Alcatel-Lucent 1665

1665 DATA MULTIPLEXER | RELEASE 7.1

INSTALLATION MANUAL

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Ordering Information

For more ordering information, refer to “How to order” in the section titled “About this document.”

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Contents

About this document

Purpose xvii

Reason for reissue xvii

Intended audience xvii

How to use this document xviii

Safety information xx

Conventions used xx

Related information xxi

Document support xxi

Technical support xxi

How to order xxii

How to comment xxii

Packaging collection and recovery requirements xxii

Recycling/take-back/disposal of product xxii

Part I: 1665 Data Multiplexer (1665 DMX) physical installation and powering

1 Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)

Planning 1-3

Connector references 1-7

Inspection 1-8

1665 DMX High-Capacity shelf installation 1-9

Heat baffle installation 1-14

Power cable and cable bracket installation 1-16

Fiber management installation (optional) 1-27

Installing the fiber ducts (optional) 1-31

Cable and optical fiber installation 1-32
DS1 cable installation 1-34
DS3/EC1 and 48TMUX cable installation 1-41
12TMUX (LNW18) cable installation 1-54
10/100BaseT backplane Ethernet cable installation 1-58
Ethernet cabling to SFP modules on circuit pack faceplates 1-62
IAO LAN and TCP/IP cable installation 1-64
Modem cable installation 1-69
Sync cable installation 1-72
Office alarm cable installation 1-78
Miscellaneous (environmental) discrete telemetry cable installation 1-84
Main optical fiber installation (OC-12, OC-48, OC-192) 1-88
Fiber installation for low-speed packs 1-90
1000Base-F and 100Base-F fiber installation 1-92
Fibre channel fiber installation 1-94
CIT cable installation 1-96
Final operations 1-99

2 Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)

Description 2-2
Powering 2-3
Circuit pack compatibility 2-7
Initial circuit pack installation 2-12

Part II: 1665 Data Multiplexer (1665 DMX) stand-alone installation tests

3 Software download and circuit pack installation

Software installation 3-4
Circuit pack installation 3-5
Use of WaveStar® CIT software 3-9
Circuit pack firmware version verification 3-12
1665 DMX shelf initialization 3-13
Provision/enable/disable TCP/IP on an IAO LAN port 3-14
Reset system date and time 3-17
Provision/Enable/disable the 1665 DMX as a TL1 TCP/IP GNE 3-18

4 Installation tests

LBO software settings 4-4

Clearing alarms 4-7

Local equipment and cross-connect tests 4-9

DS1 protection switching 4-14

DS1 cleanup procedures 4-18

DS3/EC1 and TMUX testing procedure 4-22

DS3 protection switching 4-28

DS3 cleanup procedures 4-32

LNW66, LNW71 and LNW74 (10/100T) TX Ethernet cabling testing 4-36

OC-3 (LNW37, LNW45, LNW55)/OC-12 (LNW49, LNW55)/OC-48 (LNW55, LNW62) low-speed SFP test procedure 4-41

OC-3 (low-speed) testing 4-43

OC-12 (low-speed) testing 4-47

OC-48 (low-speed) testing 4-52

LED test 4-56

Additional optical tests (optional) 4-57

5 Operational tests

Office alarm test 5-4

Automatic protection switching and alarm test 5-8

Manual switching tests 5-11

External timing verification 5-13

Miscellaneous (environmental) discrete telemetry test 5-16

Modem connection test 5-19

Final operations 5-21

Part III: 1665 Data Multiplexer (1665 DMX) ring setup and testing

6 Ring setup and testing: integration procedures

Fiber installation 6-4

Optical transmission test (OC-192, OC-48, OC-12) 6-11

Automatic protection switching test 6-12

Manual switching tests 6-14

Final operations 6-17

Part IV: 1665 Data Multiplexer (1665 DMX) supplementary information and installation checklist

A Laser safety and classifications and Electrostatic Discharge (ESD) considerations

Laser safety A-2
Electrostatic Discharge ESD considerations A-5
Laser product classification A-9
1665 DMX optical specifications A-11

B Fiber cleaning

Equipment requirements and recommendations B-3
Safety instructions B-5
Cleaning/inspecting optical connectors B-6
Cleaning pluggable optics modules B-12

C Installing fiber connectors and LBOs

LBOs C-2
Fiber connections C-5

D Backplane pin replacement

Pin and connector background D-2
Repair kits and tools D-4
Simple repair methods D-5
Replacement methods D-7

E Installation checklist

Overview E-1

F Fiber labeling

Fiber description F-2
Fiber labels F-4

G Pluggable transmission module installation

Pluggable transmission modules G-2
Install pluggable transmission modules G-6

H Technical support

Technical assistance H-2
Accessing and navigating the On-Line Customer Support (OLCS) web site H-7
Other technical support services H-13

GL Glossary

Acronyms and abbreviations GL-1

Terms and definitions GL-15

IN Index

List of figures

Part I: 1665 Data Multiplexer (1665 DMX) physical installation and powering

I-1 1665 DMX High-Capacity shelf backplane I-2

1 Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)

1-1 Connector types and pinouts 1-7

1-2 1665 DMX High-Capacity shelf mounting bracket positions — 23-inch frame 1-10

1-3 1665 DMX High-Capacity shelf mounting bracket positions — 19-inch frame 1-11

1-4 Typical 1665 DMX High-Capacity shelf bay mounting arrangements 1-12

1-5 Heat baffle position 1-15

1-6 Cable brackets 1-17

1-7 Power connector mounting positions 1-19

1-8 Alternating power cable routing 1-20

1-9 Power connection 1-21

1-10 Power cable routing with cable bracket 1-22

1-11 Power cable routing without cable bracket 1-23

1-12 DS1 cable installation 1-35

1-13 DS1 cable routing 1-36

1-14 DS3/EC1 and 48TMUX cable installation 1-42

1-15 DS3/EC1 and 48TMUX cable routing 1-43

1-16 12TMUX cable installation 1-55

1-17 TMUX cable routing 1-56

1-18 10/100BaseT cable installation 1-59

1-19 Ethernet cable routing to faceplate SFP modules 1-62

1-20 LAN cable installation to front of 1665 DMX High-Capacity shelf 1-65

1-21 IAO LAN/TCP-IP cable installation to rear of 1665 DMX High-Capacity shelf 1-66

1-22 Modem cable installation 1-70
1-23 Sync cable with molded DB9 connector installation 1-73
1-24 Sync cable with wire-wrap connector installation 1-74
1-25 Office alarm cable installation 1-79
1-26 Office alarm mult cable installation 1-81
1-27 Miscellaneous discrete cable installation 1-85
1-28 CIT cable installation 1-97

2 Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)

2-1 Power connections on 1665 DMX High-Capacity shelf backplane 2-4
2-2 1665 DMX High-Capacity shelf 2-11
2-3 LNW221 - 259 channel positions 2-15

Part II: 1665 Data Multiplexer (1665 DMX) stand-alone installation tests

4 Installation tests

4-1 Optical test set arrangement 4-59
4-2 Optical test arrangement RX fiber moved 4-60

5 Operational tests

5-1 1665 DMX Shelf Backplane 5-14
5-2 Miscellaneous (Environmental) Discrete Functions 5-17

Part IV: 1665 Data Multiplexer (1665 DMX) supplementary information and installation checklist

A Laser safety and classifications and Electrostatic Discharge (ESD) considerations

A-1 Laser Warning Labels A-3
A-2 Static control wrist strap A-6

B Fiber cleaning

B-1 Cleaning the Ferrule Endface B-7
B-2 CleTop Cleaner B-8
B-3 Acceptability Criteria for Fiber Cleaning B-10

C Installing fiber connectors and LBOs

C-1 LC-Type Connector Ports on Circuit Pack C-2
C-2 LC-Type LBO C-3

C-3 LC-Type LBO Inserted Into LC-Type Connector Port C-3
C-4 Removing LC-Type LBO From LC-Type Connector Port C-4
C-5 LC-Type Fiber Connector C-5
C-6 LC-Type Fiber Connection C-6

G Pluggable transmission module installation

G-1 Pluggable Transmission Module With Dust Plug (Optical PTMs Only) G-6
G-2 Examples of Dust Plugs G-7
G-3 Module Types G-7
G-4 Latch Type 3 (Opened and Closed) G-9
G-5 Latch Type 4, 5, 6, 7 and 8 (Opened and Closed) G-10

List of tables

Part I: 1665 Data Multiplexer (1665 DMX) physical installation and powering

1-1 Computer requirements 1-6

1 Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)

1-1 Cable requirements and options 1-5

1-2 Power cable assemblies 1-25

1-3 Power connections 1-26

1-4 DS1 cable assemblies 1-37

1-5 DS1 transmission connections 1-38

1-6 DS3 connections for different function groups 1-42

1-7 DS3/EC1 or TMUX cable assemblies 1-44

1-8 DS3/EC1 and TMUX transmission connections 1-50

1-9 12TMUX transmission connections 1-57

1-10 10/100BaseT Ethernet cable assemblies 1-60

1-11 10/100BaseT Ethernet connections 1-61

1-12 GbE Ethernet cables 1-63

1-13 LAN 10BaseT cable assemblies 1-67

1-14 LAN 10BaseT cross-over cable connections 1-68

1-15 LAN 10BaseT straight-through cable connections 1-68

1-16 Modem cable assemblies 1-71

1-17 Modem cable connections 1-71

1-18 Synchronization cable assemblies (SYNC1 and SYNC2) 1-76

1-19 Synchronization cable (DS1 timing reference) connections 1-77

1-20 Office alarm cable assemblies 1-82

1-21 Office alarm connections 1-83

1-22 Miscellaneous discrete cable assemblies 1-86
1-23 Miscellaneous (environmental) discrete telemetry connections 1-87
1-24 CIT Cable Assembly 1-97
1-25 Standard CIT cable connections 1-98
1-26 RJ-45 to DB-9 connector connections 1-98

2 Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)

2-1 1665 DMX High-Capacity shelf power supply requirements 2-3
2-2 Release 7.1 circuit pack compatibility 2-7

3 Software download and circuit pack installation

3-1 Computer Requirements 3-2

4 Installation tests

4-1 Cable lengths (feet) 4-5
4-2 DS1 Cross-Connections 4-18
4-3 DS3 Cross-Connections 4-33
4-4 Transmission rate 4-59

5 Operational tests

5-1 Office Alarm Connections 5-5
5-2 Miscellaneous (Environmental) Discrete Telemetry Connections 5-18

6 Ring setup and testing: integration procedures

6-1 Attenuation Table 6-6
6-2 Attenuation table (Pluggable Transmission Modules) 6-7

A Laser safety and classifications and Electrostatic Discharge (ESD) considerations

A-1 Laser Classes A-10
A-2 1665 DMX Optical Circuit Pack Laser Safety Specifications A-11
A-3 1665 DMX Optical Specifications A-13

B Fiber cleaning

B-1 Required and Recommended Equipment and Materials B-3

D Backplane pin replacement

D-1 Backplane Locations of METRAL Pins D-3
D-2 Metral Pins D-4

E Installation checklist

E-1 Installation Acceptance Checklist E-1

G Pluggable transmission module installation

G-1 Alcatel-Lucent Approved Pluggable Transmission Modules G-2
G-2 Insert Pluggable Transmission Module Into Socket G-11

About this document

Purpose

This document provides the information and procedures necessary to install, self-test and turn up the 1665 Data Multiplexer (1665 DMX) system.

Product naming

As a result of the Alcatel-Lucent merger and new corporate branding guidelines, Metropolis® DMX Access Multiplexer (DMX) (Metropolis® DMX is now Alcatel-Lucent 1665 Data Multiplexer (1665 DMX). The company logo and product name will be changed on many items including the shelves, circuit packs, cables, software banners, the WaveStar® CIT, documentation, ED drawings, software CD labels, configurators, OMS, and INC. Please be patient as we migrate each of these items. You may experience a period of transition when you may receive a mixture of the company logo and product names on any of these items. For example, a document may say 1665 DMX while the software says Metropolis® DMX. Despite the name change, rest assured that Metropolis® DMX and 1665 DMX are the same product with the same product features, interoperability, and operations remain unchanged

Reason for reissue

This document is being reissued to include information about new features and hardware associated with Release 7.1 and the name change to Alcatel-Lucent 1665 Data Multiplexer (1665 DMX).

Intended audience

This installation manual is intended to provide individuals and customers the information and procedures necessary to install, self-test and turn up the 1665 DMX system.

This manual is not a service or operations manual. Refer to 365-372-301, *1665 DMX Data Multiplexer User Operations Guide* for any activities involving circuit turn-up, regular maintenance, or trouble analysis.

How to use this document

This manual is divided into the following sections with a brief description of the contents of each major part/chapter/appendix:

About this document

This chapter describes the purpose, intended audience, reason for reissue, and organization of this document. This section references related documentation and explains how to order, make comments or recommend changes to this document.

Part I: "1665 Data Multiplexer (1665 DMX) physical installation and powering"

Chapter 1, "Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)"

This chapter provides the information and procedures for installing and cabling the 1665 DMX system. It provides the additional cabling information needed for the added DS1 and DS3 capacity.

Chapter 2, "Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)"

This chapter provides information for verifying that the shelf is being supplied with the proper power and provides instructions for circuit pack installation.

Part II: "1665 Data Multiplexer (1665 DMX) stand-alone installation tests"

Chapter 3, "Software download and circuit pack installation"

Software download and circuit pack installation is covered in this chapter.

Chapter 4, "Installation tests"

This chapter verifies proper transmission cabling installation and functionality.

Chapter 5, "Operational tests"

This chapter provides instructions to test protection switching and the non-transmission cabling. This section is not intended to replace acceptance test procedures.

Part III: "1665 Data Multiplexer (1665 DMX) ring setup and testing"

Chapter 6, "Ring setup and testing: integration procedures"

This chapter provides the tests to verify proper ring fiber cabling and protection switching.

Part IV: "1665 Data Multiplexer (1665 DMX) supplementary information and installation checklist"

Appendix A, "Laser safety and classifications and Electrostatic Discharge (ESD) considerations"

This appendix provides lightwave and laser safety information and precautions.

Appendix B, "Fiber cleaning"

This appendix 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 equipment.

Appendix C, "Installing fiber connectors and LBOs"

This appendix provides procedures for installing and removing the types of Line Build Out (LBO) units and fiber connectors onto input and output ports found on the 1665 DMX circuit packs.

Appendix D, "Backplane pin replacement"

This appendix provides information and the procedures used when a pin or blade on the 1665 DMX backplane has been bent or broken.

Appendix E, "Installation checklist"

This appendix provides a checklist to ensure that all necessary procedures have been completed. Use of the installation checklist is required to ensure a quality installation, all completed tasks should be checked off and those not completed should be duly noted as to the reason why. This checklist should be turned in as part of your job complete paperwork.

Appendix F, "Fiber labeling"

This appendix provides a description of how to label the fiber.

Appendix G, "Pluggable transmission module installation"

Provides examples of various SFP installation.

Appendix H, "Technical support"

This appendix provides information on Technical Support Services.

Glossary

The Glossary provides definitions for telecommunication acronyms and terms.

Index

The Index supplies users with specific subjects and corresponding page numbers to find necessary information.

Safety information

This information product contains hazard statements for your safety. Hazard statements are given at points where safety consequences to personnel, equipment, and operation may exist. Failure to follow these statements may result in serious consequences.

Safety precautions

Adhere to the following safety precautions:

- Electrostatic discharge (ESD)

You must be properly grounded when making contact with the 1665 Data Multiplexer (1665 DMX) frame and handling circuit packs, disk drives, and tapes. Wrist strap ground cords should be routinely tested for the minimum 1-megohm resistance.

- Plug-in storage

Circuit packs should be stored in static-safe packaging or in a grounded cabinet.

For additional safety precautions, please see the *1665 Data Multiplexer (1665 DMX) User Operations Guide.*

Laser safety

CAUTION

Laser safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

For more detailed information and safety precautions, refer to Appendix A, “Laser safety and classifications and Electrostatic Discharge (ESD) considerations”.

Conventions used

Italic typeface denotes a particular product line or information product.

Helvetica Bold typeface signifies a window, section, command or parameter used with the TL1 Command Builder.

Helvetica typeface indicates a faceplate or 1665 DMX label designation, as in the ACTIVE LED on a circuit pack.

`Courier Bold` indicates a TL1 command typed in a terminal window by the user, as in `act-user:LT-DMX:LUC01:ctag::DMX2.5G10G;`

`Courier` typeface indicates the system or PC response to a command.

For the remainder of this document, "1665 DMX" is used in place of 1665 Data Multiplexer (1665 DMX) in most cases.

Related information

1665 DMX Documentation Set

The following is a list of related documents:

- 365-372-300R7.1 *1665 Data Multiplexer, Release 7.1 Applications and Planning Guide*
- 365-372-301R7.1 *1665 Data Multiplexer, Release 7.1 User Operations Guide*
- 365-372-302R7.1 *1665 Data Multiplexer, Release 7.1 Alarm Messages and Troubleclearing Guide*
- 365-372-304R7.1 *1665 Data Multiplexer, Release 7.1 Installation Manual*
- 365-372-306R7.1 *1665 Data Multiplexer, Release 7.1 TL1 Message Details*
- 1665 Data Multiplexer Software Release Description
  - Paper - 109665943
  - CD-ROM -109665950

1665 DMX drawings

- ED8C871-10 1665 Data Multiplexer, Release 1.0 - 7.1.0 Engineering and Ordering Information
- ED8C871-20 1665 Data Multiplexer, Release 1.0 - 7.1.0 Interconnect Information

Document support

Alcatel-Lucent provides a referral telephone number for document support. Use this number to report errors or to ask questions about the document. This is a non-technical number. The referral number is 1 (888) 727 3615 (continental United States) or +1 (630) 713 5000 (for all countries).

Technical support

For technical support, contact your local customer support team. Reach them via the web at http://alcatel-lucent.com/support at or the telephone number listed under the Technical Assistance Center menu at http://www.alcatel-lucent.com/contact. Refer to Appendix H, "Technical support" for more information.

How to order

To order Alcatel-Lucent documents and courses, use the following websites, or the e-mail, phone, and fax contacts linked from “Contact Us” on the following sites:

Documentation:

http://www.lucentdocs.com/

Training:

http://training.lucent.com/

How to comment

To comment on this information product, go to the Online Comment Form (http://www.lucent-info.com/comments) or email your comments to the Comments Hotline (comments@alcatel-lucent.com).

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the Alcatel-Lucent Field Services/Installation - Environmental Health and Safety organization.

For installations not performed by Alcatel-Lucent, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, Alcatel-Lucent

- *Within the United States:* 1 (866) 582-3688, prompt 1
- *From all other countries:* +1 (630) 224 4672, prompt 2

Recycling/take-back/disposal of product

Electronic products bearing or referencing the symbol shown below, when put on the market within the European Union, shall be collected and treated at the end of their useful life in compliance with applicable European Union and local legislation. They shall not be

disposed of as part of unsorted municipal waste. Due to materials that may be contained in the product, such as heavy metals or batteries, the environment and human health may be negatively impacted as a result of inappropriate disposal.

Important! In the European Union, a solid bar under the crossed-out wheeled bin indicates that the product was put on the market after 13 August 2005.

Moreover, in compliance with legal requirements and contractual agreements, where applicable, Alcatel-Lucent will offer to provide for the collection and treatment of Alcatel-Lucent products at the end of their useful life. Alcatel-Lucent will also offer to provide for the collection and treatment of existing products displaced by Alcatel-Lucent equipment.

For information regarding take-back of equipment by Alcatel-Lucent, or for more information regarding the requirements for recycling/disposal of product, please contact your Alcatel-Lucent Account Manager or Alcatel-Lucent Take-Back Support at takeback@alcatel-lucent.com.

Part I: 1665 Data Multiplexer (1665 DMX) physical installation and powering

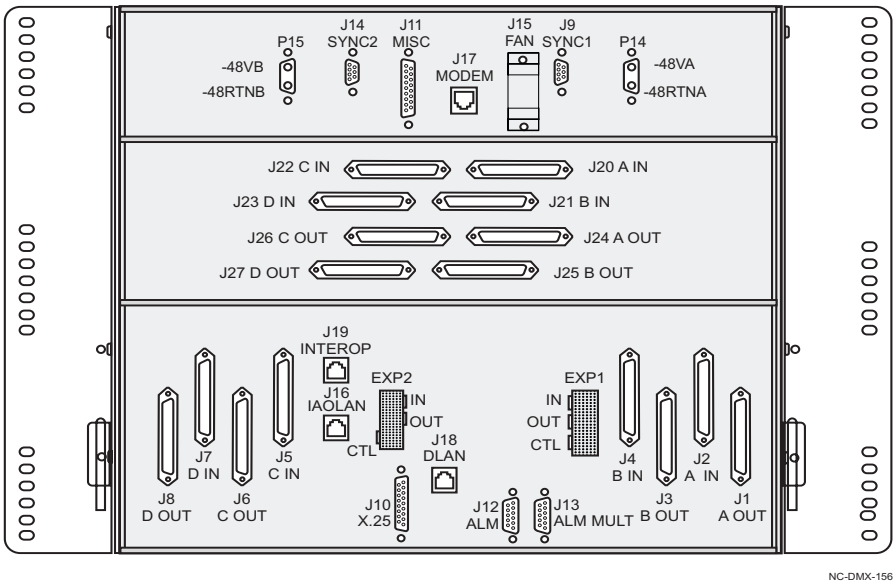
Overview

Purpose

Part I covers the physical mounting of the 1665 Data Multiplexer (1665 DMX) shelf, the running and connecting of power cables, interconnecting cables, alarm cables, and as required, external timing and communication cables. This section also covers initial circuit pack installation (not seated).

Important! The high capacity shelf does not require the installation of an additional fan shelf since the fan unit is integral to the shelf itself. Check Figure 1-1, “1665 DMX High-Capacity shelf backplane” (p. I-2) to determine if the shelf is a 1665 DMX High-Capacity shelf shelf. If the shelf you are installing is NOT equipped with the additional middle connectors (J20 - J27), refer to the *1665 DMX Release 5.0 Installation Manual*. Installation details for the 1665 DMX standard shelf are not included in this issue.

Figure 1-1 1665 DMX High-Capacity shelf backplane



Contents

This section is organized into the following chapters:

Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)	Chapter 1
Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)	Chapter 2

Tools, test equipment, and accessories

This section lists the tools, test equipment and accessories needed to perform all the procedures in this installation manual.

Listed below are the required tools, test equipment and accessories.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.

Quantity	Description	Comments
1	***Thomas & Betts**** R-5648B Crimping Tool	The crimping tool and wire stripper are only required if installing DS3 cables. The replacement cassette is for the wire stripper tool.
1	***Paladin***† Coaxial Wire Stripper R-5648B	
	Replacement Paladin† Cassette R-5648B D5	
1	Wire-Wrap Gun R-4496A	The wire-wrap gun is required for terminating DS1 cable and must be able to accommodate 24 gauge wire.
1	ESD Wrist Strap R-4987C	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	Torque Wrench R-5952	A torque wrench (50-250 IN-LBS) is used when tightening the 1665 DMX shelf to the frame. It is also used when reattaching the mounting brackets to the 1665 DMX shelf.
1	Multimeter (Optional) ITE-6379C	The voltmeter must be capable of measuring DC voltage in the 40 to 60 volt range. The use of the voltmeter is optional since the shelf will alarm or shut down if the proper voltage is not supplied.
1	Ohmmeter ITE-6379C	An ohmmeter is required to verify that the 1665 DMX is properly grounded.
1	DS1 Error Rate Test Set ITE-7113	A DS1 error rate test set is required for testing of DS1 cabling. A T-BERD 2209 or equivalent is recommended.
1	DS3 Error Rate Test Set ITE-7113	A DS3 error rate test set is required for testing of DS3 cabling. A T-BERD 209 or equivalent is recommended.
1	SONET Optical Test Set	An OC3, OC12 or OC48 test set as required for testing of optical circuit packs. An Agilent OmniBER 718 or equivalent is recommended.

Quantity	Description	Comments
2 or 3	LC-Type Optical Fiber Jumper ITE-7169 (108918269)	Two optical fiber jumpers with LC type connectors are required to optically loop the 1665 DMX shelf for test purposes. In addition, for shelves containing optical circuit packs in any of the Function Unit slots, a single optical fiber jumper is required for testing of the individual ports.
2 or 3	15-dB LC-Type LBO ITE-7196 (108279480)	Two 15-dB LBOs are required when optically looping the 1665 DMX shelf for test purposes. In addition, for shelves containing optical circuit packs in any of the Function Unit slots, a single 15-dB LBO is required for testing of the individual ports
2	20-dB LC-Type LBO ITE-7196 (108279530)	Two 20-dB LBOs are required when optically looping the 1665 DMX shelf equipped with LNW60.
2	LC-Type Optical Fiber Jumper (108918269)	Two optical fiber jumpers with LC type connectors are required to optically loop the 1665 DMX shelf for test purposes.
	Noyes OFS 300-200X Optical Fiber Scope ITE-7129	Optical Fiber Scope
	2.5 mm Universal Adapter Cap ITE-7129 D1	For use with the Noyes OFS 300-200X Optical Fiber Scope
	1.25mm Universal Adapter Cap ITE-7129 D2	
	Noyes VFS-1 ITE-7187 Video Fiber Scope[1]	This equipment may not be necessary at all locations. It is to be used when the ports need to be verified for cleanliness. If care is exercised when cleaning fibers, the video scope may not be needed
	Individual Presaturated Alcohol Wipes ITE-7136	99% pure isopropyl alcohol
1	CLETOP Cleaning Cassette ITE-7137	Type A Reel

Quantity	Description	Comments
1	CLETOP Cleaning Cassette Replacement Reel ITE-7137 D1	Type A Reel
	Luminex Stick Port Cleaners ITE-7134 & ITE-7135	1.25 mm and 2.5 mm sizes
	Luminex Cloth R-6033	5.5” x 5.5”

* Registered trademark of Thomas & Betts Corporation
† Registered trademark of Paladin Corporation.

PC and cable requirements for WaveStar® CIT

This section lists the required equipment needed to run the WaveStar® CIT software with the 1665 DMX.

Quantity	Description	Comments
1	Personal Computer (PC)	See PC minimum requirements below.
1	CIT Interface Cable	8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869).
1	Cross Over LAN Cable (If CIT cable is not available)	10-ft. long cable (Comcode 109321810) or equivalent.

PC minimum requirements

It is anticipated that most customers will dedicate a laptop or personal computer (PC) to run the WaveStar® CIT software. However, any properly configured computer will also suffice. The following table shows the requirements for the computer:

Table 1-1 Computer requirements

Components	Minimum	Recommended
Processor	Pentium 266 MHz	Pentium III 500 MHz
RAM (1 system view)	128 MB	256 MB
RAM (up to 5 system views)	256 MB	256 MB
Virtual Memory	139 MB	267 MB
Available Hard Disk Space*	500 MB	600 MB
Video	800X600 256 Colors (8 Bit)	1024X768 16 Million Colors (24 Bit)
Network Interface	10/100 baseT Network Card	10/100 baseT Network Card
CD ROM Drive	Required	Required
Operating System	Windows® NT 4.0, Windows® 2000 or Windows® XP	Windows® NT 4.0, Windows® 2000 or Windows® XP
Internet Browser	Internet Explorer 5.0/5.5/6.0	Internet Explorer 5.0/5.5/6.0

* Available hard disk space required to install and store the CIT and Generic Software is approximately 250 MB (it is 550 MB, if all graphical packages are installed). The additional disk space specified is to provide hard disk space to store DMX backup files.

Important! Minimum requirements are sufficient to run two to three GUI **System Views,** unless otherwise noted. Recommended requirements are intended to be used as a general guideline to optimize WaveStar® CIT performance. As the CIT is used with multiple NE connections and multiple NE types, the processor type and speed and the memory size will all factor into CIT performance.

□

1 Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)

Overview

Purpose

This section provides installation and cabling instructions for the 1665 Data Multiplexer (1665 DMX).

Contents

This chapter provides information on the following topics:

Planning	1-3
Connector references	1-7
Inspection	1-8
1665 DMX High-Capacity shelf installation	1-9
Heat baffle installation	1-14
Power cable and cable bracket installation	1-16
Fiber management installation (optional)	1-27
Installing the fiber ducts (optional)	1-31
Cable and optical fiber installation	1-32
DS1 cable installation	1-34
DS3/EC1 and 48TMUX cable installation	1-41
12TMUX (LNW18) cable installation	1-54
10/100BaseT backplane Ethernet cable installation	1-58
Ethernet cabling to SFP modules on circuit pack faceplates	1-62
IAO LAN and TCP/IP cable installation	1-64

Modem cable installation	1-69
Sync cable installation	1-72
Office alarm cable installation	1-78
Miscellaneous (environmental) discrete telemetry cable installation	1-84
Main optical fiber installation (OC-12, OC-48, OC-192)	1-88
Fiber installation for low-speed packs	1-90
1000Base-F and 100Base-F fiber installation	1-92
Fibre channel fiber installation	1-94
CIT cable installation	1-96
Final operations	1-99

Planning

Description

This section provides information about the following:

- Tools, test equipment and accessories
- Mounting options
- Cabling checklist.

Tools, test equipment and accessories

Listed below are the tools, test equipment and accessories necessary to perform the procedures in this section. Installers should have both metric and English unit tools.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.
1	***Thomas & Betts***[*] R-5648B Crimping Tool	The crimping tool, wire stripper and soldering iron are only required if installing DS3 cables. The replacement cassette is for the wire stripper tool.
1	***Paladin***[†] Coaxial Wire Stripper R-5648B D5	
	Replacement Paladin[†] Cassette R-5648B D5	
1	Wire-Wrap Gun R-4496A	The wire-wrap gun is required for terminating DS1 cable and must be able to accommodate 24 gauge wire.
1	ESD Wrist Strap R-4987C	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	Multimeter (Optional) ITE-6379	The voltmeter must be capable of measuring DC voltage in the 40- to 60-volt range. The use of the voltmeter is optional since the shelf will alarm or shut down if the proper voltage is not supplied.

Quantity	Description	Comments
1	Torque Wrench ITE-5952	A torque wrench (50-250 IN-LBS) is used when tightening the 1665 DMX High-Capacity shelf to the frame. It is also used when reattaching the mounting brackets to the 1665 DMX High-Capacity shelf.
1	Ohmmeter ITE-6379	An ohmmeter is required to verify that the 1665 DMX is properly grounded.

* Registered trademark of Thomas & Betts Corporation
† Registered trademark of Paladin Corporation.

Mounting options

The mounting brackets on the 1665 DMX High-Capacity shelf are designed to allow for mounting in the following:

- Standard 23-inch wide network bay frames

  The recommended network bay frames are the ED-8C500 and the ED-8C501 (rear access only). Refer to Figure 1-4, “Typical 1665 DMX High-Capacity shelf bay mounting arrangements” (p. 1-12) for 1665 DMX shelf placement in a network bay frame.
- Seismic 23-inch network bay frame

  The ED-8C800-500 and ED-8C801-501 seismic network bay frames are designed for use in all earthquake zones, and in general, do not require top support at the 7-foot level. These frames meet Pacific Bell Equipment Framework Standard PBS-000-102PT.
- 19-inch bay frames
- 23-inch wide EIA-Type bay frames

1665 DMX added to the Lambda Unite® MSS configurations

In order for the 1665 DMX shelf to be placed in a NEBS-2000 Cabinet frame combined with Lambda Unite® MSS, mounting kit 848856514 is required. For a more complete view of mounting the 1665 DMX into the Lambda Unite® Frame, see SIG-L-WW-161A, 1665 DMX added to the Lambda Unite® MSS Configurations.

Cabling checklist

This section briefly describes cabling information. For information regarding available cable lengths and ordering comcodes, refer to ED8C871-10.

Table 1-1, “Cable requirements and options” (p. 1-5) lists available cables.

Table 1-1 Cable requirements and options

Cable assembly description	Required	See note
Power	Yes	1
Fan	Yes	2
CIT or Cross over LAN Cable	Yes	3, 10
DS1	Optional	4
DS3	Optional	5
TMUX	Optional	6
10/100BaseT Ethernet	Optional	7
Office Alarm	Optional	8
Office Alarm Mult	Optional	8
Miscellaneous Discrete	Optional	9
LAN 10BaseT (Crossover)	Optional	10
LAN 10BaseT (Straight Through)	Optional	10
Sync Timing	Optional	11
Modem	Optional	12

Notes:

1. One -48VA and -48VB main power feeder is required per shelf. Many varieties of 45-amp connector cables are available as well.
2. One Fan Cable (848839551) is shipped with each 1665 DMX High-Capacity shelf.
3. One CIT Cable Assembly or Crossover LAN cable is required for PC interface with the 1665 DMX High-Capacity shelf (not included with equipment).
4. Two DS1 Cable Assemblies are required for each Function Unit equipped for 28 DS1 service (LNW6, LNW7). Four DS1 Cable Assemblies are required for each Function Unit equipped for 56 DS1 service (LNW8). Each DS1 Cable Assembly consists of two separate cable assemblies, both containing 28 pairs of 24 gauge cable. One cable is for input and the other cable is for output.

5. a. Two DS3 Cable Assemblies are required for each Function Unit equipped for 12 DS3 service (LNW16). One cable consists of 12 inputs and the other cable consists of 12 outputs. Two 24-coax cable assemblies may be used if growth to 48 DS3 packs is planned.

   b. Four DS3 Cable Assemblies are required for each Function Unit equipped for 48 DS3 service (LNW19/19B). Each DS3 Cable Assembly consists of two separate cable assemblies, both containing 735A cables. One cable consists of 24 inputs and the other cable consists of 24 outputs.
6. One DS3 Cable Assembly is required for each Function Unit Group to support use of the TMUX pack, since 12 DS3 signals are supported.
7. One cable is required for channels 1 through 12 and another for channels 13 through 24 (LNW66 and LNW71). LNW74 provides only ports 1 through 16.
8. When cabling the 1665 DMX High-Capacity shelf for office alarm applications, one Office Alarm Cable Assembly is required for the bottom 1665 DMX shelf in a bay frame. One Office Alarm Mult Cable Assembly is required for each additional 1665 DMX shelf in the bay frame.
   For example, if four 1665 DMX shelves are located in a single 7-foot bay frame, one Office Alarm Cable Assembly and three Office Alarm Mult Cable Assemblies are required.
9. One misc. discrete cable per shelf as required.
10. These cables are used for IAO LAN (OSI/TCP-IP)/Front LAN (OSI/TCP-IP) connection (J16 and Front LAN port). LAN 10BaseT cross over cable should be used if the shelf is directly connected to a PC and LAN 10BaseT straight through cable should be used if shelf is connected to a hub.
11. Two cables per shelf for Ref1 and Ref2.
12. RS232 modem cable (RJ45 to 25-pin).

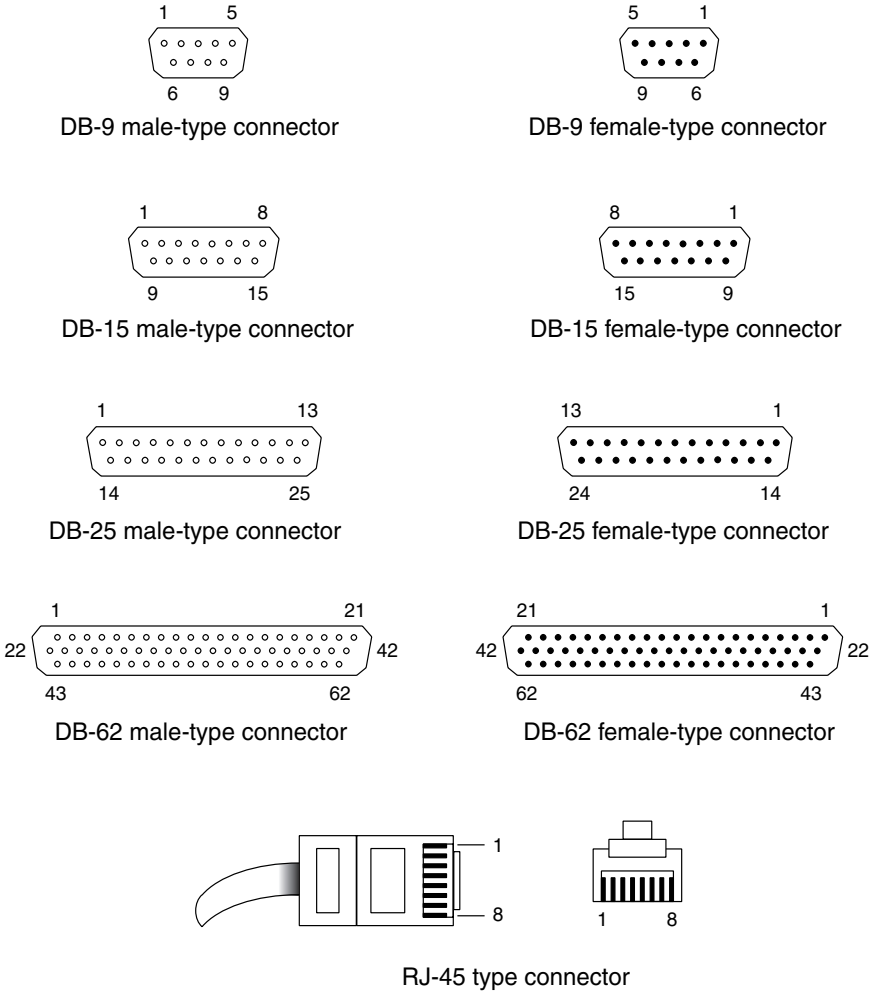
□

Connector references

Description

Figure 1-1, Connector types and pinouts (p. 1-7) provides the pinouts of some of the connectors used to interface with the 1665 DMX.

Figure 1-1 Connector types and pinouts



Inspection

Description

Perform the following procedure before installing the 1665 DMX High-Capacity shelf and cables.

Procedure

1 Inspect the shelf for visible damage including bent or touching backplane pins.

Important! If any backplane pins are damaged, refer to Appendix D, "Backplane pin replacement" for instructions on repairing the damaged pin(s).

2 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

1665 DMX High-Capacity shelf installation

Description

As an example of the 1665 DMX High-Capacity shelf installation, the following steps describe mounting the shelf from the rear of a 23-inch bay frame. Mounting from the front of a 23-inch bay frame or from the front/rear of a 19-inch bay frame is similar with the exception of the position of the side brackets.

Positioning of the side brackets is also specified.

Important! This section requires previous bay frame installation and grounding.

Procedure

Proceed as follows:

1 Determine the mounting configuration for the 1665 DMX High-Capacity shelf:

- Type of bay frame (23-inch or 19-inch wide)
- Mounting position (front or rear)
- Position in bay (bottom to top).

Important! The 1665 DMX High-Capacity shelf is shipped with the mounting brackets positioned for mounting to the rear of a 23-inch wide network bay frame.

The 1665 DMX High-Capacity shelf mounting brackets may have to be repositioned and remounted, depending on the frame type and mounting position (front or rear).

2 If necessary, reposition the shelf mounting brackets accordingly.

For 23-inch frame, front or rear mounting, refer to Figure 1-2, “1665 DMX High-Capacity shelf mounting bracket positions — 23-inch frame” (p. 1-10).

For 19-inch frame, front or rear mounting, refer to Figure 1-3, “1665 DMX High-Capacity shelf mounting bracket positions — 19-inch frame” (p. 1-11).

Figure 1-2 1665 DMX High-Capacity shelf mounting bracket positions — 23-inch frame

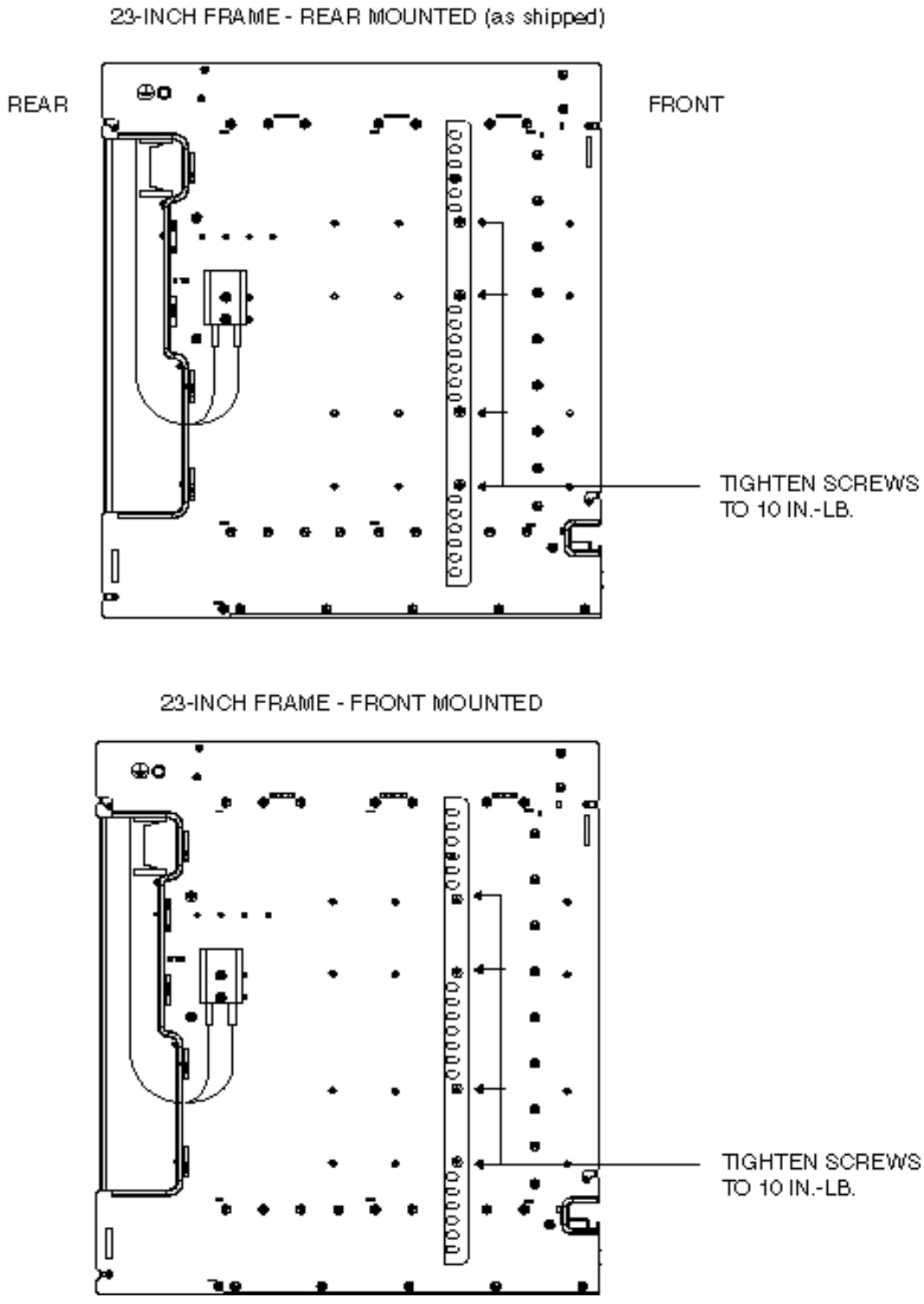
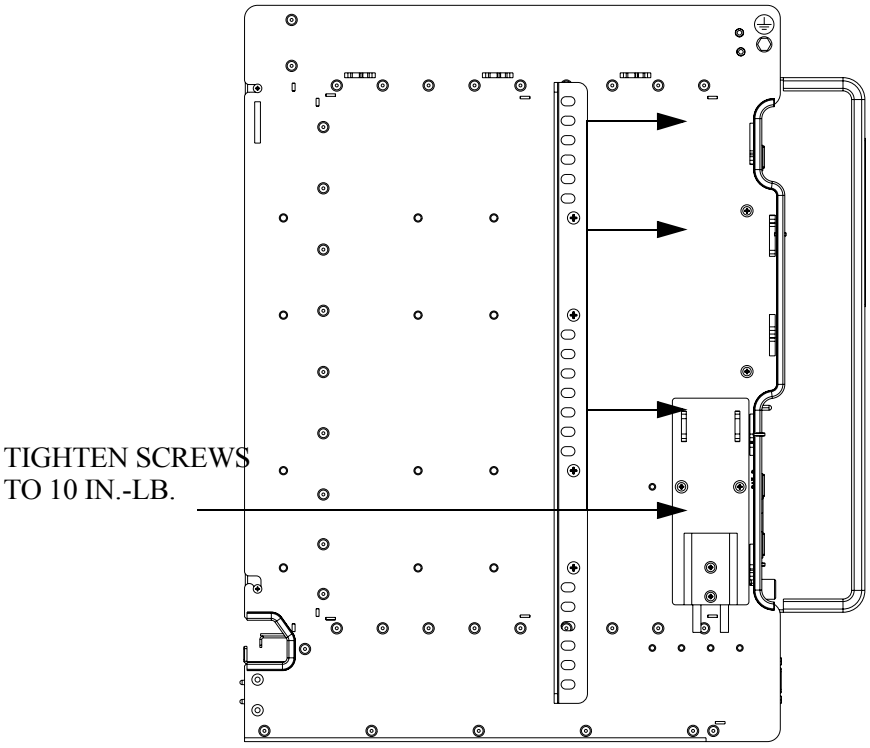


Figure 1-3 1665 DMX High-Capacity shelf mounting bracket positions — 19-inch frame



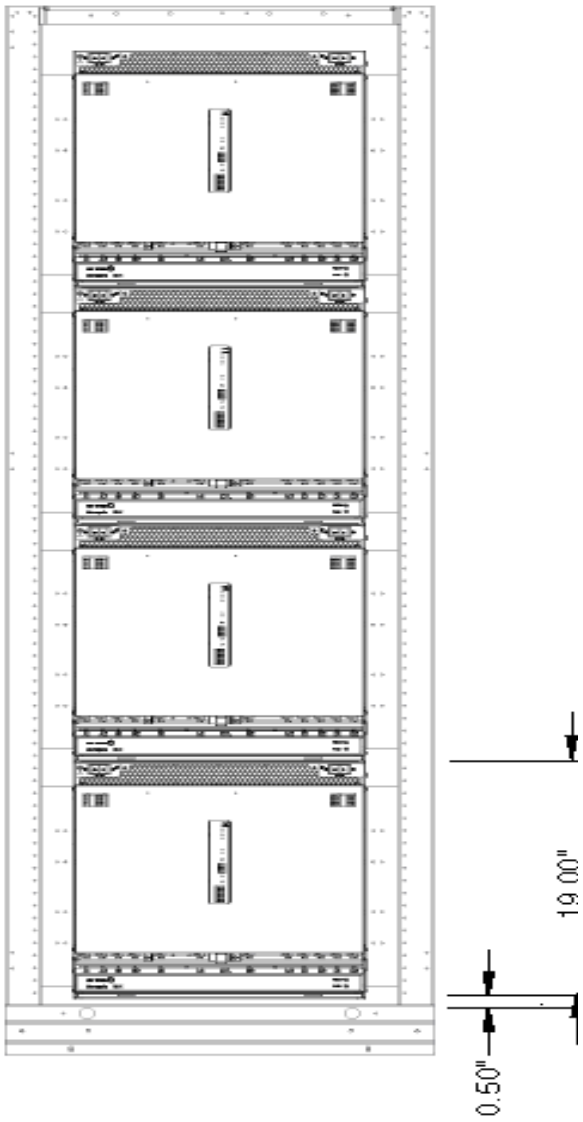
3 Determine the position that the 1665 DMX High-Capacity shelf will be mounted. Figure 1-4, “Typical 1665 DMX High-Capacity shelf bay mounting arrangements” (p. 1-12) shows the recommended mounting positions. Start at the bottom of the bay and add shelves from bottom to top.

Important! There is a switch on the fan unit controller board. It is labeled "CF ALM ON" (Clogged Filter Alarm ON) and "CF ALM OFF" (Clogged Filter OFF). The fan ships with the switch in the disable position which prevents the filter alarm from working. To enable the filter alarm, remove the fan unit from the 1665 DMX High-Capacity shelf, move the switch to the "CF ALM ON" position and then reinstall the fan unit in the shelf.

4 Position the 1665 DMX High-Capacity shelf in the frame and secure it to the frame using the thread-forming screws included with the shelf (4 screws per side). Tighten the screws to 21 in.-lb. (minimum)/30 in.-lb. (maximum).

Important! Be sure to mount the shelf using the thread-forming screws provided with the shelf to ensure a solid ground connection from the bay to the shelf.

Figure 1-4 Typical 1665 DMX High-Capacity shelf bay mounting arrangements



5 Verify with an ohmmeter that the 1665 DMX High-Capacity shelf is grounded to the bay frame. Measure between the 1665 DMX High-Capacity shelf mounting bracket and the office ground lug on the bay frame.

Requirement: The ohmmeter reads less than 1 ohm.

6 If the Ohmmeter reading is not less than 1 ohm, a secondary ground should be used for each shelf. Use an 8 AWG wire from the UL (Green M5 Screw) safety ground on the side of the shelf to bay frame or office ground.

Important! It is important to remove the paint in the area where the wire is to be connected to the bay and to apply no-ox before connecting the wire.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Heat baffle installation

Description

If a shelf is added above existing non-1665 DMX equipment, one heat baffle (848862181) must be installed between the shelf and the existing equipment.

1 Determine the mounting configuration for the heat baffle:

- Type of bay frame (23-inch or 19-inch wide)
- Mounting position (front or rear)
- Position in bay (below shelf mounted above non-DMX heat generating equipment).

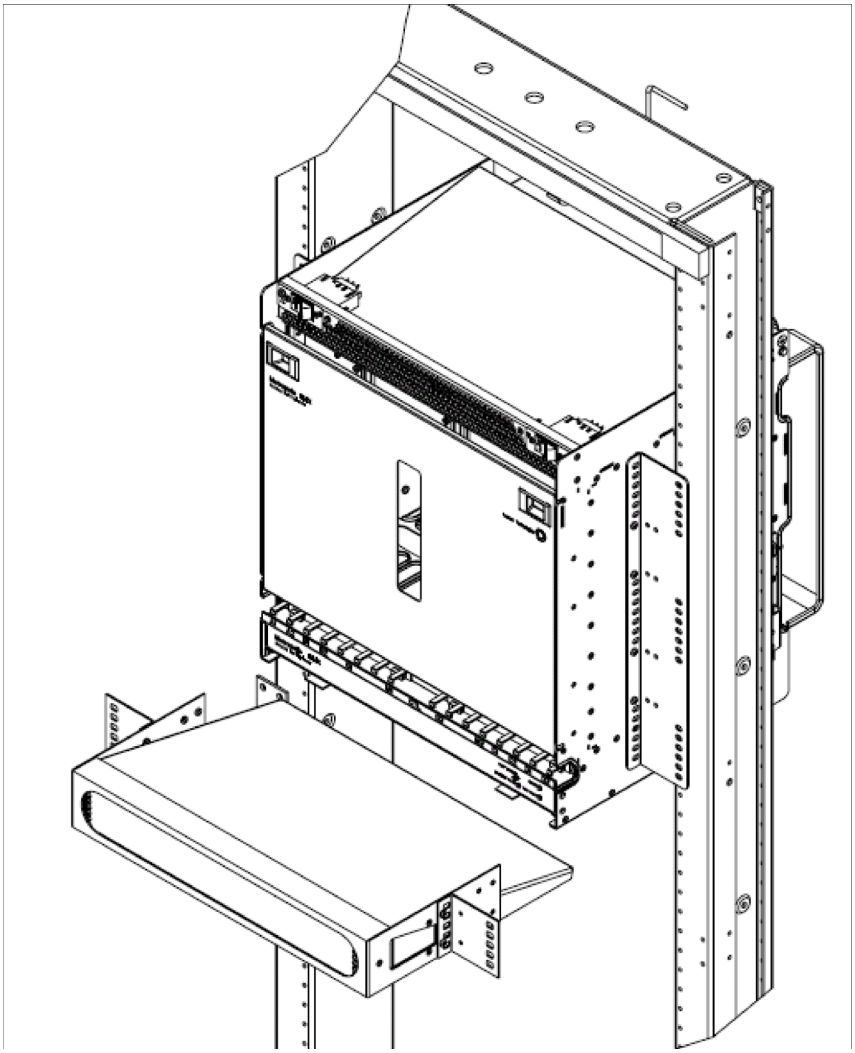
Important! The heat baffle is shipped with the mounting brackets positioned for mounting to the rear of a 23-inch wide network bay frame.

The heat baffle mounting brackets may have to be repositioned and remounted, depending on the frame type and mounting position (front or rear).

2 If necessary, reposition the heat baffle mounting brackets to match the position of the 1665 DMX High-Capacity shelf.

3 Refer to Figure 1-5, Heat baffle position (p. 1-15) for the mounting position and orientation of the heat baffle.

Figure 1-5 Heat baffle position



END OF STEPS

Power cable and cable bracket installation

Description

This section provides instructions on installing the power cable and cable bracket for the 1665 DMX High-Capacity shelf.

Important! Two feeders (A and B) are required from the battery distribution fuse board (BDFB) or battery distribution circuit breaker bay (BDCBB) to the 1665 DMX bay.

Table 1-2, "Power cable assemblies" (p. 1-25) and Table 1-3, "Power connections" (p. 1-26) list the available power cable assemblies and power connections, respectively.

CAUTION

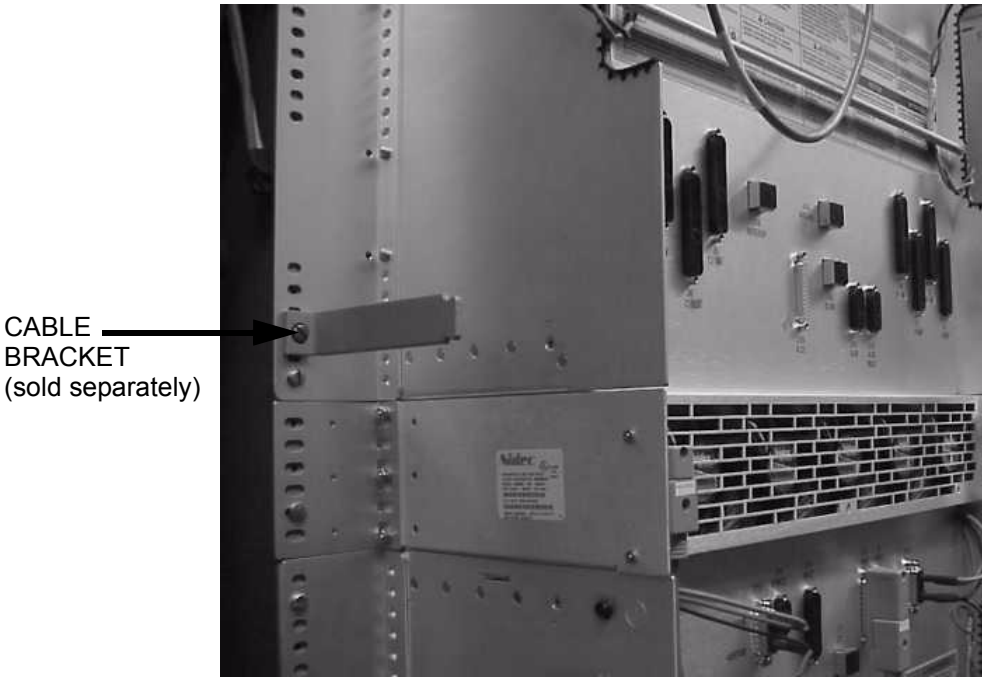
Verify that the BDCBB breakers are off or that the BDFB fuses are not installed.

Procedure

Proceed as follows:

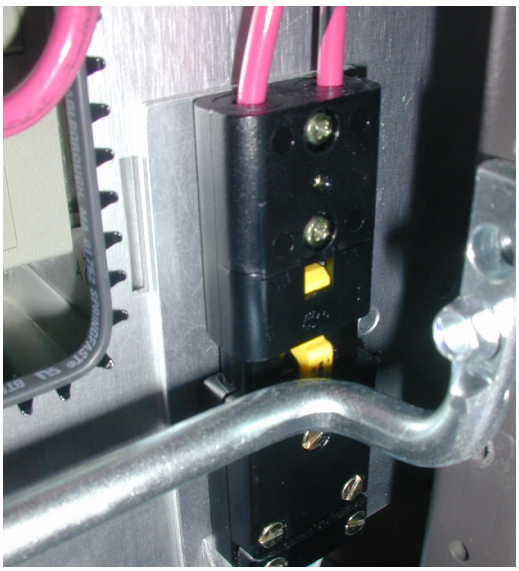
1 Install cable brackets (two per 1665 DMX High-Capacity shelf, 1 on each side) as shown in Figure 1-6, "Cable brackets" (p. 1-17).

Figure 1-6 Cable brackets



Important! Depicted above is the 1665 DMX shelf for reference purposes only, the cable bracket is the same for the 1665 DMX High-Capacity shelf.

2 If installation is on raised floors, rotate the power connectors on each side of the shelf 180 degrees, as shown:



Otherwise, ensure that power connector is in the following position:

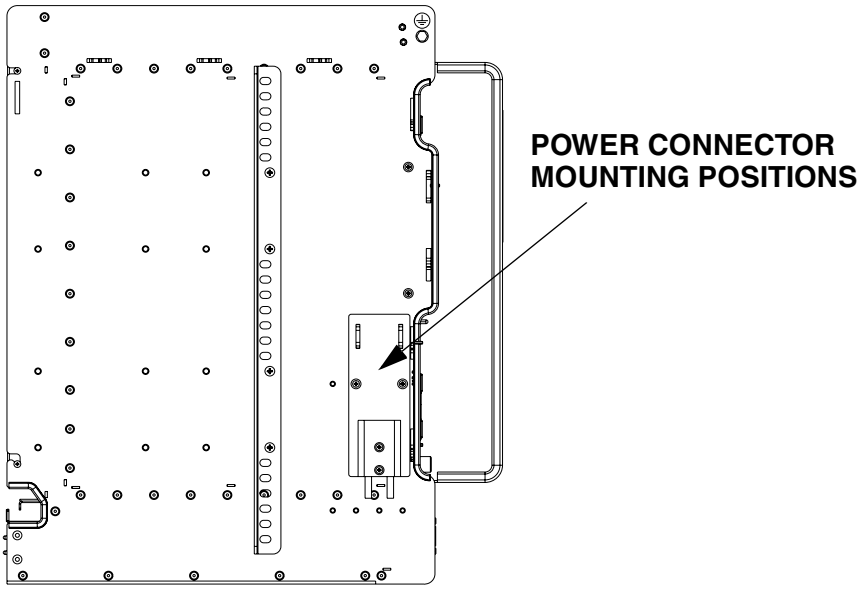
3 There are two mounting positions on each side of the 1665 DMX High-Capacity shelf chassis as shown in Figure 1-7, “Power connector mounting positions” (p. 1-19). It is recommended that if multiple shelves are being installed in a frame, the power connector positions be alternated as shown in Figure 1-8, “Alternating power cable routing” (p. 1-20).

Determine if the power connector needs to be moved to the other mounting position. If so, move the power connector to the other mounting position now.

CAUTION

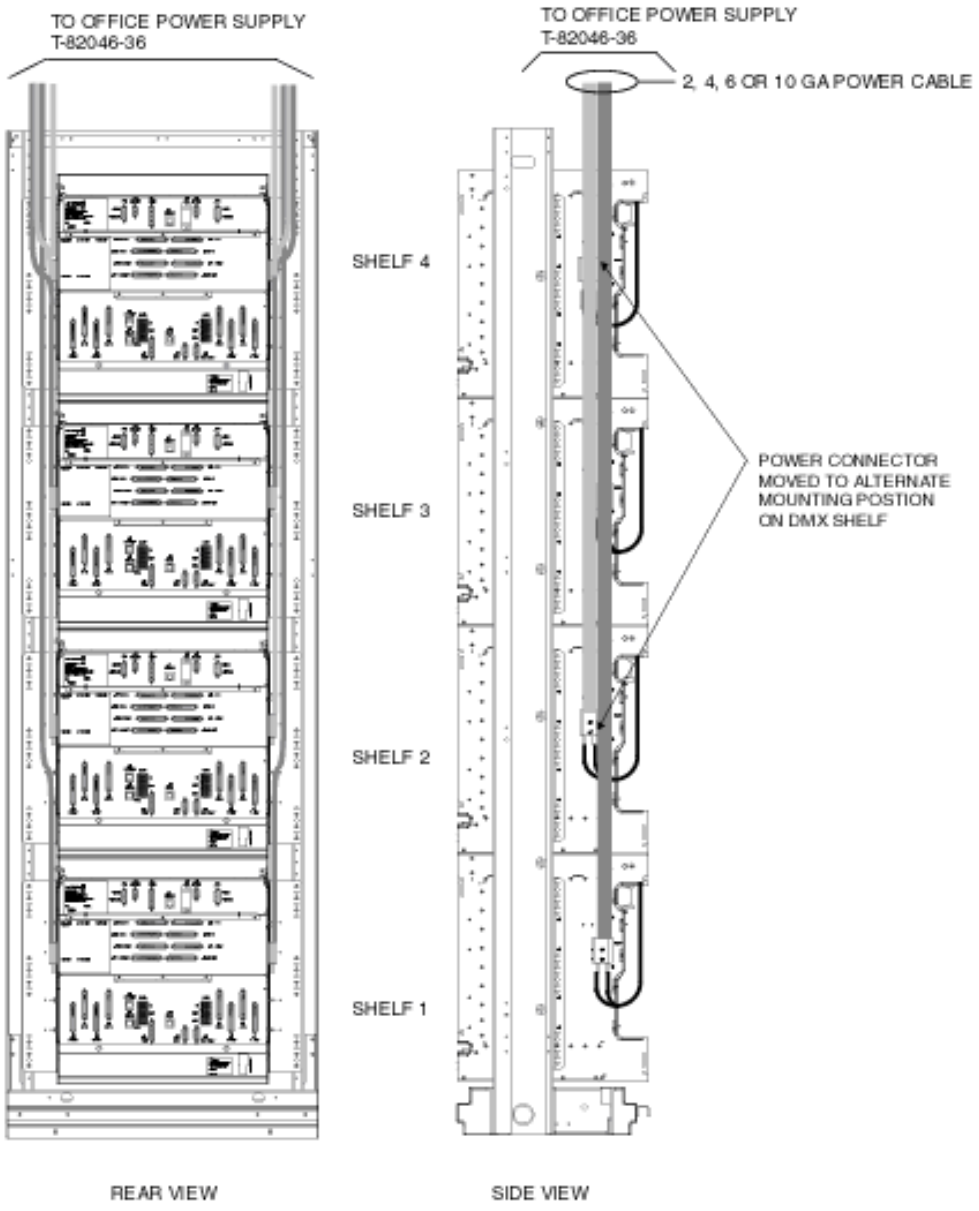
Use provided hardware only to adjust the position of the power connector housing.

Figure 1-7 Power connector mounting positions



Important! Figure 1-8, “Alternating power cable routing” (p. 1-20) shows the typical power cabling for four 1665 DMX High-Capacity shelf shelves in a standard bay frame. The side view shows the power connectors for shelves 3 and 1 mounted closest to the rear of the shelves (default position) with the cabling for shelf 1 bending away from the power connector on shelf 3 and running over it until the power cables exit the bay. The power connectors for shelves 4 and 2 are mounted in the alternate position on the shelf and the power cables routed in the same manner.

Figure 1-8 Alternating power cable routing



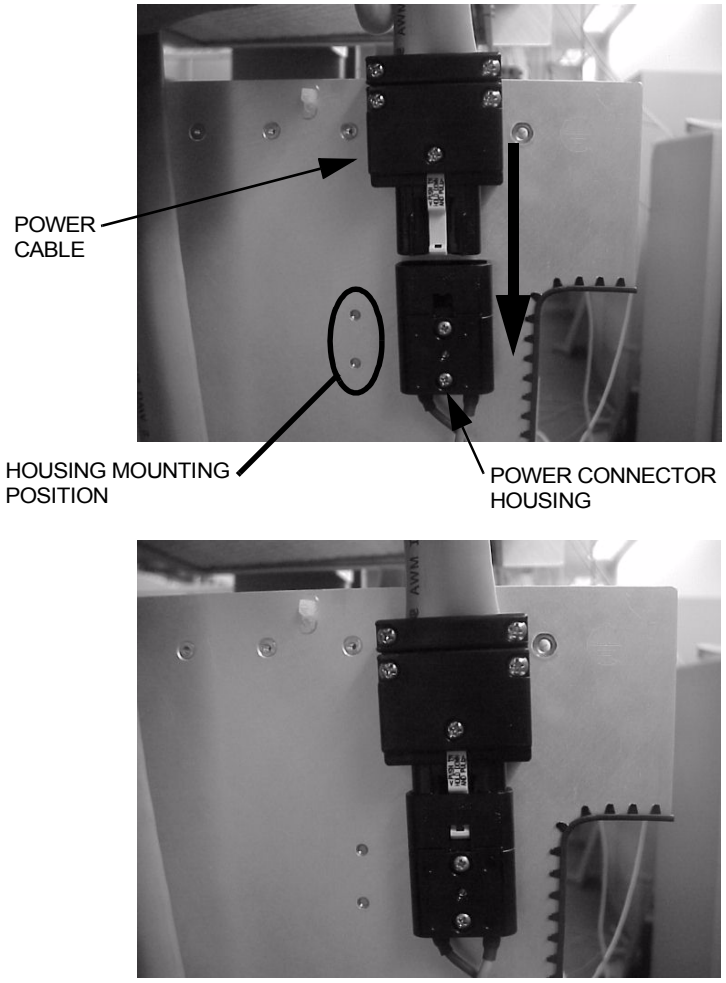
4 Connect power cable to the power connector housing on the 1665 DMX High-Capacity shelf chassis [Figure 1-9, “Power connection” (p. 1-21)].

CAUTION

Equipment damage

Ensure that the 4 pins inside the connector attached to the power cable are properly aligned before inserting the connector into the power connector housing. Failure to do so may result in damage to the connector.

Figure 1-9 Power connection



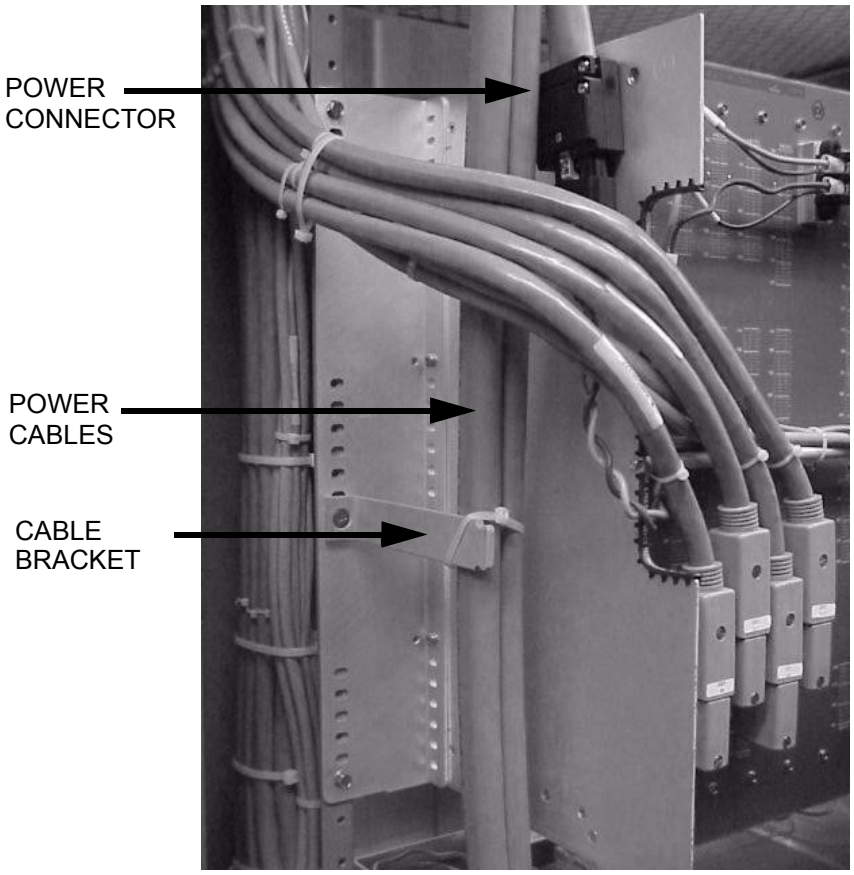
5 Route the power cable out of the bay and toward the BDCBB or BDFB, stacking the cable in the bay as shown in Figure 1-10, “Power cable routing with cable bracket” (p. 1-22) or Figure 1-11, “Power cable routing without cable bracket” (p. 1-23).

Important! The 1665 DMX High-Capacity shelf is powered by -48 V DC.

CAUTION

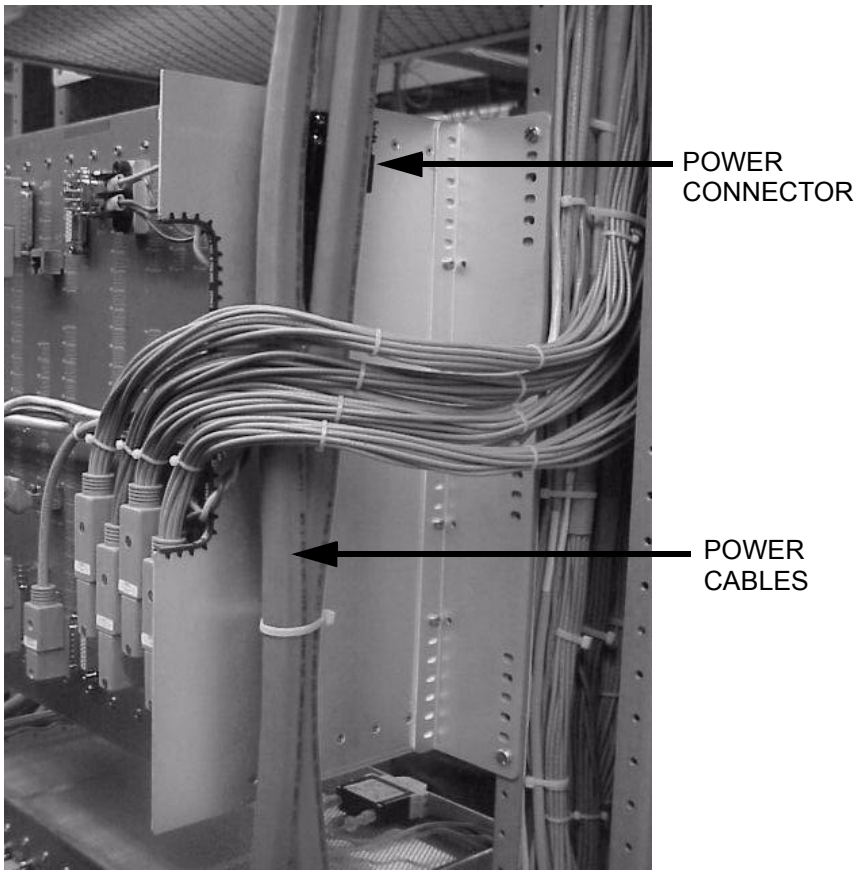
Verify that the BDCBB breakers are off or that the BDFB fuses are not installed.

Figure 1-10 Power cable routing with cable bracket



Important! The shelf shown in Figure 1-10 is the 1665 DMX and not the 1665 DMX High-Capacity shelf, however the power cabling remains the same and is depicted here for reference.

Figure 1-11 Power cable routing without cable bracket



Important! The shelf shown in Figure 1-10 is the 1665 DMX and not the 1665 DMX High-Capacity shelf, however the power cabling remains the same and is depicted here for reference.

6 Splice feeders from the BDCBB or BDFB to the 1665 DMX High-Capacity shelf power cable. Refer to Table 1-3, “Power connections” (p. 1-26).

Important! Four cables are spliced to each power cable:

1. BAT A
2. BAT A RTN
3. BAT B
4. BAT B RTN

7 Label the feeders at the BDCBB or BDFB as follows:

1. BAT A
2. BAT A RTN
3. BAT B
4. BAT B RTN

Important! Each feeder at the BDCBB should be rated 1.25 times the rating of the circuit breaker on the shelf. For the BDFB, the fuse rating should be 1.5 times the rating of the circuit breaker on the shelf.

8 Leave the BDCBB breakers off or BDFB fuses out until you are ready to perform the procedures in Chapter 2, "Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)" of this manual.

9 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-2 Power cable assemblies

Description	Cable gauge	Cable assembly #	Cable length (feet)	1665 DMX High-Capacity shelf backplane connections
Power cable	10	848841839	12	Connectors mounted on sides of the shelf (BAT A and BAT B)
	6	848635009	12	
		848635033	50	
		848635041	75	
		848635058	100	
	4	848935268	35	
		848634986	55	
		848635025	100	
	2	848935276	55	
		848634978	85	
		848635017	100	
Cable connector kit	2	848635231		
	4	848635249		
	6	848635934		
Cable bracket		846593002		

Table 1-3 Power connections

1665 DMX High-Capacity shelf bkpl conn.	Shelf power connectors (on sides)	Pin#	Color	Designation	Name
P14	BAT A	1	R	-48VA	BAT A
		2	W	-48RTNA	BAT A RTN
P15	BAT B	1	R	-48VB	BAT B
		2	W	-48RTNB	BAT B RTN

Notes:

1. Power cables for shelves 4 and 2 are mounted using the connector mounting holes located closest to the rear of the shelves with the cabling for shelf 2 bending away (out) from the power connector in shelf 4 and running over it until the power cables exit the bay. The power runs for shelves 1 and 3 are run in the same manner as described for shelves 2 and 4 using the connector holes located furthest from the rear of the shelf.

□

Fiber management installation (optional)

Description

This section describes how to install the fiber management pieces that may be shipped with the bay.

Important! If fiber management is to be installed, the width of the bay footprint must be extended by at least 2.5 inches beyond the bay upright on each side. This is typically done using base fillers.

Comcode numbers are in parentheses next to the part number.

Procedure

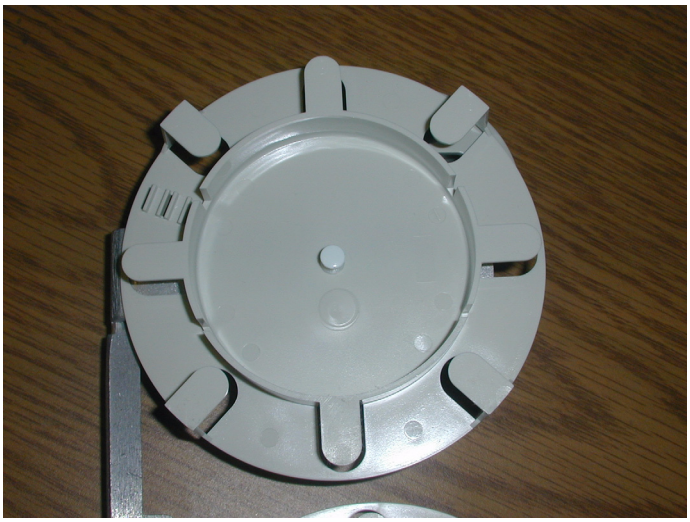
1 Locate three spools (*106738156*), one fiber radius control module (*321-1B*), one left fiber spool bracket (*848919213*) and 3 M4 X 6 bracket mounting screws (*901340059*) for each shelf being installed.

2 For each spool, put a nylach fastener through the middle. Then insert a pin halfway through.

Important! It is very important that the pin is not completely inserted. This will deform the fastener and prevent it from being assembled to the bracket.

3 Line up the nylach fastener in one of the spools with the large holes on the top arm of the bracket.

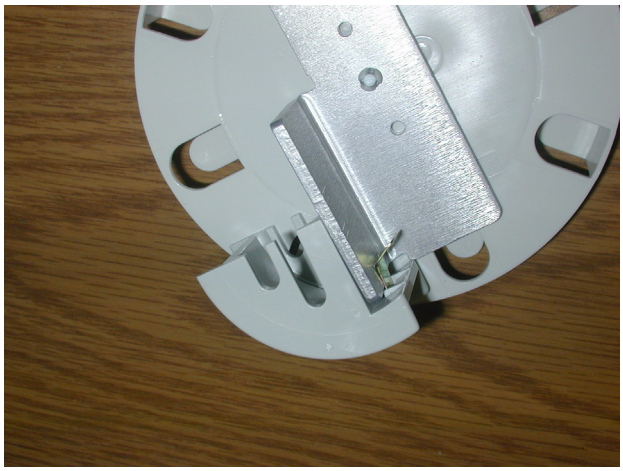
4 Spin the spool until the peg on its back fits into the smaller hole on the arm of the bracket. This will keep the spool from spinning any further.



5 Push the pin until it is completely fastened.

6 Repeat Step 3 through Step 5 for all the spools, with three per bracket.

7 Attach one fiber radius control module to the bottom of each bracket, as shown:



8 Position one of the brackets along the left side of shelf 1. Secure with 3 bracket mounting screws.

9 Repeat Step 8 for all the other shelves being installed.

10 Locate three spools (*848919221*), one fiber radius control module (*321-1B*), one right fiber spool bracket (*848919221*) and 3 M4 X 6 bracket mounting screws (*901340059*) for each shelf being installed.

11 For each spool, put a nylach fastener through the middle. Then insert a pin halfway through.

Important! It is very important that the pin is not completely inserted. This will deform the fastener and prevent it from being assembled to the bracket.

12 Line up the nylach fastener in one of the spools with the large holes on the top arm of the bracket.

13 Spin the spool until the peg on its back fits into the smaller hole on the arm of the bracket. This will keep the spool from spinning any further.

14 Push the pin until it is completely fastened.

15 Repeat Step 12 through Step 14 for all the spools, with three per bracket.

16 Attach one fiber radius control module to the bottom of each bracket.

17 Position one of the brackets along the right side of shelf 1. Secure with 3 bracket mounting screws.

18 Repeat Step 17 for all the other shelves being installed.

19 Using a label maker, create 16 labels "LS" and 8 labels "HS".

20 Attach the "HS" labels to the uppermost spool on each of the brackets.

21 Attach the "LS" labels to the middle and lower spools on each of the brackets.

22 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Installing the fiber ducts (optional)

Description

This procedure describes how to install the fiber ducts on either side of the bay. The fiber ducts may be shipped with the 1665 DMX.

Important! If fiber management is to be installed, the width of the bay footprint must be extended by at least 2.5 inches beyond the bay upright on each side. This is typically done using base fillers.

Procedure

Proceed as follows:

1. From the 848920476 Fiber Duct Components Kit, locate 2 fiber ducts (*848955845*), 6 metal fiber duct brackets (*848915153*), 12 12-24 X 3/8" HWH screws (*901211177*) and 6 M5 X 8 (*901340547*).

2. Using the 12-24 X 3/8" screws, secure the metal brackets to the front of the bay (three on each side), using the holes in between shelf 1 and shelf 2; shelf 2 and shelf 3; shelf 3 and shelf 4.

3. Position one of the fiber ducts along the left side of the shelves.

4. From the front of the duct, use the M5 X 8 screws to secure it to the metal brackets.

5. Position the other fiber ducts along the right side of the shelves.

6. From the front of the duct, use the M5 X 8 screws to secure it to the metal brackets.

7. Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Cable and optical fiber installation

Introduction

Important! Ensure only ANGLED LC connectors appear at IN ports of optical circuit packs.

1 If fiber management systems have been installed:

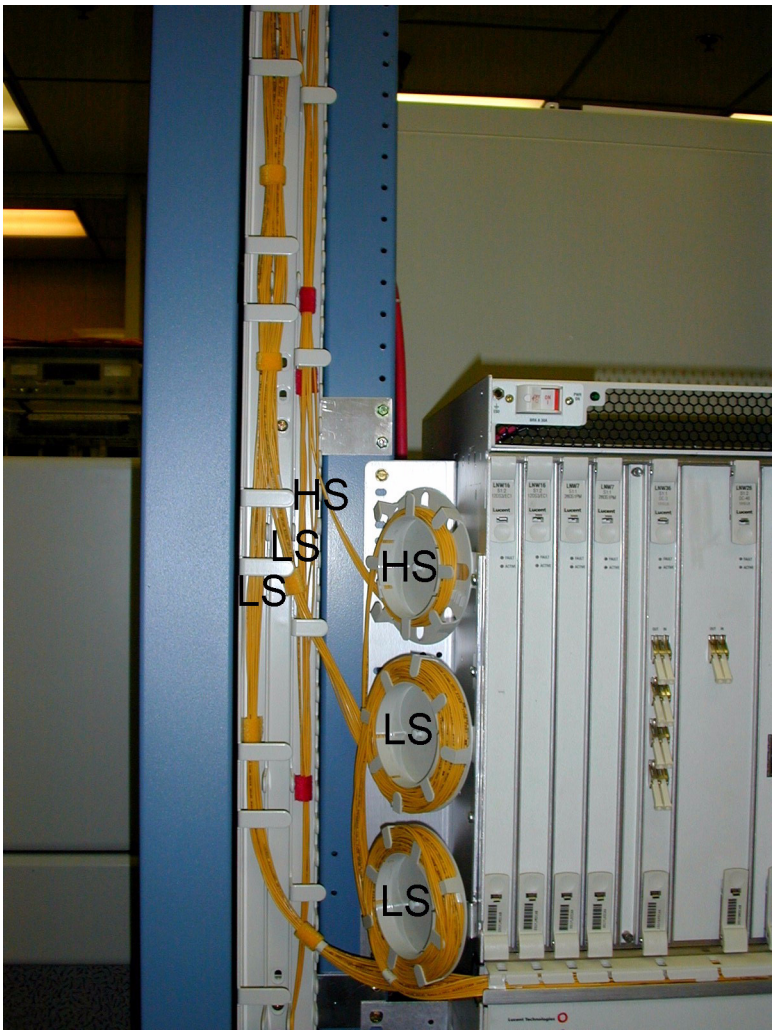
a. High-speed fibers should be routed along the fiber radius control module and then up to the uppermost spool.

b. Fiber management of low speed fibers should start with the lowest spool. Once full, fiber should be routed along the fiber radius control module and then up to the middle spool.

c. As shown in the picture below, fiber from the lowest spool (low speed) is routed in the outermost section of the fiber duct; the middle spool (low speed) to the middle section; and the upper spool (high speed) to the inner section.

Important! The high-speed fiber, routed in the innermost duct, should be held with Hellerman Tyton RED grip tie (GT.75X1802) or equivalent. The low speed fiber should be held with Hellerman Tyton YELLOW grip tie (GT.75X1804) or equivalent.

2 Check off the appropriate box in Appendix E, “Installation checklist”.



END OF STEPS

DS1 cable installation

Description

This section describes how to connect the DS1 transmission cables to the shelf, route the cables out of the bay and connect the cables to the DSX. Perform this procedure if DS1 cables are required.

Important! When cabling the 1665 DMX High-Capacity shelf to a DSX, the DSX becomes an extension of the 1665 DMX High-Capacity shelf backplane connections. Thus the IN on the 1665 DMX High-Capacity shelf backplane connects to the IN of the DSX and the OUT of the 1665 DMX High-Capacity shelf backplane connects to the OUT of the DSX respectively.

The cables are connectorized at the 1665 DMX High-Capacity shelf end and must be wire-wrapped at the DSX end. A total of four function groups fully cabled will have 224 DS1 drop capacity when the higher density DS1 circuit packs become available.

Important! The connectorized cable end is grounded to the 1665 Data Multiplexer (1665 DMX) frame ground through the backplane. Alcatel-Lucent recommends that the shield at both ends of the cable be grounded. Ground at the DSX end per office requirements.

Procedure

Proceed as follows:

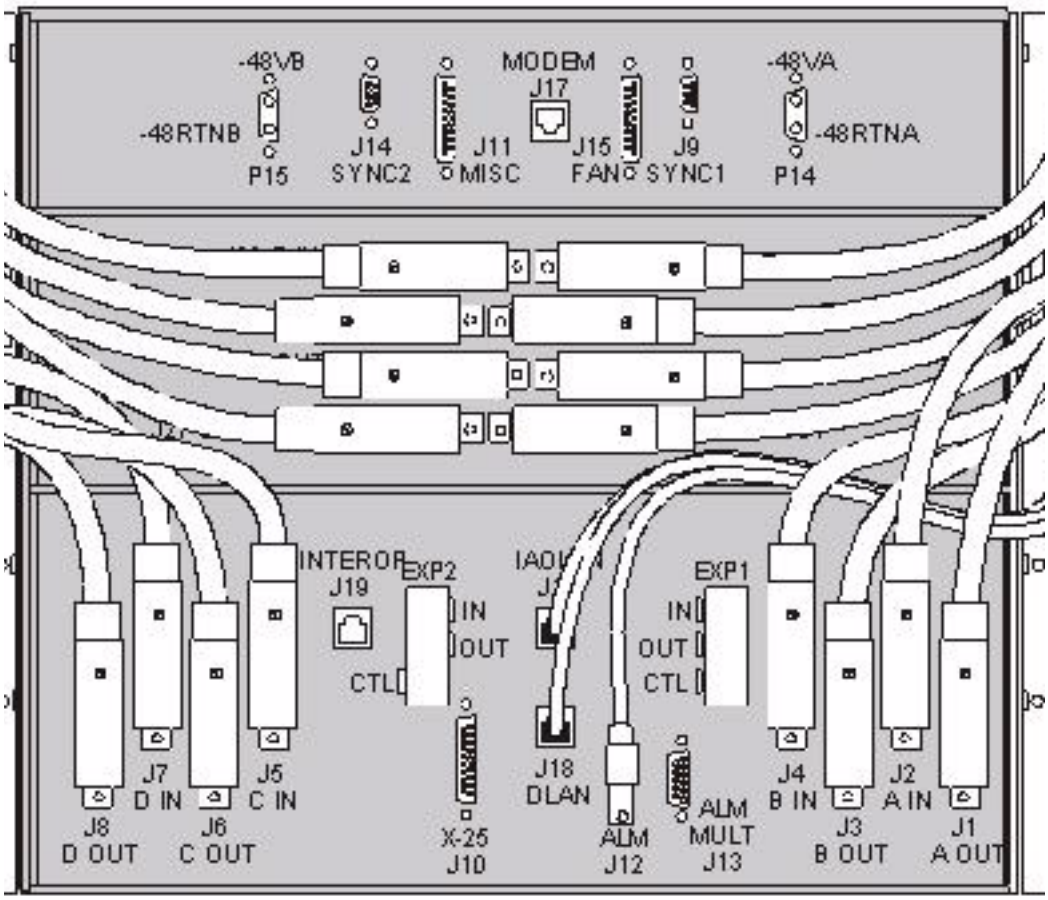
1 Refer to the engineering job specification. Obtain the DS1 cables per Table 1-4, “DS1 cable assemblies” (p. 1-37) and note the function group where each cable will be used. Label the cables, indicating bay, shelf, function group (A, B, C or D) and direction (IN or OUT of the bay) at each end.

Important! The first 28 DS1s of a Function Group, must be connected to the bottom connectors (J1- J8). The additional capacity (28 additional DS1s, 29-56) of the Function Group use the connectors located in the middle of the backplane (J20 - J27).

2 Connect the function group cables at the 1665 DMX High-Capacity shelf end, carefully matching the correct connector with the appropriate backplane connectors as shown in Figure 1-12, "DS1 cable installation" (p. 1-35).

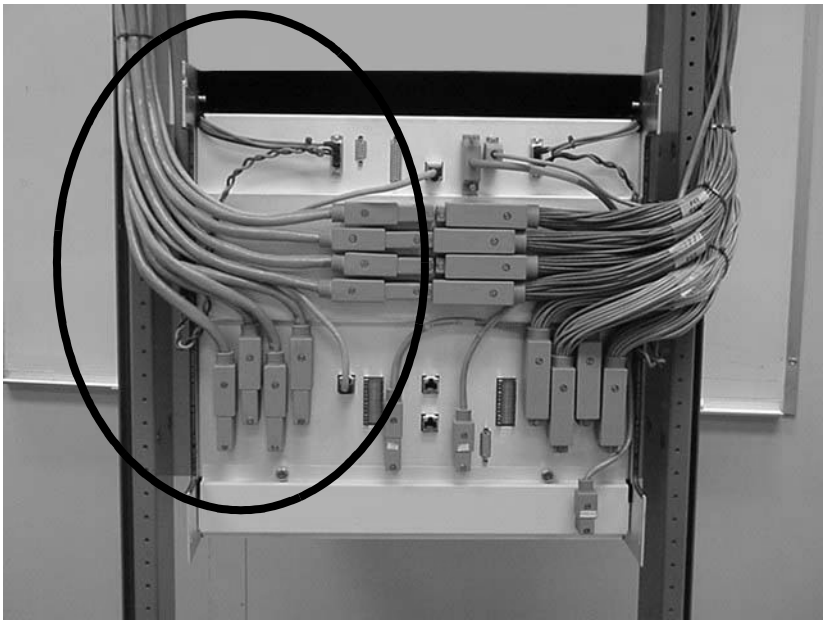
Important! DS1 cable retaining screws must be tightened to a maximum of 6.5 in-lb. Do not overtighten.

Figure 1-12 DS1 cable installation



3 Route the cables along the backplane and out of the bay to the DSX per Figure 1-13, "DS1 cable routing" (p. 1-36).

Figure 1-13 DS1 cable routing



4 Route the cables along the cable rack and into the terminating bay.

5 Remove slack and cut the DS1 cables to the desired length at the DSX.

6 Referring to Table 1-5, “DS1 transmission connections” (p. 1-38), carefully observe color codes and wire-wrap the cables at the DSX.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Table 1-4 DS1 cable assemblies

Cable length (feet)	Cable assembly #	Description	1665 DMX backplane connections
10	848954988	DS1 Cables, 24 gauge	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
20	848955001		
30	848923074		
50	848548327		
75	848923082		
100	848548335		
125	848923090		
150	848548343		
175	848923108		
200	848923116		
250	848548350		
350	848790762		
450	848548368		
550	848790770		
655	848790788		

Notes:

1. Each group listed includes all the DS1 cables for one function group.
2. One code provides one input and one output cable for 28 DS1's, i.e., for one DS1 function group, e.g, "J1 A OUT" & "J2 A IN"
3. For Input connections use cable CA1 (DS1 IN) and for Output connections use cable CA2 (DS1 OUT).
4. Cables are terminated in J1 through J8 and J20 through J27 connectors at the 1665 DMX High-Capacity shelf end and unterminated at the other end for wire-wrap installation.
5. P1 through P8 are 62 pins D-Sub male-type connectors fit into J1 through J8. P20 through P27 are 62 pins DSUB male type connectors fit into J20 through J27.
6. Two codes required for the high-capacity 56 DS1 LNW8, i.e., for DS1 function groups, e.g., "J1 A OUT" & "J2 A IN" and "J24 A OUT"&"J20 A IN"

Table 1-5 DS1 transmission connections

DSX-1 connections				1665 DMX High-Capacity shelf backplane connections								
Group	Chan DS1	T/R term	T/R color	62 pin conn. Pin# T/R	Function group A conn.		Function group B conn.		Function group C conn.		Function group D conn.	
					In	Out	In	Out	In	Out	In	Out
1	1 (1)	B8/B7	W/BL[1]	19/40	J2	J1	J4	J3	J5	J6	J7	J8
	2 (2)	B6/B5	W/O[1]	18/39	A	A	B	B	C	C	D	D
	3 (3)	B4/B3	W/G[1]	60/59	In	Out	In	Out	In	Out	In	Out
	4 (4)	B2/B1	W/BR	17/38								
2	1 (5)	B8/B7	W/S	58/57								
	2 (6)	B6/B5	R/BL	16/37								
	3 (7)	B4/B3	R/O	15/36								
	4 (8)	B2/B1	R/G	14/35								
3	1 (9)	B8/B7	R/BR	56/55								
	2 (10)	B6/B5	R/S	13/34								
	3 (11)	B4/B3	BK/BL	54/53								
	4 (12)	B2/B1	BK/O	12/33								
4	1 (13)	B8/B7	BK/G	11/32								
	2 (14)	B6/B5	BK/BR	10/31								
	3 (15)	B4/B3	BK/S	52/51								
	4 (16)	B2/B1	Y/BL	9/30								
5	1 (17)	B8/B7	Y/O	50/49								
	2 (18)	B6/B5	Y/G	8/29								
	3 (19)	B4/B3	Y/BR	7/28								
	4 (20)	B2/B1	Y/S	6/27								
6	1 (21)	B8/B7	V/BL	48/47								
	2 (22)	B6/B5	V/O	5/26								
	3 (23)	B4/B3	V/G	46/45								
	4 (24)	B2/B1	V/BR	4/25								
7	1 (25)	B8/B7	V/S	3/24								
	2 (26)	B6/B5	W/BL[1]	2/23								
	3 (27)	B4/B3	W/O[1]	44/43								
	4 (28)	B2/B1	W/G[1]	1/22								

DSX-1 connections				1665 DMX High-Capacity shelf backplane connections								
Group	Chan DS1	T/R term	T/R color	62 pin conn. Pin# T/R	Function group A conn.		Function group B conn.		Function group C conn.		Function group D conn.	
					In	Out	In	Out	In	Out	In	Out
1	1 (29)	B8/B7	W/BL[1]	19/40								
	2 (30)	B6/B5	W/O[1]	18/39	J20	J24	J21	J25	J22	J26	J23	J27
	3 (31)	B4/B3	W/G[1]	60/59	A	A	B	B	C	C	D	D
	4 (32)	B2/B1	W/BR	17/38	In	Out	In	Out	In	Out	In	Out
2	1 (33)	B8/B7	W/S	58/57								
	2 (34)	B6/B5	R/BL	16/37								
	3 (35)	B4/B3	R/O	15/36								
	4 (36)	B2/B1	R/G	14/35								
3	1 (37)	B8/B7	R/BR	56/55								
	2 (38)	B6/B5	R/S	13/34								
	3 (39)	B4/B3	BK/BL	54/53								
	4 (40)	B2/B1	BK/O	12/33								
4	1 (41)	B8/B7	BK/G	11/32								
	2 (42)	B6/B5	BK/BR	10/31								
	3 (43)	B4/B3	BK/S	52/51								
	4 (44)	B2/B1	Y/BL	9/30								
5	1 (45)	B8/B7	Y/O	50/49								
	2 (46)	B6/B5	Y/G	8/29								
	3 (47)	B4/B3	Y/BR	7/28								
	4 (48)	B2/B1	Y/S	6/27								
6	1 (49)	B8/B7	V/BL	48/47								
	2 (50)	B6/B5	V/O	5/26								
	3 (51)	B4/B3	V/G	46/45								
	4 (52)	B2/B1	V/BR	4/25								
7	1 (53)	B8/B7	V/S	3/24								
	2 (54)	B6/B5	W/BL[1]	2/23								
	3 (55)	B4/B3	W/O[1]	44/43								
	4 (56)	B2/B1	W/G[1]	1/22								

DSX-1 connections				1665 DMX High-Capacity shelf backplane connections								
Group	Chan DS1	T/R term	T/R color	62 pin conn. Pin# T/R	Function group A conn.		Function group B conn.		Function group C conn.		Function group D conn.	
					In	Out	In	Out	In	Out	In	Out

Notes:

1. Some wire colors are used twice. White binder cables are for Channel 1 through 25 and 29 through 53 blue binder cables are for Channels 26, 27, 28, 54, 55 and 56.

□

DS3/EC1 and 48TMUX cable installation

Description

This section describes how to connect the DS3/EC1 and 48TMUX cables to the 1665 DMX High-Capacity shelf and route the cables out of the bay and to the DS3/EC1 terminating equipment. Perform this procedure if DS3/EC1 or 48TMUX cables are required.

Important! When cabling the 1665 DMX High-Capacity shelf to a DSX, the DSX becomes an extension of the 1665 DMX High-Capacity shelf backplane connections. Therefore, the IN on the 1665 DMX High-Capacity shelf backplane connects to the IN of the DSX and the OUT of the 1665 DMX High-Capacity shelf backplane connects to the OUT of the DSX.

DS3/EC1 and TMUX cable options are listed in Table 1-7, “DS3/EC1 or TMUX cable assemblies” (p. 1-44).

DS3/EC1 and TMUX transmission connections are in Table 1-8, “DS3/EC1 and TMUX transmission connections” (p. 1-50). A total of four function groups fully cabled will have 192 DS3 drop capacity.

Procedure

Proceed as follows:

1 Refer to the engineering job specification. Obtain the DS3 cables per Table 1-7, “DS3/EC1 or TMUX cable assemblies” (p. 1-44) and note the function group where each cable will be used. Label the cables, indicating bay, shelf, function group (A, B, C or D) and direction (IN or OUT of the bay) at each end.

Important! The first 24 ports of a Function Unit must be cabled to the bottom connectors (J1 - J8), the additional DS3 ports (25 - 48) are cabled to the middle section of the shelf (J20 - J27).

2 Connect the function group cables at the 1665 DMX High-Capacity shelf end, carefully matching the correct connector with the appropriate backplane connectors as shown in Figure 1-14, “DS3/EC1 and 48TMUX cable installation” (p. 1-42).

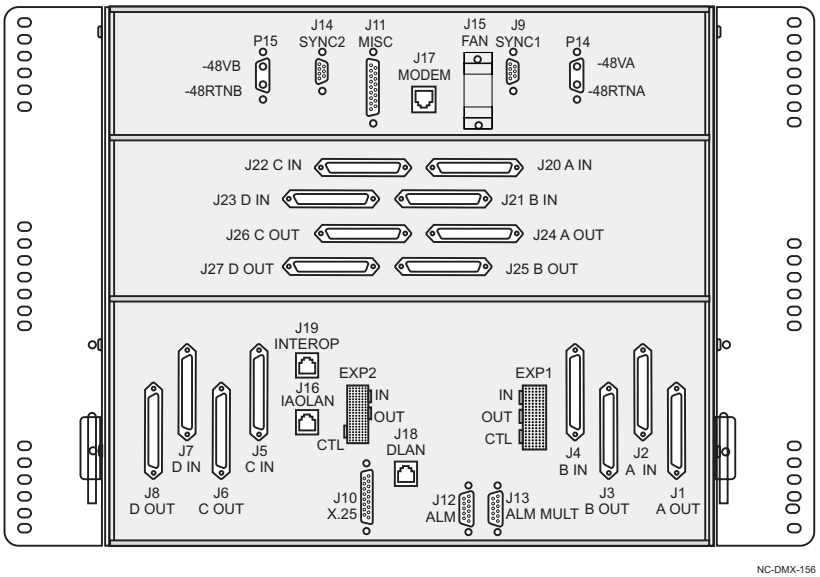
Important! DS3/EC1 and TMUX cable retaining screws must be tightened to a maximum of 6.5 in-lb. Do not overtighten.

3

Table 1-6 DS3 connections for different function groups

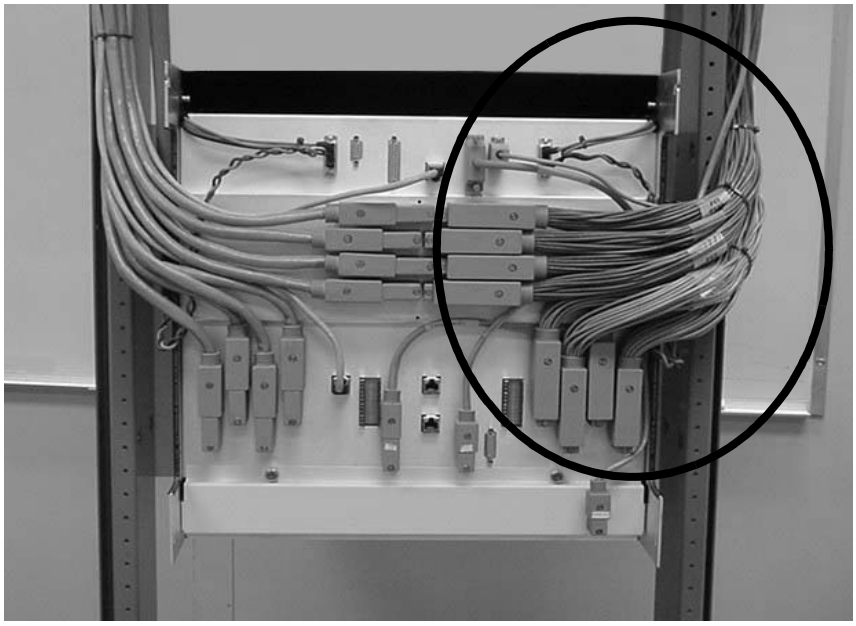
Function group	Associated connectors
A	A IN (J2 and J20) A OUT (J1 and J24)
B	B IN (J4 and J21) B OUT (J3 and J25)
C	C IN (J5 and J22) C OUT (J6 and J26)
D	D IN (J7 and J23) D OUT (J8 and J27)

Figure 1-14 DS3/EC1 and 48TMUX cable installation



4 Route the cables along the backplane and out of the bay to the DSX per Figure 1-15, “DS3/EC1 and 48TMUX cable routing” (p. 1-43).

Figure 1-15 DS3/EC1 and 48TMUX cable routing



Important! This figure shows DS3 cabling for FNA and FNB.

5 Route the cables along the cable rack and into the terminating bay (DSX or other terminating transmission equipment).

6 Cut the cables to desired length and install the BNC connectors shipped with the cable assemblies.

Important! When installing BNC connectors, follow the manufacturer's instruction carefully to ensure a proper connection. Failure to do so may result in faulty DS3 signals as a result of improperly installed BNC connectors.

7 Connect the cables to their respective positions on the terminating equipment.

Important! The 12 port cable and the 24 port cable use different signal grounds based on the circuit pack not the backplane. There is no issue interchanging these cables on the backplane. The Signals are common between both cables.

8 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-7 DS3/EC1 or TMUX cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
DS3#1-12 Cables with ITT Canon BNC's, for LNW16, LNW18 only 12 individual 735A coaxial cables with 12 ITT Canon 75ohm BNC plugs shipped loose.	848955407	10	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	848955415	20	
	848955423	30	
	848955431	40	
	848548277	50	
	848980504	60	
	848548285	100	
	848548293	150	
	848548301	250	
	848548319	450 (NE to NE)	
	848815742	450 (NE to NE)	
	848815734	750 (NE to NE)	
	848815759	900 (NE to NE)	

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
DS3#1-12 Cables with no BNC, LNW16, LNW18 only Similar to above except no BNC's are shipped loose. 849040779 uses 735A cable, and 450ft is the maximum amount of 735A allowed between two DMX's 849041710 and lengths > 450ft use ~10ft 735A spliced to 734D cable and 900ft is the maximum amount of 734D allowed between two DMX's. This splice is factory made. Stagger the splices in the cable rack to save space.	849040688	10	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	849040696	20	
	849040704	30	
	849040712	40	
	849040720	50	
	849040738	60	
	849040746	100	
	849040753	150	
	849040761	250	
	849040779	450	
	849041710	450	
	849041736	750	
	849041744	900	

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
DS3#1-24 Cables with ITT Canon BNCs, for LNW16, LNW18, LNW19, LNW19B or LNW20 24 individual 735A coaxial cables and 24 ITT Canon 75ohm BNC plugs shipped loose.	848923124	10	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	848923132	20	
	848923140	30	
	848923157	40	
	848839478	50	
	848923165	60	
	848923173	70	
	848923181	80	
	848923199	90	
	848839486	100	
	848923207	110	
	848923215	120	
	848923223	140	
	848838494	150	
	848923231	160	
	848923249	180	
	848923256	200	
	848839502	250	
	848923264	300	
	848923272	400	
	848839510	450	

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
DS3#1-24 Cables with no BNC, for the LNW16, LNW18, LNW19, LNW19B or LNW20 Similar to above except no BNC's are shipped loose	849040886	10	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	849040894	20	
	849040902	30	
	849040910	40	
	849040928	50	
	849040936	60	
	849040944	70	
	849040951	80	
	849040969	90	
	849040977	100	
	849040985	110	
	849040993	120	
	849041009	140	
	849041017	150	
	849041025	160	
	849041033	180	
	849041041	200	
	849041066	250	
	849041074	300	
	849041082	400	
	849041090	450	

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
DS3#1-24 Cables with ITT Canon BNCs Similar to above except ~10 ft of 735A spliced to 734D coaxial cable with loose ITT Canon BNCs for > 450ft between two DMX's. 900ft is the maximum amount of 734D cable allowed between two DMX's. This is a factory splice. Stagger the splices in the cable rack to save space.	848932083	250	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	848932018	275	
	848932026	300	
	848932034	325	
	848932042	350	
	848932059	375	
	848932067	400	
	848932075	425	
	848839528	450	
	848839536	750	
	848839544	900	
DS3#1-24 Cables with no BNC Similar to above except no BNC's are shipped loose.	849041785	250	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)
	849041793	275	
	849041801	300	
	849041819	325	
	849041827	350	
	849041835	375	
	849041843	400	
	849041850	425	
	849041868	450	
	849041876	750	
	849041884	900	
Customer Specific DS3#1-24 Cables Similar to above except DMX backplane 62 pin plugs on both ends of 735A coaxial cable	848956249	150	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23 (D OUT - D IN)

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
Customer Specific 12 pack Mini-BNC Cable Harness 12 individual 735A coaxial cables under one jacket, one harness per code, with 12 Mini-BNC plugs to 12 standard BNC plugs for customer specific applications.	109508416	25	
	109508424	50	
	109508432	75	
	109508440	100	
	109508457	125	
	109508465	150	
	109508473	175	
	109508481	200	
	109508499	250	
Customer Specific Mini-BNC Cable One 735A coaxial cable per code with one mini-BNC plug to one standard BNC plug for customer specific applications.	109508325	25	J1, J24 - J2, J20 (A OUT - A IN) J3, J25 - J4, J21 (B OUT - B IN) J6, J26 - J5, J22 (C OUT - C IN) J8, J27 - J7, J23
	109508333	50	
	109508341	75	
	109508358	100	
	109508366	125	
	109508374	150	
	109508382	175	
	109508390	200	
	109508408	250	

Notes:

1. All the DS3/EC1 or TMUX cable assemblies can be used for any function group.
2. 1665 DMX High-Capacity shelf connectors J1 through J8 and J20 through J27 can be used for either DS1, DS3/EC1 or TMUX.
3. Each Cable assembly# listed above contains two cable assemblies, therefore a quantity of two per function group must be ordered for the additional capacity.
4. P1 through P8 are 62 pins DSUB male type connectors fit into J1 through J8.
5. P20 through P27 are 62 pins DSUB male type connectors fit into J20 through J27.
6. LNW18, 12TMUX uses the same cable as the DS3 12 port. The DS3 High Capacity cable may also be used, but only 12 ports will be supported with LNW18, 12TMUX.
7. LNW20, 48TMUX uses the same cable as the DS3/EC1 48 port.

Table 1-8 DS3/EC1 and TMUX transmission connections

Coaxial cable	Lead designation	Name	Connector pin #
Connectors J1 - J8	(Ports 1 - 24)		
1	DS3 1R/1T	Signal	40
	FRG1	Ground	19
2	DS3 2R/2T	Signal	17
	FRG2	Ground	38
3	DS3 3R/3T	Signal	57
	FRG3	Ground	58
4	DS3 4R/4T	Signal	13
	FRG4	Ground	34
5	DS3 5R/5T	Signal	53
	FRG5	Ground	54
6	DS3 6R/6T	Signal	10
	FRG6	Ground	31
7	DS3 7R/7T	Signal	51
	FRG7	Ground	52
8	DS3 8R/8T	Signal	6
	FRG8	Ground	27
9	DS3 9R/9T	Signal	47
	FRG9	Ground	48
10	DS3 10R/10T	Signal	4
	FRG10	Ground	25
11	DS3 11R/11T	Signal	24
	FRG11	Ground	3
12	DS3 12R/12T	Signal	1
	FRG12	Ground	22
13	DS3 13R/13T	Signal	59
	FRG13	Ground	60
14	DS3 14R/14T	Signal	16
	FRG14	Ground	37

Coaxial cable	Lead designation	Name	Connector pin #
15	DS3 15R/15T	Signal	36
	FRG15	Ground	15
16	DS3 16R/16T	Signal	55
	FRG16	Ground	56
17	DS3 17R/17T	Signal	12
	FRG17	Ground	33
18	DS3 18R/18T	Signal	32
	FRG18	Ground	11
19	DS3 19R/19T	Signal	9
	FRG19	Ground	30
20	DS3 20R/20T	Signal	49
	FRG20	Ground	50
21	DS3 21R/21T	Signal	28
	FRG21	Ground	7
22	DS3 22R/22T	Signal	5
	FRG22	Ground	26
23	DS3 23R/23T	Signal	45
	FRG23	Ground	46
24	DS3 24R/24T	Signal	43
	FRG24	Ground	44
Connectors J20 - J27	(Ports 25 - 48)		
25	DS3 25R/25T	Signal	40
	FRG25	Ground	19
26	DS3 26R/26T	Signal	17
	FRG26	Ground	38
27	DS3 27R/27T	Signal	57
	FRG27	Ground	58
28	DS3 28R/28T	Signal	13
	FRG28	Ground	34
29	DS3 29R/29T	Signal	53
	FRG29	Ground	54

Coaxial cable	Lead designation	Name	Connector pin #
30	DS3 30R/30T	Signal	10
	FRG30	Ground	31
31	DS3 31R/31T	Signal	51
	FRG31	Ground	52
32	DS3 32R/32T	Signal	6
	FRG32	Ground	27
33	DS3 33R/33T	Signal	47
	FRG33	Ground	48
34	DS3 34R/34T	Signal	4
	FRG34	Ground	25
35	DS3 35R/35T	Signal	24
	FRG35	Ground	3
36	DS3 36R/36T	Signal	1
	FRG36	Ground	22
37	DS3 37R/37T	Signal	59
	FRG37	Ground	60
38	DS3 38R/38T	Signal	16
	FRG38	Ground	37
39	DS3 39R/39T	Signal	36
	FRG39	Ground	15
40	DS3 40R/40T	Signal	55
	FRG40	Ground	56
41	DS3 41R/41T	Signal	12
	FRG41	Ground	33
42	DS3 42R/42T	Signal	32
	FRG42	Ground	11
43	DS3 43R/43T	Signal	9
	FRG43	Ground	30
44	DS3 44R/44T	Signal	49
	FRG44	Ground	50

Coaxial cable	Lead designation	Name	Connector pin #
45	DS3 45R/45T	Signal	28
	FRG45	Ground	7
46	DS3 46R/46T	Signal	5
	FRG46	Ground	26
47	DS3 47R/47T	Signal	45
	FRG47	Ground	46
48	DS3 48R/48T	Signal	43
	FRG48	Ground	44

Notes:

1. Lead designation for EC1 connection for cable# x should be read as EC1 xR/xT instead of DS3 xR/xT, where x is a number from 1 to 48.

12TMUX (LNW18) cable installation

Description

This section describes how to connect the TMUX cables to the 1665 DMX High-Capacity shelf and route the cables out of the bay and to the TMUX terminating equipment. Perform this procedure if TMUX cables are required for an LNW18 in a function group.

It should be noted that the cables used for 12TMUX support are DS3 cables (12 port). The new high capacity DS3 cables will also support 12TMUX, but only in a 12 port capacity.

Important! When cabling the 1665 DMX High-Capacity shelf to a DSX, the DSX becomes an extension of the 1665 DMX High-Capacity shelf backplane connections. Therefore, the IN on the 1665 DMX High-Capacity shelf backplane connects to the IN of the DSX and the OUT of the 1665 DMX High-Capacity shelf backplane connects to the OUT of the DSX.

TMUX cable options are listed in Table 1-7, “DS3/EC1 or TMUX cable assemblies” (p. 1-44).

TMUX transmission connections are in Table 1-9, “12TMUX transmission connections” (p. 1-57). Total of four function groups fully cabled will have 48 DS3 drop capacity.

Procedure

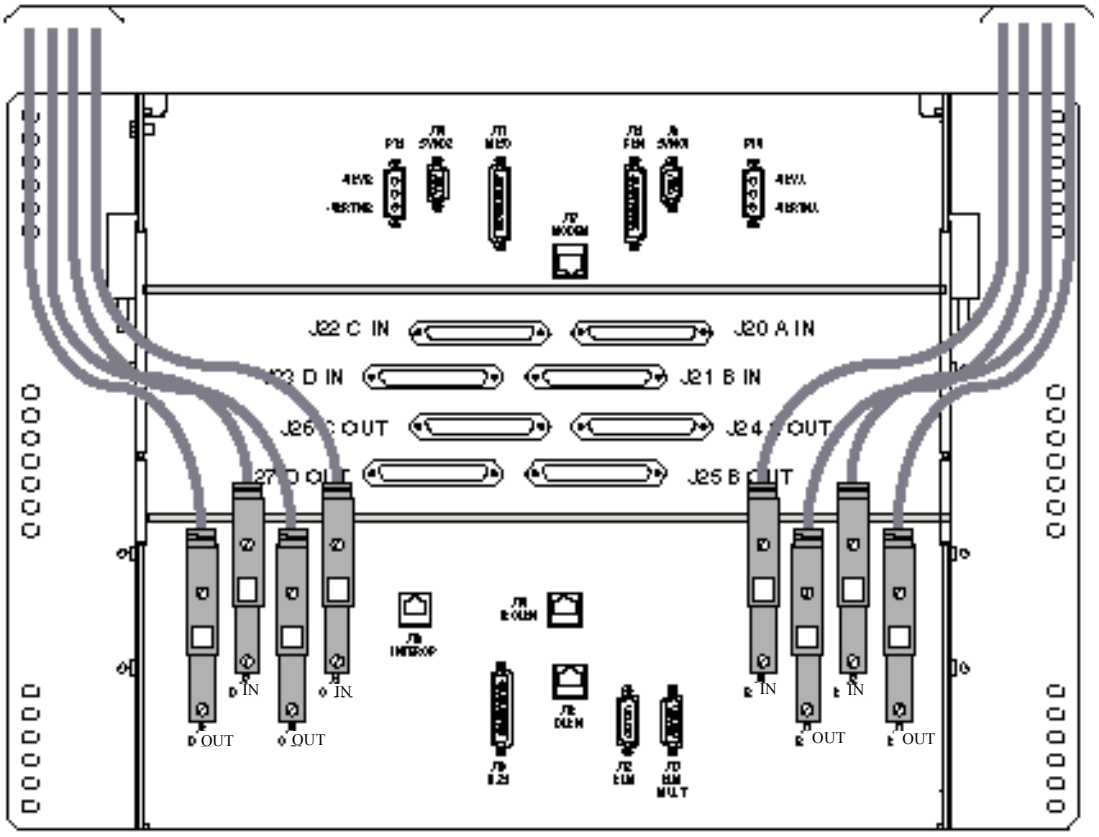
Proceed as follows:

1 Refer to the engineering job specification. Obtain the TMUX (DS3) cables per Table 1-7, “DS3/EC1 or TMUX cable assemblies” (p. 1-44) and note the function group where each cable will be used. Label the cables, indicating bay, shelf, function group (A, B, C or D) and direction (IN or OUT of the bay) at each end.

2 Connect the function group cables at the 1665 DMX High-Capacity shelf end, carefully matching the correct connector with the appropriate backplane connectors as shown in Figure 1-16, “12TMUX cable installation” (p. 1-55).

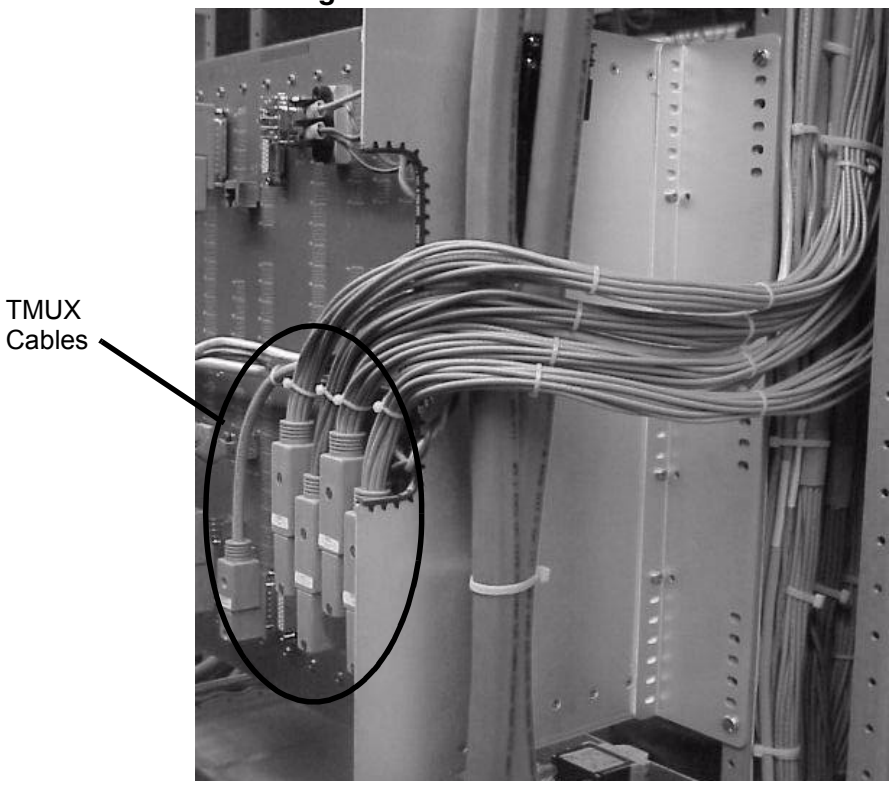
Important! DS3/EC1 and TMUX cable retaining screws must be tightened to a maximum of 6.5 in-lb. Do not overtighten.

Figure 1-16 12TMUX cable installation



3 Route the cables along the backplane and out of the bay to the DSX per Figure 1-17, “TMUX cable routing” (p. 1-56).

Figure 1-17 TMUX cable routing



Important! The shelf depicted above is a 1665 DMX standard shelf and is used for cable routing reference only.

4 Route the cables along the cable rack and into the terminating bay (DSX or other terminating transmission equipment).

5 Cut the cables to desired length and install the BNC connectors shipped with the cable assemblies.

Important! When installing BNC connectors, follow the manufacturer's instruction carefully to ensure a proper connection. Failure to do so may result in faulty DS3 signals as a result of improperly installed BNC connectors.

6 Connect the cables to their respective positions on the terminating equipment.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-9 12TMUX transmission connections

Coaxial cable	Lead designation	Name	Connector pin #
1	DS3 1R/1T	Signal	40
	FRG1	Ground	39
2	DS3 2R/2T	Signal	17
	FRG2	Ground	18
3	DS3 3R/3T	Signal	57
	FRG3	Ground	58
4	DS3 4R/4T	Signal	13
	FRG4	Ground	14
5	DS3 5R/5T	Signal	53
	FRG5	Ground	54
6	DS3 6R/6T	Signal	10
	FRG6	Ground	11
7	DS3 7R/7T	Signal	51
	FRG8	Ground	50
8	DS3 8R/8T	Signal	6
	FRG8	Ground	7
9	DS3 9R/9T	Signal	47
	FRG9	Ground	46
10	DS3 10R/10T	Signal	4
	FRG10	Ground	3
11	DS3 11R/11T	Signal	24
	FRG11	Ground	23
12	DS3 12R/12T	Signal	1
	FRG12	Ground	2

10/100BaseT backplane Ethernet cable installation

Description

This section describes how to connect the 10/100BaseT cables to the 1665 DMX High-Capacity shelf backplane and route the cables out of the bay and to the 10/100BaseT terminating equipment (for example, a *110/RJ45*® punch down block). Perform this procedure if 10/100BaseT cables are required.

The next section covers installation of Ethernet cables connected directly to SFP modules on circuit pack faceplates if applicable.

Procedure

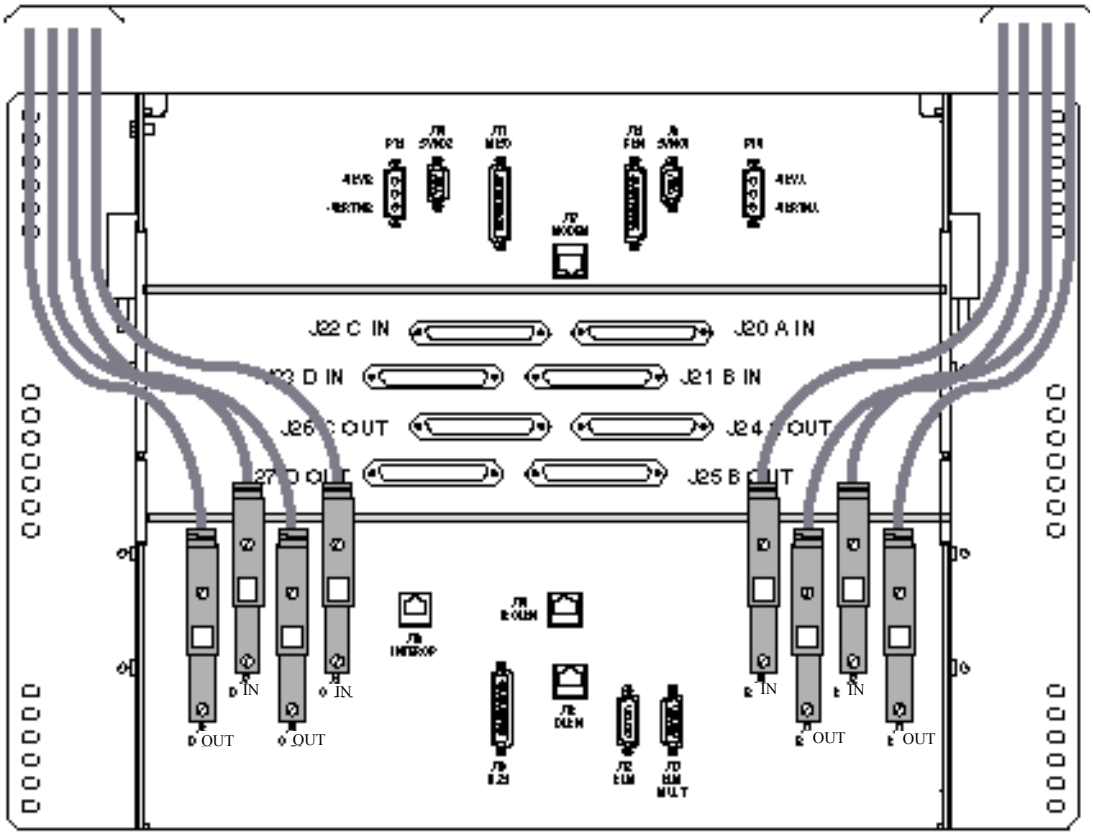
Proceed as follows:

1 Refer to the engineering job specification. Obtain the 100BASE-TX Ethernet cables per Table 1-10, "10/100BaseT Ethernet cable assemblies" (p. 1-60) and note the function group where each cable will be used. Label the cables, indicating bay, shelf and function group (A, B, C or D) at each end.

2 Connect the function group cables at the 1665 DMX High-Capacity shelf end, carefully matching the correct connector with the appropriate backplane connectors as shown in Figure 1-18, "10/100BaseT cable installation" (p. 1-59). Refer to Table 1-11, "10/100BaseT Ethernet connections" (p. 1-61).

Important! 100BASE-TX Ethernet cable retaining screws must be tightened to a maximum of 6.5 in-lb. Do not overtighten.

Figure 1-18 10/100BaseT cable installation



3 Route the cables along the backplane and out of the bay to the 110/RJ45 punch down block. Route the cables in the same manner as DS3/EC1 cables. Refer to Figure 1-15, “DS3/EC1 and 48TMUX cable routing” (p. 1-43).

4 Route the cables along the cable rack and into the terminating bay.

5 Cut cable to length and punch down cable to the 110 block. Refer to Table 1-11, “10/100BaseT Ethernet connections” (p. 1-61) for pin out assignments.

CAUTION

The LNW66, LNW71 and LNW74 10/100BaseT-Ethernet packs do not have lightning protection for the metallic connections. Therefore it is necessary to use a lightning-protected patch panel, such as the Black Box CAT5 protected patch panel JSM110A, for intra-office applications only.

Important! Backplane connectors are associated with function Groups as follows:

- J1, J2 ➠ Function Group A
- J3, J4 ➠ Function Group B
- J5, J6 ➠ Function Group C
- J7, J8 ➠ Function Group D

6 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-10 10/100BaseT Ethernet cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
10/100baseT Ethernet cable	848819090	8	J1A (ports 1-12) J2A (ports 13-24) J3B (ports 1-12) J4B (ports 13-24) J6C (ports 1-12) J5C (ports 13-24) J8D (ports 1-12) J7D (ports 13-24) NOTE: LNW74 has only ports 1-12 and ports 13-16.
	848778114	20	
	848923280	35	
	848778122	50	
	848923298	75	
	848778106	100	
	848923306	125	
	848778148	150	
	848923314	175	
	848923322	200	
	848923330	225	
	848923348	250	
	848923355	275	
	848778130	300	

Table 1-11 10/100BaseT Ethernet connections

Port# J2, J4, J5, J7	J1, J3, J6, J8	Wire color	Dsub 62M pin #	Signal	RJ-45 pin #
13	1	W/O	50/49	R+/R-	1/2
		W/BL	8/29	T+/T-	3/6
14	2	W/BR	48/47	R+/R-	1/2
		W/G	5/26	T+/T-	3/6
15	3	R/BL	7/28	R+/R-	1/2
		W/S	6/27	T+/T-	3/6
16	4	R/G	46/45	R+/R-	1/2
		R/O	4/25	T+/T-	3/6
17	5	R/S	56/55	R+/R-	1/2
		R/BR	13/34	T+/T-	3/6
18	6	BK/O	11/32	R+/R-	1/2
		BK/BL	10/31	T+/T-	3/6
19	7	BK/BR	54/53	R+/R-	1/2
		BK/G	12/33	T+/T-	3/6
20	8	Y/BL	52/51	R+/R-	1/2
		BK/S	9/30	T+/T-	3/6
21	9	Y/G	19/40	R+/R-	1/2
		Y/O	18/39	T+/T-	3/6
22	10	Y/S	58/57	R+/R-	1/2
		Y/BR	16/37	T+/T-	3/6
23	11	V/O	60/59	R+/R-	1/2
		V/BL	17/38	T+/T-	3/6
24	12	V/BR	15/36	R+/R-	1/2
		V/G	14/35	T+/T-	3/6

Notes:

1. 10/100baseT Ethernet cables have transmit and receive on the same cable.
2. LNW74 has 16 10/100BaseT ports.

□

Ethernet cabling to SFP modules on circuit pack faceplates

Description

Use this section to run Category 5e cables to the SFP modules on the front of LNW63, LNW64, LNW70 or LNW170, Ethernet circuit packs. Refer to Figure 1-19.

Procedure

Proceed as follows:

1 Refer to Figure 1-19.

Figure 1-19 Ethernet cable routing to faceplate SFP modules

2 Connect the RJ45 plugs to the faceplate SFP modules and run the cables out of the shelf as shown.

Table 1-12 GbE Ethernet cables

Description	Cable assembly #	Cable length (feet)
GbE Ethernet cables CAT5e Gigabit Ethernet shielded connectorized on both ends with straight RJ45 connector.	849010483	5
	849010491	10
	849010509	15
	849010517	20
	849010525	25
	849010533	30
	849010541	40
	849010558	50
	849010566	60
	849010574	70
	849010582	80
	849010590	90
	849010608	100
	849010616	110
	849010624	120
	849010632	130
	849010640	140
	849010657	150
	849010665	160
	849010673	180
	849010681	200
	849010699	220
	849010707	240
	849010715	260
	849010723	280
	849010731	300

END OF STEPS

IAO LAN and TCP/IP cable installation

Description

This section describes how to connect the IAO LAN/TCP-IP (LAN 10BaseT) cable to the 1665 DMX High-Capacity shelf and to the interfacing equipment. Perform this procedure if this cabling is required.

The 1665 DMX High-Capacity shelf supports an IntraOffice LAN (IAO LAN) interface for operations data communications to support operations systems such as the Navis Optical Management System (OMS).

Since the IAO LAN can be provisioned as an extension of the SONET DCC, the IAO LAN can also be used to join multiple, otherwise separate subnetworks.

All NE-to-NE OI features that are supported over the DCC are also supported over the IAO LAN.

The IAO LAN/TCP-IP interface cable is available in two configurations (cross-over and straight-through) and may be connected to either the front or rear of the 1665 DMX High-Capacity shelf. The following tables provide additional information:

- Table 1-13, “LAN 10BaseT cable assemblies” (p. 1-67)
- Table 1-14, “LAN 10BaseT cross-over cable connections” (p. 1-68)
- Table 1-15, “LAN 10BaseT straight-through cable connections” (p. 1-68)

Procedure

Proceed as follows:

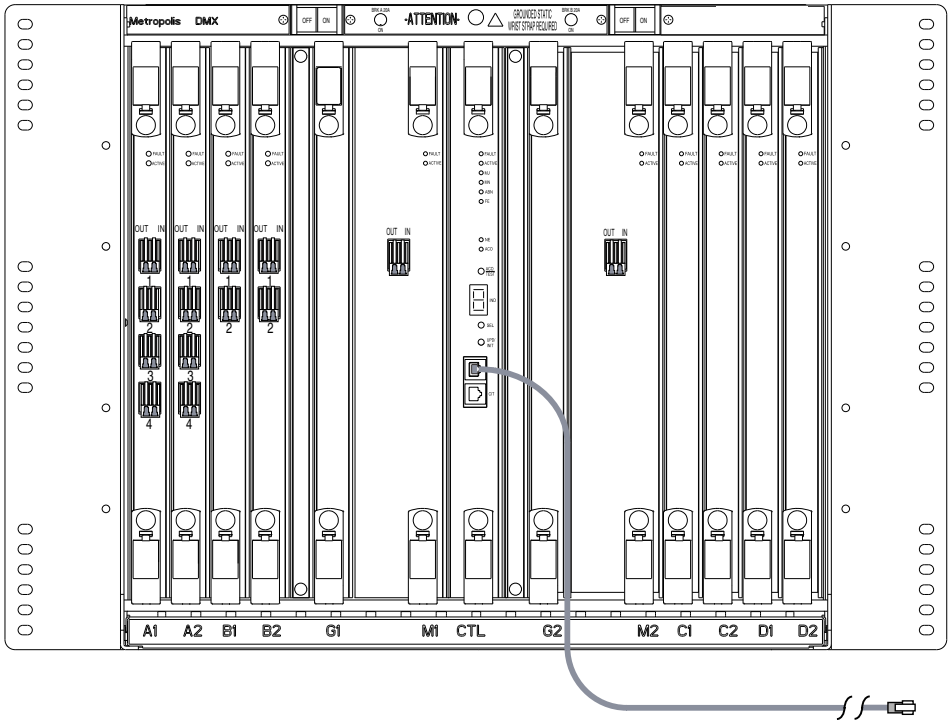
1 If connecting directly to a PC, use a LAN 10BaseT cross-over cable assembly (see Table 1-13).

If connecting to a hub, use a LAN 10BaseT straight-through cable assembly (see Table 1-13).

2 If connecting to the front of the 1665 DMX High-Capacity shelf, connect the cable to the LAN (RJ45) jack on the SYSCTL circuit pack. See Figure 1-20, “LAN cable installation to front of 1665 DMX High-Capacity shelf” (p. 1-65).

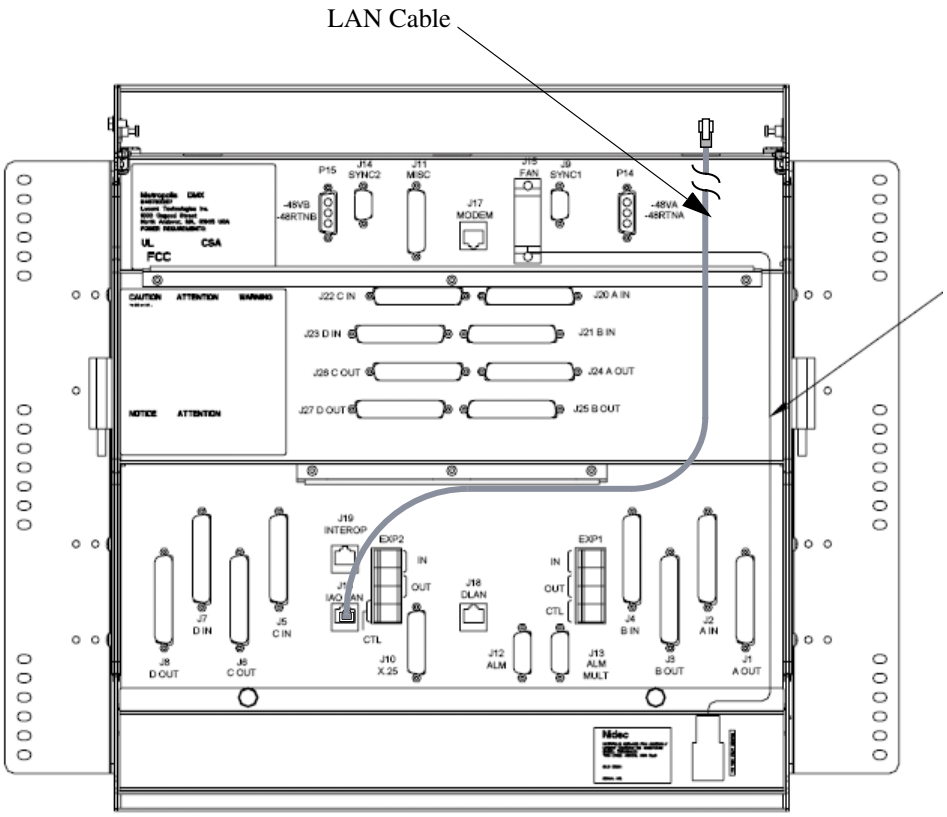
If connecting to the rear of the 1665 DMX High-Capacity shelf, connect the cable to the J16 port (IAO LAN) on the 1665 DMX High-Capacity shelf backplane. See Figure 1-21, “IAO LAN/TCP-IP cable installation to rear of 1665 DMX High-Capacity shelf” (p. 1-66).

Figure 1-20 LAN cable installation to front of 1665 DMX High-Capacity shelf



Important! The above Figure shows a standard 1665 DMX shelf as reference only. The placement of the packs and PC lan port are the same on the 1665 DMX High-Capacity shelf.

Figure 1-21 IAO LAN/TCP-IP cable installation to rear of 1665 DMX High-Capacity shelf



3 If a cross-over cable is used, route the cable to the desired PC LAN port.

If a straight-through cable is used, route the cable to the desired hub port location.

4 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Table 1-13 LAN 10BaseT cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX connections	
			Front	Rear
LAN 10BaseT cross-over cable	109321810	10	SYSCTL LAN jack	J16 (IAO LAN)
	848605028	50		
	848605036	100		
	848605051	150		
	848605069	200		
	848605077	300		
LAN 10BaseT straight-through cable	109321836	20	SYSCTL LAN jack	J16 (IAO LAN)
	109321844	30		
	109321851	40		
	848604948	50		
	109321869	60		
	109321877	70		
	109321885	80		
	109321893	90		
	848604955	100		
	109321901	110		
	109321919	120		
	109321927	130		
	109321935	140		
	848604963	150		
	109321943	160		
	109321950	180		
	848604971	200		
	109321968	220		
	109321976	240		
	109321984	260		
	109321992	280		
	848604997	300		

Table 1-14 LAN 10BaseT cross-over cable connections

Connection	1665 DMX High-Capacity shelf f bkpl	Color	Other side
J16 (IAO LAN)	1	BL - W	3
	2	W - BL	6
	3	O - W	1
	6	W - O	2

Table 1-15 LAN 10BaseT straight-through cable connections

Connection	1665 DMX High-Capacity shelf bkpl	Color	Other side
J16 (IAO LAN)	1	BL - W	1
	2	W - BL	2
	3	O - W	3
	6	W - O	6

Modem cable installation

Description

The use of a modem will allow the 1665 DMX High-Capacity shelf to be accessed remotely via dial up.

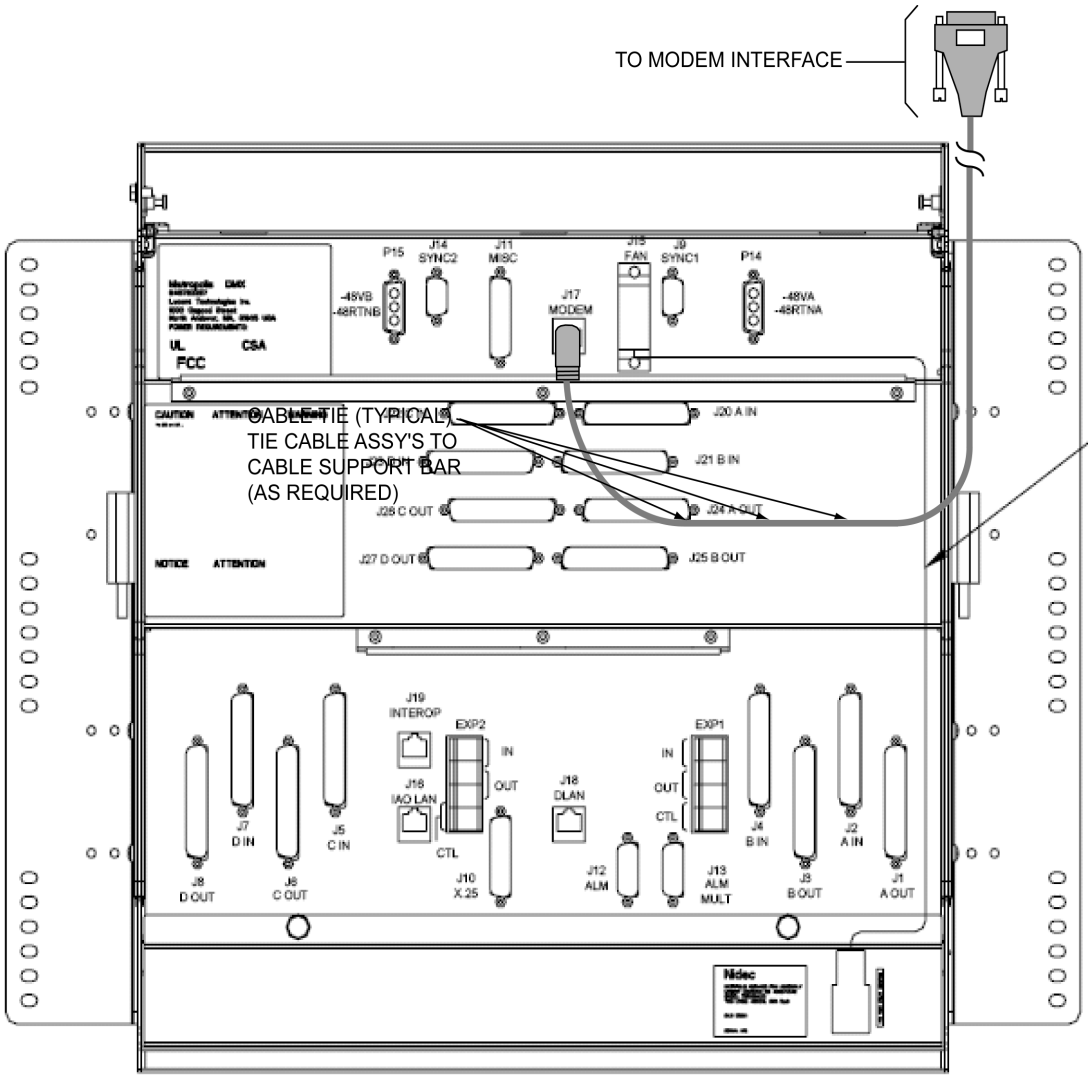
Important! Perform this procedure for the shelf that will be directly connected to a modem or a distribution frame (if specified in the order).

Procedure

Proceed as follows:

1 Obtain the modem cable per Table 1-16, “Modem cable assemblies” (p. 1-71). Connect the RJ45 end of the modem cable to the MODEM port (J17) of 1665 DMX High-Capacity shelf (See Figure 1-22, “Modem cable installation” (p. 1-70).

Figure 1-22 Modem cable installation



2 Route the modem cable out of the 1665 DMX High-Capacity shelf bay to the modem or distribution frame.

3 Dress and tie the modem cable to the 1665 DMX High-Capacity shelf backplane per Figure 1-22, “Modem cable installation” (p. 1-70).

4 Connect the modem cable to the modem or distribution frame.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-16 Modem cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX High-Capacity shelf connections
Modem cable	848756508	50	J17 (MODEM)
	848756524	100	
	848756516	150	
	848756532	250	

Table 1-17 Modem cable connections

Connection	RJ45 connector pin#	Color	DB25 Connector Pin #
Modem cable (J17)	1	W - O	8
	2	BR	20
	3	W - BL	3
	5	O / Shield	7
	6	G	2

Sync cable installation

Description

This section provides the instructions for installing the two types of synchronization (Sync) cables to the 1665 DMX High-Capacity shelf.

A Sync cable is required if the shelf is to be externally timed. The 1665 DMX High-Capacity shelf can provide DS1 external timing to a BITS clock. When the shelf is externally timed by a DS1 Reference and/or is configured to provide a Sync Output, a Sync Input timing cable is required.

This procedure should be performed on each 1665 DMX High-Capacity shelf requiring an external timing source. There are two types of cables available:

1. Sync cable with a molded D-Sub 9-Pin (DB-9) connector
2. Sync cable with a wire-wrap DB-9 connector.

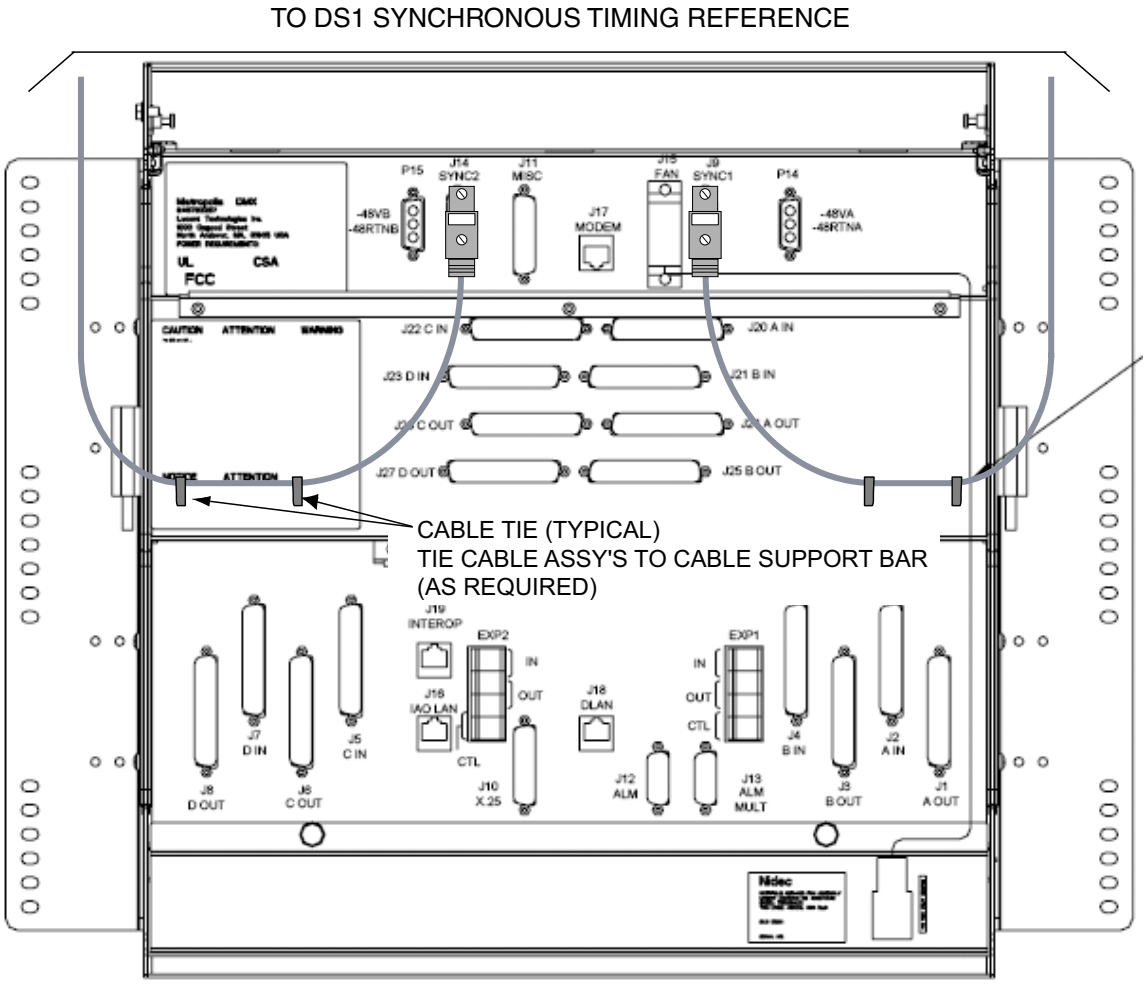
Important! Each of the Sync connections on the backplane provides an input (gray) and output (red) termination for timing. Refer to Table 1-19, “Synchronization cable (DS1 timing reference) connections” (p. 1-77) for the pinouts.

Sync cable with molded DB-9 connector procedure

Perform the following steps when using a Sync cable with a molded DB-9 connector.

1 Connect the DB-9 connector end of the Sync cable to the SYNC1 (J9) port on the 1665 DMX High-Capacity shelf backplane. Refer to Figure 1-23, “Sync cable with molded DB9 connector installation” (p. 1-73).

Figure 1-23 Sync cable with molded DB9 connector installation



2 Route the cable to proper location and cut to desired length.

3 Terminate the wires in the red jacket for an output signal.

4 Terminate the wires in the gray jacket for an input signal.

5 Repeat Step 1 through Step 4 to connect the Sync cable to the SYNC2 (J14) port.

6 Check off the appropriate box in Appendix E, “Installation checklist”.

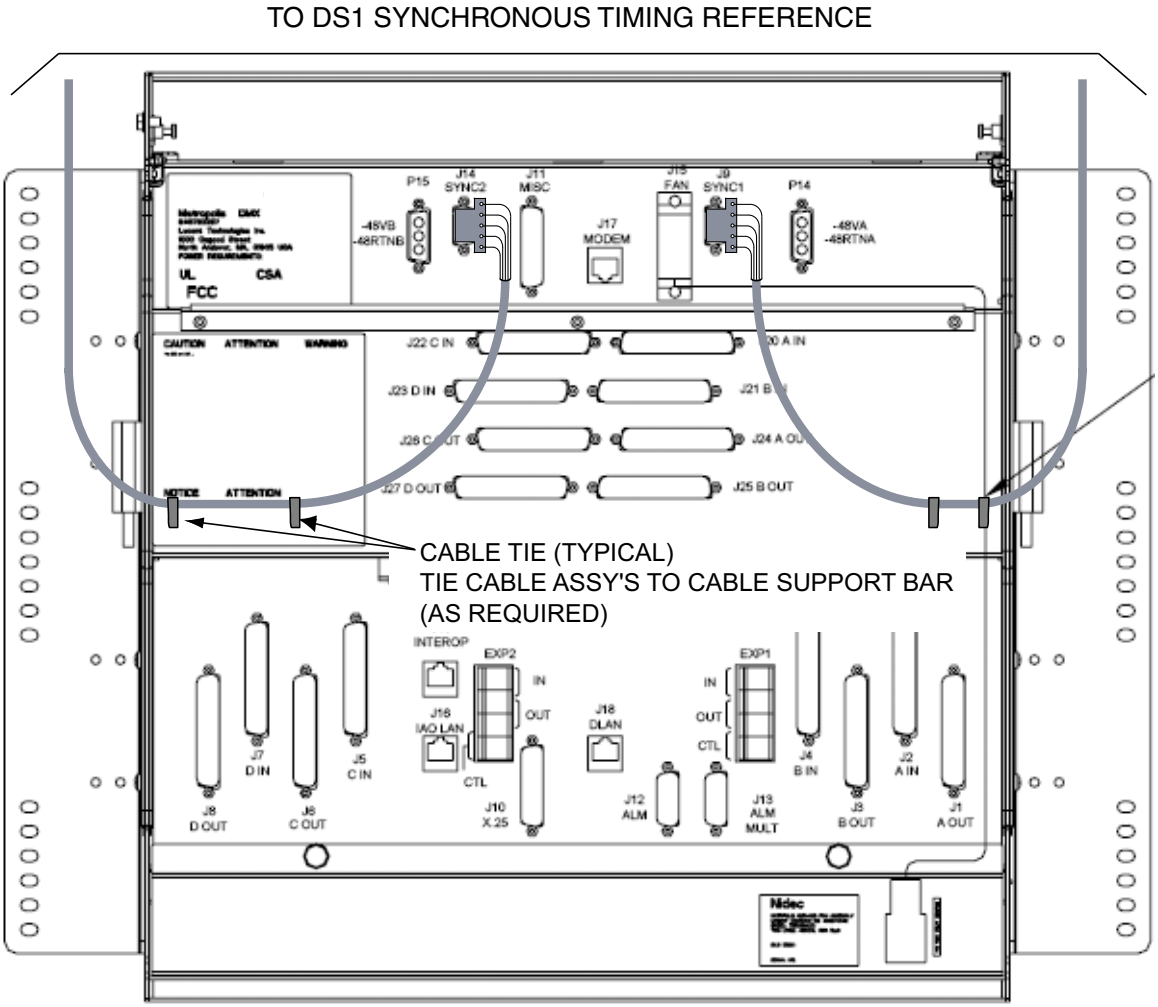
END OF STEPS

Sync cable with wire-wrap DB-9 connector procedure

Perform the following steps when using the Sync cable with the wire-wrap DB-9 connector.

1 Connect the wire-wrap DB-9 connector to SYNC1 (J9). Refer to Figure 1-24, “Sync cable with wire-wrap connector installation” (p. 1-74).

Figure 1-24 Sync cable with wire-wrap connector installation



2 Wire-wrap Rx1 and Tx1 (red cable) on the D-Sub connector for an output signal.

3 Wire-wrap Rx2 and Tx2 (gray cable) on the D-Sub connector for an input signal.

4 Route the cable to proper location and cut to desire length.

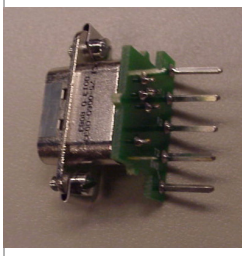
5 Terminate the other end to a clock source or equipment.

6 Repeat Step 1 through Step 5 for SYNC2 (J14) connection.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Table 1-18 Synchronization cable assemblies (SYNC1 and SYNC2)

Description		Cable assembly #	Cable length (feet)	1665 DMX backplane connections
	Sync cable with molded DB-9 connector DS1 timing reference for DS1 external sync in/out timing	848839619	50	J9 (Sync1)/ J14 (Sync2)
		848923363	75	
		848839627	100	
		848923371	125	
		848839635	150	
		848923389	175	
		848923439	200	
		848923447	225	
		848839643	250	
		848923454	275	
		848923462	300	
		848839650	450	
	**Sync cable with wire-wrap DB-9 connector** DS1 timing reference for DS1 external sync in/out timing	848631255	50	
		848631271	100	
		848631289	150	
		848631297	250	
		848631305	450	
	Sync cable with filter connector (sync input signal only) DS1 timing reference for DS1 external sync in timing	848929311	50	
		848929329	100	
		848929337	150	
		848929345	250	
		848929352	450	

Notes:

1. The Sync cable is 22 gauge.
2. Ground the Filter connector either at the bay frame ground or at the office timing source. Refer to office records.

Table 1-19 Synchronization cable (DS1 timing reference) connections

Conn.	Jacket	Color	9-Pin conn.	Special conn.	Designation	Name
Sync1 (J9)/ Sync2 (J14)	Red	BL	1	Rx1	RGO1/RGO2	Sync Output
		W	6	Tx1	TPO1/TPO2	
	Gray	BL	2	Rx2	RGI1/RGI2	Sync Input
		W	7	Tx2	TPI1/TPI2	
		Drain	5	GND	GRD	

Office alarm cable installation

Description

Office alarms are the common method used in a central office for maintenance personnel to quickly isolate a failure. Perform this procedure if connection to the office alarm system is required.

> **Important!** The office alarm relay contacts are rated at 50 VA which means that they are capable of switching 1 amp at 50 volts, or 2 amps at 25 volts. Their ability to switch large transient currents means that they can, if necessary, switch up to ten 5-watt aisle pilot lamps.

If transient voltages or currents are above these limits, transient noise-suppressing devices such as diodes or contact protection networks must be used to keep within the voltage and current limits. If these protection devices are not sufficient, an external buffer relay MUST be provided.

In all cases, and as a matter of good practice, suppression devices such as diodes or contact protection networks must be provided across any external relay coil being driven by the 1665 DMX High-Capacity shelf to limit transient voltages and currents.

Office alarm cable assemblies are listed in Table 1-20, “Office alarm cable assemblies” (p. 1-82).

Alarm Mult

Office alarm cabling in a 1665 DMX High-Capacity shelf bay starts at the bottom shelf which is cabled directly to the office alarm system. Then as shelves are added to the bay, the office alarm connection is extended by multing the alarm cabling from shelf to shelf (bottom to top). Alarm mults do not leave the bay.

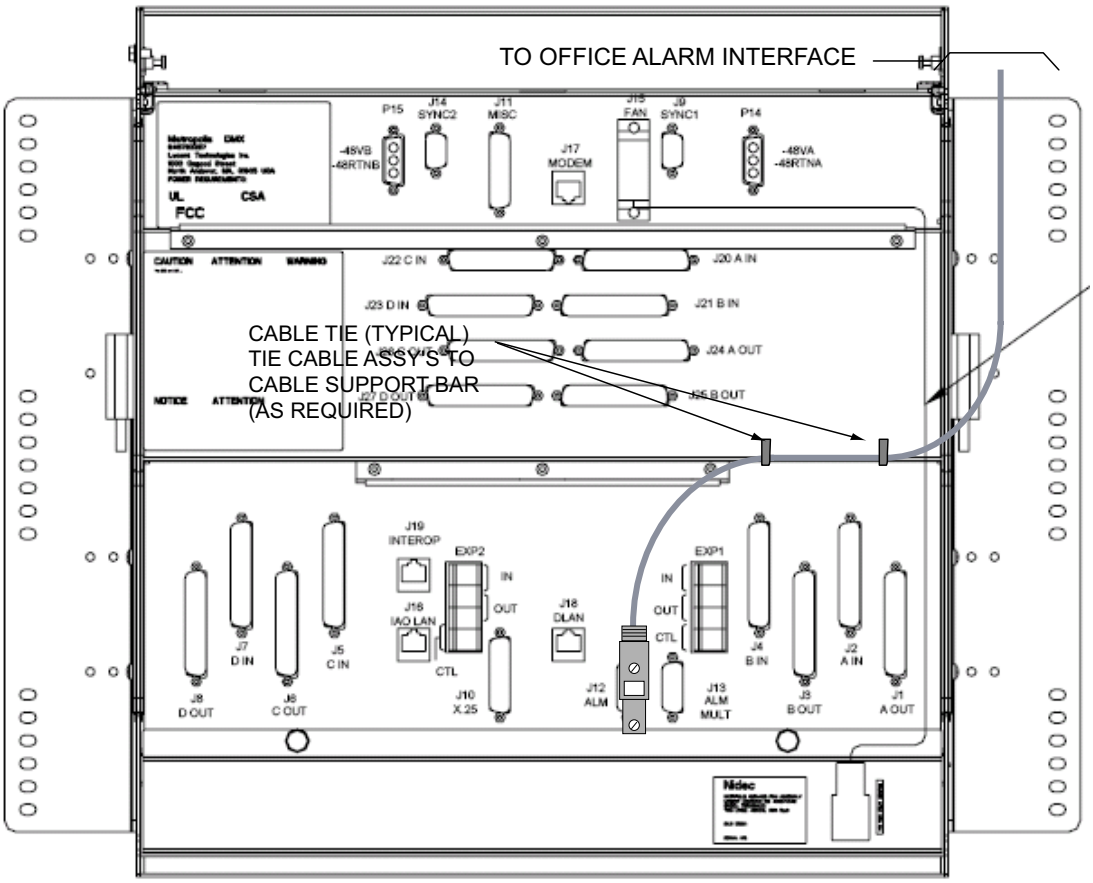
For example, J12 of one shelf should be connected to the office alarm terminal. J13 of the same shelf should be connected to J12 of the next 1665 DMX High-Capacity shelf and the same procedure should be continued to connect more shelves.

Procedure

1 Obtain the office alarm cable per Table 1-20, “Office alarm cable assemblies” (p. 1-82). Connect the office alarm cable to ALM (J12) of the bottom 1665 DMX High-Capacity shelf.

2 Route the office alarm cable from the bottom shelf out of the 1665 DMX High-Capacity shelf bay per Figure 1-25, “Office alarm cable installation” (p. 1-79) to the office alarm panel.

Figure 1-25 Office alarm cable installation



3 Inspect the office alarm panel and add a contact protection network (if required).

4 Cut the office alarm cable to the desired length.

5 Wire-wrap the loose end of the office alarm cable to the alarm panel, making connections as listed in Table 1-21, Office alarm connections.

END OF STEPS

Alarm mult

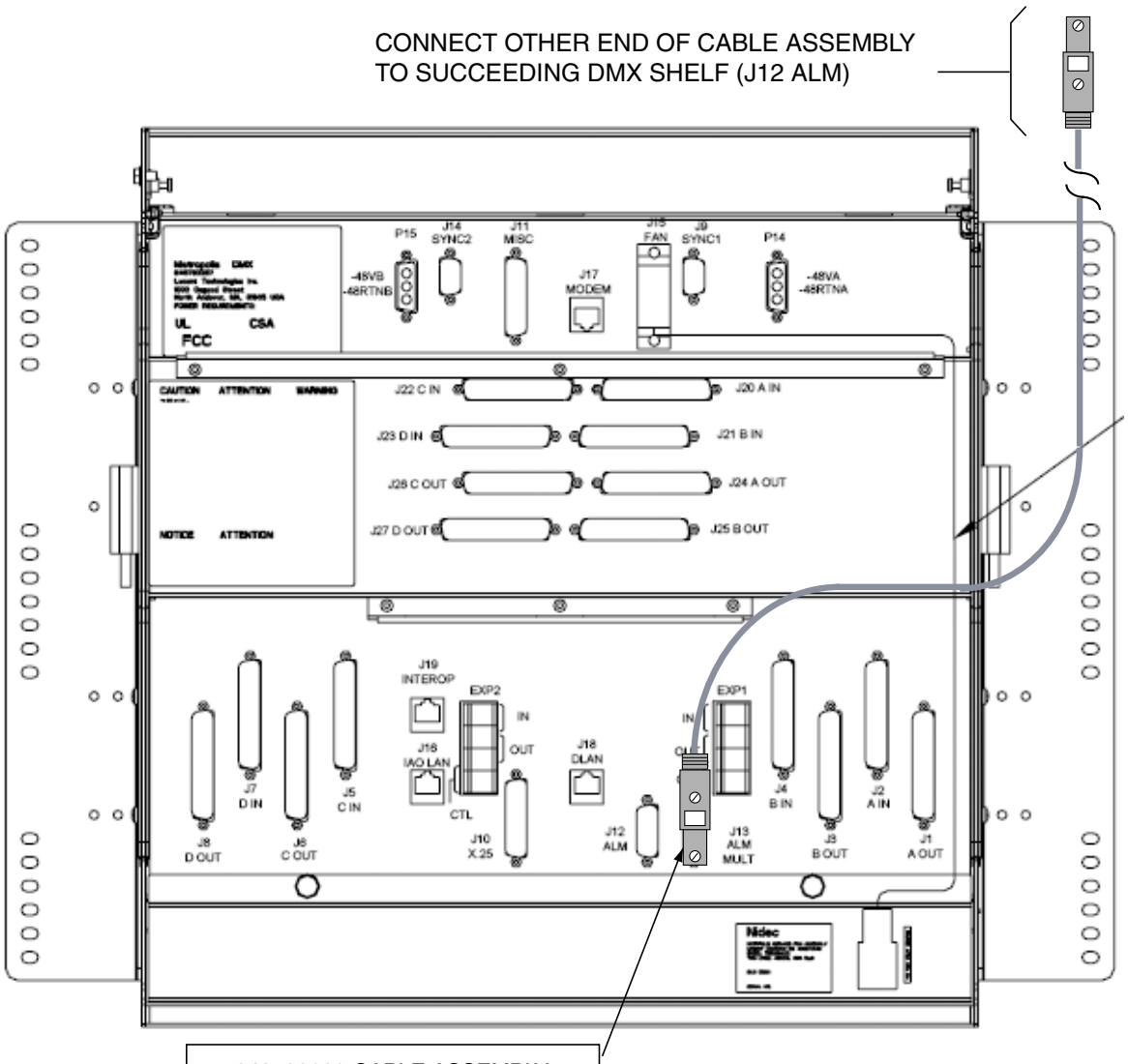
The following steps should be performed when the bottom shelf in the bay will be directly connected to the office alarms. The cable added in this procedure is to mult office alarms in a bay to the bottom shelf. In this procedure the bottom shelf is multed to the shelf immediately above. That shelf is then multed to the shelf above it. Continue until the top shelf is connected.

> **Important!** In order for office alarms in a shelf (other than the bottom shelf) to be reported, all office alarm cable mults from that shelf to the bottom shelf must be in place. No shelf should be skipped.

1 Obtain the office alarm mult cable (848589602 for DMX to DMX and 848861530 for DMX to Lambda Unite). Connect one end to ALM MULT (J13) of the 1665 DMX High-Capacity shelf.

2 Route the office alarm mult cable to the side of the bay and connect it to ALM (J12) of the 1665 DMX High-Capacity shelf above or to Lambda Unite as required.

Figure 1-26 Office alarm mult cable installation



848589602 CABLE ASSEMBLY	
CONNECT THIS END OF CABLE ASSEMBLY AS FOLLOWS	
FROM	**TO**
PATCH CONNECTOR	TO PANEL POSITION
OFFICE ALARM MULT	J13 ALM MULT

3 Repeat this procedure for each shelf in the bay.

4 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-20 Office alarm cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
Office alarm cable	848558193	50	J12
	848562286	100	
	848562294	150	
	848562302	250	
Office alarm mult cable (DMX to DMX)	848589602	3	J13
Office alarm mult cable (DMX to Lambda Unite)	848861530	3	J13

Table 1-21 Office alarm connections

Conn.	Pin#	Color	Designation	Name
J12-J13	1	BL-W	RYMJV1	Major Alarm Visible
	2	W-BL	RYMJV2	Major Alarm Visible Return
	3	O-W	RYMJA1	Major Alarm Audible
	4	W-O	RYMJA2	Major Alarm Audible Return
	5	G-W	RYMNV1	Minor Alarm Visible
	6	W-G	RYMNV2	Minor Alarm Visible Return
	7	BR-W	RYMNA1	Minor Alarm Audible
	8	W-BR	RYMNA2	Minor Alarm Audible Return
	9	S-W	RYCRV1	Critical Alarm Visible
	10	W-S	RYCRV2	Critical Alarm Visible Return
	11	BL-R	RYCRA1	Critical Alarm Audible
	12	R-BL	RYCRA2	Critical Alarm Audible Return

Notes:

1. The SYSCTL circuit pack reports office alarms.
2. The connection to the central office alarms from P12 is run for each 1665 DMX High-Capacity shelf assembly when used in a miscellaneously mounted individual application or from the first 1665 DMX High-Capacity shelf assembly when mounted in a typical bay arrangement.

□

Miscellaneous (environmental) discrete telemetry cable installation

Description

The miscellaneous (environmental) discrete telemetry access allows the maintenance center to control and monitor equipment collocated with the 1665 DMX High-Capacity shelf.

The environmental control feature enables the maintenance center to remotely initiate up to four contact closures at the remote terminal (RT) for equipment operation such as pumps, generators, etc.

The environmental alarm status indications allow up to 23 miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office.

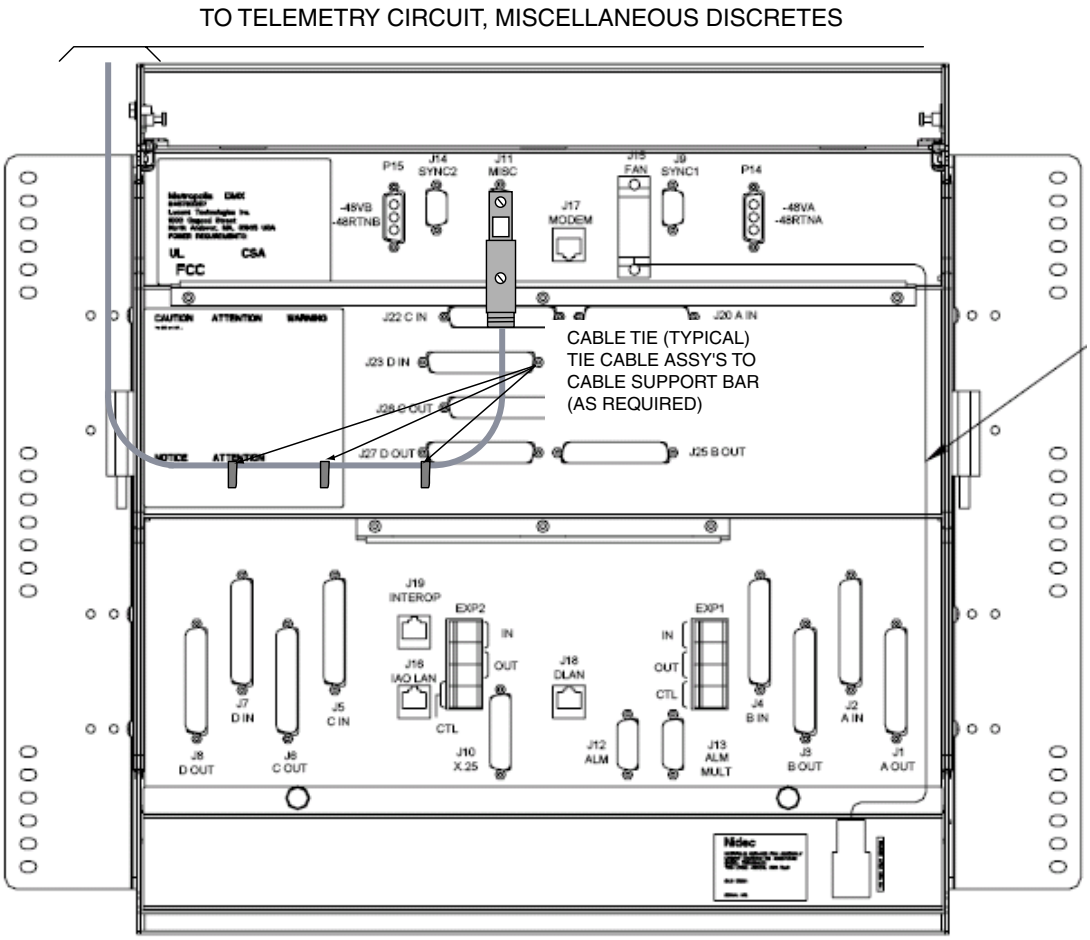
Miscellaneous (environmental) discrete telemetry cable assemblies and the length options are listed in Table 1-22, “Miscellaneous discrete cable assemblies” (p. 1-86).

Procedure

Proceed as follows:

1 Connect the miscellaneous discrete telemetry cable to the J11 MISC connector on the backplane of the 1665 DMX High-Capacity shelf per Figure 1-27, “Miscellaneous discrete cable installation” (p. 1-85).

Figure 1-27 Miscellaneous discrete cable installation



2 Route the cable out of the 1665 DMX High-Capacity shelf bay per Figure 1-27, "Miscellaneous discrete cable installation" (p. 1-85) to the telemetry panel.

3 Cut the miscellaneous (environmental) discrete telemetry cable to the desired length at the telemetry panel.

4 Wire-wrap the loose end of the miscellaneous (environmental) discrete telemetry cable to the wire-wrap terminal strip, making connections per Table 1-23, "Miscellaneous (environmental) discrete telemetry connections" (p. 1-87).

Important! Each miscellaneous (environmental) discrete telemetry designation is connected to the 1665 DMX High-Capacity shelf by two leads (wires).
For each input, one lead should be connected to input-common and the other lead should be connected to the appropriate alarm indication.
For each output, one lead should be connected to output-common and the other lead should be connected to the appropriate alarm indication.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-22 Miscellaneous discrete cable assemblies

Description	Cable assembly #	Cable length (feet)	1665 DMX backplane connections
Miscellaneous discrete cable	109321794	15	J11
	109321802	30	
	848839569	50	
	848839577	100	
	848839585	150	
	848839593	250	
	848839601	350	

Table 1-23 Miscellaneous (environmental) discrete telemetry connections

Conn.	Pin#	Color	Designation	Name
J11	1	BL-W	TLMI1	Env. Input - #1
	2	W-BL	TLMI2	Env. Input - #2
	3	O-W	TLMI3	Env. Input - #3
	4	W-O	TLMI4	Env. Input - #4
	5	G-W	TLMI5	Env. Input - #5
	6	W-G	TLMI6	Env. Input - #6
	7	BR-W	TLMI7	Env. Input - #7
	8	W-BR	TLMI8	Env. Input - #8
	9	S-W	TLMI9	Env. Input - #9
	10	W-S	TLMI10	Env. Input - #10
	11	BL-R	TLMI11	Env. Input - #11
	12	R-BL	TLMI12	Env. Input - #12
	13	O-R	TLMI13	Env. Input - #13
	14	R-O	TLMI14	Env. Input - #14
	15	G-R	TLMI15	Env. Input - #15
	16	R-G	TLMI16	Env. Input - #16
	17	BR-R	TLMI17	Env. Input - #17
	18	R-BR	TLMI18	Env. Input - #18
	19	S-R	TLMI19	Env. Input - #19
	20	R-S	TLMIC48VTRN	Input Common
	21	BL-BK/	TLMO1	Env. Output - #1
	22	BK-BL	TLMO2	Env. Output - #2
	23	O-BK	TLMO3	Env. Output - #3
	24	BK-O	TLMO4	Env. Output - #4
	25	G-BK	TLMOC	Output Common

Main optical fiber installation (OC-12, OC-48, OC-192)

Description

This section describes how to route the optical fiber cables from the interconnecting equipment (for example, a *LGX*® optical fiber distributing frame) to the Main OLIUs of the 1665 DMX High-Capacity shelf. This procedure does not cover routing the optical fiber cable between sites.

The optical fiber cables will be connected to the 1665 DMX after the circuit packs are installed. The 1665 DMX requires single-mode fiber for the main OLIUs.

Important! The optical fiber cable is fragile and must be protected. The fibers should be placed in a protective tube or channel, such as PVC tubing, or *PANDUIT* cable channel, when running the cable from the 1665 DMX High-Capacity shelf to the cable rack. The fibers should be placed in the cable rack in a protective channel with nothing on top of them. Cable ties should NOT be used with the optical fiber cables.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view an unterminated optical connector with optical instruments.

WARNING

Laser hazard

Invisible laser radiation when unterminated. Avoid direct exposure of the eyes to the beam.

Important! Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. See Appendix B, “Fiber cleaning” for recommended cleaning procedures.

Procedure

Proceed as follows:

1 Route the optical fiber cables from the interconnecting equipment into the 1665 DMX High-Capacity shelf.

Important! Protective covers must be left on fibers.

2 Place the optical fiber cables in a protective tube or channel.

3 Label the optical fiber cables, indicating bay, shelf, pack, and direction (IN or OUT).

4 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Fiber installation for low-speed packs

Description

This section describes how to route the single-mode fiber optical cables from the interconnecting equipment (for example, a *LGX*® optical fiber distributing frame) to the 1665 DMX High-Capacity shelf OC3/OC12/OC48 optical ports. This procedure does not cover routing the optical fiber cable between sites.

The optical fiber cables will be connected to the optical ports after the circuit packs are installed.

Important! The optical fiber cable is fragile and must be protected. The fibers should be placed in a protective tube or channel, such as PVC tubing, or *PANDUIT* cable channel, when running the cable from the 1665 DMX to the cable rack. The fibers should be placed in the cable rack in a protective channel with nothing on top of them. Cable ties should NOT be used with the optical fiber cables.

Important! Ensure only ANGLED LC connectors appear at IN ports of optical circuit packs.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view an unterminated optical connector with optical instruments.

WARNING

Laser hazard

Invisible laser radiation when unterminated. Avoid direct exposure of the eyes to the beam.

Important! Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. See Appendix B, “Fiber cleaning” for recommended cleaning procedures.

Procedure

Proceed as follows:

1 Refer to the engineering job specification. Determine the function slot where the pack will be inserted. The OC-3/OC-12/OC-48 pack can be inserted into any of the function slots including the growth slots.

2 Label the optical fiber cables, indicating bay, shelf, function group, pack, and direction (IN or OUT).

3 Route optical fiber cables from the interconnecting equipment into the OC-3/OC-12/OC-48 optical ports

4 Place the optical fiber cables in a protective tube or channel.

5 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

1000Base-F and 100Base-F fiber installation

Description

This section describes how to route the optical fiber cables from the interconnecting equipment (for example, an *LGX*® optical fiber distributing frame) to the optical ports on LNW63, LNW64, LNW67, LNW68, LNW70, LNW74 and LNW78 Ethernet circuit packs. Multi-mode optical fiber is required for LNW67 (1000 Base-F), LNW70 (100Base-F ports) and LNW74 (100 Base-F ports). Single-mode fiber is required for LNW68 (1000 LX), LNW70 (1000Base-F ports) and LNW78(RPR) circuit packs.

The optical fiber cables will be connected to the optical ports after the circuit packs are installed.

Important! The optical fiber cable is fragile and must be protected. The fibers should be placed in a protective tube or channel, such as PVC tubing, or *PANDUIT* cable channel, when running the cable from the 1665 DMX High-Capacity shelf to the cable rack. The fibers should be placed in the cable rack in a protective channel with nothing on top of them. Cable ties should NOT be used with the optical fiber cables.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view an unterminated optical connector with optical instruments.

WARNING

Laser hazard

Invisible laser radiation when unterminated. Avoid direct exposure of the eyes to the beam.

Important! Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. See Appendix B, “Fiber cleaning” for recommended cleaning procedures.

Procedure

1 Refer to the engineering job specification. Determine the function group (slot 1 only) where the pack will be inserted. The LNW63, LNW64, LNW67, LNW68, LNW70, LNW74 and LNW78 packs can be inserted into any of the function groups (slot 1) including the growth slot (g1). In order to use the 10/100BaseT electrical ports on the

LNW74, use FN-A, FN-B, FN-C or FN-D. Only optical ports can be used when LNW74 is located in the Growth-1 position.

2 Label the optical fiber cables, indicating bay, shelf, function group, pack, and direction (IN or OUT).

3 Route optical fiber cables from the interconnecting equipment into the optical ports.

4 Place the optical fiber cables in a protective tube or channel.

5 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Fibre channel fiber installation

Description

This section describes how to route the optical fiber cables from the interconnecting equipment (for example, an *LGX*® optical fiber distributing frame) to the optical ports on LNW73/73C Fibre Channel circuit packs. Multi-mode and single-mode optical fiber is supported. Refer to engineering job spec for fiber requirements.

The optical fiber cables will be connected to the optical ports after the circuit packs are installed.

Important! The optical fiber cable is fragile and must be protected. The fibers should be placed in a protective tube or channel, such as PVC tubing, or *PANDUIT* cable channel, when running the cable from the 1665 DMX to the cable rack. The fibers should be placed in the cable rack in a protective channel with nothing on top of them. Cable ties should NOT be used with the optical fiber cables.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view an unterminated optical connector with optical instruments.

WARNING

Laser hazard

Invisible laser radiation when unterminated. Avoid direct exposure of the eyes to the beam.

Important! Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. See Appendix B, “Fiber cleaning” for recommended cleaning procedures.

Procedure

Proceed as follows:

1 Refer to the engineering job specification. Determine the function slot that the pack will be inserted. The LNW73/73C can be inserted into any of the function slots including the growth slots.

2 Label the optical fiber cables, indicating bay, shelf, function group, pack, and direction (IN or OUT).

3 Route optical fiber cables from the interconnecting equipment into the optical ports.

4 Place the optical fiber cables in a protective tube or channel.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

CIT cable installation

Description

This section provides the procedure to connect the CIT cable from the LNW2 (SYSCTL) to a PC (serial port). This will allow communications between the PC and the CIT port located on the LNW2.

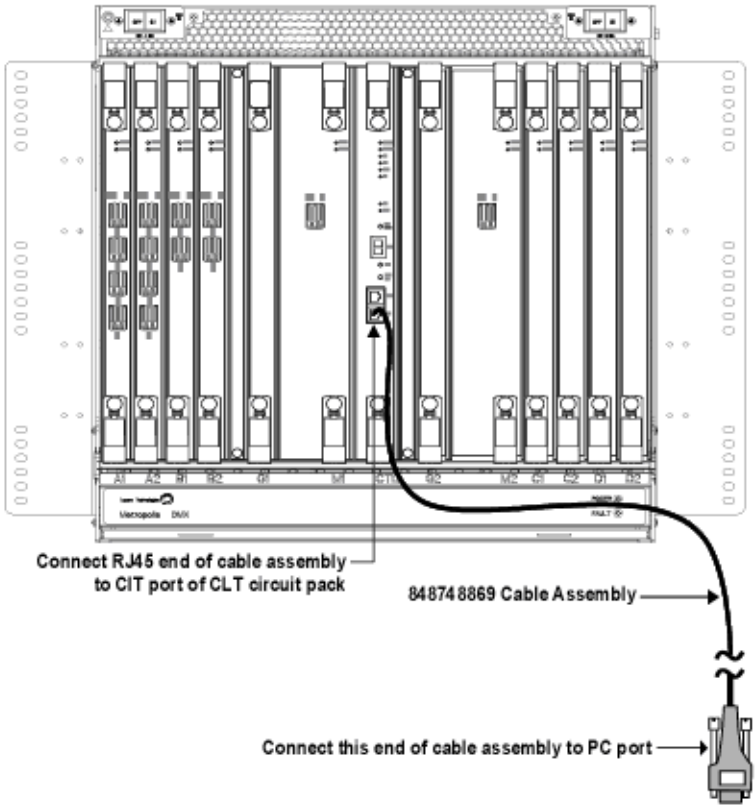
Procedure

1 Connect the RJ45 end of the CIT cable to the CIT jack located on the LNW2 (SYSCTL). Refer to Figure 1-28, “CIT cable installation” (p. 1-97).

Important! The LNW2 (SYSCTL) is not in the shelf at this time, this procedure is here to demonstrate the placement of the cable once the circuit pack is in place.

2 Connect the 9-pin D-type connector to the serial port on the PC.

Figure 1-28 CIT cable installation



3 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Table 1-24 CIT Cable Assembly

Description	Cable assembly #	Cable length	1665 DMX High-Capacity shelf connections
Front CIT cable	848748869	8 feet	CIT/RS-232 jack on SYSCTL (LNW2)

Table 1-25 Standard CIT cable connections

Connection	RJ45 connector		Color	9-Pin D-type connector	
	Pin#	Designation		Pin#	Designation
Front CIT cable	1	FRS232N	W - O	6	DCE Ready
	3	FDTR	W - BL	4	DTE Ready
	4	Ground	W - G	5	Ground
	5	FTXD	O	2	Receive Data
	6	FRXD	G	3	Transmit Data

Notes:

1. The connection and the colors shown above are for a standard Lucent made cable. If you use a RJ-45 to DB-9 connector with a standard straight-through 10BaseT LAN cable, refer to Table 1-26, “RJ-45 to DB-9 connector connections” (p. 1-98).

Table 1-26 RJ-45 to DB-9 connector connections

From RJ45 connector		To 9-pin D-type connector
Pin#	Color	Pin#
1	Blue	6
3	Black	4
4	Red	5
5	Green	2
6	Yellow	3

Notes:

1. The connection and the colors shown above are for RJ-45 to DB-9 connector.
2. This connector should be used with a standard straight-through cable which has all 8 wires connected.

Final operations

Description

Final check on equipment and cable installation.

Procedure

Proceed as follows:

1 Verify that all the cables are properly dressed/connected.

2 Verify that all cables are properly labeled.

3 Verify that designations where cables were wire-wrapped are properly labeled.

4 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

2 Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)

Overview

Purpose

This section provides information for performing the following:

- Shelf powering
- Circuit pack option settings and installation.

Detailed information on the function of each circuit pack is contained in 365-372-300, *1665 Data Multiplexer, Applications and Planning Guide*.

Contents

This chapter provides information on the following topics:

Description	2-2
Powering	2-3
Circuit pack compatibility	2-7
Initial circuit pack installation	2-12

Description

Overview

This section should be performed on all shelf installations.

Tools, test equipment and accessories

Listed below are the tools, test equipment and accessories necessary to perform the procedures in this section.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.
1	ESD Wrist Strap	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	Multimeter (Optional)	The voltmeter must be capable of measuring DC voltage in the 40- to 60-volt range. The use of the voltmeter is optional since the shelf will alarm or shut down if the proper voltage is not supplied.
1	Personal Computer (PC)	Required to run the WaveStar® CIT software. See PC minimum requirements (p. 3-2).
1	CIT Interface Cable	8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869). Required to connect the PC to the CIT jack on the front of the SYSCTL circuit pack.

□

Powering

Overview

The following table lists the power requirements for the 1665 DMX High-Capacity shelf.

Table 2-1 1665 DMX High-Capacity shelf power supply requirements

Item	Description
Voltage range, all components	-40.0V to -60.0V DC
Power feeders	two -48V power feeders [BREAKER (A) and BREAKER)B)]
Circuit breakers (two per shelf)	20.0A or 30.0 A

Procedure

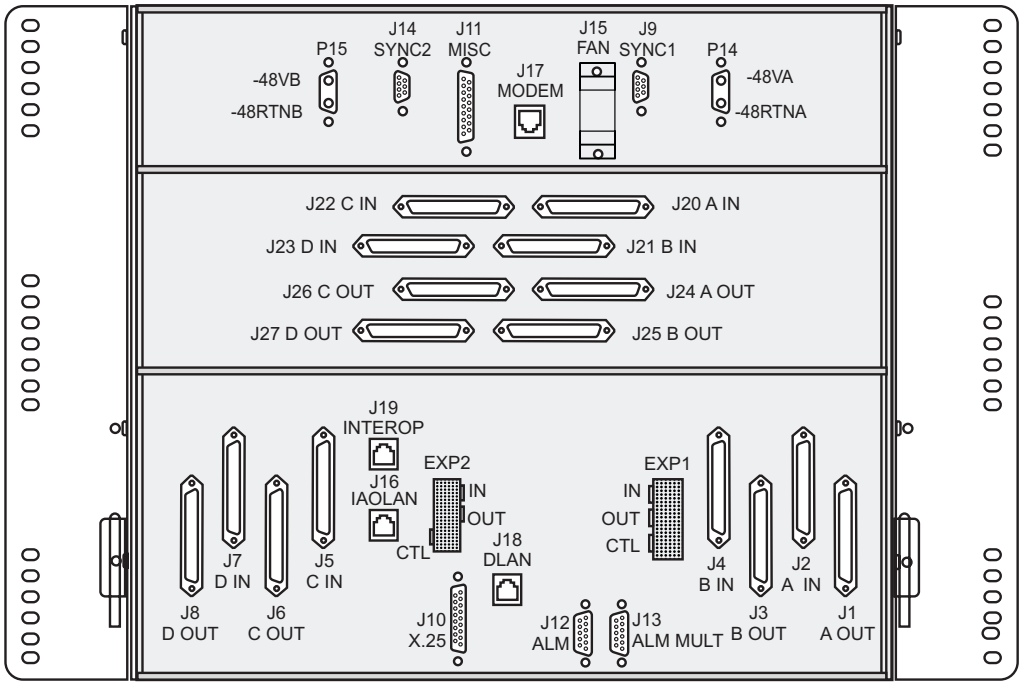
Proceed as follows:

1 Verify that the frame or structure into which the 1665 DMX High-Capacity shelf is installed is properly grounded.

2 Verify that both circuit breakers on the 1665 DMX High-Capacity shelf are in the ON position. These breakers are located on the front of the 1665 DMX High-Capacity shelf.

3 Disconnect the power cables from the backplane connectors (P15 from J15 and P14 from J14).

Figure 2-1 Power connections on 1665 DMX High-Capacity shelf backplane



NC-DMX-156

4 If fuses are being used, install fuses that are rated 1.5 times higher than the circuit breaker value on the shelf, in the BDFB that powers the 1665 DMX High-Capacity shelf A and B feeders.

Important! The 30-ampere shelf is comcode 848793287. The 20-ampere shelf is comcode 848935193.

5 If breakers are being used, use circuit breakers that are rated 1.25 times higher than the circuit breaker value on the shelf, in the BDCBB that powers the 1665 DMX High-Capacity shelf. Then switch the breakers to the ON position for the 1665 DMX High-Capacity shelf A and B feeders.

Important! The 30-ampere shelf is comcode 848793287. The 20-ampere shelf is comcode #848935193.

6 At the 1665 DMX High-Capacity shelf backplane power connector, use a voltmeter and measure the voltage on the power cable between BAT A and BAT A RTN. Then measure the voltage between BAT B and BAT B RTN.

Designation	Color
BAT A	Red
BAT A RTN	Black/Red
BAT B	Red
BAT B RTN	Black/Red

Requirement: The voltage MUST be between -40.00 and -60.0 VDC.

7 Put both circuit breakers on the 1665 DMX High-Capacity shelf in the OFF position.

Important! A small flat-bladed screwdriver or other similar type tool is required to set the 1665 DMX High-Capacity shelf circuit breakers to the OFF position.

8 Reconnect the “A” feed of the power cable to the backplane connector (P14 to J14), and reconnect the “B” feed of the power cable to the backplane connector (P15 to J15).

9 Place both circuit breakers on the 1665 DMX High-Capacity shelf in the ON position.

10 Verify that the fans have started running.

11 At the BDFB either remove the fuse or put the circuit breaker, associated with the “B” feed of the 1665 DMX High-Capacity shelf in the OFF position.

12 Verify the PWR A LED on the 1665 DMX High-Capacity shelf is lighted with only the “A” feed powered.

13 At the BDFB either insert the fuse or put the circuit breaker, associated with the “B” feed of the 1665 DMX High-Capacity shelf in the ON position. Then either remove the fuse or

put the circuit breaker, associated with the “A” feed of the 1665 DMX, in the OFF position.

14 Verify the PWR B LED on the 1665 DMX High-Capacity shelf is lighted with only the “B” feed powered.

15 At the BDFB either insert the fuse or put the circuit breaker, associated with the “A” feed of the 1665 DMX High-Capacity shelf in the ON position.

16 Verify that the both the PWR A LED and PWR B LED on the 1665 DMX High-Capacity shelf user panel are lighted with both the “A” and “B” feeds powered.

17 Verify that the fans are still running and are moving air.

18 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

Circuit pack compatibility

Overview

Table 2-2, "Release 7.1 circuit pack compatibility" (p. 2-7) lists all the circuit packs that are compatible with Release 7.1 and their respective shelf locations (slots).

Table 2-2 Release 7.1 circuit pack compatibility

Slot name								
A1, A2*	**B1, B2***	**G1***	**M1**	**CTL**	**G2***	**M2**	**C1, C2***	**D1, D2***
				LNW2				
LNW6	LNW6						LNW6	LNW6
LNW7	LNW7						LNW7	LNW7
LNW8	LNW8						LNW8	LNW8
LNW16	LNW16						LNW16	LNW16
LNW18	LNW18						LNW18	LNW18
LNW19	LNW19						LNW19	LNW19
LNW19B	LNW19B						LNW19B	LNW19B
LNW20	LNW20	LNW20†			LNW20†		LNW20	LNW20
			LNW27			LNW27		
			LNW29			LNW29		
LNW31	LNW31	LNW31			LNW31		LNW31	LNW31
			LNW32			LNW32		
LNW36	LNW36	LNW36			LNW36		LNW36	LNW36
LNW37	LNW37	LNW37			LNW37		LNW37	LNW37
LNW45	LNW45	LNW45			LNW45		LNW45	LNW45
LNW46	LNW46	LNW46			LNW46		LNW46	LNW46
			LNW48			LNW48		
LNW49	LNW49	LNW49			LNW49		LNW49	LNW49
			LNW50			LNW50		
			LNW54			LNW54		

Slot name								
A1, A2*	**B1, B2***	**G1***	**M1**	**CTL**	**G2***	**M2**	**C1, C2***	**D1, D2***
LNW55	LNW55	LNW55			LNW55		LNW55	LNW55
			LNW56			LNW56		
			LNW57			LNW57		
			LNW58			LNW58		
			LNW59			LNW59		
			LNW60			LNW60		
LNW62	LNW62	LNW62			LNW62		LNW62	LNW62
LNW63	LNW63	LNW63			LNW63		LNW63	LNW63
LNW64	LNW64	LNW64			LNW64		LNW64	LNW64
LNW66	LNW66						LNW66	LNW66
LNW67	LNW67	LNW67			LNW67		LNW67	LNW67
LNW68	LNW68	LNW68			LNW68		LNW68	LNW68
LNW70	LNW70	LNW70			LNW70		LNW70	LNW70
LNW71	LNW71						LNW71	LNW71
LNW73	LNW73	LNW73			LNW73		LNW73	LNW73
LNW73C	LNW73C	LNW73C			LNW73C		LNW73C	LNW73C
LNW74	LNW74	LNW74‡			LNW74‡		LNW74	LNW74
			LNW76			LNW76		
LNW78	LNW78	LNW78				LNW78	LNW78	LNW78
			LNW80			LNW80		
			LNW82			LNW82		
LNW93	LNW93						LNW93	LNW93
LNW94	LNW94						LNW94	LNW94
						LNW97		
LNW98	LNW98	LNW98			LNW98		LNW98	LNW98
LNW170	LNW170	LNW170			LNW170		LNW170	LNW170
177D	177D	177D			177D		177D	177D
			177E			177E		

Slot name								
A1, A2*	**B1, B2***	**G1***	**M1**	**CTL**	**G2***	**M2**	**C1, C2***	**D1, D2***
			LNW202			LNW202		
			LNW221 to LNW259			LNW221 to LNW259		
LNW421 to LNW459	LNW421 to LNW459	LNW421 to LNW459			LNW421 to LNW459		LNW421 to LNW459	LNW421 to LNW459
			LNW502			LNW502		
			LNW523			LNW523		
			LNW527			LNW527		
			LNW554			LNW554		
			LNW555			LNW555		
LNW785	LNW785	LNW785			LNW785		LNW785	LNW785

* 177D Apparatus Blanks are required in all unequipped Function Unit and Growth slots to provide proper air flow for cooling.
† In G1,G2 LNW20 only supports portless operation.
‡ Only optical ports can be used in growth slot.

Switch fabric compatibility

When equipping high-speed slots, it is imperative that the switch fabric of the circuit packs located in Main 1 and Main 2 match. For example an LNW26B located in Main 1 may be used with any LNW121B-159B DWDM circuit pack in Main 2, since both have partial (up to 12 STS-1s) VT mapping. If circuit packs with different fabrics are inserted in Main 1 and Main 2, for instance, an LNW29 were to be inserted in Main 2 with an LNW26B present in Main 1, an “unexpected circuit pack type” alarm would be raised.

Important! LNW26B, LNW28, LNW77 and the LNW1xxB series circuit packs are not supported in R7.1.

- OC-12 Circuit Packs with 12 STS-1 switch fabric:
  - LNW48
  - LNW50
  - LNW54
- OC-48 Circuit Packs with 12 STS-1 switch fabric:

Important! LNW26B, LNW28, LNW77 and the LNW1xxB series circuit packs are not supported in R7.1.

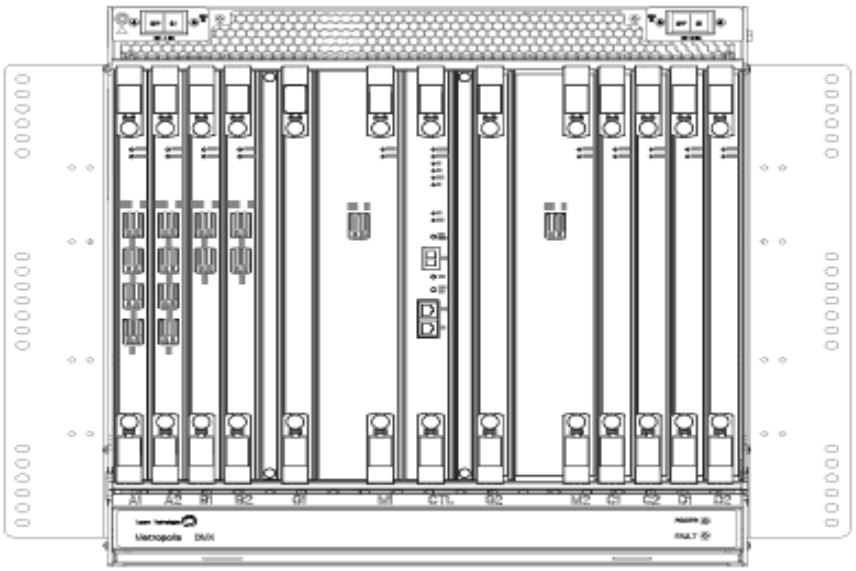
  - LNW26B (jumper set to enhanced mode)
  - LNW28 (jumper set to enhanced mode)
  - LNW77 (jumper set to enhanced mode)
  - LNW121B - 159B (jumper set to enhanced mode)
- OC-48 Circuit Packs with 48 STS-1 switch fabric:
  - LNW27
  - LNW29
  - LNW32
  - LNW76
  - LNW202
  - LNW221-259
- OC-192 Circuit Packs with 48 STS-1 switch fabric:
  - LNW56
  - LNW57
  - LNW58
  - LNW60
  - LNW502
  - LNW523
  - LNW527
  - LNW554
  - LNW555
- Main Switch Pack (no optics) with 96 STS-1 switch fabric.
  - LNW80
- OC-192 Circuit Packs with 192 STS-1 switch fabric (VLF):
  - LNW59
  - LNW82

CAUTION

Service disruption hazard

Once a high-speed OLIU is installed and placed in service, another OLIU with a different capacity switch fabric may not be substituted without disruption to traffic.

Figure 2-2 1665 DMX High-Capacity shelf



Initial circuit pack installation

Description

This section provides instructions for installing, BUT NOT fully seating, circuit packs into the 1665 DMX High-Capacity shelf. After circuit packs have been unpacked, they may be placed in their respective slots in the 1665 DMX High-Capacity shelf but NOT FULLY ENGAGED IN THE BACKPLANE CONNECTOR. The circuit packs will be fully installed (seated) in Chapter 3, "Software download and circuit pack installation", "Circuit pack installation" (p. 3-5).

Important! If office alarms are connected, it is advisable to disconnect the office alarm cable while performing the procedures in this section to prevent spurious alarms from being reported. Reconnect the office alarm cable after completion of all testing.

CAUTION

Blank circuit packs are required in all unequipped Main slots, Function Unit, and Growth slots to provide proper air flow for cooling.

CAUTION

ESD hazard

To protect against damage due to electrostatic discharge, a properly grounded ESD wrist strap must be worn when handling equipment.

Important! When only one main OLIU (OC-12, OC-48, OC-192) or main switch pack (LNW80) is required, it must be installed in the M1 slot.

LNW2 (SYSCTL) installation

Follow this procedure to install the LNW2 (SYSCTL) circuit pack into the 1665 DMX High-Capacity shelf.

1 Remove the SYSCTL circuit pack from the packing material. Verify that there are two NVM memory cards.

Important! Do not remove the NVM cards.

2 Identify the CTL slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

3 Place the SYSCTL circuit pack into the CTL slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

OC-48 main OLIU installation

Follow this procedure to install the following OC-48 OLIU circuit packs in the 1665 DMX High-Capacity shelf.

- LNW27
- LNW29
- LNW32
- LNW76
- LNW202 (SFP optics)
- LNW221 - 259

Important! From your work orders, determine the wavelength that you wish to set on the LNW221 - LNW259. Use the Channel Select Option Label on the faceplate of the circuit pack to determine the correct channel. Refer to Figure 2-3, "LNW221 - 259 channel positions" (p. 2-15) for channel jumper location.

1 Remove the first OC-48 OLIU circuit pack from the packing material.

2 Identify the M1 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

3 Place the OC-48 OLIU circuit pack into the M1 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Remove the second OC-48 OLIU from the packing material.

5 Identify the M2 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

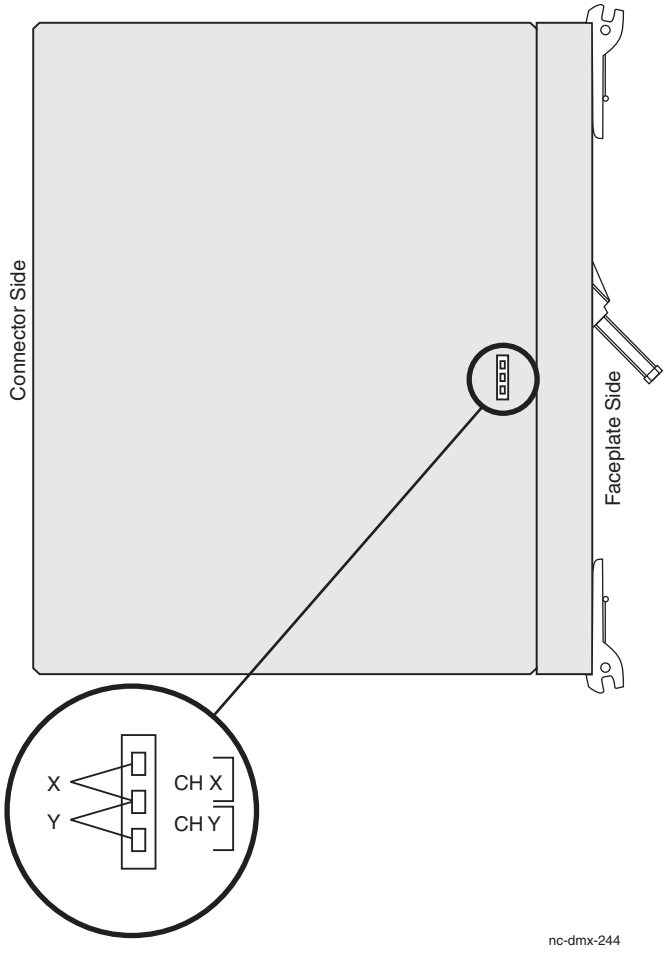
6 Place the second OLIU circuit pack into the M2 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

Important! If any of the Main slots are to remain unequipped, install a blank circuit pack to provide proper air flow for cooling.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Figure 2-3 LNW221 - 259 channel positions



OC192 main OLIU installation

Follow this procedure to install the following OC-192 OLIU circuit packs in the 1665 DMX High-Capacity shelf.

- LNW56
- LNW57
- LNW58
- LNW59 (VLF)
- LNW60
- LNW502 (SFP optics)
- LNW523
- LNW527
- LNW554
- LNW555

1 Remove the first OC-192 OLIU circuit pack from the packing material.

2 Identify the M1 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

3 Place the OC-192 OLIU circuit pack into the M1 slot on the 1665 DMX shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Remove the second OC-192 OLIU from the packing material.

5 Identify the M2 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

6 Place the second OLIU circuit pack into the M2 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

Important! If any of the Main slots are to remain unequipped, install a blank circuit pack to provide proper air flow for cooling. Always use Main-1 (M1) for shelves equipped with only one main pack.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

OC-12 main OLIU installation

Follow this procedure to install the following OC12 OLIU circuit packs in the 1665 DMX High-Capacity shelf.

- LNW48
- LNW50
- LNW54

1 Remove the first OC-12 OLIU circuit pack from the packing material.

2 Identify the M1 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

3 Place the OC-12 OLIU circuit pack into the M1 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Remove the second OC-12 OLIU from the packing material.

5 Identify the M2 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

6 Place the second OLIU circuit pack into the M2 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

Important! If any of the Main slots are to remain unequipped, install a blank circuit pack to provide proper air flow for cooling. Always use Main-1 (M1) for shelves equipped with only one main pack.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

8OC-3/8OC-12/2OC-48 main OLIU installation

Follow this procedure to install the following 8OC3/8OC12/2OC48 OLIU circuit packs in the 1665 DMX High-Capacity shelf.

- LNW82

Important! Shelf cover (comcode 849068358) is required for shelves equipped with LNW82 circuit packs. This shelf cover is larger and provides more space to prevent fibers from touching the front cover when the cover is closed.

1 Remove the first OLIU circuit pack from the packing material.

2 Identify the M1 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

3 Place the OLIU circuit pack into the M1 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Remove the second OLIU from the packing material.

5 Identify the M2 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

6 Place the second OLIU circuit pack into the M2 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

Important! If any of the Main slots are to remain unequipped, install a blank circuit pack to provide proper air flow for cooling. Always use Main-1 (M1) for shelves equipped with only one main pack.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW80 main switch pack installation

Follow this procedure to install the LNW80 circuit packs in the 1665 DMX High-Capacity shelf.

1 Remove the first LNW80 circuit pack from the packing material.

2 Identify the M1 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

3 Place the LNW80 circuit pack into the M1 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

4 Remove the second LNW80 from the packing material.

5 Identify the M2 slot on the 1665 DMX High-Capacity shelf. See Figure 2-2, "1665 DMX High-Capacity shelf" (p. 2-11).

6 Place the second LNW80 circuit pack into the M2 slot on the 1665 DMX High-Capacity shelf. Do **NOT** engage the circuit pack in the backplane connector.

Important! If any of the Main slots are to remain unequipped, install a blank circuit pack to provide proper air flow for cooling.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW785 OMD5/8 8-channel low-loss DWDM Optical Mux/Demux

Follow this procedure to install the LNW785 circuit packs in the 1665 DMX High-Capacity shelf. The LNW785 OMD5/8 circuit pack multiplexes/demultiplexes up to 8 DWDM optical channels spaced 100 GHz apart, ranging from 1530 to 1536 nm.

Important! Shelf cover (comcode 849068358) is required for shelves equipped with OMD5/8 circuit packs. This shelf cover is larger and provides more space to prevent fibers from touching the front cover when the cover is closed.

1 Refer to the engineering job specification. Identify the proper function group slots where LNW785 circuit packs will be installed.

2 Remove the first LNW785 circuit pack from the packing material.

3 Place the circuit pack into the shelf (slot A1, A2, B1, B2, C1, C2, D1, D2, G1, or G2 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 Repeat Step 1 through Step 3 for each additional LNW785 to be equipped.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW6(28DS1), LNW7(28DS1PM), LNW8(56DS1E1) low-speed installation (optional)

Follow this procedure only if installing LNW6 (28DS1), LNW7 (28DS1PM), or LNW8 (56DS1E1) circuit packs into the 1665 DMX High-Capacity shelf.

Important! LNW6 and LNW7 are not supported with LNW59 (VLF) main circuit packs.

1 Refer to the engineering job specification. Identify the proper function group slots where LNW6, LNW7, or LNW8 circuit packs will be installed.

2 Remove the LNW6, LNW7, or LNW8 from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1 or D1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 If a protection circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the protection circuit pack slot (A2, B2, C2 or D2 as required), then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second LNW6, LNW7, or LNW8 from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, or D2 as required). Do **NOT** engage the circuit pack in the backplane connector.

7 Repeat Step 1 through Step 6 for each additional function group to be equipped with LNW6, LNW7, or LNW8 circuit packs.

8 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW16 (12DS3/EC1), LNW18 (TMUX), LNW19/LNW19B (48 DS3/EC1), LNW20 (48TMUX) low-speed installation (optional)

Follow this procedure only if installing LNW16 (12DS3/EC1), LNW18 (TMUX), LNW19 (48 DS3/EC1), LNW19B (48 DS3/EC1 supporting Terminal Loopbacks) or LNW20 (48TMUX) circuit packs into the 1665 DMX shelf.

1 Refer to the engineering job specification. Identify the proper function group(s) where LNW16, LNW18, LNW19, LNW19B or LNW20 circuit packs will be installed.

2 Remove the LNW16, LNW18, LNW19, LNW19B or LNW20 from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1, D1 or G1 as required). Do **NOT** engage the circuit pack in the backplane connector.

Important! The LNW20 (48TMUX) is allowed in G1, G2 when used in portless mode. LNW16, LNW18, LNW19 and LNW19B are not allowed in G1, G2.

4 If a protection circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the protection circuit pack slot (A2, B2, C2, D2 or G2 as required), then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second LNW16, LNW18, LNW19, LNW19B or LNW20 from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, D2 or G2 as required). Do **NOT** engage the circuit pack in the backplane connector.

Important! The LNW20 is allowed in G1, G2 when used in portless mode. LNW16, LNW18, LNW19 and LNW19B are not allowed in G1, G2.

7 Repeat Step 1 through Step 6 for each additional function group to be equipped with LNW16, LNW18, LNW19, LNW19B or LNW20 circuit packs.

8 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW36 (OC-3 OLIU) low-speed installation (optional)

Follow this procedure only if installing LNW36 (OC3 OLIU) circuit packs into the 1665 DMX shelf.

Important! LNW36 and LNW37 may be used as a protection pair. LNW36 may be replaced with LNW37 and vice versa as long as the SFP optics in the LNW37 are compatible with the optical span.

1 Refer to the engineering job specification. Identify the proper function group(s) and/or growth slot(s) where LNW36 circuit pack will be installed.

2 Remove the LNW36 from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1, D1 or G1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 If a companion circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the companion circuit pack slot (A2, B2, C2, D2 or G2 as required) then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second LNW36 from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, D2 or G2). Do **NOT** engage the circuit pack in the backplane connector.

7 Repeat Step 1 through Step 6 for each additional function group and/or growth slot to be equipped with LNW36 circuit packs.

8 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW37 (4 OC-3 SFP OLIU), LNW45 (8 OC-3 SFP OLIU), LNW49 (4 OC-12 SFP OLIU), LNW55 (12OC-3/12OC12/4 OC48 SFP OLIU) or LNW62 (4 OC-48 SFP OLIU) low-speed installation (optional)

Follow this procedure only if installing the LNW37 (4 OC-3 SFP OLIU), LNW45 (8 OC-3 SFP OLIU), LNW49 (4 OC-12 SFP OLIU), LNW55 (12 OC-3/12 OC-12/4 OC-48 SFP OLIU) or LNW62 (4 OC-48 SFP OLIU) circuit packs into the 1665 DMX shelf.

Important! Shelf cover (comcode 849068358) is required for shelves equipped with LNW55 circuit packs. This shelf cover is larger and provides more space to prevent fibers from touching the front cover when the cover is closed.

Important! The LNW37, LNW45, LNW49, LNW55 and LNW62 circuit packs require SFP modules for the optical interface. This procedure will consist of two parts. Installing the circuit card and installing the SFP per Install pluggable transmission modules (p. 2-34).

1 Refer to the engineering job specification. Identify the proper function group(s) and/or growth slot(s) where the low-speed OLIU circuit packs will be installed.

2 Remove the OLIU from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1, D1 or G1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 If a companion circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the companion circuit pack slot (A2, B2, C2, D2 or G2 as required), then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second OLIU from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, D2 or G2 as required). Do **NOT** engage the circuit pack in the backplane connector.

7 Repeat Step 1 through Step 6 for each additional function group and/or growth slot to be equipped with LNW37, LNW45, LNW49, LNW55 or LNW62 circuit packs.

8 Install the SFP module per Install pluggable transmission modules (p. 2-34)

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW46 (OC-12 OLIU) low-speed installation (optional)

Follow this procedure only if installing LNW46 (OC-12 OLIU) circuit packs into the 1665 DMX High-Capacity shelf.

1 Refer to the engineering job specification. Identify the proper function group(s) and/or growth slot(s) where LNW46 circuit packs will be installed.

2 Remove the LNW46 or from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1, D1 or G1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 If a companion circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the companion circuit pack slot (A2, B2, C2, D2 or G2 as required), then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second LNW46 from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, D2 or G2 as required).

7 Repeat Step 1 through Step 6 for each additional function group and/or growth slot to be equipped with LNW46 circuit packs.

8 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW31 (OC-48 OLIU), or LNW421-459 (OC-48 PWDM OLIU) low-speed installation (optional)

Follow this procedure only if installing LNW31 (OC-48 OLIU) or LNW421-LNW459 (DWDM OC-48 OLIU) circuit packs into the 1665 DMX shelf.

1 Refer to the engineering job specification. Identify the proper function group(s) and/or growth slot(s) where LNW31 or LNW421-LNW459 circuit pack will be installed.

2 Remove the LNW31 or LNW421-LNW459 from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1, D1 or G1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 If a companion circuit pack is required, continue with Step 5. If not, install a blank circuit pack into the companion circuit pack slot (A2, B2, C2, D2 or G2 as required) then proceed to Step 7.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Remove the second LNW31 or LNW421-LNW459 from the packing material.

6 Place the circuit pack into the shelf (slot A2, B2, C2, D2 or G2). Do **NOT** engage the circuit pack in the backplane connector.

7 Repeat Step 1 through Step 6 for each additional function group and/or growth slot to be equipped with LNW31 or LNW421-LNW459 circuit packs.

8 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW66 (10/100T) or LNW71 (10/100-PL) installation (optional)

Follow this procedure only if installing LNW66 (10/100T) or LNW71 (10/100-PL) circuit packs into the 1665 DMX shelf.

1 Refer to the engineering job specification. Identify the proper function group slot (A1, B1, C1 or D1) where the LNW66 or LNW71 circuit pack will be installed.

Important! The LNW66 or LNW71 circuit pack can only be installed in slot 1 of any function group.

2 Remove the LNW66 or LNW71 from the packing material.

3 Place the circuit pack into the shelf (slot A1, B1, C1 or D1 as required). Do **NOT** engage the circuit pack in the backplane connector.

4 Install a blank circuit pack into the companion circuit pack slot (A2, B2, C2 or D2 as required).

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Repeat Step 1 through Step 4 for each additional function group slot 1's to be equipped with LNW66 or LNW71 circuit packs.

6 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LNW70 (100/1G FXS), LNW74 (10/100 T/F), LNW63 (1000BASE-SX/LX/LX10), LNW64 (8 GbE), LNW78 (RPR) and LNW170 (100/1G FXS) installation (optional)

Follow this procedure only if installing LNW70 (100/1G FS), LNW74 (10/100 T/F), LNW63 (1000BASE-SX/LX/LX10), LNW64 (8 GbE), LNW78 (RPR) and LNW170 (100/1G FXS) circuit packs into the 1665 DMX shelf.

Important! The LNW70, LNW74, LNW63, LNW64, LNW78 and LNW170 circuit packs require SFP modules for the Ethernet interface. This procedure will consist of two parts. Installing the circuit card and installing the SFP per Install pluggable transmission modules (p. 2-34).

1 Refer to the engineering job specification. Identify the proper function group slot (A1, A2, B1, B2, C1, C2, D1, D2, G1 or G2) where the LNW70, LNW74, LNW63, LNW64, LNW78 or LNW170 circuit pack will be installed.

Important! When LNW74 is installed in the G1 or G2 position, only the faceplate optical 100 Base-F ports are available for use.

The LNW70, LNW74, LNW63, LNW64, LNW78 and LNW170 circuit packs can only be installed in slot 1 of any function group **unless** the mains are equipped with LNW59 or LNW82 (VLF) main circuit packs. With the LNW59 and LNW82 mains, all fn slots may be equipped.

2 Remove the LNW70, LNW74, LNW63, LNW64, LNW78 or LNW170 from the packing material.

3 Place the circuit pack into the shelf fn slot. Do **NOT** engage the circuit pack in the backplane connector.

4 Install a blank circuit pack into the companion fn circuit pack slot as required.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Repeat Step 1 through Step 4 for each additional function group to be equipped with LNW70, LNW74, LNW63, LNW64, LNW78 or LNW170 circuit packs.

6 Install the SFP module per Install pluggable transmission modules (p. 2-34).

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW67 (1G SX) installation (optional)

Follow this procedure only if installing LNW67 (1G SX) circuit packs into the 1665 DMX shelf.

Important! The LNW67 (1G SX) requires **multi-mode** fiber.

1 Refer to the engineering job specification. Identify the proper function group slot (A1, A2, B1, B2, C1, C2, D1, D2) and/or growth slot (G1 or G2) where the LNW67 circuit pack will be installed.

Important! Unless equipped with LNW59 VLF mains, the LNW67 circuit pack can only be installed in slot 1 of any function group or growth slot 1.

2 Remove the LNW67 from the packing material.

3 Place the circuit pack into the shelf fn slot as required). Do **NOT** engage the circuit pack in the backplane connector.

4 Install a blank circuit pack into the companion fn circuit pack slot as required.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Repeat Step 1 through Step 4 for each additional function group and/or growth slot to be equipped with LNW67 circuit packs.

6 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW68 (1G LX) installation (optional)

Follow this procedure only if installing LNW68 (1G LX) circuit packs into the shelf.

Important! The LNW68 (1G LX) requires **single-mode** fiber.

1 Refer to the engineering job specification. Identify the proper function group slot (A1, A2, B1, B2, C1, C2, D1, D2) and/or growth slot (G1, G2) where the LNW68 circuit pack will be installed.

Important! Unless equipped with LNW59 VLF mains, the LNW68 circuit packs can only be installed in slot 1 of any function group or growth slot 1.

2 Remove the LNW68 from the packing material.

3 Place the circuit pack into the shelf fn slot as required. Do **NOT** engage the circuit pack in the backplane connector.

4 Install a blank circuit pack into the companion circuit pack slot as required.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Repeat Step 1 through Step 4 for each additional function group and/or growth slot to be equipped with or LNW68 circuit packs.

6 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW73 (FC-1X/2X) and LNW73C (FC-1X/2X with compression) installation (optional)

Follow this procedure only if installing LNW73 (FC-1X/2X) and LNW73C (FC-1X/2X with compression) circuit packs into the 1665 DMX High-Capacity shelf.

Important! The LNW73 and LNW73C circuit pack requires SFP modules for the optical interface. This procedure will consist of two parts. Installing the circuit card and installing the SFP per Install pluggable transmission modules (p. 2-34).

1 Refer to the engineering job specification. Identify the proper function group slot (A1, A2, B1, B2, C1, C2, D1, D2) and/or growth slot (G1, G2) where the LNW73 or LNW73C circuit pack will be installed.

Important! Unless equipped with LNW59 VLF mains, the LNW73 and LNW73C circuit packs can only be installed in slot 1 of any function group or growth slot 1.

2 Remove the LNW73 or LNW73C from the packing material.

3 Place the circuit pack into the shelf fn slot as required. Do **NOT** engage the circuit pack in the backplane connector.

4 Install a blank circuit pack into the companion circuit pack slot as required.

Important! Blank circuit packs are required in all unused slots to provide proper air flow for cooling.

5 Repeat Step 1 through Step 4 for each additional function group and/or growth slot to be equipped with LNW73 or LNW73C circuit packs.

6 Install the SFP module per Install pluggable transmission modules (p. 2-34).

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

177D/LNW98 blank CP installation (optional)

Follow this procedure to install 177D Apparatus Blank(s) or LNW98 Detectable Blank(s) into the 1665 DMX High-Capacity shelf.

Important! A 177D Apparatus Blank or LNW98 Detectable Blank is required in any unequipped slots to provide proper air flow for cooling.

1 Identify all the unequipped Function Unit or Growth slots.

2 Remove the 177D or LNW98 from the packing material.

3 Insert (fully seat) the 177D or LNW98 blank into an unequipped slot on the shelf.

4 Continue with the next unequipped slot until all the unused slots are equipped with an 177D Apparatus Blank or LNW98 Detectable Blank.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

177E/LNW97 blank CP installation (optional)

Follow this procedure to install 177E Apparatus Blank(s) or LNW97 Detectable Blank(s) into the 1665 DMX High-Capacity shelf.

Important! A 177E Apparatus Blank or LNW97 Detectable Blank is required in the Main-2 (M2) slot to provide proper air flow for cooling when only one main is equipped. Always use Main-1 (M1) for shelves equipped with only one main pack.

1 Identify any unequipped Main slots.

2 Remove the 177E or LNW97 from the packing material.

3 Insert (fully seat) the 177E or LNW97 into the unequipped Main slot on the shelf.

4 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Install pluggable transmission modules

This section contains the instructions for the installation of the pluggable transmission modules.

1 Refer to the engineering job specification. Identify the proper circuit pack type and the port socket being equipped with the pluggable module (SFP). Make sure the transmission rate (OC3, OC12, 100Base Ethernet or GbE) matches the rate of the SFP. See Appendix G, "Pluggable transmission module installation".

Important! Pluggable modules are shipped with a dust plug installed into the ports to maintain cleanliness during storage and/or transportation. It is recommended that the dust plug be kept in place to maintain cleanliness. With proper care and handling, cleaning the pluggable modules should not be necessary.

2 Check the ports for cleanliness and clean the pluggable module if necessary. See Appendix B, "Fiber cleaning".

CAUTION
Never mechanically clean the receive (RX) port. Air blows only should be used on the receive (RX) port. The receive (RX) port contains a lens for focusing a wide input. The lens is more easily scratched than cleaned.

3 Insert the pluggable module in the required socket of the circuit pack faceplate, then wiggle the module to verify that it is locked in the socket. See Appendix G, "Pluggable transmission module installation". Verify that all unused sockets are equipped with dust plugs.

4 Repeat Step 1 through Step 3 if more modules need to be installed.

5 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

☐

Part II: 1665 Data Multiplexer (1665 DMX) stand-alone installation tests

Overview

Purpose

Part II covers the generic software download to the 1665 Data Multiplexer (1665 DMX), stand-alone installation tests to verify correct interconnect cabling, alarm cabling, and as required, external timing and communication cabling. This section also covers circuit pack installation (fully seated).

Contents

This section is organized into the following chapters:

Software download and circuit pack installation	Chapter 3
Installation tests	Chapter 4
Operational tests	Chapter 5

3 Software download and circuit pack installation

Overview

Purpose

This chapter provides the procedures for initial software download and use of the craft interface terminal (CIT).

Contents

This chapter provides information on the following topics:

Software installation	3-4
Circuit pack installation	3-5
Use of WaveStar® CIT software	3-9
Circuit pack firmware version verification	3-12
1665 DMX shelf initialization	3-13
Provision/enable/disable TCP/IP on an IAO LAN port	3-14
Reset system date and time	3-17
Provision/Enable/disable the 1665 DMX as a TL1 TCP/IP GNE	3-18

Tools, test equipment and accessories

Listed below are the required tools, test equipment and accessories.

Quantity	Description	Comments
1	Personal Computer (PC)	Required to run the WaveStar® CIT software. See PC minimum requirements (p. 3-2).

Quantity	Description	Comments
1	CIT Interface Cables Serial Connection OSI LAN Connection	 8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869). Required to connect the PC to the CIT jack on the front of the SYSCTL circuit pack. CAT5 Ethernet cable with either a 10/100 hub or a cross-over cable for the **LAN CIT** or **IAO LAN** ports
	LBOs	20-dB (for LNW60), 15-dB, 10-dB and 5-dB LBOs are required when looping back the main OLIUs on themselves.

PC minimum requirements

It is anticipated that most customers will dedicate a laptop or personal computer (PC) to run the WaveStar® CIT software. However, any properly configured computer will also suffice. The following table shows the requirements for the computer:

Table 3-1 Computer Requirements

Components	Minimum	Recommended
Processor	Pentium 266 MHz	Pentium IV 1 GHz
RAM (1 system view)	128 MB	512 MB
RAM (up to 5 system views)	256 MB	1 GB
Virtual Memory	139 MB	267 MB
Available Hard Disk Space*	500 MB	850 MB (for all graphical packages)
Video	800X600 256 Colors (8 Bit)	1024X768 16 Million Colors (24 Bit)
Network Interface	10/100 baseT Network Card	100 baseT Network Card
CD ROM Drive	Required	Required
Operating System	Windows® NT 4.0, Windows® 2000 or Windows® XP	Windows® 2000 or Windows® XP

Components	Minimum	Recommended
Internet Browser	Internet Explorer 5.0/5.5/6.0/7.0	Internet Explorer 5.0/5.5/6.0/7.0

* Available hard disk space required to install and store the CIT and Generic Software is approximately 250 MB (it is 550 MB, if all graphical packages are installed). The additional disk space specified is to provide hard disk space to store 1665 Data Multiplexer (1665 DMX) backup files**.**

Important! Minimum requirements are sufficient to run two to three GUI **System Views,** unless otherwise noted. Recommended requirements are intended to be used as a general guideline to optimize WaveStar® CIT performance. As the CIT is used with multiple NE connections and multiple NE types, the processor type and speed and the memory size will all factor into CIT performance.

□

Software installation

Description

Software installation is accomplished by performing the appropriate software download procedures in the Software Release Description (SRD) which is shipped with the software.

When the software installation is complete check off the appropriate box in Appendix E, “Installation checklist”.

☐

Circuit pack installation

Description

This section provides instructions and the recommended order for installing (fully seating) the circuit packs in the 1665 DMX shelf. The procedures in this section assume that the SYSCTL is installed and software has been successfully downloaded as described in the section, Software installation (p. 3-4).

Locations of circuit packs (Function Unit slots) are shown in Chapter 2, Figure 2-2, “1665 DMX High-Capacity shelf” (p. 2-11).

Circuit packs are keyed to prevent being inserted into the wrong shelf position. Installing circuit packs requires some force.

CAUTION

Laser safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

CAUTION

Equipment damage

When installing the circuit packs, be careful to insert them straight to avoid damaging the backplane pins.

When a circuit pack is installed, its FAULT LED will light for several seconds to possibly several minutes then extinguish.

CAUTION

ESD hazard

A properly grounded ESD wrist strap MUST be worn when handling circuit packs.

Important! The UPD/INIT pushbutton on the SYSCTL circuit pack is recessed and will require a pointed object.

Circuit pack installation procedure

Important! Dust plugs supplied with the optical packs should always be in each optical port if no optical connector is installed. The dust plugs should be saved so that they can be reinstalled when the optical connector is removed.

1 Fully insert both M1 and M2 (OC3/OC12/OC48, OC-12, OC-48 or OC-192) OLIUs into the shelf.

Important! When LNW59, LNW82, LNW202 or LNW502 is used in the main slots, pluggable transmission modules are required for the optical interface. From the engineering work order, determine if PTMs are required and in which port(s).

The LNW59 can operate as a switch pack when PTMs are not equipped.

LNW80 is a main switch pack with no optics. If equipped, continue with Step 6.

2 For circuit packs in the main slots, determine if PTMs are required. If the installation calls for optical interfaces to the mains, locate and install the PTMs.

3 Insert the proper LBO into the IN connectors of each MAIN OLIU. Refer to Appendix A, "Laser safety and classifications and Electrostatic Discharge (ESD) considerations" for maximum and minimum transmit levels. If necessary, refer to Appendix C, "Installing fiber connectors and LBOs".

Important! Attenuation may be required when optically looping an OLIU on itself. Refer toChapter 6, Table 6-1, "Attenuation Table" (p. 6-6), to find out the attenuator value.

4 Fully seat blank packs in any unequipped Main slots.

5 Connect IN to OUT on the OLIU in the M1 slot of the 1665 DMX shelf using an optical fiber jumper cable. Refer to Appendix B, "Fiber cleaning" for proper fiber cleaning instructions.

Connect IN to OUT on the OLIU in the M2 slot of the 1665 DMX shelf using an optical fiber jumper cable.

Result: After a few minutes the flashing FAULT LEDs should extinguish on each OLIU circuit pack. The FAULT, MJ and NE LEDs will light on the SYSCTL due to DCC alarms created by optically looping the OLIUs. These SYSCTL LEDs will remain lit until the DCC is disabled. Refer to Chapter 4, Local equipment and cross-connect tests (p. 4-9) to clear the alarms.

6 Starting with slot A1, fully seat the circuit pack slotted there using a steady pressure on both of the faceplate latches at the same time until the circuit pack is fully seated.

Important! All electrical circuit packs must be slotted in the function slots with the proper cables attached in the back of the shelf.

The ACTIVE and FAULT LEDs should light when circuit packs are inserted and the FAULT LED should extinguish after a short period of time. Some circuit packs such as LNW67/LNW68 may take several minutes before their FAULT LEDs extinguish.

7 Continue seating the circuit packs with slot A2 and then on to B1, B2, G1, G2, C1, C2, D1, and D2.

8 Fully seat Blank packs in any other unfilled slots.

Blank Types	Comcode	Series	Continue with
LNW177D w/o PEMS	108950585	S1:2	Step 10
LNW98 w/o PEMS	109412866	S1:2	Step 10
LNW177D w/ PEMS *If installing the Fiber Bracket Kit	108950585 848949871	S1:3 NA	Step 10 Step 9
LNW98 w/ PEMS *If installing the Fiber Bracket Kit	109412866 848949871	S1:3 NA	Step 10 Step 9
LNW177D w/ Fiber Bracket Installed	848960175	S1:3	Step 10
LNW98 w/ Fiber Bracket Installed	848960167	S1:3	Step 10

Important! *The Fiber Bracket Kit is used in conjunction with the LNW177D and LNW98 that is equipped with the PEMS.

9 Attach the fiber bracket to the blank pack with the hardware provided.

Important! The bracket must be positioned with the LC openings in the down position.

10 If there are any FAULT LEDs on or flashing on any of the inserted circuit packs, press the UPD/INIT pushbutton on the SYSCTL circuit pack.

Result: The operation of the UPD/INIT pushbutton on the SYSCTL circuit pack will update the system and should clear all standing alarms.

11 If FAULT LEDs remain lit on any of the inserted circuit packs, replace the respective circuit pack.

12 Any other alarms will be cleared later on in this chapter.

13 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Use of WaveStar® CIT software

Description

Complete the following steps to login to the 1665 DMX via WaveStar® CIT. It is assumed that the CIT software has been installed on the PC and the NE software has been downloaded to the 1665 DMX shelf per the Software Release Description. See Software installation (p. 3-4).

Login procedure

1 Connect the PC Serial cable to the RS232 (Serial) jack on the front of the SYSCTL circuit pack. Or connect a PC LAN cable (cross-over) to the LAN (OSI) connector on the front of the SYSCTL circuit pack.

2 Start the WaveStar® CIT software on the PC by double clicking on the WaveStar® icon that was created by the installation procedure.

3 Enter the following in the Login window:

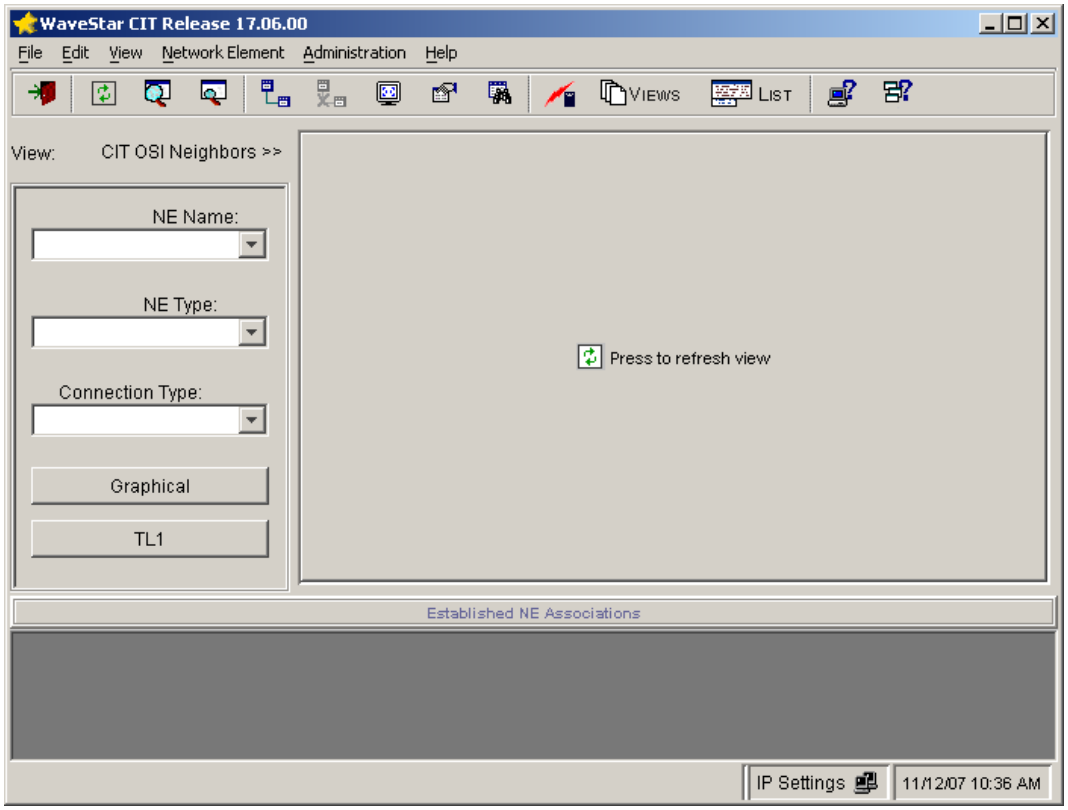
User ID: LUC01
Password: LUC+01

> **Important!** The login and password may not be required to login to the WaveStar® CIT if disabled during installation.

4 Click **OK** to connect.

5 After reading the Legal Notice, click **OK**.

Result: The following is displayed.



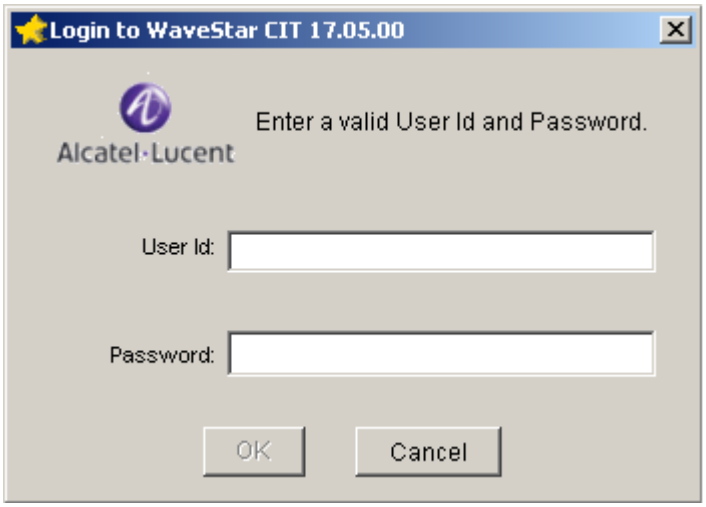
6 Under **NE Name**, enter **LT-DMX**.

7 Under **NE Type** click on the drop-down menu arrow and choose DMX from the drop-down list.

8 Under **Connection Type**, click on the drop-down menu arrow and choose Serial or OSI, depending on the type of connection you are using.

Important! An IP address must be assigned to the NIC card on the PC or laptop. Otherwise, you may experience login problems. To assign an IP address, start the DOS prompt on the computer, and type the command ipconfig/all. The command will show an IP address line. If there is no address line or 0.0.0.0 for an IP address, then you must assign an IP address in the NIC card of the computer.

9 Click on the **Graphical** button. The following screen appears.



10 Enter the Login for the shelf:
User Id: **LUC01**
Password: **DMX2.5G10G** (case sensitive)

11 Click **OK**.

Result: The 1665 DMX system view is displayed.

12 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Circuit pack firmware version verification

Description

This section provides instructions to verify firmware versions on the circuit packs in the 1665 DMX shelf. The procedures in this section assume that the SYSCTL is installed and software has been successfully downloaded and the circuit packs have been installed in the shelf as described in the preceding sections.

Circuit pack firmware version verification procedure

1 Log on to the 1665 DMX shelf using the CIT.

2 Select View -> Equipment...

3 For each circuit pack listed in the View Equipment window, highlight the CP and click Select.

4 Compare the Program Version to the information provided in the Software Release Description (SRD).

5 If the Program Version did not match the version number in the Firmware Version table in the SRD, reseat that circuit pack and wait 15 minutes.

6 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

1665 DMX shelf initialization

Description

This section provides instructions for initializing the 1665 DMX shelf, to insure that all circuit pack databases are correct for the current shelf and software release. The procedures in this section assume that the SYSCTL is installed and software has been successfully downloaded and the circuit packs have all been installed in the shelf as described in the preceding sections.

Shelf initialization procedure

1 Log on to the 1665 DMX shelf using the CIT software as described in the Use of WaveStar® CIT software (p. 3-9).

2 Select Fault -> Reset -> Initialize System...

3 Click OK and then Yes to the Warning.

Result: After a few minutes the shelf will reset and end the CIT session.

4 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

Provision/enable/disable TCP/IP on an IAO LAN port

Description

This is an optional task which describes the steps necessary to provision, enable or disable the TCP/IP on the IAO LAN Port.

Before you begin

Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Know which LAN Port is being provisioned.
- Obtain the IP Address and IP Subnet Mask of the desired LAN Port and the IP Default Router Address if you are connecting to a router.
- Be able to log in to a 1665 DMX with the WaveStar® CIT and be familiar with the functions of the WaveStar® CIT.

Procedure

Proceed as follows:

1 Use the WaveStar® CIT to log in to the 1665 DMX shelf being provisioned using a Graphical connection.

2 Determine which IAO LAN Port(s) you want to use (front or rear).

Important! If you are using the rear IAO LAN port, use lan-2 as the AID. If you are using the front IAO LAN port, use lan-1 as the AID.

3 From the System View menu, select

Administration -> Data Communications

Result: The **Data Communications** window opens

4 In the **Data Communications** window, click on the **TCP/IP** tab at the top of the window.

Result: The TCP/IP parameters are displayed.

5 Select and/or modify the following parameters:

1. Select the **Port Aid**: (lan-1 [front] or lan-2 [rear]) being provisioned.
2. If applicable, one at time, click the **Modify** button to set the **IP Address** and **IP Subnet Mask** of the desired LAN port and the **IP Default Router Address**, if you are connecting to a default router.

   When the provisioning window opens for the IP address being provisioned, enter the IP address as four dot-separated decimal numbers ranging from 0 to 255. Click **OK** to make your changes or **Cancel** to quit.
3. Select **Enable** to enable the TCP/IP function, or **Disable** to disable the TCP/IP function.

   Important! If you enter duplicate IP addresses and/or IP subnet addresses, a warning appears: I**nput, Data Not Valid, each IAO LAN Port must have a unique IP subnet mask**.
   Scroll through the Port AID drop-down menu and identify the duplication, then assign correct addresses as necessary.

   Important! If you select **Enable** and click **OK** to apply any changes, then execute the command when requested, the system may reset and you will be logged off the system. Selecting **Disable** allows you to stay logged on to the system to perform more provisioning. You can then come back to this window and enable the TCP/IP function.

   Important! Following a 1665 DMX system reset, the date and time may revert to January 1, 1970 (70-01-01) at midnight (00:00:00). If automatic synchronization is unsuccessful from the network, the date and time must be reset manually.

6 Click **Apply** at the bottom of the window to make your changes.

Result: A warning window opens and asks if you want to execute this command.

7 Click **Yes** to execute the command

Result: If you made changes and also enabled the TCP/IP function, the changes are applied, the system resets, and you are logged off the system. If you made changes and disabled the TCP/IP function, the changes are applied and you are still logged on to the system.

8 Click **Close** when you want to exit the window if you are still logged into the system.

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

Reset system date and time

Description

The following steps are instructions on how to change the date and time on your shelf if they have been reset to default values (January 1970).

1 Connect the PC and establish a WaveStar® CIT session (graphical).

2 From the **System View** menu, select **Administration -> Set Date and Time** to bring up the Set Systems Date and Time screen for 1665 DMX.

3 From the **Date** panel, select the **Year** and **Month** from the pull-down menus.

Result: A calendar is displayed for the month and year selected.

4 Click on the **Date** from the calendar.

5 From the **Time** panel, select the **Hour**, **Minute** and **Second** from the pull-down menus (based upon a 12-hour clock).

6 Select **am** or **pm.**

7 Click **OK**.

Result: The new date and time appear in the lower right-hand corner of the GUI System View.

8 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Provision/Enable/disable the 1665 DMX as a TL1 TCP/IP GNE

Purpose

Use this task to provision, enable or disable the 1665 DMX as a TL1 TCP/IP GNE.

Required equipment

The following equipment is required:

- Personal Computer (PC) with WaveStar CIT® software installed
- Wrist Strap

Safety precautions

To assure both personal safety and the proper functioning of the 1665 DMX, it is imperative to review and understand these warnings and precautions prior to performing this task.

CAUTION

ESD hazard

Use a static ground wrist strap whenever handling circuit packs or working on a system to prevent electrostatic discharge damage to sensitive components.

Before you begin

Prior to performing this task, you must:

- Obtain the work instructions for this task.
- Complete the Circuit pack firmware version verification procedure to provision and enable TCP/IP for the selected LAN port.
- Complete the "Provision/enable/disable TCP/IP on an IAO LAN port" (p. 3-14).
- Know which LAN port is being provisioned.
- Know the IP addresses, host names and host types for the gateway hosts which will be allowed access to the 1665 DMX TL1 TCP/IP GNE.
- Be able to log in to a 1665 DMX WaveStar®CIT and be familiar with the functions of the WaveStar® CIT.

Procedure

Proceed as follows:

1 Use the WaveStar® CIT to log in to the 1665 DMX TL1 TCP/IP GNE to be modified, enabled or disabled, using a Graphical connection.

2 On the **System View** menu, select **Administration > Data Communications**

Result: The **Data Communications** window opens.

3 In the Data Communications window, click on the **TCP/IP** tab at the top of the window.

Result: The TCP/IP parameters display.

4 Verify that TCP/IP is properly provisioned and enabled for the required LAN port(s).

5 In the Data Communications window, click on the TCP/IP Gateway tab at the top of the window.

Result: The TCP/IP Gateway parameters display.

6 From your work instructions, determine which IP calling addresses will be allowed to access the 1665 DMX TL1 TCP/IP GNE.

7 Use the instructions on the screen to add, modify, or delete a gateway host from the **TCP/IP Gateway Host List**.

The following parameters apply:

- The OS host IP address which is four dot-separated decimal numbers, each ranging from 0 to 255.
- The OS Host Name which may consist of 1 to 24 alpha-numeric characters.
- The OS Type which may consist of standard types or listed as other.

Repeat this step for each of the Host IP address you want to authorize for access to the 1665 DMX TL1 TCP/IP GNE. There may be up to 50 provisioned entries in the list.

8 On the Data Communications window under **TCP/IP Gateway Control**, select **Enable** to enable the TCP/IP Gateway, or select **Disable** to disable the TCP/IP Gateway.

9 Click **Apply** at the bottom of the window.

Result: A warning window opens and asks if you want to execute this command.

10 Click **Yes** to execute the command, then click **Close** to exit the window, if desired.

11 Repeat this procedure for each TL1 TCP/IP GNE to be modified, enabled or disabled.

12 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

4 Installation tests

Overview

Purpose

The purpose of this section is to verify proper transmission cabling installation and Release 7.1 functionality as well as the associated functionality of the 1665 Data Multiplexer (1665 DMX) shelf.

For end-to-end turn-up and testing procedures, refer to 365-372-301, *1665 Data Multiplexer User Operations Guide.*

Contents

This chapter provides information on the following topics:

LBO software settings	4-4
Clearing alarms	4-7
Local equipment and cross-connect tests	4-9
DS1 protection switching	4-14
DS1 cleanup procedures	4-18
DS3/EC1 and TMUX testing procedure	4-22
DS3 protection switching	4-28
DS3 cleanup procedures	4-32
LNW66, LNW71 and LNW74 (10/100T) TX Ethernet cabling testing	4-36
OC-3 (LNW37, LNW45, LNW55)/OC-12 (LNW49, LNW55)/OC-48 (LNW55, LNW62) low-speed SFP test procedure	4-41
OC-3 (low-speed) testing	4-43
OC-12 (low-speed) testing	4-47

OC-48 (low-speed) testing	4-52
LED test	4-56
Additional optical tests (optional)	4-57

Tools, test equipment and accessories

Listed below are the required tools, test equipment and accessories. For complete listing see Part I or Part II.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.
1	ESD Wrist Strap	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	DS1 Error Rate Test Set	A DS1 error rate test set is required for testing of DS1 cabling. A T-BERD 2209 or equivalent is recommended.
1	DS3 Error Rate Test Set	A DS3 error rate test set is required for testing of DS3/EC1 and TMUX cabling. A T-BERD 2209 or equivalent is recommended.
1	SONET Optical Test Set	An OC-3, OC-12 or OC-48 test set as required for testing of optical circuit packs. An Agilent OmniBER 718 or equivalent is recommended.
2 or 3	LC-type Optical Fiber Jumper (108918269)	Two optical fiber jumpers with LC-type connectors are required to optically loop the 1665 DMX shelf for test purposes. In addition, for shelves containing optical circuit packs in any of the Function Unit slots, a single optical fiber jumper is required for testing of the individual ports.

Quantity	Description	Comments
2 or 3	15-dB LC-type LBO (108279480)	Two 15-dB LBOs are required when optically looping the 1665 DMX shelf for test purposes.In addition, for shelves containing optical circuit packs in any of the Function Unit slots, a single 15-dB LBO is required for testing of the individual ports.
2	20-dB LC-type LBO (108279530)	Two 20-dB LBOs are required when optically looping the 1665 DMX shelf equipped with LNW60.
1	Personal Computer (PC)	Required to run the WaveStar® CIT software. See Chapter 3, "Software download and circuit pack installation", PC minimum requirements (p. 3-2).
1	CIT Interface Cable	8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869). Required to connect the PC to the CIT jack on the front of the SYSCTL circuit pack.
2	LAN 10BaseT Straight-through Cable CAT 5 or better	As required to reach from front of 1665 DMX to the RJ45 patch panel
1	LAN 10BaseT Cross-over Cable CAT 5 or better	As required to reach from front of 1665 DMX to the PC

LBO software settings

Description

This section provides instructions for setting the software Line Build Out (LBO) for the DS1, DS3/EC1 and TMUX cabling and requires that the SYSCTL, DS1, DS3/EC1 and/or TMUX circuit packs be installed and that software has been downloaded.

Setting DS1 LBOs

Follow this procedure to set the LBOs for the DS1, DS3/EC1 and TMUX circuit packs.

1 Log on to the 1665 DMX shelf using the CIT software as described in the Chapter 3, "Use of WaveStar® CIT software" (p. 3-9).

2 Refer to the following table of cable lengths and LBO values. Determine the LBO value corresponding to the DS1 cables installed.

LBO value	Distance (feet)
20	0 - 133 (default)
40	134 - 267
60	268 - 420
80	421 - 533
100	534 - 655

3 From the CIT GUI, select Configuration -> Equipment...

4 Select the desired DS1 port by clicking the + sign next to the CP and VT Group.

5 Highlight the port and click Select.

From the pull-down next to Line Build Out: choose the LBO value determined in Step 2.

6 If a change is made click Apply.

7 Repeat Step 2 through Step 6 for all DS1 ports in all function unit slots which are populated with DS1 circuit packs.

8 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Setting DS3/EC1 and TMUX LBOs

The DS3/EC1 and TMUX cabling will be tested with all ports provisioned for DS3. Set DS3 LBO values as follows.

1 Refer to the following table of cable lengths and LBO values. Determine the LBO value corresponding to the DS3 (TMUX) cables installed:

Table 4-1 Cable lengths (feet)

LBO Value	734D	735A
IN	0 - 225	0-125
OUT	225-450	125-250

2 From the CIT GUI, select Configuration -> Equipment...

3 Select the desired DS3 port by clicking the + sign next to the CP.

4 Highlight the port and click Select.

5 Next to Line Build Out: choose the LBO value determined in Step 1.

6 Repeat Step 1 through Step 5 for all DS3 ports in all function unit slots that are populated with DS3 or TMUX circuit packs.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

☐

Clearing alarms

Description

In order to clear standing alarms the 1665 DMX synchronization will be optioned for "Free Running." The DCC will be disabled in order to prevent DCC alarms from being generated due to the optical loopback on the main OLIUs.

1 Select Configuration -> Timing/Sync...

Result: From the Timing Mode: pull-down, choose Free Running.

2 Click **OK**.

3 Select Configuration -> DCC Terminations...

4 From the Port AID: pull-down, select dcc-m1-1.

5 Next to OSI Over DCC, click disabled.

6 Click Apply.

7 From the Port AID: pull-down, select dcc-m2-1.

8 Next to OSI Over DCC, click disabled.

9 Click Apply.

10 Click Close.

11 If there are any FAULT LEDs on or flashing, press the UPD/INIT push button on the SYSCTL circuit pack.

> **Important!** LNW16 (DS3/EC1) circuit pack require either a 75-ohm termination or a loopback at the DSX-3 on all ports. If loopbacks are used, make sure to take down any cross-connections.

12 If there are still FAULT LEDs on, replace the respective circuit pack.

13 Disconnect the office alarm cable until all procedures and testing have been completed.

14 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Local equipment and cross-connect tests

Description

The tests in this section verify the proper operation of the circuit packs and the circuit pack positions in the 1665 DMX shelf. It verifies proper cabling from the 1665 DMX to the DSX cross-connect panel or connecting equipment. The shelf must successfully pass this test before testing any other feature of the 1665 DMX.

It is assumed that Chapter 2, "Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)" has been completed and the 1665 DMX shelf has fiber loop-back cables on the Main OLIUs with proper LBOs installed, and synchronization set to free-running.

On initial installation/turn-up of 1665 DMX there are no default cross-connects. All cross-connects need to be entered for these tests. Upon completion of this test all cross-connections will be deleted.

Important! If the shelf is not fully equipped, move circuit packs to unequipped function slots and repeat the test. Test all circuit pack positions which have DSX cabling.

Important! After completing this test, isolate and correct any incorrect wiring or isolate and replace any failed units. If any cabling is corrected or units replaced, repeat the Local Equipment and cross-connect tests until the units pass without failure.

CAUTION

ESD hazard

A properly grounded ESD wrist strap MUST be worn when handling circuit packs.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

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DS1 terminating equipment loopback testing

Facility Loopback testing allows the installer to verify electrical cabling to the DS1 Terminating Equipment. This test is only required if the 1665 DMX shelf is connected to DS1 terminating equipment such as a DACS. It will be necessary to work with the Customer Network Control Center to have them establish a terminal loopback. If the shelf is NOT connected to DS1 terminating equipment, skip this section and continue with DS1 non-terminating equipment transmission testing (optical main OLIU) (p. 4-11).

The Function Unit slot under test must contain a 28 DS1 (LNW6 or LNW7) or a 56DS1/E1 (LNW8) circuit pack in order to perform this test. The 56DS1/E1 circuit packs can only be used with high capacity shelves. If the 1665 DMX shelf is not fully populated, it may be necessary to move the circuit pack(s) from slot to slot in order to test all DS1 cabling.

Procedure

This command creates a cross-connect to map the first DS1 of a DS1 circuit pack in a Function Unit to the first VT1.5 within the first VT Group of STS1 of the Main OLIUs.

1 Log on to the 1665 DMX shelf using the CIT software as described in Chapter 3, “Use of WaveStar® CIT software” (p. 3-9).

2 Select Configuration -> Cross-Connections...

3 Use the Cross-Connection Wizard to enter a new cross-connection at the VT1.5 rate, UPSR Ring Add/Drop, between m1-1-1-1-1 and fn1-1-1-1 (fn will be a,b,c or d depending on the slot where the DS1 CP is located).

4 At this point it is necessary to have the Customer Network Control Center establish a terminal loopback at the port under test at the DS1 terminating equipment.

5 Run a test transmission test to verify the electrical cabling.
Select Fault -> Test -> Transmission...

6 Select the CP, VT Group and Port 1-1 (DS1) associated with the cross-connection entered above.

7 Select the FACILITY direction.

Result: The results should indicate that the test ran for a duration of 60 seconds followed by 0 es (errored seconds).

8 Complete the above test on all Function Unit slots terminating at DSX equipment. Once you have completed the test make sure that all loopbacks have been removed at the Customer Network Control Center before moving on to any other testing.

9 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS1 non-terminating equipment transmission testing (optical main OLIU)

Perform the following steps for all 1665 DMX shelf Function Unit slots that are cabled to a DSX-1 and not to any terminating equipment.

A Function Unit slot cabled to the DSX-1 must contain a 28DS1 (LNW6 or LNW7) circuit pack or a 56DS1/E1 (LNW8) circuit pack in order to perform these tests. If the 1665 DMX shelf is not fully populated, it may be necessary to move the circuit pack(s) from slot to slot in order to test all DS1 cabling.

This procedure requires the use of a DS1 test set.

Procedure

This command creates a cross-connect to map the first DS1 of a DS1 circuit pack in a Function Unit to the first VT1.5 within the first VT Group of STS1 of the Main OLIUs.

1 Log on to the 1665 DMX shelf using the CIT software as described in the Chapter 3, "Use of WaveStar® CIT software" (p. 3-9).

2 Select Configuration -> Cross Connections...

3 Use the Cross-Connection Wizard to enter a new cross-connection at the VT1.5 rate, UPSR Ring Add/Drop, starting with m-1-1-1-1 and fn-1-1-1 (fn will be a,b,c or d

depending on the slot where the DS1 CP is located). Refer to Table 4-2, "DS1 Cross-Connections" (p. 4-18).

4 Set the DS1 test set to transmit and receive a Quasi-Random Sequence Signal (QRSS) with B8ZS formatting.

5 Connect a cable from the DS1 test set **transmit** connection to the IN jack of the DSX-1 associated with the DS1 tributary to be tested (start with the first).

6 Connect a cable from the DS1 test set **receive** connection to the OUT jack of the DSX-1 associated with the DS1 tributary to be tested (start with the first).

Result: The DS1 test set should indicate it is receiving an error free QRSS signal with B8ZS formatting.

If an error free signal is not received:

- Verify that the DS1 line coding format is set to B8ZS using the **View -> Equipment** command
- Verify that the LBOs are set according to cable length using the **View -> Equipment** command (see Setting DS1 LBOs (p. 4-4).
- Check DS1 cabling for proper connections.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS1 non-terminating equipment transmission testing (LNW80 switch or LNW59 without optics)

Perform this test when the 1665 DMX is equipped with LNW80 switch packs or LNW59 without optics in the main slots.

Facility loopback testing allows the installer to verify the electrical cabling to the 1665 DMX NE. Follow the procedure below to perform a facility loopback test at the 1665 DMX shelf.

To test cabling to the DSX-1, use a DS1 test set to transmit and receive toward the facility loopback.

Perform the following tests for each DS1 circuit cabled to the 1665 DMX.

1 Select Fault -> Analysis -> Loopback...

2 Choose the DS1 port to test and click Select.

3 Select Operate and Loopback Type: Facility and click Apply.

4 Once the loopback is up, a test signal shall be generated at the DS1 terminating equipment which will verify that the cabling is correct.

Important! A test set can be applied at the DSX-1 to test cabling toward the facility loopback.

5 Once the test is complete, remove the loopback.

Select Fault -> Analysis -> Loopback...

6 Choose the DS1 port to test and click Select.

7 Select Release and Loopback Type: Facility and click Apply.

8 Repeat Step 1 through Step 7 for each DS1 cabled to the DSX-1.

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

DS1 protection switching

DS1 function unit protection switching test (manual)

While a VT cross connection exists, and a test set is connected, path switching will be verified.

Use this procedure to test all of the Function Unit Slots occupied by a LNW6/LNW7/LNW8 (DS1) circuit pack.

> **Important!** This test is performed when the DS1 circuit packs are in a 1x1 protection arrangement. It is not mandatory to perform this test on each VT cross-connection, however this procedure should be performed on each Function Unit Slot pair.

Procedure

Proceed as follows:

1 Locate the Function Group equipped with the DS1 circuit pack.

2 Determine the system is alarm free by clicking on the Alarm List button on the system view.

3 Unseat the active circuit pack. The active circuit pack has an ACTIVE LED lit. Monitor the test set connected to the DSX patch panel.

> **Result:** The ACTIVE LED on the other circuit pack in the Function Group will light. The MN alarm and the NE LED lamps on the SYSCTL will light.
> Transmission at the test set will take a momentary hit and then re-establish.

Confirm that there is a CP Removed alarm by clicking on the Alarm List button on the system view.

4 Unseat the second circuit pack of the pair.

> **Result:** On the SYSCTL, the MN alarm extinguishes and the CR alarm lights. Test set will be registering continuous bit errors and indicate AIS alarm.

5 Reseat the first circuit pack that was removed.

Result: The ACTIVE LED on the reseated circuit pack will light. The FAULT LED on the circuit pack will light for several seconds then extinguish.
On the SYSCTL, the CR alarm extinguishes and the MN alarm and the NE LED will be lit. Test set will indicate good transmission.

6 Reseat the second circuit pack.

Requirement: The ACTIVE LED on the first circuit pack remains on.
The ACTIVE LED on the second circuit pack remains off.
The FAULT LED on the second circuit pack will light for several seconds then extinguish. On the SYSCTL, the MN alarm extinguishes.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS1 function unit protection switching test (command)

This test will initiate switching commands from the CIT and verify proper switching and LED indications.

Important! It is not necessary to perform this test on each vt cross-connection, however this procedure should be performed on each Function Unit Slot pair.

1 Select Fault -> Protection Switch...

2 Click on 1+1 Equip fn-x (x is a,b,c or d corresponding to the function group equipped with DS1).

3 Click Select.

4 In the Switch Type: pull-down, select Manual (Normal).

5 Click Apply.

Result: The pack that was active should now be the standby pack and the pack that was standby is now active. Transmission should take a momentary hit as it is switched to the other pack. This information should agree with the ACTIVE LEDs on the LNW6/LNW7 or LNW8 circuit packs.

6 Repeat Step 1 through Step 5 to verify a switch back to the original Function Unit circuit pack, with the same results as the previous step.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS1 path switching test (manual)

Important! It is not mandatory to perform this test on each vt cross-connection, however this procedure should be performed on each Function Unit Slot pair.

1 Select Fault -> Protection Switch...

2 Under Path Protection, click on Path m-1-1-1-1.

3 Click Select.

4 At the Switch Type: pull-down, select Manual.

5 Click Apply.

Result: The Active Path: indicates a change from m1 to m2 (or if m2 was originally the active path, the switch is from m2 to m1).
The Switch Request State: indicates Manual Switch.

6 At the Switch Type: pull-down, select Clear.

7 Click Apply.

8 Repeat Step 1 through Step 7 to verify a switch back to the original ring.

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

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DS1 cleanup procedures

Delete any existing DS1 cross-connections

Before moving on to the next port to test, it is necessary to remove the cross-connection. This procedure details the necessary steps to delete a cross-connection.

1 Select Configuration -> Cross-Connections...

2 Use the Cross-Connection Wizard to Delete leg(s) of an existing cross-connection associated with CP main-1, Port 1.

Requirement: The DS1 test set should indicate a blue (AIS) signal is being received in place of the QRSS signal.

3 Remove the test set connections from the DSX-1.

4 Select Configuration -> Update System... -> Update All.

Result: This command will remove alarms generated by removing the test signals from the DSX-1.

5 Repeat the DS1 terminating equipment loopback testing (p. 4-10) or the DS1 non-terminating equipment transmission testing (optical main OLIU) (p. 4-11) procedure and the Delete any existing DS1 cross-connections (p. 4-18) procedure to test each of the remaining DS1 tributaries of the Function Unit. This is necessary in order to ensure that the cabling of each port address is correct.

The table below lists the tributaries and cross-connections for all DS1s associated with a function group.

When testing cabling for a Function Unit slot other than a, replace the **a** in each of the addresses with the letter (**b**, **c**, or **d**) corresponding to the Function Unit slot under test.

Table 4-2 DS1 Cross-Connections

Tributary @ DSX-1	Cross-Connection
2	m-1-1-1-2,a-1-1-2
3	m-1-1-1-3,a-1-1-3

Tributary @ DSX-1	Cross-Connection
4	m-1-1-1-4,a-1-1-4
5	m-1-1-2-1,a-1-2-1
6	m-1-1-2-2,a-1-2-2
7	m-1-1-2-3,a-1-2-3
8	m-1-1-2-4,a-1-2-4
9	m-1-1-3-1,a-1-3-1
10	m-1-1-3-2,a-1-3-2
11	m-1-1-3-3,a-1-3-3
12	m-1-1-3-4,a-1-3-4
13	m-1-1-4-1,a-1-4-1
14	m-1-1-4-2,a-1-4-2
15	m-1-1-4-3,a-1-4-3
16	m-1-1-4-4,a-1-4-4
17	m-1-1-5-1,a-1-5-1
18	m-1-1-5-2,a-1-5-2
19	m-1-1-5-3,a-1-5-3
20	m-1-1-5-4,a-1-5-4
21	m-1-1-6-1,a-1-6-1
22	m-1-1-6-2,a-1-6-2
23	m-1-1-6-3,a-1-6-3
24	m-1-1-6-4,a-1-6-4
25	m-1-1-7-1,a-1-7-1
26	m-1-1-7-2,a-1-7-2
27	m-1-1-7-3,a-1-7-3
28	m-1-1-7-4,a-1-7-4
29*	m-1-2-1-1,a-2-1-1
30*	m-1-2-1-2,a-2-1-2
31*	m-1-2-1-3,a-2-1-3
32*	m-1-2-1-4,a-2-1-4

Tributary @ DSX-1	Cross-Connection
33*	m-1-2-2-1,a-2-2-1
34*	m-1-2-2-2,a-2-2-2
35*	m-1-2-2-3,a-2-2-3
36*	m-1-2-2-4,a-2-2-4
37*	m-1-2-3-1,a-2-3-1
38*	m-1-2-3-2,a-2-3-2
39*	m-1-2-3-3,a-2-3-3
40*	m-1-2-3-4,a-2-3-4
41*	m-1-2-4-1,a-2-4-1
42*	m-1-2-4-2,a-2-4-2
43*	m-1-2-4-3,a-2-4-3
44*	m-1-2-4-4,a-2-4-4
45*	m-1-2-5-1,a-2-5-1
46*	m-1-2-5-2,a-2-5-2
47*	m-1-2-5-3,a-2-5-3
48*	m-1-2-5-4,a-2-5-4
49*	m-1-2-6-1,a-2-6-1
50*	m-1-2-6-2,a-2-6-2
51*	m-1-2-6-3,a-2-6-3
52*	m-1-2-6-4,a-2-6-4
53*	m-1-2-7-1,a-2-7-1
54*	m-1-2-7-2,a-2-7-2
55*	m-1-2-7-3,a-2-7-3
56*	m-1-2-7-4,a-2-7-4

Important! Tribs 29-56 (denoted *) are only used for LNW8 circuit packs.

6 Repeat this procedure for each Function Unit slots cabled to a DSX-1 via DS1 cabling.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Verify cross-connects removed

1 Select View -> Cross-Connections...

2 Choose shelf (1665 DMX) and click Select.

3 Verify that there are no cross-connections on the shelf.

4 Select Configuration -> Update System... -> Update All.

Result: This command will remove alarms generated by removing the test signals from the DSX-1.

5 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

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DS3/EC1 and TMUX testing procedure

Description

Perform the following steps for all 1665 DMX shelf Function Unit slots containing 12DS3/EC1 (LNW16), 48DS3/EC1 (LNW19/LNW19B), 12TMUX (LNW18) and 48TMUX (LNW20) circuit packs and cabled to a DSX-3 via DS3/EC1 cabling. The 48DS3/EC1 and 48TMUX circuit packs can only be used with high capacity shelves.

If the 1665 DMX is cabled to some other type of DS3/EC1 terminating equipment, use this procedure by substituting these ports for the DSX-3 ports called out in the procedure. If the 1665 DMX shelf is not fully populated, it may be necessary to move the circuit pack(s) from slot to slot in order to test all DS3/EC1 and TMUX cabling.

This procedure requires the use of a DS3 test set.

Important! The LNW16 and LNW19/LNW19B circuit packs are provisioned on a "per port" basis for DS3 or EC1. The default setting for all ports is DS3. Tests in the section will verify proper cabling by using a DS3 test set with all ports provisioned as DS3.

TMUX is only provisionable for DS3.

Verify provisioning

Verify that all ports are provisioned as DS3.

1 Select View -> Equipment...

2 Click on the + sign next to the CP fn with the DS3/EC1 circuit pack.

3 Verify that all ports are labeled as DS3.

4 To change provisioning from EC1 to DS3, select Configuration -> Equipment... Select the DS3/EC1 circuit pack and port, then choose DS3 and click Apply.

5 Repeat Step 1 through Step 4 for each Function Group equipped with LNW16 or LNW19/LNW19B circuit pack(s).

6 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS3 terminating equipment loopback testing (optical main OLIUs)

When the 1665 DMX is equipped with optical main OLIUs, they are looped on themselves and the following tests verify correct operation.

When the 1665 DMX is equipped with LNW80 switch packs or LNW59 mains without optics, go to DS3 terminating equipment loopback testing (LNW80 switch and LNW59 without optics) (p. 4-24).

Facility Loopback testing allows the installer to verify the electrical cabling to the 1665 DMX NE. Follow the procedure below to perform a facility loopback test at the 1665 DMX shelf. When the 1665 DMX is cabled to other DS3 terminating equipment, in order to complete the loopback testing, it will be necessary to contact the Customer Network Control Center and have a signal established at the port(s) under test.

1 Log on to the 1665 DMX shelf using the CIT software as described in Chapter 3, "Software download and circuit pack installation", "Use of WaveStar® CIT software" (p. 3-9).

2 Select Configuration -> Cross-Connections...

3 Using the Cross-Connection Wizard create a new cross-connection, UPSR Ring Add/Drop, at the STS1 rate from m1-1-1 to fn1-1 (fn is a,b,c or d).

4 Select Fault -> Analysis -> Loopback...

5 Choose the DS3 port to test and click Select.

6 Select Operate and Loopback Type: Facility and click Apply.

7 Once the loopback is up, a test signal shall be generated at the DS3 terminating equipment which will verify that the cabling is correct.

8 While observing the error free transmission, grasp the DS3 cable about two inches from the BNC connector head and gently rotate (twist) the cable in a clockwise and counter clockwise direction about 45 degrees (gently).

Result: If any errors are detected while performing this "wiggle test," the BNC connector must be cut off and replaced.

If an error free signal is not received:

- Check the LBOs settings using **View -> Equipment** (see Setting DS3/EC1 and TMUX LBOs (p. 4-5).
- Verify that the pack is provisioned for the framing format being sent from the test set, CBIT or M13.
- Verify that the port is provisioned for DS3. See Verify provisioning (p. 4-22).
- Check the DS3/EC1 cabling for proper connections.

9 Once the test is complete, remove the loopback.

Select Fault -> Analysis -> Loopback...

10 Choose the DS3 port to test and click Select.

11 Select Release and Loopback Type: Facility and click Apply.

12 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

DS3 terminating equipment loopback testing (LNW80 switch and LNW59 without optics)

Perform this test when the 1665 DMX is equipped with LNW80 switch packs or LNW59 without optics in the main slots.

Facility Loopback testing allows the installer to verify the electrical cabling to the 1665 DMX NE. Follow the procedure below to perform a facility loopback test at the 1665 DMX shelf. When the 1665 DMX is cabled to other DS3 terminating equipment, in order to complete the loopback testing, it will be necessary to contact the Customer Network Control Center and have a signal established at the port(s) under test.

To test cabling to the DSX-3, use a DS3 test set to transmit and receive toward the facility loopback.

Perform the following tests for each DS3 circuit cabled to the 1665 DMX.

1 Select Fault -> Analysis -> Loopback...

2 Choose the DS3 port to test and click Select.

3 Select Operate and Loopback Type: Facility and click Apply.

4 Once the loopback is up, a test signal shall be generated at the DS3 terminating equipment which will verify that the cabling is correct.

> **Important!** A test set can be applied at the DSX-3 to test cabling toward the facility loopback.

5 While observing the error-free transmission, grasp the DS3 cable about two inches from the BNC connector head and gently rotate (twist) the cable in a clockwise and counter clockwise direction about 45 degrees (gently).

> **Result:** If any errors are detected while performing this "wiggle test," the BNC connector must be cut off and replaced.

If an error free signal is not received:

- Check the LBOs settings using **View -> Equipment** (see Setting DS3/EC1 and TMUX LBOs (p. 4-5).
- Verify that the pack is provisioned for the framing format being sent from the test set, CBIT or M13.
- Verify that the port is provisioned for DS3. See Verify provisioning (p. 4-22).
- Check the DS3/EC1 cabling for proper connections.

6 Once the test is complete, remove the loopback.

Select Fault -> Analysis -> Loopback...

7 Choose the DS3 port to test and click Select.

8 Select Release and Loopback Type: Facility and click Apply.

9 Repeat Step 1 through Step 8 for each DS3 cabled to the DSX-3.

10 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS3 non-terminating transmission (optical main OLIU)

Perform the remaining steps in this procedure for all Function Groups equipped with LNW16 (12DS3/EC1), LNW19/LNW19B (48DS3/EC1), LNW18 (TMUX) or LNW20 (48TMUX) circuit packs that are terminated at a DSX3 patch panel.

1 Select Configuration -> Cross-Connections...

2 Use the Cross-Connection Wizard to enter a new cross-connection at the STS1 rate, UPSR Ring Add/Drop, between m-1-1 and fn-1 (fn will be a,b,c or d depending on the slot where the DS3 or TMUX CP is located).

3 Set the DS3 test set to transmit and receive a framed Pseudo Random Bit Stream (PRBS) DS3 test signal M13.

M13 should be used to test TMUX.

4 Connect a cable from the DS3 test set **transmit** connection to the IN jack of the DSX-3 associated with the first DS3 or TMUX tributary of the 1665 DMX Function Unit slot to be tested.

5 Connect a cable from the DS3 test set **receive** connection to the OUT jack of the DSX-3 associated with the first DS3 or TMUX tributary of the 1665 DMX Function Unit slot to be tested.

Result: The DS3 test set should indicate it is receiving an error free PRBS signal. To verify that the port on the DS3 or TMUX pack is receiving the signal, verify that the port has transitioned to an "in service" state with the **View -> Equipment** command.

A port state of "IS" indicates that the pack is receiving a good signal to the port.

6 While observing the error-free transmission at the DSX, grasp the DS3 cable about two inches from the BNC connector head and gently rotate (twist) the cable in a clockwise and counter clockwise direction about 45 degrees (gently).

Result: If any errors are detected while performing this “wiggle test,” the BNC connector must be cut off and replaced.

If an error-free signal is not received:

- Check the LBOs settings using the **View -> Equipment** command (see Setting DS3/EC1 and TMUX LBOs (p. 4-5).
- Verify that the pack is provisioned for the framing format being sent from the test set, M13.
- Verify that the port is provisioned for DS3. See Verify provisioning (p. 4-22).
- Check the DS3/EC1 cabling for proper connections.

7 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

DS3 protection switching

DS3 function unit protection switching test (manual)

Use this procedure to test all of the Function Unit Slots occupied with an LNW16(DS3/EC1), LNW19/LNW19B(48DS3/EC1), LNW18 (TMUX) or LNW20 (48TMUX) circuit pack, whether they are cabled to a DSX or terminating equipment.

Important! This test is performed when the DS3 circuit packs are in a 1x1 protection arrangement.
It is not mandatory to perform this test on each sts cross-connection, however this procedure should be performed on each Function Unit Slot pair.

1 Locate the Function Group equipped with the DS3/TMUX circuit pack.

2 Unseat the active circuit pack. The active circuit pack has an ACTIVE LED lit.

Result: The ACTIVE LED on the other circuit pack in the Function Group will light. The MN alarm and the NE LED lamps on the SYSCTL will light. Transmission at the test set will take a momentary hit and then re-establish.

3 Unseat the second circuit pack of the pair.

Result: On the SYSCTL, the MN alarm extinguishes and the CR alarm lights. The test set is registering loss of transmission.

4 Reseat the first circuit pack that was removed.

Result: The ACTIVE LED on the reseated circuit pack will light. The FAULT LED on the circuit pack will light for several seconds then extinguish. On the SYSCTL, the CR alarm extinguishes and the MN alarm and the NE LED will be lit. Transmission is re-established at the test set.

5 Reseat the second circuit pack.

Requirement: The ACTIVE LED on the first circuit pack remains on.
The ACTIVE LED on the second circuit pack remains off.
The FAULT LED on the second circuit pack will light for several seconds then extinguish.
On the SYSCTL, the MN alarm extinguishes.

6 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS3 function unit protection switching test (command)

While an STS cross-connection exists, and a test set is connected, the protection switching will be verified.

This test will initiate switching commands from the CIT and verify proper switching and LED indications while monitoring transmission at a test set.

Important! It is not necessary to perform this test on each sts cross-connection, however this procedure should be performed on each Function Unit Slot pair.

1 Select Fault -> Protection Switch...

2 Click on 1+1 Equip fn-x (x is a,b,c or d corresponding to the function group equipped with DS3).

3 Click Select.

4 In the Switch Type: pull-down, select Manual (Normal).

5 Click Apply.

Result: The pack that was active should now be the standby pack and the pack that was standby is now active. Transmission should take a momentary hit as it is switched to the other pack. This information should agree with the ACTIVE LEDs on the LNW16/LNW19/LNW19B, LNW18 or LNW20 circuit packs.

6 Repeat Step 1 through Step 5 to verify a switch back to the original Function Unit circuit pack, with the same results as the previous step.

7 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

DS3 path switching test (command)

While an STS cross-connection exists, and a test set is connected, path switching will be verified.

> **Important!** It is not mandatory to perform this test on each sts cross-connection, however this procedure should be performed on each Function Unit Slot pair.

1 Select Fault -> Protection Switch...

2 Under Path Protection, click on Path m-1-1.

3 Click Select.

4 At the Switch Type: pull-down, select Manual.

5 Click Apply.

> **Result:** The Active Path: indicates a change from m1 to m2 (or if m2 was originally the active path, the switch is from m2 to m1).
> The Switch Request State: indicates Manual Switch.

6 At the Switch Type: pull-down, select Clear.

7 Click Apply.

8 Repeat Step 1 through Step 7 to verify a switch back to the original ring.

9 Repeat Step 1 through Step 7 to verify a switch back to the original ring.

10 Check off the appropriate box in Appendix E, “Installation checklist”

END OF STEPS

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DS3 cleanup procedures

Delete the existing DS3 cross-connections

Before moving on to the next port to test, it is necessary to remove the cross-connection.

1 Select Configuration -> Cross-Connections...

2 Use the Cross-Connection Wizard to Delete leg(s) of an existing cross-connection associated with CP main-1, Port 1.

Result: The DS3 test set should indicate a blue (AIS) signal is being received in place of the PRBS signal.

3 Remove the test set connections from the DSX-3.

4 Select Configuration -> Update System... -> Update All.

Result: This command will remove alarms generated by removing the test signals from the DSX-3.

5 Repeat the DS3 terminating equipment loopback testing (optical main OLIUs) (p. 4-23) or the DS3 non-terminating transmission (optical main OLIU) (p. 4-26) procedure and the Delete the existing DS3 cross-connections (p. 4-32) procedure to test each of the remaining DS3 tributaries of the Function Unit, substituting the following address information within the Cross-Connection Wizard. This is necessary in order to ensure that the cabling of each port address is correct.

The table below lists the tributaries and cross-connections for all DS3s associated with a function group.

When testing cabling for a Function Unit slot other than **a**, replace the **a** in each of the addresses with the letter (**b**, **c**, or **d**) corresponding to the Function Unit slot under test.

Table 4-3 DS3 Cross-Connections

Tributary @ DSX-3	Cross-Connection
2	m-1-2,a-2
3	m-1-3,a-3
4	m-1-4,a-4
5	m-1-5,a-5
6	m-1-6,a-6
7	m-1-7,a-7
8	m-1-8,a-8
9	m-1-9,a-9
10	m-1-10,a-10
11	m-1-11,a-11
12	m-1-12,a-12
13*	m-1-13,a-13
14*	m-1-14,a-14
15*	m-1-15,a-15
16*	m-1-16,a-16
17*	m-1-17,a-17
18*	m-1-18,a-18
19*	m-1-19,a-19
20*	m-1-20,a-20
21*	m-1-21,a-21
22*	m-1-22,a-22
23*	m-1-23,a-23
24*	m-1-24,a-24
25*	m-1-25,a-25
26*	m-1-26,a-26
27*	m-1-27,a-27
28*	m-1-28,a-28
29*	m-1-29,a-29

Tributary @ DSX-3	Cross-Connection
30*	m-1-30,a-30
31*	m-1-31,a-31
32*	m-1-32,a-32
33*	m-1-33,a-33
34*	m-1-34,a-34
35*	m-1-35,a-35
36*	m-1-36,a-36
37*	m-1-37,a-37
38*	m-1-38,a-38
39*	m-1-39,a-39
40*	m-1-40,a-40
41*	m-1-41,a-41
42*	m-1-42,a-42
43*	m-1-43,a-43
44*	m-1-44,a-44
45*	m-1-45,a-45
46*	m-1-46,a-46
47*	m-1-47,a-47
48*	m-1-48,a-48

Important! Tribs 13-48 (denoted *) are for LNW19/LNW19B and LNW20 circuit packs only.

6 Repeat this procedure for each Function Unit slot cabled to a DSX-3 via DS3/EC1 cabling.

7 Verify there are no existing DS3 cross-connections. Use the View -> Cross-Connections command.

8 Select Configuration -> Update System... -> Update All.

Result: This command will remove alarms generated by removing the test signals from the DSX-3.

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

LNW66, LNW71 and LNW74 (10/100T) TX Ethernet cabling testing

Description

This procedure is used to test the Ethernet 10/100 TX cabling from the function groups to the RJ45 patch panel.

Ethernet port assignment verification testing

1 Connect the Front CIT cable between the PC and the CIT/RS 232 jack of System Controller and login to the shelf using the serial connection.

2 Identify the function groups that contain an LNW66, LNW71 or LNW74 (10/100T) circuit packs with cabling for testing.

3 Identify the RJ45 patch panel associated with the function groups identified above.

4 Connect the RJ45 cable from the first RJ45 on the patch panel to the Ethernet port on your PC.

5 Watch for the link LED to light on the PC's Ethernet card or wait for 30 seconds and then disconnect the RJ45 cable from the patch panel.

6 The Fault LED will start flashing on the LNW66, LNW71 or LNW74.

7 Verify that there is an inc. FE-LAN LOS alarm associated with the Ethernet port where the signal was removed. Use the Alarm List button on the CIT system view.

8 Select Configuration -> Update System... -> Update All.

Result: The flashing fault LED on the LNW66, LNW71 or LNW74 will clear.

9 Connect the RJ45 cable to the next jack on the RJ45 patch panel and repeat starting at Step 5 until all connected jacks have been tested.

10 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Ethernet port wiring verification testing

Important! Continue with the following section only for LNW66 circuit packs. Testing is complete for LNW71 and LNW74 packs!

1 If not still connected serially from the last procedure then, connect the Front CIT cable between the PC and the CIT/RS-232 jack of System Controller and login to the shelf using the serial connection.

2 Select Configuration -> Data -> Create Virtual Switch.

3 Choose the LNW66 that is being tested.

4 Click Select.

5 Enter Virtual Switch ID: 1.

6 Under Ethernet (LAN) Ports, click Select All.

7 Click Apply.

8 Click Close

9 Select Configuration -> Data -> Create VLAN

10 Choose the CP fn circuit pack that applies.

11 Click Select.

12 Enter VLAN ID:100

13 Choose Virtual Switch:1

14 Under “Untagged Traffic” click on Select All.

15 Click Apply.

16 Connect a RJ45 Ethernet cable from the LAN port on the LNW2 SYSCTL to the first position on the RJ45 Ethernet patch panel.

17 Connect a second RJ45 Ethernet cable from the PC Ethernet port to the second position on the RJ45 Ethernet patch panel.

18 Watch for the link LED to light on the PC’s Ethernet card or wait for 30 seconds.

19 Login to the shelf using the OSI connection.

Result: Successful login to the 1665 DMX.

20 Log out of the 1665 DMX shelf.

21 At the RJ45 Ethernet patch panel disconnect the RJ45 Ethernet cable run to the PC Ethernet port and connect it to the next position on the RJ45 Ethernet patch panel to be tested.

22 Ignore the flashing fault LED on the Ethernet circuit pack and any alarms on the shelf.

23 Watch for the link LED to light on the PC's Ethernet card or wait for 30 seconds.

24 Login to the shelf using the OSI connection.

Result: Successful login to the 1665 DMX.

25 Log out of the 1665 DMX shelf.

26 Repeat this procedure starting at Step 21 for the remaining Ethernet connections on the RJ45 patch panel connected to the LNW66 under test, then continue on to Step 27.

27 Disconnect the PC from the RJ45 patch panel and the 1665 DMX LAN port from the RJ45 patch panel.

28 Connect the Front CIT cable between the PC and the CIT/RS 232 jack of System Controller and login to the shelf using the serial connection.

29 Select Configuration -> Update System... -> Update All.

Result: The flashing fault LED on the Ethernet circuit pack will clear and any alarms on the 1665 DMX shelf will also clear.

30 Select Configuration -> Data -> Delete Virtual Switch.

31 Choose the LNW66 circuit pack and click Select.

32 Select the VRTSW ID and click Apply.

33 Log out and disconnect the PC from the 1665 DMX serial port.

34 Repeat this procedure for every slot containing and LNW66, LNW71, and LNW74.

35 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

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OC-3 (LNW37, LNW45, LNW55)/OC-12 (LNW49, LNW55)/OC-48 (LNW55, LNW62) low-speed SFP test procedure

OC-3/OC-12/OC-48 SFP low-speed SFP test procedure

CAUTION

Laser safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Important! When reference is made to optical fiber loopback connections to IN and OUT on the OLIU, make the connections at the LGX equipment in order to verify correct installation and labeling of the fibers.

LBOs are installed on the OLIU faceplate IN port.

1 Identify the function groups that contain an LNW37/LNW45 OC-3, LNW49 OC-12, LNW62 OC-48 or LNW55 12 port multi-rate OLIU circuit pack.

2 Insert a 15-dB LC-type LBO into the top IN connector (Port 1) of the first SFP equipped. Refer to Appendix C, “Installing fiber connectors and LBOs”.

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 1).

3 Connect the Port 1 IN connector to the Port 1 OUT connector (at the LGX) of the OC-3, OC-12 or OC-48 OLIU using an optical fiber jumper cable. Refer to Appendix B, “Fiber cleaning” for proper fiber cleaning instructions.

Requirement: The FAULT LED on the OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

4 Remove the optical fiber jumper from the OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

The alarm on the SFP module will flash.

5 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

6 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OLIU. There should be no alarm indications on the 1665 DMX shelf.

7 From the system view click Alarm List to verify that the circuit pack alarm is cleared.

8 Repeat this entire procedure for each LNW37, LNW45, LNW49, LNW55 or LNW62 SFP equipped in the 1665 DMX shelf.

9 Replace all protective dust covers on the LNW37, LNW45, LNW49 or LNW62 SFP OLIU connectors (OLIU and LGX), that were removed to perform this procedure.

10 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

☐

OC-3 (low-speed) testing

OC-3 testing procedure

Perform the following steps for all 1665 DMX shelf Function Unit or Growth slots containing OC-3 (LNW36) OLIU circuit packs.

CAUTION

Laser safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Important! When reference is made to optical fiber loopback connections to IN and OUT on the OLIU, make the connections at the LGX equipment in order to verify correct installation and labeling of the fibers.

LBOs are installed on the OLIU faceplate IN port.

1 Identify the function groups that contain an OC-3 OLIU circuit pack and fully insert the OLIU into the shelf.

Requirement: After a few moments, the ACTIVE LED should be lit on the OC-3 OLIU.

2 Insert a 15-dB LC-type LBO into the top IN connector (Port 1) of the OC-3 OLIU. Refer to Appendix C, “Installing fiber connectors and LBOs”.

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 1).

3 Connect the Port 1 IN connector to the Port 1 OUT connector (at the LGX) of the OC-3 OLIU, using an optical fiber jumper cable. Refer to Appendix A, “Laser safety and classifications and Electrostatic Discharge (ESD) considerations” for proper fiber cleaning instructions.

Requirement: The FAULT LED on the OC-3 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-3 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

4 Remove the optical fiber jumper from the OC-3 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-3 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

5 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

6 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-3 OLIU. There should be no alarm indications on the 1665 DMX shelf.

7 Place the 15-dB LBO that was removed from the OC-3 OLIU (Port 1) and place it on the IN connector directly below it (Port 2).

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 2).

8 Connect the Port 2 IN connector to the Port 2 OUT connector (at the LGX) of the OC-3 OLIU, using an optical fiber jumper cable.

Requirement: The FAULT LED on the OC-3 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-3 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

9 Remove the optical fiber jumper from the OC-3 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-3 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

10 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

11 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-3 OLIU. There should be no alarm indications on the 1665 DMX shelf.

12 Remove the 15-dB LBO from the OC-3 OLIU (Port 2) and place it on the IN connector directly below it (Port 3).

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 3).

13 Connect the Port 3 IN connector to the Port 3 OUT connector (at the LGX) of the OC-3 OLIU, using an optical fiber jumper cable.

Requirement: The FAULT LED on the OC-3 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-3 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

14 Remove the optical fiber jumper from the OC-3 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-3 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

15 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

16 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-3 OLIU. There should be no alarm indications on the 1665 DMX shelf.

17 Remove the 15-dB LBO from the OC-3 OLIU (Port 3) and place it on the IN connector directly below it (Port 4).

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 4).

18 Connect the Port 4 IN connector to the Port 4 OUT connector (at the LGX) of the OC-3 OLIU, using an optical fiber jumper cable.

Requirement: The FAULT LED on the OC-3 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-3 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

19 Remove the optical fiber jumper from the OC-3 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-3 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

20 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

21 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-3 OLIU. There should be no alarm indications on the 1665 DMX shelf.

22 Remove the 15-dB LBO from the OC-3 OLIU (port 4).

23 Replace all protective dust covers on the OC-3 OLIU connectors (OLIU and LGX), that were removed to perform this procedure.

24 Repeat this entire procedure for each OC-3 OLIU in the 1665 DMX shelf.

25 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

OC-12 (low-speed) testing

OC-12 testing procedure

Perform the following steps for all 1665 DMX shelf Function Unit or Growth slots containing OC-12 (LNW46) OLIU circuit packs.

CAUTION

Laser safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Important! When reference is made to optical fiber loopback connections to IN and OUT on the OLIU, make the connections at the LGX equipment in order to verify correct installation and labeling of the fibers.

LBOs are installed on the OLIU faceplate IN port.

1 Identify the function groups that contain an OC-12 OLIU circuit pack and fully insert the OLIU into the shelf.

Requirement: After a few moments, the ACTIVE LED should be lit on the OC-12 OLIU.

2 Insert a 15-dB LC-type LBO into the top IN connector (Port 1) of the OC-12 OLIU. Refer to Appendix C, “Installing fiber connectors and LBOs”.

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 1).

3 Connect the Port 1 IN connector to the Port 1 OUT connector (at the LGX) of the OC-12 OLIU, using an optical fiber jumper cable. Refer to Appendix B, “Fiber cleaning” for proper fiber cleaning instructions.

Requirement: The FAULT LED on the OC-12 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC1-2 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

4 Remove the optical fiber jumper from the OC-12 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-12 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

5 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

6 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-12 OLIU. There should be no alarm indications on the 1665 DMX shelf.

7 Remove the 15-dB LBO from the OC-12 OLIU (Port 1) and place it on the IN connector directly below it (Port 2).

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 2).

8 Connect the Port 2 IN connector to the Port 2 OUT connector (at the LGX) of the OC-12 OLIU, using an optical fiber jumper cable.

Requirement: The FAULT LED on the OC-12 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-12 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

9 Remove the optical fiber jumper from the OC-12 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-12 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

10 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

11 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-12 OLIU. There should be no alarm indications on the 1665 DMX shelf.

12 Remove the 15-dB LBO from the OC-12 OLIU (Port 2).

13 Replace all protective dust covers on the OC-12 OLIU connectors, that were removed to perform this procedure.

14 Repeat this entire procedure for each OC-12 OLIU in the 1665 DMX shelf.

15 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

OC-12 facility loopback testing

Facility Loopback testing allows the installer to verify cabling to the OC-12 equipment. This test is only required if the 1665 DMX shelf is connected to OC-12 equipment. If the shelf is NOT connected to OC-12 equipment, skip this section and continue to the section on OC-48 low-speed testing procedure (p. 4-52).

Important! An optical test set with the capability to transmit OC-12 SONET levels are necessary for the testing.

The Function Unit slot under test must contain a OC-12 (LNW46) circuit pack in order to perform this test.

1 Log on to the 1665 DMX shelf using the CIT software as described in the Chapter 3, "Software download and circuit pack installation", "Use of WaveStar® CIT software" (p. 3-9).

2 Select Configuration -> Cross-Connections...

3 Use the Cross-Connection Wizard to enter a new cross-connection at the STS-12 rate, UPSR Ring Add/Drop, between m-1-1 and fn-1-1 (fn will be a,b,c,d or g depending on the slot where the OC-12 CP is located).

This command creates a cross-connect to map the first OC-12 of an OC-12 circuit pack to the first STS-12 of the Main OLIUs.

4 Verify transmission at the patch panel.

5 Select Configuration -> Cross-Connections...

6 Use the Cross-Connection Wizard to Delete leg(s) of an existing cross-connection associated with CP main-1, Port 1 (the OC-12 cross-connection).

7 Verify loss of transmission at the patch panel. This should be evident by a SONET alarm and a loss of pattern alarm.

8 Select Fault -> Analysis -> Loopback...

9 Choose the correct port on the OC-12 CP and click Select.

10 Click on Operate and Loopback Type: Facility.

11 Click Apply.

This command creates a facility loopback on the OC-12 port of an OC-12 circuit pack.

12 Verify transmission at the patch panel. There should be no alarms at the test set.

13 Select Fault -> Analysis -> Loopback...

14 Choose the correct port on the OC-12 CP and click Select.

15 Click on Release.

16 Click Apply.

17 Verify loss of transmission at the patch panel. This should be evident by a SONET alarm and a loss of pattern alarm.

18 Repeat this section for all OC-12 ports.

19 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

OC-48 (low-speed) testing

OC-48 low-speed testing procedure

Perform the following steps for all 1665 DMX shelf Function Unit or Growth slots containing OC-48 (LNW31, LNW425, LNW427, LNW447, LNW449, LNW453, LNW455, LNW459) OLIU.

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Important! When reference is made to optical fiber loopback connections to IN and OUT on the OLIU, make the connections at the LGX equipment in order to verify correct installation and labeling of the fibers.

LBOs are installed on the OLIU faceplate IN port.

1 Identify the function groups that contain an OC-48 OLIU circuit pack and fully insert the OLIU into the shelf.

Requirement: After a few moments, the ACTIVE LED should be lit on the OC-48 OLIU.

2 Insert a 15-dB LC-type LBO into the IN connector of the OC-48 OLIU. Refer to Appendix C, “Installing fiber connectors and LBOs”.

Connect the fibers labeled IN and OUT from the LGX to the OLIU (Port 1).

3 Connect the IN connector to the OUT connector (at the LGX) of the OC-48 OLIU, using an optical fiber jumper cable. Refer to Appendix B, “Fiber cleaning” for proper fiber cleaning instructions.

Requirement: The FAULT LED on the OC-48 OLIU will begin flashing and the MN and NE LEDs should be lit on the SYSCTL circuit pack.

After approximately 20 seconds the flashing FAULT LED should extinguish on the OC-48 OLIU and the FAULT, MJ and NE LEDs should be lit on the SYSCTL circuit pack.

4 Remove the optical fiber jumper from the OC-48 OLIU (at the LGX).

Result: The FAULT LED should begin flashing on the OC-48 OLIU and only the MN and NE LEDs should be lit on the SYSCTL circuit pack.

5 From the system view click Alarm List to verify that the circuit pack alarm is associated with the optical port being tested.

6 Select Configuration -> Update System... -> Update All.

Requirement: The flashing FAULT LED should extinguish on the OC-48 OLIU. There should be no alarm indications on the 1665 DMX shelf.

7 Remove the 15-dB LBO from the OC-48 OLIU.

8 Replace all protective dust covers on the OC-48 OLIU connectors, that were removed to perform this procedure.

9 Repeat this entire procedure for each OC-48 OLIU in the 1665 DMX shelf.

10 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

OC-48 facility loopback testing

Facility Loopback testing allows the installer to verify cabling to the OC-48 equipment. This test is only required if the 1665 DMX shelf is connected to OC-48 equipment. If the shelf is NOT connected to OC-48 equipment, skip this section and continue to the next chapter.

Important! An optical test set with the capability to transmit OC-48 SONET levels are necessary for the testing.

The Function Unit slot under test must contain an OC-48 (LNW31, LNW425, LNW427, LNW447, LNW449, LNW453, LNW455, LNW459) circuit pack in order to perform this test.

1 Log on to the 1665 DMX shelf using the CIT software as described in the Chapter 3, "Software download and circuit pack installation", "Use of WaveStar® CIT software" (p. 3-9).

2 Select Configuration -> Cross-Connections...

3 Use the Cross-Connection Wizard to enter a new cross-connection at the STS48 rate, UPSR Ring Add/Drop, between m-1-1 and fn-1-1 (fn will be a,b,c,d or g depending on the slot where the OC-48 CP is located).

This command creates a cross-connect to map the first STS-48 of an OC-48 circuit pack to the first STS-48 of the Main OLIUs.

4 Verify transmission at the patch panel. There should be no alarms at the test set.

5 Select Configuration -> Cross-Connections...

6 Use the Cross-Connection Wizard to Delete leg(s) of an existing cross-connection associated with CP main-1, Port 1 (the OC-48 cross-connection).

7 Verify loss of transmission at the patch panel. This should be evident by a SONET alarm and a loss of pattern alarm.

8 Select Fault -> Analysis -> Loopback...

9 Choose the correct port on the OC-48 CP and click Select.

10 Click on Operate and Loopback Type: Facility.

11 Click Apply.

This command creates a facility loopback on the OC-48 port of an OC-48 circuit pack.

12 Verify transmission at the patch panel. There should be no alarms at the test set.

13 Select Fault -> Analysis -> Loopback...

14 Choose the correct port on the OC-48 CP and click Select.

15 Click on Release.

16 Click Apply.

17 Verify loss of transmission at the patch panel. This should be evident by a SONET alarm and a loss of pattern alarm.

18 Repeat this section for all OC-48 ports.

19 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

LED test

Description

This test verifies proper operation of all LEDs on the 1665 DMX circuit packs. Operation of all the LEDs is necessary to assist in trouble isolation.

Important! If there are any LED failures, determine if the problem is with the circuit pack or shelf and replace the faulty unit.

Important! If the shelf is not fully equipped, move circuit packs around and repeat the test for all valid circuit pack positions.

LED test procedure

1 Select Fault -> Test -> LED...

2 Choose shelf (1665 DMX).

3 Click Select.

4 Choose Number of Iterations: 1.

5 Click OK.

Result: All LEDs on the shelf should light for 10 seconds, then extinguish for 10 seconds, and then the proper LEDs will light to indicate the current status of the shelf.

6 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Additional optical tests (optional)

Low -speed optical testing

The following procedure is provided for installers wishing to further test the low-speed optical packs using an optical test set. Perform the following steps for all 1665 DMX shelf Function Unit or Growth slots. DCC will be disabled in order to prevent DCC alarms from being generated due to the optical loopback.

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

To test this procedure an optical test set is required as well as a 1x2 optical splitter.

Important! When reference is made to optical fiber loopback connections to IN and OUT on the High-Speed OLIU, make the connections at the LGX equipment in order to verify correct installation and labeling of the fibers.

The high-speed packs (OC-12, OC-48 or OC-192) should still be looped back on themselves and the dcc disabled to prevent dcc alarms. The dcc can be verified with the View -> DCC GUI command. If the high speed packs are no longer looped back, do so at the LGX panel. The dcc should also be disabled at the function unit slot under test since it will be connected to a test set and will register alarms. The dcc can be provisioned with the Provision -> DCC Terminations GUI command. Change the dcc on M2 and the FN slots by using the same command and double clicking on the m1 and selecting m2 or selecting the FN a-g slot.

The OC-48 Optical Packs including the High-Speed OLIUs should be attenuated with 15-dB LBOs. If using OC-192 in the high-speed slots, attenuate with 5 dB. LBOs are installed on the OLIU faceplate IN port.

Procedure

Log in to the 1665 DMX shelf and verify that there are no existing alarms by viewing the Alarm List.

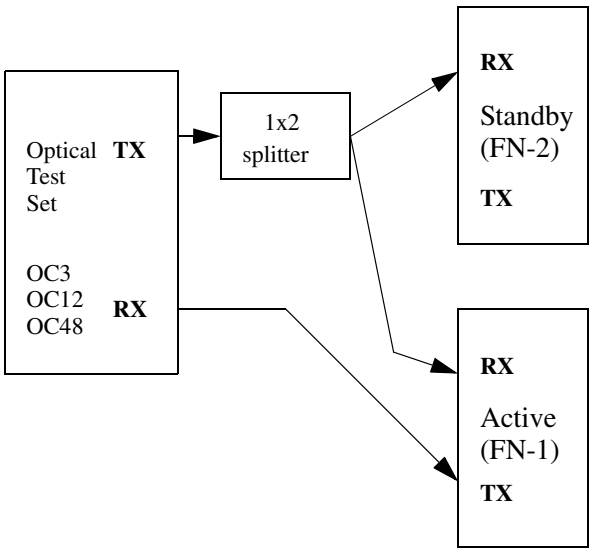
1 Starting at Function Slot A, insert the optical packs to be tested in Slot A-1 and A-2. Both packs must be of the same type, otherwise a **circuit pack not allowed alarm** will be displayed.

2 At the LS LGX Bay, measure the TX output level of all Ports on all OC-3, OC-12 and OC-48 low-speed cards. Ensure the transmit level conforms to Appendix A, Table A-2, "1665 DMX Optical Circuit Pack Laser Safety Specifications" (p. A-11). If the levels are not within specification, check the levels at the 1665 DMX. If levels are not within specification at the 1665 DMX, replace the pack with a spare and return the suspect pack back through the RMA process. If levels meet specifications, check the fiber to the LGX panel for continuity.

3 Ensure that the optical packs to be tested have 15-dB attenuators inserted to the IN port of the port under test. Failing to insert attenuators may overdrive the circuitry and cause permanent damage to the circuit packs. Start testing in Port 1.

4 Connect the optical test set using the 1 x 2 optical splitter. The TX of the test set is connected to the LGX ports corresponding to the RX of both FN-1 and FN-2 of the function slots under test. The LGX port corresponding to the TX of the port under test of FN-1 (active slot) is connected to the RX of the test set. (Some test sets require an attenuation of at least 10dB on the RX side). Reference Figure 4-1, "Optical test set arrangement" (p. 4-59).

Figure 4-1 Optical test set arrangement



5 Set the test set to the required rate for the packs under test. Refer to Table 4-4, Transmission rate.

Table 4-4 Transmission rate

	OC-3 (LNW36,LNW37, LNW45,LNW55)	**OC-12 (LNW46,LNW49, LNW55)**	**OC-48 (LNW31,LNW55, LNW62,LNW425, LNW427, LNW447, LNW449, LNW453, LNW455, LNW459)**
Test signal mapping	STS-3C	STS-3C/12C	STS-3C/12C/48C
Pattern	2^23 -1 PRBS	2^23 -1 PRBS	2^23 -1 PRBS

6 Once the test set is in place, it will display pattern and AIS alarms. This is due to the fact that we have not established a cross-connection. Enter a cross-connection either through the GUI using the cross-connect wizard. Enter the command according to the optical pack and function slot under test.

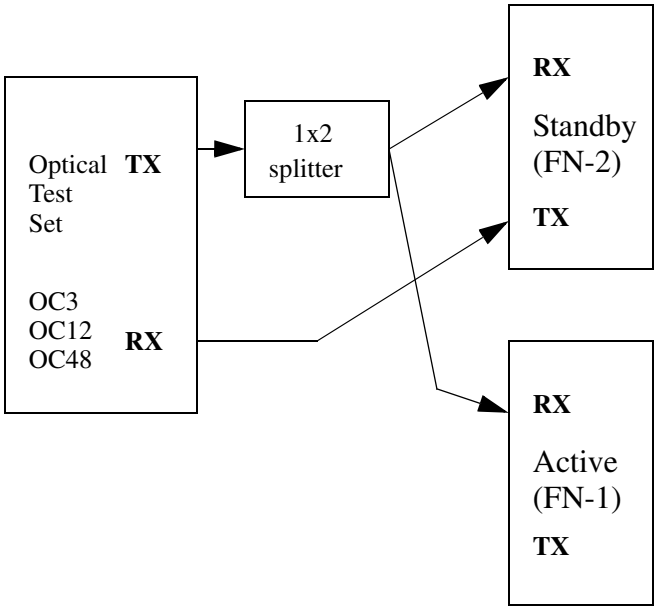
7 Check the transmission at the test set. It should show no alarms. If alarms are present, check the test set provisioning and the cross-connection to ensure they correspond to the pack under test. Make any adjustments necessary, and do not continue the test until transmission is good.

8 Check that the pack in FN-1 is the active pack with the GUI command View -> Protection and selecting the associated pack.

If slot 1 is the active slot continue with testing, if slot 2 is active and slot 1 is standby, reseat the pack in slot 2, switching the active path to slot 1.

9 At the LS LGX Bay, move the Test Set RX cable to the Standby TX Port, refer to Figure 4-2. Examine the test traffic received by the test set. Look for errors or any other signal information that the test set is capable of indicating. The Standby OCN card should be running without errors.

Figure 4-2 Optical test arrangement RX fiber moved



10 Remove the Test Set TX cable from the Active OCN Card in FN-1. This will result in an Active to Standby OCN card switch. Verify that the traffic switched to the current Active OCN card FN-2, and that there is a LOS alarm issued against the current Standby OCN

card FN-1. Retrieving the alarms can be accomplished by selecting the Alarm List button on the top right of the GUI.

Important! The test set will indicate that there was a transmission hit indicating the switch, but should clear and show good transmission.

11 Return the Test Set TX Cable to normal operation and ensure that the LOS alarm clears.

12 Delete any cross-connects through the GUI Cross-Connection Wizard.

13 Select Configuration -> Update System... -> Update All.

14 Repeat this test on all OCN ports for all optical packs which will reside in the shelf.

15 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

5 Operational tests

Overview

Purpose

This section provides instructions to test protection switching and the non-transmission cabling. This section is not intended to replace acceptance test procedures. If problems are encountered, refer to 365-373-302, *1665 Data Multiplexer Alarm Messages and Trouble Clearing Guide* for detailed troubleshooting procedures.

Contents

This chapter provides information on the following topics:

Office alarm test	5-4
Automatic protection switching and alarm test	5-8
Manual switching tests	5-11
External timing verification	5-13
Miscellaneous (environmental) discrete telemetry test	5-16
Modem connection test	5-19
Final operations	5-21

Tools, test equipment and accessories

Listed below are the tools, test equipment and accessories necessary to perform the procedures in this section.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.
1	ESD Wrist Strap	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	Multimeter (Optional)	The voltmeter must be capable of measuring DC voltage in the 40 to 60 volt range. The use of the voltmeter is optional since the shelf will alarm or shut down if the proper voltage is not supplied.
1	DS1 Error Rate Test Set	A DS1 error rate test set is required for testing of DS1 cabling. A T-BERD 211 or equivalent is recommended.
1	DS3 Error Rate Test Set	A DS3 error rate test set is required for testing of DS3 cabling. A T-BERD 305 or equivalent is recommended.
1	SONET Optical Test Set	An ONC3, OC-12, or OC-48 test set is required for testing of optical circuit packs. An Agilent OmniBER 718 or equivalent is recommended.
2	LC-type Optical Fiber Jumper (108918269)	Two optical fiber jumpers with LC type connectors are required to optically loop the 1665 DMX shelf for test purposes.
2	15 dB LC-type LBO (108279480)	Two 15-dB LBOs are required when optically looping the 1665 DMX shelf for test purposes.
2	20-dB LC-type LBO (108279530)	Two 20-dB LBOs are required when optically looping the 1665 DMX shelf equipped with LNW60.
1	Personal Computer (PC)	See Chapter 3, “Software download and circuit pack installation”, “PC minimum requirements” (p. 3-2).
1	CIT Interface Cable	8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869).

Safety instructions

Important! All precautions should be observed when handling fiber.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

CAUTION

The operational tests in this section are run only in an out-of-service mode of operation. Office alarms will normally be connected only during the office alarm test to prevent constant alarms throughout this section.

□

Office alarm test

Description

This test verifies proper operation and wiring of the office alarms in a Network Equipment Building System (NEBS) environment.

Audible and visual reporting of critical, major, minor alarms will be verified.

Prerequisite

The following is a list of items to verify before beginning tests in this section.

- The 1665 Data Multiplexer (1665 DMX) Main OLIUs should be optically looped from the previous section. Verify that the 1665 DMX shelf is clear of all alarms (only green LEDs are lighted) prior to and after completing this test.
- The office alarm cable will be temporarily connected during this procedure. Table 5-1, “Office Alarm Connections” (p. 5-5) lists the office alarms connections.
- It is a requirement that alarms on the 1665 DMX do not affect and are not affected by other equipment via office alarm connections. During this test, the alarm state of other equipment connected to the same office alarms as the 1665 DMX should be examined after creating or clearing every alarm.
- A properly grounded ESD wrist strap must always be worn while handling circuit packs.
- This test should be performed on all shelves where office alarm reporting is required.
- After completing the office alarm test, the 1665 DMX office alarms should be disconnected from the office alarm system for the remainder of the test procedures. This will prevent the office alarms from being activated while performing the other tests in this section.

Table 5-1 Office Alarm Connections

Conn.	Pin#	Color	Designation	Name
J12-J13	1	BL-W	RYMJV1	Minor Alarm Visible
	2	W-BL	RYMJV2	Minor Alarm Visible Return
	3	O-W	RYMJA1	Minor Alarm Audible
	4	W-O	RYMJA2	Minor Alarm Audible Return
	5	G-W	RYMNV1	Major Alarm Visible
	6	W-G	RYMNV2	Major Alarm Visible Return
	7	BR-W	RYMNA1	Major Alarm Audible
	8	W-BR	RYMNA2	Major Alarm Audible Return
	9	S-W	RYCRV1	Critical Alarm Visible
	10	W-S	RYCRV2	Critical Alarm Visible Return
	11	BL-R	RYCRA1	Critical Alarm Audible
	12	R-BL	RYCRA2	Critical Alarm Audible Return

Office alarm test procedure

1 Connect the office alarm cable to J12 (ALM) on the backplane of the 1665 DMX shelf. If the shelf to be tested is part of a multiple shelf bay arrangement, the office alarm cable connects to shelf 1.

2 Verify that one of the function groups is equipped with LNW6/LNW7/LNW8 DS1, LNW16/LNW19/LNW19B DS3 or LNW18/20 TMUX circuit packs.

3 Establish a CIT session by following the procedure under "Use of WaveStar® CIT software" (p. 3-9) in Chapter 3, "Software download and circuit pack installation".

4 Select Configuration -> Cross-Connections.

5 Use the Cross-Connection Wizard to enter a new cross-connection at the STS-1 rate, UPSR Ring Add/Drop, between m1-1-1 and fn1-1 (fn will be a,b,c or d depending on the slot where the DS1, DS3, or TMUX CP is located).

This command creates a cross-connection to map 28 DS1s of a DS1circuit pack or the first DS3 of a DS3/EC1 or TMUX circuit pack in a Function Unit slot(s) to the first STS-1 of the Main OLIUs.

6 Select Configuration -> Alarms -> Alarm Configuration.

7 Choose Power Alarm Level: Major.

8 Click OK.

9 Unseat one of the LNW6/LNW7/LNW8, LNW16/LNW19/LNW19B or LNW18 circuit packs from the function group being used.

Requirement: Activated office alarms: MN visual, MN audible.

Important! Alarms will not be activated until the alarm delay time has passed. The default time is 2 seconds.

10 Press the ACO pushbutton on the SYSCTL.

Requirement: Activated office alarm: MN visual.
The MN audible alarm clears.

11 Using a small flat bladed screwdriver, set one of the circuit breakers to OFF.

Requirement: Activated office alarms: MN visual, MN audible.

12 Press the ACO pushbutton on the SYSCTL.

Requirement: Activated office alarm: MJ visual.
The MJ audible alarm should clear.

13 Unseat the second circuit pack from the same function group pair as the circuit pack removed in Step 9.

Result: Activated office alarms: CR visual, CR audible.

14 Press the ACO pushbutton on the SYSCTL.

Result: Activated office alarm: CR visual.
The CR audible alarm should clear.

15 Reseat the pair of function units.

16 Turn on the breaker that was turned off in Step 11.

Result: After a few minutes, all alarm indications should clear.

17 Disconnect the office alarm cable connected in Step 1 for the remainder of the test procedures in this chapter.

18 Select Configuration -> Alarms -> Alarm Configuration.

19 Choose Power Alarm Level: Minor.

20 Click OK.

Important! Do **NOT** delete the cross-connect that was entered for this test.

21 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

☐

Automatic protection switching and alarm test

Description

This section provides the procedures for verifying the 1665 DMX shelf automatic protection switching.

Note the following:

- These tests do NOT simulate circuit pack failures.
- The tests will verify proper alarm reporting and LED indications when circuit packs are removed.
- All protected circuit packs will be tested.
- A properly grounded wrist strap must always be worn while handling circuit packs.
- This test is performed with the 1665 DMX shelf optically looped back on itself (that is, with the IN of the OLIU M1 looped to the OUT of the OLIU M1, and the IN of the OLIU M2 looped to the OUT of the OLIU M2).
- Prior to performing each test, the shelf under test must be clear of all alarms (that is, only green LEDs are lit).

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

CAUTION

ESD hazard

A properly grounded ESD wrist strap MUST be worn when handling circuit packs.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

Main OLIU switching test

Use this procedure to test the following Main OLIU circuit packs in a UPSR (default) configuration:

OC-3

LNW82

OC-12

LNW48, LNW50, LNW54, LNW82

OC-48

LNW27, LNW29, LNW32, LNW76, LNW82, LNW202, LNW221-LNW259

OC-192

LNW56, LNW57, LNW58, LNW59 (VLF), LNW60, LNW502, LNW523, LNW527, LNW554 or LNW555.

It should be noted that switching tests for Function Unit circuit packs were performed in the previous chapter.

1 Establish a CIT session by following the procedure under Use of WaveStar® CIT software (p. 3-9) in Chapter 3, "Software download and circuit pack installation".

2 Select View -> Cross-Connections.

3 Choose shelf (1665 DMX) and click Select.

4 Verify that the cross-connection entered in the previous section is on the list. If there is no cross connect remaining from the previous section, then a cross connection must be established before continuing.

5 Select Configuration -> Cross-Connections.

6 Use the Cross-Connection Wizard to enter a new cross-connection at the STS-1 rate, UPSR Ring Add/Drop, between m1-1-1 and fn1-1 (fn will be a,b,c or d depending on the slot where the DS1, DS3, or TMUX CP is located).

This command creates a cross-connection to map 28 DS1s of a DS1 circuit pack or the first DS3 of a DS3/EC1 or TMUX circuit pack in a Function Unit slot(s) to the first STS-1 of the Main OLIUs.

7 Select View -> Protection.

8 Under Path Protection choose m-1-1.

9 Click Select.

10 Note the Active Path: (m1-1-1 or m2-1-1).

The M1 OLIU is associated with Ring 1 and the M2 OLIU is associated with Ring 2.

11 Disconnect the optical fiber connected to the IN port of the OLIU that is the active receiver.

Result: The MN and then NE alarm LED should light on the SYSCTL and the FAULT LED should flash on the OLIU.

12 Click Refresh in the View Protection window.

Result: The Active path has changed. (If m1-1-1 was active before, m2-1-1 is active now).

13 Reconnect the fiber at the OLIU.

Result: After a short time, the MN and NE alarm LEDs on the SYSCTL and the FAULT LED on the OLIU should extinguish.

14 Repeat Step 10 through Step 13 to verify a switch back to the OLIU that was originally active.

15 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

Manual switching tests

Description

This test will initiate switching commands from the CIT and verify proper switching and LED indications.

Main OLIU switch test

Important! An STS-1 cross-connect should still exist from the previous tests.

1 Select Fault -> Protection Switch.

2 Under Path Protection choose Path m-1-1.

3 Click Select.

4 Note the Active Path:.

5 In the Switch Type: pull-down, choose Manual.

6 Click Apply.

Requirement: The ring that was active in Step 4 is no longer active and the other ring is now active.

7 In the Switch Type pull-down, choose Clear.

8 Click Apply.

9 Repeat Step 4 through Step 8 to verify a switch back to the original ring.

10 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

☐

External timing verification

Description

This test should be performed if the 1665 DMX shelf is going to be externally timed. The shelf timing cable must be installed and connected between the 1665 DMX shelf and the office timing source (BITS clock) and the timing source must be active.

Timing verification test procedure

1 Determine the frame format (SF or ESF) and line code (AMI or B8ZS) of the DS1 timing signals being generated by the timing source.

2 Select Configuration -> Timing/Sync.

3 In the Timing Mode: pull-down, verify External Timing is displayed. If not choose External and click OK and select Configuration -> Timing/Sync.

4 Click on the Timing Input Ports tab at the top of the window.

5 Enter the DS1 Input and Output Format: (SF or ESF) for REF-1 and REF-2.

6 Enter the DS1 Input Line Code: (AMI or B8ZS) for REF-1 and REF-2.

7 Click OK.

8 Select View -> Timing/Sync.

Result:

- Correct line coding and frame format
- Provisioned and active timing mode are both external

- Both references are in service (IS)
- Which of the two references is active.

Important! If a reference does not indicate **IS**, that input is not receiving a proper timing reference. Verify:

– Cabling between the timing source and the 1665 DMX shelf

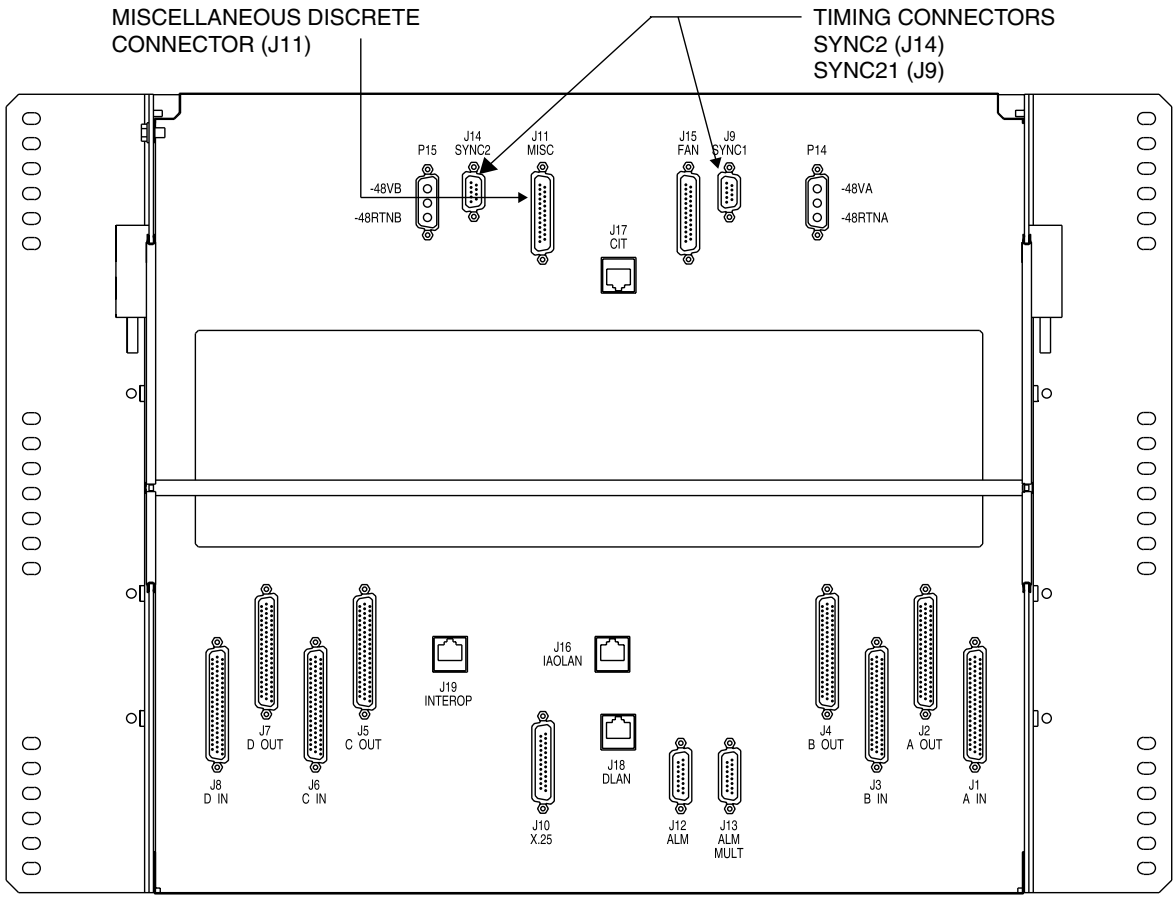
– Correct line coding

– Correct frame format.

9 At the rear of the shelf (see Figure 5-1, “1665 DMX Shelf Backplane” (p. 5-14)), disconnect the input timing cable from the connector associated with the active reference.

Requirement: The MN LED lights on the SYSCTL and the FAULT LED flashes on the MAIN OLIU circuit pack associated with that reference (SYNC1 is associated with M1 and SYNC2 is associated with M2).

Figure 5-1 1665 DMX Shelf Backplane



Important! Above is the 1665 DMX shelf, but it should be noted that the timing connections are the same for the 1665 DMX High-Capacity shelf.

10 Click Refresh in the View Timing/Sync window

Result: The other reference is now the active reference.

11 Reconnect the timing cable at the rear of the shelf.

Requirement: The MN LED extinguishes on the SYSCTL and the FAULT LED on the OLIU stops flashing.

12 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

☐

Miscellaneous (environmental) discrete telemetry test

Description

Miscellaneous discrete telemetry access allows the maintenance center to control and monitor equipment co-located with the 1665 DMX shelf. Perform this procedure for shelves that are cabled for miscellaneous discrete telemetry.

Miscellaneous discrete telemetry test procedure

1 Determine which environmental inputs are to be monitored via the 1665 DMX shelf.

2 Verify that the miscellaneous discrete cable is connected to the J11 MISC connector on the shelf. See Figure 5-1, “1665 DMX Shelf Backplane” (p. 5-14).

3 Refer to Table 5-2, “Miscellaneous (Environmental) Discrete Telemetry Connections” (p. 5-18) to determine the wire color of the cable lead associated with the environmental input to be tested.

4 At the far end of the cable, short the associated environmental input lead to the red-slate (R-S) Input Common lead.

5 Verify that the minor (MN) alarm lights on the SYSCTL.

6 From the system view click Alarm List.

Result: Verify that the correct environmental alarm has been activated.

7 Remove the short and verify that the minor (MN) alarm indication on the SYSCTL clears.

8 Repeat Step 3 through Step 7 for each environmental input being used.

9 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Figure 5-2 Miscellaneous (Environmental) Discrete Functions

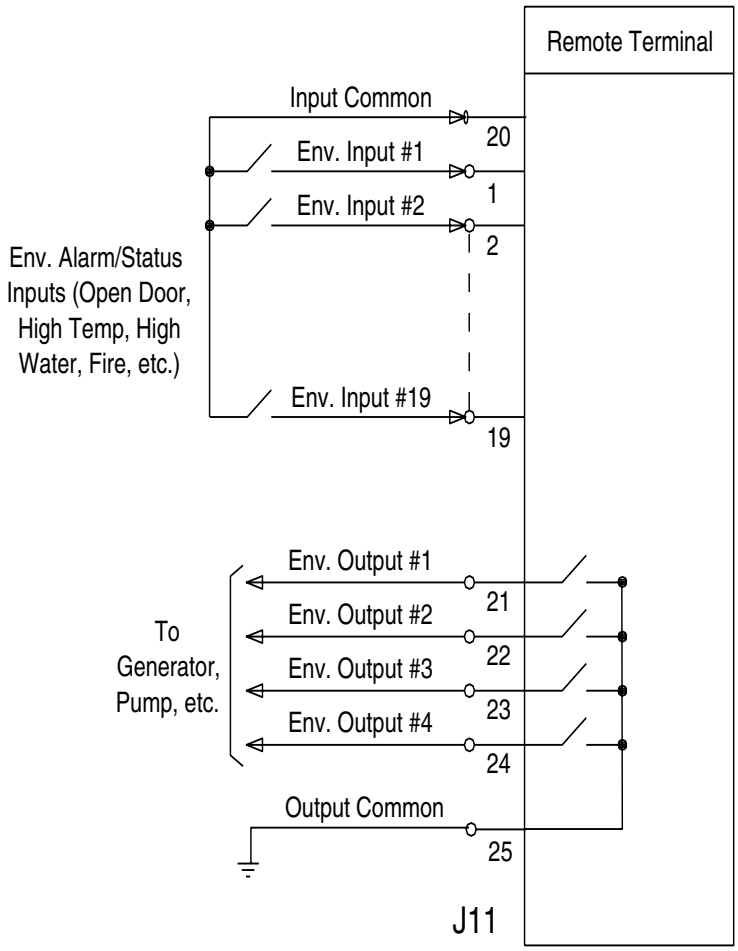


Table 5-2 Miscellaneous (Environmental) Discrete Telemetry Connections

Conn.	Pin#	Color	Designation	Name
J11	1	BL-W	TLMI1	Env. Input - #1
	2	W-BL	TLMI2	Env. Input - #2
	3	O-W	TLMI3	Env. Input - #3
	4	W-O	TLMI4	Env. Input - #4
	5	G-W	TLMI5	Env. Input - #5
	6	W-G	TLMI6	Env. Input - #6
	7	BR-W	TLMI7	Env. Input - #7
	8	W-BR	TLMI8	Env. Input - #8
	9	S-W	TLMI9	Env. Input - #9
	10	W-S	TLMI10	Env. Input - #10
	11	BL-R	TLMI11	Env. Input - #11
	12	R-BL	TLMI12	Env. Input - #12
	13	O-R	TLMI13	Env. Input - #13
	14	R-O	TLMI14	Env. Input - #14
	15	G-R	TLMI15	Env. Input - #15
	16	R-G	TLMI16	Env. Input - #16
	17	BR-R	TLMI17	Env. Input - #17
	18	R-BR	TLMI18	Env. Input - #18
	19	S-R	TLMI19	Env. Input - #19
	20	R-S	TLMIC48VTRN	Input Common
	21	BL-BK	TLMO1	Env. Output - #1
	22	BK-BL	TLMO2	Env. Output - #2
	23	O-BK	TLMO3	Env. Output - #3
	24	BK-O	TLMO4	Env. Output - #4
	25	G-BK	TLMOC	Output Common

Modem connection test

Description

This test will verify proper modem connection to the 1665 DMX shelf.

This test should only be performed if a modem is required.

Modem connection test procedure

1 Verify the generic parameters of the modem are set to the following:

Modem parameters

- 1200, 2400, 4800, 9600, or 19,200 baud
- Full duplex
- 8 data bits
- No parity bits
- 1 start bit
- 1 stop bit
- No flow control
- Transparent data mode - ON
- Direct operating mode - ON

Important! Modems supporting a large set of options and error detection capabilities may require other options be set before using the modems to download generic software. Refer to manufacture's manuals for instructions on setting modem parameters.

2 Verify that the modem cable is properly connected from the modem to J17 (CIT) on the backplane of the 1665 DMX shelf.

3 Verify that the modem is connected to the phone line.

4 Select Administration -> Data communications...

5 Click the Serial Port tab.

6 Choose CIT Port: cit-2.

7 Choose Baud Rate: to match the modem being connected.

8 Dial into the modem using an application such as HyperTerminal from a PC with a modem configured to similar parameters.

9 After a connection is established, press the enter key.

Result: /* SYSTEM TID: LT-DMX */

10 Enter the command:

```
act-user:LT-DMX:LUC01:ctag::DMX2.5G10G;
```

Result: A message indicating that the command completed will be displayed along with the Alcatel-Lucent disclosure.

11 Enter the command:

```
canc-user:LT-DMX:LUC01:ctag;
```

Result: A message indicating that the command completed will be displayed.

12 Disconnect the HyperTerminal session.

13 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Final operations

Description

The following procedure ensures that all test signals and cross-connects have been removed and the 1665 DMX shelf is alarm free and ready for network connection procedures.

Procedure

1 Select Configuration -> Cross-Connections...

2 Choose Delete leg(s) of an existing cross-connection.

3 Click Next and continue with the Cross-Connection Wizard to delete the cross-connections associated with CP main-1, Port 1.

4 To verify that all cross-connections are deleted, select View-> Cross-Connections...

5 Choose shelf (1665 DMX) and click select.

6 Verify that no alarm LEDs are lit and no FAULT LED is lit on any circuit pack.

If any alarm is present, refer to 365-373-302, *1665 Data Multiplexer, Alarm Messages and Trouble Clearing Guide*.

7 If desired, reconnect the office alarm cable at this time.

8 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Part III: 1665 Data Multiplexer (1665 DMX) ring setup and testing

Overview

Purpose

This section starts the process of integrating the 1665 Data Multiplexer (1665 DMX) into the customer's network. The section provides the procedures to connect inter-office fibers and verify DCC communications and path switching.

Contents

This section is organized into the following chapters:

Ring setup and testing: integration procedures	Chapter 6

□

6 Ring setup and testing: integration procedures

Overview

Purpose

This procedure is used to make fiber connections between nodes in a ring. It is not intended to replace acceptance test procedures. If problems are encountered, refer to 365-373-302, *1665 Data Multiplexer Alarm Messages and Trouble Clearing Guide* for detailed troubleshooting procedures.

If additional provisioning procedures are desired, refer to 365-372-301 *1665 Data Multiplexer User Operations Guide.*

Contents

This chapter provides information on the following topics:

Fiber installation	6-4
Optical transmission test (OC-192, OC-48, OC-12)	6-11
Automatic protection switching test	6-12
Manual switching tests	6-14
Final operations	6-17

Tools, test equipment and accessories

Listed below are the tools, test equipment and accessories necessary to perform the procedures in this section.

Quantity	Description	Comments
	Screwdriver(s)	A screwdriver(s) with the appropriate head(s) is (are) required for securing the mounting screws, repositioning the mounting brackets, installing the interfacing cables, and for setting the circuit breakers to the OFF position.
1	ESD Wrist Strap	A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the shelf.
1	Multimeter (Optional)	The voltmeter must be capable of measuring DC voltage in the 40- to 60-volt range. The use of the voltmeter is optional since the shelf will alarm or shut down if the proper voltage is not supplied.
1	DS1 Error Rate Test Set	A DS1 error rate test set is required for testing of DS1 cabling. A T-BERD 2209 or equivalent is recommended.
1	DS3 Error Rate Test Set	A DS3 error rate test set is required for testing of DS3 cabling. A T-BERD 2209 or equivalent is recommended.
1	OC-48 Test Set	An OC-48 test set is required for testing of optical circuit packs. An Agilent OmniBER 718 or equivalent is recommended.
1	Personal Computer (PC)	See Chapter 3, “Software download and circuit pack installation”, PC minimum requirements (p. 3-2).
1	CIT Interface Cable	8-ft. long RJ45 to 9-pin D-sub serial cable (Comcode 848748869).
1	Optical Power Meter	

Safety instructions

Important! All precautions should be observed when handling fiber.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

CAUTION

The operational tests in this section are run only in an out-of-service mode of operation. Office alarms will normally be connected only during the office alarm test to prevent constant alarms throughout this section.

□

Fiber installation

Description

This section is used to verify proper fiber connections between 1665 Data Multiplexer (1665 DMX) nodes.

Prerequisite

The following is a list of items to verify before beginning tests in this section.

- Two people are required to perform the end-to-end turn up in this section (one at each adjacent node).
- The 1665 DMX Main OLIUs should be optically looped from the previous section. Verify that the 1665 DMX shelf is clear of all alarms (only green LEDs are lighted) prior to and after completing this test.
- CIT is still connected to the 1665 DMX.
- The office alarm cable will remain disconnected during this procedure.

CAUTION

ESD hazard

A properly grounded ESD wrist strap MUST be worn when handling circuit packs.

WARNING

Laser hazard

Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Fiber installation procedure

The following procedures are performed at each end of the optical span being tested.

1 Verify that the office alarm cable to J12 (ALM) on the backplane of the 1665 DMX shelf is disconnected. If the shelf to be tested is part of a multiple shelf bay arrangement, the office alarm cable connects to shelf 1.

2 Enter the shelf TID per the customer order or set TIDs to LT-DMX-1 and LT-DMX-2, etc.

3 Enable Remote NE Status and Alarm Gateway (AGNE) at LT-DMX-1 only. Select Administration -> Set NE...

4 Enable Remote NE Status at the far end node. Select Administration -> Set NE...

5 Dress optical cables in the fiber tray at the bottom front of the shelf.

6 Route the optical jumpers from the bottom of the shelf.

7 Establish communications with the technician at the other end of the optical span.

8 At both ends of the optical span, remove protective covers from receive and transmit optical jumper cables and clean LC connectors.

> **Important!** The 1665 DMX OLIUs require single-mode lightguide cable. Single-mode optical fibers connecting this shelf with the far-end shelf should not be connected to the OLIU until at least 45 seconds after an optical loopback is removed. It may take from 15 seconds to 3.5 minutes for the FAULT LEDs to stop flashing after the cables are connected, depending on the setting of the signal degrade threshold.

9 At both ends of the optical span, ensure that only the dual LC adapter is installed on the OLIU (no LBO).

Important! For 1665 DMX ring configurations, optical fibers extend in two different directions to make up the ring. At each shelf (node) in the ring, the **M1** OLIU will connect to the **M2** OLIU in one adjacent node, and the **M2** OLIU will connect to the **M1** OLIU in the other adjacent node. Likewise, when the 1665 DMX is interfacing with other equipment at low-speeds (OC-3, OC-12 or OC-48) using 0x1 protection, the Function Group slot (A, B, C, D, or G) **1** will connect to **Main 2** on whatever shelf the 1665 DMX is being connected to. The Function Group slot (A, B, C, D, or G) **2** will connect to **Main 1**.

10 At each end of the optical span, connect the optical fiber transmit cables to the OLIU OUT connectors.

11 At each end of the optical span, measure the optical power of the optical fiber receive cables using an optical power meter.

12 Determine the LBO value required based on the received optical power measurement. Refer to the following table.

Table 6-1 Attenuation Table

Optics	Circuit Pack	Received Power (dBM)	LBO (dB)
OC-48 (High Speed)	LNW27 LNW29 LNW221 - 259 LNW421 - 459 LNW32	+3.0 to -9.0 -9.0 to -29.0	15 0
	LNW76	-3.0 to -18.0	0
Low-Speed Optics (OC-3, OC-12, OC-48)	LNW36 (OC-3)	0.0 to -15.0	10
		-15.0 to -34.0	0
	LNW46 (OC-12)	+2.0 to -8.0	10
		-8.0 to -15.0	5
		-15.0 to -30.5	0
	LNW31 (OC-48)	0.0 to -18.0	0

Optics	Circuit Pack	Received Power (dBM)	LBO (dB)
OC-12 (high speed)	LNW48	-8.0 to -28.0	0
	LNW50	+2.0 to -7.0	10
		-7.0 to -30.5	0
	LNW54	+2.0 to -7.0	10
		-7.0 to -29.0	0
OC-192 (high speed)	LNW57	+6.0 to +3.0	15
		+3.0 to -7.0	10
		-7.0 to -24.0	0
	LNW60	+12.5 to +6.0	20
		+6.0 to +3.0	15
		+2.0 to -7.0	10
		-7.0 to -24.0	0
	LNW555	+6.0 to 0	15
		0.0 to -22.0	0
	LNW523, LNW527, LNW554	+6.0 to +1.0	15
		+1.0 to -7.0	10
		-7.0 to -24.0	0
	LNW56	+2.0 to -1.0	5
		-1.0 to -14.0	0
	LNW58	-1.0 to -11.0	0

Table 6-2 Attenuation table (Pluggable Transmission Modules)

SFP/XFP optics	Circuit Pack	Received Power (dBM)	LBO (dB)
S15512	LNW37, LNW45, LNW55, LNW82	-8.0 to -23.0	0
OC-3 IR1-I1	LNW37, LNW45, LNW55, LNW82	-8.0 to -28.0	0

SFP/XFP optics	Circuit Pack	Received Power (dBM)	LBO (dB)
OC-3 LR1-I1	LNW37, LNW45, LNW55, LNW82	0.0 to -5.0	15
		-5.0 to -10	10
		-10 to -34.0	0
OC-12 IR1-I1	LNW49, LNW55, LNW82	-8.0 to -28.0	0
OC-12 LR1-I1	LNW49, LNW55, LNW82	+2.0 to -5.0	15
		-5.0 to -15	10
		-15 to -28.0	0
OC-12 LR2-I1	LNW49, LNW55, LNW82	+2.0 to -5.0	15
		-5.0 to -15	10
		-15 to -28.0	0
OC-48 SR-I1	LNW55, LNW62, LNW82, LNW202	-3.0 to -18.0	0
OC-48 LR-I1	LNW55, LNW62, LNW82, LNW202	+3.0 to -5.0	15
		-5.0 to -10.0	10
		-10.0 to -15.0	5
		-15.0 to -27.0	0
OC-48 LR2-I1	LNW55, LNW62, LNW82, LNW202	+3.0 to -5.0	15
		-5.0 to -10.0	10
		-10.0 to -15.0	5
		-15.0 to -27.0	0
S2DxxC6 series	LNW55, LNW62, LNW82, LNW202	+3.0 to -5.0	15
		-5.0 to -10.0	10
		-10.0 to -15.0	5
		-15.0 to -27.0	0
OC192SR1-C1	LNW59, LNW502	-1.0 to -11	0
OC192IR2-C1	LNW59, LNW502	+2.0 to -1.0	5
		-1.0 to -14	0

SFP/XFP optics	Circuit Pack	Received Power (dBM)	LBO (dB)
OC192LR2-C1	LNW59, LNW502	+4.0 to 0.0	15dB
		0.0 to -7.0	10
		-7.0 to -24.0	0

13 Select the proper LBO based on the value required and the comcode as listed below.

Code	Comcode	Loss (dB)
ABLCS-05.0	108279381	5
ABLCS-10.0	108279431	10
ABLCS-15.0	108279480	15
ABLCS-20.0	108279530	20

14 Clean LC LBOs and install LBO assemblies in the OLIU IN connector.

15 At the far end, connect the input optical fiber to the proper OLIU IN connector.

Requirement: The FAULT LED on the OLIU extinguishes.

16 At the near end, connect the input optical fiber to the proper OLIU IN connector.

Requirement: The FAULT LED on the OLIU extinguishes.

17 Disconnect the fiber cable from the OUT connector on the OLIU at one end of the span. At the other end, verify that the associated FAULT LED is flashing, indicating a loss of signal. Reconnect the fiber and repeat the process for the other direction of transmission.

18 Enable communications with the adjacent 1665 DMX nodes. Configuration -> DCC Terminations...

19 Select Port AID: dcc-m1-1, OSI Over DCC: enabled, LAPD Role: user-side.

20 Select Port AID: dcc-m2-1, OSI Over DCC: enabled, LAPD Role: network-side.

21 Set the timing to internal (free running) at LT-DMX-1 and line time LT-DMX-2. Configuration -> Timing/Sync... Timing Mode: Free Running.

22 Verify proper communications with the adjacent 1665 DMX nodes. Administration->OSI Neighbor Map.

Result: The adjacent node appears in the neighbor list.

23 Perform steps in this procedure on all adjacent nodes in the ring.

24 After all connections and tests have been made, verify optical fiber cables are placed in fiber tray and properly routed in bay framework.

25 Reconnect the office alarm cable disconnected in Step 1.

26 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Optical transmission test (OC-192, OC-48, OC-12)

Overview

The following test verifies error-free transmission between nodes.

Transmission test procedure

1 At the test location, select Performance -> View PM Reports -> OCn Section...

2 Choose CP main-1, Port 1

3 Click Select.

4 Select Time Period: 15-Min, Monitored Date: Current Date and Monitor Level: 0 UP.

5 Click Select All to move all Available Parameters to the Selected Parameters column.

6 Click Apply.

Result: The Response Window indicates no transmission errors.

7 Repeat Step 1 through Step 6 substituting CP main-2 in Step 2.

8 Repeat Step 1 through Step 7 for all 1665 DMX shelves at the test location.

9 Repeat Step 1 and Step 8 for each node in the ring.

10 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

□

Automatic protection switching test

Description

This section provides the procedures for verifying the 1665 DMX shelf automatic and manual protection switching.

Note the following:

- These tests do NOT simulate circuit pack failures.
- A properly grounded wrist strap must always be worn while handling circuit packs.
- Prior to performing each test, the shelf under test must be clear of all alarms (that is, only green LEDs are lighted).

Main OLIU switch test

1 In order to perform path switching, an add/drop cross-connection must be entered. Select Configuration -> Cross-Connections... and use the Cross-Connection Wizard to enter an add/drop cross-connection.

2 Select View -> Protection...

3 Under Path Protection choose Path m-1-1 and click Select.

4 Note the Active Path (m1 or m2).

5 Disconnect the optical fiber connected to the IN port on the active path OLIU.

Result: The MN and then MJ alarm LED should light on the SYSCTL and the FAULT LED should flash on the OLIU.

6 Click refresh in the View Protection window.

7 Verify the Active Path has changed (from m1 to m2 or m2 to m1).

8 Reconnect the optical fiber to the OLIU.

Result: After a short time, the MJ alarm LED on the SYSCTL and the FAULT LED on the OLIU should extinguish.

9 Repeat Step 2 through Step 8 to verify a switch back to the OLIU that was originally active.

10 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

Manual switching tests

Description

This test will initiate switching commands from the CIT and verify proper switching and LED indications.

Important! An STS-1 cross-connect is required in order to perform manual switching.

Manual switching test procedure

1. Enter an STS-1 add/drop cross-connection between an equipped Function Unit and the Main OLIU. Select Configuration -> Cross-Connections... and use the Cross-Connection Wizard to enter an add/drop cross-connection.
2. Select Fault -> Protection Switch...
3. Under Path Protection choose Path m-1-1 and click Select.
4. Note the Active Path (m1 or m2).
5. Choose Switch Type: Manual.
6. Click Apply.
7. Verify that the Active Path: has changed (m1 to m2 or m2 to m1).
8. Repeat Step 2 through Step 7 to verify a switch back to the original ring.

9 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

Function units/growth slots, switching test

This test will initiate switching commands from the CIT and verify proper switching and LED indications.

Important! This procedure should be performed on each Function Unit equipped with protected electrical TDM circuit packs.

1 Select Fault -> Protection Switch...

2 Click on 1+1 Equip fn-x (x is a,b,c or d corresponding to the function group equipped).

3 Click Select.

4 Note which Function Unit or Growth Slot circuit pack is the active circuit pack.

5 In the Switch Type: pull-down, select Manual (Normal).

6 Click Apply.

Result: The pack that was active should now be the standby pack and the pack that was standby is now active. Transmission should take a momentary hit as it is switched to the other pack. This information should agree with the ACTIVE LEDs on the circuit packs.

7 Repeat Step 1 through Step 6 to verify a switch back to the original Function Unit circuit pack, with the same results as the previous step.

8 Repeat this procedure for each Function Unit pair.

9 Swap circuit packs from another function group to test any unequipped function slots.

10 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

□

Final operations

Description

The following procedure ensures that all test signals and cross-connects have been removed and the 1665 DMX shelf is alarm free and ready for network connection procedures.

Procedure

1 Select Configuration -> Cross-Connections...

2 Use the Cross-Connection Wizard to Delete leg(s) of an existing cross-connection associated with CP main-1, Port 1.

3 Select Configuration -> Update System... -> Update All.

4 Verify that no alarm LEDs are lit and no FAULT LED is lit on any circuit pack.

If any alarm is present, refer to 365-373-302, *1665 Data Multiplexer (1665 DMX), Alarm Messages and Trouble Clearing Guide*.

5 Check off the appropriate box in Appendix E, "Installation checklist".

END OF STEPS

Clear PM registers

The following steps will clear all the performance monitoring registers:

1 Select Performance -> Initiate PM Registers -> Both.

2 If desired, reconnect the office alarm cable at this time.

3 Check off the appropriate box in Appendix E, “Installation checklist”.

END OF STEPS

☐

Part IV: 1665 Data Multiplexer (1665 DMX) supplementary information and installation checklist

Overview

Purpose

This section provides supplementary information that is useful when installing the 1665 Data Multiplexer (1665 DMX) system and using this Installation Manual.

The Installation Checklist is also contained in this part.

Contents

This section is organized into the following sections:

Appendix A, “Laser safety and classifications and Electrostatic Discharge (ESD) considerations”
Appendix B, “Fiber cleaning”
Appendix C, “Installing fiber connectors and LBOs”
Appendix D, “Backplane pin replacement”
Appendix E, “Installation checklist”
Appendix F, “Fiber labeling”
Appendix G, “Pluggable transmission module installation”
Appendix H, “Technical support”
Glossary
Index

Appendix A: Laser safety and classifications and Electrostatic Discharge (ESD) considerations

Overview

Purpose

This appendix provides laser safety information and precautions.

Contents

This appendix provides information on the following topics:

Laser safety	A-2
Electrostatic Discharge ESD considerations	A-5
Laser product classification	A-9
1665 DMX optical specifications	A-11

Laser safety

System design

The Alcatel-Lucent 1665 Data Multiplexer (1665 DMX) product line complies with FDA/CDRH 21 CFR 1040.10 and 1040.11 as a Class IIIb laser product and with IEC 60825-1:2001 as a Class 1M Optical Fiber Telecommunication laser product.

The system has been designed to ensure that the operating personnel is not endangered by laser radiation during normal system operation. The safety measures specified in the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations and the international standards IEC-60825 or DIN/EN 60825 are met. Please also refer to Laser product classification (p. A-9).

Potential sources of danger

Beware of the following potential sources of danger which will remain despite all safety measures taken:

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

CAUTION

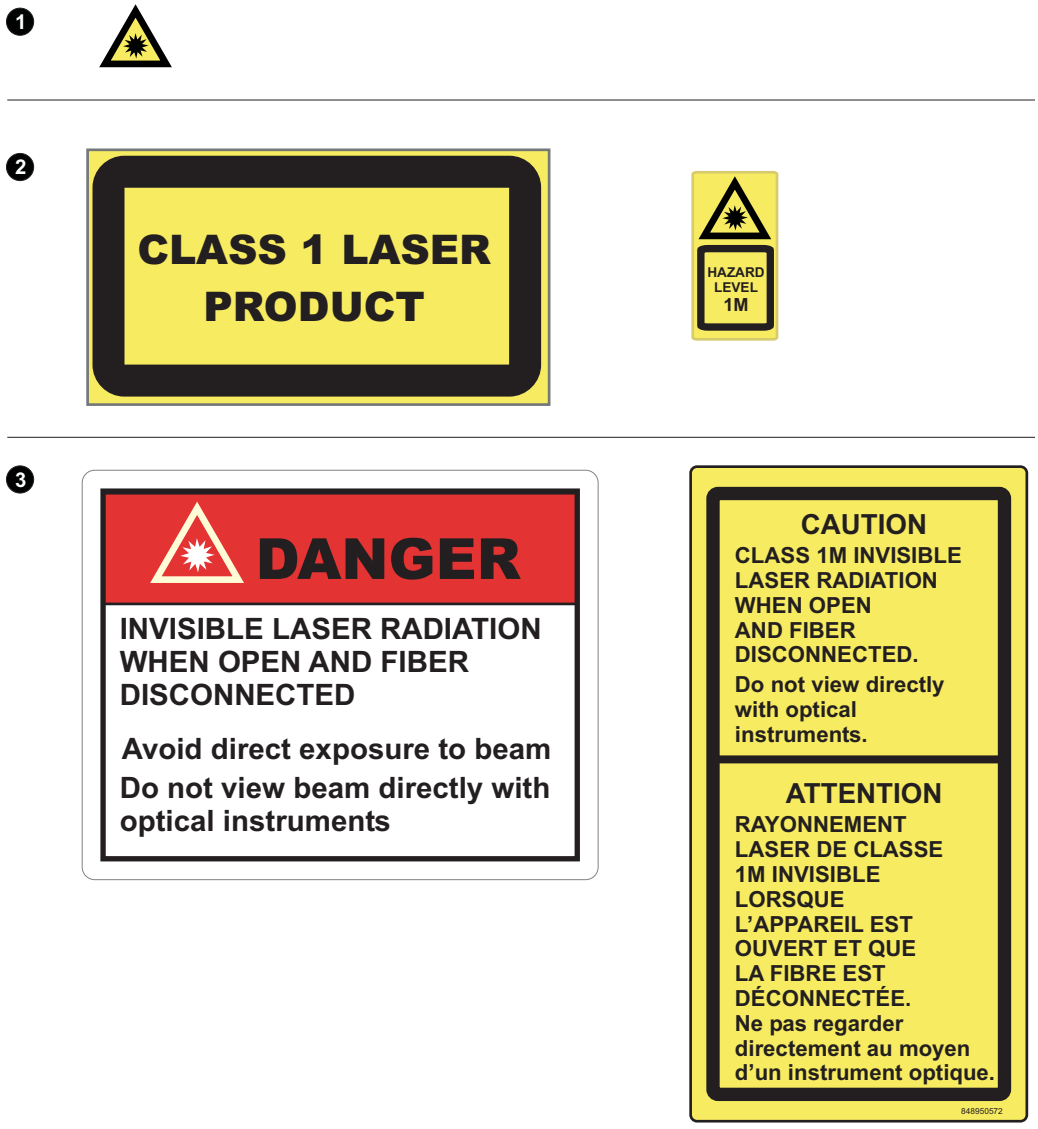
Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Laser warning labels

The following figure shows the different types of laser warning labels.

Figure A-1 Laser Warning Labels



MA-DMX-416

Legend

1. Laser symbol.
2. Laser classification labels. This label may show only the laser class or both the laser class and the maximum output power.
3. Laser warning labels.

Laser safety instructions

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

- Read the relevant descriptions in the manuals before taking equipment into operation or carrying out any installation and maintenance work on the optical port units, and follow the instructions. Ignoring the instructions can result in exposure to dangerous radiation.
- Do not view directly into the laser beam with optical instruments such as a fiber microscope, because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.
- Never look into the end of an exposed fiber or an open connector as long as the optical source is still switched on.
- Ensure that the optical source is switched off before disconnecting optical fiber connectors.
- In the event of doubt, check that the optical source is switched off by measuring with an optical power meter.

□

Electrostatic Discharge ESD considerations

ESD precautions

CAUTION

ESD hazard

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

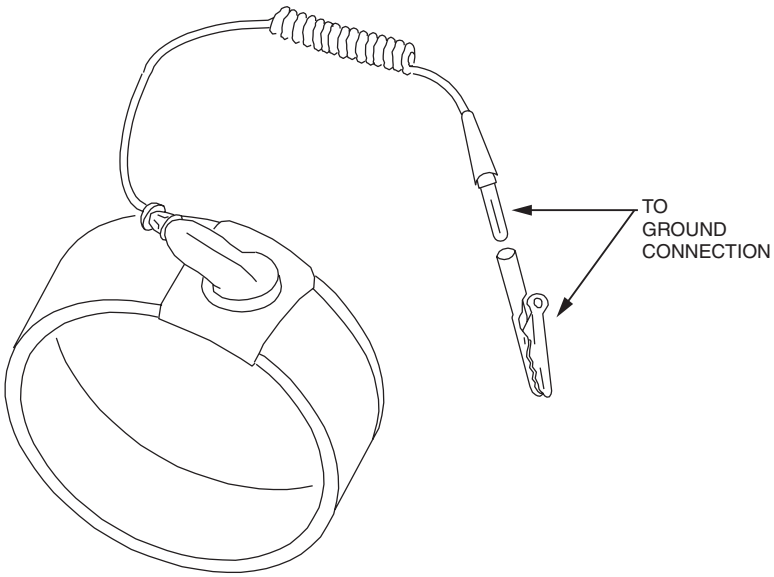
In order to prevent damage by electrostatic discharge the following precautions should be observed when handling circuit packs:

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD.
- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap such as the one shown in Figure A-2 or wear a heel strap and stand on a grounded, static dissipating floor mat. If a static dissipating floor mat is used, be sure that it is clean to ensure a good discharge path.
- 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.
- If possible, open all circuit packs at a static safe work position, using properly grounded wrist straps and static dissipating table mats. If a static dissipating floor mat is used, be sure that it is clean to ensure a good discharge path.
- Always store and transport circuit packs in static safe packaging. Shielding is not required unless specified.
- 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.
- Whenever possible, maintain relative humidity above 20 percent.

To reduce the possibility of ESD damage, assemblies are equipped with grounding jacks to enable personnel to ground themselves using wrist straps. See Figure A-1, Laser Warning Labels (p. A-3) while handling circuit packs or working on an assembly. The jack

for connection of wrist straps is located at the upper left-hand corner of each assembly and is labeled. When grounding jacks are not provided, an alligator clip adapter enables connection to bay frame ground.

Figure A-2 Static control wrist strap



IMPORTANT SAFETY INSTRUCTIONS

READ AND UNDERSTAND ALL INSTRUCTIONS

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying this product.

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

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on this product.
3. This product should be only operated from the type of power sources indicated on the marking label.
4. Connect this product only to the type of power sources recommended by Lucent Technologies.
5. This equipment is suitable for mounting on a concrete or other noncombustible surface only.
6. For information on proper mounting instructions, consult the Installation Manual.
7. Install only equipment identified in this Installation Manual. Use of other equipment may result in improper connection of circuitry leading to fire or injury to persons.

8. All metallic telecommunication interfaces (traffic ports) should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.
9. Do not use this product near water, for example, in a wet basement.
10. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
11. Use caution when installing or modifying telecommunications lines.
12. Never install telecommunications wiring during a lightning storm.
13. Never install telecommunications connections in wet locations.
14. Never touch uninsulated telecommunications wires or terminals unless the telecommunications line has been disconnected at the network interface.
15. Never touch uninsulated wiring or terminals carrying direct current or ringing current, or leave this wiring exposed. Protect and tape uninsulated wiring and terminals to avoid risk of fire, electric shock, and injury to service personnel.
16. 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 liquids of any kind on the product.
17. Slots and openings in the unit are provided for ventilation, to protect it from overheating, and these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided.
18. To reduce the risk of an electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.
19. Some of the 1665 DMX Family hardware modules contain FDA/CDRH Class IIIb/IEC Class 1M single-mode laser products that are enclosed lightwave transmission systems. Under normal operating conditions, lightwave transmission systems are completely enclosed; nonetheless, the following precautions must be observed because of the potential for eye damage:
    - Do not disconnect any lightwave cable or splice and stare into the optical connectors terminating the cables.
    - Lightwave/lightguide operations should not be performed by a technician who has not satisfactorily completed an approved training course.
    - Do not use optical instruments such as an eye loupe to view a fiber or unterminated connector.
    - More information about laser safety can be found in Appendix A, “Laser safety and classifications and Electrostatic Discharge (ESD) considerations”
20. For a unit intended to be powered from -48 V dc voltage sources, read and understand the following:
    - To be powered only by Safety Extra Low Voltage (SELV) -48 Vdc Sources.

- Disconnect up to two (2) power supply connections when removing power from the system.
- This equipment must be provided with a readily accessible disconnect device as part of the building installation.
- Ensure that there is no exposed wire when the input power cables are connected to the unit.
- Installation must include an independent frame ground drop to building ground. This ground symbol is marked on the product, adjacent to the ground (earth) area for the connection of the ground (earth) conductor.
- This Equipment is to be installed only in restricted access Areas on business and customer premises applications in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No.70. Other installations exempt from the enforcement of the National Electrical Code may be engineered according to the accepted practices of the local telecommunications utility.

SAVE THESE INSTRUCTIONS

Laser product classification

Standards compliance

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

FDA/CDRH regulations

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

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

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

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

IEC requirements

There are five major differences between the FDA/CDRH regulations and the IEC requirements:

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

- Class 1, 1M
- Class 3R
- Class 3B
- Class 4.

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

- The Accessible Emission Limits (AEL) are different
- Class 3R applies to all wavelengths
- Class 3B requires strict engineering controls
- Classification is under single fault conditions (IEC).

Laser classes

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

Table A-1 Laser Classes

Laser class	Wavelength	Maximum Output Power of Laser Radiation
1	1310 nm	8.85 mW
	1550 nm	10 mW
3R	1310 nm	24 mW
	1550 nm	50 mW
3B	1310 nm	0.5 W
	1550 nm	0.5 W

Hazard level assignment

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

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

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

Classification of optical telecommunication equipment

Optical telecommunication equipment is generally classified as IEC Class 1 or FDA/CDRH Class I, because under normal operating conditions, the transmitter ports terminate on optical fiber connectors. These are covered by a front panel to ensure protection against emissions from any energized, unterminated transmitter. The circuit packs themselves, however, may be IEC Class 1, 1M or 3R or FDA/CDRH Class I or IIIb.

□

1665 DMX optical specifications

Overview

Table A-2 provides the optical specifications for 1665 DMX optical circuit packs.

Table A-2 1665 DMX Optical Circuit Pack Laser Safety Specifications

Laser Circuit Pack Code	Wavelength (nm)	Maximum Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
LNW36	1310	0.0	Single Mode (9)	LC	I(LN50)/1
LNW46	1310	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW48	1310	-8.0	Single Mode (9)	LC	I(LN50)/1
LNW50	1310	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW54	1550	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW27	1310	+3.0	Single Mode (9)	LC	I(LN50)/1
LNW29	1550	+3.0	Single Mode (9)	LC	I(LN50)/1
LNW31	1310	0.0	Single Mode (9)	LC	I(LN50)/1
LNW32	1310	1.5	Single Mode (9)	LC	I(LN50)/1
LNW76	1310	-3.0	Single Mode (9)	LC	I(LN50)/1
LNW223	1558.98 1558.17	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW225	1557.36 1556.56	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW227	1555.75 1554.94	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW231	1552.52 1551.72	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW233	1550.92 1550.12	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW235	1549.32 1548.52	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW237	1547.72 1546.92	+2.0	Single Mode (9)	LC	I(LN50)/1

Laser Circuit Pack Code	Wavelength (nm)	Maximum Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
LNW245	1542.14 1541.35	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW247	1540.56 1539.77	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW249	1538.98 1538.19	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW253	1535.82 1535.04	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW255	1534.25 1533.47	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW259	1531.12 1530.33	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW425	1557.36 1556.56	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW427	1555.75 1554.94	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW447	1540.56 1539.77	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW449	1538.98 1538.19	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW453	1535.82 1535.04	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW455	1534.25 1533.47	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW459	1531.12 1530.33	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW56	1550	+2.0	Single Mode (9)	LC	I(LN50)/1
LNW57	1550	+6.0	Single Mode (9)	LC	I(LN50)/1
LNW58	1310	-1.0	Single Mode (9)	LC	I(LN50)/1
LNW60	1550	+12.5	Single Mode (9)	LC	IIIb/1M
LNW523	1558 to 1560*	+6.0	Single Mode (9)	LC	I(LN50)/1
LNW527	1554 to 1557	+6.0	Single Mode (9)	LC	I(LN50)/1

Laser Circuit Pack Code	Wavelength (nm)	Maximum Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
LNW554	1533 to 1535*	+6.0	Single Mode (9)	LC	I(LN50)/1
LNW555	1533.465	+6.0	Single Mode (9)	LC	I(LN50)/1

* Refer to 1665 Data Multiplexer Application and Planning Guide for detailed Wavelength information.

packs.

Table A-3 1665 DMX Optical Specifications

Module Code	Supported Circuit Pack(s)	Wavelength (nm)	Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
100BASE-LX-L1	LNW70 LNW74 LNW78 LNW170	1310	-8.0	Single Mode (9)	LC	I(LN50)/1
1000BASE-SX-C1	LNW70 LNW78	850	0.0	Multimode (50 and 62.5)	LC	I(LN50)/1
1000BASE-ZX-I1	LNW63 LNW64 LNW70 LNW78 LNW170	1550	+5.0	Single Mode (9)	LC	I(LN50)/1
BASE-TC1-electrical	LNW63 LNW64 LNW70 LNW78 LNW170	NA	NA	NA	RJ45	NA
ESCON-MM-I1	LNW73/73C	1310	-14.0	Multimode (50 and 62.5)	LC	I(LN50)/1
GE-1X2XFC-LX-C1	LNW64 LNW70 LNW73/73C LNW78 LNW170	1310	-3.0	Single Mode (9)	LC	I(LN50)/1

Module Code	Supported Circuit Pack(s)	Wavelength (nm)	Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
GE-1X2XFC-LX-I1	LNW63 LNW64 LNW70 LNW73/73C LNW78 LNW170	1310	-3.0	Single Mode (9)	LC	I(LN50)/1
GE-1X2XFC-SX-C1	LNW64 LNW70 LNW73/73C LNW78 LNW170	850	-2.5	Multimode (50 and 62.5)	LC	I(LN50)/1
GE-1X2XFC-SX-I1	LNW63 LNW64 LNW70 LNW73/73C LNW78 LNW170	850	-2.5	Multimode (50 and 62.5)	LC	I(LN50)/1
S15512	LNW37 LNW45 LNW55 LNW82	1310	-8.0	Single Mode (9)	LC	I(LN50)/1
OC3IR1-I1	LNW37 LNW45 LNW55 LNW82	1310	-8.0	Single Mode (9)	LC	I(LN50)/1
OC3LR1-I1	LNW37 LNW45 LNW55 LNW82	1310	-0.0	Single Mode (9)	LC	I(LN50)/1
OC12IR1-I1	LNW49 LNW55 LNW82	1310	-8.0	Single Mode (9)	LC	I(LN50)/1

Module Code	Supported Circuit Pack(s)	Wavelength (nm)	Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
OC12LR1-I1	LNW49 LNW55 LNW82	1310	+2.0	Single Mode (9)	LC	I(LN50)/1
OC12LR2-I1	LNW49 LNW55 LNW82	1550	+2.0	Single Mode (9)	LC	I(LN50)/1
OC48LR1-I1	LNW55 LNW62 LNW82 LNW202	1310	+3.0	Single Mode (9)	LC	I(LN50)/1
OC48LR2-I1	LNW55 LNW62 LNW82 LNW202	1550	+3.0	Single Mode (9)	LC	I(LN50)/1
OC48SR1-I1	LNW55 LNW62 LNW82 LNW202	1310	-3.0	Single Mode (9)	LC	I(LN50)/1
S2D23C6	LNW82 LNW202	1558.983	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D25C6	LNW55 LNW62 LNW82 LNW202	1557.363	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D27C6	LNW55 LNW62 LNW82 LNW202	1555.747	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D31C6	LNW82 LNW202	1552.524	+4.0	Single Mode (9)	LC	I(LN50)/1

Module Code	Supported Circuit Pack(s)	Wavelength (nm)	Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
S2D33C6	LNW82 LNW202	1550.918	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D35C6	LNW82 LNW202	1549.315	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D37C6	LNW82 LNW202	1547.715	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D45C6	LNW82 LNW202	1541.349	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D47C6	LNW55 LNW62 LNW82 LNW202	1539.766	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D49C6	LNW82 LNW202	1538.186	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D53C6	LNW55 LNW62 LNW82 LNW202	1535.036	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D55C6	LNW55 LNW62 LNW82 LNW202	1533.465	+4.0	Single Mode (9)	LC	I(LN50)/1
S2D59C6	LNW55 LNW62 LNW82 LNW202	1530.334	+4.0	Single Mode (9)	LC	I(LN50)/1
OC192IR2-C1	LNW59 LNW502	1550	+2.0	Single Mode (9)	LC	I(LN50)/1
OC192LR2-C1	LNW59 LNW502	1550	+4.0	Single Mode (9)	LC	I(LN50)/1

Module Code	Supported Circuit Pack(s)	Wavelength (nm)	Output Power (dBm)	Fiber Type (µm)	Connector Type	FDA Class/ IEC Class
OC192SR1-C1	LNW59 LNW502	1310	-1.0	Single Mode (9)	LC	I(LN50)/1

□

Appendix B: Fiber cleaning

Overview

Purpose

This appendix describes the Alcatel-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 connector faces 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 essential for successful operation.

Contents

This appendix provides information on the following topics:

Equipment requirements and recommendations	B-3
Safety instructions	B-5
Cleaning/inspecting optical connectors	B-6
Cleaning pluggable optics modules	B-12

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 Alcatel-Lucent University, Course Code: LMC200H “Understanding Fiber Optic Cleaning, Inspection and Testing.” To learn more about this course, consult your local Alcatel-Lucent Account Representative.

□

Equipment requirements and recommendations

Description

For proper cleaning, the following equipment and materials are recommended:

Table B-1 Required and Recommended Equipment and Materials

Product	Model/ Description	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
2.5mm Universal adapter cap	For use with the Noyes OFS 300-200X	408197044	ITE-7129D1	33712901
1.25mm Universal adapter cap	For use with the Noyes OFS 300-200X	408197069	ITE-7129D2	33712902
Video Fiber Scope[1]	Noyes VFS-1	TBD	TBD	TBD
Individual presaturated 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

Product	Model/ Description	Comcode	ITE #	Installation Order #
Luminex Cloth	5.5” x 5.5”	408201226	R6033	23603300

Notes:

1. This equipment may not be necessary at all locations. It is to be used when the ports need to be verified for cleanliness. If care is exercised when cleaning fibers, the video scope may not be needed.

Important! The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended.

□

Safety instructions

Description

WARNING

Laser hazard

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 endfface of a connector with a fiberscope, be absolutely certain that the system is deactivated.

WARNING

Noxious substance hazard

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 being connected. Keep the protective ferrule dust cap on the connector until initiating the cleaning process.

Cleaning procedure

The following cleaning procedure is acceptable for field service/installation activities:

1 Remove the dust cap from the connector ferrule, thus exposing the connector endface.

2 Open an individual foil packet of pre-saturated isopropyl alcohol (99% pure) wipe.

See Figure B-1, “Cleaning the Ferrule Endface” (p. B-7).

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.

Figure B-1 Cleaning the Ferrule Endface

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.

See Figure B-2, “CleTop Cleaner” (p. B-8).

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.

Figure B-2 CleTop Cleaner

4 Insert and press the connector ferrule endface perpendicular against the cleaning cloth in the first of two slots of the cleaner.

See Figure B-3, “Acceptability Criteria for Fiber Cleaning” (p. B-10).

Drag it down (in the direction indicated by the arrows on the cleaner). Make certain not to release the lever of the cassette.

5 Lift the connector from the first slot and rotate it 90 degrees and repeat the downward motion 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 5.

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, optic wipes are single use and disposable.

8 Inspect the connector for cleanliness. If necessary, repeat the cleaning process.

See "Connector inspection" (p. B-9).

END OF STEPS

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

When using an optical power meter to verify the connector and fiber to be clean, take special precaution to make sure the no power is being emitted from the fiber before viewing.

1 Follow the instructions in the manual provided with the Optical Fiber Scope to view the ferrule endface of the fiber under inspection.

2 The visual area of the ferrule endface (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminates. See Figure B-3, "Acceptability Criteria for Fiber Cleaning" (p. B-10).

Repeat the Cleaning Procedure if the fiber endface does not meet the following requirements:

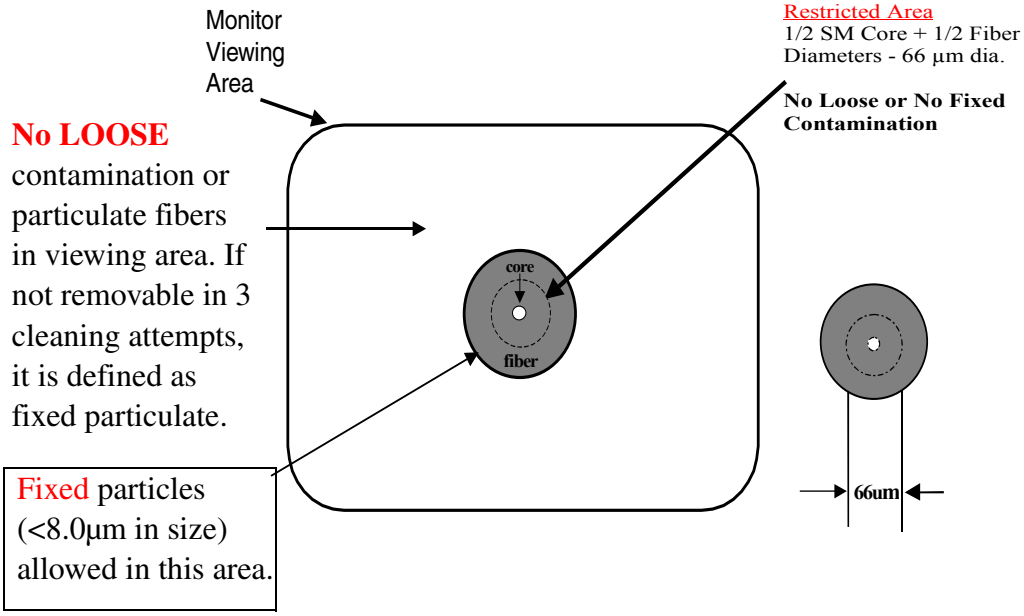
Requirement: No fixed type of contamination (contaminates that remain at the same location after three wet-dry cleaning cycles), regardless of size, is allowed in the restricted area of the glass fiber endface.

Requirement: The restricted area is defined as ~66 microns (µm) diameter for both singlemode and multimode fibers.

Requirement: No chips, cracks or scratches are allowed near the core of the glass fiber endface.

Requirement: No large floating (loose) contaminates are allowed on the glass fiber and ceramic ferrule endface.

Figure B-3 Acceptability Criteria for Fiber Cleaning



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 cannot be immediately connected to 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 connection.

END OF STEPS

Fiber adapters or circuit pack connectors

During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter or the circuit pack connector. The following procedure is recommended.

CAUTION

Do not attempt to clean ports equipped with yellow Light guide BuildOut (LBO) attenuators. Attenuators contain a thin glass lens that is extremely fragile. The LBO will be damaged if cleaned using this method.

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 connector. 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 side walls of the adapter and the endface of the circuit pack connector.

4 Gently insert the Video Fiber Scope probe into the port until the fiber ferrule comes into view.

5 Verify that the fiber ferrule is clean. Repeat Step 1 through Step 3 if the fiber does not meet the requirements specified in “Connector inspection” (p. B-9).

END OF STEPS

□

Cleaning pluggable optics modules

Purpose

This task describes the Alcatel-Lucent recommended method for cleaning pluggable optics modules using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment.

Important! Pluggable optics modules are shipped with a water-tight process plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the process plug be kept in place to maintain cleanliness until the optical fiber is connected. With proper care and handling, cleaning the pluggable optics modules should not be necessary.Because a major source of contamination is often a contaminated mating connector, it is extremely important to clean the connector ferrule end surface each time before making connections.

Procedure

Complete the following steps to clean a pluggable optics module.

1 Remove the protective process plug from the pluggable optics module. Keep the process plug clean until reinstalled later, if required.

CAUTION

Corrosive substance hazard

*When performing this step hold the canned dry nitrogen or air **upright**. If the canned dry nitrogen or air is held upside down, inert gas may be released onto the connector surface. The inert gas leaves contamination on the connector surface that cannot be removed.*

2 While holding the canned dry nitrogen or air, position the tip of the nozzle extension as close as possible, but not close enough to make physical contact, to the sleeve inside the port receptacle and make three consecutive short blows (approximately one second each).

Repeat this step for the other port.

3 Using the stereo zoom scope, visually inspect the optics module. If required, repeat Step 2 up to two more times then go to the next step.

CAUTION
This step should only be performed on the transmit (TX) port if the air blows did not work. Do not perform this step on the receive (RX) port. The receive (RX) port contains a lens for focusing a wide input. The lens is more easily scratched than cleaned.

4 If required, insert a CLETOP stick into the transmit (TX) port sleeve until vertical force can be applied to the fiber stub end surface. Rotate the CLETOP stick five full rounds.

5 Using the stereo zoom scope, visually inspect the optics module. If required, repeat Step 4.

CAUTION
It is recommended that the process plug be installed into the optical ports on the pluggable optics module to maintain cleanliness until the optical fiber is connected.

6 If required, reinstall the process plug into the optical ports to maintain cleanliness.

END OF STEPS

□

Appendix C: Installing fiber connectors and LBOs

Overview

Purpose

This appendix provides procedures for installing and removing Line Build Out units (LBOs) and fiber connectors onto input and output ports found on the 1665 Data Multiplexer (1665 DMX) optical circuit packs.

Contents

This appendix provides information on the following topics:

LBOs	C-2
Fiber connections	C-5

Objectives

This appendix provides information to perform the following:

- Install and remove LC-type LBOs onto and from LC-type ports.
- Install and remove LC-type fiber connections.

Fiber cleaning

Refer to Appendix B, “Fiber cleaning” for fiber cleaning information. Do not attempt to clean LBOs as they may be damaged by a cleaning attempt. Discard suspect LBOs and replace with a new unit.

□

LBOs

General

LBOs are fixed-value optical attenuators that mate into mounting blocks and provide a specific connector interface (LC, ST, FC or SC-type) for external fiber connections. The 1665 DMX optical circuit packs are equipped with LC-type connector ports designed for use with LC-type LBOs and fiber connectors. Dust caps should be applied on all LBOs when not installed in connector ports.

LC-type connector port

The LC-type connector port will only accept LC-type LBOs for external fiber connection.

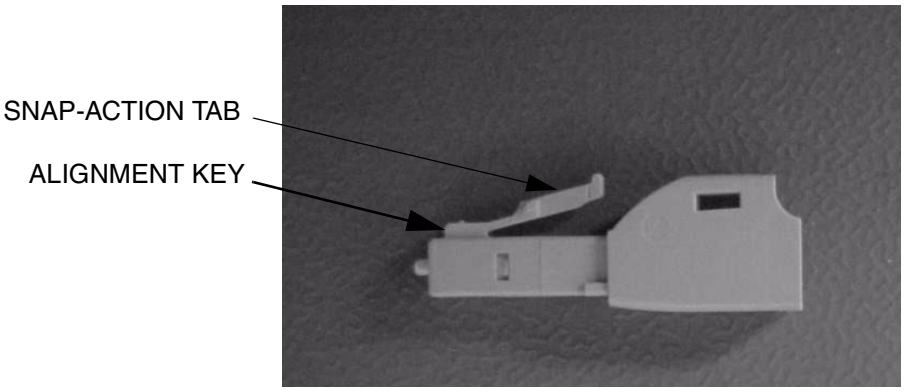
Figure C-1 LC-Type Connector Ports on Circuit Pack

LC-type LBO

1665 DMX utilizes Alcatel-Lucent's state-of-the-art *AllWave ADVANTAGE*™ Fiber Optic Attenuators. These attenuators reduce optical power from the transmitter that can result in over-saturation of the receiver, have low reflection to meet stringent system requirements, and are backward-compatible with existing transmission systems. Unique to the AllWave

ADVANTAGE optical connectivity solution (OCS), the new *LC*™ optic attenuators are designed to provide flat spectral loss across the full spectrum, allowing the attenuators to be used in the 1300-nm, 1400-nm, and 1500-nm bands.

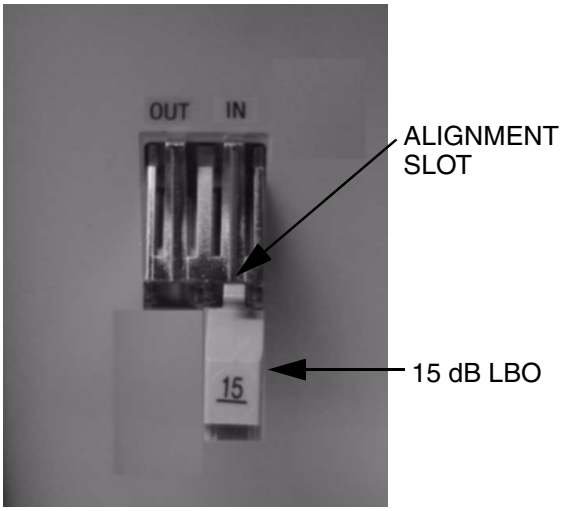
Figure C-2 LC-Type LBO



Assembly of LC-type LBO into LC block

The LC-type LBOs are installed into the LC-type connector by aligning the alignment key with the slot in the connector port and pushing the LBO into the port until it snaps into place.

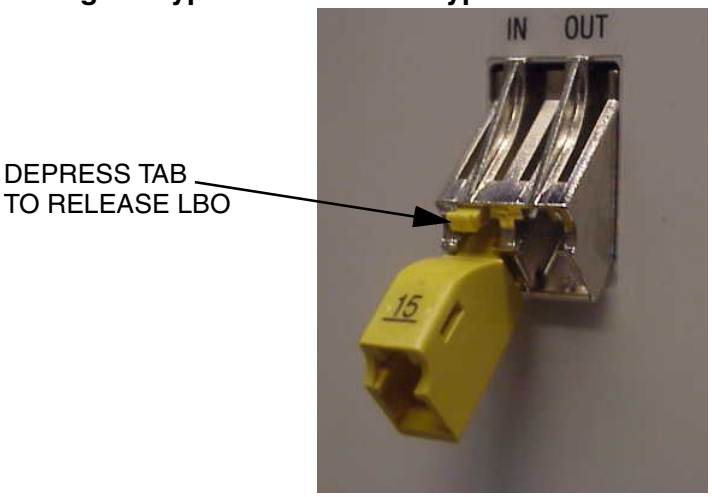
Figure C-3 LC-Type LBO Inserted Into LC-Type Connector Port



Removal of LC-type LBO from LC block

The LC-type LBOs are removed from the LC-type connector port by depressing the tab to release the LBO and then pulling straight out.

Figure C-4 Removing LC-Type LBO From LC-Type Connector Port



Fiber connections

General

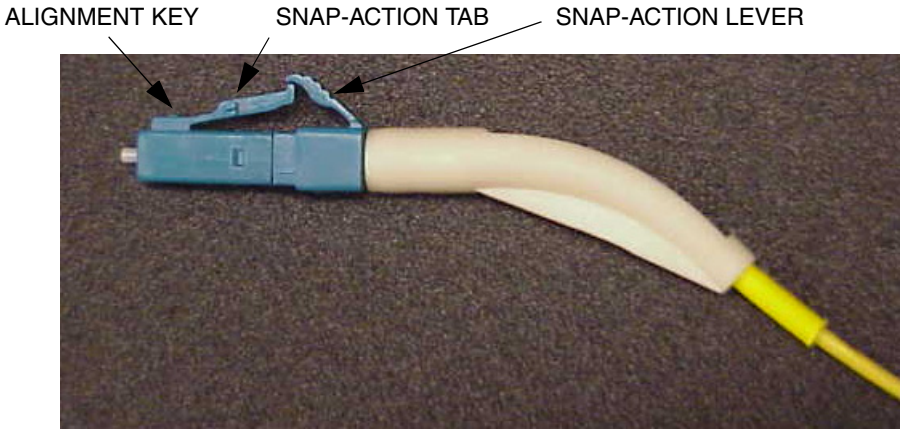
1665 DMX uses *AllWave ADVANTAGE*™ Lightguide Jumpers, part of Lucent's *AllWave ADVANTAGE*™ Optical Connectivity Solution (OCS). These jumpers contain a boot angled at 40 degrees, allowing the jumpers to dress appropriately into the fiber tray. The angled boot eliminates projection outside the front of the shelf assembly.

All fiber connectors should be cleaned and inspected before assembling into connector ports. Refer to Appendix B, "Fiber cleaning" for Fiber Cleaning information. Dust caps should be applied to all fiber connectors when not installed in a connector port.

LC-type connections

LC-type fiber connectors use a snap-action, lever-tab locking method to join the fiber connector to the port connector.

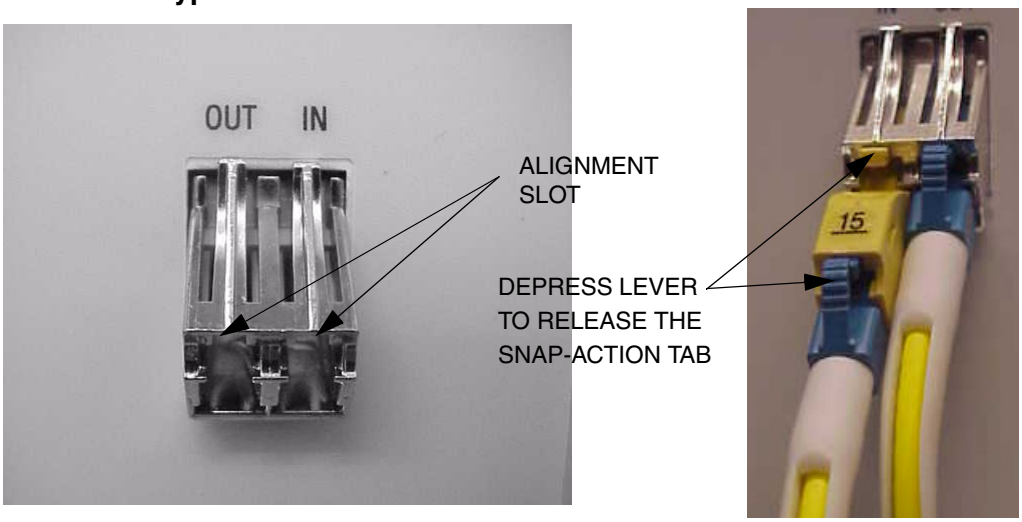
Figure C-5 LC-Type Fiber Connector



The LC-type fiber connector is assembled onto an LC-type connector port of a circuit pack or LC-type LBO by aligning the alignment key with the slot in the connector port and pushing the connector into the port until it snaps into place.

The LC-type fiber connector is removed from a connector port by depressing the snap-action lever to disengage the fiber connector.

Figure C-6 LC-Type Fiber Connection



Appendix D: Backplane pin replacement

Overview

Purpose

This appendix provides information and the procedures used when a connector and/or pin on the 1665 Data Multiplexer (1665 DMX) backplane has been bent or broken.

Contents

This appendix provides information on the following topics:

Pin and connector background	D-2
Repair kits and tools	D-4
Simple repair methods	D-5
Replacement methods	D-7

Objectives

This appendix provides information and procedures to do the following:

- Identify a bent or broken pin
- Determine the correct replacement pin and pin kit
- Straighten bent pin
- Replace broken pins

□

Pin and connector background

Description

This section describes the procedures for the repair/replacement of the press-fit connector pins used on the backplane of the 1665 DMX shelf. Trouble clearing procedures may lead you to inspect the backplane for damaged connectors.

Circuit packs are plugged into METRAL™ signal pin connectors which have been press-fit into the backplane. A plastic shroud is included with the connectors to protect the pins. The signal pin press-fit terminals in these connectors my be replaced individually if they have been damaged beyond simple repair methods.

D-subminiature connectors

Interface cabling to and from the 1665 DMX shelves is connected through D-Subminiature connectors which have been press-fit into the backplane. Should these connectors be damaged beyond simple repair methods, contact your next level of support for the replacement procedure.

RJ45 jacks

Interface cabling to and from the 1665 DMX shelves is connected through RJ45 connectors (jacks) which have been press-fit into the backplane. Should these jacks be damaged beyond simple repair methods, contact your next level of support for the replacement procedure.

Shelves and backplanes

The 1665 DMX has its connectors and terminal identifiers stenciled on the back surface for identification of location or position. The stenciling can only be seen when the back cover is removed.

Pins are identified by a column and row position on the backplane. D-Subminiature connectors are identified by their designation and J-number. All the METRAL™ pins used on the 1665 DMX shelves have the same tail length of 4.30 mm (0.169 in.).

Table D-1, “Backplane Locations of METRAL Pins” (p. D-3) show the location and type of METRAL™ pins on the 1665 DMX backplane.

Table D-1 Backplane Locations of METRAL Pins

Row	Column	Type	Mating Length (mm)	Tail Length (mm)
001, 154, 156, 162	GND	Signal Pin	5.75	4.30
001, 154, 156, 162	a, b, c, d, e	Signal Pin	8.00	4.30
All others	All others	Signal Pin	5.75	4.30

Repair kits and tools

Repair kits

For the repair or replacement of METRAL signal pins, use one of the following repair kits:

- Berg Electronic MT370-01 Shelf Level Press-Fit Repair Kit
- IMDARC R-6004 Metral Pin Repair Kit - Comcode 407959881

This kit include the tools, parts and instructions for repair and replacement of signal pins.

Replacement pins

Replacement pins are available. These pins are defined by the mating length extending beyond the inside of the plastic shroud and by their tail length for press-fitting into the backplane. The tail length includes a compliant press-fit section needed to achieve a gas-tight connection in four contact areas. All the METRAL pins used on the 1665 DMX shelves have the same tail length of 4.30 mm (0.169 in.).

Additional replacement signal pins may be ordered in packages of 100 by the part number shown in Table D-2, “Metral Pins” (p. D-4).

Table D-2 Metral Pins

Type	Mating Length (mm)	Berg Part #
Ground	5.75	88929-502
Signal Pin	5.75	88929-502
Signal Pin	8.00	88929-519

Simple repair methods

Precautions

CAUTION

These procedures should be done with the shelf out of service and powered down to ensure no further damage to the equipment or to the person doing the repair. If service cannot be removed or rerouted, contact your next level of support before proceeding.

CAUTION

ESD hazard

Proper ESD precautions must be followed.

Make sure that you have adequate space to access the backplane area and that you have good light sources so that you can see what you are doing.

Visual examination

Visually examine the connector pins to determine which pins may have been damaged and the degree of the damage. Pins that have been slightly bent may be carefully restored to their initial straight position. Examine both sides of the backplane to determine if the press-fit termination has been disturbed. These pins depend on an undisturbed interference fit between the terminal body and the plated-through hole in the backplane to create a reliable connection.

If the visual examination suggests that the connector pins are loose or are damaged beyond repair, replace the connector pin.

CAUTION

This is a delicate procedure. Take your time to gently straighten the pin in several small steps. Large movements may damage adjacent pins.

METRAL™ backplane pins

Follow the instructions and use the tools provided in the MT370-01 Shelf Level Press-Fit Repair Kit to straighten METRAL pins which may have been bent out of position.

Guide pins and keying pins

If a stainless steel guide pin or keying pin has been bent out of alignment, attempts to straighten it may damage the backplane. The recommended alternative is to replace the bent pin.

D-subminiature pins

The D-subminiature connectors on the 1665 DMX backplane are all of the receptacle type. These connectors are designated as jacks and not as plugs. The individual connector terminals are protected somewhat by the molded plastic insert inside the connector shell. It is unlikely that these terminals would be bent in the manner that the exposed pin terminals of a plug might be bent. The damage concern for these receptacle terminals is that they may be “crushed” or otherwise distorted out of shape. Attempts to “straighten” these terminals may result in fracturing them. If a receptacle terminal has been damaged to the extent that the mating plug connector cannot be connected, then the recommended alternative is to replace the entire backplane.

RJ45 jacks

The RJ45 connectors (jacks) are press-fitted into the 1665 DMX backplane. Should these jacks be damaged beyond simple repair methods, contact your next level of support for the replacement procedure.

□

Replacement methods

Background

Connector pins are designed to withstand a considerable removal force. An impact-type tool is used to generate a controlled removal force. Similarly, proper insertion of a press-fit connector pin is done with an impact-type tool to control the insertion forces and not damage adjacent pins.

Precautions

Read the following Important statements before proceeding:

Important! Any press-fit connector pin may be removed and replaced **one time** in the 1665 DMX backplane. A second removal and replacement in the same plated-through hole may not meet the long-term reliability objectives. If a replacement is needed for a previously replaced connector pin, contact your next level of support before proceeding.

Important! Protect the surrounding area from any debris which may be generated during the pin removal and replacement.

Procedure for METRAL™ pins

Use the procedure below to replace pins when required:

1. Verify that the problem cannot be fixed using a simple repair procedure.
2. Secure the proper tool kit.
3. Read the tool kit instructions before beginning.
4. Plan and write out a “Method of Procedure” specific to your location.
5. Follow the instructions provided to remove the damaged pin.
6. Install the replacement pin.

7 Verify that the new pin is securely in the backplane.

8 If the replacement is not successful, contact your next level of support.

END OF STEPS

Guide and keying pin procedure

If it becomes necessary to replace Guide or Keying Pins, contact your next level of support for tooling, replacement parts and detailed replacement procedures. The replacements will need to installed with screws and washers.

D-subminiature pin procedure

If it becomes necessary to replace either the D-Subminiature pins or connector, contact your next level of support for detailed replacement procedures.

RJ45 jacks

If it becomes necessary to replace a RJ45 connector, contact your next level of support for the replacement procedure.

□

Appendix E: Installation checklist

Overview

Purpose

This chapter provides the recommended checklist to follow when installing a 1665 Data Multiplexer (1665 DMX) system. Use of the installation checklist is required to ensure a quality installation, all completed tasks should be checked off and those not completed should be duly noted as to the reason why. This checklist should be turned in as part of your job complete paperwork.

Contents

This chapter contains the following:

Overview	E-1

Table E-1 Installation Acceptance Checklist

Section and Chapter	Procedure	Required	Completed	
			Yes	No
Part I: "1665 Data Multiplexer (1665 DMX) physical installation and powering"				
Chapter 1, "Equipment and cable installation for 1665 Data Multiplexer (1665 DMX)"	Inspection (p. 1-8)	Yes		
	1665 DMX High-Capacity shelf installation (p. 1-9)	Yes		
	Heat baffle installation (p. 1-14)	See Note 1		
	Power cable and cable bracket installation (p. 1-16)	Yes		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
	Fiber management installation (optional) (p. 1-27)	Yes		
	Installing the fiber ducts (optional) (p. 1-31)	See Note 1		
	Cable and optical fiber installation (p. 1-32)	Yes		
	DS1 cable installation (p. 1-34)	See Note 1		
	DS3/EC1 and 48TMUX cable installation (p. 1-41)	See Note 1		
	12TMUX (LNW18) cable installation (p. 1-54)	See Note 1		
	10/100BaseT backplane Ethernet cable installation (p. 1-58)	See Note 1		
	Ethernet cabling to SFP modules on circuit pack faceplates (p. 1-62)	See Note 1		
	IAO LAN and TCP/IP cable installation (p. 1-64)	See Note 1		
	Modem cable installation (p. 1-69)	See Note 1		
	Sync cable installation (p. 1-72)			
	Sync cable with molded DB-9 connector procedure (p. 1-72)	See Note 1		
	Sync cable with wire-wrap DB-9 connector procedure (p. 1-74)	See Note 1		
	Office alarm cable installation (p. 1-78)	See Note 1		
	Miscellaneous (environmental) discrete telemetry cable installation (p. 1-84)	See Note 1		
	Main optical fiber installation (OC-12, OC-48, OC-192) (p. 1-88)	See Note 1		
	Fiber installation for low-speed packs (p. 1-90)	See Note 1		
	1000Base-F and 100Base-F fiber installation (p. 1-92)	See Note 1		
	Fibre channel fiber installation (p. 1-94)	See Note 1		
	CIT cable installation (p. 1-96)	See Note 1		
	Final operations (p. 1-99)	Yes		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
Chapter 2, "Powering and initial circuit pack installation for 1665 Data Multiplexer (1665 DMX)"	Powering (p. 2-3)	Yes		
	Initial circuit pack installation (p. 2-12)			
	LNW2 (SYSCTL) installation (p. 2-12)	Yes		
	OC-48 main OLIU installation (p. 2-13)	See Note 1		
	OC192 main OLIU installation (p. 2-15)	See Note 1		
	OC-12 main OLIU installation (p. 2-16)	See Note 1		
	8OC-3/8OC-12/2OC-48 main OLIU installation (p. 2-17)	See Note 1		
	LNW80 main switch pack installation (p. 2-18)	See Note 1		
	LNW785 OMD5/8 8-channel low-loss DWDM Optical Mux/Demux (p. 2-19)	See Note 1		
	LNW6(28DS1), LNW7(28DS1PM), LNW8(56DS1E1) low-speed installation (optional) (p. 2-20)	See Note 1		
	LNW16 (12DS3/EC1), LNW18 (TMUX), LNW19/LNW19B (48 DS3/EC1), LNW20 (48TMUX) low-speed installation (optional) (p. 2-21)	See Note 1		
	LNW36 (OC-3 OLIU) low-speed installation (optional) (p. 2-22)	See Note 1		
	LNW37 (4 OC-3 SFP OLIU), LNW45 (8 OC-3 SFP OLIU), LNW49 (4 OC-12 SFP OLIU), LNW55 (12OC-3/12OC12/4 OC48 SFP OLIU) or LNW62 (4 OC-48 SFP OLIU) low-speed installation (optional) (p. 2-23)	See Note 1		
	LNW46 (OC-12 OLIU) low-speed installation (optional) (p. 2-25)	See Note 1		
	LNW31 (OC-48 OLIU), or LNW421-459 (OC-48 PWDM OLIU) low-speed installation (optional) (p. 2-26)	See Note 1		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
	LNW66 (10/100T) or LNW71 (10/100-PL) installation (optional) (p. 2-27)	See Note 1		
	LNW70 (100/1G FXS), LNW74 (10/100 T/F), LNW63 (1000BASE-SX/LX/LX10), LNW64 (8 GbE), LNW78 (RPR) and LNW170 (100/1G FXS) installation (optional) (p. 2-28)	See Note 1		
	LNW67 (1G SX) installation (optional) (p. 2-29)	See Note 1		
	LNW73 (FC-1X/2X) and LNW73C (FC-1X/2X with compression) installation (optional) (p. 2-31)	See Note 1		
	177D/LNW98 blank CP installation (optional) (p. 2-33)	See Note 1		
	177E/LNW97 blank CP installation (optional) (p. 2-33)	See Note 1		
	Install pluggable transmission modules (p. 2-34)	See Note 1		
Part II: “1665 Data Multiplexer (1665 DMX) stand-alone installation tests”				
Chapter 3, “Software download and circuit pack installation”	Software installation (p. 3-4)	See Note 1		
	Circuit pack installation (p. 3-5)	See Note 1		
	Use of WaveStar® CIT software (p. 3-9)	Yes		
	Circuit pack firmware version verification (p. 3-12)	See Note 1		
	1665 DMX shelf initialization (p. 3-13)	Yes		
	Provision/enable/disable TCP/IP on an IAO LAN port (p. 3-14)	See Note 1		
	Reset system date and time (p. 3-17)	Yes		
	Provision/Enable/disable the 1665 DMX as a TL1 TCP/IP GNE (p. 3-18)	See Note 1		
Chapter 4, “Installation tests”	LBO software settings (p. 4-4)			
	Setting DS1 LBOs (p. 4-4)	See Note 1		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
	Setting DS3/EC1 and TMUX LBOs (p. 4-5)	See Note 1		
	Clearing alarms (p. 4-7)	Yes		
	Local equipment and cross-connect tests (p. 4-9)			
	DS1 terminating equipment loopback testing (p. 4-10)	See Note 1		
	DS1 non-terminating equipment transmission testing (optical main OLIU) (p. 4-11)	See Note 1		
	DS1 protection switching (p. 4-14)			
	DS1 function unit protection switching test (manual) (p. 4-14)	See Note 1		
	DS1 function unit protection switching test (command) (p. 4-15)	See Note 1		
	DS1 path switching test (manual) (p. 4-16)	See Note 1		
	DS1 cleanup procedures (p. 4-18)			
	Delete any existing DS1 cross-connections (p. 4-18)	See Note 1		
	Verify cross-connects removed (p. 4-21)	See Note 1		
	DS3/EC1 and TMUX testing procedure (p. 4-22)			
	Verify provisioning (p. 4-22)	See Note 1		
	DS3 terminating equipment loopback testing (optical main OLIUs) (p. 4-23)	See Note 1		
	DS3 non-terminating transmission (optical main OLIU) (p. 4-26)	See Note 1		
	DS3 protection switching (p. 4-28)			
	DS3 function unit protection switching test (manual) (p. 4-28)	See Note 1		
	DS3 function unit protection switching test (command) (p. 4-29)	See Note 1		
	DS3 path switching test (command) (p. 4-30)	See Note 1		
	DS3 cleanup procedures (p. 4-32)			

Section and Chapter	Procedure	Required	Completed	
			Yes	No
	Delete the existing DS3 cross-connections (p. 4-32)	See Note 1		
	LNW66, LNW71 and LNW74 (10/100T) TX Ethernet cabling testing (p. 4-36)			
	Ethernet port assignment verification testing (p. 4-36)	See Note 1		
	Ethernet port wiring verification testing (p. 4-37)	See Note 1		
	OC-3 (LNW37, LNW45, LNW55)/OC-12 (LNW49, LNW55)/OC-48 (LNW55, LNW62) low-speed SFP test procedure (p. 4-41)			
	OC-3/OC-12/OC-48 SFP low-speed SFP test procedure (p. 4-41)	See Note 1		
	OC-3 (low-speed) testing (p. 4-43)			
	OC-3 testing procedure (p. 4-43)	See Note 1		
	OC-12 (low-speed) testing (p. 4-47)			
	OC-12 testing procedure (p. 4-47)	See Note 1		
	OC-12 facility loopback testing (p. 4-49)	See Note 1		
	OC-48 (low-speed) testing (p. 4-52)			
	OC-48 low-speed testing procedure (p. 4-52)	See Note 1		
	OC-48 facility loopback testing (p. 4-53)	See Note 1		
	LED test (p. 4-56)			
	LED test procedure (p. 4-56)	See Note 1		
	Additional optical tests (optional) (p. 4-57)			
	Low -speed optical testing (p. 4-57)	See Note 1		
Chapter 5, “Operational tests”	Office alarm test (p. 5-4)			
	Office alarm test procedure (p. 5-5)	See Note 1		
	Automatic protection switching and alarm test (p. 5-8)			
	Main OLIU switching test (p. 5-8)	See Note 1		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
	Manual switching tests (p. 5-11)			
	Main OLIU switch test (p. 5-11)	See Note 1		
	External timing verification (p. 5-13)			
	Timing verification test procedure (p. 5-13)	See Note 1		
	Miscellaneous (environmental) discrete telemetry test (p. 5-16)			
	Miscellaneous discrete telemetry test procedure (p. 5-16)	See Note 1		
	Modem connection test (p. 5-19)			
	Modem connection test procedure (p. 5-19)	See Note 1		
	Final operations (p. 5-21)			
	Procedure (p. 5-21)	Yes		

Section and Chapter	Procedure	Required	Completed	
			Yes	No
Part III: "1665 Data Multiplexer (1665 DMX) ring setup and testing"				
Chapter 6, "Ring setup and testing: integration procedures"	Fiber installation (p. 6-4)			
	Fiber installation procedure (p. 6-5)			
	Optical transmission test (OC-192, OC-48, OC-12) (p. 6-11)			
	Transmission test procedure (p. 6-11)			
	Automatic protection switching test (p. 6-12)			
	Main OLIU switch test (p. 6-12)			
	Manual switching tests (p. 6-14)			
	Manual switching test procedure (p. 6-14)	Yes		
	Function units/growth slots, switching test (p. 6-15)			
	Final operations (p. 6-17)			
	Procedure (p. 6-17)			
	Clear PM registers (p. 6-17)			

Notes:

1. Only required if equipped.

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Appendix F: Fiber labeling

Overview

Purpose

This chapter describes the labeling of the fiber.

Contents

This chapter contains the following.

Fiber description	F-2
Fiber labels	F-4

Fiber description

Fibers

There are three different types of single-mode fiber used with the 1665 Data Multiplexer (1665 DMX) system, simplex blue fiber, simplex yellow fiber, and the customer's fiber, and two types of multi-mode fiber used with the 1665 DMX, multi-mode simplex gray fiber and the customer's multi-mode fiber. Multi-mode fiber is only supported for use with the LNW67 1GSX circuit pack.

Gray fiber

Gray fiber is made up of a multi-mode gray colored fiber equipped with LC connectors at both ends. The Gray Fibers come in different lengths as well as custom lengths. The length is given on the protection boot of the LC connector.

These fibers are used to make connections from the circuit pack to the LGX. Installation is covered in Chapter 1, Chapter 2, Chapter 3, and Chapter 6.

Yellow fiber

Yellow fiber is made up of a single-mode yellow colored fiber equipped with LC connectors at both ends. The Yellow Fibers come in different lengths as well as custom lengths. The length is given on the protection boot of the LC connector.

These fibers are used to make connections from the circuit pack to the LGX. Installation is covered in Chapter 1, Chapter 2, Chapter 3, and Chapter 6.

Outside fiber

Outside fiber is the fiber connecting the customer equipment to the 1665 DMX. Depending on the customers specifications, these fibers may be any combination of SC, FC, or ST connectors. The length of these fibers depends on the system interface setup. This fiber is usually referred to as the ***Outside Bay or Plant Fiber***.

Outside Bay Fiber management should be specified by the customer. It is beyond the scope of this document to specify the route or dressings that the fiber should take once it leaves the equipment bays.

Precautions

CAUTION

Equipment Damage

Fiber is constructed of glass and should be treated with care. It should not be pulled or stretched. This could cause damage to the fiber or the fiber connector.

Fiber should not be bent in a radius of less than 1-1/2".

Single-mode fiber testing requirements

All fibers shall be tested after they are installed as follows:

- All fibers shall be tested after installation, but prior to turn-up
- Before fibers are tested, they shall be labeled properly and all cable tags shall be removed.
- A 1310-nm or 1550-nm test source and an ITE# 7116 (or equivalent) optical power meter shall be used to perform all tests.
- The light source shall first be measured for a reference point/baseline.
- No fiber jumper may have a measured loss of more than 2 dB.

□

Fiber labels

Introduction

If pre-printed labels are not available, use a label-maker to create labels for each end of each fiber. The label should include:

- Rack location
- Circuit pack
- Port
- Direction (IN,OUT)

Labeling the fibers

To apply the labels to the connectors, use the following procedure.

1 Remove the appropriate label from the backing sheet or the label maker.

2 Apply the label to the strain relief boot, close to the body of the LC connector.

3 Adhere the end of the label with the printed text first.

4 The label must be oriented perpendicular to the main axis of the connector.

5 Wrap the label around the boot so that the second wrap is directly on top of the first wrap. (The label will wrap around the boot approximately two times). The text is printed diagonally on the label so that it can be read when applied the correct way.

Important! Do not apply the label diagonally to the boot. The label must wrap directly on top of itself for the adhesive to work.

END OF STEPS

□

Appendix G: Pluggable transmission module installation

Overview

Purpose

This chapter describes how to insert a pluggable transmission module (PTM) into a 1665 Data Multiplexer (1665 DMX) circuit pack. PTMs are sometimes referred to as SFP (small form pluggable) modules.

CAUTION

Laser Safety

When connecting fiber loops between the IN and OUT ports on optical circuit packs, always connect to the IN port first and then the OUT port. This will prevent any optical radiation from being present at the fiber end.

Contents

This chapter contains the following.

Pluggable transmission modules	G-2
Install pluggable transmission modules	G-6

□

Pluggable transmission modules

Alcatel-Lucent approved Class 1 SFP transceivers

The following table lists all the current approved pluggable transmission modules to be used with 1665 DMX.

Table G-1 Alcatel-Lucent Approved Pluggable Transmission Modules

Apparatus Code	Comcode	Description	Used in
BASE-T-C1 FE and GbE (electrical - NOT OSP)	109565549	Electrical PTM, provisionable to 100 or 1000 Mbps, Lucent approved RJ-45 Cat 5-E cable, maximum span length of 100 meters	LNW63, LNW64, LNW70, LNW78, LNW170
OC-3IR1-I1	109453894	OC-3 PTM TRCVR Intermediate Reach, 1.3 IR-1, 1310nm	LNW37, LNW45, LNW55, LNW82
OC-3LR1-I1	109453886	OC-3 PTM TRCVR Long Reach, 1.3 LR-1, 1310nm	LNW37, LNW45, LNW55, LNW82
S15512	109602599	OC-3 PTM TRCVR Short Reach, 1.3 SR-1, 1310 nm	LNW37, LNW45, LNW55, LNW82
OC-12IR1-I1	109453902	OC-12 PTM TRCVR Intermediate Reach, 1.3 IR-1, 1310nm	LNW49, LNW55, LNW82
OC-12LR1-I1	109467522	OC-12 PTM TRCVR Long Reach, 1.3 LR-1, 1310nm	LNW49, LNW55, LNW82
OC-12LR2-I1	109604447	OC-12 PTM TRCVR Long Reach, 1.5 LR-2 (80km), 1550	LNW49, LNW55, LNW82
OC48SR1-I1	109564518	OC48 PTM TRCVR Short Reach, 1.3 SR-1 (2km), 1310nm	LNW55, LNW62, LNW82, LNW202

Apparatus Code	Comcode	Description	Used in
OC48LR1-I1	109493528	OC48 PTM TRCVR Long Reach, 1.3 LR-1 (40km), 1310nm	LNW55, LNW62, LNW82, LNW202
OC48LR2-I1	109504431	OC-48 PTM TRCVR Long Reach, 1.5 LR-2 (80 km), 1550 nm	LNW55, LNW62, LNW82, LNW202
S2D23C6	109610378	OC48/STM16/OTU1 DWDM 192.3THz/1558.983nm	LNW82, LNW202
S2D25C6	109610394	OC48/STM16/OTU1 DWDM 192.5THz/1557.363nm	LNW55, LNW62, LNW82, LNW202
S2D27C6	109610410	OC48/STM16/OTU1 DWDM 192.7THz/1555.747nm	LNW55, LNW62, LNW82, LNW202
S2D31C6	109610451	OC48/STM16/OTU1 DWDM 193.1THz/1552.524nm	LNW82, LNW202
S2D33C6	109610477	OC48/STM16/OTU1 DWDM 193.3THz/1550.918nm	LNW82, LNW202
S2D35C6	109610493	OC48/STM16/OTU1 DWDM 193.5THz/1549.315nm	LNW82, LNW202
S2D37C6	109610519	OC48/STM16/OTU1 DWDM 193.7THz/1547.715nm	LNW82, LNW202
S2D45C6	109610600	OC48/STM16/OTU1 DWDM 194.5THz/1541.349nm	LNW82, LNW202
S2D47C6	109610626	OC48/STM16/OTU1 DWDM 194.7THz/1539.766nm	LNW55, LNW62, LNW82, LNW202
S2D49C6	109610642	OC48/STM16/OTU1 DWDM 194.9THz/1538.186nm	LNW82, LNW202

Apparatus Code	Comcode	Description	Used in
S2D53C6	109610691	OC48/STM16/OTU1 DWDM 195.3THz/1535.036nm	LNW55, LNW62, LNW82, LNW202
S2D55C6	109610717	OC48/STM16/OTU1 DWDM 195.5THz/1533.465nm	LNW55, LNW62, LNW82, LNW202
S2D59C6	109610766	OC48/STM16/OTU1 DWDM 195.9THz/1530.334nm	LNW55, LNW62, LNW82, LNW202
OC192SR1-C1	109537902	OC-192 XFP TRCVR Short Reach, 1.3 SR-1 (2 km), 1310 nm	LNW59, LNW502
OC192IR2-C1	109537563	OC-192 XFP TRCVR Intermediate Reach, 1.5 IR-2 (40 km), 1550 nm	LNW59, LNW502
OC192LR2-C1	109537555	OC-192 XFP TRCVR Long Reach, 1.5 LR-2 (80 km), 1550 nm	LNW59, LNW502
100BASE-LX-I1 (FE-TX)	109527812	Optical Fast Ethernet PTM LC-type connectors (FE-1310SM)	LNW74, LNW70, LNW78, LNW170
GE-1X2XFC-LX-C1 (1000BASE-LX, 1Gbps and 2 Gbps Fibre-Channel/ FICON)	109527804	GbE long-reach, Single Mode PTM, supports Ethernet, FICON, and Fibre-Channel traffic, LC-type connectors (GbE/FC/2FC-1310)	LNW64, LNW70, LNW73, LNW73C, LNW78, LNW170
GE-1X2XFC-SX-C1 (1000BASE-SX, 1Gbps and 2 Gbps Fibre-Channel)	109527796	GbE short-reach, Single Mode PTM, supports Ethernet and Fibre-Channel traffic, LC-type connectors (GbE/FC/2FC-850)	LNW64, LNW70, LNW73, LNW73C, LNW78, LNW170
ESCON-MM-I1 (ESCON)	109523886	ESCON, Multi-Mode PTM, LC-type connectors (ESCON - 1310)	LNW73, LNW73C

Apparatus Code	Comcode	Description	Used in
GE-1X2XFC-SX-I1 (1000BASE-SX, 1Gbps)	109570606	GbE short-reach, Single Mode PTM, supports Ethernet and Fibre-Channel traffic, LC-type connectors OSP hardened (GbE/FC/2FC-850)	LNW63, LNW64, LNW70, LNW73, LNW73C, LNW78, LNW170
GE-1X2XFC-LX-I1 (1000BASE-LX, 1 Gbps)	109568782	GbE long-reach, Single Mode PTM, supports Ethernet, FICON, and Fibre-Channel traffic, LC-type connectors, OSP hardened (GbE/FC/2FC-1310)	LNW63, LNW64, LNW70, LNW73, LNW73C, LNW78, LNW170
1000BASE-ZX-I1 (1000BASE-ZX, 1Gbps)	109541862	GbE Short-reach, Single Mode PTM, supports Ethernet, LC-type connectors, OSP hardened (GbE - 1550)	LNW63, LNW64, LNW70, LNW78, LNW170

Install pluggable transmission modules

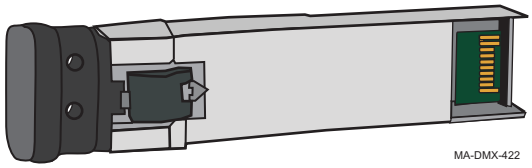
Procedure

Complete the following steps to install pluggable transmission modules in a circuit pack that has already been installed in a shelf.

1 Determine the circuit pack and socket being equipped with the pluggable transmission module.

2 Hold the connector/latch-end of the module in your left hand with the gold fingers facing you. The module should be positioned in manner similar to Figure G-1, “Pluggable Transmission Module With Dust Plug (Optical PTMs Only)” (p. G-6).

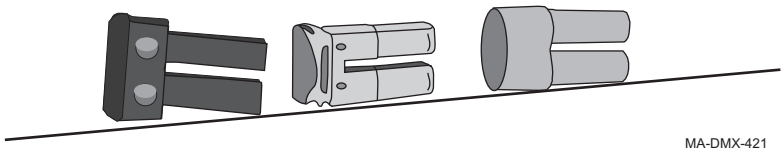
Figure G-1 Pluggable Transmission Module With Dust Plug (Optical PTMs Only)



Important! Do not remove the dust plug unless you are ready to connect fibers or if you need to clean the module.

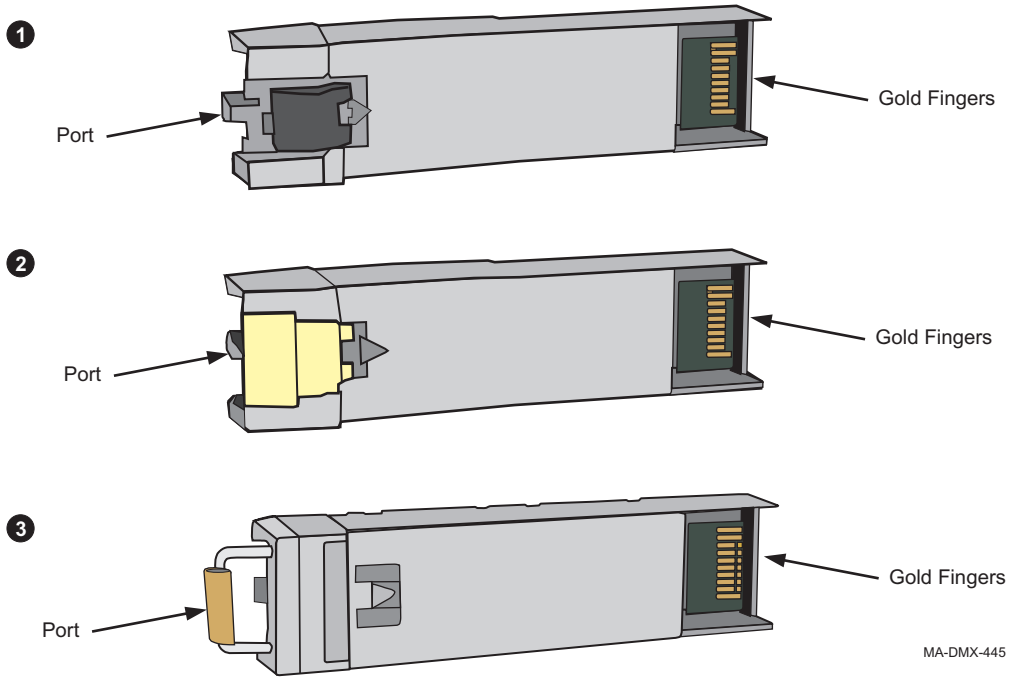
Dust plugs (Optical PTMs only) There are a variety of different types of dust plugs. Any of the following examples could be similar to the dust plug in your pluggable transmission module.

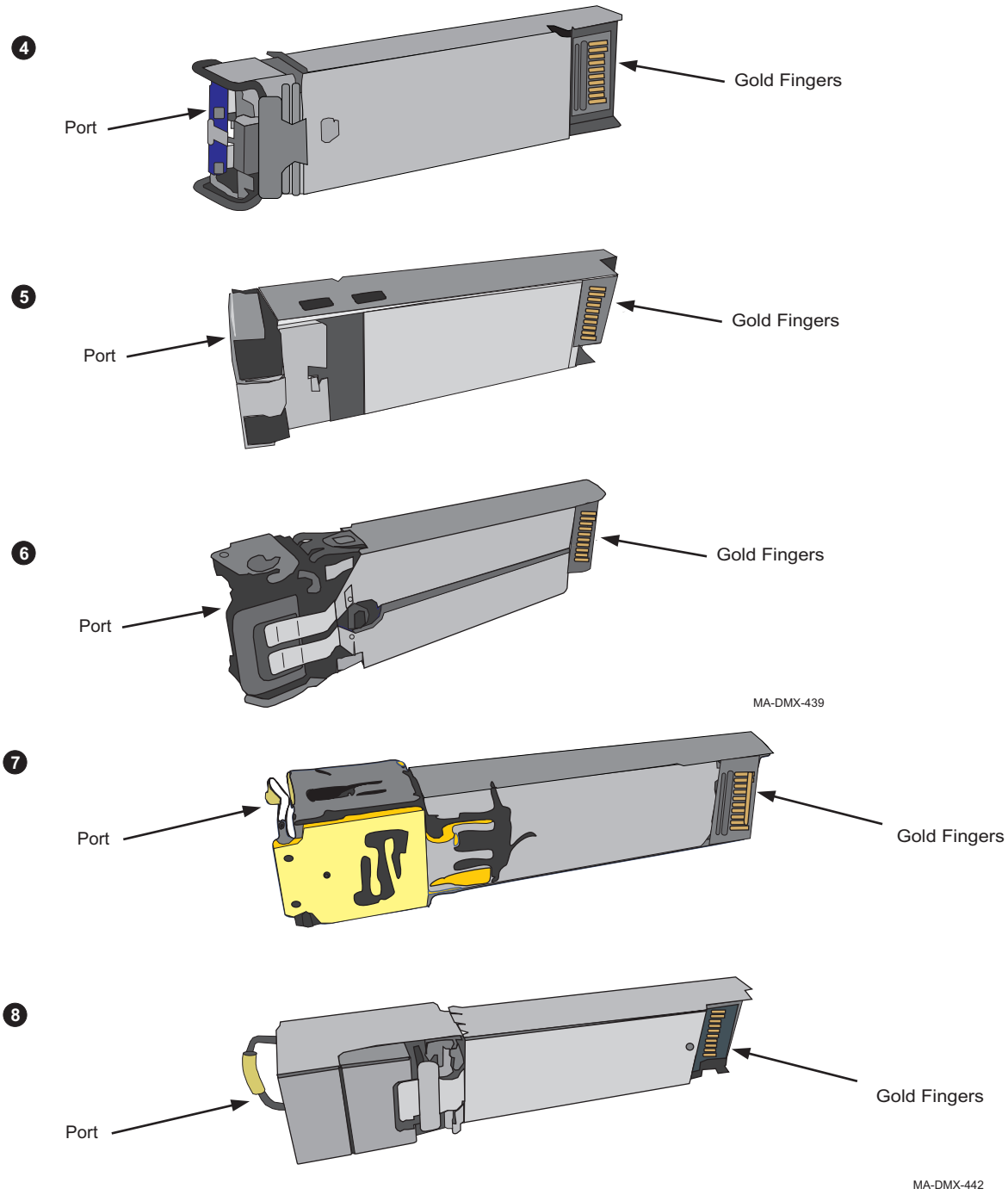
Figure G-2 Examples of Dust Plugs



3 Referring to Figure G-3, “Module Types” (p. G-7) below, determine the type of latching mechanism on the pluggable transmission module you have.

Figure G-3 Module Types





Important! Optical pluggable transmission modules are shipped with a dust plug installed into the optical ports to maintain cleanliness during storage and/or transportation. It is recommended that the dust plug be kept in place to maintain cleanliness until the cabling is connected. With proper care and handling, cleaning the pluggable transmission modules should not be necessary.

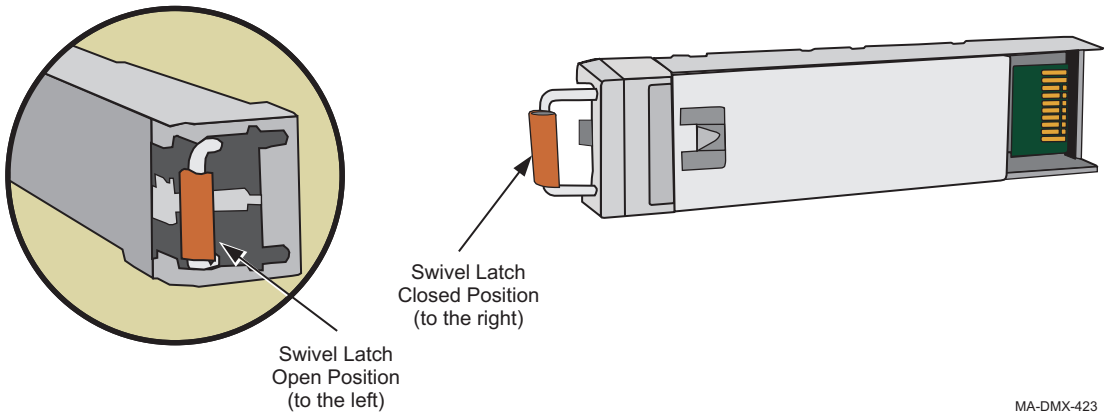
4 Referring to Step 3, what type of latching mechanism does your module have?.

If...	Then...
Type 1 or 2 (optical)	Proceed to Step 8
Type 3 (optical)	Continue with Step 5
Type 4, 5, or 6 (optical)	Proceed to Step 7
Type 7 or 8 (electrical)	Proceed to Step 7

5 Before inserting the module, the latch must be in the closed position. With the dust plug in place, the latch is in the closed position.

Figure G-4 shows the open and closed position of the latch. Depending on your PTM type, the appearance of the port opening and latch mechanism may vary.

Figure G-4 Latch Type 3 (Opened and Closed)

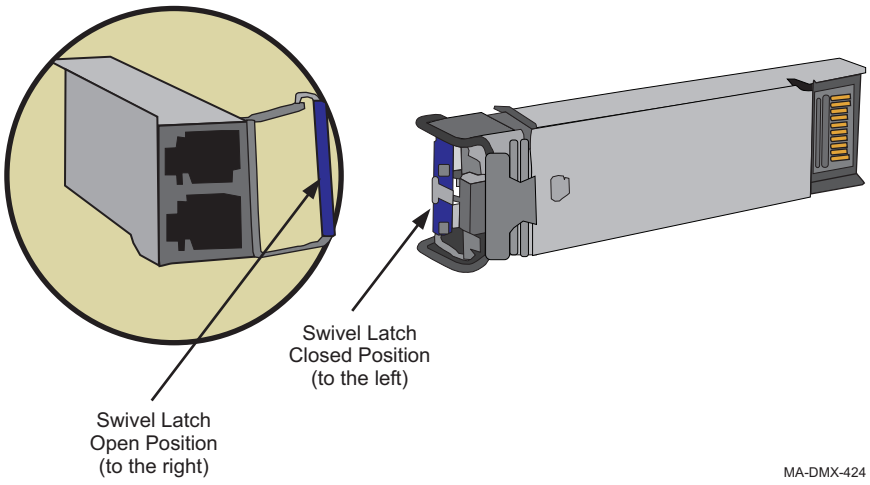


6 Proceed to Step 8.

7 Before inserting the module, the latch must be in the closed position. With the dust plug in place, the latch is in the closed position.

Figure G-5 shows the open and closed position of the latch. Depending on your PTM type, the appearance of the port opening and latch mechanism may vary.

Figure G-5 Latch Type 4, 5, 6, 7 and 8 (Opened and Closed)

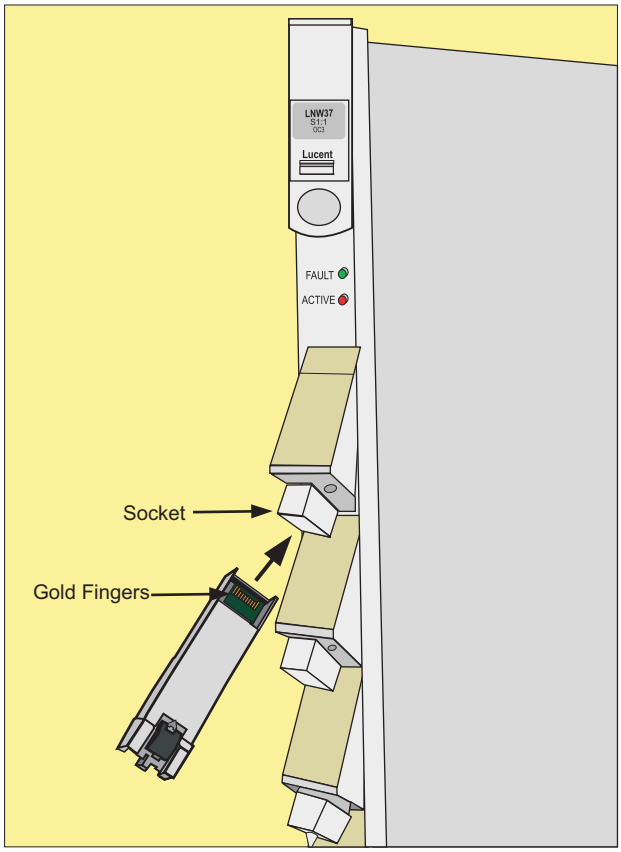


8 With your left hand, hold the pluggable transmission module by the dust plug (optical) or port end (electrical). The ports are in your left hand and the gold fingers are visible (facing you). (Do not insert pluggable transmission module.)

9 Rotate the module; the dust plug or port end is facing you and the gold fingers are pointing away from you and are facing to the right. (Do not insert pluggable transmission module.)

10 Insert the pluggable transmission module in the required socket of the circuit pack faceplate. Confirm that the pluggable transmission module is locked in the socket. Verify that all unused sockets on the circuit pack are equipped with dust covers.

Table G-2 Insert Pluggable Transmission Module Into Socket



Result: The port appears in the WaveStar® CIT System View indicating successful installation.

If response is not correct, replace the pluggable transmission module. If the pluggable transmission module fails when inserted, and another pluggable transmission module in the shelf fails at the same time, replace the newly-installed pluggable transmission module. Each pluggable transmission module has unique internal data for warranty purposes. If this data for any reason is not unique, both pluggable transmission modules with the duplicated information will be declared failed. Refer to the *1665 Data Multiplexer Alarm Messages and Trouble Clearing Guide, 365-372-302*.

11 Push on the dust plug or port end to insert the module. The latch automatically catches when the module is inserted. The module is secure.

To verify that the pluggable transmission module is properly latched in the cage, gently pull the pluggable transmission module (parallel to the direction the pluggable transmission module was installed). Do *not* rotate the swivel latch or activate the de-latching feature on the pluggable transmission module.

12

If installing a pluggable transmission module in an...	Then...
Optical OLIU circuit pack,	Continue with Step 13.
Ethernet/DATA circuit pack,	Proceed to Step 17.

13 To test the OC-n optical port on installed OLIU circuit packs, loop back the OC-n optical port on itself (IN to OUT) with a 15-dB Attenuator.

Result: No alarms on the OLIU.

14 Remove the lightguide jumper used to loop back the OC-n optical port and the LBO.

Result: The port LED starts flashing. The **MN** and **NE** LEDs are lighted on the SYSCTL circuit pack.

15 From the System View window, select **Configuration → Update System → Update All**.

Result: The port LED stops flashing. All alarms are cleared.

16 Repeat Step 1 to Step 15 for additional pluggable transmission modules.

17 If all pluggable transmission modules are installed, then from the System View menu click on the Alarm List button to verify that no alarms are present for the pluggable transmission modules just installed on the circuit packs.

END OF STEPS

Appendix H: Technical support

Overview

Purpose

This chapter provides important technical assistance information for the 1665 Data Multiplexer (1665 DMX).

Contents

This appendix contains the following sections

Technical assistance	H-2
Accessing and navigating the On-Line Customer Support (OLCS) web site	H-7
Other technical support services	H-13

Technical assistance

Overview

Alcatel-Lucent provides the following Technical Support Services:

- Remote Technical Support (RTS) - remote technical support to troubleshoot and resolve system problems.
- On-site Technical Support (OTS) - on-site assistance with operational issues and remedial maintenance.
- Repair and Replacement (R&R) - technical support services for device repair/return or parts replacement.
- Alcatel-Lucent On-Line Customer Support (OLCS) - online access to information and services that can help resolve technical support requests.

Important! Technical Support Services are available 24 hours a day, 7 days a week.

For additional information regarding Alcatel-Lucent Worldwide Services, refer to the Alcatel-Lucent web site at http://www.alcatel-lucent.com/solutions.

Select the appropriate category:

- Service Providers
- Enterprise

Important! Use the appropriate steps below for the above categories.

Service Providers:

1. Select **Service Providers**.
2. Select **Services**.
3. Select **Network Support and Maintenance Services** located in the Maintenance section.

Important! An overview of services provided is displayed. If more detailed information on a particular category is needed, then select the appropriate information from the top tabs displayed.

Enterprises:

1. Select **Enterprises**.
2. Under the **Evaluate** section at the bottom of the page, select **Products and Services**.
3. At the **Products and Services** page, select **Services**.

Important! An overview of the services provided is displayed. For more information, select one of the three categories shown at the bottom of the page: Consult & Design, Maintain & Operate, or Integrate & Deploy.

Technical support

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

Alcatel-Lucent has been and continues to be committed to providing excellence in technical support for its products and services. Therefore, we provide a hierarchical support structure ready and available to solve any Alcatel-Lucent product technical issue.

When additional assistance is required, the Alcatel-Lucent Welcome Center is the first point of contact. An Alcatel-Lucent Welcome Center operator can direct the request to engineers that are highly trained and skilled in resolving issues, involving Alcatel-Lucent products. Technical assistance is available 24 hours a day, 7 days a week.

Alcatel-Lucent Welcome Center

1 866 582 3688, prompt 1 (continental U.S.)
+1 (630) 224 4672 (outside continental U.S.)
(24 hours a day, 7 days a week)

By using the Alcatel-Lucent Welcome Center as the entry point for Alcatel-Lucent support, customers will be assured of a timely and effective technical support service.

On-line customer support

Overview

On-Line Customer Support (OLCS) is the Customer Support web site for our customers' technical support needs. This customer web access tool provides an easy method to access data about Alcatel-Lucent products using the World Wide Web. A customer must first request access to this web site to gain access to the following customer support features:

- Ask AL Knowledge base
- Customer Assistance Request Entry System (CARES)
- Data Drop Box
- Documentation
- Downloads
- Alcatel-Lucent Alerts
- Product Change Notices
- RMA (Repair and Exchange)

Ask AL Knowledge base

The Ask AL Knowledge base web interface feature connects you to the Knowledge Management solutions database. The Ask AL Knowledgeably feature lets you search for solutions by using natural language queries. Many products have an extensive set of Solutions available. Solutions are created by technicians to provide customers with a method to resolve issues without calling for assistance. Solutions are displayed, showing the percentage weight or percent match, based on search criteria. Searches can be performed on all products that are entitled, through the level of service contract a customer has for RTS services.

CARES

The CARES web interface feature makes it easy for you to submit an Assistance Request (AR), subscribe to AR Notifications (be notified when an AR is updated), and view all the customer ARs. The CARES feature lets you open an AR for low severity issues or questions. Any high severity issue should be called into CTAM. Users can stay informed about their ARs by using the flexible AR Notification subscriptions. Users can choose a method for receiving updates: email, text messaging messages, or none. Users can choose when updates are wanted (when the state of the AR changes, any update to the investigation field occurs, or any time any text field is modified). Users can log into the OLCS web site and view ARs 24 hours a day, 7 days a week.

Data Drop Box

The Data Drop Box feature allows Alcatel-Lucent support technicians to provide customers with a quick method to share files. The Data Drop Box allows a technician to provide or receive a file from a customer quickly. These files remain in place for 7 days.

Documentation

The Documentation feature on the OLCS web site contains three areas: Manuals and Guides, Technical Notes, and Release Information.

- Manuals and Guides

  This section contains the documents that are available in paper or electronic copy and are distributed with a new product. These are the documents that are available within the Alcatel-Lucent Product Documentation web site. The OLCS web site contains links to the actual documents at the Customer Information Center (CIC) web site. The following is a list of possible documents that are available from this site:

  – Administration Guide

  – Applications Planning Guide (APG)/Applications Planning and Ordering Guide (APOG)

  – Getting Started Guide

  – Installation Manual (IM)/Installation Guide (IG)

  - Modification Implementation Procedure (MIP)
  - User Guide
  - Alarm Messaging and Trouble Clearing Guide (AMTCG)
  - Framework User Guide
  - Graphical User Interface (GUI) Guide
  - Maintenance Guide, Provisioning Guide
  - User Operations Guide (UOG)
- Technical Notes

  This section contains documents that are specific to the product and are technical in nature. Most of these documents will provide information in product data sheets or white papers, which are technical documents that explain the operation of a particular part of the system. The following documents are available in this section:
  - Change Notice (CN)
  - Ethernet Management Guide
  - Method of Procedure (MOP)
  - Planning Guide
  - Service Assurance Guide
  - Engineering Change Procedure (ECP)
  - Feature Contents
  - Operations Interworking (OI) Guide
  - Screen Help
  - White Papers

These documents will vary from product to product.

- Release Information

  This section contains documents that are specific to the release of a product. The following documents are available in this section:
  - Acceptance Documents
  - Software Release Descriptions (SRD)
  - Specific SRD sections
  - White Papers (release specific)
  - Software Compatibility
  - Upgrade Paths

Downloads

Important! This may not apply to all products.

The Downloads area allows Alcatel-Lucent support technicians to provide access to software downloads that are specific to a customers contract. This feature is only allowed through negotiation with the Account Team and the Product Manager of the product.

Alcatel-Lucent Alerts

The Alcatel-Lucent Alerts tool is a subscription-based tool that provides the same information that our Product Notifications (PNs) did previously provide. This new method of communication is a vehicle to share product and support issues that are of informational, maintenance, or preventive nature. Alcatel-Lucent Alerts contain detailed text descriptions and urgency of Alcatel-Lucent product issues that need to be quickly communicated to customers after the deployment of a release or product.

Product Change Notices

The Product Change Notices (PCN) area provides information on hardware changes for a product. There is a selection of choices to help you search for Change Notices (CNs) or Customer Change Notices (CCNs).

Return Material Authorization (RMA) (Repair and Exchange)

Important! This may not apply to all products.

The RMA area provides a list of contact information on all Alcatel-Lucent products. There is a “request an RMA number” on-line for most Alcatel-Lucent products. An RMA number is required for all returned parts and this feature provides you with an easy method to obtain the RMA number. Please check the warranty status before submitting a request.

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Accessing and navigating the On-Line Customer Support (OLCS) web site

Description

This section provides the method to access the On-Line Customer Support (OLCS) web site, obtain a login (if necessary), and navigate to each feature listed in this document.

Accessing the OLCS web site

To access the Alcatel-Lucent OLCS web site, enter: www.alcatel-lucent.com/support. Once you are at this web page, select **Lucent Global Support**. This will bring you to the web site where you can log in to gain access to the entitled products.

Obtaining a login for OLCS

To request a login, a customer must register, then and an email confirmation is sent within 2 business days. The following steps tell you how to register for a login:

1. Select “Register Here” on the top right (just below the Login and Password boxes) of the Online Customer Support (https://support.lucent.com/portal/olcsHome.do) web site.
2. Follow this registration process:
   - Select the role and accept the terms of use.
   - Provide a business identification, and enter in all of the required information.
   - Validate your email address.
   - Confirm your business identity and set a password.
   - Select content. (This will be verified against the current contract agreements.)
   - Register for the selected content.
3. An email confirmation of the registration and the site access privileges is sent within 2 business days.
4. Customize the web view once you have gained access to the OLCS web site.
   - After logging in, a personalized view of the Customer Support Home page displays. This view is based on the user's and company support entitlements.

Need Help while registering?

From the U.S.	1 (866) 582 3688, prompt 7
From outside the U.S.	+1 (630) 218 7688
In Asia/Pacific	Please contact the in-country technical support hotline.
Via email	Use the email address: olcshelp@alcatel-lucent.com or use the site's "Contact Us" form
Use the OLCS help desk number for OLCS access problems, registration questions, password resets, navigation questions, etc.	

View an OLCS website

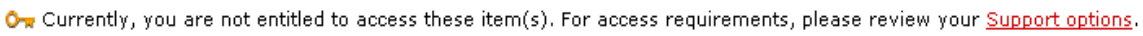
After you have logged into the OLCS web site, a personalized view of the Customer Support Home page is displayed. This view is based on the user's and company support entitlements.

To set Customer Support as the default, if it is the primary destination on the www.alcatel-lucent.com website, click "Select default home page" on the left column. The "My Products" section provides you with quick navigation to the entitled products and also quick access to the CARES tool. While navigating through the various tools, you can establish bookmarks to certain tools, documents, or web pages (within OLCS) by clicking "Add to Bookmarks."

The Customer Support home page can be customized by selecting "Customize page layout" and adjusting the fields to be displayed (uncheck the boxes to de-select those elements). These fields can be adjusted at any time. The changes take effect immediately.

There are two methods to find product information. Click "My Products" to choose a product, or click "Documentation" or "Downloads" to display a complete product listing. When the full product list is displayed, use the alphabetic listing (default) or the category list, whichever you prefer. Once a product is selected, a "Product Summary Page" is displayed, which describes all of the tools and features available for this product.

> **Important!** If content has been posted, but contract entitlements do not allow access, then the following padlock icon is displayed:



Ask AL Knowledge base

The Ask AL web page can be accessed from the left column on the Customer Support homepage (unless you changed the view), from the "Technical Support" section in the center of the page, or from the "My Bookmarks" section (if it was added there). Once at

the Ask AL Knowledge base web page, enter a question or phrase using natural language, and click the check boxes for only the products that should be searched; otherwise, all products checked will be searched.

The results that return show a percentage weight or percent match based on the search criteria. To refine a search, add more details to the question or phrase and answer the other questions displayed. Once you find a solution of interest, select that solution, and the complete solution will display.

Many of the solutions are based on generated ARs or Known Problems from the SRD. To provide quality information, solutions go through a review process before being posted. Content can grow daily as solutions move through the review cycle.

CARES

CARES ARs are accessed from the left column on the Customer Support homepage (unless this view was changed), under the "Technical Support" section in the center of the page, from the "My Bookmarks" section (if CARES was added there), or from the Quick Link section "CARES Assistance Requests," at the bottom of the Customer Support homepage. Product Notifications and Solutions can also be selected in this section. These are both legacy tools. The new tools, Alcatel-Lucent Alerts and Ask AL Knowledge base, are discussed in other sections of this document.

When you select CARES, a general web page displays. From that page, a particular function can be selected from the left column. To provide more information on the selected tool, select "More" from the center column.

ARs can be viewed (using "Find an AR" or "Advanced query"), created (using "Create an AR"), or used to report a warranty defect (using "Report a warranty defect"). The CARES web interface has features that keep you informed about the progress of ARs. With the flexible AR Notification subscriptions, CARES can email or send text messages on a variety of activities regarding an AR. A notification is sent when the AR state is changed to Created, Resolved, Closed, or Pending Customer Action. Other conditions that generate notifications are if the following fields are updated: Investigation, Short Description, Current Summary, Description, and Resolution. You can set up (subscribe), remove (unsubscribe), or change these conditions at any time.

Data Drop Box

You can access the Data Drop Box from the left column on the Customer Support homepage (unless your view was changed), from the "Technical Support" menu in the center of the page, or from the "My Bookmarks" section (if Data Drop Box has been added there). Click the "Upload a file" button in the Data Drop Box window to send a file to the Alcatel-Lucent support technician. An email address can also be entered so that the

Alcatel-Lucent technician will be notified when the file has been sent. Click the "Download a file" button from the Data Drop Box if the Alcatel-Lucent technician has sent a file to be downloaded. These files will remain on the site for 7 days.

Documentation

You can access documentation by selecting a product from the "My Products" area. Alternatively, documentation can also be accessed from the left column on the Customer Support home page (unless this view has been changed), from the "Technical Support" section in the center of the page, or from the "My Bookmarks" section (if Documentation has been added there). If accessing Documentation by means other than the "My Products" area, choose the product whose documentation you wish to access by selecting the product from the alphabetical listing or the category list.

Once you are on the product web page, select "Manuals and Guides" from the list under the "Documentation and downloads" section. The "Manuals and Guides" link brings you to the Library of Manuals and Guides for the product you have chosen. The document links bring you to the document stored in the Alcatel-Lucent Customer Information Center (CIC) web site or to another OLCS webpage that contains the product documentation.

Within the "Documentation and Downloads" area, the "Technical Notes" link brings you to a web page which contains documents that are not release specific and are technical in nature.

Also, within the "Documentation and Downloads" area, the Release Information link brings you to a Library of Release Notes web page that contains documents which are release specific and are listed by release.

Click on these links to download or open a PDF file.

Downloads

Important! This may not apply to all products.

You can access downloads by selecting a product from the "My Products" section. Downloads can also be accessed from the left column on the Customer Support homepage (unless this view has been changed), from the "Technical Support" section in the center of the page, or from the "My Bookmarks" section (if Downloads was added there). If accessing Downloads by means other than the "My Products" area, choose the product whose Downloads you wish to access by selecting the product from the alphabetical listing or the category list.

Once you are on the product web page, click the "Downloads: Electronic Delivery" link from the list under the "Documentation and Downloads" area. Select the appropriate release to be downloaded from the drop-down list, and click "Next." Select the file to be downloaded and click "Next." On the next web page, enter the path where the file should be downloaded and click "Download."

Alcatel-Lucent Alerts

You can access Alcatel-Lucent Alerts from the left column on the Customer Support homepage (unless this view has been changed), from the “Technical Support” section in the center of the page, or from the “My Bookmarks” section (if Alcatel-Lucent Alerts is added there).

Once you are on the Alcatel-Lucent Alerts web page, a list of products are displayed. Click on a product to see a list of Alerts for that product. Alternatively, use the “Enter the number of the Alert” field to find a specific Alert, or use the text search to search for Alerts with certain words.

To subscribe to Alcatel-Lucent Alerts, click the “Alerts Subscription Page” link. Once at the “Alcatel-Lucent Alerts Subscription” page, fill out the form and choose the product whose alerts you would like to subscribe to.

You have the option to click “Modify Subscription” or “Cancel Subscription.” Modify Subscription allows you to modify the Urgency, Type, and/or Products selected. “Cancel Subscription” will stop future Alcatel-Lucent Alerts email messages.

Product Change Notices (PCNs)

You can access Product Change Notices (PCNs) from the left column on the Customer Support home page (unless this view has been changed), from the “Technical Support” section in the center of the page, or from the “My Bookmarks” section (if PCNs were added there).

Once on the PCN web page, a list of PCNs is displayed. You can search PCNs by clicking one of the following links:

- PCN cross-reference
- Search for specific text in Class A PCNs
- PCNs added or updated within the past 30 day
- Change Notice summary report

Return Material Authorization (RMA) (Repair and Exchange)

Important! This may not apply to all products.

Return Material Authorization (RMA) can be accessed from the left column on the Customer Support home page (unless this view has been changed), from the “Technical Support” section in the center of the page, or from the “My Bookmarks” section (if it was added there).

Once on the RMA web page, a table with contact information is displayed. Use the contact information provided or choose to fill in the online RMA request form at the bottom of that web page.

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Other technical support services

The technical support services expert workshop series

Audience: Technicians, installers, maintenance engineers, technical support personnel, product evaluators, and anyone who has a working knowledge of the products involved and is interested in a hands-on workshop covering advanced troubleshooting issues.

Description: The same engineers that resolve the Assistance Requests (ARs) have developed a series of advanced, hands-on workshops that can be customized to the unique network applications. Individual product modules will provide the knowledge and skills to perform troubleshooting and fault-finding activities at the equipment site or from a remote operations center. There are lab exercises using Alcatel-Lucent network management systems to simulate real-world provisioning and troubleshooting scenarios. In addition, general technology modules will round out the understanding of the network element (NE) troubleshooting performed.

Objectives: Each module has specific objectives. Some overall series objectives are listed below:

- Understand advanced network element security features
- Setup and understand interworking between Alcatel-Lucent network elements
- Perform provisioning operations and remote trouble-shooting using CIT, EMS and TL1 interfaces.
- Analyze Performance Monitoring Data
- Understand alarm handling / alarm management
- Provision and understand system synchronization techniques
- Provision and understand protection schemes (BLSR, UPSR, 1+1 APS)
- Understand network communication issues (OSI and TCP/IP interfacing)

Length: Product Modules are scheduled for 3 days. Technology Modules are scheduled for 1 day.

Expected Foundation Knowledge: Suggested prerequisites are listed on each module's workshop description. Generally, customers should have a basic understanding of digital fundamentals and lightwave transmission systems. In addition, customers should have taken a previous Alcatel-Lucent Operating & Maintenance course or have equivalent experience with operations and maintenance issues related to the product

Activities Prior to Workshop Delivery: The effectiveness of this workshop series relies on the fact that it allows a customer to address the issues experienced in their network today. To achieve this, prior to the workshop, a conference call will be set up with the engineers that will facilitate the workshop. During this call, the logistics of simulating the customer's network environment will be discussed.

Workshop Location: This workshop will be delivered in the Customer Advocate System Test Labs in Westford, MA. The format is 75% hands-on lab exercises, reinforced with 25% classroom instruction.

How to Sign Up:

To enroll in the training course:

- Within the United States,
  - Visit https://training.lucent.com
  - Call **1 (888) 582 3688**: *Prompt* 2.
- Outside the continental United States,
  - Visit https://training.lucent.com
  - Contact your in-country training representative
  - Call: **+1 (407) 767 2798**
  - Fax: **+1 (407)767 2677**
- Enter “Advanced Workshops” in the search menu and click “Go.”
- Choose which Advanced Maintenance Workshop you’d like to register for by clicking on the link.
- Read the workshop description(s) and follow the links to register.

□

Glossary

Acronyms and abbreviations

A

ABN
Abnormal (status condition)

ACO
Alarm Cutoff

ACO/SW
Alarm Cutoff and Test

ADM
Add/Drop Multiplexer

AGNE
Alarm Gateway Network Element

AIS
Alarm Indication Signal

AMI
Alternate Mark Inversion

ANSI
American National Standards Institute

APS
Automatic Protection Switch

ARM
Access Resource Manager

AS&C
Alarm, Status, and Control

ASCII
American Standard Code for Information Interchange

ASN.1
Abstract Syntax Notation 1

ASNE
Alarm Server Network Element

ATM
Asynchronous Transfer Mode

Auto
Automatic

AUXCTL
Auxiliary Control

B

B3ZS
Bipolar 3-Zero Substitution

B8ZS
Bipolar 8-Zero Substitution

BDFB
Battery Distribution and Fuse Bay

BER
Bit Error Ratio

BIP
Bit Interleaved Parity

BITS
Building Integrated Timing Supply

BRI
Basic Rate Interface

C

CC
Clear Channel

CCITT
International Telephone and Telegraph Consultative Committee

CEV
Controlled Environment Vault

CD-ROM
Compact Disk, Read-Only Memory

CDTU
Channel and Drop Test Unit

CIT
Craft Interface Terminal

CLF
Carrier Line Failure Status

CLK
Clock

CMISE
Common Management Information Service Element

CMOS
Complementary Metal Oxide Semiconductor

CMTS
Cable Modem Termination System

CO
Central Office

CP
Circuit Pack

CPE
Customer Premises Equipment

CR
Critical (alarm status)

CSA
Carrier Serving Area

CSU
Channel Service Unit

CS&O
Customer Support and Operations

CV
Coding Violation

CVFE
Coding Violation Far End

D

DCC
Data Communications Channel

DCE
Data Communications Equipment

DEMUX
Demultiplexer

DLC
Digital Loop Carrier

DPLL
Digital Phase-Locked Loop

DRI
Dual Ring Interworking

DS1
Digital Signal Level 1

DS3
Digital Signal Level 3

DSLAM
Digital Subscriber Line Access Multiplexer

DSNE
Directory Services Network Element

DSX
Digital Cross-Connect Panel

DT
Distant Terminal

DTE
Data Terminating Equipment

E

EC-1
Electrical Carrier Level 1

ECI
Equipment Catalog Item

EEPROM
Electrically-Erasable Programmable Read-Only Memory

EIA
Electronic Industries Association

EMC
Electromagnetic Compatibility

EMI
Electromagnetic Interference

EOOF
Excessive Out of Frame

EPROM
Erasable Programmable Read-Only Memory

EQ
Equipped (memory administrative state)

ES
Errored Seconds

ESD
Electrostatic Discharge

ESF
Extended Super Frame

EST
Environmental Stress Testing

F

FCC
Federal Communications Commission

FDDI
Fiber Distribution Data Interface

FE
Far End

FE ACTY
Far End Activity

FEBE
Far End Block Error

FE ID
Far End Identification

FEPROM
Flash EPROM

FERF
Far End Receive Failure

FE SEL
Far End Select

FIT
Failures in 10^9 hours of operation.

G

GbE
Gigabit Ethernet

GNE
Gateway Network Element

GR
Telcordia Technologies General Requirement

GTP
General Telemetry Processor

GTSIP
Global Technical Support Information Platform

GUI
Graphical User Interface

H

HECI
Humans Equipment Catalog Item

I

IC
Internal Clock

ID
Identifier

IEC
International Electrotechnology Commission

IMF
Infant Mortality Factor

INC
Incoming Status

I/O
Input/Output

IP
Internet Protocol

IR
Intermediate Reach

IS
In Service

ISCI
Intershelf control Interface

ISI
Intershelf Interface

ISDN
Integrated Services Digital Network

ISO
International Standards Organization

ISP
Internet Service Provider

IVHS
Intelligent Vehicle Highway System

L

LAN
Local Area Network

LAPD
Link Access Procedure "D"

LBO
Line Build Out

LCN
Local Communications Network

LEC
Local Exchange Carrier

LED
Light-Emitting Diode

LOF
Loss of Frame

LOP
Loss of Pointer

LOS
Loss of Signal

LR
Long Reach

LS
Low Speed

M

MD
Mediation Device

MJ
Major Alarm

MM
Multimode

MML
huMan-Machine Language

MN
Minor Alarm

MPEG
Moving Picture Experts Group

MSDT
Multi-Services Distant Terminal

MTBF
Mean Time Between Failures

MTBMA
Mean Time Between Maintenance Activities

Mult
Multipling

MUX
Multiplex

MXBIU
Multiplexer and Backplane Interface Unit

N

NE
Near End

NE
Network Element

NE ACTY
Near-End Activity

NEBS
Network Equipment-Building System

nm
Nanometer (10^{-9} meters)

NMA
Network Monitoring and Analysis

NMON
Not Monitored (provisioning state)

NRZ
Nonreturn to Zero

NNI
Network-Network Interface

NSA
Not Service Affecting

NSAP
Network Services Access Point

NTF
No Trouble Found

O

OAM&P
Operations, Administration, Maintenance, and Provisioning

OC-1
Optical Carrier Level 1 Signal (51.84 Mb/s)

OC-3
Optical Carrier Level 3 Signal (155 Mb/s)

OC-12
Optical Carrier Level 12 Signal (622 Mb/s)

OC-48
Optical Carrier Level 48 Signal

OLIU
Optical Line Interface Unit

OOF
Out of Frame

OOL
Out of Lock

OPS/INE
Operations System/Intelligent Network Element

OS
Operations System

OSGNE
Operations System Gateway Network Element

OSI
Open Systems Interconnection

OSMINE
Operations Systems Modifications for the Integration of Network Elements

OSP
Outside Plant

P

P-bit
Performance Bit

PC
Personal Computer

PCU
Power Conversion Unit

PID
Program Identification

PINFET
Positive Intrinsic Negative Field Effect Transistor

PJC
Pointer Justification Count

PLL
Phase-Locked Loop

PM
Performance Monitoring

PMN
Power Minor Alarm

POH
Path Overhead

POP
Points of Presence

POTS
Plain Old Telephone Service

PRM
Performance Report Message

PROTN
Protection

PRS
Primary Reference Source

PSU
Power Supply Unit

PTM
Pluggable Transmission Module

PVC
Permanent Virtual Circuit

PWR
Power

R

RAM
Random Access Memory

RPP
Reliability Prediction Procedure (described in Telcordia Technologies TR-NWT-00032)

RT
Remote Terminal

NARTAC
Lucent Regional Technical Assistance Center (1-866-LUCENT8)

RZ
Return to Zero

S

SA
Service Affecting

SCADA
Supervisory Control and Data Acquisition

SD
Signal Degrade

SDH
Synchronous Digital Hierarchy

SEFS
Severely Errored Frame Seconds

SEO
Single-Ended Operations

SES
Severely Errored Seconds

SF
Super Frame (format for DS1 signal)

SFP
Small Form Pluggable

SID
System Identification

SLA
Service Level Agreements

SLIM
Subscriber Loop Interface Module

SM
Single Mode

SONET
Synchronous Optical NETwork

SPE
Synchronous Payload Envelope

SQU
Sync Quality Unknown

SRD
Software Release Description

STS, STS-n
Synchronous Transport Signal

STM
Synchronous Transfer Mode

STS-1 SPE
STS-1 Synchronous Payload Envelope

STS-3c
Synchronous Transport Level 3 Concatenated Signal

STS-12c
Synchronous Transport Level 12 Concatenated Signal

SYSCTL
System Controller (circuit pack)

T

T1X1 and T1M1
The ANSI committees responsible for telecommunications standards

TA
Telcordia Technologies Technical Advisory

TABS
Telemetry Asynchronous Byte Serial (Protocol)

TARP
Target ID Address Resolution Protocol

TCA
Threshold-Crossing Alert

TCP/IP
Transmission Control Protocol/Internet Protocol

TCVCXO
Termperature-Compensated Voltage-Controlled Crystal Oscillator

TDM
Time Division Multiplexing

TID
Target Identifier

TL1
Transaction Language 1

TLB
Timing Looped Back

TOP
Task Oriented Practice

TR
Telcordia Technologies Technical Requirement

TSA
Time Slot Assignment

TSI
Time Slot Interchange

TSO
Technical Support Organization

U

UAS
Unavailable Seconds

UNI
User Network Interface

UOC
Universal Optical Connector

UPD/INIT
Update/Intialize

UPSR
Unidirectional Path Switched Rings

V

VF
Voice Frequency

VLAN
Virtual Local Area Network

VLSI
Very Large Scale Integration

VM
Violation Monitor

VMR
Violation Monitor and Removal

VoIP
Voice over Internet Protocol

VONU
Virtual Optical Network Unit

VPN
Virtual Private Network

VT
Virtual Tributary

VT1.5
Virtual Tributary 1.5 (1.728 Mb/s)

VT-G
Virtual Tributary Group

W

WAN
Wide Area Network

0x1

See Ring (0x1) Low-Speed Interface.

1+1

The 1+1 protection switching architecture protects against failures of the optical transmit/receive equipment and their connecting fiber facility. One bidirectional interface (two fibers plus associated OLIUs on each end) is designated "service," and the other is designated "protection." In each direction, identical signals are transmitted on the service and protection lines ("dual-fed"). The receiving equipment monitors the incoming service and protection lines independently, and selects traffic from one line (the "active" line) based on performance criteria and technician/OS control. In 1+1 both service and protection lines could be active at the same time (service in one direction, protection in the other).

1xN, 1x1

1xN protection switching pertains to circuit pack protection that provides a redundant signal path through the DMX 2.5G Multiplexer (it does not cover protection switching of an optical facility; se "1+1"). In 1xN switching, a group of N service circuit packs share a single spare protection circuit pack. 1x1 is a special case of 1xN, with N=1. In 1x1 only one is active at a time.

A

Active

Active identifies a 1+1 protected OC-N line which is currently selected by the receiver at either end as the payload carrying signal or a 1x1 or 1xN protected circuit pack that is currently carrying service. (See Standby).

AGNE - Alarm Gateway Network Element

A defined NE in an alarm group through which members of the alarm group exchange information.

AIS - Alarm Indication Signal

A code 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.

ASCII - American Standard Code for Information Interchange

A standard 8-bit code used for exchanging information among data processing systems and associated equipment.

Auto

One possible state of a service interface port. In this state, the port will automatically be put "in service" if a good incoming signal is detected on the port.

Automatic Protection Switch

A feature that allows another synchronization source to be automatically selected and the synchronization source provisioning to be automatically reconfigured in the event of a synchronization source failure or network synchronization change, for example, a fiber cut.

Available Time

In performance monitoring, the 1-second intervals.

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.

Backbone Ring

A host ring.

BER - Bit Error Ratio

The ratio of bits received in error to the total bits sent.

BIP - Bit Interleaved Parity

A method of error monitoring over a specified number of bits, that is BIP-3 or BIP-8.

BITS - Building Integrated Timing Supply

A single clock that provides all the DS1 and DS0 synchronization references required by clocks in a building.

Broadband

Any communications channel with greater bandwidth than a voice channel; sometimes used synonomously with wideband. Also refers to signals at the DS3 (44.736 Mb/s) and higher. Wideband refers to lower rates (i.e. DS1, VT1.5, etc.).

C

CC - Clear Channel

A provisionable mode for the DS3 output that causes parity violations not to be monitored or corrected before the DS3 signal is 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. Recently changed to the International Telecommunications Union Telecommunications Standards Sector (ITU-TSS).

Channel

A logical signal within a port. For example, for an EC-1 port, there is one STS-1 channel and sometimes 28 VT1.5 channels. See Port.

Channel State Provisioning

A feature that allows a user to suppress reporting of alarms and events during provisioning by supporting multiple states (automatic, in-service and not monitored) for VT1.5 and STS-1 channels. See Port State Provisioning.

CV - Coding Violation

A performance monitoring parameter.

CVFE - Coding Violation Far-End

An indication returned to the transmitting terminal that an errored block has been detected at the receiving terminal.

D

DACS III-2000

Digital Access and Cross-Connect System that provides clear channel switching at either the DS3 or the STS-1 rates, eliminating the need for manual DSXs.

DACS IV-2000

Digital Access and Cross-Connect System that provides electronic DS3/STS-1 or DS1/VT1.5 cross-connect capability, eliminating the need for manual DSXs.

DCC - Data Communications Channel

The embedded overhead communications channel in the SONET line. It 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

In a data station, the equipment that provides the signal conversion and coding between the data terminal equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

DDM-2000

Lucent's first generation SONET multiplexers that multiplex DS1, DS3, or EC-1 inputs into EC-1, OC-1, OC-3, or OC-12 outputs.

Default Provisioning

The parameter values that are preprogrammed as shipped from the factory.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

DEMUX - Demultiplexer

The DEMUX direction is from the fiber toward the DSX.

Digital Multiplexer

Equipment that combines time-division multiplexing several digital signals into a single composite digital signal.

DRI - Dual Ring Interworking
Two ring networks interconnected at two common nodes.

Drop and Continue
A technique that allows redundant signal appearances at two central offices in a DRI network, allowing protection against central office failures.

DS1
Digital Signal Level 1 (1.544 Mb/s).

DS1(28) Circuit Pack
The DS1(28) circuit pack interfaces to the DSX-1 panel.

DS3
Digital Signal Level 3 (44.736 Mb/s).

DS3/EC-1 Circuit Pack
The DS3/EC-1 circuit pack interfaces to the DSX-3 panel.

DSn - Digital Signal Rate n
One of the possible digital signal rates at DMX 2.5G Multiplexer interfaces: DS1 (1.544 Mb/s) or DS3 (44.736 Mb/s).

DSNE - Directory Services Network Element
A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses (NSAPs - network service access points) in an OSI subnetwork. There can be one DSNE per ring. Can also be a GNE.

DSX - Digital Cross-Connect Panel
A panel designed to interconnect to equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

DTE - Data Terminating Equipment
That part of a data station that serves as a data source (originates data for transmission), a data sink (accepts transmitted data), or both.

Dual Homing
A network topology in which two DMXs serve as hosts supporting up to 16 OC-3 rings or 4 OC-12 rings. Each OC-3 and OC-12 ring is interconnected between the two separate hosts.

E

EC-1, 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. An EC-1 signal can be built in two ways: A DS1 can be mapped into a VT1.5 signal and 28 VT1.5 signals multiplexed into an EC-1 (VT1.5 based EC-1), or a DS3 can be mapped directly into an EC-1 (DS3 based EC-1).

ECI - Equipment Catalog Item
The bar code number on the faceplate of each circuit pack used by some inventory systems.

ES - Errored Seconds
A performance monitoring parameter.

ESF - Extended Super Frame
The format for a DS1 signal.

F

FE - Far End
Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

FE ACTY - Far End Activity
An LED on the SYSCTL circuit pack faceplate.

FEBE - Far End Block Error
An indication returned to the near-end transmitting node that an errored block has been detected at the far end.

FEPROM - Flash EPROM
Nonvolatile Electrically-erasable Programmable Read-Only Memory.

FERF - Far End Receive Failure
An indication returned to the transmitting terminal that the receiving terminal has detected an incoming section failure.

FE SEL - Far End Select
An LED on the faceplate of the SYSCTL circuit pack.

FIT
Failures in 10^9 hours of operation.

Free Running
An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000
Lucent's SONET OC-48 Lightwave System.

Function Unit
Refers to any one of a number of different circuit packs that can reside in the A, B, C, or D function unit slots on the DMX 2.5G Multiplexer.

G

GNE - Gateway Network Element
A network element that has an active X.25 link. Can also be a DSNE.

H

Hairpin Routing
A cross-connection between function units (inter-function unit). For example, function unit C to function untis A, B, or D. Also, a cross-connection within the same function unit (intra-function unit). Cross-connections go through Main, but no bandwidth or time slots are taken from the backbone ring. Eliminates need for another shelf.

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

IC - Internal Clock

Used in synchronization messaging.

ID

See shelf ID and site ID.

IR - Intermediate Reach

A term used to describe distances of 15 to 40 km between optical transmitter and receiver without regeneration. See long reach.

IS - In Service

One possible state of a DS1, DS3, or EC-1 port. Other possible states are "auto" (automatic) and "nmon" (not monitored).

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

LBO - Line Build Out

An equalizer network between the DMX 2.5G Multiplexer and the DSX panel. It guarantees the proper signal level and shape at the DSX panel.

LED - Light Emitting Diode

Used on a circuit pack faceplate to show failure (red) or service state. It is also used to show the alarm and status condition of the system.

Line Timing

The capability to directly derive clock timing from an incoming OC-N signal while providing theuser the capability to provision whether switching to an alternate OC-N from a different source (as opposed to entering holdover) will occur if the OC-N currently used as the timing reference for that NE becomes unsuitable as a reference. For example, intermediate nodes in a linear network are line timed. See Loop Timing.

Local

See Near-End.

Locked Cross-Connection

This is a variation of the ring cross-connection that allows the user to lock the path selector to a specified rotation of the ring. Any signal received from the other rotation of the ring is ignored.

LOF - Loss of Frame

A failure to synchronize to an incoming signal.

Loop Timing
Loop timing is a special case of line timing. It applies to NEs that have only one OC-N interface. For example, terminating nodes in a linear network are loop timed. See Line Timing.

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.

LR - Long Reach
A term used to describe distances of 40 km or more between optical transmitter and reciever without regeneration. See Intermediate Reach.

M

Main
The two slots (M-1 and M-2) on the DMX 2.5G Multiplexer shelf in which the OC-48 OLIU circuit packs are installed.

Midspan Meet
The capability to interface between two lightwave terminals of different vendors. This applies to high-speed optical interfaces.

Multiplexing
The process of combining several distinct digital signals into a single composite digital signal.

Mult - Multipling
The cascading of signals in a bay. In the MULT mode, the DS1 external reference can be cascaded to other shelves in a bay using Mult cables. Normally starting with the bottom shelf (Number 1) and working towards the top of the bay.

N

NE - Near End
The network element the user is at or working on. Also called local.

NE - Network Element
The basic building block of a telecommunications equipment within a telecommunication network that meets SONET standards. Typical internal attributes of a network element include: onr or more high- and low-speed transmission ports, built-in intelligence, synchronization and timing capability, and access interfaces for use by technicians and/or operation systems. In addition, a network element may also include a time slot interchanger.

NE ACTY - Near End Activity
An LED on the faceplate of the SYSCTL circuit pack.

NMA - Network Monitoring and Analysis
An operations system designed by Telcordia Technologies which is used to monitor network facilities.

NMON - Not Monitored
A provisioning state for equipment that is not monitored or alarmed.

Node
In SONET, a node is a line terminating element.

Non-Revertive
A protection switching mode in which, after a protection switch occurs, the equipment remains in its current configuration after any failure conditions that caused a protection switch to occur clear or after any external switch commands are reset. See Revertive.

NSAP - Network Services Access Point
An address that identifies a network element. Used for maintenance subnetwork communication using the OSI protocol.

O

OC, OC-n - Optical Carrier
The optical signal that results from an optical inversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

OC-1
Optical Carrier Level 1 Signal (51.844 Mb/s).

OC-3
Optical Carrier Level 3 Signal (155 Mb/s).

OC-3c (STS-3c)
Optical Carrier Level 3 Concatenated Signal. Low-speed broadband equivalent to three STS-1s linked together with a single path overhead.

OC-12
Optical Carrier Level 12 Signal (622 Mb/s).

OC-12c (STS-12c)
Optical Carrier Level 12 Concatenated Signal. High-speed broadband equivalent to twelve STS-1s linked together with a single path overhead.

OC-48
Optical Carrier Level 48 Signal.

Operations Interface
Any interface that provides information on the system performance or control. These include the equipment LEDs, SYSCTL faceplate, and office alarms.

OS - Operations System
A central computer-based system used to provide operations, administration, and maintenance functions.

OSI - Open Systems Interconnection
Referring to the OSI reference model, a logical structure for network operations standardized by the Internation Standards Organization (ISO).

OSGNE - Operations System Gateway Network Element
An OSGNE serves as a single interface to the OS for NEs in the same subnetwork using X.25 interfaces.

P

Pass Through

Paths that are cross-connected directly across an intermediate node in a ring network.

Plesiochronous Network

A network that contains multiple maintenance subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant. For example, in SONET networks, each timing traceable to their own Stratum 1 clock are considered plesiochronous with respect to each other.

PM - Performance Monitoring

Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

Port

The physical, electrical, or optical interface on a system. For example, DS1, DS3, EC-1, OC-3, OC-12, and OC-48. ***See Channel***.

Port State Provisioning

A feature that allows a user to supress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service, and not monitored) for low-speed ports. ***See Channel State Provisioning***.

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 (for example, performance monitoring).

Protection Line

As defined by the SONET standard, the protection line is the pair of fibers (one transmit and one receive) that carry the SONET APS channel (K1 and K2 bytes in the SONET line overhead). On a DMX 2.5G Multiplexer, a protection line is a pair of fibers that terminate an OLIU circuit pack in the Main-2, A-2, B-2, C-2, D-2, or G-2 slots. ***See Service Line***.

Product Family 2000

Lucent's first line of SONET standard network products providing total network solutions.

R

Reactive Maintenance

Refers to decting defects/failures and clearing them.

Remote

See Far-End (FE).

Revertive

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the service equipment is active, and the protection equipment is standby) after the clearing of any failure conditions that caused a protection switch to occur or after any external switch commands are reset. ***See Non-Revertive***.

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over a protection line.

Ring (0x1) Low-Speed Interface

Formerly referred to as dual 0x1 or single 0x1. In ring applications, the DMX 2.5G Multiplexer may use a 0x1 interface, meaning both fibers carry service, as opposed to a linear (1+1) low-speed interface where one fiber is used for service and other for protection. ***See 1+1***.

RPP - Reliability Prediction Procedure

Described in Telcordia Technologies TR-NWT-00032.

RT - Remote Terminal

An unstaffed equipment enclosure that may have a controlled or uncontrolled environment.

S

Self-Healing

Ring architecture in which two or more fibers are used to provide route diversity. Node failures only affect traffic dropped at the failed node.

SEO - Single-Ended Operations

The maintenance capability that provides remote access to all DMX 2.5G Multiplexer systems from a single location over the DCC.

Service Line

On a DMX 2.5G Multiplexer system, a service (or "working") line is a pair of fibers (one transmit and one receive) that terminate on an OLIU circuit pack in the Main-1, A-1, B-1, C-1, or D-1 slots. As defined by the SONET standard, the SONET APS channel is not defined on a service line. ***See Protection Line***.

SES - Severely Errored Seconds

This performance monitoring parameter is a second in which a signal fail occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

SF - Super Frame

The format for DS1 signals.

Small Form Pluggable (SFP)Optics

SFP optics are used on the LNW37/45/49/70/73/74 packs. SFP optics are “pluggable" optics. This means that the circuit pack does not come equipped with optics. The customer orders the number and type of optics required at the time of installation. Additional optics can be ordered as new services are required. Thus DMX interface density is made scalable to meet the unique needs of each customer. The SFP optics also allow for some versatility in the span lengths and rates that can be covered by the same pack. The SFP optics adhere to Telcordia GR-253 and ITU G.957 standards.

Single 0x1 Cross-Connection

In a dual-homed application, the DMX 2.5G Multiplexer uses a single 0x1 cross-connection to map the VT1.5 channels between the DDM-2000 FiberReach, OC-3 Multiplexer, or OC-12 Multiplexer and the DMX 2.5G Multiplexer rings. This single 0x1 architecture maps low speed to high speed on a specified ring rotation. The high speed to low speed drop is made on the same specified ring with no path switching. Protection is provided at the VT1.5 end points.

Single Homing

A network topoly in which a single DDM-2000 FiberReach, OC-3 Multiplexer, or OC-12 Multiplexer serves as a DMX 2.5G Multiplexer host supporting up to six OC-3 or OC-12 rings.

Standby

Standby identifies a 1+1 protected OC-N line which is not currently selected by the receiver at either end as the payload carrying signal, or 1x1 or 1xN protected circuit pack that is not currently carrying service. ***See Active***.

Status

The indication of a short-term change in the system.

STS, STS-n - Synchronous Transport Signal

The basic 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-1 SPE - STS-1 Synchronous Payload Envelope

A 125-microsecond frame structure composed of STS path overhead and the STS-1 payload.

STS-3c

Synchronous Transport Level 3 Concatenated Signal. ***See OC-3c***.

Subnetwork

Group of SONET network elements that share a SONET data communications channel.

Synchronization Messaging

SONET synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

SYSCTL - System Controller

The system controller circuit pack that provides overall administrative control of the terminal.

T

T1X1 and T1M1

The ANSI committees responsible for telecommunications standards.

TCA - Threshold Crossing Alert

A condition set when a performance monitoring counter exceeds a user-selected threshold. A TCA does not generate an alarm but is available on demand through the CIT and causes a message to be sent to NMA via the X.25/TL1 interface.

TL1 - Transaction Language 1

A Telcordia Technologies machine-to-machine communications language that is a subset of ITU-TSS, formerly CCITT's, human-machine language.

U

UAS - Unavailable Seconds

In performance monitoring, the count of seconds in which a signal is declared failed or, in which, 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

Unidirectional

A protection switching mode in which the system at each end of an optical span monitors both service and protection lines and independently chooses the best signal (unless overridden by an equipment failure or by an external request, such as a forced switch or lockout). In a system that uses unidirectional line switching, both the service and protection lines may be active simultaneously, with one line carrying traffic in one direction and other line carrying traffic in the other direction. For a 1+1 protection scheme the K1 and K2 bytes in the SONET line overhead are used to convey to the far end which line the near-end receiver has chosen, so that an "active" indication may be made at the far end.

UOC - Univeral Optical Connector

Receptacles on the faceplate of some OLIUs that accept ***ST***, SC, or FC connectors.

UPD/INIT

A push-button on the SYSCTL faceplate.

V

VM - Violation Monitor

A mode of the DS3 circuit pack in which it will monitor but not remove P-bit parity violations on the DS3 signal from the received fiber.

VMR - Violation Monitor and Removal

A mode of the DS3 circuit pack in which it will monitor and remove P-bit parity violations on the DS3 signal received from the fiber.

VT - Virtual Tributary

A structure designed for transport and switching of a sub-DS3 payload.

VT1.5

A 1.728 Mb/s virtual tributary.

VT-G - Virtual Tributary Group

A 9-row by 12-column SONET structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte-interleaved within the VT-organized STS-1 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 and B8ZS for DS1 signals).

Index

test equipment, 5-2, 6-2

10/100Base-T cables, 1-58

1000Base-T
optical fiber cables, 1-92, 1-93, 1-94, 1-95

110/RJ45 punch down block, 1-59

110/RJ45® punch down block, 1-58

177E, 2-33

8OC, 2-17

A Accessible Emission Limits (AEL), A-9

Alarm Cut-Off (ACO), 5-6, 5-7

alarm panel, 1-79, 1-80

alarm reporting, 5-8

alarm status indications
user settable, 1-84

alarm(s)
critical (CR), 1-83, 5-5, 5-6, 5-7

default delay time, 5-6

environmental, 1-84

fan shelf, 5-8, 6-12

LED, 5-8

major (MJ), 1-83, 5-5, 5-6

minor (MN), 1-83, 5-5, 5-6

office, 5-3, 5-6, 6-3

Alternate Mark Inversion (AMI), 5-13

automatic protection switch, 5-8, 6-12

B battery distribution fuse board (BDFB), 1-16, 1-21, 1-22, 1-23, 1-24

bay frame ground, 6

bipolar 8 zero substitution (B8ZS), 5-13

BITS clock, 5-13

C cable(s)
10/100Base-T, 1-58

1000Base-T, 1-92, 1-94

1000Base-T optical fiber

optical fiber

1000Base-T, 1-93, 1-95

CIT, 3-2

CIT interface, 2-2, 4-3, 5-2, 6-2

discrete cables, 1-84

DS1, 1-34, 1-36, 1-41, 1-54

DS1 color codes, 1-36

DS3/EC-1, 1-41, 1-54

DS3/EC-1 cable connections, 1-44

environmental, 1-84

IAO LAN/TCP-IP, 1-64

miscellaneous discrete, 1-84

modem, 1-69, 1-70

OC-3, 1-90, 1-91

OC-48, 1-89

OC-48 optical fiber, 1-88

office alarm, 1-78, 1-79, 1-80, 4-8

office alarm connections, 1-82, 1-83

optical fiber, 1-89, 1-90, 1-91, 1-92, 1-94

power, 1-21, 1-23

power cable, 2-3

SYNC, 1-74

SYNC cable connections, 1-77

cabling
checklist, 1-4

power, 1-21

central office (CO), 1-78, 1-84

CIT
interface cable, 4-3, 5-2, 6-2

serial port, 1-96

software, 3-9

CIT Interface Cable, 1-5

CIT interface cable, 2-2, 5-2, 6-2

CLETOP cleaning cassette, 1-4, B-3
coaxial wire stripper, 1-3
commands, 5-11, 6-14, 6-15
connectors
DB-15 pinouts, 1-7
DB-25 pinouts, 1-7
DB-62 pinouts, 1-7
DB-9 pinouts, 1-7
pinouts, 1-7
RJ-45 pinouts, 1-7
crimping tool, 1-3
critical alarm (CR), 1-83, 5-5, 5-6, 5-7
cross-connect tests, 4-9
cross-connects, 4-9
VT1.5, 4-9

D
DB-15 connector pinouts, 1-7
DB-25 connector pinouts, 1-7
DB-62 connector pinouts, 1-7
DB-9 connector pinouts, 1-7
discrete, 1-84
DS1
cable assemblies, 1-34, 1-36, 1-41, 1-54
DS1 error rate test set, 1-3, 4-2, 5-2, 6-2
DS1 timing reference, 1-76
DS3 error rate test set, 1-3, 4-2, 5-2, 6-2
DS3/EC-1
cables, 1-41, 1-54
DSX, 1-34, 1-36, 1-41, 1-54, 4-9
DSX cabling, 4-9

E
EIA-type bay frame
network bay frame
EIA-type, 1-4
environmental alarm, 1-84
environmental discrete, 1-84, 5-16, 5-17
ESD
damage, 5
electronic components, 5
jack, 1-3, 2-2, 4-2, 5-2, 6-2
wrist strap, 1-3, 2-2, 4-2, 5-2, 5-4, 5-8, 6-2, 6-12, 5, 6
Extended superframe (ESF), 5-13
external buffer relay, 1-78

F
fan alarm, 5-8, 6-12
FDA/CDRH, A-2
21 CFR 1040.10 and 1040.11, A-2
FDA/CDRH regulations, A-9
fiber cleaning, B-1
acceptable criteria, B-10
function group, 5-6
function unit, 5-7, 6-15

G
ground, 1-3, 1-4, 1-12, 1-13
bay frame, 6

I
IAO LAN/TCP-IP
cabling, 1-64
IEC
60825-1, A-2
IEC requirements, A-9

J
jumper(s)
optical fiber, 1-4, 4-2, 4-43, 4-44, 4-45, 4-46, 4-47, 4-48, 4-52, 5-2

L
labels
laser safety, A-3
Laser, A-10
laser
classes, A-10
DMX optical specifications, A-10
product classifications, A-9
radiation, 5-3, 6-3
safety, A-2
laser radiaition, 1-92, 1-94
laser radiation, 1-88, 1-90, 1-92, 1-94, 4-9, 5-8, 6-4, B-5
LBO, 1-4, 4-3, 5-2, C-2, C-3
LBO Table, 6-6
LC Block, C-3
LC-type connector port, C-2
LC-type fiber connectors, C-5
LED, 5-8, 6-12
LGX, 1-88, 1-90, 1-92, 1-94
line coding, 5-13
local equipment tests, 4-9
Luminex Stick port cleaners, 1-5, B-3

M
major alarm (MJ), 1-83, 5-5, 5-6
minor alarm (MN), 1-83, 5-5, 5-6
miscellaneous discrete, 5-16, 5-17
modem, 1-69, 5-19
cable, 5-19
modem cable, 1-70
mult office alarms, 1-80
multimeter, 1-3, 2-2, 5-2, 6-2

N
network bay frame, 1-4
seismic, 1-4
Network Equipment Building System (NEBS), 5-4

O
OC, 2-16
OC-3
optical fiber cables, 1-90, 1-91
OC-48
optical fiber cables, 1-88, 1-89
office alarm, 1-78, 1-80, 5-3, 5-6, 6-3
alarm(s)
office, 5-4
cable, 1-78, 5-4, 6-4
connections, 1-82, 1-83, 5-4
mult, 1-80
relay contacts, 1-78
test, 5-4
office alarm cable, 1-79, 1-80, 4-8
office alarm panel, 1-79, 1-80
ohmmeter, 1-3, 1-4
optical attenuators, C-2
optical fiber scope, 1-4, B-3
out-of-service mode, 5-3, 6-3

P
Personal Computer (PC), 5-2, 6-2
CIT requirements, 1-5, 2-2, 3-1, 4-3
pinouts
connectors, 1-7
power
cables, 2-3
power cable, 1-21, 1-23
product disposal, xxii
product take-back, xxii
protection network, 1-79
protection switching, 5-1
automatic, 5-8, 6-12

R
recycle, xxii
remote terminal (RT), 1-84
RJ-45 connector pinouts, 1-7

S
safety
FDA/CDRH, 7
instructions, B-5
laser, A-2
laser instructions, A-4
laser warning labels, A-3
screwdriver(s), 1-2, 2-2, 4-2, 5-2, 6-2
seismic network bay frame, 1-4
serial port, 1-96
single-mode fiber, 1-88
standards
Pacific Bell Equipment Framework Standard PBS-000-102PT, 1-4
Superframe (SF), 5-13
SYNC cable, 1-74
cable(s)
SYNC, 1-72
SYNC cables
DS1 timing, 1-77
synchronization cable
connections, 1-77
timing, 1-77

T
technical support, H-1
telemetry, 1-84, 5-16
connections, 5-18
telemetry panel, 1-85
test equipment
CIT interface cable, 2-2
DS1 error rate test set, 1-3, 4-2, 5-2, 6-2
DS3 error rate test set, 1-3, 4-2, 5-2, 6-2
LBO, 5-2
multimeter, 1-3, 2-2
ohmmeter, 1-3, 1-4
optical fiber jumpers, 1-4, 5-2
optical fiber scope, 1-4, B-3
Personal Computer (PC), 5-2, 6-2
screwdrivers, 2-2
video fiber scope, 1-4, B-3
timing
DS1, 1-77
external sync, 1-76
tools
CLETOP cleaning cassette, 1-4, B-3
coaxial wire stripper, 1-3
crimping, 1-3
Luminex Stick port cleaners, 1-5, B-3
screwdriver(s), 1-2, 5-2, 6-2
screwdrivers, 4-2
torque wrench, 1-3, 1-4
wire-wrap gun, 1-3
torque wrench, 1-3, 1-4
transient currents, 1-78
transient voltages, 1-78

V
video fiber scope, 1-4, B-3
VT1.5
cross-connects, 4-9

W
wire-wrap gun, 1-3
wrist strap
ESD, 1-3, 2-2, 4-2, 5-2, 5-4, 5-8, 6-2, 6-12, 5, 6