — Clicking opens a user note storage utility.

10. NESERVER application — A Windows 95 application that transfers data
between the CenterLink Management Console software running on the
web browser and the serial port of the PC. This MUST be running for
CenterLink to operate.

11. Personal Web Server Application — A Windows 95 application which
allows the PC to operate as a web server. Needed to execute the JAVA
scripts the CenterLink Management Console software uses.

**Network Element
Software
Installation**

Using the Software Installation Manager from the CenterLink Management
Console, follow the steps in the table below to install the Network Element
Software:

Step	Action	Reference
1	Seat the LEA2 SYSMEM circuit pack is seated in the slot marked SYSMEM. **Requirement:** The FAULT LED remains illuminated and the MJ LED is lit on the alarm panel.	
2	Seat the LEA1 SYSCTL circuit pack is seated in the slot marked SYSCTL.	
3	Follow the procedures in the Software Release Description C109074484 to download the R7 NE software using the Download Manager.	

$\Longrightarrow$ **NOTE:**
Do not use the Software Installation Manager that is provided on the
opening page of the NE Management Console. Refer to Figure 8-2.

Software Installation (Continued)

**Network Element
Software
Installation
(continued)**

Figure 8-2.   Software Installation Manager Selection
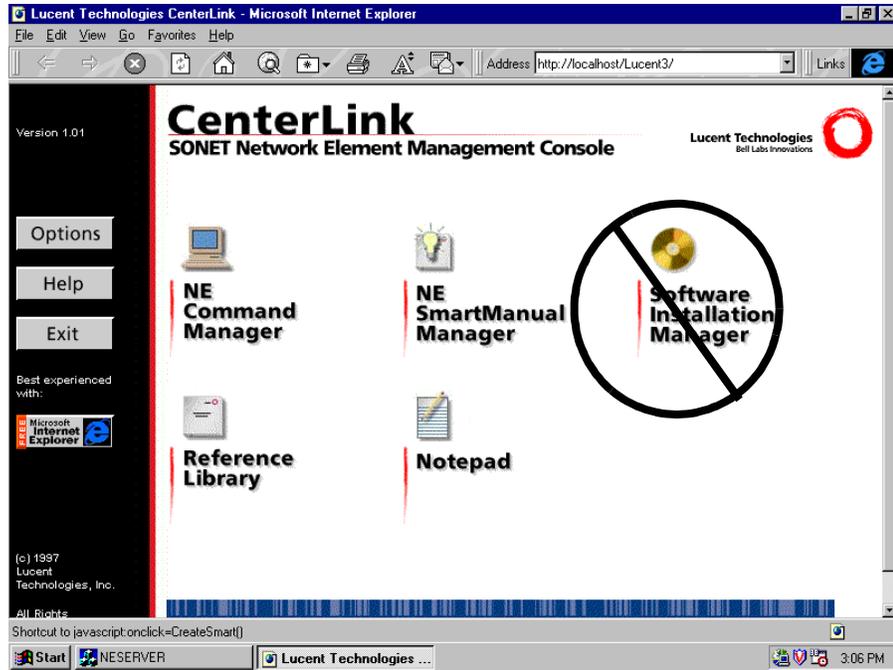
Step	Action	Reference
4	When the download completes, the following actions will occur: ■ The system will automatically initiate a reset. ■ LEDs on the SYSMEM and SYSCTL will go off after being reset.	
5	This completes the Blank System Software Installation Procedure.	

Connecting to the NE

Procedures   Use the following steps to connect to the Network Element:

Step	Action	Reference
1	Either double click on the CenterLink icon (with the Lucent symbol) on the desktop or select Start-Programs-Lucent Technologies-Centerlink Home Page to start Centerlink Management Console.	
2	Click on the NE Command Manager Icon.	Figure 8-2
3	Enter the default Target Identifier (TID): — LT-FT-2000 (Use capital letters and zeros.) then click on the Submit button	

Figure 8-3.   NE Selection Menu Window
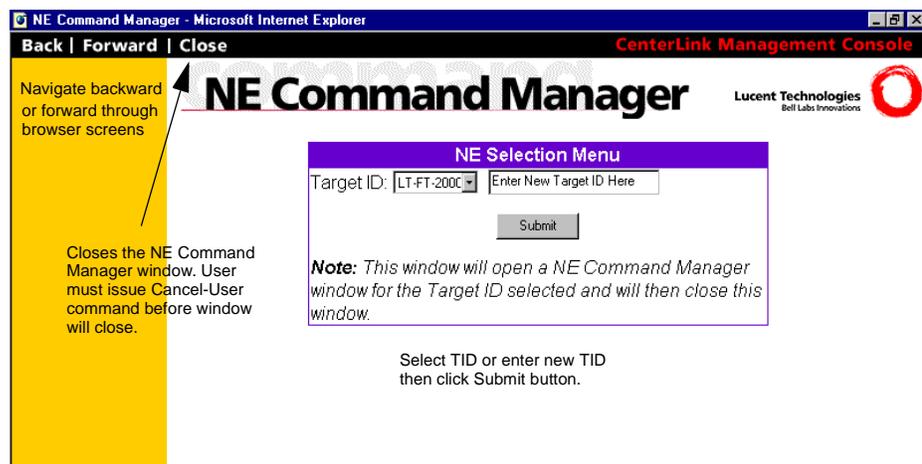
Connecting to the NE (Continued)

**Procedures
(continued)**

Step	Action	Reference
4	Enter User ID, Password and Privilege Level: — Default User ID: LT01 (All caps with a zero.) — Default Password: FT-2000 (All caps with zeros.) — To Set the Privilege Level, use downward arrow. Click on EXPERT.	Figure 8-3
5	CenterLink will connect to the Network Element and a Login Successful confirmation will be received. If no connection is established: 1. Verify that the RS-232 cable is connected properly between the COM port and the NE. 2. Verify NEServer is running. 3. Return to the login command and try again.	
6	This completes the Login to the Network Element.	

Figure 8-**4.   Network Element Login Window**
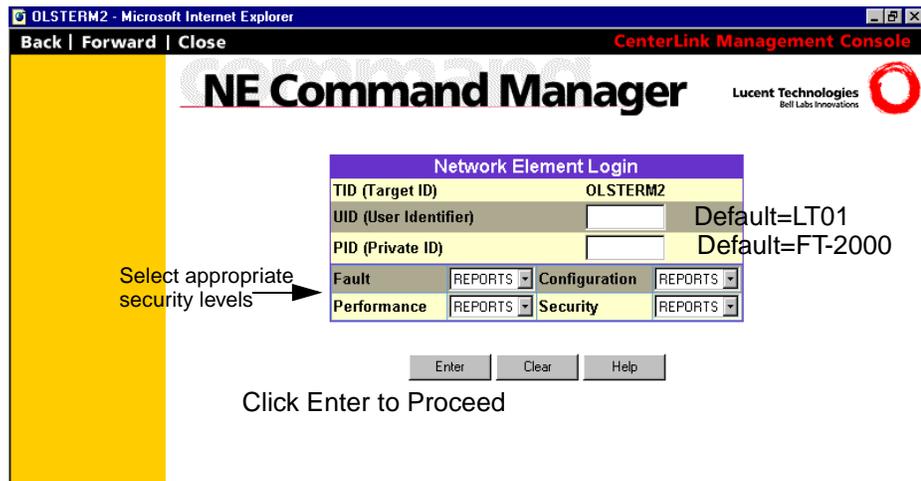
Circuit Pack Insertion

**General
Considerations**

- 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.

**Installing the
Controller Packs**

Follow the steps in the table below to insert the controller packs:

Step	Action	Reference
1	Seat the LEA5 TOHCTL into its slot in the lower shelf **Requirement:** After a 5 minute reset the FAULT LED will extinguish.	
2	Seat the LUD1 OTCTL into its slot on the OT System shelf if an OT System will be integrated with the WaveStar OLS 40G. **Requirement:** After about a 2 minute reset the FAULT LED will extinguish.	

Initial Circuit Pack Insertion (Continued)

Transmission Circuit Pack Insertion

Follow the procedures in the table below to insert the Transmission Circuit Packs:

⟹ **NOTE:**
To prevent potential damage to the Optical Amplifiers, connect the fiber to the "IN" and "OUT" ports **before** seating these packs into the shelf

Step	Action	Reference
1	At end terminal offices insert the OMU/ODU packs and tighten the captive screws if they have not already been seated.	
2	Seat the transmission packs into the shelf or shelves. These packs include OAs, TLMs, and OTUs. **Requirement:** Verify that all the FAULT LEDs are extinguished, except for the LEDs on OA circuit packs. ⟹ **NOTE:** 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.	
3	Execute a Configuration>Update>System command.	
4	Execute a Fault>Retrieve>Condition>All command. This will view all of the alarms present on the system. **Requirement:** Verify the alarms shown.	

⟹ **NOTE:**
After Optical Amplifier circuit packs have been inserted it may be necessary to remove the fiber jumper before unseating the unit.

Initial Provisioning

Before Beginning Provisioning

The following procedure **MUST** be done immediately after the software installation has taken place to avoid travel to all connected sites repeatedly:

> **NOTE:**
> Failure to Initialize the system using the following procedures could cause problems trying to provision the parameters listed in the following section.

Step	Action	Reference
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.	
2	Log back into the network element.	

Initial Provisioning (Continued)

Basic Network Element Provisioning

Using the following steps, set and/or specify the following provisionable parameters:

- 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,

- Indicate whether or not the NE will utilize X.25 redirect,

- Indicate whether or not the NE will have through wavelength connections,

- 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.

Step	Action	Reference
1	Log into the NE as an EXPERT user.	
2	Select SECURITY>Enter>System.	Figure 8-5

Initial Provisioning (Continued)

Basic Network Element Provisioning (continued)

Figure 8-5.   Security.Enter.System Screen.

Initial Provisioning (Continued)

**Basic Network
Element
Provisioning
(continued)**

Step	Action	Reference
3	Enter the new TID in the box provided. Hit the tab key or move the mouse pointer to the next box.	
4	Set the alarm-reporting Standard: Select SONET or SDH from the pull-down box. Hit the tab key or move the mouse pointer to the next box.	
5	Set the 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. ⇒ **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.	
6	Set the 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.	
7	Set the 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.	
8	Set the X25PS: Click on the appropriate packet size. Hit the tab key or move the mouse pointer to the next appropriate box.	

Initial Provisioning (Continued)

**Basic Network
Element
Provisioning
(continued)**

Step	Action	Reference
9	Set the X.25 redirect: In the "PVC2_Redirect" drop down menu, select yes or no, depending on whether the NE will utilize the X.25 redirect option or not. Hit the tab key or move the mouse pointer to the next appropriate box.	
10	Wavelength Pass-Through: Select yes from the drop down menu if the NE will have through wavelengths, without OTUs. Select no if the NE will not utilize the pass-through feature. Hit the tab key or move the mouse pointer to the next appropriate box.	
11	ASPD: Click on the desired selection enabled or disabled. The default is ENABLED. Do not disable APSD at this time.	See Danger earlier in this section.
12	Set the 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.)	
13	SIDE1_SYS: Select the appropriate power configuration. Find the appropriate setting, A, B, C, or 1_OA, from the referenced 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 8-3
14	SIDE2_SYS: If the DIRN selection is Dual, select the appropriate power setting for side 2 from the table and select it from the SIDE2_SYS pull-down box.	Table 8-3

Initial Provisioning (Continued)

**Basic Network
Element
Provisioning
(continued)**

Step	Action	Reference
15	When all entries have been made and verified, click on the enter button. If corrections need to be made, click on clear and re-enter the information beginning at Step 3. **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 SYSMEM until communication with the DS-NE is established.	

Default Values

⇒ **NOTE:**
If the above selections are not made, the following factory default values will remain in place:

Initial Provisioning (Continued)

**Default Values
(continued)**

Table 8-2.   Factory Default Values

Option	Default
TID	LT-FT-2000
Alarm Group	255
Packet Size	256
Alarm Gateway Network Element (AGNE)	No
Directory Server-Network Element (DS-NE)	No
Automatic Power Shut Down (APSD)	Enabled
PVC2_Redirect	No
Pass_Thru	No

Initial Provisioning (Continued)

OA Pump Power Settings

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.

Table 8-3.   OA Pump Power Settings

OA	OA Pump Setting	# of Spans	Max. No. of Wavelengths
LEA7 LEA7B	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

Initial Provisioning (Continued)

Additional Provisioning

Follow the steps in the table below to finish the provisioning of the NE:

Step	Action	Reference
1	Enable far end communications: SECURITY>Enter>Far End Communications. Click on RAR (Remote Alarm Reporting) Enabled.	
2	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; STOPDST is end of daylight savings time date; 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. **Requirement:** Output from the bay now displays the correct date and time in the headings.	Figure 8-6

Figure 8-6.   Configuration.Edit.Date_and Time
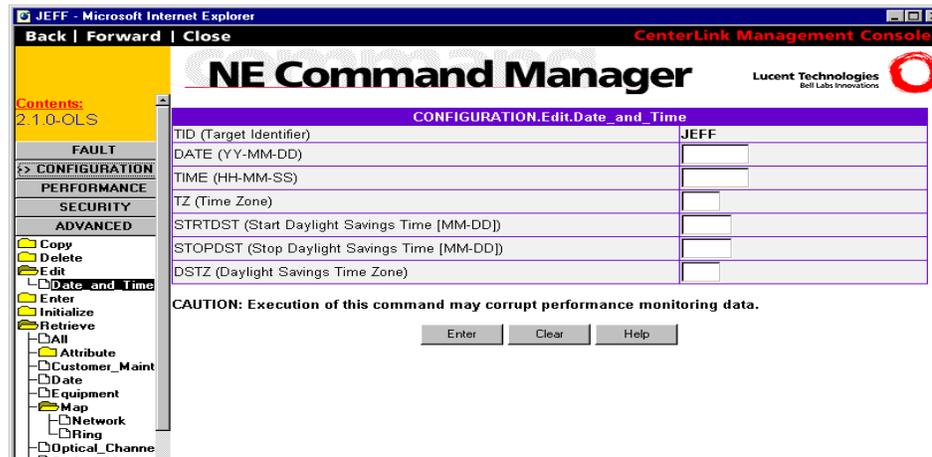
Initial Provisioning (Continued)

**Other
Provisioning
(continued)**

Step	Action	Reference
3	Execute FAULT>Retreive>Condition>All to view alarms and conditions. Click on Enter. **Requirement:** Verify the alarms shown (alarms may vary depending upon AGNE & DS-NE selections).	Figure 8-7

Figure 8-7.   Fault.Retreive.Condition.All
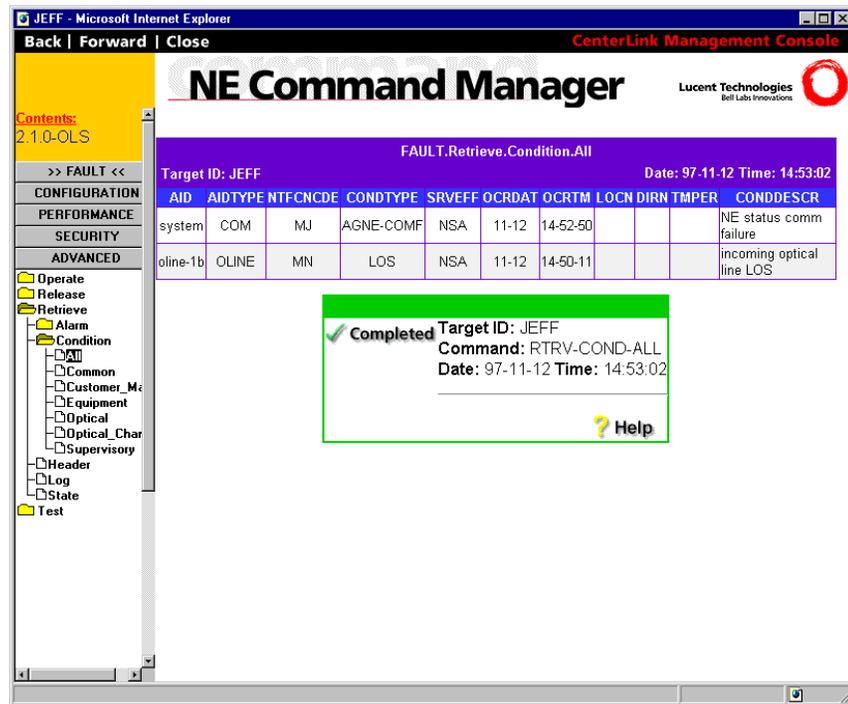
Final Hardware Installation

Fiber Connection to Circuit Packs

Verify the intrashelf fiber jumpers were dressed into place in Section 5 for each system type.

⚠ **CAUTION:**
*To prevent potential damage to the Optical Amplifiers (LEA7,LEA7B, LEA104, or LEA105), connect the fibers to the "IN" and "OUT" ports **before** seating these transmission packs into each shelf.*

Final Operations

Proceed to <u>Chapter 8, Network Element Startup and Provisioning</u> for testing Network Elements.

Local Installation Testing

9

Contents

Background

Overview
This section describes the LED test, ODU and OMU Verification tests, and Installation Auto Turnup tests for the WaveStar^{TM} 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 NE has WaveStar OLS 40G software installed. 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.d

- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress.

Background (Continued)

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 9-1. Local Installation Test Equipment

Equipment	Number Needed for End Term. or Dual Face	Number Needed 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	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[a]			1
OC-3/STM-1 and/or OC-12/STM-4 optical signal source or test set			1
Optical Multi-Wavelength Meter (optional as required)	1		

a. 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.

Background (Continued)

**Testing Setup
Procedure**

Perform the following to connect the CMC computer to the WaveStar OLS 40G.

Log back into the Network Element in **EXPERT** mode as described in the previous chapter if not currently logged in.

⇒ **NOTE:**
   The detailed CMC connection and login procedure is given in "Login Procedure Overview" in Appendix F.

For OT ONLY: If testing an OT only, proceed to OT Miscellaneous Discrete Tests: page 9-29. 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 step to test all LEDs on the WaveStar OLS 40G:

Step	Action	Reference
1	Select FAULT.Test.LED from the CIT menu.	
2	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.	

ODU Tests

**ODU Test
Description and
Cautions**

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,LEA7B, 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.

⚠ **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.

ODU Tests (Continued)

**ODU Test
Procedures**

Use the following steps to preform the ODU test:

Step	Action	Reference
1	To perform the following ODU tests, APSD must be disabled to produce a valid OA signal. Disable APSD at this time.	See Danger notice on previous page.
2	Open the input to the test source amplifier as follows: — For 1A-TX end terminals, verify the fiber is removed from OA 1B IN to verify no signal is driving the OA. — For 1A-RCV end terminals, verify the fiber is removed from OA 1A IN to verify no signal is driving the OA. — For a dual facing shelf, consider line 1 a 1A-RCV configuration, and line 2 a 2A-TX configuration.	See Figure 9-1 and Figure 9-2
3	Connect the output of the source OA to the INPUT port of the ODU for line 1.	
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 and within approximately 10 dB of OCHAN 1 OUT. The power level should increase slightly through the middle wavelengths and taper back to the original value from OCHAN 1 at the higher wavelengths.	

ODU Tests (Continued)

ODU Test Procedures (continued)

Figure 9-1.   ODU Line 1 Verification Connections (1A-TX)
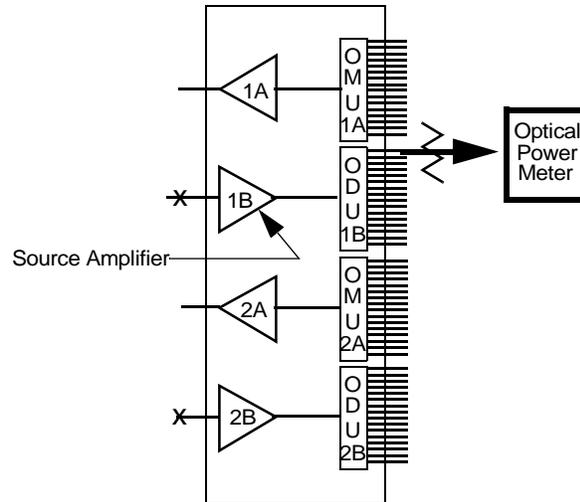
Figure 9-2.   ODU Line 1 Verification (1A-RCV)
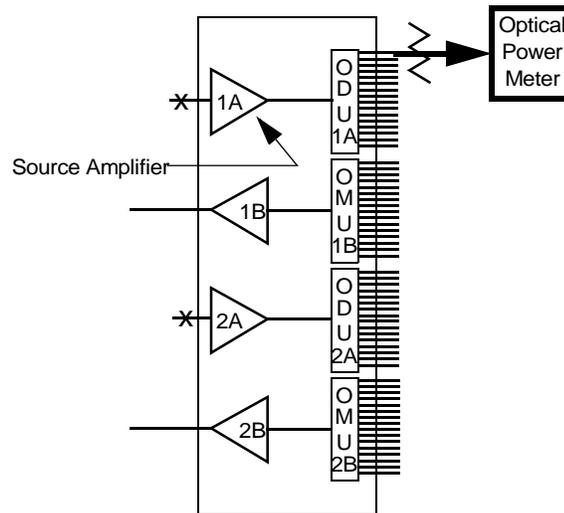
ODU Tests (Continued)

**ODU Testing
Procedures
(continued)**

Step	Action	Reference
6	Repeat for each successive OCHAN_ OUT.	
7	Repeat Steps 1 - 6 for all other line, using appropriate ODUs and OAs for each line.	
8	Return the intrashelf fiber jumpers to their original positions when complete.	
9	When finished testing, enter the SECURITY.Enter.System command in the CMC to ENABLE the APSD feature. ⚠ **CAUTION:** *APSD must be enabled for safety purposes.*	

OMU Tests

OMU Test Description and Cautions

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.

⚠ **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.

OMU Testing Procedures

Use the following steps to test the OMUs:

Step	Action	Reference
1	To perform the following OMU tests, APSD must be disabled to provide a valid amplifier signal. Disable APSD at this time.	See Danger above.
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.	See Figure 9-3 and Figure 9-4.

OMU Tests (Continued)

**OMU Testing
Procedures
(continued)**

Figure 9-3.   OMU Line Verification Connections (1A-TX)
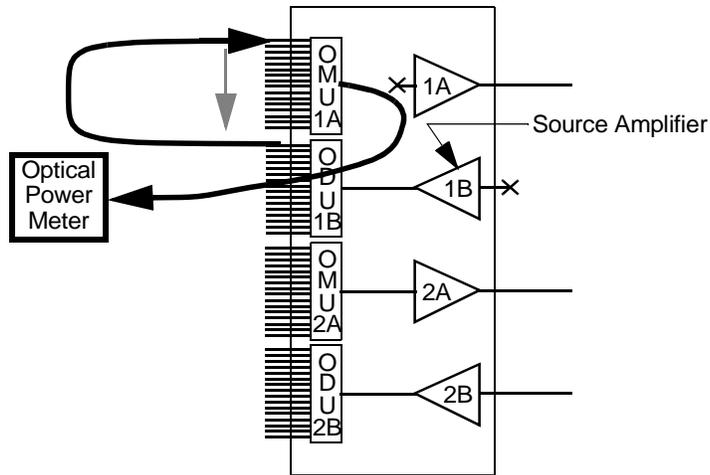
Figure 9-4.   OMU Line 1 Verification Connections (1A-RCV)

OMU Tests (Continued)

**OMU Testing
Procedures
(continued)**

Step	Action	Reference
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 greater than +16 dBm, do not use the 33 dB test cable.	
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.	
7	Connect OCHAN1 OUT of the ODU with a fiber jumper to OCHAN1 IN of Line 1 OMU. **Requirement:** Verify a power level difference of between −12 dB and −19 dB. ⇒ **NOTE:** If the loss is greater than 19 dB, clean the optical connections and retest. If the loss is still greater than these values, contact your next level of support.	
8	Verify optical channels 2 through 16 by moving the connection on Line 1 OMU from the measured OCHAN OUT to the next OCHAN OUT and repeating Step 7. **Requirement:** If any one channel varies from the average of all channels by more than 3 dB, clean the optical connections and retest. If the loss still varies greatly, contact your next level of support.	
9	Repeat Steps 1 - 8 for all Lines.	
10	Return the intrashelf fiber jumpers to their original positions.	

Auto Turnup Local Test

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 11.

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 Procedures

Perform the following steps for the Auto Turnup Local CMS test:

Step	Action	Reference
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.)	See Figure 9-5, Figure 9-6, and Figure 9-7.
3	Execute CONFIGURATION.Update.System.	
4	Select the command Fault.Test.Auto.Local and Press Enter. ⇒ **NOTE:** Login in expert mode if the command is not found.	

Auto Turnup Local Tests (Continued)

Auto Local Turnup CMS Procedures (continued)

Figure 9-5.   Auto Turnup Local CMS Connections (1A-TX)

1A-TX

End Terminal
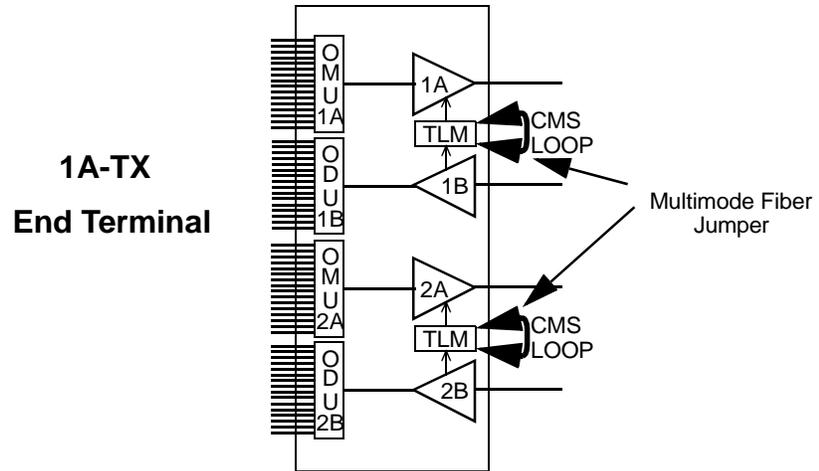
Figure 9-6.   Auto Turnup Local CMS Connections for Repeaters
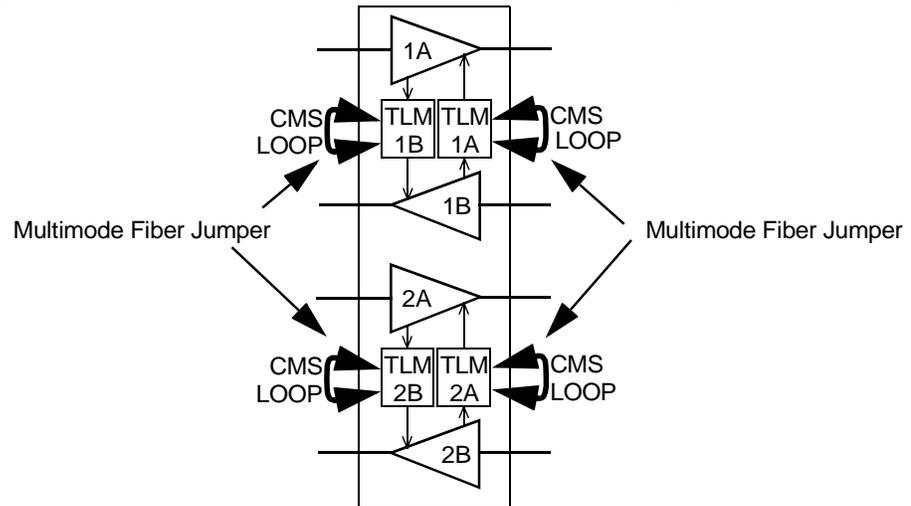
Auto Local Turnup Tests (Continued)

Auto Local Turnup CMS Procedures (continued)

Figure 9-7.   Auto Turnup Local CMS Connections for Single OAs

Step	Action	Reference
5	In the box provided, type in the words CMS-ALL. **Requirement:** 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.	

Auto Turnup Local Test (Continued)

**Auto Local Turnup
CMS Procedures
(continued)**

Step	Action	Reference
6	Remove optical CMS loopback cables.	
7	Repeat steps 1 to 6 for any other equipped lines until all lines are tested.	
8	Execute CONFIGURATION.Update.System. **Requirement:** The command clears CMS loss of signal alarms.	

**Auto Turnup Local
SUPR Cautions**

⚠ **CAUTION:**
*To prevent potential damage to the Optical Amplifiers (LEA6, LEA7,LEA7B, 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 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.

Auto Turnup Local Tests (Continued)

Auto Turnup Local SUPR Procedures for End Terminals

Perform the steps in the following table to complete the Auto Turnup Local SUPR test for End Terminals:

⟹ **NOTE:**
For Repeaters, go to the next section in this manual.

Step	Action	Reference
1	Disable APSD.	See Danger on previous page.
2	Loop back the Line 1 high speed signal from the OA OUT of the transmitting OA to the OA IN of the receiving OA through 33 dB of attenuation. If a THRU connection is being used, loop back the TLM 1B IN port to the OUT port on the same pack, using 15 to 18 dB of attenuation on the TLM IN port. For Single OA applications, connect the transmit OA OUT to the ODU directly as shown in Figure 9-10. 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.	Figure 9-8 on page 9-18, Figure 9-9 on page 9-18, and Figure 9-10 on page 9-19
3	If Line 2 is being used, loop back the Line 2 high speed signal from the OA OUT of the transmitting OA to the OA IN of the receiving OA through 33 dB of attenuation. If a THRU connection is being used, loop back the TLM 1B IN port to the OUT port on the same pack, using 15 to 18 dB of attenuation on the TLM IN port. For Single OA applications, connect the transmit OA for Line 2 to the ODU directly, as shown in Figure 9-10. 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.	Figure 9-8 on page 9-18, Figure 9-9 on page 9-18 and Figure 9-10 on page 9-19

Auto Turnup Local Tests (Continued)

Auto Turnup Local SUPR Procedures for End Terminals (continued)

Figure 9-8. Auto-Turnup-Local SUPR Connections for 2 OAs (1A-TX-THRU)
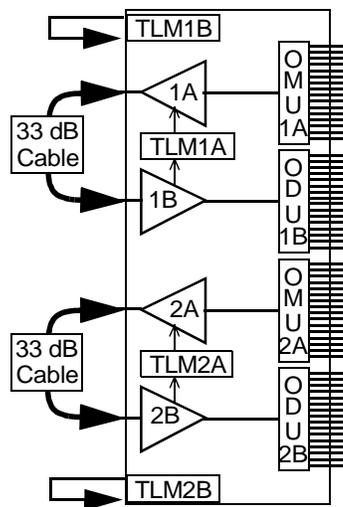
Figure 9-9. Auto-Turnup-Local SUPR Connections for 2 OAs (1A-RCV-THRU)

Auto Turnup Local Tests (Continued)

**Auto Turnup Local
SUPR Procedures
for End Terminals
(continued)**

Figure 9-10.   Auto-Turnup-Local SUPR Connections for Single OA
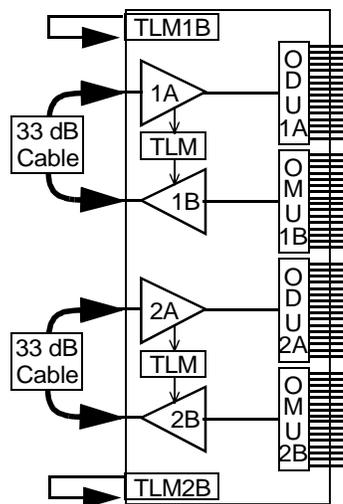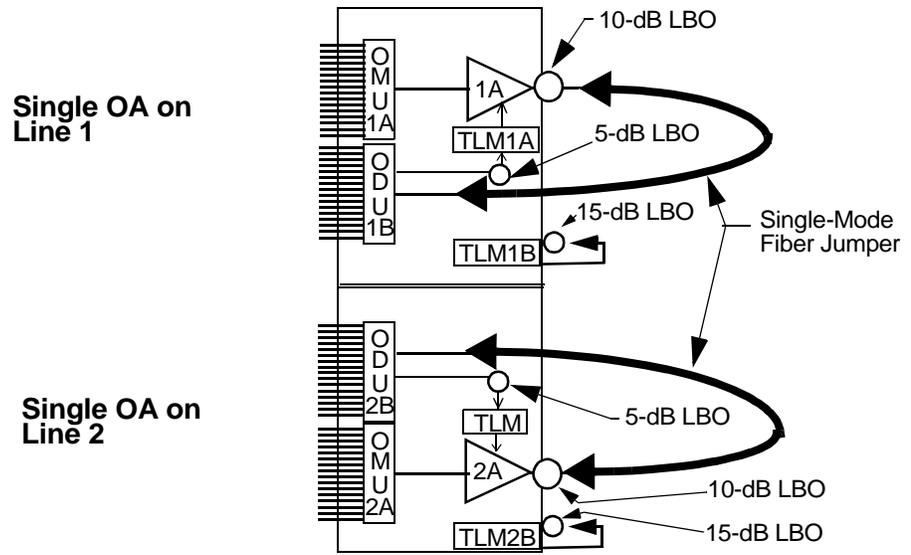
(Continued on next page)

Auto Turnup Local Test (Continued)

**Auto Turnup Local
SUPR Procedures
for End Terminals
(continued)**

Step	Action	Reference
4	Verify the customer maintenance signal connectors (CM IN/CM OUT) are not looped.	
5	Execute CONFIGURATION.Update.System. **Requirement:** The command clears loss of signal alarms. FAULT LEDs on all OAs are off and are not flashing.	
6	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.	
7	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.	
8	Remove the loopback from the 1B and 2B Telemetry circuit packs, and the 15 to 18 dB attenuation used on the TLM IN ports.	
9	Execute CONFIGURATION.Update.System.	
10	Repeat Steps 1 to 8 for any other equipped lines until all lines are tested.	
11	When finished testing, enter the SECURITY. Enter.System command to enable APSD. The APSD feature **must** be enabled for safety purposes.	See Danger on previous page.

Auto Turnup Local Tests (Continued)

Auto Turnup Local SUPR Procedures for Repeaters

Use the following procedures to perform the Auto Turnup Local SUPR Test for Repeaters:

Step	Action	Reference
1	Disable APSD.	See Danger on previous page3.
2	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.	Figure 9-11
3	If Line 2 is populated, 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.	Figure 9-11
4	Verify the customer maintenance signal connectors are not looped.	
5	Execute CONFIGURATION.Update.System. **Requirement:** The command clears loss of signal alarms. FAULT LEDs on both OAs are off and are not flashing.	
6	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.	

Auto Turnup Local Tests (Continued)

Auto Turnup Local SUPR Procedures for Repeaters (continued)

Figure 9-11.   Auto-Turnup-Local SUPR Connections for Repeaters
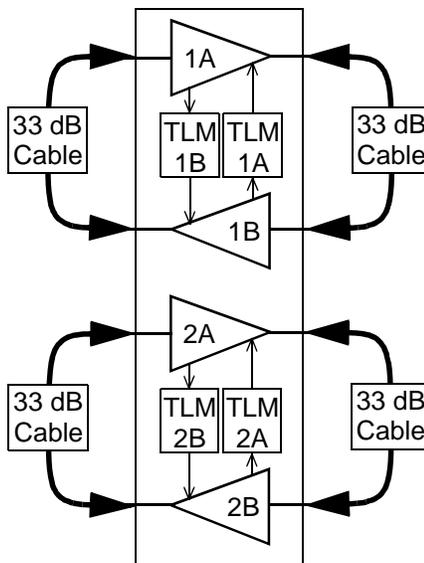
Step	Action	Reference
7	Remove optical loopback cables.	
8	Execute CONFIGURATION.Update.System.	
9	Repeat steps 2 to 8 for any other equipped lines until all lines are tested.	
10	When finished with this test, enter the SECURITY.Enter.System command to ENABLE the APSD. The APSD feature **must** be enabled for safety purposes.	See Danger on previous page.

Local Operational Tests

Description   The local operational tests verify that the office alarms and CIT-DTE connections are operating properly.

Local Alarm Test Procedure

⟹ **NOTE:**
   The following steps should be performed to test the Local Alarms:).

Step	Action	Reference
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 interconnection panel. ⟹ **NOTE:** If installing the office alarm cable on an End Terminal for 4 Line System, 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 2 times through each alarm state. The alarm states are tested in this order: CR, MJ/Prompt. MN/ Deferred, and All Alarm LEDs off. **Requirement:** Verify that the office audible alarms, visual alarms, and the LEDs on the indicator strip are reflecting the correct alarm status. The NE ACTY will be lighted throughout the test. ⟹ **NOTE:** (The ABN, FE ACTY (INFO-F), and NE ACTY (INFO-N) are not tested	

Local Operational Tests (Continued)

**Local Alarm Test
Procedure
(continued)**

Step	Action	Reference
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.

- Select FAULT.Test.Telemetry.Parallel, select "all" and hit Enter.

- Parallel telemetry alarm is activated.

**Miscellaneous
Discrete and
Extended
Miscellaneous
Discrete (EMDU)
Alarms Tests**

If miscellaneous and/or extended miscellaneous discretes are equipped, perform the following steps to verify the miscellaneous discrete points:

Step	Action	Reference
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.	

Local Operational Tests (Continued)

CIT(CMC)-DTE Port Test Background

This procedure requires the use of a null modem, since like ports (DTE and DTE) are to be connected together. Null-Handshake null modem wiring is given in Figure 9-12. 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 9-12.   Null Handshake Null Modem Wiring
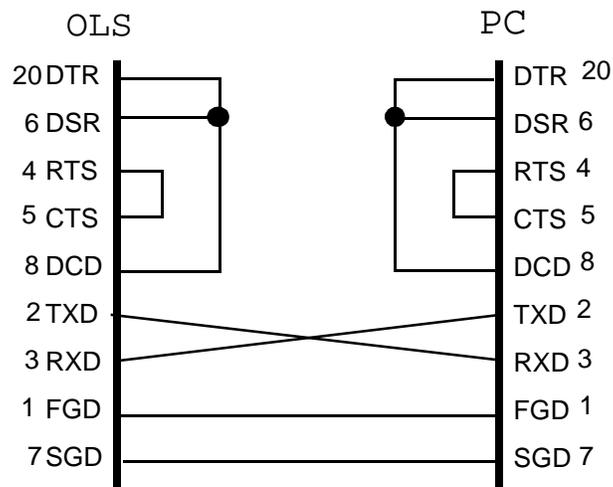
Serial Interface port signals and connector pinouts for DB9, DB25, and RJ45- 8 pin ports are given in Table 9-2 on page 9-26 for reference.

Local Operational Tests (Continued)

**CIT(CMC)-DTE
Port Test
Background
(continued)**

Table 9-2.   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

**Verifying DTE
Port Operation**

Perform the following steps to verify DTE port operation:

Step	Action	Reference
1	Remove the CIT (CMC) cable from the user panel.	
2	Using a null modem adapter, connect the CIT cable to the DTE connector on the interconnection panel.	

Local Operational Tests (Continued)

Verifying DTE Port Operation (continued)

Step	Action	Reference
3	Follow the steps listed in Chapter 7 to login to the NE. ⇛ **NOTE:** For additional information regarding logging in to the Network Element, refer to the Software Release Description.	
4	When finished logging in, logout from the CMC.	
5	Remove the null modem from the cable.	

Final OLS 40G Operations

**Dangers and
Cautions**

> ⚠️ **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.*

Procedures

Perform the following to complete the testing of the WaveStar OLS 40G:

Step	Action	Reference
1	Place protective covers on all optical connectors.	
2	If the WaveStar OLS 40G is to be a stand-alone system (i.e., no OT installation at this time), proceed to Chapter 11; otherwise, continue with procedure for testing the OT system.	
3	Verify the APSD feature is ENABLED. To enable the APSD, enter the SECURITY.Enter.System command.	

OT Miscellaneous Discrete Tests

Background

> **➡ 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.

OT Miscellaneous Discrete Tests (Continued)

Testing OT Misc. Discrete Alarms on Non-Integrated OLS/OT Systems

The table below lists the procedure for testing miscellaneous discrete alarms:

Step	Action	Reference
1	Enable the Serial Telemetry Port by selecting the following command through the CMC. SECURITY.Enter.Channel_Identifier.Security. In the AID box select, SER_TLM1, in the PORTACC box click on enable. ⟹ **NOTE:** 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.Retreive.Condition - ALL	
3	If environmental alarms exist, clear the environmental alarms before proceeding. ⟹ **NOTE:** The presence of an environmental alarm indicates that the alarm wiring has a short. Locate and repair short.	See Table 9-3 on page 9-31.

OT Miscellaneous Discrete Tests (Continued)

Testing OT Misc. Discrete Alarms on Non-Integrated OLS/OT Systems (continued)

Table 9-3.   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
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

OT Miscellaneous Discrete Tests (Continued)

Testing OT Misc. Discrete Alarms on Non-Integrated OLS/OT Systems (continued)

Step	Action	Reference
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.	

OT Miscellaneous Discrete Tests
(Continued)

**Testing OT Misc.
Discrete Alarms on
Non-Integrated
OLS/OT Systems
(continued)**

Figure 9-13. FAULT.Retreive.Log Sample Report

Step	Action	Reference
8	Verify the operation of the miscellaneous discrete alarms by reviewing the Alarm History report using the command: FAULT.Retrieve.Log. **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).	Figure 9-13 on page 9-33

OT Miscellaneous Discrete Tests
(Continued)

**Testing OT Misc.
Discrete Alarms on
Non-Integrated
OLS/OT Systems
(continued)**

Step	Action	Reference
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.Retreive.Log.**Critical.**	
11	Verify proper operation of all the alarms. Report will be similar to an abbreviated report shown in Figure 9-13 on page 9-33.	

Installing OTU/QOTU/OTPMs into Final Positions

Basic Instructions

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.

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 9-3 on page 9-31 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 9-4. on page 9-35 along with their descriptions for provisioning.

Table 9-4.   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

Installing OTU/QOTU/OTPMs into
Final Positions (Continued)

**Sample Procedure
for Provisioning
Miscellaneous
Discretes**

An example of these procedures is given below:

⟹ **NOTE:**
This example provisions an OTU/QOTU is slot 12.

Step	Action	Reference
1	Go to Table 9-3 and look up the alarms associated with OTU Slot 12. They are environmental alarm 28 (CP Fail) and 60 (LOS).	
2	Enter the following command through the CMC: CONFIGURATION.Set.Attribute.Environment. enter env in the AID box, select 28 in the second box.	
3	Enter env in the AID box and select 28 in the second box.	
4	In the ALarm Level Box, select MN_deferred.	
5	In the ALMMSG box, type in capital letters CP FAIL OTU 12 then click on Enter.	

Installing OTU/QOTU/OTPMs into Final Positions (Continued)

Procedure for Provisioning Miscellaneous Discretes

Follow the expanded procedure below to provision all supplied Miscellaneous Discretes:

Step	Action	Reference
1	Using the sample process above, provision environmental alarm 60 so that it will be provisioned LOS OTU12.	
2	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.	
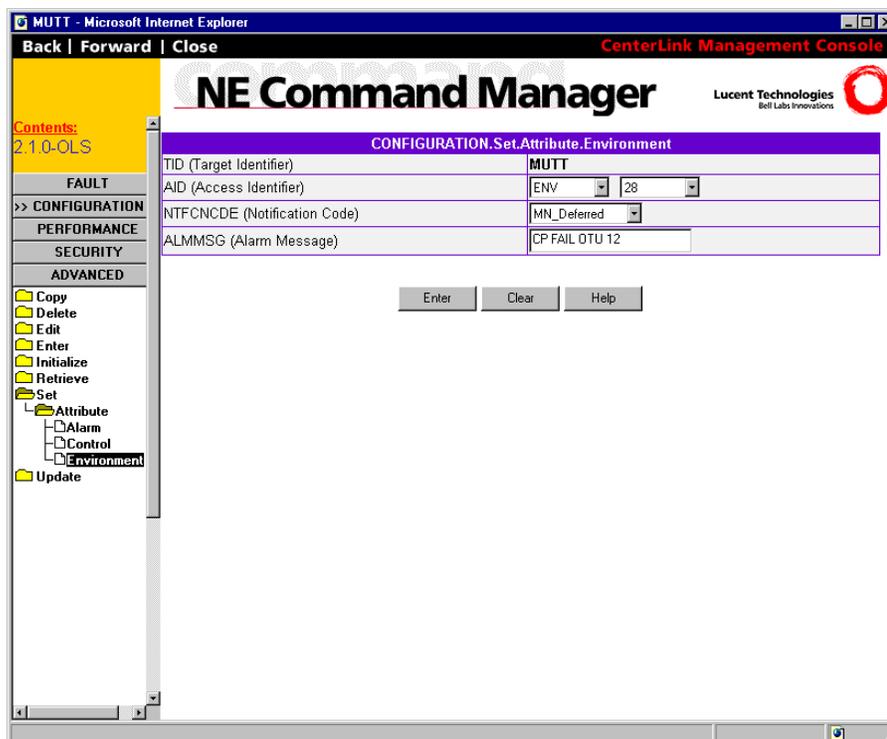
Figure 9-14.   Configuration.Set.Attribute.Environment Screen

(Continued on next page)

Installing OTU/QOTU/OTPMs into Final Positions (Continued)

Procedure for Provisioning Miscellaneous Discretes (continued)

Step	Action	Reference
3	When the alarm provisioning has been completed, request a listing of the provisioned alarms using the following command CONFIGURATION.Retreive.Attribute. Select Env and All. Click on Enter.	
4	Table 9-5 on page 9-38 shows a partial listing of all the provisioned alarms. Compare the sample provisioned alarm descriptions on the CMC screen with those given in Table 9-5.	

Table 9-5.   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 Cautions and Notes

> **⚠ 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.

- If the 41S Quad OTU is to be fully populated with 4 port modules (42A/B, 43A/, or 44A/B), no more than one of them can be a B-type module.

- 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.

Final Testing of OTU Circuit Packs (Continued)

**Test Procedure
Cautions and
Notes (continued)**

⇒ **NOTE:**
0The 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.

⇒ **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 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.

Final Testing of OTU Circuit Packs
(Continued)

Final Test Procedures

Perform the following steps to final test the OTU/OTPMs:

Step	Action	Reference
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 9-6 on page 9-42 and the fault LED shall be OFF.	Table 9-6 on page 9-42
3	If the 506B OMU is being used, the incoming channels must be balanced. Connect the output signal of the OTU/OTPM which still has the test set on it from Step 2 to the correct OCHAN IN port of the OMU. Connect an optical power meter or optical multi-wavelength meter to the OMU OUT port. **Requirement**: The per-channel output power of the OMU should be -21 dBm. If the Requirement is not met, adjust the LC LBO on the OCHAN IN port of the OMU.	

Final Testing of OTU Circuit Packs (Continued)

Final Test Procedures (continued)

Table 9-6. 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, 41F1	1549.31	-5.0 to -3.0	5
41A2, 41C2, 41D2, 41F2	1550.91	-6.3 to -4.3	7
41A3, 41C3, 41D3, 41F3	1552.52	-7.5 to -5.5	9
41A4, 41C4, 41D4, 41F4	1554.13	-8.2 to -6.2	11
41A5, 41C5, 41D5, 41F5	1555.75	-8.7 to -6.7	15
41A6, 41C6, 41D6, 41F6	1557.36	-9.2 to -7.2	17
41A7, 41C7, 41D7, 41F7	1558.98	-9.0 to -7.0	19
41A8, 41C8, 41D8, 41F8	1560.61	-7.5 to -5.5	21
41A9, 41C9, 41D9, 41F9	1548.51	-1.3 to -2.7	23
41A10, 41C10, 41D10, 41F10	1550.11	-4.9 to -5.3	24
41A11, 41C11, 41D11, 41F11	1551.72	-5.1 to -6.5	25
41A12, 41C12, 41D12, 41F12	1553.33	-6.1 to -7.5	26
41A13, 41C13, 41D13, 41F13	1554.94	-6.7 to -8.1	27
41A14, 41C14, 41D14, 41F14	1556.55	-7.2 to -8.6	28
41A15, 41C15, 41D15, 41F15	1558.17	-7.4 to -8.9	29
41A16, 41C16, 41D16, 41F16	1559.79	-6.5 to -7.9	30
41B, 41E, 41G	1310.00	0.0 to 2.0	NA

Final Testing of OTU Circuit Packs (Continued)

**Final Test
Procedures
(continued)**

Step	Action	Reference
4	If the OTU/OTPM meets requirement, replace the protective INPUT and OUTPUT caps. Do not install input or output fibers.	
5	Repeat steps two and three until all the OTU/OTPMs have been tested.	

> **NOTE:**
> If a loopback is used to reduce the amount of test equipment needed while testing 41F-type Gigabit Ethernet OTUs, remove the loopback before removing the test signal. While the loopback is in place, if a loss of signal condition is introduced by removing the test signal, a circuit pack failure may be seen on the pack with the loopback in place. Restoring the signal may not clear the failure and the circuit pack may require reseating. Upon circuit pack recovery, enter the Configuration.Update.System command.

**Miscellaneous
Discrete Power
Fail Test for 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.

Final Testing of OTU Circuit Packs (Continued)

Miscellaneous Discrete Power Fail Test for Non-Integrated OLS/ OT Systems (continued)

The procedure for testing this alarm operation is as follows:

Step	Action	Reference
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. All other Power Fail alarms are to be OFF.	Table 9-4 on page 9-35
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

Final Check   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.

Fiber Connections

10

Contents

Overview

Basic Information

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 365-575-387 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

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 365-575-387 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, 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.

Overview (Continued)

Caution

> ⚠ **WARNING:**
> *Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*

Lightwave Jumpers   The following table lists some of the available jumpers for high speed fiber connections.

Table 10-1.   Lightwave 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

Overview (Continued)

**Optical Line
Buildouts (LBOs)**

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.

A wide variety of LBOs are available for Release 2.1 and subsequent releases. 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, Line Buildout (LBO) to obtain tolerances, power ratings, and further data on LBOs.

> ⚠ **WARNING:**
> *The 15 dB and higher Yellow colored LBOs are made using a carbon-loaded plastic element instead of the clear plastic element used in LBOs of lower attenuation. The carbon-loaded plastic element experiences localized heating that tends to increase their attenuation at input powers above 0 dBm. To minimize the long-term reliability risk and provide predictable attenuation, the 15 dB and up LBOs should not be used to attenuate signals of greater than +3 dBm.*

Overview (Continued)

LBO Selection and Replacement 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 to become familiar with it.

Step	Action
1	At the local node and at the far end node, disable APSD.
2	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.
3	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.
4	Install the chosen buildout. To install, remove the protective covers from the chosen buildout. 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.

Overview (Continued)

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 10-1 on page 10-6.

Once the installation team reaches the AGNE site again they will proceed back in the B direction to the DS-NE site.

Figure 10-1.   System Turnup Sequence of Example System
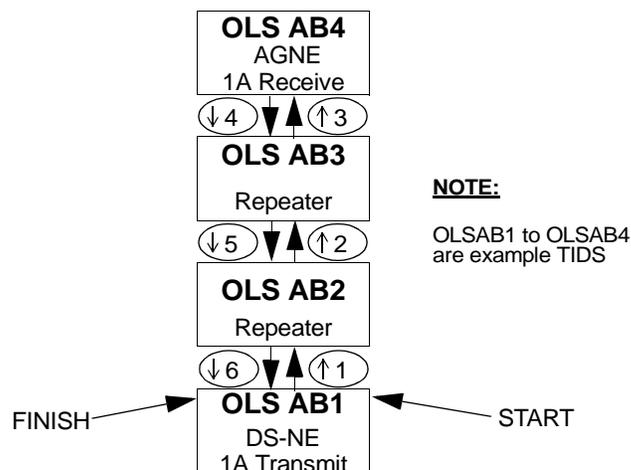
Overview (Continued)

Critical Considerations

The following engineering rules must be applied for the systems mentioned below:

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 ODUs.

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 ODUs.

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.)

OA Applications

The WaveStar OLS 40G can be configured for many different span and wavelength combinations. The associated span losses, total reaches, and allowable number of spans for two-OA and one-OA systems are shown in Table 10-2 and Table 10-3, respectively.

Table 10-2.   Engineering Rules for Two-OA Systems

OA	Power Config. Side	No. Chan.	No. Spans	Span Loss (dB) Min.	Span Loss (dB) Max.	Total Reach (dB) Max.	Span Distance (km) Max.	Total Reach (km) Max.
LEA104	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[a]	150	120	600

a. Each upstream LEA104 must have a 3-dB LOB on its output port.

Overview (Continued)

OA Applications (continued)

Table 10-2.   Engineering Rules for Two-OA Systems (continued)

OA	Power Config. Side	No. Chan.	No. Spans	Span Loss (dB) Min.	Span Loss (dB) Max.[a]	Total Reach (dB) Max.	Span Distance (km) Max.[a]	Total Reach (km) Max.[a]
LEA7 or LEA7B	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]		

a. Fiber loss = 0.25 dB/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 X 17 ps/nm-km = 10880 ps/nm).

c. See Table 10-3 on page 10-9, "Engineering Rules for Single-OA System With LEA105."

Overview (Continued)

**OA Applications
(continued)**

Table 10-3.   Engineering Rules for Single-OA System With LEA105

OA	Max. No. Chan.	No. Span	Span Loss (dB)		Total Reach in (km) Fiber Loss = 0.25 dB/km	Bit Rates
			Min.	Max.		
LEA105	16	1	0	12	48	OC-48/12/3, STM-16/4/1 or 100-750 Mb/s
		1	0	12	48	OC-48/12, STM-16/4, or 100-750 Mb/s
		1	0	13	52	OC-48/3 or STM-16/1
		1	0	16	64	OC-12/3, STM-4/1, or 100-750 Mb/s
		1	0	13	52	OC-48, STM-16 alone
		1	0	16	64	OC-12, STM-4 alone, or 100-750 Mb/s
		1	0	20	80	OC-3, STM-1 alone

DS-NE Office Transmit OA Connection Procedure

Notes and Cautions   Read carefully the following notes and cautions before beginning the procedures:

> **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.*

> **NOTE:**
> At any time throughout the test procedure remove attenuated test cable if measured power is within the range of the optical power meter.

Line 1 Connection Procedures   Follow the steps in the table below to make the connection at the DS-NE Office Transmit:

Step	Action	Reference
1	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.	See Danger above.

DS-NE Office Transmit OA Connection Procedure (Continue)

Line 1 Connection Procedures (continued)

Step	Action	Reference
2	Clean and then connect 1A OA OUT to an optical power meter. Use attenuated test cable if necessary. Test point 1P on Figure 10-2 on page 10-12	
3	Verify the OA Output Power by referring to Table 10-4 on page 10-11.	
4	Clean and then connect the fiber jumper to 1A OA OUT and to the outside plant fiber at the LGX. (Test point 1P on Figure 10-2 on page 10-12). For 7-8 span applications, place a 3dB LBO on the OA OUT port before connecting the fiber.	

Table 10-4.   Output Levels for Releases 2.1 and Subsequent Releases

# of equipped wavelengths	OA Type	Side Power Configuration	OA Output Power
0	LEA7 LEA7B	A	8 to 12 dB
		B	7 to 11dB
		C	4 to 8 dB
	LEA104	A	8 to 12 dB
		B	7 to 11dB
	LEA105	A	4 to 8 dB
		1_OA	4 to 8 dB

DS-NE Office Transmit OA Connection Procedure (Continued)

Line 1 Connection Procedures (continued)

Figure 10-2. DS-NE Office Transmit OA Connection Points
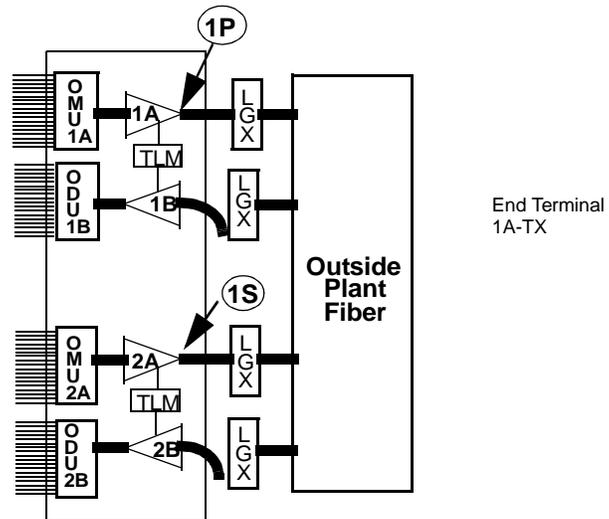
DS-NE Office Transmit OA Connection Procedure (Continued)

Line 2 Connection Procedures

Use the following steps to connect Line 2:

Step	Action	Reference
1	Clean and then connect 2A OA OUT to an optical power meter. Test point 1S on Figure 10-2 on page 10-12.	
2	Verify the OA Output Power by referring Table 10-4 on page 10-11.	
3	Clean and then connect the fiber jumper to 2A OA OUT and to the outside plant fiber at the LGX. See test point 1S in Figure 10-2 on page 10-12.	
4	For 7-8 span applications, place a 3 dB LBO on the OA OUT port before fibering.	
5	Execute the CONFIGURATION.Retreive.Optical_Line command and record the CLF (Channel Loading Factor) for both lines for use in downstream office LBO calculations. (CLF should be zero with no channels equipped.)	
6	For safety purposes, the APSD must be ENABLED after power measurements have been taken. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD feature.	See Danger on previous page.
7	Move to the next office and the next section based on the following: ■ If the next site is a Repeater, go to "Repeater A Direction Connection Procedure" ■ Is the Next site is the AGNE End Terminal Office, go to "AGNE Office Receive OA Connection Procedure"	

Repeater A Direction Connection Procedure

Cautions and Notes

> ➡ **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.*

> ➡ **NOTE:**
> At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

Line 1 Connection Procedures

Using the following steps to connect Line 1 into the system:

Step	Action	Reference
1	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.	See Danger on previous page.

Repeater A Direction Connection Procedure (Continued)

Line 1 Connection Procedures (continued)

Step	Action	Reference
2	Clean and then connect fiber assigned to 1A OA IN to an optical power meter. Test point 1P on Figure 10-3.	
3	Clean and then connect the other end of the above jumper to its assigned LGX location.	
4	Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.	**See LBO Selection Procedures.**
5	Install the appropriate LBO in 1A OA IN connector.	
6	Connect the jumper to the 1A OA IN connector. **Requirement:** The 1A OA FAULT LED shall stop flashing within 1 minute.	
7	Clean and then connect 1A OA OUT to an optical power meter. Test point 2P on Figure 10-3.	
8	Verify the OA Output Power by referring to Table 10-4 on page 10-11.	
9	Clean and then connect the jumper from OA 1A OUT to the LGX Test point 2P on Figure 10-3. If the application is for 7-8 spans, install a 3 dB LBO on OA 1A OUT port prior to installing the fiber.	

Repeater A Direction Connection
Procedure (Continued)

LBO Selection
Procedures

Use the table below to correctly select the LBO to be installed:

Step	Action	Reference
1	Log into the Network Element.	
2	Click on the Smart Manual Manager to open.	
3	Click on the Software Release number.	
4	Click on Installation.	
5	Click on Tasks.	
6	Click on Optical Amplifier Input Line BuildOut Selection.	
7	Enter the OA type i.e. LEA7,LEA7B, LEA104 and click Continue.	
8	Enter the System Type i.e. A, B, C and click Continue.	
9	Enter the Channel Loading Factor obtained at the previous office and click Continue.	
10	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.	

Repeater A Direction Connection Procedure (Continued)

Line 2 Connection Procedures

Use the table below to make the Line 2 connections:

Step	Action	Reference
1	Clean and then connect fiber assigned to 2A OA IN to an optical power meter. Test point 1S on Figure 10-3.	
2	Clean and 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.	**LBO Selection Procedures.**
4	Install the appropriate LBO in 2A OA IN connector.	
5	Connect the jumper to the 2A OA IN connector. **Requirement:** The 2A OA FAULT LED shall stop flashing within 1 minute.	
6	Clean and then connect 2A OA OUT to an optical power meter. Test point 1S on Figure 10-3.	
7	Verify the OA Output Power by referring to Table 10-4 on page 10-11.	
8	If this is a 7-8 span application, install a 3 dB LBO on the OA 2A OUT. Clean and then connect the jumper from OA 2A OUT port to the LGX. Test point 2S on Figure 10-3.	
9	When finished selecting the attenuation, enter the SECURITY.Enter.System command to ENABLE the APSD feature. APSD must be enabled for safety purposes.	

Repeater A Direction Connection
Procedure (Continued)

**Line 2 Connection
Procedures
(continued)**

Step	Action	Reference
10	Move to the next office and use the following procedures: ■ If the next office is a repeater, repeat this section ■ If the next office is the AGNE End Terminal, go to the next section.	

Figure 10-3.   Repeater "A" Direction Connection Point

AGNE Office Receive OA Connection

Cautions and Notes

> **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.*

> **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 input. Connect the LC jumper to the ODU and proceed to Step 6.

AGNE Office Receive OA Connection
(Continued)

Line 1 Connection Procedures

Follow the steps in the table below to make Line 1 connections:

Step	Action	Reference
1	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.	See Danger above.
2	Clean and 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.	LBO Selection Procedures.
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 input. Connect the LC jumper to the ODU input and proceed to Step 6.	
5	Connect the jumper to the 1A OA IN connector. **Requirement:** The 1A OA FAULT LED shall stop flashing within 1 minute.	
6	For single OA applications, place a 5dB LBO in the input port of the TLM circuit pack in position 1A.	

AGNE Office Receive OA Connections
(Continued)

Line 2 Connections Procedures

Use the steps in the table below to perform the Line 2 Connections:

Step	Action	Reference
1	Clean and then connect fiber assigned to 2A OA IN to an optical power meter. Use Test point 1S.	Figure 10-4 on page 10-22
2	Clean and then connect the other end of the jumper above to the LGX location.	
3	Select an OA IN LBO based on the measured power and the number of wavelengths (channels) present.	LBO Selection Procedures
4	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 Step 6.	
5	Connect the jumper to the 2A OA IN connector. **Requirement:** The 2A OA FAULT LED shall stop flashing within 1 minute.	
6	For single OA applications, place a 5dB LBO in the input port of the TLM circuit pack in position 2A.	
7	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.	See Danger above.
8	Continue with the next section of this chapter.	

AGNE Office Receive OA Connections

Associated Figure   **Figure 10-4.   AGNE Office Receive OA Connection Points**

AGNE Office Transmit OA Connection

Cautions and Notes

> ➭ **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.*

> ➭ **NOTE:**
> At any time throughout test procedure remove, attenuated test cable if measured power is within the range of the optical power meter.

Line 1 Connection Procedures

Follow the steps in the table below to make Line 1 connections:

Step	Action	Reference
1	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.	See Danger above.
2	Clean and then connect 1B OA OUT to an optical power meter. Use Test point 1P.	Figure 10-5 on page 10-25

AGNE Office Transmit OA Connection (Continued)

Line 1 Connection Procedures (continued)

Step	Action	Reference
3	Verify the OA Output Power by referring to the table.	Table 10-4 on page 10-11
4	For 7-8 span applications, install a 3 dB LBO in the 1B OA OUT. Clean and then connect the fiber jumper to 1B OA OUT and the outside plant fiber at the LGX. Use Test point 1P.	Figure 10-5 on page 10-25

Line 2 Connection Procedures

Follow the procedures in the table below to make Line 2 Connections:

Step	Action	Reference
1	Clean and then connect 2B OA OUT to an optical power meter. Use Test point 1S.	Figure 10-5 on page 10-25
2	Verify the OA Output Power by referring to the table.	Table 10-4 on page 10-11
3	For 7-8 span applications, install a 3 dB LBO in 2B OA OUT. Clean and then connect the fiber jumper to 2B OA OUT and the outside plant fiber at the LGX. Use Test point 1S.	Figure 10-5 on page 10-25
4	Execute the CONFIGURATION.Retreive.Optical_Line command and record the Channel Loading Factor for use in downstream offices.	

AGNE Office Transmit OA Connection (Continued)

Line2 Connection Procedures (continued)

Step	Action	Reference
5	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.	
6	If the next office is a Repeater, go to Repeater B Direction Connection Procedures. If the next office is the DS-NE Terminal Office, go to DS-NE Office Receive OA Connection Procedures.	

Associated Figure   **Figure 10-5.   AGNE Office Transmit OA Connection Points**
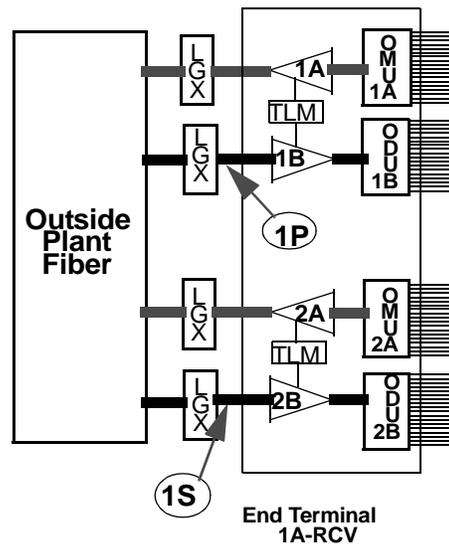
Repeater B Directions Connection

Cautions and Notes

> **⇒ 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.*

> **⇒ NOTE:**
> At any time throughout test procedure remove attenuated test cable if
> measured power is within the range of the optical power meter.

Line 1 Connection Procedures

Use the following table to make the Line 1 Connection:

Step	Action	Reference
1	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.	See Danger above.
2	Clean and then connect fiber assigned to 1B OA IN to an optical power meter. Use Test point 1P.	Figure 10-6 on page 10-29

Repeater B Direction Connection
(Continued)

**Line 1 Connection
Procedures
(continued)**

Step	Action	Reference
3	Clean and then connect the other end of the jumper above to its assigned LGX location.	
4	Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present.	See LBO Selection Procedures.
5	Install the appropriate LBO in 1B OA IN connector if necessary.	
6	Connect the jumper to the 1B OA IN connector. **Requirement:** The 1B OA FAULT LED shall stop flashing within 1 minute.	
7	Clean and then connect 1B OA OUT to an optical power meter. Use Test point 2P.	Figure 10-6 on page 10-29
8	Verify the OA Output Power by referring to the table.	Table 10-4 on page 10-11
9	For 7-8 span applications, install a 3 dB LBO in the OA 1B OUT. Clean and then connect the jumper from OA 1B OUT to the LGX. Use Test point 2P.	Figure 10-6 on page 10-29

Repeater B Direction Connection (Continued)

Line 2 Connection Procedures

Step	Action	Reference
1	Clean and then connect fiber assigned to 2B OA IN to an optical power meter through attenuated test cable. Use Test point 1S.	Figure 10-6 on page 10-29
2	Clean and 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.	See LBO Selection Procedures.
4	Install the appropriate LBO in 2B OA IN connector if necessary.	
5	Connect the jumper to the 2B OA IN connector. **Requirement:** The 2B OA FAULT LED shall stop flashing within 1 minute.	
6	Clean and then connect 2B OA OUT to an optical power meter through attenuated test cable. Use Test point 2S.	Figure 10-6 on page 10-29
7	Verify the OA Output Power by referring to the table.	Table 10-4 on page 10-11
8	For 7-8 span applications, install a 3dB LBO in the OA 2B OUT. Clean and then connect the jumper from OA 2B OUT to the LGX. Use Test point 2S.	Figure 10-6 on page 10-29
9	For safety purposes, the APSD feature **must** be ENABLED. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD.	
10	If the next office is a Repeater, Repeat this section of the chapter. If the next office is the DS-NE, go to the DS-NE receive OA connection procedure.	

Repeater B Direction Connection (Continued)

Associated Figure   **Figure 10-6.   Repeater B Direction Connection Points**

DS-NE Office Receive OA Connection

Cautions and Notes

> **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.*

> **NOTE:**
> At any time throughout test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

Line 1 Connection Procedure

Use the following procedures to make the Line 1 connection:

Step	Action	Reference
1	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.	See Danger above.
2	Clean and then connect fiber assigned to 1B OA IN to an optical power meter. Use Test point 1P.	Figure 10-7 on page 10-33

DS-NE Office Receive OA Connection (Continued)

**Line 1 Connection
Procedure
(continued)**

Step	Action	Reference
3	Clean and then connect the other end of the jumper above to its assigned LGX location.	
4	Select an OA IN LBO based on the measured power and the number of OC-48 wavelengths (channels) present. ⇛ **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 7.	LBO Selection Procedures
5	Install the appropriate LBO in 1B OA IN connector if necessary.	
6	Connect the jumper to the 1B OA IN connector.The 1B OA FAULT LED shall stop flashing within 1 minute. **Result:** The 1B OA FAULT LED shall stop flashing within 1 minute.	
7	For single OA applications, place a 5dB LBO in the input port of the TLM circuit pack in position 1A.	

DS-NE Office Receive OA Connection (Continued)

Line 2 Connection Procedure

Use the following table to make the Line 2 Connection:

Step	Action	Reference
1	Clean and then connect fiber assigned to 2B OA IN to an optical power meter through attenuated test cable. Use Test point 1S. ➡ **NOTE:** For Single OA applications you will need a LC-to-LC adapter and a short LC fiber to connect to the power meter.	Figure 10-7 on page 10-33
2	Clean and then connect the other end of the jumper above to its assigned LGX location.	
3	Clean and then connect the other end of the jumper above to its assigned LGX location.	
4	Select an OA IN LBO based on the measured power and the number of wavelengths (channels) present. ➡ **NOTE:** For Single OA applications there will be no LBO used on the ODU. Connect the jumper to the ODU and proceed Step 7.	See LBO Selection Procedures.
5	Install the appropriate LBO in 2B OA IN connector if necessary.	
6	Connect the jumper to the 2B OA IN connector. **Requirement:** The 2B OA FAULT LED shall stop flashing within 1 minute.	
7	For single OA applications, place a 5dB LBO in the input port of the TLM circuit pack in position 2A.	
8	For safety purposes, the APSD **must** be ENABLED. Enter the SECURITY.Enter.System command at this time to ENABLE the APSD feature.	
9	Proceed to "Ring Closure Verification Procedure."	

DS-NE Office Receive OA Connection (Continued)

Associated Figure   **Figure 10-7.   DS-NE Office Receive OA Connection Points**
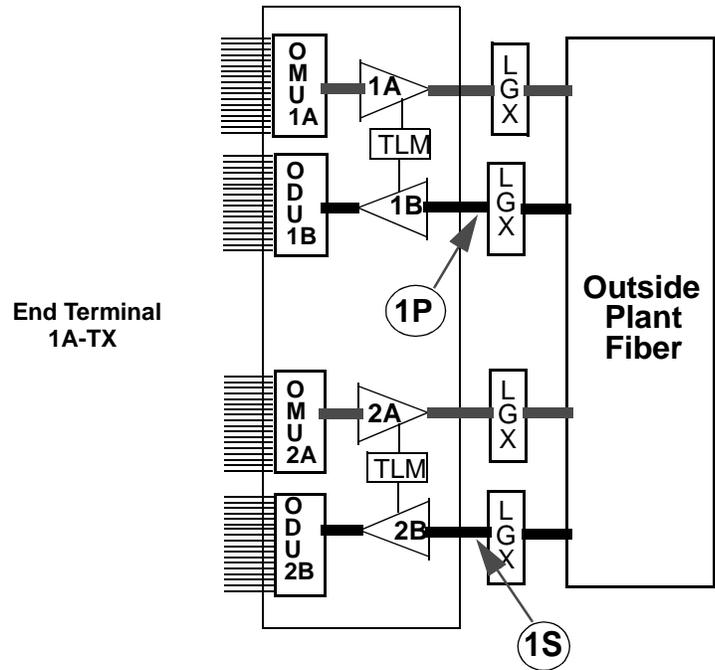
Ring Closure Verification

Background   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 steps in the following table to verify 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 365-575-387 WaveStar OLS 40G User/Service Manual before proceeding.

Step	Action
1	Log into any WaveStar OLS 40G site using the CMC PC.
2	Execute CONFIGURATION.Retreive.Ring.Map. **Requirement:** Verify the TIDs are all listed correctly. Verify the communication status is good for each site.
3	Execute FAULT.Retreive.Alarms.Network. **Requirement:** Verify there are no alarms at the requested level.
4	Execute FAULT.Retreive.Alarms.All. **Requirement:** Verify there are no local alarms.
5	Execute SECURITY.Retreive.System. **Requirement:** Verify the APSD state is ENABLED. If it is not, use the SECURITY.Enter.System command to ENABLE the APSD.
6	Log into another site using the correct TID. **Requirement:** Verify the Alarm and Status Report displayed upon logging in reports no alarms.
7	Execute SECURITY.Retreive.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

Background
This procedure will verify that performance monitoring reports show proper optical power and zero B2 parity error rates.

Procedures
Perform the steps in the following table to complete the Monitor Bit Error Tests:

> **NOTE:**
> If at any step the requirements are not met, resolve the problem using procedures in the 365-575-387 WaveStar OLS 40G User/Service Manual before proceeding.

Step	Action
1	Execute the PERFORMANCE.Retreive-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.Retreive-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

Final Procedure   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 10, Fiber Connections to connect SONET/SDH systems to the WaveStar OLS 40G.

Connecting SONET/SDH Systems to WaveStar OLS 40G

11

Contents

Background

Introduction　　This chapter covers fiber jumper installation and testing between SONET/SDH Systems and the WaveStar Optical Line System (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.

Background (Continued)

**General
Considerations
(continued)**

■ 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 the following:

■ To disconnect the output jumper:

1. Allow the pack to boot (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 Powering Level requirements, 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.

Background (Continued)

LBO Information (continued)

A wide variety of LBOs are available for Release 2.1 and subsequent releases. A 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.

OTU and OTPM Information

41-Type OTUs

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 41F(1-16) type OTU enables Gigabit Ethernet (1-Gb Ethernet) signals to be transmitted on the 40G system. All OTUs can receive optical signals in the 1310-nm and 1550-nm range.

OTUs may be used to regenerate the optical signal or provide Wavelength Add Drop (WAD) capability. The 41B-type, 41E-type and 41G-type OTU translate a 1550-nm signal to a 13100-nm signal for compatibility with 1310-nm equipment.

For additional information on the 41-type OTUs, refer to the Applications, Planning, and Ordering Guide (365-575-386).

42-Type OTPMs

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- to 1580-nm range and converts it to an electrical STS-12 signal. The electrical STS-12 signal is reshaped, retimed, and amplified.

Background (Continued)

**OTU and OTPM
Information
(continued)**

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 (365-575-386).

43-Type OTPMs

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- to 1580-nm range and converts it to an electrical STS-3 signal. The electrical STS-3 signal is reshaped, retimed, and amplified.

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 detailed information associated with the 43A and 43B OTPM circuit packs, refer to the APOG (365-575-386).

44-Type OTPMs

Each of these Low-Speed Broadband (LSBB) Optical Translator Port Modules (OTPM) accepts any OC-3/STM-1, OC-12/STM-4, or 100-750 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 100-750 Mb/s signal in the 1330 nm range for other receivers. For additional information regarding 44-type OTPMs, refer to the APOG (365-575-386).

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.

Connect SONET/SDH to Optical Line System (OLS)

Description

This procedure is broken into two parts:

■ Connect Generic SONET/SDH transmitters to Optical Translator, and

■ Connect compatible SONET/SDH transmitters to OLS. OLS-compatible transmitters include:

— OC-48/STM-16 Optical Translator Units — 41A( ), 41A( )B, 41A( )C, 41C( ), 41C( )B, 41C( )C, 41D( ), and 41F( ).

— 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 OLS: page 11-8" section.

Measure Level Into OT

Step	Action
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.

$\Longrightarrow$ **NOTE:**
At any time throughout the test procedure, remove attenuated test cable if measured power is within the range of the optical power meter.

Connect SONET/SDH to Optical Line System (OLS) (Continued)

Connect Generic SONET/SDH Transmitters to OT (continued)

Step	Action
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 of the correct type 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. 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, clean and 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 "Connect Compatible SONET/SDH Transmitter to OLS: page 11-8" Section.

Connect SONET/SDH to Optical Line System (OLS) (Continued)

Connect Compatible SONET/SDH Transmitter to OLS

Step	Action
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. This connector should have a pre-selected LBO from the factory, with a label designating its value. Verify the LBO in the OUT port is the value indicated on the label.
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 11-1 for OC-48/STM-16 or Table 11-2 for other signals.

Table 11-1.   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

Connect SONET/SDH to Optical Line System (OLS) (Continued)

Connect Compatible SONET/SDH Transmitter to OLS (continued)

Table 11-1.   OLS-Compatible OC-48/STM-16 Transmitter Output Levels (continued)

FT-2000 ADR Transmitters	FT-2000 LCT Transmitters	41-Type OTU	Output Connector Power Level
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 11-2.   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

Connect SONET/SDH to Optical Line System (OLS) (Continued)

Connect Compatible SONET/SDH Transmitter to OLS (continued)

Table 11-2.   OLS-Compatible Low-Speed Transmitter Output Levels (continued)

Tx Channel	Output Connector Power Levels		
	42-Type OTU	**43-Type OTU**	**44-Type OTU**
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

Step	Action
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 IN, 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/1-Gb Ethernet: page 11-11, to confirm the new wavelength end-to-end.

Connect Optical Line System to SONET/SDH/1-Gb Ethernet

Description   This procedure is broken into two parts:

- Connect Optical Line System to compatible SONET/SDH/1-Gb Ethernet receivers. OLS-compatible SONET/SDH/1-Gb Ethernet 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

  — 1-Gb Ethernet Optical Translator Unit — 41G

- Connect OTU/OTPM output to generic SONET/SDH/1-Gb Ethernet receiver input.

Connect WaveStar OLS 40G to Compatible SONET/SDH/1-Gb Ethernet Receivers

Step	Action
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.)

Connect Optical Line System to SONET/SDH/1-Gb Ethernet (Continued)

Connect WaveStar OLS 40G to Compatible SONET/SDH/1-Gb Ethernet Receivers (continued)

Step	Action
4	For Releases 2.1 and subsequent releases, refer to the SmartManual furnished by the CMC.
5	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.)
6	At the transmitting end of the WaveStar OLS 40G (the previous SONET/SDH/ 1-Gb Ethernet), momentarily remove then reconnect the fiber from the SONET/SDH/1-Gb Ethernet transmitter. **Requirement**: The optical power meter shows a momentary loss of optical power. (Power drops at least 25 dB on the meter.)
7	Proceed to the "Add Additional Wavelengths: page 11-13" section for systems with OLS compatible receivers. Proceed to the "Connect OT/OTPM to Generic SONET/SDH/1-Gb Ethernet Receivers: page 11-13" section for systems without OLS compatible receivers.

Connect Optical Line System to SONET/SDH/1-Gb Ethernet (Continued)

Connect OT/ OTPM to Generic SONET/SDH/1-Gb Ethernet Receivers

Step	Action
1	Connect the optical power meter to the output of the 41B, 41E, or 41G OTU, and 42B, 43B, or 44B OTPM. **Requirement**: 0.0 to 2.0 dBm.
2	Connect a fiber jumper to the output of the OTU/OTPM.
3	At the SONET/SDH/1-Gb Ethernet receiver end of the jumper from the OTU/OTPM, measure and adjust the level as appropriate for the SONET/ SDH system.
4	Verify the SONET/SDH/1-Gb Ethernet loss of signal clears when the jumper is connected at the appropriate level.

Add Additional Wavelengths

Step	Action
1	Repeat the appropriate sections of this chapter for all remaining wavelengths (channels) being installed.
2	Proceed to System Verification: page 11-14 when all wavelengths have been installed.

System Verification

**SONET/SDH/1-Gb
Ethernet to
WaveStar OLS 40G
Verification**

Step	Action
1	Momentarily remove the fiber from a SONET/SDH/1-Gb Ethernet transmitter. **Requirement**: Verify the SONET/SDH/1-Gb Ethernet 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.

Troubleshooting

12

Contents

Background

Introduction   This section provides basic troubleshooting information for the WaveStar OLS 40G.

Troubleshooting Table

Description   Troubleshooting an Optical Line System begins by referencing the 365-575-387
WaveStar OLS 40G User/Service Manual. CTS-CARES login access also has
news bulletins and diagnostic dictionary listings of the most up-to-date issues and
solutions. See Chapter 1, Technical Support: page 1-20, for information on
obtaining a CTS-CARES Customer Web Access Login. A quick trouble shooting
reference is given in Table 12-1 for problems which may come up during
installation.

**Installation
Troubleshooting**

Table 12-1.   Installation Troubleshooting

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 8-1 for CMC minimum connections. Also see the CMC Connection Requirements: page 12-21.
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 Table 8-1. Also see the CMC Connection Requirements: page 12-21.

Troubleshooting Table

Installation Troubleshooting (continued)

Table 12-1.   Installation Troubleshooting (continued)

Trouble or Error Message	Probable Cause	Suggested Solution
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 CMC Connection Requirements: page 12-21.
	PC serial port not powered.	Check PC hardware manual for power saver instructions. Also see CMC Connection Requirements: page 12-21.
	PC serial port BAUD rate does not operate below 9600 BAUD.	Check PC hardware manual Also see CMC Connection Requirements: page 12-21 section.
	PC has background processes running.	Refer to Appendix F, PC Setup & Usage For CenterLink Management Console for examples on clearing. Also see CMC Connection Requirements: page 12-21.
	PC is not detecting CTS and DSR leads as high.	Check hardware manual for PC from PC back to CTS and DSR. Also see CMC Connection Requirements: page 12-21.
	STSCTL failure.	Rule out other causes: Replace SYSCTL. Also see CMC Connection Requirements: page 12-21.

(Continued on next page)

Troubleshooting Table

**Installation
Troubleshooting
(continued)**

Table 12-1. Installation Troubleshooting (continued)

Trouble or Error Message	Probable Cause	Suggested Solution
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.
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 is 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.

Troubleshooting Table

Installation Troubleshooting (continued)

Table 12-1.   Installation Troubleshooting (continued)

Trouble or Error Message	Probable Cause	Suggested Solution
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

Introduction   The following sections are referred to 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 12-1 on page 12-22 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 go high on the correct COM port then the CMC program will immediately issue a "Communication with the NE cannot be established" error message. If the error message is reported after several seconds then the handshaking is probably correct and the problem is with the data transmission being corrupted. If a local area network is used to connect the CMC PC to the WaveStar OLS 40G, XON/XOFF handshaking must be disabled at both ends of the network connection.

Troubleshooting Information (Continued)

CMC Connection Requirements (continued)

Figure 12-1.   CIT (CMC) Minimum Connections
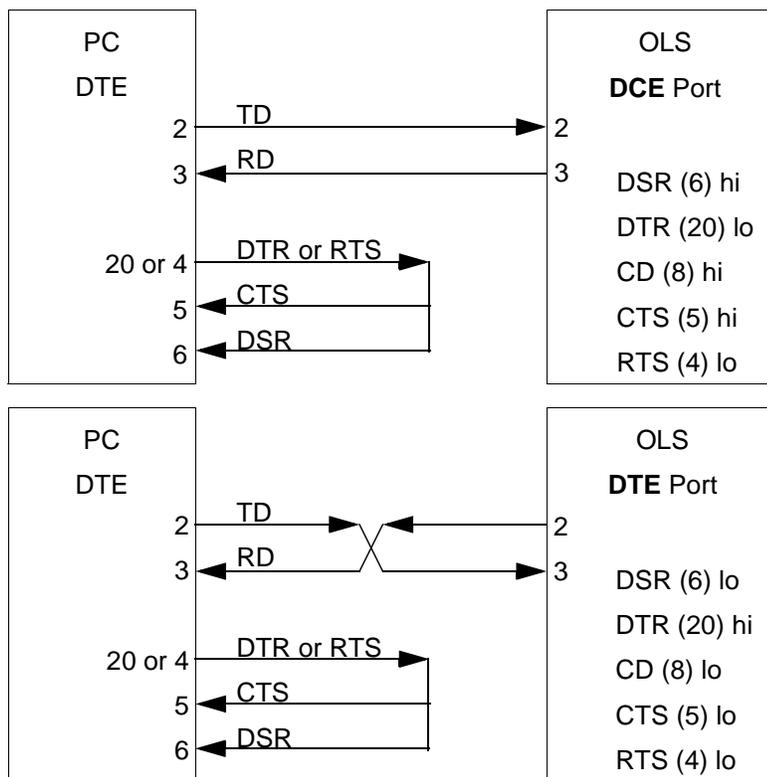
Test-Auto-Turnup — Local Description

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:

■   The Telemetry Pack-to-Optical Amplifier Pack (Supervisory) Channel, or

■   The Customer Maintenance Signal (CMS) In/Out Port.

Troubleshooting Information (Continued)

Test-Auto-Turnup — Local Description (continued)

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.Retreive.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

Troubleshooting Information (Continued)

Test-Auto-Turnup — Local Description (continued)

- 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 12-2 on page 12-25 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.

Troubleshooting Information (Continued)

Supervisory Channel Continuity Test Operation

Once setup and initialization are complete, the following operations are performed to confirm Supervisory Channel continuity per TLM slot:

Step	Action
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 12-2.   Auto-Turnup-Local SUPR Test
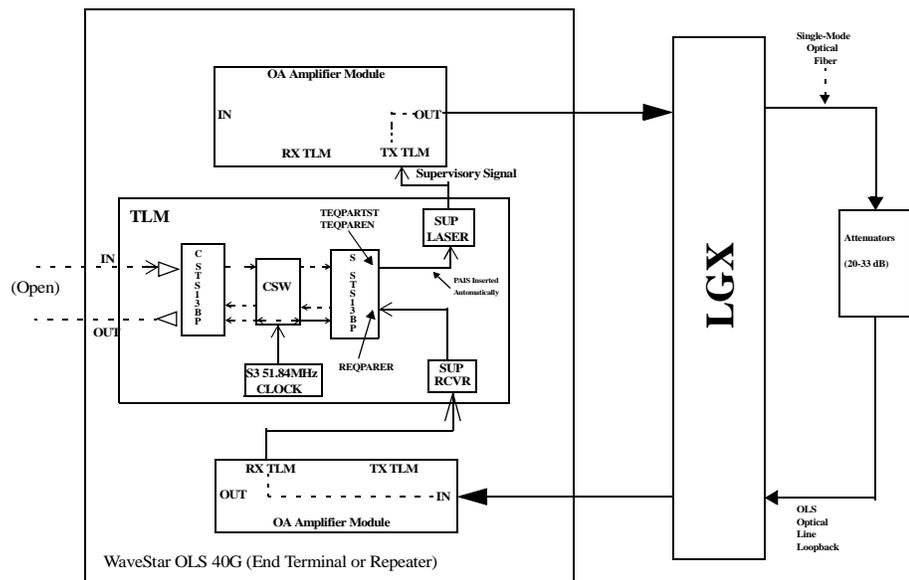
Troubleshooting Information (Continued)

Supervisory Channel Continuity Test Operation (continued)

CMS In/Out Port Automatic Setup

Figure 12-3 on page 12-27 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:

Step	Action
1	Verify no C1 parity error is detected at the C-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 C-STS13BP device of the TLM pack via TEQPARTST function.
3	Verify C1 parity error is detected at the C-STS13BP by reading REQPARER.
4	Remove C1 parity error at the C-STS13BP via TEQPARTST function.
5	Verify no C1 parity error detected at the C-STS13BP by reading REQPARER.

Troubleshooting Information (Continued)

Supervisory Channel Continuity Test Operation (continued)

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 12-3.   Auto-Turnup-Local CMS Test

Releases 1.0 and 2.0 LBO Selection Tables

A
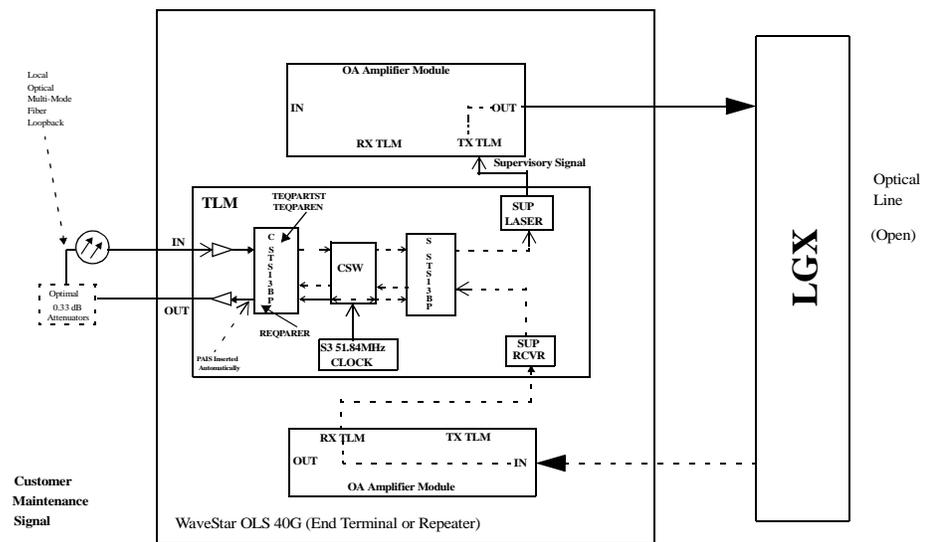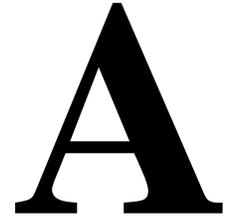
Contents

Overview

Description   Refer to Appendix A of the WaveStar OLS 40G Installation Manual number 365-575-344 for selection of LBOs for Releases 1.0 and 2.0

For selection of LBOs for Releases 2.1 and 3.0, refer to the SmartManual furnished with the CMC software.

Pin Repair

B

Contents

General

Description   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

Description   **KS-22876, L6 Pin Replacement Kit — Comcode 406984641**

L101 Handle Assembly	
L102 Extension Rod	
L103 Head No. 1	Inserts pins in spacer aligner areas from circuit pack side
L104 Head No. 2W	Inserts pins in areas without spacer aligners from circuit pack side
L105 Head No. 3	Removes pins from wiring side
L106 Head No. 4	Removes stub of broken pins from wiring side
L107 Head No. 5	Removes pins from circuit pack side
L110 Pin Gauge	
L112 Case	
L113 Instruction	
L114 Deburring Head	
L115 Drill Bit	
L116 Pin Vise	
AT-7860 D Long Nose Pliers (Insulated)	

METRAL Press-Fit Repair Kit

Repair Tool Kit	BERG MT370-01
Individual Pins	See Table B-1 on page B-4
Pin Repair Kit:	Metral R-6004 (C407959881)
Ordering Information	See Step 7 on page B-7

Pin Designations

Description   **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

PIN ID	Comcode	Pin Type or Commercial Code	FASTECH/METRAL
A		88929-102	METRAL
C		88929-119	METRAL
D		88930-101	METRAL
F		88929-106	METRAL
X		88929-120	METRAL

WaveStar OLS 40G Circuit Pack and Equipment Location

Description   **Table B-3.   WaveStar OLS 40G Equipment Location**

Circuit Pack	Backplane Location	
SYSMEM (LEA2)	20-604	
SYSCTL (LEA1)	20-584	
TOHCTL (LEA5) (LEA102)	20-554	
OA (LEA7, LEA7B, LEA104, and LEA105)	20-534, 20-434, 20-330,20-230	
TLM (LDA1)	52-180, 52-230 52-280, 52-330	
OMU/ODU (506A, 606B)	52-382, 52-430 52-478, 52-526	
USER PNL	45-557	Backplane Designation Only
PWR A	50-597	
PWR B	44-597	

OT Circuit Pack and Equipment Location

Description   **Table B-4.   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.
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

Description

⚠ **CAUTION:**
This procedure must been 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.

Step	Action
1	Determine if the bent or broken pin is in an WaveStar OLS 40G OT.
2	Determine the shelf in which the bent or broken pin resides (ex. OLS).
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 (Figure B-1 through Figure B-8) to determine the letter pin code associated with the pin.
6	Using Table B-1 on page B-4, 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

Procedures for Pin Replacement

Reference Notes
- 1-type contacts shall be press fit from the component side.
- 1D1 contacts shall be broken off on the component side after insertion.
- 1B32, 1B33, 1B34, and 1C6 contacts shall be broken off on the noncomponent side after insertion.

WaveStar OLS 40G — Pin Type Location

Pin Type Locations **Figure B-1.** **WaveStar OLS 40G — Component Side View**
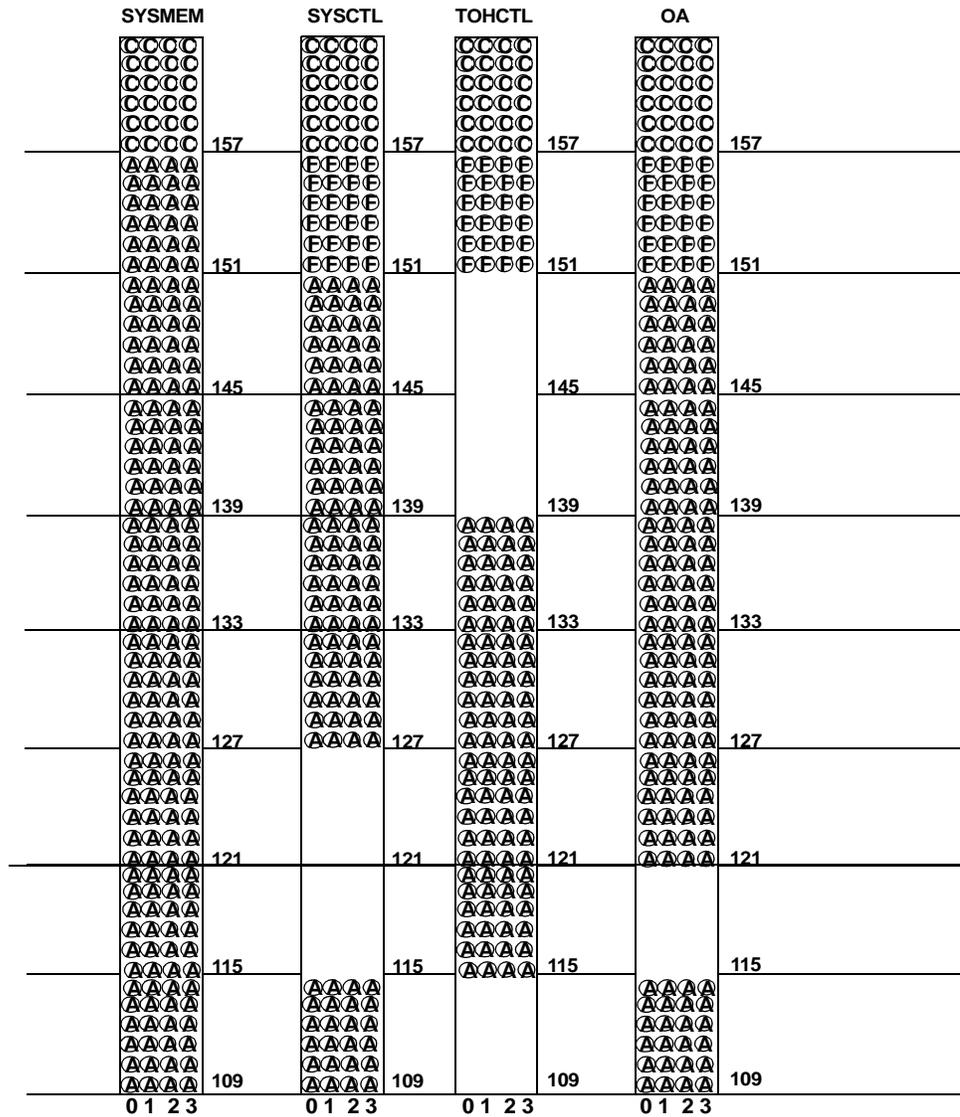
SYSMEM	SYSCTL	TOHCTL	OA

(Figure showing pin type locations with columns labeled SYSMEM, SYSCTL, TOHCTL, and OA, each with row numbers 157, 151, 145, 139, 133, 127, 121, 115, 109 and column numbers 0 1 2 3.)

(Continued on next page)

WaveStar OLS 40G — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-2.   WaveStar OLS 40G (Middle) — Component Side View
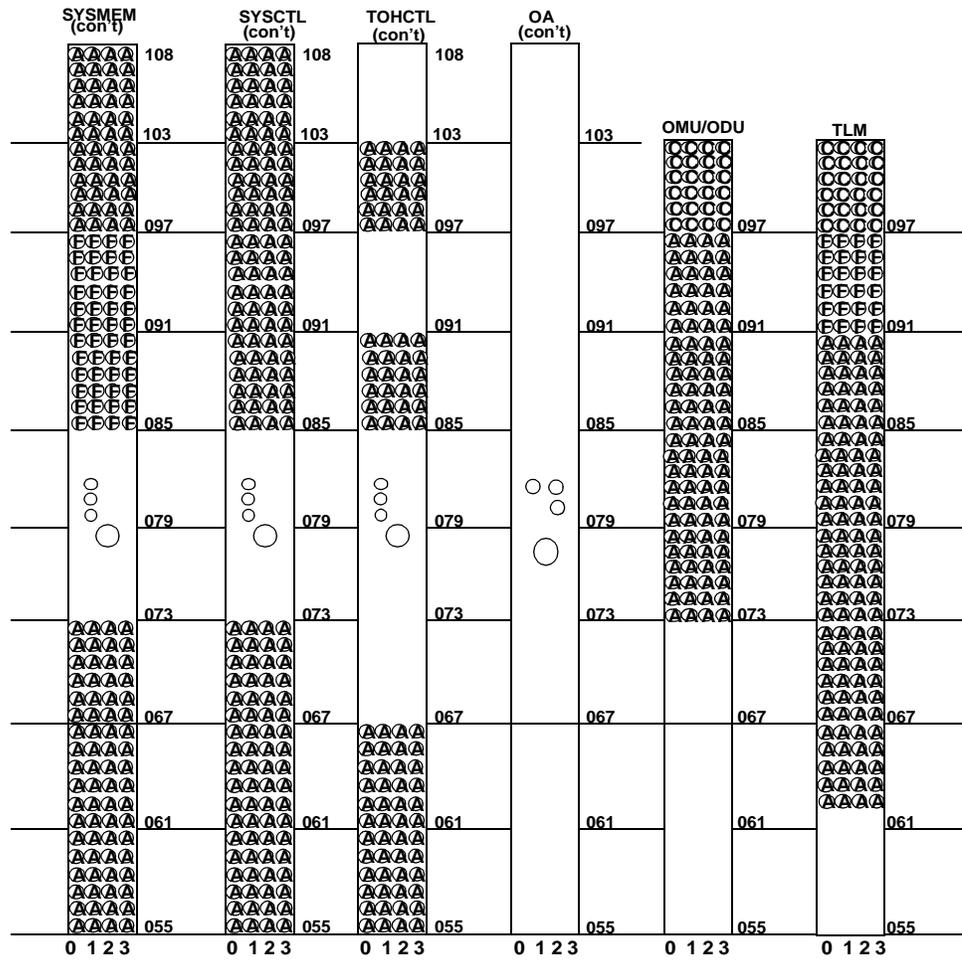
WaveStar OLS 40G — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-3.   WaveStar OLS 40G (Lower) — Component Side View

(Continued on next page)
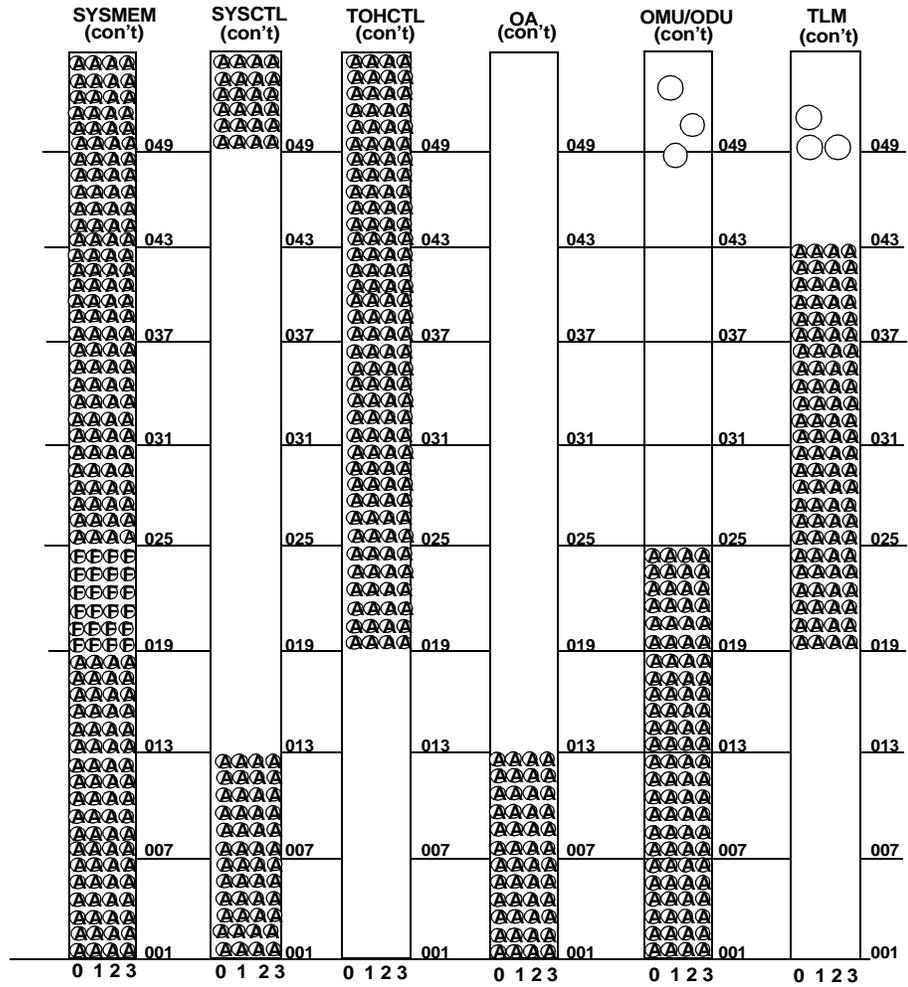
WaveStar OLS 40G — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-4.   WaveStar OLS 40G — Power and User Panel — Component Side View
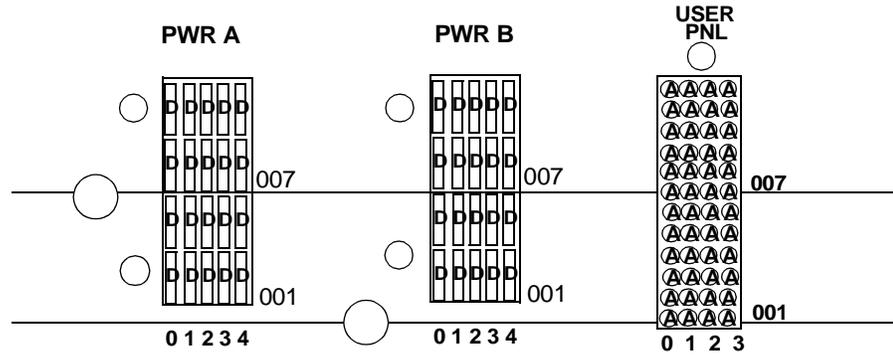
Optical Translator (OT) — Pin Type Location

Pin Type Locations   **Figure B-5.   Optical Translator (Upper) — Component Side View**
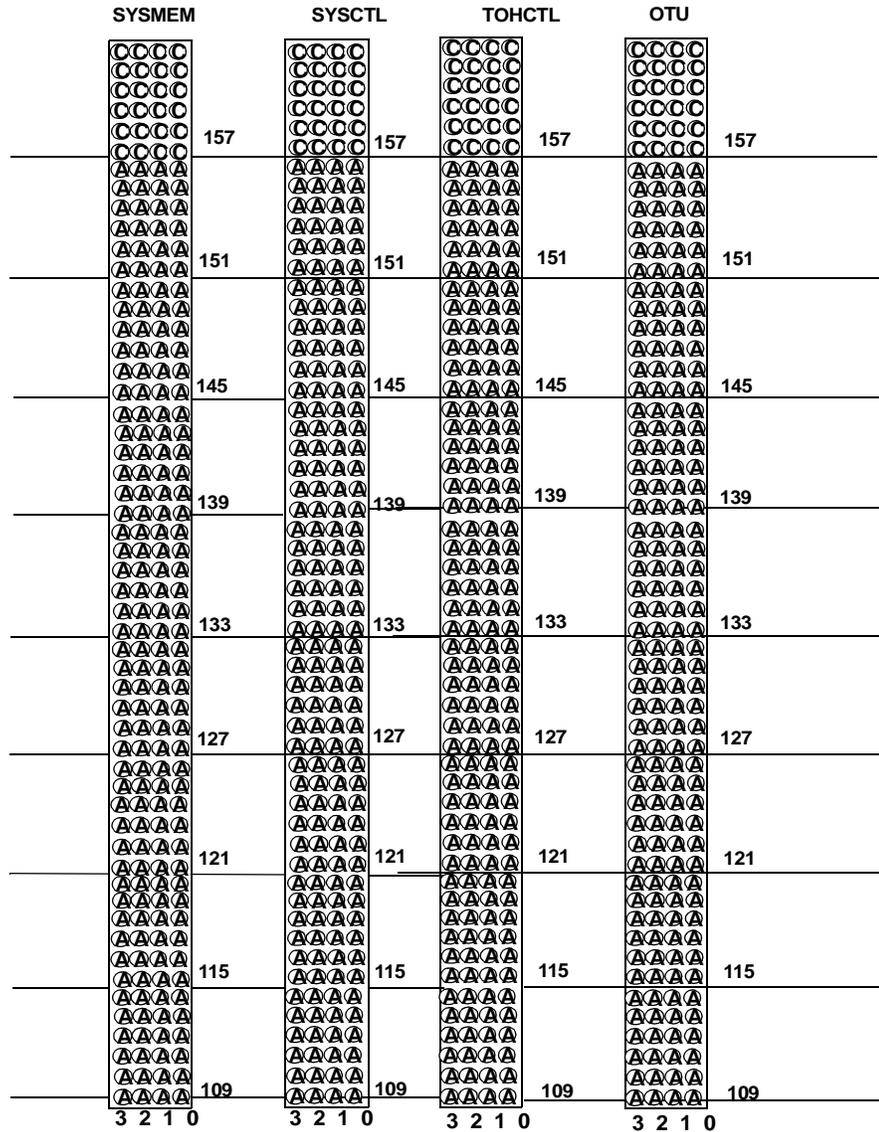
Optical Translator (OT) — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-6.   Optical Translator (Middle) — Component Side View
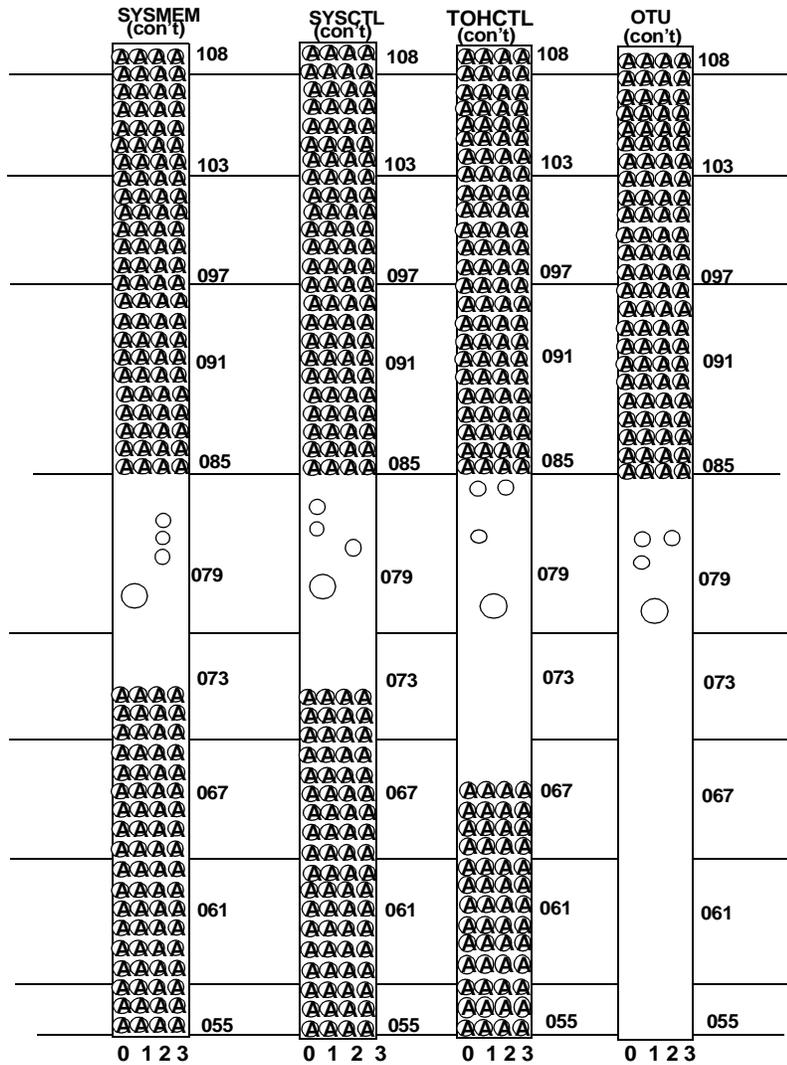
Optical Translator (OT) — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-7.   Optical Translator (Lower) — Component Side View

Optical Translator (OT) — Pin Type Location (Continued)

Pin Type Locations (continued)

Figure B-8. **Optical Translator — Power and User Panel — Component Side View**
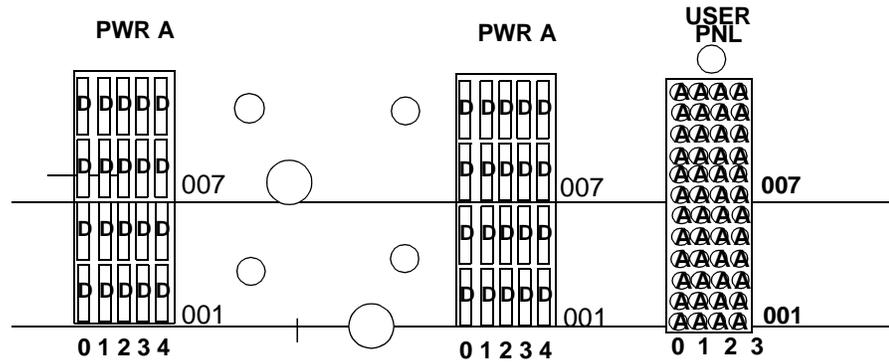
Fiber Cleaning

C

Contents

Background

Introduction This procedure describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment. It is critical that the connector endfaces are clean and free from particular contamination to assure proper performance and reliability of lightwave systems. With the modern high speed, high power and wider bandwidth optical transmission systems, clean connectors along the optical path are absolutely essential for successful operation.

Objectives This chapter provides information to perform the following:

1. Properly clean an optical connector

2. Inspect an optical connector for cleanliness

Related Information A course on connector cleaning and the connector inspection process is now offered through Lucent Technologies Learning and Performance Center, Course Code: LMC214H "Understanding Fiber Optic Cleaning, Inspection and Testing." To learn more about this course, consult your local Lucent Account Representative.

Equipment Required

Description For proper cleaning, the following equipment and materials are recommended:

Product	Model	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
2.5mm Universal adapter cap	for use with Noyes OFS 300-200X	408197044	ITE-7129D1	33712901
1.25mm Universal adapter cap	for use with Noyes OFS 300-200X	408197069	ITE-7129D2	33712902
SC angled adapter	for use with Noyes OFS 300-200X	408376812	ITE-7129D3	33712903
Individual pre-saturated alcohol wipes	99% pure isopropyl alcohol	901375147	ITE-7136	33713600
CLETOP Cleaning Cassette	Type A Reel	901375154	ITE-7137	33713700
CLETOP Cleaning Cassette Replacement Reel	Type A Reel	901375014	ITE-7137 D1	33713701
Luminex Stick port cleaners	1.25 mm	901375030	ITE-7134	33713400
Luminex Stick port cleaners	2.5 mm	901375022	ITE-7135	33713500
Luminex Cloth	5.5" x 5.5"	408201226	R6033	23603300
Video Optical Fiber Inspection Microscope	Noyes VFS-1	408356830	ITE-7146	41714600

Equipment Required (Continued)

**Description
(continued)**

Product	Model	Comcode	ITE #	Installation Order #
FC adapter	for use with Noyes VFS-1	408356863	ITE-7146D3	33714603
1.25 mm adapter	for use with Noyes VFS-1	408356848	ITE-7146D1	33714601
2.5 mm adapter	for use with Noyes VFS-1	408356855	ITE-7146D2	33714602
LC adapter	for use with Noyes VFS-1	408356889	ITE-7146D4	33714604
SC adapter	for use with Noyes VFS-1	408356954	ITE-7146D5	33714605
ST adapter	for use with Noyes VFS-1	408356962	ITE-7146D6	33714606

➡ **NOTE:**
The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended by Lucent.

Safety Instructions

Description

⚠️ **WARNING:**
Never view an energized optical cable with the naked eye or with an optical magnifying instrument. Disconnected or separated optical connectors may emit invisible laser radiation and direct exposure can severely injure the eye. If inspecting the endface of a connector with a fiberscope, be absolutely certain that the system is deactivated.

⚠️ **WARNING:**
Alcohol is flammable and is harmful if swallowed, inhaled or absorbed through the skin. Keep alcohol away from heat, sparks, or flame. Avoid contact with eyes, skin and clothing.

Cleaning/Inspecting Optical Connectors

Introduction   The procedure that follows utilizes the "Wet/Dry" method for connector cleaning. This method first applies a "wet" solvent (high purity alcohol) to the connector endface to dissolve/remove any organic particulate or oily films, followed by a "dry" double clean wipe using the CLETOP cleaning cassette.

This procedure is recommended for connector ferrules 2.5 mm and 1.25 mm in diameter associated with ST, SC, FC, and LC connectors. The ferrule of a fiber optic connector consists of a ceramic or stainless steel cylinder with a hole located longitudinally down the center of its axis, allowing enough tolerance for a fiber to pass through.

All optical connectors should be cleaned prior to connectorization. Keep the protective ferrule dust cap in place on the connector until initiating the cleaning process.

Cleaning Process   The following cleaning procedure is acceptable for field service/installation activities.

Step	Action
1	Remove the dust cap from the connector ferrule exposing the endface of the connector.

Cleaning/Inspecting Optical Connectors (Continued)

Cleaning Process (continued)

Step	Action
2	Open an individual foil packet of pre-saturated isopropyl alcohol (99% pure) wipe. Grasp the connector housing and place the connector ferrule endface perpendicular to the alcohol wipe. Drag it against the wipe three (3) times in a figure eight pattern. This action applies the alcohol solvent to the endface and initially loosens and scrubs away organic/solid contaminants.

Cleaning/Inspecting Optical Connectors (Continued)

Cleaning Process (continued)

Step	Action
3	If a CLETOP cassette cleaner is not available, proceed with step 7. Otherwise, hold the CLETOP cassette cleaner in the palm of your hand with the cassette shutter door facing up. Rotate the cassette lever all the way down with your thumb. Do not release the lever. The lever advances the "dry" Luminex cleaning cloth inside the case and simultaneously opens the shutter. The CLETOP cassette shutter door is now open and ready for cleaning the connector.

Cleaning/Inspecting Optical Connectors (Continued)

Cleaning Process (continued)

Step	Action
4	Insert and press the connector ferrule endface perpendicular against the cleaning cloth in the first of two slots of the cleaner. Drag it down in the direction indicated by the arrows on the cleaner. Do not release the lever of the cassette.
5	Lift the connector from the first slot and rotate it 90 degrees and repeat the wiping procedure using the second slot. Be sure the ferrule is pressed snug against the cleaning cloth while dragging the ferrule to assure the proper cleaning action.
6	Release the cassette lever allowing the shutter door to close to its initial position. Continue with Step 8.
7	Wrap a Luminex cleaning cloth around the ferrule and rotate the connector housing, cleaning the outside periphery of ferrule. Follow this by folding an unused portion of the cloth over the end of the ferrule endface and then with light pressure from the thumb, slightly drag the cloth from the center of the ferrule to the edge while rotating the connector 360 degrees. If the Luminex cleaning cloth is not available, a lint free cleanroom optic wipe can be used. The Luminex cleaning cloth is washable and can be used multiple times. The optic wipes are single use and disposable.
8	Inspect the connector for cleanliness. If necessary, repeat the cleaning process.

Connector Inspection

After cleaning the connector, inspect the ferrule endface to ensure that it is free from significant particulate contamination using an optical fiber inspection scope of at least 200X magnification. When using an optical fiber scope (for example, the Noyes OFS 300-200X) exercise extreme caution to assure fiber being examined is de-energized.

Cleaning/Inspecting Optical Connectors (Continued)

Connector Inspection (continued)

⚠ **WARNING:**
Use an optical power meter to verify the connector and fiber to be cleaned has been de-energized/deactivated before viewing.

Step	Action
1	Follow the instructions in the manual provided with the Optical Fiber Scope to view the ferrule endface of the fiber under inspection.
2	The visual area of the ferrule endface (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminants (see Figure C-1 on page C-11). **Requirement**: No fixed type of contamination (contaminants which after 3 wet-dry cleaning operations remain at the same location on the connector endface), regardless of size, is allowed in the restricted area of the glass fiber endface as determined after 3 successive wet-dry cleaning attempts. The restricted area is defined as ~66 micron (um) diameter for both single-mode and multimode fibers. Chips, cracks, and scratches are not allowed near the core of the glass fiber endface. No large floating (loose) contaminants are allowed on the glass fiber and ceramic ferrule endface. If after 3 successive wet-dry cleaning attempts, particulate that is less than 8 um in size remains *fixed* on the ceramic ferrule endface and *outside* the defined restricted area on the fiber glass endface, it will be acceptable.

Cleaning/Inspecting Optical Connectors (Continued)

Connector Inspection (continued)

Figure C-1.   Acceptability Criteria: Single-Mode and Multimode Fibers

Restricted Area
1/2 SM (Single Mode) Core + 1/2 Fiber Diameters - 66 µm dia.
No Loose or No Fixed Contamination

No LOOSE contamination or particulate fibers in viewing area. If not removable in 3 cleaning attempts, it is defined as fixed particulate, and is acceptable outside the restricted area.

Monitor Viewing Area

core

fiber

66um

No particulate contamination equal to or greater than the size of the core (8.0 microns) is allowed anywhere on the fiber or ferrule end face.

Step	Action
3	After the connector has been verified to be cleaned, it should be immediately inserted into the adapter buildout of the optical component. This will assure maximum cleanliness and effectiveness of the connector.
4	If the cleaned connector can not be "connectorized" with a corresponding adapter, the connector ferrule must be protected with a connector dust cap. Before placing the cap on the ferrule, make sure the cap is clean. This can be accomplished by inserting a CLETOP stick cleaner (swab) of the same inside diameter as the cap (either 2.5 or 1.25 mm) and rotate the stick 360 degrees three (3) times. Following this procedure, carefully place the cap over the ferrule. When the cleaned connector is ready for assembly, it should be re-inspected for cleanliness prior to connectorization.

Cleaning/Inspecting Optical
Connectors (Continued)

**Optical Fiber
Adapters and
Circuit Pack
Connectors**

During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter and the circuit pack connector.

⇒ **NOTE:**
  Do not attempt to clean ports equipped with yellow lightguide buildout (LBO) attenuators. Attenuators contain a thin glass lens that is extremely fragile and would be damaged by cleaning by a mechanical means. Discard any contaminated LBOs.

The following procedure is recommended.

Step	Action
1	Using the appropriate CLETOP stick cleaner (2.5 mm for SC, ST, and FC connectors, 1.25 mm for LC connectors) dampen the stick cleaner with Ethyl alcohol using the alcohol wipe. Insert the stick cleaner into the adapter rotating the stick 360 degrees while inserting. Push/rotate stick until the stick cleaner makes contact with the ferrule end face. Apply slight pressure upon contact and rotate stick 360 degrees at least three (3) times.
2	Remove the stick cleaner rotating it upon removal.
3	Using a dry CLETOP stick cleaner of appropriate diameter, repeat the above cleaning procedure. This procedure will clean the sidewalls of the adapter and the endface of the circuit pack connector.

CMC Dantel Alarm and Control Block Installation, Extended Miscellaneous Discretes

D

Contents

Overview

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
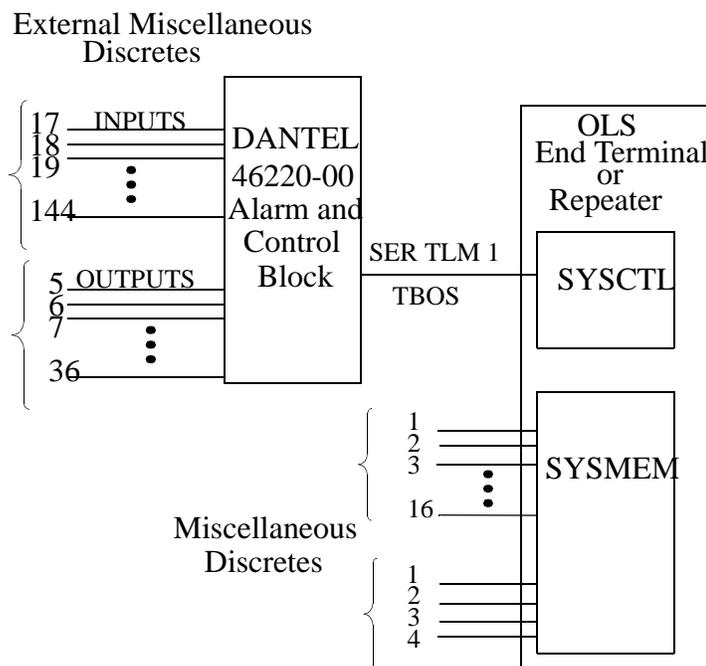
Overview (Continued)

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	ED-7G028-22	

Tools and Equipment Required

The following tools are required:

- Phillips Screwdriver
- Small Standard Screwdriver
- 11/32-Inch Wrench

The following equipment is required:

- Alarm Control Box
- 23" Mounting Bar
- Standard WECO Distribution Frame
- ED-7G028-22 Cable

Installation Procedure

Description   A detailed installation procedure is provided in the DANTEL Installation &
Operation Manual provided with the 46220-00 Alarm and Control Block. The
following procedure is provided to facilitate its use with Lucent's Release 2.0 & 2.1
Optical Line System.

Assembly

Step	Action
1	Attach the Alarm and Control Block to the Mounting Bar.
2	Attach the mounting bar to the distribution frame. The mounting bar is rear-mounted to the distribution frame.
3	Run the ED-7G028-22 cable from the SER TLM1 port of the OLS to the Alarm Control Block.
4	The SER TLM1 Cable needs to be wired to the Alarm Control Block.

Installation Procedure (Continued)

Wiring

Step	Action
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-6.

Figure D-2.   Opening the Dantel Alarm Block

PLACE THUMB
HERE

Installation Procedure (Continued)

Wiring (continued)   **Figure D-3.   Pulling Down the Power Supply and CPU**
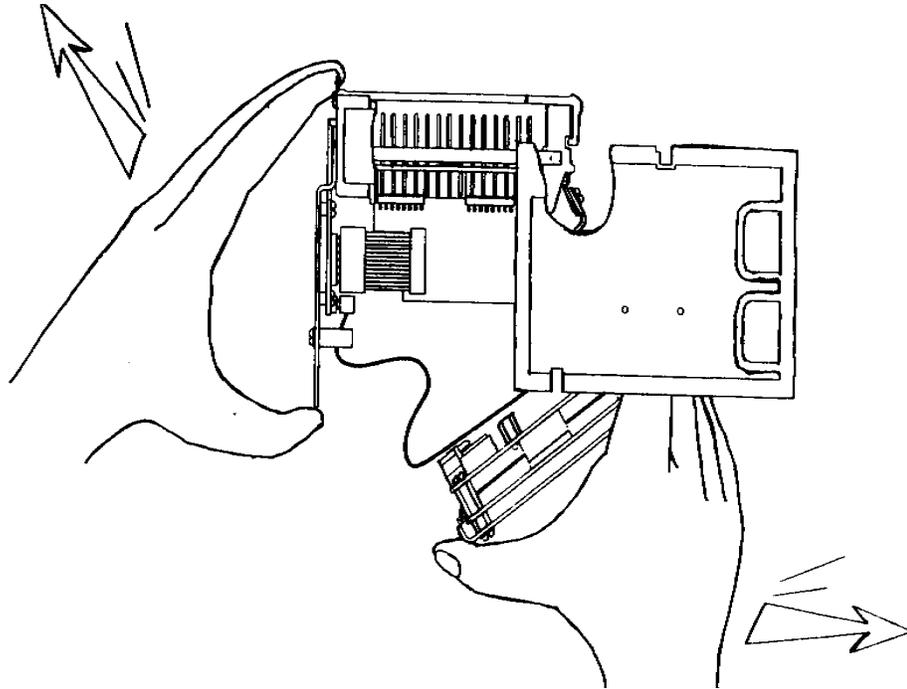
Step	Action
2	Pull the Power Supply board and CPU board down. Refer to Figure D-3 on page D-6.
3	On the power supply board, wire negative battery (–21 to –56 VDC) to connector TB1 (Refer to Figure D-4 on page D-7).

Installation Procedure (Continued)

Wiring (continued) **Figure D-4. Power Supply Board Component Location**

Step	Action
4	Wire the alarm inputs (refer to Figure D-5 on page D-8). 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-7). Pin 1 will begin with Input Point 17 (See Figure D-5 on page D-8). Table D-2 on page D-8 lists 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-8) need to be wire-wrapped to pins 32 E-H on the Alarm and Control Block (See Figure D-5 on page D-8). CABLE 1 CABLE 2 1. TBASTXP (W) to 32-E 3. TBASRXP (W) to 32-G 2. TBASTXN (BL) to 32-F 4. TBASRXN (O) to 32-H

(Continued on next page)

Installation Procedure (Continued)

Wiring (continued)   **Figure D-5.   Dantel Wire Wrap Pin Designations**
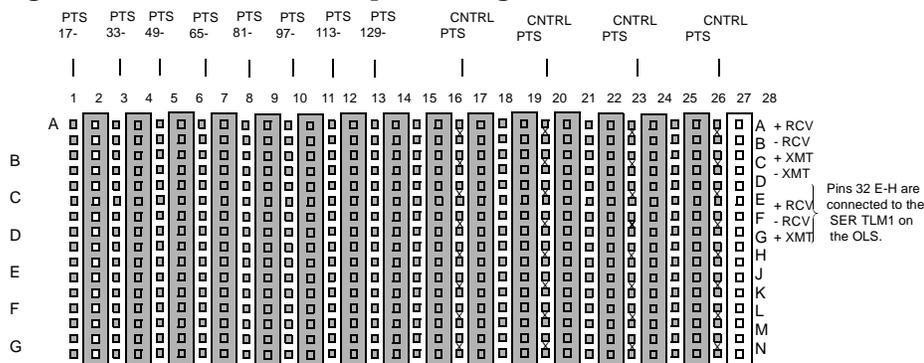
Table D-2.   SER TLM 1 Cable Connections and Designations

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-8 for location.

Installation Procedure (Continued)

Wiring (continued)   **Figure D-6.   OLS Interconnection Panel (SER TLM1 at Arrow)**
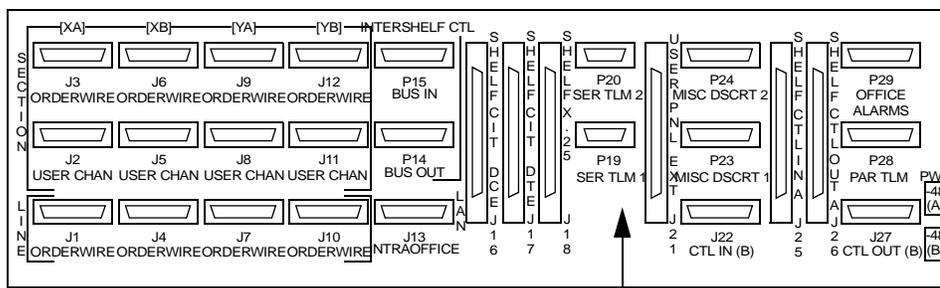
Switch and Strap Settings

On the Dantel Alarm and Control Block there are three (3) switches (S1-S3) located on the Power Supply Board (see Figure D-4 on page D-7). 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_Enviroment_

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-RETREIVE-LOG and FAULT-RETREIVE-ALARMS reports.

Provisioning Extended Miscellaneous Discretes

Extended Miscellaneous Discrete Assignments Used to Monitor the Optical Translator

When used to monitor the Optical Translator (OT), Miscellaneous Discrete Point 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

Provisioning Extended Miscellaneous Discretes (Continued)

Extended Miscellaneous Discrete Assignments Used to Monitor the Optical Translator (continued)

Table D-4.   Miscellaneous Discrete Assignments — Monitoring OT

Point No.	Description	Point No.	Description	Point No.	Description
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

E

Contents

Overview

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
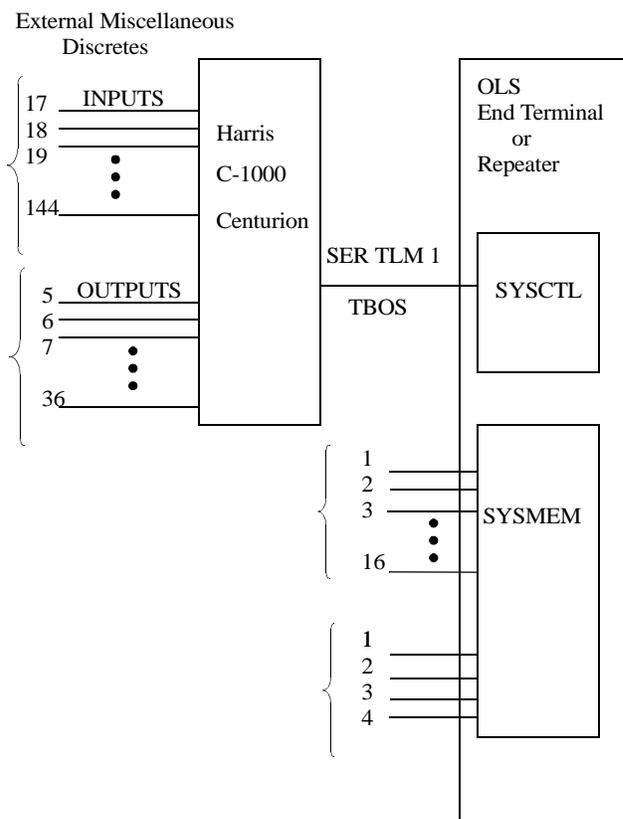
Overview (Continued)

Ordering Information

Table E-1.   Ordering Information

Description	Order Number	Comcode Number
C-1000 Centurion	594-T043	407567932
Rear Access Wire Wrap Connector	620-T030	407532217
SER TLM1 Cable	ED-7G028-22	

Tools and Equipment Required

The following tools are required:

- Phillips Screwdriver
- Small Standard Screwdriver
- 11/32-Inch Wrench

The following equipment is required:

- C-1000 Centurion
- Mounting Brackets
- Standard WECO Distribution Frame
- ED-7C028-22 Cable

OT Connections to the Harris Centurion EDMU

Description   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 10 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.

Figure E-2.   Miscellaneous Discrete Power Filter Connections

Misc. Discrete
Power Fail Connector

−48 Volt Terminal

−48 Volt Terminal

Misc. Discrete
Power Fail
Connector

A Power Filter   B Power Filter
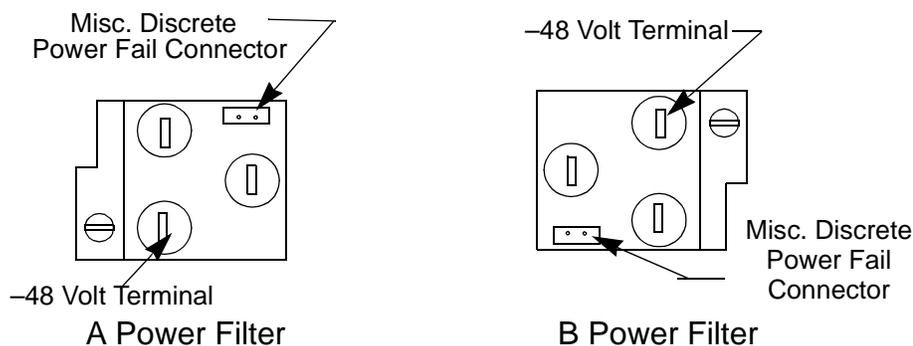
Figure E-3.   Required Length for Misc. Discrete Power Fail Cables

Power Filter

**Misc. Discrete
Power Fail Cable**

10 in.
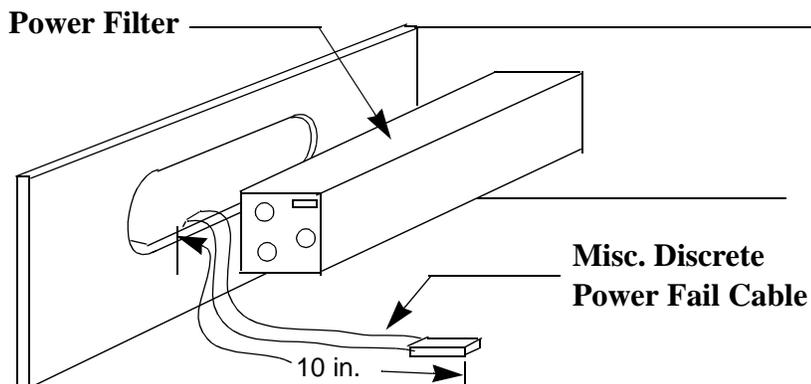
(Continued on next page)

OT Connections to the Harris Centurion EDMU (Continued)

Description (continued)

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 Miscellaneous Discrete Cable Wiring/OT to Harris EMDU

OLS ALM 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 & J!-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)

OT Connections to the Harris Centurion EDMU(Continued)

Description (continued)

Table E-2. OT Miscellaneous Discrete Cable Wiring/OT to Harris EMDU (continued)

OLS ALM No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg.)	WIRE COLORS	OT CABLE PIN Numbers
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)
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)

OT Connections to the Harris Centurion EDMU (Continued)

Description (continued)

Table E-2.   OT Miscellaneous Discrete Cable Wiring/OT to Harris EMDU (continued)

OLS ALM No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg.)	WIRE COLORS	OT CABLE PIN Numbers
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)

OT Connections to the Harris Centurion EDMU (Continued)

Description (continued)

Table E-2.   OT Miscellaneous Discrete Cable Wiring/OT to Harris EMDU (continued)

OLS ALM No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg.)	WIRE COLORS	OT CABLE PIN Numbers
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)
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)

OT Connections to the Harris Centurion EDMU (Continued)

Description (continued)

Table E-2.   OT Miscellaneous Discrete Cable Wiring/OT to Harris EMDU (continued)

OLS ALM No.	OTU ALRM NAME	CABLE CONN/ SHELF	HARRIS ALARM NO. (Pin Desg.)	WIRE COLORS	OT CABLE PIN Numbers
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

Description   A complete and detailed installation procedure is provided in the Harris C1000
User Guide provided with the Centurion C-1000. The following procedure is
provided to facilitate its use with Lucent's Release 2.0 and subsequent releases of
Optical Line System.

Assembly

Step	Action
1	Attach the Mounting Brackets to the Harris C-1000 Centurion.The Mounting Brackets are then front mounted to the distribution frame.
2	Run the ED-7G028-22 cable from the SER TLM1 port of the 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

Step	Action
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).

Installation Procedure

Switch Settings

Step	Action
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: ■ S1-1 to S1-8 OFF (down) ■ S1-9 to S1-10 ON (up) ■ 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.

Provisioning Extended Miscellaneous Discretes (Continued)

Extended Miscellaneous Discrete Assignments (continued)

■ 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-RETREIVE-LOG and FAULT-RETREIVE-ALARMS reports.

Extended Miscellaneous Discrete Assignments Used to Monitor the Optical Translator

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

Provisioning Extended Miscellaneous Discretes (Continued)

Extended Miscellaneous Discrete Assignments Used to Monitor the Optical Translator (continued)

Table E-3.   Miscellaneous Discrete Assignments — Monitoring OT (continued)

Point No.	Description	Point No.	Description	Point No.	Description
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

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Contents

Overview

Description The information in this chapter has been removed due to the constantly changing PC setup information for different PC software platforms. For the procedures to setup a PC using Windows 95/98, refer to the Release 7.0 Software Release Description C109074484.

Related Equipment

G

Contents

Overview

Dantel Orderwire   OLS fully supports 64-kb/s orderwire use. Line and Selection Orderwire channels (E2 and E1 bytes) are supported by the 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 form 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 on page G-5 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.

Remove 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 mode[1] so that the Dantel channel 1 is the operational channel and channels 1 and 2 (East and West directions) are not bridged. The SONET section orderwire (E1 byte) is not automatically protected from fiber cuts or other transmission failures so a transmission failure somewhere in the ring can cut off the orderwire service to some nodes. For most single failures in a ring, orderwire access to nodes that have been cut off by the failure can be accessed by simply swapping the East and West orderwire connectors.

For voice application, the system operates as a standard orderwire when you pick up the handset on the front of the orderwire panel and call someone at a remote terminal (station 1 code). The voice circuit uses channel 1 of the system.

For data circuit applications, dial a different number (station 2 code) to call the same remote terminal to set up a data communications path.

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1. The switch and strap settings for terminal mode will be described in the final version of the Dantel practice.

Overview (Continued)

**Dantel Orderwire
(continued)**

The data circuit works as follows:

1. Select channel 1 on the 41096 orderwire panel, then pick up the handset and call the remote terminal (station 2 code).

   At the remote end, the 00330 orderwire 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 (OC) circuit disables the side tone in the 00330 orderwire 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 pushbutton. The channel 2 button can be released or left pushed in since it is used for both voice and data communications.

Recommended Orderwire System

Description   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

Description

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 G-1. Orderwire for Voice Communication
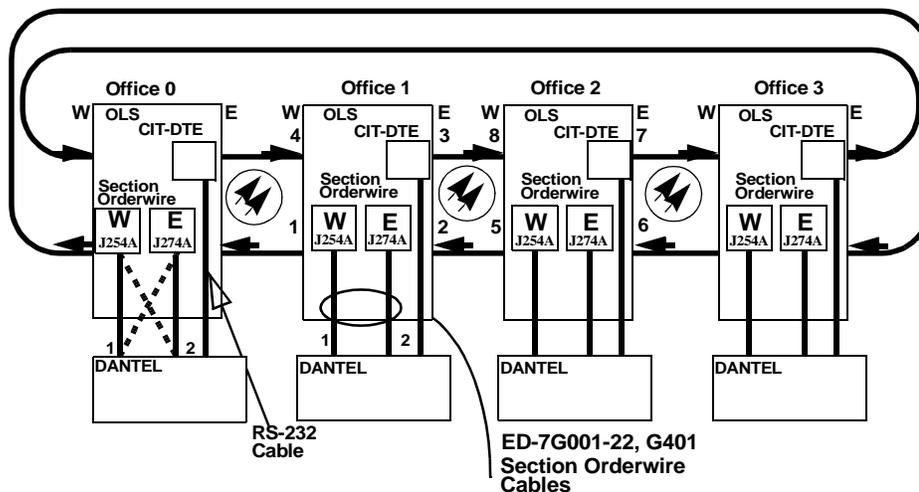
Orderwire Shelf Mounting and Powering (Continued)

Description (continued)

Figure G-2.   Orderwire for Voice and Data Communications

Note: The Dantel Shelf at the breakpoint (DSNE Office 0) is configured in Terminal mode.
All other Dantel Shelves are in Repeater mode.

Dantel Options Setting

Description The shelf consists of several Plug-in Modules. Switch and strap settings compatible with FT-2000 use are given in Table G-1 on page G-7 and Table G-2 on page G-9 for each module.
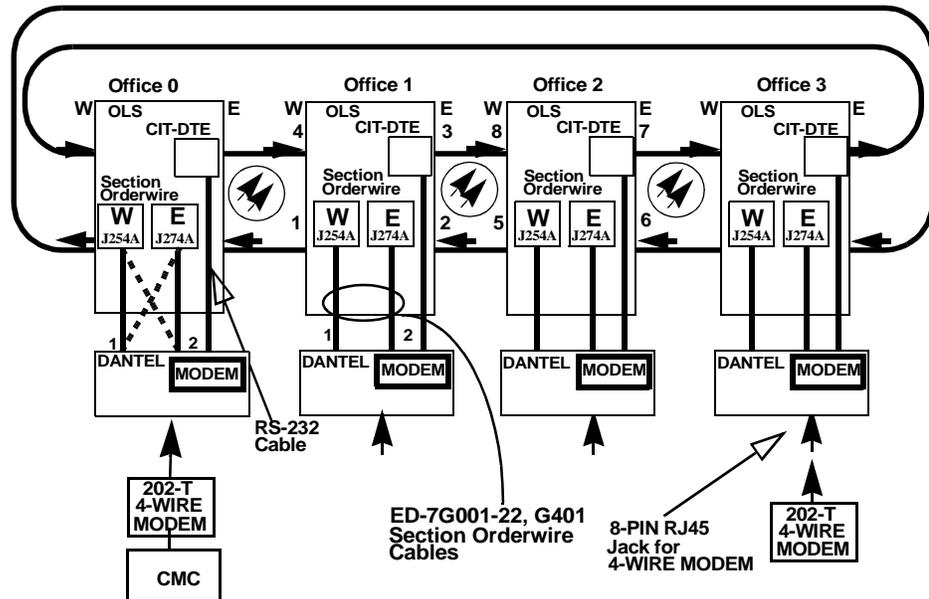
Table G-1.   Dantel Orderwire Options Settings for Voice Communications

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.

Dantel Options Setting (Continued)

Description (continued)

Table G-1.   Dantel Orderwire Options Settings for Voice Communication (continued)

Module	Settings
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.

Dantel Options Setting (Continued)

**Description
(continued)**

**Table G-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 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.

Dantel Options Setting (Continued)

**Description
(continued)**

**Table G-2.   Dantel Orderwire Options Settings for Voice and Data
Communications (continued)**

Module	Settings

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

Description

Basic cable information is given in Chapter 6, "Wired Cable Installation" of this manual. This appendix provides information about connections at the Dantel Orderwire shelf.

Table G-3 gives Channel 1 wire connection information.

Table G-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 G-4.   Channel 2 Dantel Orderwire Connections (For Reference Only)

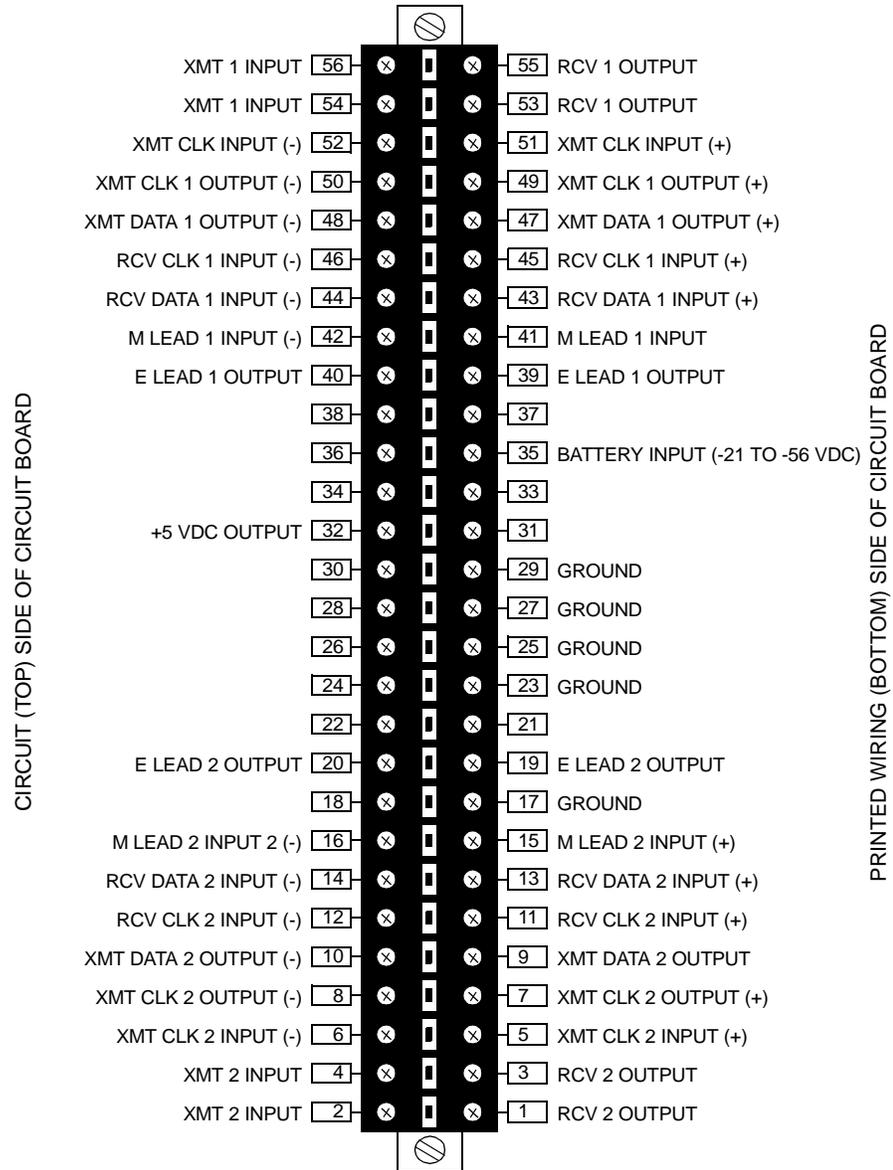| Wire Color	BL-W	W-BL	G-W	W-G	BL-R	R-BL	BR-W	W-BR
ED-7G028-22, G401	1	9	3	11	6	14	4	12
Dantel 46105 Connector End	6	5	10	9	12	11	14	13

Figure G-3 on page G-12 diagrams the Dantel connector.

Cabling to OLS (Continued)

**Description
(continued)**

Figure G-3.   View of 46105 Edge Connector From Backplane

XMT 1 INPUT `56` — RCV 1 OUTPUT `55`
XMT 1 INPUT `54` — RCV 1 OUTPUT `53`
XMT CLK INPUT (-) `52` — XMT CLK INPUT (+) `51`
XMT CLK 1 OUTPUT (-) `50` — XMT CLK 1 OUTPUT (+) `49`
XMT DATA 1 OUTPUT (-) `48` — XMT DATA 1 OUTPUT (+) `47`
RCV CLK 1 INPUT (-) `46` — RCV CLK 1 INPUT (+) `45`
RCV DATA 1 INPUT (-) `44` — RCV DATA 1 INPUT (+) `43`
M LEAD 1 INPUT (-) `42` — M LEAD 1 INPUT `41`
E LEAD 1 OUTPUT `40` — E LEAD 1 OUTPUT `39`
`38` — `37`
`36` — BATTERY INPUT (-21 TO -56 VDC) `35`
`34` — `33`
+5 VDC OUTPUT `32` — `31`
`30` — GROUND `29`
`28` — GROUND `27`
`26` — GROUND `25`
`24` — GROUND `23`
`22` — `21`
E LEAD 2 OUTPUT `20` — E LEAD 2 OUTPUT `19`
`18` — GROUND `17`
M LEAD 2 INPUT 2 (-) `16` — M LEAD 2 INPUT (+) `15`
RCV DATA 2 INPUT (-) `14` — RCV DATA 2 INPUT (+) `13`
RCV CLK 2 INPUT (-) `12` — RCV CLK 2 INPUT (+) `11`
XMT DATA 2 OUTPUT (-) `10` — XMT DATA 2 OUTPUT `9`
XMT CLK 2 OUTPUT (-) `8` — XMT CLK 2 OUTPUT (+) `7`
XMT CLK 2 INPUT (-) `6` — XMT CLK 2 INPUT (+) `5`
XMT 2 INPUT `4` — RCV 2 OUTPUT `3`
XMT 2 INPUT `2` — RCV 2 OUTPUT `1`

CIRCUIT (TOP) SIDE OF CIRCUIT BOARD

PRINTED WIRING (BOTTOM) SIDE OF CIRCUIT BOARD

Optical Protection Switch (OPS)

H

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Overview

Description
The Optical Protection Switch (OPS) is a specialized application of WaveStar™ OLS 40G and is the primary feature added for Release 3.1. This feature is not supported in Release 7, and therefore, this section has been removed. If information regarding OPS is required, refer to the latest issues of Installation Manual 365-575-344 or 365-575-364.

Line Buildout (LBO)

I

Contents

Overview

Description   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 single-mode 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

Description

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 I-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) Multimode (MM) to Multimode (MM)
Power	Tested to 20 dBm
Internal Element	None
Attenuation (dB)	Zero dB[1]
Attenuation Tolerance	NA
Operating Temperature	−40°C to +75°C
Wavelength	1310 nm and 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
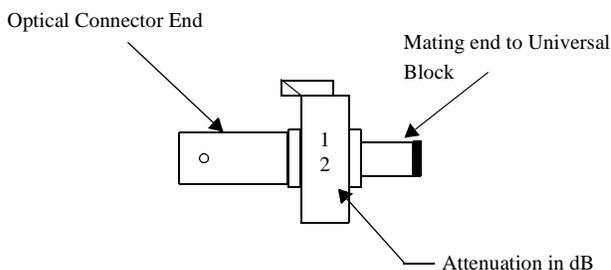
Broadband Single-Mode Attenuators — Yellow LBOs

Description   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 equipment. Table I-2 lists the specifications for this type of LBO.

Table I-2.   Broadband Attenuators Specification

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 dB 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 and 1550 nm

1550-nm Single-Mode Attenuators — Green LBOs

Description

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 Multimode inputs will negate the value of the attenuator.** A single-mode to multimode transition attenuator (Gray in color) must be used (refer to Table I-4 on page I-6).

Table I-3 lists the specifications for this type of LBO.

Table I-3. 1550-nm Single-Mode Attenuators Specifications

1550-nm 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, and 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: +/–0.3 dB] [16 dB: +/-0.5 dB] [18 to 20 dB: +/-1 dB]
Operating Temperature	−40°C to +75°C
Wavelength of Ratings	1550 nm

1550-nm Single-Mode to Multimode Attenuators — Color: Gray

Description   This family of LBOs was designed to attenuate the input signal levels to the OTPM for WaveStar OLS 40G applications. The OTPMs utilize a single-mode fiber at the transmitter output but receive using a multimode fiber. To attenuate the transmitter output, a Single-Mode to Single-Mode LBO (Green or Yellow) must be used. **To attenuate the OTPM receiver input a Single-Mode to Multimode LBO (Gray) must be used.** 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 Multimode Attenuator

1550-nm Single-Mode to Multimode Attenuator — Color: Gray	
Connector Types	ST and FC
Connection Type	Single Mode (SM) to Multimode (MM)
Power	5 dB Max. for all values of attenuation
Internal Element	Carbon-Loaded element for all values of attenuation
Attenuation Values (dB)	5, 7, 10, 12, 15, 17, 20 dB
Attenuation Tolerance	+/–2 dB for all values of attenuation
Operating Temperature	–40°C to +75°C
Wavelength of Ratings	1550 nm