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Lucent Technologies
Bell Labs Innovations

FT-2000 OC-48 Lightwave System

Add/Drop-Rings

Installation Manual

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About this Document

Purpose

This manual provides instructions for installation of the FT-2000 OC-48 Add/Drop-Rings Terminal and FT-2000 OC-48 Lightwave Repeater Bay. This manual is not a service manual. Refer to the *FT-2000 OC-48 Lightwave System User/Service Manual* for any activity involving circuit turn-up, regular maintenance, or trouble analysis. Refer to 365-575-102 issue 7.2 for all Releases 1 through 7.2. Refer to 365-575-103 issue 9.1 for Releases 8.0 and Later. Refer to document 824-102-148, *2000 Family of Products Operations Systems Engineering Guide* for any activity using TBOS or X.25 (using TL-1) operations.

The intent of this manual is to provide installation information pertaining to the J68974D-1 FT-2000 Dual Add/Drop Rings Terminal and J68974R-1 L1 FT-2000 OC-48 Lightwave Repeater Bay only. Activities such as DCC upgrades for J68974E-1 L3 or L4 Bays or in-service or out-of-service upgrades of J68974A-1, J68974E-1 L1 or L4 Bays or in-service or out-of-service merging of FT-2000 rings should be based on information in the Modification Implementation Procedures given under the Related Documents heading of Section 1, Overall Installation and Test Considerations. Provisioning the ring for transmission after installation should be based on information in document 365-575-102 and 365-575-103 *FT-2000 Lightwave System User/Service Manual*.

Intended Audience

This installation manual is for personnel who will install FT-2000 Add/Drop-Rings Terminal and Repeater equipment. It emphasizes available software release practices and procedures.

Reason for Reissue

This document, Issue 9.1, replaces document 365-575-115 *FT-2000 OC-48 Lightwave System,* Issue 9.0. This document was reissued primarily to provide installation information on new features found in Release 9.1-ADR Software.

There is new hardware involved in this release. This new hardware consists of a new OC-48 circuit packs, 739H1-H16.

More detailed information on the specific features in Releases 9.1 may be found in the document 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual,* Issue 9.1 and in 365-575-100 *FT-2000 OC-48 Lightwave System* Applications, Planning, and Ordering Guide, Issue 9.1.

It is very important to be thoroughly familiar with the information contained in the Software Release Description associated with the version of software being installed. The Software Release Description contains information pertaining to any known problems that may be associated with the release, and compatibility of circuit packs.

How to Use this Manual

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.

The Chapters in this document provide the following information:

- "About this Document" describes the purpose, intended audience, and organization of this document. Ordering information and procedures to comment on this document are included.
- Section 1, “Overall Installation and Test Considerations”, provides a list of required tools and test equipment for FT-2000 Add/Drop-Rings equipment installation and testing, gives a description of requirements for the Personal Computer to be used as the Craft Interface Terminal (CIT), presents safety information, and gives a list of other related documentation. Training, security, and technical support information is also presented as well as information about product change notifications (PCN’s).
- Section 2, "Platform Descriptions", introduces the FT-2000 OC-48 Lightwave System platforms and describes the FT-2000 OC-48 Add/Drop-Rings Terminal. The FT-2000 OC-48 Repeater Bay is also described.
- Section 3, “CIT Description”, describes the Craft Interface Terminal (CIT). Set up of the PC for use with FT-2000 is described. FT-2000 Login procedure is described. CIT command codes and provisioning descriptions are included.

- Section 4, "Equipment Installation", describes how to uncrate and erect FT-2000 equipment.
- Section 5, “Cable Installation - ADR Terminal”, provides information about cables related to FT-2000 OC-48 Add/Drop-Rings Terminal and describes how to install the cables.
- Section 6, “Powering, Circuit Pack Installation and Start-up - ADR Terminal”, provides procedures for verifying bay ground, powering the bay, and installing circuit packs in the bay. The procedure for installing software and logging into the FT-2000 OC-48 Add/Drop-Rings Terminal is also provided.
- Section 7, “Local Installation Testing - ADR Terminal”, describes how to perform FT-2000 OC-48 Add/Drop-Rings Terminal Auto Turnup Local and DSX tests. These tests are self tests available in the Network Element Software. Tests of cross connect cabling and Operations Systems interfaces are also described.
- Section 8, “Required Provisioning - ADR Terminal”, describes how to provision required information in each Add/Drop - Rings Terminal network element so that the Ring Incomplete/Open alarm will clear when all fiber connections are correctly made.
- Section 9, “Cable Installation - Repeater Bay”, provides information about cables related to FT-2000 Repeater Bays and describes how to install the cables.
- Section 10, “Powering, Circuit Pack Installation NE Start-up - Repeater Bay”, provides procedures for verifying bay ground, powering the bay, and installing circuit packs in the bay. The procedure for installing software and logging into the FT-2000 Repeater Bays is also provided.
- Section 11, “Local Installation Testing - Repeater Bay”, describes how to perform FT-2000 OC-48 Repeater Bay Auto Turnup Local tests. This test is a self test available in the Network Element Software. Tests of Operations Systems interfaces are also described.
- Section 12, “Required Provisioning - Repeater Bay”, describes how to provision required information in each Repeater Bay network element so that the Ring Incomplete/Open alarm will clear when all fiber connections are correctly made.
- Section 13, “Fiber Connection”, describes how to select Optical Line Buildouts and set up the FT-2000 OC-48 Add/Drop Ring for installation tests.
- Section 14, “Ring Installation Testing”, describes how to perform ring installation and transmission tests.
- Section 15, “Network Element Provisioning”, describes how to retrieve, enter and delete cross-connections, establish timing, OC-3 provisioning, and OC-12 provisioning.
- Section 16, “Installation Troubleshooting“, provides guidelines for troubleshooting an out-of-service system.

- Appendix A, “Related Equipment”, provides information on connecting Dantel equipment.
- Appendix B, “065-215-250-500/800 Series Installation Guide Seismic Network Bay Frame”, provides information on installing a seismic bay, and raised floor application information.
- Appendix C “DACS III-2000 Testing”, provides information on local transmission testing for the DACSIII-2000.
- Appendix D “Software Installation”, provides detailed information on installing the Software into a new FT-2000 terminal.
- Appendix E “LBA and WDM Installation Information”, provides information to establish connectivity between LBA and WDM equipment in an FT-2000 OC-48 Ring.
- Appendix F “J68974D-1 Dual Add/Drop-Rings Terminal Installation Information”, provides information for installing the Dual Add/Drop-Rings Terminal.

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How to Comment on This Document

This manual was developed by the FT-2000 Customer Technical Support (CTS). The CTS organization 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 508-960-1665.

If the feedback form is missing, fax your comments on this document to 508-960-1665.

Electronic Documentation

Documentation for the FT-2000 OC-48 Lightwave System is now available in electronic form, on compact disk read-only memory (CD-ROM). CD-ROM has many advantages over traditional paper documentation, including cost savings, search and retrieve capability, and the assurance of the most current documentation.

CD-ROM is available by annual subscription (on standing order).

- To order, call your Technical Information Resource Manager, your Lucent Technologies Account Executive, or the Lucent Technologies Customer Information Center (1-888-582-3688). The CD-ROM Product Line Order Number for the Lucent Technologies transmission product documentation is document 300-100-010.
- For pricing information, contact your Lucent Technologies Account Executive or the Lucent Technologies Customer Information Center (1-888-582-3688).
- For technical information, call Lucent Technologies Documentation Support (1-800-334-0404).

Product Change Notifications

During the life of a product, changes may be required in service to correct an existing or potential problem. Product changes are issued in the form of product change notices (PCNs). Customers are notified about PCN's through the Design Change Management System (DCMS). The DCMS is an on-line tool similar to CTS-CARES. For more information about DCMS, contact your local Account Executive.

Overall Installation and Test Considerations

1

Contents

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Overall Installation and Test Considerations

1

Overview

This Chapter presents a list of required tools and test equipment for the installation of FT-2000 OC-48 Add/Drop Rings Terminal and Repeater Bays, requirements of the Personal Computer to be used as a Craft Interface Terminal, and safety instructions including: lightwave safety and ESD considerations. Also included are a list of related documentation for FT-2000 equipment, information on available FT-2000 training, CIT security features, and Technical Support functions.

Required Tools and Test Equipment

Table 1-1 lists the tools, test sets, and accessories required for installation of FT-2000 OC-48 Lightwave System Add/Drop-Rings and Repeater Equipment.

.

Table 1-1 Required Tools and Test Equipment

Description	Commercial or COMCODE	LUCENT Installers Only	Notes
Multimeter	Fluke 8060A	ITE #5632 or ITE #6379A	For measuring 40-60 V DC
Flathead Screwdriver or dime			For removing front covers
Anti-oxidation Material	NO-OX-ID "A" Compound	NO-OX-ID "A" Compound	For use only if bay has been scraped to make ground connection
ESD wrist strap	900486994	R TOOL #4987B	For ESD protection
Fiber jumpers (minimum of 2 jumpers needed) - ST connectors - SC connectors - FC/PC connectors - 4C -15 dB Test Cable - 93AK8573 -35 dB Test Cable	 105357727 see APOG (Chapter 7, Ordering) 107089955 847265451	 105357727 see APOG (Chapter 7, Ordering) 107089955 847265451	For optical local loopback tests. (Minimum 2 ft. length) For Auto-Turnup tests with LBA.
Optical LBOs - 15 dB ST - 20 dB ST - 15 dB SC - 20 dB SC - 15 dB FC/PC - 20 dB FC/PC	 106795388 106795396 106708985 106708993 106795438 106795446	 106795388 106795396 106708985 106708993 106795438 106795446	For Auto-Turnup tests -15dB or -20dB is required (qty 2).
Low speed loopback cables (75 ohm coaxial patchcords)			For DSX loopbacks, 9 required, up to 48 useful.
Microduster air (clean) (12 cans/case)	900709361	R TOOL #5341-001	For fiber cleaning
Microduster nozzle assembly	900709338	R TOOL #5341	
Absorbond cleaner (300 wipes/pkg.)	900709379	RAMAC #1623413	

Table 1-1 Required Tools and Test Equipment

Description	Commercial or COMCODE	LUCENT Installers Only	Notes
DS3, STS1E and OC3/12 transmitter and receiver test set(s)	Tektronix Model ST112 (or equivalent)	ITE #6384 *	For Fiber Connection and Ring Installation Testing
Optical power meter with appropriate (ST, SC, FC/PC and/or Biconic adapters)	HP8140A equipped with HP81401A	ITE #6550	For optical power measurements
Null modem, per Figure 7-3 or Figure 11-1.	Black Box Corp. ME200		For testing CIT DTE modem port
Installation Kit	847020799		Flex-tubing. Spare fuses, and miscellaneous parts, provided with bay.
BNC bulkhead jack-440 connector adapters (minimum of 2)	(TROMPETER ADMW12) 405383050	ITE #6222A	For field testing field-terminated BNC-type connector and field-spliced 219P connectors
Pin Repair Kit (optional, as required)		INST ORD #62228763	For replacing any damaged pins, if needed KS22876 L-2
Shorting Contact Repair tool (optional, as required)	Berg 1023A Repair tool Part 413506002		
Personal Computer (laptop)	See "Personal Computer for Use as Craft Interface Terminal"	ITE #6795 LIST 2 or ITE #6938	For use as CIT on DCE port
Straight through 25 pin RS-232 cable.	Black Box Corp. RM-BC00301 OR RM-BC00401		For providing the connection between the PC and FT-2000
BNC Termination Tool	Page SMR-25/E,20/E with TW-15 (solder only) ED8C739-50 ** (crimp only)	TK-604 (solder and crimp)	Used to terminate BNC connectors onto various coaxial cable types.
Low Profile Dolly Truck		TS-586	4 wheels and wrench for rolling bay into place.

Table 1-1 Required Tools and Test Equipment

Description	Commercial or COMCODE	LUCENT Installers Only	Notes
* Note for DS3, STS1E and OC3/12 refer to Chapters 13 or 14 depending upon the application use the ITE #6909. ** Group 1 - complete tool kit, group 2 - all tools except outer crimper frame and associated dies, group 3 - only center pin crimp			

Installation Scope of Work

Table 1-2 lists the standard installation requirements for FT-2000 OC-48 Add/ Drop-Rings Terminal Equipment.

Table 1-2. Installation Requirements

Scope	Procedure	Chapters	Details
Standard Installation E, F & I	Equipment Installation	Chapter 4, Appendix B	Mount, Drill, Erect and Ground Bay
	Low Speed Cable Installation	Chapter 5	Low Speed Interface Cable to DSX-3 Cross-Connection
	Cable Installation	Chapter 5 & 9	Office Alarms, Serial Telemetry, X.25, CIT DCE, Input and Output Timing
	High and Low Speed Fiber Installation	Chapter 5 & 9	from the LGX to the FT-2000
	Powering, Software Installation Circuit Pack Installation	Chapter 6, 10 & Appendix D	Setup, Install CIT and NE Software
	Local Installation Testing	Chapter 7 & 11	LED, Auto Turnup, Cable, Operational
	Required Provisioning - ADR Terminal	Chapter 8	Required provisioning
	Required Provisioning - Repeater Bay	Chapter12	Required provisioning
	LBA & WDM Information	Appendix E	Establish connectivity between LBA & WDM equipment within an FT-2000 Ring.
"Turnkey" Extension of duties	Fiber Connection	Chapter 13	Establish connections, select LBOs.
	Ring Installation Testing	Chapter 14	Monitor a signal for 8-24 hours after a ring has been established
	Network Element provisioning	Chapter 15	Establish cross-connections, timing modes, and OC-3/12 protection.
	Installation Troubleshooting	Chapter 16	Basic Installation Troubleshooting.

Personal Computer for Use as Craft Interface Terminal

The craft interface terminal (CIT) for FT-2000 is a personal computer (PC). A PC and the FT-2000 Software distribution diskettes will be necessary to install FT-2000 software. Document 365-575-102 and 365-575-103, *FT-2000 OC-48*

Lightwave System User/Service Manual lists suggested PC's that are suitable for use as a CIT. The PC must meet certain requirements to ensure proper interaction with the FT-2000 terminal. The minimum requirements are as follows:

- 386SX *IBM** - compatible desktop or laptop PC
- Disk drive - one 1.44 Megabyte (3.5 inch)
- Hard disk with approximately 10 Megabytes of free space
- 4 Megabytes RAM**
- *MS-DOS*† operating system version 5.0 or higher.
- Serial port (EIA-232-D): configured as COM1 or COM2
- Parallel Port: Configured as LPT1
- VGA color monitor.

* Registered Trademark of International Business Machines Corporation

** No memory resident programs running in the background. 585 Kilobytes of free conventional memory are required. If less than 585 Kilobytes of free conventional memory are available, a program manager (for example HIMEM.SYS with *MS-DOS* 5.0 and later) is required to increase the free conventional memory.

† Registered Trademark of Microsoft Corporation

Safety Instructions

Admonishments

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

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

These admonishments are noted by an alert symbol .

IMPORTANT SAFETY INSTRUCTIONS

READ AND UNDERSTAND ALL INSTRUCTIONS.

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

(1) Follow all warnings and instructions marked on the product.

(2) Slots and openings in this product at the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.

(3) Opening or removing rear covers or sheet-metal parts may present exposure to high current or electrical energy levels, or to other risks.

(4) Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.

(5) Refer servicing to qualified service personnel.

(6) Use caution when installing and modifying telecommunications lines.

(7) Never install telecommunication wiring during a lightning storm.

(8) Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.

(9) Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.

(10) Installation must include an independent frame ground conductor to building ground. Grounding/bonding circuit continuity is vital for safe operation of this equipment. Never operate with grounding/bonding conductor disconnected.

(11) This product has two -48V DC input power feeders. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect the two power supply cables when removing power from the system.

(12) Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.

(13) For continued protection against risk of fire and property, replace fuses only with same type and rating.

(14) Use only Lucent Technologies manufactured, recognized circuit packs.

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 such as the FIND-R-SCOPE[1]. Viewing optics tend to focus the energy from an optical connector and, hence, increase the potential risk for injury.

Lasers and laser products are subject to federal and state regulations as well as Lucent Technologies laser safety requirements. The FT-2000 OC-48 Add/Drop-Rings Equipment 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 FT-2000 OC-48 Add/Drop-Rings system that can be removed and allow potential access to laser radiation have been identified. A warning label (Figure 1-1) is provided on the filter panel of the Enhanced High Speed Shelf and on the right front of the High Speed Shelf and Repeater Shelf - System Controller. The word DANGER is in central office white lettering on a red background. The text of the warning label is in black lettering on a white background.

In addition, a compliance label stating that the system has been certified, along with the manufacturer's name and place of manufacture, is attached to each equipment bay. Figure 1-2 shows an example of a compliance label. The compliance label is located on the rear of the equipment bays (at eye level). Several Cautions, Notices and Danger Indications are also given on the rear label, be sure to read and observe them. The text in these labels now appears in both French and English, for an international market.

1. Registered trademark of F. J. W. Industries, Inc.

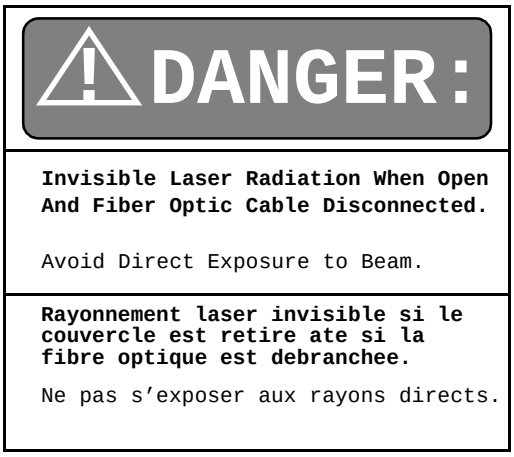

Figure 1-1. Warning Label

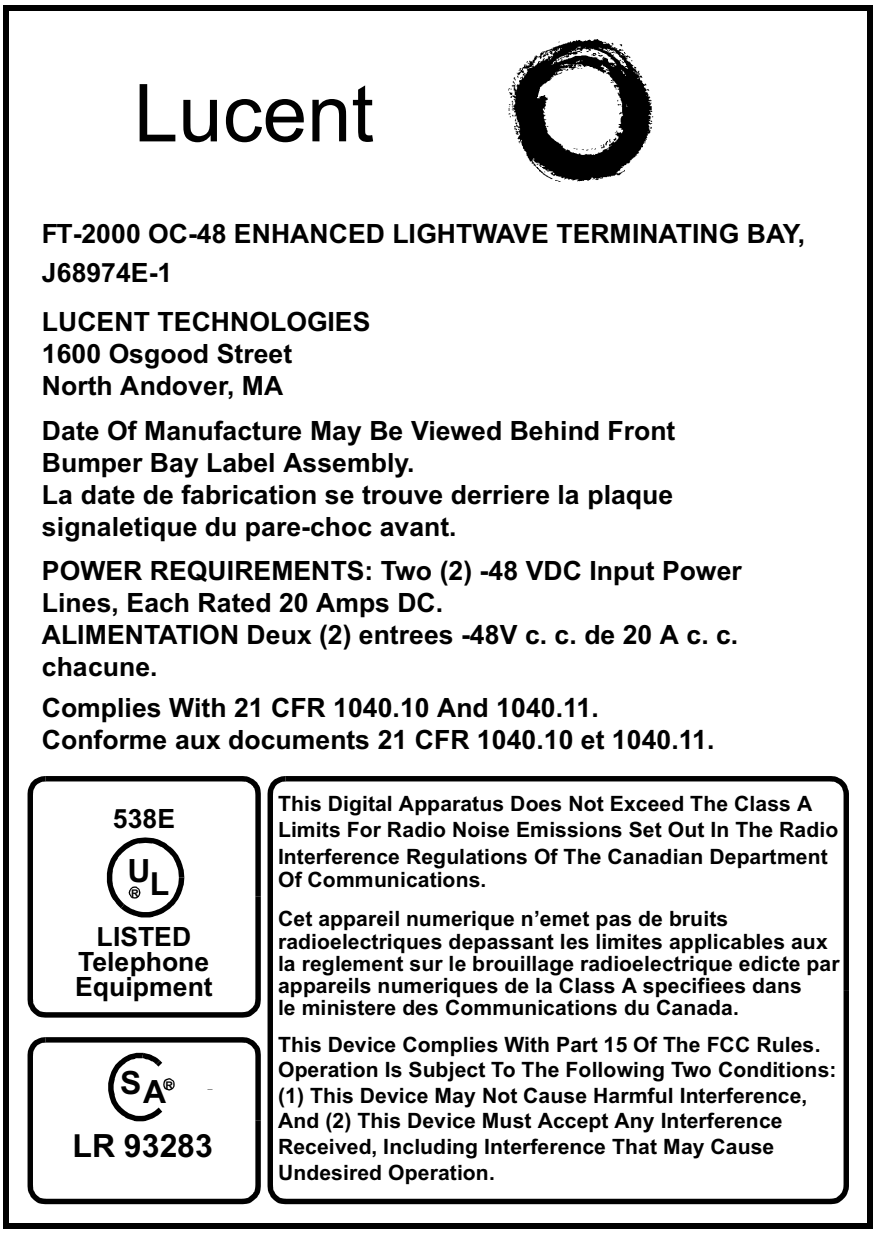

Figure 1-2. Example Compliance Label

Electrostatic Discharge (ESD) Considerations

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

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

- Assume all circuits packs contain solid state electronic components that can be damaged by ESD.
- Always wear a grounded wrist strap (shown in Figure 1-3) or wear a heel strap and stand on a grounded, static-dissipating, floor mat when handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane.
- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.
- Open (if possible) all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats.
- Store and transport (always) circuit packs in static-safe packaging.
- Keep all static-generating materials such as food wrappers, plastics, and styrofoam containers away from all circuit packs. Upon removal from bay, immediately put circuit packs into static-safe packages.
- Maintain (whenever possible) relative humidity above the 20 percent level.
- Keep the electromagnetic interference (EMI)/ESD protective front covers installed at all times except during an upgrade or maintenance procedure. Once a circuit pack is replaced in the shelf, close the front cover immediately.

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

Wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.

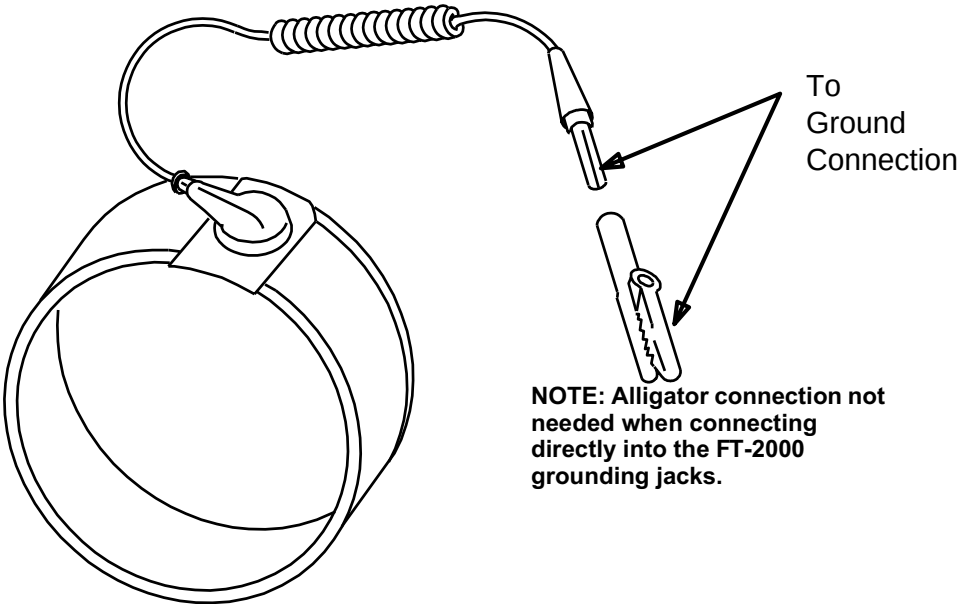

Figure 1-3. Static Control Wrist Strap

Related Documentation

FT-2000 Documents

The following documents provide additional information about the FT-2000 OC-48 Lightwave System:

- Number: 365-575-100

  Title: *FT-2000 OC-48 Lightwave System, Applications, Planning, and Ordering Guide, Issue 9.0*

  Audience: System planners and engineers

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

- Number: 365-575-101

  Title: *FT-2000 OC-48 Lightwave System, Quick Reference Guide*

  Audience: End user maintenance personnel

  Content: Abbreviated list of common report commands and a trouble clearing procedure that can be used to clear most trouble

- Number: 365-575-102

  Title: *FT-2000 OC-48 Lightwave System, Releases 1 through 7.2, User/ Service Manual*

  Audience: End user maintenance personnel

  Content: Detailed descriptive information about the system including CIT usage and trouble clearing procedures.

- Number: 365-575-103

  Title: *FT-2000 OC-48 Lightwave System, Release 9, User/Service Manual*

  Audience: End user maintenance personnel

  Content: Detailed descriptive information about the system including CIT usage and trouble clearing procedures.

- Number: 365-575-104

  Title: *FT-2000 OC-48 Lightwave System, Releases 1 and 2, Installation Manual*

  Audience: Customers planning to install and turn up the equipment

  Content: Customer installation instructions for the FT-2000 OC-48 1x1 End Terminal and FT-2000 OC-48 Repeater Bay platforms

- Number: 365-575-115

  Title: FT-2000 OC-48 Lightwave System Add/Drop Rings Terminal Installation Manual, issue 9.0

  Audience: Customers planning to install and turn up the equipment

  Content: Customer installation instructions for the FT-2000 OC-48 Add/Drop-Rings Terminal and FT-2000 OC-48 Repeater Bay platforms

- Number: Comcode 107095499*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 2.1.1-TRM

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 2.1.1-TRM software

- Number: Comcode 106944671*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 2.1.0-RPTR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 2.1.0-RPTR software

- Number: Comcode 107095390*

  Title: FT-2000 OC-48 Lightwave System, Software Release Description, Release 3.0.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 3.0.1-ADR software

- Number: Comcode 107027484*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 4.0.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 4.0.0-ADR software

- Number: Comcode 107027468*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 4.0.0-RPTR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 4.0.0-RPTR software

- Number: Comcode 107027476*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 4.1.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 4.1.0-ADR software

- Number: Comcode 107361875*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 5.0.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 5.0.1-ADR software

- Number: Comcode 107653396*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 5.0.2-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 5.0.2-ADR software

- Number: Comcode 107717068*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 5.0.3-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 5.0.3-ADR software

- Number: Comcode 107675639*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 6.0.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 6.0.0-ADR software

- Number: Comcode 107889644*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 6.0.1-RPTR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 6.0.1-RPTR software

- Number: Comcode 107675639*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 6.0.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 6.0.1-ADR software

- Number: Comcode 107741787*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 6.0.2-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 6.0.2-ADR software

- Number: Comcode 107883670*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.0.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.0.1-ADR software

- Number: Comcode 107972671*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.0.3-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.0.3-ADR software

- Number: Comcode 107715096*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.1.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.1.0-ADR software

- Number: Comcode 108035734*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.0-ADR software Number

- Number: Comcode 108134743*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.1-ADR software

- Number: Comcode 108216961*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.2-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.2-ADR software

- Number: Comcode 108265943*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.3-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.3-ADR software

- Number: Comcode 108491895*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.4-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.4-ADR software

- Number: Comcode 108491895*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.5-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.5-ADR software

- Number: Comcode 108722810*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 7.2.7-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 7.2.7-ADR software

- Number: Comcode 108138371*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 8.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 8.0-ADR software

- Number: Comcode 108171539*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 8.1.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 8.1.0-ADR software

- Number: Comcode 108405317*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 8.1.1-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 8.1.1-ADR software

- Number: Comcode 108361452*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 9.0.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 9.0.0-ADR software

- Number: Comcode 108614457*

  Title: *FT-2000 OC-48 Lightwave System, Software Release* Description, Release 9.1.0-ADR

  Audience: End user maintenance personnel

  Content: Status of problems fixed and known problems for Release 9.1.0-ADR software

- Number: 365-575-120

  Title: *FT-2000 OC-48 1x1 End Terminal Provisioning Job Aid (Releases 1 and 2)*

  Audience: End user maintenance personnel

  Content: List of provisionable parameters, original values, options, and the corresponding inputs for the FT- 2000 OC-48 1x1 End Terminal

- Number: 365-575-121

  Title: *FT-2000 OC-48 Repeater Bay/Shelf Provisioning Job Aid (Releases 2, 4, and 6)*

  Audience: End user maintenance personnel

  Content: List of provisionable parameters, original values, options, and the corresponding inputs for the FT- 2000 OC-48 Repeater Bay/Shelf

- Number: 365-575-122

  Title: *FT-2000 OC-48 Add/Drop-Rings Terminal Provisioning Job Aid (Releases 3, 4, 5, 6, and 7)*

  Audience: End user maintenance personnel

  Content: List of provisionable parameters, original values, options, and the corresponding inputs for the FT- 2000 OC-48 Add/Drop-Rings Terminal

- Number: 365-575-123

  Title: *FT-2000 Threshold Crossing Alert (TCA) Parameters Provisioning Job Aid (Releases 4, 5, 6, and 7)*

  Audience: End user maintenance personnel

  Content: List of provisionable TCA parameters, original values, and the corresponding inputs for the FT-2000 OC-48 Add/Drop-Rings Terminal

- Number: 824-102-148

  Title: *FT-2000 Lightwave System Operations Systems Engineering Guide, issue 7.0*

  Number: 824-102-148

  Audience: Engineers

  Content: Operations systems engineering information for the FT-2000 OC-48 Lightwave System.

- Number: 824-102-144

  Title: *2000 Product Family Multi-vendor Operations Interworking Guide*

  Audience: System Planners and Engineers

  Content: Operations interworking information for the 2000 Product Family systems including DDM-2000 Multiplexers and FT-2000 OC-48 Lightwave System in multi-vendor subnetworks.

- Number: 824-102-147

  Title: *2000 Product Family Operations Interworking Guide*

  Audience: System Planners and Engineers

  Content: Operations interworking information for the 2000 Product Family systems including DDM-2000 Multiplexers and FT-2000 OC-48 Lightwave System.

- Number: MIP0030-MV

  Title: *Modification Implementation Procedure 0030-MV, FT- 2000 End Terminal to 2-Fiber Add/Drop-Rings Terminal Out- of-Service Upgrade*

  Audience: RTAC, Installers, Engineers, Planners

  Content: Procedures for upgrading out-of-service FT-2000 OC-48 1x1 End Terminals to FT-2000 OC-48 Add/Drop-Rings Terminals for 2-Fiber Rings.

- Number: MIP0036-MV

  Title: *Modification Implementation Procedure 0036-MV, FT- 2000 End Terminal to 2-Fiber Add/Drop-Rings Terminal In- Service Upgrade*

  Audience: RTAC, Installers, Engineers, Planners

  Content: Procedures for transferring service off an in- service FT-2000 OC-48 1x1 End Terminal in preparation for the MIP0030-MV out-of-service upgrade to be performed.

- Number:MIP0046-MV

  Title: Modification Implementation Procedure 0046-MV, FT-2000 Add/ Drop-Rings DCC Cable Upgrade. See Table , “,” on page 2-28.

  *Contact RTAC or your Account Executive for these items.

FT-2000 Drawings

- J68974A-1

  FT-2000 OC-48 Lightwave Terminating Bay (Equipment and Circuit Packs Ordered with Equipment)

- J68974AK-1

  FT-2000 OC-48 Lightwave Terminating Bay (Circuit Packs, Miscellaneous Hardware, and Spare Parts Shipped Separately from Equipment)

- J68974D-1

  FT-2000 OC-48 Dual Add/Drop-Rings Bay (Equipment and Circuit Packs Ordered with Equipment)

- J68974DS-1

  FT-2000 OC-48 Lightwave Dual Add/Drop-Rings Bay (Software and Documentation)

- J68974E-1

  FT-2000 OC-48 Enhanced Lightwave Terminating Bay (Equipment and Circuit Packs Ordered with Equipment)

- J68974EK-1

  FT-2000 OC-48 Enhanced Lightwave Terminating Bay (Circuit Packs, Miscellaneous Hardware, and Spare Parts Shipped Separately from Equipment)

- J68974ES-1

  FT-2000 OC-48 Enhanced Lightwave Terminating Bay (Software and Documentation)

- J68974R-1

  FT-2000 OC-48 Lightwave Repeater Bay (Equipment and Circuit Packs Ordered with Equipment)

- J68974RK-1

  FT-2000 OC-48 Lightwave Repeater Bay (Circuit Packs, Miscellaneous Hardware, and Spare Parts Shipped Separately from Equipment)

- J68974RS-1

  FT-2000 OC-48 Lightwave Repeater Bay (Software and Documentation)

- SD-5G250-01

  FT-2000 OC-48 Lightwave Terminating Bay Application Schematic

- SD-5G250-02

  FT-2000 OC-48 Enhanced Lightwave Terminating Bay Application Schematic

- SD-5G252-01

  FT-2000 OC-48 Lightwave Repeater Bay Application Schematic

- T5G250-31

  FT-2000 Lightwave Transmission System OC-48 Lightwave Terminating Bay Interconnect Circuit

- T5G250-33

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay Interconnect Circuit

- T5G252-31

  FT-2000 Lightwave Transmission System OC-48 Lightwave Repeater Bay Interconnect Circuit

- ED6G994-30

  User/Filter Panel

- ED6G995-30

  High Speed Shelf Assembly

- ED6G995-31

  Enhanced High Speed Shelf Assembly

- ED6G999-30

  Low Speed Shelf Assembly

- ED6G999-31

  Low Speed Shelf Assembly ED7G000-30 Repeater Shelf Assembly

- ED7G001-10

  Method of Cabling for ED-7G001-30 OC-48 Lightwave Terminating Bay

- ED7G001-11

  Method of Cabling for ED-7G001-31 OC-48 Enhanced Lightwave Terminating Bay

- ED7G001-20

  Cable Assemblies for ED-7G001-30 OC-48 Lightwave Terminating Bay

- ED7G001-24

  Cable Assemblies for ED-7G001-31 OC-48 Enhanced Lightwave Terminating Bay

- ED7G001-21

  FT-2000 OC-48 Coaxial Cable Assemblies for All EC-1/DS3 Applications (Intraoffice Transmission Cables)

- ED7G001-22

  FT-2000 OC-48 Interbay Cable Assemblies (Intraoffice Non-Transmission Cables)

- ED7G001-30

  FT-2000 Lightwave Transmission System OC-48 Lightwave Terminating Bay Framework

- ED7G001-31

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay Framework

- ED7G002-10

  Method of Cabling for ED-7G002-30 OC-48 Lightwave Repeater Bay

- ED7G002-30

  FT-2000 Lightwave Transmission System OC-48 Lightwave Repeater Bay Framework

- ED8C500-50

  Network Bay Frame

- ED8C800-50

  Seismic Network Bay Frame

- FPD 804-911-168-1

  FT-2000 Lightwave Transmission System OC-48 Lightwave Terminating Bay (with 2 Active Shelves)

- FPD 804-911-168-2

  FT-2000 Lightwave Transmission System OC-48 Lightwave Terminating Bay (with 3 Active Shelves)

- FPD 804-911-168-3

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay (with 2 Active Shelves on Nonseismic Framework)

- FPD 804-911-168-4

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay (with 3 Active Shelves on Nonseismic Framework)

- FPD 804-911-168-5

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay (with 2 Active Shelves on Seismic Framework)

- FPD 804-911-168-6

  FT-2000 Lightwave Transmission System OC-48 Enhanced Lightwave Terminating Bay (with 3 Active Shelves on Seismic Framework)

- FPD 804-911-168-10

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 1 Active Shelf on Nonseismic Framework

- FPD 804-911-168-11

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 2 Active Shelves on Nonseismic Framework

- FPD 804-911-168-12

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 3 Active Shelves on Nonseismic Framework

- FPD 804-911-168-13

  FT-2000 Lightwave Transmission System OC-48 Repeater Shelf Miscellaneously Mounted

- FPD 804-911-168-14

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 1 Active Shelf on Seismic Framework

- FPD 804-911-168-15

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 2 Active Shelves on Seismic Framework

- FPD 804-911-168-16

  FT-2000 Lightwave Transmission System OC-48 Repeater Bay with 3 Active Shelves on Seismic Framework.

Documents for Related Lucent Technologies Equipment

The following documents provide additional information about related equipment:

- 065-215-200

  Seismic Network Bay Frame Application, Planning, and Ordering Guide

- 065-215-250

  Seismic Network Bay Frame Installation Guide

- 190-523-101

  SNC-2000 CPro User Manual

- 365-331-000

  DACS III-2000 Release 2.0 Applications, Planning, and Ordering Guide

- 365-340-004

  DACS IV-2000 Release 2.1 Reference Manual

- 363-206-200

  DDM-2000 OC-3 and OC-12 Multiplexers, Applications, Planning, and Ordering Guide

- 363-206-202

  DDM-2000 OC-3 Multiplexer, User/Service Manual

- 363-206-207

  DDM-2000 OC-12 Multiplexer, User/Service Manual

- 365-301-130

  System III DSX-3/4, Planning, Engineering, Installation, and Operation System Reference Guide

- 365-303-102

  DSX-3 Cross-Connect Bay, Description, Operation, and Maintenance Manual

- 636-299-120

  LGX(R) Distribution System, Planning, Engineering, Installation, and Operation System Reference Guide

- 365-565-200

  FT-Ring Diversity Switch, Engineering, Operation, and Maintenance Manual

- 365-565-500

  Digital Transmission Systems, FT-Lightwave Booster Amplifier, Description, Engineering, Installation, and Maintenance Manual.

- 365-575-300

  Optical Line System Applications, Planning and Ordering Guide

- 365-575-311

  Optical Line System Installation Manual

- 365-575-301

  Optical Line System User/Service Manual

- 365-575-400

  Optical Translator (OT) Applications, Planning and Ordering Guide

- 365-575-410

  Optical Translator (OT) Installation Manual

- 365-575-401

  Optical Translator (OT) User/Service Manual

Training

No product offering is complete without a formal training package. The National Product Training Center provides management courses for system planning, engineering and ordering, as well as training telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses is also available. Contact the National Product Training Center on **1-800-TRA-INER (1-800-872-4637)** to enroll in training classes. To arrange suitcase sessions, call the Product Training Manager on **1-614-764-5542**. The following courses are provided by the National Product Training Center:

- Number: LW2248

  Title: FT-2000 OC-48 Lightwave System Applications and Architecture

Audience: Fundamental planners, account executives, and private telecommunications network technical consultants

Content: Basic synchronous optical network (SONET) terms, applications (for example, point-to-point, add/drop, rings), architecture (that is, bays, shelves, circuit packs), and operation, administration, maintenance, and provisioning (OAM&P) features.

- Number: LW2348

  Title: FT-2000 OC-48 Lightwave System Equipment

  Engineering and Planning

  Audience: Facility planners, outside plant engineers, central office equipment engineers, and private network design engineers

  Content: Equipment and cabling specifications for engineering and ordering the FT-2000 OC-48 Lightwave System.

- Number: LW2616

  Title: FT-2000 OC-48 Add/Drop-Rings Terminal Operations and Maintenance

  Audience: Technicians, installers, maintenance engineers, technical support personnel, product evaluators, and anyone desiring operations and maintenance information for the FT-2000 OC-48 Add/Drop-Rings Terminal.

  Content: Description of initial turnup and day-to-day operations and maintenance tasks. Emphasis on developing: -- skills using the installation manual and the user/service manual - competence performing turnup and day-to-day provisioning and maintenance tasks.

  Number: TR2448

  Title: FT-2000 OC-48 Lightwave System Installation- Hands On

  Audience: This course is designed for Lucent Technologies personnel responsible for the installation of FT-2000 OC-48 Lightwave System Add/ Drop Ring Terminals.

  Content: This course instructs the student on the procedures to install, equip, and test FT-2000 OC-48. Equipage tasks include powering up, installing circuit packs, and loading software. Testing includes running auto-turnup tests to check cabling and the operation of the local equipment. The course also covers the procedures to connect the optical fibers to complete the system (ring) and verify the overall system operation. The course combines classroom presentations and hands-on exercises at the equipment using the standard installation manual.

  This course is designed to enable students to use standard documentation to:

(1) Equip an FT-2000 OC-48 Add/Drop Ring terminal with circuit packs and software.

(2) Properly test the operation of the equipment and the cabling.

(3) Identify and replace defective circuit packs.

Security

Lucent Technologies has designed the craft interface terminal (CIT) 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 CIT. Security features are fully described in the *FT-2000 OC-48 Lightwave System User/Service Manual*.

Technical Support

Assistance in maintaining your installed system is available through the Regional Technical Assistance Center (RTAC) and the Customer Technical Support (CTS). As shown in Figure 1-4, RTAC is your single point of contact. For technical assistance, simply call **1-800-225-RTAC**.

RTAC organizations are supported by a centralized CTS for transmission products. CTS maintains a close relationship with Bell Laboratories and other Lucent Technologies organizations to expedite resolutions and maintain contact with the development community.

Customer Technical Support Customer Assistance Request Entry System (CTS-CARES)

The customer Web Access tools provide external customers an easy method to access data about Lucent Technologies Products using the World Wide Web. These tools include:

Solutions

The solutions access tool allows customers to view and search for known problems and solutions for Lucent Technologies products. Entries are created within CARES by a Lucent Customer technical Support Engineer. Customer's using the web access can search for solutions using a number of fields such as product, Sub-product, Created Date or Description.

Product Notifications

The Product Notification access tool allows customers to view and search for information regarding Lucent Technologies products that have an issue which needs to be communicated to their customers. A detailed text description of the issue and the urgency of the issue is the type 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 CTAM/VCC at 1-800-225-4672 or WECARE/VCC at 1-800-932-2273 or for Non-US at 1-630-224-4672. Please make sure you ask for a CTS-CARES Customer Web Access Login. An agent will create an Assistance Request in CTS CARES and forward your request to the appropriate administrator.

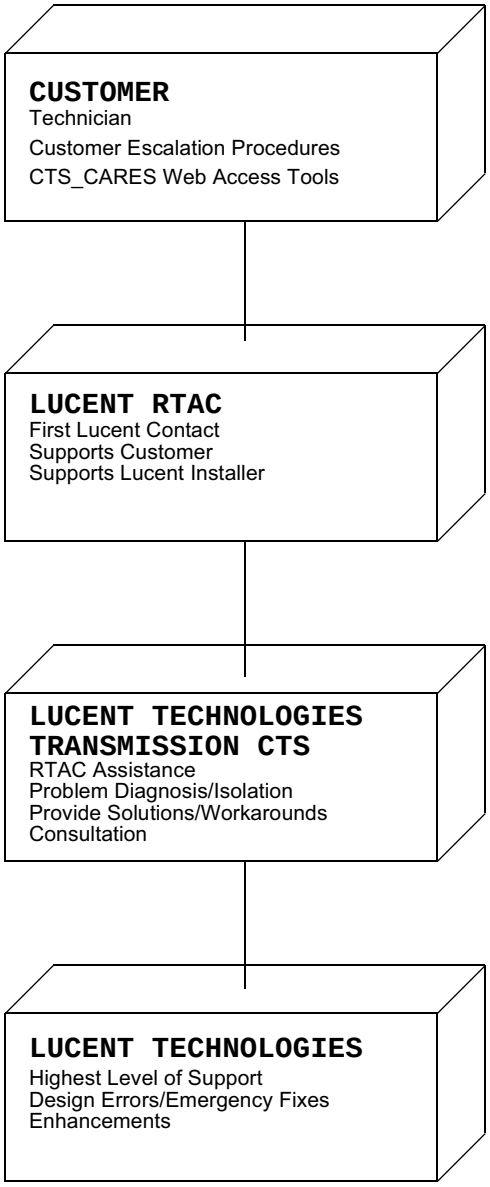

Figure 1-4. Product Support

Platform Descriptions

2

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  - PC Tray and Screen 2-19

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Platform Descriptions

2

Overview

This Chapter introduces FT-2000 OC-48 Lightwave System platforms and provides a detailed view of FT-2000 OC-48 Add/Drop-Rings Terminal physical design. The FT-2000 OC-48 Repeater bay is also described.

Introduction

The FT-2000 OC-48 Lightwave System is a flexible, high capacity, lightwave system that transmits digitally encoded information through single-mode optical fiber at the synchronous optical network (SONET) OC-48 signal rate of 2.5 Gb/s (up to 32,256 voice channels). The FT-2000 OC-48 Lightwave System consists of several platforms. A platform is a family of equipment and software configurations designed to support a particular set of applications. These platforms enable the FT-2000 OC-48 Lightwave System to offer flexible and upgradable features for different applications in high capacity loop, interoffice, outstate, and long-haul environments. FT-2000 OC-48 Lightwave System software enables each platform to be upgraded with new features as they become available.

Present FT-2000 platforms include:

- FT-2000 OC-48 Dual Add/Drop-Rings Terminal
- FT-2000 OC-48 Repeater Bay

NOTE:
The FT-2000 OC-48 Lightwave Terminating Bay (E-Bay) has been DAed as of December 1999.

FT-2000 OC-48 Add/Drop-Rings Terminal Platform

Equipment Package

The FT-2000 OC-48 Add/Drop-Rings Terminal for use in 2-fiber rings is available in the following equipment package:

- **FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings**:

  The FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings consists of the J68974D-1 L1 FT-2000 OC-48 Dual Lightwave Terminating Bay.

NOTE:
The FT-2000 OC-48 Lightwave Terminating Bay, J68974E-1 L5, has been DAed as of December 1999.

The J68974D-1 L1 FT-2000 OC-48 Dual Lightwave Terminating Bay consists of a power distribution and fuse panel, one or two Low Speed Shelves - System Controller and one or two Condensed High Speed Shelves mounted in a single network bay framework. Details for the Dual Add/Drop-Rings Terminal are contained in Appendix F.

The FT-2000 OC-48 Lightwave System transports up to 48 DS3 equivalent signals over the OC-48 line. It supports a mix of DS3, EC-1, OC-3, or OC-12 interfaces. The OC-3 and OC-12 low speed interfaces support optical extensions. The electrical DS3 and EC-1 low speed interfaces are 1xN (N <= 16) protected. If protection is required for the optical OC-3 or OC-12 low speed signals, it can only be 1+1.

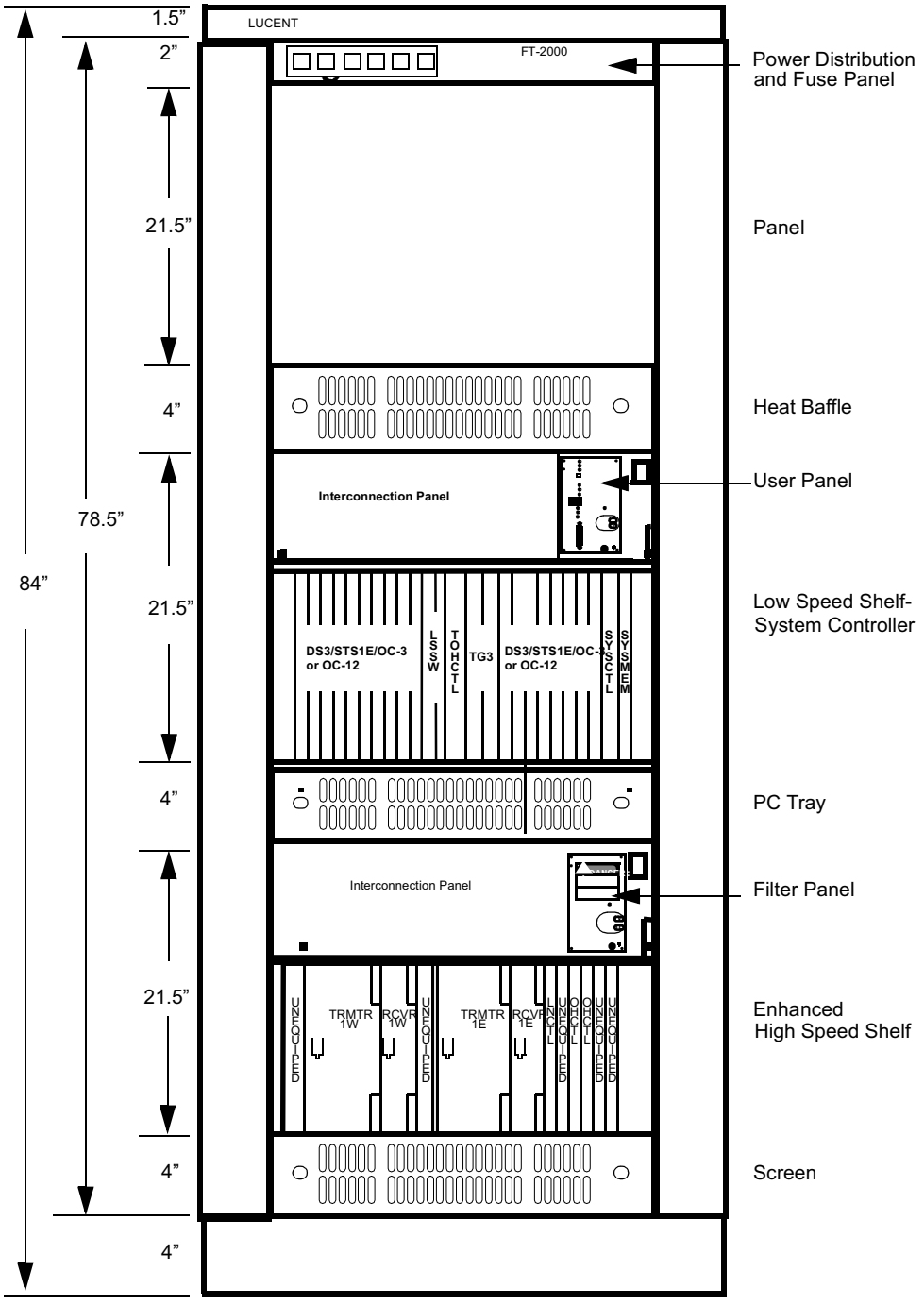


Figure 2-1. FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings

Add/Drop-Ring Terminal Shelf Descriptions

Power Distribution and Fuse Panel

The power distribution and fuse panel is located at the top of each FT-2000 OC-48 Lightwave System bay. It measures 2 inches high by 21.5 inches wide by 12 inches deep. The power distribution and fuse panel has a removable front cover that allows front access for shelf power connections. It accepts two 8-gauge power feeder stubs and distributes power to the shelves in the bay. The power distribution and fuse panel is also equipped with six 10-amp fuses (two for each shelf in the bay). Three fuses are for power feeder A and three fuses are for power feeder B. The power distribution and fuse panel is shown in Figure 2-2. Note that the J68974R-1 Repeater Bay is labeled with its name, FT-2000 OC-48 Lightwave Repeater Bay.

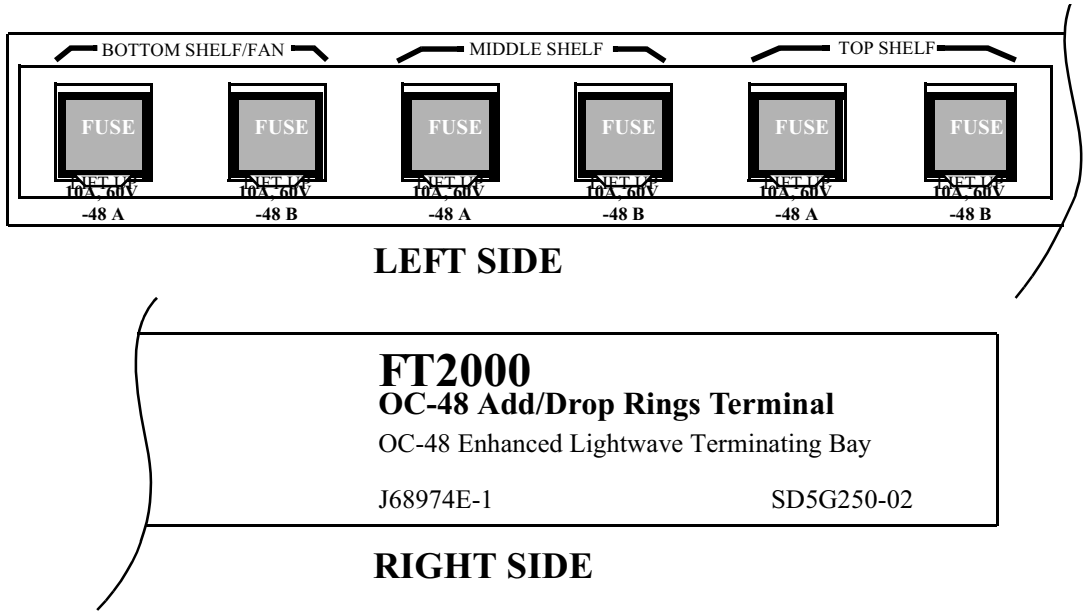


Figure 2-2. Power Distribution and Fuse Panel

Low Speed Shelf - System Controller

Purpose of Low Speed Shelf - System Controller

The Low Speed Shelf - System Controller provides high-level system control functions and serves as an interface for up to 48 DS3 equivalent low speed signals. These 48 low speed interface signals can be cross-connected to OC-48 high speed line 1W or 1E. The Low Speed Shelf - System Controller consists of a fully connectorized interconnection panel, a user panel, and 25 circuit pack slots. It measures 21.5 inches high by 21.5 inches wide by 12 inches deep and fits in a standard 23-inch. Coincident with software Release 7.2.0-ADR, a new Low Speed Shelf-System Controller and User Panel was introduced. The diagrams in this documentation reflect the new equipment.

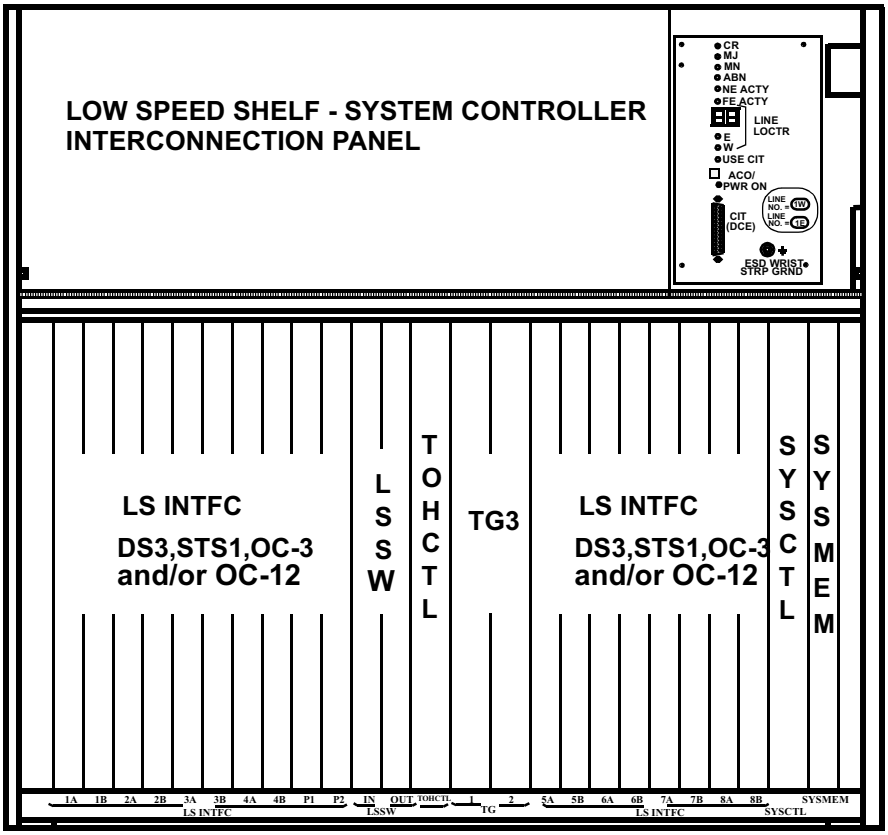


Figure 2-3. Low Speed Shelf - System Controller (without Cover)

Low Speed Shelf - System Controller Circuit Packs

The Low Speed Shelf - System Controller provides the following circuit pack slots:

- **LS INTFC 1A - 8B**: Sixteen slots are provided for LAA2 LS Interface (DS3), LAA4 LS Interface (STS1-E), LAA5 LS Interface (IS3), LAA10 and LAA10B LS Interface (OC-3), or T939A LS Interface (OC-12) circuit packs. Any mix may be equipped, but not more than 16 (see Chapter 6 for a Low Speed Shelf-System Controller equipage example).
- **LS INTFC P1 and P2**: Two slots are provided for one protection LAA2 (DS3) circuit pack and one LAA4 (STS1-E) circuit pack. The protection slots should be equipped with one of each type of LS Interface circuit pack, DS3 and/or STS1E, as equipped in slots 1A-8B. It does not matter which type is in which slot; however, LAA5, LAA10, LAA10B or T939A Optical LS interface circuit packs are not to be used in P1 or P2.
- **LSSW IN and OUT**: Two slots are provided for LAA12 Low Speed Switch (LSSW) circuit packs.
- **TOHCTL**: One slot is provided for the LAA26 Tributary Overhead Controller (TOHCTL). This circuit pack is only supported in Release 6.0.0-ADR software or greater and L5 Terminal bays or equivalent.
- **TG 1 and 2**: Two slots are provided for LAA18 Timing Generator, Stratum 3 DS1 [TG3 (DS1)] circuit packs.
- **SYSCTL**: One slot is provided for the LAA23B System Controller (SYSCTL) circuit pack.
- **SYSMEM**: One slot is provided for the LAA25 System Memory (SYSMEM) circuit pack.

Mechanical keying prevents circuit packs from being inserted into incorrect slots.

Low Speed Shelf - System Controller Interfaces

Front cable access is provided through the interconnection panel. Figure 2-4. and Figure 2-5. shows the interconnection panel. As of approximately June 1997 a new low speed shelf will be implemented. The interconnection panel provides the following interfaces:

- **LS INTFC 1A - 8B**: These connectors are cabled to the low speed interface slots 1A through 8B. For example, the low speed interface circuit pack in slot 1A receives three low speed interface signals through the three IN connectors (1, 2, and 3) on the interconnection panel associated with label 1A. The low speed interface circuit pack in slot 1A also transmits three low speed interface signals through the three OUT connectors (1, 2, and 3) associated with label 1A. Labels 9A through 16B are printed for future use.

NOTE:
The LAA5, LAA10, LAA10B and T939A circuit packs require no coaxial cabling. Transmission is through the optical transmit and receive ports on the faceplate.

- **X.25**: This connector provides an interface to a message-based operations system that uses X.25 protocol and the Transaction Language 1 (TL1) message language.
- **SER TLM 1 and SER TLM 2**: These connectors provide a serial telemetry interface to a remote maintenance center that uses telemetry byte-oriented serial (TBOS) protocol.
- **OFFICE ALMS**: This connector provides an interface to the local office audible and visible alarms.
- **PAR TLM**: This connector provides an interface to an operations center for alarm information.
- **MISC DSCRT 1 and MISC DSCRT 2**: These connectors provide an interface to external equipment via a terminal strip[1]. This allows an operations system to monitor and control equipment co-located with the FT-2000 OC-48 Lightwave System.
- **CIT (DTE)**: This connector provides an interface to a modem that allows dial-up Craft Interface Terminal access.
- **TIMING IN PRI and TIMING IN SECY**: These connectors provide an interface to external DS1 timing sources.
- **TIMING OUT 1 and TIMING OUT 2**: These connectors provide an interface to other central office equipment that requires a DS1 timing reference signal.
- **CIT (DCE)**: This connector provides an interface to the CIT (DCE) port on the user panel that allows local access.
- **USER PNL DISPLAY**: This connector provides an interface to the alarm and status indicators, and LINE LOCTR display on the user panel.
- **PWR**: These connectors provide an interface to the -48V DC power filters on the user panel. The power cables are connected to radio frequency (RF) filters on the interconnection panel using push-on type connectors.

1. Terminal strip is typically miscellaneously mounted.

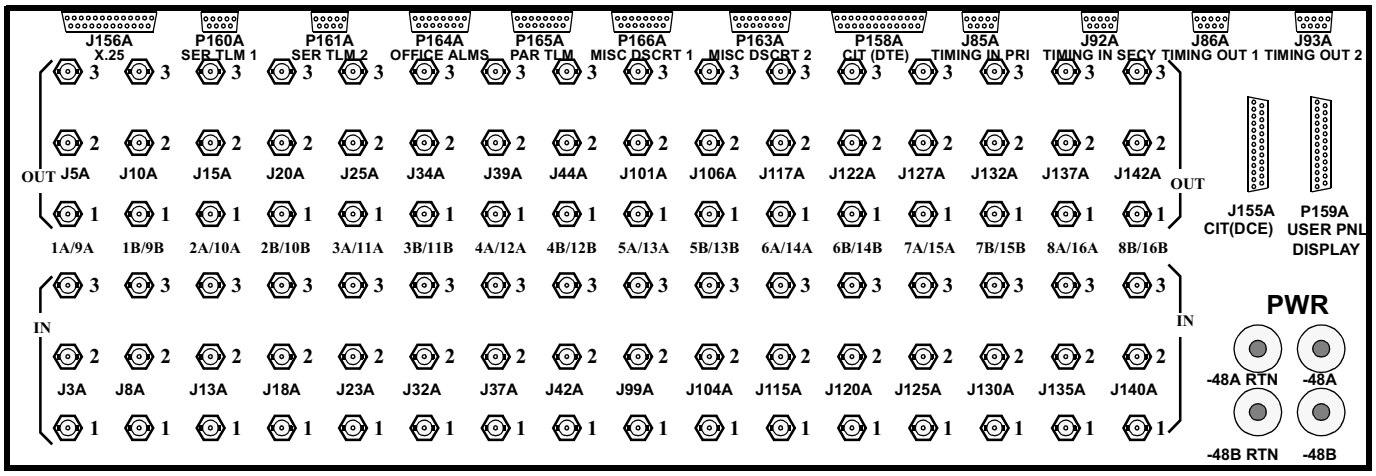


Figure 2-4. Interconnection Panel (Low Speed Shelf-System Controller)

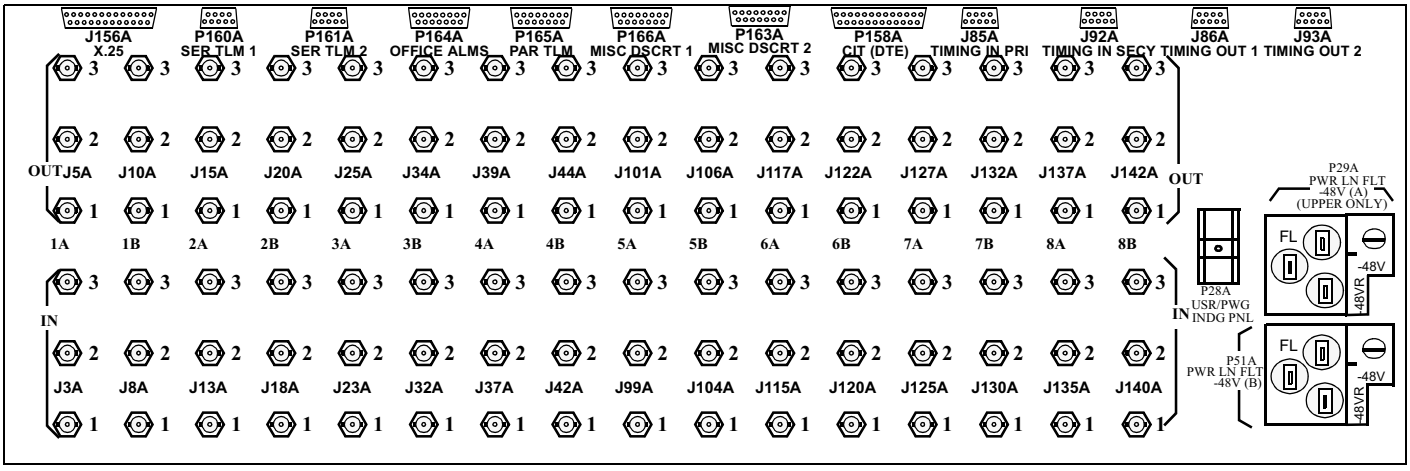


Figure 2-5. New Interconnection Panel (Low Speed Shelf System Controller) shipped later than approximately June 1997

Except for power, all cabling entering the interconnection panel is connectorized with the following industry standard connectors:

- **BNC connectors**: 75 Ohm BNC connectors are used on all cables for low speed interfaces (DS3 or STS1E).
- **D-subminiature connectors**: D-subminiature connectors are used on all cables for the operation system and central office interfaces.

Low Speed Shelf - System Controller Enhanced User Panel

The user panel (enhanced) (Figure 2-6.and Figure 2-7.) is a factory-installed unit mounted next to the right-hand flange on the Low Speed Shelf - System Controller. The user panel displays system-level information. The Low Speed Shelf - System Controller is equipped with a filter panel, provides -48V DC power filters, a power on (PWR ON) LED, alarm and status indicators, an electrostatic discharge wrist strap ground, and line identification labels. (In approximately June 1997 a new user panel, which is a plug-in module, will begin shipping. The new plug-in module user panel will replace the Old User Panel.)

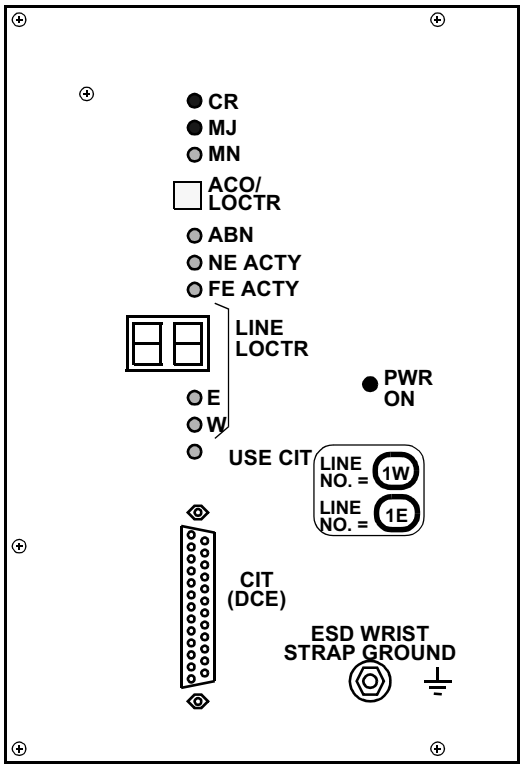


Figure 2-6. Old User Panel (Enhanced) Prior to June 1997

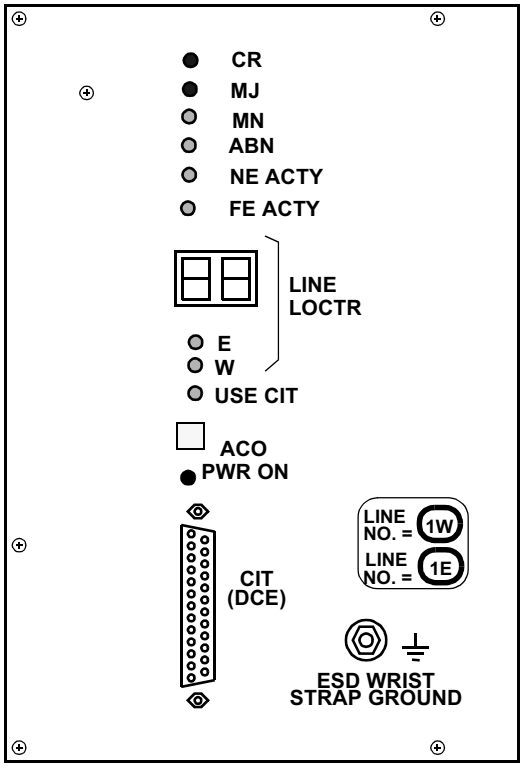


Figure 2-7. New User Panel (Enhanced) After June 1997

LED, Push-button, and Display Descriptions

The indications of the LED's located on the user panel (enhanced) are listed in Table 2 - 1.

Table 2-1. User Panel (Enhanced) LED's Indications

LED	Status	Indications
CR (red)	Critical	For FT-2000, any unprotected incoming signal loss is critical
MJ (red)	Major	Non-service-affecting unprotected failure that may mask the reporting of another service-affecting failure. For example, a Controller failure will cause a MJ alarm.

Table 2-1. User Panel (Enhanced) LED's Indications

LED	Status	Indications
MN (Yellow)	Minor	Non-service-affecting failure, protected failure
ACO/LOCTR[a] (Green)	Alarm Cutoff	Audible office alarms are silenced and parallel telemetry indications are turned off
ACO (Green)[b]	Alarm Cutoff	Audible office alarms are silenced and parallel telemetry indications are turned off
PWR-ON (Green)	Power On	Terminal is receiving at least one -48 volt source
ABN (Yellow)	Abnormal	Abnormal condition initiated through a CIT, TBOS, or TL1 command. For example, loopback, forced switch
NE ACTY (Yellow)	Near End Activity	An alarm or status condition exists at the near-end terminal
FE ACTY (Yellow)	Far End Activity	An alarm or status condition exists at a far-end terminal
USE CIT (Yellow)	Use the CIT	CIT must be used to obtain more information about system status
E (Yellow)	East Direction	An alarm or status condition is present from the East direction
W (Yellow)	West Direction	An alarm or status condition is present from the West direction

a. Old User Panel
b. New User Panel

User Panel (Enhanced) Push-button and Display

The ACO/LOCTR or ACO push-button and LINE LOCTR display located on the user panel (enhanced) perform the following functions as given in Table 2 - 2:

Table 2-2. User Panel (Enhanced) Push Button and LOCTR Display

ACO/LOCTR (Alarm Cutoff/Locator) or ACO (Alarm Cutoff)	Pressing this button silences existing audible office alarms and parallel telemetry indications or toggles the LINE LOCTR display between a "1" or either an "H" or "L" (see LINE LOCTR).
LINE LOCTR (Line Locator)	When there is a single FAULT, the LINE LOCTR displays either an "L", representing a FAULT in the low speed shelf - system controller or an "H" representing a fault in the enhanced high speed shelf.

FAULT LED Indication

Each circuit pack has a FAULT LED.

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

Low Speed Shelf - System Controller Covers

The Low Speed Shelf - System Controller has two front covers which are shown in Figure 2-8. One covers the interconnection panel and the other covers the circuit packs. An opening is provided in the interconnection panel cover that allows the user panel to show through and provides access to the craft interface terminal (CIT) port. The interconnection panel cover is labeled, care should be taken to reinstall covers on the proper shelf. The covers are hinged so that they can be easily removed for maintenance access.

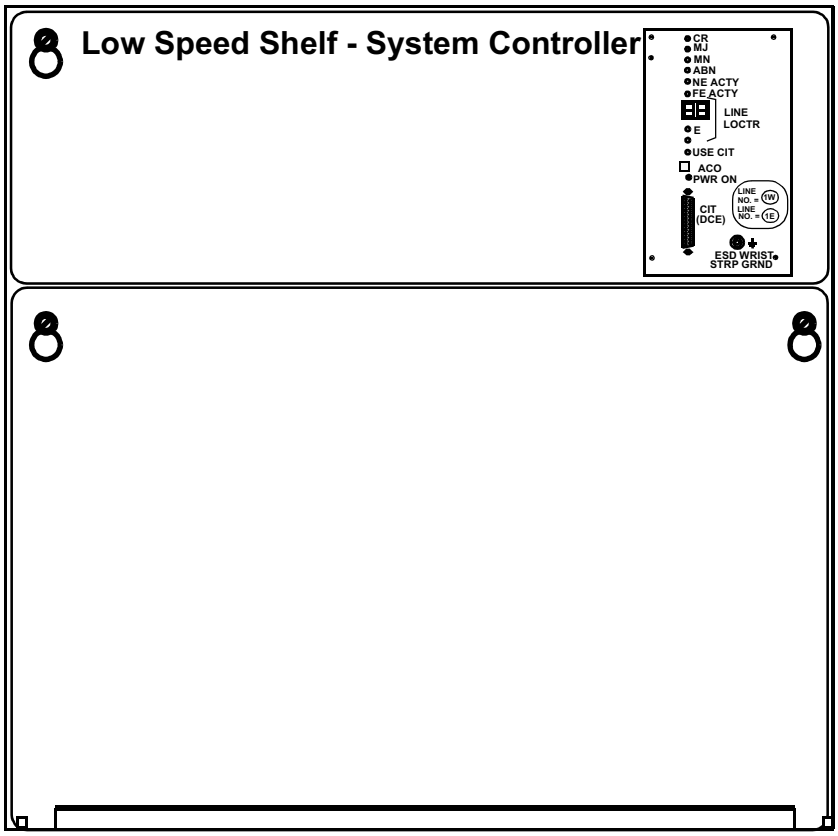


Figure 2-8. Low Speed Shelf - System Controller (with Covers)

Enhanced High Speed Shelf

Purpose of Enhanced High Speed Shelf

The Enhanced High Speed Shelf (in Figure 2-13.) serves as an interface for OC-48 high speed lines 1W and 1E. The Enhanced High Speed Shelf consists of a fully connectorized interconnection panel, a filter panel, and 12 circuit pack

slots. It measures 21.5 inches high by 21.5 inches wide by 12 inches deep and fits in a standard 23-inch wide bay.

Enhanced High Speed Shelf Circuit Packs

The Enhanced High Speed Shelf provides the following circuit pack slots:

- **TRMTR 1W and RCVR 1W**: Two slots are provided for the 739B2, 739C2, 739J2, 739J3, 739R2, 739S2, 739B4, 739J4, 739B5, 739C5, 739J5, 739P5, 739R5, 739S5, 739E1-8, or 739G1-8 OC48 Transmitters, Add/Drop [OC48 TRMTR (A/D)] and the 839B2, 839B4, 839B4B, 839B5, or 839E5 OC48 Receiver, Add/Drop [OC48 RCVR (A/D)] circuit packs for OC-48 high speed line 1W.
- **TRMTR 1E and RCVR 1E**: Two slots are provided for the 739B2, 739C2, 739J2, 739J3, 739R2, 739S2, 739B4, 739J4, 739B5, 739C5, 739J5, 739P5, 739R5, 739S5, 739E1-16, 739H1-16, or 739G1-8 OC48 Transmitters, Add/Drop [OC48 TRMTR (A/D)] and the 839B2, 839B4, 839B4B, 839B5, or 839E5 OC48 Receiver, Add/Drop [OC48 RCVR (A/D)] circuit packs for OC-48 high speed line 1E.
- **LNCTL 1W**: One slot is provided for the LAA28 Line Controller - 4 Megabyte [LNCTL (4 MEG)] circuit pack for OC-48 high speed lines 1W and 1E.
- **OHCTL 1W**: One slot is provided for the LAA21 OHCTL (TERM) circuit pack for OC-48 high speed line 1W.
- **OHCTL 1E**: One slot is provided for the LAA21 OHCTL (TERM) circuit pack for OC-48 high speed line 1E.
- **OECTL 1W** and **1E**: Two slots are reserved for use in a future release.

Mechanical keying prevents circuit packs from being inserted into incorrect slots.

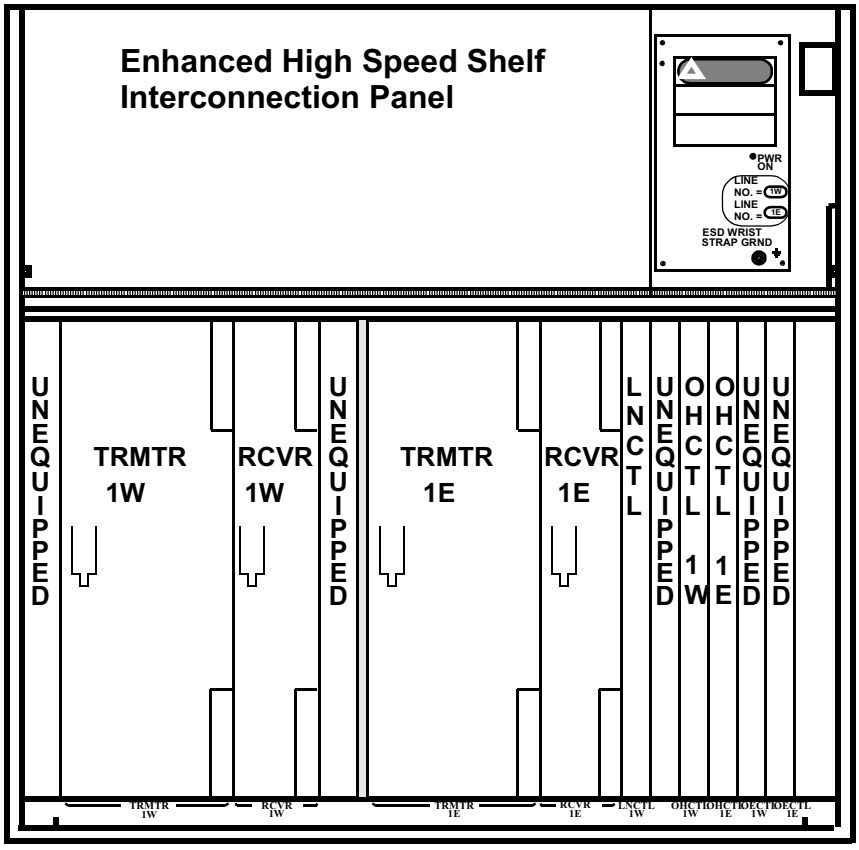


Figure 2-9. Enhanced High Speed Shelf (without Covers)

Enhanced High Speed Shelf Interfaces

Front access to cabling is provided through the interconnection panel, shown in Figure 2-10. The interconnection panel bears a label which defines Line X as 1W and Line Y as 1E. Line X and Line Y terminology is used in many FT-2000 documents. The interconnection panel provides the following interfaces:

- **LINE GROWTH CHAN LINE (X)** and **LINE (Y)**: These connectors provide an interface that allows access to the line growth channel (Z1 and Z2 bytes) of the OC-48 high speed lines.

- **SECTION USER CHAN LINE (X)** and **LINE (Y)**: These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-48 high speed lines. These connectors are reserved for use in a future release.
- **SECTION OW (LOC OW) LINE (X)** and **LINE (Y)**: These connectors provide an interface that allows an orderwire set access to the section orderwire (E1 byte) for voice communications, or (with additional wiring and converters) other uses such as connection to remote alarm or CIT ports.
- **LINE OW (EXP OW) LINE (X)** and **LINE (Y)**: These connectors provide an interface that allows an orderwire set access to the line orderwire (E2 byte) for voice communications.
- **INTRAOFFICE LAN LINE (X)** and **LINE (Y)**: These connectors are reserved for use in a future release.
- **PWR**: These connectors provide an interface to the -48V DC power filters on the filter panel.

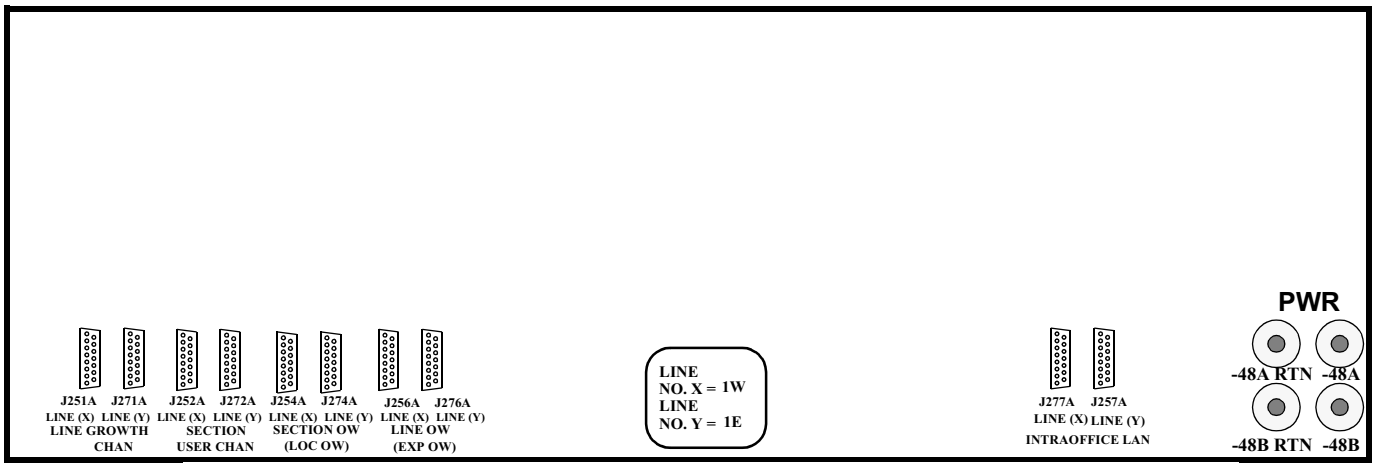
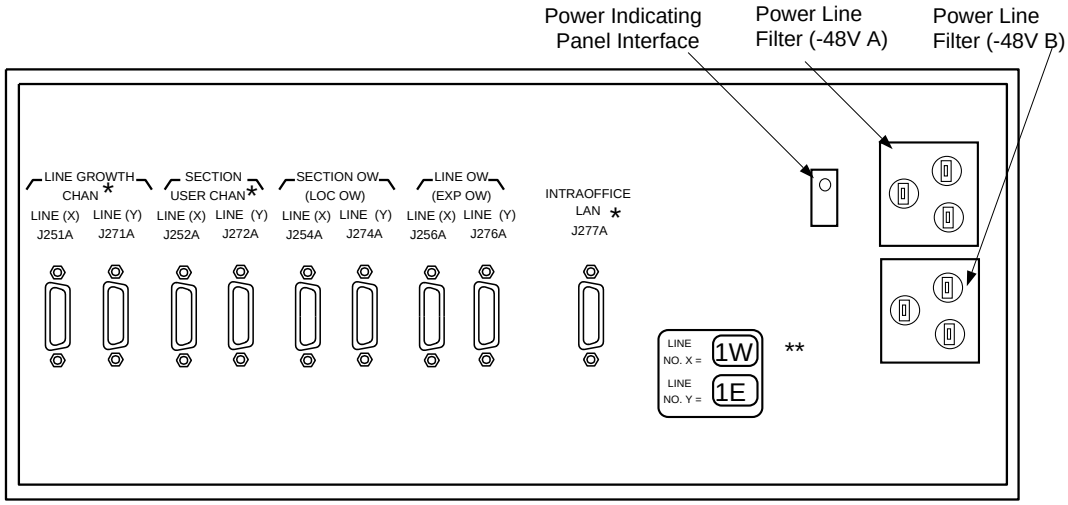


Figure 2-10. Interconnection Panel (Enhanced High Speed Shelf) prior to October 1996



* Reserved for future release.

Figure 2-11. Interconnection Panel (Enhanced High Speed Shelf) shipped after October 1996.

Except for power, all the cabling entering the interconnection panel is connectorized with 15 pin D-subminiature connectors. Power cables are connected to RF filters on the interconnection panel using push-on type connectors.

Enhanced High Speed Shelf Filter Panel

The filter panel provides -48V DC power filters, a power on (PWR ON) LED, and an electrostatic discharge wrist strap ground for the Enhanced High Speed Shelf. This is shown in Figure 2-12.

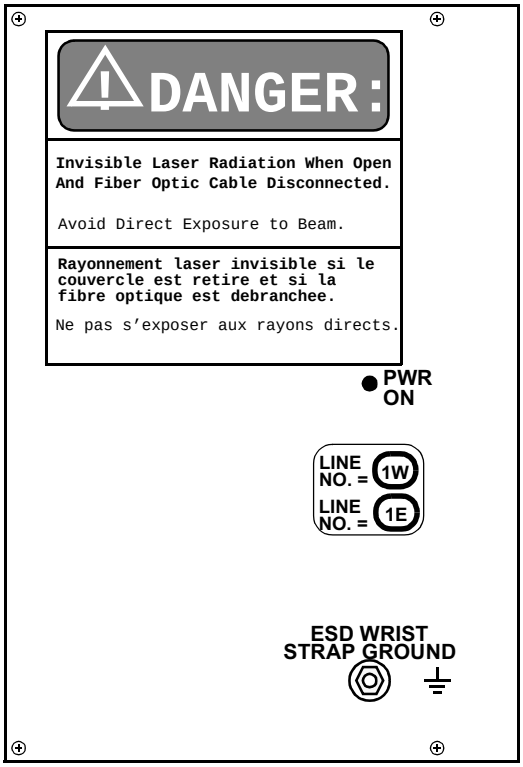


Figure 2-12. Filter Panel (Enhanced High Speed Shelf)

Enhanced High Speed Shelf Covers

The Enhanced High Speed Shelf has two front covers which are shown in Figure 2-13. One covers the interconnection panel and the other covers the circuit packs. An opening is provided in the interconnection panel cover that allows the filter panel to show through. The interconnection panel cover is labeled, care should be taken to reinstall covers on the proper shelf. The covers are hinged so that they can be easily removed for maintenance access.

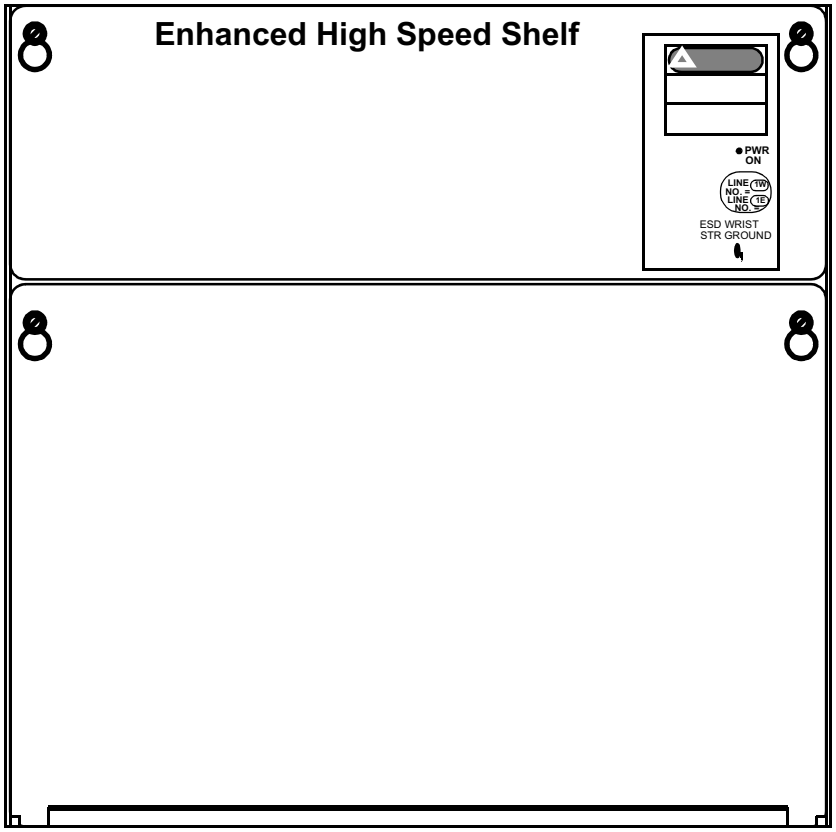


Figure 2-13. Enhanced High Speed Shelf (with Covers)

Heat Baffle

Heat baffles prevent heat rising from the shelf below from entering the shelf above. A front cover is provided to maintain a flush appearance.

PC Tray and Screen

The PC tray is a combination PC tray and heat baffle. It provides a place to hold a portable PC weighing up to 25 pounds, 20-inches wide, and 12-inches deep. This fixture folds into the heat baffle when not in use. A front cover is provided to maintain a flush appearance. The PC Tray also provides a slot to equip the air filter used when the bay is equipped with a fan shelf. The filter slides in at the top of the shelf.

Screen

The screen provides a filter panel at the bottom of the bay and an air intake plenum for cooling purposes. Do not block this air intake.

FT-2000 OC-48 Repeater Bay

Equipment Packages

The FT-2000 OC-48 Repeater Bay is available in the following equipment packages:

- **FT-2000 OC-48 Repeater Bay**: The J68974R-1 L1 FT-2000 OC-48 Repeater Bay (Figure 2-14.) consists of a power distribution and fuse panel, one Repeater Shelf - System Controller, Release 2.1.0-RPTR, 4.0.0-RPTR or 6.0.1-RPTR Software, and a PC tray mounted in a single 7-foot network bay framework.

NOTE:
Figure 2-14. shows a configuration for a point-to-point system. For an add/drop ring configuration it is recommended the left side only will be equipped.

- **FT-2000 OC-48 Repeater Shelf**: The J68974R-1 L10 FT-2000 OC-48 Repeater Shelf (Figure 2-15.) is a miscellaneously mounted shelf arrangement. This shelf arrangement consists of one Repeater Shelf - System Controller, Release 2.1.0-RPTR, 4.0.0-RPTR or 6.0.1-RPTR Software, a PC tray, and a user panel equipped with two 10-amp fuses. (Power fusing is performed on the shelf level.) It is possible to mount the FT-2000 OC-48 Repeater Shelf in several types of network bays. This shelf arrangement may be used in existing bays where space is limited or in cross-route locations.

NOTE:
Figure 2-15. shows a configuration for a point-to-point system. For an add/drop rings configuration it is recommended that only 1EW and 1WE be equipped.

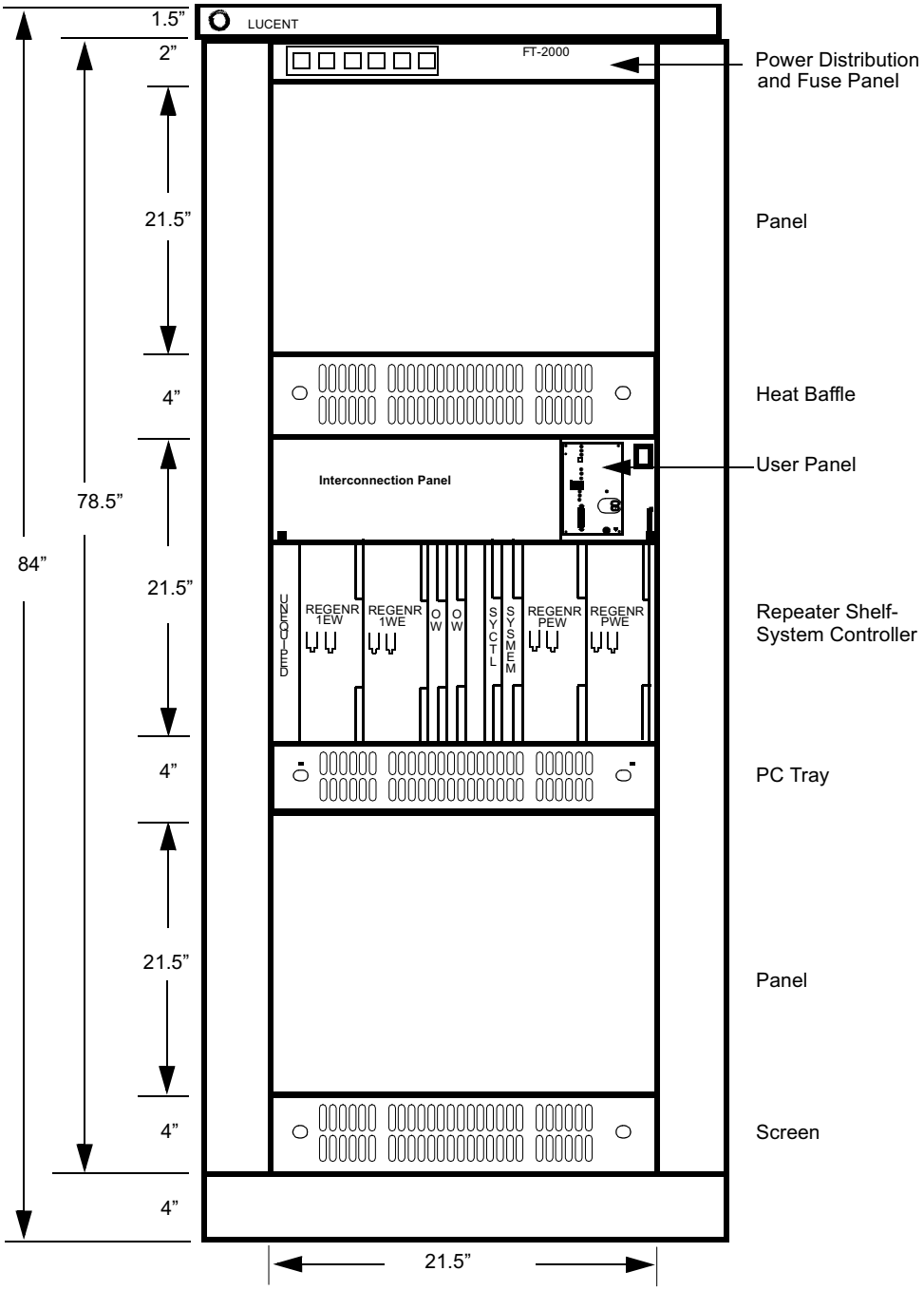


Figure 2-14. FT-2000 OC-48 Repeater Bay

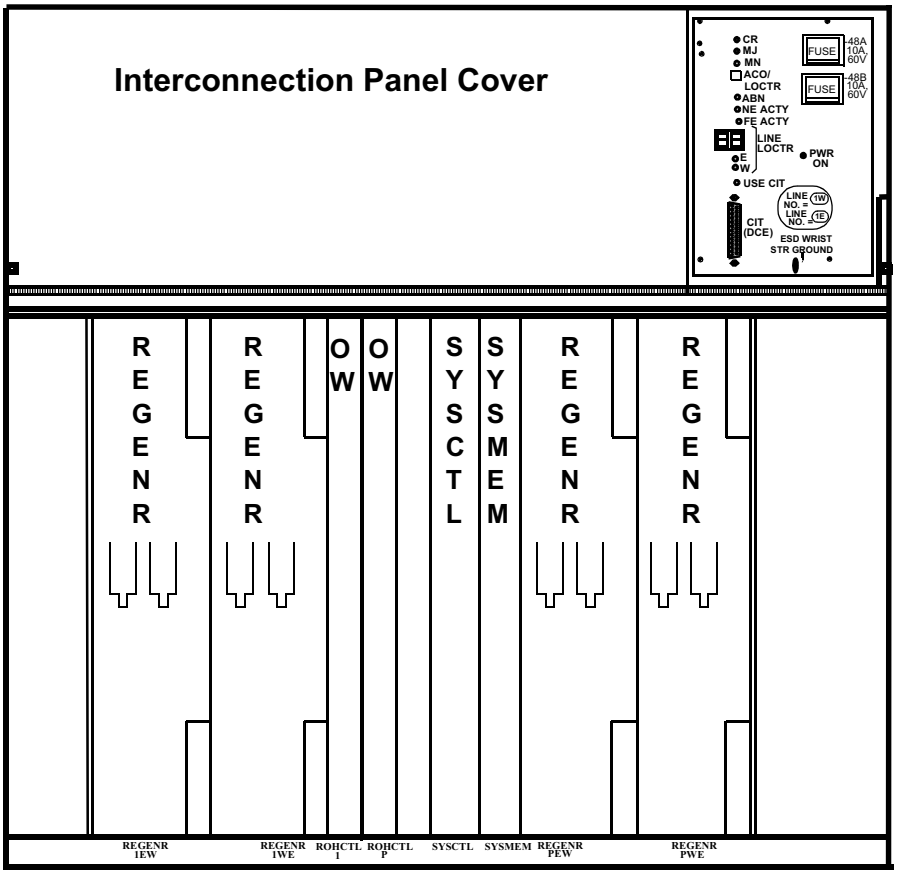


Figure 2-15. FT-2000 OC-48 Repeater Shelf (Miscellaneously Mounted)

Repeater Shelf - System Controller

Purpose of Repeater Shelf - System Controller

The Repeater Shelf - System Controller provides high level system control functions and serves as an interface for up to four OC-48 bidirectional regenerators. The Repeater Shelf - System Controller consists of the fully connectorized interconnection panel, an enhanced user panel, and eight circuit pack slots. It measures 21.5 inches high by 21.5 inches wide by 12 inches deep and fits in a standard 23-inch wide bay.

Repeater Shelf - System Controller Circuit Packs

The Repeater Shelf - System Controller provides the following circuit pack slots:

- **REGENR 1EW and 1WE**: Two slots are reserved for the 39B2, 39C2, 39J2, 39J3, 39R2 or 39S2 OC-48 Regenerator (REGENR) circuit packs for the OC-48 line. For two fiber ring applications only these two REGENR's are equipped.
- **OW**: For an add/drop ring, the left slot is reserved for the LAA14 Orderwire circuit pack. For a 1x1 point to point, both slots are reserved for the LAA14 Orderwire circuit packs.
- **SYSCTL**: One slot is reserved for the LAA23B System Controller (SYSCTL) circuit pack.
- **SYSMEM**: One slot is reserved for the LAA25 System Memory (SYSMEM) circuit pack.
- **REGENR PEW and PWE**: Two slots are reserved for the 39B2, 39C2, 39J2, 39J3, 39R2 or 39S2 OC-48 Regenerator (OC48 REGENR) circuit packs for the protection line in point to point applications.

Mechanical keying prevents circuit packs from being inserted into incorrect slots.

Repeater Shelf - System Controller Interfaces

Front access cabling is provided through the interconnection panel. Figure 2-16. shows the interconnection panel. The interconnection panel provides the following interfaces:

- **SHELF CONTROL**: These connectors are reserved for use in a future release. Newer miscellaneously mounted Repeater Shelf -System Controller shelves do not have wiring to these connectors, and eventually the connectors will be removed entirely.
- **OFFICE ALMS**: This connector provides an interface to the local office audible and visual alarms.
- **MISC DSCRT 1 and 2**: These connectors provide an interface that allows an operations system to monitor equipment co-located with the FT-2000 OC-48 Repeater Shelf - System Controller.
- **CIT (DTE)**: This connector provides an interface to a modem that allows dial-up Craft Interface Terminal access.
- **CIT (DCE)**: This connector provides an interface to the CIT (DCE) port on the user panel that allows local access.
- **USER PNL DISPLAY**: This connector provides an interface to the alarm and status indicators, and LINE LOCTR display on the user panel.

- **CONTROL BUS OUT and IN**: These connectors are reserved for use in a future release. For Group 1 shelves, mounted in an FT-2000 Repeater Bay, they must be equipped with termination plugs (ED7G000-20 G30) for all current releases. These termination plugs are provided with the Group 1 shelf. For Group 10, new miscellaneously mounted Repeater Shelf-System Controller, terminations are provided at the backplane. For Group 10 shelves the Control Bus In and Out connectors do not need the ED7G000-20 G30 terminations. Group numbers can be found stamped on the right side of the shelf.
- **SECTION USER CHAN LINE 1 and LINE P**: These connectors are reserved for use in a future release.
- **SECTION OW (LOC OW) LINE 1 and LINE P**: These connectors provide an interface to the Dantel Orderwire shelf, and require LAA14 CP's and Release 6.0.0-RPTR or 6.0.1-RPTR software.
- **PWR**: These connectors provide an interface to the -48V DC power filters on the user panel.

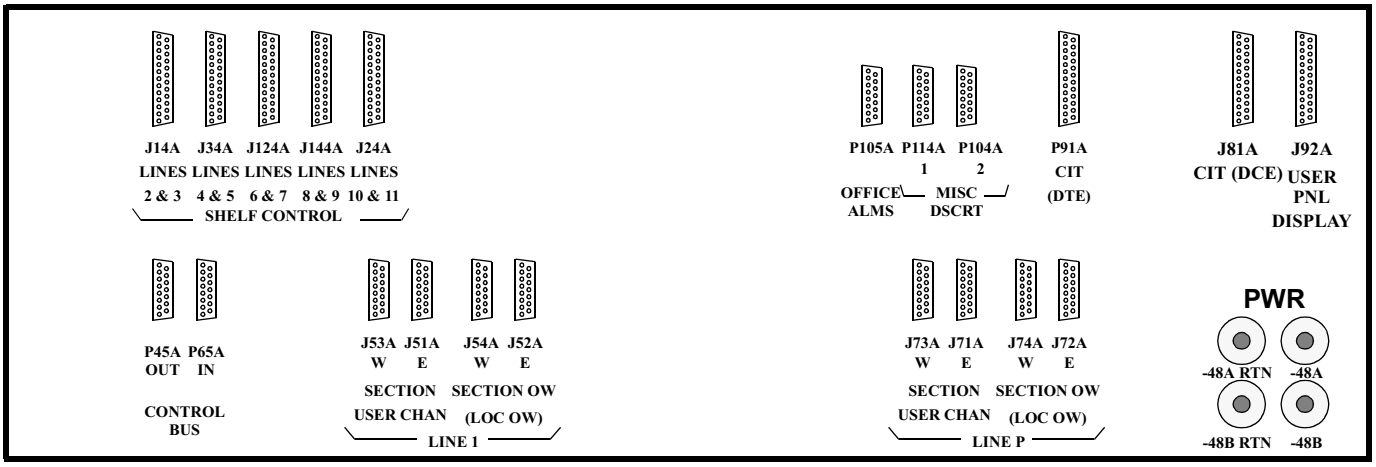


Figure 2-16. Interconnection Panel (Repeater Shelf - System Controller)

Except for power, all cabling entering the interconnection panel is connectorized with D-subminiature connectors.

Repeater Shelf - System Controller Covers

The Repeater Shelf - System Controller has two front covers. One covers the interconnection panel and the other covers the circuit packs. An opening is provided in the interconnection panel cover that allows the user panel to show through and provides access to the craft interface terminal (CIT) port. The interconnection panel cover is labeled, care should be taken to reinstall covers on the proper shelf. The covers are hinged so that they can be easily removed for maintenance access. Figure 2-17. shows the Repeater Shelf - System Controller with covers.

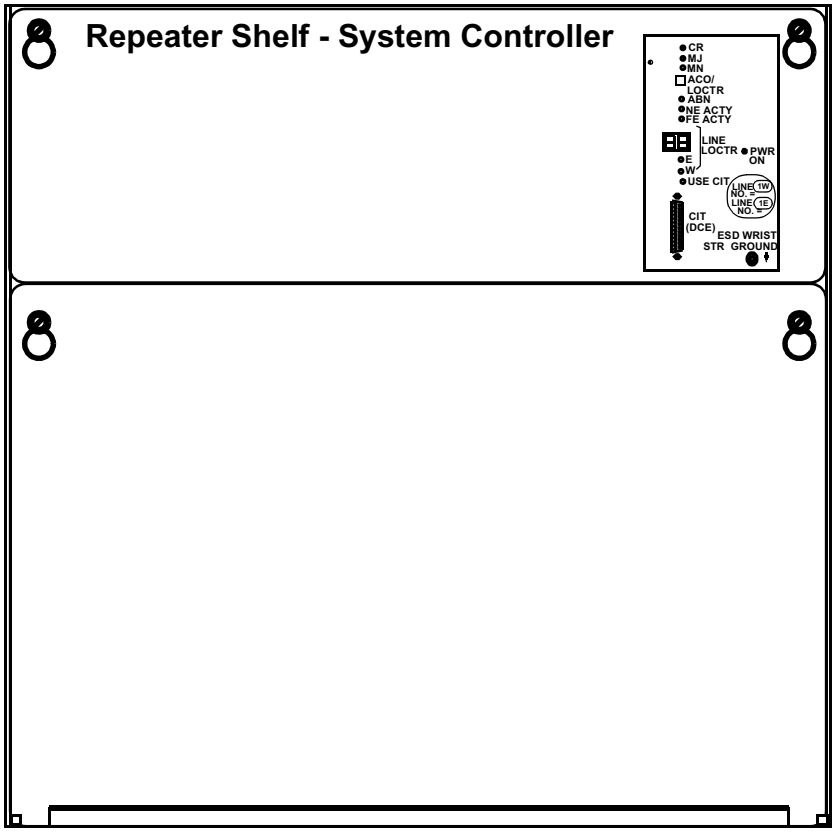


Figure 2-17. Repeater Shelf - System Controller with Covers

Other or Future FT-2000 OC-48 Platforms

Refer to Appendix F for information about the Dual Add/Drop-Rings Terminal information.

For information about other or future FT-2000 OC-48 Lightwave System platforms, refer to 365-575-100, *FT-2000 OC-48 Lightwave System, Applications, Planning, and Ordering Guide*.

2-Fiber OC-48 Add/Drop-Rings Application

With ADR terminal software, FT-2000 equipment can be configured into a bidirectional line switched ring architecture with Add/Drop capabilities. FT-2000 currently supports a two fiber ring architecture.

The FT-2000 OC-48 Lightwave System transports up to 48 DS3 equivalent signals over the OC-48 line. It supports a mix of DS3, EC-1,IS3, OC-3 or OC-12 interfaces. The OC-3 low speed interfaces support optical extensions. The electrical DS3 and EC-1 low speed interfaces are 1xN (N<= 16) protected. If protection is required for the optical OC-3 low speed signals, it can only be 1+1.Up to 48 low speed interface electrical and/or optical protected traffic signals can be carried on a two fiber ring. The East line may carry 24 protected signals, and the West line may carry 24 protected signals. Low speed interface signals may be added or dropped at any terminal.

FT-2000 Add/Drop-Rings supports a maximum of 16 Add/Drop-Ring Terminals in a ring. Releases 7.0.1-ADR and greater support up to 32 Network Elements in a network. Releases 4.0.0 (and greater) software supports up to 30 Repeater sites between nodes.

Figure 2-18. illustrates a sample four terminal ring.

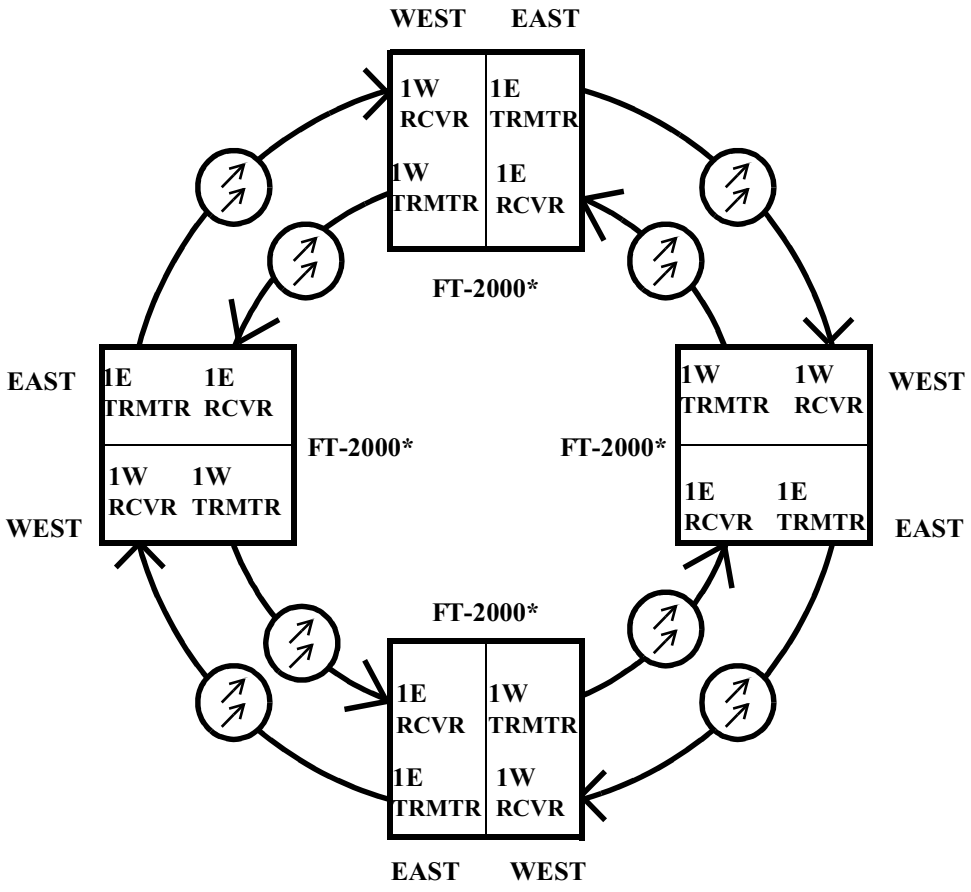


Figure 2-18. FT-2000 Add/Drop Ring with Four Terminals

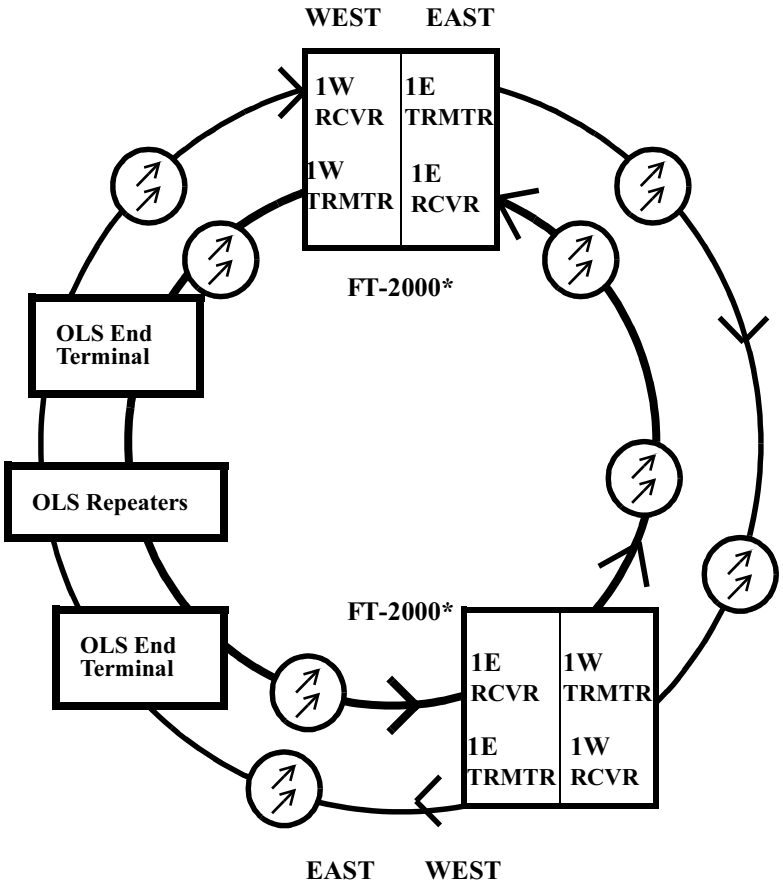


Figure 2-19. FT-2000 Add/Drop Ring with Two Terminals and OLS

Upgrades

An upgrade is the addition of new capabilities (features) to an existing platform. Upgrades require new software and may require new hardware. FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings equipped with the J68974E-1 L3 FT-2000 OC-48 Enhanced Lightwave Terminating Bay may be upgraded in-service to provide:

- OC-3 DCC

This upgrade requires access to the rear of the bay. For more information about possible upgrades, refer to FT-2000 OC-48 Lightwave Systems Modification Implementation Procedure 0046-MV FT-2000 *Add/Drop Rings Terminal OC-3 Cable Upgrade* or consult your local Account Executive.

For more information about the FT-2000 OC-48 Lightwave System features release plan and the availability of features, refer to 365-575-100, *FT-2000 OC-48 Lightwave System, Applications, Planning, and Ordering Guide*.

CIT Description

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CIT Description

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Overview

This Chapter briefly describes how to perform software installation, set up a PC for use with FT-2000, connect and login to FT-2000 using a craft interface terminal (CIT) PC, perform the command selection procedure, and provision FT-2000 by the user. For more complete descriptions, see the 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual.*

FT-2000 Software Installation Overview

Releases 5.0.2-ADR and later, and 6.0.0 Repeater and later are shipped on 3.5 inch 1.44 MHD disks only. Previous releases of FT-2000 software may be shipped either on 3.5 inch (720K or 1.44M) disks or may also be ordered on 5.25 inch 360K disks; if required, contact your local Lucent Technologies Account Representative. All releases contain four parts:

- The FT-2000 Install program.
- The FT-2000 CIT software.
- The FT-2000 Network Element software (Generic).
- The FT-2000 Data disk.

The Install program is used to:

- Copy the Network Element Software to the Personal Computer (PC) Hard Drive from the Distribution Diskettes.
- Install the CIT software to the PC from the Distribution Diskettes.

- Install the Network Element software to the Network Element from the Hard Drive, or the Distribution Diskettes.

Only the SYSMEM and SYSCTL circuit packs need to be equipped before software installation is performed. The software is loaded into the SYSMEM circuit pack through the SYSCTL circuitry.

FT-2000 Network Element software is installed into the terminal using a PC. Network Element software can be installed to the FT-2000 terminal from the set of distribution diskettes, or, the diskettes can first be copied onto the hard drive of a PC and then installed into the terminal. Installing the software from the PC hard drive has an advantage over installation from the distribution diskettes: it does not require someone to be on hand to load each distribution disk individually; however, progress of an installation from the hard drive should be checked frequently.

FT-2000 CIT software is on the FT-2000 distribution diskettes labeled “CIT-PC”. The CIT software provides a menu-driven approach for executing commands at, and retrieving reports from, the FT-2000 terminal. The FT-2000 CIT software is to be installed on the PC. This will enable the PC to function as the CIT.

The software installation procedure is described in detail in Appendix D. For additional and current software installation information, consult *FT-2000 OC-48 Lightwave System Software Release Description*, which is provided with the software diskettes.

PC Setup

The Personal Computer for use with FT-2000 should meet minimum requirements given in this document, and in the *FT-2000 OC-48 Lightwave System User/ Service Manual*. Some minimum understanding of PC operation and Disk Operating Systems (DOS) is assumed in the following discussions. Consult DLP-529 in the FT-2000 OC-48 Lightwave System User/Service Manual for a basic introduction to PCs.

When the CIT software is installed onto the hard drive of the Personal Computer, two example files (AUTOEXEC.CIT and CONFIG.CIT) are in the CIT directory. Use the “type” command at the DOS prompt to view the content of these files.

The AUTOEXEC.BAT file should not start anything running in the background, e.g., Terminate, Stay Resident (TSR) programs. Any other setup of the PC which uses up RAM (such as Windows or some electronic mail monitors) should be turned off, so that all RAM is available to the CIT program.

Be sure to consult the hardware manual supplied with your PC to determine which COM port(s) is connected to the Serial Port of your PC. Also determine if this port is constantly powered, or must be turned on to function.The FT-2000 CIT software is designed to support COM ports 1 and 2. Some PCs support additional COM ports. Usage of these additional COM ports has proven to be unreliable and is not recommended. Select a cable to connect from your PC serial port to the DB25-S CIT-DCE port of FT-2000. Also, note that many older PC’s and laptops are not capable of 38.Kbs BAUD rates, choose a slower rate if you encounter trouble.

PC Troubleshooting Tips

These notes are provided to assist installers with the problems that may be encountered with their PC when installing or running FT-2000 software.

The minimum requirements for a PC to be used in this application are listed in Section 6 of the User/Service manual.

While the installation software and the CIT software may generally be run under *Windows* [1], sometimes problems have been encountered. If problems are encountered with your PC running under *Windows*, it may be necessary to run the FT-2000 software directly from DOS without *Windows* running.

The following steps are ways to bypass *Windows*:

Windows 3.1

- When the PC is booting up (either from power on, reset, or CTRL-ALT-DEL), at the “Starting MS-DOS” display, immediately (within about 3 seconds) press the f8 key. Step through each item listed in the CONFIG.SYS file and answer “Y” to the four items listed on the next page and “N” to all others that appear. Answer “N” to the first AUTOEXEC.BAT inquiry. This will go directly to the DOS prompt and will allow your PC to have more memory available to run the FT-2000 Install program. If the values in your CONFIG.SYS file do not agree with the minimum recommendation on the following page, then you should edit your CONFIG.SYS file to agree with the minimum recommendation.

  The CONFIG.SYS file should **minimally** contain the following:

  - FILES=50
  - BUFFERS=40
  - DEVICE=C:\DOS\HIMEM.SYS
  - DEVICE=C:\DOS\EMM386.EXE NOEMS HIGH SCAN X=CC00-CFF

Windows 95/98

- When the PC is booting up (either from power on, reset, or CTRL-ALT-DEL), at the “Starting Windows 95/98” display, immediately (within about 3 seconds) press the f8 key. This will display a *Windows 95/98* start-up Menu. Select item 6,“Command Prompt Only”. This will go directly to the DOS prompt and will allow your PC to have more memory available to run the FT-2000 Install program.

1. Windows, Windows95 and Windows 98 are a Trademark of Microsoft Corporation.

Other PC Suggestions

- Running a DOS window from within *Windows* is not the same as starting DOS as described above. Going to DOS from *Windows* leaves *Windows* and other programs running in the background, possibly using memory required by FT-2000.
- In laptop portable PCs, if the power save feature is active and set to shutdown in less than one-half hour, it may cause problems during the Installation process because there may be long intervals of no communication activity thus causing the PC to shutdown and not respond to future responses from the FT-2000.
- The AUTOEXEC.BAT file should not have commands which start other programs running (known as Terminate and Stay Resident programs [TSR]) in the background. After the CIT software has been installed to the PC, an example of an AUTOEXEC.BAT file that is compatible with the FT-2000 software is contained in the directory that the files were stored in. This file is called “AUTOEXEC.CIT”.
- The CONFIG.SYS file should **minimally** contain the following:
    - FILES=50
    - BUFFERS=40
    - DEVICE=C:\DOS\HIMEM.SYS
    - DEVICE=C:\DOS\EMM386.EXE NOEMS HIGH SCAN X=CC00-CFF
- Sometimes while loading the software from the diskettes onto the PC a message may indicate that an incorrect diskette has been inserted or that the input diskette is corrupted. If this happens, remove and reinsert the diskette in the drive and follow the prompts on the screen. Try this a couple of times.

    Do not proceed if one of the disks continues to fail to install. Install the FT-2000 software again from the beginning. If failure continues, contact your next level of support.

Running CIT and Install Programs under Windows 95/98

It is recommended that CIT and Install programs be run under Windows 95/98 when possible. It is also recommended that, when running under Windows 95/98, that the user install the software using the installation tools provided and also create "shortcuts" to facilitate easy access.

Create "CIT" Program Shortcut

The procedure is as follows for creating a shortcut for running the CIT program:

Right Mouse click on the "desktop" area

(1) Click "New"

(2) Click "shortcut"

(3) If it is desired to have a shortcut to run CIT in the non-expert mode, in the command line type: C:\CIT900\CIT.BAT where CIT900 is the directory that the software was installed in. If it is desired to have a shortcut to run CIT in the EXPERT mode, then, in the command line, type C:\CIT900\CIT.BAT EXPERT.

(4) Click "Next".

(5) The name for the shortcut should identify the program i.e.: CIT900 for non-expert mode and CIT900 Expert for expert mode.

(6) Click "Next"

(7) Choose an Icon from the list

(8) Click "Finish"

(9) An icon will be added to the "desktop" and the CIT program can be started by double-clicking the Icon.

Create "Install" Program Shortcut

The procedure is as follows for creating a shortcut for running the Install program.

Right Mouse click on the "desktop" area.

(1) Click "New"

(2) Click "Shortcut"

(3) In the command line type C:\CIT900\INSTALL.EXE where CIT900 is the directory that the software was installed in.

(4) The name for the shortcut should identify the program i.e.: Install 900.

(5) Click "Next"

(6) Choose an Icon from the list.

(7) Click "Finish"

(8) An icon will be added to the "Desktop" and the Install program can be started by double-clicking the Icon.

General Software Notes

- It will take approximately 2 hours at 19200 baud or 3 hours at 9600 baud to install the software into the SYSMEM circuit pack.
- FT-2000 Generic and Data software with the CIT software altogether comprise the software package. You must install or upgrade both Generic and CIT software.
- If you install the software into the system from the distribution disks you will have to insert and remove each diskette about every 15 minutes. It is recommended that the software first be copied from the distribution disks to the hard drive of your PC (approximately 10 minutes). This will allow you to start the install process and the system will operate without operator intervention until the installation is complete.
- The CIT software will take approximately 3 minutes to install into the personal computer that is intended for use as the CIT. The CIT software resides on the CIT-PC disks.
- If you make any mistakes while making your selections, you can use the <ESC> key to back up and re-enter your selection(s).
- Even though the software may be installed into a new system for the first time it is still considered an Upgrade Procedure.
- The upgrade procedures documented in this section have been tested by Bell Laboratories and the Customer Technical Support Organizations and results show NO service interruptions when the procedures are followed correctly. These procedures must be followed to ensure a successful upgrade.
- If the ring is currently running Release 5.0.1-ADR or greater, remote installations via the OC-48 DCC configuration and the CONFIGURATION-COPY-PROGRAM CIT command may be performed. Completion time for OC-48 DCC installations, after the initial node has been installed via the DTE or DCE port, is between 20 minutes and 4 1/2 hours, depending on the number of simultaneous (1-15) remote installations being executed.
- Some laptops have power-saver features which will turn power off to the serial port. The power saver feature also sometimes reduces the processor speed; this can interrupt software installation.

FT-2000 Login Procedure Overview

Perform the following steps to log into FT-2000 using the CIT. All software must be installed on the PC and FT-2000 terminal prior to performing this procedure (as given in Appendix D).

(1) Connect a properly configured PC (refer to “Personal Computer for Use as Craft Interface Terminal,” if necessary) to the CIT DCE port on the FT-2000 user panel using a straight-through 25-pin RS-232 cable. Turn the PC on.

(2) While in the PC directory where the CIT software was installed (use the DOS cd \CIT command if needed), run the FT-2000 CIT program by typing “CIT” or “CIT EXPERT” followed by the Return or Enter key.

NOTE:
The “CIT EXPERT” mode was first introduced in release 4.1.0-ADR and gives the user complete access to all commands and options. If the user logs into the system with just the “CIT” command then only a limited set of commands and options will be accessible. For the initial turnup and testing of the system the “CIT EXPERT” mode must be used to gain access to the AUTO-TURNUP tests and

Network Element provisioning. “EXPERT” mode must be used to gain access to the AUTO-TURNUP tests and Network Element provisioning.

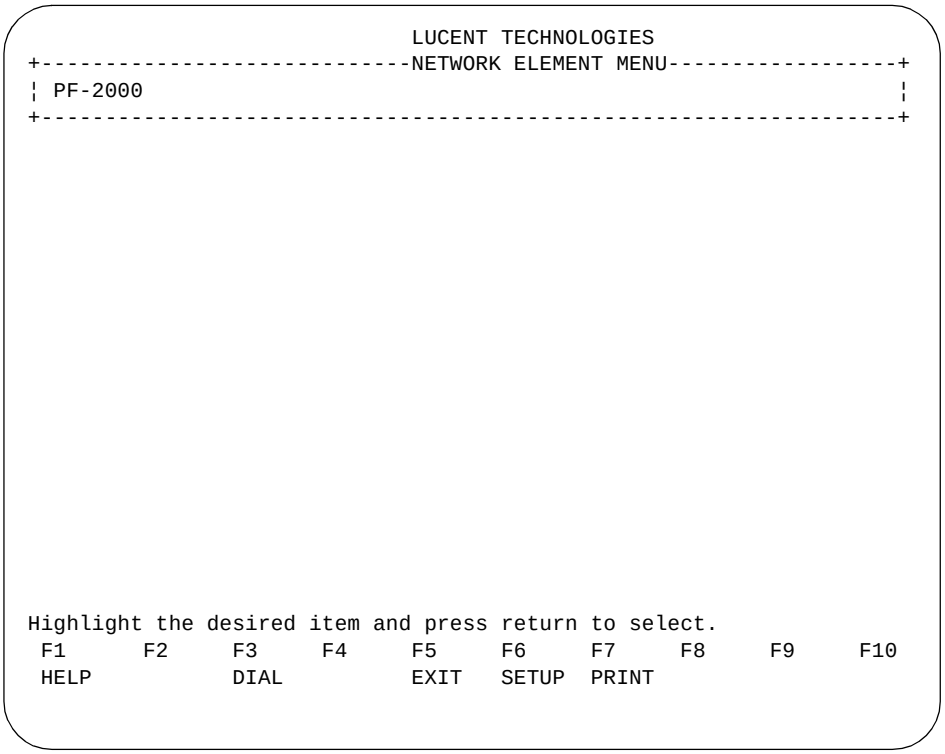
Requirement: The screen below appears...

```
                        LUCENT TECHNOLOGIES


                       CIT-PC Release 9.0


             Support for FT-2000 and OLS Releases:

    2.1.1-TRM    2.1.0-RPTR   3.0.1-ADR    6.0.1-ADR
                 4.0.0-RPTR   4.0.0-ADR    6.0.2-ADR
                 6.0.0-RPTR   4.1.0-ADR    7.0.0-ADR
                 6.0.1-RPTR   5.0.1-ADR    7.0.1-ADR
                              5.0.2-ADR    7.0.2-ADR
                              5.0.3-ADR    7.0.2-ADR
                              6.0.0-ADR    7.0.3-ADR
                                           7.1.0-ADR
                                           7.2.0-ADR
                                              7.2.1-ADR
                                              8.0.0-ADR
                                              9.0.0-ARD

                    PRESS ANY KEY TO CONTINUE.

                Copyright (c)  1997 LUCENT TECHNOLOGIES
```

Action: Press any key to remove the introductory screen.

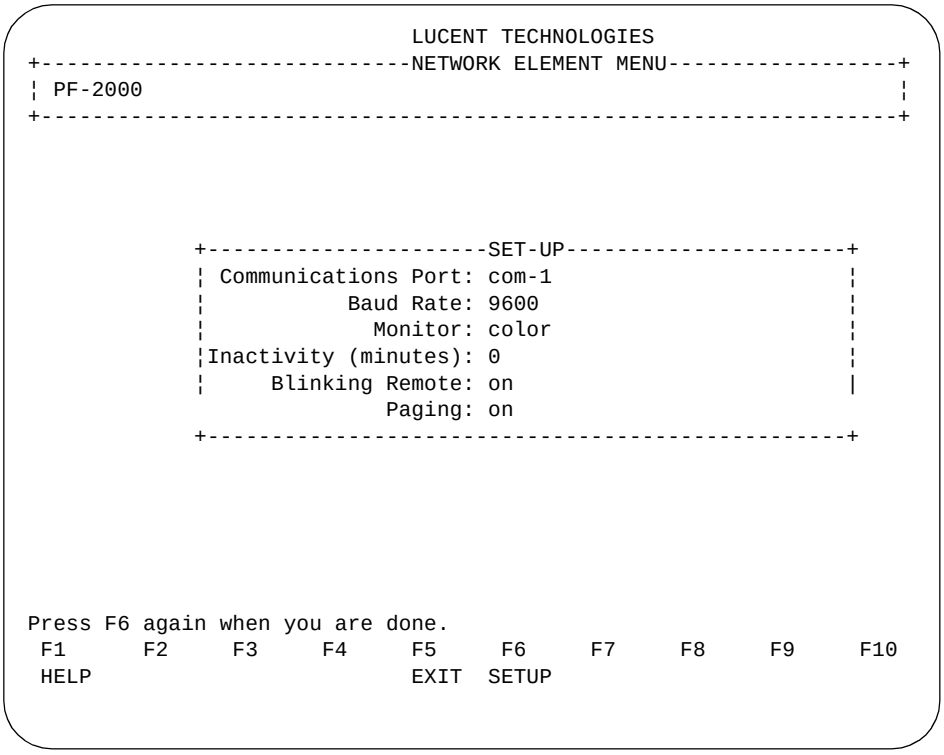
Note that this screen may include reference to software release 8.1.0 when it is available and being used.

Requirement: The screen below appears:



Action: Press the F6 (SETUP) key.

Requirement: The screen below appears:



NOTE:

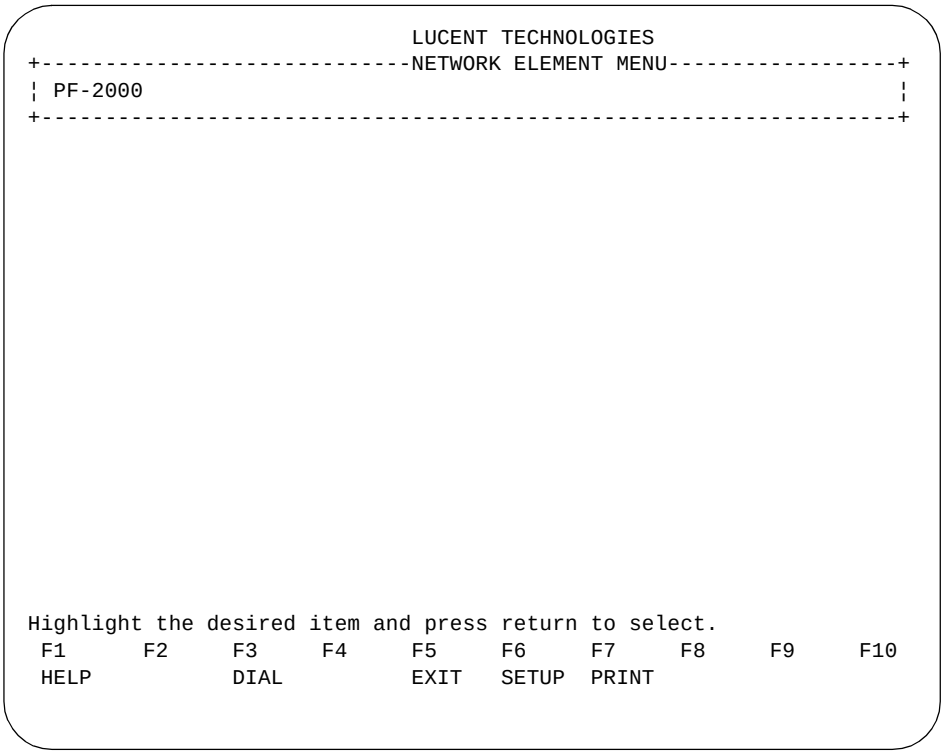
If any of these parameters differ from the PC hardware configuration, they must be changed to match. To select a parameter, press the up arrow or down arrow key. Depress the F1 HELP key for additional information. Once the desired parameter is highlighted, type a “?”. A smaller window will appear which lists all valid settings for the parameter. Select the desired setting by using the arrow keys until it is highlighted. Press the Return or Enter key.

NOTE:

The choice of COM1or COM2 depends on the hardware configuration of your computer. Most laptops and desk tops use COM1, but if COM1 does not work check your hardware manual or try another. Operate at the highest baud rate that works. Select color or monochrome monitor depending on your PC. Blinking Remote on or off causes the upper right corner location indicator (Local ONLY, Local, or Remote) to flash when toggled to the Remote bay. Paging control is turned on and off using the field Paging.

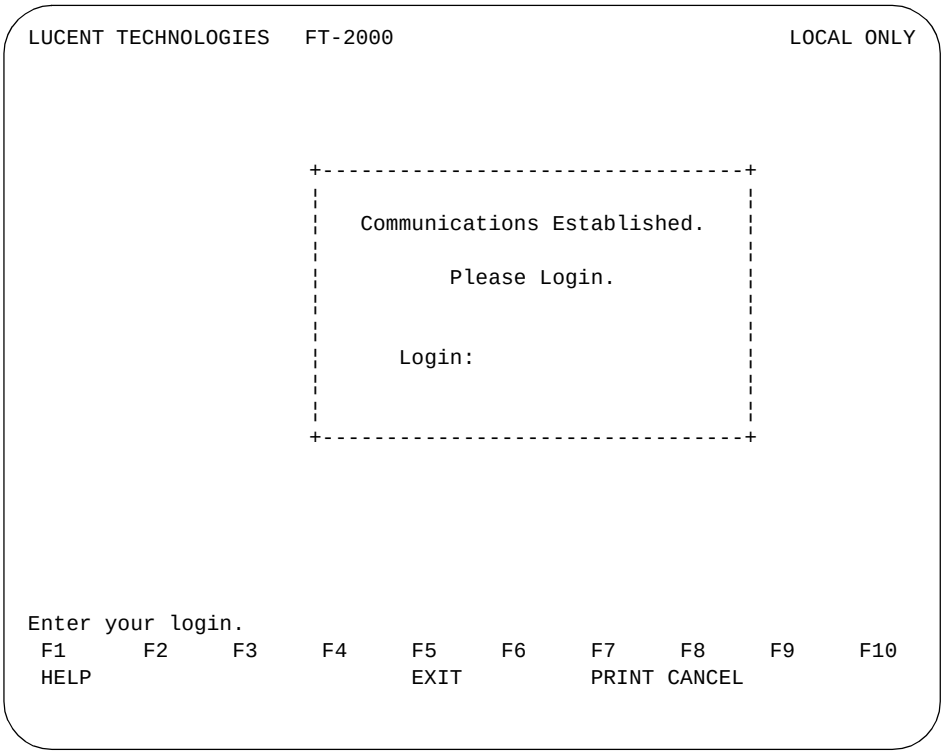
Action: When all the parameter settings are correct for the PC, press F6 to save them. You will not need to repeat this SETUP step again, once the values are saved.

Requirement: The screen below appears:



Action: Use the arrow keys to highlight (select) PF-2000 (Product Family 2000) in the NETWORK ELEMENT MENU. (It may already be selected.) Press the Enter or Return key.

Requirement: The screen below appears:



Action: Type “LUC01” in capital letters at the login prompt, and then press the Enter or Return key. A new prompt labeled “Password:” will appear. Type “FT-2000” in capital letters at the password prompt, and then press the Enter or Return key again.

NOTE:

For security, the password will not be displayed on the screen when it is typed. When successfully logged into the “EXPERT” mode, the CIT will display a “warning” box, press escape to continue. Then a report of all current alarms and status conditions will be displayed. The CIT will display a menu of the types of commands to issue. These commands may be selected by using the arrow keys to highlight the desired command and pressing the Enter or Return key to select. **Pressing “F1” at any time will display a help window.**

Action: When desired, press the LOGOUT (F4) or EXIT (F5) key to exit the session to DOS.

CIT Connection Requirements

This paragraph describes the minimum requirements for the physical connection between the CIT PC and the FT-2000 terminal.

Figure 3 - 1 shows the minimum cabling needed. The RS-232 control lead values are listed for the DCE (user panel) and DTE (interconnection) connectors. The FT-2000 terminal does not change these control lead values or do any active handshaking during communications sessions. The CIT program does actively handshake as follows:

- When a carriage return is entered from the product selection menu of the CIT 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 CIT program expects the CTS and DSR leads to go high.

If the CTS and DSR leads do not both go high on the correct COM port then the CIT program will immediately issue a “Communication with the FT-2000 cannot be established” error message. If the error message is reported after several seconds then the handshaking is probably correct and the problem is with the data transmission being garbled. If a local area network is used to connect the CIT PC to the FT-2000 XON/XOFF software, handshaking must be disabled at both ends of the network connection. The Black Box ME200 Null Handshake Null Modem has the correct wiring as shown in the diagram.

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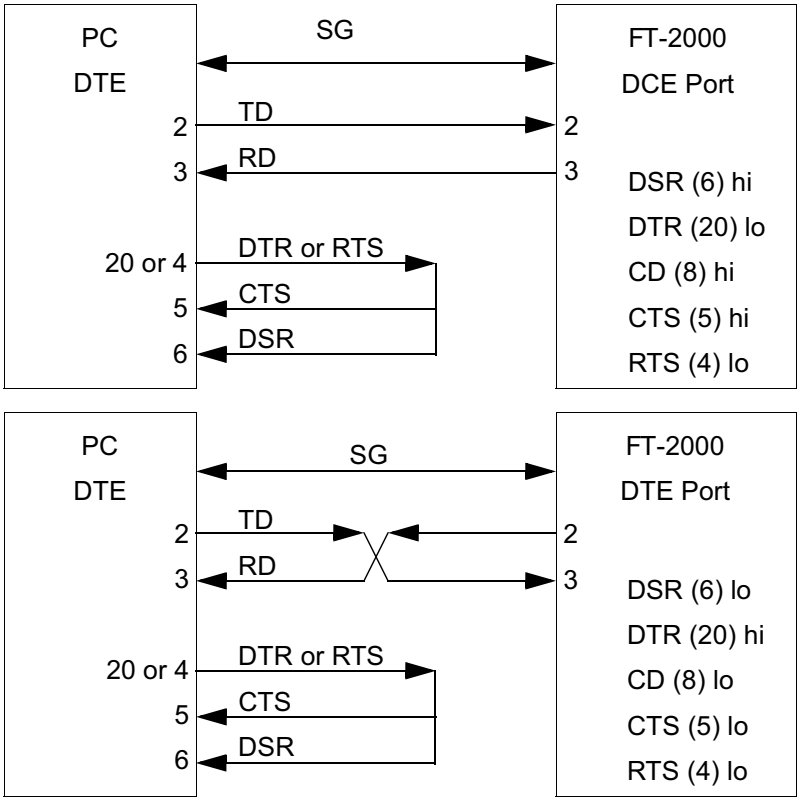

Figure 3-1. CIT Minimum Connections

CIT Command Selection

Command selection for FT-2000 is menu-driven.

- To select a command or parameter, either press the first letter of the word once (or more depending upon how many commands begin with the same letter), or use the arrow keys to highlight the desired item. When the item is highlighted, press the Enter or Return key to select the item.
- **Pressing “F1” at any time will display a help window.**

- At all times the single line, between the function key label boxes at the bottom of the screen and the text display area in the middle of the screen, reminds the user of the next suggested action.
- If at any time during a command selection process it becomes necessary to return to an earlier menu, press the ESC key. Each time the ESC key is pressed, the most recent menu is removed from the screen.
- Once a command has been selected, the default or current value of the parameter will be in the selection box. To obtain a list of valid parameters to change to, type "?". This will display a menu with a list of all valid parameters. If the parameter box is empty, simply press Return or Enter to display the valid choices. The desired parameter may be selected by typing the first letter of the parameter or, by using the arrow keys to highlight the parameter, followed by pressing the Enter or Return key.
- The <F9> Execute key is used to execute the command.
- The <F3> function key is used to toggle between input and output modes. Use this key to display the input menu when output has finished, when the label reads "INPUT".

As an example of how to select and execute a command, the following steps detail how to retrieve the equipment report. This report lists the type and serial number of each circuit pack installed in the FT-2000 terminal. All commands have a similar menu selection process. After each command executes, the <F9> key may be pressed twice to repeat and execute the previous command, if desired.

NOTE:

Communication to the FT-2000 terminal must be established using the "Setup and Login Procedure" before this command selection procedure can be performed.

(1) With the Input Menu displayed, select CONFIGURATION and press Enter or Return.

Requirement: Configuration Commands Menu appears.

(2) Select Retrieve and press Return.

Requirement: Retrieve Commands Menu appears.

(3) Select Equipment and press Return.

Requirement: A parameter entry field prompts the user to select the circuit pack type(s) for which the equipment list is to be retrieved.

(4) Type "?".

Requirement: A list of all valid parameter entries will appear.

(5) Select All and press Return.

(6) Press the F9 key to execute the command.

Requirement: A report which details the slot address, type of circuit pack, apparatus code, series number, *CLEI*[1] code, equipment catalog item (ECI) code, and serial number for each circuit pack is displayed on the screen. If the report is longer than 25 lines, after filling the PC screen, the last line will display “Continue report page-by-page? (y/n)”

(7) Enter “Y” and press Return.

Requirement: The next page of the report will print. Continue until the entire report is printed on the screen. Answering “N” would display the prompt "Continue report without paging? (y/n)", answering "N" again would stop the report or the function key F8 will cancel at any time.

(8) Press the F3 key labeled “INPUT.”

Requirement: The Input Menu appears, ready for the next command

1. CLEI is a registered trademark of Bell Communications Research and stands for Common Language Equipment Identifier

Command List

Table 3-1 lists the commands that can be executed on the FT-2000 Add/Drop Rings Terminal from the CIT.

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Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
FAULT	Retrieve	Alarm (and Status)		Reports Only	
		History		Reports Only	
		Network Alarms		Reports Only	
		State		Reports Only	
	Switch	Line		General	
		Low Speed		General	
		OC3		General	5.0.2
		OC12		General	7.1.0
		Path	STS3	General	4.1.0
			STS1	General	
		Synchronization	Hardware	General	
			Mode	General	
			Reference	General	

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
FAULT	Test	Alarm		General	
		Auto Turnup	DSX	Privileged/ Expert	
			LOCAL	Privileged/ Expert	
		LED		Report Only	
		Telemetry[a]	Parallel	General	
			Serial	General	
	Operate	Alarm Cutoff		Reports Only	
		Loopback	EC1	General	4.0.0
			OC3	General	5.0.2
			OC12	General	7.1.0
			T3	General	
	Release	Loopback	EC1	General	4.0.0
			OC3	General	5.0.2
			OC12	General	7.1.0
			T3	General	
	Allow	Alarm		General	
	Inhibit	Alarm		General	
	Reset			General	

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
CONFIGURATION	Retrieve	Assignment	DCC	Report Only	6.0.1
		Attribute	Alarm	Reports Only	
			Control	Reports Only	
			Environment	Reports Only	
		Circuit	STS1	Reports Only	
		Crossconnection	All	Reports Only	
		Date		Reports Only	
		EC1		Reports Only	4.0.0
		Equipment		Reports Only	
		Low Speed		Reports Only	
		Map	Ring	Report Only	
			Network	Reports Only	6.0.1
			Neighbor	Reports Only	7.1.0
		OC3		Reports Only	5.0.2
		OC12		Reports Only	7.1.0
		OC48		Reports Only	
		Path	Trace	Reports Only	4.0.0
		Protection	Line	Reports Only	
			Low Speed	Reports Only	4.1.0
		Synchronization		Reports Only	
		T3		Reports Only	
		Timeslot	STS-1	Reports Only	

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
CONFIGURATION	Set	Attribute	Alarm	General	
			Control	General	
			Environment	General	
		Date		Privileged	
		EC1		General, Privileged/ Expert	4.0.0
		Low Speed		General	
		OC3		General, Privileged/ Expert	5.0.2
		OC12		General, Privileged/ Expert	7.1.0
		OC48		General	
		Path	Trace	General	4.0.0
		Protection	Line	General	
			Low Speed	General	4.1.0
		State	EC1	General	4.0.0
			T3	General	
		Synchronization		Privileged/ Expert	
		T3		General, Privileged/ Expert	
	Enter	Assignment	DCC	General	6.0.1
		Crossconnection	STS3	General	
			STS1	General	
		Roll	STS3	General	4.1.0
			STS1	General	
		Squelch Map	STS1	General	5.0.2 thru 6.0.2 only

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
CONFIGURATION	Delete	Assignment	DCC	General	6.0.1
		Crossconnection	STS3	General	
			STS1	General	
	Copy	EC1		General, Privileged/ Expert	4.0.0
		OC3		General, Privileged/ Expert	6.0.1
		0C12		General, Privileged/ Expert	7.1.0
		OC48		General	
		Path	Trace	General	4.0.1
		Program		Privileged/ Expert	5.0.2
		T3		General, Privileged/ Expert	
	Update			General	
	Initialize	System		Privileged/ Expert	

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
PERFORMANCE	Retrieve	PM	EC1	Reports Only	4.0.0
			Line	Reports Only	
			Optics	Reports Only	
			Section	Reports Only	
			Start Time	Reports Only	5.0.2
			STS1	Reports Only	
			T3	Reports Only	
			TCA	Reports Only	4.0.0
		PM Mode	T3	Reports Only	5.0.2
		PM Threshold	EC1	Reports Only	4.0.0
			Line	Reports Only	4.0.0
			Optics	Reports Only	4.0.0
			Section	Reports Only	4.0.0
			STS1	Reports Only	4.0.0
			T3	Reports Only	4.0.0
	Set	PM	Start Time	General	5.0.2
		PM Mode	T3	General	5.0.2
		PM Threshold	EC1	General	4.0.0
			Line	General	4.0.0
			Optics	General	4.0.0
			Section	General	4.0.0
			STS1	General	4.0.0
			T3	General	4.0.0
	Initialize	PM	All, Day, QH	General	6.0.2

Table 3-1. Release 9.0, FT-2000 ADR Inputs (Commands) Menu for Add/ Drop-Rings Terminal

Category	Verb	Modifier	Modifier	Security Level	Release Introduced
SECURITY	Retrieve	Active	User	Reports Only	6.0.1
		Far End Communication		Reports Only	
		Login		Reports Only	
		Network Element		Reports Only	
		Security	Network Element	Reports Only	
			Port	Reports Only	
	Set	Far End Communications		Privileged	
		Login	Change	Privileged	
			Delete	Privileged	
			Enter	Privileged	
		Network Element		Privileged	
		Password		Reports Only	
		Security	Network Element	Privileged	
			Port	Privileged	

a. This command is removed from software release 8.

Table 3-2 lists the commands that can be executed on the FT-2000 Repeater Bay or Repeater Shelf.

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Table 3-2. Release 6.0.0, 4.0.0, 2.1.0 - RPTR Inputs (Commands) Menu for Repeater Bay/Shelf

Category	Verb	Modifier	Modifier	Security Level
FAULT	Retrieve	Alarm (and Status)		Reports Only
		History		Reports Only
	Test	Auto Turnup		General
		Led		Reports Only
	Reset			General
CONFIGURATION	Retrieve	Attribute	Environment	Reports Only
		Date		Reports Only
		Equipment		Reports Only
		OC48		Reports Only
	Set	Attribute	Environment	General
		Date		General
	Update			General
	Initialize	System		Privilege
SECURITY	Retrieve	Network Element		Reports Only
		Login		Reports Only
		Security	Network Element	Reports Only
			Port	Reports Only
	Set	Login	Change	Privilege
			Delete	Privilege
			Enter	Privilege
		Network Element		Privilege
		Password		Reports Only
		Security	Network Element	Privilege
			Port	Privilege
PERFORMANCE *				

* These commands are not accessible at the FT-2000 Repeater Bay or Repeater Shelf.

FT-2000 Lightwave System Provisioning

The FT-2000 OC-48 Lightwave System has features provisionable by the user. This provides users the ability to tailor the system to their needs. All provisioning is performed via the CIT. There are no dip-switches or jumper plugs associated with FT-2000 provisioning.

The provisionable features for FT-2000 Add/Drop-Rings Terminal include:

- Alarm settings.
- Node ID, Target ID (name), Directory Server Node and Gateway Network Element (Release 4.1.0 only).
- Date and time settings.
- Enabling/disabling far end communications.
- Port and slot transmission characteristics.
- Protection switching priorities.
- Timing characteristics.
- Security/user login privileges.
- STS-1 and STS-3 routing and crossconnection.
- Performance Monitoring.

The provisionable features for FT-2000 Repeater include:

- Target ID (name).
- Date and time settings.
- Security/user login privileges.

FT-2000 Add/Drop-Rings Terminal Provisionable Features

A partial listing of provisionable features and value settings is given below. Complete information may be obtained in document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*.

CONFIGURATION

Delete-Crossconnection-STS1

Security Category: General

Related Commands: ENTER-CROSSCONNECTION-STS1

This command allows the user to delete a crossconnection from the system.

Delete-Crossconnection-STS3

Security Category: General

Related Commands: ENTER-CROSSCONNECTION-STS3

This command allows the user to delete a crossconnection from the system.

Enter-Crossconnection-STS1

Security Category: General

Related Commands: DELETE-CROSSCONNECTION-STS1

This command allows the user to enter a crossconnection into the system.

Enter-Crossconnection-STS3

Security Category: General

Related Commands: DELETE-CROSSCONNECTION-STS3

This command allows the user to enter a crossconnection into the system.

Enter-Assignment

Security Category: General

Related Commands: DELETE-ASSIGNMENT

This command allows the user to enter the DCC assignment into the system.

- Slot {1A - 8B}
- DCC Channel {1 - 8}
- Orientation {User, Network}

Delete-Assignment

Security Category: General

Related Commands: ENTER-ASSIGNMENT

This command allows the user to delete the DCC assignment from the system.

- Slot {1A - 8B}
- DCC Channel {1 - 8}

Set-Attribute-Alarm

Security Category: General

Related Commands: RETRIEVE-ATTRIBUTE-ALARM

This command allows the user to set the alarm delays. The alarm delays include the following:

- Incoming Signal Alarm Delay

  0-120 second - 2 second default

- Alarm Clear Delay

  0-120 second - 10 second default.

- Tributary Reporting

  NO - default

Set-Attribute-Control

Security Category: General

Related Commands: RETRIEVE-ATTRIBUTE-CONTROL

This command provisions character strings associated with the miscellaneous discrete control points. The input parameters are the address of the control output point and a character string to associate with the address.

- The point address range is 1-4, no default.
- The default character string is “control n” where n is the number of the point reflected in the output point address.
- The character string may be up to 26 characters long.

Set-Attribute-Environment

Security Category: General

Related Commands: RETRIEVE-ATTRIBUTE-ENVIRONMENT

This command provisions the alarm level and character strings associated with each miscellaneous discrete environmental input point. The input parameters consist of the following:

- The environmental input point address, 1-16, no default
- The alarm level desired - {CR, MJ, MN, NA, NR}, default MN
- The description, a 26-character alphanumeric string, default “environment n” where n corresponds to the input point address.

Set-Date

Security Category: General

Related Commands: RETRIEVE-DATE

This command allows a user to set the network element correct time and calendar date. The user may also specify the date(s) on which to change to/from daylight savings time. The input parameters are as follows:

- The Date in the form YY-MM-DD
- The Hours of the correct time {0-23}
- The Minutes of the correct time {0-59}
- The Seconds of the correct time {0-59}
- The Standard Time Zone {string of 3 or less characters}
- Start Daylight Savings Date in the form of MM-DD
- Stop Daylight Savings Date in the form of MM-DD, and
- Daylight Savings Time Zone {string of 3 or less characters}.

Set-EC1

Security Category: General

Related Commands: RETRIEVE-EC1

This command sets the alarm level and signal degrade threshold of EC-1 interface ports.

- Slot {All, 1A-8B}
- Alarm Level {CR, MJ, MN, NA, NR}
- Signal Degrade Threshold {-6, -3}

Set-Low-Speed

Security Category: Privileged

Related Commands: RETRIEVE-LOW SPEED

This command specifies the protection switching priority of a low speed slot. Input parameters are:

- Slot {All, 1A-8B}
- Protection Switching Priority {High, Low}.

Set-OC3

Security Category: General

Related Commands: RETRIEVE-OC3

This command specifies the characteristics for selected LS INTFC slot addresses.

- Slot {All, 1A-8B}
- Protection Mode - from OC3 {0x1, 1+1}
- Protection Mode - from OC48 {0x1, 1+1}
- Alarm Level {CR, MJ, MN, NA, NR, NO}
- Signal Degrade Threshold {-5, -6, -7, -8, -9}
- Output AU4 Mapping {SONET, SDH}
- Sync Messaging[1] {ENABLED, DISABLED, S BYTE, K BYTE}

Set-OC12

Security Category: General

Related Commands: RETRIEVE-OC12

This command specifies the characteristics for selected LS INTFC slot addresses.

- Quad {1-4}
- Protection Mode - from OC12 {0x1, 1+1}
- Protection Mode - from OC48 {0x1, 1+1}
- Alarm Level {CR, MJ, MN, NA, NR, NO}
- Signal Degrade Threshold {-5, -6, -7, -8, -9}
- Output AU4 Mapping {SONET, SDH}
- Sync Messaging[2] {ENABLED, DISABLED}

1. Introduced in Release 7.1, S BYTE and K BYTE added in Release 9.0

2. Introduced in Release 7.1.

Set-OC48

Security Category: General

Related Commands: RETRIEVE-OC48, COPY-OC48

This command specifies the characteristics of the OC-48 line. These characteristics consist of the signal degrade threshold.

Input parameters are:

- Line {All, 1E, 1W}
- Signal Degrade Threshold {-5, -6, -7, -8, -9}
- Sync Messaging[1] {ENABLED, DISABLED}

Set-Path-Trace

Security Category: General

Related Commands: RETRIEVE-PATH-TRACE

This command sets transmitted and expected received path traces.

- Slot {All, 1A-8B}
- RCV Path Trace (string of 62 or less characters)
- XMIT Patch Trace (string of 62 or less characters)

Set-Protection-Line/Low Speed

Security Category: General

Related Commands: RETRIEVE-PROTECTION LINE

This command specifies the line protection switching characteristics for the Network Element.

Input parameters are:

- Wait to restore, integer {0-12}, default is 5 minutes
- Setting applies to both high speed and low speed protection switching in Releases 3.0.1 and 4.0.0. In Release 4.1.0, 5.0.1, 5.0.2, 5.0.3, 6.0.1, 6.0.2, and 7.0.0 low speed and high speed settings are separate.

Set-State-EC1

Security Category: General

Related Commands: RETRIEVE-EC1

1. In software releases 7.2 and later, OC-48 Sync Messaging is supported for (4) and (5)-type optics. Sync Messaging must be disabled at those nodes with (2)-type optics installed. This may be accomplished by using the CONFIGURATION- Set-OC48-ALL command.

This command sets the primary state of both directions of EC-1 ports to “AUTO or MNON”

- Slot {All, 1A-8B}
- Direction from {STSX1, OC48}
- Primary State {Auto, Mon}

Set-State-T3

Security Category: General

Related Commands: RETRIEVE-T3, RETRIEVE-STATE

This command sets the memory administrative state of a DS3 port.

Input parameters are:

- Slot {All, 1A-8B}
- Direction from {DSX, OC48}
- Primary state, {AUTO, NMON}.

Set-Synchronization (Required)

Security Category: General (In Release 4.1.0 and higher expert mode only)

Related Commands: RETRIEVE-SYNCHRONIZATION,SWITCH-SYNCHRONIZATION

This command specifies the synchronization characteristics of FT-2000.

Input parameters are:

- Provisioned mode, {Free Running, Through Timed, default R9-Externally Timed, Line Timed}, default R3-R7-Free Running.
- Primary DS1 In\Out Format {SF, ESF}, default SF
- Secondary DS1 In\Out Format {SF, ESF}, default SF
- Primary DS1 In Line Code {AMI, B8ZS}, default AMI
- Secondary DS1 In Line Code {AMI, B8ZS}, default AMI
- DS1 Out 1 Equalization {20, 40, 60, 80, 100}, default 20
- DS1 Out 2 Equalization {20, 40, 60, 80, 100}, default 20.

Set-T3

Security Category: General

Related Commands: RETRIEVE-T3 COPY-T3

This command specifies the characteristics of a DS3 port.

Input parameters are:

- Slot {All, 1A-8B}
- Violation Monitor Removal, {VMR, VM, CC w/ AIS, CC w/o AIS}, default VMR
- Alarm level, {CR, MJ, MN, NA, NR}, default CR
- Signal Degrade Threshold, integer {-6, -3}, default -6 (log base 10).

SECURITY

Set-Login-Change

Security Category: Privileged

Related Commands: RETRIEVE-LOGIN, SET-LOGIN-ENTER, SET-LOGIN-DELETE, SET-PASSWORD

This command enables a privileged user to edit the login ID, password, user privileges, and (enable/disable) the status of any nonprivileged user, and to edit the login ID and password of the other privileged user. It can also be used to re-enable a nonprivileged login ID that has expired due to login aging.

Input parameters are as follows:

- Login {string of 10 or less characters}
- New Login {string of 10 or less characters}
- New Password
- Re-enter New Password
- User Privilege {General, Reports Only, Privileged}
- Status {Enabled, Disabled, <expired>}.

Set-Login-Delete

Security Category: Privileged

Related Commands: RETRIEVE-LOGIN, SET-LOGIN-ENTER, SET-LOGIN-CHANGE, SET-PASSWORD

This command enables a privileged user to delete nonprivileged login IDs. If the login is active at the time the command is executed, the user is immediately logged out and disconnected from the Network Element.

Input parameters are as follows:

- Login {string of 10 characters}.

Set-Login-Enter

Security Category: Privileged

Related Commands: RETRIEVE-LOGIN, SET-LOGIN-DELETE, SET-LOGIN-CHANGE, SET-PASSWORD

This command enables a privileged user to enter a new login ID.

Input parameters are as follows:

- New Login {string of 10 or less characters}
- New Password
- Re-enter New Password
- User Privilege {General, Reports Only}.

Set-Network-Element (Required)

Security Category: Privileged

Related Commands: RETRIEVE-NETWORK ELEMENT

This command sets the Target ID (TID) and the Node ID (NID) of the Network Element. This command is also used to set one Network Element to the Directory Server terminal. This command is also used to set one Network Element to be the TL-1 Gateway terminal in Release 4.1.0.

Input parameters are:

- TID, 20 character alphanumeric string.
- NID, number from 0 to 15, each NE must be numbered uniquely. In release 6.0.0-ADR and later this number will automatically be generated by the FT-2000 once the ring has been established and one (and only one) of the nodes have been defined as the DSNE.
- Directory Server = {Yes, No} (for Release 7.2 and earlier).
- TL-1 Gateway = {Yes, No} (for Release 4.1.0 only).
- X25 Packet Size = {128, 256} (Release 6.0.0 and greater).
- Alarm Group = {0-255} (Release 6.0.0 through 7.2).
- Alarm Gateway Network Element = {Yes, No} (Release 6.0.0 through 7.2).

Set-Password

Security Category: Reports Only

Related Commands: SET-LOGIN, RETRIEVE-LOGIN

This command changes a user's password. All users can change their own passwords, including Reports Only users.

- Input parameters are:
- Old Password {string of 10 or less characters}
- New Password
- Re-enter New Password.

Set-Security-Network Element

Security Category: Privileged

Related Commands: RETRIEVE-SECURITY-NETWORK ELEMENT

This command enables a privileged user to set the global security parameters for the system.

Input parameters are:

- Logins Allowed {Yes, No}.
- Password Aging = {7 - 999}
- Login Aging = {7 - 999}

Set-Security-Port

Security Category: Privileged

Related Commands: RETRIEVE-SECURITY-PORT

This command enables a privileged user to activate a port to accept logins and to provision the time-out value of the access ports.

Input parameters are:

- Type {X25, DCE, DTE, DCC}
- Commands: RETRIEVE-SECURITY-PORT-X25
- Channel Type = {Switched, Permanent}
- Table Entry = {1 - 6}
- OS Type = {maintenance, cmd-resp, other, none}
- Calling Address = {string of 15 or less characters}

Commands: RETRIEVE-SECURITY-PORT-DTE

- Port Access = {Enable, Disable}
- Inactivity Time Out (Minutes) = {0 - 999}
- Port Type = {CIT, TL1}

Commands: RETRIEVE-SECURITY-PORT-DCE

- Port Access = {Enable, Disable}
- Inactivity Time Out (Minutes) = {0 - 999}
- Port Type = {CIT, TL1}

Commands: RETRIEVE-SECURITY-PORT-DCC

- Port Access = {Enable, Disable}

Equipment Installation

4

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Equipment Installation

4

Overview

This Chapter covers the general requirements and methods for installing Seismic Network Bay framework and associated end guard assembly used on FT-2000. For a more detailed look at installing the framework turn to Appendix B of this document. Appendix B contains 065-215-250 *Seismic Network Bay Frame INSTALLATION Guide.* This document is an excellent source for information related to the installation of the FT-2000 bay and associated material.

NOTE:
This chapter and the following chapters refer to installing a FT-2000 OC-48 Light-wave Terminating Bay (E-Bay). Although DAed in December, the information is still correct. If you are installing a FT-2000 OC-48 Dual Add/Drop-Rings Terminal, please refer to Appandix F for information on this type of bay. The information included in Appendix F is given as asupplement to the information contained in this and the following chapters.

Equipment

The procedure for installing the FT-2000 equipment is summarized as follows:

NOTE:
Please note the following precautions when un-crating equipment:

- Do NOT ship or store containers in any position other than it's marked position.
- Move containers in the shipping position only. Verify that containers have not been damaged. It is important that all containers be handled with care and that no units are dropped.

- Uncrate all materials in quarters seperate from the equipment room so as to keep dust and lint away from other equipment.
- Uncrate the bay in it's shipping position.
- Care should be exercised when uncrating bays so that the equipment will not be damaged.
- Four people are required to move the bay. Move the bay by lifting from the bay frame.

NOTE:
Refer to Appendix B of this document for more detailed instruction.

- Check material and tools
- Determine Earthquake Zone
- Mark floor layout and drill mounting holes
- Uncrate equipment bay
- Haul equipment to the station
- Erect and align bays and framework
- Ground Bay Framework
- Install end guard assembly

Check Material and Tools

Material

Material shipped with the bay includes:

- The equipment bay, along with circuit packs per the order
- Floor mounting hardware kit (see Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide* to determine which Drop-in anchor kit to use).
- Two power cables (4 ft. or longer as specified by the order).
- Installation spare piece parts, fuses, EMI metal finger stock (for use in repairing the covers).
- Top Bay Cover Plate (mounted on equipment bay).
- High speed optical circuit packs, packed individually.
- Spare circuit packs per the order.

- Manuals and software per the order.

Tools

The tools required for installation of the FT-2000 Lightwave System are listed below in Table 4-1, with the exception of small hand tools normally used.

Table 4-1. Required Tools for installation

Quantity	Comcode	Description
1	-	Vacuum
1	-	Drilling hammer (for 5/8 drill)
1	54720	C-Tap *Thomas & Betts** or equivalent
1	TBM2 or TMB8	Crimping tool *Thomas & Betts** or equivalent (use 54720)
1	Die code brown or pink	*Thomas & Betts** (use 54720)
1	-	Safety goggles
1	406902049	Anchor Setting Tool for drop-in Anchors
1	406899831	Anchor Setting Tool for Heavy-Duty Anchors
1	-	3/4” Torque wrench, 25 ft.-lbs. (for 1/2” bolts)
1	-	19-mm Open End Wrench (or 3/4”)
1(optional)	TS-586	4 wheels and wrench for rolling bay into place

* Registered trademark of Thomas & Betts Corporation.

Determine Earthquake Zone

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

Mark Floor Layout and Drill Mounting Holes

Floor Marking

Refer to Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide* pages for bay mounting information. Bays need a one-eighth-inch clearance between adjacent bays framework when mounted side by side. Refer to the job floor plan for bay-lineup location, and mark the floor for drilling using a marking pencil or felt pen.

Floor Drilling

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

Refer to Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide* for bay mounting information. Noting the correct earthquake zone for your area, special attention should be paid to the Anchor Installation for Heavy Duty Anchor or Drop-In Anchor to ensure correct floor drilling.

Uncrating and Hauling Precautions

NOTE:
Please note the following precautions when uncrating equipment:

- Do NOT ship or store containers in any position other than its marked position.
- Do not stack equipment more than two bays high when it is being transported over the road or is being held in a warehouse.
- Move containers in the shipping position only. Verify that containers have not been damaged. It is important that all containers be handled with care and that no units are dropped.

- Uncrate all material in quarters separate from the equipment room so as to keep dust and lint away from other equipment.
- Uncrate the bay in its shipping position. All bays are shipped in a dust-protective, antistatic plastic bag and placed in a wooden container. The bay is in the container on its right side.
- Care should be exercised when uncrating bays so that the equipment will not be damaged. The tools required for uncrating bays are standard pinch-bar and claw-type hammers. Use a pinch-bar and/or hammer only in areas that have been nailed. The bottom plate where the bay rests may remain until the bay is at its final position. Remove the plastic bag and all foreign material.
- Once the equipment is uncrated and near the location where it will be installed, remove the stile strips secured to the left side of the bay and set aside for future use.
- Use the bay's channel-type framework when lifting and moving the bay into position.

Erect and Align Bays and Framework

Adding Bay Extenders

Assemble bay extenders for high ceiling offices before erecting and mounting the bay in the lineup. Refer to Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide* for mounting information.

Bay Mounting and Assembly Procedure

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

(1) Move the bay to its proper floor location. Exercise care when moving the bay and avoid sudden shock or strain to the equipment.

(2) Use two or more technicians to erect the bay into position. For added safety, holes are provided at the top of the bay for lifting if required. To use these holes, assemble a 5/8 11-inch eye bolt in each hole and tie off with rope to a solid overhead structure.

(3) Lift the bay and place it into its proper location in the lineup. Visually inspect for obvious damage.

(4) Before the bay is secured to the floor, verify that it is level so that alignment with adjacent bays using junction plates can occur. Trial fit the junction plates. If junction plates can be assembled onto an adjacent bay, it can be assumed

that the bays are level. Refer to Appendix B: document 065-215-250 *Seismic Network Bay Frame Installation Guide*, for shim part numbers. The distance between bays in a lineup is 1/8 inch.

(5) Assemble the bay to the floor using specific and supplied hardware. Be sure to note earthquake zone requirements, and follow instructions in Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide*.

(6) Assemble the junction plates as described in Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide*. Each bay requires three junction plates.

Ground Bay Framework

Connecting the frames to building ground serves two purposes:

(1) A direct earth ground connection for lightning protection, and

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

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

All FT-2000 frames are shipped with ground cable assemblies. It will be necessary to terminate the ground wire in the cable rack, see Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide*.

Install End Guard Assembly

When an end guard assembly is required, the method described applies to either left-hand or right-hand growth.

The parts that are needed for one end guard assembly are given in Appendix B, document 065-215-250 *Seismic Network Bay Frame Installation Guide*.

Cable Installation - ADR Terminal

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Cable Installation - ADR Terminal

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Overview

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

NOTE:
All instructions in this chapter referring to the low speed shelf, and figures used are referring to the new low speed shelf introduced in approximately June 1997.

This Chapter covers FT-2000 Add/Drop-Rings Terminal cable installation, which includes:

- Power (battery A and battery B) cable and top bay cover plate installation
- Low speed interface cable installation and connectorizing low speed interface cables
- Office alarms, parallel telemetry, and miscellaneous discrete cable installation
- Serial telemetry cable installation
- X.25 telemetry cable installation
- Craft interface terminal (CIT) and data terminal equipment (DTE) cable installation
- Input timing (primary/secondary) cable installation
- Output timing cable installation
- High and Low speed fiber and fiber protection installation
- Line orderwire, section orderwire, section user channel, and line growth cables installation

General Considerations

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

CAUTION:
Connectors on the Low Speed System Controller Interconnect panel and the Enhanced High Speed 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 protection is maintained.

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

Keep the following information under consideration during cable installation:

- This cable information is the latest cable information available at the time of the issue. For up-to-date information, refer to the ED cable drawings listed in the Chapter 1, “Overall Installation and Test Considerations.”
- For ordering information, refer to document 365-575-100, *FT-2000 OC-48 Lightwave System Application, Planning, and Ordering Guide*.
- To simplify installation, install low speed input/output cables starting from the left side of the interconnection panel and work towards the right.
- If additional room is needed for installing the cables at the top of the interconnection panel (Low Speed Shelf - System Controller), remove the heat baffle that is mounted above the panel. This must be returned to its original state at completion of cable installation.
- All shielded cable that is less than 25 feet in length must have its shield grounded. If cables are over 25 feet in length, it is advised to ground the shield.
- **Do not** use cable ties with the optical fiber.
- Place optical fiber jumpers in protective tube or channel, such as polyvinyl chloride (PVC) tubing or *PANDUIT*# channel, when running the cable from the FT-2000 OC-48 Lightwave System to the cable rack.
- Place optical fiber jumpers in the cable rack in a protected channel with nothing on top of them.

*. Registered trademark of F.J.W. Industries.

#. Registered trademark of Panduit Corporation.

- Fan alarm cable installation
- Final verification
- **Do not** use cable ties (use lacing cord instead) for securing the coaxial cable. The use of cable ties can alter the electrical characteristics of the cable, if pulled tight. Do not overtighten the lacing cord, because this could also alter the electrical characteristics of the cable.
- Maintain a minimum of 0.5 inches of 734D coaxial cable bend radius.
- Maintain a minimum of 0.25 inches of 735A or 1735006A coaxial cable bend radius.
- FT-2000 must be equipped with the front and rear covers at the completion of the installation to ensure proper air flow and EMI shielding.
- Do not remove the backplane cover during the installation process since all cable installation will be done from the front.
- Small metal covers are attached at each side cable opening on the interconnection panels. When cabling is completed, move the cover against the cables and secure it. This will improve the terminal's electromagnetic interference (EMI) enclosure. Do this for both the Enhanced High speed shelf, and the Low Speed Shelf - System Controller.
- Low speed signal outputs should always be terminated to ensure proper transmission.
    - — DS3 patchcords (loopback cables) must have the **IN** jack connected before the **OUT** jack.
    - — When removing a patchcord (loopback cable), the **OUT** jack must be removed before the **IN** jack.

Power Cable Installation

Description

The FT-2000 Add/Drop-Rings Terminal is powered by -48 volt direct current. Since redundant power is used to ensure maximum availability of the terminal, two battery power feeds are required for each terminal (feed A is Red and feed B is Blue).

Power Requirements

The power requirements for FT-2000 Add/Drop-Rings Terminal are as follows:

- Two feeders (A and B) are required for powering the terminal.
- Each independent feeder must supply -48 volts direct current and a return.
- Each feeder capacity must be 30 amperes for early single shelf bays (E type) and Dual Add/Drop-Rings Terminal at the battery distribution fuse board (BDFB).

Table 5-1 below gives power dissipation for FT-2000 terminals. Refer to Floor Plan Data Sheet FPD 804-911-168 for complete information on power engineering for the FT-2000 OC-48 Lightwave System.

Table 5-1. Power Dissipation

Equipment Package	Maximum Power Dissipated (Watts)
FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings (fully equipped)	490
FT-2000 OC-48 Add/Drop-Rings Terminal for 2-Fiber Rings 0% add/drop configuration (equipped with no low speed transmission or switching circuit packs)	315

Available Power Cables

Table 5-2 lists power cables available for installing an FT-2000 Add/Drop-Rings Terminal.

Table 5-2. Available Power Cables

ED-9C103-21 Cable Group	Cable Length (ft.)	Use With Power Bus	Color
1	15	A	Red
2	15	B	Blue
11	As Required	A	Red
12	As Required	B	Blue

Two Group 1 cables can be used for other applications. Cables that are connectorized at both ends are also available, consult the *FT-2000 Applications, Planning and Ordering Guide*.

Groups 2 and 3 cables are required when bay extenders are mounted on the bay frame.

Groups 5 and 6 cables are required when an overhead cable rack is mounted immediately above the terminal.

Groups 21 and 22 cables are required for raised floor applications.

Power Cable Connection

The FT-2000 Add/Drop Rings Terminals will be shipped with the Top Bay Cover Plate installed and power cable extenders which will be cable tied to the cover plate.

(1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).

NOTE:
Leave the fuses out or breakers off until performing the steps in Chapter 6, “Powering and Network Element Start Up” of this document.

(2) Label 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.

(3) Check that the supplied power feed cables are labeled for battery A (RED) and battery B (BLUE) use. Connect them to the battery feed connections at the appropriate battery A or battery B terminal connectors located on the fuse panel at the top of the FT-2000 Add/Drop-Rings Terminal.

(4) The power cable extenders are tied just above the right side slot on the cover plate and are mechanically keyed to prevent incorrect insertion. Be sure to fully seat the cables until they are locked into the connector on the extender, then route toward the battery distribution fuse board or other protection equipment.

(5) Splice feeders from the battery distribution fuse board to the FT-2000 Add/Drop-Rings Terminal power cables. The red power lead connects to -48V. The white power lead connects to the power feed return.

Low Speed Cable Installation

Description

FT-2000 Add/Drop-Rings Terminal Release 4.0.0 and later interfaces with EC-1 SONET signals and DS3 low speed signals (Release 3.0.1 is DS3 only). Each low

speed interconnection panel contains 96 BNC connectors: 48 low speed signal IN connectors and 48 low speed signal OUT connectors.

NOTE:

Releases 5.0.1 and greater support the OC3 optical low speed interface. In addition, release 7.1.0 and higher support IS3 and OC12 optical low speed interfaces. Optical connections are made with fiber jumpers directly to the faceplate of the optical Interface unit.

Low speed cables may be cut to length and terminated at the central office. KS23558, L4, L5 and L6 connectors must be soldered to the coaxial cable center conductors. KS23558 L14 and L16 conductors may either be crimped or soldered to the coaxial cable center conductors. KS23558 L15 may be crimped to 734D cable center conductors.

It may also be necessary to splice 734D cable to 735A cable, using a 219P connector or a KS23942, L2 connector.

Connectorization Tools

It is important to use the TK-604 tool kit or the ED-8C739-50 tool kit for connectorizing coaxial cable with BNC connectors. The TK-604 tool kit contains all the tools necessary to strip coaxial cables and properly crimp and/or solder the BNC connectors. The ED-8C739-50 tool kit contains all the tools necessary to strip coaxial cables and properly crimp the BNC connectors, it does not contain any soldering tools.

Connectorizing Low Speed Cable with BNC-Type Connector

CAUTION:

Failure to properly connectorize coaxial cable with BNC connectors may cause service interruptions. Customer service that is interrupted by a coaxial cable failure is not protected.

Things to consider when connectorizing coaxial cable with BNC connectors:

- If you are in doubt about whether or not the BNC pin should be soldered, then solder the pin (better to be safe).
- Larger conductors take a longer time to heat before soldering. Poor soldering of the center conductor is the largest cause of connector related failures.
- Bare copper conductors **must be** tinned before attaching to connector.
- Do not double crimp a BNC termination. Cut an unsuccessful termination off and do it again.

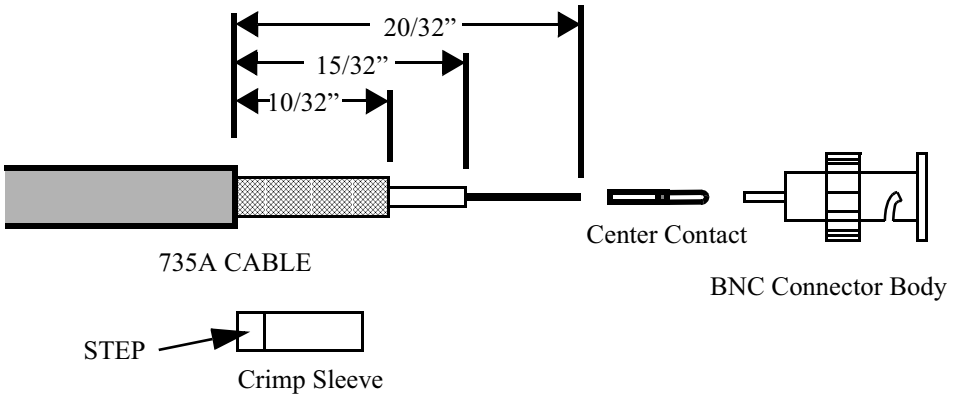


Figure 5-1. FT-2000 Low Speed Cable (735A) and BNC-Type Connector

NOTE:

Figure 5-1 shows a BNC-type connector and a low speed cable (735A). Dimensions shown are those specified for the KS-23558, L6 and L16 BNC connector. The cable dimensions may vary slightly for different BNC-type connector manufacturers. FOLLOW INSTRUCTIONS SUPPLIED WITH THE KS CONNECTORS. Instructions given in this manual are in case the card is missing and are for KS-23558 L6 and L16 connectors only.

(1) With the STEP away from the connector body, slip the crimp sleeve over the cable.

(2) Prepare the cable to the dimensions shown in Figure 5-1.

(3) If crimping the L16 center contact to conductor: use only the R-5761 hand tool. This is the only tool certified to produce a reliable crimp. Slide the contact all the way on to the center conductor. Insert the contact all the way into the crimping tool. Be sure that contact butts against the dielectric. Fully close the crimping tool. Twelve uniform indents must appear in the contact body.

(4) If soldering the L6 or L16 connector, insert solder slug in the hole in the end of the gold pin and apply heat with the resistance tweezers. Slide the gold pin over the exposed part of the coaxial cable center conductor. Remove heat and let cool, connecting the gold pin to the center conductor.

(5) Being careful not to disturb the foil shield, using a scribe (or equivalent tool), push back and fan out the braided shield from the foil shield.

(6) Insert the gold pin into the body of the BNC-type connector until the pin locks in place.

NOTE:
The braided shield should be outside the body of the BNC-type connector, and the foil should be inside the body.

(7) Slide the outer ferrule over the braided shield to the back of the BNC-type connector. Crimp the ferrule to secure the BNC plug onto the cable. Use a tool with a width of 0.5 inch and a die flat dimension of 0.178 inch.

Splicing Low Speed Cable Using a 219P Connector

Figure 5-2 shows the 219P splice and associated low speed cables (735A and 734D). Follow the numbered steps to splice low speed cables together using the 219P connector.

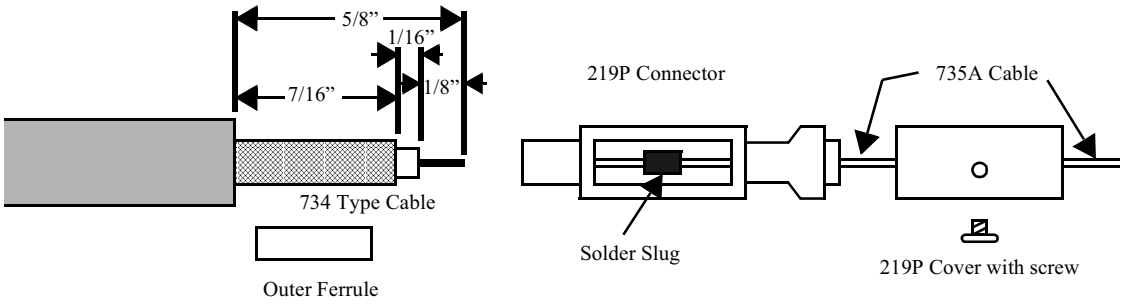


Figure 5-2. FT-2000 Low Speed Cable Splicing

(1) Prepare the 734D cable to the dimensions shown in Figure 5-2.

(2) **Tin** the center conductor if cable is 734A. Untinned 734A is the most common cause of related splice failure.

(3) Remove the cover from the 219P connector and slide it back over the 735A cable.

(4) Slide the ferrule onto the 734 Type cable.

(5) Being careful not to disturb the foil shield, using a scribe, or equivalent tool, push back the braided shield from the foil shield on the 734 Type cable.

(6) Fully insert the 734 type center conductor into the end of the 219P connector that is not preconnected to the 735A cable. The braided shield should be outside the body of the connector. The foil should be inside the connector body.

(7) Slide the ferrule over the braided shield to the end of the 219P connector and crimp using a tool with a width of 0.5 inch and a die flat dimension of 0.255 inch.

(8) Check that the crimp is uniform.

(9) Flow the solder slug contained in the splice with a soldering iron by heating below the slug. This will create an electrical connection between the two cables.

(10) Check that the solder is fully flowed between the two center conductors and the wire entry holes are fully plugged with solder.

(11) Slide the cover into place on the 219P connector and tighten the screw.

Splicing Low Speed Cable Using a KS-23942, L2 Connector

The KS23942, L2 (735/734 type cable) connector is a splice that is assembled using the same procedure as a KS-type BNC cable termination. The center gold pin and crimp sleeve are identical to those components in a KS-type BNC cable termination for the equivalent cable. Detailed assembly instructions are provided with the splice.

Available Low Speed Cables

Low Speed Interface Cables to DSX-3 Cross-Connection or Other BNC Connectorized Equipment

Table 5-3 lists all low speed interface cables that are available to interface between FT-2000 and a DSX-3/4 cross-connection panel, DDM-2000, DACS III-2000 or DACS IV-2000 that use BNC connections.

Table 5-3. Low Speed Interface Cables - FT-2000 to DSX 3/4, DDM-2000, DACS III-2000 or DACS IV-2000 (BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
735type Single conductor cable	G.1	75	AA	FA (LA)
	G.2	100	AA	FA (LA)
	G.3	150	AA	FA (LA)
	G.4	250	AA	FA (LA)
	G.5	As reqd.	AA	FA (LA)
1735006type 6-Conductor cable	G.101	75	6BA	6FA (6LA)
	G.102	100	6BA	6FA (6LA)
	G.103	150	6BA	6FA (6LA)
	G.104	250	6BA	6FA (6LA)
	G.105	As reqd.	6BA	6FA (6LA)
735type/734type Single conductor cable	G.301	75	DAD	FAD (LAD)
	G.302	100	DAD	FAD (LAD)
	G.303	150	DAD	FAD (LAD)
	G.304	250	DAD	FAD (LAD)
	G.305	As reqd.	DAD	FAD (LAD)
734type Single conductor cable	G.301	75	DA	1FA (1LA)
	G.302	100	DA	1FA (1LA)
	G.303	150	DA	1FA (1LA)
	G.304	250	DA	1FA (1LA)
	G.305	As reqd.	DA	1FA (1LA)

Table 5-3. Low Speed Interface Cables - FT-2000 to DSX 3/4, DDM-2000, DACS III-2000 or DACS IV-2000 (BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
734type/735type Single conductor cable	G.301	75	DAD	1FA (1LA)
	G.302	100	DAD	1FA (1LA)
	G.303	150	DAD	1FA (1LA)
	G.304	250	DAD	1FA (1LA)
	G.305	As reqd.	DAD	1FA (1LA)

Low Speed Interface Cables to DACS III-2000

Table 5-4 lists all low speed interface cables that are available to interface between the FT-2000 and DACS III-2000 Digital Cross-Connect System, when the DACS III-2000 does not use BNC connections.

Table 5-4. Low Speed Interface Cables - FT-2000 to (DACS III-2000 Non BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
735type Single conductor cable	G.1	75	AC	FA (LA)
	G.2	100	AC	FA (LA)
	G.3	150	AC	FA (LA)
	G.4	250	AC	FA (LA)
	G.5	As reqd.	AC	FA (LA)

Table 5-4. Low Speed Interface Cables - FT-2000 to (DACS III-2000 Non BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
1735006type 6-Conductor cable	G.101	75	6BC	6FA (6LA)
	G.102	100	6BC	6FA (6LA)
	G.103	150	6BC	6FA (6LA)
	G.104	250	6BC	6FA (6LA)
	G.105	As reqd.	6BC	6FA (6LA)
735type/734type Single conductor cable	G.301	75	DAD	FCD (LCD)
	G.302	100	DAD	FCD (LCD)
	G.303	150	DAD	FCD (LCD)
	G.304	250	DAD	FCD (LCD)
	G.305	As reqd.	DAD	FCD (LCD)
734type Single conductor cable	G.301	75	DA	FCD (LCD)
	G.302	100	DA	FCD (LCD)
	G.303	150	DA	FCD (LCD)
	G.304	250	DA	FCD (LCD)
	G.305	As reqd.	DA	FCD (LCD)
734type/735type Single conductor cable	G.301	75	DAD	FCD (LCD)
	G.302	100	DAD	FCD (LCD)
	G.303	150	DAD	FCD (LCD)
	G.304	250	DAD	FCD (LCD)
	G.305	As reqd.	DAD	FCD (LD)

Low Speed Interface Cables to DACS IV-2000

Table 5-5 lists all low speed interface cables that are available to interface between FT-2000 and DACS IV-2000 Digital Cross-Connect System, when the DACS IV-2000 does not use BNC connections.

Table 5-5. Low Speed Interface Cables - FT-2000 to (DACS IV-2000 Non BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
735type Single conductor cable (DS3 IN)	G.1	75	AD	FA (LA)
	G.2	100	AD	FA (LA)
	G.3	150	AD	FA (LA)
	G.4	250	AD	FA (LA)
	G.5	As reqd.	AD	FA (LA)
735type Single conductor cable (DS3 OUT)	G.1	75	AE	FA (LA)
	G.2	100	AE	FA (LA)
	G.3	150	AE	FA (LA)
	G.4	250	AE	FA (LA)
	G.5	As reqd.	AE	FA (LA)
1735006type 6-Conductor cable	G.101	75	6BJ	6FA (6LA)
	G.102	100	6BJ	6FA (6LA)
	G.103	150	6BJ	6FA (6LA)
	G.104	250	6BJ	6FA (6LA)
	G.105	As reqd.	6BJ	6FA (6LA)

Table 5-5. Low Speed Interface Cables - FT-2000 to (DACS IV-2000 Non BNC Connectors)

Cable Type	ED8C900-20 Group No.	Cable Lengths (ft.)	Termination Code (note)	
			Near End Group No.	Far End Group No.
735type/734type Single conductor cable (DS3 IN)	G.301	75	DDD	FAD (LAD)
	G.302	100	DDD	FAD (LAD)
	G.303	150	DDD	FAD (LAD)
	G.304	250	DDD	FAD (LAD)
	G.305	As reqd.	DDD	FAD (LAD)
735type/734type Single conductor cable (DS3 OUT)	G.301	75	DED	FAD (LAD)
	G302	100	DED	FAD (LAD)
	G303	150	DED	FAD (LAD)
	G304	250	DED	FAD (LAD)
	G305	As reqd.	DED	FAD (LAD)
734type/735type Single conductor cable (DS3 IN)	G.301	75	DDD	FA (LA)
	G.302	100	DDD	FA (LA)
	G.303	150	DDD	FA (LA)
	G.304	250	DDD	FA (LA)
	G.305	As reqd.	DDD	FA (LA)
734type/735type Single conductor cable (DS3 OUT)	G.301	75	DED	FA (LA)
	G302	100	DED	FA (LA)
	G303	150	DED	FA (LA)
	G304	250	DED	FA (LA)
	G305	As reqd.	DED	FA (LA)

Low Speed Interconnection Panel Label Description

NOTE:

All diagrams and descriptions of the low speed shelf - System Controller and the User Panel discussed in this section are referring to the new Shelf introduced in approximately June 1997.

The Low Speed Shelf - System Controller interconnection panel organizes electrical coaxial connections in six rows (Figure 5-3) as follows:

- Three top rows are for coaxial cables carrying low speed signals out from the terminal (labeled **OUT**).
- Three bottom rows are for coaxial cables carrying low speed signals into the terminal (labeled **IN**).

Cable connectors correspond in order to low speed interface circuit pack slots. For example, all connectors in the column labeled “1A” in Figure 5-4 correspond to the low speed signals going in to and out from low speed slot 1A. The individual BNC connectors are also labeled “1”, “2”, or “3”. This corresponds to the port which the low speed signal is carried on within the indicated slot.

To reference a specific port, the following convention is used:

slot - port

For example: 2B-2 refers to slot 2B, port 2.

NOTE:

When installation is complete, verify that all cable tags have been removed.

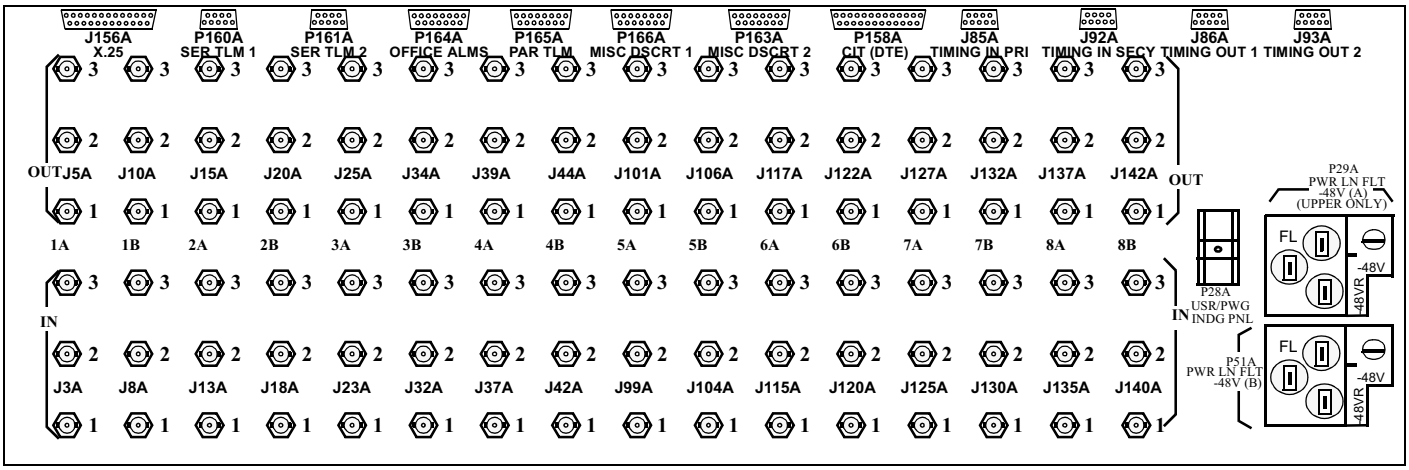


Figure 5-3. Interconnection Panel (Low Speed Shelf - System Controller)

Table 5-6 lists the D-subminiature connector types for office alarms, parallel telemetry, and miscellaneous discrete applications.

Table 5-6. Interconnection Panel Connectors and Types

CONNECTOR	TYPE
J156A	DB25 Female
P160A, P161A	DB9 Male
P163A, P164A, P165A, P166A	DB15 Male
P158A	DB25 Male
J85A, J86A, J92A, J93A	DB9 Female

Low Speed Cable Connection

Perform the following steps (referring to Figure 5-4, Figure 5-5, and Figure 5-6) to connect low speed interface cables for each equipped low speed interface circuit pack in the Low Speed Shelf - System Controller. Cables for future use may be installed for unequipped slots at this time.

(1) Label the low speed interface cables: port 1A-1-IN through port 8B-3-OUT, marking on each end where it connects (that is, FT-2000 Add/Drop-Rings Terminal end versus DSX-3 end). Suggestion: for cables grouped in six cable bundles, use cable marked CA1 for the lowest number port OUT of the slot, use CA3 and CA5 for the next two OUT, use CA2, CA4, CA6 for the three IN ports from lowest port number to highest. This uses cables in order as ports are added (see Figure 5-4).

(2) Electrical line buildouts may be required to be connected in series with the transmit LS INTFC cable connectors depending on the application, cable type, and cable length associated with that particular LS INTFC cable. Check Chapter 10, Technical Specifications of the *FT-2000 OC-48 Lightwave System User/Service Manual* for full specifications. Table 5-7 shows when electrical line buildouts should be used based on the actual cable length (or equivalent measured signal level) for each transmit cable. Install 9824AG (J68974EK-1 L109) electrical line buildout on OUT jacks (see Figure 5-6).

Table 5-7. Electrical Line Buildout Specifications

Application Connection to FT-2000	Length in Feet from FT-2000 Equipment to Connected Equipment for LS INTFC Signal In/Out Cables		
	735A Cable (Note 1)	734 Cable or 735A/734D (Note 2) Combination Cable	LBO Required for LS INTFC Signal Out Cable
DS3 or EC-1 Cross-Connect Equipment	0-125	0-255	Yes
	>125-250	>225-450	No
DACS III-2000, DACS IV-2000, DDM-2000, FT-2000, or Equiv. Non-Cross-Connect Equipment	0-125	0-255	Yes
	>125-500	>225-900	No

(3) Route the cables through the left opening in the side of the Low Speed Shelf - System Controller next to the interconnection panel. To route the cables in an orderly fashion, start to cable the connections in the left most (1A) and work toward the right of the interconnection panel. All should be routed through the left opening. Leave 1 or 2 inches of cable slack near the BNCs to ensure that the electrical connections to each BNC are not damaged (see Figure 5-5 and Figure 5-6).

(4) Connect cables to the appropriate BNC connector (or electrical line buildout) on the interconnection panel.

(5) Route the cables along the cable rack to the terminating equipment (DSX-3 or other).

(6) Connect the cables to the terminating equipment (DSX-3 or other). Slack should be left in the cable racks by running the cable back and forth in the rack.

(7) Dress and tie the cabling with lacing cord. A cable tie bar is provided at the rear cable opening on each side of the bay.

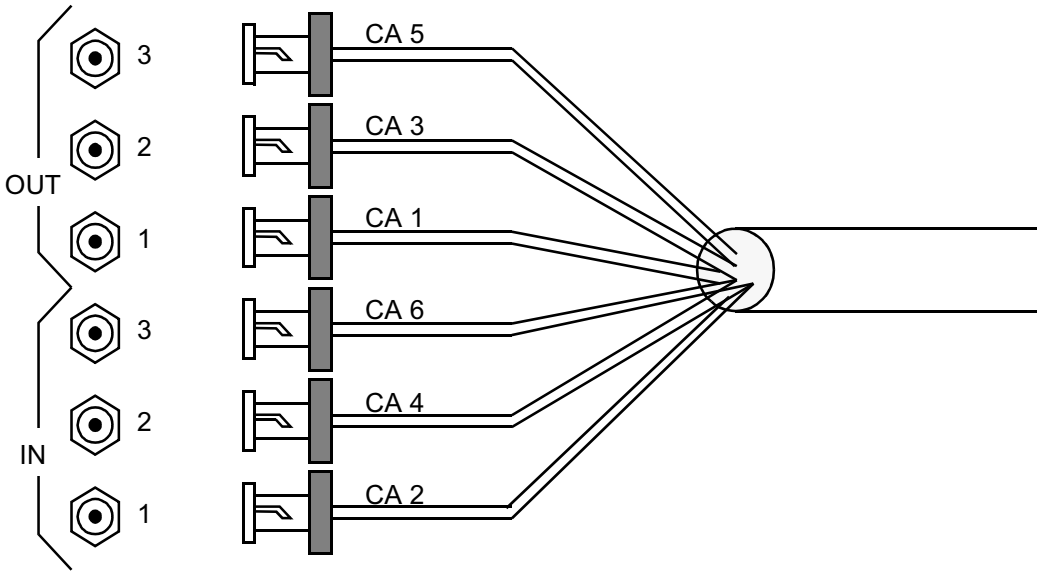


Figure 5-4. Recommended Method of Connecting 1735006A Type Cable

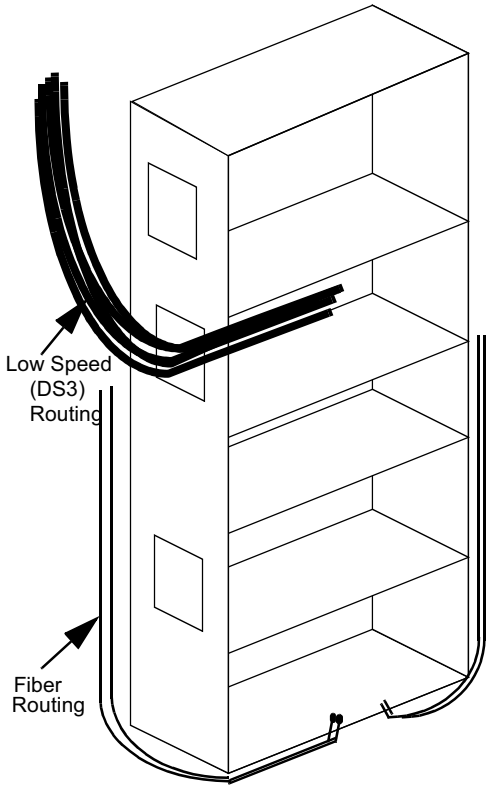


Figure 5-5. FT-2000 Cabling and Routing

NOTE:
Route, dress and tie cables as specified in the Low Speed Cable Connection procedure.

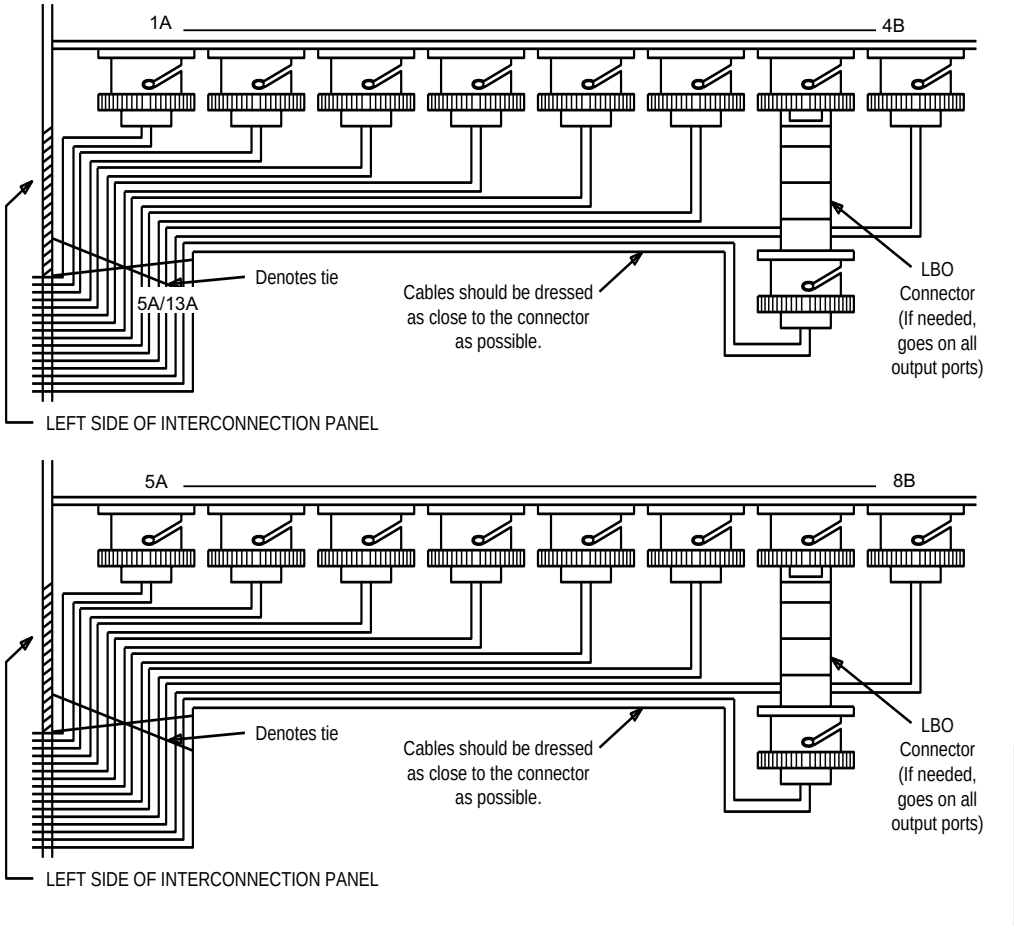


Figure 5-6. Low Speed Cable Routing

Wire Color Conversion

There are cables that exist that use outdated wire color standards. These cables are equivalent to the cables with the new wire color standards. If a cable is provided that uses the outdated wire color standard, use the information below to convert to the new wire color standard.

The outdated color standard is described in the examples below:

EXAMPLE: BL1W WIRE: blue with 1 white stripe

EXAMPLE: BL2W WIRE: blue with 2 white stripes

The new color standard is described in the examples below:

EXAMPLE: W-BL WIRE: white with a blue stripe

EXAMPLE: BL-W WIRE: blue with a white stripe

Refer to Table 5-8 for wire color conversion and wire color codes.

Table 5-8. Wire Color Conversion (Old Color to New Color)

Old Color	New Color	Old Color	New Color
W1BL	W-BL	BL2BK	BL-BK
O1W	W-O	O2BK	O-BK
G1W	W-G	G2BK	G-BK
BR1W	W-BR	BR2BK	BR-BK
S1W	W-S	S2BK	S-BK
BL1R	R-BL	BL2Y	BL-Y
O1R	R-O	O2Y	O-Y
G1R	R-G	G2Y	G-Y
BR1R	R-BR	BR2Y	BR-Y
S1R	R-S	2Y	S-Y
BL1BK	BK-BL	W3BK	W-BK
O1BK	BK-O	W3Y	W-Y
G1BK	BK-G	R3W	R-W
BR1BK	BK-BR	R3Y	R-Y
S1BK	BK-S	BL3W	W-3BL
BL1Y	Y-BL	O3W	W-3O
O1Y	Y-O	G3W	W-3G
G1Y	Y-G	BR3W	W-3BR
BR1Y	Y-BR	S3W	W-3S
S1Y	Y-S	BL3R	R-3BL
W1BK	BK-W	O3R	O-3R
W1Y	Y-W	G3R	R-3G

Table 5-8. Wire Color Conversion (Old Color to New Color)

Old Color	New Color	Old Color	New Color
R1W	W-R	BR3R	BR-3R
R1Y	Y-R	S3R	S-3R
R1BK	BK-R	BL3BK	BL-3BK
BL2W	BL-W	O3BK	O-3BK
O2W	O-W	G3BK	G-3BK
G2W	G-W	BR3BK	BR-3BK
BR2W	BR-W	S3BK	S-3BK
S2W	S-W	BL3Y	Y-3BL
BL2R	BL-R	03Y	Y-3O
O2R	O-R	G3Y	Y-3G
G2R	G-R	BR3Y	Y-3BR
BR2R	BR-R	S3Y	Y-3S
S2R	S-R		

Refer to Table 5-9 for wire color conversion and wire color codes.

Table 5-9. Wire Color Codes

Code	Color	Code	Color
W	White	R	Red
BK	Black	Y	Yellow
BL	Blue	BR	Brown
O	Orange	G	Green
S	Slate		

Office Alarms, Parallel Telemetry, and Miscellaneous Discrete Cables Installation

Description

Office alarms, parallel telemetry, and miscellaneous discrete points are used for the following purposes:

- Office alarms are commonly used by central office maintenance personnel to quickly identify a failed system.
- Parallel telemetry reports a minimum set of alarms and status indications to a maintenance center via a telemetry system. Parallel Telemetry cables are not required if software release 8 or later is being used in the bay.
- Miscellaneous discrete points provide a means for notifying an operations system (OS) maintenance center of environmental conditions at the FT-2000 site.

Available Office Alarms, Parallel Telemetry, and Miscellaneous Discrete Cables

Table 5-10 lists cables that are available for office alarms, parallel telemetry, and miscellaneous discrete applications. Cables listed may be used for each application.

Table 5-10. Office Alarms, Parallel Telemetry, and Miscellaneous Discrete Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
301	As Req'd	811AS
351	150	
361	250	

Table 5-11 lists cable connections to the Low Speed Shelf - System controller interconnection panel.

Table 5-11. Alarm, Telemetry and Misc. Discrete Connection to Interconnection Panel

Cable Applications	Low Speed Shelf - System Controller Interconnection Panel Location
Office Alarms	P164A
Parallel Telemetry	P165A
Misc. Discrete 1	P166A
Misc. Discrete 2	P163A

Office Alarm Cable Connection

Table 5-12 lists office alarm cable connections and designations.

Table 5-12. Office Alarm Cable Connection

Alarm Name	Designation	Pin	Wire Color
Office Alarm Critical Audible	OACRAUD	1	BL-W
Office Alarm Critical Visual	OACRVIS	2	O-W
Office Alarm Major Audible	OAMJAUD	3	G-W
Office Alarm Major Visual	OAMJVIS	4	BR-W
Office Alarm Minor Audible	OAMNAUD	5	S-W
Office Alarm Minor Visual	OAMNVIS	6	BL-R
No Connection	none	7	O-R
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

Table 5-12. Office Alarm Cable Connection

Alarm Name	Designation	Pin	Wire Color
Office Alarm Major Visual Return	OAMJVISR	12	W-BR
Office Alarm Minor Audible Return	OAMNAUDR	13	W-S
Office Alarm Minor Visual Return	OAMNVISR	14	R-BL
No Connection	none	15	R-O

Office 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 FT-2000 Add/Drop-Rings Terminal.

Selection of transient suppression devices shall be made according to the specific office alarm circuit arrangement.

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

(1) Route the office alarm cable (see Figure 5-3) through the left opening in the side of the Low Speed Shelf - System Controller, from the office alarm panel.

(2) Connect the office alarm cable to P164A on the interconnection panel of the Low Speed Shelf - System Controller.

(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.

Parallel Telemetry Cable Connections

- Parallel Telemetry cables are not required if software release 8 or later is being used in the bay.

Table 5-13 lists parallel telemetry cable connections and designations.

Table 5-13. 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	O-R
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

Parallel Telemetry Cable Installation Procedure

Perform the following steps to install the parallel telemetry cable:

(1) Route the cable through the left opening in the side of the Low Speed Shelf - System Controller (see Figure 5-8) from the telemetry system.

(2) Connect the parallel telemetry cable to P165A on the interconnection panel of the Low Speed Shelf - System Controller.

(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.

Miscellaneous Discrete Cable Connection

Two miscellaneous discrete connections are supported by FT-2000 Add/Drop-Rings Terminal.

Table 5-14 lists connections and designations for miscellaneous discrete cable 1.

Table 5-14. Miscellaneous Discrete Cable 1 Connection

Name	FT-2000 Misc. Discretes	Designation	Pin	Wire Color
User Settable Discrete In 12	13	USDI12	1	BL-W
User Settable Discrete In 08	9	USDI08	2	O-W
User Settable Discrete In Common		USDICOM	3	G-W
User Settable Discrete In 04	5	USDI04	4	BR-W
User Settable Discrete In 00	1	USDI00	5	S-W
User Settable Discrete Out Common		USDOCOM	6	BL-R
User Settable Discrete Out 00		USDO00	7	O-R
No Connection		none	8	none
User Settable Discrete In 13	14	USDI13	9	W-BL
User Settable Discrete In 09	10	USDI09	10	W-O
User Settable Discrete In Common		USDICOM	11	W-G
User Settable Discrete In 05	6	USDI05	12	W-BR
User Settable Discrete In 01	2	USDI01	13	W-S
User Settable Discrete Out Common		USDOCOM	14	R-BL
User Settable Discrete Out 01		USDO01	15	R-O

NOTE:
The miscellaneous discretes are numbered 0 through 15. However, they will appear as 1 through 16 on the CIT display.

Table 5-15 lists connections and designations for miscellaneous discrete cable 2.

Table 5-15. Miscellaneous Discrete Cable 2 Connection

Name	FT-2000 Misc. Discretes	Designation	Pin	Wire Color
User Settable Discrete In 14	15	USDI14	1	BL-W
User Settable Discrete In 10	11	USDI10	2	O-W
User Settable Discrete In Common		USDICOM	3	G-W
User Settable Discrete In 06	7	USDI06	4	BR-W
User Settable Discrete In 02	3	USDI02	5	S-W
User Settable Discrete Out Common		USDOCOM	6	BL-R
User Settable Discrete Out 02		USDO02	7	O-R
No Connection		none	8	none
User Settable Discrete In 15	16	USDI15*	9	W-BL
User Settable Discrete In 11	12	USDI11	10	W-O
User Settable Discrete In Common		USDICOM	11	W-G
User Settable Discrete In 07	8	USDI07	12	W-BR
User Settable Discrete In 03	4	USDI03	13	W-S
User Settable Discrete Out Common		USDOCOM	14	R-BL
User Settable Discrete Out 03		USDO03	15	R-O

* USDI15 has been designated for the fan alarm point

Miscellaneous Discrete Cables Installation Procedure

Perform the following steps to install miscellaneous discrete cables:

(1) Route cable 1 (see Figure 5-8) through the left opening in the side of the Low Speed Shelf - System Controller. Route cable 2 (see Figure 5-9) through the right opening in the side of the Low Speed Shelf - System Controller.

(2) Connect the two miscellaneous discrete cables to P166A (Cable 1) and P163A (Cable 2) on the interconnection panel of the Low Speed Shelf - System Controller.

(3) Route the cables to the terminal strip for miscellaneous discrete input points and control output points along the cable rack.

(4) Connect the miscellaneous discrete cables to the miscellaneous discrete input points and control output points terminal strip by cutting the cables to length and wire-wrapping the loose ends onto the terminal strip. The terminal strip is not part of the FT-2000 equipment, it needs to be provided elsewhere in the office. Use Figure 5-7 as a guide.

(5) Label the connections that are wire-wrapped.

(6) Clearly label the use of each discrete input and output on the terminal strip.

(7) Dress and tie the cable.

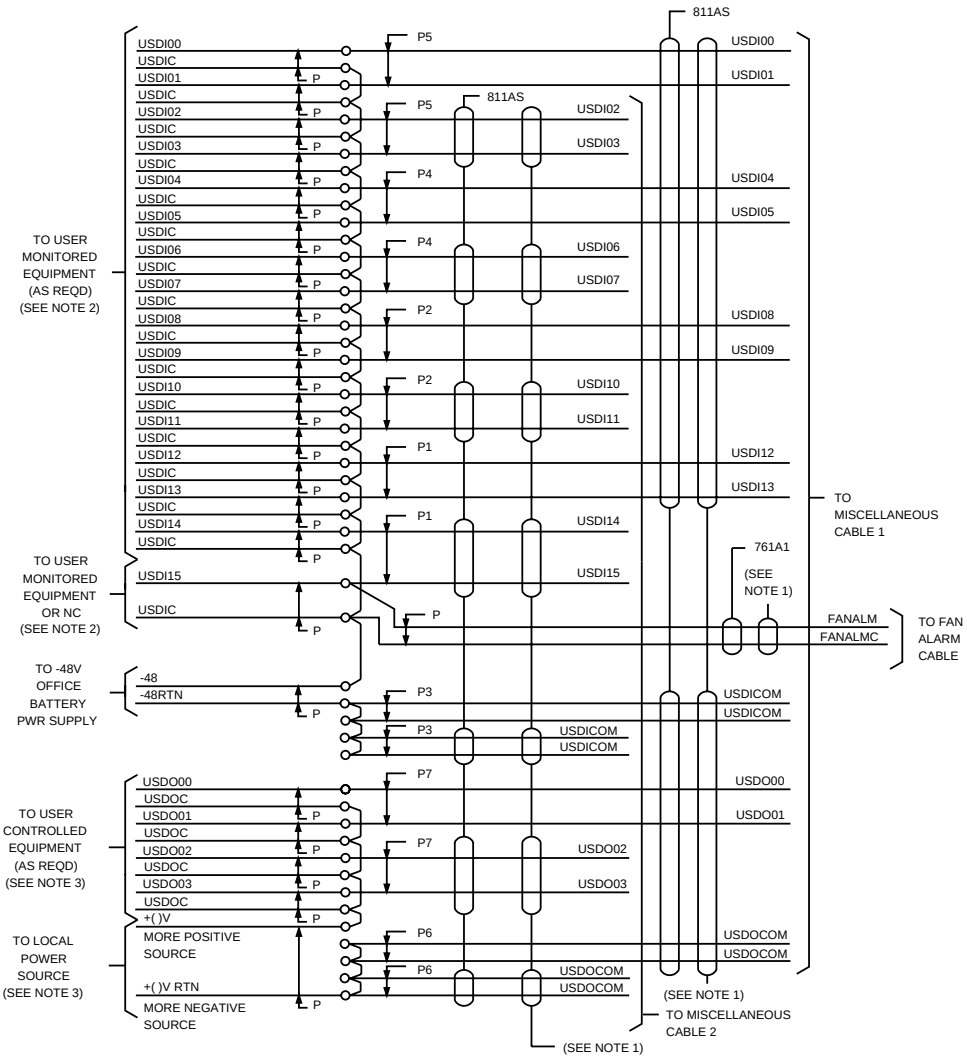


Figure 5-7. Office Termination for Miscellaneous Discrete Cables

Notes for Figure 5-7:

(1) The miscellaneous customer equipment to be monitored by the FT-2000 equipment must provide the electrical equivalent of a contact closure across the corresponding USDI/USDIC pairs. The closure must be capable of passing at least 10 mA of DC current.

(2) Shield wires must be terminated to the frame or chassis ground if the distance between the miscellaneous terminal strip and the FT-2000 low-speed control interconnection panel is 25 feet or less. For greater distance, the shield ground is not required, but is recommend for enhanced EMC performance.

(3) The power source to enable the FT-2000 equipment to control user-provided equipment may be from 3 V to a maximum of 72 V. The FT-2000 equipment provides a unidirectional opto-isolator connected across each corresponding USDO[]USDOC[] pair. The load current across each corresponding USDO[]USDOC[] pair shall be limited by the customer equipment and *shall not exceed 35 mA*.

(4) The miscellaneous discrete alarms can be assigned in any order. However, if the terminal is equipped with a fan, input number 15 is allocated for the fan alarm, so MISC discrete cable 2 would be required.

Serial Telemetry Cables Installation

Description

- Serial Telemetry cables are not required if software release 8 or later is being used in the bay.

Serial telemetry provides information to the maintenance center about that location and remote control over that location from the maintenance center.

Two serial telemetry cables are routed from the FT-2000 Add/Drop-Rings Terminal to the serial telemetry interface. Serial telemetry port 1 provides alarm, status, control, and performance-monitoring information for the Add/Drop-Rings Terminal. Serial telemetry port 2 provides alarm, status, control, and performance monitoring information for repeater bays in the span the terminal is connected to.

Available Serial Telemetry Cables

Table 5-16 lists available cables for serial telemetry applications.

Table 5-16. Serial Telemetry Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
201	As req'd (4000' max)	761A1 (CA1) and 761A2 (CA2)
251	150	
261	250	

Table 5-17 lists serial telemetry cable connection to the interconnection panel of the Low Speed Shelf - System Controller.

Table 5-17. Serial Telemetry Cable Connection to Interconnection Panel Low Speed Shelf - System Controller

Cable Application	Low Speed Shelf - System Controller Interconnection Panel Location
Serial Telemetry 1	P160A
Serial Telemetry 2	P161A

Serial Telemetry Cable Connection

Table 5-18 lists serial telemetry cable connections and designations.

Table 5-18. 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)

Table 5-18. Serial Telemetry Connector

Name	Designation	Pin	Wire Color
No Connection	none	7	none
TBOS TRM Receive P	TBASRXP	8	W (CA2)
No Connection	none	9	none

Serial Telemetry Cable Installation Procedure

Perform the following steps to install serial telemetry cables:

(1) Route the serial telemetry cables (see Figure 5-8) out the left side of the Low Speed Shelf - System Controller to the serial telemetry system.

(2) Connect serial telemetry cable 1 to P160A on the interconnection panel of the Low Speed Shelf - System Controller.

(3) Connect serial telemetry cable 2 to P161A on the same interconnection panel.

(4) Connect the serial telemetry cables to the serial telemetry system by cutting the cables to length and wire-wrapping the loose ends onto the panel.

(5) Label the connections that are wire-wrapped.

(6) Dress and tie the cables.

X.25 (TL-1) Telemetry Cables Installation

Description

X.25 is a synchronous network communication protocol commonly used with operations systems. It utilizes transaction language 1 (TL-1) for the message language.

Available X.25 Telemetry Cables

Table 5-19 lists cables available for X.25 applications.

Table 5-19. X.25 Telemetry Cable

ED-7G001-22 Cable Group*	Cable Length (ft.)	Cable Type	Connector Types F=Female M=Male
602	300’ max	811AS	F-M
652	300’	811AS	F-M
603	300’ max	811AS	M-M
613	50’	811AS	M-M
623	75’	811AS	M-M
633	100’	811AS	M-M
643	125’	811AS	M-M

* NOTE: New Design may be used with Datakit II.

X.25 Telemetry Cable Connection

Table 5-20 lists the X.25 telemetry cable connection to the interconnection panel of the Low Speed Shelf - System Controller.

Table 5-20. X.25 Telemetry Cable Connection to Interconnection Panel

Cable Application	Low Speed Shelf - System Controller Interconnection Panel Location
X.25	J156A

Table 5-21 lists pin connections for the X.25 cable (EIA-232D). For more information about the TL1 interface refer to document 824-102-148 *2000 Family of Products Operations Systems Engineering Guide*.

Table 5-21. TL1/X.25 Interface - EIA-232D Pin Connections

Pin	Description
1	Protective Ground (Shield)

Table 5-21. TL1/X.25 Interface - EIA-232D Pin Connections

Pin	Description
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 FT-2000 is powered.
** FT-2000 will only transmit data via X.25 when CTS is on.

Table 5-22 lists X.25 cable connections and designations for Group 602, 652, 603, 613, 623, 633 and 643 cables.

Table 5-22. X.25 Telemetry Cable Connection, G602,G603, G613, G623, G633, G643, G652

Name	Designation	P156A Terminal	Wire Color	Datakit End
Protective Ground	GRD	1	BL	1 GRD
MSR Transmit Data	MSRTDX	2	BL/W	2 TDX
MSR Receive Data	MSRRXD	3	O/W	3 RXD
MSR Request To Send	MSRRTS	4	G/W	No Connect
MSR Clear To Send	MSRCTS MSRDTR	5 20	W/G W/S	4 RTS 20 DTR **
MSR Data Set Ready	MSRDSR	6	BR/W	6 DSR
Signal Ground	GRD	7	S/W	7 GRD
MSR Receive Line Signal Detected	MSRRLSD	8	BL/R	8 RLSD
No Connection	none	9	none	
No Connection	none	10	none	
No Connection	none	11	none	
No Connection	none	12	none	
No Connection	none	13	none	
No Connection	none	14	none	
MSR Transmitter Signal Element Timing	MSRTSET	15	R/O	15 TSET
No Connection	none	16	none	
MSR Receiver Signal Element Timing	MSRRSET	17	R/G	17 RSET
No Connection	none	18	none	
No Connection	none	19	none	
MSR Data Terminal Ready	MSRDTR MSRCTS	20 5	W/S W/G	20 DTR 4 RTS **
No Connection	none	21	none	
MSR Ring Indicator	MSRRI	22	R/BL	22 RRI
No Connection	none	23	none	

Table 5-22. X.25 Telemetry Cable Connection, G602,G603, G613, G623, G633, G643, G652

Name	Designation	P156A Terminal	Wire Color	Datakit End
No Connection	none	24	none	
No Connection	none	25	none	

** The short between 5 and 20 at the FT-2000 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.

Table 5-23. Pin-outs for connecting to a Micom Pad

FT pin	Pad pin
2	3
3	2
4, 5	8
8	4, 5
6	20
7	7
15	9, 15
17	24
20	6
24	17

Table 5-24. Pin-outs for connecting to an AI switch Null Sync Null Modem

FT pin	AI pin
2	3
3	2
4	5
5	4

Table 5-24. Pin-outs for connecting to an AI switch Null Sync Null Modem

FT pin	AI pin
6, 8	20
7	7
15	17
17	15
20	6, 8

X.25 Telemetry Cable Installation Procedure

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

NOTE:
When running a direct X.25 cable between an ITM SNC-2000 and the FT-2000 a Synchronous Modem Eliminator (SME) is required. This needs to be done to provide a clock.

NOTE:
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 on the FT-2000 bay. The socket end (female) is intended to mate with Datakit. For cables that have two blank labels, mark P156A on the blank label at the plug (male) end of the cable.

(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 (P156A) of the cable is at the FT-2000 equipment, route the X.25 cable out the left side of the Low Speed Shelf - System Controller (see Figure 5-8) to the X.25 port of the operation support system.

(3) Connect the X.25 telemetry cable to J156A on the interconnection panel of the Low Speed Shelf - System Controller.

(4) Connect the X.25 telemetry cable to the X.25 port of the operation support system.

(5) Dress and tie the cables.

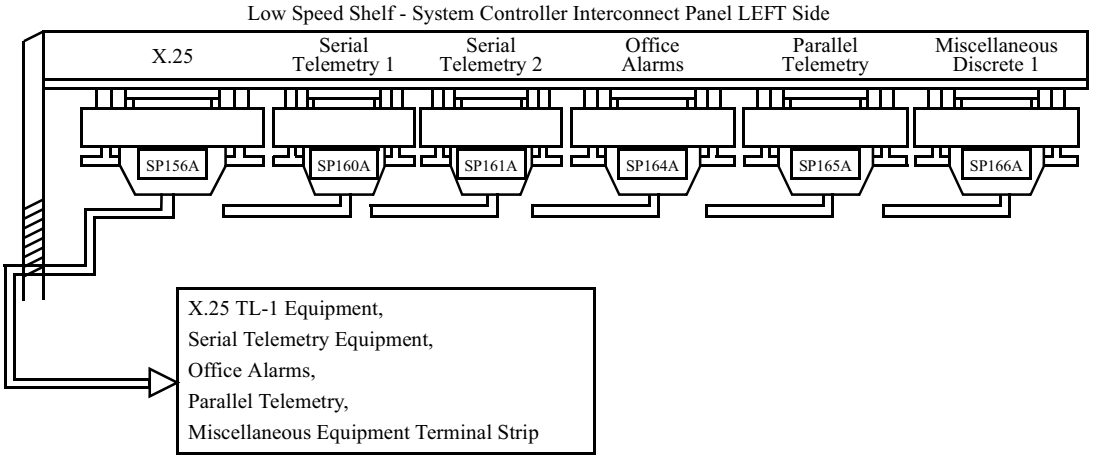


Figure 5-8. Low Speed Shelf - System Controller Cable Routing, LEFT SIDE

NOTE:
Cables are routed out the left side of the shelf.

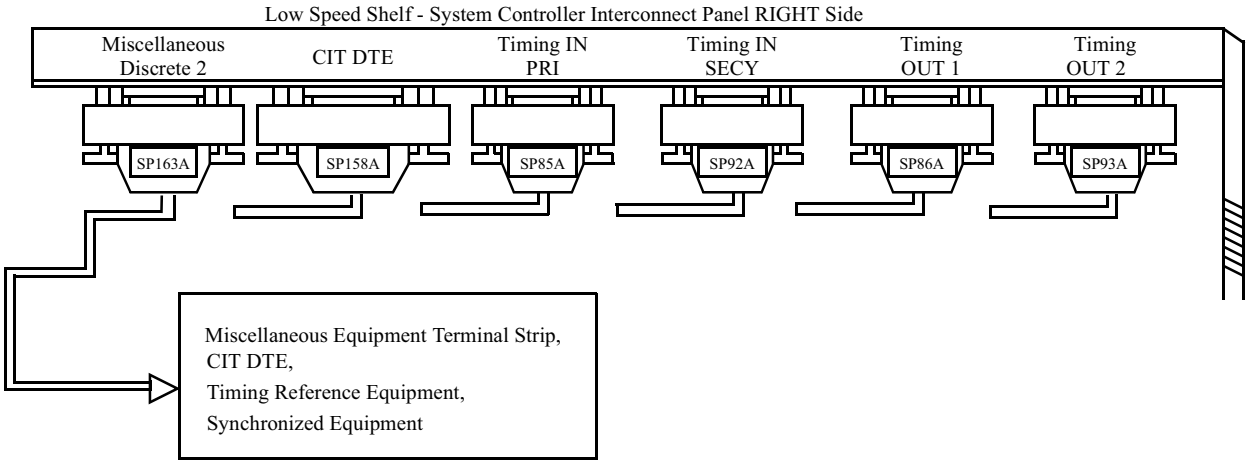


Figure 5-9. Low Speed Shelf - System Controller Cable Routing RIGHT SIDE

NOTE:
Cables are routed out the left side of the shelf.

CIT DTE Cables Installation

Description

FT-2000 Add/Drop-Rings Terminals support access to remote CIT PC's through a modem connection to the CIT DTE port.

Available CIT DTE Cables

Table 5-25 lists cables available for CIT DTE applications.

Table 5-25. CIT DTE Cable

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
702	As Req'd. 150' max	811AS
732	100'	811AS
752	150'	811AS

CIT DTE Cable Connection

Table 5-26 lists cable connection to the interconnection panel of the Low Speed Shelf - System Controller.

Table 5-26. CIT DTE Cable Connection to Interconnection Panel

Cable Application	Low Speed Shelf - System Controller Interconnection Panel Location
CIT DTE	P158A

The CIT DTE cable connects to a modem which must meet the following requirements:

- Must be able to transmit at 300, 1200, 2400, 4800, or 9600 baud rate

- Must have an RS-232 DCE interface port
- Must be configured for 8 bit data bytes with 1 start bit and 1 stop bit
- Must not use the DSR lead.

Table 5-27 lists CIT DTE cable connections and designations.

Table 5-27. 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[1]	none	15	R/O (G702,752 only) none (G701,751,761)
No Connection	none	16	none
No Connection[1]	none	17	R/G (G702,752 only) none (G701,751,761)
No Connection	none	18	none
No Connection	none	19	none
CT Data Terminal Ready	CTDTR	20	W/G (G701,751,761) W/S (G702, 752)
No Connection	none	21	none
No Connection[1]	none	22	R/BL (G702,752 only) none (G701,751,761)
No Connection	none	23	none

Table 5-27. CIT DTE Cable Connection

Name	Designation	Pin	Wire Color
No Connection	none	24	none
No Connection	none	25	none

1. Pins 15, 17 and 22 are wired in Groups 702, 732 and 752 only.

CIT DTE Cable Installation Procedure

Perform the following steps to install the CIT DTE cable:

(1) Both ends of the cable are connectorized. Making sure the socket end of the cable is at the FT-2000 equipment, route the CIT DTE cable out the right side of the Low Speed Shelf - System Controller (see Figure 5-9) to the 25-pin D-type connector on the modem.

(2) Connect the CIT DTE cable to P158A on the interconnection panel of the Low Speed Shelf - System Controller.

(3) Connect the CIT DTE cable to the RS232 DCE port on the modem.

(4) Dress and tie the cables.

Input Timing (Primary/Secondary) Cables Installation

Description

The timing input cables provide external DS1 clock sources to the FT-2000 Add/Drop-Rings Terminal for phase locked operation.

Available Input Timing (Primary/Secondary) Cable

Table 5-28 lists cables for timing input applications. Groups 1, 2, 51, 52, 61, and 62 are obsolete and should not be used. Use Groups 3, 4, 53, 54, 63 and 64 respectively.

Table 5-28. Input Timing (Primary/Secondary) Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type	Number of Connectors
3	As Req'd (655 max.[1])	YR28365	1 (one end only)
53	150		
63	250		
4	As req'd. (655 max.*)	YR28365	2 (each end)
54	20		
64	100		

1. Maximum lengths are for wiring to a DS1 cross-connection; if cable is to be terminated directly at the slave timing equipment, the maximum length is 1310 feet.

Table 5-29 lists timing input cable connections to the interconnection panel of the Low Speed Shelf - System Controller.

Table 5-29. Input Timing (Primary/Secondary) Cable Connection to Interconnection Panel (Low Speed Shelf - System Controller)

Cable Application	Low Speed Shelf - System Controller Interconnection Panel Location
Primary Input Timing	J85A
Secondary Input Timing	J92A

Input Timing (Primary/Secondary) Cable Connection

Table 5-30 list input timing (primary) cable connections.

Table 5-30. Input Timing (Primary) Cable Connection

Name	Designation	J85A Terminal	Wire Color
ER Input A N	ERIAN	1	BK (Ring)
No Connection	none	2	none
No Connection	none	3	none
No Connection	none	4	none
No Connection	none	5	none
ER Input A P	ERIAP	6	W (Tip)
No Connection	none	7	none
No Connection	none	8	none
No Connection	none	9	none

Table 5-31 list input timing (secondary) cable connections

Table 5-31. Input Timing (Secondary) Cable Connection

Name	Designation	J92A Terminal	Wire Color
ER Input B N	ERIBN	1	BK (Ring)
No Connection	none	2	none
No Connection	none	3	none
No Connection	none	4	none
No Connection	none	5	none
ER Input B P	ERIBP	6	W (Tip)
No Connection	none	7	none
No Connection	none	8	none
No Connection	none	9	none

Input Timing Cable Installation Procedure

Perform the following steps to install the input timing cables:

NOTE:
If external timing mode is to be used, both primary and secondary cables must be attached.

(1) Route the input timing cables out through the left side of the Low Speed Shelf - System Controller (see Figure 5-9) to the primary and secondary timing sources for the FT-2000 Add/Drop-Rings Terminal.

(2) Connect the primary input timing cable to J85A on the interconnection panel of the Low Speed Shelf - System Controller.

(3) Connect the secondary input timing cable to J92A on the same panel.

(4) When working with Group 3, 53, or 63 cable, cut the primary input timing cable to length and wire-wrap to the primary clock source. Convention has it that White, the P rail, is Tip, and Black, the N rail is Ring.

(5) When working with Group 3, 53, or 63 cable, cut the secondary input timing cable and wire-wrap to the secondary clock source. Convention has it that White, the P rail, is Tip, and Black, the N rail is Ring.

(6) When working with Group 3, 53, or 63 cable, label the connections that are wire-wrapped.

(7) When working with Group 4, 54, or 64 cable, connect the far end to the timing reference equipment.

(8) Dress and tie the cables.

Output Timing Cables Installation

Description

Output timing cables are used to provide a DS1 clock source from the FT-2000 to a BITS clock or other pieces of equipment (for example, DDM-2000). There are two timing outputs on the Low Speed Shelf - System Controller.

NOTE:
When using external time from FT-2000 to DDM-2000 use Group 29 or 30,refer to ED8C724-22 for details.

NOTE:
Although there are two timing output connectors, only one should (J86A or J93A, it doesn't matter which one is used) be used to externally time other pieces of equipment. Following this rule will help avoid timing loops.

Available Output Timing Cables

Table 5-32 lists available cables for output timing. Groups 1, 2, 51, 52, 61, and 62 are obsolete and should not be used. Use Groups 3, 4, 53, 54, 63 and 64 respectively.

Table 5-32. Output Timing Cable

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type	Number of Connectors
3	As Req'd. (655 max[1])	YR28365	1 (one end only)
53	150		
63	250		
4	As req'd. (655 max[1])	YR28365	2 (each end)
54	20		
64	100		

1. Maximum lengths are for wiring to a DS1 cross-connection; if cable is to be terminated directly at the slave timing equipment, the maximum length is 1310 feet.

Table 5-33 lists output timing cables connections to the interconnection panel of the Low Speed Shelf - System Controller.

Table 5-33. Output Timing Cable Connection to Interconnection Panel (Low Speed Shelf - System Controller)

Cable Application	Low Speed Interconnection Panel Location
Output Timing 1	J86A
Output Timing 2	J93A

Output Timing Cable Connection

Table 5-34 list output timing 1 cable connections and designations.

Table 5-34. Output Timing 1 Cable Connection

Name	Designation	J86A Terminal	Wire Color
ER Output A N	EROAN	1	BK (Ring)
No Connection	none	2	none
No Connection	none	3	none
No Connection	none	4	none
No Connection	none	5	none
ER Output A P	EROAP	6	W (Tip)
No Connection	none	7	none
No Connection	none	8	none
No Connection	none	9	none

Table 5-35 list output timing 2 cable connections and designations

Table 5-35. Output Timing 2 Cable Connection

Name	Designation	J93A Terminal	Wire Color
ER Output B N	EROBN	1	BK (Ring)
No Connection	none	2	none
No Connection	none	3	none
No Connection	none	4	none
No Connection	none	5	none
ER Output B P	EROBP	6	W (Tip)
No Connection	none	7	none
No Connection	none	8	none
No Connection	none	9	none

Output Timing Cable Installation Procedure

Perform the following steps to install the output timing cables:

(1) Route the output timing cables out through the left side of the Low Speed Shelf - System Controller (see Figure 5-9) to the timing inputs of the desired equipment.

(2) Connect the output timing 1 cable to J86A on the interconnection panel of the Low Speed Shelf - System Controller.

(3) Connect the output timing 2 cable to J93A on the same panel.

(4) When using Group 3, 53, or 63 cables, cut the output timing 1 cable to length and wire-wrap to the clock input of the desired equipment or DS1 cross-connection. Label the connections that are wire-wrapped.

(5) When using Group 4, 54, or 64, connect to the timing input of the desired equipment or DS1 cross-connection. Convention has it that White, the P rail, is Tip, and Black, the N rail is Ring.

(6) When using Group 3, 53, or 63 cables, cut the output timing 2 cable to length and wire-wrap to the clock input of the desired equipment or DS1 cross-connection.

(7) When using Group 4, 54, or 64, connect to the timing input of the desired equipment or DS1 cross-connection. Label the connections that are wire-wrapped. Convention has it that White, the P rail, is Tip, and Black, the N rail is Ring.

(8) Dress and tie the cables.

High Speed Fiber Installation

Description

FT-2000 Add/Drop-Rings Terminal transmit at the SONET OC-48 rate, transmitting 32,256 voice channels simultaneously on one optical fiber. The Enhanced High Speed Shelf receives transmission on one high speed fiber and transmits on another high speed fiber. One TRMTR circuit pack transmits in the East direction and the other TRMTR transmits in the West direction.

Available High Speed Fiber Jumpers

Table 5-36 lists some of the available jumpers for low speed and high speed fiber connection.

Table 5-36. Lightwave Jumpers

Code	Comcode	Length	Description
FS1E-E-02	105 357 727	2 ft.	ST-ST
FS1E-E-10	105 357 768	10 ft.	ST-ST
FS1E-E-25	105 357 800	25 ft.	ST-ST
FS1E-E-50	105 357 859	50 ft.	ST-ST
FS1E-E-100	105 357 875	100 ft.	ST-ST
LS1K-E-10	105 713 150	10 ft.	Biconic-ST
LS1K-E-25	105 712 939	25 ft.	Biconic-ST
LS1K-E-50	105 712 988	50 ft.	Biconic-ST
LS1K-E-100	105 712 947	100 ft.	Biconic-ST
LS1FP-FP	106 470 446	As Req'd.	FC/PC-FC/PC

High Speed Fiber Connection

High speed fibers connect to circuit packs within the Enhanced High Speed Shelf. Connectors are directly on the faceplate of the TRMTR or RCVR circuit pack. Connection is made to a removable Optical Line Build-Out (LBO). Only 0dB, non attenuating, LBOs are used in most of the TRMTRs. The E1 through E8 TRMTRs use a non-zero dB attenuator that is installed at the factory. Do not change this attenuator. It is selected to work properly with an OLS System. Selection of the LBO used on the RCVR is described in Chapter 13, “Fiber Connection”. The High Speed Fiber Installation has been broken into two procedures. Procedure 1 should be used if the FT-2000 ADR terminal will be directly connected to the Lightguide cross-connect panel. Appendix E should be used if the FT-2000 ADR terminal will be connected to an LBA and/or a DWDM device.

High Speed Fiber Installation Procedure 1 - Direct Connection to an LGX Panel

Refer to Figure 5-10 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*.

(2) Connect the jumper to the lightguide (LGX) cross-connection panel.

(3) Label the optical fibers. Indicate the line (West or East) and direction (TRMTR or RCVR).

(4) Route the optical fibers from the LGX to the FT-2000 ADR terminal. Fibers (1 Transmit and 1 Receive) for the West line must be routed down the left side of the bay in the fiber protection channel, fibers (1 Transmit and 1 Receive) for the East line must be routed down the right side of the bay in the fiber protection channel.

(5) The fiber jumpers should hang without any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Enhanced High Speed Shelf. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(6) Fibers enter the Enhanced High Speed Shelf near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(7) Optical fibers should be left with enough slack next to the TRMTR and RCVR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(8) The protective channel will be covered when the stile strips are installed.

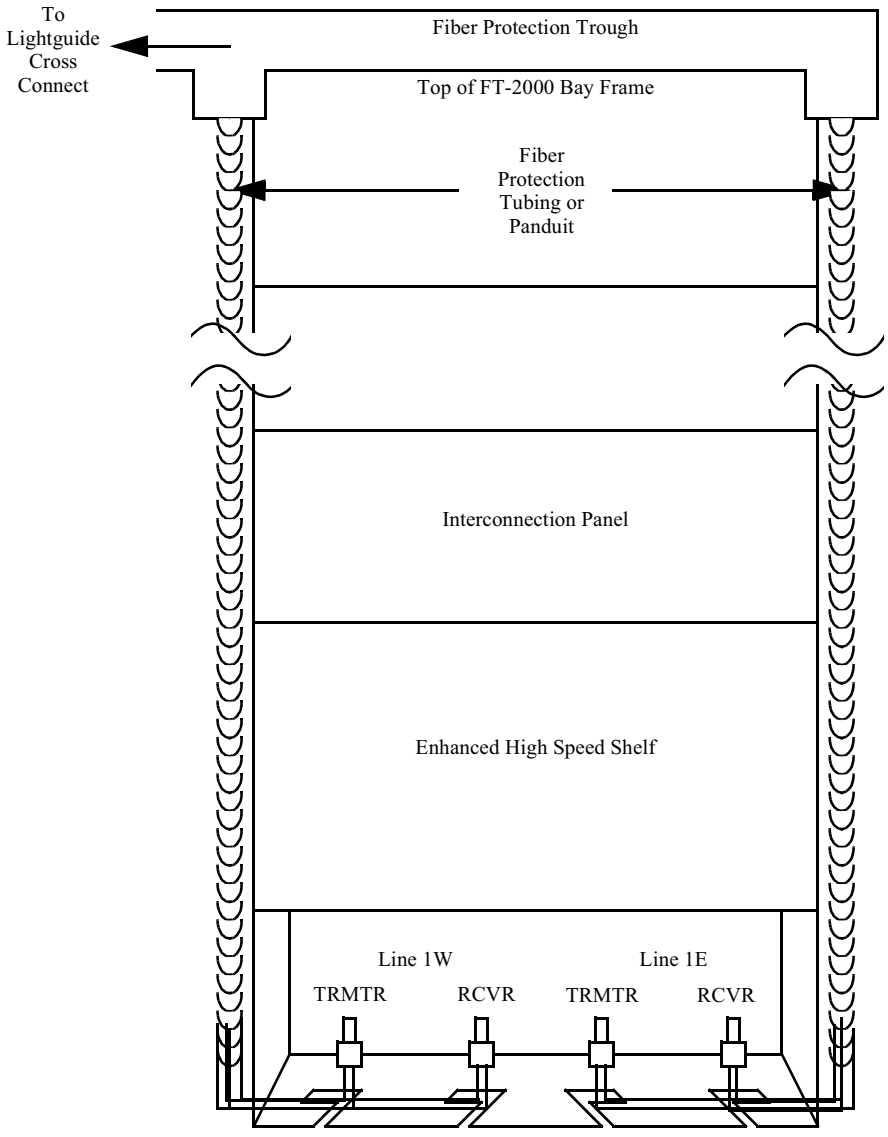


Figure 5-10. FT-2000 OC-48 ADR High Speed Fiber Routing

Low Speed Fiber Installation

Description

This procedure is used to select the proper value of Line Build Out to be used on the faceplate of the LAA5/LAA10/T939A (OUT) jack. In rare instances buildouts can be placed in the LGX, but this is NOT recommended.

FT-2000 OC-3/IS-3 Interface Circuit Packs transmit at the SONET OC-3 rate of 155.52 megabytes (2,016 voice channels simultaneously on one optical fiber). The LAA5/LAA10 (IS-3/OC3) receives transmission on one low speed fiber connecting to the IN port and transmits on another low speed fiber connecting to the OUT port.

Low speed fibers connect directly to circuit packs within the Low Speed Shelf. Connectors are located on the faceplate of the LAA5, LAA10, or T939A circuit packs. Connection is made to a removable Optical Line Build-Out (LBO). Only 0dB LBOs are used in the RCV IN port, and attenuating LBOs must be used in the TRMT OUT port.

The LAA10 supports span lengths from 0 to 51 km, terminates one OC-3 input signal, generates one OC-3 output signal, and automatically supports transport of either STS-3 or STS-3c (concatenated payload) signals. The LAA5 supports span lengths up to 2000 feet. The LAA5 terminates one OC-3 input signal, generates one OC-3 output signal, and automatically supports transport of either STS-3 or STS-3c (concatenated payload) signals.

The FT-2000 OC-12 Interface Circuit Packs transmit at the rate of 622.08 megabytes. The T939A receives transmission on one low speed fiber connecting to the IN port and transmits on another low speed fiber connecting to the OUT port.

Refer to Table 5-36 which lists some of the available jumpers for low speed single mode fiber connection. For multi-mode fiber jumpers refer to Table 5-37.

Table 5-37. Multi-mode fiber jumpers

Code	Comcode	length (feet)
FL1E-E-2	105351795	2
FL1E-E-10	105351837	10
FL1E-E-25	105351860	25
FL1E-E-50	105351910	50
FL1E-E-100	105351936	100

Table 5-38. Optical Line Buildouts

Description	Connection	Loss (dB)	Comcode
A3070 ST 0 dB buildout	SM-SM & MM-MM	0	106795354
A2060B ST 5 dB buildout	MM-MM	5	106795313
A3070B1 ST 5 dB buildout	SM-SM	5	107406183
A3070X1 ST 7.1 buildout	SM-SM	7.1	107107740
A2070D ST 10dB buildout	MM-MM	10	106795321
A3070D1 ST 10 dB buildout	SM-SM	10	107406191
A2070F ST 15 dB buildout	MM-MM	15	106795339
A3070F1 ST 15 dB buildout	SM-SM	15	107406209
A3070H ST 20 dB buildout	SM-SM	20	106795396

Span Lengths

CAUTION:
SIngle mode fiber is loss limited, so only the received power needs to be measured. Multi-mode fiber is dispersion limited, not loss limited, thus requiring the extra step of the span length. At the receive end there may be sufficient power, but the signal shape may not be adequate. The length of fiber that is allowed must be determined by the type and manufacturer of the multi-mode fiber. The receive end power must still be measured to ensure that the power level to the receiver is not too high nor too low, however, it can not be assumed that because the power level is within range, that the signal quality is adequate.

Table 5-39 shows the approximate maximum distances allowable for different fiber bandwidth specifications.

Table 5-39. Multimode Operation Span Length

Fiber Bandwidth Specification	Maximum Span Length (km)	Maximum Span Length (miles)
1000 MHz-km	6.5 km	4.1 miles
800 MHz-km	5.1 km	3.2 miles

Table 5-39. Multimode Operation Span Length

Fiber Bandwidth Specification	Maximum Span Length (km)	Maximum Span Length (miles)
500MHz-km	3.1 km	1.9 miles
300 MHz-km	1.8 km	1.1 miles

NOTE:
For more detailed information about maximum span lengths for particular fibers, refer to the manufacturers specifications.

LBO Selection

The LAA10s are shipped from the factory with a 0dB attenuator in the receive (IN) port and a 7.1dB attenuator in the transmit (OUT) port, on the connector blocks on the faceplate. The LAA5s are shipped with 0dB attenuators in receive and transmit ports. The T939As are shipped with 0dB attenuators in both the transmit (OUT) and receive (IN) ports.

NOTE:
If attenuation must be provided at the input on the LAA10 or T939A, a multi-mode LBO must be used: refer to *Fiber Optic Products,* available at 1-800-344-0223. The LAA5 requires multi-mode LBOs.

The following tables show the appropriate LBO value to select when the measured received power is within ranges specified.

(1) Measure, and record for office records, the received optical power. Be sure to set the optical power meter for the wavelength of the light to be measured, 1300nm.

(2) Choose the appropriate LBO from the table.

OC-3 LBO Selection

Table 5-40. LBO Selection for FT-2000 LAA10 OC-3 (multimode or single-mode fibers)

Measured Received Power in dBm at FT-2000	Use Optical LBO Value at Transmit
0 to -20.0 dBm	7.1 dB
-20.1 to -34.0 dBm	0 dB

Table 5-41. LBO Selection for DDM-2000 21G2-U, 22F-U, 22F2-U, 22G2-U (multimode or single mode fiber)

Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
0 to -34 dBm	0 dB

Table 5-42. LBO Selection for DDM-2000 21G/21G-U (multimode or single mode fiber)

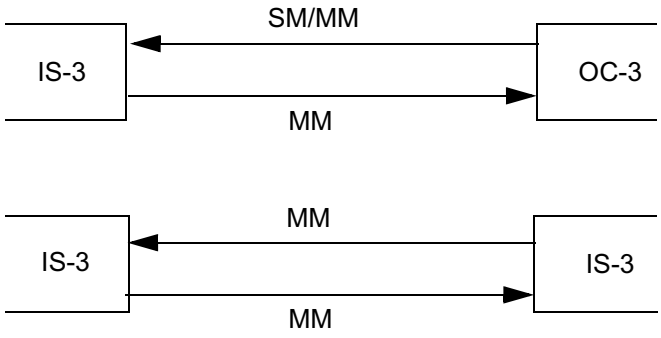
Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
0 to -3.0 dBm	10 dB
-3.0 to -8.0 dBm	5 dB
-8.0 to -34.0 dBm	0 dB

Table 5-43. LBO Selection for DDM-2000 22G-U and 22F OLIU (multimode or single mode fiber)

Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
0.0 to -5.0	15 dB
-5.0 to -10.0	10 dB
-10.0 to -15.0	5 dB
-15.0 to -34.0	0 dB

IS-3 LBO Selection

For interconnection between an IS-3 (LAA5 or 21D/21D-U/22D-U) and an OC-3 or circuit pack, multimode fiber must be used on the IS-3 transmit, and multimode or single mode can be used on the OC-3 transmit as follows:



NOTE:
The IS-3 circuit pack uses multimode fiber only with a 2000 foot maximum distance. Zero dB multimode attenuators should always be used when connecting IS-3 circuit packs.

Table 5-44. LBO Selection for FT-2000 LAA5 (transmit: multimode fiber)

Measured Received Power in dBm at FT-2000	Use Optical LBO Value at Transmit
0 to -14.0 dBm	15dB
-14.0 to -30.8 dBm	0 dB

Table 5-45. LBO Selection for DDM-2000 21D/21D-U/22D-U (transmit: multimode fiber)

Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
0 to -15 dBm	15 dB
-15.0 to -33.9 dBm	0 dB

OC-12 LBO Selection

Table 5-46. LBO Selection for DDM-2000 OC-12 23G/23G-U OLUI (single mode fiber)

Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
2.0 to 1.0	15 dB
1.0 to -4.0	10 dB
-4.0 to -9.0	5 dB
-9.0 to -31.0	0 dB

Table 5-47. LBO Selection for DDM-2000 OC-12 23H/23H-U OLIU (single mode fiber)

Measured Received Power in dBm at DDM-2000	Use Optical LBO Value at Transmit
2.0 to -3.0	20 dB
-3.0 to -8.0	15 dB
-8.0 to -13.0	10 dB
-13.0 to -18.0	5 dB
-18.0 to -34.0	0 dB

Low Speed Fiber Installation Procedure

Refer to Figure 5-11 during this procedure.

(1) Clean the optical connectors following DLP - 510 of Document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) Connect the jumper to the lightguide cross-connection. If keyed biconics are used, align arrows properly.

(3) Label the optical fibers.

(4) Route the optical fibers from the lightguide cross-connection to the protective channels located on each side of the bay. If the fibers are to be connected to OC-3/OC-12 circuit packs located in slots 1A through 4B then route the fibers

down the left side of the bay. If the fibers are to be connected to OC-3/OC-12 circuit packs located in slots 5A through 8B then route the fibers down the right side of the bay.

(5) The fiber jumpers should hang with out any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the middle so that they can be properly dressed in the LowSpeed System Controller Shelf. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above, then place the fibers in protective tubing and lace the tubing to the protective channel.

(6) Fibers enter the Low Speed Shelf near the middle front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(7) Optical fibers should be left with enough slack next to other circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(8) The protective channel will be covered when the stile strips are installed.

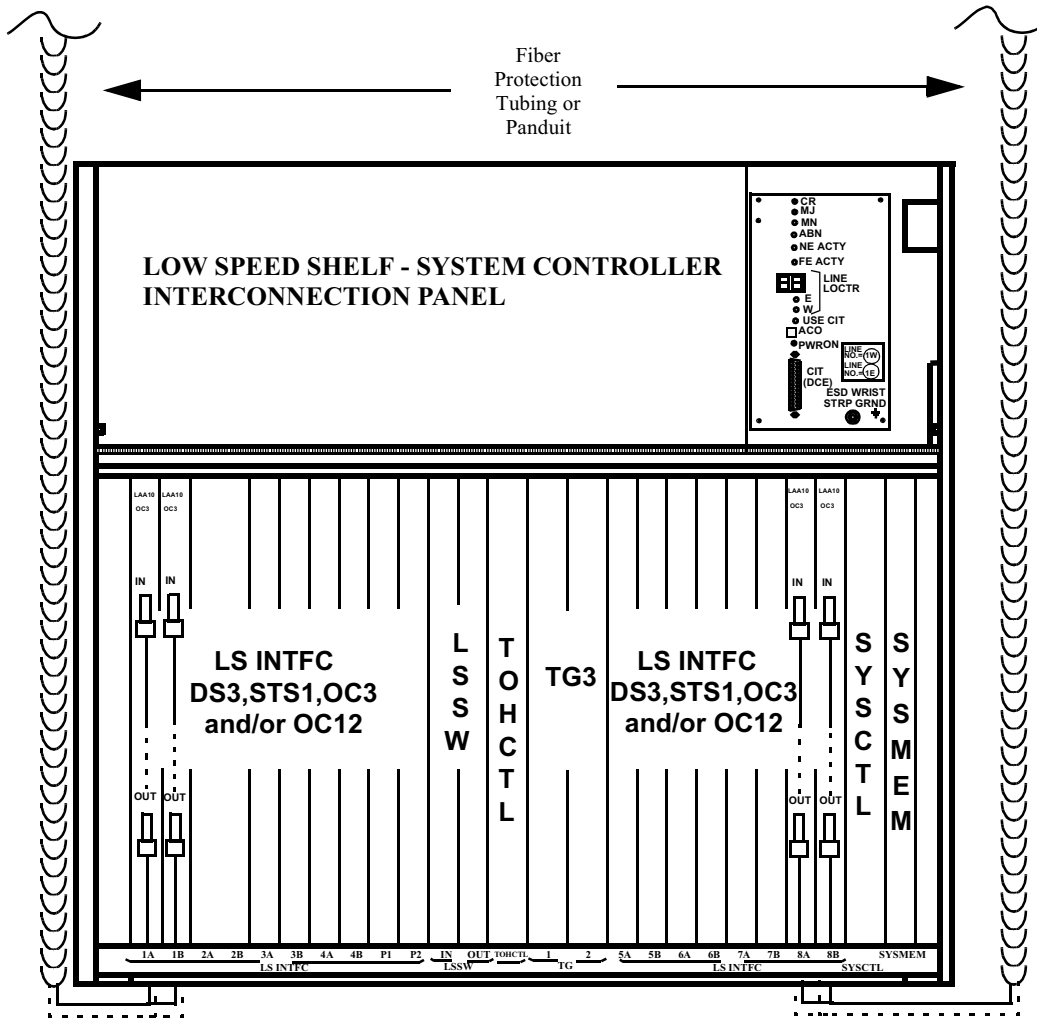


Figure 5-11. Low Speed Shelf Fiber Routing (without Cover)

Line Orderwire, Section Orderwire, Section User Channel and Line Growth Cables Installation

Description

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

- Orderwire capabilities
- User channel access
- Line growth.

NOTE:
Note that Section Orderwire is supported if software releases 6.0.0ADR (or greater) and 6.0.0-RPTR are both installed.

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

Table 5-48 lists the cables that are available for line orderwire, section orderwire, section user channel, and line growth.

Table 5-48. Available Line Orderwire, Section Orderwire, Section User Channel, and Line Growth Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
401	As req'd (2850' max[1])	816AS
451[2]	150	
461[2]	250	

1. When used for Line Growth Channel application the limit is 11 ft.
2. Not available for Line Growth Channel applications

Table 5-49 lists line orderwire, section orderwire, section user channel, and line growth cable connection to the interconnection panel (Enhanced High Speed Shelf).

Table 5-49. Line Orderwire, Section Orderwire, Section User Channel, and Line Growth Cable Connection to Interconnection Panel (Enhanced High Speed Shelf)

Cable Application	Enhanced High Speed Shelf Interconnect Panel Location
Line Orderwire X/Y[1]	J256A / J276A
Section Orderwire X/Y	J254A / J274A[2]
Section User Channel X/Y	J252A / J272A[3]
Line Growth Channel X/Y	J251A / J271A

1. Note: X=West, Y=East
2. Section Orderwire operates only if software releases 6.0.0-ADR (or greater) and 6.0.0-RPTR are both installed.
3. Reserved for future use.

Line Orderwire Cable Connections

Table 5-50 lists line orderwire cable connections and designations.

Table 5-50. Line Orderwire Cable Connection

Name	FT-2000 Input/ Output	Designation	J256A/ J276A Terminal	Wire Color
Transmit Overhead E2 Clock Input N	Output	OE2CIN	1	BL-W
Transmit Overhead E2 Sync Input N	Output	OE2SIN	2	O-W
Transmit Overhead E2 Data Input N	Input	OE2DIN	3	G-W
Receive Overhead E2 Data Output N	Output	OE2DON	4	BR-W
Receive Overhead E2 Sync Output N	Output	OE2SON	5	S-W
Receive Overhead E2 Clock Output N	Output	OE2CON	6	BL-R
No Connection		none	7	none
No Connection		none	8	none
Transmit Overhead E2 Clock Input P	Output	OE2CIP	9	W-BL
Transmit Overhead E2 Sync Input P	Output	OE2SIP	10	W-O
Transmit Overhead E2 Data Input P	Input	OE2DIP	11	W-G
Receive Overhead E2 Data Output P	Output	OE2DOP	12	W-BR
Receive Overhead E2 Sync Output P	Output	OE2SOP	13	W-S
Receive Overhead E2 Clock Output P	Output	OE2COP	14	R-BL
No Connection		none	15	none

Line Orderwire Cable Installation Procedure

Perform the following steps to install the line orderwire cable:

(1) Route the cable through the left side of the Enhanced High Speed Shelf to the line orderwire equipment (see Figure 5-12).

(2) Connect the line orderwire cable to J256A/J276A on the interconnection panel of the Enhanced High Speed Shelf (see Figure 5-12).

(3) Connect line orderwire cable to line orderwire equipment by cutting the cable to length and wire-wrapping the loose ends onto the unit. See Appendix A, "Related Equipment" for additional information to wire a Dantel orderwire shelf.

(4) Label the connections that are wire-wrapped.

(5) Dress and tie the cable.

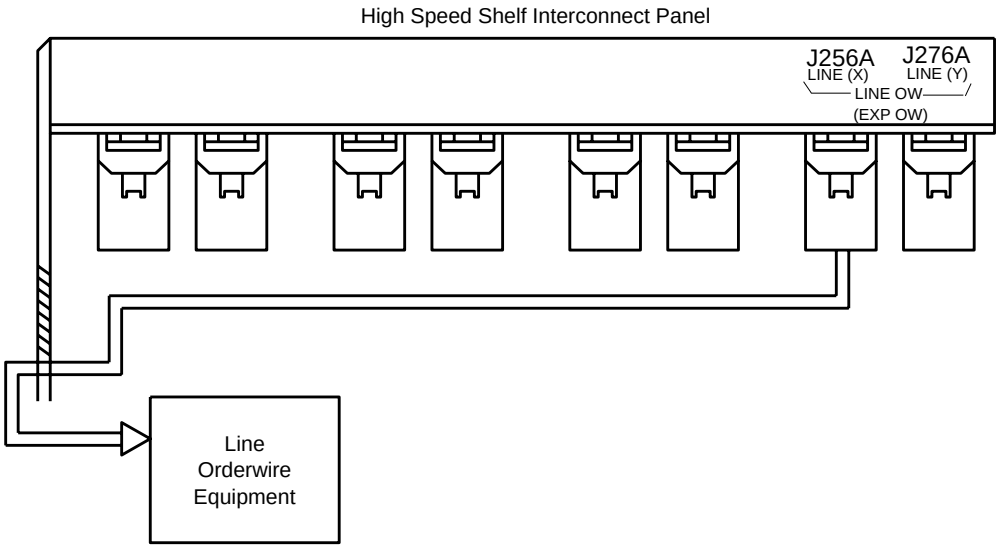


Figure 5-12. FT-2000 Line Orderwire Cable Routing

Section Orderwire Cable Connections

Table 5-51 lists section orderwire cable connections and designations.

Table 5-51. Section Orderwire Cable Connection

Name	FT-2000 Input/ Output	Designation	J254A/ J274A Terminal	Wire Color
Transmit Overhead E2 Clock Output N	Output	OE2CIN	1	BL-W
Transmit Overhead E2 Sync Input N	Output	OE2SIN	2	O-W
Transmit Overhead E2 Data Input N	Input	OE2DIN	3	G-W
Receive Overhead E2 Data Output N	Output	OE2DON	4	BR-W
Receive Overhead E2 Sync Output N	Output	OE2SON	5	S-W
Receive Overhead E2 Clock Output N	Output	OE2CON	6	BL-R
No Connection		none	7	none
No Connection		none	8	none
Transmit Overhead E2 Clock Input P	Output	OE2CIP	9	W-BL
Transmit Overhead E2 Sync Input P	Output	OE2SIP	10	W-O
Transmit Overhead E2 Data Input P	Input	OE2DIP	11	W-G
Receive Overhead E2 Data Output P	Output	OE2DOP	12	W-BR
Receive Overhead E2 Sync Output P	Output	OE2SOP	13	W-S
Receive Overhead E2 Clock Output P	Output	OE2COP	14	R-BL
No Connection		none	15	none

Section Orderwire Cable Installation Procedure

Perform the following steps to install the section orderwire cable:

(1) Route the cable through the left side of the Enhanced High Speed Shelf (see Figure 5-13) to the section orderwire equipment.

(2) Connect the section orderwire cable to J254A/J274A on the interconnection panel of the Enhanced High Speed Shelf.

(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.

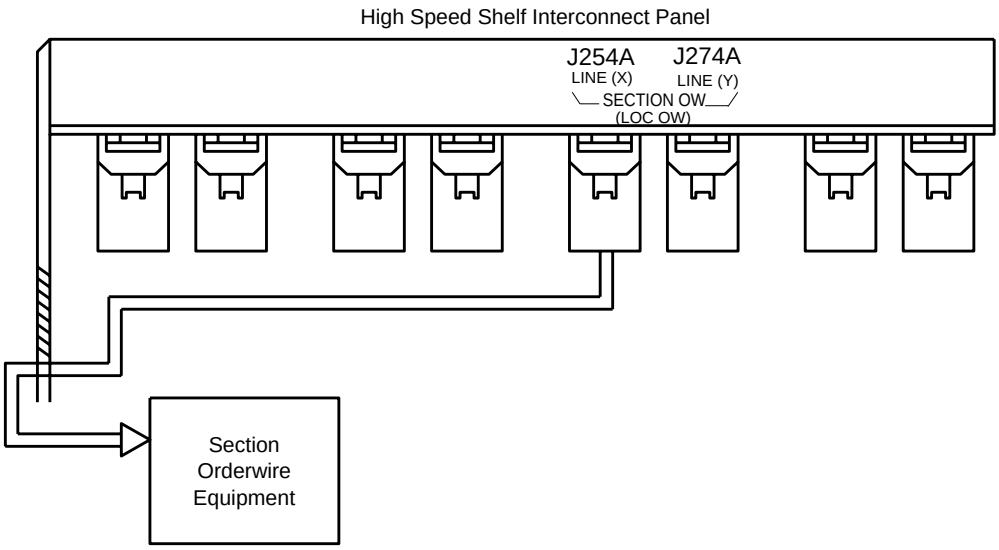


Figure 5-13. FT-2000 Section Orderwire Cable Routing

Section User Channel Cable Connections

Table 5-51 lists section user channel cable connections and designations.

Table 5-52. Section User Cable Connection

Name	FT-2000 Input/ Output	Designation	J252A/ J272A Terminal	Wire Color
Transmit Overhead E2 Clock Input N	Output	OE2CIN	1	BL-W
Transmit Overhead E2 Sync Input N	Output	OE2SIN	2	O-W
Transmit Overhead E2 Data Input N	Input	OE2DIN	3	G-W
Receive Overhead E2 Data Output N	Output	OE2DON	4	BR-W
Receive Overhead E2 Sync Output N	Output	OE2SON	5	S-W
Receive Overhead E2 Clock Output N	Output	OE2CON	6	BL-R
No Connection		none	7	none
No Connection		none	8	none
Transmit Overhead E2 Clock Input P	Output	OE2CIP	9	W-BL
Transmit Overhead E2 Sync Input P	Output	OE2SIP	10	W-O
Transmit Overhead E2 Data Input P	Input	OE2DIP	11	W-G
Receive Overhead E2 Data Output P	Output	OE2DOP	12	W-BR
Receive Overhead E2 Sync Output P	Output	OE2SOP	13	W-S
Receive Overhead E2 Clock Output P	Output	OE2COP	14	R-BL
No Connection		none	15	none

Section User Channel Cable Installation Procedure

Perform the following steps to install the section user channel cable:

(1) Route the cable through the left side of the Enhanced High Speed Shelf to the user channel equipment.

(2) Connect the section user channel cable to J252A/J272A on the interconnection panel of the Enhanced High Speed Shelf (see Figure 5-14).

(3) Connect the section user channel X or Y 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.

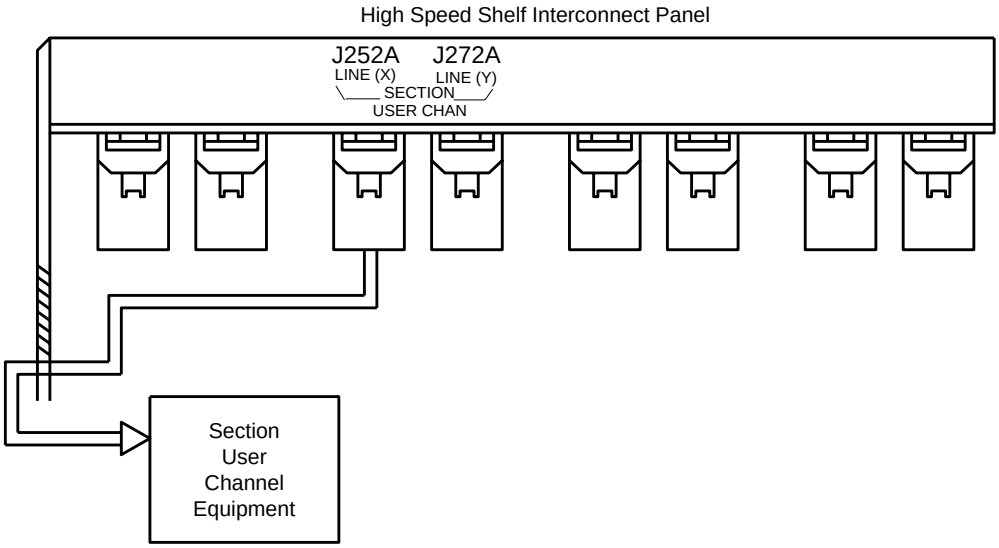


Figure 5-14. FT-2000 Section User Channel Cable Routing

Line Growth Cable Connections

Table 5-53 lists line growth cable connections and designations.

Table 5-53. Line Growth Cable Connection

Name	FT-2000 Input/ Output	Designation	J251A/ J271A Terminal	Wire Color
Overhead E2 Clock Input N	Output	Z1CIN	1	BL-W
Overhead E2 Sync Input N	Output	Z1SIN	2	O-W
Overhead E2 Data Input N	Input	Z1DIN	3	G-W
Overhead E2 Data Output N	Output	Z1DON	4	BR-W
Overhead E2 Sync Output N	Output	Z1SON	5	S-W
Overhead E2 Clock Output N	Output	Z1CON	6	BL-R

Table 5-53. Line Growth Cable Connection

Name	FT-2000 Input/ Output	Designation	J251A/ J271A Terminal	Wire Color
No Connection		none	7	none
No Connection		none	8	none
Overhead E2 Clock Input P	Output	Z1CIP	9	W-BL
Overhead E2 Sync Input P	Output	Z1SIP	10	W-O
Overhead E2 Data Input P	Input	Z1DIP	11	W-G
Overhead E2 Data Output P	Output	Z1DOP	12	W-BR
Overhead E2 Sync Output P	Output	Z1SOP	13	W-S
Overhead E2 Clock Output P	Output	Z1COP	14	R-BL
No Connection		none	15	none

Line Growth Cable Installation Procedure

Perform the following steps to install the line growth cable:

(1) Route the cable through the left side of the terminal to the line growth channel equipment.

(2) Connect the line growth channel X or Y cable to J251A/J271A on the interconnection panel of the Enhanced High Speed Shelf (see Figure 5-15).

(3) Connect the line growth channel X or Y cable to the line growth channel 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.

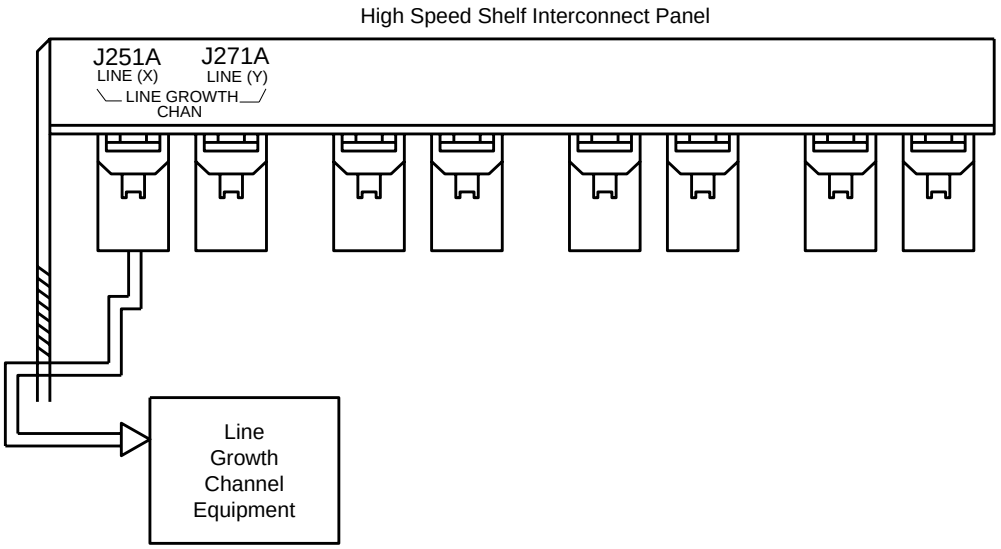


Figure 5-15. FT-2000 Line Growth Channel X or Y Cable Routing

Powering, Circuit Pack Installation, and Start Up - ADR Terminal

6

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Powering, Circuit Pack Installation, and Start Up - ADR Terminal

6

Overview

This Chapter describes procedures to:

- Power FT-2000 Equipment.
- Install stile strips on the FT-2000 OC-48 Add/Drop Rings Terminal.
- Install circuit packs into the FT-2000 OC-48 Add/Drop Rings Terminal Network Element.

This Chapter also provides sections on Software Installation Description and Considerations. **The complete procedure for software installation is located in Appendix D.**

Tools, Test Sets, and Accessories

The following equipment is required to complete the procedures in this section:

- Multimeter capable of measuring resistance (ohms) and DC volts from -40 to -60 volts.
- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.
- A complete set of FT-2000 software distribution diskettes. ADR is an abbreviation for Add/Drop Rings.
- Personal computer for use as CIT, see requirements in Chapter 3.

- A “straight-through” RS-232 cable. Figure 6-1 below shows the wiring required. The cable must have a DB25 male connector at one end to mate with FT-2000 DCE CIT port. Table 6-1 may be used together with the figure to determine pin numbers to connect. Typically a DB9 female connector is needed to mate with the PC serial port (com port) at the other end.

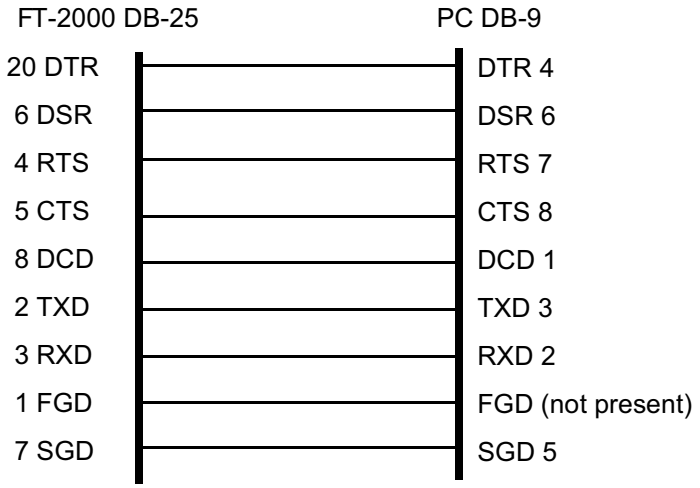

Figure 6-1. Required straight-through cable wiring

Table 6-1. 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 (ADR- Terminal) CIT DCE port is located on the User Panel.
Network Element (ADR- Terminal) CIT DTE port is located at P158A on the System Controller Interconnection panel.
PC serial port (com port) is DTE.
Modem ports are DCE.
Use straight through cable between unlike ports, use null modem between like ports.

ADR - Terminal Powering

Description

Two -48V DC power feeders connect to the FT-2000 OC-48 Add/Drop-Rings Terminal fuse panel. From the fuse panel, power is channeled through each user or filter panel to the backplane of the shelf, the fan assembly, and to the circuit packs.

⚠ CAUTION:
The red power lead connects to -48V DC source. The white power lead connects to battery return.

ADR - Terminal Powering Procedure

Perform the following steps to power the terminal:

(1) Verify that all packing material has been removed from the terminal.

(2) Verify the following:

- Circuit breakers at the Battery Distribution and Fuse Bay (BDFB) are in the **OFF** position, or
- Fuses on the BDFB are **not installed**.

(3) Unseat all circuit packs from the terminal.

(4) Remove the fuses from the power distribution and fuse panel at the top of the terminal. Open the retainer by lifting up on the bottom edge of the retainer, then press lightly down on the top edge of the fuse cap, the fuse cap will pop out.

(5) Using an ohm meter, measure the resistance from the top terminal, inside each FT-2000 fuse holder, to the terminal frame grounding cable. Refer to Figure 6-2 which shows where to take the measurement from the front of the terminal.

Requirement: The resistance should show an open circuit (more than a megohm reading) for each fuse. If the resistance measurement requirement is not met then proceed to Chapter 16, Installation Troubleshooting.

(6) Insert 30 amp fuses into the FT-2000 power feeds at the BDFB for both single shelf bays and Dual ADR Terminals.If circuit breakers are being used, put them in the **ON** position.

(7) Using the voltmeter, measure the voltage from the top terminal of each FT-2000 fuse holder to the terminal grounding cable. Refer to Figure 6-2. which shows where to take the measurement from the front of the terminal.

Requirement: The voltage should be -48 volts (between -41.75 and -60.0 VDC) at each fuse.

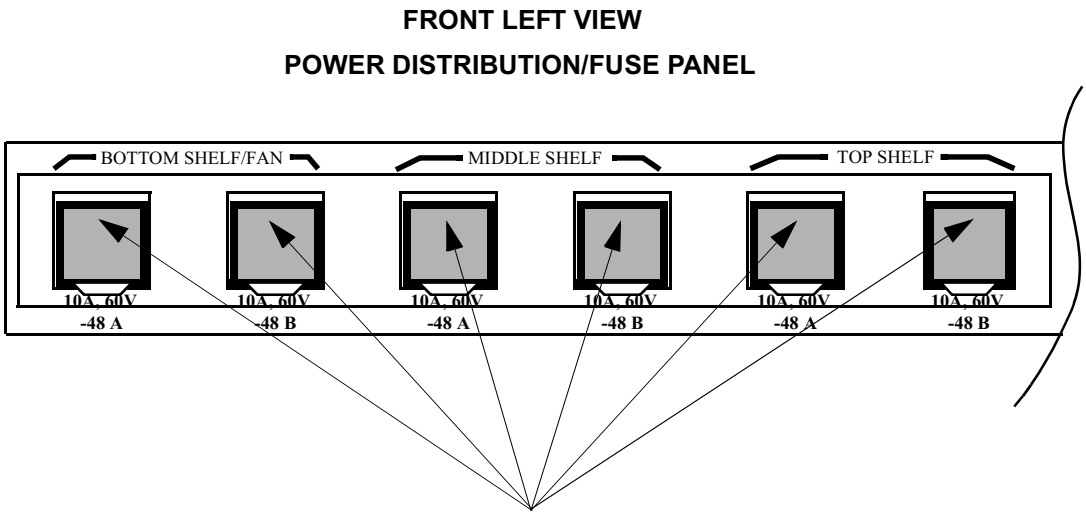

Figure 6-2. Fuse Panel Measurement Point

(8) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled BOTTOM SHELF/FAN A and B positions 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 power distribution/fuse panel shelf, being 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 filter panel of the bottom shelf. If a fan unit is installed, the fan PWR ON LED will also be illuminated.

(9) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled MIDDLE SHELF A and B positions.

Requirement: The PWR ON LED is lighted on the user panel of the middle shelf.

(10) No fuses are actually needed in the fuse panel at the positions labeled TOP SHELF, if the TOP SHELF is unequipped. However, fuses are needed in the fuse holder cap for the cap to fit properly into the socket. Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled TOP SHELF. These can be used as spares if needed. There are also spares in the installation spare parts kit shipped with the terminal.

(11) Disconnect the A power feed by turning the circuit breaker off or removing the fuse for the A power feed at the BDFB.

Requirement: The PWR ON LED on each shelf should remain illuminated.

(12) Remove the A fuse in the power distribution and fuse panel for the bottom shelf/fan.

Requirement: Verify that the PWR ON LED on the bottom shelf is still on.

NOTE:

If the LED is not on, then the A and B power feeders to the terminal are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

(13) Reinsert the A fuse for the bottom shelf into the fuse panel.

(14) Turn the circuit breaker on or replace the fuse for the A power feed at the BDFB.

Stile Strip Installation

Description

When completely installed, the terminal has four stile strips attached at each upright corner of the terminal as shown in Figure 6-3 These stile strips protect cables and fibers from damage and improve the appearance of the terminal. Stile strips ship attached to the left side of the terminal.

Stile Strip Installation Procedure

Perform the following steps to install the stile strips:

NOTE:
There are four *different* stile strips.

(1) Clip each stile strip to the top upright corner of the terminal, then align and tighten the thumbscrews at the bottom of the stile strip.

- The front left stile strip has a white label: "CAUTION: for continued protection against risk of fire, replace only with same type and rating of fuse," at the top.
- The front right stile strip has a yellow label: "ATTENTION: Grounded wrist strap required," at the top.
- The rear right stile strip has a yellow label: "ATTENTION: Grounded wrist strap required, remove stile cover to access ESD jack," at the top.
- The rear left stile strip has no label.

(2) Verify that there is a uniform gap, no larger than an eighth inch, between the stile strip and the side of the shelves in the terminal. The brackets that hold the stile strip in place may be manually modified to achieve uniformity.

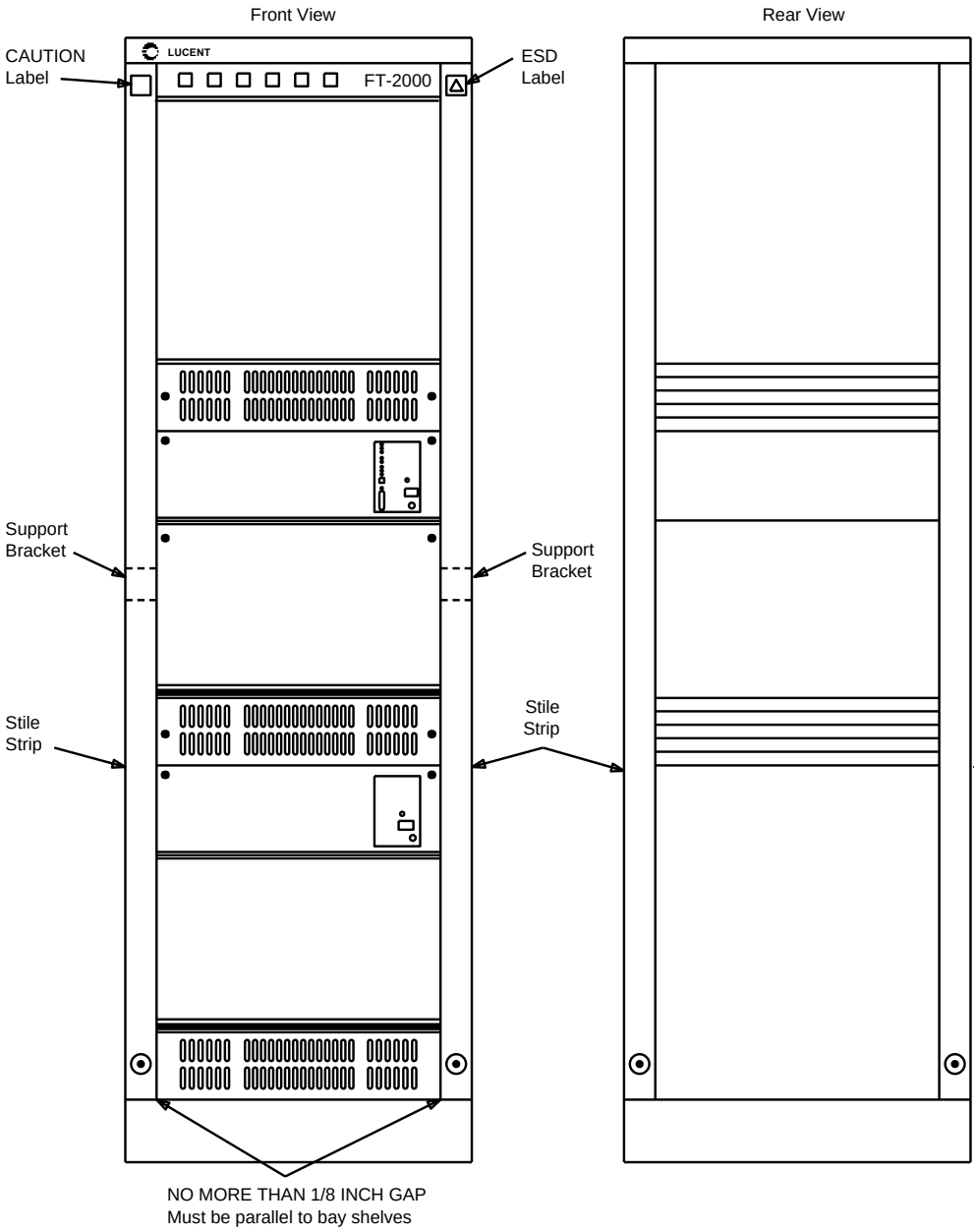

Figure 6-3. Stile strips

Software Installation

Description

The software installation procedure for the FT-2000 OC-48 Add/Drop-Rings Terminal is provided in **Appendix D**. Use this procedure only for new installations. Installation of new software to in-service terminals should follow procedures given in the *FT-2000 Software Release Description* shipped with the diskettes. The *FT-2000 Software Release Description* contains the most up-to-date instructions.

ADR - Terminal
Circuit Pack Installation

Description

Circuit pack installation for the FT-2000 OC-48 Add/Drop-Rings Terminal includes the following:

- Terminal circuit pack considerations, availability, installation procedure.

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.
- 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.

Circuit Pack Availability

Table 6-2 lists available circuit packs for the FT-2000 OC-48 Add/Drop-Rings Terminal.

Table 6-2. Available FT-2000 OC-48 Circuit Packs

Comcode	Product Code	Description	Max. / Shelf	Min. / Shelf
106453475	739B2	TRMTR (Add/Drop 1.3µ Standard Power)	2	2 [1]
107275828	739B4[6]	TRMTR (Add/Drop 1.3µ Standard Power)	2	2 [1]
107428310	739B5[6]	TRMTR (Add/Drop 1.3µ Standard Power)	2	2 [1]
106453483	739C2	TRMTR (Add/Drop 1.3µ High Power)	2	2 [1]
107428336	739C5[6]	TRMTR (Add/Drop 1.3µ High Power)	2	2 [1]
106453491	739J2	TRMTR (Add/Drop 1.5µ Standard Power)	2	2 [1]
107187502	739J3	TRMTR (Add/Drop 1.5µ LBA)	2	2
107275884	739J4[6]	TRMTR (Add/Drop 1.5µ Standard Power)	2	2
107428344	739J5[6]	TRMTR (Add/Drop 1.5µ Standard Power)	2	2
107428351	739P5[6]	TRMTR (Add/Drop 1.5µ LBA)	2	2
107551269	739R2[5]	TRMTR (Add/Drop 1.5µ LBA W1)	2	2
107567646	739R5	TRMTR (Add/Drop 1.5µ LBA W1)	2	2
107551277	739S2[5]	TRMTR (Add/Drop 1.5µ LBA W2)	2	2
107567653	739S5[6]	TRMTR (Add/Drop 1.5µ LBA W2)	2	2
107079684	739E1[8]	TRMTR	2	2
107430688	739E2[8]	TRMTR	2	2
107430696	739E3[8]	TRMTR	2	2
107430704	739E4[8]	TRMTR	2	2
107430712	739E5[8]	TRMTR	2	2
107430720	739E6[8]	TRMTR	2	2
107430738	739E7[8]	TRMTR	2	2
107430746	739E8[8]	TRMTR	2	2
106079700	739G1[8]	TRMTR	2	2

Table 6-2. Available FT-2000 OC-48 Circuit Packs

Comcode	Product Code	Description	Max. / Shelf	Min. / Shelf
107974099	739G2[8]	TRMTR	2	2
107974107	739G3[8]	TRMTR	2	2
107974115	739G4[8]	TRMTR	2	2
107974123	739G5[8]	TRMTR	2	2
107974131	739G6[8]	TRMTR	2	2
107974149	739G7[8]	TRMTR	2	2
107974156	739G8[8]	TRMTR	2	2
106079718	739H1[8]	TRMTR	2	2
108620584	739H2[8]	TRMTR	2	2
108620618	739H3[8]	TRMTR	2	2
108620634	739H4[8]	TRMTR	2	2
108620667	739H5[8]	TRMTR	2	2
108620691	739H6[8]	TRMTR	2	2
108620709	739H7[8]	TRMTR	2	2
108620717	739H8[8]	TRMTR	2	2
108620733	739H9[8]	TRMTR	2	2
108620758	739H10	TRMTR	2	2
108620774	739H11[8]	TRMTR	2	2
108620790	739H12[8]	TRMTR	2	2
108620816	739H13[8]	TRMTR	2	2
108620840	739H14[8]	TRMTR	2	2
108620865	739H15[8]	TRMTR	2	2
108620881	739H16[8]	TRMTR	2	2
106453509	839B2	RCVR	2	2
107670788	839B4[6]	RCVR	2	2

Table 6-2. Available FT-2000 OC-48 Circuit Packs

Comcode	Product Code	Description	Max. / Shelf	Min. / Shelf
107781973	839B4B[6]	RCVR	2	2
107477457	839B5[6]	RCVR	2	2
107933434	839E5[8]	RCVR	2	2
106829559	LAA2	LS INTFC (DS3)	17 [3]	0
106033202	LAA4 [2]	LS INTFC (STS1E)	17 [3]	0
106033210	LAA5 [7]	LS INTFC (IS3)	16 [3]	0
106033269	LAA10[4]	LS INTFC (OC3)	16 [3]	0
108337478	LAA10B[a]	LS INTFC (OC3)	16 [3]	
107508152	T939A[7]	LS INTFC (OC12)	4	0
106332293	LAA12	LSSW	2	0
106053903	LAA18	TG3 (DS1)	2	2
106690597	LAA21	OHCTL	2	2
106916687	LAA23B	SYSCTL	1	1
106053978	LAA25	SYSMEM	1	1
106281066	LAA26 [5]	TOHCTL	1	0
106726870	LAA28	LNCTL	1	1

[1] Only two transmitter circuit packs total per shelf.
[2] Supported in Release 4.0.0 or greater.
[3] Only combined max. of 18 LS INTFC per shelf.
[4] Supported in Release 5.0.0 or greater.
[5] Supported in Release 6.0.0 or greater.
[6] Supported in Release 7.0.0 or greater.
[7] Supported in Release 7.1.0 or greater.
[8]Supported in Release 7.2.0 or greater

a. Supported in Release 9.0.0 or Greater

ADR- Terminal Circuit Pack Installation Procedure

NOTE:
The SYSMEM and SYSCTL were inserted during the software installation procedure.

(1) Insert two LAA18 TG3 timing circuit packs at slots TG-1 and TG-2 of the Low Speed Shelf - System Controller.

(2) Insert DS3, STS1, or Optical Low Speed Interface (0 to 18) circuit packs. In cases with low speed protection switching (most cases) put 1 of each type as required (LAA2 and LAA4) into slots P1 and P2; Optical interface packs are not used in P1 or P2. Remaining DS3, STS1, or Optical Low Speed Interfaces go into the service slots, 1A through 8B of the Low Speed Shelf - System Controller.

NOTE:
Correct placement of specific types of circuit packs in the shelf should be defined in the circuit orders. In some cases the terminal may be operating without low speed protection switching, e.g., when FT-2000 works in conjunction with an RDS shelf. In cases without low speed protection switching, do not install any circuit packs in the P1 or P2 slots.

NOTE:
OC-3 and IS-3 optical low speed circuit packs can be provisioned for 1+1 unidirectional non-revertive switching. In this case, adjacent low speed A/B slots must be equipped for protection (same integer identifier - 1A,1B). Unprotected mode, 0x1, will allow 16 STS-3 signals in a fully equipped shelf; this is the default mode, and, optical packs need not be paired.

NOTE:
OC-12 optical low speed circuit packs can be provisioned for 1+1 protection. An OC-12 card physically occupies 4 slots which is referred to as a quad. The four quads 1, 2, 3, and 4 in the low speed shelf are slots 1A-2B, 3A-4B, 5A-6B, and 7A-8B respectively. The OC-12 1+1 non-revertive switching uses quad pairs. The first quad pair is 1 and 2. The second quad pair is 3 and 4.

Table 6-3 provides an example of protected low speed shelf mixing of circuit packs for the FT-2000 OC-48 Add/Drop Rings Terminal.

Table 6-3. Provisioning Example of a Low Speed Shelf

Slot/Circuit Pack	Status
1A --> LAA10	Unprotected OC3 (0x1)
1B --> LAA4	STS1-E
2A --> LAA2	DS3
2B --> LAA10	Unprotected OC3 (0x1)
3A --> LAA10	Protected OC3 (1+1)
3B --> LAA10	
4A --> LAA10	Unprotected OC3 (0x1)
4B --> Blank Slot	
P1 --> LAA2	DS3
P2 --> LAA4	STS1-E

(3) If required, and the software is release 6.0.0-ADR or greater, insert one LAA26 TOHCTL tributary overhead controller circuit pack into slot TOHCTL of the Low Speed Shelf - System controller.

(4) Insert two LAA12 LSSW low speed switch circuit packs into slots LSSW IN and LSSW OUT of the Low Speed Shelf - System Controller. In cases without low speed protection switching (no LAA2 or LAA4 packs in the shelf), do not install any LAA12 circuit packs.

(5) Insert two receiver circuit packs into slots RCVR 1W and RCVR 1E of the Enhanced High Speed shelf. These circuit packs are shipped individually packed, not in the terminal. A list of compatible receiver circuit packs is shown in table 6-2.

(6) Insert two transmitter circuit packs into slots TRMTR 1W and TRMTR 1E of the Enhanced High Speed shelf. A list of compatible transmitter circuit packs is shown in table 6-2. Be sure to equip the correct type of circuit packs into the proper East and West directions based on engineering information.

(7) Insert one LAA28 LNCTL line controller circuit pack into slot LNCTL 1W of the Enhanced High Speed shelf.

(8) Insert two LAA21 OHCTL overhead controller circuit packs into slots OHCTL 1W and OHCTL 1E of the Enhanced High Speed shelf.

(9) Wait about 15 minutes. The LNCTL and OHCTL FAULT LED's will go off, then the remaining FAULT LED's will go off.

Requirement: Verify that all the circuit pack FAULT LED's are extinguished, except for the LED's on RCVR and optical low speed circuit packs which will be flashing because there is no valid OC-3[1], IS-3, OC-12, or OC-48 signal input. Refer to Chapter 16, Trouble Shooting, if this requirement is not met.

NOTE:
In order to minimize travel to sites, the test procedures in Chapter 7 should be completed just after the circuit pack installation in Chapter 6 is completed.

1. In Release 7.1.0-ADR and later the LED's on the low speed optical cards, OC-3, IS-3, and OC-12 will not be flashing.

Local Installation Testing- ADR Terminal

7

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Local Installation Testing- ADR Terminal

7

Overview

This Chapter describes the LED test and Installation Auto Turnup tests for the FT-2000 OC-48 Lightwave System. Tests described in this Chapter must be performed on each Add/Drop-Rings Terminal that makes up the ring.

Testing Setup Description

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 FT-2000 terminal before performing any tests. Reconnect the office alarm cable after completing testing.

- This procedure requires that the SYSCTL and the SYSMEM circuit packs have FT-2000 software installed. Additionally, all circuit packs must be installed, with their FAULT LED's off, except IS-3, OC-3, OC12[1], or OC-48 RCVRs which have flashing LED's. Software installation and circuit pack insertion procedures are in Chapter 6, "Powering and Start Up - ADR Terminal".
- It is suggested that the CIT PC be set up on the convenient PC tray which is located inside the heat baffle below the Low Speed Shelf (designed for laptop PC's 25 lbs. or less).
- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress.

Tools, Test Sets and Accessories

The following equipment is required for performing Installation Auto Turnup tests:

- One wrist strap connected to the wrist strap ground jack on the user panel for ESD protection.
- Two optical fiber cables with appropriate connectors (ST, FC/PC, or SC) on each end. (Single-mode, recommended length of 2-4 feet).
- Two optical line buildouts (ST, FC/PC, or SC type -15dB or 20dB loss - or optical 4C 19dB Test cables).
- Low speed interface loopback cables to loop back the DSX. (Up to 48 cables if the shelf is fully equipped, one should be four to five feet long. Minimum of three required.)
- One personal computer (PC) with FT-2000 CIT software installed on its hard disk, for use as craft interface terminal.
- Alcohol-moistened wipes or lint-free tissues, and a compressed air duster for fiber cleaning.
- Multi-mode fiber jumpers will be necessary if IS-3 circuit packs are being installed.

Example Test Command Entry

In these procedures, command entry is given in this format: Execute **FAULT_Test_LED (all,2)**. This is accomplished by:

(1) Selecting (highlighting) **FAULT** in the command menu, by using the arrow keys or typing "f", and pressing Enter or Return.

1. In Release 7.1.0-ADR and later, the fault LEDs on the optical low speed cards will not be flashing.

(2) Selecting **Test** (using the arrow keys, or typing "t") in the list which appears under **FAULT**, and pressing Enter or Return.

(3) Selecting **LED** in the list which appears under **Test** (using the arrow keys or typing "l"), and pressing Enter or Return.

(4) Use the value: **all**, for the first entry, LED type (type "?" for list or type all directly). Press Enter or Return to move the cursor to the next field.

(5) Use the value: **2**, for the second entry, Number of tests (type "?" for list or type "2" directly).

(6) When entry is complete press Execute (<F9>).

(7) To return to the command menu press Input (<F3>).

(8) In general you should respond "Yes" to all confirmation notices, except if you have made a mistake and wish to correct it. If you have selected the wrong item in a menu, or to move back through the popup menus, use the <Esc> key on the keyboard.

Testing Setup Procedure

Perform the following steps to set up for installation tests.

- ❑ Connect a properly configured PC (refer to Chapter 1 “Personal Computer for Use as Craft Interface Terminal,” if necessary) to the CIT (DCE) port on the FT-2000 user panel using a straight-through 25-pin RS-232 cable. Turn the PC on.
- ❑ While in the PC directory where the CIT software was installed (use the DOS cd \CIT command if needed), run the FT-2000 CIT program. Type the command indicated in Table 7-1 based on the software release you are using followed by the Return or Enter key.

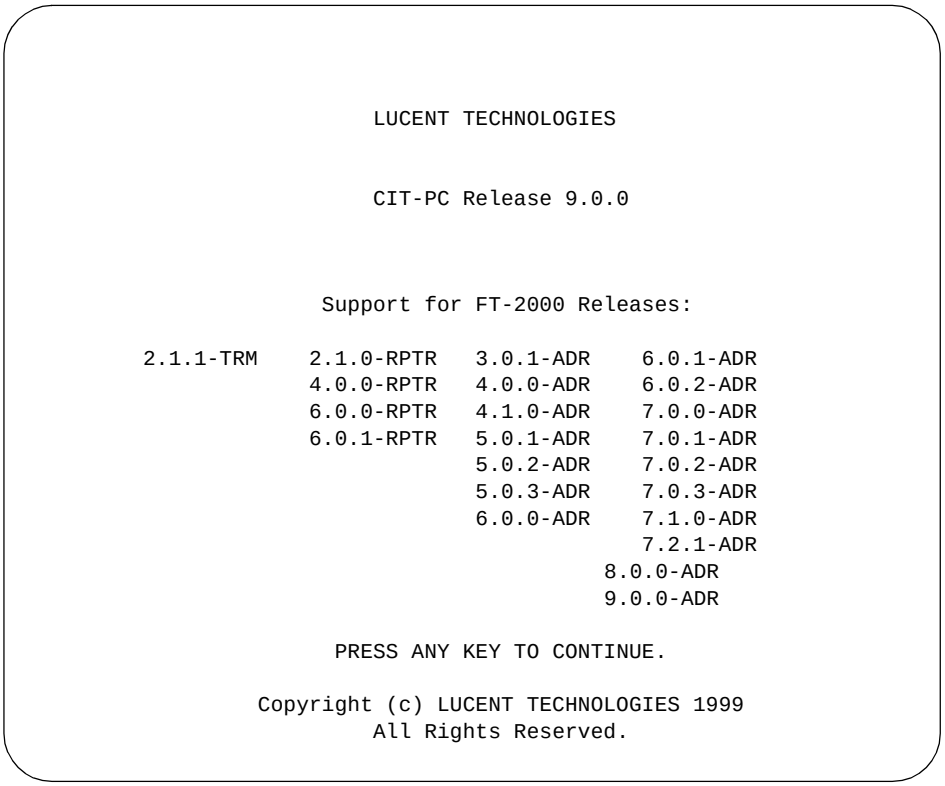
Table 7-1. CIT Start-up Commands for Testing

Software Release	Command to Use
Release 3.0.1	CIT
Release 4.0.0	CIT
Release 4.1.0	CIT EXPERT
Release 5.0.1	CIT EXPERT
Release 5.0.2	CIT EXPERT
Release 5.0.3	CIT EXPERT
Release 6.0.0	CIT EXPERT
Release 6.0.1	CIT EXPERT
Release 6.0.2	CIT EXPERT

Table 7-1. CIT Start-up Commands for Testing

Release 7.0.1	CIT EXPERT
Release 7.0.3	CIT EXPERT
Release 7.1.0	CIT EXPERT
Release 7.2.1	CIT EXPERT
Release 8.0.0	CIT EXPERT
Release 8.1.0	CIT EXPERT
Release 9.0.0	CIT EXPERT

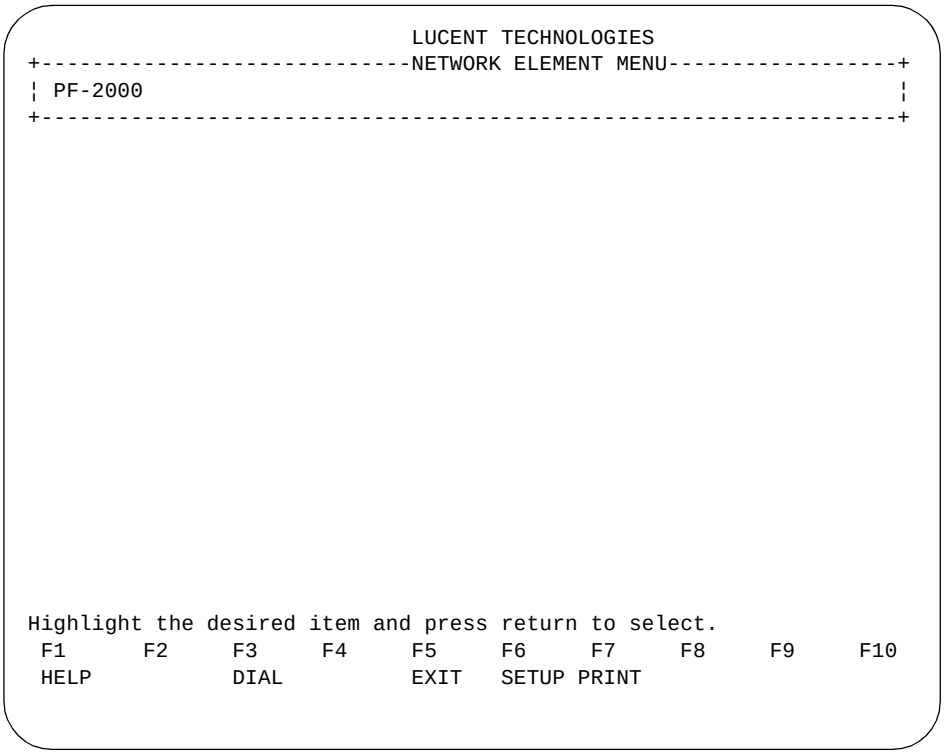
Requirement: An Introductory screen appears.



Action: Press any key to remove the introductory screen.

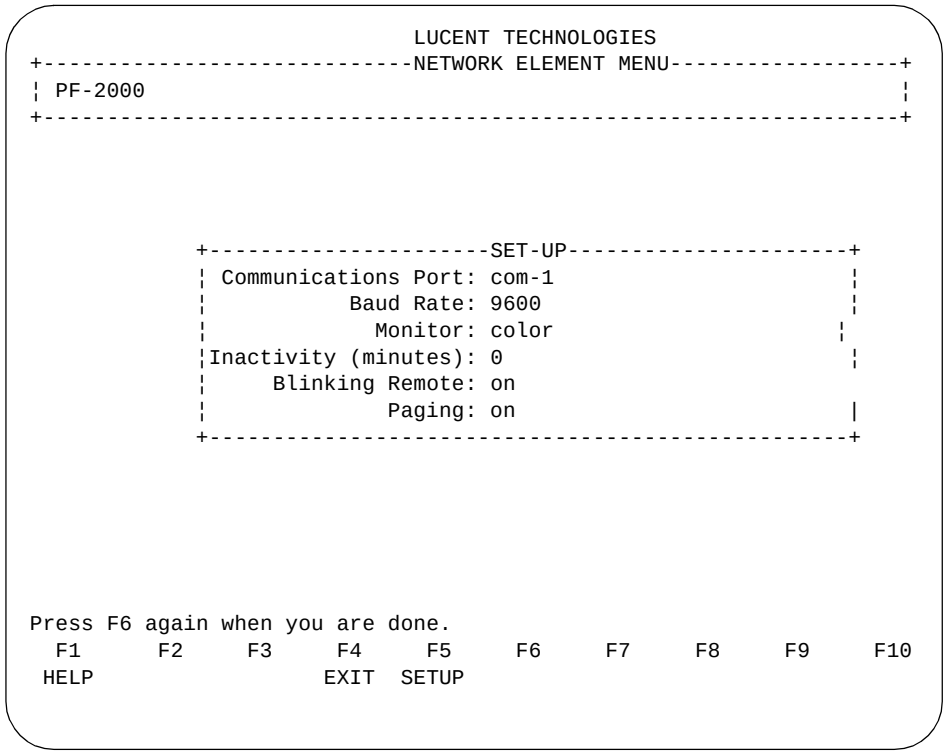
Note that this screen and all subsequent screens may include reference to software release 8.1.0 when it is available and being used.

Requirement: The screen below appears:



Action: Press the F6 (SETUP) key.

Requirement: The screen below appears:

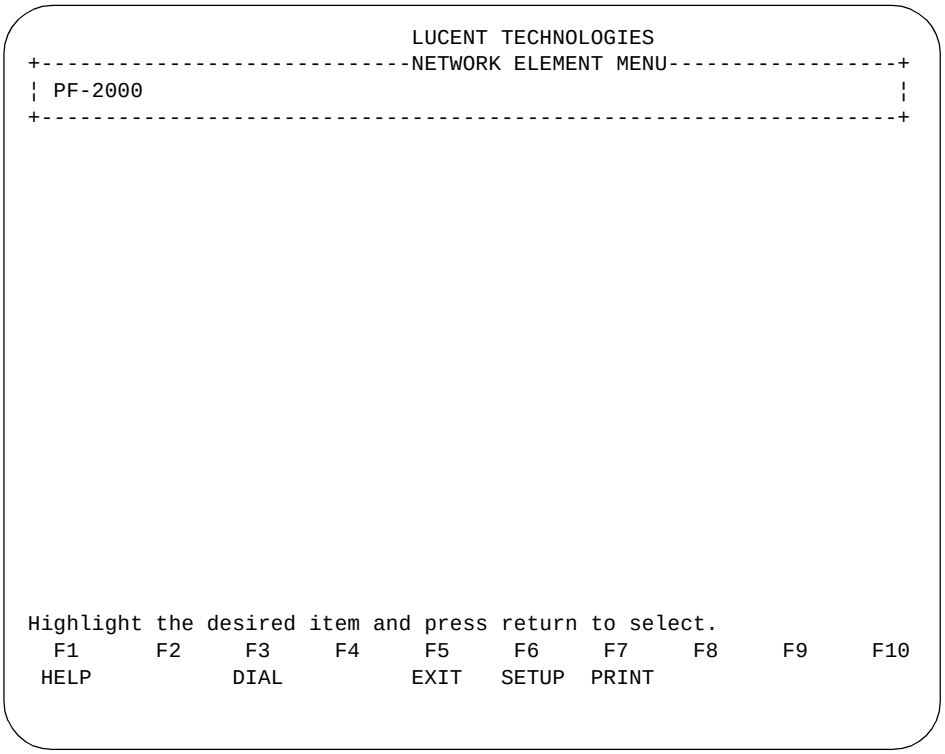


NOTE:

If any of these parameters differ from the PC hardware configuration, they must be changed to match. To select a parameter, press the up arrow or down arrow key. Once the desired parameter is highlighted, type a “?”. A smaller window will appear which lists all valid settings for the parameter. Select the desired setting by using the arrow keys until it is highlighted. Press the Return or Enter key. The choice of Communications Port depends on the hardware configuration of your computer. Most laptops and desktop computers use COM1or COM2. If COM1 does not work, check your hardware manual, or try another port. Operate at the highest baud rate that works. Some older PC’s will not operate at a speed greater than 9600 BAUD. Select color or monochrome monitor depending on your PC. Inactivity timer units are in minutes. The CIT will disconnect after the number of minutes of inactivity with the terminal have passed. In releases prior to 5.0.2 enter 0 to disable the inactivity timer (never be logged off due to inactivity). The inactivity timer is set using security commands for the network element in releases 5.0.2 and greater. Blinking Remote on or off causes the upper right corner location indicator (Local ONLY, Local, or Remote) to flash when toggled to the Remote terminal. Paging control is turned on and off using the Paging field.

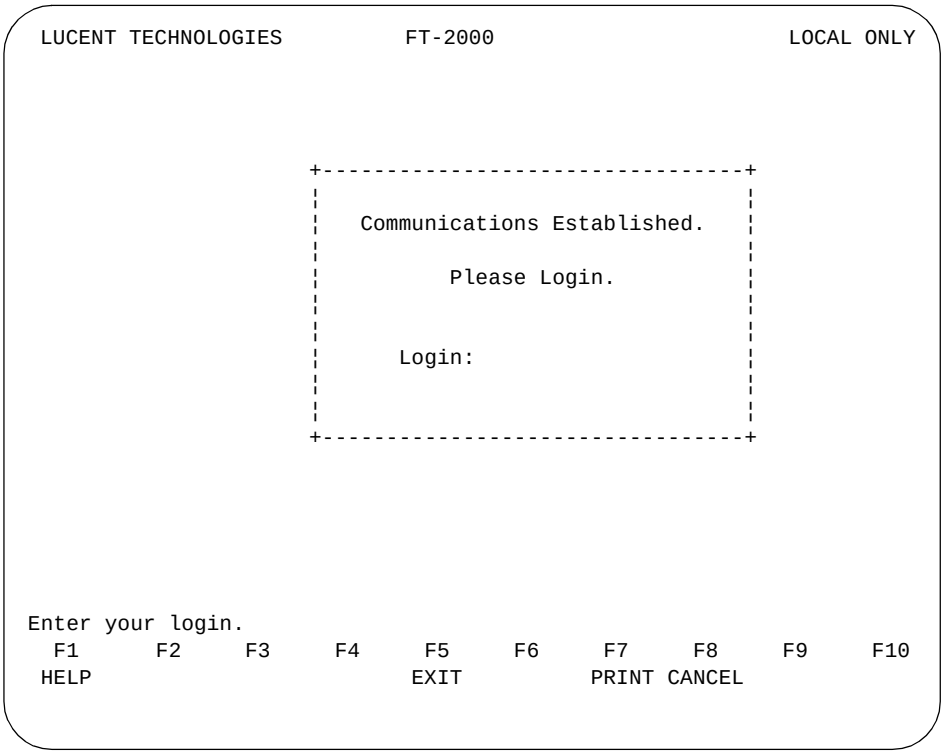
Action: When all the parameter settings are correct for the PC, press F6 to save them.

Requirement: The screen below appears:



Action: Use the arrow keys to highlight (select) PF-2000 in the NETWORK ELEMENT MENU. (It may already be selected.) Press the Enter or Return key.

Requirement: The screen below appears:



Action: Type **LUC01** in capital letters at the login prompt, and then press the Enter or Return key. A new prompt labeled “Password:” will appear. Type **FT-2000** in capital letters at the password prompt, and then press the Enter or Return key again. For security, the password will not be displayed on the screen when it is typed.

NOTE:
In releases prior to 7.0.3-ADR the default login was **ATT01**

Requirement: When successfully logged in, the CIT will report all the current alarms and status conditions. You may find a ring start-up in progress alarm, wait until that alarm is no longer present and alarms remain constant.

Action: Use **FAULT_Retrieve_Alarm [and Status] (all)** to view alarms. For an Add/Drop Rings Terminal Release 8.0.0 the current alarms are as shown below:

```
CRITICAL LUCENT TECHNOLOGIES FT-2000 9.0.0-ADR LT-FT-2000  LOCAL ONLY


   LT-FT-2000 70-01-01 16:05
M  Retrieve-Alarm:All:COMLD
/* Active Alarms and Status Report
  ================================================================
   Alarm   Source   Date  Time      Srv  Description
   Level   Address  Detected
================================================================
   CR      line-1e  01-01 00:02:41 SA   incoming OC-48 LOS
   CR      line-1w  01-01 00:02:41 SA   incoming OC-48 LOS
----------------------------------------------------------------
   MJ      line-1w  01-01 00:02:35 nsa  site provisioning conflict
   MJ      line-1e  01-01 00:02:35 nsa  site provisioning conflict
   MJ      system   01-01 00:04:46 nsa  ring incomplete/open
----------------------------------------------------------------
   -       system   01-01 00:03:27  nsa  DS-NE not reachable[1]
   */

_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
```

1. In Release 8 and later, there is no DS-NE.

NOTE:

The “DS-NE not reachable” will not be displayed if that node has been provisioned to be the DS-NE. Also, in Releases prior to R6, the NE Stat Com failure will not be present. In Release 8 and later, there is no DS-NE.

NOTE:

Installed OC3 circuit packs will have an incoming OC-3 LOS prior to Release 7.1.0-ADR.

LED Tests

LED Test Description

The LED test verifies proper operation of LEDs in the FT-2000 Network Element. Proper LED operation is necessary to assist in trouble isolation. If failed LED's are indicated (they do not light), replace the circuit pack or module they are in; only the PWR ON green LEDs are in sockets. Repeat the test until all LEDs pass the test. If a FAULT LED on a circuit pack works in one slot, it will work in any slot, there is no need to move circuit packs to unequipped slots.

LED Test Procedure

Perform the following steps to test all LEDs in the FT-2000 OC-48 Add/Drop-Rings Terminal:

(1) Execute **FAULT_Test_LED (all,2)**.

Requirement: Observe that all LEDs light for 10 seconds, then turn off for 10 seconds, the 20 second sequence repeats, then LEDs revert to their initial state.

NOTE:
The left digit 7-segment display of the LINE LOCTR only lights a one (|).

Auto Turnup DSX (Software)

Auto Turnup DSX Test (Software) Description

To properly test the low speed signal cabling, both a software and a hardware test must be performed. A software test is performed first to test the continuity of the low speed signal cables. A hardware test is performed next to verify the proper arrangement of input and output cables.

The software low speed signal cabling (Auto Turnup DSX) test sends signals from each low speed interface circuit pack towards the crossconnect panel. Signals are looped back at the panel with jumpers. The software checks for error free transmission. By injecting parity errors on one output at a time, the software checks for continuity by expecting to count those errors at the input port for the same port. Protection switches are performed, and the signal is again checked for continuity using parity error insertion. Figure 7-1 illustrates how the test is

performed. The test can take up to 10 minutes to perform depending on the number of low speed interface slots equipped.

The hardware low speed signal cabling test uses an output from the terminal to test each INPUT port to ensure that INPUT ports are truly INPUT ports (No INPUT and OUTPUT reversals, which the software test is unable to detect). Additionally the hardware test will verify that each INPUT port is labeled properly at the terminating equipment.

If failed cabling is indicated, check the BNC termination crimps which can cause a short of the center conductor to ground. Also check for proper cable arrangement. Repeat the test until all cabling passes the test.

If the shelf is not fully equipped with low speed interface circuit packs, but has future cabling installed, move circuit packs into unequipped slots and repeat the test until all installed cabling is tested.

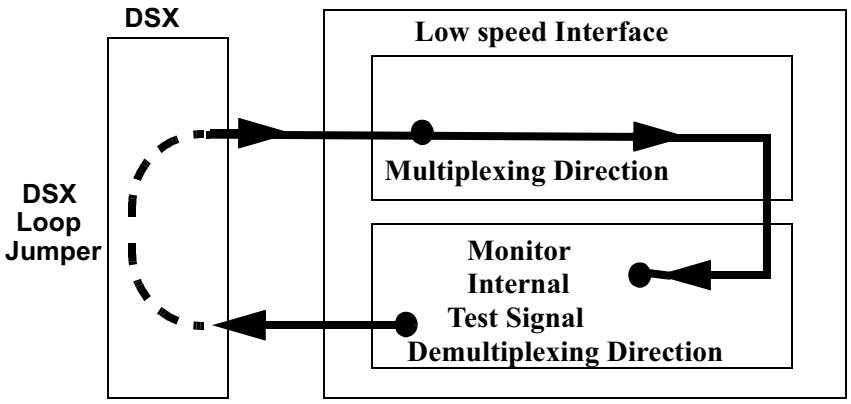


Figure 7-1. DSX (Low Speed Cabling Self Test)

Auto Turnup DSX Test (Software) Procedure

NOTE:
All DS3, STS1E,OC3 AND OC12 tests may be run simultaneously, provided that the proper circuit packs and jumpers are available.

NOTE:
Refer to Appendix C, if the FT-2000 terminal is to be connected to a DACS III-2000 system instead of a manual crossconnect. Ask an authorized craft to make the low speed signal loopbacks at the DACS III-2000 system.

Auto Turnup DSX Procedure

Perform the following steps to test the low speed signal cabling:

(1) For each electrical low speed circuit pack installed (LAA2, or LAA4), loop back each electrical low speed signal by connecting one end of a coaxial cable to an INPUT port (e.g. IN 1A-1) at the crossconnect panel and connecting the other end of the cable to the corresponding OUTPUT port (e.g. OUT 1A-1) at the crossconnect panel. This step must be performed for all three ports of each equipped slot.

(2) For each optical low speed circuit pack installed (OC3/IS3/OC12), loop back all the optical low speed signals by connecting a fiber jumper from OUT port to the IN port on each circuit pack's faceplate.

(3) Execute **CONFIGURATION_Update**.

Requirement: The command clears low speed input loss of signal alarms.

NOTE:
The following list shows allowable alarms. This auto turnup test may be denied if the terminal is exhibiting any additional alarms.

The allowed alarms are:

- incoming OC-48 LOS.
- site provisioning conflict.
- ring incomplete/open.
- DS-NE not reachable.
- STS1 squelch map conflict
- incoming (from STSX1) line AIS
- incoming OC-48 APS default byte
- NE Status Comm failure
- Sync Mode Holdover:Auto Switch

(4) Execute **FAULT_Test_Auto Turnup_DSX (all)**. This test will take approximately 10 minutes.

Requirement: The results will be printed on the CIT screen. A **"g"** represents a passed port. A **"-"** represents an untested port (no circuit pack equipped). An **"F"** represents a failed port. If failed ports are indicated check the cabling to the DSX for that port and ports around it. You may want to tem-

porarily recable the port with a known good cable, to verify the problem goes away, or temporarily use the suspected cable on another known good port to see the problem move with the cable. The report on the following page shows a passing test for a terminal with three LAA2 circuit packs equipped in slots 1A, 1B, and 2A and one LAA10 in slot 3A. Note that for the OC-3 located in slot3A, no symbol (g, F, -) appears in ports 2 and 3

.

```
 CRITICAL LUCENT TECHNOLOGIES FT-2000 9.0.0-ADR LT-FT-2000 LOCAL ONLY



;


   LT-FT-2000 70-01-01 03:49:13
M Test-Auto Turnup-DSX:All: COMPLD
   /* Test-Auto Turnup Report - Cross-Connect Wiring Test

=====================================================================
                        ------------LS INTFC-----------
                        1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8
                  port  A B A B A B A B A B A B A B A B
                    1   g g g - g - - - - - - - - - - -
                    2   g g g -   - - - - - - - - - - -
                    3   g g g -   - - - - - - - - - - -
  */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP   REMOTE  INPUT LOGOUT  EXIT                       REPEAT
```

(5) If the terminal is not fully equipped with low speed interface circuit packs, but has newly installed, untested cabling for future use on additional slots, move the circuit packs from left to right and repeat steps 1 through 4 until all ports with installed cabling are tested. There must always be a circuit pack in the P1 or P2 slot, both are required if there is a mix of LAA2s and LAA4s (one of each type).

(6) After every port with installed cabling passes this test, remove all loopbacks from the DSX-3 crossconnect panel.

(7) Move the low speed interface circuit packs back to the slots specified by the circuit order.

(8) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms and circuit removed alarms.

Low Speed Signal Cable Test (Hardware)

Low Speed Signal Cable Test (Hardware) Description

The Auto Turnup DSX Test (Software) Procedure tested the continuity of each cable and insured that IN and OUT cables are paired by port properly. This procedure will test that the cables are properly connected to IN and OUT connectors. This procedure uses the terminal alarm history recording to verify that a correct input signal was present. The order of the alarms in the history report verifies the correct order of cabling at the crossconnect. Be sure to execute the order of the test carefully.

Low Speed Signal Cable Test (Hardware) Procedure

Perform the following steps to verify that the input for each low speed signal at the crossconnect panel is correctly wired.

(1) Remove any input signals or loopbacks at the DSX.

(2) Remove all LAA5/LAA10/LAA10B OC-3 circuit packs from slots 1A-8B.

(3) Remove all but one type of LAA2 or LAA4 circuit pack in slots 1A-8B, i.e., use either LAA2's or LAA4's but not both; only one type can be employed to test the cabling. Use as many of one type as are available. P1 and P2 may be left blank.

(4) Execute **CONFIGURATION_Update** command.

Requirement: The command clears loss of signal and circuit pack removed alarms.

(5) At the crossconnect: connect one end (fixed end) of a cable to any OUT port of any equipped and cabled circuit pack. This cable will be used to provide a valid signal to the IN ports of all the equipped and cabled ports.

NOTE:
The length of cable, connected to the output port, used to perform this test may interfere with results by causing a failure on the LSSW. Should this occur, change the length of cable or use a test set as described in Chapter 1 as a signal termination.

(6) At the crossconnect: connect the unconnected end (moveable end) of the valid signal cable to the highest numbered equipped IN port (e.g. 8B-3 if all packs are equipped).

(7) Wait *at least 10 seconds* before removing the valid signal cable from the IN port at the crossconnect panel.

Requirement: The FAULT LED on the circuit pack, for the port you have tested, will start to flash (or continue to flash if other ports for that slot have already been tested) indicating a loss-of-signal. If this does not occur, then INPUT and OUTPUT cables may be reversed or a different slot (e.g. 1B instead of 1A) is cabled to the DSX.

(8) Connect the moveable end of the valid DS3 signal cable to the next lower numbered equipped IN port.

(9) Repeat steps 7 and 8 until all equipped IN ports have had a signal applied and removed.

(10) Remove the valid signal cable from the OUT port it is connected to.

(11) Execute **FAULT_Retrieve_History**.

Requirement: All ports report incoming (from DSX) LOS in ascending order from the lowest port (e.g. 1A-1) equipped to the highest port. If this not the case, check the DSX cabling of the ports that are either missing or reported out of order.

The sample report on the following page shows a passing test for a terminal with two LAA2 circuit packs equipped in slots 1A, 1B.

```
 CRITICAL LUCENT TECHNOLOGIES FT-2000 9.0.0-ADR LT-FT-2000 LOCAL ONLY


   LT-FT-2000 70-01-01 04:05:40
M  Retrieve-History: COMPLD
   /* Maintenance History Report
 ================================================================
   Date  Time    System  Source   Event
   of Event      Alarm   Address  Description
================================================================
   01-01 04:05:23 CR    ls-1a-1 incoming (from DSX) DS3  LOS
   01-01 04:05:14 CR    ls-1a-2 incoming (from DSX) DS3  LOS
   01-01 04:05:11 CR    ls-1a-3 incoming (from DSX) DS3  LOS
   01-01 04:05:07 CR    ls-1b-1 incoming (from DSX) DS3 LOS
   01-01 04:05:03 CR    ls-1b-2 incoming (from DSX) DS3 LOS
   01-01 04:05:00 CR    ls-1b-3 incoming (from DSX) DS3 LOS




Continue report page-by-page?(y/n)Yes
  F1      F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP                          EXIT                CANCEL
```

NOTE:

A port reported out of order indicates that either **BOTH** the IN and OUT ports are reversed with their neighboring ports, or that entire slots have been miscabled. (Note that having passed the software test, cables *are* paired correctly.) Retest ports that are missing in the report, you may not have had the signal applied for the full 10 seconds, or input and output cables may be labeled improperly.

(12) If unequipped slots have been cabled, then repeat steps 4 through 11 for all slots after moving circuit packs into the cabled slots.

(13) Re-equip slots 1A through 8B with DS3, STS1, OC-3, IS3, or OC-12 interfaces as specified in the circuit orders.

(14) Execute **CONFIGURATION_Update** command.

Requirement: The command clears loss of signal alarms and circuit removed alarms.

Auto Turnup Local

Auto Turnup Local Test Description

For the FT-2000 OC-48 Add/Drop Rings Terminal, this test verifies the wiring between the low speed and high speed shelves by testing the low speed to high speed connection capabilities. The local equipment test verifies signal continuity for each low speed slot that is equipped. In addition, the test verifies the low speed protection path for each low speed slot that is equipped. The test may take up to 10 minutes to complete.

If failed slots are indicated, replace the circuit pack. Repeat the test until all slots pass the test. If the shelf is not fully equipped, move circuit packs into unequipped slots 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 Transmitter and Receiver. Figure 7-2 illustrates how the test is performed.

.

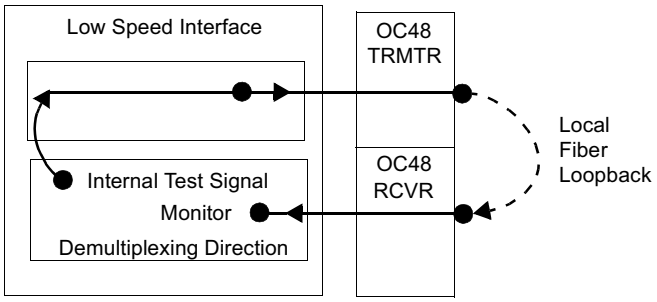


Figure 7-2. Local (Terminal Self-Test)

Auto Turnup local Test Procedure

(1) Remove any low speed Loopbacks or connections which may have been left from the previous test.

(2) Terminate any low speed output port, which has a circuit pack driving the output in that slot, into 75 ohms to ground. Use termination plugs at the low speed crossconnect as required for many non Lucent vendor panels. The internal termination of the crossconnect will be present when the jack is not connected on most Lucent panels. An alternative method is to terminate the output of the first signal port into the input of the second port, and so on, until the output of the last port is terminated into a Bit Error Rate Test Set receiver input.

NOTE:
If the alternative daisy chain method is used, be sure to terminate into an equipped slot, and a slot of the same type of circuit pack. Failure to terminate low speed output ports may invalidate test results.

(3) RCVRs are shipped from the factory with a 0dB attenuator in the connector block on the faceplate. Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1E RCVR. Be sure that connections are clean. To remove the buildout, lightly press the small tab (that lies in the plane perpendicular to the connector) on the top of the buildout with a small blunt tool. With the tab pressed, rotate the buildout counterclockwise slightly, and slide the buildout out of the connector block along the angle of the connector block. Insertion of the 15dB or 20dB attenuator is the opposite of removal.

(4) Using a fiber jumper, connect the **OUT** connector of the 1E TRMTR to the **IN** connector of the 1E RCVR.

(5) Remove the 0dB attenuator in the connector block of the 1W RCVR and replace it with a 15dB or 20dB attenuator. Be sure that connections are clean.

(6) Using a fiber jumper, connect the **OUT** connector of the 1W TRMTR to the **IN** connector of the 1W RCVR.

(7) Execute **FAULT_Reset.**

Requirement: The command completes. The full Reset time is about 10 minutes. The Reset will cause the CIT to be disconnected from the Network Element.

(8) Log back into the Network Element (use CIT EXPERT). You will need to wait up to 15 minutes before the Auto Turn up Test will run.

NOTE:
When using the CIT in EXPERT mode and a reset is performed, to get back into the EXPERT mode it is necessary to exit the CIT program completely, returning to the MS-DOS prompt, and type “CIT EXPERT” again.

(9) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LED’s on both RCVRs are off.

NOTE:

The following list shows allowable alarms. This auto turnup test may be denied if the terminal is exhibiting any additional alarms.

The allowed alarms are:

- incoming (from OC-48) DCC Channel Failure
- site provisioning conflict.
- ring incomplete/open.
- DS-NE not reachable.
- NE Status Comm Failure
- STS1 squelch map conflict
- incoming (from STSX1) line AIS
- incoming OC48 APS default byte
- Sync Mode Holdover: Auto switch

(10) Execute **FAULT_Test_Auto Turnup(all,Local)**.This test will take up to 10 minutes, depending on how many low speed interface slots are equipped.

Requirement: Results will be displayed on the CIT screen. A **g** represents a good slot. An **F** represents a failed slot. 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. The report on the following page shows a passing test for a terminal with four LAA2 or LAA4 circuit packs equipped in slots 1A, 1B, 2A and P1.

.

```
   MAJOR LUCENT TECHNOLOGIES FT-2000 9.0.0-ADR LT-FT-2000   LOCAL ONLY



 LT-FT-2000 70-01-01 03:21:24
M  Test-Auto Turnup-Local: COMPLD
   /* Test-Auto Turnup Report - Local Test
   ================================================================
    --TRMTR-- --RCVR--   ---TG---  --LSSW--  --OHCTL--         --TOHCTL--
    1W   1E   1W   1E    1    2    IN  OUT   1W    1E   LNCTL
    g    g    g    g     g    g    g    g    g     g     g        g

_
                 --------------LS INTFC-------------
                 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 p p
                 A B A B A B A B A B A B A B A B 1 2
                 g g g - - - - - - - - - - - - g -
   */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP   REMOTE  INPUT LOGOUT  EXIT                       REPEAT
```

(11) Move all low speed interface circuit packs (LAA2, LAA4, LAA5, LAA10, LAA10B, or T939A) into unequipped slots to the right.

(12) Repeat steps 9 and 10 for previously unequipped slots until all slots are tested.

(13) When all slots are tested, move the LAA2, LAA4, LAA5, LAA10 or LAA10B circuit packs back to the leftmost or customer assigned slots.

(14) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal and circuit removed alarms.

(15) Remove optical loopback cables. Restore factory supplied 0dB attenuators in RCVRs.

Operations Interface Tests

Operations Interface Tests Description

The local operational tests verify that the office alarms, serial telemetry (TBOS), and CIT (DTE) connections are operating properly.

NOTE:
Notify alarm monitoring personnel that testing is taking place on the office alarm systems. Connect all alarm cabling on the Low Speed Shelf - System Controller interconnect panel.

Local Alarm Test Procedure

(1) Execute **FAULT_Test_Alarm (all,2)** command. The test will cycle through each alarm state and then repeat. The alarm states are tested in this order:

Table 7-2. Test Results Displayed

Alarms	1st Pass	2nd Pass
Alarm LED's Off	1	
CR Alarm	2	1
MJ Alarm	3	2
MN Alarm	4	3
Alarm LEDs Off		4

Requirement: Verify that the office audible alarms, visual alarms, and the LED's on the user panel are reflecting the correct alarm status. The NE ACTY will be lighted throughout the test.

(2) Execute **FAULT_Test_Alarm (MJ,1)**. During the alarmed 10 seconds, press the ACO button on the user panel.

Requirement: The audible alarms are silenced and the ACO button is lighted.

TBOS (Serial) Telemetry Test Procedure

- Serial Telemetry is not supported if software release 8 or later is being used in the bay.

If serial telemetry is used, perform the following steps to verify the TBOS serial telemetry.

(1) Execute **FAULT_Test_Telemetry_Serial (1,1,even,1)** command. This test will turn all serial telemetry port 1, display #1, even-numbered TBOS points on simultaneously for 10 seconds and then off for 10 seconds.

Requirement: Verify at the operations support center that all even points in display 1 are exercised.

NOTE:
Cabling is correct if this requirement is met. There is no need to test other displays or points, since they are all carried over the same cable. However, other tests can be performed to check monitoring data bases and point names using the FAULT_Test_Telemetry_Serial () command to set specific points in specific displays.

NOTE:
TBOS is no longer supported in Release 8.0.0 and Later.

Parallel Telemetry Test Procedure

- Parallel Telemetry is not supported if software release 8 or later is being used in the bay.

If parallel telemetry is used, perform the following steps to verify parallel telemetry.

(1) Execute **FAULT_Test_Telemetry_Parallel (CR-NE)** command.

Requirement: Verify at the operations support center that parallel telemetry alarm CR-NE is activated.

(2) Repeat step 1 for MJ-NE, MN-NE, CR-FE, MJ-FE, and MN-FE alarms.

CIT DTE Port Test Procedure

NOTE:
This procedure requires the use of a null modem, for example Black Box ME200, since like ports (DTE and DTE) are to be connected together. Null-Handshake null modem wiring is given in Figure 7-3. 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 FT-2000 DTE port.

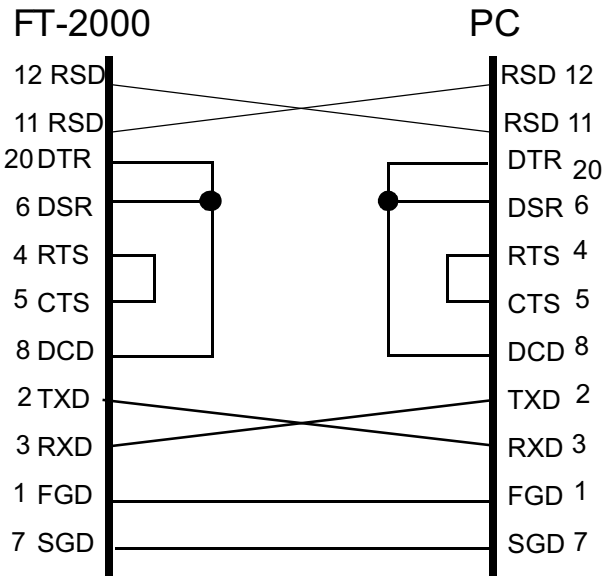


Figure 7-3. Null Handshake Null Modem Wiring

Serial Interface port signals and connector pinouts for DB9, DB25, and RJ45- 8 pin ports are given in Table 7-3 for reference.

Table 7-3. Serial Port Pinout information

Signal	Name	DB9 Pin	DB25 pin	RJ45-8 pin	DCE I/O	DTE I/O
DCD	Data Carrier Detect	1	8	6	O	I
RXD	Received Data	2	3	5	O	I
TXD	Transmitted Data	3	2	3	I	O
DTR	Data Terminal Ready	4	20	4	I	O
SGD	Signal Ground	5	7	7	NA	NA
DSR	Data Set Ready	6	6	not present	O	I
RTS	Request to Send	7	4	2	I	O
CTS	Clear to Send	8	5	8	O	I
RI	Ring Indicator	9	22	not present	O	I
FGD	Frame Ground	not present	1	1	NA	NA

Perform the following steps to verify DTE port operation.

(1) Remove the CIT cable from the user panel.

(2) Connect the null modem to the end of the cable that was just removed from the user panel CIT DCE port of the Low Speed Shelf - System Controller.

(3) Connect the cable with the null modem to the DTE connector (P158A) on the interconnection panel.

(4) FT-2000 is highlighted in the NETWORK ELEMENT MENU. Press the Enter or Return key. The CIT will then display a login window.

(5) Login to the FT-2000 terminal, type **`LUC01`** at the Login prompt and type **`FT-2000`** in all capital letters at the password prompt. (Original login = LUC01, original password = FT-2000).

Requirement: When successfully logged in, the CIT will report all the current alarms and status conditions. This verifies the DTE port is working.

(6) Press the function key labeled “EXIT” (F5) on the CIT. Respond "Yes" to the warning prompt.

(7) When the prompt “C>” appears, remove the cable and the null modem from the interconnection panel port.

(8) Remove the null modem from the cable.

Final Operations

Perform the following steps to complete the installation tests.

(1) **IMPORTANT!** Remove the 15 dB or 20dB optical attenuators from the RCVR and replace them with the 0 dB attenuators that were shipped with the units.

(2) Put protective covers on both TRMTR and RCVR output and input optical connectors.

NOTE:
In order to minimize travel to sites, the provisioning procedures in Chapter 8 should be completed just after the tests in Chapter 7 are completed.

Required Provisioning- ADR Terminal

8

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- Overview 8-1
- General Considerations 8-1
- ADR Terminal Provisioning 8-2
  - Description 8-2
  - Required Terminal Provisioning 8-3

Required Provisioning- ADR Terminal

8

Overview

This Chapter describes how to provision each FT-2000 OC-48 Add/Drop-Rings Terminal that makes up the FT-2000 Ring so that ring installation testing can be done. A more detailed description of provisioning can be found in document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual,* Chapter 8, “Administration and Provisioning”.

General Considerations

Note the following before starting:

- Required equipment for this chapter is: one personal computer (PC) with FT-2000 CIT software for use as craft interface terminal and connecting cable.
- Basic familiarity with the CIT program is required, Chapter 3 of this document describes CIT usage. Refer to document 365-575-102 *or 365-575-103 FT-2000 OC-48 Lightwave System User/Service Manual*, tab 11, “Craft Interface Terminal Usage”, for details.
- Information required to provision the ring should be entered into the provisioning table Table 8-1 at the end of this chapter, so that it can be used while making entries.
- Only one FT-2000 ADR Terminal must be designated as the Directory Service Network Element (DSNE). In Release 6 and 7, the DSNE may be in another ring of the subnetwork. In Release 8 and later, there is no DSNE.

- At least one FT-2000 ADR Terminal must be designated as the Alarm Group Network Element *(AGNE applies only for releases 6 and 7)*; however, this should be done at a node other than the DSNE. In Release 8 and later, there is no AGNE or DSNE.
- The timing mode at each office should be known (if it isn't, each office can be free-running, or 1 node free-running and remaining nodes through-timed for testing, External Mode is the default for R9).
- The Node ID (NID) and Target Identifier (TID) should be known. In Releases 6 and later NID provisioning is automatically assigned once the ring is complete. See Table 8-2 for NID and TID values to use for testing if actual values are unknown. Release 4.1.0 provides for designation of one or more TL-1 Gateway Network Elements (GNE), assign them as required. Release 5.0.1 and 6 provides GNE capability for all nodes, provisioning is not required.
- In Release 7.2 and higher, Sync Messaging is automatically enabled when the software is installed. If ()4 or ()5 optics or E1 through E8 transmitters are installed in a node, there will be no alarms. If ()2 optics are installed in a node, there will be a MJ alarm at that node. Sync Messaging must be disabled at those nodes with ()2 optics installed. This may be accomplished by using the CONFIGURATION-Set-OC48-All command.
- In Release 9, the default timing setting is "External". This will require that an external timing source be available as well as appropriate connecting cables, described in 5-41.

  It is not recommended that Sync Messaging be used in an FT-2000 ring containing mixed OC-48 optics (i.e. ()4 or ()5 optics or E1 through E8 transmitters in some nodes, and ()2 optics in other nodes in the same ring. Therefore, in a mixed ring, Sync Messaging should be disabled at all nodes.
- Refer to NTP-019 of 365-575-103 Issue 3 or later for provisioning information if there are any WaveStar 2.5G/10G nodes in the FT-2000 ring.

ADR Terminal Provisioning

Description

This section provides a procedure for: setting the Network Element time and date, enabling far end communications, setting the NID, TID, AGNE and defining the Directory Service Network Element (DSNE). This procedure can (and should) be done immediately after the software installation has taken place, so there is no need to travel to all the sites repeatedly. There are slight differences between Terminal provisioning and Repeater provisioning, use the proper chapter.

Required Terminal Provisioning

Login to the Network Element using the CIT PC at the CIT DCE port on the User-Panel Low Speed Shelf - System Controller and perform the following steps:

(1) For the FT-2000 OC-48 Add/Drop Rings Terminal: set the NID, TID, DSNE and GNE designation: execute the **`SECURITY_Set_Network-Element (TID, NID, DSNE Yes or No, GNE Yes or No, AGNE Yes or No)`** command

NOTE:
The **GNE Yes or No** information is only provisioned for release 4.1.0-ADR and the **AGNE Yes or No** information is only provisioned for release 6-ADR and 7-ADR, and should not be provisioned to **Yes** in the same node that the DSNE is provisioned to **Yes**.
In Release 8 and later, there is no **AGNE** and no **DSNE**.
The **NID** is automatically provisioned in release 6 and later.
Use the information from the provisioning tables, Table 8-1 or Table 8-2.

Requirement: The command completes, the TID now appears in the heading of all output from the terminal, during this login session.

NOTE:
If the TID has been provisioned and the FT-2000 has not been connected into a ring yet, the default TID will reappear at the top of the CIT screen (if the user logs out and logs in again) until the terminal is part of a ring. Also: the X.25 network must use the default TID until the ring is complete.

(2) Enable far end communications: execute the **`SECURITY_Set_Far End Communications (enable, disable)`** command. Enable remote activity reporting, disable remote office alarms. Remote activity reporting enables the FE-ACTY (Far End - Activity) LED on the User Panel.
In Release 8 and later, this command is not available.

NOTE:
Depending on local practices, remote activity reporting need not necessarily be enabled for the ring to operate properly.

(3) Set the date and time: execute the **`CONFIGURATION_Set_Date (YY, MM, DD, HH, MM, SS, XST, 04-xx, 10-xx, XDT)`** command, where YY is year, MM is month, DD is day, HH is hour, MM is minutes, SS is seconds, XST is AST, EST, CST, MST or PST, in most of the U.S., 04-xx is start of daylight savings time date (use actual date), 10-xx is end of daylight savings time date (use actual date), and XDT is EDT, CDT, MDT or PDT, in most of the U.S. If daylight savings time is not used, leave the start and stop dates both on the same date.

Requirement: Output from the terminal now displays the correct date and time in the headings.

Table 8-1. Blank for Actual Provisioning Information

NID (0-15) *	TID (office name)	DSNE (Yes or No)*	GNE (Yes or No)**	AGNE (Yes or No) ***

* Only applies to Terminals, not Repeaters, and can be assigned to any node (not restricted to node 0). NIDs are not provisionable in Release 6-ADR and later. In Release 8 and later, there is no DSNE.
** Provisioning only applies to Release 4.1.0-ADR.
*** Provisioning only applies to Release 6 and 7-ADR, and should not be set to Yes at a Node where the DSNE is set to Yes.

Table 8-2. Example Values for Tests Provisioning Information

NID (0-15) *	TID (office name)	DSNE (Yes or No)*	GNE (Yes or No)**	AGNE (Yes or No) ***
0	NODE-0	Yes	Yes	No
1	NODE-1	No	No	Yes***
2	NODE-2	No	No	No
3	NODE-3	No	No	No
4	NODE-4	No	No	No
5	NODE-5	No	No	No
6	NODE-6	No	No	No
7	NODE-7	No	No	No
8	NODE-8	No	No	No
9	NODE-9	No	No	No
10	NODE-10	No	No	No
11	NODE-11	No	No	No
12	NODE-12	No	No	No
13	NODE-13	No	No	No
14	NODE-14	No	No	No
15	NODE-15	No	No	No

* Only applies to Terminals, not Repeaters, and can be assigned to any node (not restricted to node 0). NIDs are not provisionable in Release 6-ADR and later. In Release 8 and later, there is no DSNE.
** Provisioning only applies to Release 4.1.0-ADR.
*** Provisioning only applies to Release 6 and 7-ADR, and should not be set to Yes at a Node where the DSNE is set to Yes.

Cable Installation-
Repeater Bay

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Cable Installation- Repeater Bay

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Overview

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

This Chapter covers FT-2000 Repeater Bay or Repeater Shelf cable installation, which includes:

- Power (battery A and battery B) cable
- Office alarms and miscellaneous discrete cables installation
- Craft interface terminal (CIT) and data terminal equipment (DTE) cables installation
- High speed fiber and fiber protection installation
- Section orderwire and section user channel cable installation
- Final verification.

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.

WARNING:

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

Keep the following information under consideration during cable installation:

- This cable information is the latest cable information available at the time of the issue. For up-to-date information, refer to the ED cable drawings listed in the section 1, “Overall Installation and Test Considerations.”
- For ordering information, refer to document 365-575-100, *FT-2000 OC-48 Lightwave System Application, Planning, and Ordering Guide*.
- All shielded cable that is less than 25 feet in length must have its shield grounded. If cables are over 25 feet in length, it is strongly advised to ground the cable shield.
- **Do not** use cable ties with the optical fiber.
- Place optical fiber jumpers in protective tube or channel, such as polyvinyl chloride (PVC) tubing or *PANDUIT*# channel, when running the cable from the FT-2000 OC-48 Lightwave System to the cable rack.
- Place optical fiber jumpers in the cable rack in a protective channel with nothing on top of them.
- Maintain a minimum of 1.5 inches of optical fiber bend radius.
- Optical fiber jumpers require *ST*, FC/PC, or SC type connectors for connection to the FT-2000 OC-48 Lightwave System.
- **Do not** use cable ties (use lacing cord instead) for securing the coaxial cable. The use of cable ties can alter the electrical characteristics of the cable, if pulled tight.
- FT-2000 must be equipped with the front and rear covers at the completion of the installation.
- Do not remove the backplane cover during the installation process since all cable installation will be done from the front.
- Small metal covers are attached at each side cable opening on the interconnection panels. When cabling is completed, move the cover against the cables and secure it. This will improve the terminal’s electromagnetic interference (EMI) enclosure.

*. Registered trademark of F.J.W. Industries.

#. Registered trademark of Panduit Corporation.

Power Cable Installation

Description

The FT-2000 Repeater Bay or Repeater Shelf is 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 cable has a Red outer jacket and feed B, Blue).

Power Requirements

The power requirements for FT-2000 Repeater Bay or Repeater Shelf are as follows:

- Two feeders (A and B) are required for powering the terminal.
- Each independent feeder must supply -48 volts direct current and a return.
- Each feeder capacity must be 30 amperes at the battery distributation fuse board (BDFB).

Table 9-1 below gives power dissipation for FT-2000 Repeater Bay or Repeater Shelf. Refer to Floor Plan Data Sheet FPD 804-911-168-() for complete information on power engineering for the FT-2000 OC-48 Lightwave System.

Table 9-1. Power Dissipation

Equipment Package	Maximum Power Dissipated (Watts)
FT-2000 OC-48 Repeater Bay with One Repeater Shelf - System Controller	175
FT-2000 OC-48 Repeater Shelf (Misc. Mounted)	175

Available Power Cables

Table 9-2 lists power cables available for installing an FT-2000 Repeater Bay or Repeater Shelf.

Table 9-2. Available Power Cables

ED-9C103-20 Cable Group	Cable Type	Cable Length (ft.)	Use With Power Bus	Jacket Color
1	WHICS 2998400000	As required	A or B	Black
2	WHICS 2998400000	15	A	Red
3	WHICS 2998400000	15	B	Blue
5	WHICS 2998400000	4.5	A	Red
6	WHICS 2998400000	4.5	B	Blue
21	WHICS 2998400000	8.5	A	Red
22	WHICS 2998400000	8.5	B	Blue
24	WHICS 2998400000	As Required	A	Red
25	WHICS 2998400000	As Required	B	Blue
30	WHICS 2998400000	13 1/2”	A	Red
31	WHICS 2998400000	13 1/2"	B	Blue

Power Cable Connection

The FT-2000 Repeater Bay will be shipped with the Top Bay Cover Plate installed and power cable extenders which will be cable tied to the cover plate.

(1) Turn the power breakers off, or do not install fuses, at the battery distribution fuse board (BDFB).

NOTE:
Leave the fuses out or breakers off until performing the steps in Chapter 10, “Powering, Circuit pack Installation and Start Up” of this document.

(2) Label 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.

(3) Check that the supplied power feed cables are labeled for battery A and battery B use. Connect them to the battery feed connections at the appropriate battery A or battery B terminal connectors located on the fuse panel at the top of the FT-2000 Repeater Bay.

(4) The power cable extenders are tied just above the right side slot on the cover plate and are mechanically keyed to prevent incorrect insertion. Be sure to fully seat the cables until they are locked into the connector on the extender, then route toward the battery distribution fuse board or other protection equipment.

(5) Splice feeders from the battery distribution fuse board to the FT-2000 Repeater Bay power cables. The red power lead connects to -48V. The white power lead connects to the power feed return.

Wire Color Conversion

There are cables that exist that use outdated wire color standards. These cables are equivalent to the cables with the new wire color standards. If a cable is provided that uses the outdated wire color standard, use the information below to convert to the new wire color standard.

The outdated color standard is described in the examples below:

EXAMPLE: BL1W WIRE: blue with 1 white stripe

EXAMPLE: BL2W WIRE: blue with 2 white stripes

The new color standard is described in the examples below:

EXAMPLE: W-BL WIRE: white with a blue stripe

EXAMPLE: BL-W WIRE: blue with a white stripe

Refer to Table 9-3 for wire color conversion and wire color code.

Table 9-3. Wire Color Conversion (Old Color to New Color)

Old Color	New Color	Old Color	New Color
W1BL	W-BL	BL2BK	BL-BK
O1W	W-O	O2BK	O-BK
G1W	W-G	G2BK	G-BK
BR1W	W-BR	BR2BK	BR-BK
S1W	W-S	S2BK	S-BK
BL1R	R-BL	BL2Y	BL-Y
O1R	R-O	O2Y	O-Y
G1R	R-G	G2Y	G-Y
BR1R	R-BR	BR2Y	BR-Y
S1R	R-S	2Y	S-Y
BL1BK	BK-BL	W3BK	W-BK
O1BK	BK-O	W3Y	W-Y
G1BK	BK-G	R3W	R-W
BR1BK	BK-BR	R3Y	R-Y
S1BK	BK-S	BL3W	W-3BL
BL1Y	Y-BL	O3W	W-3O
O1Y	Y-O	G3W	W-3G
G1Y	Y-G	BR3W	W-3BR
BR1Y	Y-BR	S3W	W-3S
S1Y	Y-S	BL3R	R-3BL
W1BK	BK-W	O3R	O-3R
W1Y	Y-W	G3R	R-3G
R1W	W-R	BR3R	BR-3R
R1Y	Y-R	S3R	S-3R
R1BK	BK-R	BL3BK	BL-3BK

Table 9-3. Wire Color Conversion (Old Color to New Color)

Old Color	New Color	Old Color	New Color
BL2W	BL-W	O3BK	O-3BK
O2W	O-W	G3BK	G-3BK
G2W	G-W	BR3BK	BR-3BK
BR2W	BR-W	S3BK	S-3BK
S2W	S-W	BL3Y	Y-3BL
BL2R	BL-R	03Y	Y-3O
O2R	O-R	G3Y	Y-3G
G2R	G-R	BR3Y	Y-3BR
BR2R	BR-R	S3Y	Y-3S
S2R	S-R		

Refer to Table 9-4 for wire color conversion and wire color codes.

Table 9-4. Wire Color Codes

Code	Color	Code	Color
W	White	R	Red
BK	Black	Y	Yellow
BL	Blue	BR	Brown
O	Orange	G	Green
S	Slate		

Office Alarms and Miscellaneous Discrete Cables Installation

Description

Office alarms and miscellaneous discrete points are used for the following purposes:

- Office alarms are commonly used by central office maintenance personnel to quickly identify a failed system.
- Miscellaneous discrete points provide a means for notifying an operations system (OS) maintenance center of environmental conditions at the FT-2000 site.

Available Office Alarms and Miscellaneous Discrete Cables

Table 9-5 lists cables that are available for office alarms and miscellaneous discrete applications. Cables listed may be used for each application.

Table 9-5. Office Alarms and Miscellaneous Discrete Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
301	As Req'd	811AS
351	150	
361	250	

Table 9-6 lists cable connections to the Repeater Shelf - System Controller interconnection panel.

Table 9-6. Alarm, Telemetry and Misc. Discrete Connection to Interconnection Panel

Cable Applications	Repeater Shelf - System Controller Interconnection Panel Location
Office Alarms	P105A
Misc. Discrete 1	P114A
Misc. Discrete 2	P104A

Office Alarm Cable Connection

Table 9-7 lists office alarm cable connections and designations.

Table 9-7. Office Alarm Cable Connection

Alarm Name	Designation	Pin	Wire Color
Office Alarm Critical Audible	OACRAUD	1	BL-W
Office Alarm Critical Visual	OACRVIS	2	O-W
Office Alarm Major Audible	OAMJAUD	3	G-W
Office Alarm Major Visual	OAMJVIS	4	BR-W
Office Alarm Minor Audible	OAMNAUD	5	S-W
Office Alarm Minor Visual	OAMNVIS	6	BL-R
No Connection	none	7	O-R
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

Table 9-7. Office Alarm Cable Connection

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

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 FT-2000 Repeater Bay.

Selection of transient suppression devices shall be made according to the specific office alarm circuit arrangement.

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

(1) Route the office alarm cable through the right opening in the side of the Repeater Shelf - System Controller, from the office alarm panel.

(2) Connect the office alarm cable to P105A on the interconnection panel of the Repeater Shelf - System Controller.

(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.

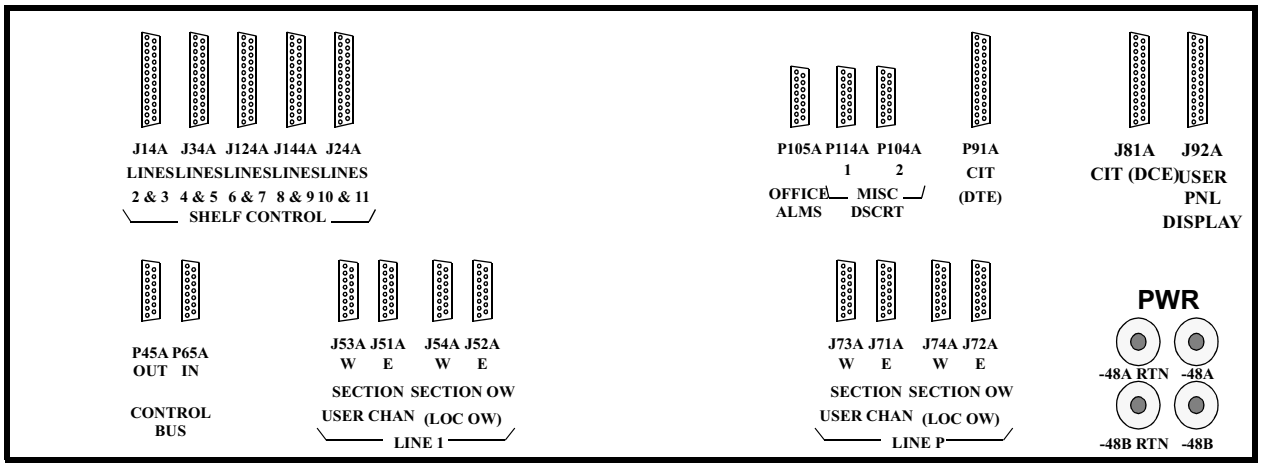

Figure 9-1 Interconnection Panel (Repeater Shelf - System Controller)

Miscellaneous Discrete Cable Connection

Two miscellaneous discrete connections are supported by FT-2000 Repeater Bay.

Table 9-8 list connections and designations for miscellaneous discrete cable 1.

Table 9-8. Miscellaneous Discrete Cable 1 Connection

Name	FT-2000 Misc. Discrete	Designation	Pin	Wire Color
User Settable Discrete In 12	13	USDI12	1	BL-W
User Settable Discrete In 08	9	USDI08	2	O-W
User Settable Discrete In Common		USDICOM	3	G-W
User Settable Discrete In 04	5	USDI04	4	BR-W
User Settable Discrete In 00	1	USDI00	5	S-W
User Settable Discrete Out Common		USDOCOM	6	BL-R
User Settable Discrete Out 00		USDO00	7	O-R
No Connection		none	8	none
User Settable Discrete In 13	14	USDI13	9	W-BL
User Settable Discrete In 09	10	USDI09	10	W-O
User Settable Discrete In Common		USDICOM	11	W-G
User Settable Discrete In 05	6	USDI05	12	W-BR
User Settable Discrete In 01	2	USDI01	13	W-S
User Settable Discrete Out Common		USDOCOM	14	R-BL
User Settable Discrete Out 01		USDO01	15	R-O

Table 9-9 list connections and designations for miscellaneous discrete cable 2.

Table 9-9. Miscellaneous Discrete Cable 2 Connection

Name	FT-2000 Misc. Discrete	Designation	Pin	Wire Color
User Settable Discrete In 14	15	USDI14	1	BL-W
User Settable Discrete In 10	11	USDI10	2	O-W
User Settable Discrete In Common		USDICOM	3	G-W
User Settable Discrete In 06	7	USDI06	4	BR-W
User Settable Discrete In 02	3	USDI02	5	S-W
User Settable Discrete Out Common		USDOCOM	6	BL-R
User Settable Discrete Out 02		USDO02	7	O-R
No Connection		none	8	none
User Settable Discrete In 15	16	USDI15*	9	W-BL
User Settable Discrete In 11	12	USDI11	10	W-O
User Settable Discrete In Common		USDICOM	11	W-G
User Settable Discrete In 07	8	USDI07	12	W-BR
User Settable Discrete In 03	4	USDI03	13	W-S
User Settable Discrete Out Common		USDOCOM	14	R-BL
User Settable Discrete Out 03		USDO03	15	R-O

* USDI15 has been designated for the fan alarm point

Miscellaneous Discrete Cables Installation Procedure

Perform the following steps to install miscellaneous discrete cables:

(1) Route both cables (see Figure 9-1) through the right opening in the side of a Repeater Shelf - System Controller.

(2) Connect the two miscellaneous discrete cables to P114A (Cable 1) and P104A (Cable 2) of the Repeater Shelf - System Controller.

(3) Route the cables to the terminal strip for miscellaneous discrete input points and control output points along the cable rack.

(4) Connect the miscellaneous discrete cables to the miscellaneous discrete input points and control output points terminal strip by cutting the cables to length and wire-wrapping the loose ends onto the terminal strip. The terminal strip is not part of the FT-2000 equipment, it needs to be provided elsewhere in the office. Use Figure 9-2 as a guide.

(5) Label the connections that are wire-wrapped.

(6) Clearly label the use of each discrete input and output on the terminal strip.

(7) Dress and tie the cable.

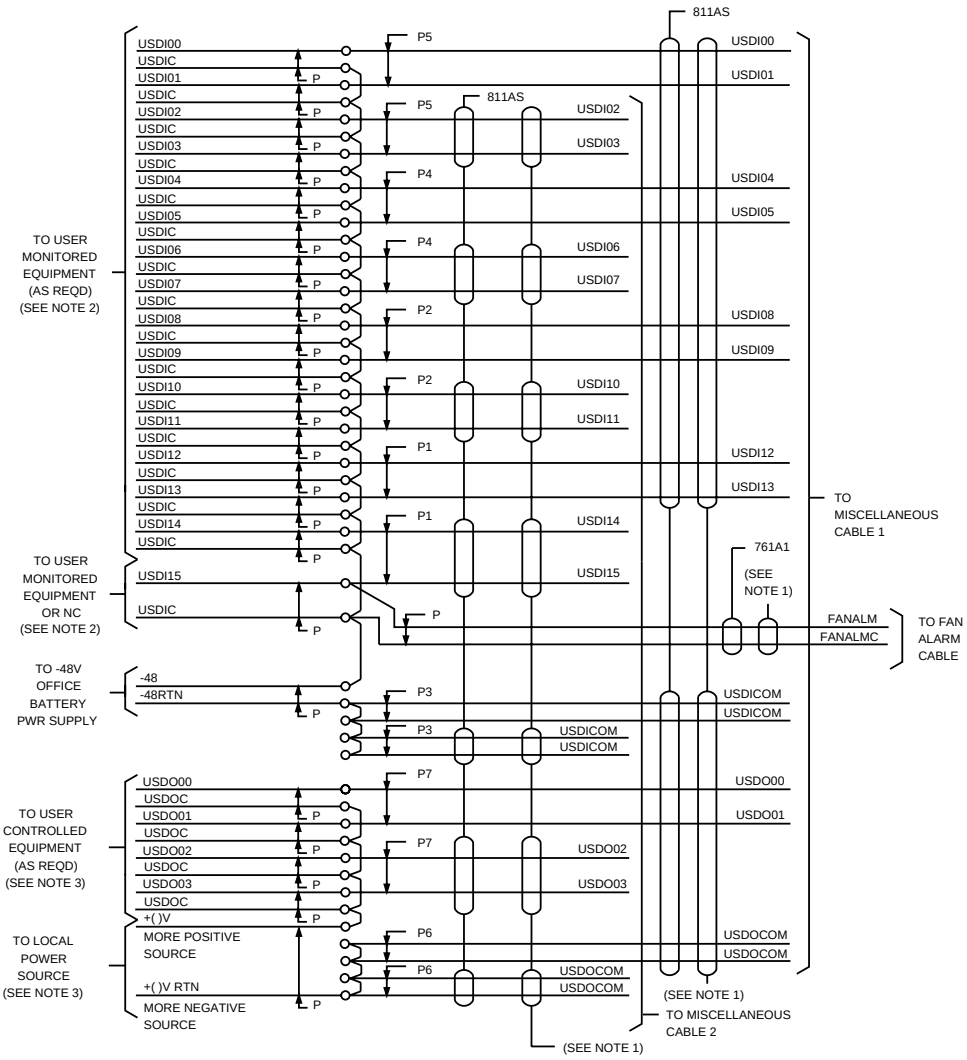

Figure 9-2 Office Termination for Miscellaneous Discrete Cables

Notes for Figure 9-2:

(1) The miscellaneous customer equipment to be monitored by the FT-2000 equipment must provide the electrical equivalent of a contact closure across the corresponding USDI/USDIC pairs. The closure must be capable of passing at least 10 mA of DC current.

(2) Shield wires must be terminated to the frame or chassis ground if the distance between the miscellaneous terminal strip and the FT-2000 Repeater Shelf - System Control interconnection panel is 25 feet or less. For greater distance, the shield ground is not required, but is recommend for enhanced EMC performance.

(3) The power source to enable the FT-2000 equipment to control user-provided equipment may be from 3 V to a maximum of 72 V. The FT-2000 equipment provides a unidirectional opto-isolator connected across each corresponding USDO/USDOC pair. The load current across each corresponding USDO/ USDOC pair shall be limited by the customer equipment and *shall not exceed 35 mA*.

(4) The miscellaneous discrete alarms can be assigned in any order.

CIT DTE Cables Installation

Description

FT-2000 Repeater Bay support access to remote CIT PCs through a modem connection to the CIT DTE port.

Available CIT DTE Cables

Table 9-10 lists cables available for CIT DTE applications.

Table 9-10. CIT DTE Cable

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
702	As Req'd. 150' max	811AS
732	100'	811AS
752	150'	811AS

CIT DTE Cable Connection

Table 9-11 lists cable connection to the interconnection panel of the Repeater Shelf - System Controller.

Table 9-11. CIT DTE Cable Connection to Interconnection Panel

Cable Application	Repeater Shelf - System Controller Interconnection Panel Location
CIT DTE	P91A

The CIT DTE cable connects to a modem which must meet the following requirements:

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

Table 9-12 lists CIT DTE cable connections and designations.

Table 9-12. 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

Table 9-12. CIT DTE Cable Connection

Name	Designation	Pin	Wire Color
No Connection	none	13	none
No Connection	none	14	none
No Connection*	none	15	R/O (G702,752 only) none (G701,751,761)
No Connection	none	16	none
No Connection*	none	17	R/G (G702,752 only) none (G701,751,761)
No Connection	none	18	none
No Connection	none	19	none
CT Data Terminal Ready	CTDTR	20	W/G (G701,751,761) W/S (G702, 752)
No Connection	none	21	none
No Connection*	none	22	R/BL (G702,752 only) none (G701,751,761)
No Connection	none	23	none
No Connection	none	24	none
No Connection	none	25	none

* Pins 15, 17 and 22 are wired in Groups 702, 732 and 752 only.

CIT DTE Cable Installation Procedure

Perform the following steps to install the CIT DTE cable:

(1) Both ends of the cable are connectorized. Making sure the socket end of the cable is at the FT-2000 equipment, route the CIT DTE cable out the right side of the Repeater Shelf - System Controller (see Figure 9-1) to the 25-pin D-type connector on the modem.

(2) Connect the CIT DTE cable to P91A on the interconnection panel of the Repeater Bay - System Controller.

(3) Connect the CIT DTE cable to the RS232 DCE port on the modem.

(4) Dress and tie the cables.

High Speed Fiber Installation

Description

FT-2000 Repeater Bay transmit at the SONET OC-48 rate, transmitting 32,256 voice channels simultaneously on one optical fiber. The Repeater Shelf - System Controller receives transmission on one high speed fiber and transmits on another high speed fiber. One REGENR circuit pack transmits in the East direction and the other REGENR transmits in the West direction.

Available High Speed Fiber Jumpers

Table 9-13 lists some of the available jumpers for high speed fiber connection.

Table 9-13. Lightwave Jumpers

Code	Comcode	Length	Description
FS1E-E-02	105 357 727	2 ft.	ST-ST
FS1E-E-10	105 357 768	10 ft.	ST-ST
FS1E-E-25	105 357 800	25 ft.	ST-ST
FS1E-E-50	105 357 859	50 ft.	ST-ST
FS1E-E-100	105 357 875	100 ft.	ST-ST
LS1K-E-10	105 713 150	10 ft.	Biconic-ST
LS1K-E-25	105 712 939	25 ft.	Biconic-ST
LS1K-E-50	105 712 988	50 ft.	Biconic-ST
LS1K-E-100	105 712 947	100 ft.	Biconic-ST
LS1FP-FP	106 470 446	As Req'd.	FC/PC-FC/PC

High Speed Fiber Connection

High speed fibers connect to circuit packs within the Repeater Shelf-System Controller. Connectors are directly on the faceplate of the REGENR circuit pack. Connection is made to a removable Optical Line Build-Out (LBO). Only 0dB, non attenuating, LBOs are used in the TRMTR. Selection of the LBO used on the RCVR is described in Chapter 13, “Optical LBO Selection Procedure”. The High

Speed Fiber Installation has been broken into four procedures. Procedure 1 should be used if the FT-2000 Repeater Shelf will be directly connected to the Lightguide cross-connect panel. Procedure 2 should be used if the FT-2000 Repeater Shelf will be connected to a miscellaneous mounted DWDM device. Procedure 3 should be used if the FT-2000 Repeater Shelf will be connected to the FT-2000 LBA shelf. Procedure 4 should be used if the FT-2000 Repeater Shelf will be connected to the FT-2000 LBA shelf and a miscellaneous mounted DWDM device.

High Speed Fiber Installation Procedure 1 - Direct Connection to an LGX Panel

Refer to Figure 9-3 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) Connect the jumper to the lightguide (LGX) cross-connection.

(3) Label the optical fibers. Indicate the line (West or East) and direction (REGENR).

(4) Route the optical fibers from the LGX to the FT-2000 Repeater Shelf-System Controller. Fibers (1 Transmit and 1 Receive) for the West line must be routed down the left side of the bay in the fiber protection channel, fibers (1 Transmit and 1 Receive) for the East line must be routed down the left side of the bay in the fiber protection channel.

(5) The fiber jumpers should hang without any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Repeater Shelf-System Controller. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(6) Fibers enter the Repeater Shelf-System Controller near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(7) Optical fibers should be left with enough slack next to the REGENR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(8) The protective channel will be covered when the stile strips are installed.

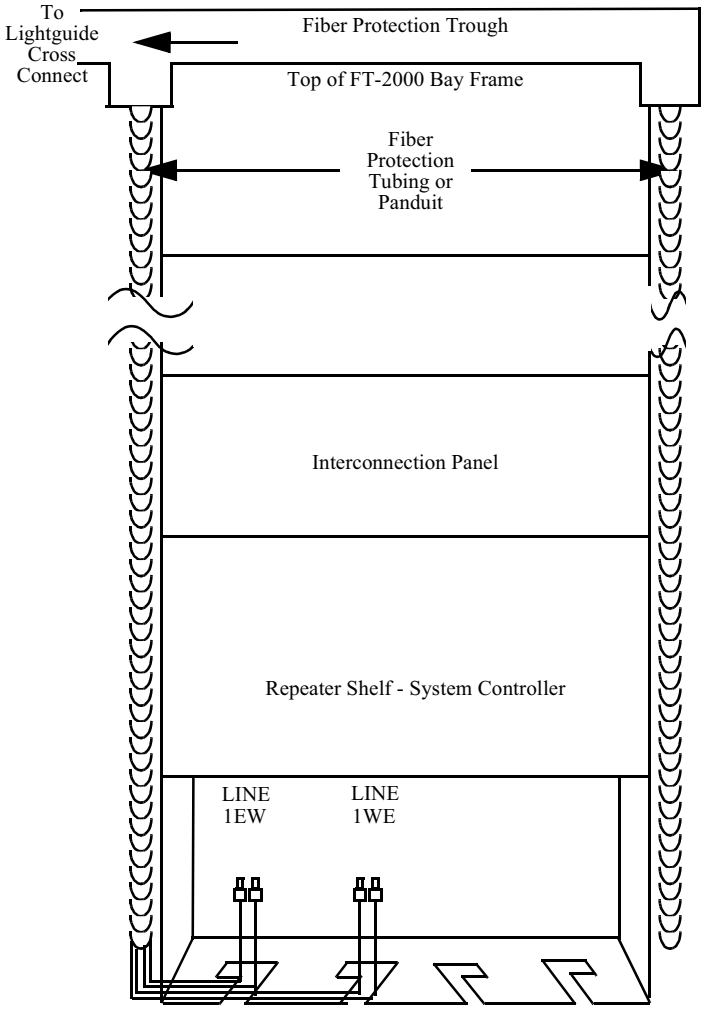

Figure 9-3 FT-2000 OC-48 RPTR High Speed Fiber Routing

Section Orderwire and Section User Channel Cable Installation

Description

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

- Orderwire capabilities
- User channel access.

NOTE:
Note that Section Orderwire is not supported in any current software release.

Section Orderwire and Section User Channel Cables

Table 9-14 lists the cables that are available for line orderwire, section orderwire and section user channel.

Table 9-14. Section Orderwire and Section User Channel

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
401	As req'd (2850' max*)	816AS
451	150	
461	250	

Table 9-15 lists section orderwire and section user channel cable connection to the interconnection panel.

Table 9-15. Section Orderwire and Section User Channel Cable Connection to Interconnection Panel

Cable Application	Repeater Shelf - System Controller Interconnect Panel Location
Section Orderwire X/Y	J54A/J52A
Section User Channel X/Y	J53A/J51A
Note: X=WEST, Y=EAST	

Section Orderwire Cable Connections

Table 9-17. lists section orderwire cable connections and designations.

Table 9-16. Section Orderwire Cable Connection

Name	FT-2000 Input/ Output	Designation	J54A/J52A Terminal	Wire Color
Transmit Overhead E2 Clock N	Output	E2CIN	1	BL-W
Transmit Overhead E2 Sync N	Output	E2SIN	2	O-W
Transmit Overhead E2 Data N	Input	E2DIN	3	G-W
Receive Overhead E2 Data N	Output	E2DON	4	BR-W
Receive Overhead E2 Sync N	Output	E2SON	5	S-W
Overhead E2 Clock N	Output	E2CON	6	BL-R
No Connection		none	7	none
No Connection		none	8	none
Transmit Overhead E2 Clock P	Output	E2CIP	9	W-BL
Transmit Overhead E2 Sync P	Output	E2SIP	10	W-O
Transmit Overhead E2 Data P	Input	E2DIP	11	W-G
Receive Overhead E2 Data P	Output	E2DOP	12	W-BR
Receive Overhead E2 Sync P	Output	E2SOP	13	W-S

Table 9-16. Section Orderwire Cable Connection

Name	FT-2000 Input/ Output	Designation	J54A/J52A Terminal	Wire Color
Receive Overhead E2 Clock P	Output	E2COP	14	R-BL
No Connection		none	15	none

Section Orderwire Cable Installation Procedure

Perform the following steps to install the section orderwire cable:

(1) Route the cable through the left side of the Repeater Shelf - System Controller (see Figure 9-1) to the section orderwire equipment.

(2) Connect the section orderwire cable to J54A/J52A on the interconnection panel of the Repeater Shelf - System Controller.

(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.

Section User Channel Cable Connections

Table 9-17 lists section user channel cable connections and designations.

Table 9-17. Section User Channel Cable Connection

Name	FT-2000 Input/ Output	Designation	J53A/J51A Terminal	Wire Color
Transmit Overhead E2 Clock N	Output	E2CIN	1	BL-W
Transmit Overhead E2 Sync N	Output	E2SIN	2	O-W
Transmit Overhead E2 Data N	Input	E2DIN	3	G-W
Receive Overhead E2 Data N	Output	E2DON	4	BR-W
Receive Overhead E2 Sync N	Output	E2SON	5	S-W
Overhead E2 Clock N	Output	E2CON	6	BL-R
No Connection		none	7	none

Table 9-17. Section User Channel Cable Connection

Name	FT-2000 Input/ Output	Designation	J53A/J51A Terminal	Wire Color
No Connection		none	8	none
Transmit Overhead E2 Clock P	Output	E2CIP	9	W-BL
Transmit Overhead E2 Sync P	Output	E2SIP	10	W-O
Transmit Overhead E2 Data P	Input	E2DIP	11	W-G
Receive Overhead E2 Data P	Output	E2DOP	12	W-BR
Receive Overhead E2 Sync P	Output	E2SOP	13	W-S
Receive Overhead E2 Clock P	Output	E2COP	14	R-BL
No Connection		none	15	none

Section User Channel Cable Installation Procedure

Perform the following steps to install the section user channel cable:

(1) Route the cable through the left side of the Repeater Shelf - System Controller to the user channel equipment.

(2) Connect the section user channel cable to J53A/J51A on the interconnection panel of the Repeater Shelf - System Controller (see Figure 9-1)

(3) Connect the section user channel X or Y 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.

Final Verification

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

(1) Verify that cables are properly secured and dressed.

(2) Verify that optical cable is protected properly.

(3) Verify that all cables (including the cables that are wire-wrapped) are properly labeled.

(4) Verify that heat baffles and/or fans are mounted to the terminal.

(5) Verify that EMI shields are secured in place against the cables on all the interconnection panel side openings.

Powering, Circuit Pack Installation, and Start Up - Repeater Bay

10

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Powering, Circuit Pack Installation, and Start Up - Repeater Bay

10

Overview

This Chapter describes procedures to:

- Power FT-2000 Equipment: FT-2000 OC-48 Repeater Bay or FT-2000 OC-48 Repeater Shelf.
- Install stile strips on the FT-2000 Repeater Bay.
- Install circuit packs into the Repeater Shelf-System Controller.

This Chapter also provides sections on Software Installation Description and Considerations. The complete procedure for software installation is located in Appendix D.

Tools, Test Sets, and Accessories

The following equipment is required to complete the procedures in this Chapter:

- Multimeter capable of measuring resistance (ohms) and DC volts from -40 to -60 volts.
- Wrist strap connected to the wrist strap ground jack of the user panel for ESD protection.
- A complete set of FT-2000 Release 2.1.0-RPTR, Release 4.0.0-RPTR or Release 6.0.1-RPTR software distributation diskettes.
- Personal computer for use as CIT, see requirements in Chapter 1.

- A “straight-through” RS-232 cable. Figure 10-1 below shows the wiring required. The cable must have a DB25 male connector at one end to mate with FT-2000 DCE CIT port. Table 10-1 may be used together with the figure to determine pin numbers to connect. Typically a DB9 female connector is needed to mate with the PC serial port (com port) at the other end.

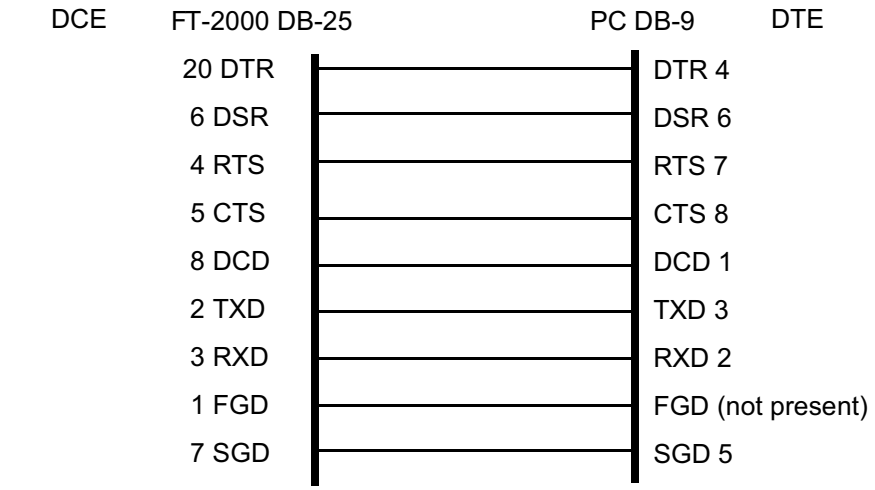

Figure 10-1. Required straight-through cable wiring

Table 10-1. 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 located on the User Panel.
Network Element (bay) CIT DTE port is located at P158A on the System Controller Interconnection Panel.
PC serial port (com port) is DTE.
Modem ports are DCE.
Use straight through cable between unlike ports, use null modem between like ports.

Repeater Bay Powering

Description

Two -48V DC power feeders connect to the FT-2000 Repeater Bay fuse panel. From the fuse panel, power is channeled through each user or filter panel to the backplane of the shelf, the fan assembly, and to the circuit packs.

CAUTION:
The red power lead connects to -48V DC source. The white power lead connects to battery return.

NOTE:
There are four power wires, in two pairs, attached to the miscellaneously mounted Repeater Shelf - System Controller. One pair is battery A, the Red/Black pair. Red is -48V DC, Black is battery return. The other pair is battery B, the Slate/Slate-black pair. Slate is -48V DC, Slate-black is battery return.

Repeater Bay Powering Procedure

Perform the following steps to power the repeater bay:

(1) Verify that all packing material has been removed from the repeater.

(2) Verify the following:

- Circuit breakers at the Battery Distribution and Fuse Bay (BDFB) are in the **OFF** position, or
- Fuses on the BDFB are **not installed**.

(3) Unseat all circuit packs from the repeater bay.

(4) Remove the fuses from the power distribution and fuse panel at the top of the repeater bay. Open the retainer by lifting up on the bottom edge of the retainer, then press lightly down on the top edge of the fuse cap, the fuse cap will pop out. Fuses are located on the User Panel of the miscellaneously mounted Repeater Shelf - System Controller.

(5) Using an ohmmeter, measure the resistance from the top terminal, inside each FT-2000 fuse holder, to the terminal frame grounding cable. Refer to Figure 10-2 which shows where to take the measurement from the front of the repeater.

Requirement: The resistance should show an open circuit (more than a megohm reading) for each fuse. If the resistance measurement requirement is not met then proceed to Chapter 16, Installation Troubleshooting.

(6) Insert 30 amp fuses into the FT-2000 power feeds at the BDFB. If breakers are being used, put them in the **ON** position.

(7) Using the voltmeter, measure the voltage from the top terminal of each FT-2000 fuse holder to the terminal grounding cable. Refer to Figure 10-2, which shows where to take the measurement from the front view of the repeater.

Requirement: The voltage should be -48 volts (between -41.75 and -60.0 VDC) at each fuse.

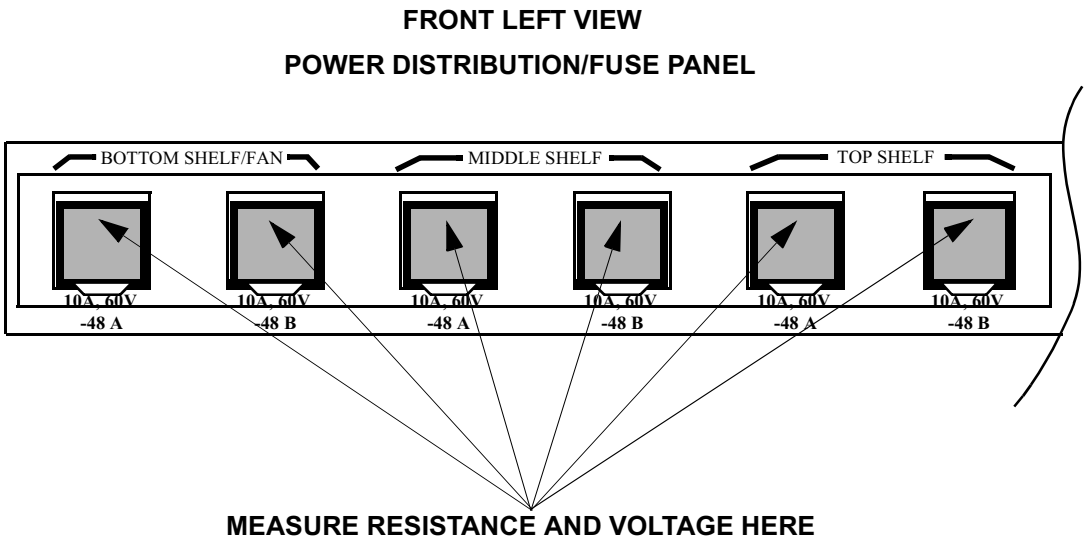

Figure 10-2. Fuse Panel Measurement Point

(8) No fuses are needed in the fuse panel at the positions labeled BOTTOM SHELF/FAN, in the Repeater Bay. However, fuses are needed in the fuse holder cap for the cap to fit properly into the socket. To insert fuses, open the retainer from the bottom edge and swing up out of the way. Put the fuse in the fuse cap, and the entire assembly in the fuse position on the bay, be sure to put the lettering right-side-up. Push up and in gently on the bottom edge of the fuse, the fuse will secure in place. Close the retainer over the fuse cap and snap it in place.

Requirement: Since the Repeater Bay has no bottom shelf, there is no LED on.

(9) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled MIDDLE SHELF A and B positions.

Requirement: The PWR ON LED is lighted on the user panel of the middle shelf.

(10) No fuses are needed in the fuse panel at the positions labeled TOP SHELF, if the TOP SHELF is unequipped. However, fuses are needed in the fuse holder cap for the cap to fit properly into the socket. Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled TOP SHELF. These can be used as spares if needed. There are also spares in the installation spare parts kit shipped with the bay.

(11) If working with a miscellaneously mounted Repeater Shelf - System Controller, insert two 10 amp terminal fuses into the fuse positions of the User Panel.

Requirement: The PWR ON LED is lighted on the user panel.

(12) Disconnect the A power feed by turning the circuit breaker off or removing the fuse for the A power feed at the BDFB.

Requirement: The PWR ON LED on each shelf should remain lighted.

(13) Remove the A fuse in the power distribution and fuse panel for the bottom shelf/fan.

Requirement: Verify that the PWR ON LED on the bottom shelf is still on.

NOTE:

If the LED is not on, then the A and B power feeders to the terminal are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

(14) Reinsert the A fuse of the bottom shelf into the fuse panel.

(15) Turn the circuit breaker on or replace the fuse for the A power feed at the BDFB.

Stile Strip Installation

Description

When completely installed, the repeater bay has four stile strips attached at each upright corner of the repeater bay as shown in Figure 10-3 These stile strips protect cables from damage and improve the appearance of the repeater. Stile strips ship attached to the left side of the repeater bay. There are no stile strips for the miscellaneously mounted Repeater Shelf - System Controller.

Stile Strip Installation Procedure

Perform the following steps to install the stile strips:

NOTE:
There are four *different* stile strips.

(1) Clip each stile strip to the top upright corner of the repeater bay, then align and tighten the thumbscrews at the bottom of the stile strip.

- The front left stile strip has a white label: “CAUTION: for continued protection against risk of fire, replace only with same type and rating of fuse,” at the top.
- The front right stile strip has a yellow label: “ATTENTION: Grounded wrist strap required,” at the top.
- The rear right stile strip has a yellow label: “ATTENTION: Grounded wrist strap required, remove stile cover to access ESD jack,” at the top.
- The rear left stile strip has no label.

(2) Verify that there is a uniform gap, no larger than an eighth inch, between the stile strip and the side of the shelves in the repeater. The brackets that hold the stile strip in place may be manually modified to achieve uniformity.

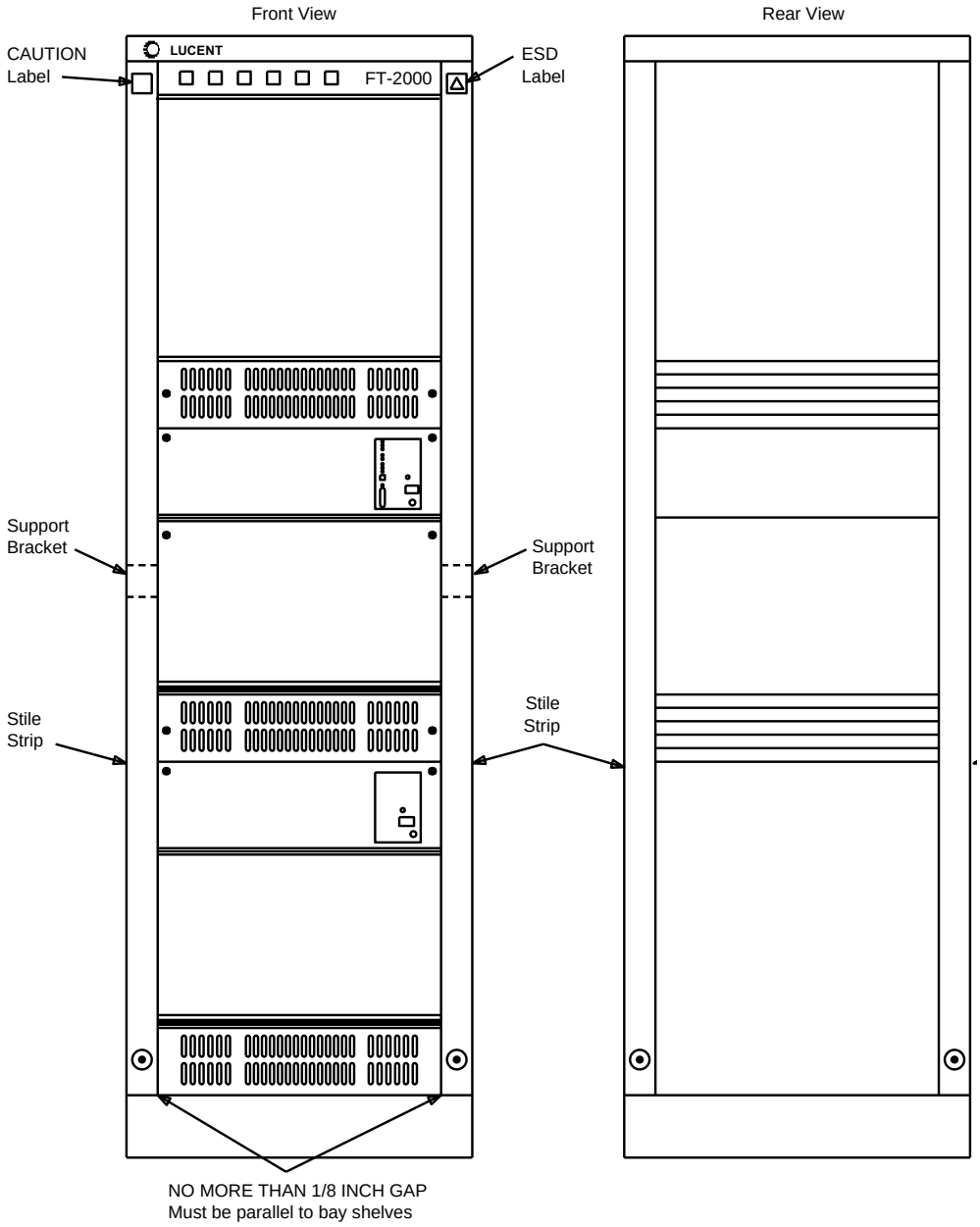

Figure 10-3. Stile strips

Software Installation

Description

The software installation procedure for the FT-2000 Repeater Bay, or FT-2000 OC-48 Repeater Shelf is provided in Appendix D. Use this procedure only for new installations. Installation of new software to in-service repeaters should follow procedures given in the *FT-2000 Software Release Description* shipped with the diskettes. The *FT-2000 Software Release Description* contains the most up-to-date instructions.

General Software Installation Considerations

- Read the entire software installation procedure before beginning.
- Alarms are immediately generated by FT-2000 when the SYSCTL and SYSMEM circuits are inserted, until the system is in full operation. 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 P105A on the Repeater Shelf - System Controller interconnection panel.
- Installation of the CIT software to the hard drive of the PC takes about 3 minutes.
- Copying the Network Element software from the distribution diskettes to the PC hard drive takes about 10 minutes.
- Installation of the Network Element (NE) software to the NE takes one to two hours, dependent upon the baudrate selected.
- The person(s) performing the software installation should be trained and have an understanding of the FT-2000 system.
- Perform the software installation procedure in the sequence provided.
- Do not proceed if one of the disks fails to install correctly. Install the FT-2000 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 shipped on 3.5- inch hard floppies (720K or 1.44M) contains one install disk, one or two CIT-PC disks, several generic disks, and one data disk. Check that all disks are present before beginning.

- If you install the network element software into the repeater bay from the distribution disks you will have to insert and remove each diskette about every 15-20 minutes. It is recommended that the software first be copied from the distribution disks to the hard drive of your PC. This will allow you to start the download process and leave the system basically unattended until the download is complete. However, it is recommended that you check the installation progress frequently even if you are installing from the PC hard drive. Installation from the distribution diskettes is not described in detail in this document, refer to the Software Release Description for details, or follow instructions on the PC similar to the details given for the installation from the hard disk.
- If you make any mistakes while making your selections, you can use the <Esc> key to back up and reenter your selection(s).
- In the example screens shown, the source and destination drive and directory is only an example, your screen will reflect the values you are using.
- If any error message windows are displayed, refer to Chapter 16, Troubleshooting of this manual to address the problem.

Repeater Bay Circuit Pack Installation

Description

Circuit pack installation for the FT-2000 Repeater Bay or FT-2000 OC-48 Repeater Shelf includes the following:

- Repeater Shelf - System Controller circuit pack installation considerations and procedures.

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 repeater.
- Circuit packs are keyed to prevent being inserted into the wrong shelf position.
- 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.

Circuit Pack Availability

Table 10-2 lists available circuit packs for the FT-2000 Repeater Bay.

Table 10-2. Available FT-2000 OC-48 Circuit Packs

Comcode	Product Code	Description	Max. / Shelf	Min. / Shelf
106916695	39B2	REGENR (1.3µ Standard Power)	2*	2*
106916703	39C2	REGENR (1.3µ High Performance)	2*	2*
107003402	39J2	REGENR (1.5µ Standard Power	2*	2*
107551244	39R2	REGENR (1.5µ LBA, λ1)	2*	2*
107551251	39S2	REGENR (1.5µ LBA, λ2)	2*	2*
106033319	LAA14**	OW	1	1
106916687	LAA23B	SYSCTL	1	1
106053978	LAA25	SYSMEM	1	1

* Only two Regenerator circuit packs total per shelf.
**Only supported in R6.0.0. or greater

Repeater Shelf - System Controller Circuit Pack Installation Procedure

(1) Insert two REGENRs (39B2, 39C2, 39J2, 39R2 or 39S2) circuit packs into the slots marked REGENR 1EW and REGENR 1WE. Be sure to insert the proper type into the proper direction slot per line engineering and the order. The REGENR PEW and REGENR PWE slots are unused.

(2) Wait about 5 minutes. The REGENR FAULT LED's will go off, then start flashing, since there is no valid OC-48 signal input.

Requirement: Verify that all the circuit pack FAULT LED's are extinguished, except for the LED's on REGENR circuit packs which will be flashing because there is no valid OC-48 signal input. Refer to Chapter 16, Troubleshooting, if this requirement is not met.

(3) If the LAA14 Order Wire circuit pack is required, insert it at this point.

NOTE:
In order to minimize travel to sites, the test procedures in Chapter 11 should be completed just after the circuit pack installation in Chapter 10 is completed.

Local Installation Testing- Repeater Bay

11

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Local Installation Testing- Repeater Bay

11

Overview

This Chapter describes the LED test and installation Auto Turnup tests for the FT-2000 OC-48 Lightwave System. Tests described in this Chapter must be performed on each Repeater Bay or Repeater Shelf that is part of a ring.

Testing Setup

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 FT-2000 Repeater bay before performing any tests. Reconnect the office alarm cable after completing testing.
- This procedure requires that the SYSCTL and the SYSMEM circuit packs have FT-2000 software installed. Additionally, all circuit packs must be installed, with their FAULT LED's off, except REGENR's which have flashing LED's. Software installation and circuit pack insertion procedures are in Chapter 10, "Powering and Network Element Start-Up - Repeater Bay".

- It is suggested that the CIT PC be set up on the convenient PC tray which is located inside the heat baffle below the Repeater Shelf - System Controller (designed for laptop PC's 25 lbs. or less).
- No circuit pack should be pulled or inserted while any of the Auto Turnup tests are in progress.

Tools, Test Sets and Accessories

The following equipment is required for performing installation Auto Turnup tests:

- One wrist strap connected to the wrist strap ground jack on the user panel for ESD protection.
- Two optical fiber cables with appropriate connectors (ST, FC/PC, or SC) on each end. (Single-mode, recommended length of 2-4 feet).
- Two optical line buildouts (ST, FC/PC, or SC type, 15dB or 20dB loss).
- One personal computer (PC) with FT-2000 CIT software installed on its hard disk for use as craft interface terminal.
- Alcohol-moistened wipes or lint-free tissues and a compressed air duster for fiber cleaning.

Example Test Command Entry

In these procedures, command entry is given in this format: Execute **FAULT_Test_LED (all,2)**. This is accomplished by:

(1) Selecting (highlighting) **FAULT** in the command menu, by using the arrow keys or typing "f", and pressing Enter or Return.

(2) Selecting **Test** (using the arrow keys, or typing "t") in the list which appears under FAULT, and pressing Enter or Return.

(3) Selecting **LED** in the list which appears under Test (using the arrow keys or typing "l"), and pressing Enter or Return.

(4) Use the value: **all**, for the first entry, LED type (type "?" for list or type all directly). Press Enter or Return to move the cursor to the next field.

(5) Use the value: **2**, for the second entry, Number of tests (type "?" for list or type "2" directly).

(6) When entry is complete press Execute (<F9>).

(7) To return to the command menu press Input (<F3>).

(8) In general you should respond "Yes" to all confirmation notices, except if you have made a mistake and wish to correct it. If you have selected the wrong item in a menu, or to move back through the popup menus, use the <Esc> key on the keyboard.

Testing Setup Procedure

Perform the following steps to set up for installation tests.

(1) Connect a properly configured PC (refer to Chapter 1 if necessary) to the CIT (DCE) port on the FT-2000 user panel using a straight-through 25-pin RS-232 cable. Turn the PC on.

(2) While in the PC directory where the CIT software was installed (use the DOS cd \CIT command if needed), run the FT-2000 CIT program. Type the command indicated in Table 11-1 based on the software release you are using followed by the Return or Enter key.

Table 11-1. CIT Start-up Commands for Testing

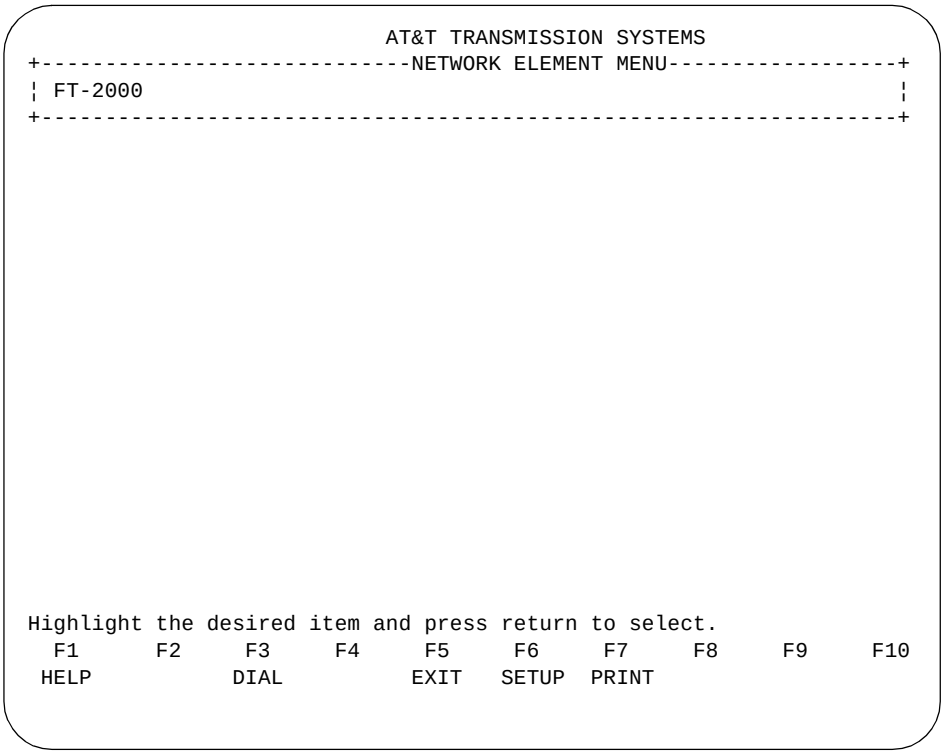
Software Release	Command to Use
Release 2.1.1-RPTR	CIT
Release 4.0.0-RPTR	CIT
Release 6.0.0-RPTR	CIT EXPERT
Release 6.0.1-RPTR	CIT EXPERT

Requirement: A similar screen as shown below appears:

```
                    Lucent Technologies

                      CIT-PC Release 7.0.2-ADR

                Support for FT-2000 and OLS Releases:

          2.1.1-TRM  2.1.0-RPTR  3.0.1-ADR  6.0.1-ADR
                     4.0.0-RPTR  4.0.0-ADR  6.0.2-ADR
                     6.0.0-RPTR  4.1.0-ADR  7.0.0-ADR
                     6.0.1-RPTR  5.0.1-ADR  7.0.1-ADR
                                 5.0.2-ADR
                                 5.0.3-ADR
                                 6.0.0-ADR

                    PRESS ANY KEY TO CONTINUE.

          Copyright (c) 1989, 1992 AT&T, 1996 Lucent Technologies
                      All Rights Reserved.
```

Action: Press any key to remove the introductory screen.

Requirement: The screen below appears:



Action: Press the F6 (SETUP) key

Requirement: The screen below appears:

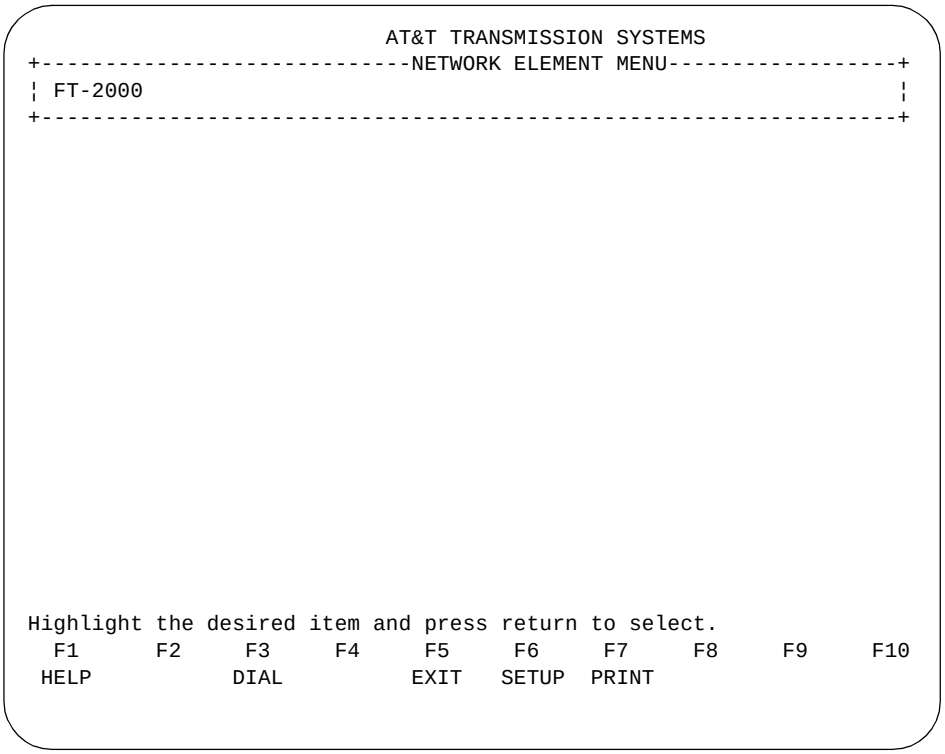
```
                          AT&T TRANSMISSION SYSTEMS
+----------------------------NETWORK ELEMENT MENU-----------------+
¦ FT-2000                                                         ¦
+-------------------------------------------------------------------+




             +----------------------SET-UP----------------------+
             ¦ Communications Port: com-1                        ¦
             ¦           Baud Rate: 9600                         ¦
             ¦             Monitor: color                        ¦
             ¦Inactivity (minutes): 0                            ¦
             ¦     Blinking Remote: on
             ¦              Paging: on                           |
             +-----------------------------------------------+



Press F6 again when you are done.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP                          EXIT  SETUP
```

NOTE:

If any of these parameters differ from the PC hardware configuration, they must be changed to match. To select a parameter, press the up arrow or down arrow key. Once the desired parameter is highlighted, type a “?”. A smaller window will appear which lists all valid settings for the parameter. Select the desired setting by using the arrow keys until it is highlighted. Press the Return or Enter key. The choice of Communications Port depends on the hardware configuration of your computer. Most laptops and desktop computers use COM1, COM2, COM3, or COM4. If COM1 does not work, check your hardware manual, or try another port. Operate at the highest baud rate that works. Some older PC’s will not operate at a speed greater than 9600 BAUD. Select color or monochrome monitor depending on your PC. Inactivity timer units are in minutes. The CIT will disconnect after the number of minutes of inactivity with the terminal have passed. Enter 0 to disable the inactivity timer (never be logged off due to inactivity). Blinking Remote on or off causes the upper right corner location indicator (Local ONLY, Local, or Remote) to flash when toggled to the Remote bay. Paging control is turned on and off using the Paging field.

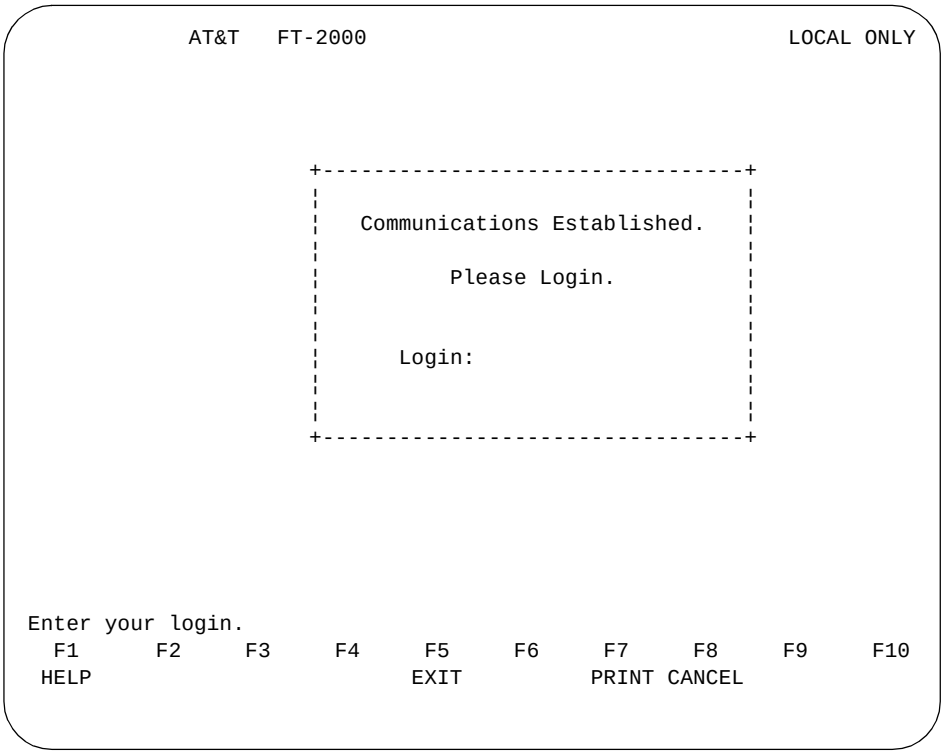
Action: When all the parameter settings are correct for the PC, press F6 to save them.

Requirement: The screen below appears:



Action: Use the arrow keys to highlight (select) FT-2000 in the NETWORK ELEMENT MENU. (It may already be selected.) Press the Enter or Return key.

Requirement: The screen below appears:



Action: Type **ATT01** in capital letters at the login prompt, and then press the Enter or Return key. A new prompt labeled “Password:” will appear. Type **FT-2000** in capital letters at the password prompt, and then press the Enter or Return key again. For security, the password will not be displayed on the screen when it is typed.

Requirement: When successfully logged in, the CIT will report all the current alarms and status conditions. You may find a ring start-up in progress alarm, wait until that alarm is no longer present and alarms remain constant.

Action: Use **FAULT_Retrieve_Alarm [and Status] (all)** to view alarms. For Repeater release 6.0.1 the current alarms are as shown below:

.

```
     MAJOR      AT&T   FT-2000 6.0.1-RPTR      ATT-FT-2000   LOCAL ONLY
+--------------------------------COMMAND MENU----------------------+
¦      FAULT          CONFIGURATION       PERFORMANCE       SECURITY
-------------------------------------------------------------------+

   ATT-FT-2000 70-01-01 02:54:12
M  Retrieve-Alarm: COMPLD
   /* Active Alarms and Status Report

=====================================================================
Alarm  Source      Date  Time     Srv Description
Level  Address     Detected
=====================================================================
MJ     regenr-1we  01-01 00:05:34 nsa site provisioning conflict
MJ     regenr-1ew  01-01 00:05:34 nsa site provisioning conflict
 ---------------------------------------------------------------
MN     line-1e     01-01 00:05:34 nsa incoming OC-48 LOS
MN     line-1w     01-01 00:05:34 nsa incoming OC-48 LOS
---------------------------------------------------------------------
NE ACTY regenr-1we 01-01 00:05:34 nsa receiver parameter-out-of-range
NE ACTY regenr-1ew 01-01 00:05:34 nsa receiver parameter-out-of-range
*/
;
Highlight the desired item and press return to select.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP          OUTPUT LOGOUT  EXIT          PRINT        ALARMS
```

NOTE:

If this requirement is not met, execute CONFIGURATION_inititalize command as given in the 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*. The initialization should clear any settings that would alter the alarm status. If it does not, recheck procedures in Chapter 10, or contact your next level of support.

LED Tests

LED Test Description

The LED test verifies proper operation of LEDs in the FT-2000 Network Element. Proper LED operation is necessary to assist in trouble isolation. If failed LEDs are indicated (they do not light), replace the circuit pack or module they are in, only the PWR ON green LEDs are in sockets. Repeat the test until all LEDs pass the test. If a FAULT LED on a circuit pack works in one slot, it will work in any slot, there is no need to move circuit packs to unequipped slots.

LED Test Procedure

Perform the following steps to test all LEDs in the FT-2000 OC-48 Add/Drop-Rings Repeater bay or FT-2000 OC-48 Repeater Shelf:

(1) Execute **FAULT_Test_LED (all,2)**.

Requirement: Observe that all LEDs light for 10 seconds, then turn off for 10 seconds, the 20 second sequence repeats, then LEDs revert to their initial state.

NOTE:
Note: The left digit 7-segment display of the LINE LOCTR only lights a one (|).

Auto Turnup Local

Auto Turnup (local) Test Description

For the FT-2000 Repeater Bay or FT-2000 OC-48 Repeater Shelf, the test verifies REGENR operation.

Auto Turnup (local) Test Procedure

Auto Turnup (local) for the FT-2000 OC-48 Repeater:

Perform the following steps for Auto Turnup (local) test:

(1) REGENR's are shipped from the factory with a 0dB attenuator in the connector block on the faceplate. Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1EW REGENR. Be sure that connections are clean. To remove the buildout, press the numbered tab on the top of the buildout with a small blunt tool. With the tab pressed, rotate the buildout counterclockwise slightly, and slide the buildout out of the connector block along the angle of the connector block. Insertion of the 15dB or 20dB attenuator is the opposite of removal.

(2) Using a fiber jumper, connect the **OUT** connector of 1EW REGENR to the **IN** connector of 1EW REGENR.

(3) Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1WE REGENR. Be sure that connections are clean.

(4) Using a fiber jumper, connect the **OUT** connector of 1WE REGENR to the **IN** connectors of 1WE REGENR.

(5) Execute **FAULT_reset.**

Requirement: The command completes. The full Reset time is about 10 minutes. The Reset will cause the CIT to be disconnected from the Network Element.

(6) Log back into the Network Element (use CIT EXPERT).

NOTE:
When logged into the EXPERT mode and a reset is performed, to get back into the EXPERT mode it is required to log out to MS-DOS prompt and type "CIT EXPERT" again.

(7) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LED's on both REGENR's are flashing.

(8) Execute **FAULT_Test_Auto Turnup_(all, Local)**.This test will take up to 10 minutes.

Requirement: Results will be displayed on the CIT screen. A **good** represents a good slot. A **failed** represents a failed slot. 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. The report below shows a passing test for a Repeater Shelf-System Controller with REGENR's in slots 1EW and 1WE.

.

```
  MAJOR      AT&T   FT-2000 6.0.1-RPTR      ATT-FT-2000       LOCAL ONLY
                     ;
ATT-FT-2000 70-01-01 3:18:31
M  Test-Auto Turnup:All: COMPLD
   /* Test-Auto Turnup Report - Local Test

=====================================================================
   Slot        Test
   Address     Results
 =====================================================================
   regenr-1ew     good
   regenr-1we     good
   */
;









Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP           INPUT LOGOUT  EXIT                        REPEAT
```

(9) Remove the fiber jumpers and move the REGENR packs to the PEW and PWE slots

(10) Repeat steps 1 through 8, the results in step 8 will indicate Slot Addresses regenr-pew and regenr-pwe.

(11) Remove the fiber jumpers and move the REGENR packs back to the slots 1EW and 1WE, leave the fiber jumpers off.

(12) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LED's on both REGENR's are flashing.

CIT DTE Port Test Procedure

NOTE:
This procedure requires the use of a null modem, for example Black Box ME200, since like ports (DTE and DTE) are to be connected together. Null-Handshake null modem wiring is given in Figure 11-1. 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 FT-2000 DTE port.

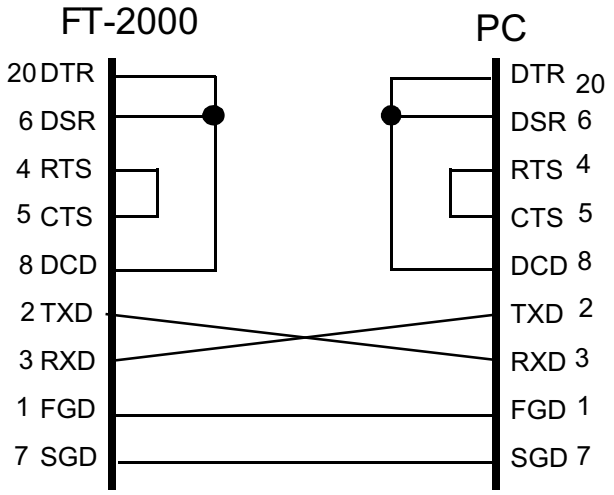


Figure 11-1. Null Handshake Null Modem Wiring

Serial Interface port signals and connector pinouts for DB9, DB25, and RJ45- 8 pin ports are given in Table 11-2 for reference.

Table 11-2. Serial Port Pinout information

Signal	Name	DB9 Pin	DB25 pin	RJ45-8 pin	DCE I/O	DTE I/O
DCD	Data Carrier Detect	1	8	6	O	I
RXD	Received Data	2	3	5	O	I
TXD	Transmitted Data	3	2	3	I	O
DTR	Data Terminal Ready	4	20	4	I	O
SGD	Signal Ground	5	7	7	NA	NA
DSR	Data Set Ready	6	6	not present	O	I
RTS	Request to Send	7	4	2	I	O
CTS	Clear to Send	8	5	8	O	I
RI	Ring Indicator	9	22	not present	O	I
FGD	Frame Ground	not present	1	1	NA	NA

Perform the following steps to verify DTE port operation.

(1) Remove the CIT cable from the user panel.

(2) Connect the null modem to the end of the cable that was just removed from the user panel CIT DCE port of the Repeater Shelf - System Controller.

(3) Connect the cable with the null modem to the DTE connector on the interconnection panel.

(4) FT-2000 is highlighted in the NETWORK ELEMENT MENU. Press the Enter or Return key. The CIT will then display a login window.

(5) Login to the FT-2000 terminal, type **`ATT01`** at the Login prompt and type **`FT-2000`** in all capital letters at the password prompt. (Original login = ATT01, original password = FT-2000).

Requirement: When successfully logged in, the CIT will report all the current alarms and status conditions. This verifies the DTE port is working.

(6) Press the function key labeled “EXIT” (F5) on the CIT. Respond "Yes" to the warning prompt.

(7) When the prompt “C>” appears, remove the cable and the null modem from the interconnection panel port.

(8) Remove the null modem from the cable.

Final Operations

Perform the following steps to complete the installation tests:

(1) **IMPORTANT!** Remove the 15 dB or 20dB optical attenuators from the REGENR **IN** connectors, and replace them with the 0 dB attenuators that were shipped with the units.

(2) Put protective covers on both REGENR's output and input optical connectors.

NOTE:
In order to minimize travel to sites, the provisioning procedures in Chapter 12 should be completed just after the tests in Chapter 11 are completed.

Required Provisioning-Repeater Bay

12

Contents

- Overview 12-1
- General Considerations 12-1
- Required Repeater Provisioning 12-2
  - Description 12-2
  - Required Repeater Bay/Shelf Provisioning Procedure 12-2

Required Provisioning- Repeater Bay

12

Overview

This Chapter describes how to provision each FT-2000 Repeater bay or FT-2000 OC-48 Repeater Shelf that makes up the FT-2000 Ring so that ring installation testing can be done. A more detailed description of provisioning can be found in document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/ Service Manual,* Chapter 8, “Administration and Provisioning”.

General Considerations

Note the following before starting:

- Required equipment is: one personal computer (PC) with FT-2000 CIT software for use as craft interface terminal and connecting cable.
- Basic familiarity with the CIT program is required, Chapter 3 of this document describes CIT use. Refer to the Lucent 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*, tab 11, “Craft Interface Terminal Usage”, for details.
- Information required to provision the ring should be entered into the provisioning table at the end of this section, so that it can be used while making entries. The Target Identifier (TID) should be known.
- A Repeater is not a Node, thus it does not have a Node ID (NID). Repeaters are identified by a Site ID (assigned automatically), and a Target Identifier (TID).

Required Repeater Provisioning

Description

This section provides a procedure for: setting the Target identifier (TID), time and date, and enabling far end communications. This procedure can (and should) be done immediately after the software installation has taken place.

Required Repeater Bay/Shelf Provisioning Procedure

Login to the Network Element using the CIT PC at the CIT DCE port on the Repeater Shelf - System Controller and perform the following steps:

(1) For the FT-2000 OC-48 Repeater Bay: set the TID designation: execute the **`SECURITY_Set_Network-Element (TID)`** command. Use the information from Provisioning Table 12-1.

Requirement: The command completes, the TID now appears in the heading of all output from the bay.

(2) Set the date and time: execute the **`CONFIGURATION_Set_Date (YY, MM, DD, HH, MM, SS, XST, 04-xx, 10-xx, XDT)`** command, where YY is year, MM is month, DD is day, HH is hour, MM is minutes, SS is seconds, XST is AST, EST, CST, MST or PST, in most of the U.S., 04-xx is start of daylight savings time date (use actual date), 10-xx is end of daylight savings time date (use actual date), and XDT is ADT, EDT, CDT, MDT or PDT, in most of the U.S. If daylight savings time is not used, leave the start and stop dates both on the same date.

Requirement: Output from the bay now displays the correct date and time in the headings

(3) Enable far end communications: execute **`SECURITY_Set_Far End Communications (enable, disable)`** command. Enable remote activity reporting, disable remote office alarms. Remote activity reporting enables the FE-ACTY (Far End - Activity) LED on the User Panel.

Table 12-1. Blank for Actual Provisioning Information

TID (office name)

Table 12-2. Example Values for Tests Provisioning Information

TID (office name)
RPTR-1
RPTR-2
RPTR-3
RPTR-4
RPTR-5
RPTR-6
RPTR-7
RPTR-8
RPTR-9
RPTR-10
RPTR-11
RPTR-12
RPTR-13
RPTR-14
RPTR-15
RPTR-16
RPTR-17
RPTR-18
RPTR-19
RPTR-20
RPTR-21
RPTR-22
RPTR-23
RPTR-24
RPTR-25
RPTR-26
RPTR-27

Fiber Connection

13

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  - Description 13-4
  - Procedure 13-4
- Head End TRMTR Optical Power Check 13-5
  - Description 13-5
  - Head End Transmitter Check 13-6
- Optical Fiber Connection Procedure for Add/Drop Rings 13-9
  - Description 13-9
  - Ring Fiber Connection Procedure 13-11
- Final Installation Operations 13-13

Fiber Connection

13

Overview

This Chapter describes how to establish FT-2000 fiber connections. Some general information on Lightwave jumpers, and optical line buildouts is given in the following sections as a quick reference. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual* and document 365-575-100 FT-2000 *OC-48 Lightwave System Applications, Planning, and Ordering Guide* for complete details. Read and understand the optical line buildout selection procedure before starting to connect fibers.

This chapter provides procedures for directly connecting the FT-2000 Add/Drop-Rings Terminals together. If the FT-2000 Add/Drop-Rings Terminals connect to each other through Lightwave Booster Amplifiers (LBA) or Wavelength Division Multiplexors (WDM), refer to Appendix E for the fiber connection procedures. If the FT-2000 Add/Drop-Rings terminals connect together through an Optical Line System (OLS), refer to the Optical Networking Installation Manual 365-575-311 for fiber connection procedures.

This chapter should be used as a high level ring connection overview even if WDM or OLS equipment is used. Chapter 14, “Ring Installation Testing” should be performed after the ring has been established, either using this chapter, Appendix E, or the Optical Networking Manual.

General Considerations

⚠ WARNING:
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

Note the following before starting the procedures which follow:

- Disconnect the office alarms cable at the FT-2000 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 chapters of this document.
- Actual geographic East and West location of Network Elements and offices may not reflect the chosen fiber assignments for the particular ring installation, follow the fiber assignments given by maintenance engineering.
- Required equipment is listed in Chapter 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 CIT is assumed, each and every key stroke is not detailed. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*, tab 11, “Craft Interface Terminal Usage”, for complete CIT use instructions.

Lightwave Jumpers

Table 13-1 details the fiber cable jumpers available with *ST*-type connectors on one end and *ST*-type connectors or keyed biconic connectors (2016AK) on the other end of the jumper. If fiber jumper cables using other connector types are needed, refer to the Ordering Chapter of document 365-575-100 *Applications, Planning, and Ordering Guide*.

Table 13-1. Lightwave Jumpers

Code	Comcode	Length	Description
FS1E-E-02	105 357 727	2 ft.	ST-ST
FS1E-E-10	105 357 768	10 ft.	ST-ST
FS1E-E-25	105 357 800	25 ft.	ST-ST
FS1E-E-50	105 357 859	50 ft.	ST-ST
FS1E-E-100	105 357 875	100 ft.	ST-ST

Optical Line Buildouts

FT-2000 supports *ST*-type, SC-type, and FC/PC-type connections to fiber. All transmitters typically are equipped with 0 dB attenuators, however, 739 E(1-8) and 739(G1-8) transmitters may be equipped with a non-zero LBO. Receivers, and OC-12 circuit packs are factory-equipped with *ST*-type 0 dB lightguide buildouts. The OC-3 circuit packs are factory-equipped with ST-type lightguide

buildouts, the receive port contains a 0dB and the transmit port contains a 7.1dB. If the installation uses other than *ST*-type optical interfaces, additional 0 dB lightguide buildouts of the proper type must be obtained to replace the factory-equipped *ST*-type on the transmitter circuit packs, and/or the OUT connector of the REGENR or IN connector of LS INTFC (OC-3 / OC-12).

Table 13-2 lists optical line buildouts that are available with *ST*-type, FC/PC-type, and SC-type connections. (For a more complete offering, refer to *Fiber Optic Products,* available to Non-Lucent Technologies customers at 1-800-344-0223, ext 3023 and Lucent Technologies customers at 1-800-432-6600 select code 2492C.)

Table 13-2. Single Mode Optical Line Buildouts

Code	Comcode	Loss (dB)	Connector Type
A3070	106 795 354	0	ST
A3070B	106 795 362	5	ST
A3070X1	107 107 740	7.1	ST
A3070D	106 795 370	10	ST
A3070F	106 795 388	15	ST
A3070H	106 795 396	20	ST
A3060	106 708 951	0	SC
A3060B	106 708 969	5	SC
A3060X1	107 107 732	7.1	SC
A3060D	106 708 977	10	SC
A3060F	106 708 985	15	SC
A3060H	106 708 993	20	SC
A3080	106 795 404	0	FC/PC
A3080B	106 795 412	5	FC/PC
A3080X1	107 107 757	7.1	FC/PC
A3080D	106 795 420	10	FC/PC
A3080F	106 795 438	15	FC/PC
A3080H	106 795 446	20	FC/PC

High Speed Optical LBO Selection

Description

This procedure is used to select the proper value of Line Build Out to be used on the faceplate of the RCVR or REGENR **IN** jack, based on received optical power. It is recommended that the LBO be placed on the RCVR or REGENR **IN** jack since this is the furthest physical point on the fiber line from the TRMTR and takes all connector losses into account. In rare instances buildouts can be placed in the LGX, but this is NOT recommended. It is also not recommended to put the LBO at the TRMTR. The Optical LBO selection procedure is to be used in conjunction with the Optical Fiber Connection Procedure for Add/Drop Rings. Read and understand the procedure now so you will be familiar with it.

Procedure

(1) Measure, and record for office records, the received optical power from the far end. Be sure to set the optical power meter for the wavelength of the light to be measured, 1550nm or 1310nm (a 739B4, 739B5, or 739C5 TRMTR uses 1310nm while a 739J4, 739P5, 739R5, 739S5, 739E1-8, or 739G1-8 TRMTR uses 1550nm).

Requirement: Using the value measured, choose an optical LBO value from Table 13-3 to install in the faceplate of the RCVR or IN connector of a REGENR circuit pack.

Table 13-3. Optical LBO Value (High Speed Shelf)

Measured Received Power in dBm (See Note)	Use Optical LBO Value	Code*
0 to -4.9 dBm	15 dB	A3070F
-5.0 to -9.9 dBm	10 dB	A3070D
-10.0 to -14.9 dBm	5 dB	A3070B
-15.0 to -21.5 dBm	0 dB	A3070
-21.5 dBm to -25.9dBm	Optical loss out of range. Follow head end TRMTR optical power check. **	A3070**
-26 dBm	Optical loss out of range. Replace outside plant fiber.	

Table 13-3. Optical LBO Value (High Speed Shelf)

Measured Received Power in dBm (See Note)	Use Optical LBO Value	Code*

* Refer to Table 13-2 for a complete list of Optical Line Buildouts.
** The fiber connection must also meet the outside plant loss budget. See document 365-575-102 or 365-575-103 , *FT- 2000 OC-48 Lightwave System User/Service Manual*, Chapter 10, Technical Specifications.

(2) Remove the 0 dB line buildout in the faceplate of the RCVR or REGENR (IN). To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the buildout out along the angle it is installed in the faceplate.

(3) Install the chosen buildout. To install, remove the protective cover from the chosen buildout. Clean the buildout connection of any material or dust. With the tab facing up towards you, slide the buildout into the faceplate of the RCVR or the IN connector of the REGENR over the fiber end in the faceplate at the angle of the connector block in the faceplate. The buildout can only 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.

NOTE:
A 20 dB optical LBO is typically used for local optical loopback testing only.

Head End TRMTR Optical Power Check

Description

This procedure must be followed when the optical power reading at an 839B4B RCVR falls below -21.5dBm. Figures 13-1 and 13-2 show why -21.5dBm is the lower limit for this procedure. For the purpose of this discussion the power of B2=B4=B5, C2=C5, J2=J3=J4=J5=P5.

When a reading below -21.5dBm is obtained at an 839B2, 839B4B, or 839B5 RCVR, and the head end TRMTR has unknown output level, the TRMTR may be between +2.5 and -2dBm (for a B2, B4, or B5 type). This means that the line loss may be between 24 and 19.5dB. (+2.5 *minus* -21.5) = 24 or
(-2 *minus* -21.5) = 19.5. Line losses greater than 24dB must not be used. If a reading of, say, -22dBm is obtained at an 839B4B RCVR, the TRMTR at the head end may still range between +2.5 and -2dBm output level. If the TRMTR is at, say +2.5dBm the line loss would be (+2.5 *minus* -22) = 24.5dB. This 24.5dB line loss is not allowed. Future replacement TRMTRs may not work on that line if they fall below the original +2.5 level of output (which is very likely since not many TRMTRs have that high of an output, or because there is no allowance for future splices).

To determine if a reading of less than -21.5dBm at a RCVR is acceptable (and a 0dB optical line buildout used) follow the following procedure:

Head End Transmitter Check

(1) Measure the head end TRMTR that feeds that line. Another person at the far site or travel to the site will be required. Record the TRMTR output power directly off the OUT jack on the faceplate, use only a short jumper from the jack to the power meter. Example1: reading of 0.5dBm. Example 2: reading of -1.5dBm.

(2) Calculate the line loss by subtracting the reading value from the RCVR which is below -21.5dBm. Example: RCVR reading -24dBm. From Example 1 above: calculate (0.5dBm *minus* -24dBm) = 24.5dB line loss. From Example 2 above: calculate (-1.5dBm *minus* -24dBm) = 22.5dB line loss.

(3) Is the line loss calculated in step 2 above greater than or equal to 24dB? If Yes, this line is unusable. For example, you read 24.5dB loss as in example 1 above, therefore you'll need to contact the outside plant maintenance to correct the line. If Not, this line is usable. For example, you read 22dB loss as in example 2 with a 0dB optical LBO in the RCVR faceplate. Therefore you can use this line.

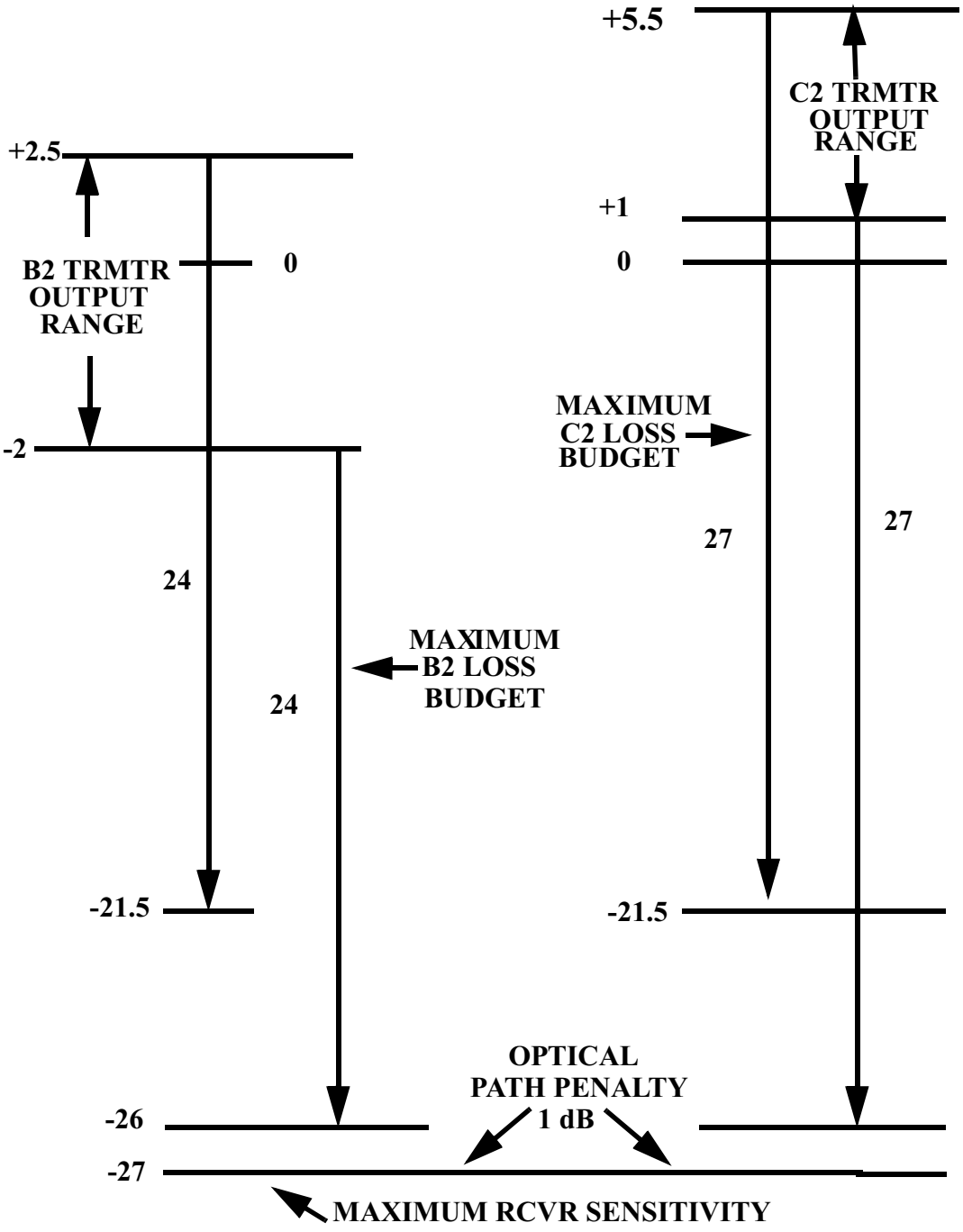


Figure 13-1 Optical Loss Budget - B2/C2

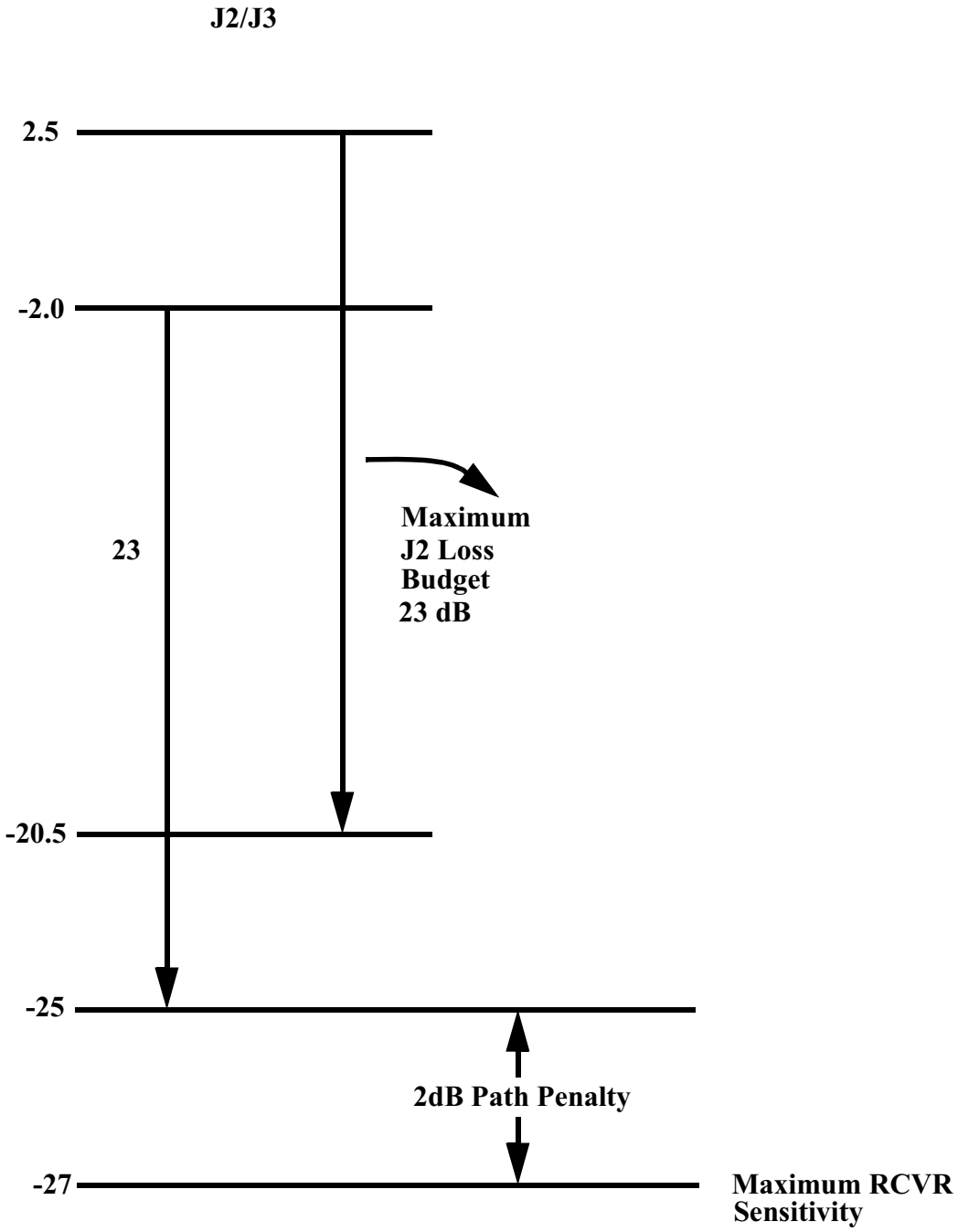


Figure 13-2 Optical Loss Budget - J2/J3

Optical Fiber Connection Procedure for Add/Drop Rings

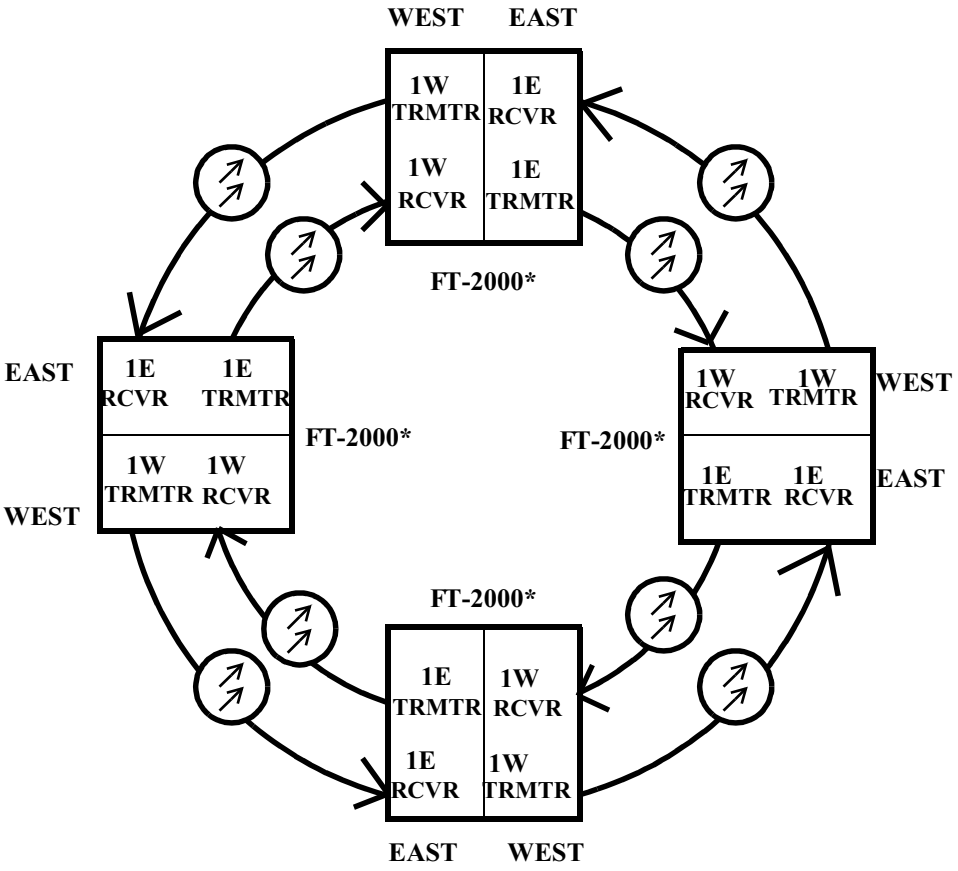
Description

Fibers directly connected between Add/Drop Rings Terminals are connected as follows (See Figure 13-3):

- 1W TRMTR at the near end terminal to 1E RCVR in the next adjacent terminal to the West.
- 1E TRMTR at the near end terminal to 1W RCVR in the next adjacent terminal to the East.

Fibers connected between Add/Drop Rings Terminals, through Repeaters are connected as follows (See Figure 13-4):

- 1W TRMTR at the near end terminal to 1EW REGENR **IN** at next adjacent Repeater site to the West.
- 1EW REGENR **OUT** to 1EW REGENR **IN** at next adjacent Repeater site, to the West or 1E RCVR at next adjacent far end terminal to the West.
- 1E TRMTR at the near end terminal to 1WE REGENR **IN** at next adjacent Repeater site to the East.
- 1WE REGENR **OUT** to 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.



*** FT-2000 OC-48 ADD/DROP RINGS TERMINAL**

Figure 13-3 Fiber Connections - Terminals

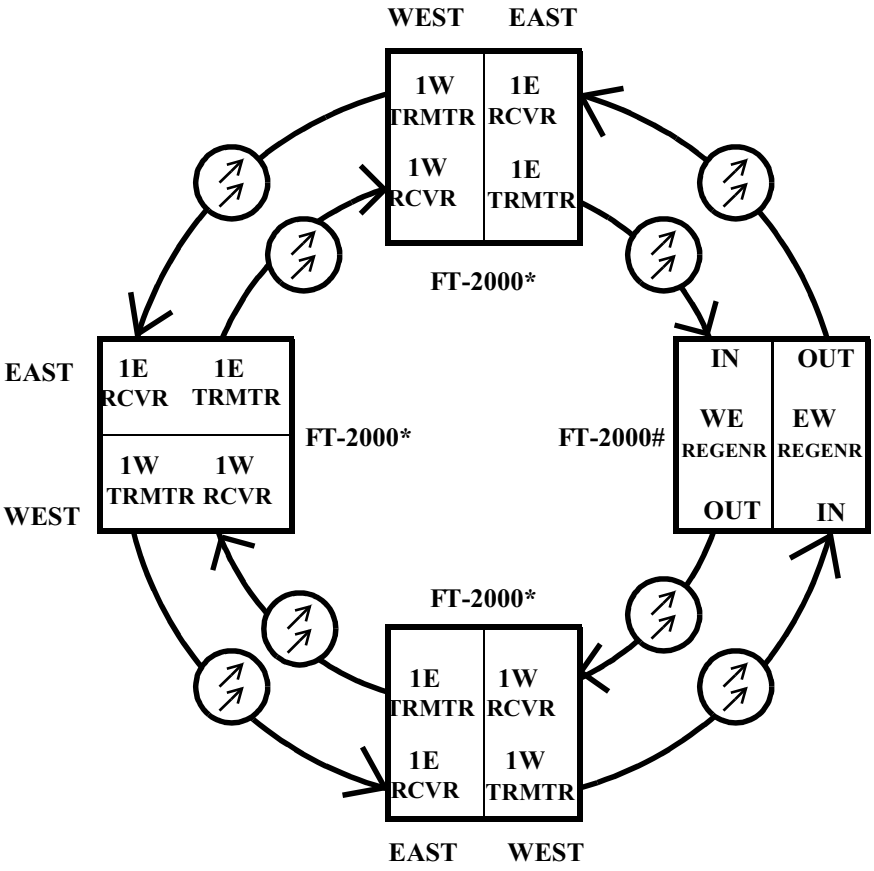


Figure 13-4 Fiber Connections - Terminals with Repeaters

Ring Fiber Connection Procedure

When working alone, the following connection procedure is recommended. However, the work will go much faster if two people work together. When two people are available, leave one person behind as one travels to the next site, then

continue to travel separated by one node. This will allow the fiber connection returning to the first node to be established at the same time as the fiber connection leaving from the first node.

(1) At a terminal node [or repeater site] perform the following:

- Clean and connect the fiber to the 1W TRMTR [or 1 EW REGENR] circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).

(2) At the node or [repeater site] follow the optical LBO selection procedure, using the incoming fiber from the EAST (which is connected to the 1W TRMTR [or 1EW REGENR] **OUT** at the node you just left, and should be the only fiber with light). Clean and connect the fiber to the 1E RCVR [or 1EW REGENR] **IN** using the selected LBO.

Requirement: the FAULT LED on the 1E RCVR [or 1EW REGENR] should stop flashing after approximately 20 seconds.

NOTE:

If the LED on the RCVR [or REGENR] is flashing, one of the following things may be wrong:

— The transmit and receive fibers are reversed.
— Too high a value optical LBO may have been selected. Recheck the incoming optical power. Follow the optical LBO selection procedure to verify the correct value LBO has been selected.
— The fiber may be dirty at one of the connectors or a fiber may not be properly inserted into an LGX, LBA, RCVR, REGENR or a TRMTR circuit pack. You may need to measure optical power at these intermediate points to resolve the problem.

(3) Repeat steps 1 and 2 until you are back at the first site. When you have completed step 1 at the first node skip step 2 and continue at step 4.

(4) At the node [or repeater site] perform the following:

- Clean and connect the fiber to the 1E TRMTR [or 1WE REGNR] circuit pack per the fiber assignments. Move to the next node or repeater site to the EAST (as defined by the ring, which may not match actual geography).

(5) At the node [or repeater site] follow the optical LBO selection procedure, using the incoming fiber from the WEST (which is connected to the 1E TRMTR [or 1WE REGENR] **OUT** at the node you just left, and should be the only fiber with light). Clean and connect the fiber to the 1W RCVR [or 1WE REGENR] **IN** using the selected LBO.

Requirement: the FAULT LED on the 1W RCVR [or 1WE REGENR] should stop flashing after approximately 20 seconds.

(6) Repeat steps 4 and 5 until you are back at the first node. When you have completed step 4 at the first node you are done.

Requirement: The MJ Ring Incomplete/Open alarm clears in less than 20 minutes.

NOTE:
The Ring Incomplete/Open and DS-NE Unreachable alarms should clear when the last fiber is connected. Recheck fiber connections if they did not. A Reset at individual nodes, or the DS-NE node may cure many problems. Other alarms related to incoming low speed interface signals may be cleared by the Update command. If there are alarms, note the node TIDs and alarm levels and use the User/Service Manual TOPS Section to resolve them. In some instances the Ring Incomplete/open alarm will not clear, even after all connections, power levels and LBO selections have been checked. One typical cause of this is the use of “air gap” type “D4” optical connectors at the LGX. These type of connectors are not recommended. They may produce poor return loss properties that allow power readings which are within range, but the signal is distorted such that the DCC channel is unable to communicate ring data. The Ring Incomplete/open alarm will be accompanied by an incoming DCC failure. Correct the problem by replacing the air gap connections with “physical contact” type connections.

Final Installation Operations

Perform the following steps to complete the installation and operational tests:

(1) Verify that only green LED’s are lighted on each of the Network Elements that make up the ring.

(2) Connect the office alarm cables.

Ring Installation Testing

14

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Ring Installation Testing

14

Overview

This Chapter describes how to perform line and operational tests for FT-2000 Add/Drop Rings. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual* for complete details. Read and understand the optical line buildout selection procedure before starting to connect fibers.

General Considerations

⚠ WARNING:
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

Note the following before starting the procedures which follow:

- Disconnect the office alarms cable at the FT-2000 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 chapters of this document.
- Actual geographic East and West location of Network Elements and offices may not reflect the chosen fiber assignments for the particular ring installation, follow the fiber assignments given by maintenance engineering.
- Required equipment is listed in Chapter 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 CIT is assumed, each and every key stroke is not detailed. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*, tab 11, “Craft Interface Terminal Usage”, for complete CIT use instructions.

Line Verification

Description

Line verification procedures check optical line continuity between Add/Drop Rings Terminals of the FT-2000 ring. Perform this test after each Add/Drop Rings Terminal has been individually tested and provisioned per previous Chapters of this document. This procedure assumes that the fiber has been connected at each Add/Drop-Rings Terminal and Repeater within the ring as detailed earlier in this chapter.

Line Verification Procedure

Login to any Terminal node using the CIT PC. Perform the following steps to verify that the fiber is properly connected and that the Add/Drop-Rings Terminals are communicating with each other.

NOTE:
If at any step the requirements are not met, resolve the problem using procedures in document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual* before proceeding.

(1) Execute **`CONFIGURATION_Retrieve_Map_Ring`**

Requirement: Verify that the TID of the Add/Drop-Rings Terminal that you are logged into is listed first. The remaining list must have the TIDs of each of the ring terminals going around the ring in the East direction. Verify that the communication status is good for each node. Release 4.1.0-ADR or greater software provides a more detailed map-ring report, check that the DSNE (prior to release 8), TL-1 Gateway (Release 4.1.-ADR only), and System Identifiers are reported correctly (the System Identifier is assigned by the system, they should all be present and unique).

NOTE:
If the TIDs are not listed in the expected order, then there is a reversal of East and West directions.

Performance Monitor Bit Error Tests

Description

This procedure will verify that performance monitoring reports show proper optical power and zero B2 parity error rates. Login to any terminal node in the ring and perform the following:

NOTE:
If at any step the requirements are not met, resolve the problem using procedures in the 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/ Service Manual* before proceeding.

Performance Monitor Bit Error Test Procedure

(1) Execute the **`PERFORMANCE_Retrieve_PM_Optics_Type: {OC-48, OC-3} (all)`** command.

Requirement: The report should not indicate OUT OF RANGE for the last fifteen minutes.

NOTE:
If the ring is newly established the 24 hour report may indicate Out of Range.

(2) Execute the **`PERFORMANCE_Retrieve_PM_Line_Type: {OC-48, OC-3} (all)`** command.

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 TRMTRs, RCVRs, REGENRs, 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.

(3) Press the F2 key labeled "Remote". Enter the TID of the next node to the EAST Add/Drop-Rings Terminal when prompted.

(4) Repeat steps 1 and 2.

(5) Log out from the remote session by pressing the F4 key labeled "Logout".

(6) Repeat steps 3, 4, and 5 for each remaining node in the ring.

Final Installation Operations

Perform the following steps to complete the installation and operational tests:

(1) Verify that only green LED's are lighted on each of the Network Elements that make up the ring.

(2) Connect the office alarm cables.

(3) Execute **`FAULT_Retrieve_Network Alarms`**[1]

Requirement: Verify that there are no alarms at the requested level.

NOTE:
In Release 8 and later, there is no command to retrieve network alarms.

(4) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Verify there are no local alarms.

(5) Press the F2 key labeled "Remote".

(6) Accept the PF-2000 choice in the Network Element Menu by pressing Enter.

(7) Enter the TID of the next Add/Drop-Rings Terminal node to the EAST when prompted. Release 4.1.0-ADR or greater will give you a list of valid TIDs to choose from by pressing Enter with nothing in the destination box. For Releases 3.0.1-ADR, and 4.0.0-ADR if you forget what the TIDs are for the remaining terminals, execute the CONFIGURATION_Retrieve_Map_Ring command and copy the report to paper.

Requirement: Verify that the Alarm and Status Report displayed upon logging in reports no alarms.

(8) Execute the **`PERFORMANCE_Retrieve_PM_Optics_Type: {OC48,all)`** command.

Requirement: The report should not indicate OUT OF RANGE for the last fifteen minutes.

NOTE:
If the ring is newly established the 24 hour report will indicate Out of Range.

1. In Release 8, this command is not available. If the FE ACT led is on, it means that there is a high speed line switch or a high speed line lockout active somewhere iin the OC-48 ring. Use the remote login capability to locate the activity if necessary.

(9) Execute the **PERFORMANCE_Retrieve_PM_Line_Type: {OC-48,all)** command.

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 TRMTRs, RCVRs, REGENRs, 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.

(10) Logout from the remote session by pressing the F4 key labeled “Logout”.

(11) Repeat steps 4 through 9 for each of the remaining Add/Drop-Rings Terminals continuing to the EAST.

End-to-End Line Verification

Description

This procedure will verify End-to-End transmission through the OC-48 ring. An ERTS (Error Rate Test Set) will monitor bit errors and line switches for an overnight soak (8-24 hours).

NOTE:
Refer to Appendix C, if the FT-2000 terminal is to be connected to a DACS III-2000 system instead of a manual cross-connect. Ask an authorized craft to make the low speed signal loopbacks at the DACS III-2000 system.

NOTE:
This procedure tests the continuity of the ring using STS-3 Cross-Connections. It may also be tested using STS-1 Cross-Connections but they are not specified here.

End-to-End Line Verification Procedure

Perform the following steps for End-to-End line verification:

(1) At NODE-0 (DSNE) enter two cross-connections (1E and 1W directions), both must be sourced as a 2-way add/drop as in the examples below, also see Figure 14-1.

NOTE:
In Release 8 and later, there is no DSNE. However, these tests can still be conducted as described.

(2) Execute the **CONFIGURATION_Enter_Crossconnection_STS3** command.

NOTE:
Review Cross-Connection Descriptions before proceeding.

- At NODE-0, a 2-way add/drop cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Slot
  - Source Slot: 1A
  - Destination Line: 1E
  - Destination Tributary: 1
  - Destination Node TID: NODE-0
  - Audit: Yes (Release 7 and later)
- At NODE-0, a 2-way add/drop cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Slot
  - Source Slot: 1B
  - Destination Line: 1W
  - Destination Tributary: 1
  - Destination Node TID: NODE-0
  - Audit: Yes(Release 7 and later)

(3) All remaining nodes require a through cross-connection with the node 0 as the source and destination as in the following example.

Requirement: Path Alarm until crossconnections are complete.

(4) Log onto remote node: F2 key and select from drop menu Node TID.

(5) Execute the **CONFIGURATION_Enter_Crossconnection_STS3** command.

- At NODE-1, NODE-2, and NODE-3 a 2-way through cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Tributary
  - Source Line: 1E
  - Source Tributary: 1
  - Source Node TID: NODE-0
  - Destination: Tributary
  - Destination Node TID: NODE-0
  - Audit: Yes(Release 7 and later)

(6) Execute the **CONFIGURATION_Retrive_Crossconnection_ALL** command.

(7) Repeat step 6 at each TID NODE to verify crossconnections were entered properly.

(8) Using a low speed cable (patchcord), connect to an output port (slot 1A) at the DSX to the receive input jack on the Error Rate Test Set (ERTS).

(9) Using a low speed cable (patchcord), connect to an input port (slot 1A) at the DSX to the transmit output jack on the ERTS.

(10) At the DSX for testing with DS3 and STS1E circuit packs, loop either 1 or all 3 input to output ports for slot 1B. When testing OC3 or OC12 packs there are two options:

- using a fiber jumper, loop the IN and OUT port on the faceplate of the LAA5, LAA10, or T939A
- using a fiber jumper, loop the input and output port at the LGX

(11) The ERTS should monitor bit errors and have the following setup:

- Interface {DS3, STS1E, OC-3 or OC12}
- Untimed
- Framed
- PRBS (Pseudo Random Bit Stream)

(12) Inject single errors to verify that the ERTS is setup correctly, then clear all errors.

(13) Perform a line switch, Execute **FAULT_Switch_Line** command.

- {ALL, **1E**, 1W}
- {Reset, Lockout, Forced Switch, **Manual Switch**}

(14) Verify that the ERTS showed a hit and clear errors.

(15) Reset the switch, Execute **FAULT_Switch_Line** command.

- {ALL, **1E**, 1W}
- {**Reset**, Lockout, Forced Switch, Manual Switch}

(16) Verify that the ERTS showed a hit and clear errors.

(17) Perform another line switch on the opposite line, repeat steps 13 through 16.

(18) Perform another line switch for all remaining NODEs, repeat steps 13 through 17. (Note: Node 0 Monitors Test Set.)

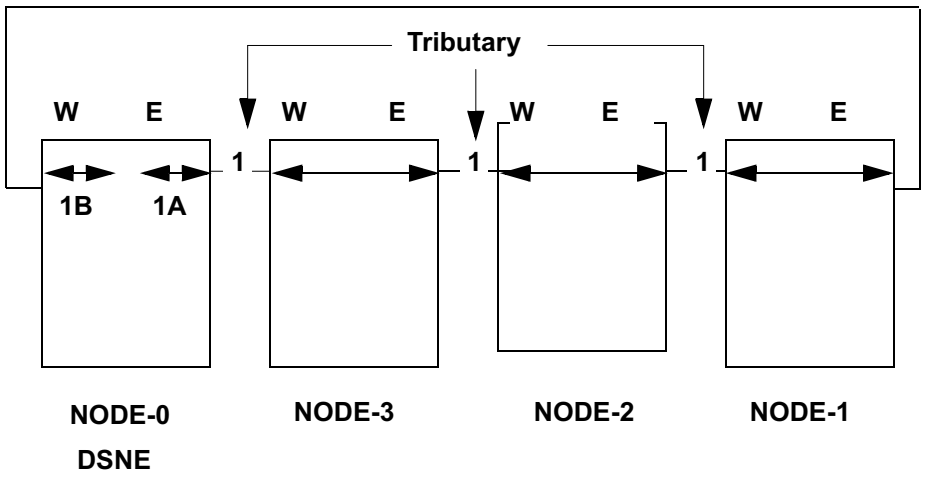

Figure 14-1 End-to-End Test Provisioning

Automatic Switch

(1) At the node 0 remove the fiber from the 1E Transmitter.

(2) Verify that the ERTS showed a hit and clear errors.

(3) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Verify there are no local alarms.

(4) At node 0 replace the fiber to the 1E Transmitter.

(5) Repeat steps 1 through 4 for the 1W Transmitter.

(6) To ensure that there are no dribbling errors, clear all errors and leave the ERTS setup for a 8-24 hour time period.

Network Element Provisioning

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Network Element Provisioning

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Overview

This Chapter describes how to establish FT-2000 Cross-Connections, Timing Modes and OC-3 Protection. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System 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 FT-2000 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 chapters of this document.
- Actual geographic East and West location of Network Elements and offices may not reflect the chosen fiber assignments for the particular ring installation, follow the fiber assignments given by maintenance engineering.
- Required equipment is listed in Chapter 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 CIT is assumed, each and every key stroke is not detailed. Refer to document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*, tab 11, “Craft Interface Terminal Usage”, for complete CIT use instructions.

Basic Cross-Connection Provisioning

NOTE:
At this point the ring is fully installed and tested. Cross-Connection provisioning procedures are fully described in document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual* section 8, Administration and Provisioning. Information presented here is to be used only as an introduction to operation of the FT-2000 OC-48 Lightwave system.

General

FT-2000 OC-48 Add/Drop-Rings has STS-1 and STS-3 time slot assignment (STS1TSA[1] and STS3TSA) capability that supports the following cross-connections:

- 2-way cross connections (available in Release 3.0.1-ADR and later)
- 1-way cross-connections (available in Release 4.1.0-ADR and later)
- 1-way-DRI cross-connections (available in Release 4.1.0-ADR and later).

Upon initial installation and basic provisioning of an FT-2000 OC-48 2-fiber ring there are no cross-connections established in the FT-2000 OC-48 Add/Drop-Rings terminals that make up the ring. Transmission of data will not take place until cross-connections are established using the CONFIGURATION_Enter_ Crossconnection_STS-3 or CONFIGURATION _Enter_Crossconnection_STS-1 input described under the heading “Entering Cross-Connection Inputs” in this chapter for each terminal in the ring.

Cross-Connection Descriptions

NOTE:
When entering a 2-way cross-connection in Release 6.0.0 and later, a MJ alarm will appear stating a Path Integrity Failure. Until all cross-connections are entered the alarm will remain, once completed it will take 30 seconds to clear the alarm. If cross-connections are completed and the alarm has changed to Squelch Map Inconsistent recheck the Source/Destination data of the cross-connection that you have entered. One way this can be done is to use the Configuration_Retrieve_Timeslot command when all connections are on one tributary.

1. Release 7.0.1-ADR and later.

STS-3 Cross-Connections

2-Way Cross-Connections

FT-2000 OC-48 Add/Drop-Rings Terminals provide an STS-3 time slot assignment (STS3TSA) capability that supports the following STS-3 2-way cross-connections:

- Add/Drop cross-connections: Add/Drop cross-connections are made between any service low speed interface slot and any service 155Mb/s (STS-3) tributary of OC-48 high speed line 1W or 1E. In 2-fiber bidirectional rings, STS-3 tributaries 1 through 8 are service tributaries and STS-3 tributaries 9 through 16 are protection tributaries.
- Through cross-connections: Through cross-connections are made between any STS-3 tributary on OC-48 high speed line 1W or 1E and the same-numbered service STS-3 tributary of the other OC-48 high speed line.

1-Way Cross-Connections

FT-2000 OC-48 Add/Drop-Rings Terminals provide an STS-3 time slot assignment (STS3TSA) capability that supports the following STS-3 1-way cross-connections:

- Add cross-connections: Add cross-connections are made from any service low speed interface slot to any outgoing service STS-3 tributary of OC-48 high speed line 1W or 1E. In 2-fiber bidirectional rings, STS-3 tributaries 1 through 8 are service tributaries and STS-3 tributaries 9 through 16 are protection tributaries.
- Drop cross-connections: Drop cross-connections are made from any incoming service STS-3 tributary of OC-48 high speed line 1W or 1E to any service low speed interface slot.
- Through cross-connections: Through cross-connections are made from any incoming service STS-3 tributary of OC-48 high speed line 1W or 1E to the same numbered outgoing service STS-3 tributary of the other OC-48 high speed line.
- Drop and Continue cross-connections: A drop and continue cross-connection is a drop cross-connection and a superimposed through cross-connection sharing the same source. The drop cross-connection and through cross-connection share the same incoming service STS-3 tributary of OC-48 high speed line 1W or 1E. Drop and Continue cross-connections require two entries, a 1-way drop cross-connection and a 1-way through cross-connection.

1-Way-DRI Cross-Connections

A 1-way-DRI cross-connection is a 1-way add cross-connection and a superimposed 1-way through cross-connection sharing the same destination. The add cross-connection and through cross-connection share the same outgoing service STS-3 tributary of OC-48 high speed line 1W or 1E.

The add cross-connection and the through cross-connection are entered with the same input; only one cross-connection (add or through) carries traffic at a time. For more information about the dual-ring-interworking (DRI) application, refer to section 3, “Applications” of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*. For more information about DRI switching refer to section 9, “Maintenance Description” of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*.

STS-1 Cross-Connections[1]

2-Way Cross-Connections

FT-2000 OC-48 Add/Drop-Rings Terminals provide an STS-1 time slot assignment (STS1TSA) capability that supports the following STS-1 2-way cross-connections:

- Add/Drop cross-connections: Add/Drop cross-connections are made between any service low speed interface slot and any service 155Mb/s (STS-1)\(STS-3) tributary of OC-48 high speed line 1W or 1E. In 2-fiber bidirectional rings, STS-3 tributaries 1 through 8 are service tributaries and STS-3 tributaries 9 through 16 are protection tributaries.
- Through cross-connections: Through cross-connections are made between any STS-1 tributary on OC-48 high speed line 1W or 1E and the same-numbered service STS-1 tributary of the other OC-48 high speed line.

1-Way Cross-Connections

FT-2000 OC-48 Add/Drop-Rings Terminals provide an STS-1 time slot assignment (STS1TSA) capability that supports the following STS-1 1-way cross-connections:

- Add cross-connections: Add cross-connections are made from any service low speed port to any outgoing service STS-1\STS-3 tributary of OC-48 high speed line 1W or 1E. In 2-fiber bidirectional rings, STS-3 tributaries 1 through 8 are service tributaries and STS-3 tributaries 9 through 16 are protection tributaries.

1. Release 7.0.1-ADR and later

- Drop cross-connections: Drop cross-connections are made from any incoming service STS-1\STS-3 tributary of OC-48 high speed line 1W or 1E to any service low speed port.
- Through cross-connections: Through cross-connections are made from any incoming service STS-1 tributary of OC-48 high speed line 1W or 1E to the same numbered outgoing service STS-1 tributary of the other OC-48 high speed line.
- Drop and Continue cross-connections: A drop and continue cross-connection is a drop cross-connection and a superimposed through cross-connection sharing the same source. The drop cross-connection and through cross-connection share the same incoming service STS-1\STS-3 tributary of OC-48 high speed line 1W or 1E. Drop and Continue cross-connections require two entries, a 1-way drop cross-connection and a 1-way through cross-connection.

1-Way-DRI Cross-Connections

A 1-way-DRI cross-connection is a 1-way add cross-connection and a superimposed 1-way through cross-connection sharing the same destination. The add cross-connection and through cross-connection share the same outgoing service STS-1 tributary of OC-48 high speed line 1W or 1E.

The add cross-connection and the through cross-connection are entered with the same input; only one cross-connection (add or through) carries traffic at a time. For more information about the dual-ring-interworking (DRI) application, refer to section 3, “Applications” of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*. For more information about DRI switching refer to section 9, “Maintenance Description” of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*.

Cross-Connection Capacity

When an STS-3 or STS-1 tributary of OC-48 high speed line 1W or 1E is cross-connected to a service low speed interface slot or low speed port, another service low speed interface slot may be cross-connected to the same-numbered STS-3 or STS-1 tributary of the other OC-48 high speed line.

Cross-Connection Restrictions

Cross-Connections cannot be made from one low speed interface slot to another low speed interface slot or between two differently numbered STS-3 or STS-1 tributaries.

All STS-1 drop cross-connections to a given slot must come from the same line direction (either east or west only), but add cross-connections can go out both lines.

Extra Traffic Capability

FT-2000 OC-48 Add/Drop-Rings Terminal also has the capability to provide extra traffic. Extra traffic allows access to the protection tributaries of the OC-48 high speed line 1W or 1E for low priority or for restoration purposes. In 2-fiber bidirectional ring, STS-3 tributaries 9 through 16 are protection tributaries. Any protection STS-3 tributary of the OC-48 high speed line 1W or 1E may be cross-connected to any service low speed port or to the same-numbered protection STS-3 tributary of the other OC-48 high speed line. In Release 7 and later releases 1-way, 1-way-DRI, and 2-way cross-connections are possible between any service low speed port and any protection STS-1\STS-3 tributary of OC-48 high speed line 1E or 1W.

Extra traffic is preempted if a 2-fiber ring protection switch occurs. In 2-fiber ring protection switching, the protection STS-3 tributaries of the OC-48 high speed line 1E protect the service STS-3 tributaries of OC-48 high speed line 1W, and the protection STS-3 tributaries of high speed line 1W protect the service STS-3 tributaries of OC-48 high speed line 1E. For more information about 2-fiber ring protection switching, refer to section 9, “Maintenance Description” of document 365-575-102 or 365-575-103 *FT-2000 OC-48 Lightwave System User/Service Manual*.

In Release 7.1 Non-preemptable protection access (NPPA) is available on the STS-3 level. Release 7.2 has NPPA on the STS-1 level. When using NPPA the traffic that is on tributaries 9-16 does not get dropped in the case of a ring switch. Both service and protection tributaries will have the same priority.

Retrieving Current Cross-Connection Configuration

Current cross-connection information for the FT-2000 OC-48 Add/Drop-Rings terminal may be retrieved using the following CIT-PC command inputs:

- CONFIGURATION_Retrieve_Crossconnection-STS-3: All Rings Releases prior to Release 7.0.1-ADR support a retrieve cross-connection request. This input generates a graphical report showing all the existing STS-3 cross-connections in the FT-2000 OC-48 Add/Drop-Rings Terminal.
- CONFIGURATION_Retrieve_Crossconnection-STS-1: Release 7.0.1-ADR supports a retrieve cross-connection request. This input generates a text report showing all the existing STS-1 cross-connections in the FT-2000 OC-48 Add/Drop-Rings Terminal. This command is available only with Release 7.0.1-ADR.

- CONFIGURATION_Retrieve_Crossconnection-ALL: All Rings Releases after Release 7.0.1-ADR support a retrieve cross-connection request. This input generates a graphical report showing all the existing STS-3 and STS-1 cross-connections in the FT-2000 OC-48 Add/Drop-Rings Terminal

Entering Cross-Connection Inputs

Refer to the User/Service Manual for detailed cross-connection information.

Entering STS-3 Cross-Connections

Cross-Connections are specified and created using the following CIT-PC command inputs:

- CONFIGURATION_Enter_Crossconnection-STS-3: this input creates a 2-way (automatically made up of 2 1-way cross-connections), 1-way, or 1-way-DRI cross-connection.
  - **2-way cross-connection:** All Rings Releases support a 2-way cross-connection entry. A 2-way cross-connection is entered by first specifying a 1-way source and destination. The source may be a low speed interface slot or STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-3 tributary. If the source is an STS-3 tributary, the destination must be a low speed interface slot or the same-numbered STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-3 tributary is specified as the destination, the TID of the destination node in the ring must also be specified.

    After the user specifies the first 1-way source and destination, the FT-2000 OC-48 Add/Drop-Rings Terminal automatically enters the corresponding 1-way source and destination in the opposite direction. This creates a 2-way cross-connection.

    An input requesting a 2-way cross-connection will be denied if the specified source is already cross-connected to a different destination, or if the specified destination is already cross-connected to a different source. An input requesting a 2-way cross-connection will also be denied if the destination is already involved in a 1-way-DRI.
  - **1-way cross-connection:** Only Releases 4.1.0-ADR or greater support a 1-way cross-connection entry. A 1-way cross-connection is entered by specifying a 1-way source and destination. The source may be a low speed interface slot or STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-3 tributary. If the source is an STS-3 tributary, the destination must be a low speed interface slot or the

same-numbered STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-3 tributary is specified as the destination, the TID of the source or destination node in the ring must also be specified.

An input requesting a 1-way cross-connection will be denied if the specified destination is already cross-connected to a different source, or the destination is already involved in a 1-way-DRI cross-connection.

— **1-way-DRI cross-connection:** Only Releases 4.1.0-ADR or greater support a 1-way-DRI cross-connection entry. A 1-way-DRI cross-connection is entered by specifying a 1-way source and destination. The source is always a low speed interface slot, and the destination is always an STS-3 tributary. The TID of the destination node in the ring must also be specified.

An input requesting a 1-way-DRI cross-connection will be denied if the specified destination (always an STS-3 tributary) is already involved in a 1-way, 2-way, or 1-way-DRI cross-connection. Release 7.2-ADR introduces Revertive DRI switching.

- CONFIGURATION_Enter_Roll_STS-3: Only Releases 4.1.0-ADR or greater support a CONFIGURATION_Enter_Roll_STS-3 entry. This input performs a CONFIGURATION_Delete_Crossconnection_STS-3 input and a CONFIGURATION _Enter_Crossconnection_STS-3 input in a 1 step process. The latter roll command is supported by release 7.0.0-ADR and greater only. This process rolls traffic from an existing source to the new source for 1-way and 1-way-DRI cross-connections. The existing cross-connection and the new cross-connection must have the same destination. Traffic is rolled from the existing source to the new source by specifying the destination and source of the existing 1-way or 1-way-DRI cross-connection to be deleted, the type of new cross-connection (1-way or 1-way-DRI), and the new source of the 1-way or 1-way-DRI cross-connection to be entered. The TID of the source node in the ring must be specified.

  This input is denied if the existing cross-connection, as specified, is not in effect or if the new cross-connection does not meet the requirements for a 1-way or 1-way-DRI cross-connection.

STS-3 Cross-Connection Examples

Entering 1-Way and 2-Way STS-3 Cross-Connections

Figure 15-1 shows two circuits that have been established on a 2-fiber bidirectional ring with 1-way and 2-way cross-connections at FT-2000 OC-48 Add/Drop-Rings Terminals. The `CONFIGURATION-Enter-Crossconnection-STS3` input is used to enter 1-way and 2-way cross-connections.

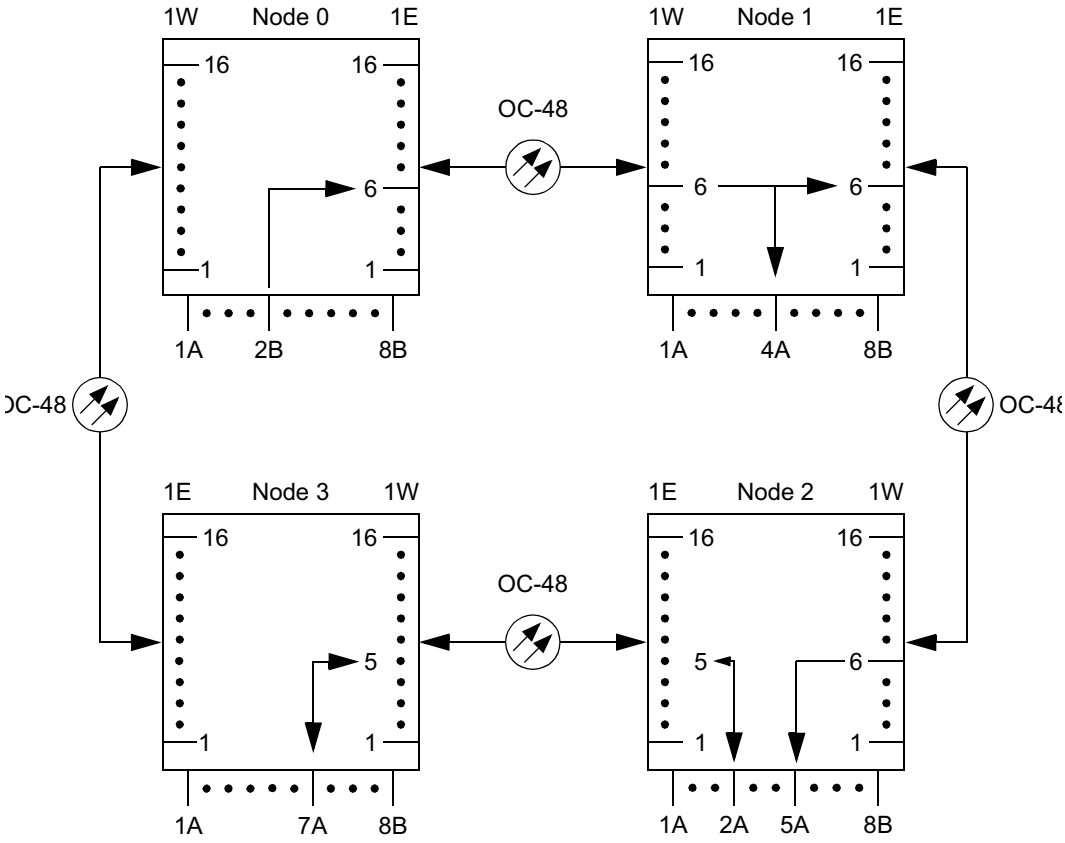


Figure 15-1 Example of Entering 1-way and 2-way STS-3 Cross-Connections in a 2-Fiber Bi-Directional Ring

- At node 0, 1-way add cross-connection is entered by specifying:
  - — Source (slot)
  - — Source low speed interface slot[1] (slot 2B)
  - — Destination line (line 1E)

1. In Release 5 or later releases, if the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

- Destination STS-3 tributary (tributary 6)
- Destination node TID[1,2] (node 2 TID)
- Audit:(Yes) Available in Release 7.0.1-ADR and later.

- At node 1, a 1-way through cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source node TID[2] (node 0 TID)
  - Destination (tributary)
  - Destination node TID[2] (node 2 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 1, a bridge is also established when a 1-way drop cross-connection is entered. The 1-way drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source node TID[2] (node 0 TID)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 4A)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 2, a 1-way drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source node TID[2] (node 0 TID)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 5A)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.

1. In Release 4.1 and later releases, entering a question (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the Retrieve-Map-Ring input to update the point-and-shoot list.
2. If an STS-3 tributary is bridged at one or more nodes in a ring, the last node where the low speed signals are terminated is the destination node.

- At node 2, a 2-way add/drop cross-connection is entered by specifying:
  - Source (slot)
  - Source low speed interface slot[1] (slot 2A)
  - Destination line (line 1E)
  - Destination STS-3 tributary (tributary 5)
  - Destination node TID[2,3](node 3 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- The same 2-way add/drop cross-connection may also be entered by specifying:
  - Source (tributary)
  - Source line (line 1E)
  - Source STS-3 tributary (tributary 5)
  - Source node TID[2] (node 3 TID)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 2A)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 3, a 2-way add/drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 5)
  - Source node TID[2] (node 2 TID)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 7A)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.

- The same 2-way add/drop cross-connection may also be entered by specifying:

1. In Release 5 or later releases, if the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.
2. In Release 4.1 and later releases, entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the Retrieve-Map-Ring input to update the point-and-shoot list.
3. In Releases 3 and 4.0, the node ID is entered.

— Source (slot)

— Source low speed interface slot[1] (slot 7A)

— Destination line (line 1W)

— Destination STS-3 tributary (tributary 5)

— Destination node TID[2,3] (node 2 TID)

— Audit:(Yes) Available in Release 7.0.1-ADR and later.

Entering 1-Way-DRI STS-3 Cross-Connections in Dual Ring Interworking Applications

Figure 15-2 shows a 1-way circuit that has been established on a 2-fiber bidirectional ring that is part of a dual ring interworking application. 1-way and 1-way-DRI cross-connections are used at the primary and secondary nodes. The `CONFIGURATION-Enter-Crossconnection-STS3` input is used to enter 1-way and 1-way-DRI cross-connections. Refer to “Entering 1-Way and 2-Way Cross-Connections” in this section for examples showing bridge and 2-way cross-connections.

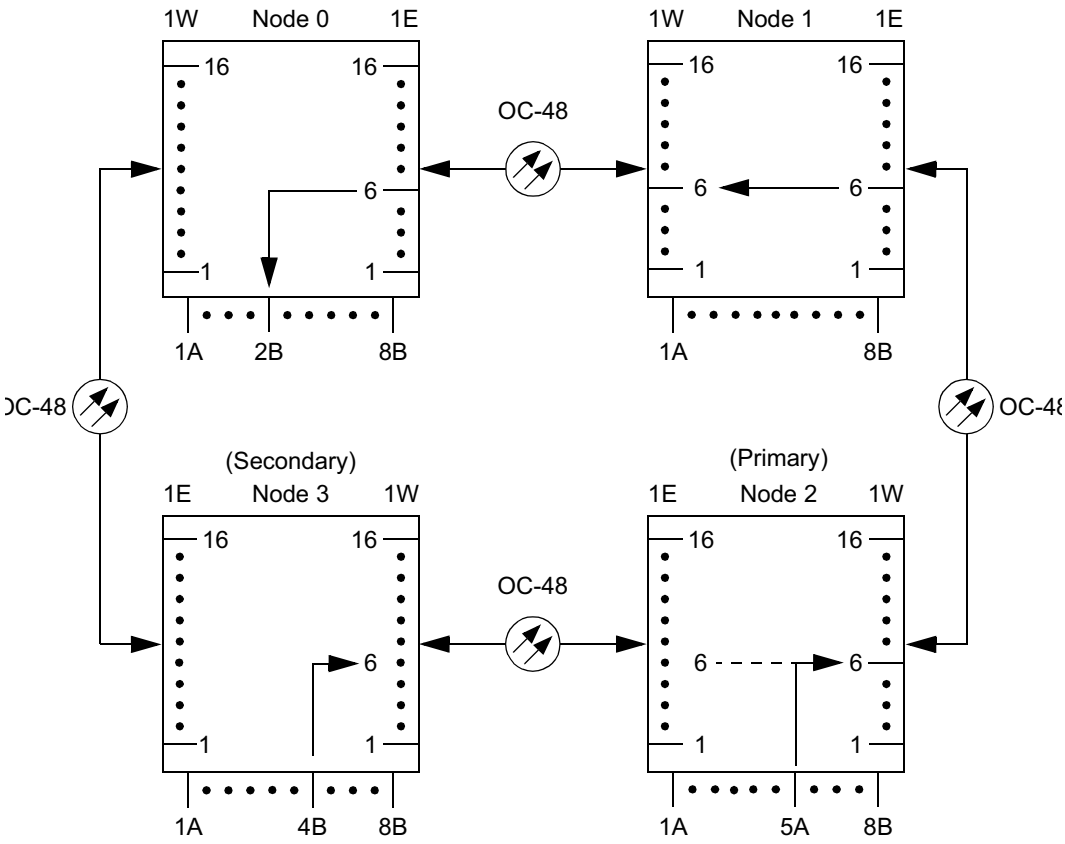


Figure 15-2 Example of Entering STS-3 1-Way DRI Cross-Connections in a 2-Fiber Bidirectional Ring.

- At node 2 (primary node), a 1-way-DRI cross-connection is entered by specifying:
  - — Source low speed interface slot[1] (slot 5A)
  - — Destination line (line 1W)
  - — Destination STS-3 tributary (tributary 6)
  - — Destination node TID[2] (node 0 TID)
  - — Secondary node TID[2] (node 3 TID)

1. In Release 5 or later releases, if the specified slot is part of a slot pair (for example, slot 1A 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

- — Audit:(Yes) Available in Release 7.0.1-ADR and later.

- At node 3 (secondary node), a 1-way add cross-connection is entered by specifying:
  - — Source (slot)
  - — Source low speed interface slot[1] (slot 4B)
  - — Destination line (line 1W)
  - — Destination STS-3 tributary (tributary 6)
  - — Destination node TID[2] (node 0 TID)
  - — Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 1 a 1-way through cross-connection is entered by specifying:
  - — Source (tributary)
  - — Source line (line 1E)
  - — Source STS-3 tributary (tributary 6)
  - — Source node TID[2] (node 3 TID)
  - — Destination (tributary)
  - — Destination node TID[2] (node 0 TID)
  - — Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 0, a 1-way drop cross-connection is entered by specifying:
  - — Source (tributary)
  - — Source line (line 1E)
  - — Source STS-3 tributary (tributary 6)
  - — Source node TID[2] (node 3 TID)
  - — Destination (slot)
  - — Destination low speed interface slot[1] (slot 2B)
  - — Audit:(Yes) Available in Release 7.0.1-ADR and later.

While cross-connections are entered, the FT-2000 OC-48 Add/Drop-Rings Terminal will report several trouble conditions (for example, `circuit provisioning error` and `path integrity failure`). However, these trouble conditions should be ignored until all the cross-connections for a circuit have been entered. If the trouble conditions remain after all the cross-

2. In Release 4.1 and later releases, entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the `Retrieve-Map-Ring` input to update the point-and-shoot list.

connections have been entered, refer to the “Operation and Maintenance (TOP)” Section of the FT-2000 OC-48 Add/Drop-Rings Terminal User/Service Manual.

When a DRI circuit is provisioned in Release 5, the circuit provisioning audits check the active add cross-connection only for provisioning errors. To check the standby through cross-connection, a manual switch and then a reset *must* be performed using the `FAULT-Switch-Path-STS3` input. This switches the through cross-connection to the active state and then resets the cross-connection to the original standby state.

Entering STS-1 Cross-Connections

— **2-way cross-connection:** All Rings Releases support a 2-way cross-connection entry. A 2-way cross-connection is entered by first specifying a 1-way source and destination. The source may be a low speed port or STS-1 tributary. If the source is a low speed port, the destination must be an STS-1 tributary. If the source is an STS-1 tributary, the destination must be a low speed port or the same-numbered STS-1 tributary on the OC-48 high speed line in the opposite direction. If an STS-1 tributary is specified as the destination, the TID of the destination node in the ring must also be specified.

After the user specifies the first 1-way source and destination, the FT-2000 OC-48 Add/Drop-Rings Terminal automatically enters the corresponding 1-way source and destination in the opposite direction. This creates a 2-way cross-connection.

An input requesting a 2-way cross-connection will be denied if the specified source is already cross-connected to a different destination, or if the specified destination is already cross-connected to a different source. An input requesting a 2-way cross-connection will also be denied if the destination is already involved in a 1-way-DRI.

— **1-way cross-connection:** Only Releases 4.1.0-ADR or greater support a 1-way cross-connection entry. A 1-way cross-connection is entered by specifying a 1-way source and destination. The source may be a low speed port or STS-1\STS-3 tributary. If the source is a low speed port, the destination must be an STS-1\STS-3 tributary. If the source is an STS-1\STS-3 tributary, the destination must be a low speed port or the same-numbered STS-1\STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-1\STS-3 tributary is specified as the destination, the TID of the source or destination node in the ring must also be specified.

An input requesting a 1-way cross-connection will be denied if the specified destination is already cross-connected to a different source, or the destination is already involved in a 1-way-DRI cross-connection.

— **1-way-DRI cross-connection:** Only Releases 4.1.0-ADR or greater support a 1-way-DRI cross-connection entry. A 1-way-DRI cross-connection is entered by specifying a 1-way source and destination. The source is always a low speed port, and the destination is always an STS-1\STS-3 tributary. The TID of the destination node in the ring must also be specified.

An input requesting a 1-way-DRI cross-connection will be denied if the specified destination (always an STS-1\STS-3 tributary) is already involved in a 1-way, 2-way, or 1-way-DRI cross-connection.

STS-1 Cross-Connection Examples

Entering 1-Way and 2-Way STS-1 Cross-Connections

Figure 15-3 shows two STS-1 circuits that have been established on a 2-fiber bidirectional ring with 1-way and 2-way STS-1 cross-connections at FT-2000 OC-48 Add/Drop-Rings Terminals. The `CONFIGURATION-Enter-Crossconnection-STS1` input is used to enter 1-way and 2-way cross-connections.

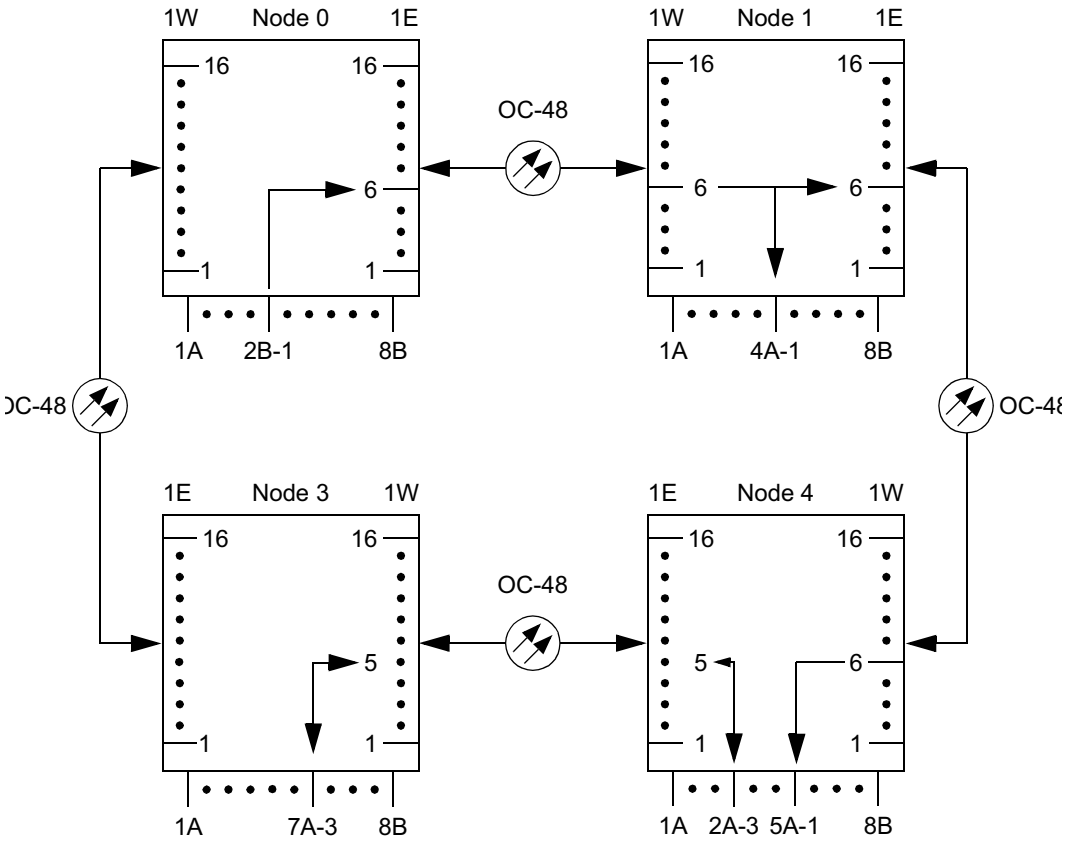


Figure 15-3 Example of a 1-Way and 2-Way STS-1 Cross-Connection in a 2-Fiber Bidirectional Ring.

- At node 0, a 1-way add cross-connection is entered by specifying:
  - Source low speed interface slot[1] (slot 2B)
  - Source STS-1 port (1)
  - Destination line (line 1E)
  - Destination STS-3 tributary (tributary 6)
  - Destination STS-1 tributary (tributary 1)

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

- Destination node TID[1,2] (node 2 TID)
- Audit:(Yes) Available in Release 7.0.1-ADR and later.

- At node 1, a 1-way through cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Source node TID[1] (note 0 TID)
  - Destination (tributary)
  - Destination node TID[1,2] (node 2 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.

  At node 1, a bridge is also established when a 1-way drop cross-connection is entered. The 1-way drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Source node TID[1] (node 0 TID)
  - Destination (STS1 port)
  - Destination low speed interface slot[1] (slot 4A)
  - Destination low speed port (1)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 2, a 1-way drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Source node TID[1] (node 0 TID)

1. Entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the `Retrieve-Map-Ring` input to update the point-and-shoot list.
2. If an STS-1 tributary is bridged at one or more nodes in a ring, the last node where the low speed signals are terminated is the destination node.

- — Destination (STS-1 port)
- — Destination low speed interface slot[1] (slot 5A)
- — Destination low speed port (1)
- — Audit:(Yes) Available in Release 7.0.1-ADR and later.

- At node 2, a 2-way add/drop cross-connection is entered by specifying:
  - — Source (STS-1 port)
  - — Source low speed interface slot[1] (slot 2A)
  - — Source low speed port (3)
  - — Destination line (line 1E)
  - — Destination STS-3 tributary (tributary 5)
  - — Destination STS-1 tributary (tributary 2)
  - — Destination node TID[2] (node 3 TID)
  - — Audit:(Yes) Available in Release 7.0.1-ADR and later.
- The same 2-way add/drop cross-connection may also be entered by specifying:
  - — Source (tributary)
  - — Source line (line 1E)
  - — Source STS-3 tributary (tributary 5)
  - — Source STS-1 tributary (tributary 2)
  - — Source node TID[1] (node 3 TID)
  - — Destination (STS-1 port)
  - — Destination low speed interface slot[1] (slot 2A)
  - — Destination low speed port (3)
  - — Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 3, a 2-way add/drop cross-connection is entered by specifying:
  - — Source (tributary)
  - — Source line (line 1W)

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.
2. Entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the `Retrieve-Map-Ring` input to update the point-and-shoot list.

- Source STS-3 tributary (tributary 5)
- Source STS-1 tributary (tributary 2)
- Source node TID[1] (node 2 TID)
- Destination (STS-1 port)
- Destination low speed interface slot[1] (slot 7A)
- Destination low speed port (3)
- Audit:(Yes) Available in Release 7.0.1-ADR and later.

■ The same 2-way add/drop cross-connection may also be entered by specifying:

- Source (STS-1 port)
- Source low speed interface slot[1] (slot 7A)
- Source low speed port (3)
- Destination line (line 1W)
- Destination STS-3 tributary (tributary 5)
- Destination STS-1 tributary (tributary 2)
- Destination node TID[2] (node 2 TID)
- Audit:(Yes) Available in Release 7.0.1-ADR and later.

Entering 1-Way-DRI STS-1 Cross-Connections in Dual Ring Interworking Applications

Figure 15-4 shows a 1-way circuit that has been established on a 2-fiber bidirectional ring that is part of a dual ring interworking application. 1-way and 1-way-DRI cross-connections are used at the primary and secondary nodes. The `CONFIGURATION-Enter-Crossconnection-STS1` input is used to enter 1-way and 1-way-DRI cross-connections. Refer to “Entering 1-Way and 2-Way STS-1 Cross-Connections” in this section for examples showing bridge and 2-way cross-connections.

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.
2. Entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the `Retrieve-Map-Ring` input to update the point-and-shoot list.

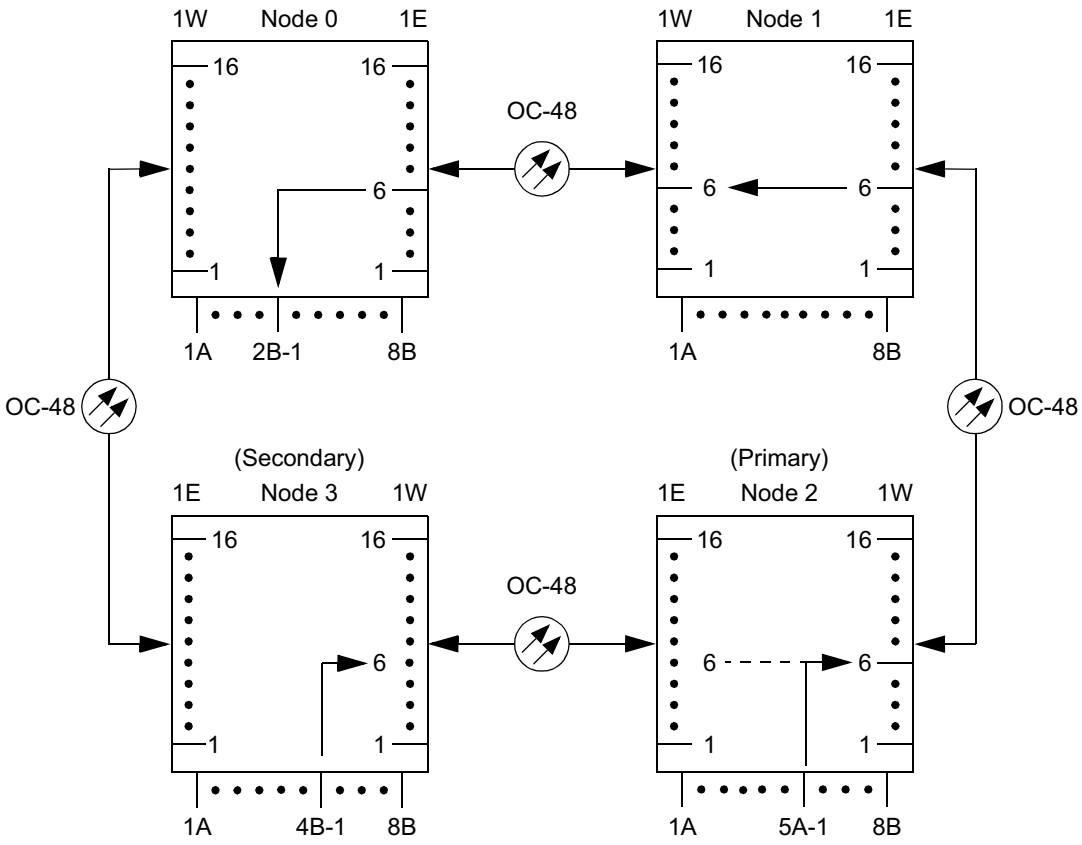


Figure 15-4 Example of Entering STS-1 1-Way DRI Cross-Connections in a 2-Fiber Bidirectional Ring

- At node 2 (primary node), a 1-way-DRI cross-connection is entered by specifying:
  - — Source low speed interface slot[1] (slot 5A)
  - — Source low speed port (1)
  - — Destination line (line 1W)
  - — Destination STS-3 tributary (tributary 6)
  - — Destination STS-1 tributary (tributary 1)

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

  - Destination node TID[1] (node 0 TID)
  - Secondary node TID[2] (node 3 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.

- At node 3 (secondary node), a 1-way add cross-connection is entered by specifying:
  - Source (STS-1 port)
  - Source low speed interface slot[1] (slot 4B)
  - Source low speed port (1)
  - Destination line (line 1W)
  - Destination STS-3 tributary (tributary 6)
  - Destination STS-1 tributary (tributary 1)
  - Destination node TID[2] (node 0 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 1, a 1-way through cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1E)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Source node TID[2] (node 3 TID)
  - Destination (tributary)
  - Destination node TID[2] (node 0 TID)
  - Audit:(Yes) Available in Release 7.0.1-ADR and later.
- At node 0, a 1-way drop cross-connection is entered by specifying:
  - Source (tributary)
  - Source line (line 1E)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Source node TID† (node 3 TID)
  - Destination low speed interface slot[1] (slot 2B)
  - Destination low speed port (1)

1. Entering a question mark (?) in response to the TID prompt will display a point-and-shoot list of available addresses in the ring network. Enter the `Retrieve-Map-Ring` input to update the point-and-shoot list.

— Audit:(Yes) Available in Release 7.0.1-ADR and later.

When a DRI circuit is provisioned, the circuit provisioning audits check the active add cross-connection only for provisioning errors. To check the standby through cross-connection, a manual switch and then a reset *must* be performed using the `FAULT-Switch-Path-STS1` input. This switches the through cross-connection to the active state and then resets the cross-connection to the original standby state. For more information about circuit provisioning audits, refer to Section 9, “Maintenance Description” of the User/Service Manual.

Deleting Existing Cross-Connections

Deleting STS-3 Cross-Connections

Existing cross-connections are deleted using the following CIT-PC command inputs:

- CONFIGURATION_Delete_Crossconnection_STS-3: This input deletes a 2-way (made up of two 1-way cross-connections), 1-way, or 1-way-DRI cross-connection.
  - **2-way cross-connection:** All Rings Releases support deletion of a 2-way cross-connection. A 2-way cross-connection is deleted by first specifying the source and destination. The source is a low speed interface slot or STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-3 tributary. If the source is an STS-3 tributary, the destination must be a low speed interface slot or the same-numbered STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-3 tributary is specified as the source, the TID of the source or destination node in the ring does not have to be specified.

    After the user specifies the first 1-way source and destination, the FT-2000 OC-48 Add/Drop-Rings Terminal automatically deletes the corresponding 1-way source and destination in the opposite direction. This deletes the 2-way cross-connection.
  - **1-way cross-connection:** Only Releases 4.1.0-ADR or greater support deletion of a 1-way cross-connection. A 1-way cross-connection is deleted by specifying the source and destination The source is a low speed interface slot or STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-3 tributary. If the source is an STS-3 tributary, the destination must be a low speed interface slot or the same-numbered

STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-3 tributary is specified as the destination, the TID of the source or destination node in the ring does not have to be specified.

— **1-way-DRI Cross-connection:** Only Releases 4.1.0-ADR or greater support deletion of a 1-way-DRI cross-connection. A 1-way-DRI cross-connection is deleted by specifying the source and destination. The source is always a low speed interface slot, and the destination is always an STS-3 tributary. The TID of the destination node in the ring does not have to be specified.

Deleting STS-3 Cross-Connection Examples

The cross-connections shown in Figure 15-5 may be deleted using the `CONFIGURATION-Delete-Crossconnection-STS3` input.

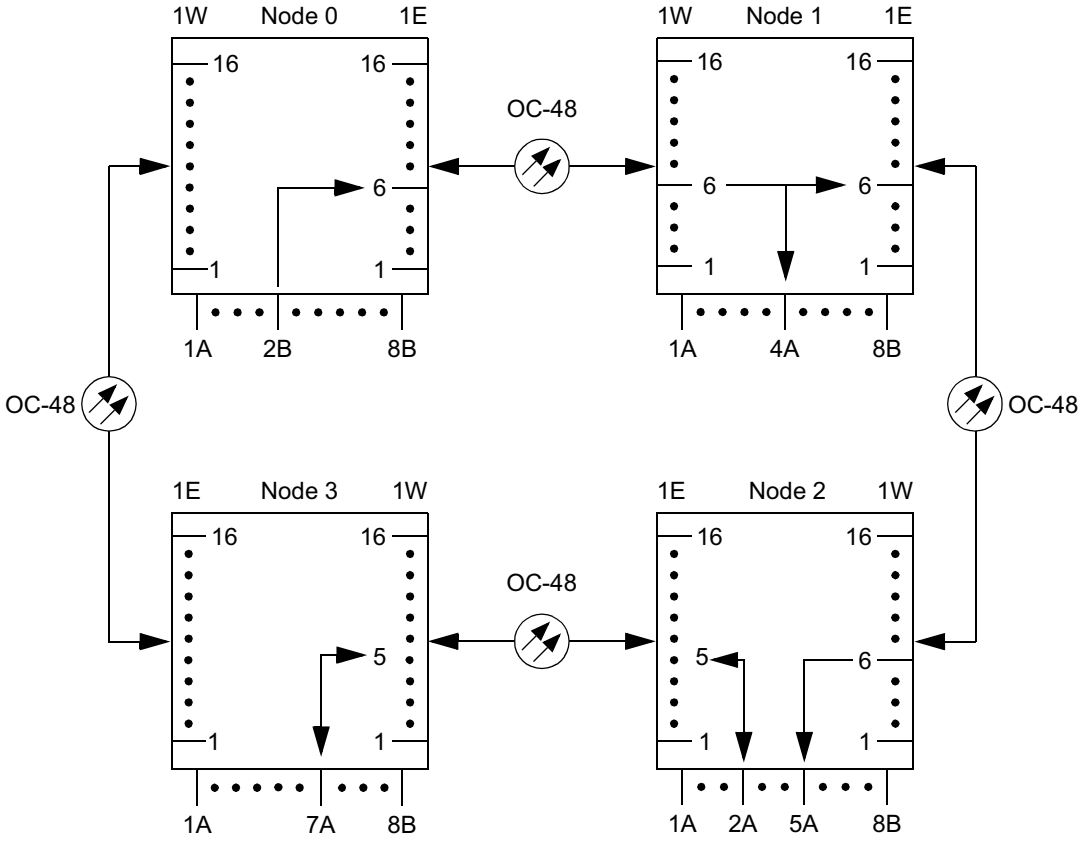


Figure 15-5 Example of Deleting STS-3 Cross-Connections in a 2-Fiber Bidirectional Ring.

- At node 0, the 1-way add cross-connection is deleted by specifying:

- Source (slot)
- Source low speed interface slot[1] (slot 2B)
- Destination line (line 1E)
- Destination STS-3 tributary (tributary 6)

- At node 1, the 1-way through cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Destination (tributary)

The 1-way drop cross-connection is deleted by specifying:

- Source (tributary)
- Source line (line 1W)
- Source STS-3 tributary (tributary 6)
- Destination (slot)
- Destination low speed interface slot[1] (slot 4A)

- At node 2, the 1-way drop cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 5A)

The 2-way add/drop cross-connection is deleted by specifying:

- Source (slot)
- Source low speed interface slot[1] (slot 2A)
- Destination line (line 1E)
- Destination STS-3 tributary (tributary 5)

1. In Release 5 or later releases, if the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

- At node 3, the 2-way add/drop cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 5)
  - Destination (slot)
  - Destination low speed interface slot[1] (slot 7A)

Deleting STS-1 Cross-Connections

Existing cross-connections are deleted using the following CIT-PC command inputs:

- CONFIGURATION_Delete_Crossconnection_STS-1: This input deletes a 2-way (made up of two 1-way cross-connections), 1-way, or 1-way-DRI cross-connection.
  - **2-way cross-connection:** All Rings Releases support deletion of a 2-way cross-connection. A 2-way cross-connection is deleted by first specifying the source and destination. The source is a low speed interface slot or STS-1\STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-1\STS-3 tributary. If the source is an STS-1\STS-3 tributary, the destination must be a low speed interface slot or the same-numbered STS-1\STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-1\STS-3 tributary is specified as the source, the TID of the source or destination node in the ring does not have to be specified.

    After the user specifies the first 1-way source and destination, the FT-2000 OC-48 Add/Drop-Rings Terminal automatically deletes the corresponding 1-way source and destination in the opposite direction. This deletes the 2-way cross-connection.
  - **1-way cross-connection:** Only Releases 4.1.0-ADR or greater support deletion of a 1-way cross-connection. A 1-way cross-connection is deleted by specifying the source and destination The source is a low speed interface slot or STS-1\STS-3 tributary. If the source is a low speed interface slot, the destination must be an STS-1\STS-3 tributary. If the source is an STS-1\STS-3 tributary, the destination must be a low speed interface slot or the same-numbered STS-1\STS-3 tributary on the OC-48 high speed line in the opposite direction. If an STS-1\STS-3 tributary is specified as the destination, the TID of the source or destination node in the ring does not have to be specified.

1. In Release 5 or later releases, if the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot.

— **1-way-DRI Cross-connection:** Only Releases 4.1.0-ADR or greater support deletion of a 1-way-DRI cross-connection. A 1-way-DRI cross-connection is deleted by specifying the source and destination. The source is always a low speed interface slot, and the destination is always an STS-1\STS-3 tributary. The TID of the destination node in the ring does not have to be specified.

NOTE:
The CONFIGURATION_Delete_Crossconnection_STS-3 and CONFIGURATION_Delete_Crossconnection_STS-1 command inputs are not denied if the specified cross-connection is not in effect.

Deleting STS-1 Cross-Connection Examples

Deleting STS-1 Cross-Connections

The cross-connections shown in Figure 15-6 may be deleted using the `CONFIGURATION-Delete-Crossconnection-STS1` input.

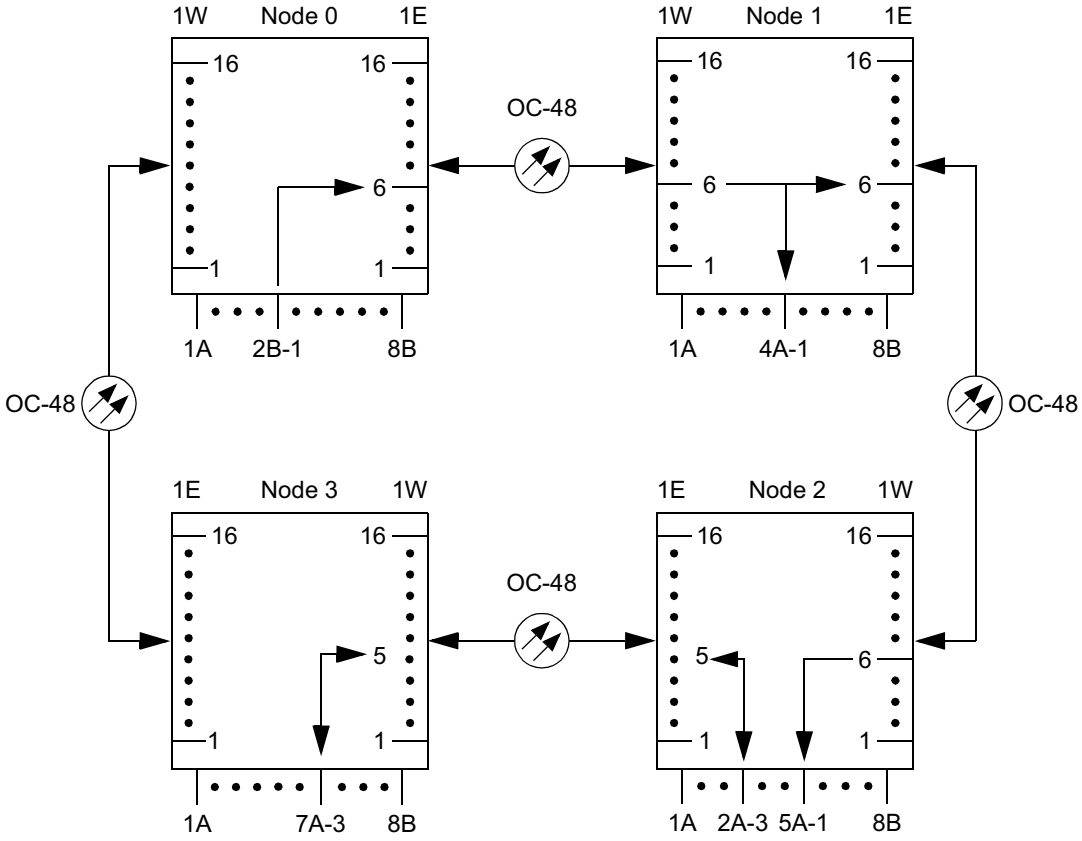


Figure 15-6 Example of Deleting STS-1 Cross-Connections in a 2-Fiber Bidirectional Ring.

- At node 0, the 1-way add cross-connection is deleted by specifying:
  - Source (STS-1 port)
  - Source low speed interface slot[1] (2b)
  - Source low speed port (1)
  - Destination line (line 1E)
  - Destination STS-3 tributary (tributary 6)
  - Destination STS-1 tributary (tributary 1)

- At node 1, the 1-way through cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Destination (tributary)

  The 1-way drop cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Destination (STS-1 Port)
  - Destination low speed interface slot[1] (slot 4A)
  - Destination low speed port (1)
- At node 2, the 1-way drop cross-connection is deleted by specifying:
  - Source (tributary)
  - Source line (line 1W)
  - Source STS-3 tributary (tributary 6)
  - Source STS-1 tributary (tributary 1)
  - Destination (STS-1 port)
  - Destination low speed interface slot[1](slot 5A)
  - Destination low speed port (1)

The 2-way add/drop cross-connection is deleted by specifying:
- Source (STS-1 port)
- Source low speed interface slot[1](slot 2A)
- Source low speed port (3)
- Destination line (line 1E)
- Destination STS-3 tributary (tributary 5)
- Destination STS-1 tributary (tributary 2)

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

- At node 3, the 2-way add/drop cross-connection is deleted by specifying:
  - — Source (tributary)
  - — Source line (line 1W)
  - — Source STS-3 tributary (tributary 5)
  - — Source STS-1 tributary (tributary 2)
  - — Destination (STS-1 port)
  - — Destination low speed interface slot[1] (slot 7A)
  - — Destination low speed port (3)

NOTE:
While cross-connections are deleted, the FT-2000 OC-48 Add/Drop-Rings Terminal will report several trouble conditions (for example, `circuit provisioning error` and `path integrity failure`). However, these trouble conditions should be ignored until all the cross-connections for a circuit have been deleted. If the trouble conditions remain after all the cross-connections have been deleted, refer to the "Operation and Maintenance (TOP)" Section of the User/Service Manual.

OC-3 and OC-12 cross connection tips

- When entering OC-3c or OC-12c crossconnections, consecutive tributaries must be used. An example of this is: If there is a OC-3 card in slot 2B, with an OC-3c signal, then an STS-3 crossconnection must be used, i.e. tributary 1, ports 1, 2, and 3. If there is an OC-12 card in quad 1, then four consecutive STS-3 cross connections must be used, i.e. tributaries 1 through 4.

1. If the specified slot is part of a slot pair (for example, slot 1A and 1B) that has been provisioned for the OC-3 1+1 protected mode, specifying one slot also includes the companion slot. OC-12 1+1 protection mode uses quad pairs (for example slots 1A-2B and 3A-4B), specifying one slot also includes the companion.

Timing

Description

This section provides a procedure for provisioning the timing mode.

Timing Provisioning

NOTE:
The feature SYNC messaging is only supported in release 7.1 and later. The default for this mode is enabled. If the network element has the 739*2, or 839*2 transmitters or receiver respectively, then this needs to be disabled using the CONFIGURATION-SET-OC48 command.

NOTE:
In order to perform the Configuration_Set_Synchronization command listed below, CIT must be in the Expert Mode. Execute CIT EXPERT to start the CIT program when using Release 4.1.0 or greater.

- `CONFIGURATION-Set-Synchronization`: This input sets the network element synchronization mode and synchronization operation parameters.
  - The Provisioned Mode specifies the primary synchronization mode of the network element. The options are:
    - "Free Running": The network element operates asynchronously, with the timing of the transmitted high speed signals derived from the local timing generator.
    - "Through Timed": The network element synchronizes the transmitted high speed signals to the high speed signals received from the opposite direction.
    - "Externally Timed[1]": The network element synchronizes the transmitted high speed signals to an external DS1 reference signal.
    - "Line Timed": The network element derives the timing from the OC-48 line.
  - The Primary DS1 In Format parameter (Releases prior to Release 4.1) specifies whether the primary DS1 reference signal uses superframe (SF) or extended superframe (ESF) format.

1. "Phase Locked' in releases prior to Release 5.

— The Primary DS1 In/Out Format parameter (Release 4.1 and later) specifies whether the TIMING IN PRI and TIMING OUT 1 DS1 reference signals use superframe (SF) or extended superframe (ESF) format.

— The Secondary DS1 In Format parameter (Releases prior to Release 4.1) specifies whether the secondary DS1 reference signal uses superframe (SF) or extended superframe (ESF) format.

— The Secondary DS1 In/Out Format parameter (Release 4.1 and later) specifies whether the TIMING IN SEC and TIMING OUT 2 DS1 reference signals use superframe (SF) or extended superframe (ESF) format.

— The Primary DS1 In Line Code parameter specifies whether the primary DS1 reference signal uses alternate mark inversion (AMI) or bipolar eight zero substitution (B8ZS) line coding.

— The Secondary DS1 In Line Code parameter specifies whether the secondary DS1 reference signal uses alternate mark inversion (AMI) or bipolar eight zero substitution (B8ZS) line coding.

(1) The DS1 Out 1 and DS1 out 2 Equalization parameter provisions the DS1 Out 1 and DS1 out 2 to drive “20, 40, 60, 80, or 100" percent of its maximum rated cable length. The cable lengths are based on YR28365 cable. Provision the equalization to the smallest value greater than the actual cable length based on Table 15-1 below

Table 15-1. Timing Output Equalization Settings

Optimum Equalization Setting (Percent)	Cable Length to DSX-1 Panel (Feet)
20	0-133
40	133-267
60	267-400
80	400-533
100	533-655

(2) For the FT-2000 OC-48 Add/Drop Rings Terminal, execute the **`CONFIGURATION_Retrieve_Synchronization`** command.

Requirement: The report shows the current provisioned mode as desired, and does not show HOLDOVER for the current operating mode.

NOTE:
In Releases up to R8, the default Timing mode is "Free Running". In Release 9 and higher, the default Timing mode is "External". External mode will require that a timing source be cabled to the FT-2000.

NOTE:
If the bay is to be phase locked, the TIMING IN PRI and SECY cables must be attached, and they must have valid DS1 signal of the desired (ES or D4) format, otherwise HOLDOVER will be the operating mode, but the FAULT LED of the TG3 will not flash.

IS-3/OC-3 Provisioning

Description

This section provides a procedure for provisioning the LAA5 (IS-3) and LAA10/ LAA10B (OC-3) Circuit Packs.

The provisioning for the OC-3 and IS-3 cards is the same. IS-3 packs, however, do not have performance monitoring capability.

LAA5/LAA10/LAA10B (OC-3) Circuit Pack Provisioning

When protection is required for OC3 it must be provisioned. Release 6.0.0-ADR or greater software will have default provisioning (shown in bold) as follows:

Configuration_Set_OC3

Security Category: General

Related Commands: RETRIEVE-OC3

This command specifies the characteristics for selected LS INTFC slot addresses.

- Slot {All, 1A-8B}

NOTE:
If all slots are not equipped, you will need to input each equipped slot individually.

- Protection Mode - from OC3 {**0x1**, 1+1}
- Protection Mode - from OC48 {**0x1**, 1+1}
- Alarm Level {**CR**, MJ, MN, NA, NR, NO}
- Signal Degrade Threshold {-5, **-6**, -7, -8, -9}

- Output AU4 Mapping {**SONET**, SDH}
- SYNC Messaging {**Enable**, Disable,S byte, K byte}

NOTE:
The following command is used to provision slots equipped with OC-3 circuit packs.

- `CONFIGURATION-Set-OC-3` (TL1 = `SET-ATTR-rr`): In Release 5 and later releases, this input sets the Protection Mode, Alarm Level, Signal Degrade Threshold, and Output AU4 Mapping of the OC-3 line. This input sets the provisioned protection mode parameters successfully even if the slot associated with the addressed slot pair is not equipped with an OC-3 circuit pack or is in the AUTO state.
  - The Protection Mode (from OC-3) parameter sets the protection mode of a low speed interface slot to “1+1” or “0×1” in the add direction (from OC-3 to OC-48). The “1+1” protection mode is provided by using a pair of adjacent “A” and “B” low speed interface slots (for example, slot 2A and 2b). Each “1+1” protected OC-3 circuit pack pair establishes an active cross-connection between one slot of the slot pair and an STS-3 tributary, and a standby cross-connection between the other slot and the same STS-3 tributary.
  - To implement the OC-3 operating protection mode, the following condition must exist:
    - Both slots in the slot pair must be provisioned “1+1”.
    - Both slots in the slot pair must be equipped.
    - A cross-connection must exist between either slot in the slot pair and an STS-3 tributary.
  - The Protection Mode (from OC-48) parameter sets the protection mode of a low speed interface slot to “1+1' or “0×1” in the drop direction (from OC-48 to OC-3). The “1+1” protection mode is provided by using a pair of adjacent “A” and “B” low speed interface slots. For a “1+1” protected OC-3 circuit pack pair, the STS-3 tributary feeds the low speed signal to both slots.
  - To implement the OC-3 operating protection mode, the following conditions must exist:
    - Both slots in the slot pair must be provisioned “1+1”.
    - Both slots in the slot pair must be equipped.
    - A cross-connection must exist between either slot in the slot pair and an STS-3 tributary.
  - The Alarm Level parameter sets the severity of an incoming (from the lightguide cross-connect panel) signal failure condition. The choices are:
    - “CR”:critical

- — “MJ”:major
- — “MN”:minor
- — “NA”:status not alarmed
- — “NR”:status not alarmed and not reported to the OS
- — “NO”:no failure conditions reported (Release 6 and later) (Not applicable to slots in the 1+1 Protection Mode.)

— The Signal Degrade Threshold is the base 10 logarithm of the OC-3 line parity (B2) error rate threshold. The allowed values are “–5”, “–6”, “–7”, “–8”, or “–9”. A signal degrade condition is reported for OC-3 signals received from the lightguide cross-connect panel with error rates greater than the threshold.

— The Output AU4 Mapping parameter sets the AU4 mapping bit to SONET or SDH. The OC-3 circuit pack can automatically support transport of STS-3, STS-3c, or STM-1 signals carrying AU-4 mapped signals. For STM-1 AU-4 mapped payloads, the OC-3 circuit pack can be provisioned to output the appropriate values in the pointer bytes so that direct interface to SDH equipment is possible over an STM-1 optical interconnection. The high speed transport of the payload is SONET, but this does not present any operational difficulties. “SONET” indicates the transport of an OC-3 signal. “SDH” indicates the transport of an AU4 signal.

— The SYNC Messaging parameter turns on or off the Synchronization messaging capability.

OC-3 Data Communications Channel Assignments

General

In Release 6 and later releases, the FT-2000 OC-48 Add/Drop-Rings Terminal provides a working OC-3 data communications channel (DCC) link. A working DCC link is a bidirectional connection at the OC-3 or OC-48 rate that has the DCC bytes terminated at both ends. An FT-2000 OC-48 Add/Drop-Rings Terminal equipped with Overhead Controller — Terminal [OHCTL (TERM)] circuit packs automatically terminates the OC-48 DCC bytes. In Release 6 and later releases, OC-3 DCC channel assignments and the Overhead Controller — Tributary (TOHCTL) circuit pack are required to terminate the OC-3 DCC bytes.

The TOHCTL circuit pack terminates up to eight OC-3 DCCs. The TOHCTL circuit pack has the capacity to terminate all the OC-3 DCCs of a Low Speed Shelf — System Controller fully equipped with OC-3 (1.3 STD) circuit packs in

the 1+1 operating mode. However, the TOHCTL circuit pack is not capable of terminating all the OC-3 DCCs for some configurations with OC-3 (1.3 STD) circuit packs in the 0 × 1 operating mode.

OC-3 Data Communications Channel Assignment Inputs

The OC-3 DCC assignments must be specified and administered using the following inputs[1]:

- `CONFIGURATION-Enter-Assignment-DCC`: This input assigns an OC-3 DCC channel to a particular low speed interface slot or pair of low speed interface slots. An OC-3 DCC channel assignment is entered by first specifying a low speed interface slot and a DCC channel. The low speed interface slot may be a single slot in the OC-3 0 × 1 operating mode, or a low speed interface slot in a slot pair (for example, slot 2A and 2B) operating in the OC-3 1+1 protected mode. The user must specify a single DCC channel (DCC channel 1-8).

  After the low speed interface slot and DCC channel are specified, the user must specify the orientation (*user* or *network*). If the *user* orientation is specified at one end of the OC-3 DCC link, the *network* orientation must be specified at the other end of the OC-3 DCC link.

  An input requesting an OC-3 DCC assignment will be denied if one of the following conditions is present:

  — The specified slot is not equipped with an OC-3 (1.3 STD) circuit pack.

  — The TOHCTL slot is in the AUTO state.

  — The TOHCTL circuit pack has been removed.

  — The TOHCTL circuit pack has failed.

  An input requesting an OC-3 DCC assignment may be denied if an automatic turnup test is running. During that part of the test cycle when the DCC connections between the OC-3 (1.3 STD) and TOHCTL circuit packs are being verified, an input requesting an OC-3 DCC assignment will be denied.

  The `CONFIGURATION-Enter-Assignment-DCC` input can also be used to change the value (*user* or *network*) of the orientation parameter associated with an existing OC-3 DCC assignment. This is accomplished by re-entering the same OC-3 DCC assignment with the new value for the orientation parameter.

- `CONFIGURATION-Delete-Assignment-DCC`: This input deletes an OC-3 DCC channel assignment to a low speed interface slot or pair of low speed interface slots. Deleting an OC-3 DCC channel assignment disables DCC communications on the supporting OC-3 line. An OC-3 DCC channel

1. The FT-2000 OC-48 Lightwave System is menu-driven and prompts the user to enter the desired input.

assignment is deleted by specifying a low speed interface slot and a DCC channel. The low speed interface slot may be a single slot in the OC-3 0 × 1 operating mode, or a low speed interface slot in a slot pair (for example, slot 2A and 2B) operating in the OC-3 1+1 protected mode. The user may specify a single DCC channel (DCC channel 1-8).

An input deleting an OC-3 DCC assignment will be denied if one of the following conditions is present:

— The TOHCTL slot is in the AUTO state.

— The TOHCTL circuit pack has been removed.

— The TOHCTL circuit pack has failed.

An input deleting an OC-3 DCC assignment may be denied if an automatic turnup test is running. During that part of the test cycle when the DCC connections between the OC-3 (1.3 STD) and TOHCTL circuit packs are being verified, an input deleting an OC-3 DCC assignment will be denied.

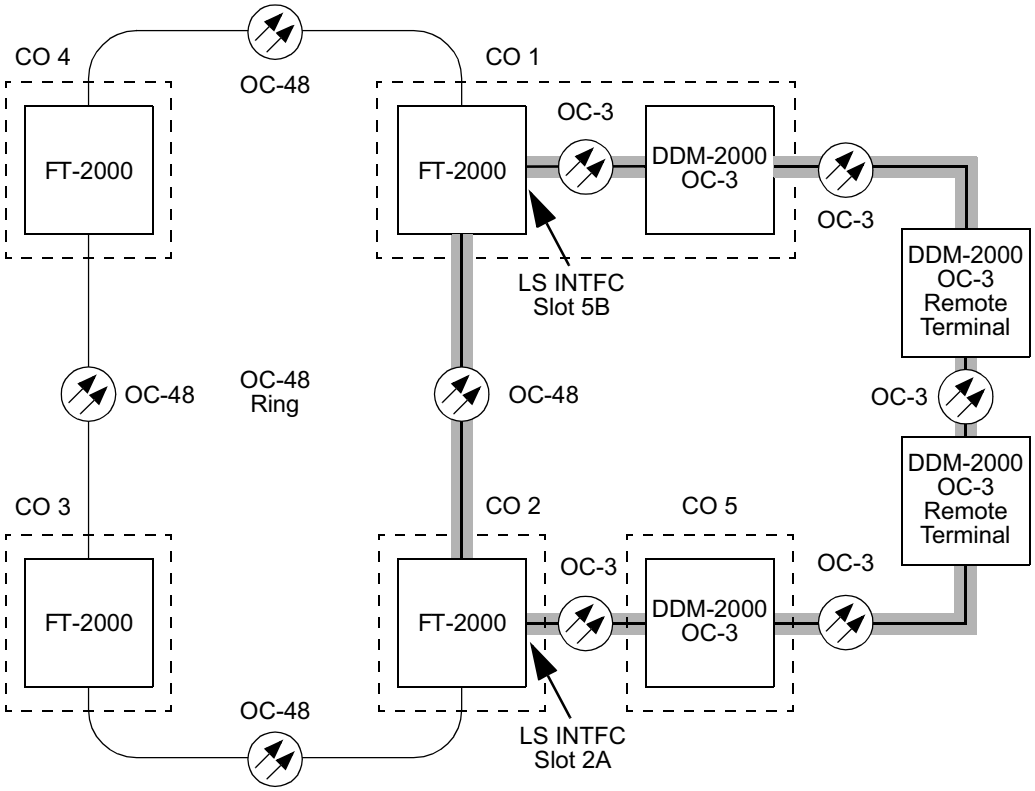
If the DCC assignment specified by the input does not exist, the input will be completed and no DCC assignment is deleted.

- `CONFIGURATION-Retrieve-Assignment-DCC`: This input generates a report showing all the OC-3 DCC channels assigned to low speed interface slots or low speed interface slot pairs in the FT-2000 OC-48 Add/Drop-Rings Terminal.

OC-3 Data Communications Channel Assignment Examples

Entering OC-3 Data Communications Channel Assignments

Figure 15-7 shows a DDM-2000 OC-3 ring transport application with OC-3 DCC connectivity. The `CONFIGURATION-Enter-Assignment-DCC` input is used to enter the OC-3 DCC assignments.



The grey shading indicates the extent of the OC-3 ring and data communications channel.

Figure 15-7 Example of OC-3 DCC Connectivity.

- At CO 1, an OC-3 DCC assignment is entered by specifying:
  - — Low speed interface slot (slot 5B)
  - — DCC channel (channel 1)
  - — Orientation (network[1])

1. If the orientation parameter is specified "network" at the FT-2000 OC-48 Add/Drop-Rings Terminal, the orientation parameter at the DDM-2000 OC-3 Multiplexer must be specified "user".

- At CO 2, an OC-3 DCC assignment is entered by specifying:
  - — Low speed interface slot (slot 2A)
  - — DCC channel (channel 1)
  - — Orientation (network[1])

For operations interworking between the FT-2000 OC-48 Add/Drop-Rings Terminal (Releases 6 through 7.2.1) and the DDM-2000 OC-3 Multiplexer, the routing domain and area fields of the network service access point (NSAP) code at the DDM-2000 OC-3 Multiplexer must be 0 (default value). The routing domain and area fields of the FT-2000 OC-48 Add/Drop-Rings Terminal have a fixed value (0) and cannot be user provisioned. In FT-2000 Release 8 and later, this value is settable and must be coordinated with the DDM-2000 OC-3 Multiplexer. For any operations interworking application to work, the network elements participating in the application must have the same routing domain and area fields. See the FT-2000 OC-48 Lightwave System, Release 8, User/ Service Manual, 365-575-103 and the Multi-vendor Operations Interworking Guide, 824-102-144 for details in implementing this capability.

Deleting OC-3 Data Communications Channel Assignments

The OC-3 DCC assignments shown in figure 15-7 may be deleted using the `CONFIGURATION-Delete-Assignment-DCC` input.

- At CO 1, an OC-3 DCC assignment is deleted by specifying:
  - — Low speed interface slot (slot 5B)
  - — DCC channel (channel 1)
- At CO 2, an OC-3 DCC assignment is deleted by specifying:
  - — Low speed interface slot (slot 2A)
  - — DCC channel (channel 1)

OC-12 Provisioning

Description

This section provides a procedure for provisioning theT939A(OC-12) Circuit Pack.

1. If the orientation parameter is specified "network" at the FT-2000 OC-48 Add/Drop-Rings Terminal, the orientation parameter at the DDM-2000 OC-3 Multiplexer must be specified "user".

T939A(OC-12) Circuit Pack Provisioning

When protection is required for OC12 it must be provisioned. Release 7.2.0-ADR or greater software will have default provisioning (shown in bold) as follows:

Configuration_Set_OC12

Security Category: General

Related Commands: RETRIEVE-OC12

This command specifies the characteristics for selected LS INTFC slot addresses.

- Quad {All, 1B, 3B, 5B, 7B}

NOTE:
If all slots are not equipped, you will need to input each equipped slot individually.

- Protection Mode - from OC12 {**0x1**, 1+1}
- Protection Mode - from OC48 {**0x1**, 1+1}
- Alarm Level {**CR**, MJ, MN, NA, NR, NO}
- Signal Degrade Threshold {-5, **-6**, -7, -8, -9}
- Output AU4 Mapping {**SONET**, SDH}
- SYNC Messaging {**Enable**, Disable}

NOTE:
The following command is used to provision slots equipped with OC-12circuit packs.

- `CONFIGURATION-Set-OC12` (TL1 = `SET-ATTR-rr`): In Release 7.2 and later releases, this input sets the Protection Mode, Alarm Level, Signal Degrade Threshold, and Output AU4 Mapping of the OC-12 line. This input sets the provisioned protection mode parameters successfully even if the slot associated with the addressed slot pair is not equipped with an OC-12 circuit pack or is in the AUTO state.
  - The Protection Mode (from OC-12) parameter sets the protection mode of a low speed interface quad[1] to “1+1” or “0×1” in the add direction (from OC-12 to OC-48). The “1+1” protection mode is provided by using adjacent quads (the OC-12 cards would have to be in quad 1 and quad 2 OR quad 3 and quad 4). Each “1+1” protected OC-12 circuit pack pair establishes an active cross-connection between one slot of the quad pair and an STS-3 tributary, and a standby cross-connection between the other quad and the same STS-3 tributary.

1. A quad is defined as four contiguous low speed slots. The T939A card fits into four contiguous slots, for example slots 1A through 2B would be quad 1.

- To implement the OC-12 operating protection mode, the following condition must exist:
  - Both cards in the quad pair must be provisioned “1+1”.
  - Both quads in the quad pair must be equipped.
  - A cross-connection must exist between either slot in the quad pair and an STS-3 tributary.
- The Protection Mode (from OC-48) parameter sets the protection mode of a low speed interface slot to “1+1' or “0×1” in the drop direction (from OC-48 to OC-12). The “1+1” protection mode is provided by using a pair of adjacent quads. For a “1+1” protected OC-12 circuit pack pair, the STS-3 tributary feeds the low speed signal to both slots.
- The Alarm Level parameter sets the severity of an incoming (from the lightguide cross-connect panel) signal failure condition. The choices are:
  - “CR”:critical
  - “MJ”:major
  - “MN”:minor
  - “NA”:status not alarmed
  - “NR”:status not alarmed and not reported to the OS
  - “NO”:no failure conditions reported (Release 6 and later) (Not applicable to slots in the 1+1 Protection Mode.)
- The Signal Degrade Threshold is the base 10 logarithm of the OC-12 line parity (B2) error rate threshold. The allowed values are “–5”, “–6”, “–7”, “–8”, or “–9”. A signal degrade condition is reported for OC-12 signals received from the lightguide cross-connect panel with error rates greater than the threshold.
- The Output AU4 Mapping parameter sets the AU4 mapping bit to SONET or SDH. The OC-12 circuit pack can automatically support transport of STS-12, STS-12c, or STM-4 signals carrying AU-4 mapped signals. For STM-4 AU-4 mapped payloads, the OC-12 circuit pack can be provisioned to output the appropriate values in the pointer bytes so that direct interface to SDH equipment is possible over an STM-4 optical interconnection. The high speed transport of the payload is SONET, but this does not present any operational difficulties. “SONET” indicates the transport of an OC-12 signal. “SDH” indicates the transport of an AU4 signal.
- The SYNC messaging parameter turns on or off the Synchronization messaging capability.

OC-12 Data Communications Channel Assignments

General

In Release 7.2 and later releases, the FT-2000 OC-48 Add/Drop-Rings Terminal provides a working OC-12 data communications channel (DCC) link with 0X1 and 1X1 protection. A working DCC link is a bidirectional connection at the OC-12 or OC-48 rate that has the DCC bytes terminated at both ends. An FT-2000 OC-48 Add/Drop-Rings Terminal equipped with Overhead Controller — Terminal [OHCTL (TERM)] circuit packs automatically terminates the OC-48 DCC bytes. In Release 7.2 and later releases, OC-12 DCC channel assignments and the Overhead Controller — Tributary (TOHCTL) circuit pack are required to terminate the OC-12 DCC bytes.

The TOHCTL circuit pack terminates up to eight low speed DCCs. The TOHCTL circuit pack has the capacity to terminate all the OC-12 DCCs of a Low Speed Shelf — System Controller fully equipped with OC-12 (1.3 STD) circuit packs in the 1+1 operating mode.

When entering DCC assignments to OC-12 cards, the slot that is used for the assignment is the Command slot. A quad is defined as four low speed slots. Following are the definitions for each quad.

Table 15-1. OC-12 Quad definitions

OC-12 Quad	Slot locations	Command Slot	Extension Slots	OC-12 Pack AID
1B	1A-1B-2A-2B	1B	1A, 2A, 2B	ls-1B
3B	3A-3B-4A-4B	3B	3A, 4A, 4B	ls-3B
5B	5A-5B-6A-6B	5B	5A, 6A, 6B	ls-5B
7B	7A-7B-8A-8B	7B	7A, 8A, 8B	ls-7B

NOTE:
Each quad location consists of one command slot and three extension slots. The command slot address is used in the OC-12 provisioning commands and for reporting any circuit pack and OC-12 signal-related alarm conditions. The extension slots are used to gain access to the STS-3 signals, in conjunction with cross-connect commands, and for reporting tributary alarms.

OC-12 Data Communications Channel

Assignment Inputs

The OC-12 DCC assignments must be specified and administered using the following inputs[1]:

- `CONFIGURATION-Enter-Assignment-DCC`: This input assigns an OC-12 DCC channel to a particular low speed interface quad or pair of low speed interface quads. An OC-12 DCC channel assignment is entered by first specifying the command slot and a DCC channel. The quad may be a single quad in the OC-12 0 × 1 operating mode, or a quad in a quad pair (for example, slot 1B and 3B) operating in the OC-12 1+1 protected mode. The user must specify a single DCC channel (DCC channel 1-8).

  After the low speed interface slot and DCC channel are specified, the user must specify the orientation (*user* or *network*). If the *user* orientation is specified at one end of the OC-12 DCC link, the *network* orientation must be specified at the other end of the OC-12 DCC link.

  An input requesting an OC-12 DCC assignment will be denied if one of the following conditions is present:

  — The TOHCTL circuit pack has been removed.

  — The TOHCTL circuit pack has failed.

  An input requesting an OC-12 DCC assignment may be denied if an automatic turnup test is running. During that part of the test cycle when the DCC connections between the OC-12 (1.3 STD) and TOHCTL circuit packs are being verified, an input requesting an OC-12 DCC assignment will be denied.

  The `CONFIGURATION-Enter-Assignment-DCC` input can also be used to change the value (*user* or *network*) of the orientation parameter associated with an existing OC-12 DCC assignment. This is accomplished by re-entering the same OC-12 DCC assignment with the new value for the orientation parameter.

- `CONFIGURATION-Delete-Assignment-DCC`: This input deletes an OC-12 DCC channel assignment to a low speed interface quad or pair of low speed interface quads. Deleting an OC-12 DCC channel assignment disables DCC communications on the supporting OC-12 line. An OC-12 DCC channel assignment is deleted by specifying a low speed interface slot and a DCC channel. The low speed interface slot may be a single quad in the OC-12 0 × 1 operating mode, or a low speed interface slot in a quad pair (for example, slots 1B and 3B) operating in the OC-12 1+1 protected mode. The user may specify a single DCC channel (DCC channel 1-8).

  An input deleting an OC-12 DCC assignment will be denied if one of the following conditions is present:

  — The TOHCTL circuit pack has been removed.

1. The FT-2000 OC-48 Lightwave System is menu-driven and prompts the user to enter the desired input.

— The TOHCTL circuit pack has failed.

An input deleting an OC-12 DCC assignment may be denied if an automatic turnup test is running. During that part of the test cycle when the DCC connections between the OC-12 (1.3 STD) and TOHCTL circuit packs are being verified, an input deleting an OC-12 DCC assignment will be denied.

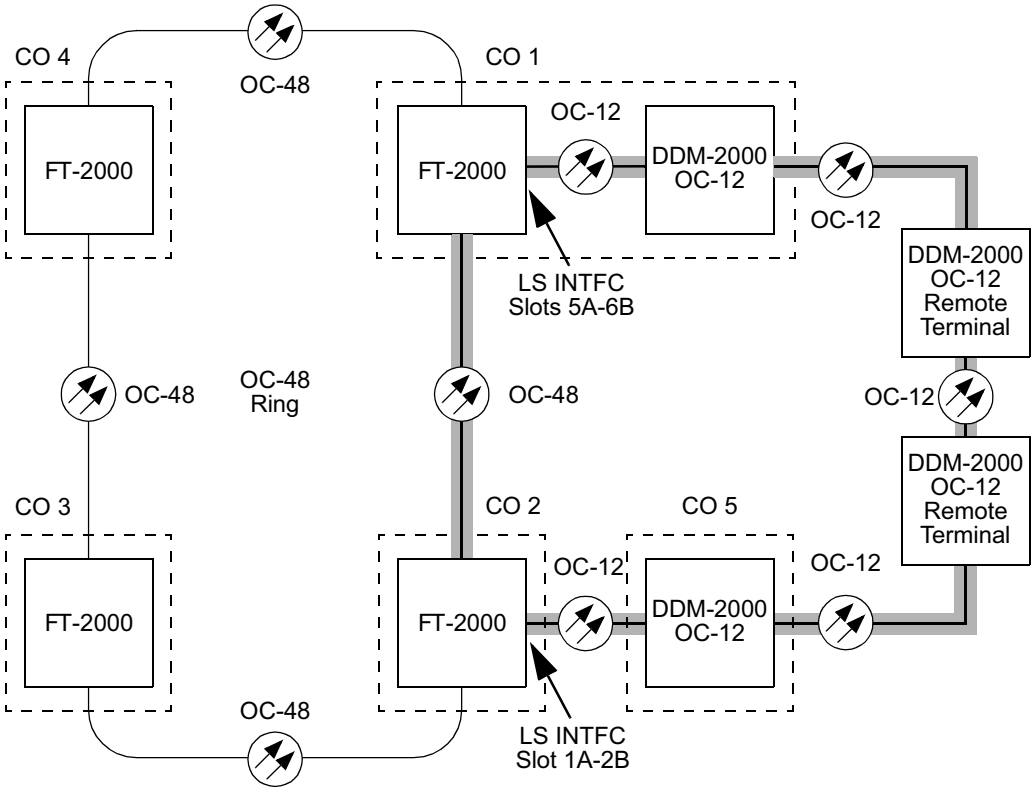
If the DCC assignment specified by the input does not exist, the input will be completed and no DCC assignment is deleted.

- `CONFIGURATION-Retrieve-Assignment-DCC`: This input generates a report showing all the OC-12 DCC channels and all OC-3 DCC channels assigned to low speed interface slots or low speed interface slot pairs or quad pairs in the FT-2000 OC-48 Add/Drop-Rings Terminal.

OC-12 Data Communications Channel Assignment Examples

Entering OC-12 Data Communications Channel Assignments

Figure 15-8 shows a DDM-2000 OC-12 ring transport application with OC-12 DCC connectivity. The `CONFIGURATION-Enter-Assignment-DCC` input is used to enter the OC-12 DCC assignments.



The grey shading indicates the extent of the OC-12 ring and data communications channel.

Figure 15-8 Example of OC-12 DCC Connectivity

- At CO 1, an OC-12 DCC assignment is entered by specifying:
  - — Low speed interface slot (slot 5B)
  - — DCC channel (channel 1)
  - — Orientation (network[1])
- At CO 2, an OC-12 DCC assignment is entered by specifying:

1. If the orientation parameter is specified “network” at the FT-2000 OC-48 Add/Drop-Rings Terminal, the orientation parameter at the DDM-2000 OC-12 Multiplexer must be specified “user.”

— Low speed interface slot (slot 1B)

— DCC channel (channel 1)

— Orientation (network[1])

For operations interworking between the FT-2000 OC-48 Add/Drop-Rings Terminal (Releases 6 through 7.2.1) and the DDM-2000 OC-12 Multiplexer, the routing domain and area fields of the network service access point (NSAP) code at the DDM-2000 OC-12 Multiplexer must be 0 (default value). The routing domain and area fields of the FT-2000 OC-48 Add/Drop-Rings Terminal have a fixed value (0) and cannot be user provisioned. In FT-2000 Release 8 and later, this value is settable and must be coordinated with the DDM-2000 OC-12 Multiplexer. For any operations interworking application to work, the network elements participating in the application must have the same routing domain and area fields. See the FT-2000 OC-48 Lightwave System, Release 8, User/Service Manual, 365-575-103 and the Multi-vendor Operations Interworking Guide, 824-102-144 for details in implementing this capability.

Deleting OC-12 Data Communications Channel Assignments

The OC-12 DCC assignments shown in figure 15-7 may be deleted using the `CONFIGURATION-Delete-Assignment-DCC` input.

- At CO 1, an OC-12 DCC assignment is deleted by specifying:
  - — Low speed interface slot (slot 5B)
  - — DCC channel (channel 1)
- At CO 2, an OC-12 DCC assignment is deleted by specifying:
  - — Low speed interface slot (slot 1B)
  - — DCC channel (channel 1)

1. If the orientation parameter is specified “network” at the FT-2000 OC-48 Add/Drop-Rings Terminal, the orientation parameter at the DDM-2000 OC-12 Multiplexer must be specified “user.”

Basic Provisioning

Provisionable Parameters and Original Values

General

Installation provisioning is minimized with provisionable parameters and original values. Each CIT provisionable parameter is assigned an original value. The provisionable parameters and original values are copied from floppy disks in the CIT to the SYSMEM circuit pack.

The SYSMEM circuit pack contains one copy of the provisionable parameters with their original values and another copy of the provisionable parameters with their current values. The SYSCTL and LNCTL circuit packs, plus the board controllers on the other circuit packs contain one copy of the provisionable parameters with their current values.

The original values cannot be changed. The current values can be changed through local provisioning.

NOTE:
The FT-2000 OC-48 Lightwave System has no switch-settable parameters.

FT-2000 OC-48 Add/Drop-Rings Terminal

Table 3-1 shows the provisionable parameters of the FT-2000 OC-48 Add/Drop-Rings Terminal. This includes the parameters that can be provisioned using the CIT, plus the parameters that are automatically provisioned or have fixed values (cannot be changed).

FT-2000 OC-48 Repeater Bay

Table 3-2 shows the provisionable parameters of the FT-2000 OC-48 Repeater Bay. This includes the parameters that can be provisioned using the CIT, plus the parameters that are automatically provisioned or have fixed values (cannot be changed).

Local Provisioning

FT-2000 OC-48 Add/Drop-Rings Terminal

The following CIT-PC inputs and corresponding TL1 commands are commonly used to provision the FT-2000 OC-48 Add/Drop-Rings Terminal after installation.

- `CONFIGURATION-Set-Date` (TL1 = `ED-DAT`): This input sets the network element clock date and time and provisions automatic daylight savings time processing.
  - The Date parameter sets the current date in the network element clock. It is entered in the form YY-MM-DD where:
    - YY is the year(00-99)
    - MM is the month(1-12)
    - DD is the day(1-31)
  - The Hours parameter sets the hour (0 to 23) in the network element clock. A value of “zero” may be entered as “–0”, “0”, or “+0”. These entries are treated as the same value.
  - The Minutes parameter sets the minute (0 to 59) in the network element clock. A value of “zero” may be entered as “–0”, “0”, or “+0”. These entries are treated as the same value.
  - The Seconds parameter sets the second (0 to 59) in the network element clock. A value of “zero” may be entered as “–0”, “0”, or “+0”. These entries are treated as the same value.
  - The Standard Time Zone parameter is the 3-letter string (for example, EST, MST) that is indicated as part of the date and time stamp in command responses when Standard Time is in effect.
  - The Start Daylight Savings Date parameter sets the date when the network element moves the current time forward by 1 hour. It should be entered in the form MM-DD where:
    - MM is the month(1-12)
  - DD is the day(1-31)
  - If this value is different from the Stop Daylight Savings Date parameter value, daylight savings time is enabled and the time change will occur at 02:00:00 on the chosen date. If the two values are the same, daylight savings time processing is disabled. The value 2-29 is not allowed.
  - The Stop Daylight Savings Date parameter sets the date when the network element moves the current time backward by 1 hour. It should be entered in the form MM-DD where:

— MM is the month(1-12)

— DD is the day(1-31)

If this value is different from the Start Daylight Savings Date parameter value, daylight savings time is enabled and the time change will occur at 02:00:00 on the chosen date. If the two values are the same, daylight savings time processing is disabled. The value 2-29 is not allowed.

— The Daylight Savings Time Zone parameter is the three-letter character string (for example, EST, MST) that is printed as part of the date and time stamp in command responses when Daylight Savings Time is in effect.

- `SECURITY-Set-Far End Communications`: This input sets the Far End Terminal,[1] Remove Activity Reporting, and Remote Office Alarms parameters.

  — Far End Terminal parameter* specifies whether the other network elements in the ring are “Lucent“ or “Other”. If “Other” is selected, the rest of the parameters will have no effect.

  — Remote Activity Reporting parameter specifies whether remote alarms are included by the `Retrieve-Network Alarms` input, and whether the FE ACTY LED is “enabled” or “disabled”. If “Enabled,” conditions at a remote network element will cause the local FE ACTY LED to be lighted, and the `Retrieve-Network Alarms` input will report local and remote conditions. If “Disabled” the FE ACTY LED will be lighted only when the `FAULT-Test-LED` input is executed, and the `Retrieve-Network Alarms` input will report only local conditions. The value of this parameter does not affect other network elements in the network reporting conditions at the local network element.

  — Remote Office Alarms parameter specifies whether the network element will cause local office alarms when remote office alarms occur. If “Enabled” then remote office alarms will also cause local office alarms (alarm contacts). If “Disabled” then remote office alarms will not cause local office alarms. The value of this parameter does not affect the local FE ACTY LED or the conditions reported by the `Retrieve-Network Alarms` input.

  The Far End Parallel Telemetry is enabled if the Remote Activity Reporting or Remote Office Alarms parameter is “Enabled.” This input may only be executed via the CIT(DCE) or CIT(DTE) port.

  In Release 6 and later releases, the Remote Activity Reporting and Remote Office Alarms parameters also apply to remote network elements (for example, DDM-2000 Multiplexers) in the same SONET subnetwork connected by OC-3 interfaces.

1. Available in Release 3 only.

- SECURITY-Set-Login-Change (TL1 = ED-USER-SECU): This input edits the user ID, password, user privileges, and status of any nonprivileged login, and changes the other privileged login's login ID and password. This input is also used to re-enable a nonprivileged login ID that has expired due to login aging.
  - The Login parameter is the login ID of the login to be changed. (The Retrieve-Login input will list the login IDs.)
  - The New Login parameter replaces the login ID for the selected login. It must be a string of from 1 to 10 alphanumeric characters, in which the difference between upper and lower case is significant, and it must be different from all other login IDs in this network element. If ENTER is pressed, the system will default to the current login ID.
  - The New Password parameter becomes the new password for the selected login ID. A password consists of a string of alphabetic, numeric, or symbolic characters conforming to the following rules:
    - String must contain from six to ten characters
    - At least two of the characters must be nonalphabetic
    - At least one of the characters must be symbolic
      (The \, @, #,?, or space not allowed)
      (The comma,:,;, or _ not allowed in Release 5 and later releases)
    - The difference between upper and lower case is significant.
  - If ENTER is pressed, the system will default to the current password.
  - The Re-enter Password parameter confirms the New Password parameter. Re-enter the exact characters that were entered for the New Password parameter.
  - The User Privilege parameter sets the user's security level for nonprivileged users to one of the following:
    - "Reports Only": User will be able to execute only the Retrieve, Set-Password, Operate-Alarm Cutoff, and Test-LED inputs.
    - "General": User will be able to execute all commands, except Initialize-System, Set-Far End Communications, Set-Login, Set-Network Element, and Set-Security.

    The user privilege parameter for a privileged user can only be set to Privileged.
  - The Visitor parameter (Release 5 and later) specifies whether the login will be changed to a visitor login (Yes or No). A visitor login is a temporary login.
  - The Status parameter enables or disables the login. The status parameter for a privileged user can only be set to Enabled.

- SECURITY-Set-Network Element (TL1 = ENT-SYS): This input sets the TID (Target IDentifier), NID (Node IDentifier), Directory Server, X.25 packet size, alarm group, alarm gateway network element (AGNE) and TL1 gateway parameters.
  - — The TID parameter is the name used to identify the local network element within a SONET network. It is used on all CIT and TL1 reports, and is the destination address for all remote logins. It is a character string of up to 20 characters, where the characters are letters, digits, or hyphens (-). Lowercase letters will be translated into uppercase before they are stored in the network element. Each TID in the network must be unique.
  - — Whenever the value of the TID parameter is changed, the user should enter the Retrieve-Map-Ring input or log off and log back in again to ensure that the new value of the TID parameter is included in the ring map.

  If a user logs into the system while a reset in progress or ring startup in progress condition is active, wait until the condition clears and enter the Retrieve-Map-Ring input or log off and log back in again to ensure that the list of TIDs in the ring map is complete.

  Changing the value of the local TID will result in all *incoming* remote TL1 sessions being disconnected. This means the local network element will terminate all login sessions that were requested from TL1 gateway network elements.
  - — The NID parameter (CIT provisionable in Releases 4 and 5 only) is the number (integer from 0 to 15) of the network element within the ring. Each network element in the ring must be numbered uniquely.
  - — The Directory Server parameter specifies (“Yes” or “No”) whether the network element is the directory services network element (DS-NE). There must be one and only one DS-NE in the ring. The DS-NE is the single reference point in a ring network. The DS-NE stores the IDs of the other network elements in the ring and updates the other network elements after configuration changes. In Release 6, one FT-2000 OC-48 Add/Drop-Rings Terminal can act as a DS-NE for a SONET subnetwork of up to 24 network elements. In Release 7, one FT-2000 OC-48 Add/Drop-Rings Terminal can act as a DS-NE for a SONET subnetwork of up to 32 network elements.
  - — In Release 8 and later, there is no DSNE.

⚠ CAUTION:
Changing the value of the directory server parameter may affect the operation of other network elements in the ring.

— The X.25 Packet Size parameter (Release 6 and later) specifies the X.25 packet size to be used for a TL1 session to the local network element.

CAUTION:
Changing the value of the X.25 packet size parameter will cause the X.25 link to be reset and all active TL1 logins will be automatically dropped. All established SVCs and PVCs on the affected X.25 link will have to be re-established.

CAUTION:
Changing the value of the X.25 packet size parameter and the directory server parameter will cause the X.25 link to be reset and all active TL1 logins will be automatically dropped. All established SVCs and PVCs on the affected X.25 link will have to be re-established. Also the operation of other network elements in the ring may be affected.

— The Alarm Group parameter (Release 6 and 7) specifies the alarm group to which the local network element belongs. An alarm group is a set of up to 32 network elements that share remote alarm information. When Release 6 of the FT-2000 OC-48 Add/Drop-Rings Terminal interworks with Release 7.2 of the DDM-2000 OC-3 Multiplexer, the recommended maximum alarm group size is 24 network elements. When Release 6 of the FT-2000 OC-48 Add/Drop-Rings Terminal interworks with Release 9 of the DDM-2000 OC-3 Multiplexer, the recommended maximum alarm group size is 24 network elements. When Release 7 of the FT-2000 OC-48 Add/Drop-Rings Terminals interworks with Release 7.2 or Release 9 of the DDM-2000 OC-3 Multiplexer, the recommended maximum alarm group size is 32 network elements.

  The Alarm Group parameter may have a value of 0 to 255. A value of 0 indicates that the local network element does not exchange remote status information with other network elements. All other values (1 to 255) indicate that the local network element exchanges remote status information with all other network elements that have the same value for the alarm group parameter.

— The Alarm Gateway Network Element (AGNE) parameter (Release 6 and 7) specifies whether the local network element will serve the other network elements in the alarm group as the AGNE. More than one AGNE may be provisioned for a SONET subnetwork.

  When Release 6 of the FT-2000 OC-48 Add/Drop-Rings Terminal interworks with Release 7.2 of the DDM-2000 OC-3 Multiplexer in subnetworks with less than 16 network elements, the same network element may serve as the AGNE and the TL1 gateway network element. However, in subnetworks with more than 16 network elements, the network element serving as the AGNE cannot serve as the TL1

gateway network element. The AGNE and TL1 gateway network element functions must be at separate network elements in the subnetwork.

- In Release 8 and later, there is no AGNE.
- The TL1 Gateway parameter (CIT provisionable in Release 4.1 only) specifies ("Yes" or "No") whether the network element is a TL1 gateway network element (GNE). There can be one or more TL1 GNEs in the ring. The TL1 GNE serves as a single interface to the local X.25 message-based operations system for all the network elements in a ring network. In Release 6 and later releases, the FT-2000 OC-48 Add/Drop-Rings Terminal can also act as a TL1 GNE for other network elements in the SONET subnetwork (for example, a DDM-2000 Multiplexer) via the OC-3 DCC.

  When Release 6 of the FT-2000 OC-48 Add/Drop-Rings Terminal interworks with Release 7.2 or Release 9 of the DDM-2000 OC-3 Multiplexer, the recommended maximum subnetwork size is 24 network elements. When Release 7 of the FT-2000 OC-48 Add/Drop-Rings Terminal interworks with Release 7.2 or Release 9 of the DDM-2000 OC-3 Multiplexer, the recommended maximum subnetwork size is 32 network elements.

- `SECURITY-Set-Password` (TL1 = `ED-PID`): This input changes your password.
  - The Old Password parameter must match the user's current password.
  - The New Password parameter replaces the old password. The New Password must be different from the old password. A password consists of a string of alphabetic, numeric, or symbolic characters conforming to the following rules:
    - String must contain from six to ten characters
    - At least two of the characters must be nonalphabetic
    - At least one of the characters must be symbolic
      (The \, @, #,?, or space not allowed)
      (The comma,:,;, or _ not allowed in Release 5 and later releases)
    - The difference between upper and lower case is significant
    - The Re-enter Password parameter confirms the New Password parameter. Re-enter the exact characters that were entered for the New Password parameter.
- `SECURITY-Set-Security-Network Element`: This input sets the global security parameter for the system.
  - The Logins Allowed parameter specifies whether nonprivileged users are allowed to log into the system. When Logins Allowed is set to "No," all nonprivileged users will be immediately logged off.

— The Password Aging parameter (Release 4.1 and later) specifies the password aging interval. The password aging interval must be zero (0) or a number between 7 and 999 days. If zero (0) is specified, the password aging mechanism is disabled.

— The Login Aging parameter (Release 5 and later) specifies the login aging interval. The login aging interval must be zero (0) or a number between 7 and 999 days. If zero (0) is specified, the login aging mechanism is disabled.

- `SECURITY-Set-Security-Port`: This input enables or disables user access via the CIT-DCC and CIT-DTE. In Release 5 and later releases, this input enables a privileged user to condition a CIT/TL1 port.

  — The Type parameter chooses the Operations Interface(s) to enable or disable. The choices are:

    — "All" (Releases prior to Release 5)

    — "DCE": Access via the user panel

    — "DTE": Dial-up access

    — "DCC": Remote login

    — "X.25": For TL1 only (Release 5 and later)

  If "All" is specified in the Type parameter, Port Access values will only be set for the CIT-DTE and the CIT-DCC port(s), since the Port Access may never be disabled for the CIT-DCE.

  — The Channel Type parameter (Release 5 and later) selects the switched type or the permanent type virtual circuit(s) of X.25 for setting the parameters.

  — The Table Entry Qualifier parameter (Release 5 and later) selects the circuit(s) of the X.25 port for setting the parameters (PVC No. 1, PVC No. 2, SVC Nos. 1 through 6).

  — The OS Type parameter (Release 5 and later) selects the autonomous message set to be reported on the selected X.25 virtual circuit. Values are from the following:

    — "maint":All autonomous messages but REPT DBCHG

    — "memry-admin": All REPT DBCHG autonomous messages

    — "cmd-resp": No autonomous messages

    — "other": All autonomous messages

    — "none":If no calling address is specified for SVC

  — The Calling Address parameter (Release 5 and later) specifies a 15-digit dial string for the X.25 switched virtual circuits (SVC Nos. 1 through 6).

— The Port Access parameter enables or disables access to the selected port(s).

— The Inactivity Timeout parameter (Release 5 and later) sets the period of minutes during which no activity results in automatic logout from a port. This parameter must be between zero (0) and 999 minutes. If zero (0) is specified, the inactivity timeout mechanism is disabled. In releases prior to Release 7, the Inactivity Timeout parameter did not apply to a port provisioned for TL1 input/output. In Release 7 and later releases, the Inactivity Timeout parameter also applies to any port provisioned for TL1 input/output.

— The Port (protocol) Type parameter (Release 5 and later) sets the communications protocol used at the CIT (DCE) or CIT (DTE) port. If “CIT” is selected, the F-interface protocol is used to communicate with a PC running the FT-2000 CIT-PC software. A PC running SNC-2000 CPro software or an ASCII-based (dumb) terminal cannot communicate with a port provisioned as “CIT.” If “TL1” is selected, TL1 protocol is used to communicate with a PC running SNC-2000 CPro software or an ASCII-based (dumb) terminal. A PC running the FT-2000 CIT-PC software cannot communicate with a port provisioned as “TL1.”

NOTE:
When logging in to a CIT (DCE) or CIT (DTE) port that is provisioned as “TL1,” enter <Ctrl-Q> <CR> before entering the initial ACT-USER TL1 command. The <Ctrl-Q> ensures that the port is not in the X/off state and the <CR> clears the input buffer.

— The baud rate parameter (Release 5 and later) selects the baud rate used for the CIT (DCE) or CIT (DCE) port that is configured for TL1 input/output. The values are “1200, 2400, 4800, or 9600."

For more information about the CIT-PC inputs, refer to Section 3, “CIT Description.” For more information about the TL1 commands, refer to document 824-102-148, *2000 Family of Products Operations Systems Engineering Guide*.

Installation Troubleshooting

16

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- ■Troubleshooting Table 16-1
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Installation Troubleshooting

16

Overview

This Chapter provides basic installation troubleshooting information for the FT-2000 OC-48 Lightwave System.

Troubleshooting Table

Troubleshooting an FT-2000 OC-48 Lightwave System begins by referencing document 365-575-101, *FT-2000 OC-48 Lightwave System Quick Reference Guide* included in the front pocket of document 365-575-102 or 365-575-103, *FT-2000 OC-48 Lightwave System User/Service Manual*. Follow the procedure given in the quick reference guide. For extensive troubleshooting of in-service equipment, refer to document 365-575-102 or 365-575-103, *FT-2000 OC-48 Lightwave System User/Service Manual* directly. COACH login access will also have news and diagnostic dictionary listings of the most up-to-date issues and solutions. A quick trouble shooting reference is given here in Table 16-1 for problems which may come up during installation.

.

Table 16-1. Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
Connect failed. Network Element not Responding to the connect request. (CIT DCE port to PC Serial Port)	Serial Port Cable is not connected, or is improper type (not straight-through).	Inspect cable connection, review Table 16-1 (or Table 16-1) and Figure 6-1 (or Figure 10-1). Refer to Chapter 3 for CIT Connection Requirements.
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 handshake null modem)	Inspect cable connection, review Table 16-3 (or Table 16-2) and Figure 6-3 (or Figure 10-1). Refer to Chapter 3 for CIT Connection Requirements.
Connect failed when SYSCTL is **NOT** running a valid F-2000 software release. Network Element not Responding to the connect request. (CIT DCE port to PC serial Port)	SYSCTL in wrong operating mode.	- Return to dos prompt (c:\>) - Restart install program, change settings, if necessary. - Reseat SYSCTL. - After approximately 10 seconds listen for a double relay click, wait 10 more seconds, then select: 4 = Install Network Element Software <Enter>. - The PC will connect to NE. - If connection fails, repeat this procedure.
Communication with FT-2000 cannot be established or disconnects (To CIT DCE or DTE).	SYSCTL and SYSMEM circuits have not finished resetting.	Wait up to 6 minutes or until LED's on circuit packs and User Panel stop changing. Refer to Chapter 3 for CIT Connection Requirements.
	PC serial port not powered, or a power saver feature is enabled.	Check PC hardware manual for power saver instructions. Refer to Chapter 3 for CIT Connection Requirements.
	PC serial port BAUD rate does not operate below 9600 BAUD.	Check PC hardware manual, and select Setup <F6> at start of CIT program or Choice 1 of Install Program to set 9600 BAUD or higher. Refer to Chapter 3 for CIT Connection Requirements.
	PC has background processes running.	Refer to Chapter 3 for examples on clearing. Refer to Chapter 3 for CIT Connection Requirements.

Table 16-1. Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
(Continued) Communication with FT-2000 cannot be established (To CIT DCE or DTE).	PC is not detecting CTS and DSR leads as high.	Check hardware manual for PC from PC back to CTS and DSR.
	SYSCTL failure.	Rule out other causes: Replace SYSCTL. Refer to Chapter 3 for CIT Connection Requirements.
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.
	486 PC processor speed too fast for Install program.	Check PC manual and reduce processor speed if possible.
	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 CIT if new type circuit is what's wanted. Otherwise restore original type circuit pack.
	Failed circuit pack.	Replace circuit pack.
An incorrect disk was inserted, during software installation.	Disks are not stored in order.	Check disk labeling, insert disk requested.
	Disks are labeled incorrectly.	Workaround Only: obtain disks from another site of SAME GENERIC and use those. To correct: Contact Customer service for replacement disks.
FAULT LED flashing	On transmission or timing circuit pack, input signal (OC-48, OC-3, OC-12, DS3, EC-1, or DS1) 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.
Constant switching (clicking) of LS SW packs, and eventual LSSW failure, P1 and/ or P2 slot failure.	Unterminated DS3 or EC-1 outputs.	Terminate outputs into 75 ohms to ground at the DSX.

Table 16-1. Installation Trouble Shooting

Trouble or Error message	Probable Cause	Suggested Solution
Not enough Memory to run CIT program.	PC has limited RAM or has insufficient conventional memory because other programs are running.	Do not run CIT under Windows, or have any terminate, stay resident programs running. Increase RAM installed per PC hardware manual. Use a MS-DOS memory management program to free up more conventional memory.
Not enough Disk space to copy NE software to hard drive.	PC has limited Disk capacity.	Delete unneeded files (games) on disk. Or, Install NE software from distribution diskettes.
MJ alarm raised when upgrading ring with B2 optics to R7.2.	SYNC messaging is not supported with B2 optics.	Disable SYNC messaging. using CONFIGURATION-Set-OC48-All.

Power Distribution Resistance Measurement

Make the following measurement only if the Bay Powering Procedure (Chapters 6 or 10) was unsuccessful.

- Power should not be applied to the bay.
- Remove Top Bay Cover Plate.
- Using an ohmmeter, as shown in Figure 16-1, measure the resistance from the points shown to bay ground.

  Requirement: With the battery feed cables connected, as completed in Chapters 5 or 9, the resistance should show a closed circuit (less then 1 ohm) for each. If this requirement is not met, check that connections at the BDFB ground are secure and corrosion free, that all splices and crimps are secure, and that the proper gauge of wire was used.

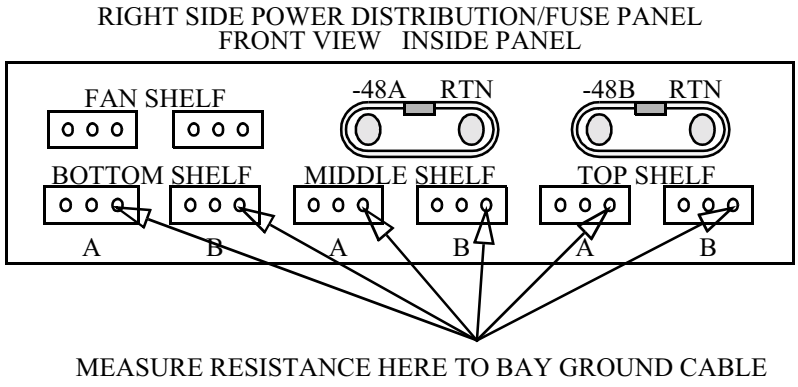


Figure 16-1. Distribution Panel Measurement Points

FT-2000 Top Bay Cover Plate

Description

The C847204005 Top Bay Cover Plate mounts at the top of a FT-2000 Add/Drop-Rings Terminal, End Terminal, or Repeater Bay to prevent objects from falling into the bay. This cover plate requires that this procedure be followed for correct installation. Procedures are provided for both removing and installing the Top Bay Cover Plate.

Removal Procedure

Refer to Figure 16-2. on page 16-8 and use the following procedure to remove the Top Bay Cover Plate.

(1) With the stile covers removed from the front sides, loosen the 7 mm hex head screws located on each side of the Power Distribution and Fuse Panel Assembly by about 6 turns. Do not remove the screws.

NOTE:
The original design of the Front Cover Designation panel makes it necessary to remove the screws completely on older bays.

(2) Remove the Front Cover Designation and its attached Bumper Bay Label Panel Assembly by sliding it to the front of the bay.

(3) Begin to remove the Top Bay Cover Plate by sliding it straight toward the front of the bay.

(4) Raise the front of the Top Bay Cover Plate to assist the rear tab clearing the top bay member and pull completely away from the bay.

(5) Replace the Front Cover Designation and stile strips if the Top Bay Cover Plate is not to be reinstalled at this time.

Installation Procedure

Refer to Figure 16-2 and use the following procedure to install the Top Bay Cover Plate.

(1) With the stile covers removed from the front sides, loosen the 7 mm hex head screws located on each side of the Power Distribution and Fuse Panel Assembly by about 6 turns. Do not remove the screws.

NOTE:
The original design of the Front Cover Designation panel makes it necessary to remove the screws completely on older bays.

(2) Remove the Front Cover Designation and its attached Bumper Bay Label Panel Assembly by sliding it to the front of the bay.

(3) Align the notch (see item 1 on Figure 16-2) on the Top Bay Cover Plate with the vertical section (see item 2 on Figure 16-2) of the Power Distribution and Fuse Panel Assembly. Verify the ED9C103-20 DC power feeder cables are routed through the slot on the right side of the Top Bay Cover Plate.

(4) Place the Top Bay Cover Plate into the gap between the Power Distribution and Fuse Panel Assembly and the top bay member. Start inserting the Top Bay Cover Plate into the gap by pushing it toward the rear and pressing it down along the right rear side or top center.

(5) While continuing to push the Top Bay Cover Plate toward the rear, verify the left rear corner (see item 3 on Figure 16-2) clears all power cables, and their protective cover, in the shelf under the top bay member (see item 4 on Figure 16-2). Use a flat screwdriver to hold the protective cover down if necessary.

(6) Continue to push inward, and downward along the top center or right rear side until the slots in the side flanges are aligned with the hex head screws.

(7) With the screws aligned in the slots, continue to push the Top Bay Cover Plate toward the rear until its back engages the top flange on the rear of the Power Distribution and Fuse Panel Assembly (see Detail A on Figure 16-2). When engaged, the front edge of the Top Bay Cover Plate is flush with the Power Distribution and Fuse Panel Assembly front surface and the slots in the side flanges will bottom out on the hex screws.

(8) Verify that both the left and right rear corners of the Top Bay Cover Plate engaged the top flange on the rear of the Power Distribution and Fuse Panel Assembly.

(9) Reinstall the Front Cover Designation and its attached Bumper Bay Label Panel Assembly with its side mounting flanges inside the Top Bay Cover Plate side flanges. Verify the Bumper Bay Label Panel Assembly slides over the top of the Top Bay Cover Plate.

(10) Tighten both hex head screws.

(11) Replace the front side stile covers to complete the installation.

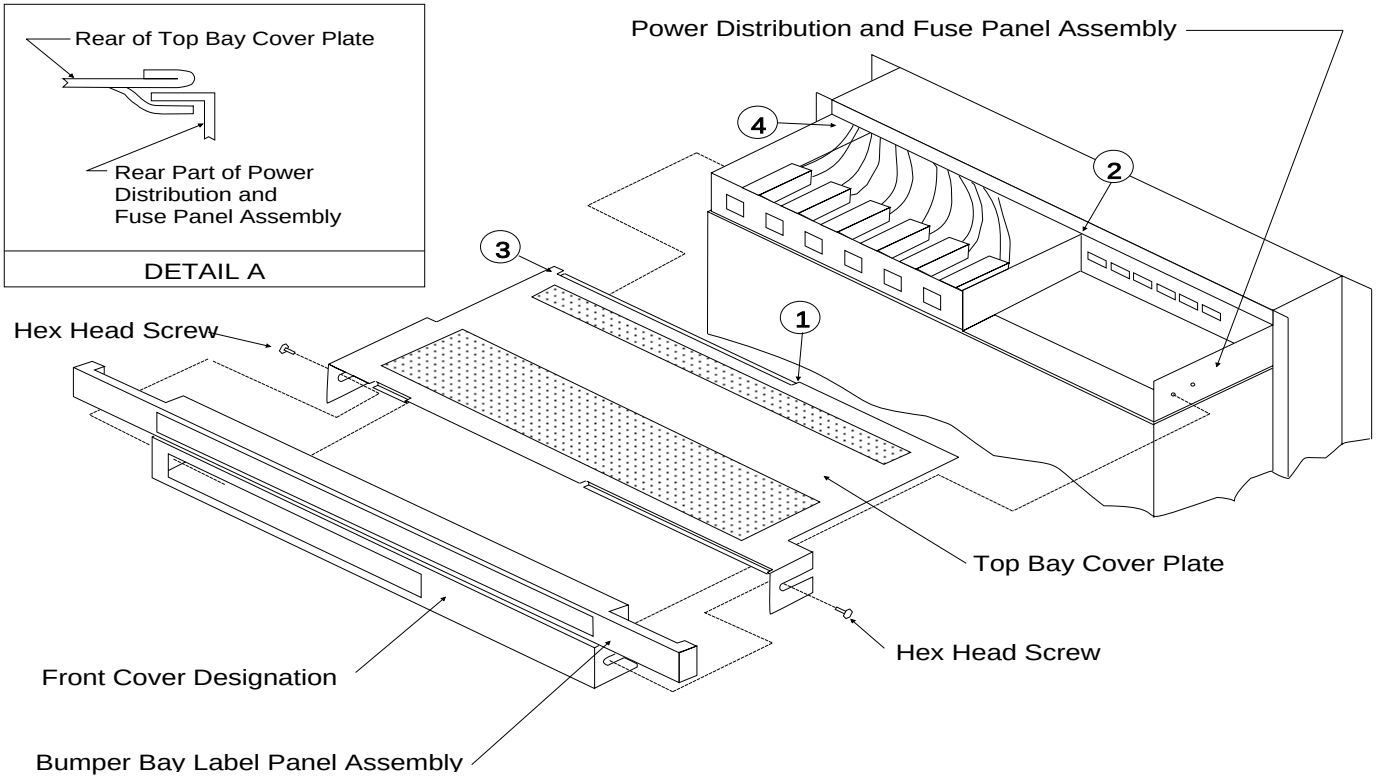


Figure 16-2. Assembly Diagram for Top of FT-2000 Bay

Related Equipment

A

Contents

- Dantel Orderwire Overview A-1
- Recommended Orderwire System A-2
- Orderwire Shelf Mounting and Powering A-2
- Dantel Options Setting A-5
- Cabling to FT-2000 A-7

Related Equipment

A

Dantel Orderwire Overview

FT-2000 fully supports 64 kb/s Orderwire use. Line and Section Orderwire channels (E2 and E1) are supported by FT-2000. Line Orderwire is carried between adjacent nodes and is expressed through any repeaters. The capability to add/drop Section Orderwire at Repeater Sites is supported in software releases 6.0.0 (and greater), with a new LAA14 circuit pack for the FT-2000 repeater bay that provides access to the section orderwire and a new orderwire system that supports the operation of a modem.

The current Orderwire system provides basic party-line service; any person can pick up the handset from the front of the Dantel unit and immediately speak to anyone else on the system. Voice party-line capability is the nominal state of this system and is operational as long as the fiber line between the Orderwire sites is good. Figure A-1 shows an example application of the current orderwire system in an FT-2000, 2 node add/drop ring with 2 repeaters. 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.

The new Orderwire system is used when remote CIT access to repeater sites is needed. Figure A-2 shows an example application of the new orderwire system in an FT-2000, 2 node add/drop ring with 2 repeaters. Each terminal and repeater site is equipped with the new Dantel shelf. The orderwire system still provides basic party-line service like the current Orderwire system. Remote CIT 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 CIT access simultaneously.

In ring applications, one of the nodes should be chosen as the break point (it is recommended the TID associated with the DSNE 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

1. The switch and strap settings for terminal mode will be described in the final version of the Dantel practice.

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 voice application, the system functions as a standard order-wire when you pick up the handset on the front of the order-wire panel and call someone at a remote terminal. The voice circuit uses channel 1 of the system.

For data circuit applications, you dial a different number (station 2 code) to call the same remote terminal to set up a data communications path.

Here is how the data circuit works:

(1) Select channel 1 on the 41096 order-wire panel, then pick up the handset and call the remote terminal (station 2 code).

At the remote end, the 00330 order-wire terminal answers your call and operates an M lead driver that opens a communications channel through the 44202 202 Compatible Modem.

(2) Select both channels 1 and 2 on the 41096 panel. This connects your computer and external modem to the system. At the same time the optical coupler (O.C.) circuit disables the side tone in the 00330 order-wire terminal so that the modem does not receive its own data.

(3) Hang up the handset and start sending or receiving digital data.

(4) When you finish, press the # key to disconnect the modem at the remote terminal. Release the channel 1 push button. You can either release the channel 2 push button or leave it pushed in since it is used for both voice and data communications.

Recommended Orderwire System

The voice only Dantel Orderwire system recommended is orderable as J68974E-1 L300 for a Terminal Office (J68974R-1 L300 for a Repeater Station), equivalent to part number A18-04588-02 from Dantel. The new Dantel Orderwire system recommended is orderable as J68974E-1 L301 for a Terminal Office (J68974R-1 L301 for a Repeater Station), equivalent to part number A18-05547-01 from Dantel. Consult document 365-575-100 *FT-2000 OC-48 Lightwave System Applications Planning and Ordering Guide* Section 7, “Ordering” for details.

Orderwire Shelf Mounting and Powering

The Dantel Orderwire shelf ships separately from the bay. It is not to be mounted in, nor powered from the bay. Consult Dantel documentation for powering and mechanical mounting information.

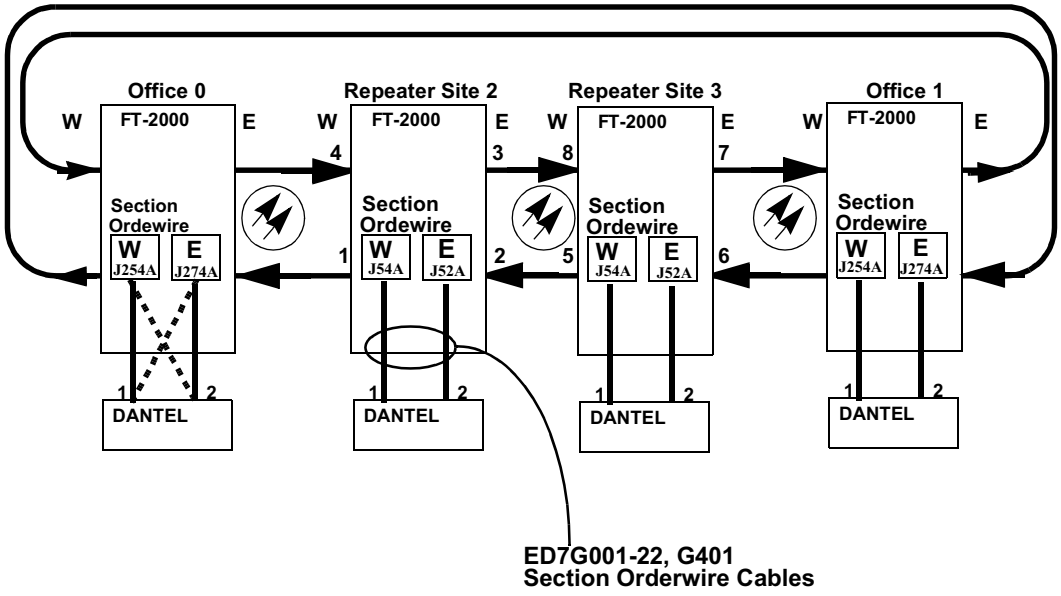
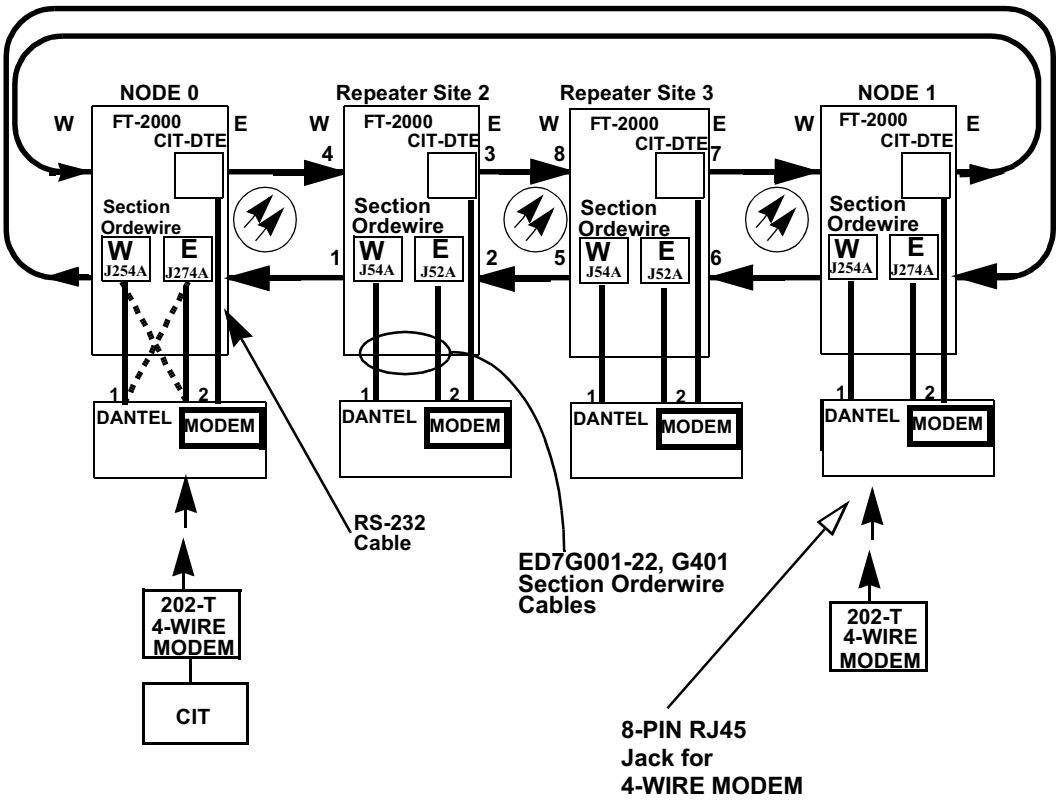


Figure A-1. Orderwire for Voice Communication



Note: The Dantel Shelf at the breakpoint (DSNE Office 0) is configured in Terminal mode. All other Dantel Shelves are in Repeater mode.

Figure A-2. Orderwire for Voice and Data Communication

Dantel Options Setting

The shelf consists of several Plug-in Modules. Switch and strap settings compatible with FT-2000 use are given in Table A-2 and Table A-2 for each Module.

Table A-1 Dantel Orderwire Options Settings For Voice Communications

Module	Settings
Backplane	Set S1 to BRIDGE Set S2 to IN Set S3 to IN.
41096	Set CTL LMT A strap, to IN position to prevent the ALL CHAN volume control knob from turning off the speaker. Set CTL LMT A strap, to OUT position to allow the ALL CHAN volume control knob to turn off the speaker. Set CTL LMT B strap, to IN position to prevent the CHAN SELECT volume control knob from turning off the speaker. Set CTL LMT B strap, to OUT position to allow the CHAN SELECT volume control knob to turn off the speaker.
46105	Set S1 (BRDG) switch, to TERM at the breakpoint (DSNE Office 0) Terminal site. Set S1 (BRDG) switch, to RPTR at all repeater and all other terminal sites. Set S2 (LPBK 1) in OFF. Set S101 (LPBL 2) in OFF. Set the XMT CLK 1 and XMT CLK 2 straps in TERM. Set the RCV CLK 1 and RCV CLK 2 straps in TERM. Set the RCV DATA 1 and RCV DATA 2 2 straps in TERM. Set the M LEAD 1 and M LEAD 2 straps in YES. Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site. Set the MODE strap, set to RPTR at all repeater and all other terminal sites. Reinstall the module in the left slot in the top equipment shelf.
44020	49018 child board, set the station 1 code with S1, S2 and S3 = three digit address for primary voice Orderwire. S1 is the first digit. Each site must have a unique address, it is recommended to use the Target ID (TID). 49018 child board S4, S5 and S6 = three digit address for All-Call. This address must be unique from all the primary voice Orderwire addresses assigned in the ring. Reinstall the module in the left slot in the bottom equipment shelf.
44022	Set the 2W/4W switch to 4w Set the 0 OHM/600 OHM to 600 OHMs. Reinstall the module in the middle slot in the bottom equipment shelf.
49920	Set RING-BACK TONE STRAPS to ON Set INTERRUPT STRAPS to NORM Set S2 switch to ON. Reinstall the module in the right slot in the bottom equipment shelf.

Table A-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 RPTR at all Repeater and all other terminal sites. Set the MODE strap, set to TERM at the breakpoint (DSNE Office 0) Terminal site. Reinstall the module in the left slot in the top equipment shelf.
44202 202	Set the TEST, ALB, and DLB switches in the DOWN positions on faceplate. Set the 2W/4W switch to 4w. set the S5 dip switch as follows: S5-1, S5-3, and S5-4 ON. S5-2 and S5-3 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 = 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 = 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. 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 FT-2000

Basic cable information is given in Chapters 5 and 9, in this document. This appendix provides information about connections at the Dantel Orderwire Shelf.

Table A-3 Gives Channel 1 wire connection information.

Table A-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
FT-2000 Cable End	1	9	3	11	6	14	4	12
Dantel 46105 Connector End	52	51	48	47	46	45	44	43

Table A-3 Gives Channel 2 wire connection information

Table A-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
FT-2000 Cable End	1	9	3	11	6	14	4	12
Dantel 46105 Connector End	6	5	10	9	12	11	14	13

Figure A-3 on the following page diagrams the Dantel connector.

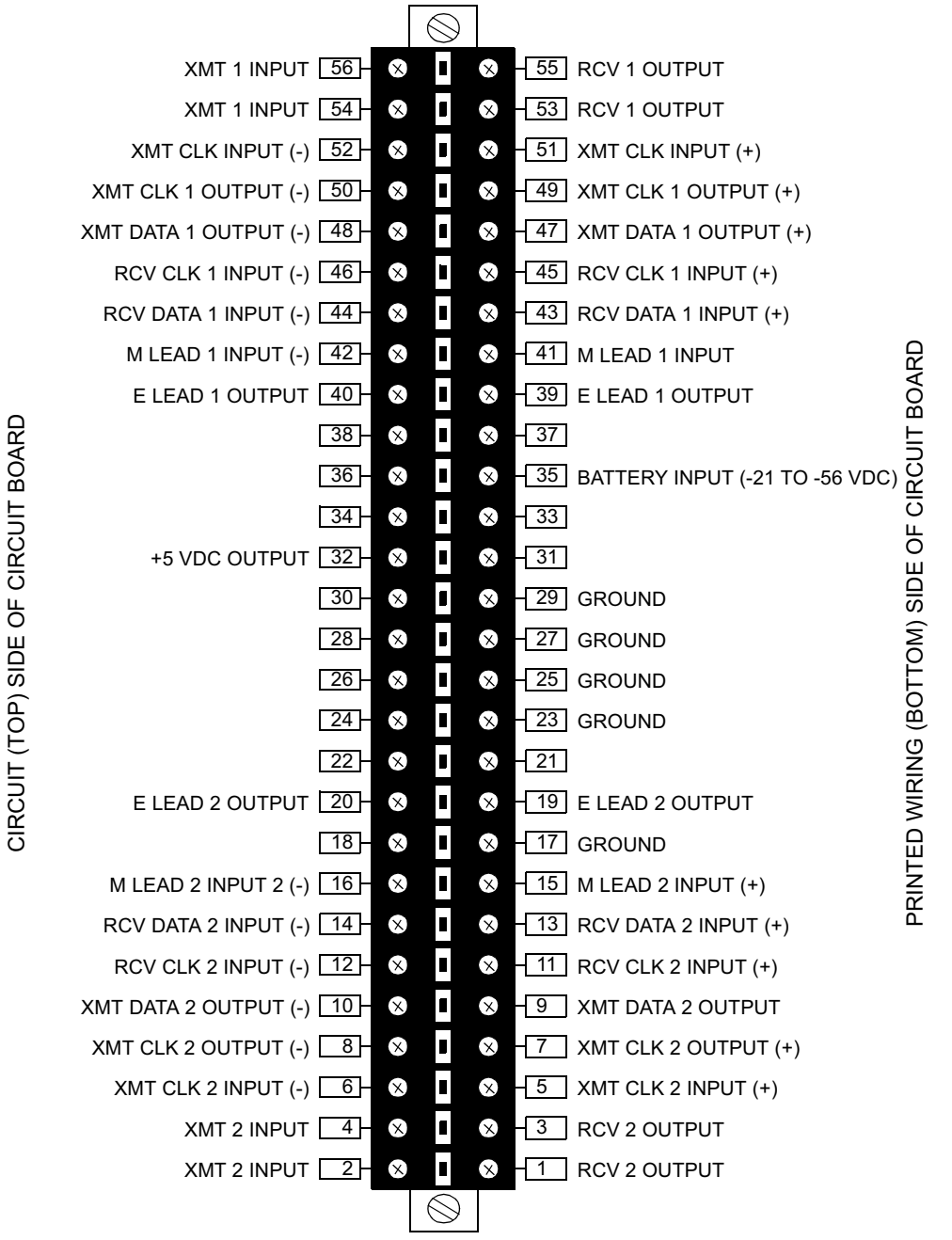


Figure A-3 View of 46105 Edge Connector from Backplane

065-215-250 (500/800) Series
Installation Guide for 500-/ 800- Type Bay Frame

B

1

065-215-250 (500/800) Series Installation Guide for 500-/800-Type Bay Frame

B

This information is provided herein for convenience. At the time of publication of the Installation Manual, the Bay Frame document was the current issue available. However, the Bay Frame document is controlled and published independent of the IM, therefore, it may be advisable to check if there is a more current issue available.

DACS III-2000 Testing

C

Contents

- Local Transmission Test DACS III-2000C-1
  - Description C-1
  - Auto Turnup Test C-2
  - Transmission Test C-4
  - End-to-End Verification Procedure - DACS III-2000 C-6
  - Automatic Switch C-10
  - OSS Test System Setup C-10

DACS III-2000 Testing

C

Local Transmission Test DACS III-2000

Description

This information is provided herein for convenience. At the time of publication of the Installation Manual, the DACS-III information was current. If there is any doubt about accuracy of the DACS-III information, please refer to DACS-III specific documentation.

This test verifies proper cabling from the FT-2000 OC-48 to the DACS III-2000 cross-connections. Omit this test if the shelf is cabled to a DSX3/STSX.

CAUTION:
Verify there are no high-speed loopbacks up before proceeding with this section.

NOTE:

After completing this test, isolate and correct any incorrect wiring. If any cabling is corrected, repeat this test until the it passes without failures.

NOTE:

Test all circuit pack positions which have cabling to the DACS III-2000. If the shelf is not equipped with LAA2 (DS3) circuit packs in all these positions, move the LAA2 (DS3) circuit packs from position to position and repeat this test for each position.

Auto Turnup Test

(1) Determine the assigned DACS III-2000, DS3 Port that corresponds to the connecting FT-2000 OC-48-ADR DS3 cables to be tested.

Where: A=Unit# (1 - 8)

B=Pack# (1 - 30)

C=Port# (1 - 8)

(2) Enter the following input command at the DTMS, in order to verify the DS3IN INTFC circuit pack corresponding to the assigned DACS III-2000, FT-2000 OC-48 tributary 1 DS3 Port under test are properly provisioned in the **"NDRVN"** state.

rtrv-prmtr-t3::a-b-1&&-8;

The output response should be:

M RTRV PRMTR T3::A-B-1&&-8: COMPLD

A-B-C: IDLE-REL,IDLE-REL,,,NORM,,,,NDRVN

(3) Verify all 48 tribs.

(4) At DTMS, enter the following command to change Trib 1 to **"DRVN"** state.

ed-prmtr-t3::a-b-c::,drvn;

The output response should be:

M ED PRMTR T3::A-B-C::,DRVN, COMPLD

(5) Repeat step 4 for all 48 tribs.

(6) At DTMS, enter the following command to loop Trib 1.

Conn-dsx1-t3::a-b-c,a-b-c;

Note: A-B-C are the same in this case.

The output response should be:

M CONN DSX1 T3::A-B-C,A-B-C::NO:NORM COMPLD

(7) Repeat step 6 for all 48 tribs.

(8) Execute **FAULT_Test_Auto Turnup_DSX (All)** command, at the FT-2000 OC-48 shelf. This test will take approximately 10 minutes.

Requirement: The results will be printed on the CIT screen. A "g" represents a passed port. A "-" represents an untested port (no circuit pack equipped. An "F" represents a failed port.

NOTE:

If failed ports are indicated check the cabling to the DSX for that port and ports around it. You may even want to temporarily recable the port with a known good cable, to see if the problem goes away, or temporarily use the suspected cable on another known good port to see if the problem moves with the cable. The report below shows a passing test for a terminal with three LAA2 (DS3) circuit packs equipped in slots 1A, 1B and 2A.

NOTE:

If this test indicates an unexpected failure of an LAA2 (DS3) circuit pack, perform the following “Transmission Tests” before replacing the circuit pack. Faulty DS3 cabling could be the cause of the failure indication.

```
   CRITICAL   Lucent   FT-2000 9.0.0-ADR    LT-FT-2000       LOCAL ONLY



   ATT-FT-2000 70-01-01 03:49:13
M Test-Auto Turnup-DSX:All: COMPLD
   /* Test-Auto Turnup Report - Cross-Connect Wiring Test

=====================================================================
                         ------------LS INTFC-----------
                         1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8
                  port   A B A B A B A B A B A B A B A B
                    1    g g g - - - - - - - - - - - - -
                    2    g g g - - - - - - - - - - - - -
                    3    g g g - - - - - - - - - - - - -
  */
_



;
Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP   REMOTE  INPUT LOGOUT  EXIT                        REPEAT
```

(9) At DTMS, enter the following command to take down the loop for Trib 1.

Disc-dsx1-t3::a-b-c,a-b-c;

Note: A-B-C are the same in this case.

The output response should be:

M DISC DSX1 T3::A-B-C,A-B-C::NO COMPLD

(10) Repeat step 9 for all 48 tribs.

(11) Enter the following input command at the DTMS, in order to verify the cross-connects are down.

rtrv-prmtr-t3::a-b-c&&-8;

The output response should be:

M RTRV PRMTR T3::A-B-1&&-8; COMPLD

A-B-C: IDLE-REL,IDLE-REL,,,NORM,,,,DRVN

Transmission Test

(1) Enter the following input command at the DTMS, on port corresponding to Trib 48.

ed-prmtr-t3::a-b-c::,,bad;

The output response should be:

M ED PRMTR T3::A-B-C::,,BAD COMPLD

Requirement: Verify that at the FT-2000 OC-48 shelf, a FAULT LED is flashing on the corresponding LAA2 (DS3) circuit pack and that CR and NE ACTY alarms are displayed on the user panel.

(2) Repeat step 2 for all Tribs in sequence.

(3) Execute **FAULT_Retrieve_History**.

Requirement: All ports report incoming (from DSX) DS3 LOS in ascending order from the lowest LAA2 port (e.g. 1A-1) equipped to the highest LAA2 port.

NOTE:

If this not the case, check the DSX cabling of the ports that are either missing or reported out of order.

The example report shows a passing test for a terminal with two LAA2 circuit packs equipped in slots 1A, 1B, and one LAA4 circuit pack equipped in slot 2A reporting only one port.

```
   CRITICAL   Lucent   FT-2000 9.00-ADR      LT-FT-2000     LOCAL ONLY


   ATT-FT-2000 70-01-01 04:05:40
M Retrieve-History: COMPLD
   /* Maintenance History Report
 ================================================================
   Date Time    System Source   Event
   of Event     Alarm  Address  Description
================================================================
   01-01 04:05:23 CR    ls-1a-1 incoming (from DSX) DS3 LOS
   01-01 04:05:14 CR    ls-1a-2 incoming (from DSX) DS3 LOS
   01-01 04:05:11 CR    ls-1a-3 incoming (from DSX) DS3 LOS
   01-01 04:05:07 CR    ls-1b-1 incoming (from DSX) DS3 LOS
   01-01 04:05:03 CR    ls-1b-2 incoming (from DSX) DS3 LOS
   01-01 04:05:00 CR    ls-1b-3 incoming (from DSX) DS3 LOS
   01-01 04:04:56 CR    ls-2a-1 inc(from STSX)line RFI/yellow-cleared
   01-01 04:04:53 CR    ls-2a-1 incoming (from STSX) EC1 LOS
   01-01 04:04:43 CR    ls-2a-1 inc(from STSX)line RFI yellow
   01-01 03:49:13 CR    cit-dce Test-Auto Turnup-DSX:slot-all
   01-01 03:49:13 CR    system test auto turnup in progress-cleared
   01-01 03:48:13 CR    system test auto turnup in progress
Continue report page-by-page?(y/n)Yes
  F1      F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP                         EXIT                CANCEL
```

Critical: A port reported out of order indicates that BOTH the IN and OUT ports are reversed with their neighboring ports, or that entire slots have been miscabled. Retest ports that are missing in the report, you may not have had the signal applied for the full 10 seconds, or input and output cables may be connected improperly.

(4) Enter the following input command at the DTMS, starting with Trib 48.

ed-prmtr-t3::a-b-c::,,norm;

The output response should be:

M ED PRMTR T3::A-B-C::,,NORM COMPLD

Requirement: Verify that the FAULT LED extinguishes on the corresponding LAA2 (DS3) circuit pack, CR and NE ACTY alarms are extinguished on the FT-2000 OC-48 user panel.

(5) Repeat step 4 for all Tribs in sequence.

(6) Execute **FAULT_Retrieve_History**.

Requirement: All ports report incoming (from DSX) DS3 LOS cleared.

NOTE:
If this not the case, check the DSX cabling of the ports that are either missing or reported out of order.

```
   CRITICAL  Lucent   FT-2000 9.0.0-ADR      LT-FT-2000      LOCAL ONLY


   ATT-FT-2000 70-01-01 04:05:40
M Retrieve-History: COMPLD
   /* Maintenance History Report
 ===================================================================
   Date Time    System Source   Event
   of Event     Alarm  Address  Description
===================================================================
   01-01 04:05:23 CR    ls-1a-1 incoming (from DSX) DS3 LOS-cleared
   01-01 04:05:14 CR    ls-1a-2 incoming (from DSX) DS3 LOS-cleared
   01-01 04:05:11 CR    ls-1a-3 incoming (from DSX) DS3 LOS-cleared
   01-01 04:05:07 CR    ls-1b-1 incoming (from DSX) DS3 LOS-cleared
   01-01 04:05:03 CR    ls-1b-2 incoming (from DSX) DS3 LOS-cleared
   01-01 04:05:00 CR    ls-1b-3 incoming (from DSX) DS3 LOS-cleared
   01-01 04:04:56 CR    ls-2a-1 inc(from STSX)line RFI/yellow-cleared
   01-01 04:04:53 CR    ls-2a-1 incoming (from STSX) EC1 LOS
   01-01 04:04:43 CR    ls-2a-1 inc(from STSX)line RFI yellow
   01-01 03:49:13 CR    cit-dce Test-Auto Turnup-DSX:slot-all
   01-01 03:49:13 CR    system test auto turnup in progress-cleared
   01-01 03:48:13 CR    system test auto turnup in progress
Continue report page-by-page?(y/n)Yes
  F1      F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP                         EXIT               CANCEL
```

(7) Proceed to Auto Turnup Local Test procedure in Chapter 7.

End-to-End Verification Procedure - DACS III-2000

Perform the following steps for End-to-End line verification:

(1) At NODE-0 (DS-NE) enter two cross-connections (1E and 1W directions), both must be sourced as a 2-way add/drop as in the examples below, also see Figure C - 1.

(2) Execute the **CONFIGURATION_Enter_Crossconnection_STS3** command.

NOTE:
Review Cross-Connection Descriptions before proceeding.

- At NODE-0 (DS-NE) a 2-way add/drop cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Slot
  - Source Slot: 1A
  - Destination Line: 1E
  - Destination Tributary: 1
  - Destination Node TID: NODE-0
  - Audit:YES (Available in Release 7.0 and later)
- At NODE-0 (DS-NE) a 2-way add/drop cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Slot
  - Source Slot: 1B
  - Destination Line: 1W
  - Destination Tributary: 1
  - Destination Node TID: NODE-0
  - Audit:YES (Available in Release 7.0 and later)

(3) All remaining nodes require a through cross-connection with the DS-NE as the source and destination as in the following example.

Requirement: Path Alarm until crossconnections are complete.

(4) Log onto remote node: F2 key and select from drop menu Node TID.

(5) Execute the **`CONFIGURATION_Enterr_Crossconnection_STS3`** command.

- At NODE-1, NODE-2, and NODE-3 a 2-way through cross-connection is entered by specifying:
  - Cross-connection Type: 2-way
  - Source: Tributary
  - Source Line: 1E
  - Source Tributary: 1
  - Source Node TID: NODE-0
  - Destination: Tributary
  - Destination Node TID: NODE-0
  - Audit:YES (Available in Release 7.0 and later)

(6) Execute the **`CONFIGURATION_Retrive_Crossconnection_All`** command.

(7) Repeat step 6 at each TID NODE.

(8) Select two Test Access Ports.

(9) Connect a Transmit cable, from the ERTS to the IN Jack on each selected Test Access Port.

(10) Determine the assigned DACS III-2000, DS3 Port that corresponds to the connecting selected Test Access Ports to be tested.

Where: A=Unit# (1 - 8)

B=Pack# (1 - 30)

C=Port# (1 - 8)

(11) Enter the following input command at the DTMS, in order to verify the DS3IN INTFC circuit pack corresponding to the assigned DACS III-2000, for the selected Test Access DS3 Ports under test, are properly provisioned in the **"NDRVN"** state.

rtrv-prmtr-t3::a-b-1&&-8;

The output response should be:

M RTRV PRMTR T3::A-B-1&&-8: COMPLD

A-B-C: IDLE-REL,IDLE-REL,,,NORM,,,,NDRVN

(12) At the DTMS, enter the following command to change the selected Test Access Ports to **"DRVN"** state.

ed-prmtr-t3::a-b-c::,drvn;

The output response should be:

M ED PRMTR T3::A-B-C::,DRVN, COMPLD

(13) Repeat steps 10 through 12 for tribs 1 and 4 to be tested.

(14) At the DTMS, enter the following command to map Trib 1 to one of the selected Test Access Ports.

Conn-dsx-t3::a-b-c,a-b-c;

Note: A-B-C are the same in this case.

The output response should be:

M CONN DSX T3::A-B-C,A-B-C::NO:NORM COMPLD

(15) Repeat step 14 for trib 4 and the other selected Test Access Port.

(16) Connect the input cable from the ERTS to the OUT Jack on the selected Test Access Port mapped to Trib 4.

(17) The ERTS should monitor bit errors and have the following setup:

— Interface {DS3, STS1E or OC-3}

— Untimed

— Framed

— PRBS (Pseudo Random Bit Stream)

(18) Inject single errors to verify that the ERTS is setup correctly, then clear all errors.

(19) Perform a line switch, Execute **FAULT_Switch_Line** command.

- {ALL, **1E**, 1W}
- {Reset, Lockout, Forced Switch, **Manual Switch**}

(20) Verify that the ERTS showed a hit and clear errors.

(21) Reset the switch, Execute **FAULT_Switch_Line** command.

- {ALL, **1E**, 1W}
- {**Reset**, Lockout, Forced Switch, Manual Switch}

(22) Verify that the ERTS showed a hit and clear errors.

(23) Perform another line switch on the opposite line, repeat steps 12 through 15.

(24) Perform another line switch for all remaining NODEs, repeat steps 12 through 15.

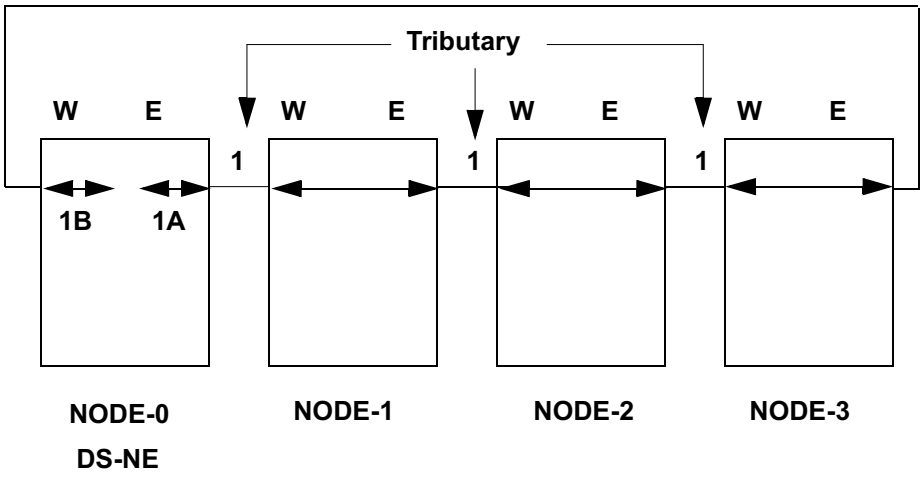


Figure C - 1 End-to-End Test Provisioning

Automatic Switch

(1) At the DS-NE remove the fiber from the 1E Transmitter.

(2) Verify that the ERTS showed a hit and clear errors.

(3) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Verify there are no local alarms.

(4) At the DS-NE replace the fiber to the 1E Transmitter.

(5) Repeat steps 1 through 4 for the 1W Transmitter.

(6) To ensure that there are no dribbling errors, clear all errors and leave the ERTS setup for a 8-24 hour time period.

OSS Test System Setup

- At NODE-1, NODE-2, and NODE-3, establish a bridge by entering:
  - Cross-connection Type: 1-way
  - Source: Tributary
  - Source Line: 1E
  - Source Tributary: 2
  - Source Node TID: NODE-0
  - Destination: Slot
  - Destination low speed interface slot (1B)
  - Audit:YES (Available in Release 7.0 and later)

(7) Execute the **`CONFIGURATION_Retrieve_Crossconnection_All`** command.

Requirement: Verify correct cross-connections.

(8) Repeat step 7 at each TID NODE

(9) Execute the **`Performance_Initialize_PM_All`** command.

Requirement: Initialize-PM:All COMPLD.

(10) This concludes testing of the FT-2000/DACS-III.

Software Installation

D

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  - Software Installation Procedure D-5
    - General Circuit Pack Installation Considerations D-5
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Software Installation

D

Overview

This appendix describes procedures to:

- Install software onto the CIT PC hard disk and into the SYSMEM circuit pack of the FT-2000 OC-48 Add/Drop Rings Terminal and Repeater Bay.

Tools, Test Sets, and Accessories

The following equipment is required to complete the procedures in this appendix:

- A complete set of FT-2000-ADR software distribution diskettes for the release that you are installing. ADR is an abbreviation for Add/Drop Rings.
- Personal computer for use as CIT, see requirements in Chapter 1.
- A “straight-through” RS-232 cable. Figure D-1 below shows the wiring required. The cable must have a DB25 male connector at one end to mate with FT-2000 DCE CIT port. Table D-1 may be used together with the figure to determine pin numbers to connect. Typically a DB9 female connector is needed to mate with the PC serial port (com port) at the other end.

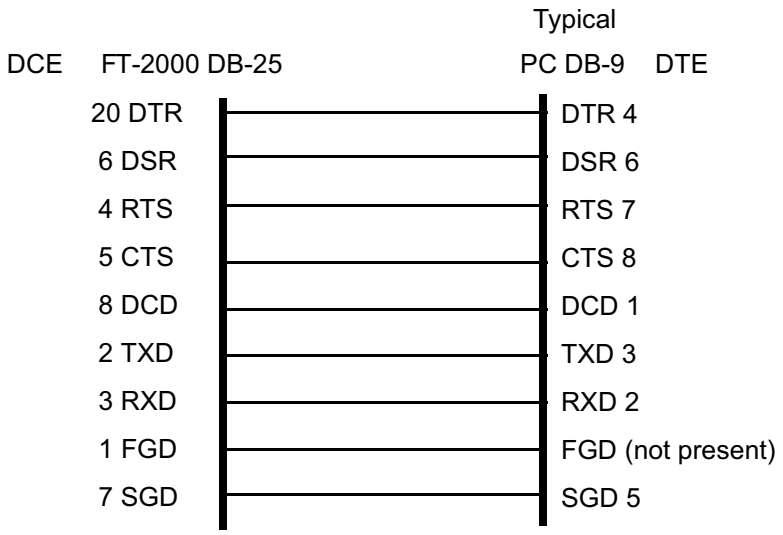


Figure D-1. Required straight-through cable wiring

Table D-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

Table D-1. Serial Port Pinout Information

Signal	Name	DB9 Pin	DB25 pin	RJ45-8 pin	DCE I/O	DTE I/O
FGD	Frame Ground	not present	1	1	NA	NA

NOTE: Network Element (ADR- Terminal) CIT DCE port is located on the User Panel.
Network Element (ADR- Terminal) CIT DTE port is located at P158A on the System Controller Interconnection panel.
PC serial port (com port) is DTE.
Modem ports are DCE.
Use straight through cable between unlike ports, use null modem between like ports.

Software Installation

Description

The software installation procedure for the FT-2000 OC-48 Add/Drop-Rings Terminal and Repeater is provided below. **Use this procedure only for new installations.** Installation of new software to in-service terminals should follow procedures given in the *FT-2000 Software Release Description* shipped with the diskettes. The *FT-2000 Software Release Description* contains the most up-to-date instructions.

NOTE:
The screens shown for this procedure are referenced to FT-2000 OC-48 Add/Drop Rings Terminal Software for Releases 8.0.0 and greater. If you are installing an earlier version of software, please refer to your Software Release Description for the appearance of the software installation screens for the appropriate release.

General Software Installation Considerations

- Read the entire software installation procedure before beginning.
- Coordinate the software installation with the alarm monitoring group, if applicable disconnect office alarms that have been connected. This is done by removing the connector from P164A on the Low Speed Shelf - System Controller interconnection panel. Alarms will be immediately generated by FT-2000 when the SYSCTL and SYSMEM circuits are inserted; and will clear when the system is in full operation.
- Installation of the CIT software to the hard drive of the PC takes about 3 minutes.

- Copying the Network Element software from the distribution diskettes to the PC hard drive takes about 10 minutes.
- Installation of the Network Element (NE) software to the NE takes one to two hours, dependent upon the baud rate selected.
- The person(s) performing the software installation should be trained and have an understanding of the FT-2000 system.
- Perform the software installation procedure in the sequence provided.
- Do not proceed if one of the disks fails to install correctly. Install the FT-2000 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 shipped on 3.5- inch hard floppies (720K or 1.44 M) contains one install disk, one or two CIT-PC disks, several generic disks, and one data disk. Check that all disks are present before beginning. (See Table D-2).
- If you install the network element software into the terminal from the distribution disks, you will have to insert and remove each diskette about every 15-20 minutes. It is recommended that the software first be copied from the distribution disks to the hard drive of your PC. This will allow you to start the download process and leave the system basically unattended until the download is complete. However, it is recommended that you check the installation progress frequently even if you are installing from the PC hard drive. Installation from the distribution diskettes is not described in detail in this document, refer to the Software Release Description for details, or follow instructions on the PC similar to the details given for the installation from the hard disk.
- If you make any mistakes while making your selections, you can use the <Esc> key to back up and re-enter your selection(s).
- In the example screens shown, the source and destination drive and directory are only an example: your screen will reflect the values you are using.
- If any error message windows are displayed, refer to Chapter 16, Installation Troubleshooting, of this manual to correct the problem.
- The FT-2000 CIT software is designed to support COM ports 1 and 2. Some PCs suport additional COM ports. Usage of these additional COM ports has proven to be unreliable and is not recommended.

Software Installation Procedure

Later in this procedure, the system memory and system controller circuit packs will be installed. Circuit pack installation for the FT-2000 OC-48 Add/Drop-Rings Terminal includes the following:

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.
- When installing circuit packs, use care to insert them straight to avoid damaging the circuit packs or the backplane pins.

Install The Software

- Power the PC from an AC source, battery power of laptops may not last long enough to complete the installation.
- Be sure you have all the distribution disks: Check Table D-2.
- Table D-2 lists all the FT-2000 software releases that are rated General Availability at the time of printing this document.

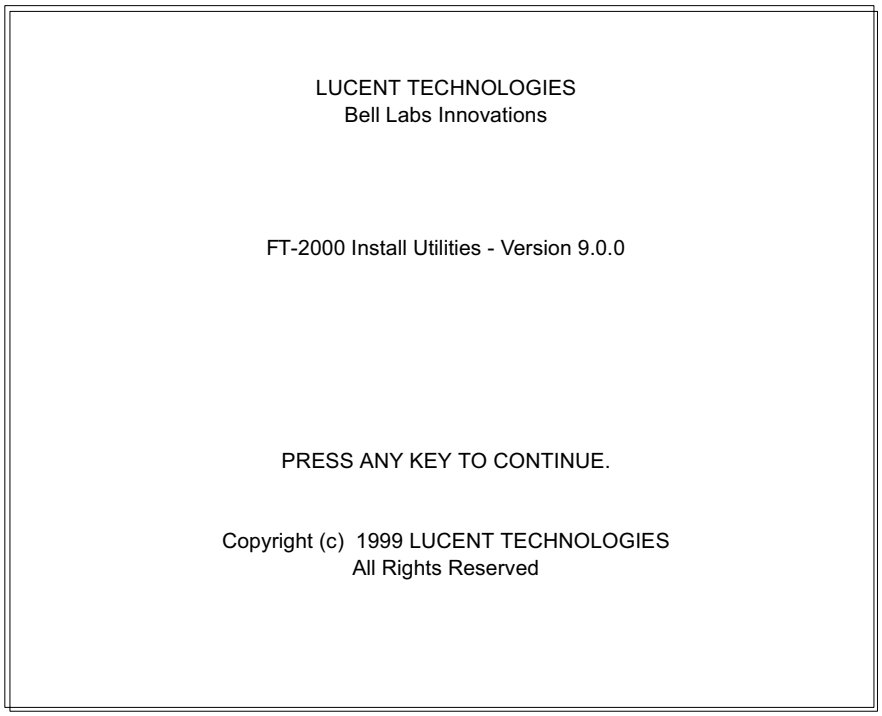
Table D-2. FT-2000 Distribution Diskette Count (3.5")

RELEASE NUMBER	INSTALL DISKS	CIT - PC DISK	GENERIC DISKS	DATA DISK	FORMAT
R7.0.1 - ADR	1	2	3	1	1.44M
R7.0.3 - ADR	1	2	3	1	1.44M
R7.1.0 - ADR	1	2	3	1	1.44M
R7.2.1 - ADR	1	3	3	1	1.44M
R8.0.0 - ADR	1	3	3	1	1.44M
R8.1.0 - ADR[a]	1	3	3	1	1.44M
R9.0.0-ADR	1	3	3	1	1.44M
R6.0.1 - RPTR	1	2	3	1	1.44M

a. R8.1 is scheduled to be released at a future date. Contact your Account Executive for availability.

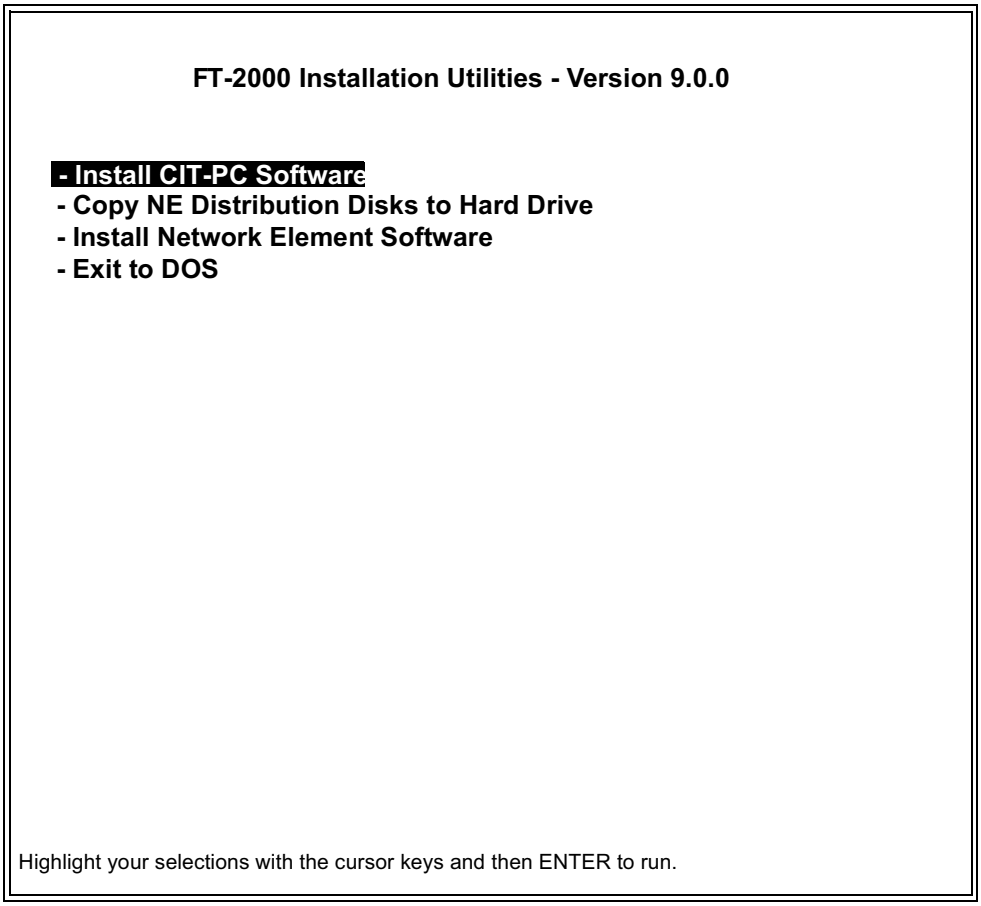
(1) Insert the Install disk in the disk drive. Type "a:Install" and return. The disk drive may be labelled "b" instead of "a".

(2) The logo screen for R8.0 is displayed, screens for previous release may be different. Refer to the Software Release Description for more detail:



Action: Press any key to continue

(3) The main menu screen is displayed with **Install CIT-PC Software** highlighted:

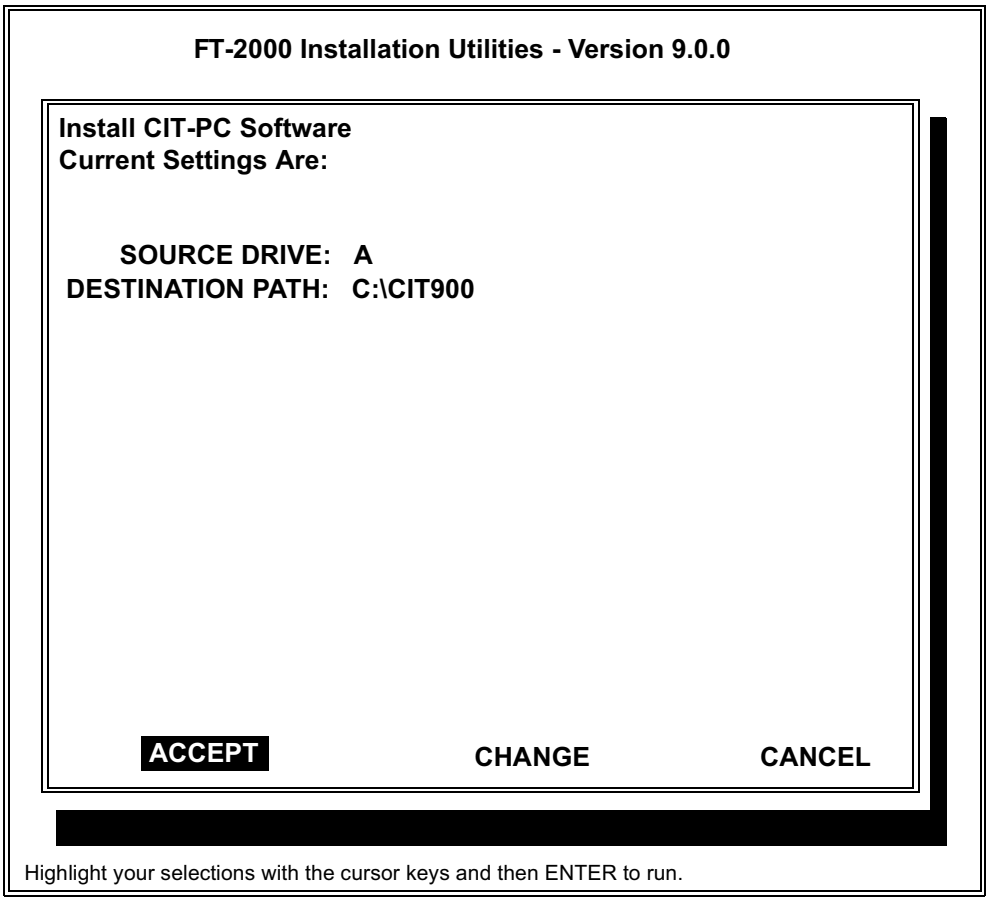


Action: Press the <enter> key.

NOTE:
If the CIT-PC software has previously been loaded on the PC or laptop. Proceed to Copy NE Distribution Disks to Hard Drive in this section.

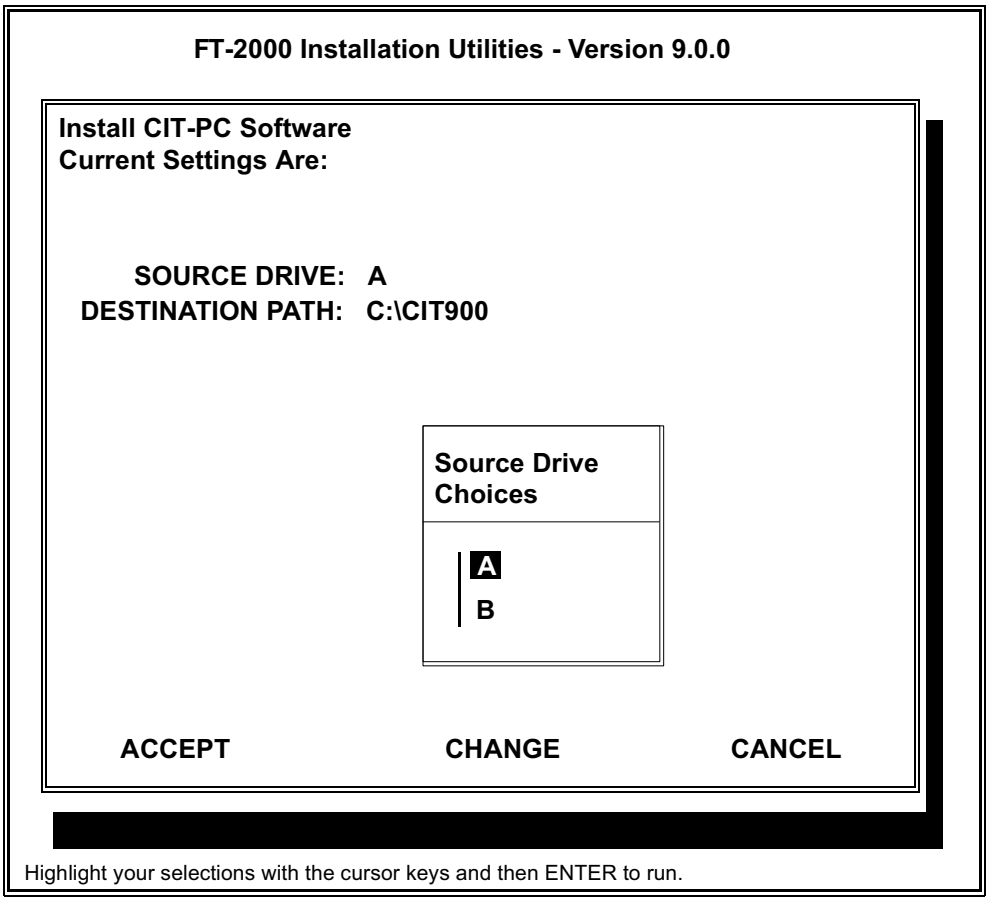
Installing CIT-PC Software to the PC Hard Disk

(1) This Install CIT-PC software screen is displayed with **ACCEPT** highlighted.



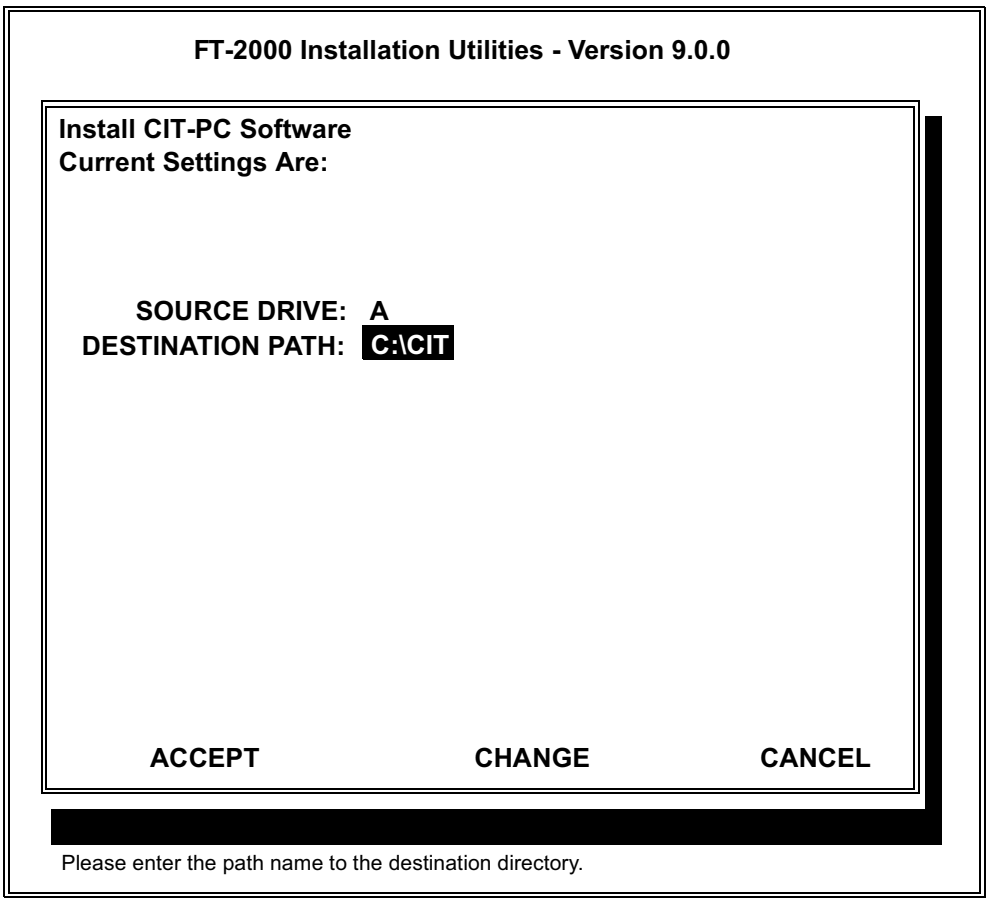
Action: Highlight **CHANGE** and then press the <enter> key.

(2) This Install CIT-PC software screen is displayed with **A** highlighted.



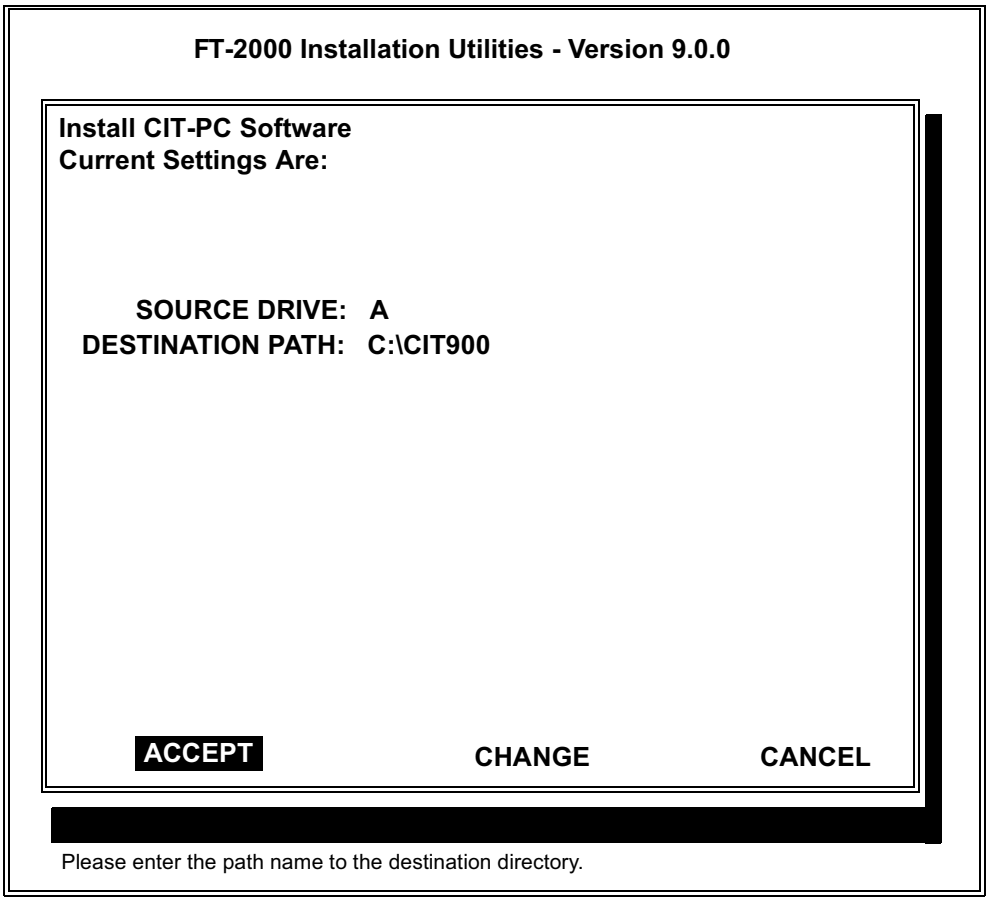
Action: Press the <enter> key if A is the correct drive, or use the arrow keys to move to the correct choice and press the <enter> key.

(3) This Install CIT-PC software screen is displayed with **C:\CIT** highlighted.



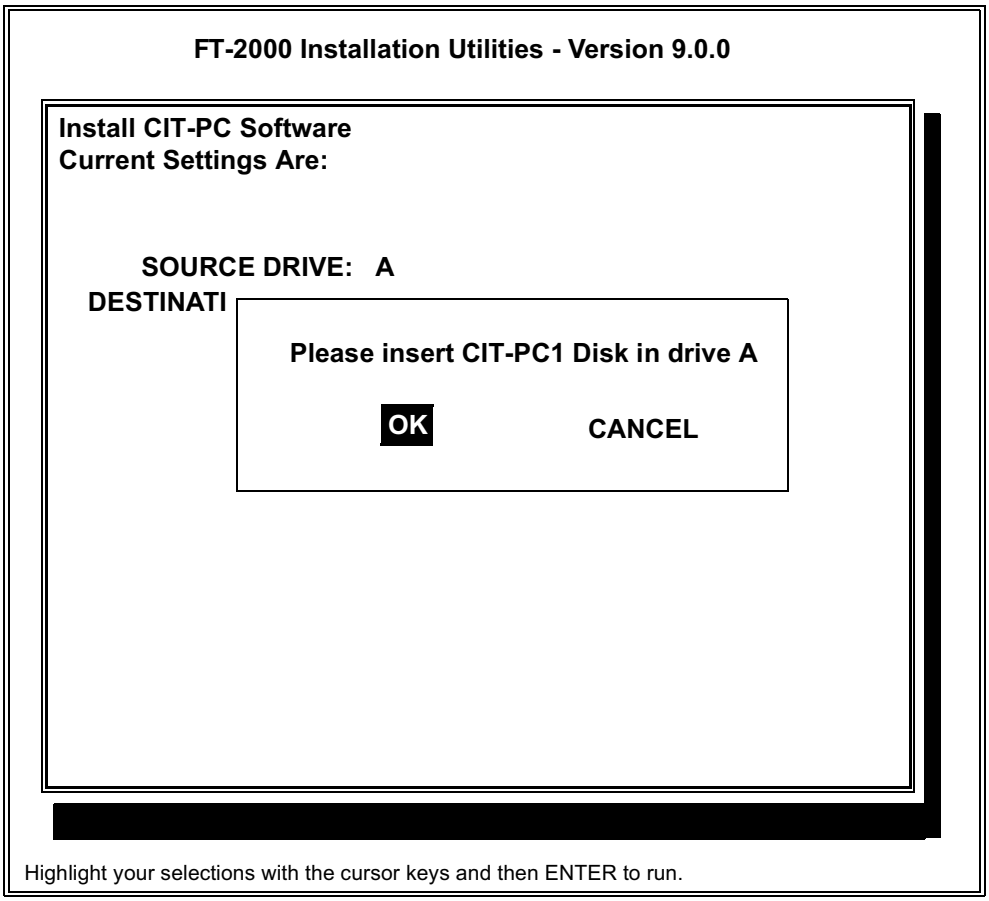
Action: Enter the Destination Path for the CIT files, typically C:\CIT, and then press <enter>.

(4) This Install CIT-PC software screen is displayed with **ACCEPT** highlighted.



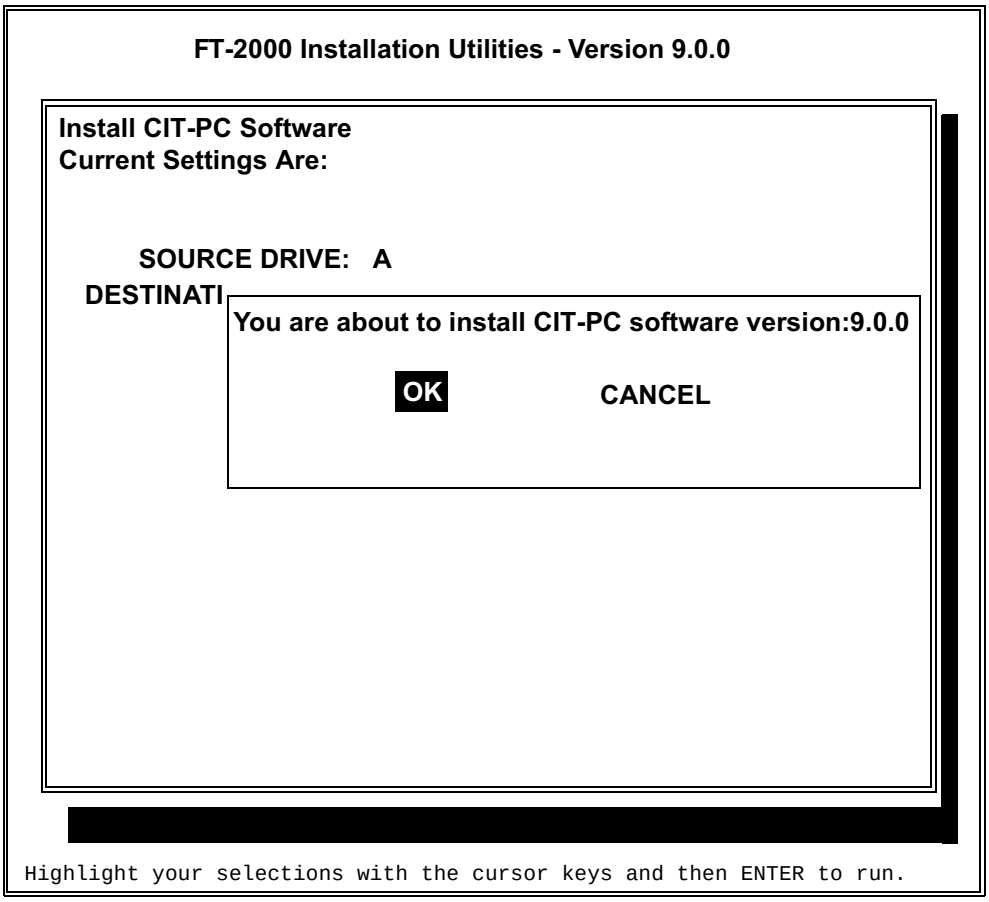
(5) Press the <enter> key again.

(6) This Install CIT-PC software screen is displayed with **OK** highlighted.



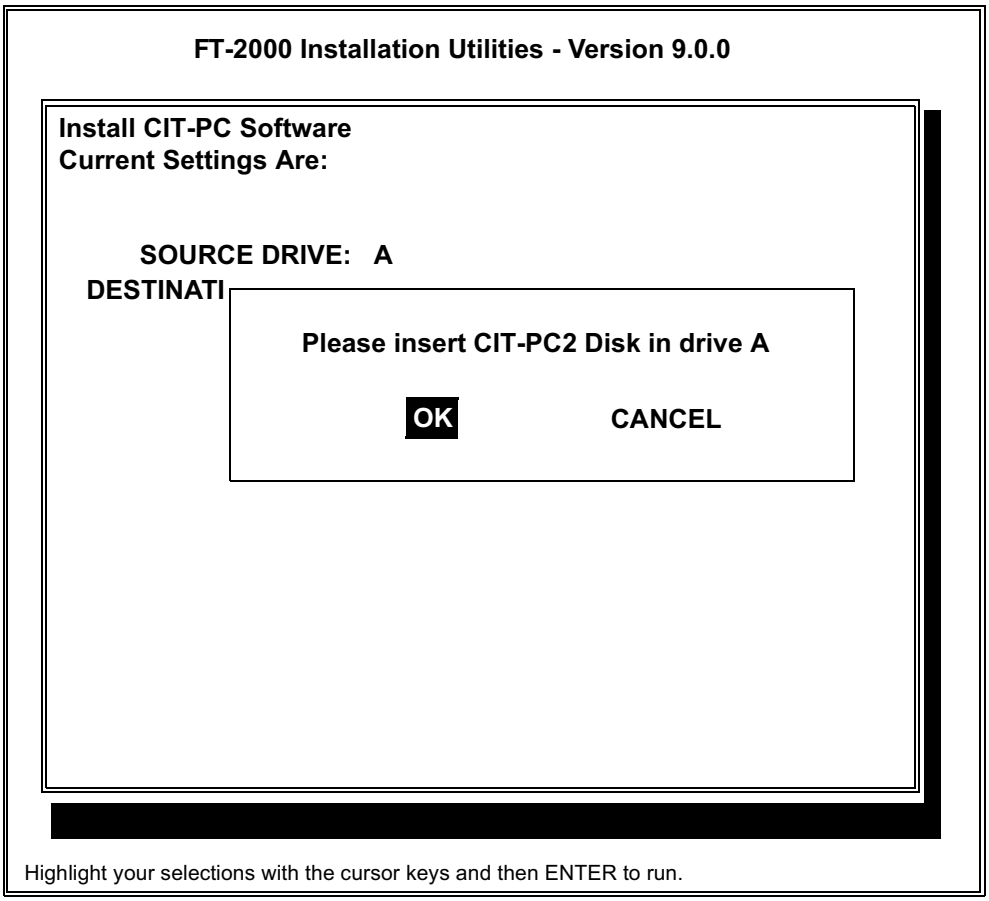
Action: Remove the Install Disk from floppy Drive A and insert the CIT-PC1 disk into floppy Drive A. Press the <enter> key.

(7) This Install CIT-PC software screen is displayed with **OK** highlighted.



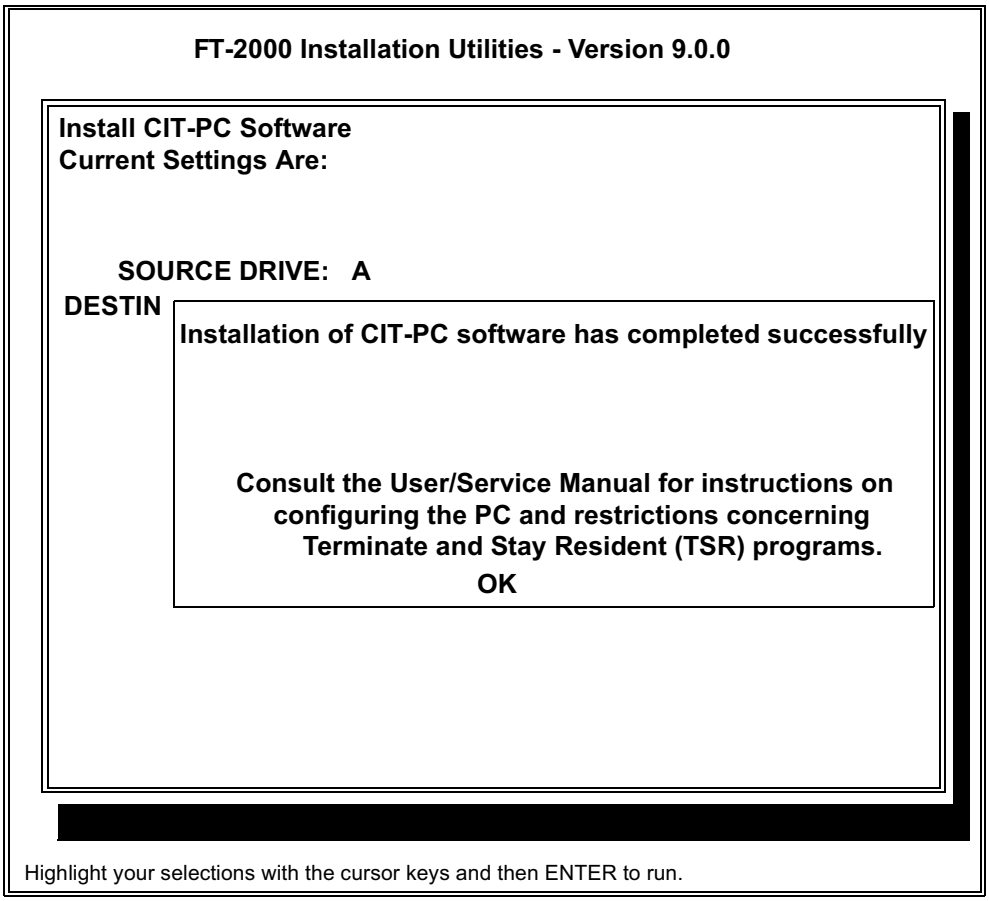
Action: Press the <enter> key.

(8) This Install CIT-PC software screen is displayed with **OK** highlighted.



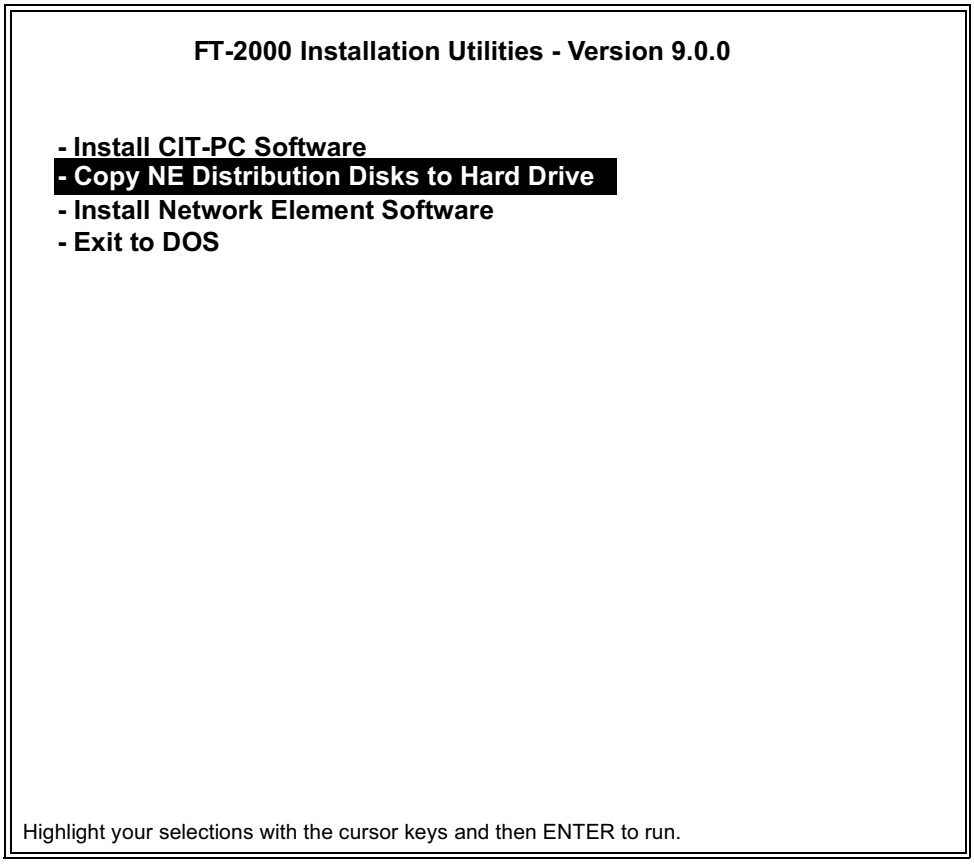
Action: Remove the CIT-PC1 Disk from floppy Drive A and insert the CIT-PC2 disk into floppy Drive A. Press the <enter> key.

(9) This Install CIT-PC software screen is displayed.



Action: Press the <enter> key.

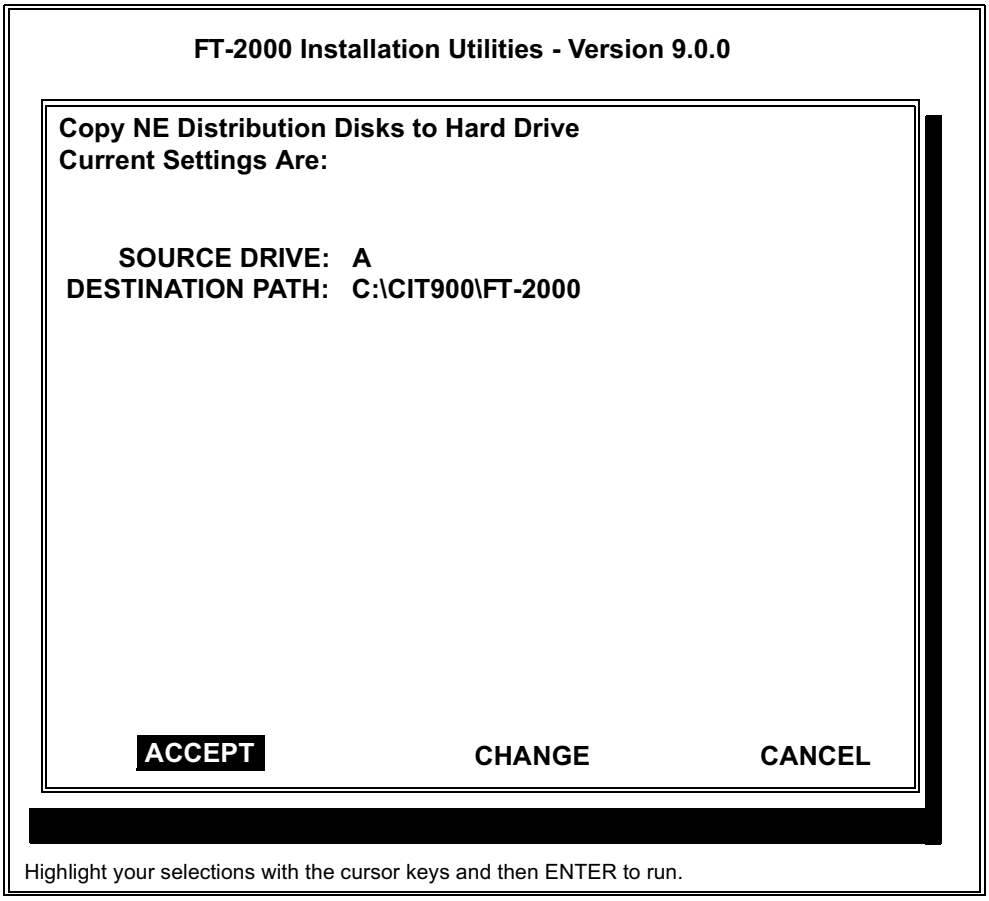
(10) This main menu will be displayed with **Copy NE Distribution Disks to Hard Drive** Highlighted.:



Action: Press the <enter> key.

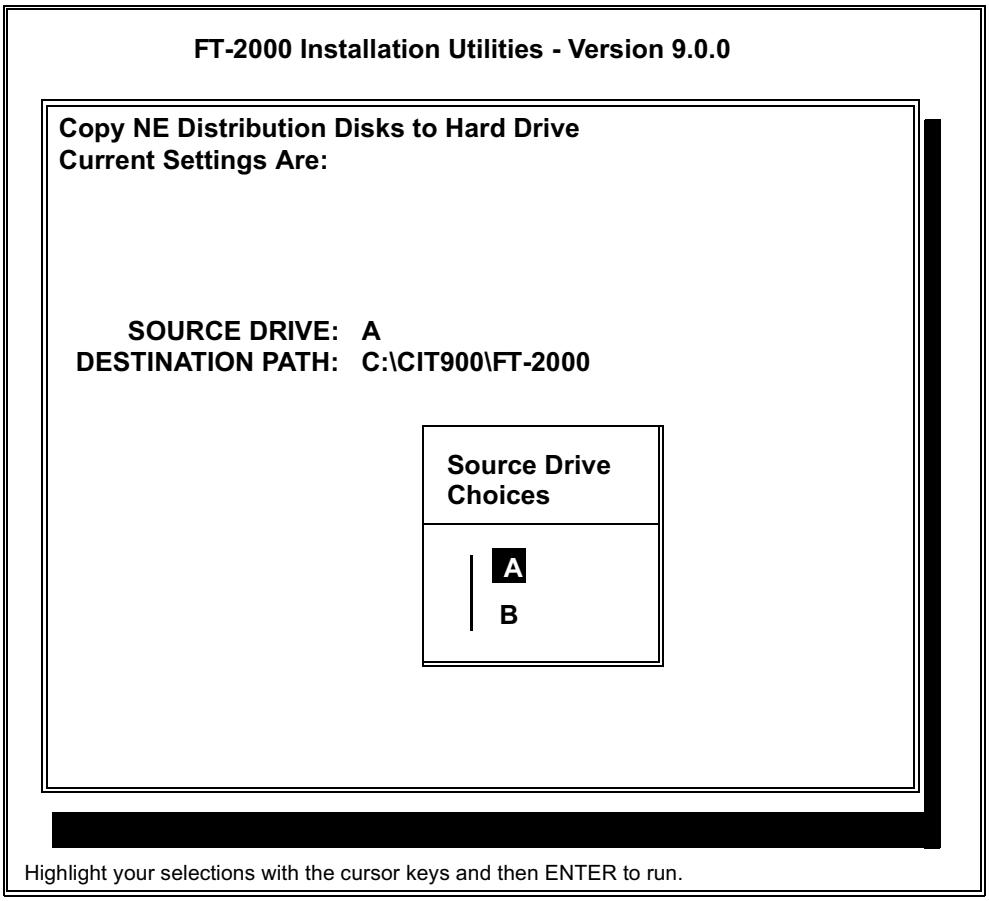
Copying the Network Element Software to the PC Hard Disk

(1) This Copy NE Distribution Disks to Hard Drive menu screen is displayed with **ACCEPT** highlighted.



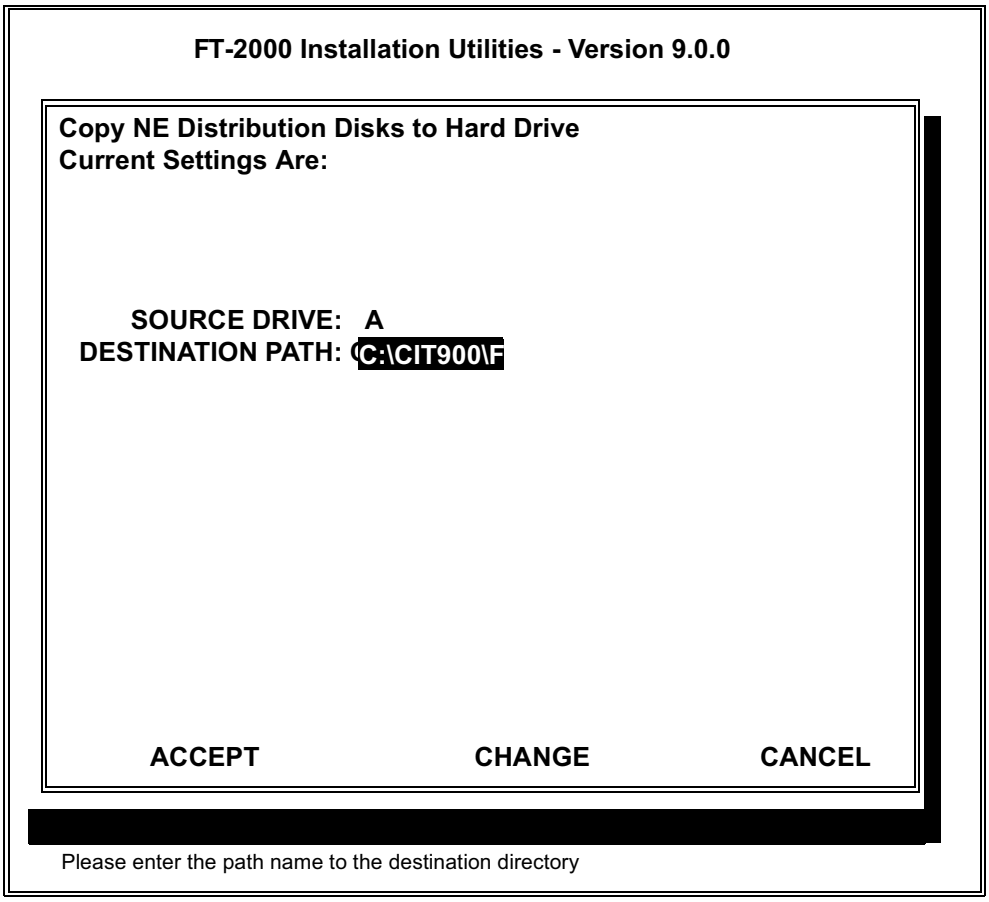
Action: Highlight **CHANGE** using the arrow keys and then press the <enter> key.

(2) This menu screen is displayed with **A** highlighted.



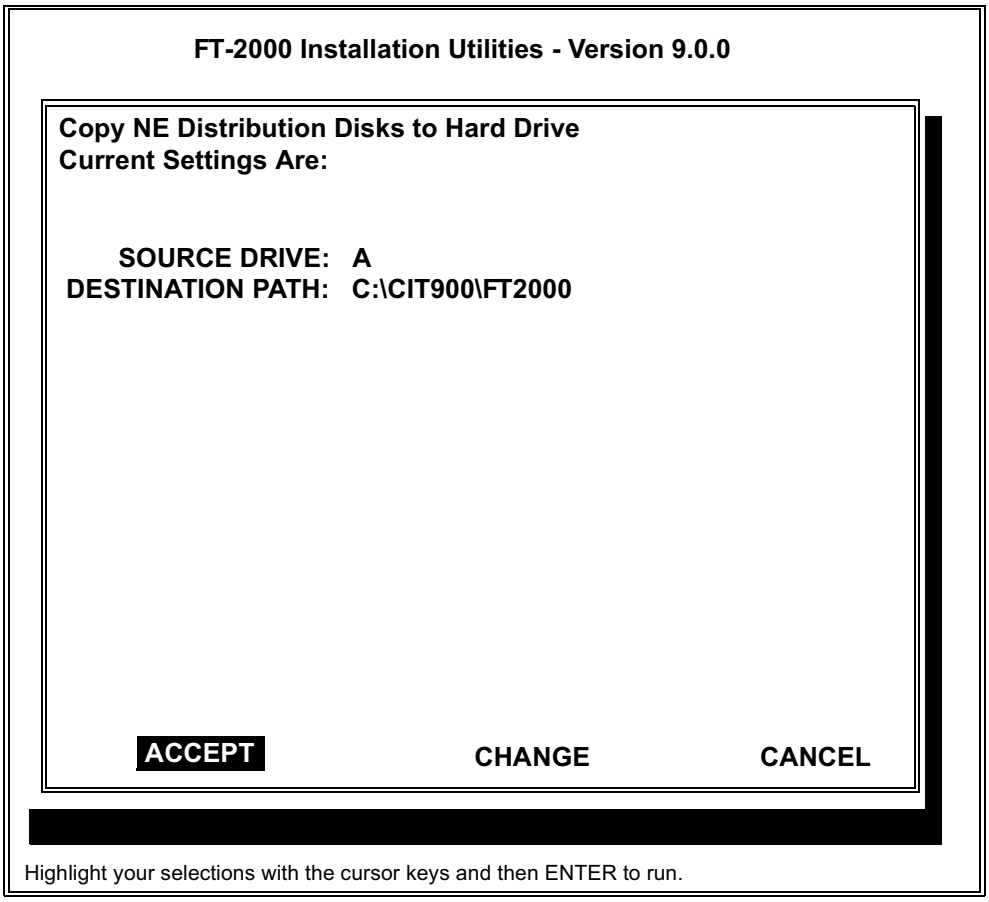
Action: Highlight the Source Drive to use, typically Drive A, then press <enter>.

(3) This menu screen is displayed with **C:\CIT900\FT-2000** highlighted.



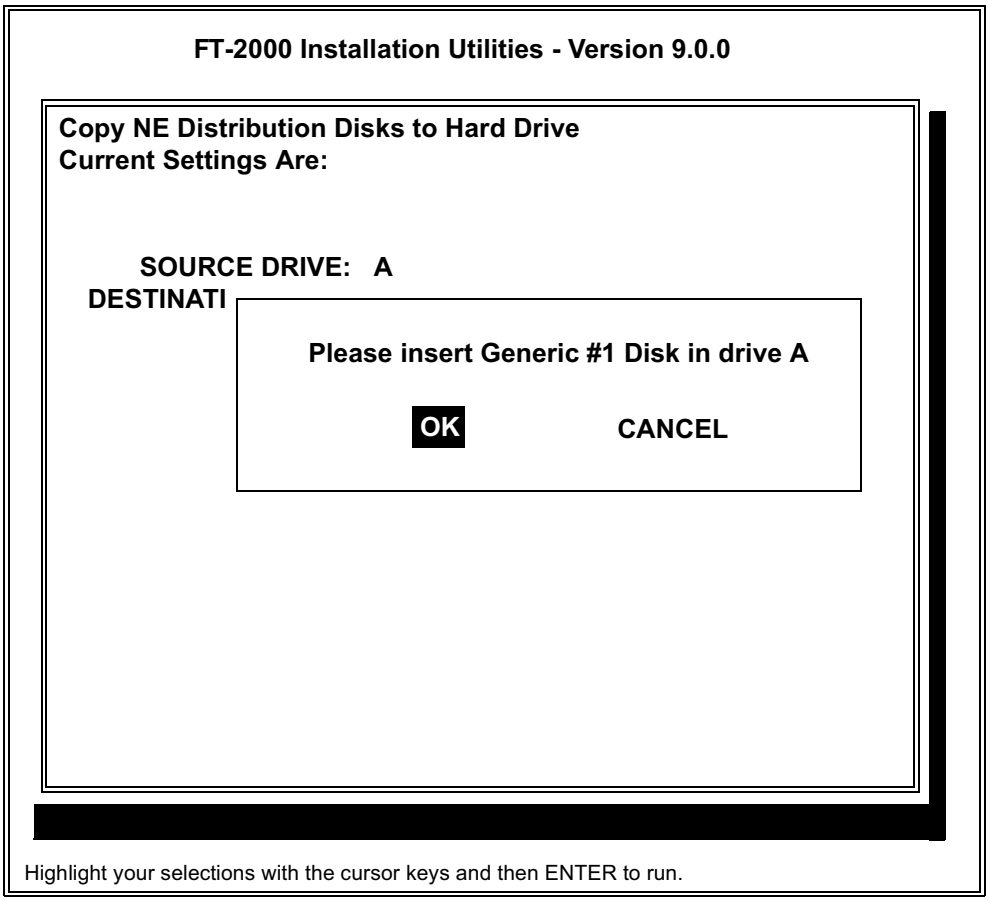
Action: If there is not enough room on the hard disk to copy the software onto it, the program will display a message “Error: You do not have enough free space on the destination drive to store the NE software.” You will have to remove files from your hard disk to be able to copy the distribution disks to the hard drive. Or you may go back to the main menu and Install Network Element Software from the distribution disks.

(4) This Copy NE Distribution Disks to Hard Drive menu screen is displayed with **ACCEPT** highlighted.



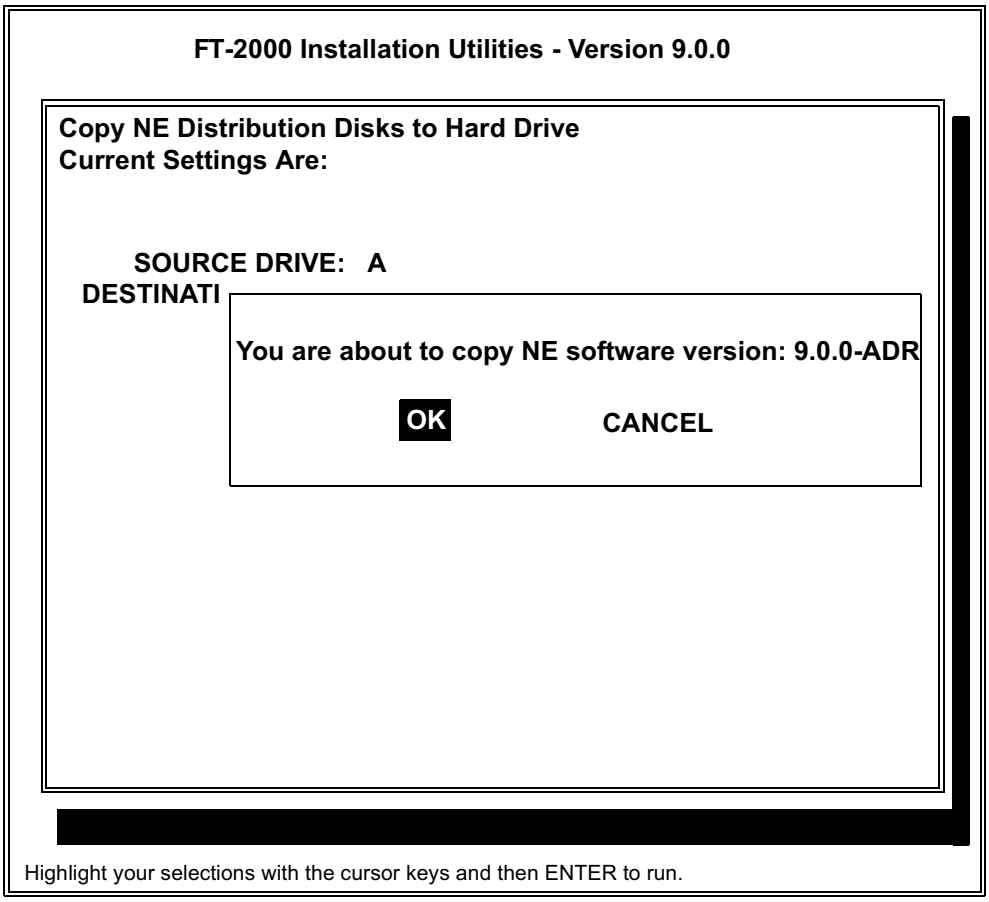
(5) Press the <enter> key again to continue with the Copy NE Distribution Disks to Hard Drive procedure.

(6) This menu screen is displayed with **OK** highlighted.



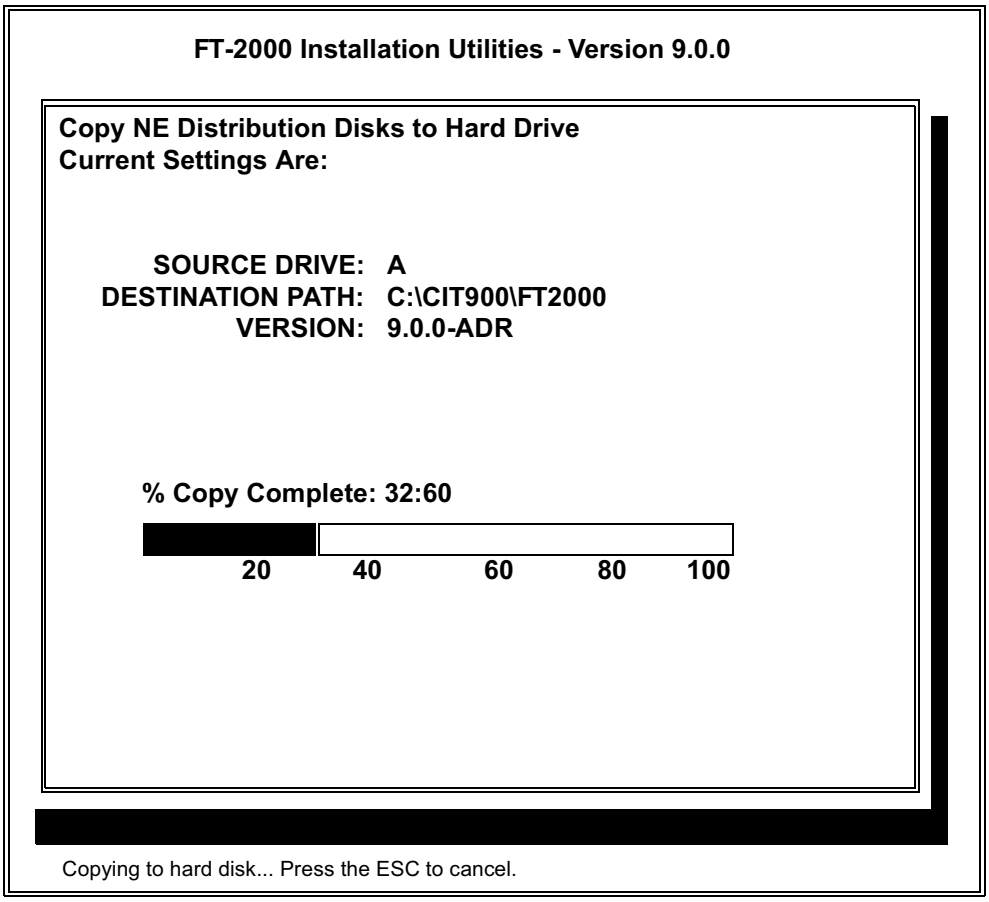
Action: Remove the CIT-PC2 Disk from floppy Drive A and insert the Generic #1 disk into floppy Drive A. Press the <enter> key.

(7) This menu screen is displayed with **OK** highlighted.

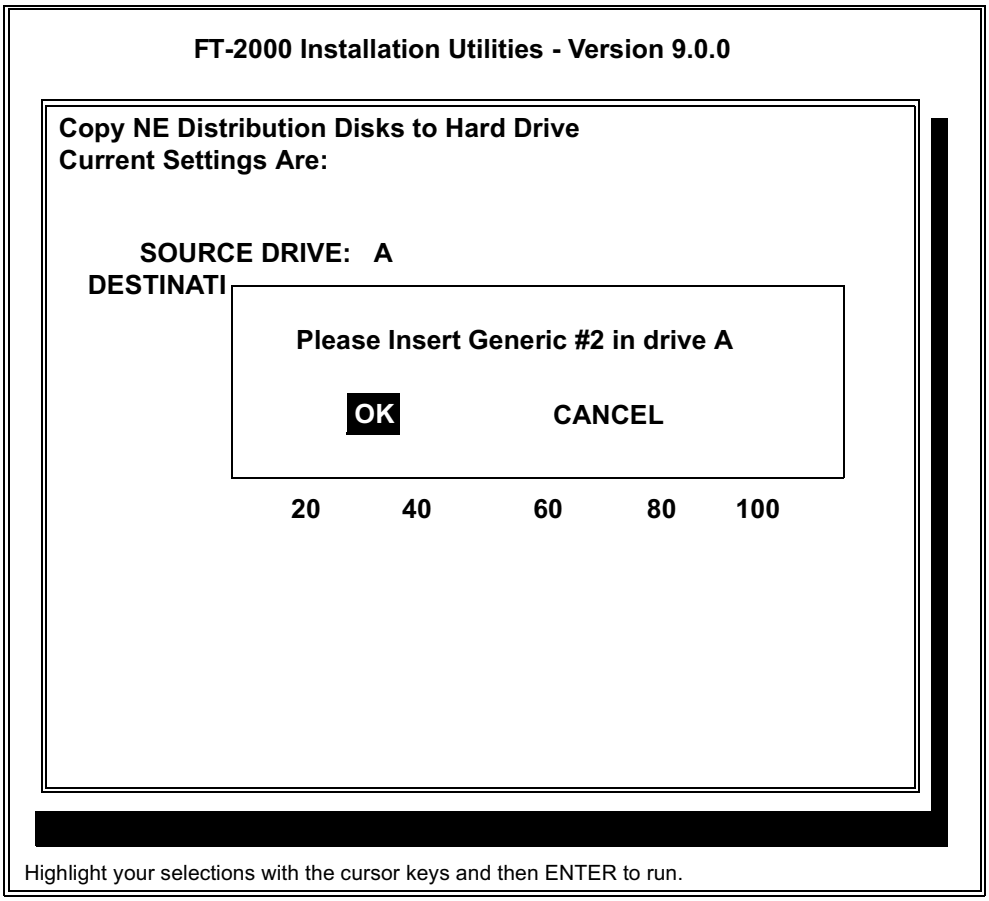


Action: Press the <enter> key to continue with copy NE Distribution to Hard Disk procedure.

(8) This menu screen is displayed.

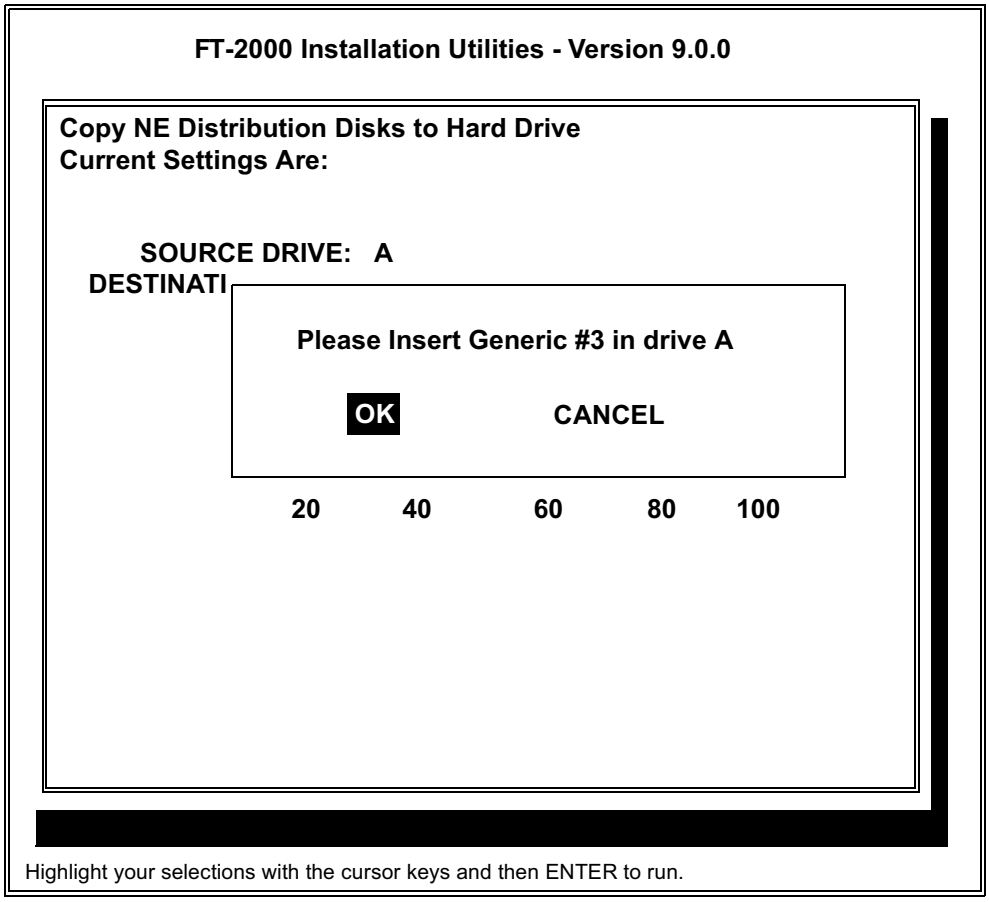


(9) This menu screen is displayed with **OK** highlighted.



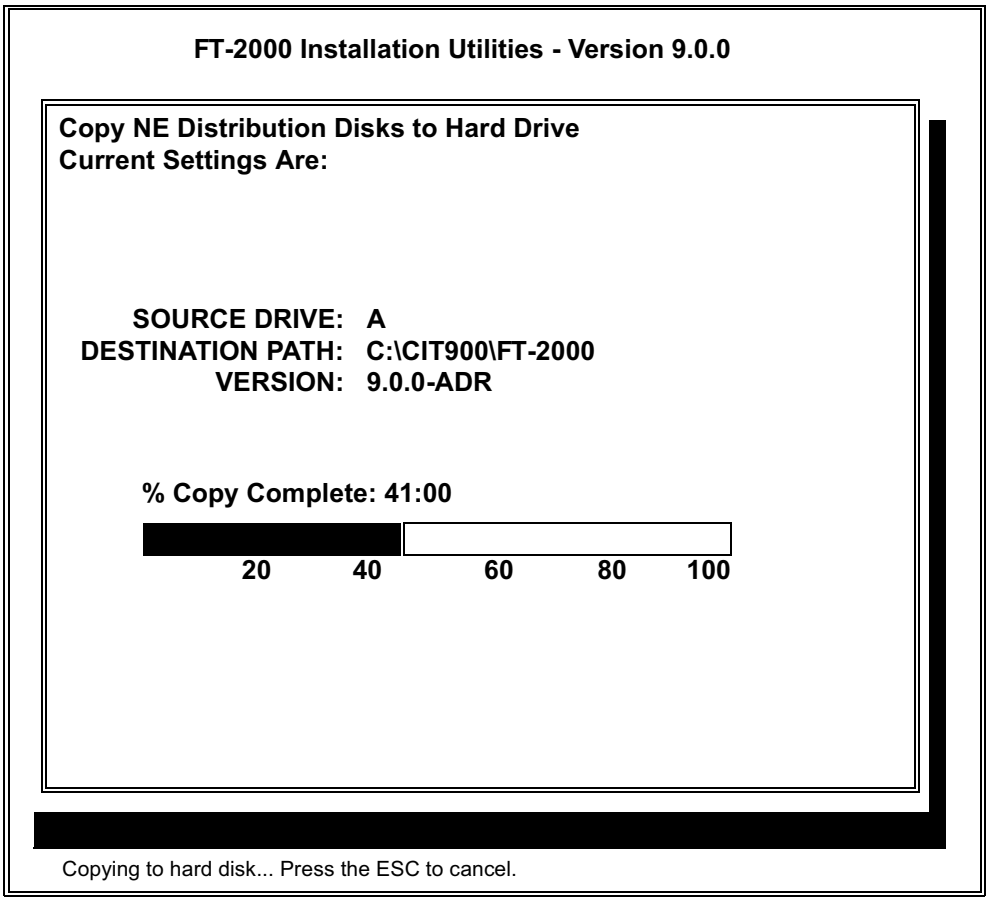
Action: Remove the Generic #1 Disk from floppy Drive A and insert the Generic #2 disk into floppy Drive A. Press the <enter> key.

(10) This menu is displayed with the okay highlighted

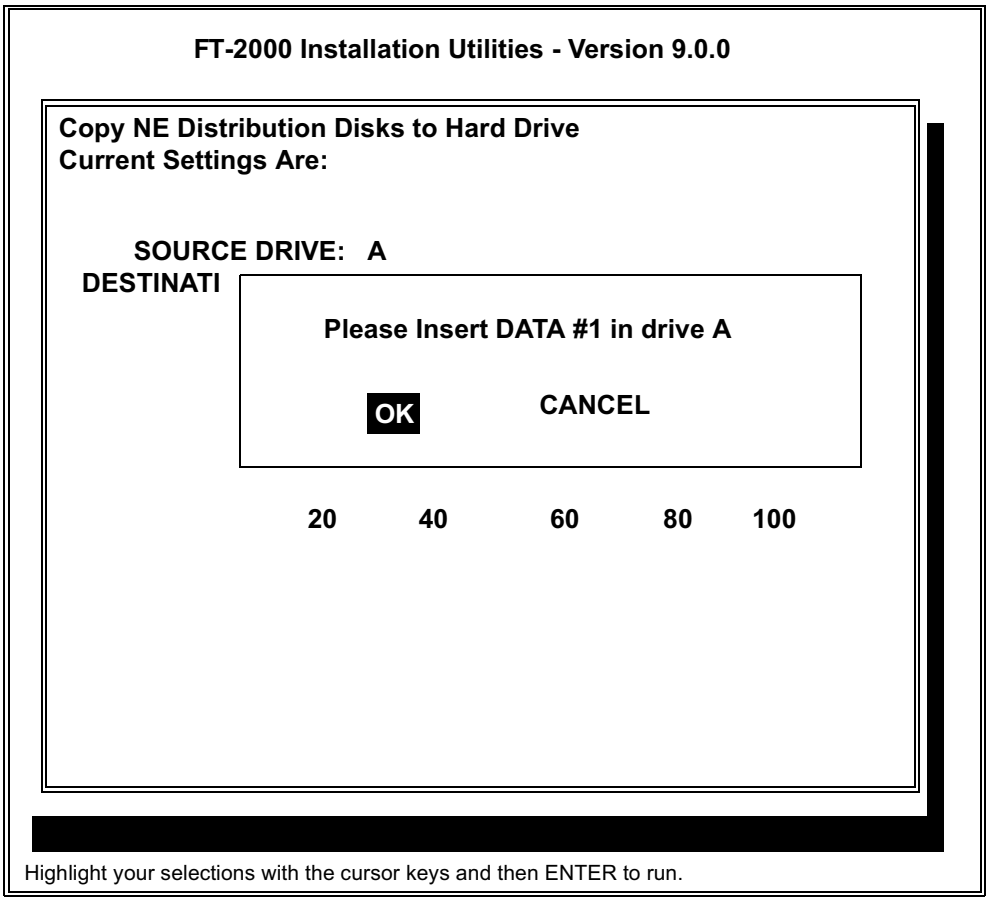


Action: Remove the Generic #2 Disk from floppy Drive A and insert the Generic #3 disk into floppy Drive A. Press the <enter> key.

(11) This menu screen is displayed.

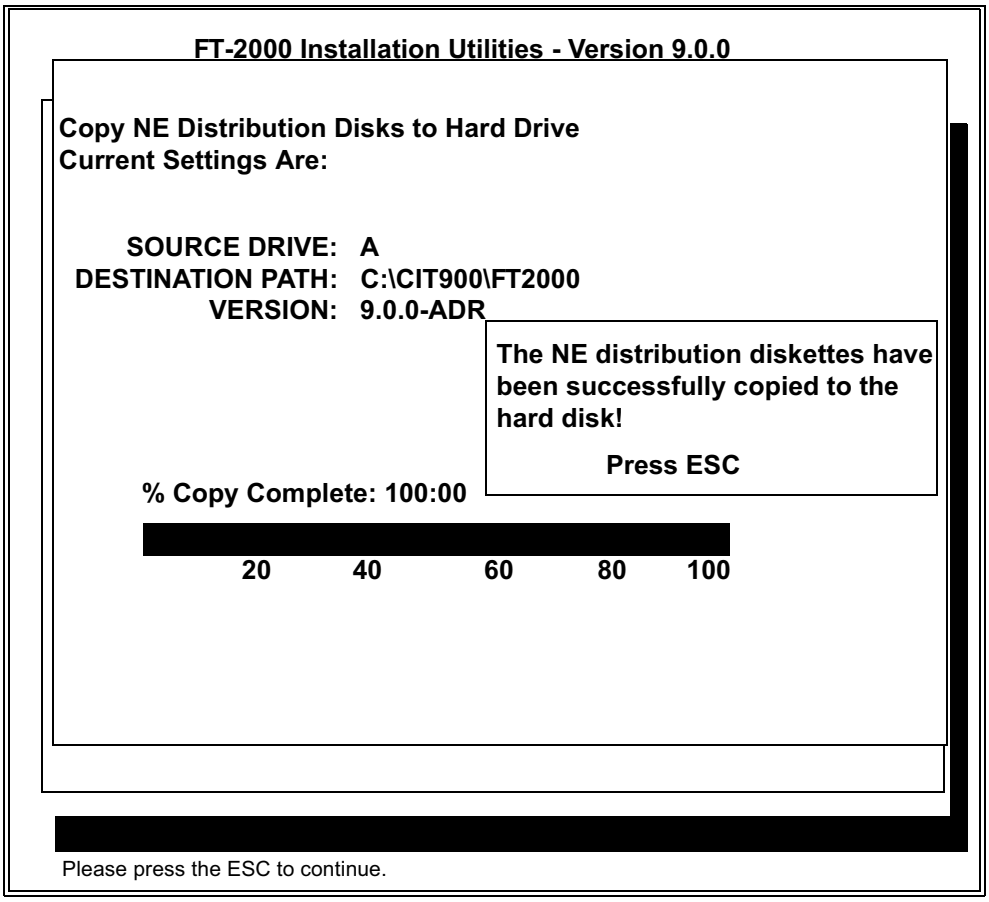


(12) This menu screen is displayed with **OK** highlighted.



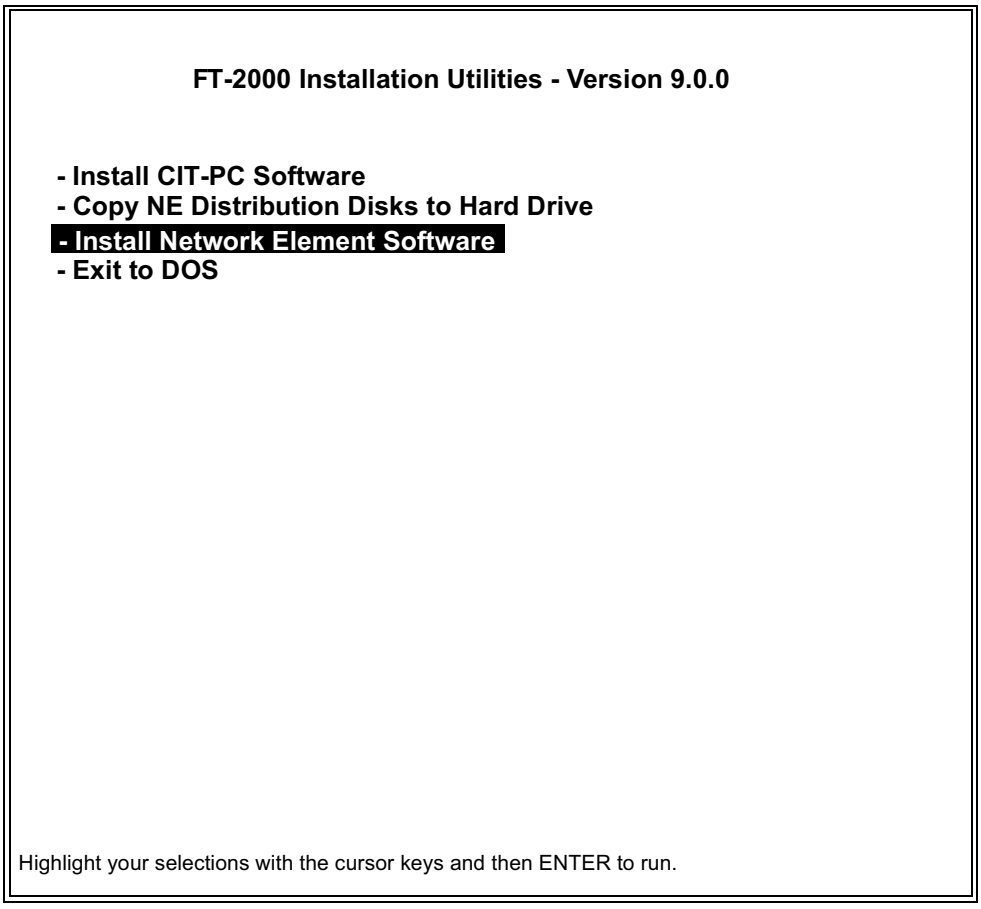
Action: Remove the Generic #3 Disk from floppy Drive A and insert the Generic #1 disk into floppy Drive A. Press the <enter> key.

(13) This menu screen is displayed.



Action: Press the ESC key.

(14) This main menu screen is displayed with Install Network Element Software highlighted



Action: Press the <enter> key.

Installing Network Element Software from the PC Hard Disk

(1) Connect the serial port of the PC (typically COM1) to the CIT DCE port on the User Panel.

NOTE:
Power the PC from an AC source, battery power of laptops may not last long enough to complete the installation.

(2) Insert the LAA25 SYSMEM circuit pack into the Low Speed Shelf - System Controller at the slot marked SYSMEM, be sure to wear an ESD protective wrist strap.

Requirement: The FAULT LED remains illuminated and a MJ alarm will be active until the software download is complete.

(3) Insert the LAA23B SYSCTL circuit pack into the Low Speed Shelf - System Controller at the slot marked SYSCTL, be sure to wear an ESD protective wrist strap.

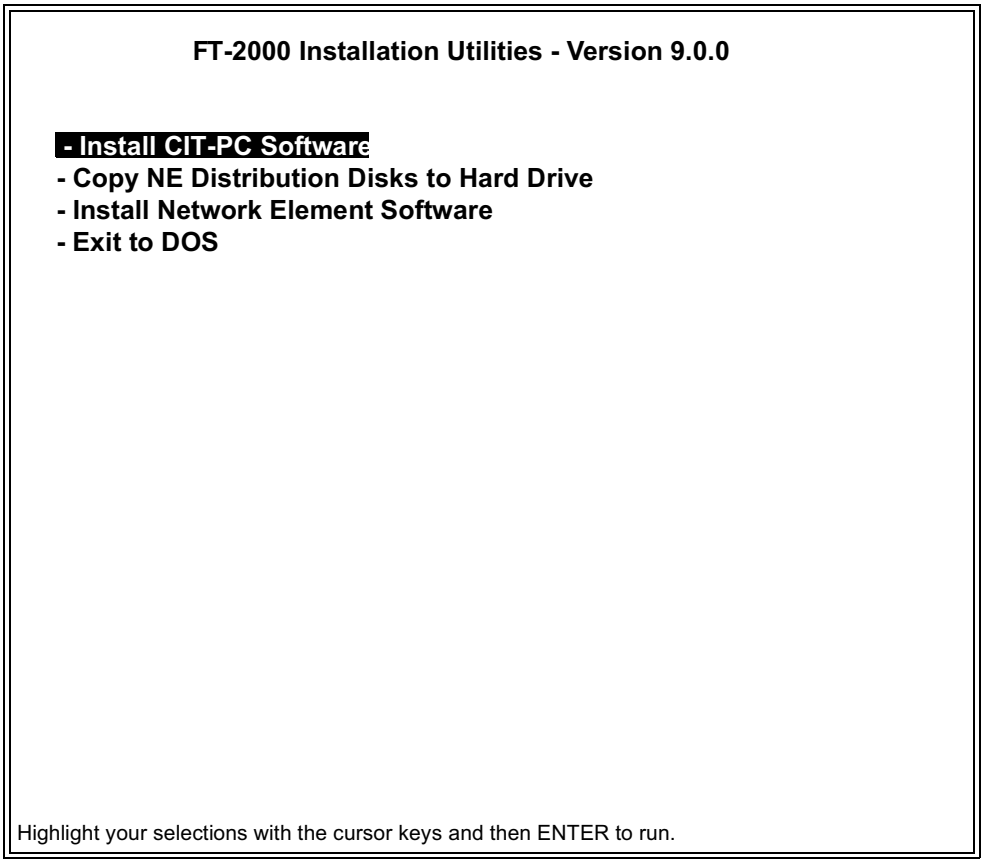
Requirement: The FAULT LED remains illuminated and a MJ alarm will be active until the software download is complete.

NOTE:
If you previously loaded the software onto the PC or laptop and are now ready to load onto the terminal continue with step 7. Otherwise proceed to step 4.

(4) Type C:”press the enter or return key” at the DOS prompt on the computer to select the hard drive.

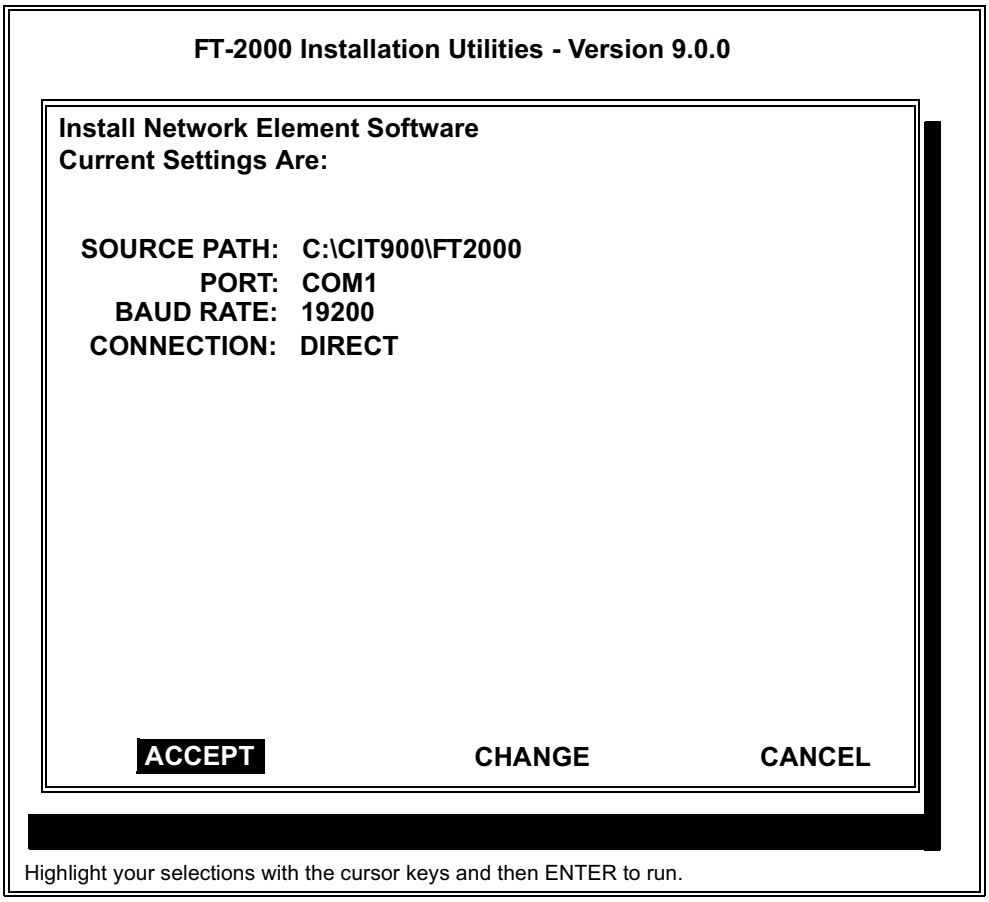
(5) Type install “press the enter or return key” at the DOS prompt.

(6) This main menu will be displayed with **Install CIT-PC Software** highlighted.



Action: Press the <down arrow> to the **Install Network Element Software** and press the <enter> key.

(7) This menu screen is displayed with **ACCEPT** highlighted.

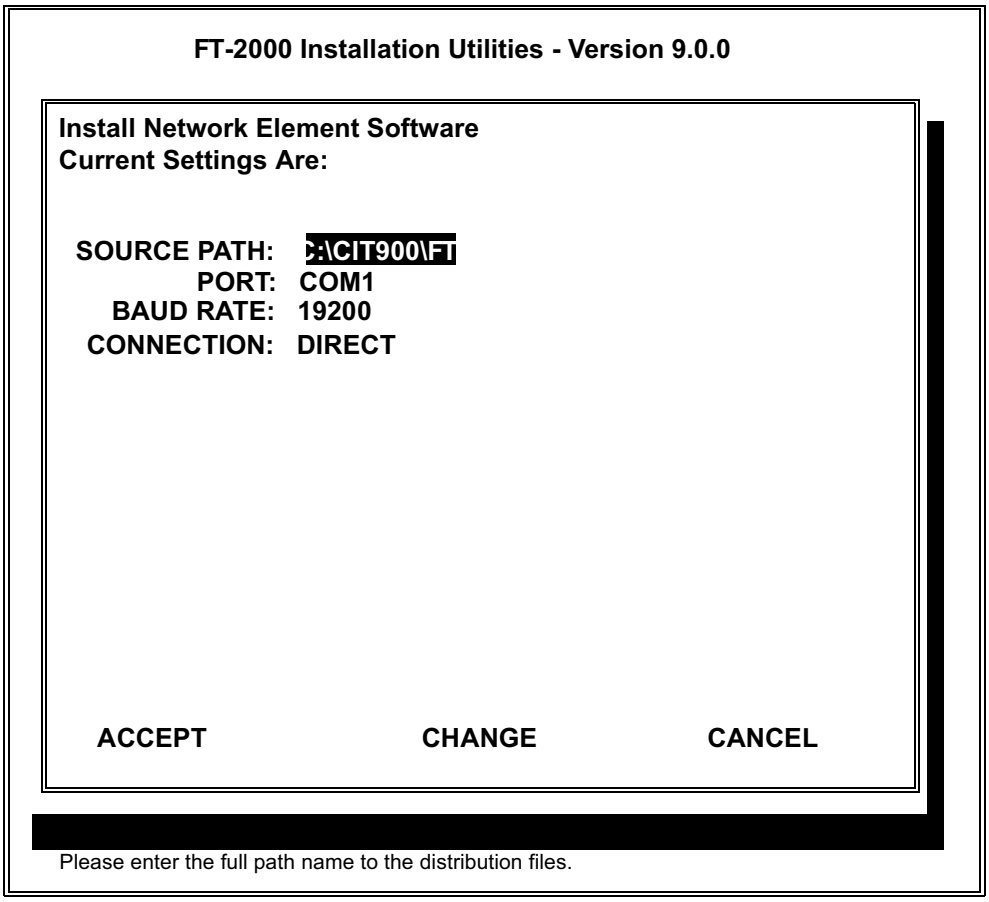


Action: The **ACCEPT** selection will be highlighted. Press the <enter> key.

(8) Proceed to step 14.

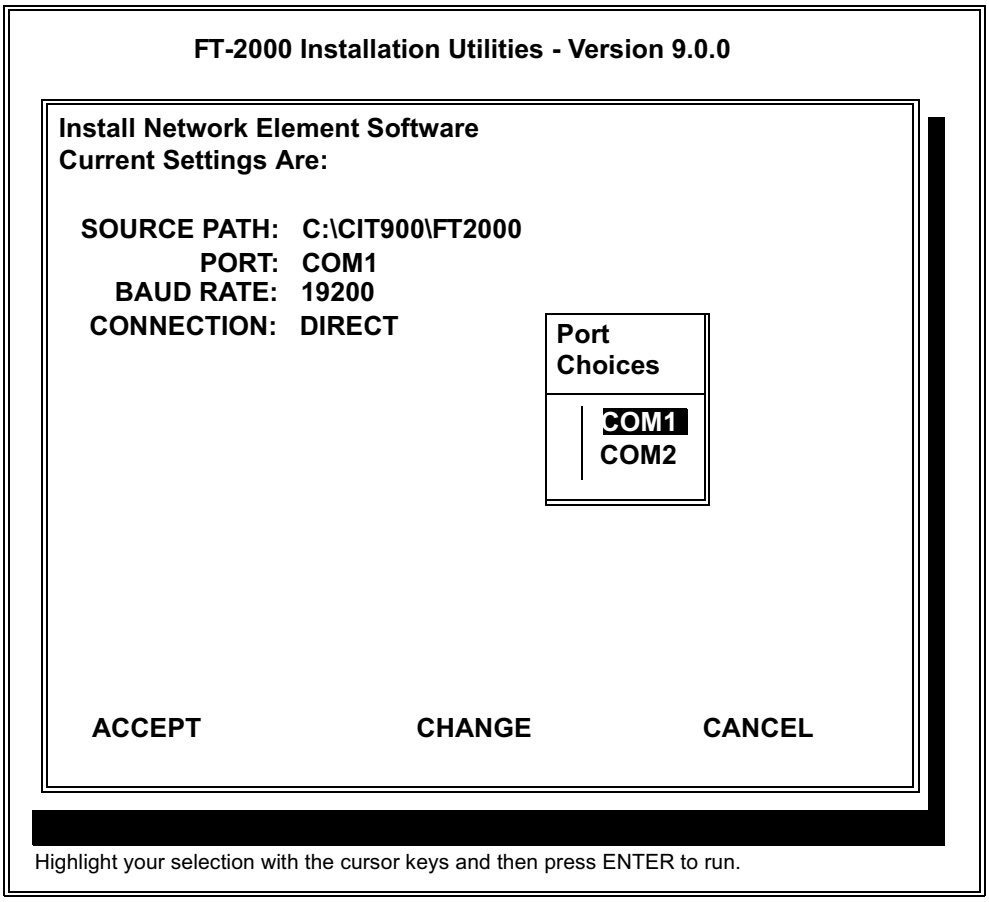
NOTE:
If source path, port, baud rate or connection needs to be changed, then press the <right arrow> key to the **CHANGE** selection and press the <enter> key and continue with step 9. In the examples shown here, the path has been changed to C:\FT200090

(9) This Install Network Element Software screen is displayed with **SOURCE PATH: C:\CIT900\FT2000** highlighted.



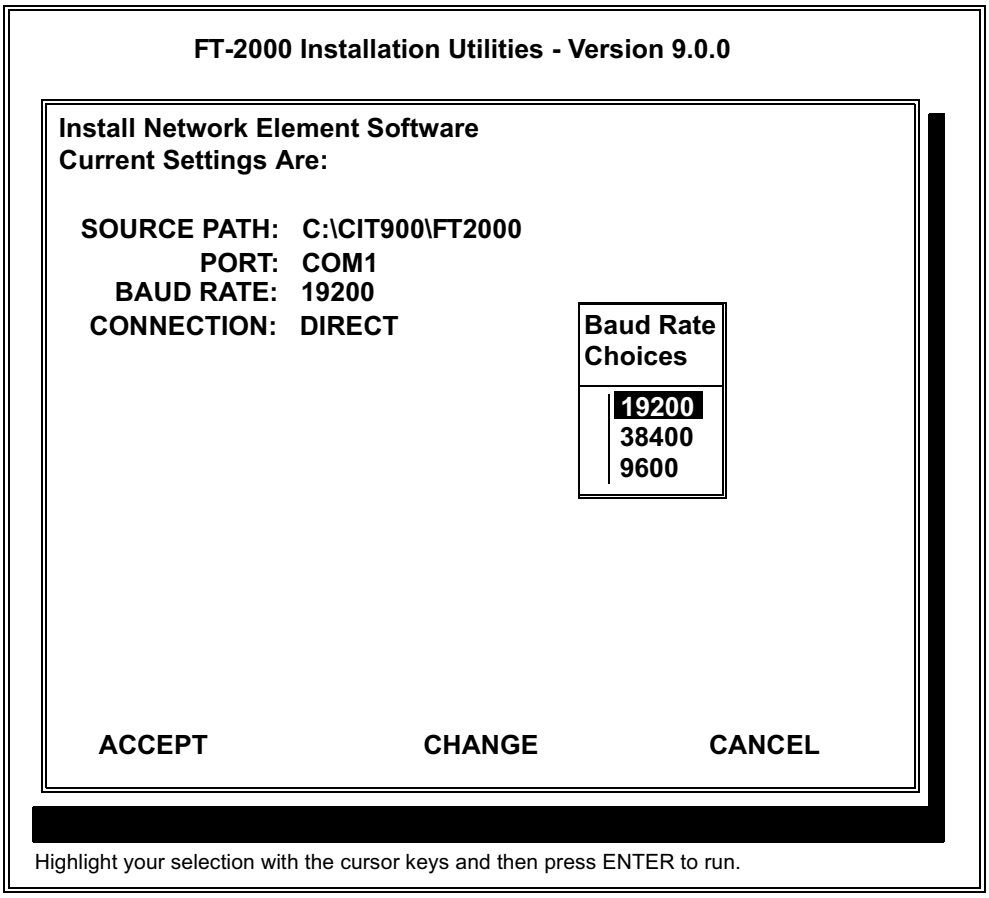
Action: Enter the full source path name to the distribution files **(default in Release 9 is C:\CIT900\FT2000)** and press the <enter> key.

(10) This Install Network Element Software screen is displayed with **COM1** highlighted.



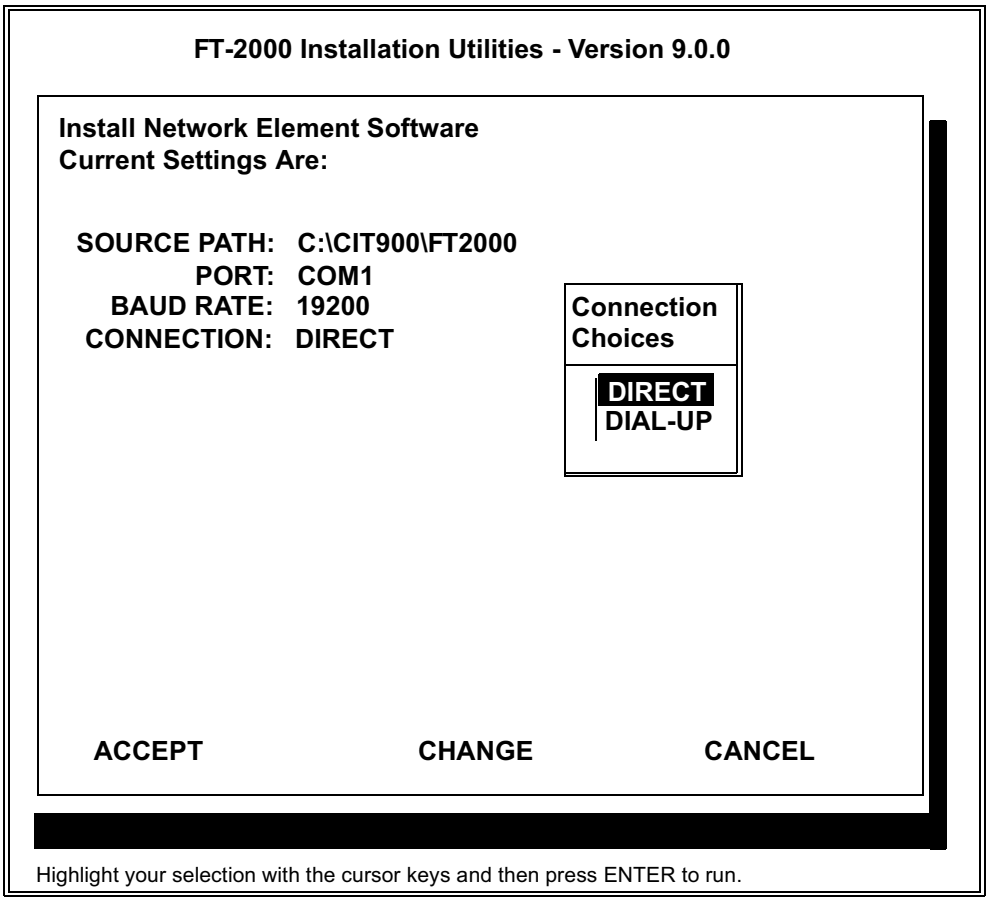
Action: Select the port and press the <enter> key.

(11) This Install Network Element Software screen is displayed with **Baud Rate 19200** highlighted.



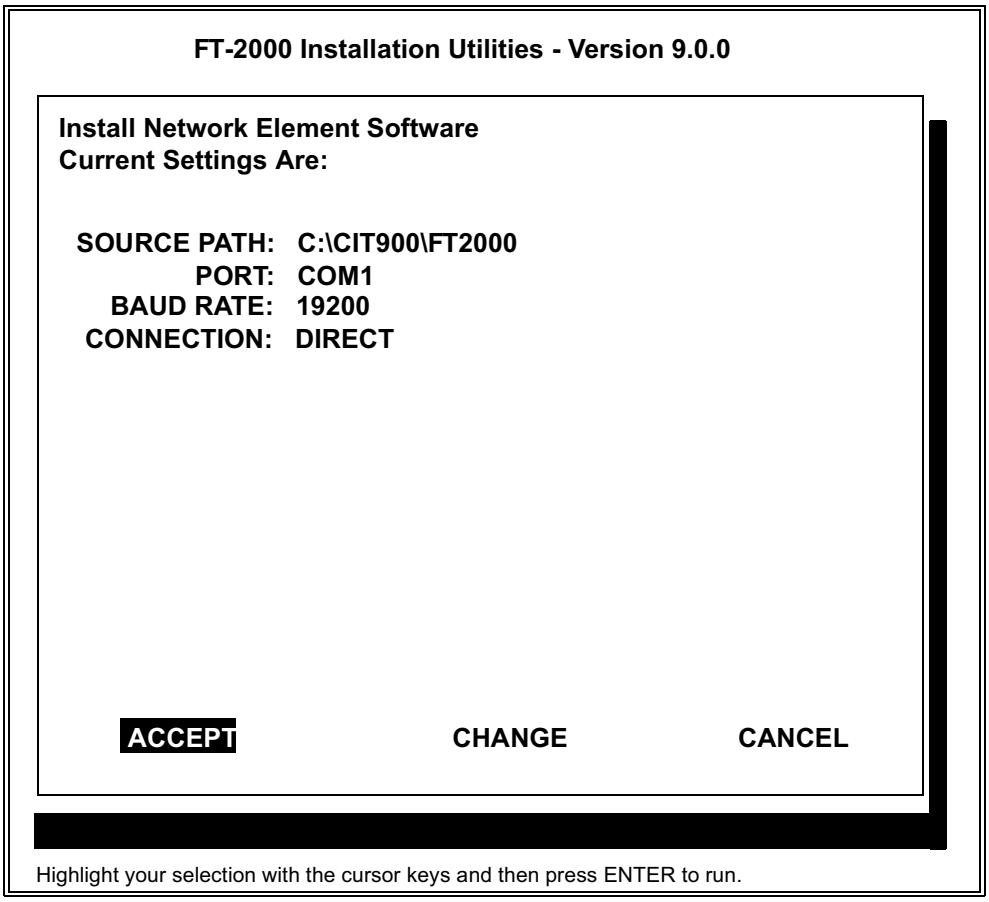
Action: Select the baud rate and press the <enter> key.

(12) This Install Network Element Software screen is displayed with Connection **DIRECT** highlighted.



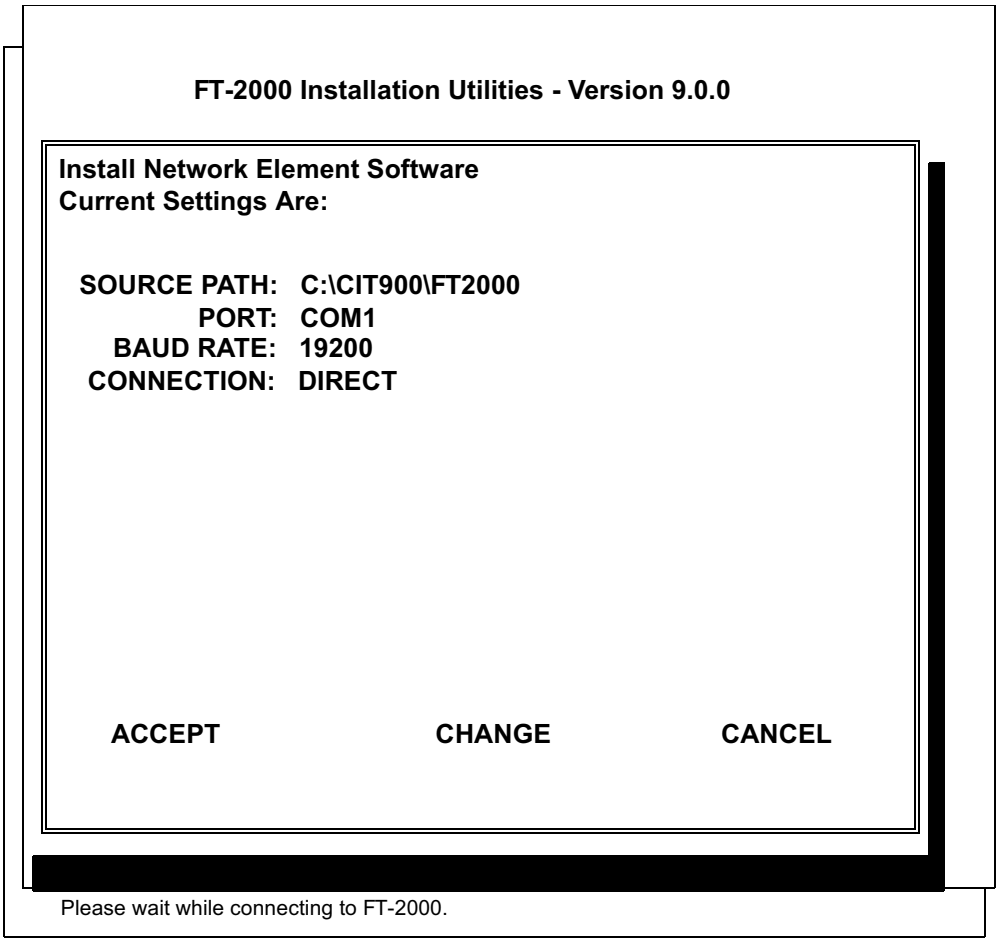
Action: Select the connection and press the <enter> key.

(13) The Element Software screen is displayed with **ACCEPT** highlighted.



Action: Press the <enter> key.

(14) This Install Network Element Software screen with the connecting message (Please wait while connecting to FT-2000) will display momentarily on the status line at the bottom of the screen.



NOTE:

If the Install program fails to connect:

(1) Exit to DOS.

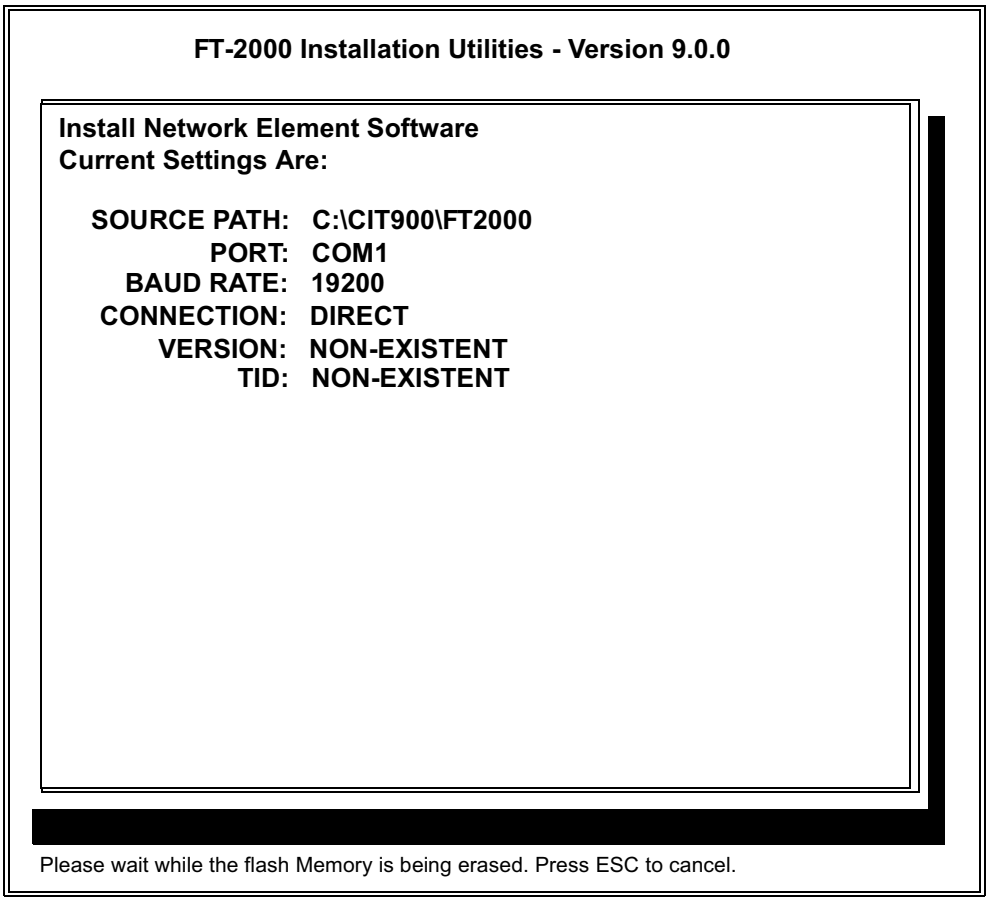
(2) Repeat the install process up to step 13, but do not execute step 13.

(3) Remove and reseat the SYSCTL.

(4) Wait 30 seconds.

(5) Repeat step 13.

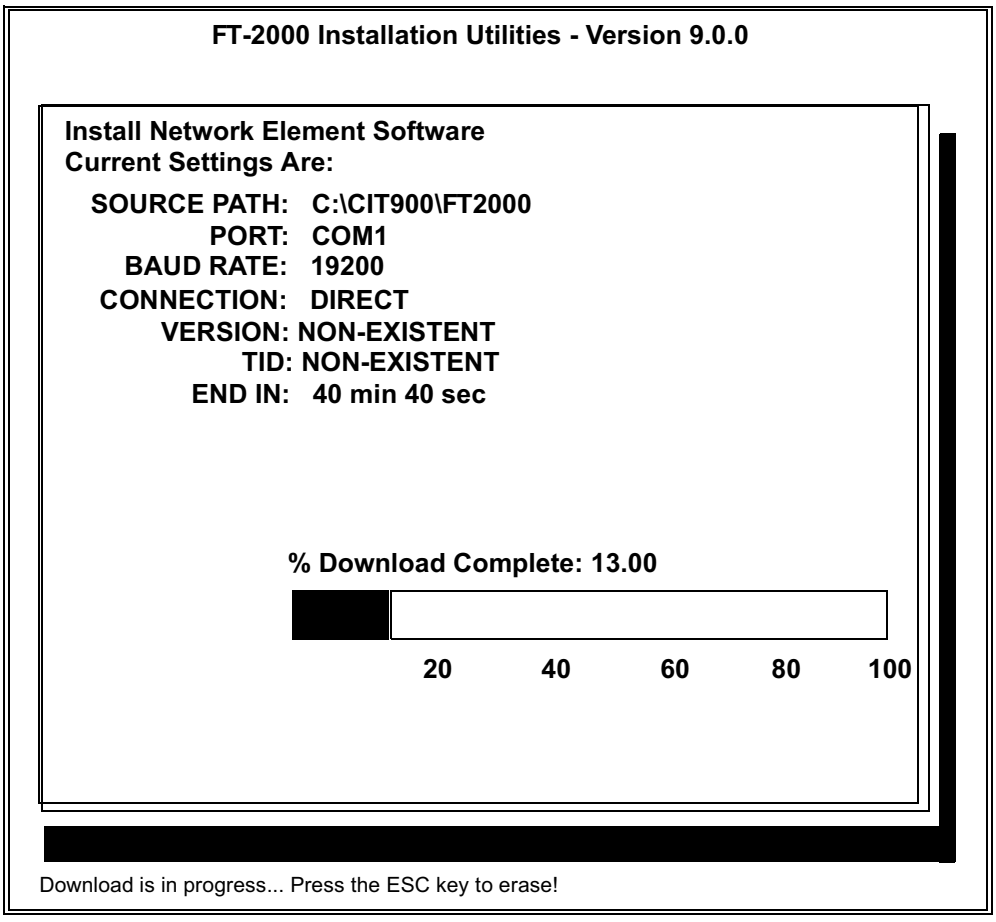
(6) This Install Network Element Software screen with the flash memory erase message displayed on the status line at the bottom of the screen.



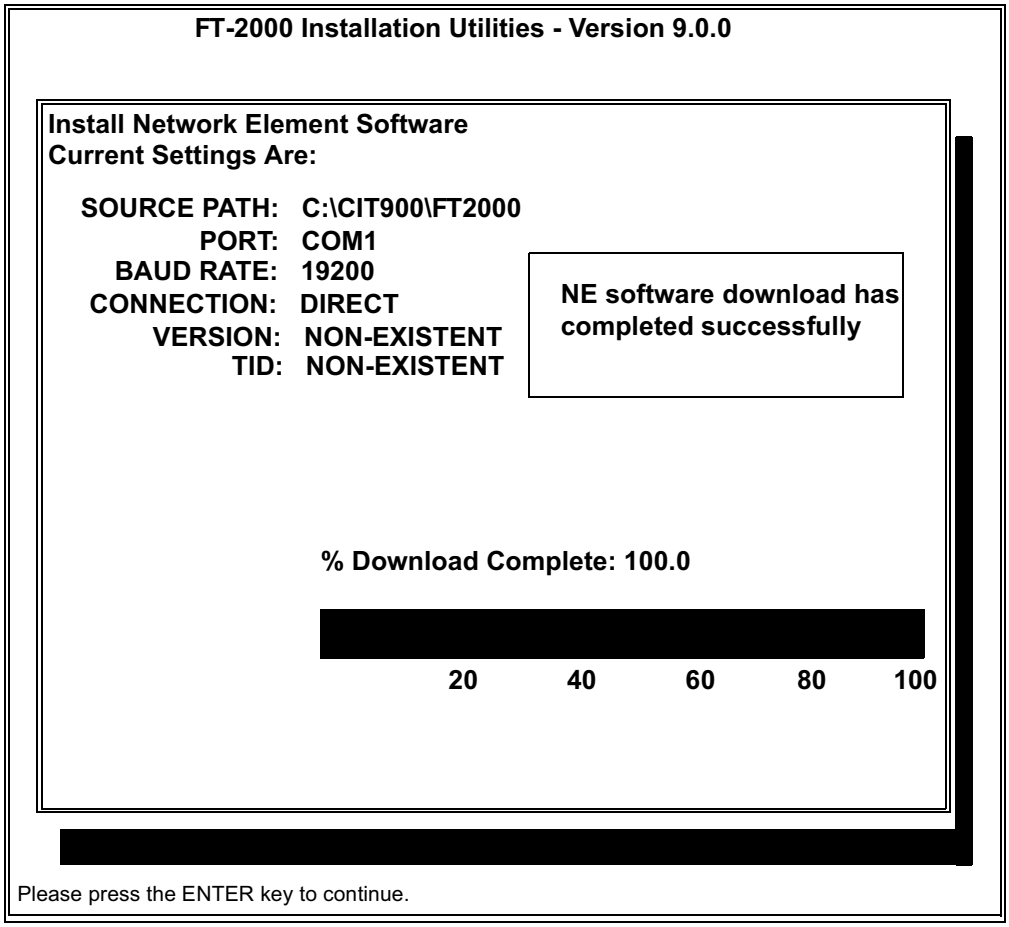
NOTE:

Erasing Flash Memory takes approximately 30 minutes. Upon completion of this, the download will automatically begin. The download process from this point will be approximately 2 hours.

(7) This screen is displayed.



(8) This screen is displayed:



(9) When the download is complete, the following occurs:

— If your SYSCTL circuit pack was not running software before you started the download (both the SYSMEM and SYSCTL LEDs were on continuously):

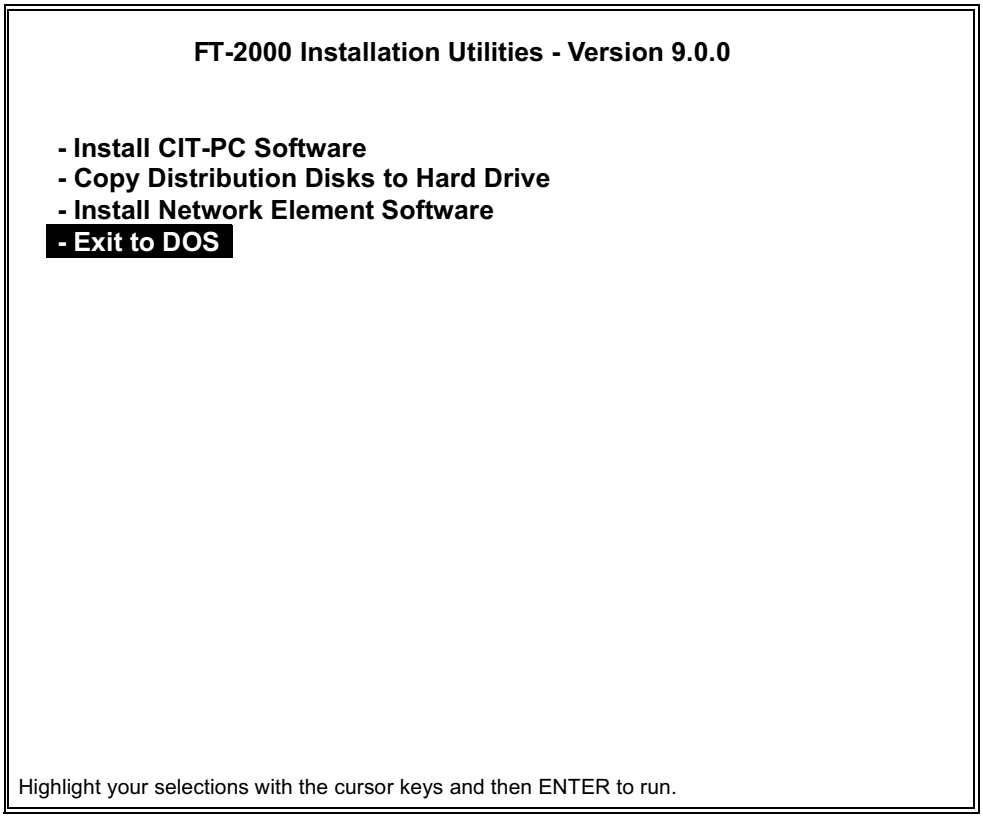
- A download confirmation message will appear on the Install screen.
- A reset will automatically be initiated by the system, and a message will briefly appear on the screen indicating that a reset is in progress.
- LEDs on the SYSMEM and SYSCTL will go off

NOTE:
All other system indicator states will be as determined by the system software now running.The audible **MJ** will be renewed during the automatic reset. You

should press the ACO button on the user panel to silence the alarm (if the central office alarms are connected).

(10) Press the <ENTER> key.

(11) This main menu will be displayed with **Exit to DOS** highlighted.:



(12) Press the <enter> key.

(13) The install program ends.

(14) Type **C:** <enter> to return to using the hard disk

(15) If you have not already done so, remove disk from the floppy drive and repackage the distribution disks.

(16) To verify the download, proceed to Initial Circuit Pack Insertion in Section 6.

LBA and DWDM Installation Information

E

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LBA and WDM Installation Information

E

Overview

This Appendix provides information to establish connectivity between LBA and WDM equipment in an FT-2000 OC-48 Ring.

LBA Alarm Cable Installation ADR Terminal

Lightwave Booster Amplifier (LBA) Alarm Cable Connection When Connected to FT-2000

Table E-1. lists the requirements for mapping the FT-2000 system to the LBA alarm contact closures to the miscellaneous discrete alarm inputs of the FT-2000 system.

Refer to Table E-1. which shows the required terminal strip and connections for the alarm cables.

Table E-1. Lightwave Booster Amplifier Miscellaneous Discrete Mapping

FT-LBA Misc. Discrete	FT-2000 Misc. Discrete	Suggested Text
Fuse/Power Alarm	14	FT-LBA Fuse/Power Failure
1EW (Service) Failure	15	FT-LBA 1EW Failure
1WE (Service) Failure	16	FT-LBA 1WE Failure

NOTE:
Connections are also required for -48 VDC office battery and its return.

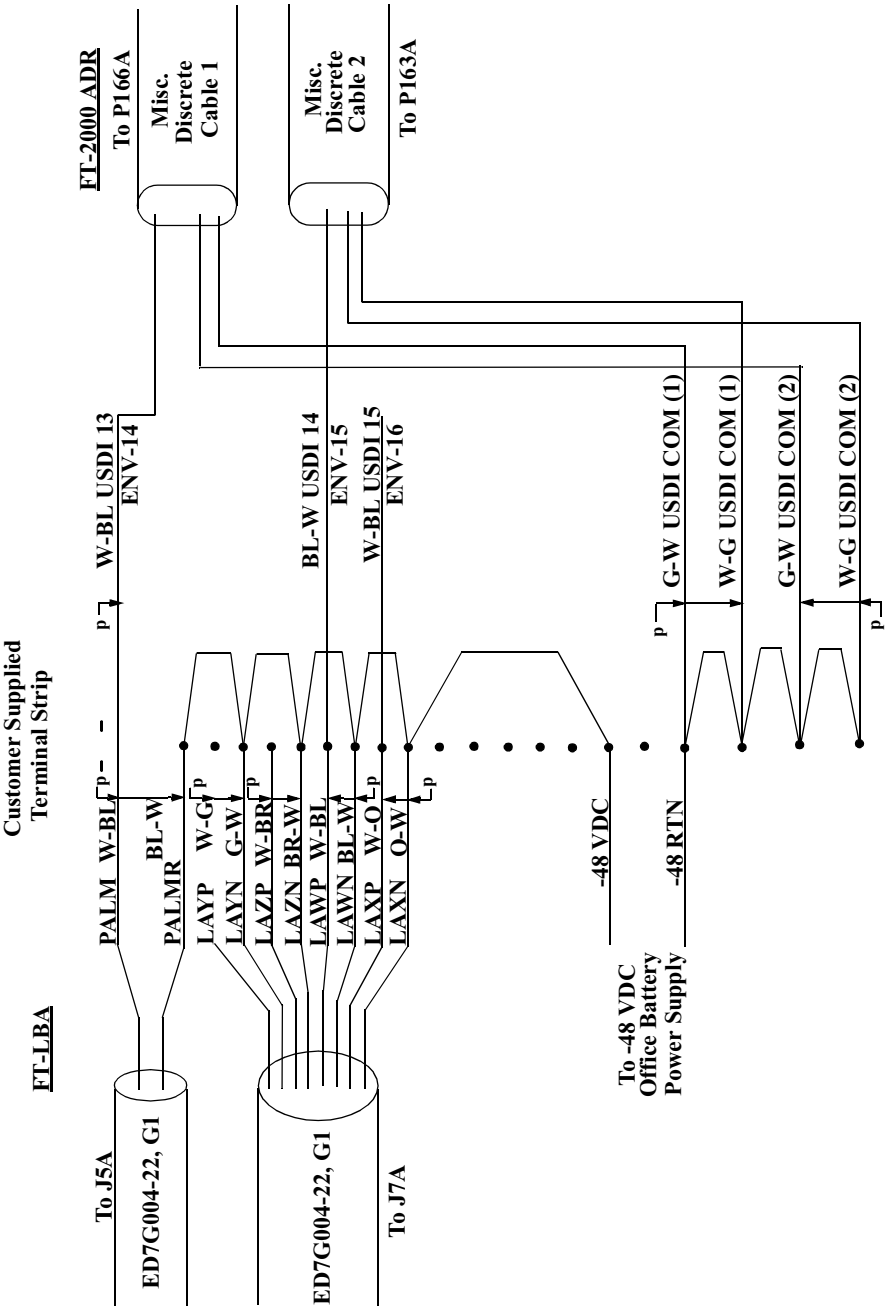


Figure E-1 Miscellaneous Discrete Connections, FT-2000 ADR Terminal to LBA

High Speed Fiber Installation Procedure 1 - Connection to an LGX Panel Through WDM

Refer to Figure E-8 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For two fiber, FT-2000 Add/drop ring through a WDM Shelf running West proceed to step 9. For two fiber, FT-2000 Add/drop ring through a WDM Shelf running East continue with step 3.

(3) Run a fiber jumper from the **OUT** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1E 1.5µm WDM **TRMTR** connector.

(4) Run a fiber jumper from the **IN** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1E 1.5µm WDM **RCVR** connector.

(5) Run a fiber jumper from the 1E 1.5µm λ1 WDM **TRMTR** to the 1.5µm λ1 FT-λ2000 ADR Bay. Run fiber down the right side of the 1E 1.5µm λ1 FT-2000 ADR Bay to the **TRMTR** connector.

(6) Run a fiber jumper from the 1E 1.5µm λ1 WDM **RCVR** to the 1.5µm λ1 FT-2000 ADR Bay. Run fiber down the right side of the 1E 1.5µm λ1 FT-2000 ADR Bay to the **RCVR** connector.

(7) Run a fiber jumper from the 1E 1.5µm λ 2 WDM **TRMTR** to the 1.5µm λ 2 FT-2000 ADR Bay. Run fiber down the right side of the 1E 1.5µm λ 2 FT-2000 ADR Bay to the **TRMTR** connector.

(8) Run a fiber jumper from the 1E 1.5µm λ 2 WDM **RCVR** to the 1.5µm λ 2 FT-2000 ADR Bay. Run fiber down the right side of the 1E 1.5µm λ 2 FT-2000 ADR Bay to the **RCVR** connector.

(9) Run a fiber jumper from the **OUT** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1W 1.5µm WDM **TRMTR** connector.

(10) Run a fiber jumper from the **IN** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1W 1.5µm WDM **RCVR** connector.

(11) Run a fiber jumper from the 1W 1.5µm λ1 WDM **TRMTR** to the 1.5µm λ1 FT-2000 ADR Bay. Run fiber down the left side of the 1W 1.5µm λ1 FT-2000 ADR Bay to the **TRMTR** connector.

(12) Run a fiber jumper from the 1W 1.5µm λ1 WDM **RCVR** to the 1.5µm λ1 FT-2000 ADR Bay. Run fiber down the left side of the 1W 1.5µm λ1 FT-2000 ADR Bay to the **RCVR** connector.

(13) Run a fiber jumper from the 1W 1.5µm λ 2 WDM **TRMTR** to the 1.5µm Rail #2 FT-2000 ADR Bay. Run fiber down the left side of the 1W 1.5µm λ 2 FT-2000 ADR Bay to the **TRMTR** connector.

(14) Run a fiber jumper from the 1W 1.5µm λ 2 WDM **RCVR** to the 1.5µm λ 2 FT-2000 ADR Bay. Run fiber down the left side of the 1W 1.5µm λ 2 FT-2000 ADR Bay to the **RCVR** connector.

(15) The fiber jumpers should hang without any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Enhanced High Speed Shelf. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(16) Fibers enter the Enhanced High Speed Shelf near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(17) Optical fibers should be left with enough slack next to the TRMTR and RCVR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(18) The protective channel will be covered when the stile strips are installed.

High Speed Fiber Installation Procedure 2 - Connection to an LGX Panel Through FT-LBA

Refer to Figure E-3 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For two fiber, FT-2000 Add/drop ring through an LBA Shelf running West-to-East proceed to step 6. For two fiber, FT-2000 Add/drop ring through an LBA Shelf running East-to-West continue with step 3.

(3) Run a fiber jumper from the **OUT** LGX to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous bay (LBA Shelf) to the 1WE LBA **OUT** connector.

(4) Run a fiber jumper from the **IN** LGX to the FT-2000 ADR Bay. Run fiber down the right side of the FT-2000 ADR Bay to the 1E RCVR connector.

(5) Run a fiber jumper from 1WE LBA **IN** connector in the LBA Shelf. Run fiber down the right side of the FT-2000 ADR Bay to the 1E TRMTR connector.

(6) Run a fiber jumper from the **OUT** LGX to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1EW LBA **OUT** connector.

(7) Run a fiber jumper from the **IN** LGX to the FT-2000 ADR Bay. Run fiber down the left side of the FT-2000 ADR Bay to the 1W RCVR connector.

(8) Run a fiber jumper from 1EW LBA **IN** connector in the LBA Shelf. Run fiber down the left side of the FT-2000 ADR Bay to the 1W TRMTR connector.

(9) The fiber jumpers should hang without any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Enhanced High Speed Shelf. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(10) Fibers enter the Enhanced High Speed Shelf near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(11) Optical fibers should be left with enough slack next to the TRMTR and RCVR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(12) The protective channel will be covered when the stile strips are installed.

High Speed Fiber Installation Procedure 3 - Connection to an LGX Panel Through WDM and FT-LBA

Refer to Figure E-5 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For two fiber, FT-2000 Add/drop ring through a WDM an LBA Shelf running West-to-East proceed to step 10. For two fiber, FT-2000 Add/drop ring through a WDM an LBA Shelf running East-to-West continue with step 3.

(3) Run a fiber jumper from the **OUT** LGX to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1EW LBA **OUT** connector.

(4) Run a fiber jumper from the **IN** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1E WDM **RCVR** connector.

(5) Run a fiber jumper from the 1E WDM **TRMTR** connector to the LBA Shelf. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1WE LBA **IN** connector.

(6) Run a fiber jumper from the 1E 1.5µm λ1 WDM **RCVR**. Run fiber down the right side of the 1.5µm λ1 FT-2000 ADR Bay to the 1E RCVR connector.

(7) Run a fiber jumper from the 1E 1.5µm λ1 WDM **TRMTR** to the 1.5µm λ1 FT-2000 ADR Bay. Run fiber down the right side of the 1.5µm λ1 FT-2000 ADR Bay to the 1E **TRMTR** connector.

(8) Run a fiber jumper from the 1E 1.5µm λ 2 WDM **RCVR**. Run fiber down the right side of the 1.5µm λ 2 FT-2000 ADR Bay to the 1E RCVR connector.

(9) Run a fiber jumper from the 1E 1.5µm λ 2 WDM **RCVR** to the 1.5µm λ 2 FT-2000 ADR Bay. Run fiber down the right side of the 1.5µm λ 2 FT-2000 ADR Bay to the 1E **TRMTR** connector.

(10) Run a fiber jumper from the **OUT** LGX to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous to the 1EW LBA **OUT** connector.

(11) Run a fiber jumper from the **IN** LGX to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1W WDM **RCVR** connector.

(12) Run a fiber jumper from the 1W WDM **TRMTR** connector to the LBA Shelf. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1EW LBA **IN** connector.

(13) Run a fiber jumper from the 1W 1.5µm λ1 WDM **RCVR**. Run fiber down the left side of the 1.5µm λ1 FT-2000 ADR Bay to the 1W RCVR connector.

(14) Run a fiber jumper from the 1W 1.5µm λ1 WDM **TRMTR** to the 1.5µm λ1 FT-2000 ADR Bay. Run fiber down the left side of the 1.5µm λ1 FT-2000 ADR Bay to the 1W **TRMTR** connector.

(15) Run a fiber jumper from the 1W 1.5µm λ 2 WDM **RCVR**. Run fiber down the left side of the 1.5µm λ 2 FT-2000 ADR Bay to the 1W RCVR connector.

(16) Run a fiber jumper from the 1W 1.5µm λ 2 WDM **RCVR** to the 1.5µm λ 2 FT-2000 ADR Bay. Run fiber down the left side of the 1.5µm λ 2 FT-2000 ADR Bay to the 1W **TRMTR** connector.

(17) The fiber jumpers should hang without any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Enhanced High Speed Shelf. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(18) Fibers enter the Enhanced High Speed Shelf near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(19) Optical fibers should be left with enough slack next to the TRMTR and RCVR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(20) The protective channel will be covered when the stile strips are installed.

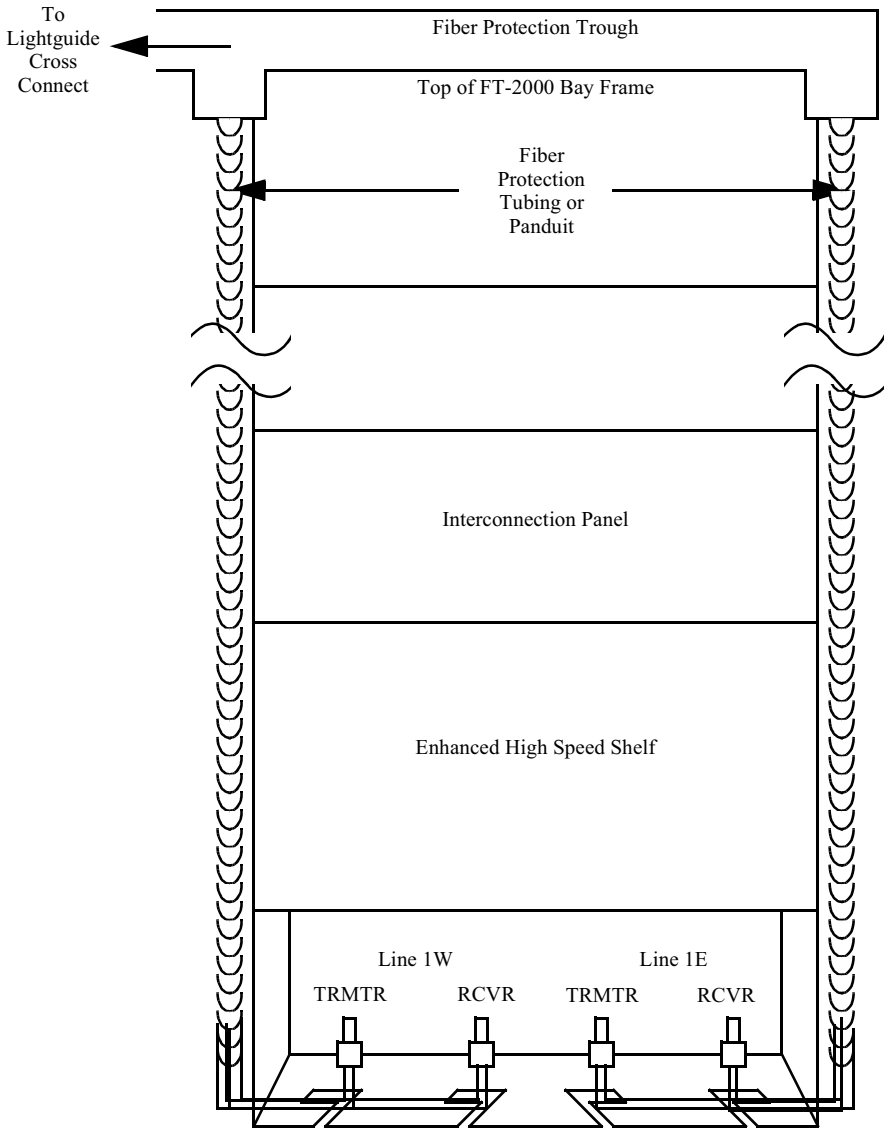


Figure E-2 FT-2000 OC-48 ADR High Speed Fiber Routing

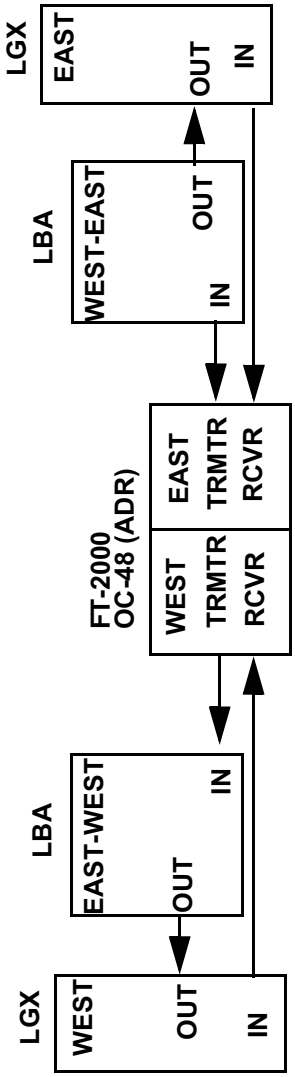


Figure E-3 FT-2000 OC-48 ADR with LBA High Speed Fiber Routing

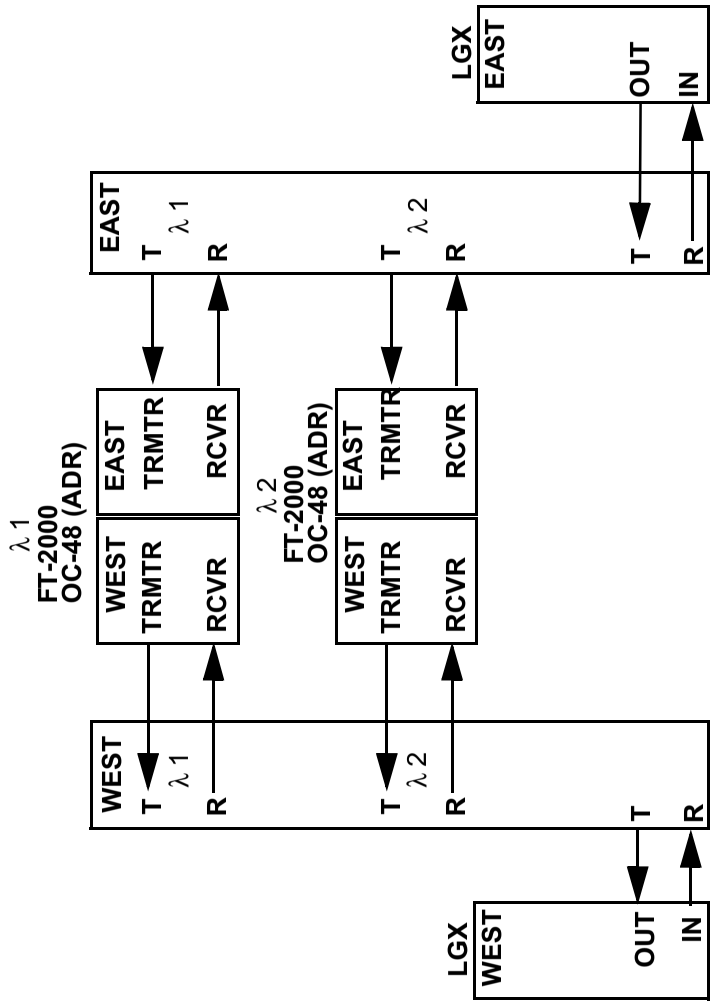


Figure E-4 FT-2000 OC-48 ADR with WDM High Speed Fiber Routing

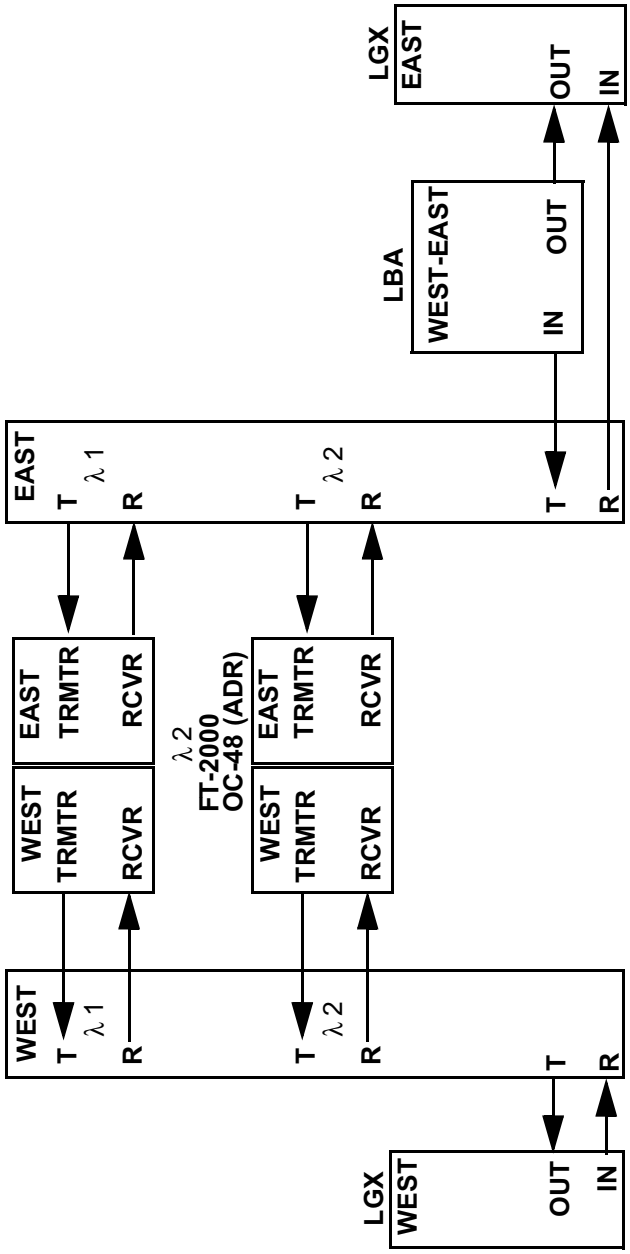


Figure E-5 FT-2000 OC-48 ADR with WDM and LBA High Speed Fiber Routing

LBA Alarm Cable Installation Repeater Bay

Lightwave Booster Amplifier (LBA) Alarm Cable Connection When Connected to FT-2000

Table E-1. lists the requirements for mapping the LBA alarm contact closures to the miscellaneous discrete alarm inputs of the FT-2000 systems.

Refer to Figure E-6, which shows the required terminal strip and connections for the alarm cables.

NOTE:
Connections are also required for -48 VDC office battery and its return.

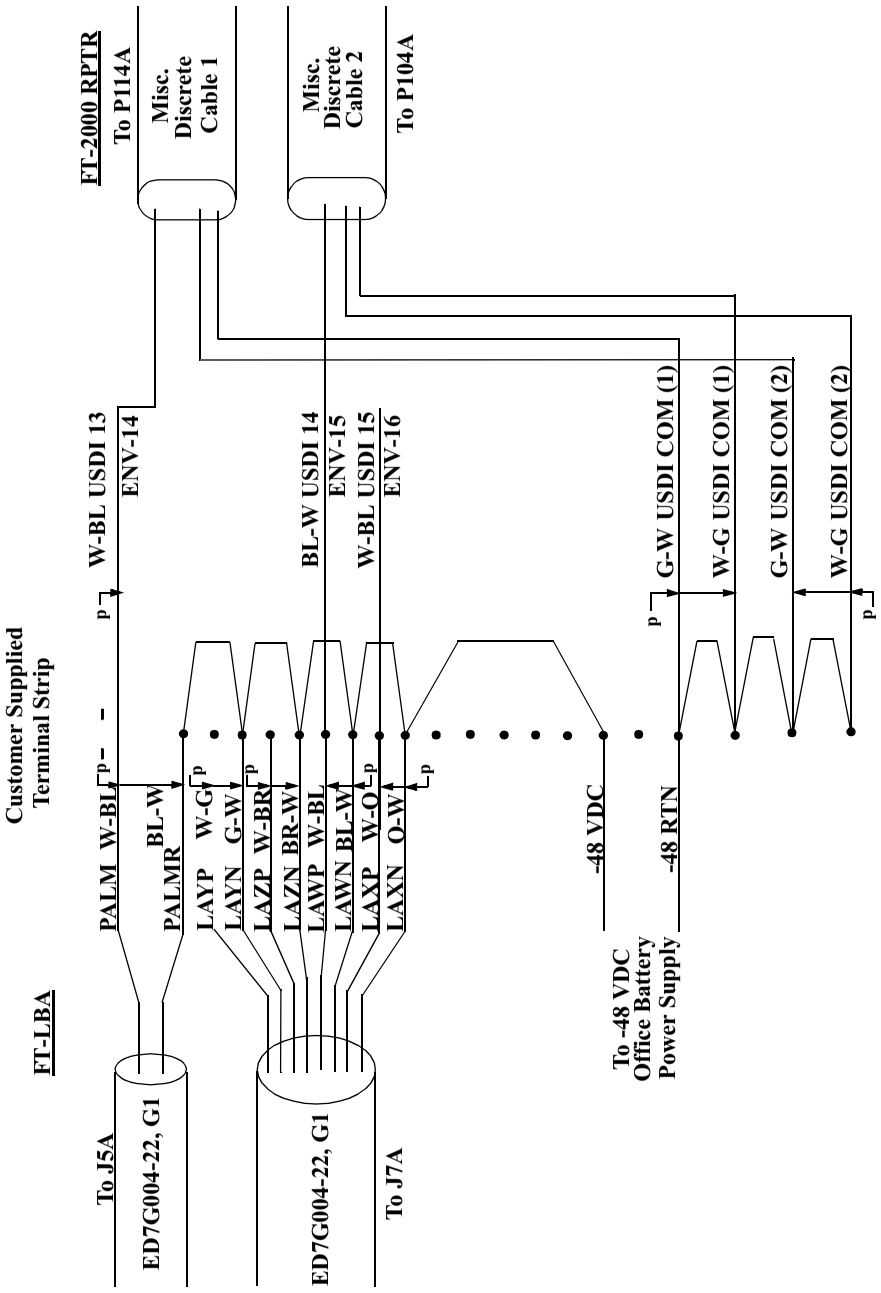


Figure E-6 Miscellaneous Discrete Connections, FT-2000 Repeater Bay to LBA

High Speed Fiber Installation Procedure 4 - Connection to an LGX Panel Through WDM

Refer to Figure E-8 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For a two fiber ring, FT-2000 Add/drop ring with an Repeater Shelf-System Controller, running West-to-East proceed to step 9. For a two fiber ring, FT-2000 Add/drop ring with a Repeater Shelf-System Controller, running East-to-West continue with step 3.

(3) Run a fiber jumper from the assigned **IN** (LGX) to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1E 1.5µm WDM **RCVR** connector.

(4) Run a fiber jumper from the 1E WDM 1.5µm λ1 **RCVR** connector to the 1.5µm Rail #1 FT-2000 Repeater Shelf-System Controller. Run fiber down the left side of the 1EW 1.5µm λ1 FT-2000 Repeater Shelf-System Controller to the REGENR (**IN**) connector.

(5) Run a fiber jumper from the 1E WDM 1.5µm λ 2 **RCVR** connector to the 1.5µm Rail #2 FT-2000 Repeater Shelf-System Controller. Run fiber down the left side of the 1EW 1.5µm λ 2 FT-2000 Repeater Shelf-System Controller to the REGENR (**IN**) connector.

(6) Run a fiber jumper from the 1EW 1.5µm λ1 FT-2000 Repeater Shelf-System Controller REGENR (**OUT**) connector. Run fiber down the left side of the miscellaneous bay to the 1W WDM 1.5µm λ1 **RCVR** connector.

(7) Run a fiber jumper from the 1EW 1.5µm λ 2 FT-2000 Repeater Shelf-System Controller REGENR (**OUT**) connector. Run fiber down the left side of the miscellaneous bay to the 1W WDM 1.5µm λ 2 **RCVR** connector.

(8) Run a fiber jumper from the miscellaneous (WDM Shelf) bay 1E WDM **TRMTR** connector. Run the fiber jumper to the assigned **OUT** (LGX).

(9) Repeat steps 1 through 8 for 1WE direction.

NOTE:
Fibers 1 (Transmit and Receive) for the (FT-2000 Repeater Shelf-System Controller) West line must be routed down the left side of the bay in the fiber protection channel.

(10) The fiber jumpers should hang with out any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Repeater Shelf-System Controller. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly

laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(11) Fibers enter the Repeater Shelf-System Controller near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(12) Optical fibers should be left with enough slack next to the REGENR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

The protective channel will be covered when the stile strips are installed.

High Speed Fiber Installation Procedure 5 - Connection to an LGX Panel Through FT-LBA

Refer to Figure -8 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For an FT-2000 Add/drop ring with a Repeater Shelf-System Controller, route the optical fibers per the following:

(3) Run a fiber jumper from the **OUT** LGX to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1EW LBA **OUT** connector.

(4) Run a fiber jumper from the **IN** LGX to the FT-2000 Repeater Shelf-System Controller. Run fiber down the left side of the FT-2000 Repeater Shelf-System Controller to the 1EW REGENR (**IN**) connector.

(5) Run a fiber jumper from 1EW LBA **OUT** connector in the LBA Bay. Run fiber down the left side of the 1EW FT-2000 Repeater Shelf-System Controller to the REGENR (**OUT**) connector.

(6) Repeat steps 1 through 5 for 1WE direction.

NOTE:
Fibers 1 (Transmit and Receive) for the (FT-2000 Repeater Shelf-System Controller) West line must be routed down the left side of the bay in the fiber protection channel.

(7) The fiber jumpers should hang with out any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Repeater Shelf-System Controller. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced

in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(8) Fibers enter the Repeater Shelf-System Controller near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(9) Optical fibers should be left with enough slack next to the REGENR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(10) The protective channel will be covered when the stile strips are installed.

High Speed Fiber Installation Procedure 6 - Connection to an LGX Panel Through WDM and FT-LBA

Refer to Figure -8 during this procedure.

(1) Clean the optical connectors following DLP - 510 of document 365-575-102 or 365-575-103 *OC-48 FT-2000 Lightwave System User/Service Manual*.

(2) For a two fiber ring, FT-2000 Add/drop ring with an Repeater Shelf-System Controller with WDM and LBA, running West-to-East proceed to step 10. For a two fiber ring, FT-2000 Add/drop ring with a Repeater Shelf-System Controller with WDM and LBA, running East-to-West continue with step 3.

(3) Run a fiber jumper from the assigned **IN** (LGX) connector to the miscellaneous (WDM Shelf) bay. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1E 1.5µm WDM **RCVR** connector.

(4) Run a fiber jumper from the 1E WDM 1.5µm λ1 **RCVR** connector to the 1.5µm Rail #1 FT-2000 Repeater Shelf-System Controller. Run fiber down the left side of the 1EW 1.5µm λ1 FT-2000 Repeater Shelf-System Controller to the REGENR (**IN**) connector.

(5) Run a fiber jumper from the 1E WDM 1.5µm λ 2 **RCVR** connector to the 1.5µm λ 2 FT-2000 Repeater Shelf-System Controller. Run fiber down the left side of the 1EW 1.5µm λ 2 FT-2000 Repeater Shelf-System Controller to the REGENR (**IN**) connector.

(6) Run a fiber jumper from the 1EW 1.5µm λ1 FT-2000 Repeater Shelf-System Controller REGENR (**OUT**) connector. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1W WDM 1.5µm λ1 **TRMTR** connector.

(7) Run a fiber jumper from the 1EW 1.5µm λ 2 FT-2000 Repeater Shelf-System Controller REGENR (**OUT**) connector. Run fiber down the left side of the miscellaneous (WDM Shelf) bay to the 1W WDM 1.5µm λ 2 **TRMTR** connector.

(8) Run a fiber jumper from 1W WDM **TRMTR** connector to the miscellaneous (LBA Shelf) bay. Run fiber down the left side of the miscellaneous (LBA Shelf) bay to the 1EW LBA **IN** connector.

(9) Run a fiber jumper from the miscellaneous (LBA Shelf) bay 1EW LBA **OUT** connector. Run fiber jumper to the assigned **OUT** (LGX).

(10) Repeat steps 1 through 9 for 1WE direction.

NOTE:

Fibers 1 (Transmit and Receive) for the (FT-2000 Repeater Shelf-System Controller) West line must be routed down the left side of the bay in the fiber protection channel.

(11) The fiber jumpers should hang with out any obstructions in the fiber protection channel. The jumpers should be routed out of the side of the protection channel near the bottom so that they can be properly dressed in the Repeater Shelf-System Controller. Make sure the bend radius of the fiber is not exceeded when dressing the fiber. Fibers should never be directly laced in place or cable tied. If secure dressing is not achieved with the steps above then place the fibers in protective tubing and lace the tubing to the protective channel.

(12) Fibers enter the Repeater Shelf-System Controller near the bottom front of the shelf and should be routed up to the optical packs through the notches along the bottom edge of the shelf. Do not crimp the fiber and maintain bend radius greater than the minimum.

(13) Optical fibers should be left with enough slack next to the REGENR circuit packs slots for later connection. Be sure to tuck fibers into the trough so that attaching and closing the shelf cover does not crimp the fiber.

(14) The protective channel will be covered when the stile strips are installed.

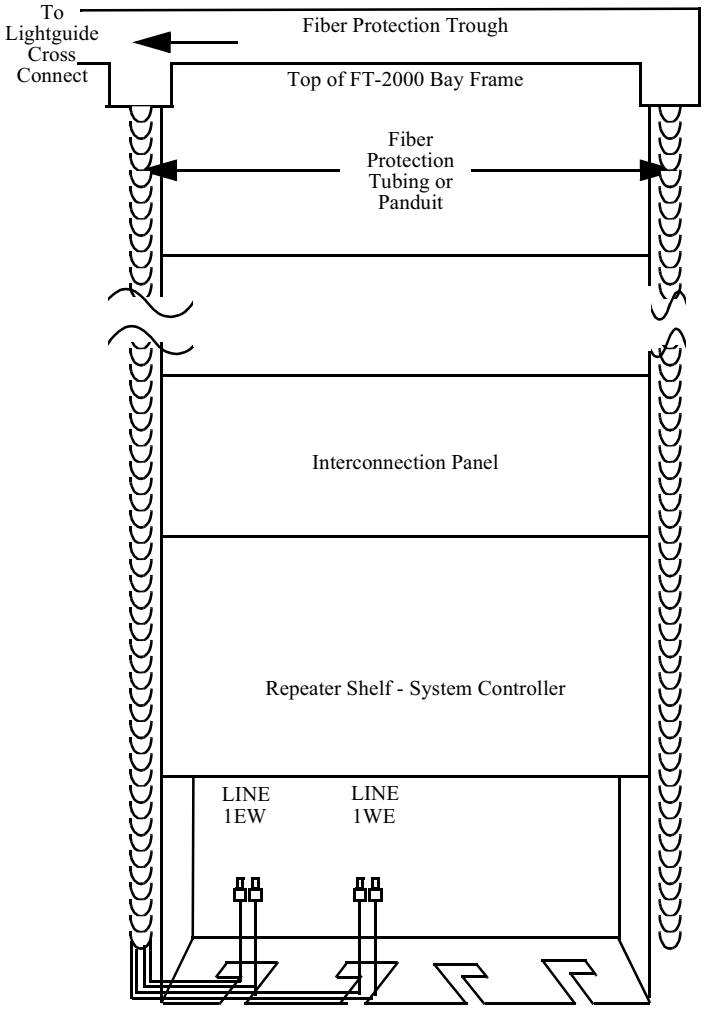


Figure E-7 FT-2000 OC-48 RPTR High Speed Fiber Routing

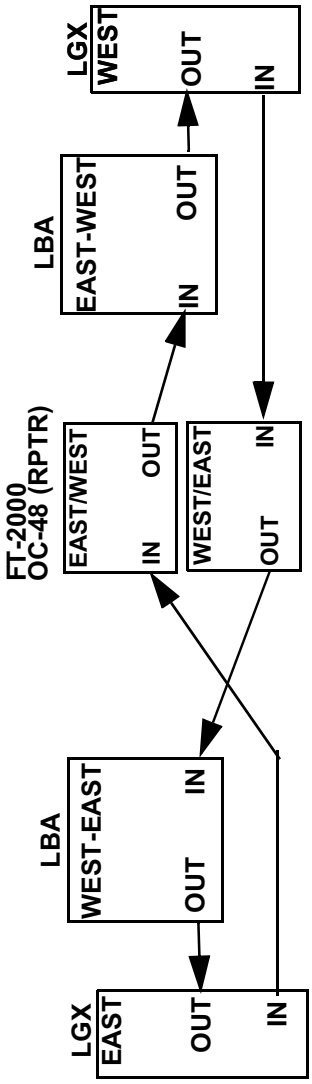


Figure E-8 FT-2000 OC-48 RPTR with LBA High Speed Fiber Routing

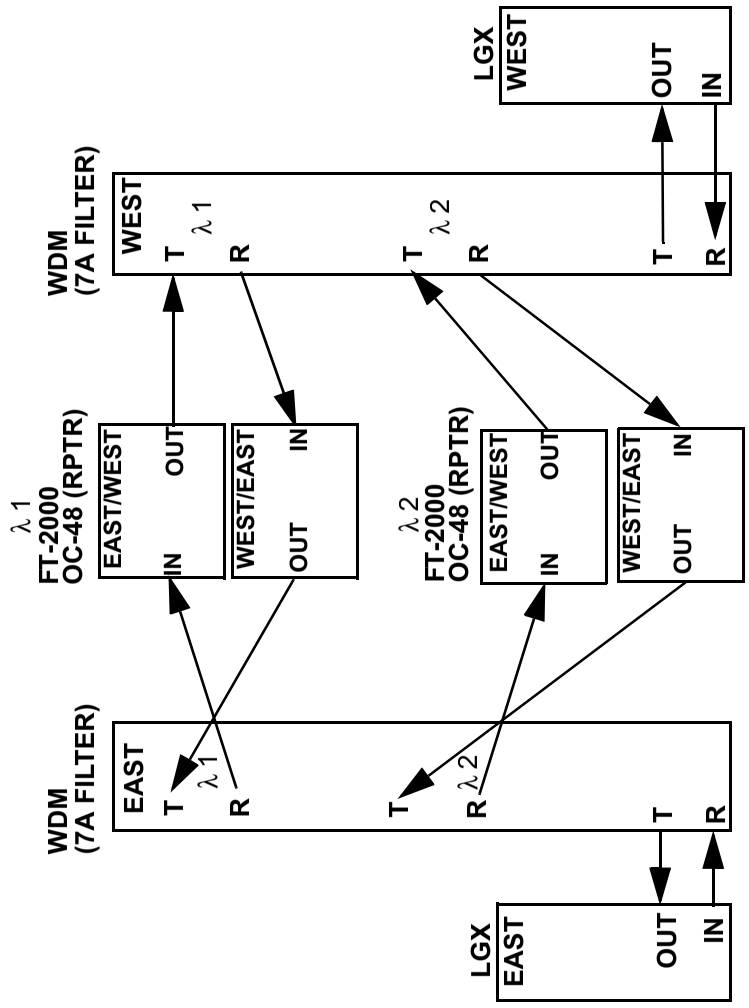


Figure E-9 FT-2000 OC-48 RPTR with WDM High Speed Fiber Routing

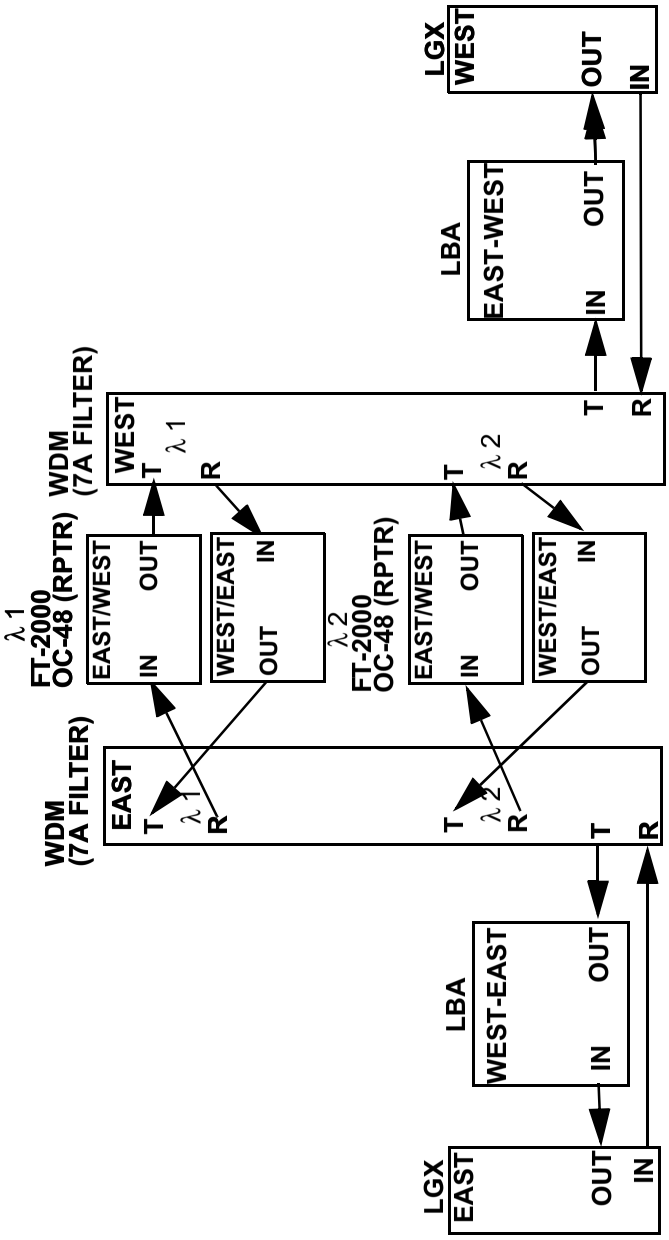


Figure E-10 FT-2000 OC-48 RPTR with WDM and LBA High Speed Fiber Routing

Local Installation Testing - ADR Terminal

NOTE:
Refer to Chapter 7 of this manual before preceding with this section.

Tools, Test Sets and Accessories

The following equipment is required in addition to what is listed in Chapter 7 for performing installation Auto Turnup tests:

- This item is only required if the FT-2000 system is interconnecting with a Lucent Technologies LBA system. Two optical 93AK8573 35dB Test cables for loopback testing LBAs.

Auto Turnup Local

Auto Turnup (local) Test Description

For the FT-2000 OC-48 Add/Drop Rings Terminal, this test verifies the wiring between the low speed and high speed shelves by testing the low speed to high speed connection capabilities. The local equipment test verifies signal continuity for each low speed slot that is equipped. In addition, the test verifies the low speed protection path for each low speed slot that is equipped. The test may take up to 10 minutes to complete.

If failed slots are indicated, replace the circuit pack. Repeat the test until all slots pass the test. If the shelf is not fully equipped, move circuit packs into unequipped slots 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 Transmitter and Receiver.

Auto Turnup (local) Test Procedure

Auto Turnup (local) for the FT-2000 OC-48 Add/Drop Rings Terminal:

Perform the following steps for Auto Turnup (local) test:

(1) Terminate any low speed output port, which has a circuit pack driving the output in that slot, into 75 ohms to ground. Either use termination plugs at the low speed crossconnect as required for many non Lucent Technologies vendor panels, or use the internal termination of the crossconnect present when the jack is open on most Lucent Technologies panels. An alternative method is to terminate the output of the first signal port into the input of the second port, and so on, until the output of the last port is terminated into a Bit Error Rate Test Set receiver input.

NOTE:

Be sure to terminate into an equipped slot, and a slot of the same type of circuit pack. Failure to terminate low speed output ports may invalidate test results.

(2) RCVR's are shipped from the factory with a 0dB attenuator in the connector block on the faceplate. Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1E RCVR. Be sure that connections are clean. To remove the buildout, press the tab on the top of the buildout with a small blunt tool. With the tab pressed, rotate the buildout counterclockwise slightly, and slide the buildout out of the connector block along the angle of the connector block. Insertion of the 15dB or 20dB attenuator is the opposite of removal.

(3) If this Add/drop ring bay is **not connecting** to a WDM then, continue with step 4. If it will be connected to a WDM then proceed to step 8.

(4) Using a fiber jumper, connect the **OUT** connector of the 1E TRMTR to the **IN** connector of the 1E RCVR.

(5) Remove the 0dB attenuator in the connector block of the 1W RCVR and replace it with a 15dB or 20dB attenuator. Be sure that connections are clean.

(6) Using a fiber jumper, connect the **OUT** connector of the 1W TRMTR to the **IN** connector of the 1W RCVR.

(7) Proceed to step 14.

(8) Using a fiber jumper, connect the 1.5µm λ1 1E TRMTR connector to the 1E 1.5µm λ1 WDM TRMTR connector.

(9) Using a fiber jumper, connect the 1.5µm λ1 1E RCVR connector to the 1E 1.5µm λ1 WDM RCVR connector.

(10) Using a fiber jumper, connect the 1.5µm λ 2 1E TRMTR connector to the 1E 1.5µm λ 2 WDM TRMTR connector.

(11) Using a fiber jumper, connect the 1.5µm λ 2 1E RCVR connector to the 1E 1.5µm λ 2 WDM RCVR connector.

(12) Using an optical loop cable, connect the 1E WDM TRMTR and the RCVR connectors.

(13) Repeat steps 8 through 12 for the 1W direction.

(14) Execute **FAULT_reset.**

Requirement: The command completes. The full Reset time is about 10 minutes. The Reset will cause the CIT to be disconnected from the Network Element.

NOTE:
When logged into the EXPERT mode and a reset is performed, to get back into the EXPERT mode it is required to log out to MS-DOS prompt and type “CIT EXPERT” again.

(15) Log back into the Network Element.

(16) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both RCVR’s are off.

(17) Execute **FAULT_Test_Auto Turnup_All_Local**.This test will take up to 10 minutes, depending on how many low speed interface slots are equipped.

Requirement: Results will be displayed on the CIT screen. A **g** represents a good slot. An **F** represents a failed slot. 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. The report below shows a passing test for a terminal with four LAA2 or LAA4 circuit packs equipped in slots 1A, 1B, 2A and P1.

.

```
   MAJOR LUCENT TECHNOLOGIES PF-2000 9.0.0-ADR ATT-FT-2000 LOCAL ONLY



 ATT-FT-2000 70-01-01 03:21:24
M Test-Auto Turnup-Local: COMPLD
   /* Test-Auto Turnup Report - Local Test
   ================================================================
    --TRMTR-- --RCVR--   ---TG---  --LSSW--  --OHCTL--         --TOHCTL--
    1W   1E   1W   1E    1    2    IN  OUT   1W    1E   LNCTL
    g    g    g    g     g    g    g    g    g     g     g        g

_
                 --------------LS INTFC-------------
                 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 p p
                 A B A B A B A B A B A B A B A B 1 2
                 g g g - - - - - - - - - - - - g -
   */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP   REMOTE  INPUT LOGOUT  EXIT                       REPEAT
```

(18) Move all low speed interface circuit packs (LAA2 or LAA4) into unequipped slots to the right.

(19) Repeat steps 16 and 17 for previously unequipped slots until all slots are tested.

(20) When all slots are tested, move the LAA2 or LAA4 circuit packs back to the left-most slots or customer assigned slots.

(21) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms.

(22) Remove optical loopback cables. Restore attenuators in RCVR's.

Auto Turnup (local) for the FT-2000 OC-48 Add/ Drop Rings Terminal With LBA:

Perform the following steps for Auto Turnup (local) test:

(1) Terminate any low speed output port, which has a circuit pack driving the output in that slot, into 75 ohms to ground. Either use termination plugs at the low speed crossconnect as required for many non Lucent Technologies vendor panels, or use the internal termination of the crossconnect present when the jack is open on most Lucent Technologies panels. An alternative method is to terminate the output of the first signal port into the input of the second port, and so on, until the output of the last port is terminated into a Bit Error Rate Test Set receiver input.

NOTE:

Be sure to terminate into an equipped slot, and a slot of the same type of circuit pack. Failure to terminate low speed output ports may invalidate test results.

(2) RCVR's are shipped from the factory with a 0dB attenuator in the connector block on the faceplate. Be sure that connections are clean.

(3) If an LBA Add/drop ring, continue with step 4. If a two fiber ring (WDM and LBA), proceed to step 10.

(4) Using a fiber jumper, connect the 1E TRMTR to the 1WE LBA **IN** connector.

(5) Connect one end of a 93AK8573 35dBm Test Cable to the 1E LBA **OUT** connector and the other end to an optical power meter.

(6) Measure the optical output power. The power should be the specification for the type of undriven 2705C() LBA measured minus the test cable loss.

Requirement: Measured optical output power plus test cable loss (marked on cable) must be greater than +6.5 dBm.

(7) Connect the 93AK8573 35dB Test Cable to the 1E RCVR connector.

(8) Repeat steps 4 through 7 for the 1W direction and 1EW LBA.

(9) Proceed to step 20.

(10) Using a fiber jumper, connect the 1.5μm λ1 1E TRMTR connector to the 1E 1.5μm λ1 WDM TRMTR connector.

(11) Using a fiber jumper, connect the 1.5μm λ1 1E RCVR connector to the 1E 1.5μm λ1 WDM RCVR connector.

(12) Insert a 10dB attenuator on the 1.5μm λ 2 1E TRMTR connector.

(13) Using a fiber jumper, connect the 1.5μm λ 2 1E TRMTR connector to the 1E 1.5μm λ 2 WDM TRMTR connector.

(14) Using a fiber jumper, connect the 1.5μm λ 2 1E RCVR connector to the 1E 1.5μm λ 2 WDM TRMTR connector

(15) Using a fiber jumper, connect the 1E WDM TRMTR to the 1WE LBA **IN** connector.

(16) Connect one end of a 93AK8573 35dBm Test Cable to the 1WE LBA **OUT** connector and the other end to an optical power meter.

(17) Measure the optical output power. The power should be the specification for the type of undriven 2705C() LBA measured minus the test cable loss.

Requirement: Measured optical output power plus test cable loss (marked on cable) must be greater than +6.5 dBm.

(18) Connect the 93AK8573 35dB Test Cable to the 1E WDM RCVR connector.

(19) Repeat steps 10 through 18 for the 1W direction and the 1EW LBA.

(20) Execute **FAULT_reset.**

Requirement: The command completes. The full Reset time is about 10 minutes. The Reset will cause the CIT to be disconnected from the Network Element.

NOTE:
When logged into the EXPERT mode and a reset is performed, to get back into the EXPERT mode it is required to log out to MS-DOS prompt and type “CIT EXPERT” again.

(21) Log back into the Network Element.

(22) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both RCVR’s are off.

(23) Execute **FAULT_Test_Auto Turnup_Local**.This test will take up to 10 minutes, depending on how many low speed interface slots are equipped.

Requirement: Results will be displayed on the CIT screen. A **g** represents a good slot. An **F** represents a failed slot. 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. The report below shows a passing test for a terminal with four LAA2 or LAA4 circuit packs equipped in slots 1A, 1B, 2A and P1.

Local Operational Tests

Miscellaneous Discrete Alarm Tests when the FT-2000 Bay interconnects with an Lucent Technologies- LBA System

(1) Perform the following steps to set and test the LBA Alarms:

(2) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 14
- Alarm Level = MN
- Description = FT LBA Fuse or Power Failure.

(3) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 15
- Alarm Level = MN
- Description = FT LBA 1EW Failure.

(4) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 16
- Alarm Level = MN
- Description = FT LBA 1WE Failure.

(5) Remove the 10A fuse from the FT-LBA -48A socket.

(6) Verify that the FT-2000 OC-48 Add/Drop Ring Terminal, reports the power failure and the central office alarms are active.

(7) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Results will be displayed on the CIT screen. **MJ env-14 FT LBA Fuse or Power Fail**

```
   MAJOR LUCENT TECHNOLOGIES PF-2000 9.0.0-ADR ATT-FT-2000 LOCAL ONLY


   ATT-FT-2000 70-01-01 16:05
M Retrieve-Alarm:All:COMLD
/* Active Alarms and Status Report
   ================================================================
   Alarm   Source  Date Time      Serve Description
   Level   Address Detected
================================================================
   MJ      env-14    01-01 00:02:35 nsa FT LBA FUSE or POWER FAIL









  */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP  REMOTE  INPUT  LOGOUT EXIT                              REPEAT
```

(8) Replace the 10A fuse in the FT-LBA -48A fuse socket and verify the PWR ON A green LED illuminates.

(9) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Verify there are no local alarms.

(10) Repeat steps 5 through 9 for the -48B fuse.

(11) Push the test button on the 1EW 2705C() booster amplifier, hold sufficiently long for the FT-2000 OC-48 Add/Drop Ring Terminal alarm to latch, and verify appropriate alarm indications on the FT-2000 OC-48 Add/Drop Ring Terminal and on the central office alarm system.

(12) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Results will be displayed on the CIT screen. **`MJ env-15 FT LBA 1EW Failure`**.

```
   MAJOR LUCENT TECHNOLOGIES PF-2000 9.0.0-ADR ATT-FT-2000 LOCAL ONLY


   ATT-FT-2000 70-01-01 16:05
M Retrieve-Alarm:All:COMLD
/* Active Alarms and Status Report
   ================================================================
   Alarm   Source  Date Time      Serve Description
   Level   Address Detected
================================================================
   MJ      env-15    01-01 00:02:35 nsa FT LBA 1EW FAILURE









  */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP  REMOTE  INPUT  LOGOUT EXIT                              REPEAT
```

(13) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Verify there are no local alarms.

(14) Push the test button on the 1WE 2705C() booster amplifier, hold sufficiently long for the FT-2000 OC-48 Add/Drop Ring Terminal alarm to latch, and verify appropriate alarm indications on the FT-2000 OC-48 Add/Drop Ring Terminal and on the central office alarm system.

(15) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Results will be displayed on the CIT screen. **MJ env-1 FT LBA 1WE Failure**.

(16) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Verify there are no local alarms.

Local Installation Testing - Repeater Bay

NOTE:
Refer to Chapter 11 of this manual before preceding with this section.

Tools, Test Sets and Accessories

The following equipment is required in addition to what is listed in Chapter 7 for performing installation Auto Turnup tests:

- This item is only required if the FT-2000 system is interconnecting with an Lucent Technologies LBA system. Two optical 93AK8573 35dB Test cables for loopback testing LBAs.

Auto Turnup Local

Auto Turnup (local) Test Procedure

Auto Turnup (local) for the FT-2000 OC-48 Repeater:

Perform the following steps for Auto Turnup (local) test:

(1) If FT-2000 Repeater Shelf-System Controller will be directly connected to the lightguide cross-connect panel continue with step 2. If FT-2000 Repeater Shelf-System Controller will be connected to a miscellaneous mounted WDM shelf then on to the lightguide cross-connect panel proceed to step 7.

(2) REGENRs are shipped from the factory with a 0dB attenuator in the connector block on the faceplate. Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1EW REGENR. Be sure that connections are clean. To remove the buildout, press the numbered tab on the top of the buildout with a small blunt tool. With the tab pressed, rotate the buildout counterclockwise slightly, and slide the buildout out of the connector block along the angle of the connector block. Insertion of the 15dB or 20dB attenuator is the opposite of removal.

(3) Using a fiber jumper, connect the **OUT** connector of 1EW REGENR to the **IN** connector of 1EW REGENR.

(4) Remove the 0dB attenuator and replace it with a 15dB or 20dB attenuator in the input connector block of the 1WE REGENR. Be sure that connections are clean.

(5) Using a fiber jumper, connect the **OUT** connector of 1WE REGENR to the **IN** connectors of 1WE REGENR.

(6) Proceed to step 14.

(7) Using a fiber jumper, connect the **OUT** connector of 1EW 1.5µm λ1 REGENR connector to the 1W 1.5µm λ1 WDM TRMTR connector.

(8) Using a fiber jumper, connect the **OUT** connector of 1EW 1.5µm λ 2 REGENR connector to the 1W 1.5µm λ 2 WDM TRMTR connector.

(9) Using a fiber jumper, connect the **IN** connector of 1EW 1.5µm λ1 REGENR connector to the 1W 1.5µm λ1 WDM RCVR connector.

(10) Using a fiber jumper, connect the **IN** connector of 1EW 1.5µm λ 2 REGENR connector to the 1W 1.5µm λ 2 WDM RCVR connector.

(11) Insert a 20dB attenuator in the 1W WDM **RCVR** connector. Be sure that connections are clean.

(12) Using an optical loop cable, connect the WDM 1W TRMTR and the RCVR connectors.

(13) Repeat steps 7 through 12 for the 1W side.

NOTE:

When logged into the EXPERT mode and a reset is performed, to get back into the EXPERT mode it is required to log out to MS-DOS prompt and type “CIT EXPERT” again.

(14) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both REGENRs are flashing.

(15) Execute **FAULT_Test_Auto Turnup_All_Local**.This test will take up to 10 minutes, depending on how many low speed interface slots are equipped.

Requirement: Results will be displayed on the CIT screen. A **g** represents a good slot. An **F** represents a failed slot. 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. The report below shows a passing test for a Repeater Shelf-System Controller with REGENRs in slots 1EW and 1WE.

.

```
  MAJOR LUCENT TECHNOLOGIES FT-2000 6.0.1-RPTR ATT-FT-2000 LOCAL ONLY
                     ;
ATT-FT-2000 70-01-01 3:18:31
M  Test-Auto Turnup:All: COMPLD
   /* Test-Auto Turnup Report - Local Test

=====================================================================
   Slot        Test
   Address     Results
 =====================================================================
   regenr-1ew     good
   regenr-1we     good
   */
;




Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP           INPUT LOGOUT  EXIT                       REPEAT
```

(16) Remove the fiber jumpers and move the REGENR packs to the PEW and PWE slots

(17) Repeat steps 3 through 15, the results in step 15 will indicate Slot Addresses REGENR-pew and REGENR-pwe.

(18) Remove the fiber jumpers and move the REGENR packs back to the slots 1EW and 1WE, leave the fiber jumpers off.

(19) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both REGENRs are flashing.

Auto Turnup (local) for the FT-2000 OC-48 Repeater With LBA:

Perform the following steps for Auto Turnup (local) test:

NOTE:
Be sure to terminate into an equipped slot, and a slot of the same type of circuit pack. Failure to terminate low speed output ports may invalidate test results.

(1) If FT-2000 Repeater Shelf-System Controller will be connected to an LBA bay then on to the lightguide cross-connect panel continue with step 2. If FT-2000 Repeater Shelf-System Controller will be connected to a miscellaneous mounted WDM shelf and an LBA bay then on to the lightguide cross-connect panel proceed to step 8.

(2) Using a fiber jumper, connect the **OUT** connector of 1EW REGENR to the 1EW LBA **IN** connector.

(3) Connect one end of a 93AK8573 35dBm Test Cable to the 1EW LBA **OUT** connector and the other end to an optical power meter.

(4) Measure the optical output power. The power should be the specification for the type of 2705C() LBA measured minus the test cable loss.

Requirement: Measured optical output power plus test cable loss (marked on cable) must be greater than +6.5 dBm.

(5) Connect the 93AK8573 35dB Test Cable to the **IN** connector of 1EW REGENR connector.

(6) Repeat steps 2 through 5 for the 1WE direction.

(7) Proceed to step 18.

(8) Using a fiber jumper, connect the **OUT** connector of 1EW 1.5µm λ1 REGENR connector to the 1W 1.5µm λ1WDM TRMTR connector.

(9) Insert a 10dB attenuator on the 1W 1.5µm λ 2 TRMTR connector.

(10) Using a fiber jumper, connect the **OUT** connector of 1EW 1.5µm λ 2 REGENR connector to the 1W 1.5µm λ 2 WDM TRMTR connector.

(11) Using a fiber jumper, connect the **IN** connector of 1EW 1.5µm λ1 REGENR connector to the 1W 1.5µm λ1 WDM RCVR connector.

(12) Using a fiber jumper, connect the **IN** connector of 1EW 1.5µm λ 2 REGENR connector to the 1W 1.5µm λ 2 WDM RCVR connector.

(13) Using a fiber jumper, connect the 1W WDM TRMTR to the 1EW LBA **IN** connector.

(14) Connect one end of a 93AK8573 35dBm Test Cable to the 1EW LBA **OUT** connector and the other end to an optical power meter.

(15) Measure the optical output power. The power should be the specification for the type of 2705C() LBA measured minus the test cable loss.

Requirement: Measured optical output power plus test cable loss (marked on cable) must be greater than +6.5 dBm.

(16) Connect the 93AK8573 35dB Test Cable to the 1W WDM RCVR connector.

(17) Repeat Steps 8 through Step 16 for 1WE

NOTE:
When logged into the EXPERT mode and a reset is performed, to get back into the EXPERT mode it is required to log out to MS-DOS prompt and type “CIT EXPERT” again.

(18) Execute **CONFIGURATION_Update**.

Requirement: The command clears loss of signal alarms. FAULT LEDs on both REGENRs are flashing.

(19) Execute **FAULT_Test_Auto Turnup_All_Local**.This test will take up to 10 minutes, depending on how many low speed interface slots are equipped.

Requirement: Results will be displayed on the CIT screen. A **g** represents a good slot. An **F** represents a failed slot. 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. The report below shows a passing test for a Repeater Shelf-System Controller with REGENRs in slots 1EW and 1WE.

.

```
  MAJOR LUCENT TECHNOLOGIES FT-2000 6.0.1-RPTR ATT-FT-2000 LOCAL ONLY
                     ;
ATT-FT-2000 70-01-01 3:18:31
M  Test-Auto Turnup:All: COMPLD
   /* Test-Auto Turnup Report - Local Test

=====================================================================
   Slot        Test
   Address     Results
 =====================================================================
   regenr-1ew     good
   regenr-1we     good
   */
;









Press F9 to repeat last command or F3 to return to input mode.
  F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 HELP           INPUT LOGOUT  EXIT                        REPEAT
```

(20) Remove the fiber jumpers and move the REGENRs and LBA (Booster Amplifiers) packs to the PEW and PWE slots

(21) Repeat steps 3 through 19, the results in step 19 will indicate Slot Addresses REGENR-pew and REGENR-pwe.

(22) Remove the fiber jumpers and move the REGENRs and LBA (Booster Amplifiers) packs back to the slots 1EW and 1WE, leave the fiber jumpers off.

(23) Execute **CONFIGURATION_Update**.

Requirement: The command clears circuit packs removed alarm. FAULT LEDs on both REGENRs are flashing.

Local Operational Tests

Miscellaneous Discrete Alarm Tests - LBA

(1) Perform the following steps to set and test the LBA Alarms:

(2) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 14
- Alarm Level = MN
- Description = FT LBA Fuse or Power Failure.

(3) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 15
- Alarm Level = MN
- Description = FT LBA 1EW Failure.

(4) Execute **CONFIGURATION__Set_Attribute_Environmental.**

- Point = 16
- Alarm Level = MN
- Description = FT LBA 1WE Failure.

(5) Remove the 10A fuse from the FT-LBA -48A socket.

(6) Verify that the FT-2000 OC-48 Repeater Shelf-System Controller, reports the power failure.

(7) Execute **`FAULT_Retrieve_Alarm [and Status] (all)`**

Requirement: Results will be displayed on the CIT screen. **MJ env-14 FT LBA Fuse or Power Fail**.

```
   MAJOR LUCENT TECHNOLOGIES FT-2000 6.0.1-RPTR ATT-FT-2000 LOCAL ONLY


   ATT-FT-2000 70-01-01 16:05
M Retrieve-Alarm:All:COMLD
/* Active Alarms and Status Report
   ================================================================
   Alarm   Source  Date Time      Serve Description
   Level   Address Detected
================================================================
   MJ      env-14    01-01 00:02:35 nsa FT LBA FUSE or POWER FAIL









  */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP  REMOTE  INPUT  LOGOUT EXIT                              REPEAT
```

(8) Replace the 10A fuse in the FT-LBA -48A fuse socket and verify the PWR ON A green LED illuminates.

(9) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Verify there are no local alarms.

(10) Repeat steps 5 through 9 for the -48B fuse.

(11) Push the test button on the 1EW 2705C() booster amplifier, hold sufficiently long for the FT-2000 OC-48 Repeater Shelf-System Controller alarm to latch, and verify appropriate alarm indications on the FT-2000 OC-48 Repeater Shelf-System Controller.

(12) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Results will be displayed on the CIT screen. **MJ env-15 FT LBA 1EW Failure**.

```
   MAJOR LUCENT TECHNOLOGIES FT-2000 6.0.1-RPTR ATT-FT-2000 LOCAL ONLY


   ATT-FT-2000 70-01-01 16:05
M Retrieve-Alarm:All:COMLD
/* Active Alarms and Status Report
   ================================================================
   Alarm   Source  Date Time      Serve Description
   Level   Address Detected
================================================================
   MJ      env-15    01-01 00:02:35 nsa FT LBA 1EW FAILURE









  */
_
;
Press F9 to repeat last command or F3 to return to input mode.
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
 HELP  REMOTE  INPUT  LOGOUT EXIT                              REPEAT
```

(13) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Verify there are no local alarms.

(14) Push the test button on the 1WE 2705C() booster amplifier, hold sufficiently long for the FT-2000 OC-48 Repeater Shelf-System Controller alarm to latch, and verify appropriate alarm indications on the FT-2000 OC-48 Repeater Shelf-System Controller.

(15) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Requirement: Results will be displayed on the CIT screen. **MJ env-16 FT LBA 1EW Failure**.

(16) Execute **FAULT_Retrieve_Alarm [and Status] (all)**

Verify there are no local alarms.

Optical Fiber Connection Procedure for Add/Drop Rings

NOTE:
Refer to Chapters 13, 14, and 15 before preceding with this section.

Description

Fibers directly connected between Add/Drop Rings Terminals are connected as follows (See Figure -11):

- 1W TRMTR at the near end terminal to 1E RCVR in the next adjacent terminal to the West.
- 1E TRMTR at the near end terminal to 1W RCVR in the next adjacent terminal to the East.

Fibers connected between Add/Drop Rings Terminals, through Repeaters are connected as follows (See Figure -11):

- 1W TRMTR at the near end terminal to 1EW REGENR **IN** at next adjacent Repeater site to the West.
- 1EW REGENR **OUT** to 1EW REGENR **IN** at next adjacent Repeater site, to the West or 1E RCVR at next adjacent far end terminal to the West.
- 1E TRMTR at the near end terminal to 1WE REGENR **IN** at next adjacent Repeater site to the East.
- 1WE REGENR **OUT** to 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.

Fibers directly connected between Add/Drop Rings Terminals, through an LBA (Lightwave Booster Amplifier) are connected as follows (See Figure -11):

- 1W LBA **OUT** at the near end terminal to 1E RCVR, in the next adjacent terminal to the West.
- 1W LBA **IN** to 1W TRMTR at the near end terminal.
- 1E LBA **OUT** at the near end terminal to 1W RCVR, in the next adjacent terminal to the East.
- 1E LBA **IN** to 1E TRMTR at the near end terminal.

Fibers connected between Add/Drop Rings Terminals, through an LBA (Lightwave Booster Amplifier), through Repeaters are connected as follows (See Figure -11):

- 1W LBA **OUT** at the near end terminal to 1EW REGENR **IN** at next adjacent Repeater site West.

- At the next adjacent Repeater site if no connection to LBA perform the following:

  1EW REGENR **OUT** to 1EW REGENR **IN** at next adjacent Repeater site, to the West or 1E RCVR at next adjacent far end terminal to the West.

- At the next adjacent Repeater site if connecting to LBA perform the following:

  1EW REGNR **OUT** to 1EW **IN** LBA at next adjacent Repeater site, from 1EW **OUT** LBA to the 1EW REGENR **IN** at next adjacent Repeater site, to the West or 1E RCVR at next adjacent far end terminal to the West.

- 1E LBA **OUT** at the near end terminal to 1WE REGENR **IN** at next adjacent Repeater site East.

- At the next adjacent Repeater site if no connection to LBA perform the following:

  1WE REGENR **OUT** to 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.

- At the next adjacent Repeater site if connecting to LBA perform the following:

  1EW REGENR **OUT** to 1WE **IN** LBA at next adjacent Repeater site, from 1WE **OUT** LBA to the 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.

Fibers directly connected between Add/Drop Rings Terminals with WDM are connected as follows (See Figure -15):

- 1W WDM **TRMTR** at the near end terminal to 1E WDM **RCVR** in the next adjacent terminal to the West.

- 1E WDM **TRMTR** at the near end terminal to 1W WDM **RCVR** in the next adjacent terminal to the East.

Fibers connected between Add/Drop Rings Terminals, through Repeaters with WDM are connected as follows (See Figure -16)

- 1W WDM **TRMTR** at the near end terminal to 1EW WDM **RCVR** at next adjacent Repeater site to the West.

- 1EW WDM **TRMTR** to 1EW WDM **RCVR** at next adjacent Repeater site, to the West or 1E **RCVR** at next adjacent far end terminal to the West.

- 1E TRMTR at the near end terminal to 1WE REGENR **IN** at next adjacent Repeater site to the East.

- 1E WDM **TRMTR** at the near end terminal to 1WE WDM **RCVR** at next adjacent Repeater site to the East.

- 1WE WDM **TRMTR** to 1WE WDM **RCVR** at next adjacent Repeater site, to the East or 1W **RCVR** at next adjacent far end terminal to the East.

Fibers directly connected between Add/Drop Rings Terminals, through an LBA (Lightwave Booster Amplifier) with WDM are connected as follows (See Figure E-15):

- 1W LBA **OUT** at the near end terminal to 1E WDM **RCVR**, in the next adjacent terminal to the West.
- 1E LBA **OUT** at the near end terminal to 1W WDM **RCVR**, in the next adjacent terminal to the East.

Fibers connected between Add/Drop Rings Terminals, through an LBA (Lightwave Booster Amplifier), through Repeaters with WDM are connected as follows (See Figure -16):

- 1W LBA **OUT** at the near end terminal to 1EW WDM **RCVR** at next adjacent Repeater site West.
- At the next adjacent Repeater site if no connection to LBA perform the following:

  1EW WDM **TRMTR** to 1EW WDM **RCVR** at next adjacent Repeater site, to the West or 1E WDM **RCVR** at next adjacent far end terminal to the West.

- At the next adjacent Repeater site if connecting to LBA perform the following:

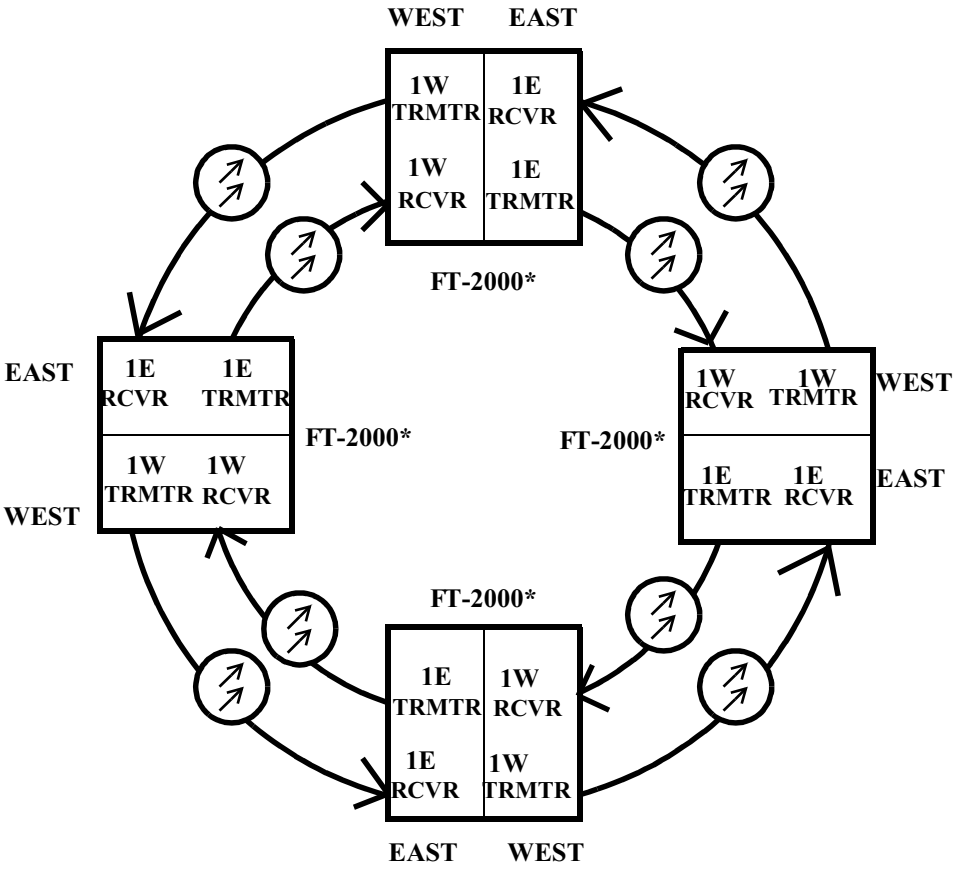
  1EW WDM **TRMTR** to 1EW **IN** LBA at next adjacent Repeater site, from 1EW **OUT** LBA to the 1EW WDM **RCVR** at next adjacent Repeater site, from to the West or 1E WDM **RCVR** at next adjacent far end terminal to the West.

- 1E LBA **OUT** at the near end terminal to 1WE REGENR **IN** at next adjacent Repeater site East.
- At the next adjacent Repeater site if no connection to LBA perform the following:

  1WE REGENR **OUT** to 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.

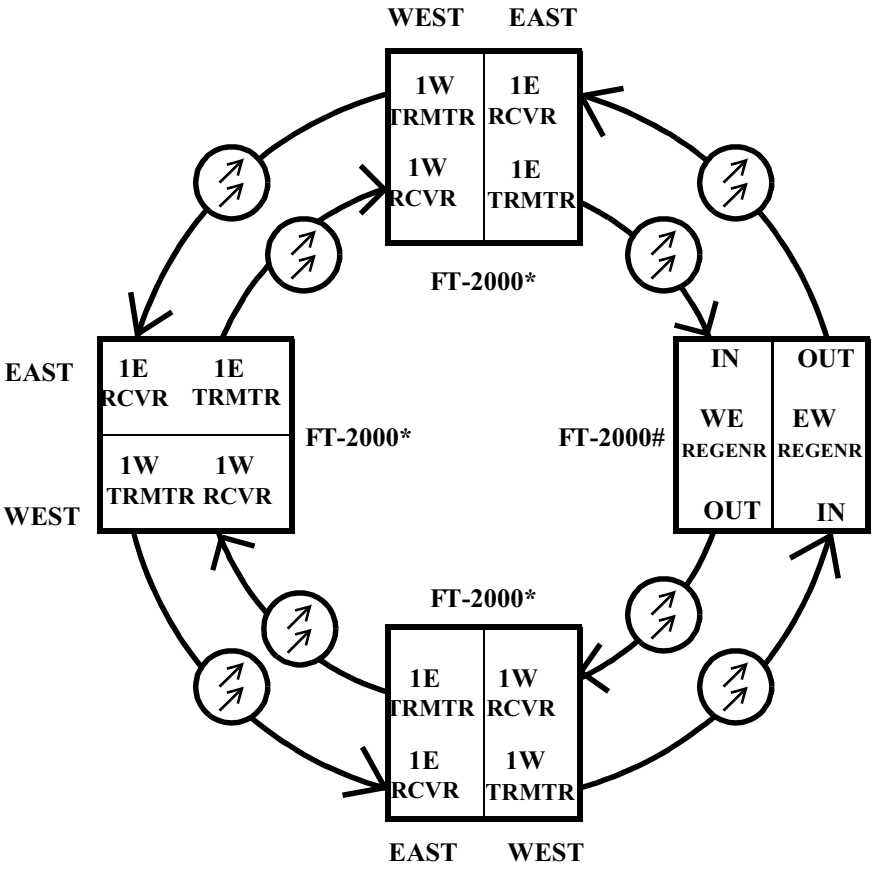
- At the next adjacent Repeater site if connecting to LBA perform the following:

  1EW REGENR **OUT** to 1WE **IN** LBA at next adjacent Repeater site, from 1WE **OUT** LBA to the 1WE REGENR **IN** at next adjacent Repeater site, to the East or 1W RCVR at next adjacent far end terminal to the East.



*** FT-2000 OC-48 ADD/DROP RINGS TERMINAL**

Figure E-11 Fiber Connections -Terminals



* FT-2000 OC-48 ADD/DROP RINGS TERMINAL

\# FT-2000 OC-48 REPEATER

Figure E-12 Fiber Connections - Terminals With Repeaters

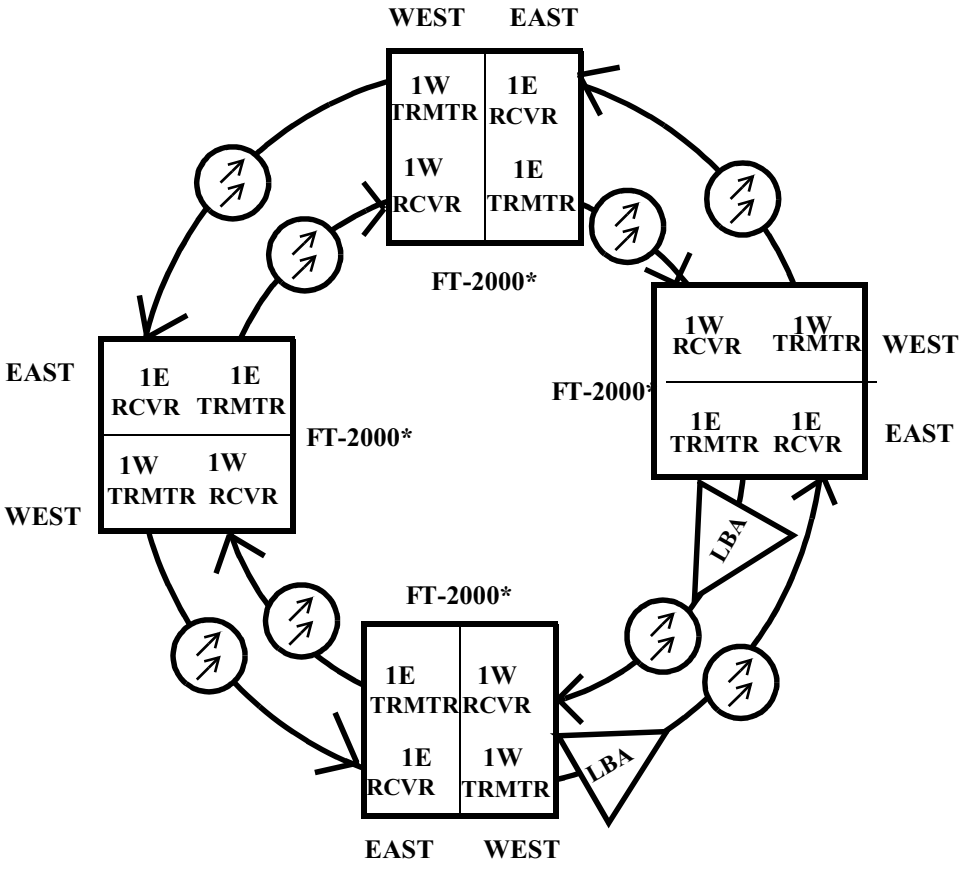
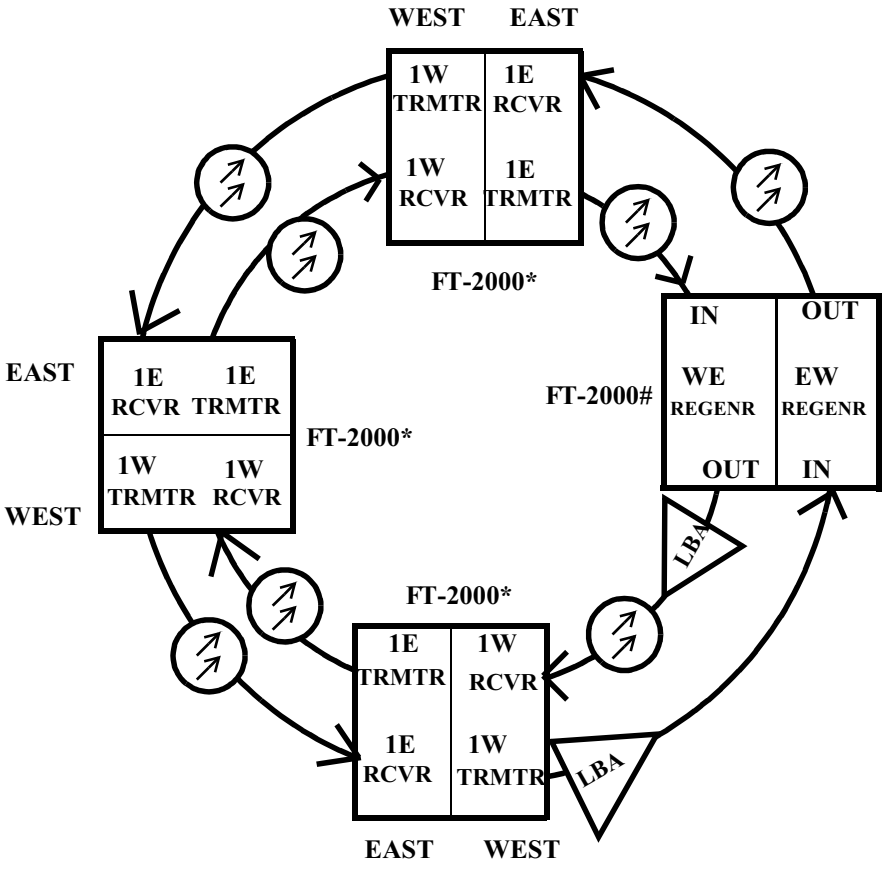


Figure E-13 Fiber Connections -Terminals With LBA



* FT-2000 OC-48 ADD/DROP RINGS TERMINAL
\# FT-2000 OC-48 REPEATER

Figure E-14 Fiber Connections -Terminals and Repeaters With LBA

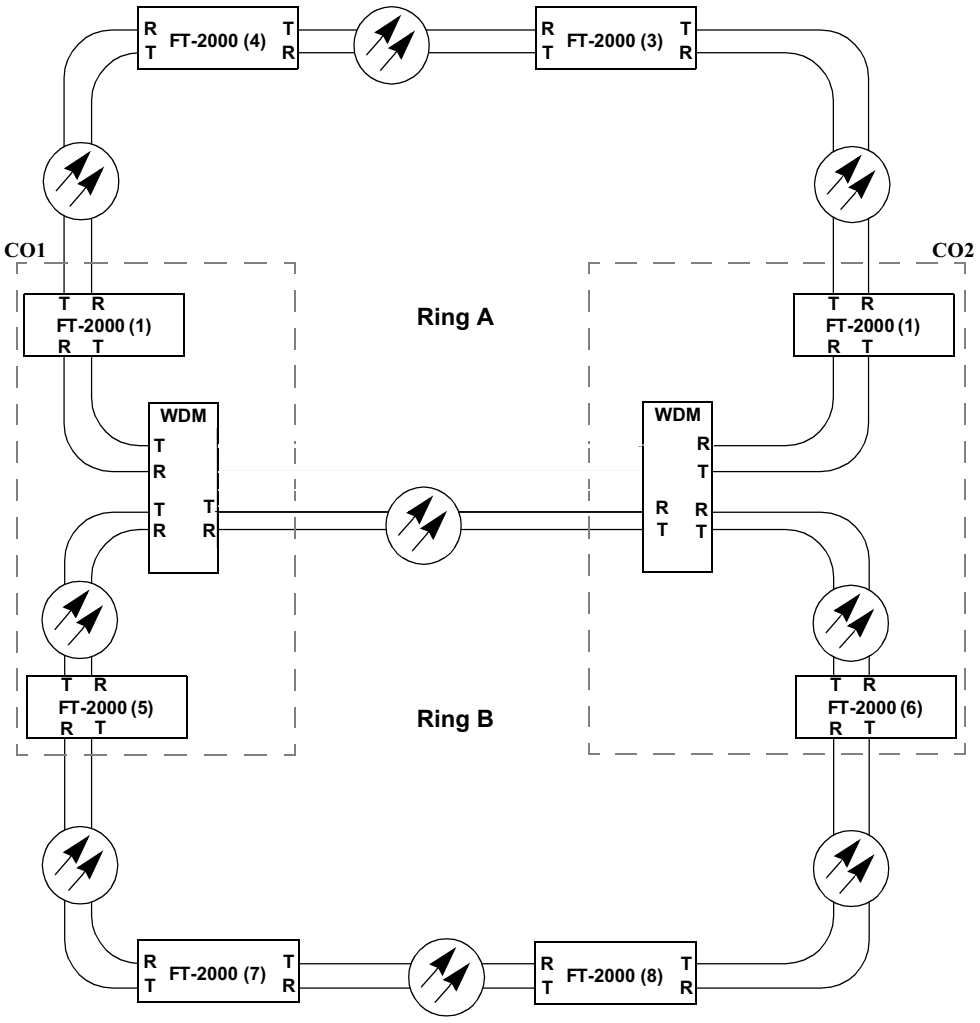


Figure E-15 Two-ring WDM Using FT-2000 OC48 (Add/drop 1.5µ LBA, W1) and OC48 (Add/drop 1.5µ LBA, W2) Transmitters

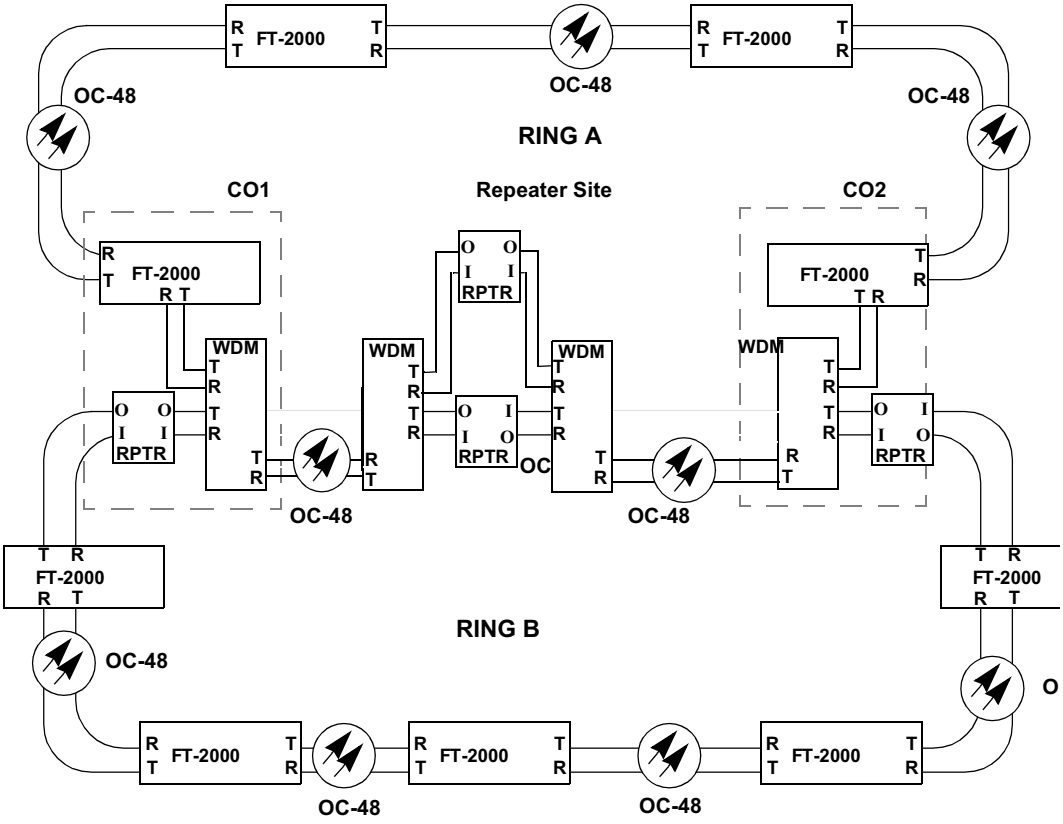


Figure E-16 Two-ring WDM Using FT-2000 OC48 (Add/drop 1.5µ LBA, W1) and OC48 (Add/drop 1.5µ LBA, W2) Regenerators

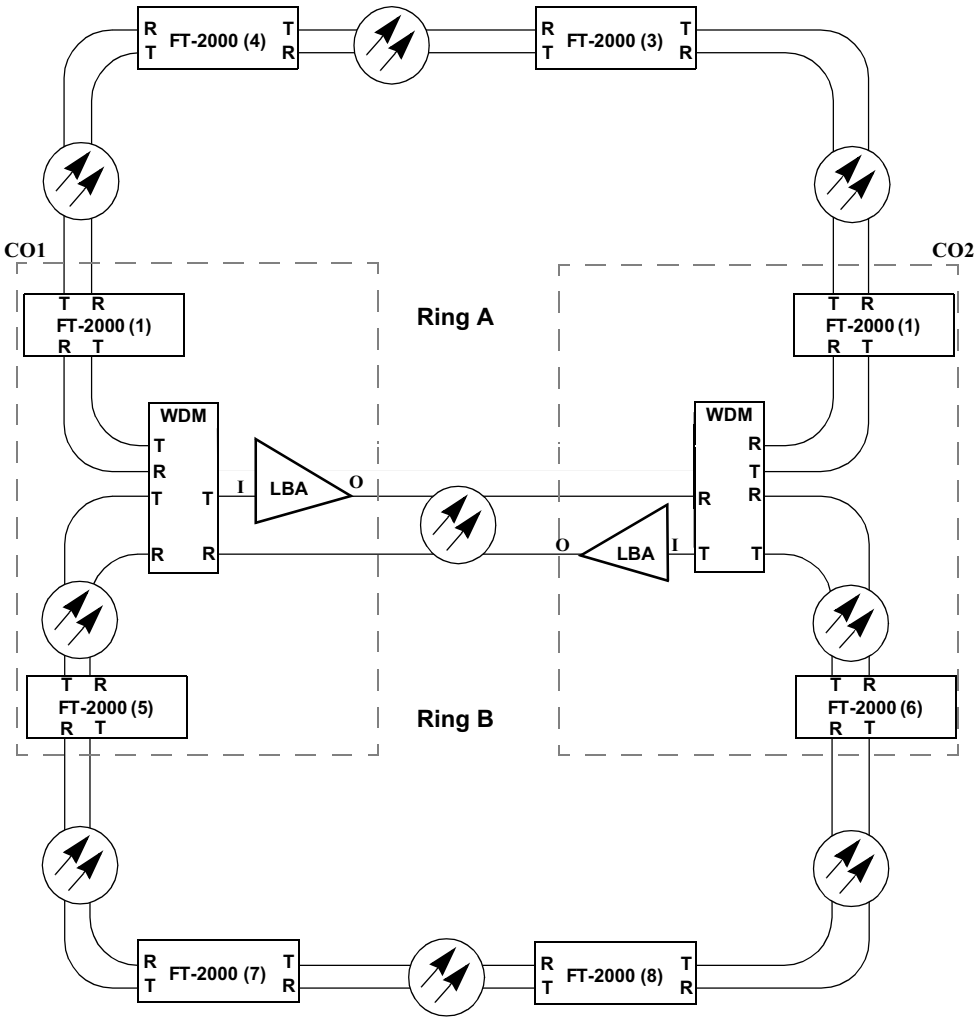


Figure E-17 Two-ring WDM with LBA Using FT-2000 OC48 (Add/drop 1.5µ LBA, W1) and OC48 (Add/drop 1.5µ LBA, W2)

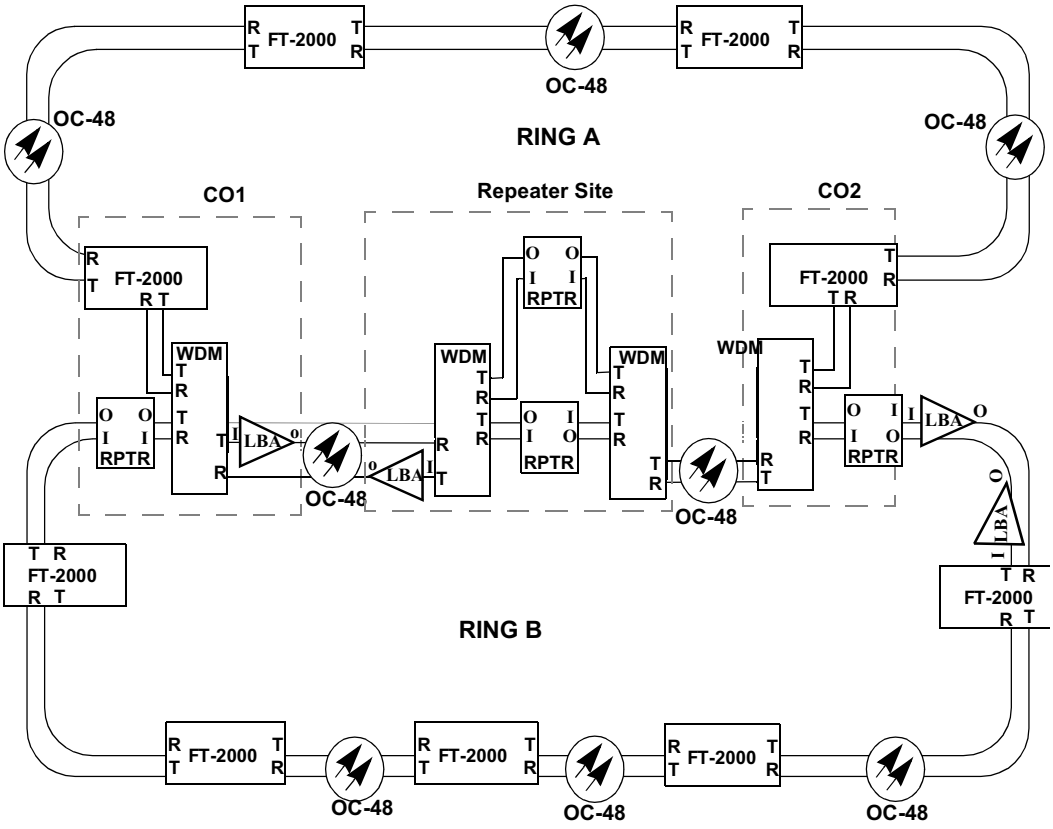


Figure E-18 Two-ring WDM Using FT-2000 OC48 (Add/drop 1.5μ LBA, W1) and OC48 (Add/drop 1.5μ LBA, W2) Regenerators

Ring Fiber Connection

When working alone, the following connection procedure is recommended. However, the work will go much faster if two people work together. When two people are available, leave one person behind as one travels to the next site, then continue to travel separated by one node. This will allow the fiber connection back towards the first node to be established at the same time as the out bound connection.

(1) At NODE-0 (DS-NE) perform the following:

- If no LBA, clean and connect the fiber to the 1W TRMTR circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).
- If equipped with an LBA clean and connect the fiber to the 1W LBA **OUT** connector. Run an optical fiber jumper from 1W LBA **IN** connector to 1W TRMTR circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).

(2) At the node or repeater site follow the optical LBO selection procedure, using the incoming fiber from the EAST (which is connected to the 1W TRMTR or 1EW REGENR **OUT** at the node you just left, and should be the only fiber with light). Clean and connect the fiber to the 1E RCVR or 1EW REGENR **IN** using the selected LBO.

Requirement: the 1E RCVR or 1EW REGENR FAULT LED should stop flashing after 20 seconds or so.

NOTE:
If the LED on the RCVR or REGENR is flashing, one of the following things may be wrong:

— The transmit and receive fibers are reversed.
— Too high a value optical LBO may have been selected. Recheck the incoming optical power. Follow the optical LBO selection procedure to verify the correct value LBO has been selected.
— The fiber may be dirty at one of the connectors or a fiber may not be properly inserted into an LGX, LBA, RCVR, REGENR or a TRMTR circuit pack. You may need to measure optical power at these intermediate points to resolve the problem.

(3) At the node or repeater site perform the following:

- If no LBA, clean and connect the fiber to the 1E TRMTR or 1EW REGENR **OUT** circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).

- If equipped with an LBA clean and connect the fiber to the 1E LBA **OUT** connector. Run an optical fiber jumper from 1E LBA **IN** connector to 1E TRMTR or 1EW REGENR **OUT** circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).

(4) Repeat steps 2 and 3 until you are back at the first node. When you have completed step 2 at the first node skip step 3 and continue at step 5.

(5) At NODE-0 (DS-NE) perform the following:

- If no LBA, clean and connect the fiber to the 1E TRMTR circuit pack per the fiber assignments. Move to the next node or repeater site to the EAST (as defined by the ring, which may not match actual geography).
- If equipped with an LBA clean and connect the fiber to the 1E LBA **OUT** connector. Run an optical fiber jumper from 1E LBA **IN** connector to 1E TRMTR circuit pack per the fiber assignments. Move to the next node or repeater site to the EAST (as defined by the ring, which may not match actual geography).

(6) At the node or repeater site follow the optical LBO selection procedure, using the incoming fiber from the WEST (which is connected to the 1E TRMTR or 1EW REGENR **OUT** at the node you just left, and should be the only fiber with light). Clean and connect the fiber to the 1W RCVR or 1WE REGENR **IN** using the selected LBO.

Requirement: the FAULT LED on the 1W RCVR or 1WE REGENR should stop flashing after 20 seconds or so.

(7) At the node or repeater site perform the following:

- If no LBA, clean and connect the fiber to the 1W TRMTR or 1WE REGENR **OUT** circuit pack per the fiber assignments. Move to the next node or repeater site to the EAST (as defined by the ring, which may not match actual geography).
- If equipped with an LBA clean and connect the fiber to the 1W LBA **OUT** connector. Run an optical fiber jumper from 1W LBA **IN** connector to 1W TRMTR or 1WE REGENR **OUT** circuit pack per the fiber assignments. Move to the next node or repeater site to the EAt the node or repeater site perform the following:
- If no LBA, clean and connect the fiber to the 1E TRMTR or 1EW REGENR OUT circuit pack per the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).
- If equipped with an LBA clean and connect the fiber to the 1E LBA OUT connector. Run an optical fiber jumper from 1E LBA IN connector to 1E TRMTR or 1EW REGENR OUT circuit pack per

the fiber assignments. Move to the next node or repeater site to the WEST (as defined by the ring, which may not match actual geography).EAST (as defined by the ring, which may not match actual geography).

(8) Repeat steps 6 and 7 until you are back at the first node. When you have completed step 6 at the first node you are done.

Requirement: The MJ Ring Incomplete/Open alarm clears in less than 20 minutes.

NOTE:
The Ring Incomplete/Open and DS-NE Unreachable alarms should have cleared when the last fiber was connected. Recheck fiber connections if they did not. A Reset at individual nodes, or the DS-NE node may cure many problems. Other alarms related to incoming low speed interface signals may be cleared by the Update command. If there are alarms, note the node TIDs and alarm levels and use the next steps to remotely login to help resolve them. Perform the next steps even if there are no network alarms reported, to verify communication to remote nodes. You will not be able to remotely login to Repeater sites. If there are alarms at repeater sites you will have to travel to the site to resolve them.

NOTE:
In some instances the Ring Incomplete/open alarm will not clear, even after all connections, power levels and LBO selections have been checked. One typical cause of this is the use of “air gap” type “D4” optical connectors at the LGX. These type of connectors are not recommended. They may produce poor return loss properties that allow power readings which are within range, but the signal is distorted such that the DCC channel is unable to communicate ring data. The Ring Incomplete/open alarm will be accompanied by an incoming DCC failure. Correct the problem by replacing the air gap connections with “physical contact” type connections.

J68974D-1 Dual Add/Drop-Rings Terminal Installation Information

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J68974D-1 Dual Add/Drop-Rings Terminal Installation Information

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Overview

This Appendix provides information for installing the J68974D-1 Dual Add/Drop-Rings Terminal. It will provide any necessary information that differs from the standard J68974E-1 Add/Drop-Rings Terminal.

How to Use this Appendix

This manual is divided into several Chapters. The Chapters are numbered in the order in which they are to be performed. Installation personnel should follow the instructions located in the standard chapters unless additional information is included in this appendix. Refer to Table F-1.

Table F-1. Dual Terminal Information In Standard Document

Installation Manual Chapters	How Applies To Dual Terminal
About this Document	Information valid and should be used
Section 1, Overall Installation and Test Considerations	Information valid and should be used except new drawing information is in this appendix
Section 2, Platform Descriptions	New Information provided in this Appendix
Section 3, CIT Description	Information valid and should be used
Section 4, Equipment Installation	Information valid and should be used
Section 5, Cable Installation - ADR Terminal	Information valid and should be used except for the miscellaneous discrete cabling which is updated in this appendix

Table F-1. Dual Terminal Information In Standard Document

Installation Manual Chapters	How Applies To Dual Terminal
Section 6, Powering, Circuit Pack Installation and Start-up - ADR Terminal	New Information provided in this Appendix
Section 7, Local Installation Testing - ADR Terminal	Information valid and should be used
Section 8, Required Provisioning - ADR Terminal	Information valid and should be used. Additional information for the fan alarm is included in this Appendix.
Section 9, Cable Installation - Repeater Bay	Information for repeater sites
Section 10, Powering, Circuit Pack Installation NE Start-up - Repeater Bay	Information for repeater sites
Section 11, Local Installation Testing - Repeater Bay	Information for repeater sites
Section 12, Required Provisioning - Repeater Bay	Information for repeater sites
Section 13, Fiber Connection	Information valid and should be used
Section 14, Ring Installation Testing	Information valid and should be used
Section 15, Basic Provisioning	Information valid and should be used
Section 16, Installation Troubleshooting	Information valid and should be used

FT-2000 Drawings

The following drawings for the dual terminal are in addition to those listed in Chapter 1:

- J68974D-1

  FT-2000 OC-48 Dual Lightwave Terminating Bay (Equipment and Circuit Packs Ordered with Equipment)

- SD-5G250-03

  FT-2000 OC-48 Dual Lightwave Terminating Bay Application Schematic

FT-2000 OC-48 Dual Add/Drop-Rings Terminal Platform Description

Equipment Package

The FT-2000 OC-48 Dual Add/Drop-Rings Terminal for use in 2-fiber rings is available in the following equipment package:

- **FT-2000 OC-48 Dual Add/Drop-Rings Terminal for 2-Fiber Rings**:

  The FT-2000 OC-48 Dual Add/Drop-Rings Terminal for 2-Fiber Rings consists of the J68974D-1 L1 FT-2000 OC-48 Dual Lightwave Terminating Bay.

  The J68974D-1 L1 FT-2000 OC-48 Dual Lightwave Terminating Bay consists of one or two FT-2000 systems in a single Network Bay Frame. Each system will contain a Condensed High Speed Shelf and a Low Speed Shelf- System Controller. A single power distribution and fuse panel is common to both systems. This is shown in Figure F-1 and Figure F-2.

  The FT-2000 OC-48 Lightwave System transports up to 48 DS3 equivalent signals over the OC-48 line. It supports a mix of DS3, EC-1, OC3 or OC12 interfaces. The OC-3 or OC12 low speed interfaces support optical extensions. The electrical DS3 and EC-1 low speed interfaces are 1xN (N<= 16) protected. If protection is required for the optical low speed signals, it can only be 1+1 using adjacent A/B slot positions.

NOTE:
The FT-2000 OC-48 Dual Add/Drop-Rings Terminal is supplied with C847324316 Kit for connecting the Terminal to another Terminal. It may also be used to connect the terminal to any other Lucent Seismic Network bay. The three special junction plates will be attached to the rear vertical uprights of the bays at the Top, Middle and Bottom.

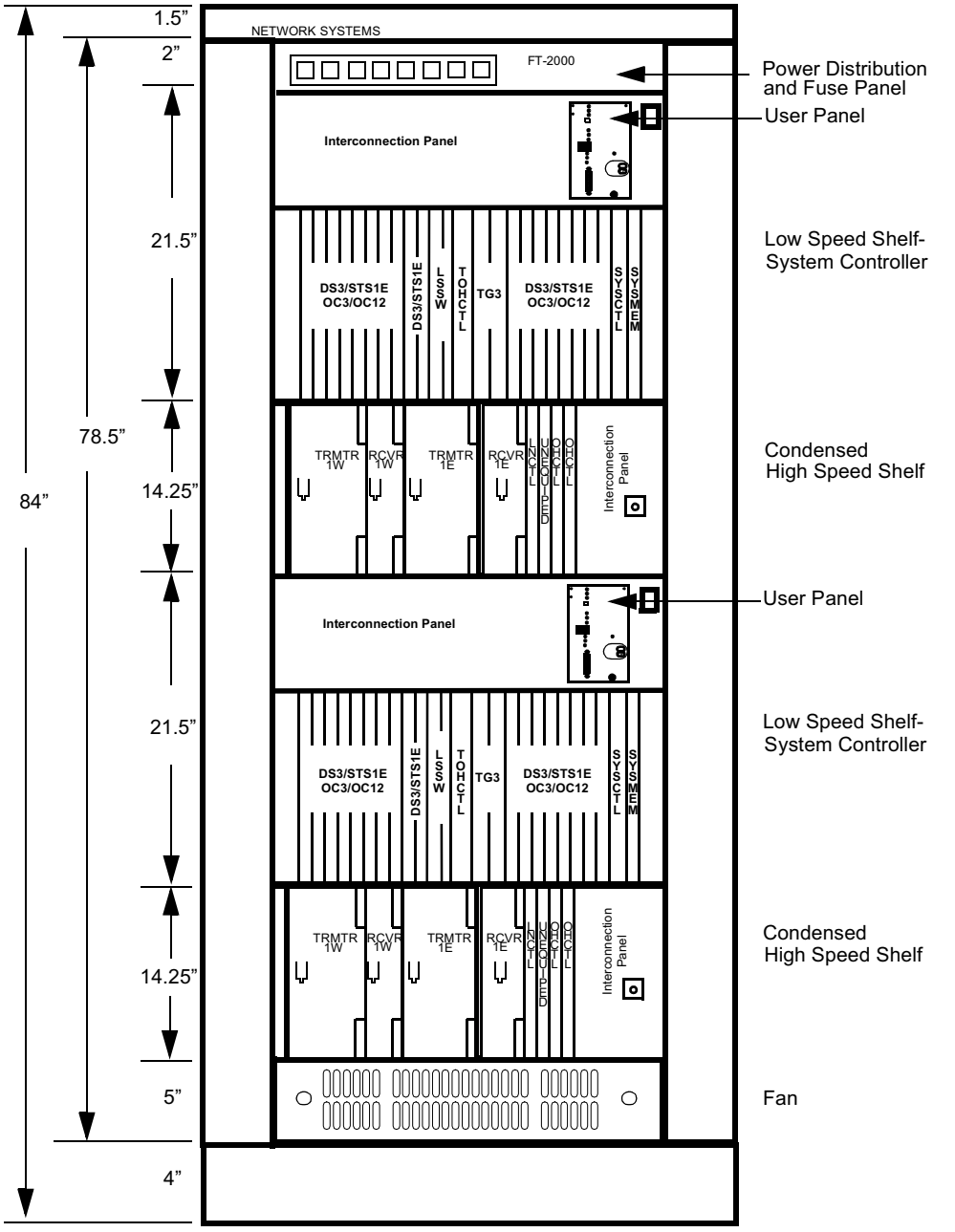

Figure F-1. FT-2000 OC-48 Dual Add/Drop-Rings Terminal for 2-Fiber Rings With 2 Systems Equipped

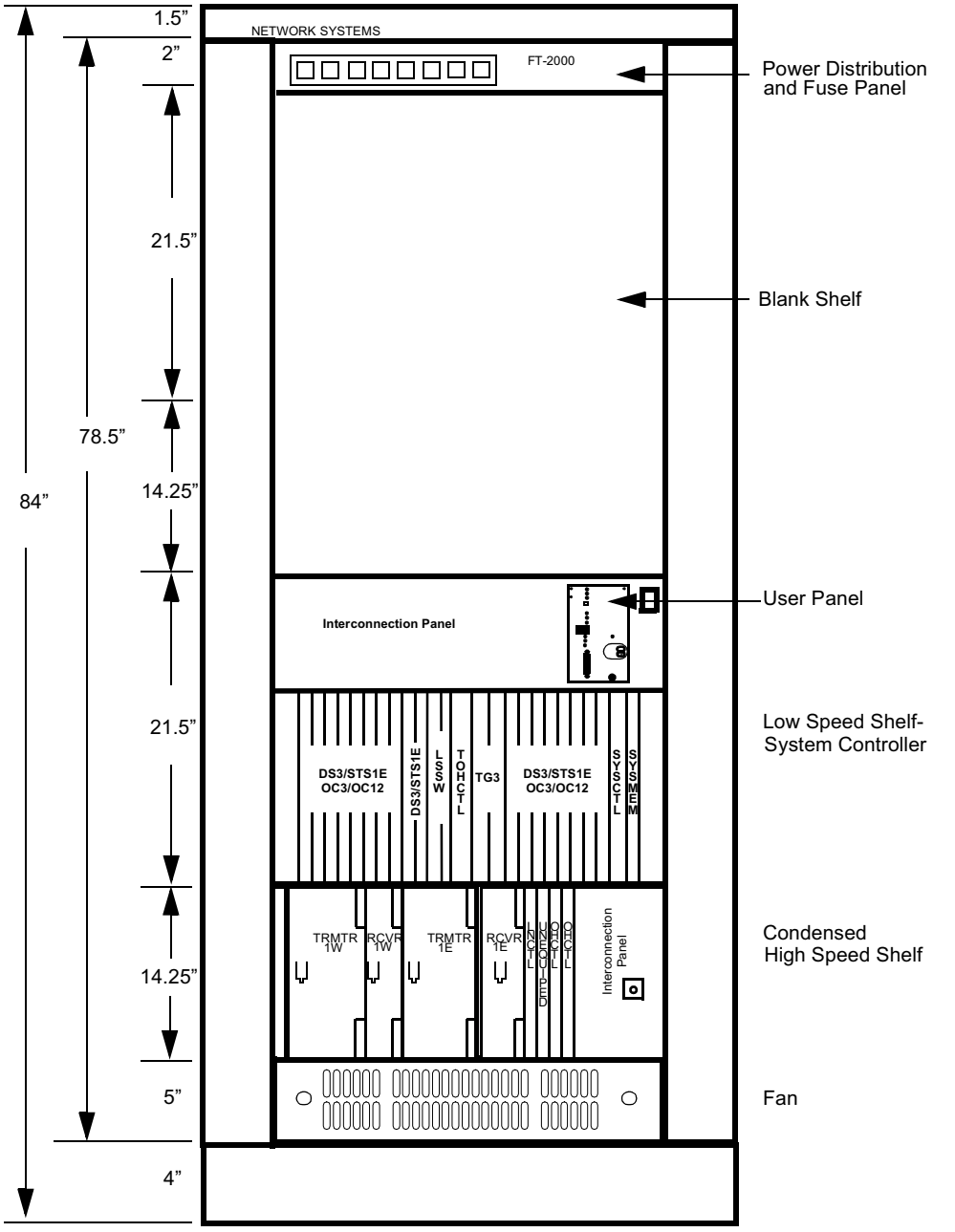

Figure F-2. FT-2000 OC-48 Dual Add/Drop-Rings Terminal for 2-Fiber Rings With 1 System Equipped

Dual Add/Drop-Ring Terminal Shelf Descriptions

Power Distribution and Fuse Panel

The power distribution and fuse panel is located at the top of each FT-2000 OC-48 Lightwave System bay. It measures 2 inches high by 21.5 inches wide by 12 inches deep. The power distribution and fuse panel has a removable front cover that allows front access for shelf power connections. It accepts two 10-gauge (formerly 8-gauge) power feeder stubs and distributes power to the shelves in the bay. The power distribution and fuse panel is also equipped with eight 10-amp fuses (two for each shelf in the bay). Four fuses are for power feeder A and four fuses are for power feeder B. The power distribution and fuse panel is shown in Figure F-3. Each feeder fuse/breaker must be 30 amperes at the battery distribution fuse board (BDFB) for single shelf bays(E type) and Dual bays(D type).

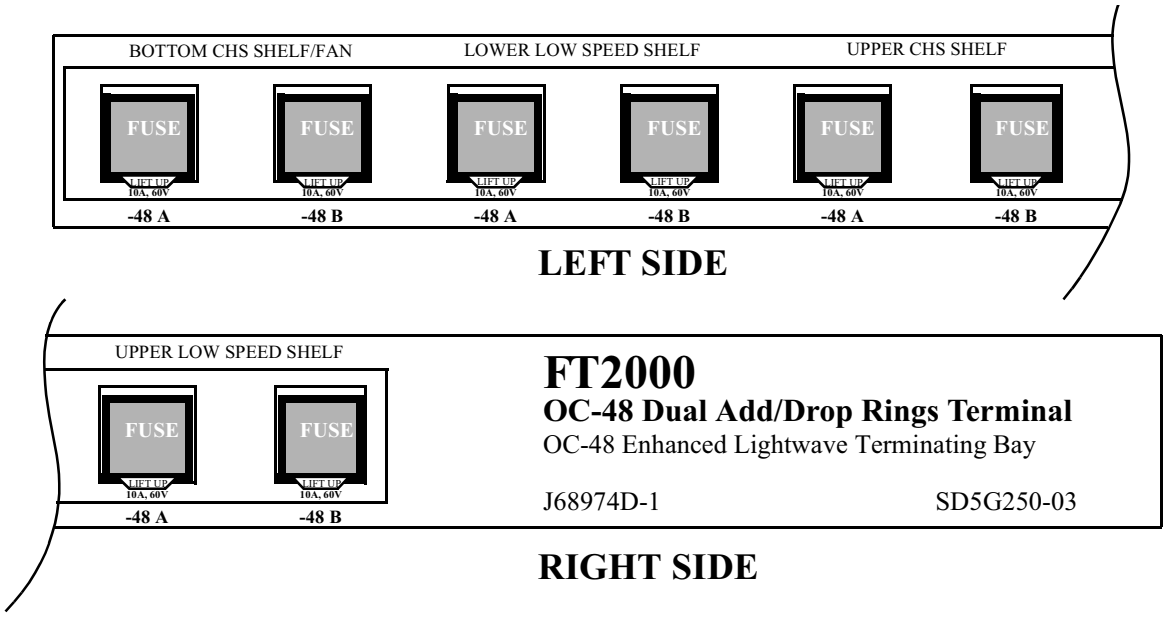

Figure F-3. Power Distribution and Fuse Panel

Low Speed Shelf - System Controller

Purpose of Low Speed Shelf - System Controller

The Low Speed Shelf - System Controller shown in Figure F-4 provides high-level system control functions and serves as an interface for up to 48 electrical and/or optical low speed signals. These 48 low speed interface signals can be cross-connected to the OC-48 high speed line 1W or 1E. The Low Speed Shelf - System Controller consists of a fully connectorized interconnection panel, a user panel, and 25 circuit pack slots. It measures 21.5 inches high by 21.5 inches wide by 12 inches deep and fits in a standard 23-inch wide bay.

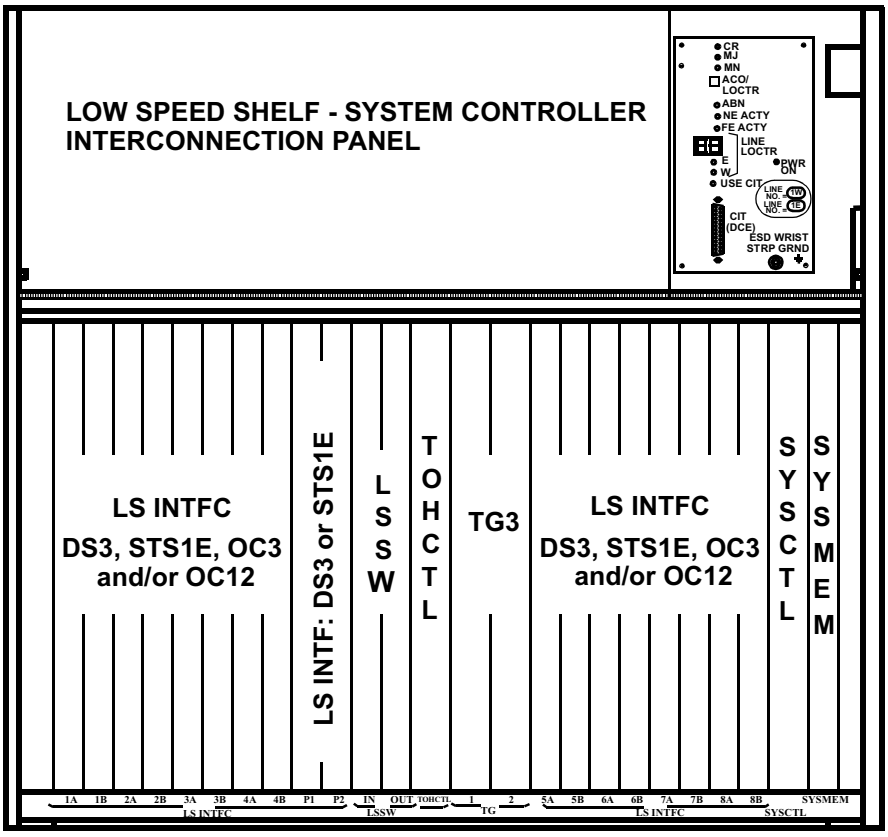

Figure F-4. Low Speed Shelf - System Controller (without Cover)

Low Speed Shelf - System Controller Circuit Packs

The Low Speed Shelf - System Controller provides the following circuit pack slots:

- **LS INTFC 1A - 8B**: Sixteen slots are provided for LAA2 LS Interface (DS3), LAA4 LS Interface (STS1-E), LAA10/LAA10B LS Interface (OC3), or T939A LS Interface (OC12) circuit packs. Any mix may be equipped, but not more than 16 LAA2, LAA4, or LAA10 circuit packs. The T939A LS Interface (OC12) uses 4 adjacent low speed interface slots and up to 4 may be equipped in the shelf. Any combination of LS interface circuit packs which fill the 16 slots is valid.
- **LS INTFC P1 and P2**: Two slots are provided for one protection LAA2 (DS3) circuit pack and one LAA4 (STS1-E) circuit pack. The protection slots should be equipped with one of each type of LS Interface circuit pack, DS3 and/or STS1E, as equipped in slots 1A-8B. It does not matter which type is in which slot; however, LAA10/LAA10B (OC-3) circuit packs are not to be used in P1 or P2.
- **LSSW IN and OUT**: Two slots are provided for LAA12 Low Speed Switch (LSSW) circuit packs.
- **TOHCTL**: One slot is provided for the LAA26 Tributary Overhead Controller (TOHCTL). This circuit pack is only supported in Release 6.0.0-ADR software or greater and L5 Terminal bays or equivalent.
- **TG 1 and 2**: Two slots are provided for LAA18 Timing Generator, Stratum 3 DS1 [TG3 (DS1)] circuit packs.
- **SYSCTL**: One slot is provided for the LAA23B System Controller (SYSCTL) circuit pack.
- **SYSMEM**: One slot is provided for the LAA25 System Memory (SYSMEM) circuit pack.

Mechanical keying prevents circuit packs from being inserted into incorrect slots.

NOTE:
ED8C902-30 G4 provides a number of filler plates and an adapter plate. The filler plates are to be used in slots that have no low speed pack inserted, and the adapter plate is for the TOHCTL slot when it is unequipped. The usage of these plates will ensure the proper airflow through the terminal.

Low Speed Shelf - System Controller Interfaces

Front cable access is provided through the interconnection panel. Figure F-5 shows the interconnection panel. The interconnection panel provides the following interfaces:

- **LS INTFC 1A - 8B**: These connectors are cabled to the low speed interface slots 1A through 8B. For example, the low speed interface circuit pack in slot 1A receives three low speed interface signals through the three IN connectors (1, 2, and 3) on the interconnection panel associated with label 1A. The low

speed interface circuit pack in slot 1A also transmits three low speed interface signals through the three OUT connectors (1, 2, and 3) associated with label 1A. Labels 9A through 16B are printed for future use.

NOTE:
The LAA10 and T939A circuit packs requires no coaxial cabling. Transmission is through the optical transmit and receive ports on the faceplates.

- **X.25**: This connector provides an interface to a message-based operations system that uses X.25 protocol and the Transaction Language 1 (TL1) message language.
- **SER TLM 1 and SER TLM 2**: These connectors provide a serial telemetry interface to a remote maintenance center that uses telemetry byte-oriented serial (TBOS) protocol. Serial Telemetry is not supported in Release 8 and later.
- **OFFICE ALMS**: This connector provides an interface to the local office audible and visible alarms.
- **PAR TLM**: This connector provides an interface to an operations center for alarm information. Parallel Telemetry is not supported in Release 8 and later.
- **MISC DSCRT 1 and MISC DSCRT 2**: These connectors provide an interface to external equipment via a terminal strip mounted external to the FT-2000 Terminal. This allows an operations system to monitor and control equipment co-located with the FT-2000 OC-48 Lightwave System. The Dual Terminal ships from the factory with the fan alarm cabled to the MISC DSCRT 2 connector. Refer to the miscellaneous discrete cabling paragraph in this appendix for additional information.
- **CIT (DTE)**: This connector provides an interface to a modem that allows dial-up Craft Interface Terminal access.
- **TIMING IN PRI and TIMING IN SECY**: These connectors provide an interface to external DS1 timing sources.
- **TIMING OUT 1 and TIMING OUT 2**: These connectors provide an interface to other central office equipment that requires a DS1 timing reference signal.
- **CIT (DCE)**: This connector provides an interface to the CIT (DCE) port on the user panel that allows local access.
- **USER PNL DISPLAY**: This connector provides an interface to the alarm and status indicators, and LINE LOCTR display on the user panel.
- **PWR**: These connectors provide an interface to the -48V DC power filters on the user panel. The power cables are connected to radio frequency (RF) filters on the interconnection panel using push-on type connectors.

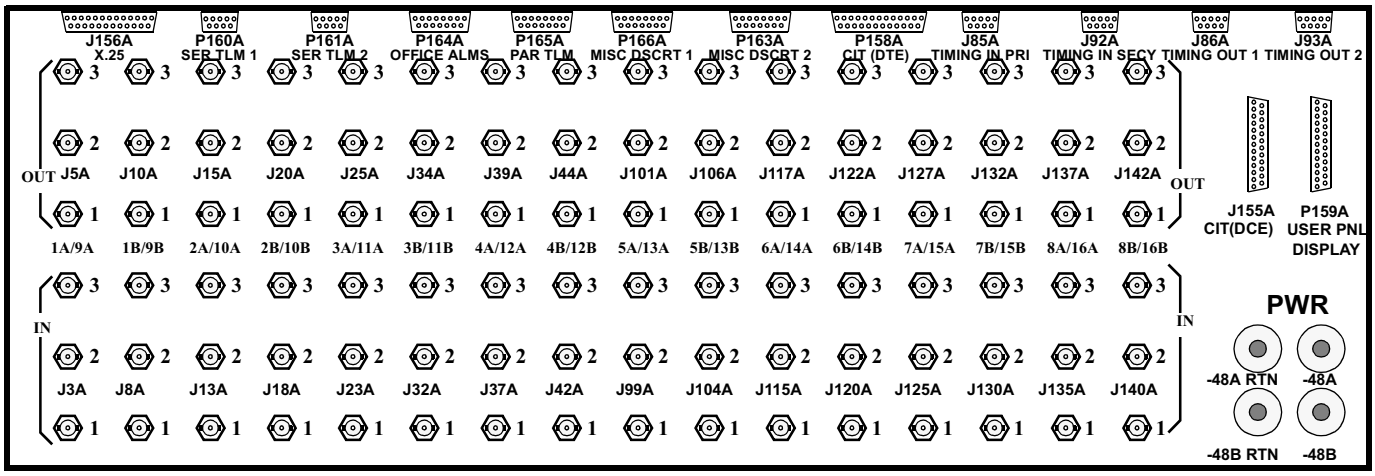

Figure F-5. Interconnection Panel (Low Speed Shelf - System Controller)

Except for power, all cabling entering the interconnection panel is connectorized with the following industry standard connectors:

- **BNC connectors**: 75 Ohm BNC connectors are used on all cables for low speed interfaces (DS3 or STS1E).
- **D-subminiature connectors**: D-subminiature connectors are used on all cables for the operation system and central office interfaces.

Low Speed Shelf - System Controller Enhanced User Panel

The user panel (enhanced) (Figure F-6) is a factory-installed unit mounted next to the right-hand flange on each equipped Low Speed Shelf - System Controller. The user panel displays system-level information. The Low Speed Shelf - System Controller is equipped with a filter panel, provides -48V DC power filters, a power on (PWR ON) LED, alarm and status indicators, an electrostatic discharge wrist strap ground, and line identification labels.

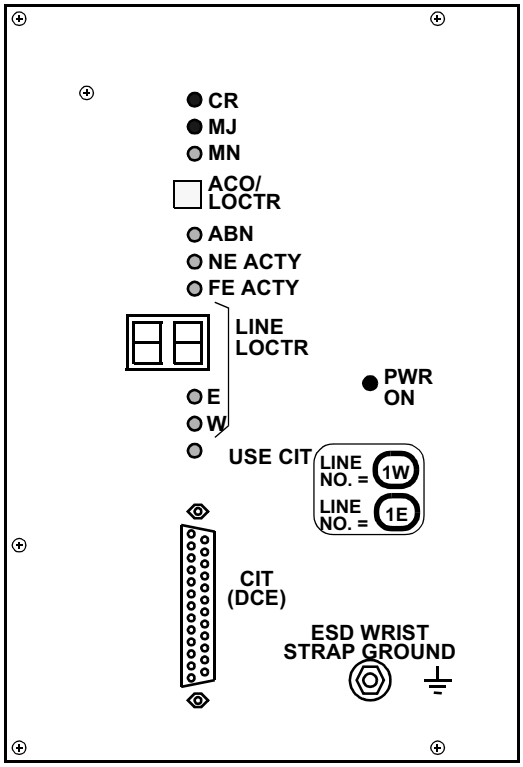

Figure F-6. User Panel (Enhanced)

LED, Push-button, and Display Descriptions

The indications of the LED's located on the user panel (enhanced) are listed in Table F-2.

Table F-2. User Panel (Enhanced) LED's Indications

LED	Status	Indications
CR (red)	Critical	For FT-2000, any unprotected incoming signal loss is critical
MJ (red)	Major	Non-service-affecting unprotected failure that may mask the reporting of another service-affecting failure. For example, a Controller failure will cause a MJ alarm.
MN (Yellow)	Minor	Non-service-affecting failure, protected failure
ACO/LOCTR (Green)	Alarm Cutoff	Audible office alarms are silenced and parallel telemetry indications are turned off
PWR-ON (Green)	Power On	Terminal is receiving at least one -48 volt source
ABN (Yellow)	Abnormal	Abnormal condition initiated through a CIT, TBOS, or TL1 command. For example, loopback, forced switch
NE ACTY (Yellow)	Near End Activity	An alarm or status condition exists at the near-end terminal
FE ACTY (Yellow)	Far End Activity	An alarm or status condition exists at a far-end terminal
USE CIT (Yellow)	Use the CIT	CIT must be used to obtain more information about system status
E (Yellow)	East Direction	An alarm or status condition is present from the East direction
W (Yellow)	West Direction	An alarm or status condition is present from the West direction

User Panel (Enhanced) Push-button and Display

The ACO/LOCTR push-button and LINE LOCTR display located on the user panel (enhanced) perform the following functions as given in Table F-3:

FAULT LED Indication

Each circuit pack has a FAULT LED.

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

Table F-3. User Panel (Enhanced) Push Button and LOCTR Display

ACO/LOCTR (Alarm Cutoff/Locator)	Pressing this button silences existing audible office alarms and parallel telemetry indications or toggles the LINE LOCTR display between a “1” or either an “H” or “L” (see LINE LOCTR).
LINE LOCTR (Line Locator)	When there is a single FAULT, the LINE LOCTR displays either an “L”, representing a FAULT in the low speed shelf - system controller or an “H” representing a fault in the enhanced high speed shelf.

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

Condensed High Speed Shelf

Purpose of Condensed High Speed Shelf

The Condensed High Speed Shelf (in Figure F-7) serves as an interface for OC-48 high speed lines 1W and 1E. The Condensed High Speed Shelf consists of a fully connectorized interconnection panel, a filter panel, and 8 circuit pack slots. It measures 14.25 inches high by 21.5 inches wide by 12 inches deep and fits in a standard 23-inch wide bay.

Condensed High Speed Shelf Circuit Packs

The Enhanced High Speed Shelf provides the following circuit pack slots:

- **TRMTR 1W and RCVR 1W**: Two slots are provided for the 739B4, 739J4, 739B5, 739C5, 739J5, 739P5, 739R5, or 739S5 OC48 Transmitters, Add/Drop [OC48 TRMTR (A/D)] and the 839B4B, or 839B5 OC48 Receiver, Add/Drop [OC48 RCVR (A/D)] circuit packs for OC-48 high speed line 1W.
- **TRMTR 1E and RCVR 1E**: Two slots are provided for the 739B4, 739J4, 739B5, 739C5, 739E1-8, 739H1-16, 739J5, 739P5, 739R5, or 739S5 OC48 Transmitters, Add/Drop [OC48 TRMTR (A/D)] and the 839B4B, or 839B5 OC48 Receiver, Add/Drop [OC48 RCVR (A/D)] circuit packs for OC-48 high speed line 1E.
- **LNCTL 1W**: One slot is provided for the LAA28 Line Controller - 4 Megabyte [LNCTL (4 MEG)] circuit pack for OC-48 high speed lines 1W and 1E.
- **OHCTL 1W**: One slot is provided for the LAA21 OHCTL (TERM) circuit pack for OC-48 high speed line 1W.
- **OHCTL 1E**: One slot is provided for the LAA21 OHCTL (TERM) circuit pack for OC-48 high speed line 1E.

Mechanical keying prevents circuit packs from being inserted into incorrect slots.

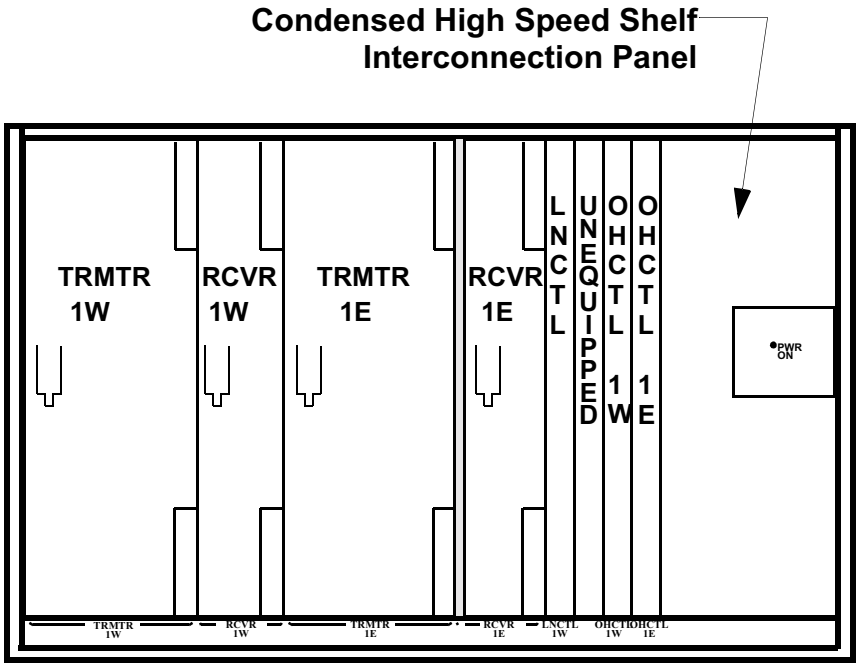

Figure F-7. Condensed High Speed Shelf (without Cover)

Condensed High Speed Shelf Interfaces

Front access to cabling is provided through the interconnection panel, shown in Figure F-8. The interconnection panel provides the following interfaces:

- **LINE GROWTH CHAN LINE 1W** and **LINE 1E**: These connectors provide an interface that allows access to the line growth channel (Z1 and Z2 bytes) of the OC-48 high speed lines for releases prior to 7.0.1.

- **SECTION USER CHAN LINE 1W** and **LINE 1E**: These connectors provide an interface that allows access to the section user channel (F1 byte) of the OC-48 high speed lines. These connectors are reserved for use in a future release.
- **SECTION OW (LOC OW) LINE 1W** and **LINE 1E**: These connectors provide an interface that allows an orderwire set access to the section orderwire (E1 byte) for voice communications, or (with additional wiring and converters) other uses such as connection to remote alarm or CIT ports.
- **LINE OW (EXP OW) LINE 1W** and **LINE 1E**: These connectors provide an interface that allows an orderwire set access to the line orderwire (E2 byte) for voice communications.
- **INTRAOFFICE LAN**: This connector is reserved for use in a future release.
- **PWR**: These connectors provide an interface to the -48V DC power filters on the filter panel.

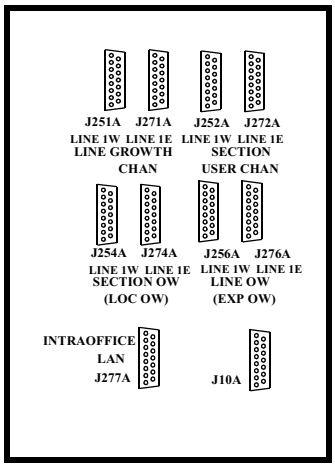

Figure F-8. Interconnection Panel (Condensed High Speed Shelf)

Except for power, all the cabling entering the interconnection panel is connectorized with 15 pin D-subminiature connectors. Power cables are connected to RF filters on the interconnection panel using push-on type connectors.

Fan

The fan provides a filter panel at the bottom of the bay and an air intake plenum for cooling purposes. Do not block this air intake.

Cable Installation

Overview

The following paragraphs provide cabling information for the dual terminal when it differs from the standard cabling information in Chapter 5.

Power Requirements For Dual Terminal

Power requirements for the FT-2000 Dual Add/Drop-Rings Terminal are as follows:

- Two feeders (A and B) are required for powering the terminal.
- Each independent feeder must supply -48 volts direct current and a return.
- Each feeder fuse/breaker capacity must be 30 amperes at the battery distribution fuse board (BDFB). (Note that early bays used an 8-gauge feeder cable and could be fused at 40 amperes.)
- Power dissipation for a fully loaded Dual system is 1142 Watts.
- Fuses at the bay power distribution fuse panel are 10 amp.

Low Speed Cable Installation For Dual Terminals

The low speed electrical cables are installed in the dual terminal as described in Chapter 5 except there may be one or two identical low speed shelves.

It is recommended that the cables from the lower shelf be installed and dressed first.

Non-Transmission Cable Installation For Dual Terminals

The non-transmission cables listed below are installed in the dual terminal as described in Chapter 5 except there may be one or two identical low speed shelves and all cables dress out to left side of the frame as viewed from the front.

- Office Alarm Cable
- Parallel Telemetry Cable (Parallel Telemetry cables are not required if software release 8 or later is being used in the bay.)
- Serial Telemetry Cables (Serial Telemetry cables are not required if software release 8 or later is being used in the bay.)
- X.25 Telemetry Cable
- CIT DTE Cable
- Input Timing Cables
- Output Timing Cables

Miscellaneous Discrete Cables Installation

- Miscellaneous discrete points provide a means for notifying an operations system (OS) maintenance center of environmental conditions at the FT-2000 site. The dual terminal uses miscellaneous discrete point 16 for the fan alarm.

Available Miscellaneous Discrete Cables

Table F-4 lists cables that are available for miscellaneous discrete applications.

Table F-4. Miscellaneous Discrete Cables

ED-7G001-22 Cable Group	Cable Length (ft.)	Cable Type
301	As Req'd	811AS
351	150	
361	250	
800		

Miscellaneous Discrete Usage On Dual Terminals

The dual terminal comes equipped from the factory with an ED-7G001-20, G318 cable run from the fan shelf to the P163A MISC DSCRT 2 connector on the lower low speed shelf to carry the fan alarm. Nothing is connected to the P166A MISC DSCRT 1 connector. Miscellaneous discrete connections to P166A are the same as described in Chapter 5.

If connections are needed to P163A then an ED-7G001-22, G800 "Y" cable must be inserted between the existing ED-7G001-20, G318 cable and P163A. A

standard miscellaneous discrete cable (G301, 351, or 361) will then be connected to the “Y” cable and run to the terminal strip as described in Chapter 5. Refer to Figure -9.

NOTE:
The miscellaneous discretes are numbered 0 through 15 on wiring drawings. However, they will appear as 1 through 16 on the CIT display.

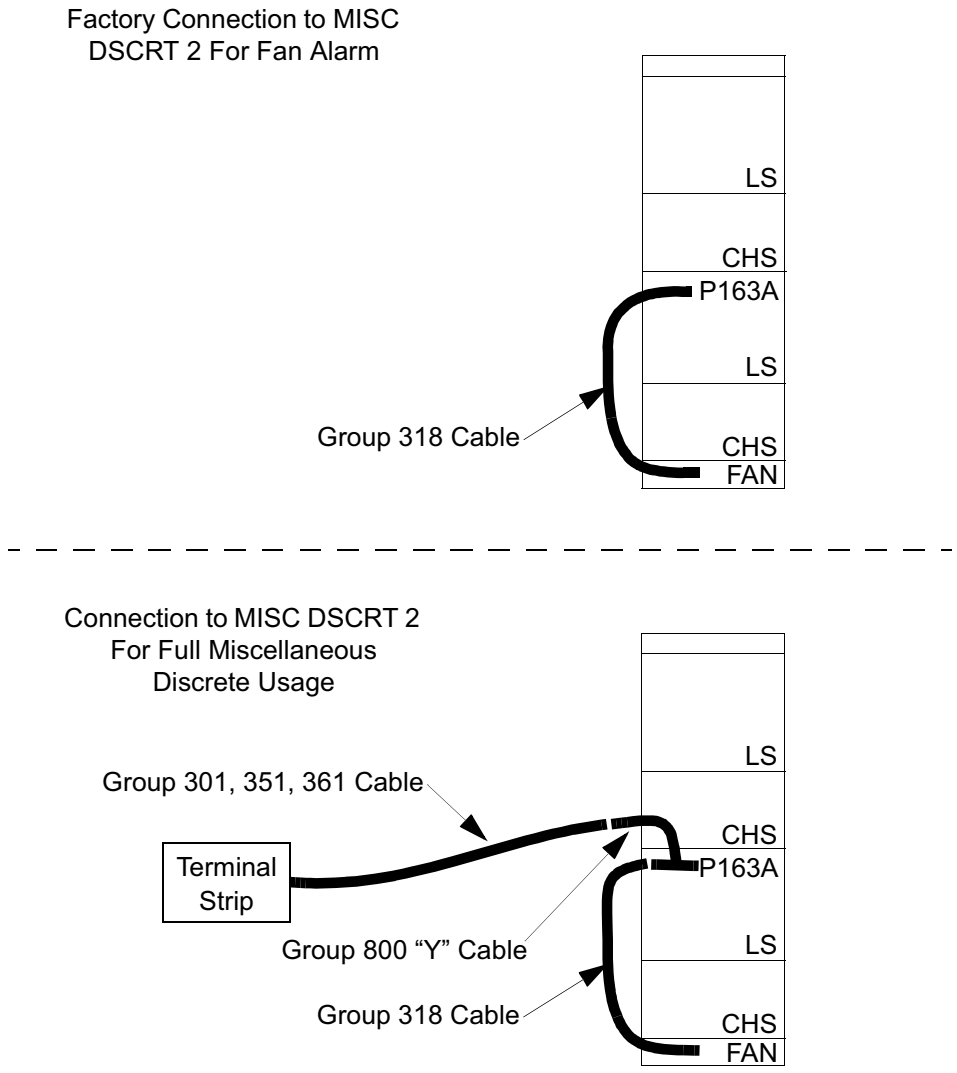

Figure F-9. Dual Terminal Miscellaneous Discrete Connections

High Speed Fiber Installation

Figure F-10 shows the high speed (OC-48) fiber routing for the dual terminal.

Low Speed Fiber Installation

Use the information in Chapter 5 and apply it to both low speed shelves for routing the low speed (OC-3 and OC-12) fibers.

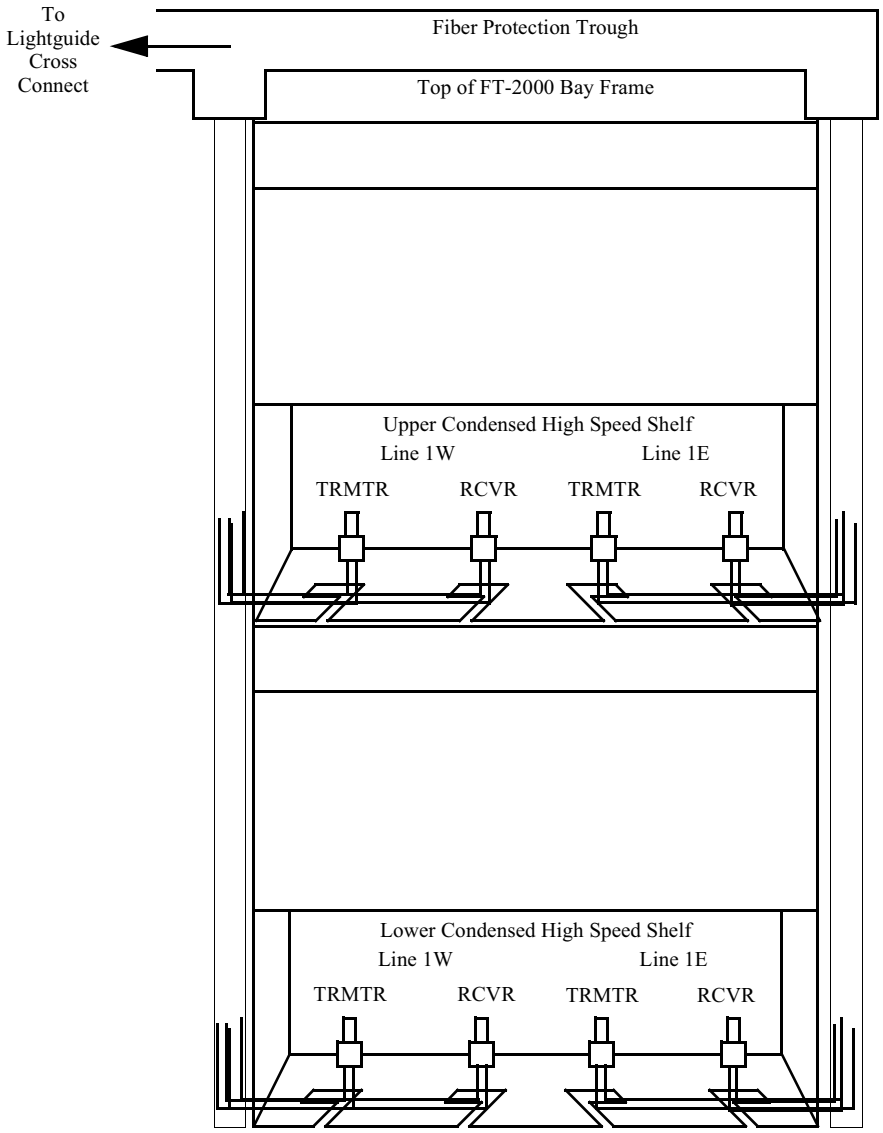

Figure F-10. FT-2000 OC-48 Dual ADR High Speed Fiber Routing

Line Orderwire, Section Orderwire, Section User Channel and Line Growth Cables Installation

Line orderwire, section orderwire, section user channel, and line growth cables are installed as described in Chapter 5 except the cables route out the right side of the shelf as viewed from the front. Refer to Figure F-9 for the connector locations.

Powering, Circuit Pack Installation, and Start-up - Dual Terminal

This paragraph describes procedures to:

- Power FT-2000 Equipment.
- Install circuit packs into the FT-2000 OC-48 Add/Drop Rings Terminal Network Element.

Dual ADR - Terminal Powering

Two -48V DC power feeders connect to the FT-2000 OC-48 Dual Add/Drop-Rings Terminal fuse panel. From the fuse panel, power is channeled through each user or filter panel to the backplane of the shelf, the fan assembly, and to the circuit packs.

⚠ CAUTION:
The red power lead connects to -48V DC source. The white power lead connects to battery return.

Dual ADR - Terminal Powering Procedure

Perform the following steps to power the terminal:

(1) Verify that all packing material has been removed from the terminal.

(2) Verify the following:

- Circuit breakers at the Battery Distribution and Fuse Bay (BDFB) are in the **OFF** position, or
- Fuses on the BDFB are **not installed**.

(3) Unseat all circuit packs from the terminal.

(4) Remove the fuses from the power distribution and fuse panel at the top of the terminal. Open the retainer by lifting up on the bottom edge of the retainer, then press lightly down on the top edge of the fuse cap, the fuse cap will pop out.

(5) Using an ohm meter, measure the resistance from the top terminal, inside each FT-2000 fuse holder, to the terminal frame grounding cable. Refer to Figure F-11 which shows where to take the measurement from the front of the terminal.

Requirement: The resistance should show an open circuit (more than a megohm reading) for each fuse. If the resistance measurement requirement is not met then proceed to Chapter 16, Installation Troubleshooting.

(6) Insert 40 amp fuses into the FT-2000 power feeds at the BDFB. If circuit breakers are being used, put them in the **ON** position.

(7) Using the voltmeter, measure the voltage from the top terminal of each FT-2000 fuse holder to the terminal grounding cable. Refer to Figure F-11. which shows where to take the measurement from the front of the terminal.

Requirement: The voltage should be -48 volts (between -41.75 and -60.0 VDC) at each fuse.

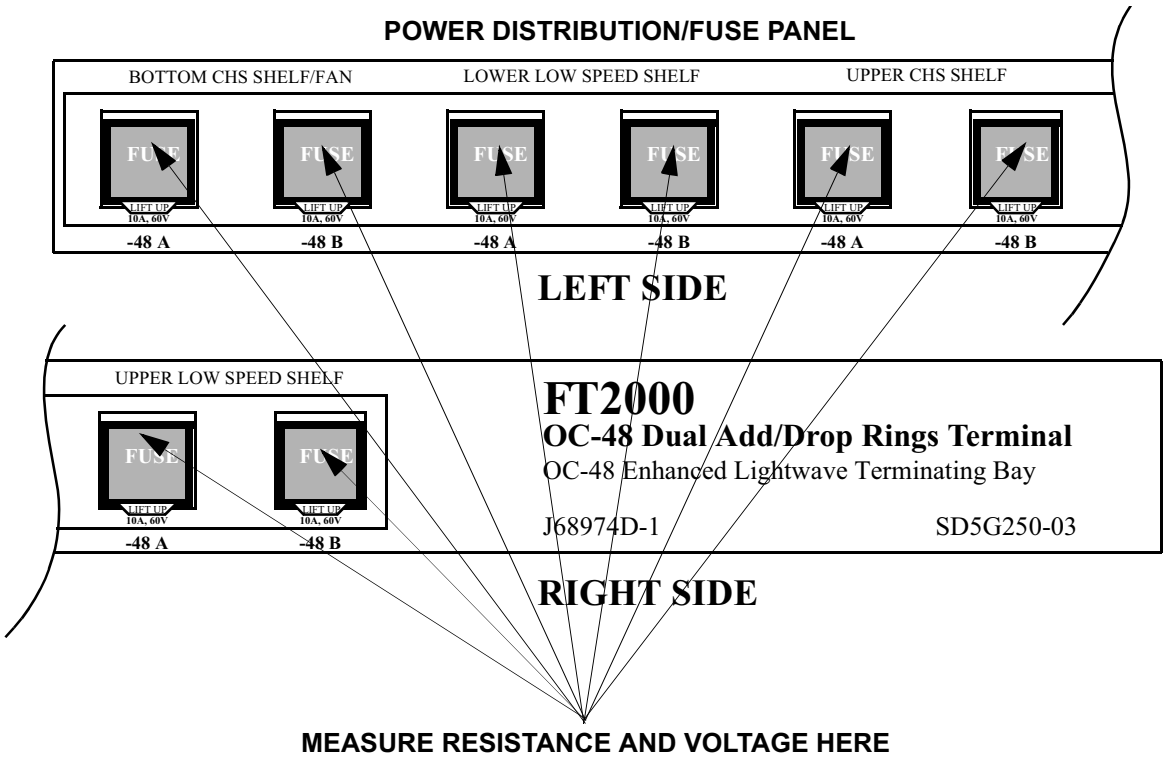

Figure F-11. Fuse Panel Measurement Point

(8) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled BOTTOM CHS SHELF/FAN A and B positions 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 power distribution/fuse panel shelf, being 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 filter panel of the bottom condensed high speed shelf. The fan PWR ON LED will also be illuminated.

(9) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled LOWER LOW SPEED SHELF A and B positions.

Requirement: The PWR ON LED is lighted on the user panel of the lower low speed shelf.

(10) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled UPPER CHS SHELF A and B positions per the following:

Requirement: The PWR ON LED is illuminated on the filter panel of the upper condensed high speed shelf.

(11) Insert two 10 amp terminal fuses into the fuse panel at the top of the terminal labeled UPPER LOW SPEED SHELF A and B positions.

Requirement: The PWR ON LED is lighted on the user panel of the upper low speed shelf.

(12) Disconnect the A power feed by turning the circuit breaker off or removing the fuse for the A power feed at the BDFB.

Requirement: The PWR ON LED on each shelf should remain illuminated.

(13) Remove the A fuse in the power distribution and fuse panel for the bottom shelf/fan.

Requirement: Verify that the PWR ON LED on the bottom shelf is still on.

NOTE:
If the LED is not on, then the A and B power feeders to the terminal are swapped, since the shelf has lost power when it should still have it from battery B. Correct the error as needed and re-test.

(14) Reinsert the A fuse for the bottom shelf into the fuse panel.

(15) Turn the circuit breaker on or replace the fuse for the A power feed at the BDFB.

Software Installation

The software is installed as described in Chapter 6 for each network element in the dual terminal.

Dual Terminal Circuit Pack Installation

Circuit packs are installed in the dual terminal as described in Chapter 6 with the additional requirement that apparatus blanks must be installed in any slot not equipped with a circuit pack.

Testing and System Turnup

Standard Test And Turnup

Refer to chapters 7, 8, 13, 14, and 15 for turning up and testing each of the 2 add/drop-rings terminals in the dual frame.

Fan Alarm Provisioning And Test

Perform the following steps to set and test the fan alarm:

(1) Execute **CONFIGURATION_Set_Attribute_Environmental**

- Point=16
- Alarm Level=MJ
- Description=Fan Alarm

(2) Remove either the **A** or the **B** fuse from the fuse panel at the top of the bay labelled **Bottom HS/Fan**.

(3) On the lower OC-48 terminal execute **FAULT_Retrieve_Alarm [and Status] (all)**.

Requirement: CIT screen reports **MJ env-16 Fan Alarm**

Requirement: CIT screen reports **MN fuse power failure (either A or B)**

Requirement: The fan speed will increase about 10 to 30 seconds after the fuse is removed.

(4) Replace the shelf fuse.

Fiber Cleaning Appendix G

Contents

- Background 2
- Equipment Required 3
- Safety Instructions 4
- Cleaning/Inspecting Optical Connectors 5

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: LMC200H “Understanding Fiber Optic Cleaning, Inspection and Testing.” To learn more about this course, consult your local Lucent Account Representative.

Equipment Required

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
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

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

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 such as 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.

(Continued on next page)

Cleaning Process, Cont.

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 contaminates.

(Continued on next page)

Cleaning Process, Cont.

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.
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.

(Continued on next page)

Cleaning Process, Cont.

Step	Action
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 any particulate contamination using an optical fiber inspection scope of at least 200X magnification. When using an optical fiber scope (for example, the Noyes OFS 300-200X) exercise extreme caution to assure fiber being examined is de-energized.

WARNING:
Use an optical power meter to verify the connector and fiber to be cleaned has been de-energized/deactivated before viewing.

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.

(Continued on next page)

Connector Inspection, Cont.

2	The visual area of the ferrule endface (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminates (see Figure 0-1). **Requirement**: No fixed type of contamination (contaminates which after 3 wet-dry cleaning operations remain at the same loaction 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 singlemode and multimode fibers. Chips, cracks, and scratches are not allowed near the core of the glass fiber endface. No large floating (loose) contaminates are allowed on the glass fiber and ceramic ferrule endface. If after 3 successive wet-dry cleaning attempts, particulate that is less than 8 um in size remains *fixed* on the ceramic ferrule endface and *outside* the defined restricted area on the fiber glass endface, it will be acceptable.

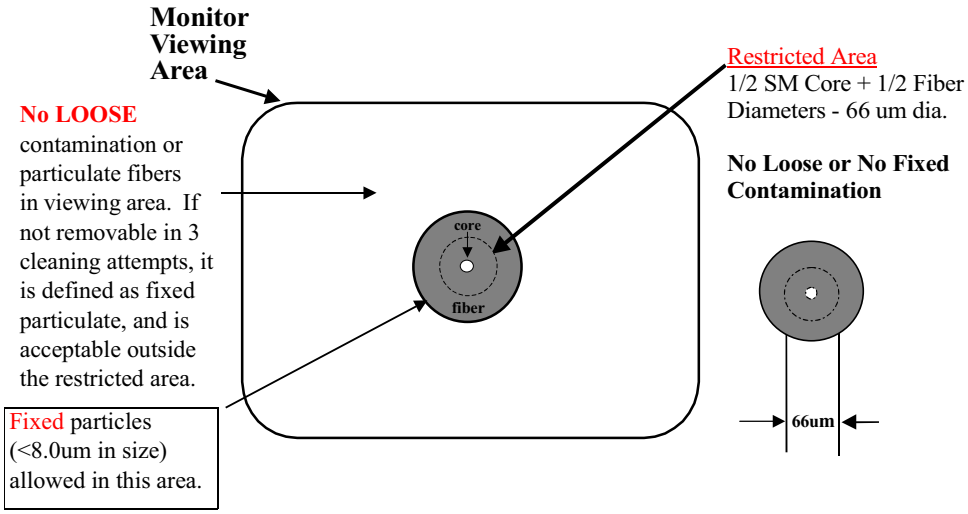

Figure 0-1. Acceptability Criteria: Singlemode and Multimode Fibers

(Continued on next page)

Connector Inspection, Cont.

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.

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.

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.

Glossary

0x1 Line Operation

A 0x1 protection system has one service OC-48 high speed line and no protection OC-48 high speed line.

1+1 Line Protection

A 1+1 protection system has two OC-48 high speed lines. The transmitting terminal transmits the same signal on two lines. The receiving terminal monitors two lines independently and chooses one line as the active line and the other line as the standby line. When a protection switch occurs, the receiving terminal selects the signal from the standby line which causes the standby line to be the new active line. The original active line becomes the standby line.This status remains the same (nonrevertive) after the fault clears.

1x1 Line Protection

A 1x1 protection system has two OC-48 high speed lines. One line is designated as the service line, and the other line is designated as the protection line. The service line normally carries traffic. When a protection switch occurs, the protection line is selected to carry traffic. When the fault clears, the original service line is selected (revertive). Also see Revertive Switching.

1xM Electrical Low Speed Interface Protection

1xM electrical low speed interface protection refers to a system with one protection electrical low speed interface circuit pack (DS3 or STS1E) and up to 16 service electrical low speed interface circuit packs (DS3 or STS1E). When a low speed protection switch occurs, the electrical low speed signals are routed from the service low speed interface circuit pack to the protection low speed interface circuit pack. When the fault clears, the low speed signals are routed back to the service low speed interface circuit pack (revertive). Also see Revertive Switching.

1xN Line Protection

A 1xN protection system has up to 12 OC-48 high speed lines. Up to 11 lines are designated as service lines, and 1 line is designated as the protection line. Also see 1x1 Line Protection and Revertive Switching.

A

ABN

Abnormal - An LED on the user panel that is lighted when a temporary condition potentially affecting transmission, exists; for example, a CIT-initiated protection switch or lockout, or loopback.

ACO/LOCTR

Alarm Cutoff - A push-button switch on the user panel that can be used to retire an audible office alarm. The alarm cutoff function is also available from the CIT and from an operations system.

ADM

Add/Drop Multiplexer

AIS

Alarm Indication Signal - A maintenance signal transmitted downstream in a digital network that shows that an upstream failure has been detected and alarmed.

AMI

Alternate Mark Inversion - A line code that employs a ternary signal to convey binary digits, in which successive binary ones are represented by signal elements that are normally of alternating, positive, and negative polarity but equal in amplitude, and in which binary zeros are represented by signal elements that have zero amplitude.

ANSI

American National Standards Institute - An organization consisting of producer, consumer, and general interest groups that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States.

APD

Avalanche Photodiode - A highly sensitive optical detector.

APS

Automatic Protection Switch

AS&C

Alarm, Status, and Control

ASCII

American Standard Code for Information Interchange - A standard 8-bit code used for exchanging information among data processing systems and associated equipment.

ASN.1

Abstract Syntax Notation 1

Asynchronous

Refers to network elements that are not timed from references traceable to a single timing source.

AUTO

Automatic - One possible state of a low speed port or slot. When a port is in the automatic state and the presence of a good signal is detected, the port is automatically placed in the IS (in service) state. When a slot is in the automatic state and the presence of a circuit pack is detected, the slot is automatically placed in the EQ (equipped) state.

Autonomous Indicators

Autonomous indicators are those indicators that are subject to incoming signal alarm delay. These include office alarm outputs, parallel telemetry outputs, TL1 autonomous messages, the alarm LEDs (CR, MJ, and MN) on the user panel, and the network element status field in the upper left-hand corner of the CIT.

B

B3ZS

Bipolar 3-Zero Substitution - A line coding method that replaces a string of three zeros with a sequence of symbols having some special characteristic.

B8ZS

Bipolar 8-Zero Substitution - A line coding method that replaces a string of eight zeros with a sequence of symbols having some special characteristic.

BCLAN

Board Controller Local Area Network - The internal local area network that provides communications between the Line Controller circuit pack (terminals only) and board controllers on the circuit packs associated with an OC-48 high speed line. In the FT-2000 OC-48 Repeater Bay, the BCLAN provides communications between the System Controller circuit pack and board controllers on the circuit packs.

BDFB

Battery Distribution and Fuse Bay

BER

Bit Error Rate - The ratio of bits received in error to bits sent.

BIP

Bit Interleaved Parity - A method of error monitoring over a specified number of bits (BIP-3 or BIP-8).

BIP-N

Bit Interleaved Parity - N - A method of error monitoring. With even parity, an N-bit code is generated by the transmitting equipment over a specified portion of the signal in such a way that the first bit of the code provides even parity over the first bit of all N-bit sequences in the covered portion of the signal. The second bit provides even parity over the second bits of all the N-bit sequences within the specified portion, etc. Even parity is generated by setting the BIP-N bits so that there are an even number of ones in each of all the N-bit sequences including the BIP-N.

BITS

Building Integrated Timing Supply - A single clock that provides all the DS1 and DS0 synchronization references required by clocks in a building.

BOC

Bell Operating Company

BRT

Business Remote Terminal

C

CC

Clear Channel - A provisionable mode for the DS3 output that causes parity violations to not be monitored or corrected before the DS3 signal is B3ZS-encoded.

CCITT

International Telephone and Telegraph Consultative Committee - An international advisory committee under United Nations sponsorship that has composed and recommended for adoption worldwide standards for international communications.

CIT

Craft Interface Terminal - A personal computer that meets FT-2000 minimum requirements loaded with the FT-2000 CIT-PC software.

CLEI

Common Language Equipment Identifier

CO

Central Office - A telephone company building where switching and/or transmission system equipment is located.

COACH

A set of software tools designed to assist Lucent Technology in providing quality service to our customers for a variety of transmission products. Customers can proactively use the tools to keep abreast of the latest product information and to communicate with the Technical Support groups and product designers.

Collapsed Rings

Collapsed (Folded) rings are ring networks without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Concatenated Switching

Concatenated switching provides protection for adjacent sections of different service lines. In concatenated switching the protection line is divided into sections. Each section of the protection line can be used to protect any service line in the section. Consequently, simultaneous failures on more than one service line can be protected.

Condition

Conditions persist in time and indicate that there is something not normal about the system. Conditions appear in the Retrieve-Alarm Report.

CR

Critical (alarm)

Current Value

The value currently assigned to a provisionable parameter.

CV

Coding Violation

D

DACS

Digital Access and Cross-Connect System

DACS III-2000

One of Lucent Technology's Digital Access and Cross-connect Systems.

DACS IV-2000

One of Lucent Technology's Digital Access and Cross-connect Systems.

Data

A collection of system parameters and their associated values.

DCC

Data Communications Channel - The embedded overhead communications channel in the SONET line. This is used for end-to-end communications and maintenance. It carries alarm, control, and status information between network elements in a SONET network.

DCE

Data Communications Equipment - The equipment that provides the signal conversion and coding between the data terminating equipment and the line. The DCE may be separate equipment or a part of the data terminating equipment.

DDM-2000

Lucent Technology's SONET-ready network multiplexer that can function as a lightwave terminal.It is designed primarily for loop feeder and interoffice applications that will work in existing asynchronous as well as the emerging SONET networks.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

DFB

Distributed Feedback

DM

Degraded Minutes

DMA

Direct Memory Access - A data transfer technique that uses a control circuit to move data between a device and memory.

DPLL

Digital Phase-Locked Loop

DRAM

Dynamic Random Access Memory - Semiconductor random-access memory that requires short interval refreshing to retain its contents.

DRI

Dual Ring Interworking - Dual ring interworking is a configuration of two ring networks that share two common nodes. Dual ring interworking allows one termination in one ring and one termination in another ring to survive a loss-of-signal failure of the shared node that is currently carrying service for the circuit.

DS3

Digital Signal Level 3 (44.736 M/bs)

DS3 Interface Circuit Pack

The FT-2000 OC-48 Lightwave System DS3 Interface circuit pack interfaces with up to three bidirectional DS3 signals.

DSX

Digital Cross-Connect Panel - A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

DTE

Data Terminating Equipment - The equipment that originates data for transmission and accepts transmitted data.

DTMS

Digital Test Measurement Station - The equipment that the DACS III-2000 commands are entered at. Also measures the DACS III-2000.

DWDM

Dense Wave Division Multiplexing

E

EC, EC-n

Electrical Carrier - The basic logical building block signal with a rate of 51.840 Mb/s for an EC-1 signal and a rate of n times 51.840 Mb/s for an EC-n signal.

EC-1

This refers to the actual physical representation of an electrical signal with an EC-1 format at a manual or electronic cross-connect interface. This is typically carried by coaxial cables from one equipment location to another. The term EC-1 not only refers to the organization and data rate of a signal but also to the voltage template the signal must conform to and the impedances for which the voltage template is valid.

ECI

Equipment Catalog Item

EEPROM

Electrically Erasable Programmable Read-Only Memory - Readable memory that is nonvolatile in nature, erased electrically, and programmed externally from the processor that uses it.

EIA

Electronic Industries Association - A trade association of the electronics industry that establishes electrical and functional standards.

EMC

Electromagnetic Compatibility

EMI

Electromagnetic Interference - High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

EPROM

Erasable Programmable Read-Only Memory - Readable memory that is nonvolatile in nature, erased by exposure to intense ultraviolet light, and programmed externally from the processor that uses it.

EQ

Equipped - A memory administrative state for slots. EQ refers to a slot that is fully monitored and alarmed.

Equal Level Cross-Connect

A cross connect where the signal strength (power) is the same for all the inputs and outputs so that any output can be connected to any input. The DSX-3 is an example of an equal level cross connect.

ES

Errored Seconds - A second in which one or more parity violation are detected. Errored seconds are monitored for the OC-48 line, OC-48 section, and STS-1 path.

ESD

Electrostatic Discharge - The discharge of static electricity into equipment that potentially causes component damage and logic errors.

ESF

Extended Super Frame - A DS1 format option.

Event

Events happen at a particular time (do not persist in time) and appear in the Retrieve-History Report.

Executable Code

The program that controls the operation of the system.

Excessive Holdover

A timing condition existing when the holdover mode has been in operation for more than 24 hours, causing an alarm.

Extra Traffic

Extra traffic is a capability of the FT-2000 OC-48 Add/Drop-Rings terminal that allows access to the protection STS-3 tributaries of an OC-48 high speed line for low priority traffic of for restoration purposes.

F

FDA

Food and Drug Administration

FE ACTY

Far-End Activity - An LED on the user panel that is lighted when an alarm or status condition exists at a remote FT-2000 OC-48 Network Element.

FEBE

Far-End-Block Error - An indication returned to the transmitting terminal that an errored block has been detected at the receiving terminal. A block is a specified grouping of bits.

FERF

Far-End-Receive Failure - An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure.

Flash EPROM

A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

FLS

Frame Loss Seconds

Folded Rings

Folded (Collapsed) rings are ring networks without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Free Running

An operating condition of a network element in which its local oscillator is not locked to any external synchronization reference and is using no storage techniques to sustain its accuracy.

FT-LBA

FT-Lightwave Booster Amplifier

FT-RDS

FT-Ring Diversity Switch

G

Gb/s

Gigabits (10^9 bits) per Second

GNE

Gateway Network Element - A network element that passes information between other network elements and operations systems via a data communication network.

H

Holdover

An operating condition of a network element in which its local oscillator is not locked to any synchronization reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

I

I/O

Input/Output

IR

Intermediate Reach

IS

In Service - A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

IS3 Interface

The IS3 circuit pack is an LED version of the OC3 circuit pack designed for Intra Office applications where the optical power of a laser is not required.

J

Jitter

Timing jitter is defined as short-term variations of the significant instants of a digital signal from their ideal positions in time.

L

LAN

Local Area Network

LBO

Line Build-Out - An equalizer network between the FT-2000 OC-48 1x1 End Terminal and the DSX panel (or equivalent). It guarantees the proper signal level and shape at the DSX panel (or equivalent).

LCLAN

Line Controller Local Area Network - The internal local area network that provides communications between the System Controller circuit pack and the Line Controller circuit packs.

LED

Light-Emitting Diode

LGX

Lightguide Cross-connect

Line

An optical transmission line. In T1/Bellcore terminology, line refers to a transmission medium, together with the associated high speed equipment, required to provide the means of transporting information between two consecutive Network Elements, one of which originates the line signal and the other terminates the line signal.

LNCTL

The FT-2000 OC-48 Lightwave System Line Controller circuit pack performs line specific computations.

LOF

Loss of Frame - A failure to synchronize to an incoming signal.

Loop Timing

A timing mode in which the network element derives its transmit timing from the received OC-48 high speed signal.

LOP

Loss of Pointer - A failure to extract good data from an STS-1 payload.

LOS

Loss of Signal - The complete absence of an incoming signal.

LS INTFC

Low Speed Interface, either DS3, STS-1, or OC-3.

LSSW

The FT-2000 OC-48 Lightwave System Low Speed Switch circuit pack performs low speed interface protection switching.

um

Micrometer - 10^{-6} meters

Menu

A set of possible values for a parameter.

Midspan Meet

The capability to interface between two lightwave terminals of different vendors. This applies to high speed optical interfaces.

MJ

Major (alarm)

MML

Human-Machine Language

MN

Minor (alarm)

Multiplexing

The process of combining several distinct digital signals into a single composite digital signal.

N

NCDRH

National Center for Devices and Radiological Health

NE

Network Element - Refers to an FT-2000 OC-48 1x1 End Terminal or FT-2000 OC-48 Repeater Bay in a network.

NE ACTY

Near-End Activity - An LED on the user panel that is lighted when an alarm or status condition exists at the local FT-2000 OC-48 Network Element.

NEBS

Network Equipment-Building System

NID

Node ID - a number used by the software to identify Network Elements, valid values are 0 - 15.

nm

Nanometer - 10^{-9} meters

NMA

Network Monitoring and Analysis System - Bellcore's alarm surveillance operations system.

NMON

Not Monitored - A memory administrative state for ports. This refers to a port that is not monitored and will not transition to the IS state if a good signal is detected.

Nonautonomous Indicators

The nonautonomous indicators are those indicators that are not subject to incoming signal alarm delay. These indicators include the circuit pack FAULT LEDs, all CIT reports, TBOS alarm and status points, TL1 command response messages, and the LEDs on the user panel (except CR, MJ, and MN).

Nonrevertive switching

In nonrevertive switching, there is a active and standby high speed line, circuit pack, etc. When a protection switch occurs, the standby line, circuit pack, etc., is selected causing the old standby line, circuit pack, etc., to be used for the new active line, circuit pack, etc. The original active line, circuit pack, etc.,becomes the standby line, circuit pack, etc. This status remains in effect when the fault clears. Therefore, this protections scheme is nonrevertive in that there is no switch back to the original status in effect before the fault occurred. Also see 1+1 Line Protection.

NPPA

Non Preemptable protection Access. NPPA is a new feature relesed in ADR 7.1.0 which locks out line switching to specific tributaries assigned by the user. This feature was designed for path switched ring optical extension applications to provide additional bandwidth.

NRZ

Nonreturn to Zero

NSA

Non-Service Affecting

O

O&M

Operation and Maintenance

OALAN

Overhead Access Local Area Network - The internal local area network that provides communications between the System Controller circuit pack and the Overhead Controller circuit pack.

OAM&P

Operations, Administration, Maintenance, and Provisioning

OC, OC-n

Optical Carrier - The optical signal that results from an optical conversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

OC3 Optical Interface Circuit Pack

The FT-2000 OC-48 Lightwave System OC3 Optical Interface circuit pack interfaces with one bidirectional OC-3 signal.

OC12 Optical Interface Circuit Pack

The FT-2000 OC-48 Lightwave System OC12 Optical Interface circuit pack interfaces with one bidirectional OC-12 signal.

OC48 RCVR

The FT-2000 OC-48 Lightwave System OC48 Receiver circuit pack interfaces with the incoming OC-48 high speed line (receive direction).

OC48 REGENR

The FT-2000 OC-48 Lightwave System OC48 Regenerator circuit pack regenerates one OC-48 signal.

OC48 TRMTR

The FT-2000 OC-48 Lightwave System OC48 Transmitter circuit pack interfaces with an outgoing OC-48 high speed line (transmit direction).

OHCTL (TERM)

The FT-2000 OC-48 Lightwave System Overhead Controller - Terminal circuit pack provides user access to the SONET overhead channels.

OOF

Out-of-Frame

Operations Interface

Any interface that provides information on the system behavior or control. These include the equipment LEDs, user panel, CIT, office alarms, and all telemetry interfaces.

Operations Interworking

The capability to access, operate, provision, and administer remote systems through CIT access from any site in a SONET network or from a centralized operations system.

Original Value

The value given to a CIT provisionable parameter at the factory.

Original Value Provisioning

The original values are the values given to CIT provisionable parameters at the factory. At system start-up, the original values are copied and become the current values. These current values can be changed using local or remote provisioning. The original values can never be changed.

OS

Operations System - A central computer-based system used to provide operations, administration, and maintenance functions.

P

Protection Access

Refers to connecting the Low Speed Shelf - Complementary to the protection OC-48 high speed line. This allows the protection line to be used for low priority traffic, temporary capacity relief, or revenue-generating services (for example, video).

Parameter

A characteristic of the system that affects its operation.

Path

A path at a given rate is a logical connection between the point at which a standard frame format for a signal at the given rate is assembled and the point at which the standard frame format for the signal is disassembled.

Path AIS

Path Alarm Indication Signal - A path level code that is sent downstream in a digital network as an indication that an upstream failure has been detected and alarmed.

Path Terminating Equipment

Network elements in which the path overhead is terminated.

Path Yellow Signal

A maintenance signal used to indicate the presence of an alarm, detected at the remote terminal, in the path originating locally. Also, refer to remote defect indicator-path (RDI-P) signal.

PC

Personal Computer

Phase Locked

An operating condition of a network element in which it is locked to an external reference.

Platform

In the FT-2000 OC-48 Lightwave System, a platform is a family of equipment and software configurations designed to support a particular set of applications.

Plesiochronous Network

A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant.

PLL

Phase Locked Loop

PM

Performance Monitoring - Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

POH

Path Overhead - Overhead assigned to and transported with the payload until the payload is demultiplexed. It is used for functions that are necessary to transport the payload.

Preprovisioning

The capability to provision a slot before installing a circuit pack.

Proactive Maintenance

Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect.

PROTN

Protection

Provisioning

Assigning a value to a parameter in memory.

PWR

Power

R

RBP

Receive Byte Processor - A device on the OC48 RCVR and OC48 REGENR circuit packs.

RDI-L

Remote Defect Indication-L - An indication returned to a transmitting terminal that the receiving terminal has detected an incoming failure. Also refer to far-end-receive-failure (FERF).

RDI-P

Remote Defect Indicator-Path - A maintenance signal inserted towards the OC-48 line by the DS3 circuit pack to show the presence of an alarm, detected at the remote terminal, in the path originating locally.

RDS

Ring Diversity Switch

Reactive Maintenance

Refers to detecting defects/failures and clearing them.

Revertive Switching

In revertive switching, there is a service and protection high speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service reverts back to the original service line. Also see 1x1 Line Protection.

RF

Radio Frequency

RPP

Reliability Prediction Procedure

RTAC

Regional Technical Assistance Center - A Lucent Technologies organization that helps customers maintain installed systems.

RZ

Return to Zero

S

SA

Service Affecting

SAS

DS3 Severely Errored Frame/AIS Seconds - The number of seconds during which an out-of-frame event occurred and AIS is inserted.

SADD

Site Address - A unique code used to identify an FT-2000 OC-48 Repeater Bay.

SD

Signal Degrade - A provisionable parameter for the incoming OC-48 high speed signal and DS3 signal (from cross-connect panel) that determines the threshold at which a signal degrade condition is declared.

SEFS

Severely Errored Frame Seconds - The number of seconds during which an out-of-frame event occurred. The severely errored frame seconds are monitored for the OC-48 section.

SES

Severely Errored Seconds - A second in which the parity violations detected reach a fixed threshold. The severely errored seconds are monitored for the OC-48 section, OC-48 line, and STS-1 path.

SF

Signal Fail - Refers to a condition when an incoming signal's bit error rate exceeds a fixed value.

SLM

Single Longitudinal Mode

SONET

Synchronous Optical Network - The American National Standards Institute's optical signal standard for broadband transmission.

SPE

Synchronous Payload Envelope - A 125-microsecond frame structure composed of STS path overhead and bandwidth for the payload.

Status

Status means a condition that does not raise an alarm.

STS, STS-n

Synchronous Transport Signal - The basic logical building block signal with a rate of 51.840 Mb/s for an STS-1 signal and a rate of n times 51.840 Mb/s for an STS-n signal.

STS-1E

This refers to the FT-2000 OC-48 Add/Drop-Rings Terminal internal electrical signal with an EC-1 format.

STS1 Electrical Interface Circuit Pack

The FT-2000 OC-48 Lightwave System STS1 Electrical Interface circuit pack interfaces with up to three bidirectional STS-1 signals.

SW

The FT-2000 OC-48 Lightwave System Switch circuit pack performs high speed line protection switching.

Synchronous

Refers to network elements that are timed from references traceable to a single timing source.

Synchronous Network

The synchronization of synchronous transmission systems with synchronous payloads to a master (network clock that can be traced to a single reference clock).

SYSCTL

The System Controller and System Memory circuit packs provide the highest level of system control for the FT-2000 OC-48 Lightwave System. The System Controller circuit pack provides overall administrative control of the system.

SYSMEM

The System Memory and System Controller circuit packs provide the highest level of system control for the FT-2000 OC-48 Lightwave System. The System Memory circuit pack provides memory support for the SYSCTL circuit pack.

T

T1X1 and T1M1

The ANSI committees responsible for telecommunications standards.

TA

Technical Advisory

TBOS

Telemetry Byte-Oriented Serial (Protocol) - Defines one physical interface for direct connection between the telemetry remote and the monitored equipment. An EIA-422 port is used to provide the operations system with enough alarm and status information to localize a problem and determine the severity.

TBP

Transmit Byte Processor - A device on the OC48 TRMTR and OC48 REGENR circuit packs.

TCA

Threshold-Crossing Alert - A condition set when a counter exceeds a user-selected high or low threshold. A TCA does not generate an alarm but is available on demand through the CIT.

TEC

Thermo-Electric Cooler

TG3 (DS1)

The FT-2000 OC-48 Lightwave System Timing Generator, Stratum 3 - DS1 circuit pack generates clock signals for distribution to the transmit circuits. It operates in the free running, loop timing, phase lock, and holdover modes.

Through Timing

Refers to a network element that derives its transmit timing in the east direction from a received line signal in the east direction and the transmit timing in the west direction from a received line signal in the west direction.

TID

Target Identifier - A provisionable parameter used to identify an FT-2000 OC-48 Lightwave System.

TL1

Transaction Language 1 - A machine-to-machine communications language that is a subset of CCITT's human-machine language.

TR

Technical Reference

Tributary

A 51.84 Mb/s signal (STS-1 level) or 155 Mb/s signal (STS-3 level) within the FT-2000 OC-48 Lightwave System. The maximum capacity of an OC-48 signal is forty-eight 51.84 Mb/s tributaries (or sixteen 155 Mb/s tributaries).

TSO

Technical Support Organization (also known as Customer Technical Support)- A Lucent Technology organization that helps customers maintain installed systems.

U

UAS

Unavailable Seconds - A second during which the STS-1 path is unavailable.

Upgrade

An upgrade is the addition of new capabilities (features) to an existing platform. This requires new software and may require new hardware.

V

Value

A number, text string, or other menu selection associated with a parameter.

VM

Violation Monitor - A provisionable mode for the DS3 output that causes parity violations to be monitored but not corrected before the DS3 signal is B3ZS encoded.

VMR

Violation, Monitor, and Removal - A provisionable mode for the DS3 output that causes parity violations to be monitored and corrected before the DS3 signal is B3ZS encoded.

VT

Virtual Tributary - A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

VT-G

Virtual Tributary Group - A 9-row by 12-column structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte interleaved with the VT-organized synchronous payload envelope.

Z

Zero Code Suppression

A technique used to reduce the number of consecutive zeros in a line-codes signal (B3ZS for DS3 signals).