

Lucent Technologies
Bell Labs Innovations



DDM-2000 FiberReach Multiplexer

Releases 2, 3 and 4

Installation Manual

363-206-310
Issue 3
November 2000

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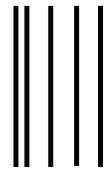
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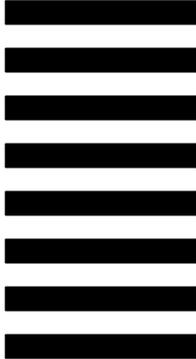


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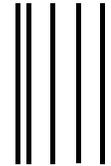
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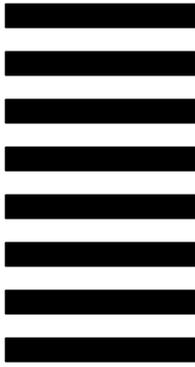


Table of Contents

About This Document

Purpose	xxi
Intended Audiences	xxi
Reason for Reissue	xxi
Safety Instructions	xxii
Related Documentation	xxvii
Product Training	xxxii
Technical Support	xxxvi
Engineering and Installation Services	xxxviii
Technical Support Services	xxxix
How to Order Documents	xl
Lucent Technologies Contacts	xli
How to Comment on This Document	xli
Electronic Documentation	xli

1 Introduction

Overview	1-1
DDM-2000 FiberReach Releases	1-2
DDM-2000 FiberReach Wideband Shelf Description	1-2
DDM-2000 FiberReach Narrowband Shelf Description	1-5
Equipment	1-6

2 Wideband Shelf Equipment and Cable Installation

Overview	2-1
Description	2-1
Inspection	2-4
DS1 Protection Option Plug Installation	2-5
Equipment Installation	2-7
DS1 Cabling — Wideband Shelf	2-8

Contents

Optical Fiber Cabling - Wideband Shelf	2-10
Power Cabling - Wideband Shelf	2-12
Office Alarm Cabling - Wideband Shelf	2-14
TBOS Telemetry Cabling - Wideband Shelf	2-16
Miscellaneous Discrete Telemetry Cabling - Wideband Shelf	2-17
Final Operations	2-19

3 Wall Distant Terminal Installation

Overview	3-1
Description	3-1
Inspection	3-5
DS1 Protection Option Plug Installation	3-6
Equipment Installation	3-7
DS1 Cabling - Wall DT	3-9
DS3 Cabling - Wall DT	3-10
Optical Fiber Cabling - Wall DT	3-11
Power Cabling — Wall DT using 1145B1 Power Supply	3-13
Power Cabling — Wall DT Miscellaneously Powered	3-15
Office Alarm Cabling - Wall DT	3-16
TBOS Telemetry Cabling - Wall DT	3-17
Miscellaneous Discrete Telemetry Cabling — Wall DT	3-18
Final Operations	3-20

4 Narrowband Shelf Installation

Overview	4-1
Description	4-1
Inspection	4-4
Equipment Installation	4-5
DS1 Cabling - Narrowband Shelf	4-6
VF Cabling - Narrowband Shelf	4-7
Power Cabling - Narrowband Shelf	4-9

Contents

	Miscellaneous (Office) Alarm Cabling — Narrowband Shelf	4-10
	RS422 Microwire Telemetry Cabling — Narrowband Shelf	4-12
	Final Operations	4-14
<hr/>		
5	NBS Powering, Verification, and Circuit Pack Installation	
	Overview	5-1
	Powering and Verification	5-2
	Circuit Pack Installation	5-3
	Final Operations	5-5
<hr/>		
6	Wideband Shelf Powering, Verification, and Circuit Pack Installation	
	Overview	6-1
	Powering and Verification	6-2
	Circuit Pack Provisioning (Option Settings)	6-4
	Software Download Procedure	6-9
	Circuit Pack Installation	6-14
	Final Operations	6-17
<hr/>		
7	Wideband Shelf Release 2 Installation Tests	
	Overview	7-1
	Use of Terminal	7-4
	LED Test	7-7
	Local Equipment and Cross-Connect Test	7-8
	Fiber Installation and Test	7-12
	Establishing Cross-Connects and System Test	7-17
	Final Operations	7-20

Contents

8	Wideband Shelf Release 3 and 4 Installation Tests	
	Overview	8-1
	Use of Terminal	8-5
	LED Test	8-8
	Local Equipment and Cross-Connect Test	8-9
	Final Operations	8-13
9	Operational Tests - Wideband Shelf	
	Overview	9-1
	Office Alarm Test	9-2
	Automatic Protection Switching and Alarm Test	9-4
	Manual Protection Switching Test	9-6
	TBOS Telemetry Test	9-7
	Miscellaneous Discrete Telemetry Test	9-7
	Final Operations	9-10
10	Wideband Shelf Troubleshooting	
	Overview	10-1
	Engineering and Installation Services	10-1
	Basic Troubleshooting Techniques	10-2
	Technical Support	10-5
	Required Product Changes	10-5
	Glossary	GL-1
	Index	IN-1

List of Figures

About This Document

Figure 1.	Static Control Wrist Strap	xxiv
Figure 2.	Product Support	xxxvii

1 Introduction

Figure 1-1.	DDM-2000 FiberReach Shelf with Circuit Packs (Release 1)	1-11
Figure 1-2.	DDM-2000 FiberReach Shelf with Circuit Packs 1x1 Protection all Circuit Pack Types Protected (Release 2)	1-12
Figure 1-3.	DDM-2000 FiberReach Shelf with Circuit Packs 1x7 Protection, only the Circuit Packs of the Type in Slot D2(P) are Protected (Release 2)	1-13
Figure 1-4.	DDM-2000 FiberReach Shelf with Circuit Packs 1x7 Protection, DS3 Circuit Packs in Function Unit Slots (Release 3)	1-14
Figure 1-5.	DDM-2000 FiberReach Carrier Assembly with one Wideband Shelf	1-15
Figure 1-6.	DDM-2000 FiberReach Carrier Assembly with two Wideband Shelves	1-16
Figure 1-7.	DDM-2000 FiberReach Carrier Assembly with one Wideband Shelf and one Narrowband Shelf	1-17
Figure 1-8.	DDM-2000 FiberReach Carrier Assembly with one Narrowband Shelf	1-18
Figure 1-9.	DDM-2000 FiberReach Carrier Assembly with two Narrowband Shelves	1-19
Figure 1-10.	FiberReach Wall DT with Wideband shelf and one DSX	1-20
Figure 1-11.	FiberReach Wall DT with Wideband Shelf, and two DSX	1-21
Figure 1-12.	FiberReach Wall DT with Wideband Shelf, one DSX, and LGX	1-22
Figure 1-13.	FiberReach Wall DT with Wideband Shelf, two DSX, and LGX	1-23
Figure 1-14.	FiberReach Wall DT with Wideband Shelf, two Top Mount DSX, and LGX Ready for Addition of Narrowband Shelf	1-24

List of Figures

Figure 1-15. FiberReach Wall DT with Wideband Shelf, Narrowband Shelf, two Top Mount DSX, and LGX	1-25
Figure 1-16. T1EXT Lightning and Surge Protection Assembly (Provides Secondary Protection)	1-26

2 Wideband Shelf Equipment and Cable Installation

Figure 2-1. DDM-2000 FiberReach Backplane	2-27
Figure 2-2. Wideband Shelf 1x7 and 1x1 Protection Assemblies	2-28
Figure 2-3. DDM-2000 FiberReach Wideband Shelf Front View	2-29
Figure 2-4. Protection Option Designation Label	2-30
Figure 2-5. DDM-2000 FiberReach Shelf Carrier Mounting (Top View)	2-31
Figure 2-6. Side Mounting Bracket Positions	2-32
Figure 2-7. Carrier and Wideband Shelf Assembly	2-34
Figure 2-8. Connector Pinouts	2-35
Figure 2-9. DS1 Cable Dressing for Both Right and Left Mounting in Carrier	2-36
Figure 2-10. Power Cable Dressing for Both Right and Left Mounting in Carrier	2-37
Figure 2-11. Office Alarm Cable for Both Right and Left Mounting in Carrier	2-38
Figure 2-12. TBOS Cable Dressing for Both Right and Left Mounting in Carrier	2-39
Figure 2-13. Misc. Discretes Cable Dressing for Both Mountings in Carrier	2-40
Figure 2-14. Cable Dressing for Both Right and Left Mounting in Carrier	2-41
Figure 2-15. Remote Terminal Miscellaneous (Environmental) Discrete Functions	2-42

3 Wall Distant Terminal Installation

Figure 3-1. DDM-2000 FiberReach Backplane	3-32
Figure 3-2. Wideband Shelf 1x7 and 1x1 Protection Assemblies	3-33
Figure 3-3. DDM-2000 FiberReach Wideband Shelf Front View	3-34
Figure 3-4. Protection Option Designation Label	3-35
Figure 3-5. DDM-2000 FiberReach Wall DT Mounting Bracket (Side View)	3-36
Figure 3-6. Wall DT Mounting Bracket (Front View)	3-37
Figure 3-7. Wall DT Assembly Attachment Screws	3-38

List of Figures

	Figure 3-8. Carrier and Wideband Shelf Assembly	3-39
	Figure 3-9. Connector Pinouts	3-40
	Figure 3-10. DSX Panel	3-40
	Figure 3-11. Remote Terminal Miscellaneous (Environmental) Discrete Functions	3-41
<hr/>		
4	Narrowband Shelf Installation	
	Figure 4-1. DDM-2000 FiberReach Narrow Band Shelf (Rear View)	4-22
	Figure 4-2. DDM-2000 FiberReach Narrow Band Shelf (Front View)	4-23
	Figure 4-3. Connector Pinouts	4-24
<hr/>		
5	NBS Powering, Verification, and Circuit Pack Installation	
	Figure 5-1. DDM-2000 FiberReach Narrow Band Shelf (Rear View)	5-7
	Figure 5-2. DDM-2000 FiberReach Narrow Band Shelf (Front View)	5-8
	Figure 5-3. AUA432 PCU Circuit Pack	5-9
	Figure 5-4. AUA413 RGU Circuit Pack	5-9
	Figure 5-5. AUA421 CDTU Circuit Pack	5-10
	Figure 5-6. FHB2 DSXBIU Circuit Pack	5-10
<hr/>		
6	Wideband Shelf Powering, Verification, and Circuit Pack Installation	
	Figure 6-1. DDM-2000 FiberReach Shelf with Circuit Packs (Release 3&4)	6-20
	Figure 6-2. BBG8 (SYSCTL) Option Switches	6-21
	Figure 6-3. BBF1B (DS1) or BBF3 (DS1PM) Option Switches	6-22
	Figure 6-4. BBF6 (T1EXT) Option Switches	6-23
	Figure 6-5. Universal Buildout Types	6-24
	Figure 6-6. BBG4B and BBG19 (DS3) Option Switches	6-25

List of Figures

7	Wideband Shelf Release 2 Installation Tests	
	Figure 7-1. Installation Test Connections	7-29
	Figure 7-2. Fiber Connections Stand Alone OC-1 Access via OC-3 Host	7-30
	Figure 7-3. Fiber Connections - Single Homed Application	7-31
	Figure 7-4. Fiber Connections - Dual Homed Application	7-32
	Figure 7-5. DDM-2000 FiberReach Wideband Shelf User Panel	7-33
	Figure 7-6. Establishing Cross-Connects Stand Alone OC-1 Access via OC-3 Host	7-34
	Figure 7-7. Establishing Cross-Connects - Single Homed Application	7-35
	Figure 7-8. Establishing Cross-Connects - Dual Homed Application	7-36
8	Wideband Shelf Release 3 and 4 Installation Tests	
	Figure 8-1. Installation Test Connections	8-16
	Figure 8-2. DDM-2000 FiberReach Wideband Shelf User Panel	8-17
9	Operational Tests - Wideband Shelf	
	Figure 9-1. Remote Terminal Miscellaneous (Environmental) Discrete Functions	9-12

List of Tables

About This Document

1 Introduction

Table 1-1.	Miscellaneous Equipment	1-7
Table 1-2.	Tools, Test Sets, and Accessories	1-9

2 Wideband Shelf Equipment and Cable Installation

Table 2-1.	DS1 Cable Assemblies	2-19
Table 2-2.	DS3 Cable Assemblies	2-20
Table 2-3.	Telemetry Cable Assemblies	2-21
Table 2-4.	Power and Alarm Assemblies	2-21
Table 2-5.	DS1 Transmission Connections	2-22
Table 2-6.	Power Connections	2-23
Table 2-7.	Office Alarm Connections	2-23
Table 2-8.	TBOS Serial Telemetry Connections	2-24
Table 2-9.	Miscellaneous (Environmental) Telemetry Connections	2-25
Table 2-10.	Universal Lightguide Buildouts	2-26

3 Wall Distant Terminal Installation

Table 3-1.	Equipment Installation Considerations	3-4
Table 3-2.	DS1 Cable Assemblies	3-21
Table 3-3.	DS3 Cable Assemblies	3-22
Table 3-4.	Telemetry Cable Assemblies	3-23
Table 3-5.	Power Cable Assembly	3-24
Table 3-6.	Alarm Cable Assemblies	3-24
Table 3-7.	DS1 Transmission Connections	3-25
Table 3-8.	Power Connections (Note 1)	3-27
Table 3-9.	Office Alarm Connections	3-27
Table 3-10.	TBOS Serial Telemetry Connections	3-28

List of Tables

Table 3-11.	Miscellaneous (Environmental) Discrete Telemetry Connections	3-29
Table 3-12.	Universal Lightguide Buildouts	3-30
Table 3-13.	Lightguide Jumpers	3-31

4 Narrowband Shelf Installation

Table 4-1.	DS1 Cable Assemblies	4-14
Table 4-2.	Voice Frequency (VF) Cable Assemblies	4-15
Table 4-3.	Alarm and Telemetry Cable Assemblies	4-16
Table 4-4.	Power Cable Assemblies	4-16
Table 4-5.	DS1 Transmission Connections (Groups 3, 18, 19 and 20)	4-17
Table 4-6.	DS1 Transmission Connections (Group 5)	4-17
Table 4-7.	Voice Frequency (VF) Transmission Connections	4-18
Table 4-8.	Power Connections	4-19
Table 4-9.	ISCI Interface Connections	4-20
Table 4-10.	RS422 Microwire Connections	4-20
Table 4-11.	Miscellaneous (Office) Connections	4-21

5 NBS Powering, Verification, and Circuit Pack Installation

Table 5-1.	DDM-2000 Fiber Reach Narrowband Shelf Codes	5-6
------------	---	-----

6 Wideband Shelf Powering, Verification, and Circuit Pack Installation

Table 6-1.	DDM-2000 FiberReach Circuit Pack Codes	6-17
Table 6-2.	Universal Lightguide Buildouts	6-19

7 Wideband Shelf Release 2 Installation Tests

Table 7-1.	User Panel LEDs	7-3
Table 7-2.	ECC1 User Panel and SYSCTL	7-3
Table 7-3.	Tools, Test Sets and Accessories	7-4
Table 7-4.	Cross-Connections for DSX-1 Testing	7-20
Table 7-5.	Stand Alone OC-1 Address via OC-3 Host Ring Network Time Slot Assignments	7-21

List of Tables

Table 7-6.	Single Homed Ring Network Time Slot Assignments	7-24
Table 7-7.	Dual Homing Ring Network Time Slot Assignments	7-26
Table 7-8.	Universal Lightguide Buildouts	7-28
Table 7-9.	Lightguide Jumpers	7-29

8 Wideband Shelf Release 3 and 4 Installation Tests

Table 8-1.	User Panel LEDs	8-3
Table 8-2.	ECC1 User Panel and SYSCTL	8-4
Table 8-3.	Tools, Test Sets and Accessories	8-4
Table 8-4.	26G2-U Cross-Connections for DSX-1 Testing (see Note 1)	8-14
Table 8-5.	Universal Lightguide Buildouts	8-15
Table 8-6.	Lightguide Jumpers	8-16

9 Operational Tests - Wideband Shelf

Table 9-1.	Office Alarm Connections	9-10
Table 9-2.	Miscellaneous (Environmental) Discrete Telemetry Connections	9-11

10 Wideband Shelf Troubleshooting

Table 10-1.	BBG8 SYSCTL I/O Connections	10-6
Table 10-2.	DS1 I/O Connections	10-9
Table 10-3.	26-Type OLIU I/O Connections	10-10
Table 10-4.	ECC1 User Panel I/O Connections	10-12
Table 10-5.	BBF8 HDSL I/O Connections	10-14
Table 10-6.	BBG4B DS3 I/O Connections	10-15

List of Tables

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About This Document

Purpose

This manual provides installation instructions for the DDM-2000 FiberReach Multiplexer for end users responsible for their own equipment installation. Refer to *DDM-2000 FiberReach Multiplexer User/Service Manual*, 363-206-301 for Release 2.0 or 363-206-305 for Release 3.0 or Release 4.0, for any activity involving circuit turnover, regular maintenance, or trouble analysis.

Intended Audiences

This manual is intended ONLY for a central office environment in network equipment building system (NEBS) installation and tests performed prior to turnover to central office personnel.

Reason for Reissue

This manual is reissued to include additional equipment and features added to the DDM-2000 FiberReach Multiplexer. The most significant changes are the addition of Information on the 28G-U and 29G-U OLIU Circuit Packs, the DS3 Circuit Pack and the BBG19 DS3 Services Circuit Pack in Function Unit slots per DDM-2000 FiberReach Software Releases 3 and 4.

Safety Instructions

Admonishments

Important safety instructions are in this manual. In addition to the instructions on the following page, there are other safety instructions you must follow. These instructions involve lasers, lightwave optical cable and connectors, and precautions when handling circuit packs to prevent damage from electrostatic discharge. This manual also contains admonishments in the form of **DANGERS**, **WARNINGS**, and **CAUTIONS** which must be followed at all times.

These admonishments have the following definitions:

- **DANGER** indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.
- **WARNING** indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.
- **CAUTION** indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. The caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.

The alert symbol  is used on product labels and in this manual to alert the user to important operating and maintenance instructions.

Lightwave Safety

An Lucent Technologies lightwave digital transmission system and associated optical test sets use semiconductor laser transmitters. The lasers emit lightwaves, at or near infrared wavelengths, into lightguide cables. This light is at the red end of the visible spectrum.

Although, at present, the transmitter power levels are below those known to cause injury to the eye, for example, from direct inadvertent exposure to the end of an energized fiber; direct exposure at close distances should be avoided.

NOTE:

Never view any unterminated optical connector with optical instruments other than indirect image-converting devices such as the FIND-R-SCOPE*, since viewing optics tend to collimate the energy from an optical connector and, hence, increase the potential risk for injury.

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

Electrostatic Discharge (ESD) Considerations



CAUTION:

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

The following list of precautions should be observed when handling circuit packs in order to prevent damage by electrostatic discharge:

- 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 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 styro-foam 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 1) while handling circuit packs or working on an assembly(s). The jacks for connection of wrist straps are located at the lower right-hand corner of each assembly and are labeled. When grounding jacks are not provided, an alligator clip adapter enables connection to bay frame ground.

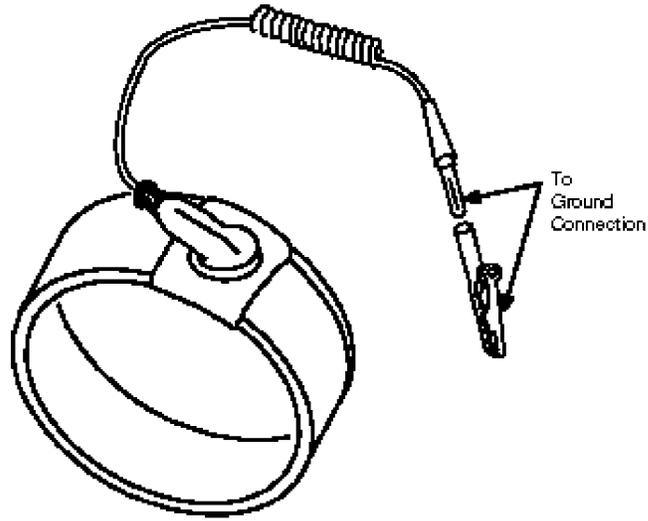


Figure 1. Static Control Wrist Strap

IMPORTANT SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
4. Slots and openings in this product cabinet and the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided. For information on proper ventilation requirements, refer to "Equipment Installation Considerations" of this manual.
5. This product should be operated only from the type of power source indicated on the marking label. For information on proper electrical distribution and power requirements, refer to "Power Cable Installation - Front Access" or "Power Cable Installation - Rear Access" of this manual.
6. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
7. To reduce the risk of electrical shock, do not disassemble this product. Service should be performed by trained personnel only. Opening or removing covers and/or circuit packs may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.



CAUTION:

Disconnect both (P3, P4, and P5) connectors from their mating (J3 and J4) power connectors when removing power from the system.

8. Use only Lucent Technologies manufactured *UL** recognized circuit packs in this system. The following circuit packs are UL recognized for use in the DDM-2000 FiberReach Multiplexer: BBF1B (DS1), BBF3 (DS1PM), BBG4B (DS3), BBG19 (Data Services) BBG8 (SYSCTL), ECC1 (USRPNL), 26G-U, 28G-U, 29G-U (OLIUs) and 177A retainer.
9. The DDM-2000 FiberReach Multiplexer is *UL* listed for restricted access installations in business and customer premises applications installed in accordance with Articles 110-16 and 110-17 of the National Electric Code, ANSI/NFPA Number 70-87. Other installations exempt from the requirements of the National Electric Code may be engineered according to the accepted practices of the local telecommunications utility.

SAVE THESE INSTRUCTIONS.

* Registered Trademark of Underwriters Laboratories, Inc.

IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Installation and maintenance procedures must be followed and performed by trained personnel only.
3. All DS1 interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.
4. All T1 interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.
5. For information on proper mounting instructions, consult the appropriate section in this installation manual.
6. Never install telecommunication wiring during a lightning storm.
7. Never install telecommunication connections in wet locations.
8. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS1 or T1 interface.
9. Use caution when installing or modifying telecommunication lines.

SAVE THESE INSTRUCTIONS.

Related Documentation

The following documents provide additional information about the DDM-2000 FiberReach WideBand Shelf:

 **NOTE:**

For additional information about the DDM-2000, see the *DDM-2000 FiberReach Multiplex Applications, Planning and Ordering Guide*, 363-206-300

■ Number: 363-206-200

Title: *DDM-2000 Multiplexer Applications, Planning, and Ordering Guide*

Audience: Network planners equipment engineers, sales teams

Content: Features, applications, high-level description, operations, administration, maintenance, and provisioning (OAM&P), system planning, ordering, product support, reliability information, technical specifications, and a Synchronous Optical Network (SONET) overview.

■ Number: 363-206-201

Title: *DDM-2000 OC-3 Multiplexer, System Commands Quick Reference*

Audience: Maintenance personnel

Content: Abbreviated list of system commands and parameters

■ Number: 363-206-280

Title: *DDM-2000 OC-3 Multiplexer, User/Service Manual*, Volumes I and II for Releases 8.0 through 11.1

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports (Volume I), operations and maintenance procedures (Volume II)

■ Number: 363-206-285

Title: *DDM-2000 OC-3 Multiplexer, User/Service Manual*, Volumes I and II for Releases 13.0 and later

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports (Volume I), operations and maintenance procedures (Volume II)

■ Number: 363-206-204

Title: *DDM-2000 OC-3 Multiplexer, Installation Manual*

Audience: Customers planning to install the equipment

Content: Customer installation instructions

- Number: 363-206-206
Title: *DDM-2000 OC-12 Multiplexer, System Commands Quick Reference*
Audience: Maintenance personnel
Content: Abbreviated list of system commands and parameters
- Number: 363-206-207
Title: *DDM-2000 OC-12 Multiplexer, User/Service Manual*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures
- Number: 363-206-208
Title: *DDM-2000 OC-12 Multiplexer/Regenerator, Installation Manual*
Audience: Customers planning to install the equipment
Content: Customer installation instructions
- Number: 363-206-220
Title: *DDM-2000 OC-3/OC-12 Multiplexer, Plug-In Options Job Aid*
Audience: Maintenance personnel
Content: Option switch settings for OC-3 and OC-12 plug-ins
- Number: 363-206-222
Title: *DDM-2000 OC-3/OC-12 Multiplexer, Acceptance Task List Job Aid*
Audience: Maintenance personnel
Content: Checklist of acceptance and turnup procedures
- Number: 363-206-300
Title: *DDM-2000 FiberReach Multiplexer, Applications, Planning, and Ordering Guide*
Audience: Network planners, equipment engineers, sales teams
Content: Features, applications, high-level description, operations, administration, maintenance, and provisioning (OAM&P), system planning, ordering, product support, reliability information, technical specifications, and a Synchronous Optical Network (SONET) overview.
- Number: 363-206-305
Title: *DDM-2000 FiberReach Multiplexer, User/Service Manual*
Audience: Maintenance personnel
Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures.

- Comcode: 847548203
Title: *1145B1 Power Arrangement for FiberReach Installation Manual*
Audience: Customers planning to install the equipment
Content: Customer installation instructions
- Number: 824-102-151
Title: *DDM-2000 Multiplexer, Operations Systems Engineering Guide*
Audience: Engineers
- Number: 190-523-101 (Manual Only)
Title: *CPro User Manual, Release 6.0*
Audience: Customers, Engineers, Maintenance Personnel
Content: Operations information for the CPro software tool to provision and maintain networks.
- DDM-2000 FiberReach Drawings:

ED-8C762-20	DDM-2000 FiberReach Cable Assemblies
ED-8C762-30	DDM-2000 FiberReach Wideband Shelf
ED-8C843-30	DDM-2000 FiberReach Shelf Assembly equipped with 1 or 2 Wideband shelves
ED-8C843-31	DDM-2000 FiberReach Wall DT Unit
SD-7C516-01	DDM-2000 FiberReach Interconnect Schematic
ED-8C843-34	DDM-2000 FiberReach Release 2 Software Ordering
ED-8C843-35	DDM-2000 FiberReach Release 3 Software Ordering
ED-8C843-36	DDM-2000 FiberReach Release 4 Software Ordering

■ DDM-2000 OC-3 Drawings:

ED-8C724-10	OC-3/OC-12 Typical Bay Arrangements
ED-8C724-15	OC-3 Cabling Plan (Rear Access)
ED-8C724-16	OC-3 Cabling Plan (Front Access)
ED-8C724-20	OC-3 Cable Assemblies (Rear Access)
ED-8C724-21	OC-3 Cable Assemblies (Front Access)
ED-8C724-30	OC-3 Shelf Assembly
ED-8C724-31	OC-3 User Panel Assembly
ED-8C724-32	OC-3 Equipment and Plug-In Ordering
ED-8C724-34	OC-3 Software Ordering (R2/3)
ED-8C724-36	OC-3 Software Ordering (R5)
ED-8C724-37	OC-3 Software Ordering (R6)
ED-8C724-38	OC-3 Software Ordering (R7)
ED-8C724-39	OC-3 Software Ordering (R8)
ED-8C724-40	OC-3 Software Ordering (R9)
ED-8C733-30	Fan, Filter, and Baffle Assemblies
SD-7C510-01	OC-3 Interconnect Schematic
T7C510-31	OC-3 Interconnect Wiring (Rear Access)
T7C510-32	OC-3 Interconnect Wiring (Front Access)
801-525-168	Floor Plan Data Sheets

■ DDM-2000 OC-12 Drawings:

ED-8C724-10	OC-3/OC-12 Typical Bay Arrangements
ED-8C727-10	OC-12 Typical Bay Arrangements
ED-8C727-15	OC-12 Cabling Plan (Rear Access)
ED-8C727-16	OC-12 Cabling Plan (Front Access)
ED-8C727-20	OC-12 Cable Assemblies (Rear Access)
ED-8C727-21	OC-12 Cable Assemblies (Front Access)
ED-8C727-30	OC-12 Shelf Assembly
ED-8C727-31	OC-12 User Panel Assembly
ED-8C727-32	OC-12 Equipment and Plug-In Ordering
ED-8C727-33	OC-12 Software Ordering (R1)
ED-8C727-34	OC-12 Software Ordering (R2)
ED-8C727-35	OC-12 Software Ordering (R3)
ED-8C727-37	OC-12 Software Ordering (R5)
ED-8C727-41	OC-12 Regenerator Software Ordering (R2)
ED-8C733-30	Fan, Filter, and Baffle Assemblies
SD-7C513-01	OC-12 Interconnect Schematic
T7C513-31	OC-12 Interconnect Wiring (Rear Access)
T7C513-32	OC-12 Interconnect Wiring (Front Access)
801-525-168	Floor Plan Data Sheets

The following document provide additional information about related equipment:

■ Number: 636-299-120

Title: *LGX® Distribution System, Planning, Engineering, Installation, and Operation System Reference Guide.*

There are also drawings and practices available that define the DDM-2000 multiplexers in traditional loop enclosure arrangements. Ordering information and other references to loop documentation supporting these arrangements are provided in 363-205-000, *SLC Series 5 Carrier System Ordering Guide.*

Product Training

The National Product Training Center in Altamonte Springs, Florida, will provide management courses for planning, engineering, and ordering, as well as training for telecommunications technicians in installation, operations, and maintenance. Suitcasing of many of these courses is available. Consult your local Account Executive for more information or reservations. Call **1-888-LUCENT8 prompt 2** for enrollment.

The following courses are provided by the National Product Training Center: Consult the Training Center for the most current course offerings as they may change from time to time.

Offerings

- Number: TR0510
Title: *Transmission Principles (Self-Paced)*
Audience: Transmission operations, maintenance, and administration personnel and their supervisors, as well as personnel involved with sales, planning, or engineering functions.
Prerequisites: None
Content: This course is designed to teach students to:
 - Describe the transmission network.
 - Explain the different types of transmission media.
 - Describe the characteristics of a voice or data signal.
 - Explain the different methods of modulations.
 - Explain the different types of multiplexing.
 - Define North American, ITU, and SONET (Synchronous Optical Network) standards.
 - Describe the typical tests done on transmission signals
- Number: TR9203
Title: *Synchronous Optical Network (SONET) Overview*
Audience: Technicians, engineers, and management personnel who will be operating, maintaining, or installing equipment that utilizes the SONET standard.
Prerequisites: None
Content: Basic description of the SONET standard.

OC-3

- Number: LW2603
Title: *DDM-2000 OC-3 Multiplexer Linear Operations, Maintenance and Administration*
Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day provisioning and maintenance.
Prerequisites: Previous transmission experience or TR0510.
Content: Information supporting operations, maintenance, and provisioning the DDM-2000 multiplexer.
- Number: LW2604
Title: *DDM-2000 OC-3 Multiplexer Ring/Linear Network Operation and Maintenance*
Audience: Personnel involved with the OAM&P (Operation, Administration, Maintenance and Provisioning) functions of the DDM-2000 (Dual DS3 Multiplexer).
Prerequisites: TR9203, LW2211, and LW2604
Content: Procedures required for system turnup, provisioning and maintenance of the multiplexer.
- Number: LW2605
Title: *DDM-2000 OC-3 Multiplexer Rings Operation and Maintenance for TARP Networks*
Audience: Personnel involved with the OAM&P (Operation, Administration, Maintenance and Provisioning) functions of the DDM-2000 (Dual DS3 Multiplexer) operating in OC-3 TARP networks.
Prerequisites: TR9203 and LW2211
Content: Procedures required for system turnup, provisioning and maintenance of the multiplexer.

OC-12

- Number: LW2612
Title: *DDM-2000 OC-12 Multiplexer Operations, Maintenance and Administration*
Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day provisioning and maintenance.
Prerequisites: TR9203 and LW2604
Content: Information supporting operations, maintenance, and provisioning the DDM-2000 OC-12 Multiplexer.
- Number: LW2613
Title: *DDM-2000 OC-12 Multiplexer Rings Operations and Maintenance for TARP Networks*
Audience: Personnel involved with the Operation, Administration, Maintenance and Provisioning (OAM&P) functions of the DDM-2000 (Dual DS3 Multiplexer) OC-12 operating in TARP Networks.
Prerequisites: TR9203 and LW2605.
Content: Information supporting operations, maintenance, and provisioning the DDM-2000 OC-12 Multiplexer in TARP networks.

FiberReach

- Number: 2610
Title: *DDM-2000 OC-1 FiberReach Wideband Shelf Operation and Maintenance*
Audience: Personnel involved with the OAM&P (Operations, Administration, Maintenance, and Provisioning) functions of the DDM-2000 OC-1 Wideband Shelf
Prerequisites: TR9203, LW2211 and LW2610
Content: Procedures required for the equipment acceptance, system turnup, provisioning, and maintenance of the DDM-2000 OC-1 multiplexer.

- Number: LW2615
Title: *DDM-2000 OC-1 FiberReach Wideband Shelf Operation and Maintenance for TARP Networks*
Audience: Personnel involved with the OAM&P (Operations, Administration, Maintenance and Provisioning) functions of the DDM-2000 OC-1 Wideband Shelf operating in TARP networks.
Prerequisites: TR9203, LW2211 and LW2605
Content: Details that are required to perform the tasks associated with the overall operation of the DDM-2000 OC-1 system in a TARP environment.

Multi-Product

- Number: LW2212
Title: *DDM-2000 OC-3 and OC-12 Multiplexer Applications and Architecture*
Audience: Fundamental planners, account executives, and private telecommunications network technical consultants.
Prerequisites: TR9203 is recommended.
Content: General information about the DDM-2000 OC-3 and OC-12 Multiplexers including a product overview, applications, architecture, and deployment planning. This course is a replacement for LW2203.
- Number: LW2312
Title: *DDM-2000 OC-3 and OC-12 Multiplexer Equipment Engineering and Planning*
Audience: Facility planners, outside plant engineers, central office equipment engineers, and private network design engineers.
Prerequisites: LW2212; TR9203 is recommended.
Content: Information and guidelines required to plan and order DDM-2000 OC-3 and OC-12 Multiplexer equipment for loop feeder and interoffice applications. This course is a replacement for LW2203.
- Number: LW2614
Title: *2000 Product Family Surveillance and Performance Monitoring*
Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day provisioning and maintenance.
Prerequisites: TR9203, LW2604 and LW2612
Content: Information supporting operations interfaces using X.25 links to an operations center.

- Number: LW2619
Title: *Advanced Ring Network Applications, Operations and Maintenance (TARP Releases)*
Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day operations of FT-2000 and/or DDM-2000 OC-3/OC-12 rings having dual ring interworking (DRI) traffic.(TARP Releases)
Prerequisites: LW2605 and LW2617
Content: Information supporting operations, maintenance, and provisioning of DRI networks.

Technical Support

Assistance in maintaining your installed system is available through the North American Regional Technical Assistance Center (NARTAC) and the Customer Technical Support organization (CTS). As shown in Figure 2 on page xxxvii, your single point of contact is the NARTAC. NARTAC personnel troubleshoot field problems 24 hours a day over the phone and, if necessary, on-site. For technical assistance, simply call **1-800-225-RTAC**. *One call guarantees support*. NARTAC organizations are supported by a centralized CTS for transmission products.

The CTS organization maintains a close relationship with Bell Laboratories and other Lucent organizations to expedite resolutions and maintain contact with the development community. This association provides continuous accessibility to every phase of a product life cycle and assures a prompt resolution to all inquiries.

CTS has also established a Web-based technical support medium called CTS-CARES (CTS Customer Action Request Entry System).

CTS-CARES is a system of on-line support tools aimed at providing product news and bulletins (Product Notifications), diagnostic services, and compatibility information (Solutions). CTS-CARES provides the most up-to-date product information so that problems are either prevented or quickly resolved.

All Lucent transmission products including DDM-2000 Multiplexers are supported by CTS-CARES.

Once connected to CTS-CARES, the user specifies which product to access and CTS-CARES grants the appropriate combination of tools and commands. Every screen provides help in making appropriate selections. CTS-CARES users will achieve proficiency quickly because of the consistency of selections among products.

To obtain a login and password for access to this Web site, call CTAM at 1 (800) 225-4672.

The CTS-CARES tools are available 24 hours a day, 7 days a week.

The following CTS-CARES tools are available:

- Solutions (formerly Diagnostic Dictionary).

Contains previously encountered problems and their solutions.

- Product Notifications (formerly News and Bulletins).

Contains information related to the product. Also includes what was formerly (1) "Compatibility Data" which lists solutions to hardware/firmware configuration problems in the form of product changes which are available and (2) "Change Notices" which list existing change notices (CNs and CCNs, including descriptions and implementation procedures.

- CTS-CARES User's Guide

An on-line version of how to use CTS-CARES.

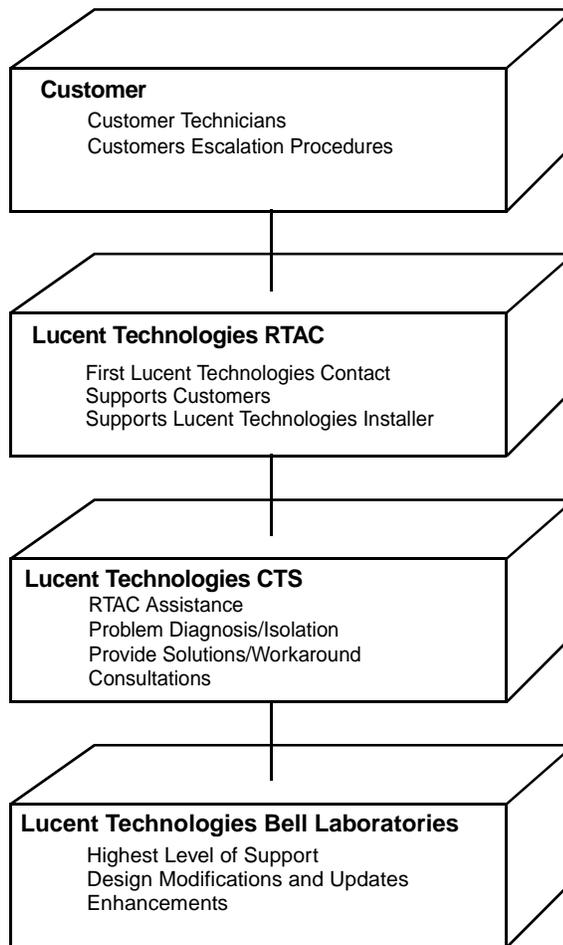


Figure 2. Product Support

Engineering and Installation Services

The Lucent Engineering and Installation organizations provides customers with quality product support services. Whether you need assistance in engineering, installation, normal system maintenance, or disaster recovery, the support staff provides you with the quality technical support you need to get your job done. Each segment of the Lucent Engineering and Installation organizations regard the customer as its highest priority and understands your obligation to maintain quality service for your customer.

Within the Lucent Engineering and Installation organizations, a highly skilled force of support personnel to provide customers with quality engineering and installation services. These engineering and installation specialists use state-of-the-art technology, equipment, and procedures to provide customers with highly competent, rapid response services. These services include analyzing your equipment request, preparing a detailed specification for manufacturing and installation, creating and maintaining job records, installing the equipment, and testing and turning over a working system.

When the Lucent Engineering and Installation organizations provides job records and installs the equipment, operationally affective changes to the system are automatically identified and applied to the system at no additional cost.

The Engineering and Installation Services group provides the customer with an individually tailored, quality-tested job that meets our published high standards and the customer's operational requirements. The group ensures that the customer's system order is integrated into a complete working system tailored to office conditions and preferences. This process provides for the customer's complete needs. It includes provisions for cabling, lighting, power equipment, and ancillary connections to local and/or remote alarm systems. The group will also respond to any customer changes that occur during installation.

All equipment engineered and installed by Lucent is thoroughly tested and integrated into a reliable system at cutover. Once approved by Lucent's Quality Assurance Test group, the system is turned over to the customer.

The group also provides any specialized engineering and installation services required for unusual or highly individualized applications. These services may include engineering consultations and database preparation. Your local Account Executive can provide more information about these services.

Technical Support Services

The goal of Lucent's Technical Support Services is to keep products operating at maximum performance and to prevent problems from interrupting service to customers. The Technical Support Services offerings include Extended Technical Support Services to pick up after the warranties end and Value Added Services from consultation and planning to turnkey operations and on-site maintenance programs.

Typical Extended Technical Support Services include:

- Operational and administrative services
- Technical consultation
- Post-warranty restoration services.

Typical Value Added Services include:

- Network design, growth planning, and performance analysis
- Multivendor troubleshooting
- Preventive and remedial maintenance.

Along with a national hotline number and on-line technical support, Lucent's Extended Technical Support Services and Value Added Support plans allow you to specify the level of coverage needed to meet your specific needs from Basic through Unlimited Coverage.

For more information on Lucent's Technical Support Services, contact your Lucent Account Executive.

How to Order Documents

To order additional copies of this document, send or call in an order as follows:

Customer	Mail Order	Telephone Order (Monday through Friday)
Commercial Customers*	Lucent Technologies Customer Information Center Attention: Order Entry Section 2855 N. Franklin Road P.O. Box 19901 Indianapolis, IN 46219	Within USA: 1-888-582-3688 Fax: 1-800-566-9568 <i>7:30 a.m. to 6:30 p.m. EST</i> Worldwide: Toll: 1-317-322-6646 FAX: 1-317-322-6699
RBOC/BOC	Process through your Company Documentation Coordinator	

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

Lucent Technologies entities should use Form IND 1-80.80 FA, available through the Customer Information Center.

One-time orders include a binder (if applicable) and the document contents for the current issue in effect at the time of order. After placing a one-time order, you may request placement on the standing order list for all later reissues of the document. The standing order list for each document provides automatic distribution for all reissues of the document. Normally, these reissues contain only the unbound document packaged in shrinkwrap material for shipment.

Standing Orders

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

Lucent Technologies Contacts

Topic	Contact Location	Telephone
Technical Assistance	Regional Technical Assistance Center	1-800-225-RTAC (1-800-225-7822) <i>(Staffed 24 hours a day)</i>
Document Support	Lucent Technologies Customer Information Development and Business Translations Organization Attention: Publishing Services Department 2400 Reynolda Road Winston-Salem, NC 27106	1-800-334-0404 <i>or</i> (toll) 1-910-727-6681 <i>Monday through Friday</i> <i>8:00 a.m. to 4:00 p.m. EST</i>

How to Comment on This Document

Feedback forms are located immediately after the title page of this document. Please fill out the form, tear it out, and return it to the address on the form.

If the feedback form is missing, send comments on this document to:

Lucent Technologies
Manager, Customer Technical Support
Dept. JJ19110B0
Building 20 Room 3-R6
1600 Osgood St.
North Andover, MA 01845-1043

Electronic Documentation

Documentation for the DDM-2000 FiberReach Multiplexer is now available in electronic form, on both floppy disks, and on compact disk read only memory (CD-ROM). Electronic documentation has many advantages over traditional paper documentation, including cost savings, search and retrieve capability, and the assurance of the most current documentation.

CD-ROM and floppy disks are available by annual subscription (on standing order).

- To order, call your Technical Information Resource Manager, your Lucent Technologies Account Executive, or the Lucent Technologies Customer Information Center at 1-800-432-6600.

- For pricing information, contact your Lucent Technologies Network Systems Account Executive, or the Lucent Technologies Customer Information Center at 1-800-432-6600.
- For technical information, call Lucent Technologies Documentation Support at 1-800-334-0404.

Introduction**1**

Contents

Overview	1-1
DDM-2000 FiberReach Releases	1-2
DDM-2000 FiberReach Wideband Shelf Description	1-2
■ DDM-2000 FiberReach WBS Release 1	1-2
■ DDM-2000 FiberReach WBS Release 2	1-3
■ DDM-2000 FiberReach WBS Release 3	1-4
■ DDM-2000 FiberReach WBS Release 4	1-5
DDM-2000 FiberReach Narrowband Shelf Description	1-5
Equipment	1-6
■ Miscellaneous Equipment	1-6
■ Test Equipment	1-7

Introduction

1

Overview

**CAUTION:**

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

This manual was developed by the organization that provides technical support, both phone and on-site, for DDM-1000 and DDM-2000. This organization interfaces directly with all types of customers (Lucent Technologies installers, AT&T, MCI, Regional Bell Telephone Companies, and independent telephone companies) on a regular basis and is sensitive to the customers' installation needs and concerns.

This manual is divided into several sections. The sections are numbered in the order in which they are to be performed. If installing more than one DDM-2000 FiberReach at the same time, perform each section on all the DDM-2000 FiberReaches before continuing on to the next section, to save time.

This manual is intended for a central office environment in network equipment building system (NEBS) installation and tests performed prior to turnover to central office personnel. Refer to 363-206-301 (Release 2, 363-206-305 (Releases 3 and Release 4) *DDM-2000 FiberReach Multiplexer User/Service Manual* for any activity involving circuit turnup, normal maintenance, or trouble analysis.

DDM-2000 FiberReach Releases

The DDM-2000 FiberReach features are being released in distinct phases.

- Release 1 supported DS1 wideband services in OC-1 ring applications and is rated Discontinued Availability (cannot be ordered).
- Release 2 in addition to Release 1 services, supports T1 extensions of wideband services and DS0 narrowband services using the Narrowband Shelf in conjunction with SLC-2000.
- Release 3 supports the standard TID Address Resolution Protocol (TARP) which allows DDM-2000 FiberReach to be compatible with other-vendor NEs. Release 3 also introduces the OC-3 OLIU (28G-U) circuit pack in the Main slots of the FiberReach shelf. Release 3 also allows DS3 (BBG4, BBG4B, BBG19) circuit packs and 22-type OLIUs in the function unit slots of the FiberReach shelf.
- Release 4, in addition to Release 3 features, introduces the OC-12 OLIU (29G-U) circuit pack in the Main slots of the FiberReach shelf. Release 4 also allows the 22-Type OLIU circuit pack in the Function Unit slots of the FiberReach shelf to permit STS-3c transport.

This manual covers installation of the Release 1 through Release 4 systems. This manual will be updated to cover additional releases as they become available.

DDM-2000 FiberReach Wideband Shelf Description

The DDM-2000 FiberReach Wideband shelf is capable of supporting Release 1, 2, 3 and 4 configurations.

DDM-2000 FiberReach WBS Release 1

The Release 1 configuration provides VT path switched OC-1 rings that restore service in the event of a fiber cut. For single-homed applications, both rotations of the OC-1 ring connect to a single DDM-2000 OC-3/OC-12 or *SLC-2000* Access System host. Also available with this release is a dual-homing option which increases the survivability against host node failures and a stand-alone OC-1 ring application. Release 2 configurations provide all Release 1 functionality with the addition of 1x7 low speed protection and T1 extensions.

The DDM-2000 FiberReach Wideband shelf is divided into several distinct areas as shown in Figure 1-1 on page 1-11 through Figure 1-3 on page 1-13.

For rack-mounted applications the DDM-2000 FiberReach Multiplexer is available in a carrier assembly, as shown in Figure 1-5 on page 1-15 through Figure 1-9 on page 1-19. This assembly provides space for up to two wideband shelves or one wideband and one

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See Notice on first page

narrowband shelf. Two electrostatic discharge (ESD) jacks are mounted on the carrier frame.

For wall-mounted applications the DDM-2000 FiberReach Multiplexer is available in a number of different Wall DT assemblies, as shown in Figure 1-10 on page 1-20 through Figure 1-15 on page 1-25. This assembly provides space for up to two wideband shelves or one wideband and one narrowband shelf. Plus up to two DS1 panel assemblies and one LGX panel assembly. Two electrostatic discharge (ESD) jacks are mounted on the carrier frame.

The ECC2 user panel, located on the right side of the shelf, provides system-level information and control functions. The user panel is also equipped with the shelf's 48 V fuses and EIA-232D port for connection with a craft interface terminal (CIT).

The SYSCTL circuit pack is located to the left of the ECC2 user panel. This circuit pack is always needed and provides the functions required for the shelf's basic operation (that is, provisioning, monitoring, protection switching, and serial telemetry).

The faceplate of the SYSCTL circuit pack has a 7-segment display, a far end select (FE SEL) push-button, an update/initialize (UPD/INIT) push-button, and a fault led.

The two slots located to the left of the SYSCTL circuit pack are the Function Unit slots. In Release 1 and Release 2 these slots will not be used.

Located to the left of the function units are the optical line interface unit (OLIU) regenerators. The OLIU multiplexes the VT-Gs into an STS-1, and then converts the STS-1 into an OC-1 optical signal for transmission onto the fiber. The reverse is performed in the demultiplex direction.

The DS1 circuit packs (Low Speed units) are located to the left of the OLIU slots. The low speed slots are configured 1x1 protection in Release 1 and either 1x1 or 1x7 protection in Release 2. If Low Speed protection is desired in 1x7 protection mode all low speed service slots must be equipped with either circuit packs or 177A retainers. Each DS1 circuit pack accommodates the multiplexing/demultiplexing of four DS1s into and out of a synchronous optical network (SONET) virtual tributary-group (VT-G) signal.

DDM-2000 FiberReach WBS Release 2

Release 2 provides the following features:

- With Release 2.0, the 1X7 low-speed protection mode that operates just as it does in a DDM-2000 OC-3 system. This allows the use of up to 28 DS1 or 14 T1 ports. A DDM-2000 FiberReach WBS supporting 1X1 low-speed protection mode can be converted, out of service, to support the 1X7 protection mode
- The new BBF6 T1EXT circuit pack provide T1 copper extensions. T1EXT and DS1 circuit pack may be mixed in a low-speed group configured for 1X7 protection mode. If the T1 copper extensions leave the building they require both primary and secondary lightning protection. Each T1EXT circuit pack accommodates the multiplexing/demultiplexing of two T1s into and out of a synchronous optical network (SONET) virtual tributary-group (VT-G) signal. The low speed slots to be equipped with

The secondary lightning protection is provided by the ED8C783-30 T1EXT Lightning and Surge Protection Assembly see Figure 1-16 on page 1-26. The lightning protection assembly provides slots for up to 7 (Group 1) or 14 (Group 2) LPROT lightning protection cards. Each LPROT card provides secondary protection for one T1 extension (so two LPROT cards would be required for each T1EXT circuit pack).

- Starting with Release 2.0, the DS1 Facility Loopback at the DS1 ports on the BBF1B/BBF3 and the T1 ports on the BBF6 circuit packs towards the DSX. Operation of the loopback causes all of the incoming signals (four on BBF1B and BBF3 and two on BBF6 on the selected circuit pack to be looped back. Loopback control is through the CIT commands: opr-lpbk-t1 and rls-lpbk-t1 (TL1 commands: OPR-LPBK-T1, RLS-LPBK-T1). The loopback is a bridge which means that the transmitted signal path is not interrupted. Either the facility or terminal loopback, but not both, can be set at any given time for a port.
- The new 27G2-U OLIU support several new OC-1 topologies of FiberReach systems when the associated DDM-2000 OC3 shelf is running Release 9.1 or later.

DDM-2000 FiberReach WBS Release 3

Release 3 provides the following features:

- Release 3 introduces the OC-3 OLIU (28G-U) circuit pack in the Main slots of the FiberReach shelf. Up to 28 VT channels on the OC-3 interface can be VT cross-connected to Low speed units. Up to 84 VT channels can be cross-connected as pass-throughs on the OC-3 ring. Up to three STS-1 channels can be STS-1 cross-connected as pass-throughs only on the OC-3 ring.

All the same options for dropping traffic at low speed ports that were supported on a DDM-2000 FiberReach system equipped with the 26-type OLIUs and running Release 2 continue to be supported when the 28G-U OLIU are used in the Main slots. A DDM-2000 FiberReach shelf equipped with the 28G-U OLIU can be linked with other similarly FiberReach shelves and at least one non-FiberReach DDM-2000 OC-3 or OC-12 shelf. Ring-on-Ring configurations between an OC-12 and a FiberReach shelf equipped with 28G-U OLIUs are also supported. Also a FiberReach shelf equipped with 28G-U OLIUs can interconnect with FT-2000 OC-48 rings via the OC-3 0X1 interface. Finally a FiberReach shelf equipped with 28G-U OLIUs and 22-type OLIUs in Function UNits will support the STS-3c 0X1 interface.

- Release 3 introduces the new BBF8 HDSL circuit pack. HDSL is an access technology that allows efficient transport of DS1 payloads over metallic twisted wires. The BBF8 fits into a low-speed slot and provides two, four wire (2 pair) HDSL interfaces with PairGain HDSL equipment located up to 12,000 feet away.
- With Release 3.1, the Function Unit of the DDM-2000 FiberReach shelf supports the DS3 (BBG4, BBG4B, BBG19) circuit packs and 22-type OLIU. Equipping the 22-type OLIUs in the function unit slots provides the ability for

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transporting STS-3c services. Ring path switching is not done on the DDM-2000 FiberReach ring; rather STS-3c level path switching is done elsewhere in the network.

DDM-2000 FiberReach WBS Release 4

Release 4 provides the following features:

- Release 4 introduces the OC-12 OLIU (29G-U) circuit pack in the Main slots of the FiberReach shelf. Any of the 12 STS-1s on the OC-12 interface can be selected for STS-1 or VT cross-connections to function units or pass-through cross-connections. Any of the four STS-3c channels in the OC-12 can be cross-connected to an OC-3 OLIU in the function unit slots.

All the same options for dropping traffic at low speed ports that were supported on DDM-2000 FiberReach systems equipped with 26/28-type OLIUs and running Release 3.0 (26-type only) or 3.1 (26/28-Type) continue to be supported when 29G-U OLIUs are used in the Main slots. A DDM-2000 FiberReach shelf equipped with 29G-U OLIUs can be linked with other similarly (with 29-type OLIUs in Main) equipped FiberReach shelves, OC-3 shelves running Release 13 (with 24-type OLIUs in Main), OC-3 shelves running Release 15 (with 24 or 29-type OLIUs in Main), or OC-12 shelves running Release 7 to create an OC-12 ring.

DDM-2000 FiberReach Narrowband Shelf

Description

The physical size of the DDM-2000 FiberReach Narrowband Shelf (NBS) is similar to the DDM-2000 FiberReach Wideband Shelf (WBS) (approximately 9.5 inches high by 8 inches wide). The purpose of this similarity is so that either shelf may be mounted in the DDM-2000 FiberReach Multiplex Carrier Assembly, the Wall DT Assembly, and the 61B cabinet. The carrier assembly provides space for up to two wideband shelves, two narrowband shelves, or one wideband shelf and one narrowband shelf. The wall assembly provides space for two wideband shelves or one wideband shelf and one narrowband shelf plus up to two DS1 jack panel assemblies and one LGX panel assembly. The 61B cabinet provides space for up to two wideband shelves, two narrowband shelves, or one wideband shelf and one narrowband shelf.

The operation of the narrowband shelf requires DLC Release 4.3 or 4.4 in the SLC[®]-2000 Host Digital Terminal (HDT) and Release 2.0 in the DDM-2000 FiberReach Wideband Shelf.

There can be up to sixteen circuit packs installed in the NBS. The four common units are always required and they are:

FHB2	DSXBUI	Provides the electrical connection to the wideband shelf
AUA413	RGU	Provides ringing voltage
AUA421	CDTU	Provides channel drop test capability
AUA432	PCU	Provides DC voltages from 48 volt battery voltage

There are twelve channel unit positions that can be used for up to 24 voice frequency (VF) lines with Release 4.3 and for up to 48 VF lines with Release 4.4. Refer to Table A in LTP 363-206-310, NTP-005 for the channel units that are supported by FiberReach Release 2.0 (*SLC-2000*, Release 4.3 and 4.4).

The *SLC-2000* HDT has a SPQ809 MSDT Server in the metallic distribution shelf (MDS) that sends a DSX-1 signal to the collocated WBS. The WBS multiplexes the DSX-1 electrical signals into an OC-1 optical signal and transmits it to the optical network unit (ONU). Another WBS in the ONU demultiplexes the OC-1 optical signal back into the DSX-1 electrical signals and sends them to the DSXBUI in the NBS. In Release 4.3 the DSXBUI conditions the signals so that one DSX-1 signal is sent to the first six channel unit slots and the second DSX-1 signal is sent to the other six channel unit slots. A second server is required in the HDT to provide the second DSX-1 signal for VF circuits 13 through 24.

DLC Release 4.4 introduces the octet mode which allows up to four DSX-1 signals to be sent to the ONU which the DSXBUI will condition and send to four sets of three channel unit slots. Each set may be used for up to 24 VF circuits or 10 ISDN lines for a total capacity of 48 VF circuits or 40 ISDN lines. Four servers are required in the HDT to provide the four DSX-1 signals for VF circuits 1 through 48.

A T1 metallic facility can also be used to connect the HDT server to the DSXBUI. The number of T1 lines and the release of the HDT DLC software will determine the capacity of the NBS.

Equipment

Miscellaneous Equipment

Miscellaneous equipment is listed in Table 1-1 on page 1-7.



NOTE:

Not all equipment is required for each installation.

Test Equipment

Tools, test sets and accessories are listed in Table 1-2 on page 1-9.



NOTE:

Not all tools are required for each installation.

Table 1-1. Miscellaneous Equipment

Item	Equipment Code or Commercial Code	Comcode
Network Bay Frame (Front or Rear Access-7 ft.)	ED-8C500-50, G1	
Network Bay Frame (Rear Access Only-7 ft.)	ED-8C500-50, G1	
Stile Cover Assemblies*		846108843
Stile Cover Brackets*		846170017
DDM-2000 FiberReach Shelf & Carrier Assembly 1 Wideband Shelf	ED-8C843-30, G1	
DDM-2000 FiberReach Shelf & Carrier Assembly 2 Wideband Shelves	ED-8C843-30, G2	
DDM-2000 FiberReach Shelf Assem- bly (No Carrier)	ED-8C762-30, G1 (D.A.)	
DDM-2000 FiberReach Shelf Assem- bly (No Carrier)	ED-8C762-30, G2	
DDM-2000 FiberReach Shelf Assem- bly equipped with one ECC2 Circuit Pack	ED-8C762-30, G3	
Heat Baffle Assembly	ED-8C724-30, G2	
DDM-2000 FiberReach Carrier Assembly		847552627
DDM-2000 FiberReach Wall DT with 1 Wideband Shelf and 1 DSX (16 DS1s)	ED-8C843-31, G1 (D.A.)	
DDM-2000 FiberReach Wall DT with 1 Wideband Shelf and 2 DSX (28 DS1s)	ED-8C843-31, G2	
DDM-2000 FiberReach Wall DT with 1 Wideband Shelf, 1 DSX (16 DS1s) and 1 LGX	ED-8C843-31, G3 (D.A.)	
DDM-2000 FiberReach Wall DT with 1 Wideband Shelf, 2 DSX (28 DS1s) and 1 LGX	ED-8C843-31, G4	

Table 1-1. Miscellaneous Equipment (Continued)

Item	Equipment Code or Commercial Code	Comcode
DDM-2000 FiberReach Wall DT with 1 Wideband Shelf, 2 top mounted DSX (28 DS1s), 1 LGX and space for 1 Narrowband Shelf	ED-8C843-31, G9	
1145B1 power supply kit with 8.0 AH battery with rack mounting brackets		107659229
1145B1 power supply kit with 8.0 AH battery with wall mounting brackets		107659211
DDM-2000 Cable Assemblies	ED-8C724-20, -21 ED8C727-20 ED8C762-20, ED8C900-20	
Coaxial Cable	734A, 735A, 1735006A or Equivalent	
Mini-Coax Cable	KS-19224, L2 or Equivalent	
Connector	219N Connector for splicing KS-19224, L2 Mini-Coax to 734A Coax	105643381
Bracket	4.82" for ED-8C500 Frame	846592913
Bracket	5.94" for ED-8C500 Frame	846593002
Bracket	2.00" for ED-8C501 Frame	846600229
Bracket	3.82" for ED-8C501 Frame	846592905
<i>PANDUIT</i> [†] Cable Channel for ED-8C500 Frame (Rear)	E1.5X.75LG78.0-A	
<i>PANDUIT</i> Cable Channel for ED-8C500 Frame (Front) or ED-8C501	E1.5X.75LG78.0	
<i>PANDUIT</i> Cover	C1.5LG78.0	
User Panel Fuses (3 Amp)		406204230

* Two front stile cover assemblies and six brackets form a hardware package that provides a flush-look appearance for DDM-2000 FiberReach when mounted in a 7-foot network bay frame.

† Registered trademark of Panduit Corporation.

Table 1-2. Tools, Test Sets, and Accessories

Description	Commercial or Comcode	Notes
Multimeter		1
Screwdriver with Appropriate Head(s)		
Soldering Iron		
Anti-Oxidation Material	NO-OX-ID "A" Compound	2
<i>Thomas & Betts</i> * Crimping Tool	WT-414	3
<i>Paladin</i> † Coaxial Wire Stripper	PA1208	
Replacement <i>Paladin</i> Cassette	PA2201	
ESD Wrist Strap > 6-1/2" circumference	901011320	
ESD Wrist Strap < 6-1/2" circumference	900557075	
ESD grounding Terminal	845264118	
Wire-wrap Gun		4
Fuse Extraction Tool	406420273	
Optical Fiber Cables with <i>ST</i> ® Connectors on Each End (Min. of 2)	105357727	5,6,8
DSX-1 Patch Cords (Min. of 4)		
DSX-3 Patch Cords (Min. of 2)		
MS-DOS‡ Compatible PC (Required)		9
Canned Air Duster (Optical Quality)		
Absorbond Cleaner (300 Wipes/Pkg.)	900709379	
963TR 1038A Contact Hand Tool	106077654	
PANDUIT Duct Notching Tool	DNT-100	7

* Registered trademark of Thomas & Betts corporation.

† Registered trademark of Paladin Corporation.

‡ Registered trademark of Microsoft Corporation.

Table 1-2 Notes:

1. The multimeter must be capable of measuring DC voltage in the 40 to 60 volt range.
2. Available from Sanchem Inc., Chicago, IL. Required if the bay has been scraped to make the ground connection.
3. The crimping tool and wire stripper are only required if installing the Group 327 or 332 cable. The replacement cassette is for the wire stripper tool.
4. A wire-wrap gun is required to make connections on the DS1, alarm, and telemetry cables. The wire-wrap gun must be able to accommodate 22 or 26 gauge wire.
5. These cables are required for loopback during installation testing. The optical fiber cables can be single or multimode fiber and the recommended length is 2 feet. If Universal type OLIUs are used see the tables of LBOs and Fiber jumpers in your release installation tests.
6. DSX-1 and DSX-3 patch cords are normally available for use with the DSX jack fields.
7. Available from PANDUIT Corporation. Provides easy method to notch wiring duct sidewalls down to the bottom scoreline for "T" and corner junction
8. Also see the Tools, Test Sets, and Accessories in the Installation Test chapter for the software release being used
9. A MS-DOS[®] compatible PC and EIA RS232 cable are required for software download.

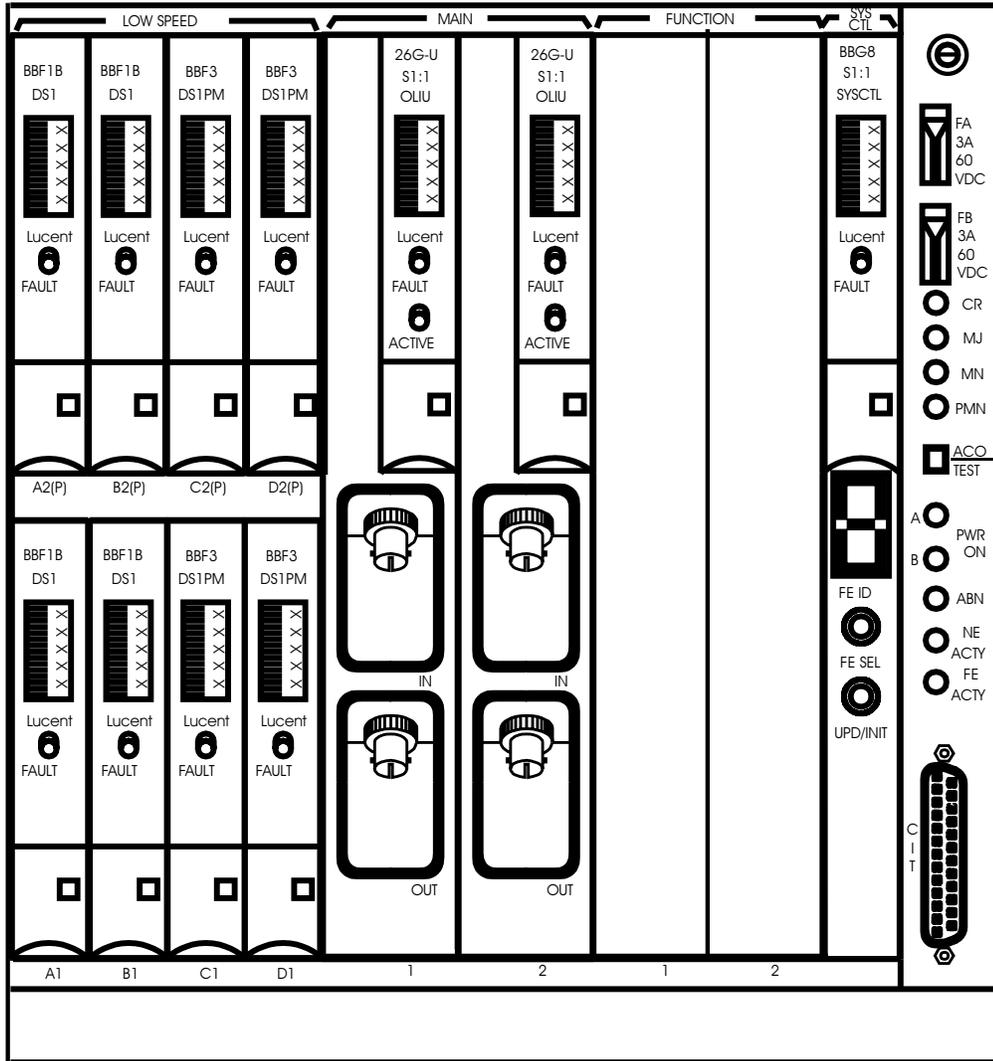


Figure 1-1. DDM-2000 FiberReach Shelf with Circuit Packs (Release 1)

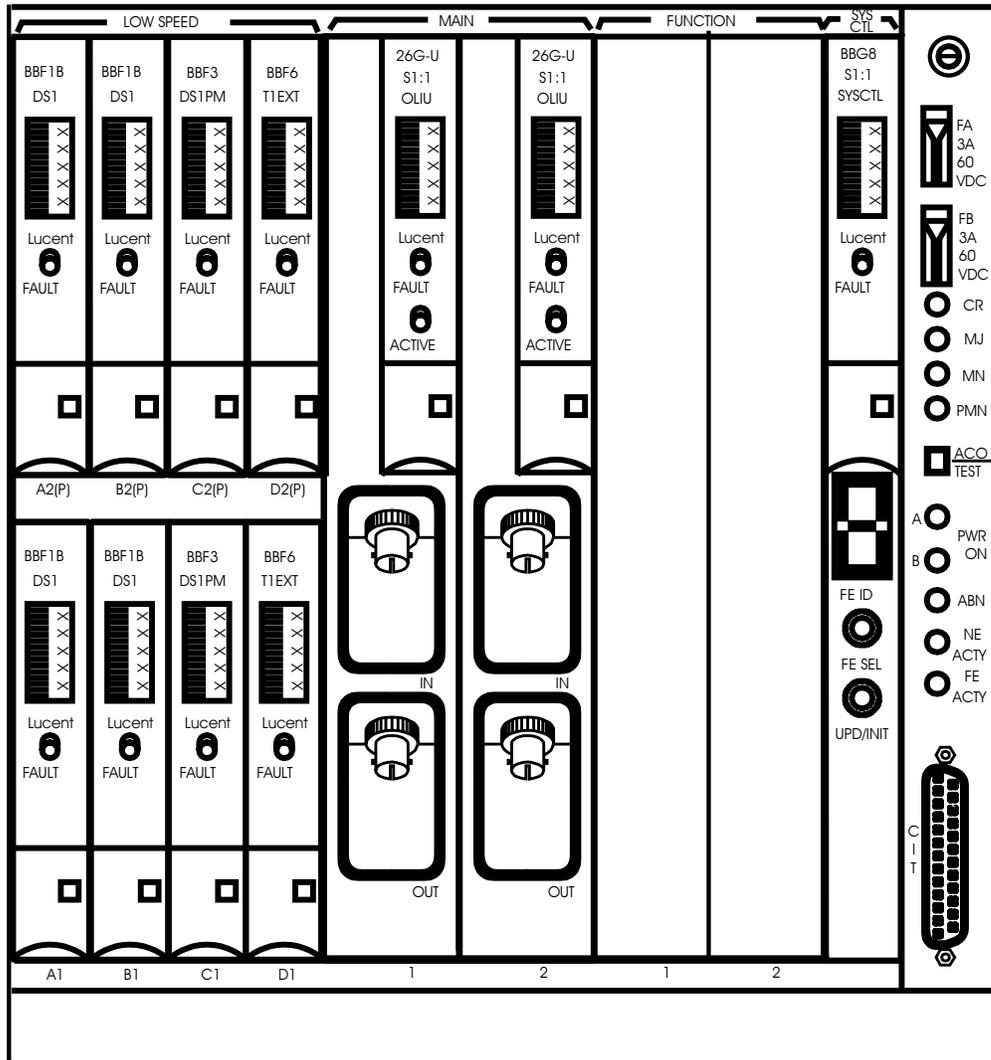


Figure 1-2. DDM-2000 FiberReach Shelf with Circuit Packs 1x1 Protection all Circuit Pack Types Protected (Release 2)

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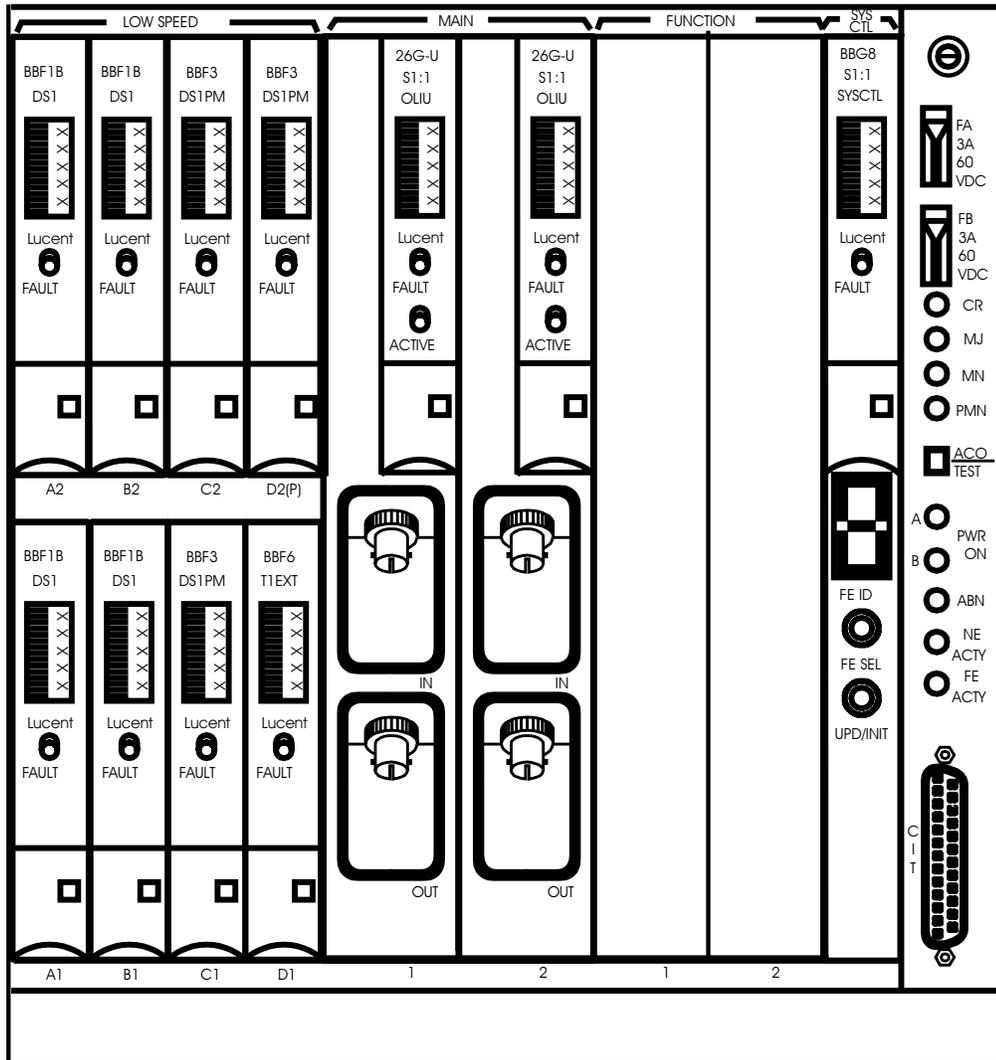


Figure 1-3. DDM-2000 FiberReach Shelf with Circuit Packs 1x7 Protection, only the Circuit Packs of the Type in Slot D2(P) are Protected (Release 2)

NOTE:
BBF3 (DS1PM) circuit pack can protect a BBF1B (DS1) circuit pack.

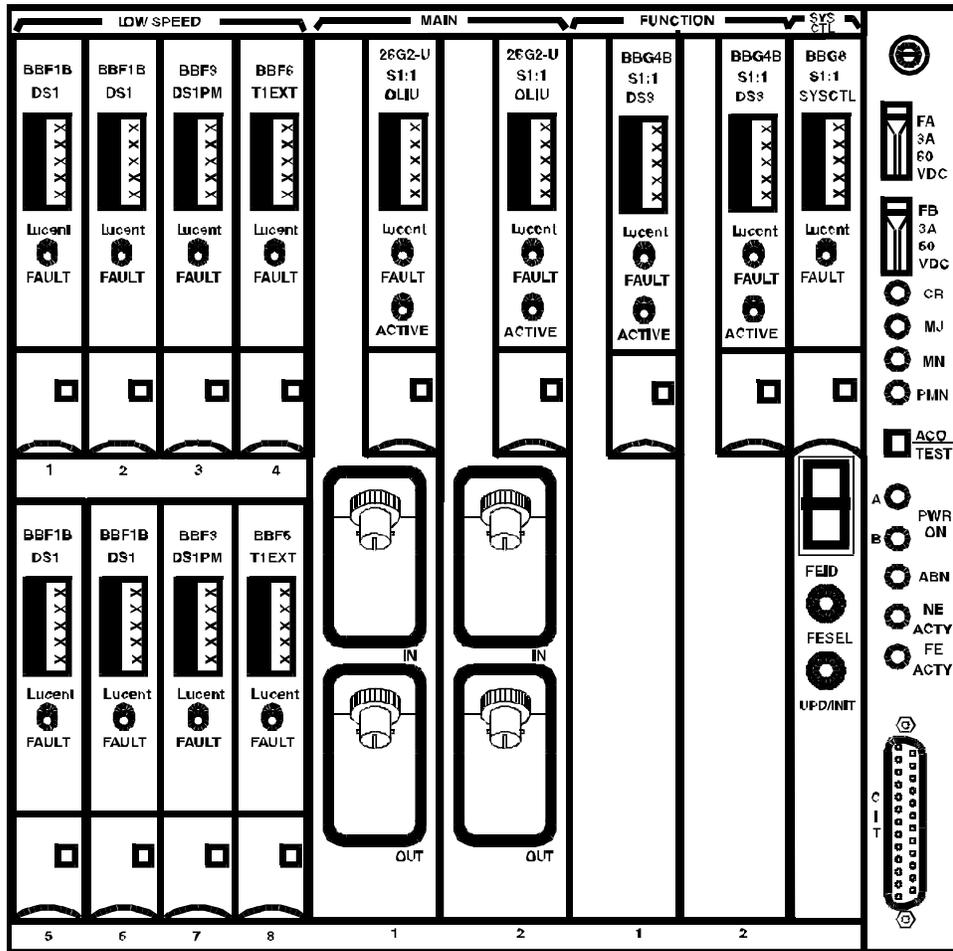


Figure 1-4. DDM-2000 FiberReach Shelf with Circuit Packs 1x7 Protection, DS3 Circuit Packs in Function Unit Slots (Release 3)

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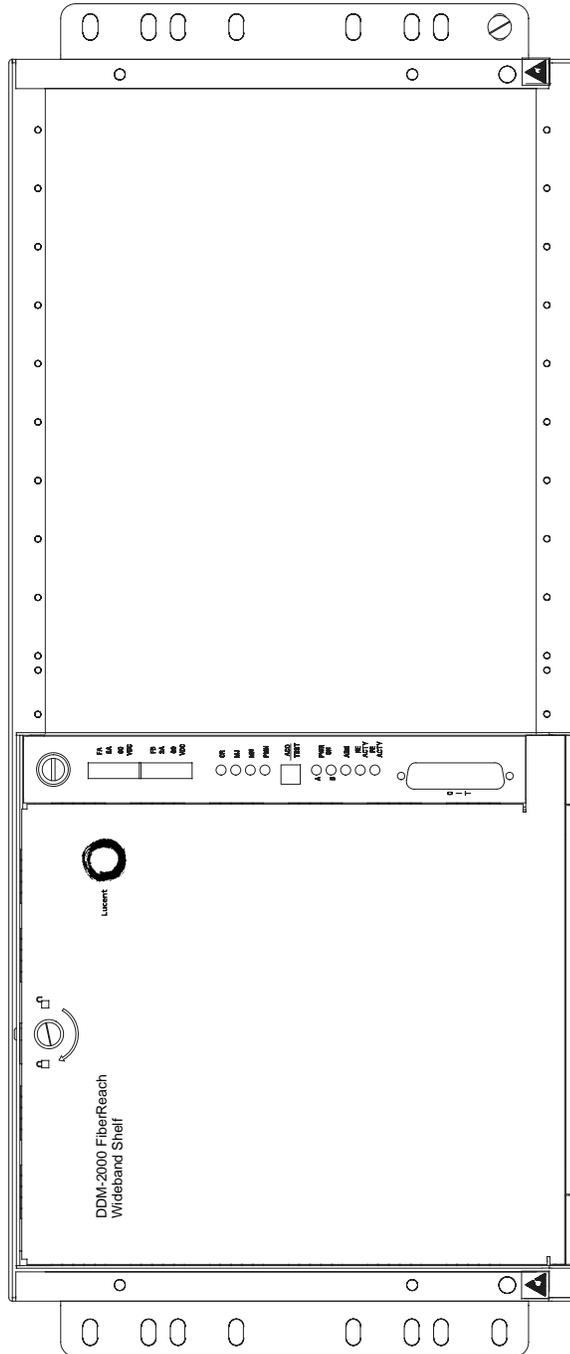


Figure 1-5. DDM-2000 FiberReach Carrier Assembly with one Wideband Shelf

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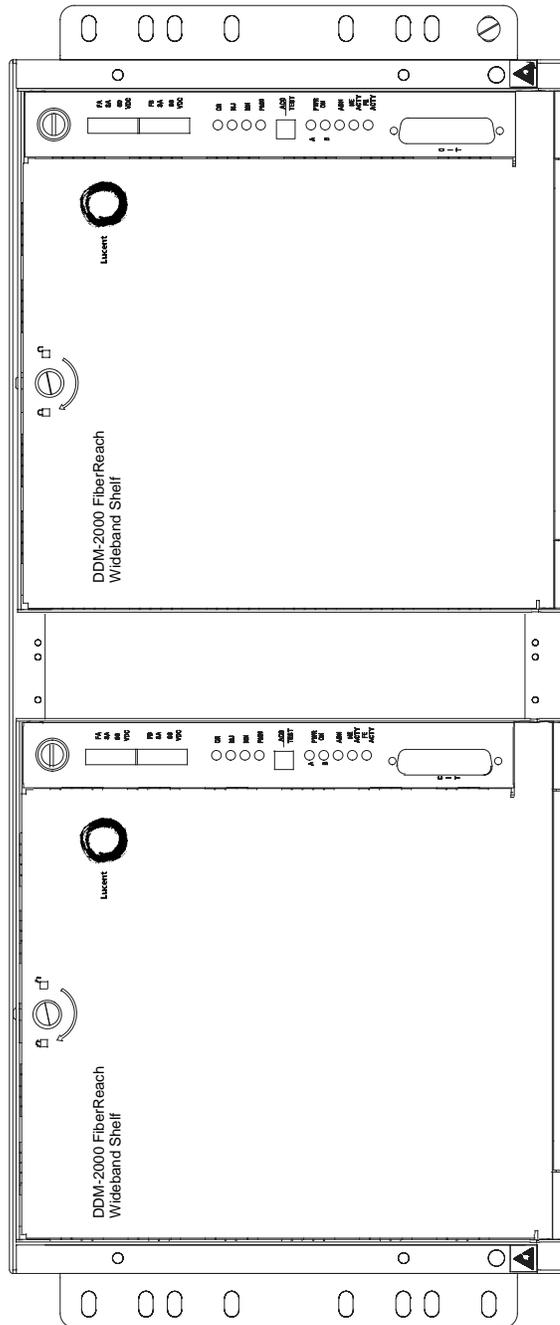


Figure 1-6. DDM-2000 FiberReach Carrier Assembly with two Wideband Shelves

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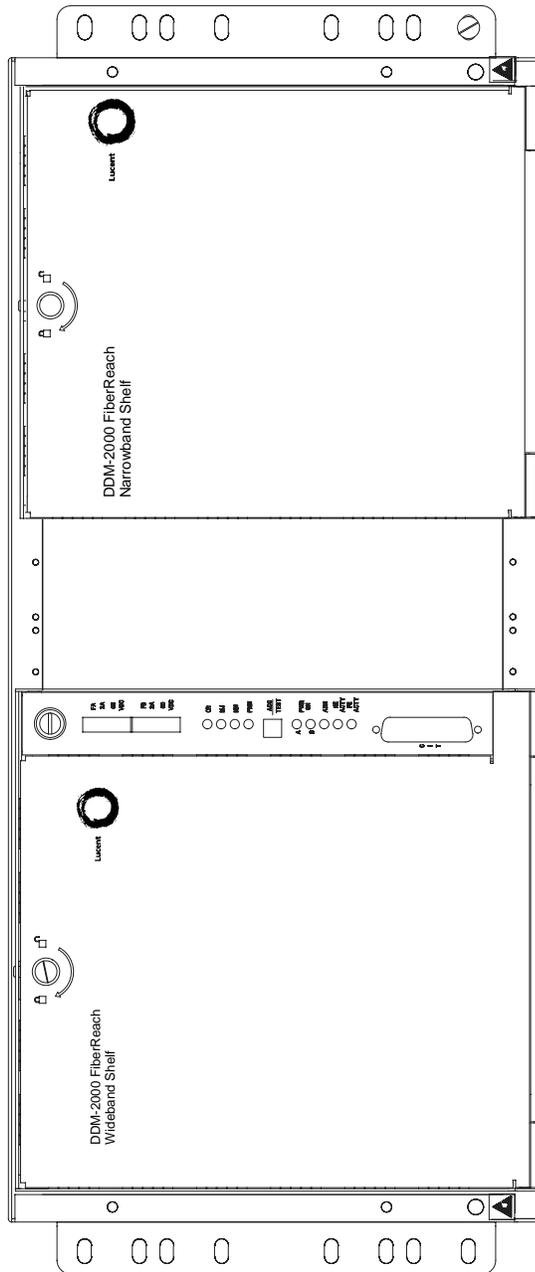


Figure 1-7. DDM-2000 FiberReach Carrier Assembly with one Wideband Shelf and one Narrowband Shelf

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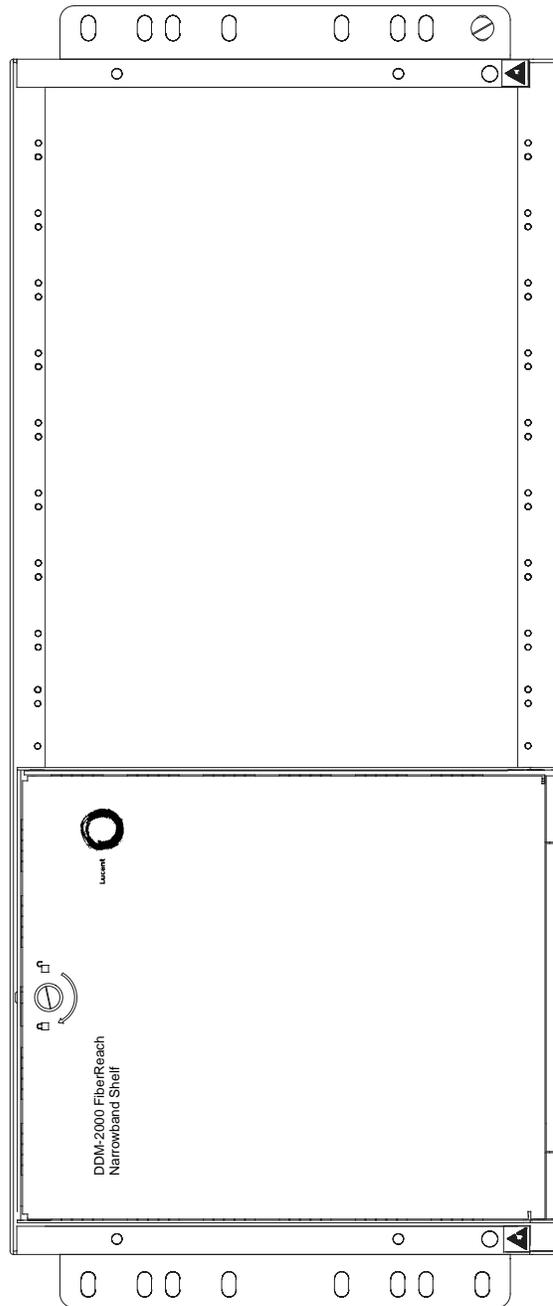


Figure 1-8. DDM-2000 FiberReach Carrier Assembly with one Narrowband Shelf

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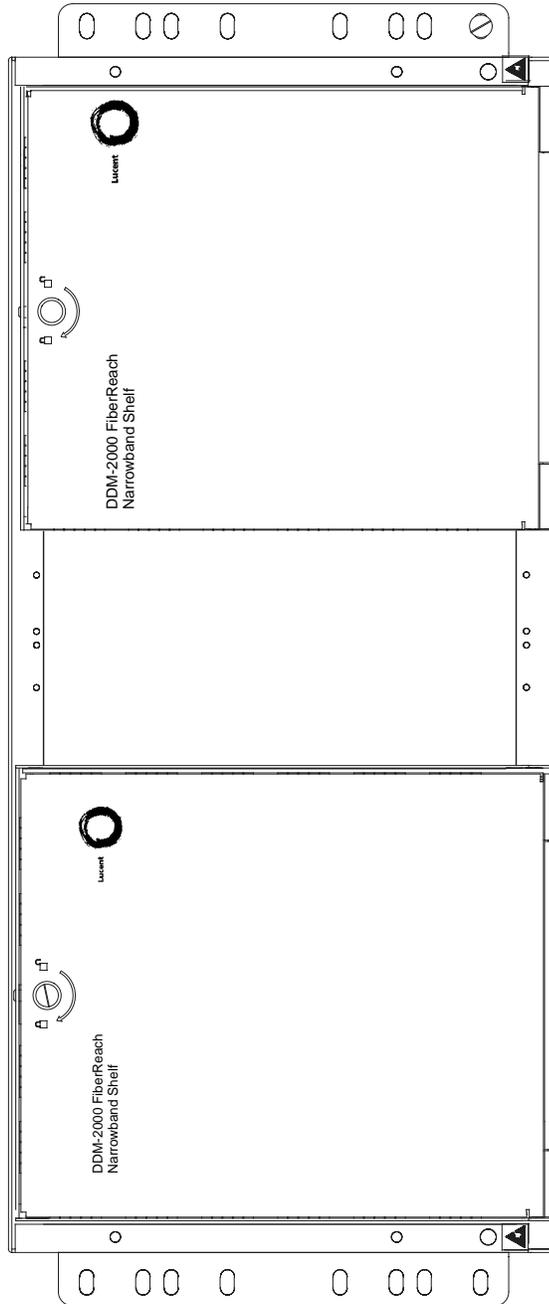


Figure 1-9. DDM-2000 FiberReach Carrier Assembly with two Narrowband Shelves

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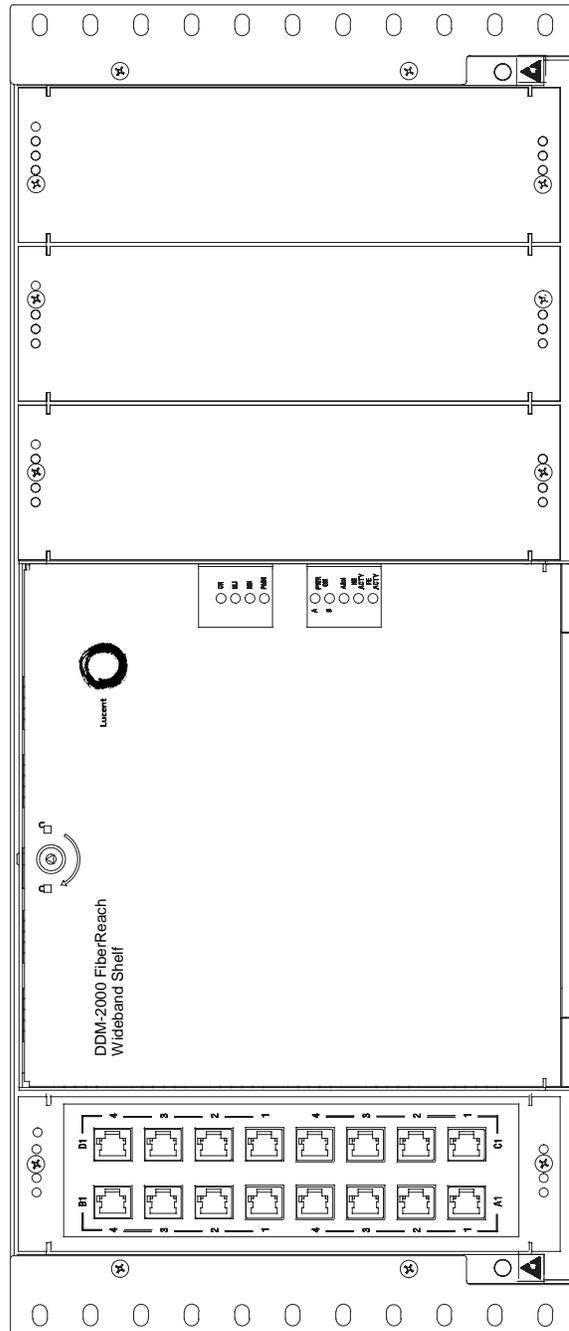


Figure 1-10. FiberReach Wall DT with Wideband shelf and one DSX

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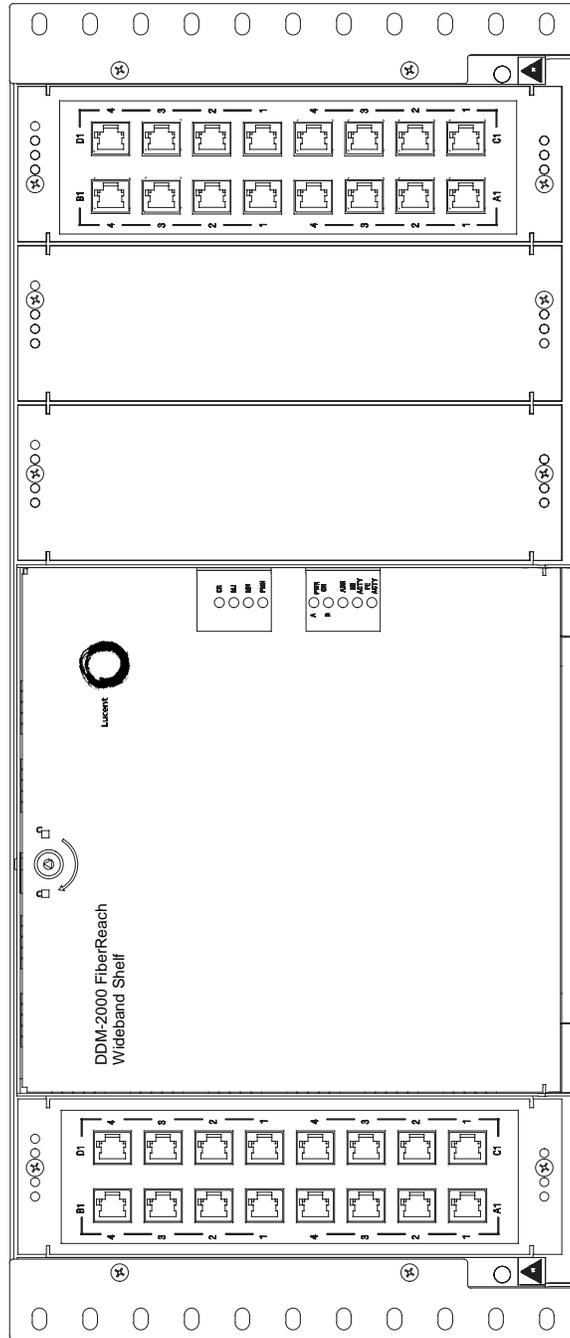


Figure 1-11. FiberReach Wall DT with Wideband Shelf, and two DSX

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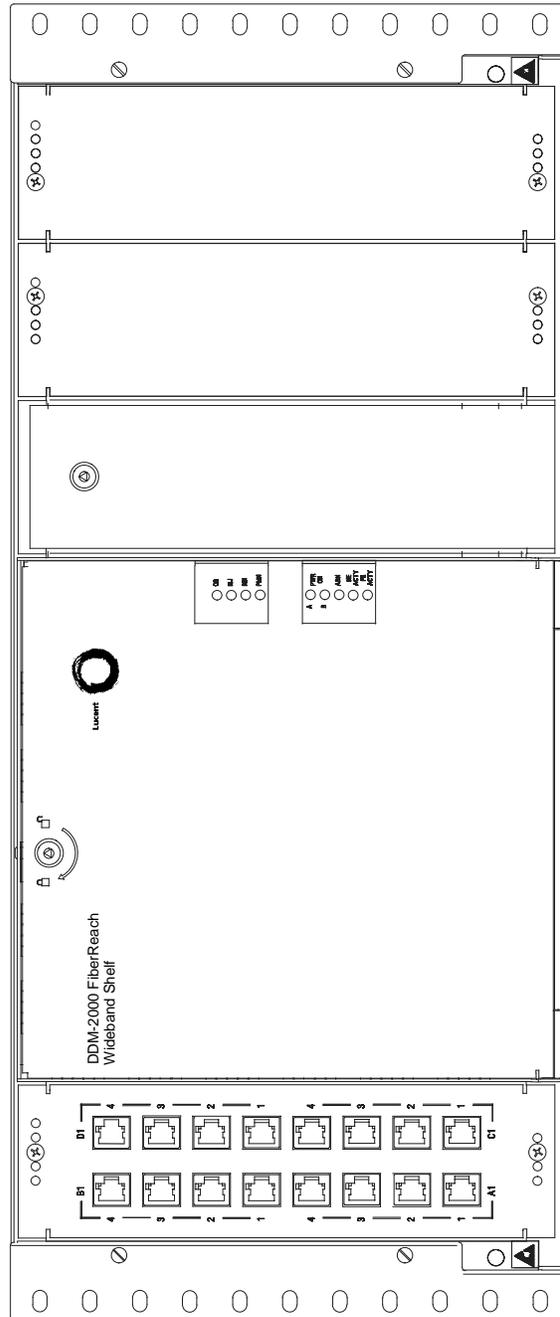


Figure 1-12. FiberReach Wall DT with Wideband Shelf, one DSX, and LGX

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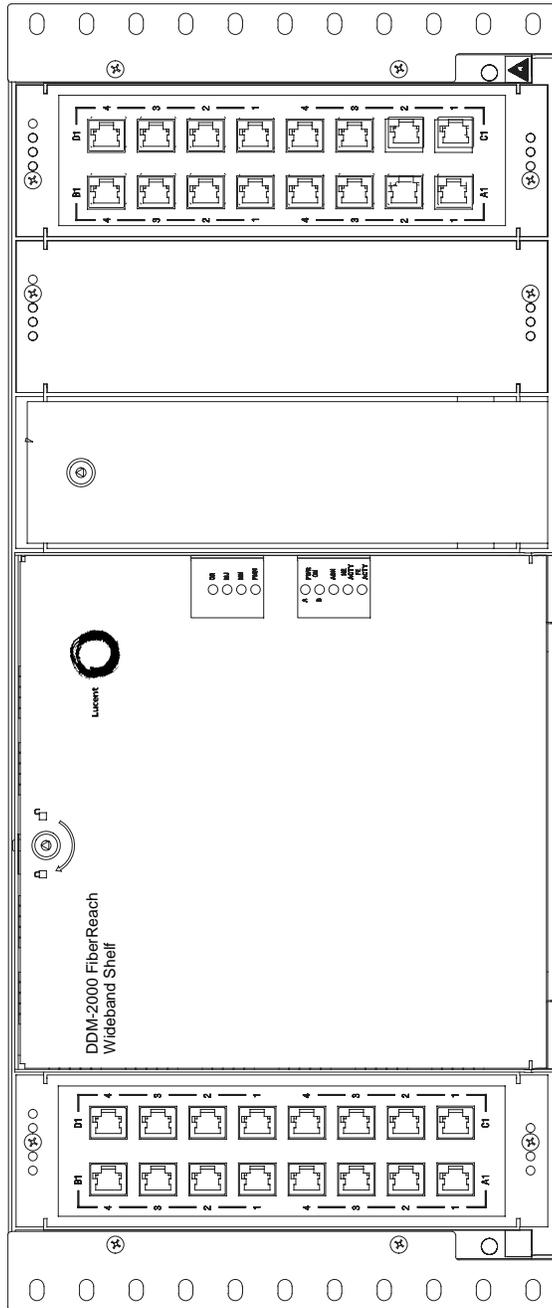


Figure 1-13. FiberReach Wall DT with Wideband Shelf, two DSX, and LGX

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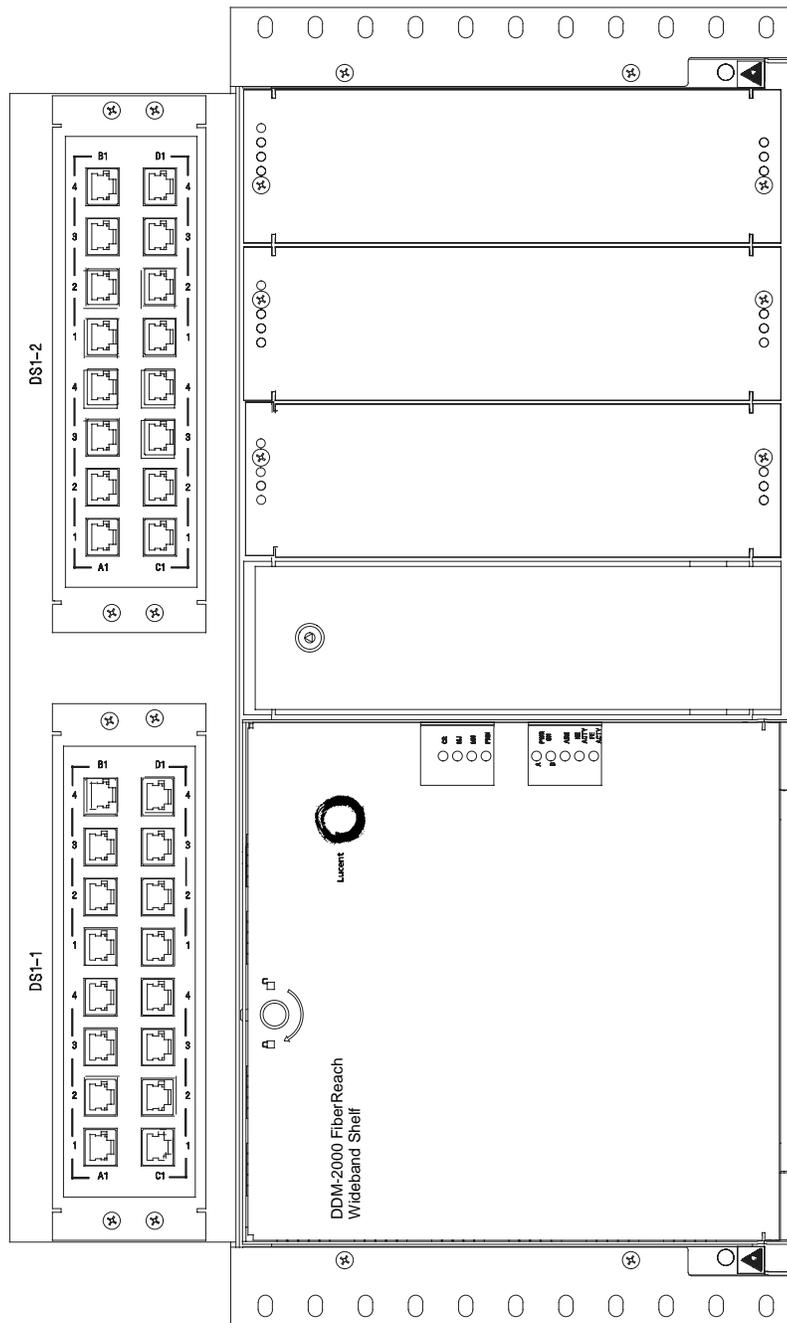


Figure 1-14. FiberReach Wall DT with Wideband Shelf, two Top Mount DSX, and LGX Ready for Addition of Narrowband Shelf

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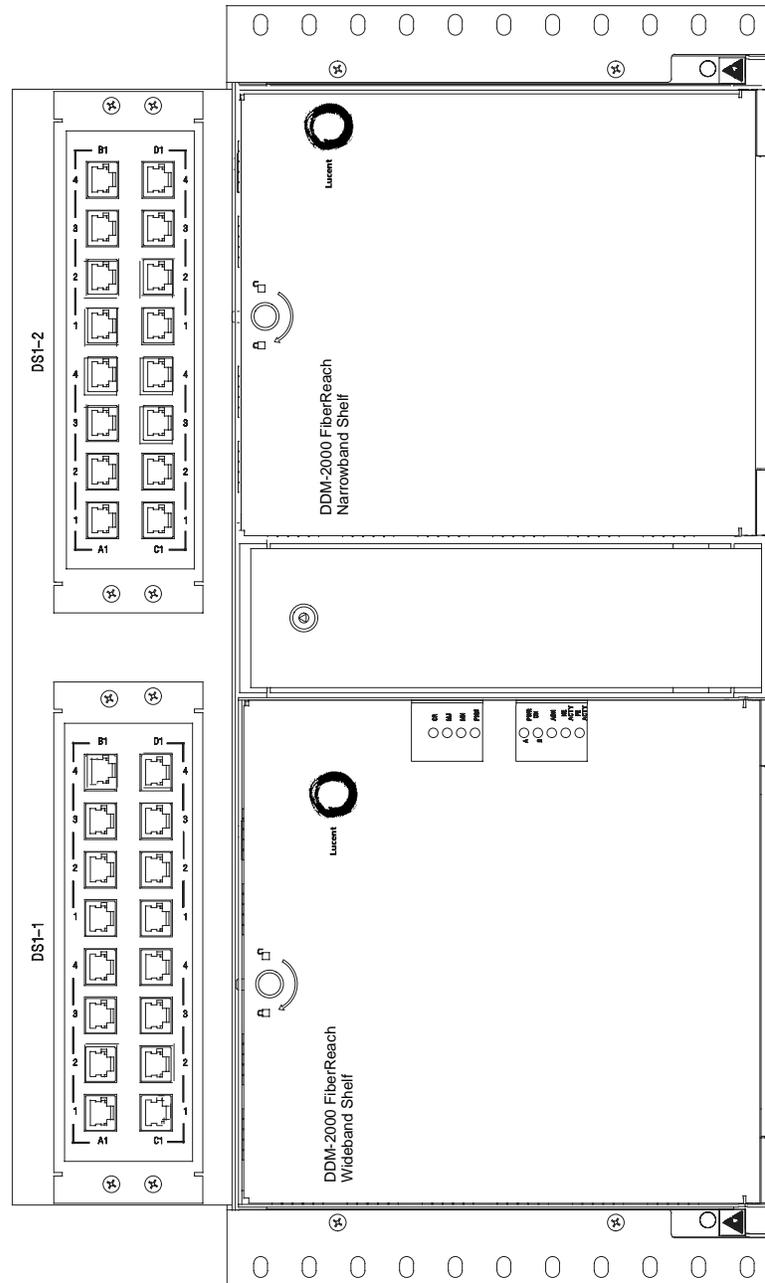


Figure 1-15. FiberReach Wall DT with Wideband Shelf, Narrowband Shelf, two Top Mount DSX, and LGX

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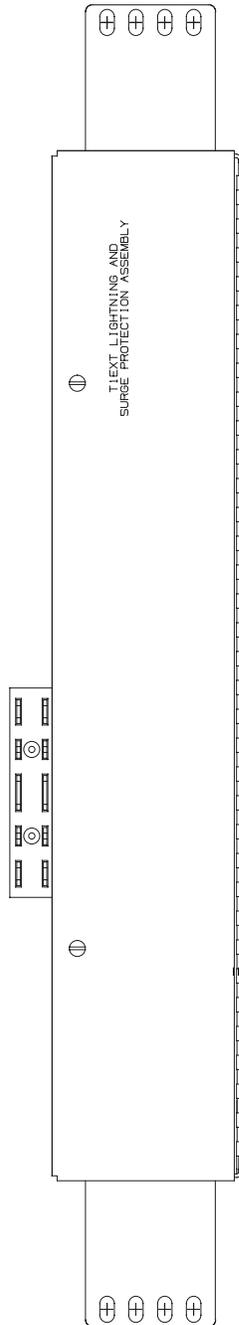


Figure 1-16. T1EXT Lightning and Surge Protection Assembly (Provides Secondary Protection)

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Wideband Shelf Equipment and Cable Installation

2

Contents

Overview	2-1
-----------------	------------

Description	2-1
--------------------	------------

■ Tools, Test Sets, and Accessories	2-2
■ Planning	2-3
■ Equipment Installation Considerations	2-3

Inspection	2-4
-------------------	------------

■ Description	2-4
■ Procedure	2-4

DS1 Protection Option Plug Installation	2-5
--	------------

■ Description	2-5
■ Procedure	2-6
■ Protection Option Label Installation	2-6

Equipment Installation **2-7**

- Description 2-7
 - Procedure for Installing FiberReach Carrier Assembly in Network Bay Frame 2-7
 - Procedure for Installing FiberReach Wideband Shelf in the Carrier Assembly 2-7
-

DS1 Cabling — Wideband Shelf **2-8**

- Description 2-8
 - Procedure 2-9
 - DS3 Cabling - Wideband Shelf 2-10
 - Description 2-10
 - Procedure 2-10
-

Optical Fiber Cabling - Wideband Shelf **2-10**

- Description 2-10
 - Procedure 2-11
-

Power Cabling - Wideband Shelf **2-12**

- Description 2-12
 - Procedure 2-12
-

Office Alarm Cabling - Wideband Shelf **2-14**

- Description 2-14
 - Procedure 2-15
-

TBOS Telemetry Cabling - Wideband Shelf **2-16**

- Description 2-16
- Procedure 2-16

Miscellaneous Discrete Telemetry Cabling - Wideband Shelf **2-17**

- Description 2-17
 - Procedure 2-18
-

Final Operations **2-19**

- Procedure 2-19

Wideband Shelf Equipment and Cable Installation

2

Overview

This section provides the information for rear access installation and covers the installation information for the shelf, heat baffles, rear access cables, and grounding for the Wideband Shelf.

This installation manual contains the latest cable information at the time of issue. For up-to-date information, refer to the ED cable drawings listed in the "About This Document" section. For miscellaneous equipment information, refer to "Miscellaneous Equipment" in the section "Introduction".

Description

This section should be performed on all rear access Wideband Shelf installations. Observe the following notes:

- ⇒ NOTE:**
This section requires previous bay frame installation and grounding. The shelf should be grounded by its mounting screws.
- ⇒ NOTE:**
It is recommended that ONLY designated Lucent Technologies cables be used.
- ⇒ NOTE:**
This section is best performed if each procedure such as "DS1 Cabling - Wideband Shelf" is performed on every shelf in the bay before proceeding to the next procedure.

- ⇒ **NOTE:**
Circuit packs must not be installed at this time.

- ⇒ **NOTE:**
All of the cables, except the optical fibers, are connected to the DDM-2000 FiberReach backplane.

- ⇒ **NOTE:**
The locations of all backplane plugs and jacks are shown in Figure 2-1 on page 2-27.

- ⇒ **NOTE:**
Cable assembly options are listed in Table 2-1 on page 2-19 through Table 2-4 on page 2-21. Connector pinouts are provided in Figure 2-8 on page 2-35.

- ⇒ **NOTE:**
Cable brackets should be installed as required.

Tools, Test Sets, and Accessories

The following tools are required:

Quantity	Description
1	Soldering Iron
1	Wrist Strap*
1	Wire-Wrap Gun†
1	Ohmmeter‡
	Screwdriver(s)**

- * A wrist strap must be worn when touching the DDM-2000 FiberReach backplane and when connecting cables. Use an available electrostatic discharge jack.
- † A wire wrap gun is required to make connections on the DS1, alarm, telemetry cables, and to the ED8C783-30 T1EXT Lightning and Surge Protection Assembly. The wire wrap gun must be able to accommodate 22 or 26 gauge wire.
- ‡ An ohmmeter is required to verify that the DDM-2000 FiberReach is properly grounded.
- ** A screwdriver with the appropriate head(s) is required for mounting the shelf, heat baffles, and cable brackets; for removing the front cover, rear protection option cover and for connecting cables to the backplane.

Planning

The DDM-2000 FiberReach may be mounted as follows:



NOTE:

The mounting brackets on the DDM-2000 FiberReach Carrier Assembly, and Heat Baffle are designed to allow for mounting in standard 23 inch wide network bay frames and 23 inch wide EIA-Type bay frames.

- a. Mounted in network bay frame. The recommended network bay frames are the ED-8C500 and the ED-8C501 (rear access only). Refer to Figure 2-5 on page 2-31 and Figure 2-6 on page 2-32 for DDM-2000 FiberReach shelf placement in a network bay frame.
- b. Mounted in seismic network bayframe. The ED-8C800-50 and ED-8C801-50 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. Shelf arrangements may be different for these bays. See ED-8C724-10 and ED-8C727-10 for OC-3 and OC-12 bay drawings respectively.
- c. Miscellaneously mounted. However, FiberReach shelf mounting must meet requirements described in Section 2 under "Equipment Installation Considerations".

Equipment Installation Considerations

Detailed network bay frame installation information is contained in ED-8C724-10, Typical Bay Arrangements. The information in this part is of a general nature.

The equipment listed below has the following height dimensions:

ED-8C762-30, G2	DDM-2000 FiberReach Multiplexer Wideband Shelf	9.5 inches
ED-8C843-30, All Groups	DDM-2000 FiberReach Multiplexer Shelf assembly equipped all Groups	9.5 inches
847552627	DDM-2000 FiberReach Multiplexer Carrier Assembly	9.5 inches
ED-8C733-30, G1	Heat Baffle	4.0 inches
ED-8C783-30, G2	T1EXT Lighting and Surge Protection Assembly	5.0 inches

If the DDM-2000 FiberReach is installed at the bottom of the bay frame, there should be an air gap of at least 1.25 inches below the DDM-2000 FiberReach.

A heat baffle is required between each DDM-2000 FiberReach Carrier Assembly as described below. If the DDM-2000 FiberReach is being installed at the top of a 7-foot bay frame, a heat baffle is not required above the sixth (top) shelf.

A heat baffle is not required below the DDM-2000 FiberReach unless heat-generating equipment is located below the DDM-2000 FiberReach.

A heat baffle is required between each T1EXT Lighting and Surge Protection Assembly and each DDM-2000 FiberReach Carrier Assembly.

DDM-2000 heat baffles must be used where required. There is no equivalent air gap.

Inspection

Description

Perform the following procedure before the DDM-2000 FiberReach Multiplexer installation or cable installation.

Procedure

1. Verify that the frame or structure into which the DDM-2000 FiberReach will be installed is properly grounded.

 **NOTE:**

Each DDM-2000 FiberReach shelf comes equipped with an installation kit, in two bags. One bag is attached to the Carrier Assembly (or baffle) containing the hardware required for mounting and grounding. The second bag is inside the Wideband Shelf and contains the protection assemblies. The installation kit for the baffle has the following:

Quantity	Description
4	0.216-24 x 5/16" Thread Cutting Screws (C 803535012)

The installation kit for the DDM-2000 FiberReach Carrier has the following:

Quantity	Description
4	12-24 x 3/8" Screws (C 901229922)

The installation kit for the DDM-2000 FiberReach shelf has the following:

Quantity	Description
4	.138-38 x 1/4" Screws (C 901301010)
1	1x1 Cross Connect Assembly (C 847578390)
1	1x7 Cross Connect Assembly (C 847578416)
1	Protection Designation Label (C 847582376)
1	Instruction Card (C 847578424)

2. Remove the front cover from the DDM-2000 FiberReach shelf.

⇒ NOTE:

The cover must be installed later to assure compliance with electromagnetic induction requirements.

3. Inspect the DDM-2000 FiberReach shelf for visible damage.
4. Determine the type of bay frame the DDM-2000 FiberReach Carrier Assembly will mount in. The DDM-2000 FiberReach Carrier Assembly side mounting brackets may have to be moved, according to bay type. Position them accordingly, refer to Figure 2-6 on page 2-33.

⇒ NOTE:

To assure that the shelf is grounded through the bay frame, the mounting brackets must be positioned so that the head of the mounting screw makes contact with the unpainted surface of the bracket.

5. Position the side mounting brackets of the DDM-2000 FiberReach heat baffle accordingly. Refer to Figure 2-6 on page 2-33.

DS1 Protection Option Plug Installation

Description

The FiberReach WideBand shelf will support to DS1 protection options of 1x1 or 1x7. These options are set by installing an option plug on the backplane. DDM-2000 FiberReach Software Release 1.0 supports only the 1x1 option. Release 2.0 and later releases of the DDM-2000 FiberReach software supports either the 1x1 or the 1x7 option. This procedure describes how to install the DS1 protection option plug on the backplane of the FiberReach Wideband shelf.

Procedure

1. Place the FiberReach Wideband shelf or the FiberReach Wideband shelf and Carrier Assembly face down on a clean work surface.
2. Locate the "hat" covering the optioning plug connector on the FiberReach backplane. See Figure 2-1 on page 2-27.
3. Remove the four screws holding the hat to the backplane cover and remove the hat.
4. Select the DS1 option plug that is required either the 1x1 (847578390) or the 1x7 (847578416). See Figure 2-2 on page 2-28.
5. Carefully install the DS1 optioning plug selected above into the connector on the backplane. The connector is keyed and will only allow insertion one way.



NOTE:

The printed wiring board side of the optioning plug faces towards the top of the FiberReach shelf.

6. Replace the metal hat over the optioning plug and screw it down to the backplane cover.
7. If a second FiberReach Wideband shelf is installed in the Carrier Assembly repeat the procedure from step 2.

Protection Option Label Installation

1. Place the FiberReach Wideband shelf or the FiberReach Wideband shelf and Carrier Assembly face up on a clean work surface.
2. Select the protection designation option label to match the option plug installed. See the 1+1 Protection label in Figure 2-4 on page 2-30.
3. Carefully peel the label off and place it on the front of the wideband shelf where shown in Figure 2-3 on page 2-29.
4. If a second FiberReach Wideband shelf is installed in the Carrier Assembly repeat the procedure from step 2.

Equipment Installation

Description

This procedure describes how to install equipment that will be accessible from both the front and rear.

Procedure for Installing FiberReach Carrier Assembly in Network Bay Frame

1. Mount the DDM-2000 FiberReach Carrier Assembly and heat baffles in a network bay frame with the wide flange of the bay frame to the front as shown in Figure 2-5 on page 2-31. Position the shelves and heat baffles in the bay frame as shown in Figure 2-6 on page 2-32. Use the thread-cutting screws provided in the installation kits to mount the shelves to ensure a good ground connection from the bay to the shelf.
2. Verify with an ohmmeter that the DDM-2000 FiberReach is grounded to the bay frame.
3. Install the required shelf brackets as shown in Figure 2-5 on page 2-31.



NOTE:

There are two brackets required per shelf to hold the *PANDUIT** cable channel for the optical fiber cables in place.

4. Install the required *PANDUIT* cable channel for the optical fiber cables as shown in Figure 2-5 on page 2-31.

Procedure for Installing FiberReach Wideband Shelf in the Carrier Assembly



NOTE:

This procedure assumes that the carrier assembly has been installed in the network bay frame using the above procedure.

1. Remove the front cover from the DDM-2000 FiberReach shelf, if this has not already been done.

* Registered trademark of Panduit Corporation.

2. Mount the DDM-2000 FiberReach Wideband Shelf by holding the shelf with the front of the shelf lower than the back and lifting the back lip (Figure B of Figure 2-7 on page 2-34) of the wideband shelf over the lower shelf attachment flange (Figure B of Figure 2-7 on page 2-34) on the carrier.
3. Use the screws provided in the installation kits to mount the shelves to ensure a good ground connection from the carrier to the shelf see Figure 2-3 on page 2-29.
4. Verify with an ohmmeter that the DDM-2000 FiberReach Wideband Shelf is grounded to the bay frame.

DS1 Cabling — Wideband Shelf

Description

This procedure 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.

 **CAUTION:**
The DS1 cables are required to have a minimum length of 30 feet to meet electro-magnetic interference (EMI) requirements.

 **CAUTION:**
Terminate any circuit from BBF6 T1EXT or BBF8 HDSL circuit packs in accordance with local procedures for T1 circuits.

 **NOTE:**
Cables are available in 22 or 26 gauge.

 **NOTE:**
DS1 cable length of 655 feet for 22 gauge cable (607C & 608C type) or 450 feet for 26 gauge cable (1249C type) should not be exceeded.

 **NOTE:**
The cables are connectorized at the DDM-2000 FiberReach end and must be wire-wrapped at the DSX end. Cables are wire-wrapped at the DSX-1 end as shown in Table 2-5 on page 2-22.



NOTE:

When the FiberReach is configured in the 1x1 protection mode do not connect the DS1 cables to J52 and J53 they are not required and may cause transmission problems.

Procedure

1. Obtain the DS1 cables per Table 2-1 on page 2-19.
2. Remove the front cover from the DDM-2000 FiberReach shelf, if this has not already been done.



NOTE:

The cover must be installed later to assure compliance with EMI requirements and proper cooling.

3. Connect the cables at the DDM-2000 FiberReach end to J50 through J53, carefully matching the correct connector with the appropriate backplane plugs as shown in Figure 2-1 on page 2-27.



NOTE:

When the FiberReach is configured in the 1x1 protection mode do not connect the DS1 cables to J52 and J53 they are not required and may cause transmission problems.

4. Route the cabling along the backplane per Figure 2-9 on page 2-36 and out of the bay to the DSX.



NOTE:

If only one FiberReach shelf is installed in the carrier route the cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

5. Tie the cables to the upper and lower rear racks.
6. Remove slack and cut the DS1 cables to the desired length at the DSX.



NOTE:

The DS1 cables are required to have a minimum length of 30 feet.

7. Referring to Table 2-5 on page 2-22, carefully observe color codes and wire-wrap the cables at the DSX-1.
8. Label appropriately any DSX jacks that are to be used for the output from the BBF6 T1EXT or BBF8 HDSL circuit packs.

DS3 Cabling - Wideband Shelf

Description

This paragraph describes how to connect the DS3 cables to the shelf and route the cables out of the bay and to the DS3 terminating equipment.

Procedure

⇒ NOTE:

When cabling to a DSX, the DSX becomes an extension of the DDM-2000 backplane connections. Thus the IN on the DDM-2000 backplane connects to the IN of the DSX and the OUT of the DDM-2000 backplane connects to the OUT of the DSX respectively.

1. The FiberReach DS3 backplane connectors are J33 (DS3 IN) and J34 (DS3 OUT).
2. Dress and tie the cables as close to the backplane as possible without touching any backplane pins.
3. Tie the cables to the upper and lower rear racks.

Optical Fiber Cabling - Wideband Shelf

Description

This procedure describes how to connect the fiber optic cables to the shelf and route the cables out of the bay and to the optical cross-connection (*LGX*[®] fiber optic distributing frame). This procedure does not cover routing the optical fiber cable between central office (CO) locations.

⇒ NOTE:

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 DDM-2000 FiberReach 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.

⇒ NOTE:
The recommended *PANDUIT* cable channel is listed in the "Introduction" section of this manual.

⇒ NOTE:
The mode of fiber (single-mode or multimode) that is connected between the LGX® fiber optic distributing frames at each end should be determined. The fiber from the DDM-2000 FiberReach transmitter to the LGX® fiber optic distributing frame must be single-mode or the same mode as exists between the LGX® fiber optic distributing frames. The fiber from the DDM-2000 FiberReach receiver to the LGX® fiber optic distributing frame must be multimode or the same mode as exists between the LGX® fiber optic distributing frames.

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

⚠ WARNING:
Invisible laser radiation when unterminated. Avoid direct exposure to the beam.

⇒ NOTE:
Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. The fibers can be cleaned with optical lint-free tissue or with a compressed air duster.

⇒ NOTE:
The 26G2-U/28G-U/29G-U OLIUs can use optical fiber cables equipped with either ST®, FC/PC, or SC type connectors, depending on the type of universal LBO used on the OLIU. The universal type OLIUs are shipped with a 0 dB ST® type universal LBO installed. If a FC/PC or SC type connector, or a larger LBO is required it can be ordered separately. See Table 2-10 on page 2-26.

⇒ NOTE:
The optical fiber cables will be connected to the DDM-2000 FiberReach after the circuit packs are installed.

Procedure

1. Connect the optical fiber cables to the LGX® fiber optic distributing frame cabinet.

⇒ NOTE:
Cables should not be energized at this time.

⇒ NOTE:
Protective covers must be left on cables.

2. Route the optical fiber cables from the LGX® fiber optic distributing frame into the DDM-2000 FiberReach bay.

⇒ NOTE:
If only one FiberReach shelf is installed in the carrier route the optical fiber cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

3. Place the optical fiber cables in a protective tube or channel.
4. Label the optical fiber cables, indicating bay, shelf, pack, and direction (IN or OUT).

Power Cabling - Wideband Shelf

Description

Two feeders (A and B) are required from the battery distribution fuse board (BDFB) to the DDM-2000 FiberReach bay.

Procedure

1. Obtain a single shelf power cable (ED-8C762-20, Group 40).
2. For each DDM-2000 FiberReach shelf:
 - a. Locate the ED-8C762-20, Group 38 DDM-2000 FiberReach shelf power cable
 - b. Remove the protective cover over the J23 terminal strip by removing the screw at the top of the cover and allowing the cover to hinge down, see Figure 2-1 on page 2-27.
 - c. Loosen the screws on the J23 terminal strip.

- d. Prepare the ends of the wires on the cable and insert them into the J23 terminal strip on the rear of the shelf per the following table:

Terminal Designation	Wire Color
-48 VA	Red
RTNA	Black
-48 VB	Slate
RTNB	Slate-Black
-48 VBB	Green
RTNBB	White

 **NOTE:**

The power feed labeled -48VBB and RTNBB on the DDM-2000 FiberReach shelf bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an inservice replacement or upgrade of the ECC1 (USRPNL).

 **WARNING:**

When connectors P3 and P4 are powered connector P5 will also be live. Connector P5 should be dressed to the bay in such a way as to prevent a short from occurring.

- e. Tighten the screws on the J23 terminal strip.
- f. Connect the P3 and P4 connectors at the other end of the G38 cable to the J3 and J4 connectors, respectively, of the single shelf power cable (G40).

 **CAUTION:**

The power feed connector labeled P5 on the G38 cable bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an inservice replacement or upgrade of the ECC1 (USRPNL) and should not be connected at this time. Any long term connection to the P5 connector could result in circuit pack damage and loss of service.

3. Route the G40 power cable out of the bay and toward the BDFB or other protection equipment, dressing the cable as shown in Figure 2-10 on page 2-37.

 **NOTE:**

If only one FiberReach shelf is installed in the carrier route the cables to the right or the left so that they will not interfere with the future installation of a second

wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

 **NOTE:**
The DDM-2000 FiberReach is powered by -48 V DC.

 **WARNING:**
Verify that the breakers are off or that the BDFB fuses are not installed.

4. Splice feeders from the BDFB to the DDM-2000 FiberReach power cable.

 **NOTE:**
Four cables are spliced to each power cable: BAT A, BAT A RTN, BAT B, and BAT B RTN.

 **NOTE:**
The cables must be a minimum of 10 gauge for bay arrangements, or 12 gauge for a single shelf.

5. Label the feeders at the BDFB BAT A, BAT A RTN, BAT B, and BAT B RTN.

 **NOTE:**
Each feeder at the BDFB should be fused for 5 amperes for a single shelf.

6. Leave the BDFB fuses out or breakers off until you are ready to do the "Powering, Verification, and Circuit Pack Installation" section of this manual.

Office Alarm Cabling - Wideband Shelf

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.

 **NOTE:**
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.

 **NOTE:**
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.

⇒ NOTE:
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 DDM-2000 FiberReach to limit transient voltages and currents.

⇒ NOTE:
Office alarm cable options are listed in Table 2-4 on page 2-21.

⇒ NOTE:
Office alarm connections are listed in Table 2-7 on page 2-23.

Procedure

⇒ NOTE:
Office alarms are cabled to each DDM-2000 FiberReach shelf in the bay.

1. Obtain an office alarm cable Group 11, 12, 14 or 13 (D.A.). Refer to Table 2-4 on page 2-21.
2. Connect the cable to J41 of the shelf.
3. Dress the office alarm cable from each shelf out of the DDM-2000 FiberReach bay per Figure 2-11 on page 2-38 to the office alarm panel.

⇒ NOTE:
If only one FiberReach shelf is installed in the carrier route the cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

4. Inspect the office alarm panel and add a contact protection network (if required).
5. Cut the office alarm cable to the desired length.
6. Wire-wrap the loose end of the office alarm cable to the alarm panel, making connections as shown in Table 2-7 on page 2-23.
7. Repeat this procedure for each shelf in the bay.

TBOS Telemetry Cabling - Wideband Shelf

Description

Telemetry byte-oriented serial (TBOS) is a serial telemetry interface providing system alarm and status data to a maintenance center and remote equipment switch capability from a maintenance center.

A cable connection from the telemetry equipment provides up to eight displays and can accommodate up to eight DDM-2000 FiberReach shelves (one display/shelf). A central office shelf and its associated remote shelf (or shelves) will typically be assigned displays associated with this single interface connection.

Connection of TBOS telemetry requires a TBOS telemetry processor in the office, thus TBOS telemetry is typically (only) used in a central office environment.

⇒ NOTE:
FiberReach WBS TARP Releases 3.0 and 4.0. do not support TBOS telemetry.

⇒ NOTE:
TBOS telemetry cable options are listed in Table 2-3 on page 2-21.

⇒ NOTE:
TBOS telemetry connections are listed in Table 2-8 on page 2-24.

Procedure

Perform the following for all the shelves that require connection to the telemetry equipment.

1. For ACORN TBOS processors, obtain a TBOS telemetry cable Group 20, 21, 44 or 22 (D.A.) Refer to Table 2-3 on page 2-21. For non-ACORN TBOS processors, obtain a TBOS telemetry cable Group 23 or 24 (refer to Table 2-3 on page 2-21).
2. Connect the TBOS telemetry cable to J21 on the rear of the shelf.
3. Dress the TBOS cable out of the DDM-2000 FiberReach bay per Figure 2-12 on page 2-39 to the telemetry system.

⇒ NOTE:
If only one FiberReach shelf is installed in the carrier route the cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

4. Dress and tie the cables in the bay.

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5. Cut the TBOS cable to the desired length at the telemetry panel.
6. Wire-wrap the loose end of the TBOS cable to the telemetry system making connections as shown in Table 2-8 on page 2-24.
7. Repeat this procedure for each shelf to be cabled directly to the telemetry system.

Miscellaneous Discrete Telemetry Cabling - Wideband Shelf

Description

The miscellaneous (environmental) discrete telemetry access allows the maintenance center to control and monitor equipment collocated with the DDM-2000 FiberReach.

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 14 miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office. A fifteenth external discrete dedicated for external power minor alarm monitoring is available (optional).

Refer to Figure 2-15 on page 2-42 for the external interconnection requirements for using the miscellaneous discrete telemetry feature at a remote terminal.

⇒ NOTE:

This procedure should be performed for each shelf requiring environmental telemetry.

⇒ NOTE:

Miscellaneous (environmental) discrete telemetry cable options and terminations are listed in Table 2-3 on page 2-21.

⇒ NOTE:

Miscellaneous (environmental) discrete telemetry connections are listed in Table 2-9 on page 2-25.

Procedure

1. Obtain a miscellaneous (environmental) discrete telemetry cable Group 27, 28, 46 or 29 (D.A.) See Table 2-3 on page 2-21. The cable is connected to the shelf requiring miscellaneous (environmental) discrete telemetry.

2. Connect the cable to J42.
3. Dress the cable out of the DDM-2000 FiberReach bay per Figure 2-13 on page 2-40 to a wire-wrap terminal strip (or where connections will be made).

⇒ NOTE:

If only one FiberReach shelf is installed in the carrier route the cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

4. Dress and tie the cables in the bay.
5. Cut the miscellaneous (environmental) discrete telemetry cable to the desired length at the telemetry panel.
6. Wire-wrap the loose end of the miscellaneous (environmental) discrete telemetry cable to the wire-wrap terminal strip, making connections per Table 2-9 on page 2-25 and Figure 2-15 on page 2-42.

⇒ NOTE:

Each miscellaneous (environmental) discrete telemetry designation is connected to the DDM-2000 FiberReach by two leads (wires).

⇒ NOTE:

For each input, one lead should be connected to input-common and the other lead should be connected to the appropriate alarm indication.

⇒ NOTE:

For each output, one lead should be connected to output-common and the other lead should be connected to the appropriate alarm indication.

⇒ NOTE:

To input the external minor (MN) alarm or power minor (PMNT- IN) alarm, one lead should be connected to the appropriate external alarm source and an external ground should be connected to output common.

Final Operations

Procedure

1. Verify that all the cables are properly dressed see Figure 2-14 on page 2-41.
2. Verify that all cables are properly labeled.

3. Verify that the proper protection designation option label has been placed on the front of the wideband shelf.
4. Verify that designations where cables were wire-wrapped are properly labeled.
5. Verify that any DSX jacks that are to be used for the output from the BBF6 T1EXT circuit pack are properly labeled.

Table 2-1. DS1 Cable Assemblies

Description	ED-8C762-20 Group (Note 1)	Cable Length (ft.)	Cable Type (Notes 2&3)	FiberReach Backplane Connections (Note 4)
DS1 26-Gauge Wire Application	G1	75	1249C	J50 - J53
	G2	100		
	G3	150		
	G4 (D.A.)*	30 to 655		
	G5	350		
DS1 22-Gauge Wire Application	G6	75	607C and 608C	
	G7	100		
	G8	150		
	G9 (D.A.)*	30 to 450		
	G10	350		

Table 2-1 Notes:

- * Discontinued Availability. G4 replaced by G5 and G9 replaced by G10
- 1. Each group listed includes all the DS1 cables for 28 DS1s.
- 2. 607C and 608C type cable is 22 gauge (maximum length is 655 feet).
- 3. 1249C type cable is 26 gauge (maximum length is 450 feet).
- 4. Cables are terminated in KS23146, L84 connectors at the DDM-2000 FiberReach end and unterminated at the other end for wire-wrap installation.

Table 2-2. DS3 Cable Assemblies

Cable and Description	Qty*	Group (Note 1)	Cable Length (ft.)	Cable Type (Notes 2&3)	Connector Types	FiberReach Backplane Connections (Note 4)	
ED8C900-20 DS3 735A Cable Application	2	G3, F/E AA,LA	150	735A	Straight BNC to BNC	J33 & J34	
		G3, F/E AC, LA	150	735A	Straight BNC to Right Angle BNC		
		G3, F/E AE, LA	150	735A	9821AF DACS IV (DS3 OUT) 2X4 to Right Angle BNC		
ED8C900-20 DS3 735D Cable Application	2	G301-G347, F/E DA, 1LA	75' to 900'	735D	Straight BNC to BNC		
		G301-G347, F/E DA, LCD	75' to 900'	735D	Straight BNC to dangler 9821AE		
	1	G301-G347, F/E DA, LDD	75' to 900'	735D	Straight BNC to dangler 9821FA		
	1	G301-G347, F/E DA, LED	75' to 900'	735D	Straight BNC to dangler 9821EA		
ED8C724-21 DS3 Front Access Dangler Kits	1	G453 [†]	2' 5"		Straight BNC to Right Angle BNC		
	1	G454 [†]	2' 7"				
	OR:						
	1	G413 [†]	2' 11"				
ED8C724-22 DS3 Cables for BBG19	1	G37	150	735A	Straight BNC to Right Angle BNC		
	1	G38 (D.A.) [‡]	250	735A			
	1	G74	250	735A			

Table 2-2 Notes:

* Per Unit

[†] One group 413 may be used to replace using one each of G453 and G454.

[‡] Discontinued Availability. G38 replaced by G74

Table 2-3. Telemetry Cable Assemblies

Description	ED-8C762-20 Group	Cable Length (ft.) (Notes 1)	Cable Type	DDM-2000 Backplane Connections
TBOS Serial Telemetry Direct Connection to an Acorn TBOS Processor	20	75 ft.	812AS	J21
	21	150 ft.		
	22 (D.A.)*	As Reqd.		
	44	250		
TBOS Serial Telemetry*	23	150 ft.	812AS	J21
	24(D.A.)*	As Reqd.		
	45	250		
Misc. (Env.) Discrete Telemetry 1 per Shelf	27	75 ft.	807AS	J42
	28	150 ft.		
	29 (D.A.)*	As Reqd.		
	46	250		

Table 2-3 Notes:

* Discontinued Availability, G22 replaced by G44, G24 replaced by G45, and G29 replaced by G46.

1. All cables are 26 gauge.

Table 2-4. Power and Alarm Assemblies

Description	ED-8C762-20 Group	Cable Length (Note 1)	Cable Type	DDM-2000 Backplane Connections
Office Alarm Interface Cable	11	75 ft.	816AS*	J41
	12	150 ft.		
	13 (D.A.)*	As Reqd.		
	14	250		
FiberReach Shelf Power Cable	ED-8C852-20 Group 13	2 ft.	12GA	J23
Power Cable for Single Shelf	40	15 ft.	12GA	P3, P4

Table 2-4 Notes:

* Discontinued Availability

1. The 816A type cable is 26 gauge.

Table 2-5. DS1 Transmission Connections

Low Speed Slots	ChanD S1	Chan HDSL	T/R Term		607C & 608C (22Gauge) T/R Color		1249C (26Gauge)T/R Color		Backplane Conn.	
			Tip	Ring	Tip	Ring	Tip	Ring	Out	In
LS-A-1	1 (1)	1	20	1	W-BL	BL-W	W	BL	J50	J51
	2 (2)	2	21	2	W-O	O-W	W	O		
	3 (3)		22	3	W-G	G-W	W	G		
	4 (4)		23	4	W-BR	BR-W	W	BR		
LS-B-1	1 (5)	1	24	5	W-S	S-W	W	S		
	2 (6)	2	25	6	R-BL	BL-R	R	BL		
	3 (7)		26	7	R-O	O-R	R	O		
	4 (8)		27	8	R-G	G-R	R	G		
LS-C-1	1 (9)	1	28	9	R-BR	BR-R	R	BR		
	2 (10)	2	29	10	R-S	S-R	R	S		
	3 (11)		30	11	BK-BL	BL-BK	BK	BL		
	4 (12)		31	12	BK-O	O-BK	BK	O		
LS-D-1	1 (13)	1	32	13	BK-G	G-BK	BK	G		
	2 (14)	2	33	14	BK-BR	BR-BK	BK	BR		
	3 (15)		34	15	BK-S	S-BK	BK	S		
	4 (16)		35	16	Y-BL	BL-Y	Y	BL		
LS-A-2	1 (17)	1	20	1	W-BL	BL-W	W	BL	J52	J53
	2 (18)	2	21	2	W-O	O-W	W	O		
	3 (19)		22	3	W-G	G-W	W	G		
	4 (20)		23	4	W-BR	BR-W	W	BR		
LS-B-2	1 (21)	1	24	5	W-BL	S-W	W	S		
	2 (22)	2	25	6	R-BL	BL-R	R	BL		
	3 (23)		26	7	R-O	O-R	R	O		
	4 (24)		27	8	R-G	G-R	R	G		
LS-C-2	1 (25)	1	28	9	R-BR	BR-R	R	BR		
	2 (26)	2	29	10	R-S	S-R	R	S		
	3 (27)		30	11	BK-BL	BL-BK	BK	BL		
	4 (28)		31	12	BK-O	O-BK	BK	O		

Table 2-6. Power Connections

Name	Designation	Conn.	Term	Color
GND	GND	J23	1	
-48 V (A) RTN (A)	-48VA -48RTNA		3 5	R BK
-48 V (B) RTN (B)	-48VB -48RTNB		7 9	S S-BK
-48 V (BB) RTN (BB)	-48VBB -48RTNBB (Note 1)		11 13	G W

Table 2-6 Notes:

1. The power feed labeled -48VBB and RTNBB on the DDM-2000 Fiber-Reach shelf bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an in-service replacement or upgrade of the ECC1 (USRPNL). When connectors P3 and P4 are powered connector P5 will also be live. Connector P5 should be dressed to the bay in such a way as to prevent a short from occurring.

Table 2-7. Office Alarm Connections

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J41	1	W-BL
Minor Alarm Visible Return	MNVR		14	BL-W
Minor Alarm Audible	MN		2	W-O
Minor Alarm Audible Return	MNR		15	O-W
Major Alarm Visible	MJV		3	W-G
Major Alarm Visible Return	MJVR		16	G-W
Major Alarm Audible	MJ		4	W-BR
Major Alarm Audible Return	MJR		17	BR-W
Critical Alarm Visible	CRV		5	W-S
Critical Alarm Visible Return	CRVR		18	S-W
Critical Alarm Audible	CR		6	R-BL
Critical Alarm Audible Return	CRR		19	BL-R

Table 2-7 Notes:

1. The office alarm cable is 26 gauge.

Table 2-8. TBOS Serial Telemetry Connections

Name	Desig.	Conn.	Term	Color
Transmitted True Data to Telem. Equip.	TDP	J21	2	W-O
Transmitted Inverted Data to Telem. Equip.	TDN		7	O-W
Received True Data to Telem. Equip	RDP		1	W-BL
Received Inverted Data to Telem. Equip.	RDN		6	BL-W

Table 2-8 Notes:

1.The TBOS telemetry cable is 26 gauge.

Table 2-9. Miscellaneous (Environmental) Telemetry Connections

Name	Desig.	Term	Color	Conn.
Power Minor Alarm	PMNT-IN	18	W-S	J42
Fan Control	FAN-CTL	23	R-S	
Input-Common	TLMI-C	9	BR-R	
Env. Input - #1	TLMI-1	17	W-BR	
Env. Input - #2	TLMI-2	15	W-O	
Env. Input - #3	TLMI-3	13	G-BK	
Env. Input - #4	TLMI-4	11	BL-BK	
Env. Input - #5	TLMI-5	7	O-R	
Env. Input - #6	TLMI-6	5	S-W	
Env. Input - #7	TLMI-7	3	G-W	
Env. Input - #8	TLMI-8	1	BL-W	
Env. Input - #9	TLMI-9	16	W-G	
Env. Input - #10	TLMI-10	14	W-BL	
Env. Input - #11	TLMI-11	12	O-BK	
Env. Input - #12	TLMI-12	10	S-R	
Env. Input - #13	TLMI-13	8	G-R	
Env. Input - #14	TLMI-14	6	BL-R	
Env. Input - #15	TLMI-15	2	OW	
Output - Common	TLMO-C	21	R-G	
Env. Output - #1	TLMO-1	19	R-BL	
Env. Output - #2	TLMO-2	24	BK-BL	
Env. Output - #3	TLMO-3	22	R-BR	
Env. Output - #4	TLMO-4	20	R-O	
No Connection	NC	25	BK-O	

Table 2-9 Notes:

1. The designation "NC" means no connection.
2. Inputs to the minor alarm and power minor alarm connections are normally derived from the -48 volt alarm outputs of a *SLC*® Series 5 Carrier System power shelf. An external ground must be connected to output-common to access the alarm. Refer to Figure 2-15 on page 2-42.
3. The external inputs to the miscellaneous (environmental) discrettes is a contact closure and is connected to the DDM-2000 by two leads (wires). For each of the miscellaneous (environmental) inputs 1 through 14 that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-X). Refer to Figure 2-15 on page 2-42.

4. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation.
5. The miscellaneous (environmental) discrete telemetry cable is 26 ga.

Table 2-10. Universal Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Connection	Comcode	Connector Type	Label Color
0 dB	A3060	SM-SM	106708951	SC	
5 dB	A3060B1	SM-SM	107406142	SC	
10 dB	A3060D1	SM-SM	107406159	SC	
15 dB	A3060F1	SM-SM	107406167	SC	
0 dB	A3070	SM-SM	106795354	ST [®]	
5 dB	A3070B1	SM-SM	107406183	ST [®]	
10 dB	A3070D1	SM-SM	107406191	ST [®]	
15 dB	A3070F1	SM-SM	107406209	ST [®]	
0 dB	A3080	SM-SM	106795404	FC	
5 dB	A3080B1	SM-SM	107406225	FC	
10 dB	A3080D1	SM-SM	107406233	FC	
15 dB	A3080F1	SM-SM	107406241	FC	Red
5 dB	A3060B	MM-MM	106795271	SC	Blue
10 dB	A3060D	MM-MM	106795289	SC	Blue
15 dB	A3060F	MM-MM	106795297	SC	Blue
5 dB	A3070B	MM-MM	106795313	ST [®]	White
10 dB	A3070D	MM-MM	106795321	ST [®]	White
15 dB	A3070F	MM-MM	106795339	ST [®]	White

⇒ NOTE:
Do **NOT** put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

⇒ NOTE:
A 15 db LBO is required to loop the 26G-U/26G2-U OLIU back on itself.

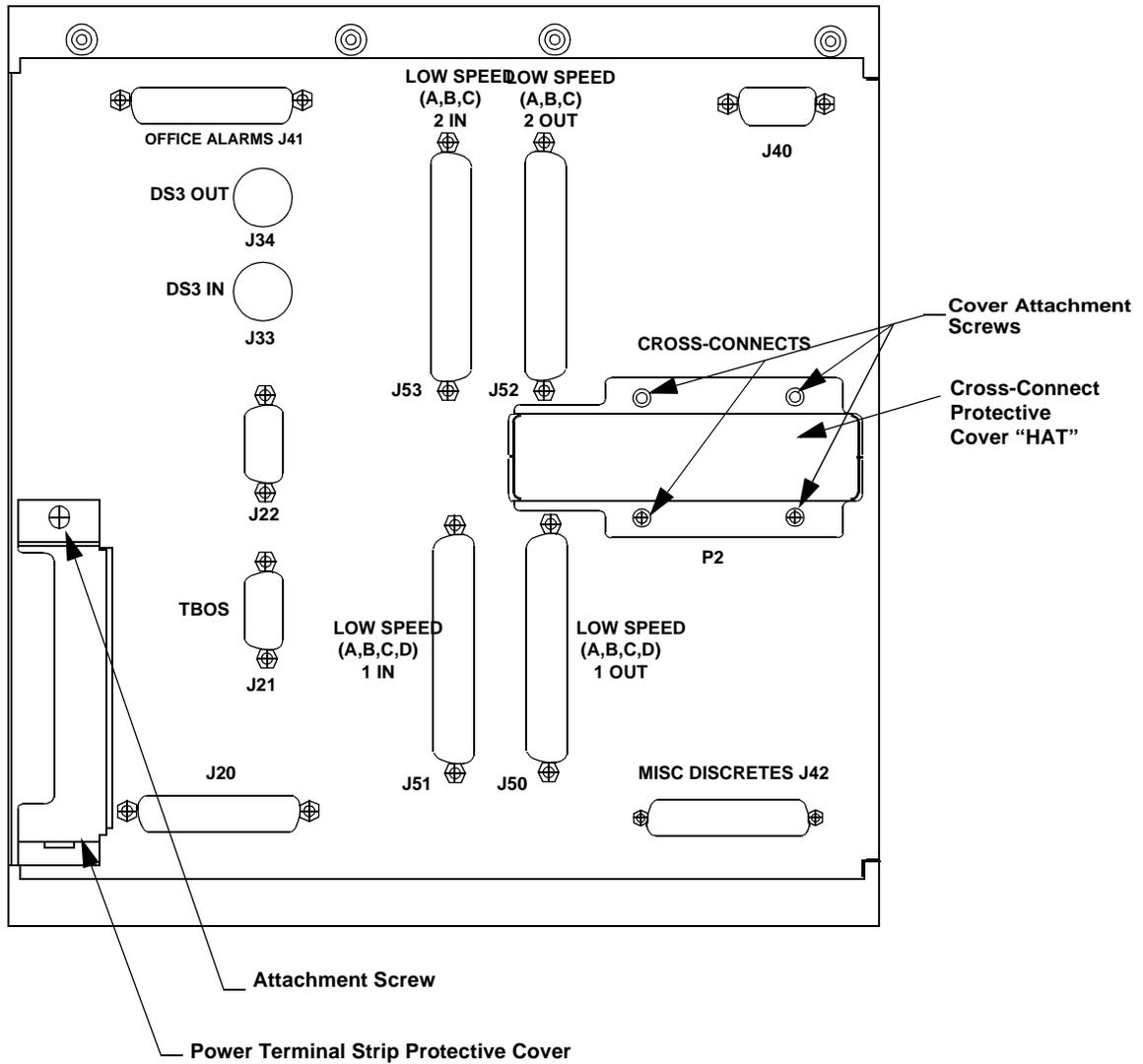


Figure 2-1. DDM-2000 FiberReach Backplane

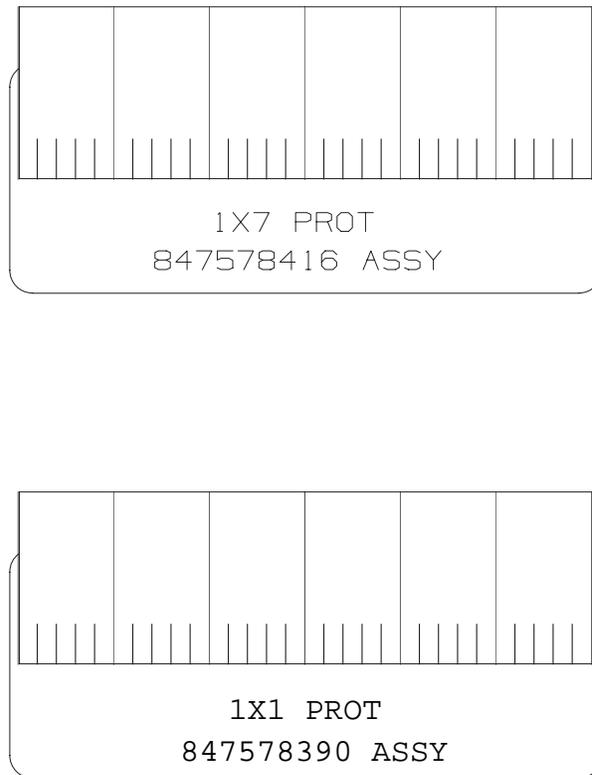


Figure 2-2. Wideband Shelf 1x7 and 1x1 Protection Assemblies

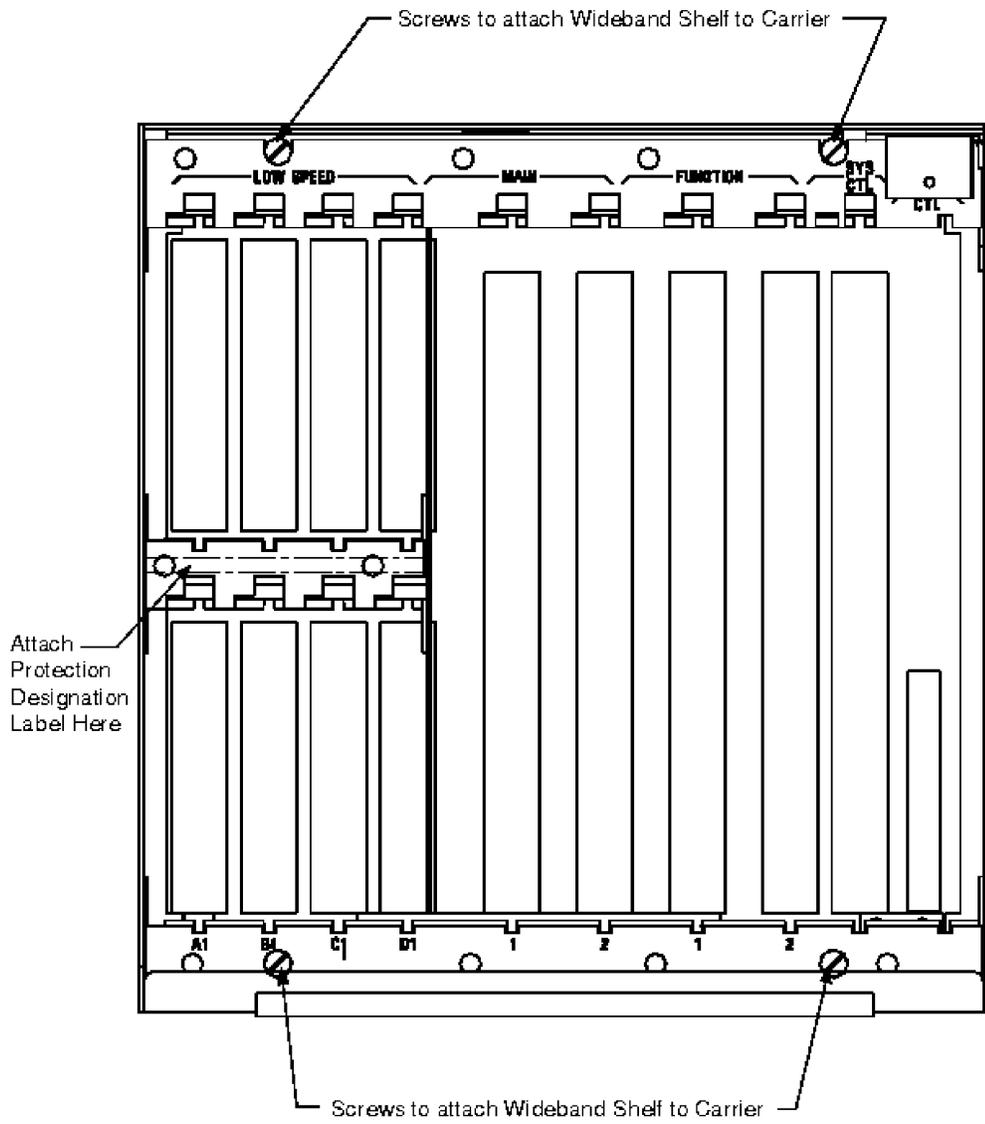


Figure 2-3. DDM-2000 FiberReach Wideband Shelf Front View

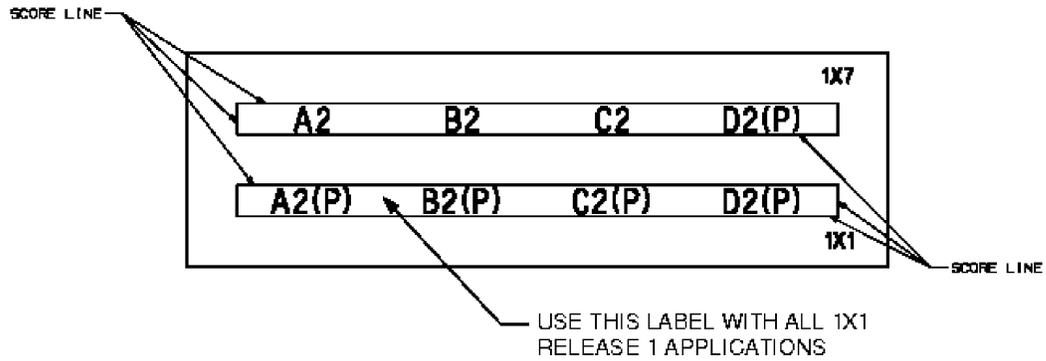
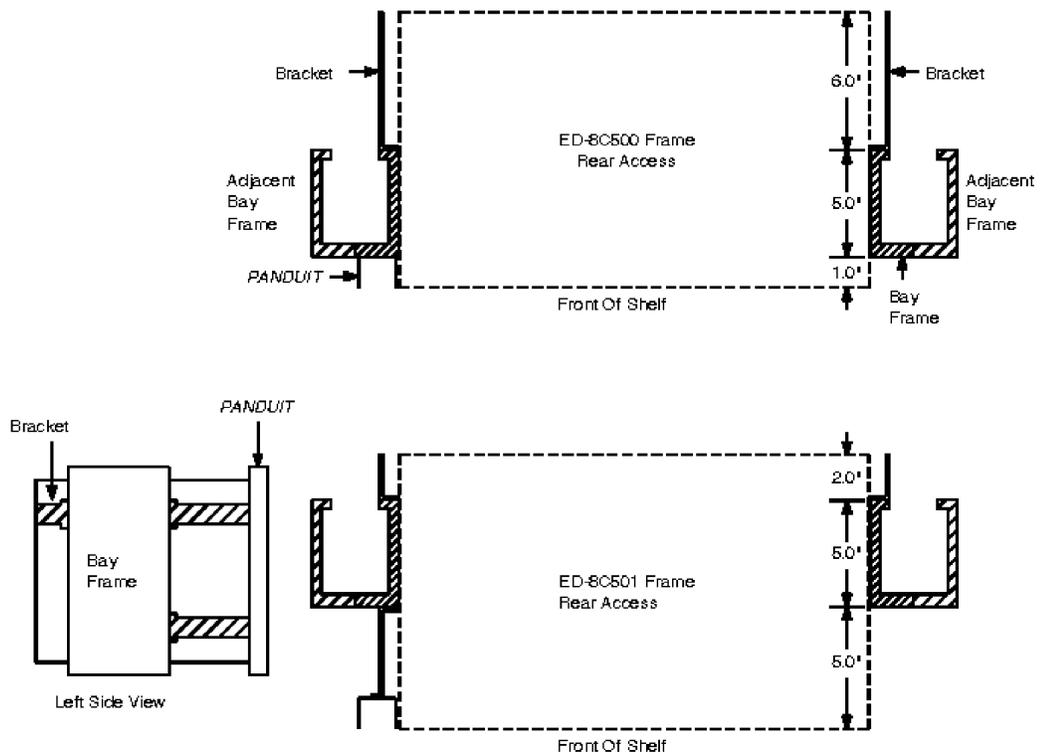


Figure 2-4. Protection Option Designation Label



Note: Two brackets required per shelf to hold the *PANDUIT** cable channel for the fibers in place.

Figure 2-5. DDM-2000 FiberReach Shelf Carrier Mounting (Top View)

* Registered Trademark of Panduit Corporation.

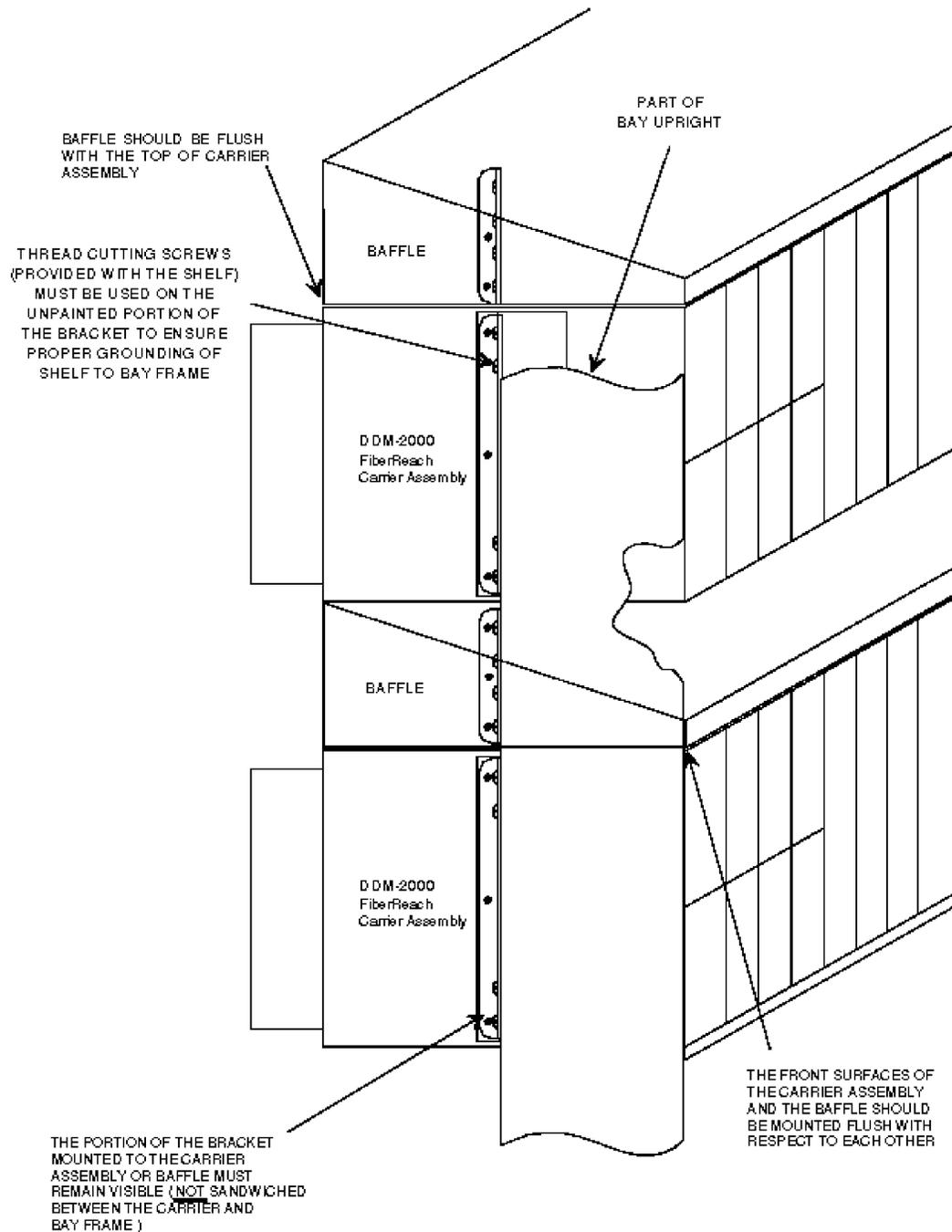


Figure 2-6. Side Mounting Bracket Positions

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See Notice on first page

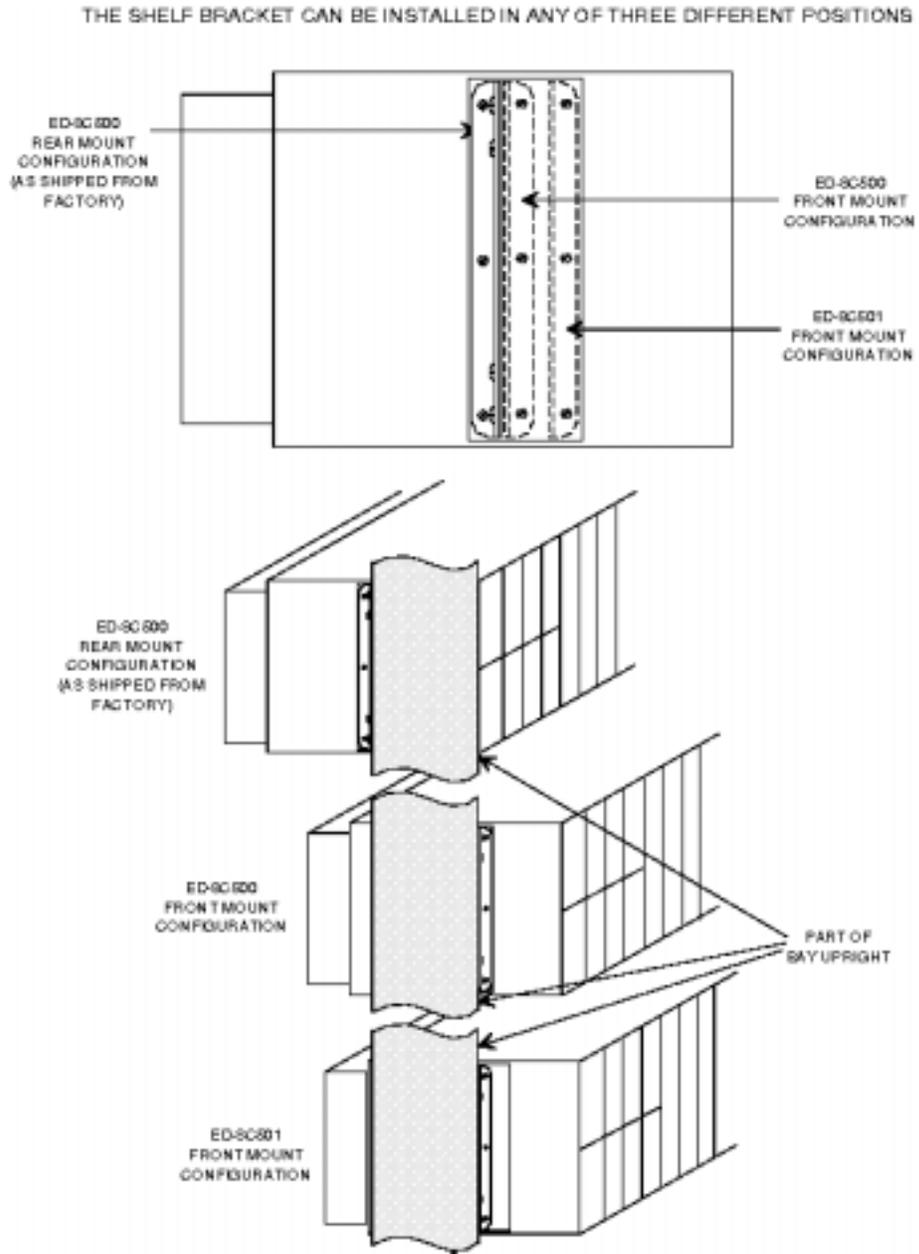


Figure 2-6. Side Mounting Bracket Positions (Continued)

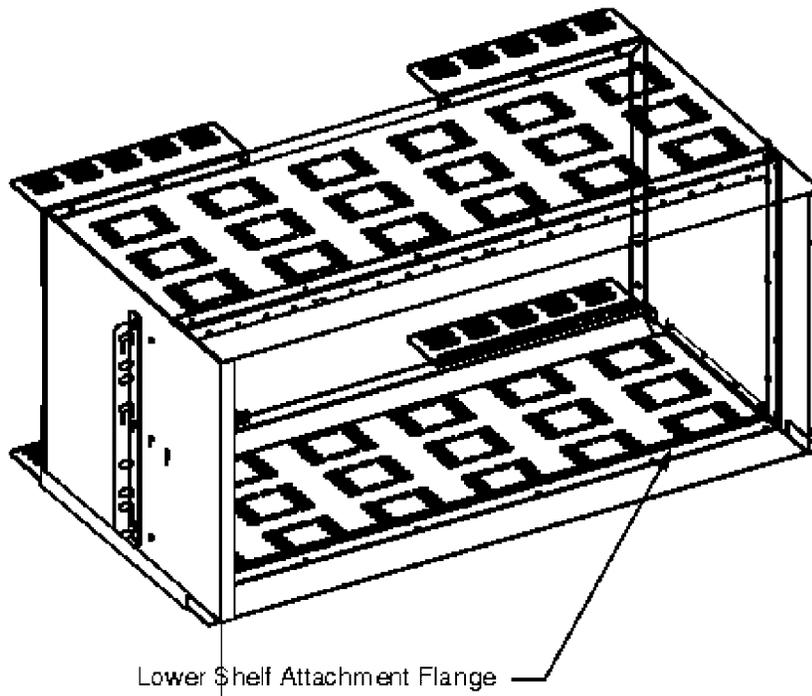


Figure A. Carrier Assembly in 3D

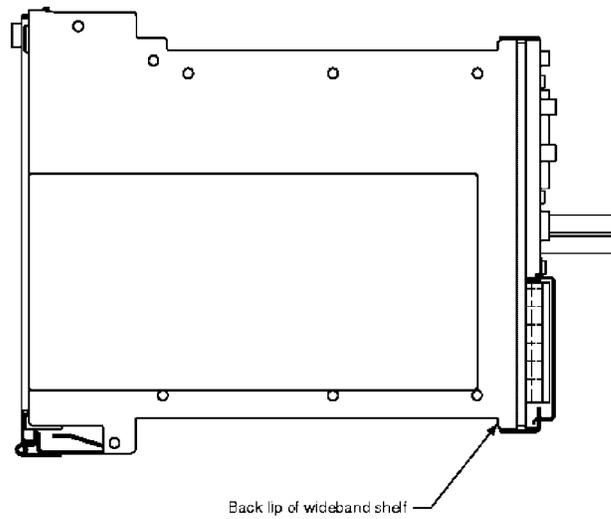
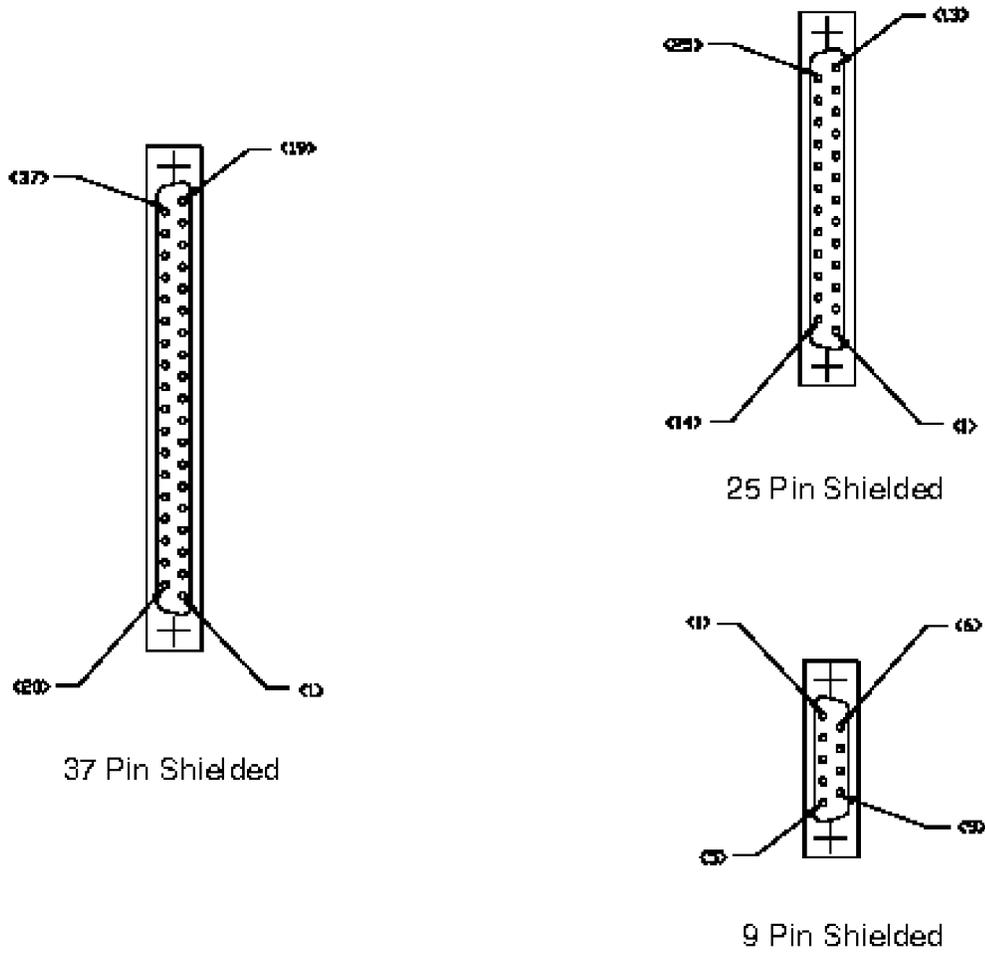


Figure B. Side View of Wideband Shelf Assembly

Figure 2-7. Carrier and Wideband Shelf Assembly

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See Notice on first page



Note: Terminals are numbered by looking at the connector from the wiring side.

Figure 2-8. Connector Pinouts

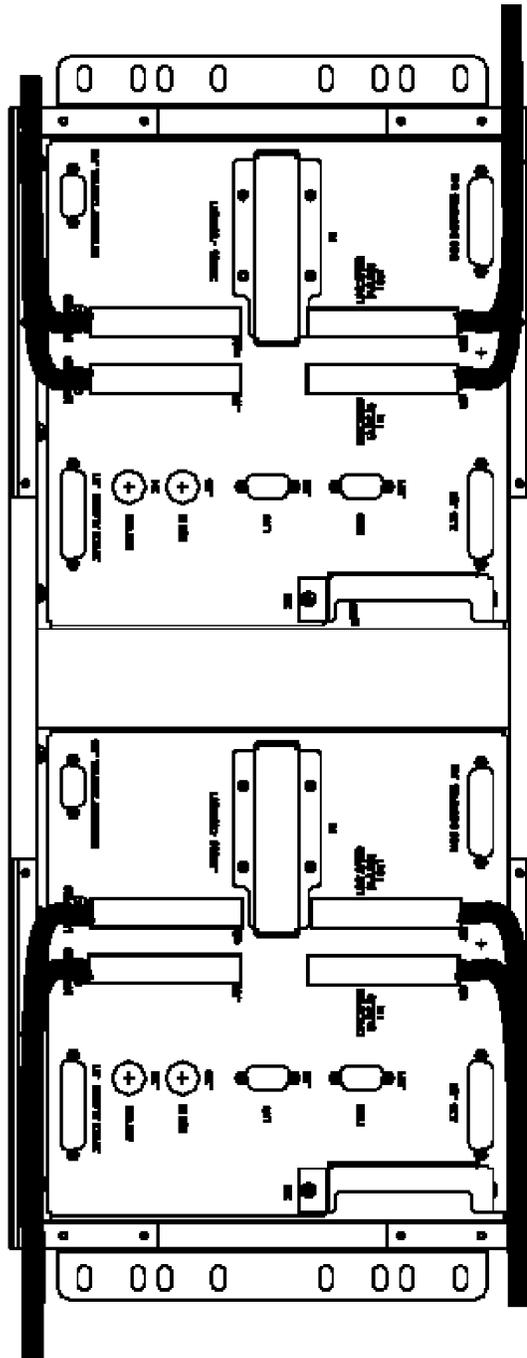


Figure 2-9. DS1 Cable Dressing for Both Right and Left Mounting in Carrier

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See Notice on first page

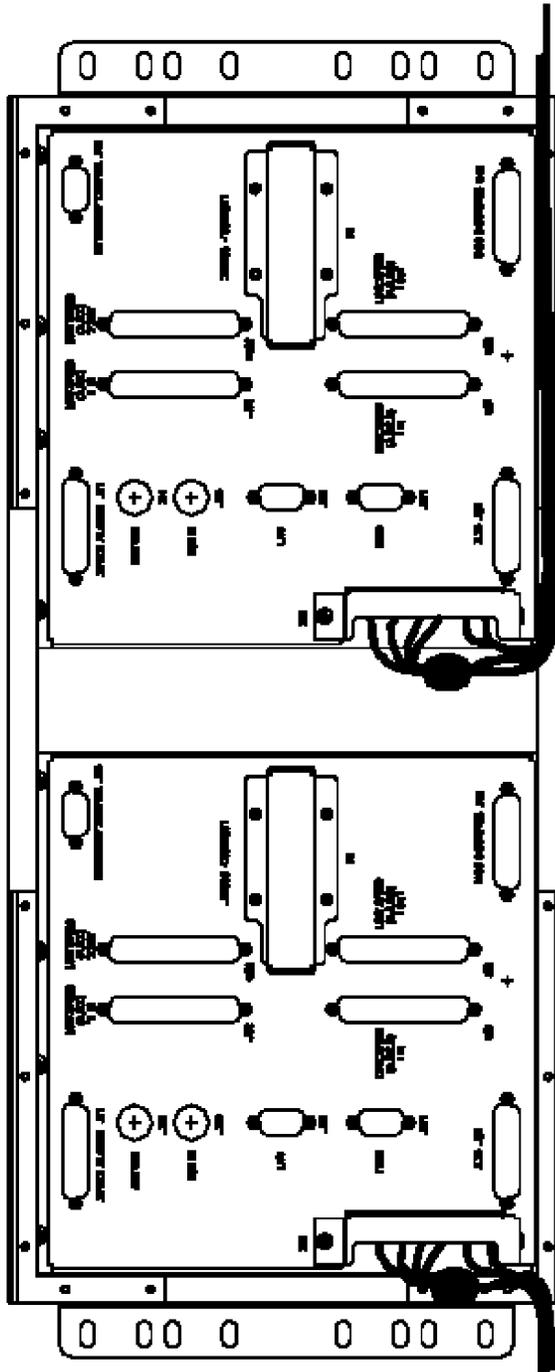


Figure 2-10. Power Cable Dressing for Both Right and Left Mounting in Carrier

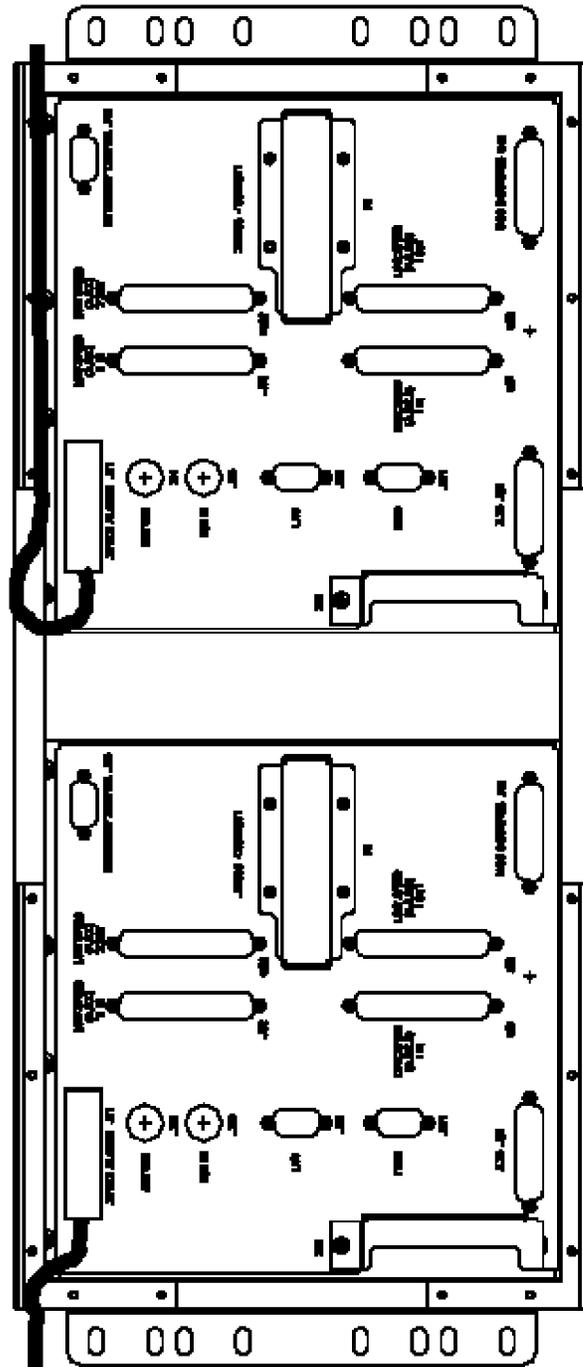


Figure 2-11. Office Alarm Cable for Both Right and Left Mounting in Carrier

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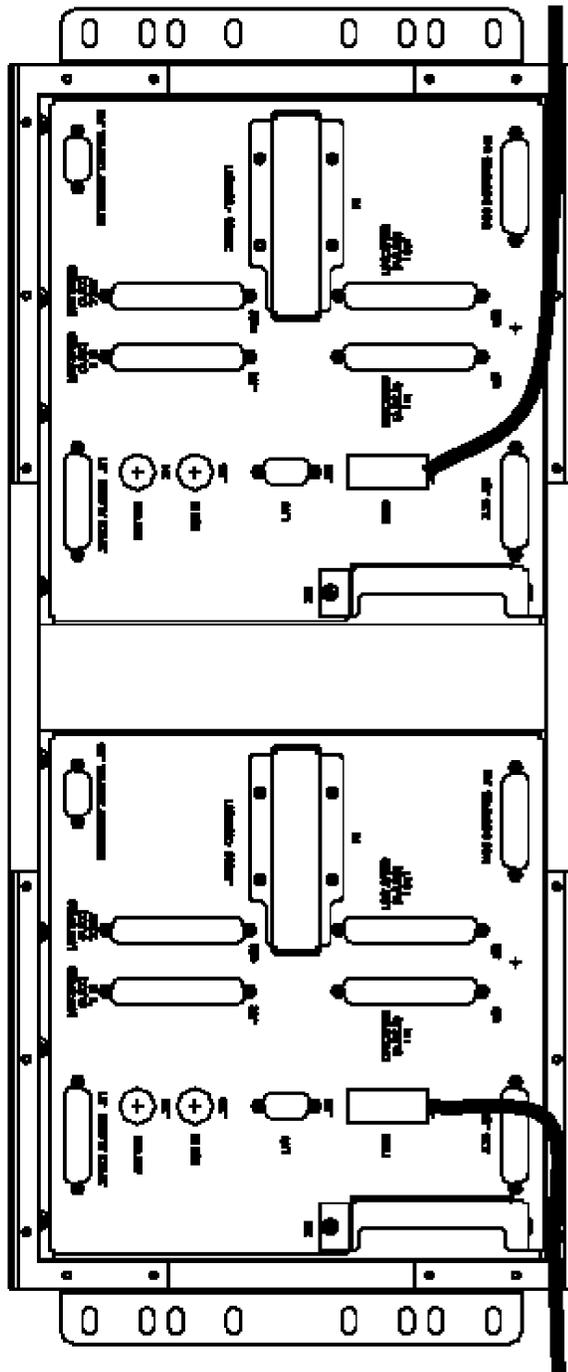


Figure 2-12. TBOS Cable Dressing for Both Right and Left Mounting in Carrier

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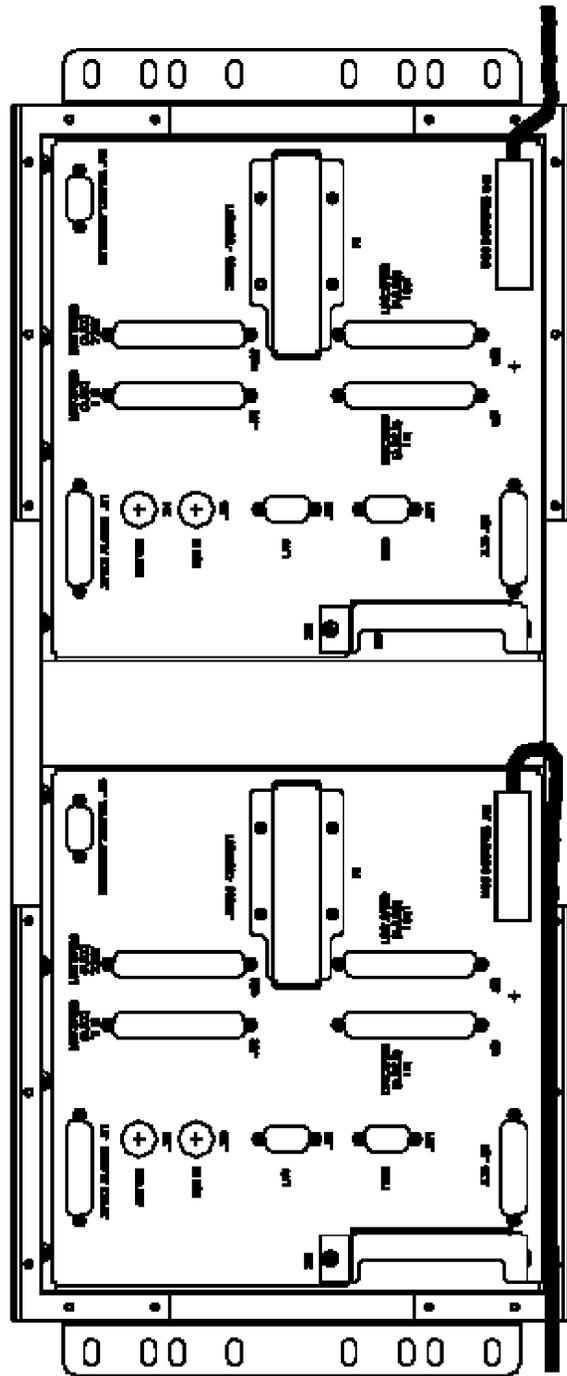


Figure 2-13. Misc. Discretes Cable Dressing for Both Mountings in Carrier

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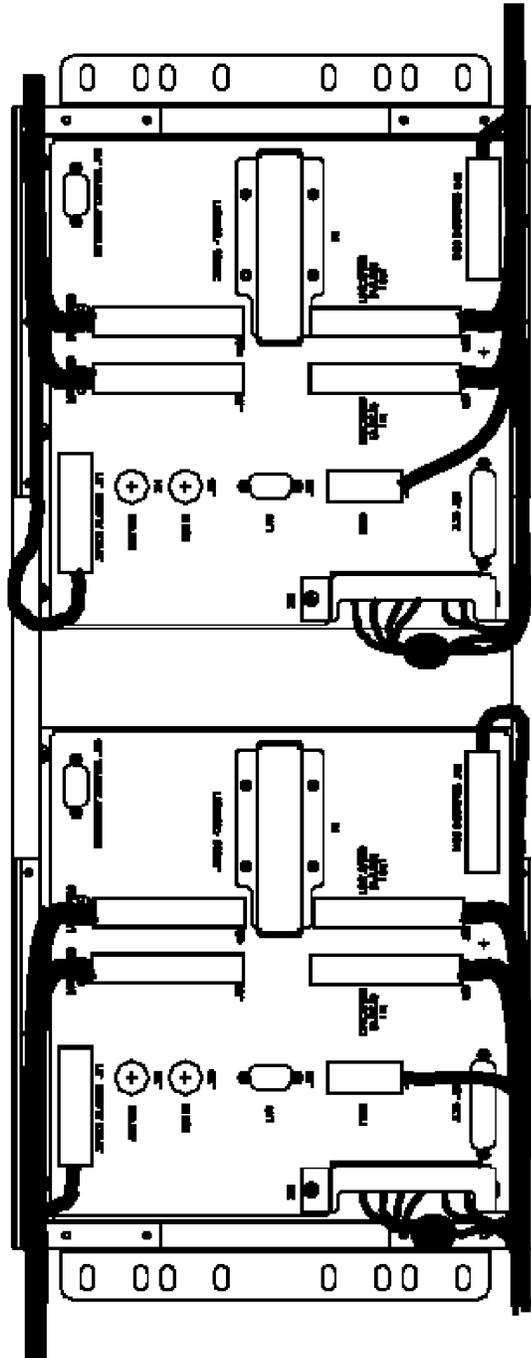
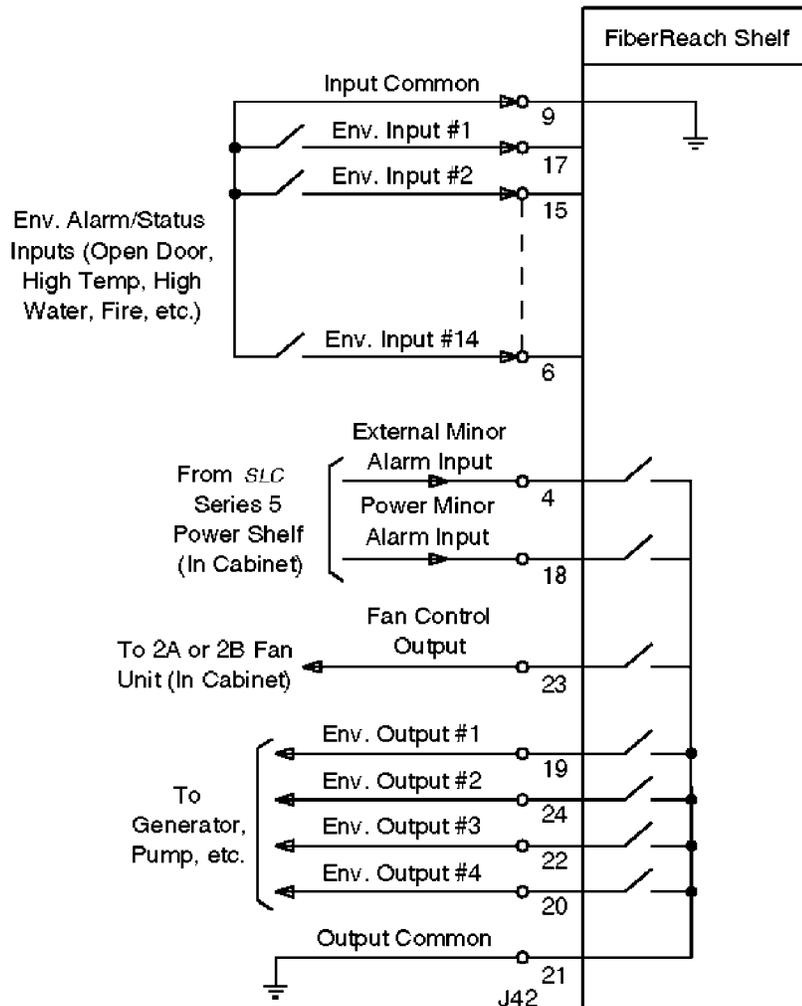


Figure 2-14. Cable Dressing for Both Right and Left Mounting in Carrier

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Notes:

1. Miscellaneous (environmental) alarm input #1 is typically wired to the open door alarm in Lucent Technologies cabinet configurations.
2. Miscellaneous (environmental) alarm input #14 is typically wired to a fan shelf alarm in non-NEBs environment (noncabinet where air inlet temperature exceeds 50 degrees C) applications where the fan shelf is required.
3. The output common must be wired to an external ground for fan control, external minor and power minor alarm inputs, and for miscellaneous (environmental) discrete outputs #1-4.

Figure 2-15. Remote Terminal Miscellaneous (Environmental) Discrete Functions

Lucent Technologies - Proprietary
See Notice on first page

Wall Distant Terminal Installation

3

Contents

Overview	3-1
-----------------	------------

Description	3-1
--------------------	------------

■ Tools, Test Sets, and Accessories	3-2
■ Planning	3-3
■ Equipment Installation Considerations	3-4

Inspection	3-5
-------------------	------------

■ Description	3-5
■ Procedure	3-5

DS1 Protection Option Plug Installation	3-6
--	------------

■ Description	3-6
■ Procedure	3-6
■ Protection Option Label Installation	3-6

Equipment Installation	3-7
■ Description	3-7
■ Procedure for Mounting Wall DT Bracket on 3/4 in. Plywood	3-7
■ Procedure for Installing FiberReach Wall DT Assembly in the Mounting Bracket	3-8
■ Procedure for Installing FiberReach Wideband Shelf in the Wall DT Assembly	3-8

DS1 Cabling - Wall DT	3-9
■ Description	3-9
■ Procedure	3-9

DS3 Cabling - Wall DT	3-10
■ Description	3-10
■ Procedure	3-10

Optical Fiber Cabling - Wall DT	3-11
■ Description	3-11
■ Procedure No LGX in Wall DT	3-12
■ Procedure LGX in Wall DT	3-12

Power Cabling — Wall DT using 1145B1 Power Supply	3-13
■ Description	3-13
■ Procedure	3-14

Power Cabling — Wall DT Miscellaneously Powered	3-15
■ Description	3-15
■ Procedure	3-15

Office Alarm Cabling - Wall DT **3-16**

- Description 3-16
- Procedure 3-16

TBOS Telemetry Cabling - Wall DT **3-17**

- Description 3-17
- Procedure 3-18

Miscellaneous Discrete Telemetry Cabling — Wall DT **3-18**

- Description 3-18
- Procedure 3-19

Final Operations **3-20**

- Procedure 3-20

Wall Distant Terminal Installation

3

Overview

This section provides the information for the Wall Distant Terminal (Wall DT) installation and covers the installation information for the shelf, power connection, and grounding.

This installation manual contains the latest cable information at the time of issue. For up-to-date information, refer to the ED cable drawings listed in the "About This Document" section. For miscellaneous equipment information, refer to "Miscellaneous Equipment" in the section "Introduction".

Description

This section should be performed on all Wall DT installations. Observe the following notes:

-  **NOTE:**
This section requires previous installation of a 1' x 2' (Minimum Wall DT only) of 3/4" plywood mounted on the site wall in accordance with all local codes. The plywood should be mounted to support a weight of 62 lbs (28.12 kg) Wall DT only.

-  **NOTE:**
If the 1145B1 power supply is being used see the installation instruction manual Comcode 847548203 for mounting of the 1145B1 power supply.

-  **NOTE:**
It is recommended that ONLY designated Lucent Technologies cables be used.

⇒ **NOTE:**
Circuit packs must not be installed at this time.

⇒ **NOTE:**
The locations of all backplane plugs and jacks are shown in Figure 3-1 on page 3-32.

⇒ **NOTE:**
Cable assembly options are listed in Table 3-2 on page 3-21 through Table 3-6 on page 3-24. Connector pinouts are provided in Figure 3-9 on page 3-40.

Tools, Test Sets, and Accessories

The following tools are required:

Quantity	Description
1	Soldering Iron
1	Wrist Strap*
1	Wire-Wrap Gun†
1	Ohmmeter‡
	Screwdriver(s)**
1	Electric Drill††

Notes:

* A wrist strap must be worn when touching the DDM-2000 FiberReach backplane and when connecting cables. Use an available electrostatic discharge jack.

† A wire wrap gun is required to make connections on the optional alarm, telemetry cables, and to the ED8C783-30 T1EXT Lightning and Surge Protection Assembly. The wire wrap gun must be able to accommodate 22 or 26 gauge wire.

‡ An ohmmeter is required to verify that the DDM-2000 FiberReach is properly grounded.

** A screwdriver with the appropriate head(s) is required for mounting the shelf; for removing the rear protection option cover and for connecting optional cables to the backplane.

†† An electric drill with appropriate bit(s) is required for predrilling the 3/4" plywood for attaching the mounting bracket.

The following accessories will be required if the LGX panel is provided:

Quantity	Description	Comcode
4-8*	Universal Buildout Block ST A3002†	106709140
4-8*	Universal Buildouts ST, FC, SC	Table 3-12 on page 3-30
4-8*	2 ft. fiber jumpers with appropriate connectors	Table 3-13 on page 3-31
1	12A1 Clamp‡	104384490
1	Mechanical Splice Kit for Lightwave Fiber†	105289656
1	Fusion Splice Kit for Lightwave Fiber†	105289664

* Four each are required for each FiberReach Wideband shelf

† Has ST connector on one side and accepts any Universal buildout on the other.

‡ Maybe required if terminating outside plant cable. Experienced installer required.

Planning

The DDM-2000 FiberReach Wall DT has the following mounting requirements:

- The installation of a 1' x 2' (Minimum Wall DT only) piece of 3/4" plywood mounted on the site wall in accordance with all local codes. The plywood should be mounted to support a weight of 62 lbs (28.12 kg) Wall DT only.
- If the 1145B1 power supply is being used see the installation instruction manual Comcode 847548203 for mounting of the 1145B1 power supply.
- If the T1EXT Lighting and Surge Protection Assembly is being used in conjunction with the Wall DT the customer must provide the miscellaneous wall mounting for the assembly.

Equipment Installation Considerations

The information in this part is of a general nature.

The equipment listed below has the following dimensions in inches:

Table 3-1. Equipment Installation Considerations

Equipment Code or Commercial Code	Description	Height	Width	Depth	Weight
107659211	1145B1 Power Supply W/8.0 AH Battery for Wall Mount*	17.5"	17"	8"	39 lbs
ED-8C843-31	DDM-2000 FiberReach Wall DT no top mount DSX (In service position)	9.75" Note 1	23.25"	13.5"	62 lbs
ED-8C843-31	DDM-2000 FiberReach Wall DT with top mount DSX (In service position)	14.0" Note 1	23.25"	13.5"	62 lbs
ED-8C783-30, G2	T1EXT Lighting and Surge Protection Assembly (Note 2)	5.0"	23.0"	5.75"	

Table 3-1 Notes:

* See BC94-019EPS for up to date information.

1. An additional 5 inches of clearance is required top and bottom to allow the Wall DT to rotate. In addition to the top clearance required for rotation another 10 inches min. is required on the top equipment access (15 inches total on top) see Figure 3-6 on page 3-37.
2. If the T1EXT Lighting and Surge Protection Assembly is being used in conjunction with the Wall DT the customer must provide the miscellaneous wall mounting for the assembly.

Inspection

Description

Perform the following procedure before the DDM-2000 FiberReach Wall DT installation or cable installation.

Procedure

1. Verify that the plywood onto which the DDM-2000 FiberReach Wall DT will be mounted is properly attached to the wall. Make sure that enough clearance has been provided to allow for access and rotation above and below the bracket, see Figure 3-6 on page 3-37.



NOTE:

Each DDM-2000 FiberReach Wall DT comes equipped with an installation kit, in two bags. One bag is attached to the Carrier Assembly containing the hardware required for mounting and the key. The second bag is inside the Wideband Shelf and contains the protection assemblies. The installation kit for the DDM-2000 FiberReach Wall DT has the following:

Quantity	Description
8	Round Head Wood Screws (C 801606435)
4	12-24 x 3/8 Slotted Screw (C 901229922)
1	Key No. 4 Size Toolhead (C 406470005)
1	1x1 Protection Option Plug (C 847578390)
1	1x7 Protection Option Plug (C 847578416)
1	Protection Designation Label (C 847582376)
1	Instruction Card (C 847578424)

2. Remove the front cover from the DDM-2000 FiberReach shelf.



NOTE:

The cover must be installed later to assure compliance with electromagnetic induction requirements.

3. Inspect the DDM-2000 FiberReach shelf for visible damage.

DS1 Protection Option Plug Installation

Description

The FiberReach Wideband shelf will support to DS1 protection options of 1x1 or 1x7. These options are set by installing an option plug on the backplane. Release R1 of the FiberReach software only supports the 1x1 option. FiberReach software releases 2 and later support either the 1x1 or the 1x7 option. This procedure describes how to install the DS1 protection option plug on the backplane of the FiberReach Wideband shelf.



NOTE:

When the FiberReach Wideband Shelf is configured in the 1x1 protection mode remove the DS1 cables to J52 and J53 (if they are present, two DSXs in the Wall DT) they are not required and may cause transmission problems.

Procedure

1. Place the FiberReach Wideband shelf or the FiberReach Wideband shelf and Carrier Assembly face down on a clean work surface.
2. Locate the hat covering the optioning plug connector on the FiberReach backplane see Figure 3-1 on page 3-32.
3. Remove the four screws holding the hat to the backplane cover and remove the hat.
4. Select the DS1 option plug that is required either the 1x1 (847578390) or the 1x7 (847578416) see Figure 3-2 on page 3-33.
5. Carefully install the DS1 optioning plug selected above into the connector on the backplane. The connector is keyed and will only allow insertion one way.



NOTE:

The printed wiring board side of the optioning plug faces towards the top of the FiberReach shelf.

6. Replace the metal hat over the optioning plug and screw it down to the backplane cover.
7. If a second FiberReach Wideband shelf is installed in the Carrier Assembly repeat the procedure from step 2.

Protection Option Label Installation

1. Place the FiberReach Wideband shelf or the FiberReach Wideband shelf and Carrier Assembly face up on a clean work surface.

2. Select the protection designation option label to match the option plug installed above see Figure 3-4 on page 3-35.
3. Carefully peel the label off and place it on the front of the wideband shelf where shown in Figure 3-3 on page 3-34.
4. If a second FiberReach Wideband shelf is installed in the Carrier Assembly repeat the procedure from step 2.

Equipment Installation

Description

This procedure describes how to install the FiberReach Wall DT.

Procedure for Mounting Wall DT Bracket on 3/4 in. Plywood

1. Using the Wall DT mounting bracket as a template mark all eight mounting holes on the 3/4 in. plywood. Make sure that enough clearance has been provided to allow for access and rotation above and below the bracket, see Figure 3-6 on page 3-37.
2. Using a 1/16 in. drill bit, drill a pilot hole at each of the eight mounting screw positions.
3. Using the eight wood screws provided attach the Wall DT mounting bracket to the 3/4 in. plywood. Make sure the slots in the side of the mounting bracket are oriented as shown in Figure 3-5 on page 3-36.



NOTE:

All eight wood screws must be used to provide secure attachment to the 3/4 in. plywood.



NOTE:

The slots on the side of the Wall DT mounting bracket must be oriented as shown in Figure 3-5 on page 3-36 for proper operation.

Procedure for Installing FiberReach Wall DT Assembly in the Mounting Bracket

1. Lift the Wall DT Assembly from the front and align the pivot points on both sides of the Wall DT Assembly with the slots on either side of the mounting bracket see Figure 3-5 on page 3-36.
2. Slide the Wall DT Assembly back into the mounting bracket and it will drop down into the rotation position.
3. Lift the Wall DT Assembly up slightly and slide it back into to the service position.
4. Temporally lock the Wall DT Assembly in the service position by inserting the top two attachment screws into the holes provided see Figure 3-7 on page 3-38.



NOTE:

The FiberReach Wall DT should not be left in the rotated position unattended.

Procedure for Installing FiberReach Wideband Shelf in the Wall DT Assembly



NOTE:

This procedure assumes that the Wall DT assembly has been installed in the Wall DT mounting bracket on the wall using the above procedure.

1. Remove the front cover from the DDM-2000 FiberReach shelf, if this has not already been done.
2. Mount the DDM-2000 FiberReach Wideband Shelf by holding the shelf with the front of the shelf lower than the back and lifting the back lip (Figure B of Figure 3-8 on page 3-39) of the wideband shelf over the lower shelf attachment flange (Figure B of Figure 3-8 on page 3-39) on the carrier.
3. Use the screws provided in the installation kits to mount the shelves to ensure a good ground connection from the Wall DT Assembly to the shelf see Figure 3-3 on page 3-34.
4. Verify with an ohmmeter that the DDM-2000 FiberReach Wideband Shelf is grounded to the Wall DT Assembly.

DS1 Cabling - Wall DT

Description

This procedure describes how to connect the DS1 transmission cables to the Wall DT DSX and route them to the equipment providing the DS1s.

⇒ **NOTE:**
Cables are available in 26 gauge.

⇒ **NOTE:**
DS1 cable length of 450 feet for 26 gauge cable (1205D type) should not be exceeded.

⇒ **NOTE:**
The cables are connectorized at both the Wall DT end and the equipment end as shown in Figure 3-9 on page 3-40. See Table 3-7 on page 3-25 for the DS1 Transmission Connections.

⇒ **NOTE:**
When the FiberReach Wideband Shelf is configured in the 1x1 protection mode remove the DS1 cables to J52 and J53 (if they are present, two DSXs in the Wall DT) they are not required and may cause transmission problems.

Procedure

1. Obtain the DS1 cables per Table 3-2 on page 3-21.
2. Connect the cables at the DDM-2000 FiberReach end to A1-1 through D1-4, DSX jacks as shown in Figure 3-10 on page 3-40.

⇒ **NOTE:**
When the FiberReach Wideband Shelf is configured in the 1x1 protection mode remove the DS1 cables to J52 and J53 (if they are present, two DSXs in the Wall DT) they are not required and may cause transmission problems.

⇒ **NOTE:**
On the second DS1 Interconnect Assembly (if provided) the jacks are labeled the same as on the first DS1 Interconnect Assembly (ex. DS1 from circuit pack A2-1 will be output to jack A1-1). Care must be taken when connecting and disconnecting service or an outage may occur.

3. Route the cabling to the right or the left depending on the location of the DSX.

4. Tie the cables to the elongated holes above and below the attachment screws. See Figure 3-7 on page 3-38
5. Route the DS1 cables back to the wall and attach to the wall in accordance with local codes.



NOTE:

The DS1 cables must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

6. Route the DS1 cables to the DS1 providing equipment and attach along the wall in accordance with local codes.
7. Label appropriately any DSX jacks that are to be used for the output from the BBF6 T1EXT circuit pack.

DS3 Cabling - Wall DT

Description

This procedure describes how to connect the DS3 transmission cables to the Wall DT and route them to the DS3 terminating equipment.

Procedure

1. The FiberReach Wall DT backplane DS3 connectors are J33 and J34. The DS3 cables are shown in Table 3-2 on page 3-21.
2. Dress and tie the cables as close to the backplane as possible without touching any backplane pins on the upper or lower rear racks.
3. Run the cables through the slot at the rear on the top side of the Wall DT and connect the cables to the DSX-3. The the IN jack on the Wall DT backplane connects to the IN of the DSX-3 and the OUT of the Wall DT backplane connects to the OUT of the DSX-3 respectively.



NOTE:

Be sure to leave enough DS3 cable slack to allow the Wall DT shelf to slide forward and rotate down (approx. 10 inches).

Optical Fiber Cabling - Wall DT

Description

This procedure describes how to connect the fiber optic cables to the shelf and route the cables to the optical cross-connection (LGX®) and then out of the Wall DT. This procedure does not cover routing the optical fiber cable between building locations.

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 DDM-2000 FiberReach. Cable ties should NOT be used with the optical fiber cables.

The mode of fiber (single-mode or multimode) that is connected between the LGX® fiber optic distributing frames at each end should be determined. The fiber from the DDM-2000 FiberReach transmitter to the LGX® fiber optic distributing frame must be single-mode or the same mode as exists between the LGX® fiber optic distributing frames. The fiber from the DDM-2000 FiberReach receiver to the LGX® fiber optic distributing frame must be multimode or the same mode as exists between the LGX® fiber optic distributing frames.



WARNING:

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



WARNING:

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



NOTE:

Prior to connecting the optical fiber cables, the fibers should be examined to ensure that they are clean. The fibers can be cleaned with optical lint-free tissue or with a compressed air duster.



NOTE:

The 26G-U/28G-U/29G-U OLIUs can use optical fiber cables equipped with either ST®, FC/PC, or SC type connectors, depending on the type of universal LBO used on the OLIU. The universal type OLIUs are shipped with a 0 dB ST® type universal LBO installed. If a FC/PC or SC type connector, or a larger LBO is required it can be ordered separately. See Table 3-12 on page 3-30.



NOTE:

The optical fiber cables will be connected to the DDM-2000 FiberReach after the circuit packs are installed.

Procedure No LGX in Wall DT

1. Connect the optical fiber cables to the LGX® fiber optic distributing frame cabinet.

 **NOTE:**
Cables should not be energized at this time.

 **NOTE:**
Protective covers must be left on cables.

2. Route the optical fiber cables from the LGX® fiber optic distributing frame into the DDM-2000 FiberReach Wall DT.

 **CAUTION:**
The fiber should be routed into the Wall DT in such a way and with enough slack that the fiber does not crimp, bend, or stress when the Wall DT slides in and out or rotates.

 **NOTE:**
If only one FiberReach shelf is installed in the Wall DT assembly route the optical fiber cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The narrowband shelf is much deeper than the wideband shelf.

3. Place the optical fiber cables in a protective tube or channel.
4. Label the optical fiber cables, indicating bay, shelf, pack, and direction (IN or OUT).

Procedure LGX in Wall DT

1. Remove front cover from LGX. The key that was supplied with the shelf is required.
2. Remove the screws top and bottom that hold the LGX in the Wall DT assembly and remove the LGX from the Wall DT.
3. Remove the side cover from the LGX assembly.
4. Mount Universal Buildout Blocks (see accessories at the start of this section) or the type of connector the customer requires.
5. Bring the fiber in through the back of the Wall DT and into the LGX assembly.



CAUTION:

The fiber should be routed into the Wall DT in such a way and with enough slack that the fiber does not crimp, bend, or stress when the Wall DT slides in and out or rotates.

6. Make all the fiber connections into the Universal Buildout Blocks (or what the customer has provided). This would typically be four fiber connections.
7. Replace side cover on the LGX assembly.
8. Replace the LGX assembly in the Wall DT.
9. If Universal Buildout Blocks were used in the LGX install the appropriate type of Universal Buildout. See Table 3-12 on page 3-30.
10. Connect appropriate type of 2 ft. fiber jumper to the LGX. See Table 3-13 on page 3-31.



NOTE:

The excess fiber jumper should be coiled and stored inside the Wideband shelf cover.



NOTE:

Cables should not be energized at this time.



NOTE:

Protective covers must be left on cables.

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

Power Cabling — Wall DT using 1145B1 Power Supply

Description

All FiberReach Wideband shelf Wall DT Groups come prewired to connect to the 1145B1 power supply. If a different -48 volt power supply is being used, follow the next procedure, labeled Power Cable Installation - Wall DT Miscellaneously Powered.



NOTE:

This procedure assumes that the 1145 B1 power supply has already been mounted. If not see the installation instruction manual Comcode 847548203 for mounting of the 1145B1 power supply.

Procedure

1. Locate unlabeled plug on the ED-8C852-20, Group 11 DDM-2000 FiberReach Wall DT shelf power and miscellaneous discrete cable.
2. Connect this plug into the matching jack on the 1145B1 power supply.
3. Locate the spade lug on the black wire that comes out of the plug that was connected on the last step.
4. Connect this lug to the terminal marked frame ground that is located right under the AC receptacle on the 1145B1.
5. Connect the spade lug on the ED-8C852-20 Group 16 cable coming from connector J23 GND to the same to the same terminal used in the step above.



NOTE:

The power and ground cables must have enough slack between the 1145B1 and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).



NOTE:

The power feed labeled -48VBB and RTNBB on the DDM-2000 FiberReach shelf bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an in-service replacement or upgrade of the ECC1 (USRPNL).

6. Connect a 16 AWG wire from the Frame Ground terminal in the step above to an approved ground.
7. Do not connect the battery (if provided) to the 1145B1 power supply until you are ready to do the "Powering, Verification, and Circuit Pack Installation" chapter of this manual.
8. Do not connect the 1145B1 power supply to the building AC supply until you are ready to do the "Powering, Verification, and Circuit Pack Installation" chapter of this manual.

Power Cabling — Wall DT Miscellaneously Powered

Description

All FiberReach Wideband shelf Wall DT Groups come prewired to connect to the 1145B1 power supply. If a different -48 volt power supply is being used, follow the procedure below. Two feeders (A and B) are required from the miscellaneous power source to the DDM-2000 FiberReach Wall DT.

Procedure

1. Obtain a Wall DT miscellaneous power cable (G9) see Table 3-5 on page 3-24.
2. Locate the ED-8C852-20, Group 11 DDM-2000 FiberReach Wall DT shelf power and miscellaneous discrete cable.
3. Disconnect the above cable from connections P3, P4, and J42. See Figure 3-1 on page 3-32.
4. Connect one end of the group 9 cable to P3 and P4. Connect the other end to the cable from the miscellaneous power source.



NOTE:

The power and ground cables must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).



NOTE:

The power feed labeled -48VBB and RTNBB on the DDM-2000 FiberReach shelf bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an inservice replacement or upgrade of the ECC1 (USRPNL).

5. Connect the ED-8C852-20 Group 16 cable coming from connector J23 GND to the same ground source as the miscellaneous power source.
6. Leave the miscellaneous power source off until you are ready to do the "Powering, Verification, and Circuit Pack Installation" section of this manual.

Office Alarm Cabling - Wall DT

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.



NOTE:

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.



NOTE:

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.



NOTE:

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 DDM-2000 FiberReach Wall DT to limit transient voltages and currents.



NOTE:

Office alarm cable options are listed in Table 3-5 on page 3-24.



NOTE:

Office alarm connections are listed in Table 3-9 on page 3-27.



NOTE:

The office alarm cable must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

Procedure

1. Obtain an office alarm cable Group 11, 12 or 13 (refer to Table 3-6 on page 3-24).
2. Connect the cable to J41 of the shelf.

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See Notice on first page

3. Dress the office alarm cable from the Wall DT to the office alarm panel.

⇒ NOTE:

The office alarm cable must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

4. Inspect the office alarm panel and add a contact protection network (if required).
5. Cut the office alarm cable to the desired length.
6. Wire-wrap the loose end of the office alarm cable to the alarm panel, making connections as shown in Table 3-9 on page 3-27.
7. Repeat this procedure for each shelf in the bay.

TBOS Telemetry Cabling - Wall DT

Description

Telemetry byte-oriented serial (TBOS) is a serial telemetry interface providing system alarm and status data to a maintenance center and remote equipment switch capability from a maintenance center.

A cable connection from the telemetry equipment provides up to eight displays and can accommodate up to eight DDM-2000 FiberReach shelves (one display/shelf). A central office shelf and its associated remote shelf (or shelves) will typically be assigned displays associated with this single interface connection.

Connection of TBOS telemetry requires a TBOS telemetry processor in the office, thus TBOS telemetry is typically (only) used in a central office environment.

⇒ NOTE:

DDM-2000 FiberReach TARP Releases 3.0 and 4.0 do not support TBOS.

⇒ NOTE:

TBOS telemetry cable options are listed in Table 3-4 on page 3-23.

⇒ NOTE:

TBOS telemetry connections are listed in Table 3-10 on page 3-28.

Procedure

Perform the following for all the DDM-2000 FiberReach Wall DT shelves with Release 2.0 software that require connection to TBOS telemetry equipment.

1. For ACORN TBOS processors, obtain a TBOS telemetry cable Group 20, 21 or 22 (refer to Table 3-4 on page 3-23). For non-ACORN TBOS processors, obtain a TBOS telemetry cable Group 23 or 24 (refer to Table 3-4 on page 3-23).
2. Connect the TBOS telemetry cable to J21 on the rear of the shelf.
3. Dress the TBOS cable out of the Wall DT to the telemetry system.



NOTE:

The TBOS cable must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

4. Dress and tie the cables in the bay.
5. Cut the TBOS cable to the desired length at the telemetry panel.
6. Wire-wrap the loose end of the TBOS cable to the telemetry system making connections as shown in Table 3-10 on page 3-28.

Miscellaneous Discrete Telemetry Cabling — Wall DT

Description

The miscellaneous (environmental) discrete telemetry access allows the maintenance center to control and monitor equipment collocated with the DDM-2000 FiberReach.

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 14 miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office. A fifteenth external discrete dedicated for external power minor alarm monitoring is available (optional).

Refer to Figure 3-11 on page 3-41 for the external interconnection requirements for using the miscellaneous discrete telemetry feature at a remote terminal.



NOTE:

This procedure should be performed for each shelf requiring environmental telemetry.

⇒ NOTE:
Miscellaneous (environmental) discrete telemetry cable options and terminations are listed in Table 3-4 on page 3-23.

⇒ NOTE:
Miscellaneous (environmental) discrete telemetry connections are listed in Table 3-11 on page 3-29.

⇒ NOTE:
The miscellaneous (environmental) discrete telemetry cable must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 in).

⇒ NOTE:
All FiberReach Wideband Wall DT Groups come prewired to connect to the 1145B1 power supply. This includes a connection to the Misc. Discrete Telemetry to report loss of AC power, if additional telemetry connections are required the ED-8C852-20 Group 12 is required in addition to ED-8C762-20 G27, G28, or G29.

Procedure

1. Obtain a miscellaneous (environmental) discrete telemetry cable ED-8C762-20 Group 27, 28 or 29 (Table 3-4 on page 3-23). The cable is connected to the shelf requiring miscellaneous (environmental) discrete telemetry.
2. Obtain a miscellaneous (environmental) discrete telemetry split cable ED-8C852-20 Group 12 (Table 3-4 on page 3-23)
3. Disconnect the cable currently connected to J42.
4. Connect the ED-8C852-20 Group 12 cable P42 to J42 on the Wideband shelf.
5. Connect the P42/42B connector on the cable removed in Step 3 to J42B on ED-8C852-20 Group 12 cable.
6. Connect the P42 connector on the ED-8C762-20 Group 27, 28 or 29 (Table 3-4 on page 3-23) to the J42A connector on the ED-8C852-20 Group 12 cable.
7. Dress the cable out of the Wall DT to a wire-wrap terminal strip (or to where connections will be made).

⇒ NOTE:
The miscellaneous (environmental) discrete telemetry cable must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

8. Cut the miscellaneous (environmental) discrete telemetry cable to the desired length at the telemetry panel.
9. Wire-wrap the loose end of the miscellaneous (environmental) discrete telemetry cable to the wire-wrap terminal strip, making connections per Table 3-11 on page 3-29 and Figure 3-11 on page 3-41.

⇒ NOTE:
Each miscellaneous (environmental) discrete telemetry designation is connected to the DDM-2000 FiberReach by two leads (wires).

⇒ NOTE:
For each input, one lead should be connected to input-common and the other lead should be connected to the appropriate alarm indication.

⇒ NOTE:
For each output, one lead should be connected to output-common and the other lead should be connected to the appropriate alarm indication.

⇒ NOTE:
To input the external minor (MN) alarm or power minor (PMNT- IN) alarm, one lead should be connected to the appropriate external alarm source and an external ground should be connected to output common.

Final Operations

Procedure

1. Verify that all the cables are properly dressed.

⇒ NOTE:
All cables must have enough slack between the wall attachment and the attachment on the Wall DT to allow the Wall DT to slide forward and rotate down (approx. 10 inches).

2. Verify that all cables are properly labeled.
3. Verify that the proper protection designation option label has been placed on the front of the wideband shelf.
4. Verify that designations where cables were wire-wrapped are properly labeled.
5. Verify that any DSX jacks that are to be used for the output from the BBF6 T1EXT circuit pack are properly labeled.

6. Lift the Wall DT Assembly up slightly and slide it back into to the service position.
7. Lock the Wall DT Assembly in the service position by inserting the all four attachment screws into the holes provided see Figure 3-7 on page 3-38.



NOTE:

The FiberReach Wall DT should not be left in the rotated position unattended.

Table 3-2. DS1 Cable Assemblies

Description	ED-8C852-20 Group (Note 1)	Cable Length (ft.)	Cable Type	Wall DT DS1 Interconnect Jacks (Note 2)
DS1 26-Gauge Wire Application	G1 (D.A.)*	0 to 450	1205D	A1-1 - D1-4
	G10	50		
	G19	150		
	G20	250		

Table 3-2 Notes:

- * G1 Manufacture Discontinued. This cable no longer available from the manufacturer and is replaced by G10, G19 and G20 cables
- 1. Each group listed is one cable per DS1. The single cable has both input and output on one cable.
- 2. Cables are terminated in RJ45 Shielded connectors at both ends.

Table 3-3. DS3 Cable Assemblies

Cable and Description	Qty*	Group (Note 1)	Cable Length (ft.)	Cable Type (Notes 2&3)	Connector Types	FiberReach Backplane Connections (Note 4)
ED8C900-20 DS3 735A Cable Application	2	G3, F/E AA,LA	150	735A	Straight BNC to BNC	J33 & J34
		G3, F/E AC, LA	150	735A	Straight BNC to Right Angle BNC	
		G3, F/E AE, LA	150	735A	9821AF DACS IV (DS3 OUT) 2X4 to Right Angle BNC	
ED8C900-20 DS3 735D Cable Application	2	G301-G347, F/E DA, 1LA	75' to 900'	735D	Straight BNC to BNC	
		G301-G347, F/E DA, LCD	75' to 900'	735D	Straight BNC to dangler 9821AE	
	1	G301-G347, F/E DA, LDD	75' to 900'	735D	Straight BNC to dangler 9821FA	
	1	G301-G347, F/E DA, LED	75' to 900'	735D	Straight BNC to dangler 9821EA	
ED8C724-21 DS3 Front Access Dangler Kits	1	G453 [†]	2' 5"		Straight BNC to Right Angle BNC	
	1	G454 [†]	2' 7"			
	OR:					
	1	G413 [†]	2' 11"			
ED8C724-22 DS3 Cables for BBG19	1	G37	150	735A	Straight BNC to Right Angle BNC	
	1	G38 (D.A.) [‡]	250	735A		
	1	G74	250	735A		

Table 3-3 Notes:

* Per Unit

[†] One group 413 may be used to replace using one each of G453 and G454.

[‡] Discontinued Availability. Group 38 replaced by Group 74

Table 3-4. Telemetry Cable Assemblies

Description	ED-8C762-20 Group	Cable Length (ft.) (Notes 1 & 2)	Cable Type	FiberReach Backplane Connections
TBOS Serial Telemetry Direct Connection to an Acorn TBOS Processor	20	75 ft.	812AS	J21
	21	150 ft.		
	22 (D.A.)*	As Reqd.		
	44	250		
TBOS Serial Telemetry*	23	150 ft.	812AS	J21
	24 (D.A.)†	As Reqd.		
	45	250		
Misc. (Env.) Discrete Telemetry 1 per Shelf	27 (Note 3)	75 ft.	807AS	J42A on the ED-8C852-20 Group 12
	28 (Note 3)	150 ft.		
	29 (D.A.)‡	As Reqd.		
	46 (Note 3)	250		
	ED-8C852-20 Group 12	2'-11"	807AS	J42

Table 3-4 Notes:

- ** G22 Manufacture Discontinued. This cable no longer available from the manufacturer and is replaced by Groups 10, 19 and 20 cables.
 - † G24 Manufacture Discontinued. This cable no longer available from the manufacturer and is replaced by the Group 45 cable.
 - ‡ G29 Manufacture Discontinued. This cable no longer available from the manufacturer and is replaced by the Group 46 cable
1. Cable lengths listed as required are specified by the customer.
 2. All cables are 26 gauge.
 3. All FiberReach Wideband shelf Wall DT Groups come prewired to connect to the 1145B1 power supply. This includes a connection to the Misc. Discrete Telemetry to report loss of AC power, if additional telemetry connections are required the ED-8C852-20 Group 12 is required in addition to ED-8C762-20 Groups 27, 28, or 46.

Table 3-5. Power Cable Assembly

Description	ED-8C852-20 Group	Cable Length (Note 1)	Cable Type	FiberReach Connections
FiberReach Shelf Power Cable	9	2 ft.	12GA	P3, P4

Table 3-5 Notes:

- All FiberReach Wideband shelf Wall DT Groups come prewired to connect to the 1145B1 power supply. If a different -48 volt power supply is being used replace the ED-8C852-20 Group 11 cable with this cable.

Table 3-6. Alarm Cable Assemblies

Description	ED-8C762-20 Group	Cable Length (Note 1)	Cable Type	FiberReach Backplane Connections
Office Alarm Interface Cable	11	75 ft.	816AS*	J41
	12	150 ft.		
	13(D.A.) [†]	As Reqd.		
	14	250		

Table 3-6 Notes:

- Cable lengths listed as required are specified by the customer.
- * The 816A type cable is 26 gauge.
- [†] G13 Manufacture Discontinued. This cable no longer available from the manufacturer and is replaced by the Group 14 cable.

Table 3-7. DS1 Transmission Connections

Low Speed Slots	Chan DS1	IN/OUT	T/R Term		1205D (26Gauge)T/R Color		DS1 Interconnect Jack (Note1)
			Tip	Ring	Tip	Ring	
LS-A-1	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-1
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-2
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-3
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-4
LS-B-1	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-1
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-2
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-3
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-4
LS-C-1	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-1
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-2
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-3
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-4
LS-D-1	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	D1-1
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	D1-2
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	D1-3
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	D1-4

Table 3-7. DS1 Transmission Connections (Continued)

Low Speed Slots	Chan DS1	IN/OUT	T/R Term		1205D (26Gauge)T/R Color		DS1 Interconnect Jack (Note1)
			Tip	Ring	Tip	Ring	
LS-A-2	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-1 (Note1)
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-2 (Note1)
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-3 (Note1)
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	A1-4 (Note1)
LS-B-2	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-1 (Note1)
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-2 (Note1)
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-3 (Note1)
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	B1-4 (Note1)
LS-C-2	1 (1)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-1 (Note1)
	2 (2)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-2 (Note1)
	3 (3)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-3 (Note1)
	4 (4)	IN OUT	4 1	5 2	O BL	W-O W-BL	C1-4 (Note1)

Table 3-7 Notes:

1. On the second DS1 Interconnect Assembly (if provided) the jacks are labeled the same as on the first DS1 Interconnect Assembly (ex. DS1 from circuit pack A2-1 will be output to jack A1-1). Care must be taken when connecting and disconnecting service or an outage may occur.

⇒ NOTE:

When the FiberReach Wideband Shelf is configured in the 1x1 protection mode remove the DS1 cables to J52 and J53 (if they are present, two DSXs in the Wall DT) they are not required and may cause transmission problems.

Table 3-8. Power Connections (Note 1)

Name	Designation	Conn.	Term	Color
GND	GND	J23	1	
-48 V (A)	-48VA		3	R
RTN (A)	-48RTNA		5	BK
-48 V (B)	-48VB		7	S
RTN (B)	-48RTNB		9	S-BK
-48 V (BB)	-48VBB		11	G
RTN (BB)	-48RTNBB (Note 2)		13	W

Table 3-8 Notes:

1. All FiberReach Wideband shelf Wall DT Groups come prewired to connect to the 1145B1 power supply. If a different -48 volt power supply is being used replace the ED-8C852-20 Group 11 cable with the ED-8C852-20 Group 9 cable.
2. The power feed labeled -48VBB and RTNBB on the DDM-2000 FiberReach shelf bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an in-service replacement or upgrade of the ECC1 (USRPNL). When connectors P3 and P4 are powered connector P5 will also be live. Connector P5 should be dressed to the bay in such a way as to prevent a short from occurring.

Table 3-9. Office Alarm Connections

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J41	1	W-BL
Minor Alarm Visible Return	MNVR		14	BL-W
Minor Alarm Audible	MN		2	W-O
Minor Alarm Audible Return	MNR		15	O-W
Major Alarm Visible	MJV		3	W-G
Major Alarm Visible Return	MJVR		16	G-W
Major Alarm Audible	MJ		4	W-BR
Major Alarm Audible Return	MJR		17	BR-W
Critical Alarm Visible	CRV		5	W-S
Critical Alarm Visible Return	CRVR		18	S-W
Critical Alarm Audible	CR		6	R-BL
Critical Alarm Audible Return	CRR		19	BL-R

Table 3-9 Notes:

1. The office alarm cable is 26 gauge.

Table 3-10. TBOS Serial Telemetry Connections

Name	Desig.	Conn.	Term	Color
Transmitted True Data To Telem. Equip.	TDP	J21	2	W-O
Transmitted Inverted Data To Telem. Equip.	TDN		7	O-W
Received True Data To Telem. Equip	RDP		1	W-BL
Received Inverted Data To Telem. Equip.	RDN		6	BL-W

Table 3-10 Notes:

1. The TBOS telemetry cable is 26 gauge.

Table 3-11. Miscellaneous (Environmental) Discrete Telemetry Connections

Name	Desig.	Term	Color	Conn.
Power Minor Alarm	PMNT-IN	18	W-S	J42A
Fan Control	FAN-CTL	23	R-S	
Input-Common	TLMI-C	9	BR-R	
Env. Input - #1	TLMI-1	17	W-BR	
Env. Input - #2	TLMI-2	15	W-O	
Env. Input - #3	TLMI-3	13	G-BK	
Env. Input - #4	TLMI-4	11	BL-BK	
Env. Input - #5	TLMI-5	7	O-R	
Env. Input - #6	TLMI-6	5	S-W	
Env. Input - #7	TLMI-7	3	G-W	
Env. Input - #8	TLMI-8	1	BL-W	
Env. Input - #9	TLMI-9	16	W-G	
Env. Input - #10	TLMI-10	14	W-BL	
Env. Input - #11	TLMI-11	12	O-BK	
Env. Input - #12	TLMI-12	10	S-R	
Env. Input - #13	TLMI-13	8	G-R	
Env. Input - #14	TLMI-14	6	BL-R	
Env. Input - #15	TLMI-15	2	OW	
Output - Common	TLMO-C	21	R-G	
Env. Output - #1	TLMO-1	19	R-BL	
Env. Output - #2	TLMO-2	24	BK-BL	
Env. Output - #3	TLMO-3	22	R-BR	
Env. Output - #4	TLMO-4	20	R-O	
No Connection	NC	25	BK-O	

Table 3-11. Miscellaneous (Environmental) Discrete Telemetry Connections (Continued)

Name	Desig.	Term	Color	Conn.
------	--------	------	-------	-------

Table 3-11 Notes:

1. The designation "NC" means no connection.
2. Inputs to the minor alarm and power minor alarm connections are normally derived from the -48 volt alarm outputs of a sLC® Series 5 Carrier System power shelf. An external ground must be connected to output-common to access the alarm. Refer to Figure 3-11 on page 3-41.
3. The external inputs to the miscellaneous (environmental) discrettes is a contact closure and is connected to the DDM-2000 by two leads (wires). For each of the miscellaneous (environmental) inputs 1 through 15 that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-X). Refer to Figure 3-11 on page 3-41.
4. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation.
5. Env. Input - #1 not used by Wall DT when power by 1145B1 Power Supply.

Table 3-12. Universal Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Connection	Comcode	Connector Type
0 dB	A3060	SM-SM	106708951	SC
5 dB	A3060B1	SM-SM	107406142	SC
10 dB	A3060D1	SM-SM	107406159	SC
15 dB	A3060F1	SM-SM	107406167	SC
0 dB	A3070	SM-SM	106795354	ST®
5 dB	A3070B1	SM-SM	107406183	ST®
10 dB	A3070D1	SM-SM	107406191	ST®
15 dB	A3070F1	SM-SM	107406209	ST®
0 dB	A3080	SM-SM	106795404	FC
5 dB	A3080B1	SM-SM	107406225	FC
10 dB	A3080D1	SM-SM	107406233	FC
15 dB	A3080F1	SM-SM	107406241	FC
5 dB	A3060B	MM-MM	106795271	SC
10 dB	A3060D	MM-MM	106795289	SC
15 dB	A3060F	MM-MM	106795297	SC
5 dB	A3070B	MM-MM	106795313	ST®

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Table 3-12. Universal Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Connection	Comcode	Connector Type
10 dB	A3070D	MM-MM	106795321	ST [®]
15 dB	A3070F	MM-MM	106795339	ST [®]

⇒ NOTE:
 Do **NOT** put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

⇒ NOTE:
 A 15 db LBO is required to loop the 26G2-U OLIU back on itself.

Table 3-13. Lightguide Jumpers

Lightguide Jumper Type	Code	Comcode	Connector Type	Length (Feet)
Single Mode	FS1E-E-2	105357727	ST [®] -ST [®]	2
Single Mode	LS1FP-FP-10	106593825	FCPC-FCPC	10
Single Mode	LS1SC-SC-2	106908247	SC-SC	2
Multimode	FL1E-E-2	105351795	ST [®] -ST [®]	2
Multimode	LL1FC-FC-10	107095549	FC-FC	10
Multimode	LL1SC-SC-2	106908668	SC-SC	2

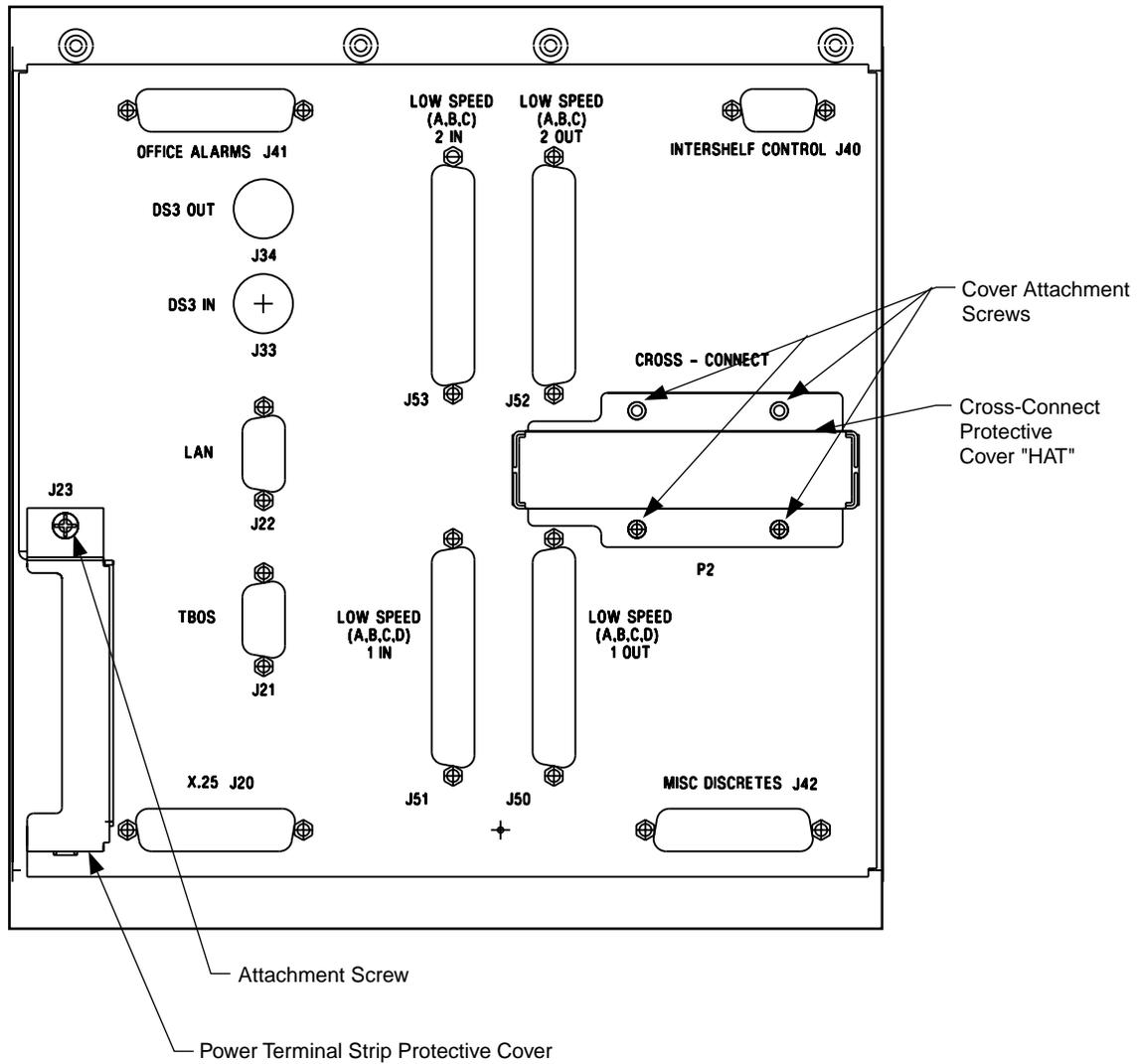


Figure 3-1. DDM-2000 FiberReach Backplane

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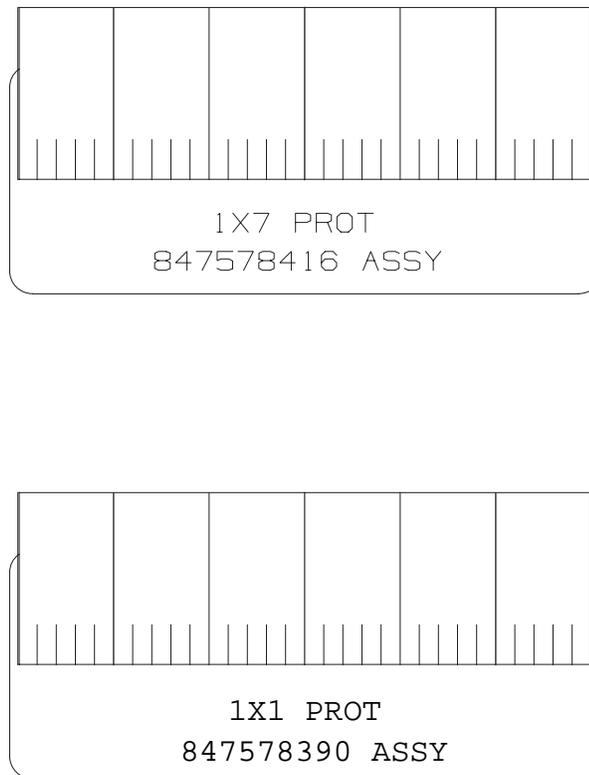


Figure 3-2. Wideband Shelf 1x7 and 1x1 Protection Assemblies

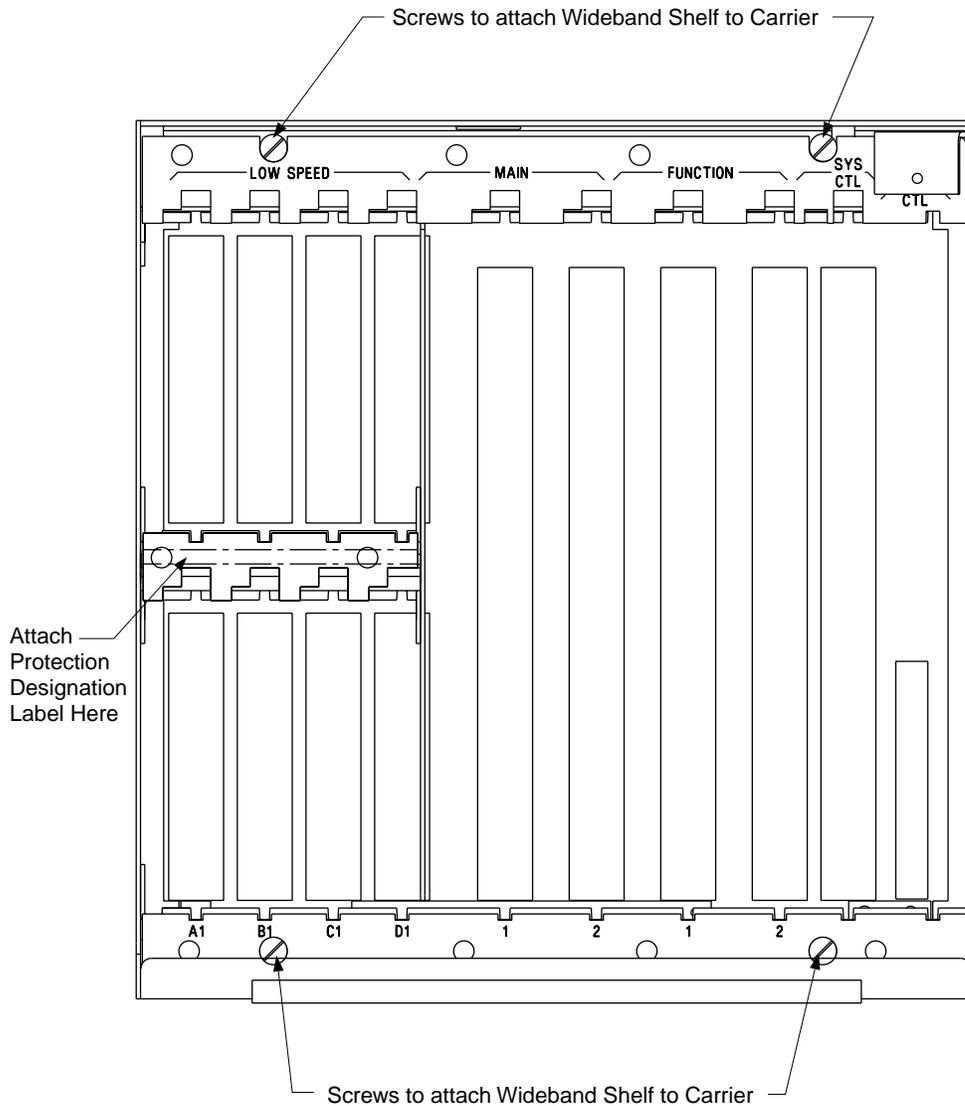


Figure 3-3. DDM-2000 FiberReach Wideband Shelf Front View

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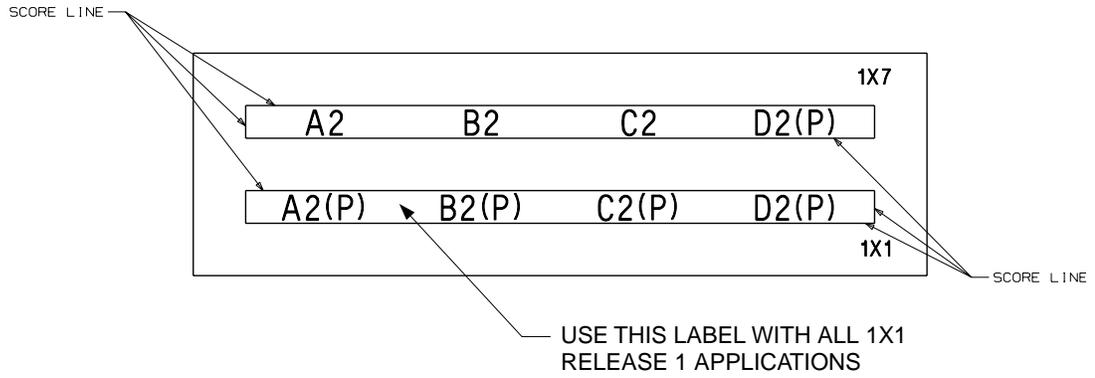


Figure 3-4. Protection Option Designation Label

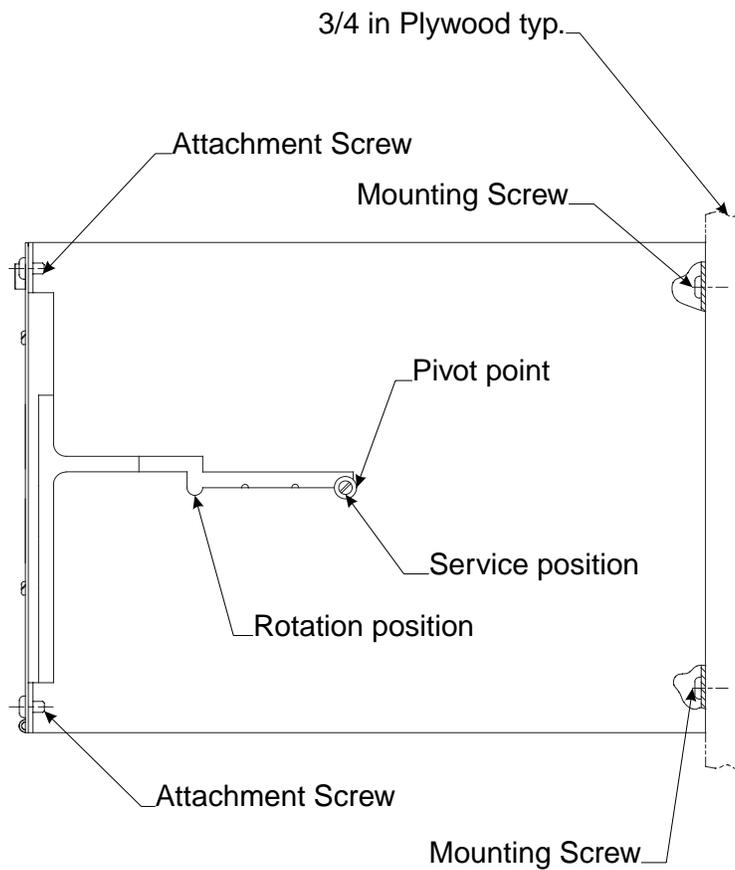


Figure 3-5. DDM-2000 FiberReach Wall DT Mounting Bracket (Side View)

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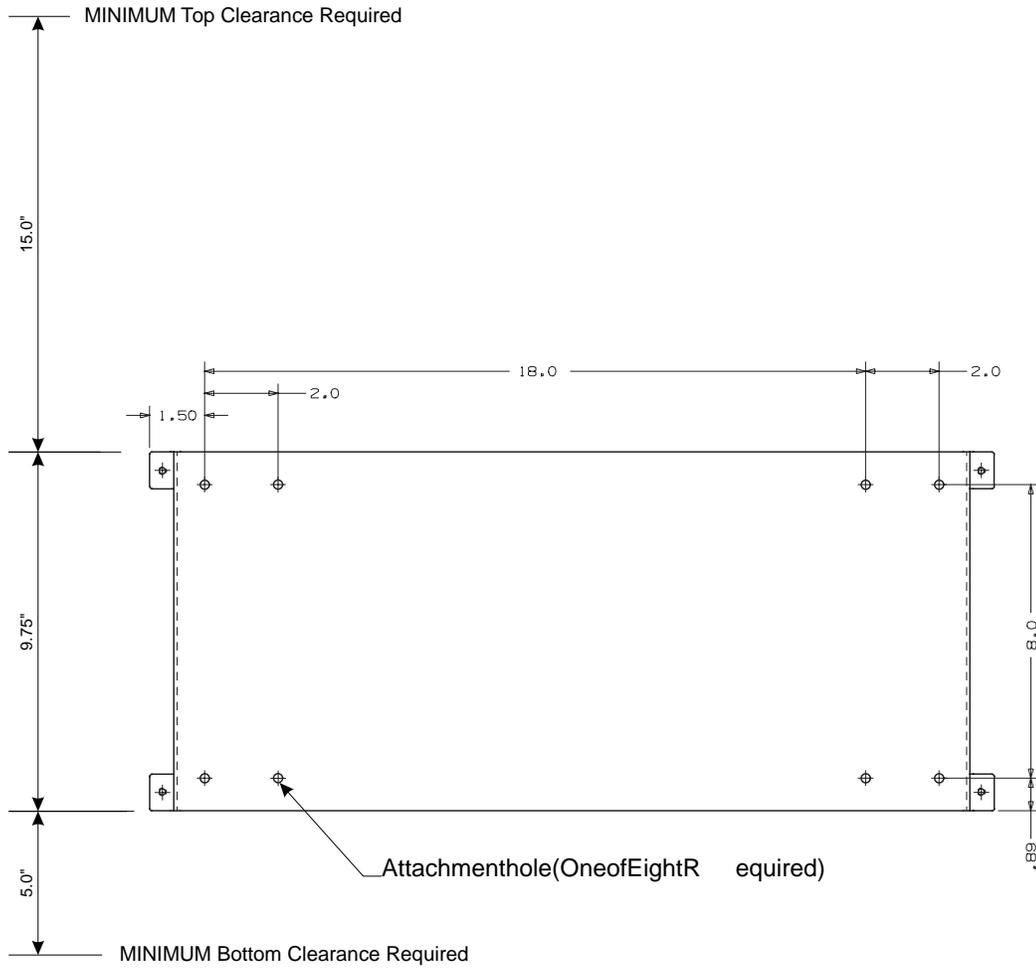


Figure 3-6. Wall DT Mounting Bracket (Front View)

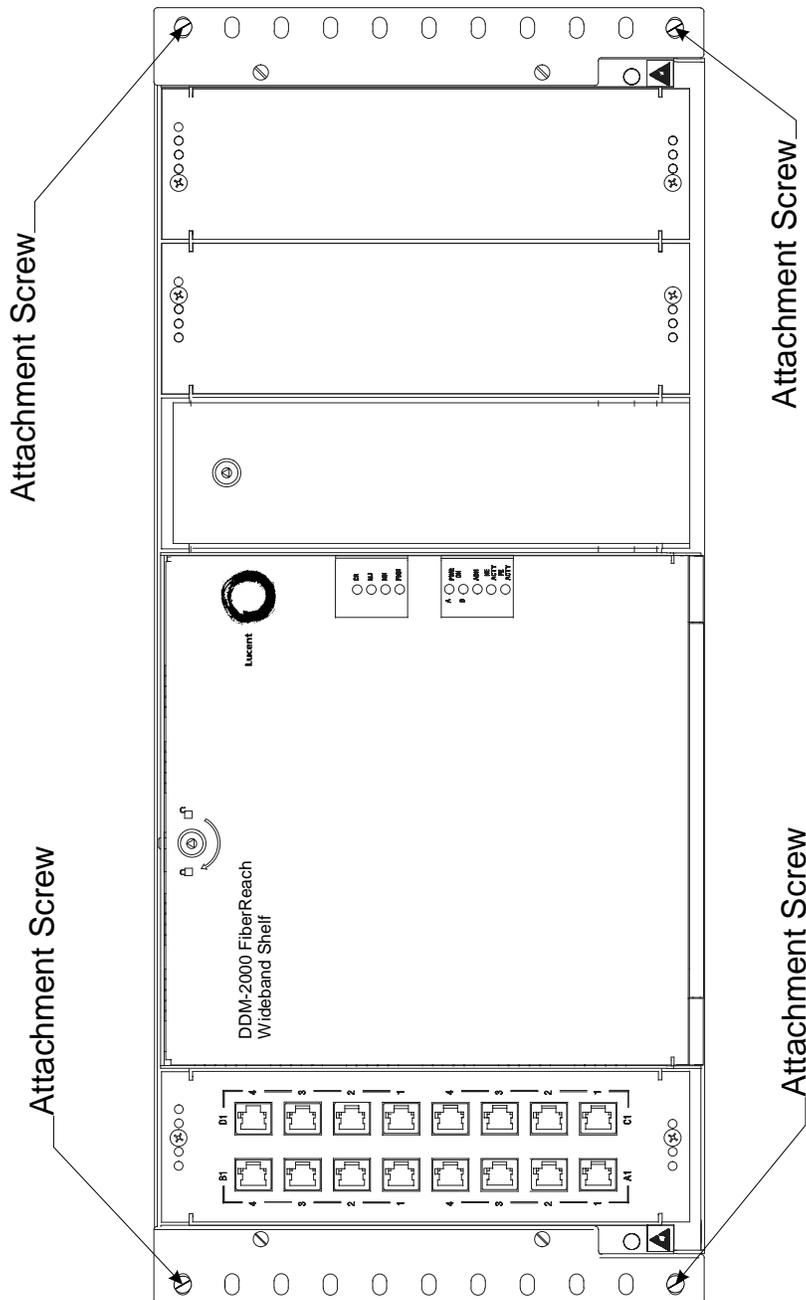


Figure 3-7. Wall DT Assembly Attachment Screws

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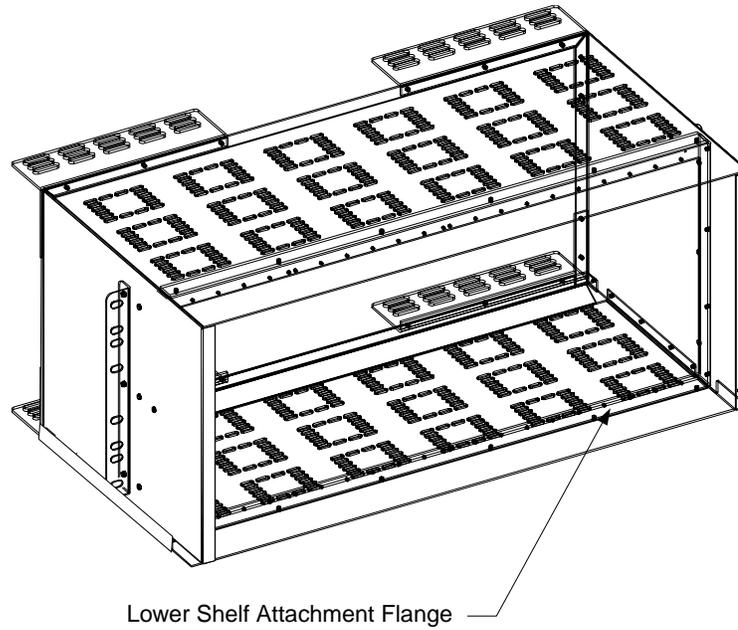


Figure A. Carrier Assembly in 3D

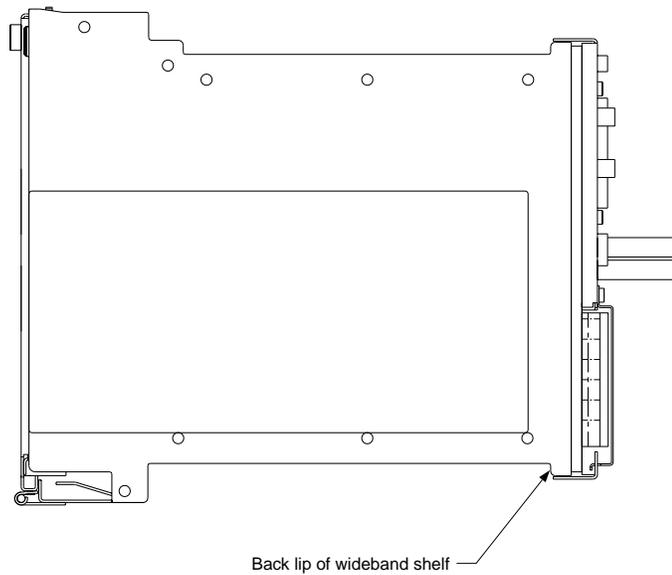


Figure B. Side View of Wideband Shelf Assembly

Figure 3-8. Carrier and Wideband Shelf Assembly

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See Notice on first page

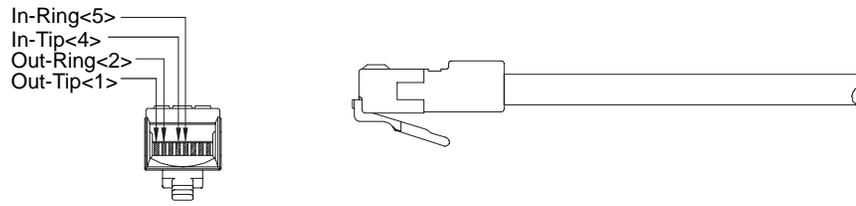


Figure 3-9. Connector Pinouts

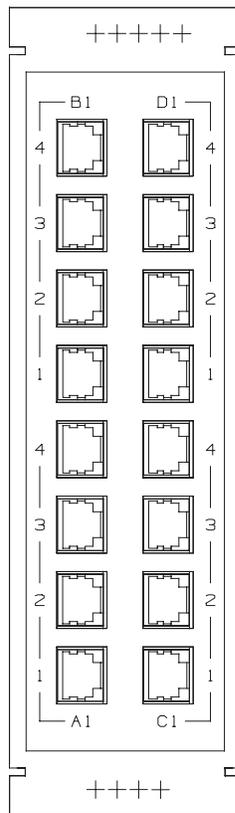
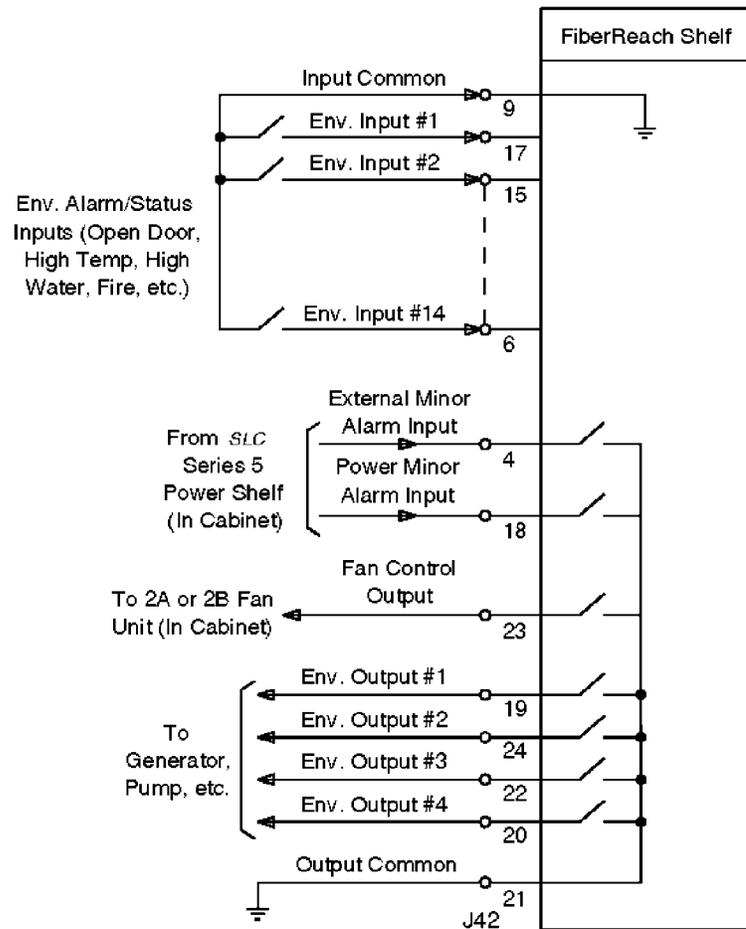


Figure 3-10. DSX Panel

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Notes:

1. Miscellaneous (environmental) alarm input #1 is typically wired to the open door alarm in Lucent Technologies cabinet configurations.
2. Miscellaneous (environmental) alarm input #14 is typically wired to a fan shelf alarm in non-NEBs environment (noncabinet where air inlet temperature exceeds 50 degrees C) applications where the fan shelf is required.
3. The output common must be wired to an external ground for fan control, external minor and power minor alarm inputs, and for miscellaneous (environmental) discrete outputs #1-4.
4. Env. Input #1 not used by Wall DT when powered by 1145B1 Power Supply.

Figure 3-11. Remote Terminal Miscellaneous (Environmental) Discrete Functions

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See Notice on first page

Narrowband Shelf Installation**4**

Contents

Overview	4-1
<hr/>	
Description	4-1
■ Tools, Test Sets, and Accessories	4-2
■ Planning	4-3
■ Equipment Installation Considerations	4-3
<hr/>	
Inspection	4-4
■ Description	4-4
■ Procedure	4-4
<hr/>	
Equipment Installation	4-5
■ Description	4-5
■ Procedure for Installing FiberReach Shelf Carrier Assembly in Network Bay Frame	4-5
■ Procedure for Installing FiberReach Narrowband Shelf in the Carrier Assembly	4-5

DS1 Cabling - Narrowband Shelf **4-6**

- Description 4-6
- Procedure 4-6

VF Cabling - Narrowband Shelf **4-7**

- Description 4-7
- Procedure 4-8

Power Cabling - Narrowband Shelf **4-9**

- Description 4-9
- Procedure 4-9

Miscellaneous (Office) Alarm Cabling — Narrowband Shelf **4-11**

- Description 4-11
- Procedure 4-11

RS422 Microwire Telemetry Cabling — Narrowband Shelf **4-12**

- Description 4-12
- Procedure 4-13

Final Operations **4-14**

- Procedure 4-14

Narrowband Shelf Installation

4

Overview

This section provides the information for the installation of the DDM-2000 FiberReach NarrowBand Shelf (NBS), rear access cables, and grounding.

This installation manual contains the latest cable information at the time of issue. For up-to-date information, refer to the ED cable drawings listed in the "About This Document" section. For miscellaneous equipment information, refer to "Miscellaneous Equipment" in the section "Introduction".

Description

This section should be performed on all rear access shelf installations. Observe the following notes:

- ⇒ NOTE:**
This section requires previous bay frame installation and grounding. The shelf should be grounded by its mounting screws.
- ⇒ NOTE:**
It is recommended that ONLY designated Lucent Technologies cables be used.
- ⇒ NOTE:**
This section is best performed if each procedure such as "DS1 Cabling - Narrowband Shelf" is performed on every shelf in the bay before proceeding to the next procedure.

- ⇒ **NOTE:**
Circuit packs must not be installed at this time.
- ⇒ **NOTE:**
All of the cables are connected to the DDM-2000 FiberReach backplane connectors.
- ⇒ **NOTE:**
The locations of all backplane plugs and jacks for the NBS are shown in Figure 4-1 on page 4-22.
- ⇒ **NOTE:**
Cable assembly options are listed in Table 4-1 on page 4-14 through Table 4-4 on page 4-16. Connector pinouts are provided in Figure 4-3 on page 4-24.
- ⇒ **NOTE:**
Cable brackets should be installed as required.

Tools, Test Sets, and Accessories

The following tools are required:

Quantity	Description
1	Soldering Iron
1	Wrist Strap*
1	Wire-Wrap Gun†
1	Ohmmeter**
	Screwdriver(s)††

* A wrist strap must be worn when touching the DDM-2000 FiberReach backplane and when connecting cables. Use an available electrostatic discharge jack.

† A wire wrap gun is required to make connections on the DS1, VF, alarm, and telemetry cables. The wire wrap gun must be able to accommodate 22 or 26 gauge wire.

** An ohmmeter is required to verify that the DDM-2000 FiberReach is properly grounded.

†† Screwdrivers with the appropriate head(s) are required for mounting the shelf, heat baffles, and cable brackets; for removing the front cover, and for connecting cables to the backplane. A screw retention screwdriver (either mechanical or magnetic) is required to start the screws that hold the narrowband shelf to the FiberReach shelf carrier assembly.

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See Notice on first page

Planning

The DDM-2000 FiberReach Narrowband Shelf is mounted in the DDM-2000 FiberReach Shelf Carrier Assembly. The carrier assembly holds two shelves as itemized below.

1. One wideband shelf and one narrowband shelf.
2. Two wideband shelves.
3. Two narrowband shelves.

Equipment Installation Considerations

The equipment listed below has the following height dimensions:

ED-8C762-30, G1	DDM-2000 FiberReach Multiplexer Wideband Shelf Assembly	9.5 inches
ED-8C785-30, G1	DDM-2000 FiberReach Multiplexer Narrowband Shelf Assembly	9.5 inches
ED-8C843-30, G1	DDM-2000 FiberReach Shelf Carrier Assembly equipped with 1 wideband shelf	9.5 inches
ED-8C843-30, G2	DDM-2000 FiberReach Shelf Carrier Assembly equipped with 2 wideband shelf	9.5 inches
ED-8C843-30, G3	DDM-2000 FiberReach Multiplexer Shelf assembly equipped with 1 narrowband shelf and 1 wideband shelf	9.5 inches
ED-8C843-30, G4	DDM-2000 FiberReach Multiplexer Shelf assembly equipped with 2 narrowband shelves	9.5 inches
ED-8C843-30, G5	DDM-2000 FiberReach Multiplexer Shelf assembly equipped with 1 narrowband shelf	9.5 inches
847552627	DDM-2000 FiberReach Multiplexer Carrier Assembly	9.5 inches
ED-8C724-30, G2	Heat Baffle	4.0 inches

If the DDM-2000 FiberReach Shelf Carrier Assembly is installed at the bottom of the bay frame, there should be an air gap of at least 1.25 inches below the DDM-2000 FiberReach Multiplexer Shelf.

A heat baffle is required between each DDM-2000 FiberReach Shelf Carrier Assembly as described below. If the DDM-2000 FiberReach Shelf Carrier Assembly is being

installed at the top of a 7-foot bay frame, a heat baffle is not required above the sixth (top) shelf.

A heat baffle is not required below the DDM-2000 FiberReach Shelf Carrier Assembly unless heat-generating equipment is located below the DDM-2000 FiberReach Shelf Carrier Assembly.

DDM-2000 heat baffles must be used where required. There is no equivalent air gap.

Inspection

Description

This procedure describes how to inspect the DDM-2000 FiberReach Narrowband shelf equipment for visible damage and proper grounding. Perform the following procedure before the DDM-2000 FiberReach Narrowband shelf installation or cable installation.

Procedure

1. Verify that the frame or structure into which the DDM-2000 FiberReach Narrowband shelf will be installed is properly grounded.



NOTE:

Each DDM-2000 FiberReach Narrowband shelf comes equipped with an installation kit, a pouch attached to the shelf containing the hardware required for mounting and grounding. The installation kit for the DDM-2000 FiberReach shelf has the following:

Quantity	Code	Description
4	C 901301010	0.138-38 x 1/4" Screws
1	C 847582376	Protection Designation Label
1	C 847578424	Instruction Card

2. Remove the front cover from the DDM-2000 FiberReach Narrowband shelf.



NOTE:

The cover must be installed later to assure compliance with electromagnetic induction requirements.

3. Inspect the DDM-2000 FiberReach Narrowband shelf for visible damage.

Equipment Installation

Description

This procedure describes how to install equipment that will be accessible from both the front and rear.

Procedure for Installing FiberReach Shelf Carrier Assembly in Network Bay Frame

1. If not already done in accordance with Section 2 of this Installation Manual, mount the DDM-2000 FiberReach Shelf Carrier Assembly and heat baffles in a network bay frame with the wide flange of the bay frame to the front as shown in Figure 2-5 on page 2-31. Position the shelves and heat baffles in the bay frame as shown in Figure 2-6 on page 2-32. Use the thread-cutting screws provided in the installation kits to mount the shelves to ensure a good ground connection from the bay to the shelf.
2. Verify with an ohmmeter that the DDM-2000 FiberReach Shelf Carrier Assembly is grounded to the bay frame.
3. Install the required shelf brackets as shown in Figure 2-5 on page 2-31.



NOTE:

There are two brackets required per shelf to hold the *PANDUIT*^{*} cable channel for the optical fiber cables in place.

4. Install the required PANDUIT cable channel for the optical fiber cables as shown in Figure 2-5 on page 2-31.

Procedure for Installing FiberReach Narrowband Shelf in the Carrier Assembly

This procedure assumes that the carrier assembly has been installed in the network bay frame using the above procedure or the procedure in Section 2.

1. Remove the front cover from the DDM-2000 FiberReach Narrowband shelf, if this has not already been done.
2. Mount the DDM-2000 FiberReach Narrowband Shelf by holding the shelf with the front of the shelf lower than the back and lifting the back lip of the narrowband shelf over the lower shelf attachment flange on the carrier.

* Registered trademark of Panduit Corporation.

3. Use the screw-retention screwdriver to start the screws that were provided in the installation kits to mount the shelves. Start the two lower screws before starting the two upper screws.
4. Tighten all four screws to ensure a good ground connection from the carrier to the shelf (see Figure 4-2 on page 4-23).
5. Verify with an ohmmeter that the DDM-2000 FiberReach Narrowband Shelf is grounded to the bay frame.

DS1 Cabling - Narrowband Shelf

Description

This procedure 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 panel. Perform this procedure if DS1 cables are required.



CAUTION:

The DS1 cables are required to have a minimum length of 30 feet to meet electro-magnetic interference (EMI) or electromagnetic compliance (EMC) requirements.



NOTE:

The ED8C785-20, Groups 3, 4, and 5, cables are available in 26 gauge.



NOTE:

DS1 cable length of 350 feet for 26 gauge cable should not be exceeded.



NOTE:

The cables are connectorized at the DDM-2000 FiberReach Shelf Carrier Assembly end and must be wire-wrapped at the DSX end, except for the ED8C785-20, Group 5 cable which is connectorized for wall DT applications. Cables are wire-wrapped at the DSX-1 end as shown in Table 4-5 on page 4-17.

Procedure

1. Obtain the ED8C785-20, Group 3, 4, or 5, DS1 cables per Table 4-1 on page 4-14. One group is required for each Narrowband shelf.
2. Remove the front cover from the DDM-2000 FiberReach Narrowband Shelf Carrier Assembly, if this has not already been done.

⇒ NOTE:

The cover must be installed later to assure compliance with EMC requirements and proper cooling.

3. Connect the cable at the DDM-2000 FiberReach Narrowband Shelf end to J200, as shown in Figure 4-1 on page 4-22.
4. If the cable assembly is ED8C785-20, Group 3, 5, 18, 19 or 20, proceed to step #6. If the cable assembly is ED8C785-20, Group 5, proceed to step #5.
5. Insert the plugs labelled A, B, C, and D into the corresponding jacks on the DSX panel. Proceed to step #10.
6. Route the cabling along the backplane per the figures in Section 2 and out of the bay to the DSX panel.

⇒ NOTE:

If only one FiberReach Narrowband Shelf is installed in the carrier, route the cables to the right or the left so that they will not interfere with the future installation of a wideband shelf or a second narrowband shelf. The Narrowband shelf is approximately the same size as the wideband shelf.

7. Tie the cables to the upper and lower rear racks.
8. Remove slack and cut the DS1 cables to the desired length at the DSX panel.

⇒ NOTE:

The DS1 cables are required to have a minimum length of 30 feet.

9. Referring to Table 4-5 on page 4-17, carefully observe color codes and wire-wrap the cables at the DSX-1 panel.
10. Repeat this procedure for each shelf in the bay.

VF Cabling - Narrowband Shelf

Description

This procedure describes how to connect the voice frequency (VF) transmission cables to the NBS shelf, route the cables out of the bay, and connect the cables to the voice frequency main frame. Perform this procedure if VF cables are required.

▲ CAUTION:

The VF cables are required to have a minimum length of 30 feet to meet electromagnetic interference (EMI) or electromagnetic compliant (EMC) requirements.

⇒ **NOTE:**
The ED8C785-20, Groups 1, 15, 16 and 17, cables are available in 26 gauge.

⇒ **NOTE:**
VF cable length of 500 feet for 26 gauge cable should not be exceeded.

⇒ **NOTE:**
The cables are connectorized at the DDM-2000 FiberReach Shelf Carrier Assembly end and must be wire-wrapped at the main frame end. Cables are wire-wrapped at the VF main frame end as shown in Table 4-5 on page 4-17.

Procedure

1. Obtain the ED8C785-20, Group 1 or 2, VF cables per Table 4-2 on page 4-15. One group is required for each NBS.
2. Remove the front cover from the DDM-2000 FiberReach Shelf Carrier Assembly, if this has not already been done.

⇒ **NOTE:**
The cover must be installed later to assure compliance with EMC requirements and proper cooling.

3. Connect the cables at the DDM-2000 FiberReach Narrowband Shelf end to J300 through J303, carefully matching the correct connector with the appropriate backplane plug as shown in Figure 4-1 on page 4-22. A label on each connector identifies it.
4. Route the cabling along the backplane per the figures in Section 2 and out of the bay to the VF main frame.

⇒ **NOTE:**
If only one FiberReach Narrowband Shelf is installed in the carrier, route the cables to the right or the left so that they will not interfere with the future installation of a wideband shelf or a second narrowband shelf. The narrowband shelf is approximately the same size as the wideband shelf.

5. Tie the cables to the upper and lower rear racks.
6. Remove slack and cut the VF cables to the desired length at the main frame.

⇒ **NOTE:**
The VF cables are required to have a minimum length of 30 feet.

7. Referring to Table 4-7 on page 4-18, carefully observe color codes and wire-wrap the cables at the VF main frame.
8. Verify that protectors, such as Lucent Model 4C1E-W, Model 4C3E-W, or equivalent, have been installed on the VF lines to the customers.

9. Repeat this procedure for each shelf in the bay.

Power Cabling - Narrowband Shelf

Description

Two -48 volt battery feeders (A and B) are required from the battery distribution fuse board (BDFB) to the DDM-2000 FiberReach bay.

Procedure

1. Obtain the single shelf power cables (ED-8C852-20, G9 and G13).
2. For each DDM-2000 FiberReach Narrowband shelf:
 - a. Locate the ED-8C852-20, Group 9 DDM-2000 FiberReach Multiplexer shelf power cable.
 - b. Remove the protective cover over the TB1 terminal strip by removing the screw at the top of the cover and allowing the cover to hinge down, see Figure 4-1 on page 4-22.
 - c. Loosen the screws on the TB1 terminal strip.
 - d. Prepare the ends of the wires on the cable and insert them into the TB1 terminal strip on the rear of the shelf per the following table:

Terminal Designation	Wire Color
-48 RNG RTN	Slate-Black
-48 RNG	Slate
-48 V RTN	Black
-48 V	Red
GND	Green



NOTE:

The green ground wire is not part of the ED8C852-20, Group 9 cable assembly.

- e. Tighten the screws on the TB1 terminal strip.
 - f. Connect the P3 and P4 connectors at the other end of the G9 cable to the J3 and J4 connectors, respectively, of the single shelf power cable (G13).
3. Route the G13 power cable out of the bay and toward the BDFB or other power equipment, dressing the cable as shown in the figures in Section 2.

⇒ NOTE:

If only one FiberReach Narrowband shelf is installed in the carrier, route the cables to the right or the left so that they will not interfere with the future installation of a wideband shelf or a second narrowband shelf. The Narrowband shelf is approximately the same size as the wideband shelf.

⇒ NOTE:

The DDM-2000 FiberReach Shelf Carrier Assembly is powered by -48 V DC.

▲ WARNING:

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

4. Splice feeders from the BDFB to the DDM-2000 FiberReach power cable.

⇒ NOTE:

Four cables are spliced to each power cable: BAT A, BAT A RTN, BAT B, and BAT B RTN.

⇒ NOTE:

The cables must be a minimum of 10 gauge for bay arrangements, or 12 gauge for a single shelf.

5. Label the feeders at the BDFB BAT A, BAT A RTN, BAT B, and BAT B RTN.

⇒ NOTE:

Each feeder at the BDFB should be fused for 5 amperes for a single shelf.

6. Leave the BDFB fuses out or breakers off until you are ready to do the "Powering, Verification, and Circuit Pack Installation" section of this manual.
7. Repeat this procedure for each shelf in the bay.

Miscellaneous (Office) Alarm Cabling — Narrowband Shelf

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.

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- ⇒ **NOTE:**
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.
- ⇒ **NOTE:**
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.
- ⇒ **NOTE:**
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 DDM-2000 FiberReach Narrowband to limit transient voltages and currents.
- ⇒ **NOTE:**
The ED8C785-20, Groups 6, 8, 9, 21 and 22, Office Alarm cable options are listed in Figure 4-3 on page 4-16.
- ⇒ **NOTE:**
The ED8C785-20, Groups 6, 21 and 22 Office Alarm connections are listed in Figure 4-11 on page 4-21.

Procedure

- ⇒ **NOTE:**
Office alarms are cabled to each DDM-2000 FiberReach shelf in the bay.
1. Obtain an office alarm cable ED-8C785-20, Group 6 or 8 or 9 or 21 or 22 (refer to Table 4-3 on page 4-16). One group is required for each NBS.
 2. Connect the cable to P205 of the shelf.
 3. If the cable assembly is ED8C785-20, Group 6 or 21 or 22, proceed to step #5. If the cable assembly is ED8C785-20, Group 8 or 9, proceed to step #4.
 4. Insert the multi-pin connector into the corresponding jack on the PSU. Proceed to step #9.
 5. Dress the office alarm cable from each shelf out of the DDM-2000 FiberReach bay to the office alarm panel.

⇒ NOTE:

If only one FiberReach Narrowband shelf is installed in the carrier, route the cables to the right or the left so that they will not interfere with the future installation of a wideband shelf or a second narrowband shelf. The narrowband shelf is approximately the same size as the wideband shelf.

6. Inspect the office alarm panel and add a contact protection network (if required).
7. Cut the office alarm cable to the desired length.
8. Wire-wrap the loose end of the office alarm cable to the alarm panel, making connections as shown in Table 4-11 on page 4-21.
9. Repeat this procedure for each shelf in the bay.

RS422 Microwire Telemetry Cabling — Narrowband Shelf

Description

The RS422 microwire telemetry access allows the maintenance center to control and monitor equipment collocated with the DDM-2000 FiberReach Multiplex shelf.

⇒ NOTE:

This procedure should be performed for each shelf requiring RS422 microwire telemetry.

⇒ NOTE:

The ED8C785-20, Groups 10, 23 and 24, RS422 microwire telemetry cable options and terminations are listed in Table 4-3 on page 4-16.

⇒ NOTE:

RS422 microwire telemetry connections are listed in Table 4-10 on page 4-20.

Procedure

1. Obtain a RS422 microwire telemetry cable ED-8C785-20, Group 10 or 23 or 24 (Table 4-3 on page 4-16). The cable is connected to the shelf requiring RS422 microwire telemetry. One group is required for each NBS.
2. Connect the cable to J205.
3. Dress the cable out of the DDM-2000 FiberReach bay per the figures in Section 2 to a wire-wrap terminal strip (or where connections will be made).

⇒ NOTE:

If only one FiberReach Narrowband shelf is installed in the carrier, route the cables to the right or the left so that they will not interfere with the future installation of a second wideband shelf or a narrowband shelf. The Narrowband shelf is approximately the same size as the wideband shelf.

4. Dress and tie the cables in the bay.
5. Cut the RS422 microwire telemetry cable to the desired length at the telemetry panel.
6. Wire-wrap the loose end of the RS422 microwire telemetry cable to the wire-wrap terminal strip, making connections per Table 4-10 on page 4-20.
7. Repeat this procedure for each shelf in the bay.

Final Operations

Procedure

1. Verify that all the cables are properly dressed. See the figures in Section 2.
2. Verify that all cables are properly labeled.
3. Verify that designations where cables were wire-wrapped are properly labeled.

Table 4-1. DS1 Cable Assemblies

Description	ED-8C785-20 Group (Note 1)	Cable Length (ft.) (Note 2)	Cable Type	DDM-2000 Backplane Connections
DS1 26-Gauge Wire Application	3	75	1400004A	J200
	4 (D.A.)*	As Req'd		
	18	150		
	19	250		
	20	350		
	5	3.25	1205002D	

Table 4-1 Notes:

* Group 4 is Manufacture Discontinued (no longer available from manufacturer) and is replaced by Group 18, 19, and 20 cables.

1. Each group listed includes all the DS1 cables for one NBS.
2. 1400004A type cable is 26 gauge (maximum length is 350 feet).
3. Cables are terminated in DSUB 37 connectors at the DDM-2000 FiberReach end and terminated at the other end in RJ-45-type connectors (G5) or unterminated at the other end for wire-wrap installation (G3 or G4).

Table 4-2. Voice Frequency (VF) Cable Assemblies

Description	ED-8C785-20 Group (Note 1)	Cable Length (ft.)	Cable Type (Note 3)	DDM-2000 Backplane Connections
VF 26-Gauge Wire Application	1	75	1400012A	J300 - J303
	2 (D.A.)*	As Req'd.		
	15	150		
	16	250		
	17	500		

Table 4-2 Notes:

- * Group 2 is Manufacture Discontinued (no longer available from manufacturer) and is replaced by Group 15, 16, and 17 cables.
 - 1. Each group listed includes all the VF cables (4) for one NBS.
 - 3. 1400012A type cable is 26 gauge (maximum length is 500 feet).
 - 4. Cables are terminated in DB 25 connectors at the DDM-2000 FiberReach end and unterminated at the other end for wire-wrap installation.
-

Table 4-3. Alarm and Telemetry Cable Assemblies

Description	ED-8C785-20 Group	Cable Length (ft.) (Notes 1 & 2)	Cable Type	DDM-2000 Backplane Connections
Misc. Office Alarms 1 per Shelf	6	75 ft.	1400006A	J205
	7 (D.A.)*	As Reqd.		
	21	150		
	22	250		
	8	2 ft. 10 in.	761A1	
	9	2 ft.		
RS422 Microwire 1 per Shelf	10	75 ft.	1400006A	J206
	11 (D.A.)†	As Reqd.		
	23	150		
	24	250		
ISCI Interface	N/A			J202

Table 4-3 Notes:

- * Group 7 is Manufacture Discontinued (no longer available from manufacturer) and is replaced by Group 21 and 22 cables.
- † Group 11 is Manufacture Discontinued and replaced by Group 23 and 24 cables.
- 1. Cable lengths listed as required are specified by the customer.
- 2. All cables are 26 gauge.
- 3. The ED8C785-20, Groups 8 and 9 cables contain the miscellaneous alarms and the power feeders when powered from the 1145A AC Power Unit.

Table 4-4. Power Cable Assemblies

Description	ED-8C852-20 Group (Note 1)	Cable Length	Cable Type	DDM-2000 Backplane Connections
Power Cable	9	2 ft.	12 GA	TB1
Power Cable	13	2 ft.	14 GA	

Table 4-4 Notes:

- 1. The ED8C852-20, Groups 9 and 13 cables are used in series to bring two 48 volt supply voltages to the NBS.

Table 4-5. DS1 Transmission Connections (Groups 3, 18, 19 and 20)

DS1 Chan	T/R Term		1400004A T/R Color		Backplane Conn.
	Tip	Ring	Tip	Ring	
A Out	1	2	W-BL	BL-W	J200
B Out	3	4	W-O	O-W	
C Out	5	6	W-G	G-W	
D Out	7	8	W-BR	BR-W	
A In	9	10	W-BL	BL-W	
B In	11	12	W-O	O-W	
C In	13	14	W-G	G-W	
D In	15	16	W-BR	BR-W	

Table 4-5 Notes:

1. 1400004A type cable is 26 gauge (maximum length is 350 feet).

Table 4-6. DS1 Transmission Connections (Group 5)

DS1 Chan	T/R Term		1205002D T/R Color		Backplane Conn.
	Tip	Ring	Tip	Ring	
A Out	1	2	W-BL	BL	J200
A In	9	10	W-O	O	
B Out	3	4	W-BL	BL	
B In	11	12	W-O	O	
C Out	5	6	W-BL	BL	
C In	13	14	W-O	O	
D Out	7	8	W-BL	BL	
D In	15	16	W-O	O	

Table 4-6 Notes:

1. 1205002D type cable is 26 gauge and is 3 feet 3 inches long.

Table 4-7. Voice Frequency (VF) Transmission Connections

VF Chan	T/R Term		1400012A T/R Color		Backplane Conn.
	Tip	Ring	Tip	Ring	
1	1	14	W-BL	BL-W	J300
2	2	15	W-O	O-W	
3	3	16	W-G	G-W	
4	4	17	W-BR	BR-W	
5	5	18	W-S	S-W	
6	6	19	R-BL	BL-R	
7	7	20	R-O	O-R	
8	8	21	R-G	G-R	
9	9	22	R-BR	BR-R	
10	10	23	R-S	S-R	
11	11	24	BK-BL	BL-BK	
12	12	25	BK-O	O-BK	
13	1	14	W-BL	BL-W	J301
14	2	15	W-O	O-W	
15	3	16	W-G	G-W	
16	4	17	W-BR	BR-W	
17	5	18	W-S	S-W	
18	6	19	R-BL	BL-R	
19	7	20	R-O	O-R	
20	8	21	R-G	G-R	
21	9	22	R-BR	BR-R	
22	10	23	R-S	S-R	
23	11	24	BK-BL	BL-BK	
24	12	25	BK-O	O-BK	
25	1	14	W-BL	BL-W	J302
26	2	15	W-O	O-W	
27	3	16	W-G	G-W	
28	4	17	W-BR	BR-W	
29	5	18	W-S	S-W	
30	6	19	R-BL	BL-R	
31	7	20	R-O	O-R	
32	8	21	R-G	G-R	
33	9	22	R-BR	BR-R	
34	10	23	R-S	S-R	
35	11	24	BK-BL	BL-BK	
36	12	25	BK-O	O-BK	

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Table 4-7. Voice Frequency (VF) Transmission Connections (Continued)

VF Chan	T/R Term		1400012A T/R Color		Backplane Conn.
	Tip	Ring	Tip	Ring	
37	1	14	W-BL	BL-W	J303
38	2	15	W-O	O-W	
39	3	16	W-G	G-W	
40	4	17	W-BR	BR-W	
41	5	18	W-S	S-W	
42	6	19	R-BL	BL-R	
43	7	20	R-O	O-R	
44	8	21	R-G	G-R	
45	9	22	R-BR	BR-R	
46	10	23	R-S	S-R	
47	11	24	BK-BL	BL-BK	
48	12	25	BK-O	O-BK	

Table 4-7 Notes:

1. 1400012A type cable is 26 gauge (maximum length is 500 feet).

Table 4-8. Power Connections

Conn.	Designation	Term	Color	TS	Name
	GND	1		TB1	GND
J4	-48V	2	R		-48 V (A)
	-48V RTN	3	R-BK		RTN (A)
J3	-48 RNG	4	S		-48 V (B)
	-48 RNG RTN	5	S-BK		RTN (B)

Table 4-8 Notes:

1. The power cables shall be of sufficient gauge for a current capacity of 3 Amperes.

Table 4-9. ISCI Interface Connections

Name	Desig.	Term	Color	Conn.
	DTRBS	1		J202
	DSR	6		
	PXD	2		
	XMTBS	7		
	TXI	3		
	RCUBS	8		
	DTR	4		
	CLAIM	9		

Table 4-9 Notes:

1. The ISCI Interface cable is 26 gauge.
2. There is no cable assembly designed for this application.

Table 4-10. RS422 Microwire Connections

Name	Desig.	Term	Color	Conn.
	SEL+	2	W-BL	J206
	SEL-	10	BL-W	
	MODE+	3	W-O	
	MODE-	11	O-W	
	SK+	4	W-G	
	SK-	12	G-W	
	DO+	5	W-BR	
	DO-	13	BR-W	
	DI+	6	W-S	
	DI-	14	S-W	

Table 4-10 Notes:

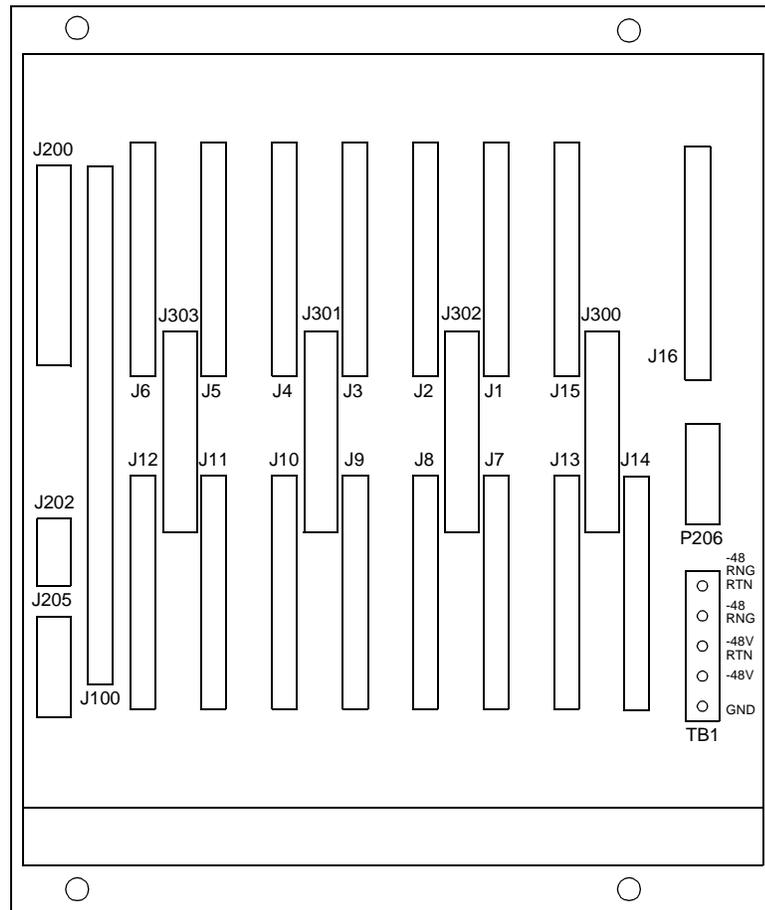
1. The RS422 Microwire cable is 26 gauge.

Table 4-11. Miscellaneous (Office) Connections

Name	Desig.	Term	Color	Conn.
MISC DT on Battery	MISC 1	1	W-BL	J205
	MISC 1R	9	BL-W	
	MISC 2	2	W-O	
	MISC 2R	10	O-W	
Currently Unused	MISC 3	3	W-G	
	MISC 3R	11	G-W	
	MISC 4	4	W-BR	
	MISC 4R	12	BR-W	
	MISC 5	5	W-S	
	MISC 5R	13	S-W	
	MISC 6	6	R-BL	
	MISC 6R	14	BL-R	

Table 4-11 Notes:

1. For each output, connect one lead to MISC() and the other lead to MISC()R for the appropriate alarm designation.
2. The miscellaneous (office) alarm cable is 26 gauge.



NOTE:
The connectors J200 through J205, P206, and J300 through J303 are for cable assemblies that connect to external equipment. TB1 is the -48 Volt input point. The connectors J1 through J16 and J100 are the backplane connectors for the circuit packs.

Figure 4-1. DDM-2000 FiberReach Narrow Band Shelf (Rear View)

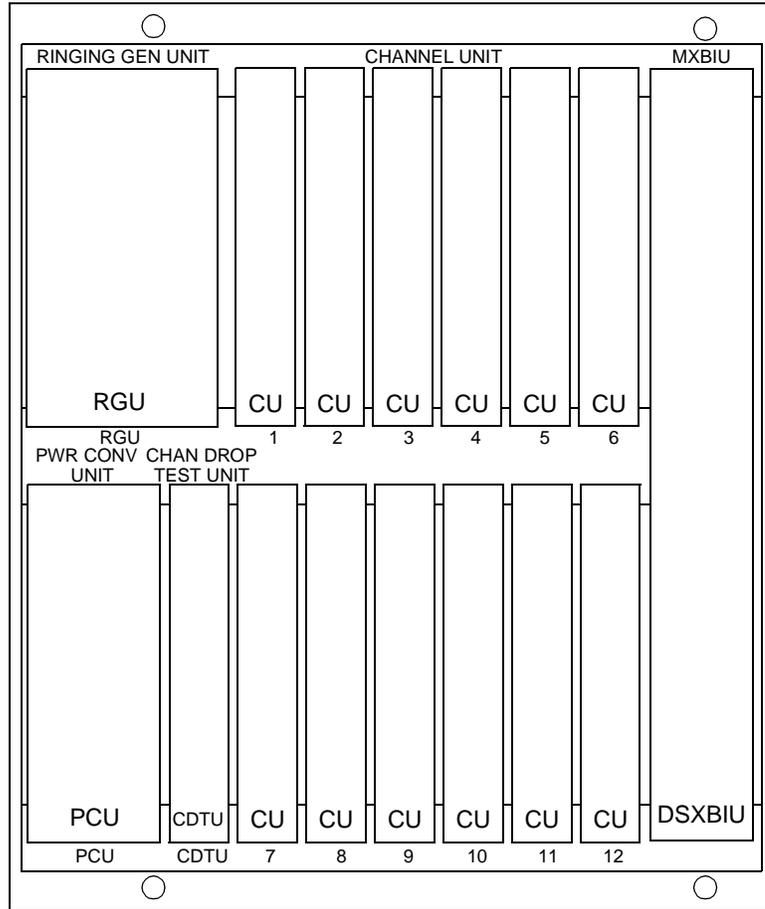
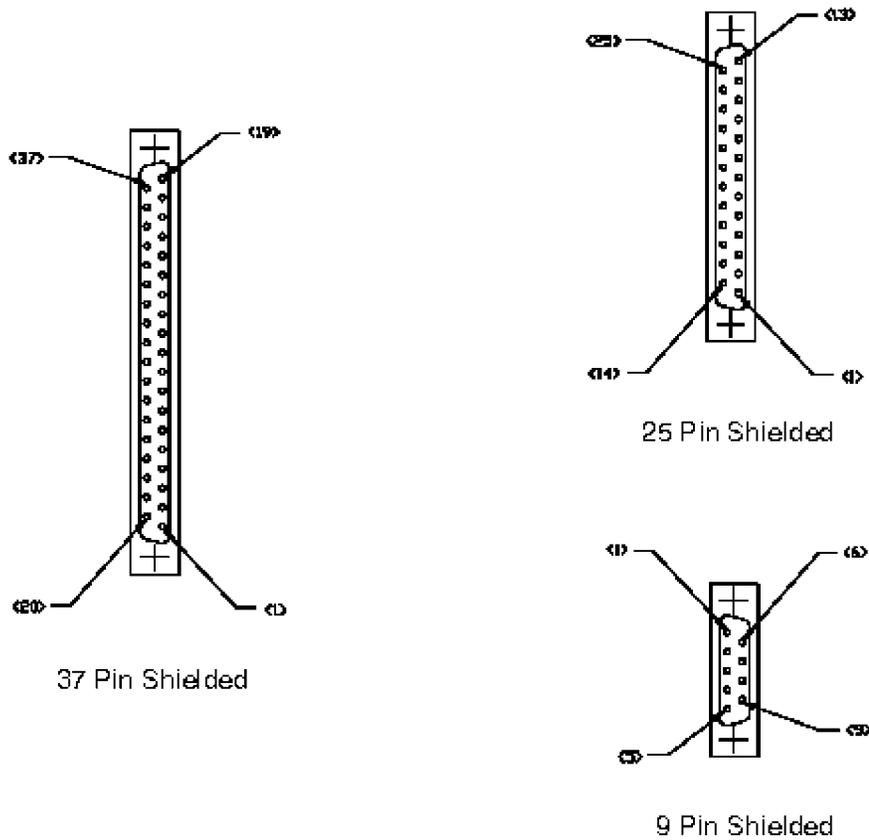


Figure 4-2. DDM-2000 FiberReach Narrow Band Shelf (Front View)



Note: Terminals are numbered by looking at the connector from the wiring side.

Figure 4-3. Connector Pinouts

NBS Powering, Verification, and Circuit Pack Installation

5

Contents

Overview	5-1
■ Software Release	5-1
■ Tools, Test Sets, and Accessories	5-2
Powering and Verification	5-2
■ Shelf Power Description	5-2
■ Procedure	5-2
Circuit Pack Installation	5-3
■ Description	5-3
■ Procedure	5-4
Final Operations	5-5
■ Procedure	5-5

NBS Powering, Verification, and Circuit Pack Installation

5

Overview

This section provides the information for verifying that the shelf is being supplied with the proper power and provides the instructions for circuit pack option settings and installation. The detailed information on the function of each circuit pack is contained in *DDM-2000 FiberReach Multiplexer User/Service Manuals* 363-206-301 for Release 2, or 363-206-305 for Release 3 and Release 4.

Software Release

The DDM-2000 FiberReach Narrowband Shelf (NBS) requires the following software releases to be installed:

Equipment	Software
DDM-2000 FiberReach Wideband Shelf	Release 2.0 or later
SLC-2000 Access System Host Digital Terminal	Release 4.3 or later

Refer to the following documents for the software download and verification procedure:

Equipment	Procedure
DDM-2000 FiberReach Wideband Shelf Software Release Description	363-206-324 (Release 3.1.2) 363-206-322 (Release 2.1.2)
SLC-2000 Access System Host Digital Terminal Software Release Description	363-208-026 (Release 4.4.00)

Tools, Test Sets, and Accessories

The following is required:

Quantity	Description
1	Digital Multimeter *
1	ESD Wrist Strap †

* The voltmeter must be capable of measuring DC voltage in the 40 to 60 volt range and AC voltage in the 80 to 120 volt range. The meter must have 1% accuracy and an input impedance of 1 megohm or greater.

† A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack that is provided on the carrier assembly.

Powering and Verification

Shelf Power Description

The 48V DC power feeders connect to the shelf's backplane where it is distributed to the circuit packs.

Procedure

1. Verify that the frame or structure into which the NBS is installed is properly grounded.
2. Verify that the NBS is properly grounded to the frame or structure.
3. Verify that there are no circuit packs installed in the NBS.
4. Disconnect the power cables from the backplane cables (P3 from J3 and P4 from J4).
5. Install a 5-ampere fuse in the battery distribution fuse board (BDFB) for each feeder to the NBS. If circuit breakers are being used, verify that they are 5-amperes and put them in the ON position.

6. Measure the voltage on the power cables.

Designation	Wire Color
-48V	Red
-48V RTN	Black
-48 RNG	Slate
-48 RNG RTN	Slate/Black

Requirement:-41.75 to -60.0 VDC

7. Reconnect the power cables to the backplane cables (P3 to J3 and P4 to J4)
8. Measure the voltage on TB1 on the NBS.

Designation	Number	Wire Color
-48V	2	Red
-48V RTN	3	Black
-48 RNG	4	Slate
-48 RNG RTN	5	Slate/Black

Requirement:-41.75 to -60.0 VDC

Circuit Pack Installation

Description

This section provides the recommended order for the installation of the circuit packs. The location of the circuit packs is shown in Figure 5-2 on page 5-8. The circuit packs are keyed to prevent their being inserted into the wrong shelf position. When installing the circuit packs, be careful to insert them straight to avoid damaging the backplane connectors.



CAUTION:

An ESD wrist strap, with a minimum resistance of 250 Kilohms, must be worn when handling the circuit packs to prevent possible damage. Before using the wrist strap, check it for opens, shorts, and minimum resistance value. If the strap does not pass these checks, it should not be used.

Procedure

1. Verify that the SPQ809 MSDT Server has been installed in the correct slot of the correct Metallic Distribution Shelf (MDS) of the SLC[®]-2000 Host Digital Terminal (HDT) for this Optical Network Unit (ONU).
2. Verify that the DLC software in the HDT is Release 4.3 or later.
3. Verify that the software in the wideband shelves at the HDT and the ONU is Release 2.0 or later.
4. Install the AUA432 Power Converter Unit (PCU).

Requirement: **FAIL** LED on the PCU goes out within 30 seconds.



CAUTION:

Before removing the PCU from the NBS, unlatch the unit and wait one minute for the capacitors to discharge.

5. Measure the DC voltage between the **-48VDC** and **-48VDC RETURN** test jacks on the PCU.

Requirement: -28 to -60 VDC

6. Install the AUA413 Ringing Generator Unit (RGU).

Requirement: **FAIL** LED on the RGU goes out within 30 seconds.



CAUTION:

Before removing the RGU from the NBS, unlatch the unit and wait one minute for the capacitors to discharge.

7. Measure the AC and DC ringing voltages between the **-20HZ** and **GND** test jacks on the RGU.

Requirement: 75 to 85 VAC RMS

Requirement: -42 to -70 VDC

8. Measure the DC voltage between the **-48V** and **GND** test jacks on the RGU.

Requirement: -42 to -60 VDC

9. Install the FHB2 Digital Cross Connect Bank Interface Unit (DSXBIU).

Requirement: **FAIL** LED on the DSXBIU goes out within 30 seconds.

10. Install the AUA421 Channel & Drop Test Unit (CDTU).

Requirement: **FAIL** LED on the CDTU goes out within 30 seconds.

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NOTE:

The **CONFIG** LED on the DSXBIU will flash while a software download is in progress.

11. Press and release the **LED Test** pushbutton on the DSXBIU.
Requirement: The indicators on the PCU, the RGU, the CDTU, and the DSXBIU shall light for approximately 10 to 15 seconds after the pushbutton is released.
12. Refer to customer provided information to determine the channel units that are to be installed.
13. Verify that protectors, such as Model 4C1E-W, Model 4C3E-W, or equivalent, have been installed on the VF lines to the customers.
14. Install the first channel unit (CU) in slot #1.
Requirement: **FAIL** LED on the CU, if equipped, goes out within 30 seconds.
15. Repeat steps 13 and 14 for each channel unit to be installed.

Final Operations

Procedure

1. Verify that all circuit packs are installed.
2. Leave the office alarm cables disconnected until all testing has been completed

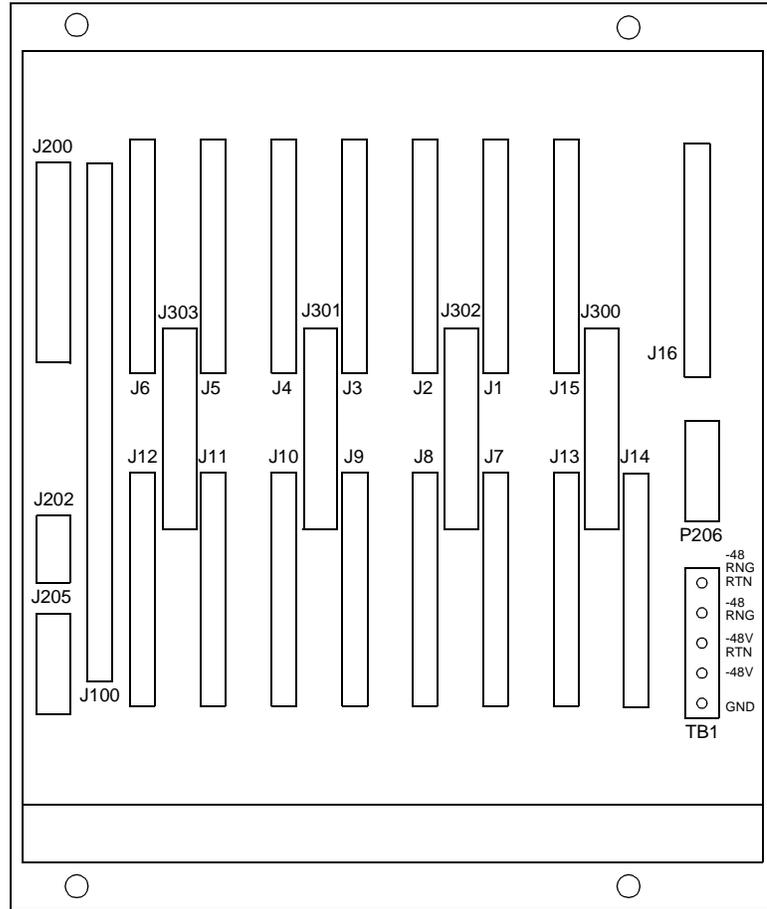
Table 5-1. DDM-2000 Fiber Reach Narrowband Shelf Codes

Product Code	Description	Max/Shelf	Min/Shelf
ED8C785-30, G1	DDM-2000 FiberReach NBS	-	-
AUA432 PCU	Power Converter Unit	1	1
AUA413 RGU	Ringing Generator Unit	1	1
FHB2 DSXBIU	Digital Cross Connect Bank Interface Unit	1	1
AUA421 CDTU	Channel & Drop Test Unit	1	1
CU (See note)	Channel Unit	12	0



NOTE:

Refer to Table 2-1 of 363-208-001, *SLC-2000 Access System User/Service Manual*, for the listing of channel units that are compatible with the NBS.



⇒ NOTE:
The connectors J200 through J205, P206, and J300 through J303 are for cable assemblies that connect to external equipment. TB1 is the -48 Volt input point. The connectors J1 through J16 and J100 are the backplane connectors for the circuit packs.

Figure 5-1. DDM-2000 FiberReach Narrow Band Shelf (Rear View)

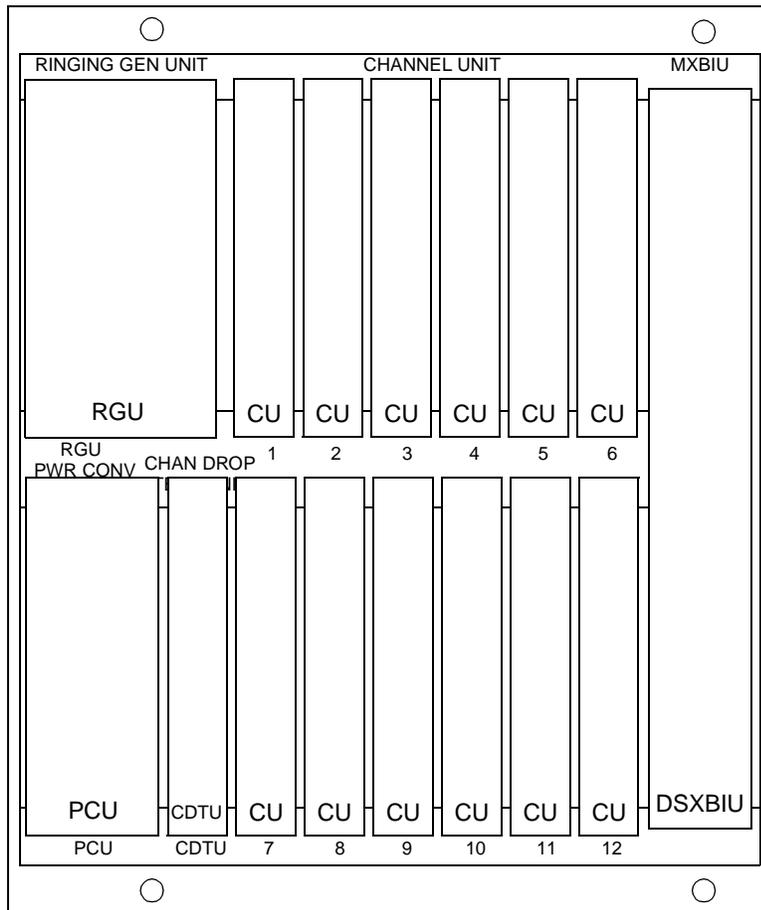


Figure 5-2. DDM-2000 FiberReach Narrow Band Shelf (Front View)

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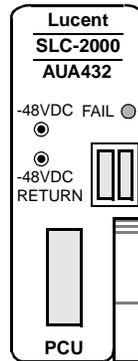


Figure 5-3. AUA432 PCU Circuit Pack

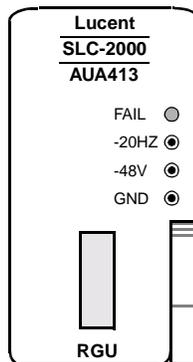


Figure 5-4. AUA413 RGU Circuit Pack

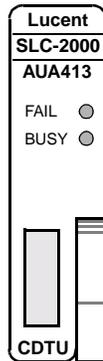


Figure 5-5. AUA421 CDTU Circuit Pack

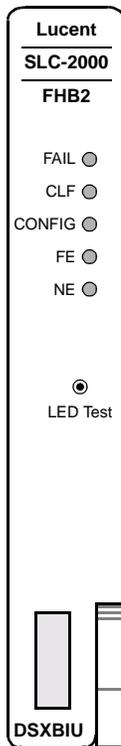


Figure 5-6. FHB2 DSXBIU Circuit Pack

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Wideband Shelf Powering, Verification, and Circuit Pack Installation

6

Contents

Overview	6-1
■ Software Download	6-1
■ Tools, Test Sets, and Accessories	6-2
<hr/>	
Powering and Verification	6-2
■ Shelf Power Description	6-2
■ Procedure	6-3
<hr/>	
Circuit Pack Provisioning (Option Settings)	6-4
■ Description	6-4
■ Controller Pack Provisioning	6-5
BBG8 (SYSCTL) Circuit Pack	6-5
■ Transmission Circuit Packs Provisioning	6-5

BBF1B (DS1) or BBF3B (DS1PM) Circuit Pack	6-5
BBF6 (T1EXT) Circuit Pack	6-5
BBF8 (HDSL) Circuit Pack	6-6
BBG4B (DS3PM) Circuit Pack	6-6
BBG19 (Data Services) Circuit Pack	6-6
26G2-U (OLIU)	6-6
28G-U (OLIU)	6-7
29G-U (OLIU)	6-7
22-Type (OLIU)	6-8

Software Download Procedure **6-9**

- Preparation 6-9
 - Procedure to Load Software to Hard Disk of the PC 6-9
 - Download Procedure 6-11
-

Circuit Pack Installation **6-14**

- Description 6-14
 - Procedure 6-14
 - OLIU Circuit Pack Installation 6-15
 - Fiber Cleaning 6-15
 - Fiber Connections 6-15
 - OLIU Circuit Pack Procedure 6-16
 - Low Speed Circuit Pack Installation Procedure 6-16
 - DS1/T1 EXT Circuit Pack Installation 6-16
 - DS3 Circuit Pack Installation 6-16
-

Final Operations **6-17**

- Procedure 6-17

Wideband Shelf Powering, Verification, and Circuit Pack Installation

6

Overview

This section provides information for verifying that the DDM-2000 FiberReach shelf is being supplied with the proper power and provides instructions for circuit pack option settings and installation. Detailed information on the function of each circuit pack is contained in *DDM-2000 FiberReach Multiplexer User/Service Manual*, 363-206-301 for Release 2, 363-206-305 for Release 3 and Release 4.

Software Download

The software download procedure mentioned in this section is required for all shelves. The BBG8 circuit pack is shipped from the factory without the software. A software package containing the necessary computer diskettes and a software release description document should be provided with the circuit packs.

**NOTE:**

Types of circuit packs available and quantities per shelf are located in Table 6-1 on page 6-17.

Software download requires an MS-DOS * compatible personal computer (PC) and an EIA-232 interface cable for connecting the PC to the connector on the faceplate of the shelf's user panel.

* Registered trademark of Microsoft Corporation.

Tools, Test Sets, and Accessories

The following are required:

Quantity	Description
1	Multimeter (Optional)*
1	Wrist Strap†
1	Personal Computer (PC)

* 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 user panel will alarm or shut down if the proper voltage is not supplied.

† A wrist strap must be worn when handling circuit packs. Use the electrostatic discharge (ESD) jack provided on the carrier assembly.

Powering and Verification

Shelf Power Description

The 48 V DC power feeders connect to the shelf's user panel and, after fusing, through the backplane to the circuit packs.

⚠ WARNING:
When connectors P3 and P4 are powered connector P5 will also be live. Connector P5 should be dressed to the bay in such a way as to prevent a short from occurring.

⚠ CAUTION:
The power feed connector labeled P5 on the G38 cable bypasses the fuses on the ECC1 (USRPNL) and is provided to allow an in-service replacement or upgrade of the ECC1 (USRPNL) and should not be connected at this time. Any long term connection to the P5 connector could result in circuit pack damage and loss of service.

Procedure

1. Verify that the frame or structure into which the DDM-2000 FiberReach shelf is installed is properly grounded.
2. Verify that the DDM-2000 FiberReach shelf is properly grounded to the frame or structure.
3. Verify that a 3 Ampere fuse is installed in the DDM-2000 FiberReach shelf user panel for each feeder.
4. Disconnect the power cable from the backplane cable (P3 from J3 and P4 from J4).
5. If this is a Wall DT installation continue with Step **(6)**, if not continue with Step **(11)**.
6. If the Wall DT is miscellaneous powered turn on the miscellaneous power unit and continue with Step **(14)**. If the Wall DT is powered by the 1145B1 power supply continue with Step **(7)**.
7. Connect the battery (if supplied) to the 1145B1 power supply.
8. Connect the 1145B1 power supply to the AC power source.
9. The Green and Yellow LEDs on the power supply should be lit. The Green LED means the power supply is providing power, and the Yellow LED means the battery (if supplied) is being charged.
10. If these LEDs are lit continue with Step **(14)**, if not see the 1145B1 power supply manual for more details.
11. Install a 5 Ampere fuse in the battery distribution fuse board (BDFB) that fuses the DDM-2000 FiberReach.
12. If breakers are being used, verify that a 5 ampere breaker is being used if in a single shelf.
13. If breakers are being used, put the breaker in the ON position.
14. Using a voltmeter, measure the voltage on the power cable between BAT A and BAT A RTN, and then between BAT B and BAT B RTN.

Designation	Color
BAT A	Red
BAT A RTN	Black
BAT B	Slate
BAT B RTN	Slate-Black

Requirement: The voltage MUST be between 41.75 and 60.0 V DC.

15. Reconnect the "A" feed of the power cable to the backplane cable (P3 to J3).
16. Verify the PWR ON A LED on the DDM-2000 FiberReach user panel is lighted with only the "A" feed connected.
17. Disconnect the "A" feed of the power cable from the backplane cable (P3 from J3).
18. Reconnect the "B" feed of the power cable to the backplane cable (P4 to J4).
19. Verify the PWR ON B LED on the DDM-2000 FiberReach user panel is lighted with only the "B" feed connected.
20. Reconnect the "A" feed of the power cable to the backplane cable (P3 to J3).
21. Verify that the PWR ON A and B LED on the DDM-2000 FiberReach user panel is lighted with both the "A" and "B" feed connected.

Circuit Pack Provisioning (Option Settings)

Description

This section provides instructions for setting circuit pack options on all the DDM-2000 circuit packs. After circuit packs have been optioned, they may be placed in the shelf but NOT FULLY INSTALLED.



NOTE:

The instructions for circuit packs not provided should be ignored.



NOTE:

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



CAUTION:

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

Controller Pack Provisioning

BBG8 (SYSCTL) Circuit Pack

1. The SYSCTL (BBG8) circuit pack has two option switches for assigning:
 - Product type
 - TBOS shelf terminator selection.
2. Set the SYSCTL circuit pack option switches as shown in Figure 6-2 on page 6-21.
3. Place, but do not fully install, the SYSCTL circuit pack into the shelf.

Transmission Circuit Packs Provisioning

BBF1B (DS1) or BBF3B (DS1PM) Circuit Pack

The BBF1B (DS1) or BBF3B (DS1PM) circuit pack has one option switch for assigning the following:

- Line build out (distance to DSX)
- DS1 line code [alternate mark inversion (AMI) or bipolar with eight zero substitution (B8ZS)].
- Switch 1, Section 8 is unused and ignored when using the BBF1B, but for the BBF3B it must be set to OFF.



NOTE:

Each DS1 channel's line code can be individually set.



NOTE:

In the absence of DS1 line coding information, coding should be set for AMI.

1. Set the DS1 circuit pack option switch as required. Refer to Figure 6-3 on page 6-22.
2. Place, but do not fully install, the DS1 circuit pack into the shelf.

BBF6 (T1EXT) Circuit Pack

The BBF6 (T1EXT) circuit pack has one option switch for assigning the following:

- T1 line code [alternate mark inversion (AMI) or bipolar with eight zero substitution (B8ZS)].
- Switch 1, Section 8 is unused and it must be set to OFF.

⇒ NOTE:
Each T1 channel's line code can be individually set.

⇒ NOTE:
In the absence of T1 line coding information, coding should be set for AMI.

1. Set the T1 circuit pack option switch as required. Refer to Figure 6-3 on page 6-22.
2. Place, but do not fully install, the T1 circuit pack into the shelf.

BBF8 (HDSL) Circuit Pack

The BBF6 DSL circuit pack has one option switch for assigning the following:

- HDSL Start-Up (master or slave)
 - HDSL Management. (local or through)
1. To set the HDSL On set S1-2 and S1-4 to ON.
 2. For Local Operation, set S1-1 and S1-3 to OFF.

BBG4B (DS3PM) Circuit Pack

The BBG4B (DS3) circuit pack is used when the low speed input is to be a DS3 signal. The BBG4B circuit pack has two options jumpers for line build out (LBO).

1. Set the BBG4B circuit pack options jumpers (for the distance to the DSX) as shown in Figure 6-6 on page 6-25.
2. Place, but do not fully install, the BBG4 or BBF4B circuit packs into the shelf.

BBG19 (Data Services) Circuit Pack

The BBG19 (Data Services) circuit pack has input and output connectors on the face plate rather than the backplane. The BBG19 circuit pack has two options jumpers for line build out (LBO) and the setting are identical to the BBG4B DS3 circuit pack.

1. Place, but do not fully install, the BBG19 circuit packs into the shelf.

26G2-U (OLIU)

The 26G2-U OLIU circuit packs are required for DDM-2000 FiberReach shelves using Release 2, and may also be equipped Release 3 or 4 software.

1. The 26G2-U OLIU circuit pack has no customer switch set options.

⇒ NOTE:
A 15 db LBO is required to loop the 26G2-U OLIU back on itself.

2. The 26G2-U OLIU circuit pack is shipped with a 0 dB *ST*[®] universal LBO installed. If an SC or FC/PC connector or different LBO is required; the universal LBO can be ordered separately. See Table 6-2 on page 6-19.

1. To remove the universal LBO.
2. Depress the locking tab on the buildout until the locking tab is free from the locked position, rotate the buildout counterclockwise to the stop position, and separate the buildout block by pulling it toward you. Refer to the appropriate figure in Figure 6-5 on page 6-24 for the specific buildout type.
3. To install the universal LBO.

 **NOTE:**

Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

4. Remove the protector caps and plugs (if equipped) from buildout and buildout block.
 5. Align the lightguide buildout locking tab with slot in buildout block (unlocked position), push in, and rotate clockwise until locked into position. Refer to the appropriate figure in Figure 6-5 on page 6-24 for the specific buildout type.
3. Place, but do not fully install, the 26G2-U OLIU circuit pack into the shelf.

28G-U (OLIU)

The 28G-U OC-3 OLIU circuit packs are available for use in the main slots of the DDM-2000 FiberReach shelf starting with Release 2.2 (non-TARP[†] release) and 3 (TARP release). A DDM-2000 FiberReach shelf equipped with 28G-U OLIUs can be linked with other similarly equipped FiberReach shelves and at least one non-FiberReach DDM-2000 OC-3 or OC-12 shelf.

1. The 24G-U OLIU circuit pack has no customer switch set options.

 **NOTE:**

An LBO is not required to loop the 28G-U OLIU back on itself.

2. The 28G-U OLIU circuit pack is shipped with a 0 dB *ST*[®] universal LBO installed. If an SC or FC/PC connector or different LBO is required; the universal LBO can be ordered separately. See Table 6-2 on page 6-19.
3. Place, but do not fully install, the 28G-U OLIU circuit pack into the shelf.

29G-U (OLIU)

The 29G-U OC-3 OLIU circuit packs are available for use in the main slots of the DDM-2000 FiberReach shelf starting with Release 4 (TARP release). A DDM-2000 FiberReach shelf equipped with 29G-U OLIUs can be linked with other similarly equipped FiberReach shelves and at least one non-FiberReach DDM-2000 OC-3 or

† Target Identifier Address Resolution Protocol

OC-12 shelf. All the same options for dropping traffic at low speeds ports that were supported on a DDM-2000 FiberReach system equipped with the 26/28-type OLIUs and running Release 3 continue to be supported when the 29-type OLIUs are used

⇒ NOTE:

An LBO is not required to loop the 29-Type OLIU back on itself.

1. The 29G-U OLIU circuit pack has no customer switch set options.
2. The 29G-U OLIU circuit pack is shipped with a 0 dB *ST*[®] universal LBO installed. If an SC or FC/PC connector or different LBO is required; the universal LBO can be ordered separately. See Table 6-2 on page 6-19.
3. Place, but do not fully install, the 29G-U OLIU circuit pack into the shelf.

22-Type (OLIU)

The 22-Type OC-3 OLIU circuit packs are available for use in the Function Unit slots of the DDM-2000 FiberReach shelf starting with Release 3 (TARP release). Starting with Release 4 (TARP release), a DDM-2000 FiberReach shelf equipped with 22-type OLIUs provides the ability of transporting STS-3c services on the low speed Function Unit interface that has been provisioned for 0X1 applications (default).

1. The 22-type OLIU circuit pack has no customer switch set options.

⇒ NOTE:

An LBO is not required to loop the 22-Type OLIU back on itself.

2. Place, but do not fully install, the 22-Type OLIU circuit pack into the shelf.

Software Download Procedure

Preparation

1. Verify that the following is available:
 - Diskettes containing DDM-2000 FiberReach the Release software required
 - 363-206-301, *DDM-2000 FiberReach Multiplexer, User/Service Manual for Release 2* (provided with the DDM-2000 shelf).
 - 363-206-305, *DDM-2000 FiberReach Multiplexer, User/Service Manual for Releases 3 and 4* (provided with the DDM-2000 shelf).
2. Verify that both the PWR ON (power on) LEDs on the DDM-2000 FiberReach shelf user panel is lighted.
3. Insert the BBG8 circuit pack into the slot adjacent to the user panel.



NOTE:

Installing the circuit pack requires some force.

The FAULT LED on the BBG8 circuit pack will light for several seconds and then extinguish. The letter "P" should be displayed in the FE ID display indicating that the BBG8 circuit pack is not equipped with software.

Procedure to Load Software to Hard Disk of the PC



NOTE:

In most cases the for the software download to work, the download must be done from the PC's hard drive not from the software diskettes.

1. If you are already in MS-DOS[‡] continue with Step (4), if you are using Windows 95[‡] continue with Step (2), if you are using Windows continue with Step (3).
2. If are using Windows 95[‡] find the Task Bar:
 - a. The Task Bar will either be:
 1. On the BOTTOM of the screen with the Start Button on the LEFT.
 2. On the TOP of the screen with the Start Button on the LEFT.
 3. On the LEFT of the screen with the Start Button on the TOP.
 4. On the RIGHT of the screen with the Start Button on the TOP.

[‡] MS-DOS is a registered trademark, and Windows and Windows 95 are Trademarks of Microsoft Corporation.

- b. If you can not find the Task Bar then press "CTRL" and "ESC" keys at the same time. This will bring up the Task Bar. If it does not find the Task Bar then you are either in the MS-DOS mode or you are NOT running Windows 95™.
 - c. Click on the Start Button on the Task Bar.
 - d. Click on Shutdown on the drop down Menu that appears.
 - e. Select the Restart Computer in MS-DOS™ Mode selection.
 - f. Click on the Yes Button.
 - g. This will shutdown Windows 95™ and restart the PC in MS-DOS mode.
 - h. Now that the PC is in MS-DOS mode, continue with Step (4)
3. If you are using Windows™:
- a. find the Program Manager:
 1. While holding down the "ALT" key press the "TAB" key.
 2. This will display a box at the center of the screen displaying one of the programs running on the PC.
 3. While still holding down the "ALT" key continue to press the "TAB" key, until the box displays the Program Manager.
 4. Release the "ALT" key and the Program Manager will be displayed.
 - b. On the Program Manager Menu bar click on the item File.
 - c. On the drop down file menu click on the item Exit Windows.
 - d. In the box that is displayed click on the Ok button.
4. When the prompt C:> appears, type the following commands:
- ```
mkdir Rabc <ENTER>
cd Rabc <ENTER>
```

**⇒ NOTE:**

"Rabc" means "Release abc". For example: R322.

5. Insert the original generic program diskette in drive A, and close the door. Type the following command:
 

```
copy a:*. * <ENTER>
```

This command tells MS-DOS™ software to copy all of the files from the A drive to the C drive (hard disk). Open the drive door, and remove the original diskette from the drive.
6. Repeat Step (5) for all diskettes.

**⇒ NOTE:**

The checkpgm command may take up to 25 minutes to complete.

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7. Execute the command "checkpgm" to check the hard disk installation of the program. Check for the following response:

```
PC has DDM-2000 program version a.b.c
Checking files.....
Checking document integrity
.....
/* All files OK. */
;
```

## Download Procedure

---

### ⇒ NOTE:

Refer to the "Install New Generic Program" (DLP-525) of Lucent Technologies *DDM-2000 FiberReach Multiplexer, User/Service Manual* and the Software Release Description while performing the following procedure. If unfamiliar with the operation of the PC, refer to the "Introduction to the PC" (DLP-533) of Lucent Technologies, *DDM-2000 FiberReach Multiplexer, User/Service Manual*.

### ⇒ NOTE:

In most cases the for the software download to work, the download must be done from the PC's hard drive not from the software diskettes.

1. If you have not copied the software diskettes to the hard disk go back to the "Procedure to Load Software to Hard Disk of the PC" on page 6-9 before continuing.
2. Connect the PC to the CIT connector on the front of the shelf user panel.
3. If not already in the directory where you loaded the software diskettes use the "cd" command to change directory to it.
4. Enter the "**term**" command. Check for the following response:

```

This program establishes an interface to a DDM-2000 system or
SLC-2000 Access System from which a new DDM-2000 program may be installed.

* COM1 selected, to alter COM PORT selection enter command "TERM COMn" *

The file README contains additional information.
To read this file, type ctrl-C now, type y to terminate the batch job
and enter the command "MORE < README".
To alter the COM PORT selection, type ctrl-C now, type y to terminate
the batch job and enter the command "TERM COMn" , where n = 1 or 2 .
To proceed with the installation,
Press any key to continue. . .
```

5. This screen tells the user which com port is selected and tells the user to use the command "**term com2**" to select com port 2.

**⇒ NOTE:**

The only valid com ports are com1 or com2.

6. Press any key to continue. Check for the following response:

```

When downloading a generic to a controller for the first time, or
when doing a forced download, the baudrate setting of the PC must
match the default for the controller, or the download will not
start. If you do not see the download proceeding (as indicated
by rows of dots) within two minutes of pressing return after
this message, change the PC baud rate and try again:
- if currently set to 9600, change to 4800
- if currently set to 4800, change to 9600
The baud rate is changed by
 1) press alt-c
 2) use return key to move to the 'speed' field
 3) press space bar until desired rate appears
 4) press escape key to activate the new rate
If doing the initial download to a new controller, the download will
restart automatically at this point. If doing a forced download
reset the controller and depress the FE SEL and UPD/INIT buttons
simultaneously to restart the download.
Press any key to continue . . .
```

7. This screen gives the user instructions on what to do if the download procedure has failed once. If the download has failed follow the instructions and change the PC baud rate.

8. Press any key to continue. Check for the following response:

```

 C T R M
Version 3.1.1, January 31, 1988
Ted Roycraft, (C) Copyright 1988
 All Rights Reserved.

Initialization file: ctrm.ini
Lines in memory buffer: 2426
 Char Stop Flow Local Int Port Kpkt xon xoff Term
 Cnfg Speed Size Bits Parity Ctrl Echo Vect Addr Size char char Type
 ---- -
* 1 9600 8 1 none xon/xoff n 4 3f8H 1200 11H 13H ctrm
 2 9600 8 1 none xon/xoff n 3 2f8H 1200 11H 13H ctrm
 3 9600 8 1 none xon/xoff n 4 3e8H 1200 11H 13H ctrm
 4 9600 8 1 none xon/xoff n 4 2e8H 1200 11H 13H ctrm
Script file: NUL

CTRM ready. (Type Alt-h for help.)
Communications established

17-Jul-96 15:47:31
```

9. After the above screen is displayed you should see following lines displayed at the bottom of the screen:

pc-load

This will be replaced by:

Searching for optimal transfer rate.

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This will be replaced by:

```
Handshake established at <baudrate> baud.
```

This will be replaced by:

```
In progress
```

**⇒ NOTE:**

A series of dots following the 'In Progress' will continue while the software is downloaded. If using diskettes a prompt will be displayed when the next diskette is required.

10. After installation is completed, the PC displays the following completion message:

```
ins-prog: TID COMPLD
/* Generic program a.b.c is installed */
```

The SYSCTL then resets and the PC is disconnected from the system.

11. Repeat the software download procedure for the spare BBG8 circuit pack.

**⇒ NOTE:**

Only one software download is permitted per CTRM session. After completing one download you must exit CTRM (press ALT and F2 keys together) and re-execute TERM before starting a second download.

## Circuit Pack Installation

---

### Description

---

This section provides the recommended order for circuit pack installation.

Locations of circuit pack units are shown in Figure 6-1 on page 6-20 for Release 3 and 4.

Circuit packs are keyed to prevent being inserted into the wrong shelf position. Installing circuit packs requires some force. When installing the circuit packs, be careful to insert them straight to avoid damaging the LEDs.

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

**⇒ NOTE:**  
A wrist strap **MUST** be worn when handling circuit packs.

**⇒ NOTE:**  
The UPD/INIT push-button on the SYSCTL (BBG8) circuit pack is recessed and will require a pointed object, like a ballpoint pen, to press it.

**⇒ NOTE:**  
The instructions for circuit packs not provided should be ignored.

### Procedure

---

1. Remove the BBG8 (SYSCTL) circuit pack and reinsert it into the shelf.
2. When the user panel CR LED flashes, depress the UPD/INIT push-button on the front of the SYSCTL within 10 seconds. The CR LED will extinguish. Then the appropriate ALARM LEDs will light to indicate the shelf's present status.

**⇒ NOTE:**  
To add a circuit pack to the SYSCTL's equipment list, the circuit pack needs only to be installed. However, to delete a circuit pack from the SYSCTL's equipment list, a UPD/INIT must be performed after the pack is unseated; otherwise, the system will alarm.

## OLIU Circuit Pack Installation

---

### Fiber Cleaning

-  **NOTE:**  
All fiber connectors and couplings should be cleaned before doing initial connections or subsequent connections following the procedure.
1. On the printed wiring board side of the OLIU circuit pack's faceplate, disconnect one of the fiber connectors from the faceplate coupling.
  2. Clean the end and sides of the connector tips with a lint-free, optical quality tissue. Blow any lint or dust from the connector, using a canned air duster 3 inches from the face of the connector.
  3. Clean the coupling on the faceplate of the OLIU by rotating a pipe cleaner, moistened with isopropyl alcohol, inside the coupling.

### Fiber Connections

1. Install the fiber connector onto the coupling by aligning the mark on the rim of the connector body with the slot in the coupling. Push the connector onto the coupling with a clockwise twist-locking motion.

 **NOTE:**  
The top connector on the OLIU is for the receiver (IN). The bottom connector on the OLIU is for the transmitter (OUT).

 **NOTE:**  
All precautions should be observed when handling fiber optic cables. When fiber cables are not connected to the equipment, the protective fiber covers should be in place. Optical fiber cables should have been placed in a protective tube and clearly labeled. If this has not been done, refer to the "Equipment and Rear Access Cable Installation" section.

 **NOTE:**  
A 15 db LBO is required to loop the 26G2-U OLIU back on itself.

 **CAUTION:**  
*Do NOT bend the optical fiber cables sharply. Exceeding the bending radius of optical fiber cables may cause permanent damage.*

2. Place the optical fiber cables in the fiber tray through the retainer bar and route the cables out the side of the fiber tray.

### **OLIU Circuit Pack Procedure**

1. Fully insert the OLIU circuit packs into the shelf.



**NOTE:**

The connectors on the OLIU circuit pack should ALWAYS be connected to fiber or have protective covers on them.



**WARNING:**

*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.*



**WARNING:**

*Invisible laser radiation when unterminated. Avoid direct exposure to beam.*

### **Low Speed Circuit Pack Installation Procedure**

#### **DS1/T1 EXT Circuit Pack Installation**

1. Fully insert the BBF1B (DS1) or BBF3B (DS1PM) circuit packs into the shelf.
2. Fully insert the BBF6 (T1EXT) circuit packs into the shelf.



**NOTE:**

If a FiberReach Wideband shelf is equipped for 1x7 protection, a 177A retainer MUST be inserted in all vacant service slots.

3. If furnished, fully insert the BBF8 (HDSL) circuit packs into the shelf.

#### **DS3 Circuit Pack Installation**

1. Fully insert the BBG4B (DS3) or BBG19 (Data Services) circuit packs into the shelf.

## Final Operations

### Procedure

1. Verify all circuit packs are installed.
2. Verify the optical fiber cables are connected.
3. If the OLIU circuit pack is not receiving an incoming signal on the fiber, its FAULT LED will flash, and the FAULT LED on the BBG8 (SYSCTL) will also flash.
4. If there are any FAULT LEDs ON, press the UPD/INIT push-button on the SYSCTL circuit pack.
5. If there are still FAULT LEDs ON, ignore them until the installation process is completed. Any failures will be isolated in the following sections.
6. Leave the office alarm cables disconnected until all testing has been completed.

**Table 6-1. DDM-2000 FiberReach Circuit Pack Codes**

| Product Code                                    | Description                                                | Max/ Shelf      |                 | Min/ Shelf (Note1) |                 |
|-------------------------------------------------|------------------------------------------------------------|-----------------|-----------------|--------------------|-----------------|
|                                                 |                                                            | 1x1 Protection  | 1x7 Protection  | 1x1 Protection     | 1x7 Protection  |
| ED-8C762-30, G1                                 | DDM-2000 FiberReach Shelf Assembly                         | -               | -               | -                  | -               |
| BBG8                                            | SYSCTL Circuit Pack                                        | 1               | 1               | 1                  | 1               |
| BBF1B                                           | DS1 Circuit Pack                                           | 8               | 8               | 2*                 | 2*              |
| BBF3B                                           | DS1 PM Circuit Pack                                        | 8               | 8               | 2*                 | 2*              |
| BBF8                                            | HDSL Circuit Pack                                          | 8               | 8               | 2*                 | 2*              |
| BBF6                                            | T1EXT T1 Extension Circuit Pack                            | 8               | 8               | 2*                 | 2*              |
| 177A                                            | Apparatus Blank                                            | 0               | 6               | 0                  | 0               |
| BBG4B                                           | DS3 Circuit Pack                                           | 2               | 2               | 2                  | 2               |
| BBG19                                           | DATA SERVICES Circuit Pack                                 | 2               | 2               | 2                  | 2               |
| 22-Type                                         | OLIU Regenerator                                           | 2               | 2               | 2                  | 2               |
| 26G2-U                                          | OLIU Regenerator                                           | 2               | 2               | 2                  | 2               |
| 28G-U                                           | OLIU Regenerator                                           | 2               | 2               | 2                  | 2               |
| 29G-U                                           | OLIU Regenerator                                           | 2               | 2               | 2                  | 2               |
| ED-8C783-30, G1 <sup>†</sup> or G2 <sup>‡</sup> | T1EXT Lightning and Surge Protection Assembly <sup>§</sup> | G2 <sup>‡</sup> | G2 <sup>‡</sup> | G1 <sup>†</sup>    | G2 <sup>‡</sup> |
| LPROT                                           | Lightning Protection Card                                  | 8               | 14              | 2**                | 2**             |

**Table 6-1. DDM-2000 FiberReach Circuit Pack Codes (Continued)**

| Product Code | Description | Max/ Shelf        |                   | Min/ Shelf (Note1) |                   |
|--------------|-------------|-------------------|-------------------|--------------------|-------------------|
|              |             | 1x1<br>Protection | 1x7<br>Protection | 1x1<br>Protection  | 1x7<br>Protection |

**Table 6-1 Notes:**

1. Minimum functionality, as defined here, includes protection switching, thus protection circuit packs are included.
- \* The shelf would use either BBF1B's, BBF3B's, BBF6's or BBF8's as protection pairs.
- † The Group 1 of the T1EXT Lightning and Surge Protection Assembly provides slots for up to 7 LPROT cards providing secondary lightning protection for 7 T1 (copper extensions) from up to 3½ T1EXT circuit packs (2 T1 extensions per circuit pack).
- ‡ The Group 2 of the T1EXT Lightning and Surge Protection Assembly provides slots for up to 14 LPROT cards providing secondary lightning protection for 14 T1 (copper extensions) from up to 7 T1EXT circuit packs (2 T1 extensions per circuit pack).
- § The Lightning and Surge Protection Assembly is required for all outside plant T1 applications. The lightning and surge protection assembly is for secondary protection only. The tip and ring conductors must have gas tubes (Lucent protector unit 4B3EW or equivalent) installed at the point of entry into a cabinet or building.
- \*/ The LPROT card protects 1 T1 extension 2 are required per BBF6 (T1EXT) service pack.

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**Table 6-2. Universal Lightguide Buildouts**

| Lightguide Line Build Out (LBO) | Code    | Connection | Comcode   | Connector Type  |
|---------------------------------|---------|------------|-----------|-----------------|
| 0 dB                            | A3060   | SM-SM      | 106708951 | SC              |
| 5 dB                            | A3060B1 | SM-SM      | 107406142 | SC              |
| 10 dB                           | A3060D1 | SM-SM      | 107406159 | SC              |
| 15 dB                           | A3060F1 | SM-SM      | 107406167 | SC              |
| 0 dB                            | A3070   | SM-SM      | 106795354 | ST <sup>®</sup> |
| 5 dB                            | A3070B1 | SM-SM      | 107406183 | ST <sup>®</sup> |
| 10 dB                           | A3070D1 | SM-SM      | 107406191 | ST <sup>®</sup> |
| 15 dB                           | A3070F1 | SM-SM      | 107406209 | ST <sup>®</sup> |
| 0 dB                            | A3080   | SM-SM      | 106795404 | FC              |
| 5 dB                            | A3080B1 | SM-SM      | 107406225 | FC              |
| 10 dB                           | A3080D1 | SM-SM      | 107406233 | FC              |
| 15 dB                           | A3080F1 | SM-SM      | 107406241 | FC              |
| 5 dB                            | A3060B  | MM-MM      | 106795271 | SC              |
| 10 dB                           | A3060D  | MM-MM      | 106795289 | SC              |
| 15 dB                           | A3060F  | MM-MM      | 106795297 | SC              |
| 5 dB                            | A3070B  | MM-MM      | 106795313 | ST <sup>®</sup> |
| 10 dB                           | A3070D  | MM-MM      | 106795321 | ST <sup>®</sup> |
| 15 dB                           | A3070F  | MM-MM      | 106795339 | ST <sup>®</sup> |

**⇒ NOTE:**  
Do **NOT** put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

**⇒ NOTE:**  
A 15 db LBO is required to loop the 26G-U OLIU or the 26G2-U OLIU back on itself.

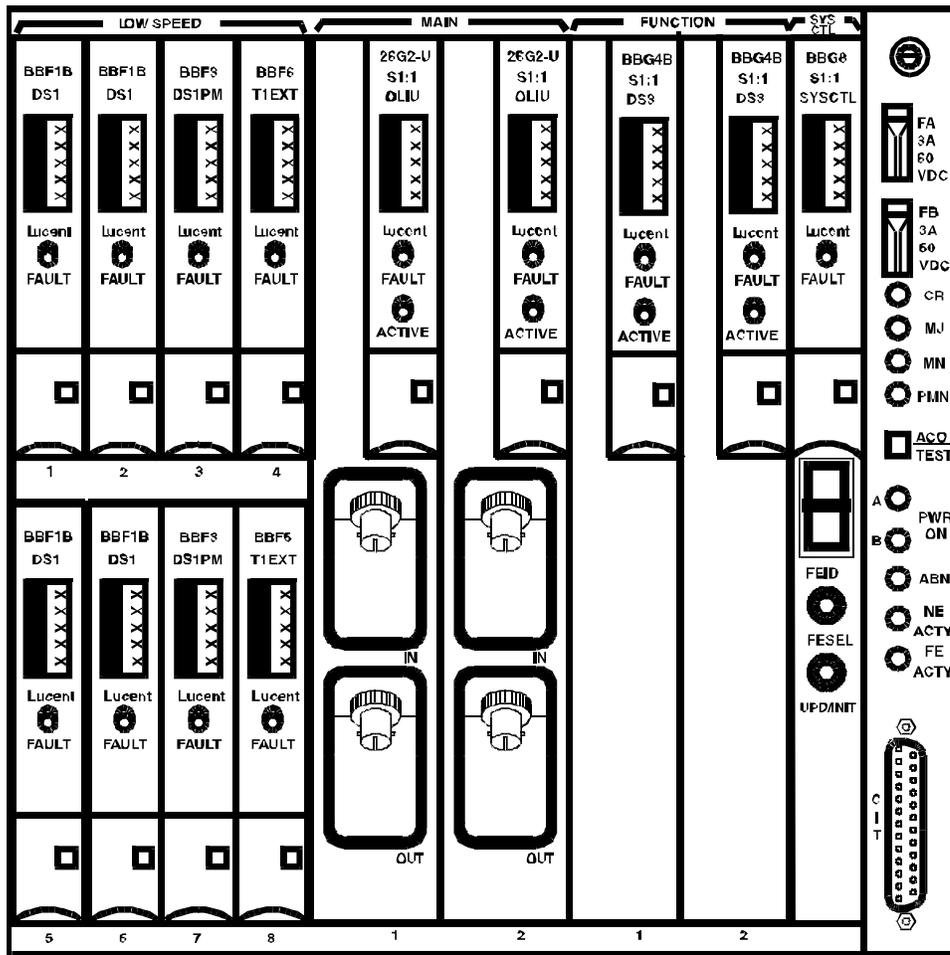
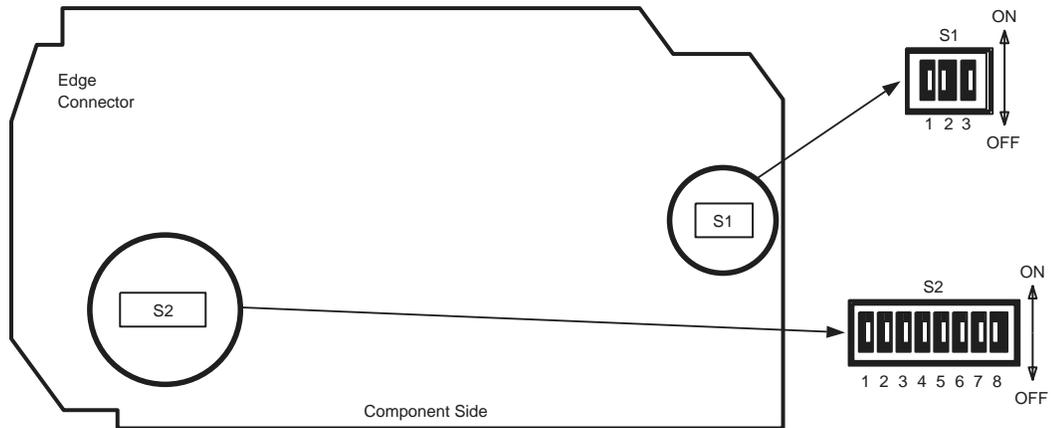


Figure 6-1. DDM-2000 FiberReach Shelf with Circuit Packs (Release 3&4)

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**BBG8(SYSCTL) Option Notes:**

1. The SYSCTL has two option switches which must be properly set. Refer to the option switch settings tables below.

**Switch 1 Settings**

| Product Type |       |       |       |
|--------------|-------|-------|-------|
| Product      | Sec 1 | Sec 2 | Sec 3 |
| FiberReach   | OFF   | OFF   | OFF   |

**SYSCTL Switch 1 Notes:**

1. For all FiberReach applications switch one all sections must be OFF.

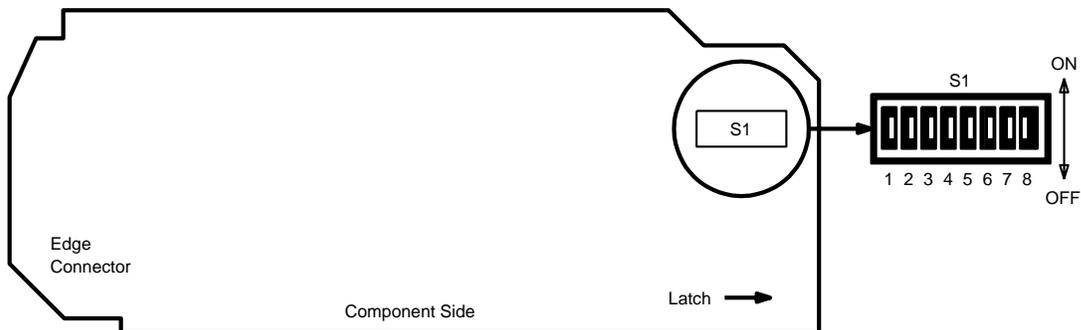
**Switch2 Settings**

| TBOS Terminator |       | Unused | FiberReach DCC |       |       |       |       |       |       |
|-----------------|-------|--------|----------------|-------|-------|-------|-------|-------|-------|
| Shelf Location  | Sec 1 | Sec 2  | Product        | Sec 3 | Sec 4 | Sec 5 | Sec 6 | Sec 7 | Sec 8 |
| Not Last        | OFF   | OFF    | FiberReach     | ON    | ON    | ON    | ON    | ON    | ON    |
| Last            | ON    |        | All Other      | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |

**SYSCTL Switch 4 Notes:**

1. Set all FiberReach applications as "not last".
2. Switch section 2 must be set to OFF.

**Figure 6-2. BBG8 (SYSCTL) Option Switches**



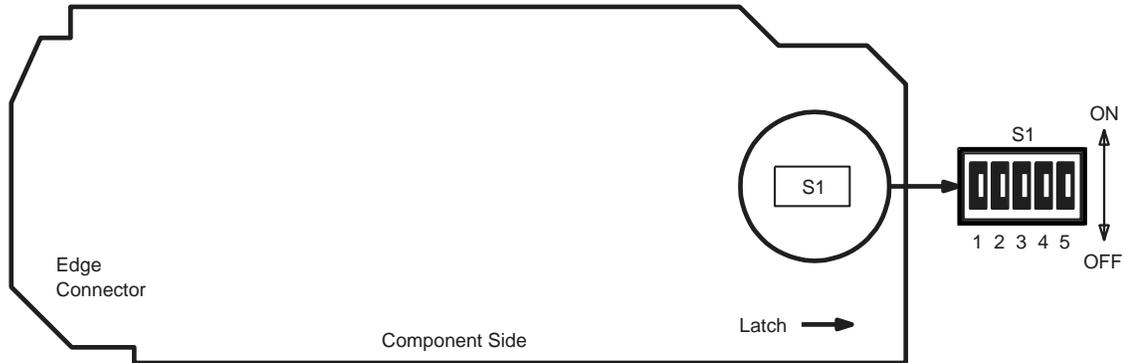
**Switch 1 Settings**

| LBO Selection                       |                                    |       |       |       | Line Code Selection |              |              |              |              |
|-------------------------------------|------------------------------------|-------|-------|-------|---------------------|--------------|--------------|--------------|--------------|
| (26 Gauge) 1249C Cable Length (ft.) | (22 Gauge) 613C Cable Length (ft.) | Sec 1 | Sec 2 | Sec 3 | Pulse Format        | Sec 4 Chan 1 | Sec 5 Chan 2 | Sec 6 Chan 3 | Sec 7 Chan 4 |
| 30 to 90                            | 30 to 133                          | OFF   | OFF   | OFF   | AMI                 | ON           | ON           | ON           | ON           |
| >90 to 180                          | >133 to 267                        | OFF   | OFF   | ON    |                     |              |              |              |              |
| >180 to 270                         | >267 to 400                        | OFF   | ON    | OFF   | B8ZS                | OFF          | OFF          | OFF          | OFF          |
| >270 to 360                         | >400 to 533                        | OFF   | ON    | ON    |                     |              |              |              |              |
| >360 to 450                         | >533 to 655                        | ON    | OFF   | OFF   |                     |              |              |              |              |

*Notes:*

1. Set the LBO setting based on the type of cable used and the cable length.
2. Section 8 is unused and ignored on the BBF1B circuit packs. On the BBF3 circuit pack section 8 must be set to OFF.
3. In the absence of engineering records, set the line code (sec 4, 5, 6, and 7) for AMI.

**Figure 6-3. BBF1B (DS1) or BBF3 (DS1PM) Option Switches**



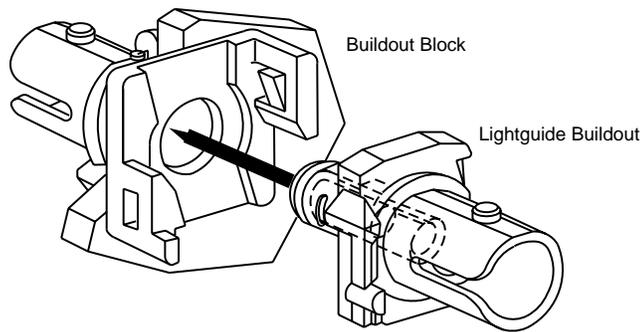
**Switch 1 Settings**

| Line Code Selection |              |              | Not Used Must be OFF |                |                |
|---------------------|--------------|--------------|----------------------|----------------|----------------|
| Pulse Format        | Sec 1 Chan 1 | Sec 2 Chan 2 | Sec 3 Not Used       | Sec 4 Not Used | Sec 5 Not Used |
| AMI                 | ON           | ON           |                      |                |                |
| B8ZS                | OFF          | OFF          | OFF                  | OFF            | OFF            |

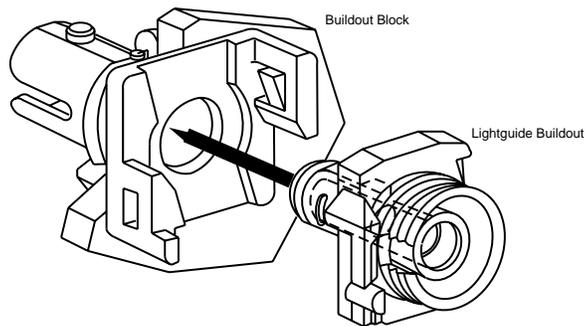
**Notes:**

1. On the BBF6 circuit pack sections 3, 4, and 5 must be set to OFF.
2. In the absence of engineering records, set the line code (sec 1 and 2) for AMI.

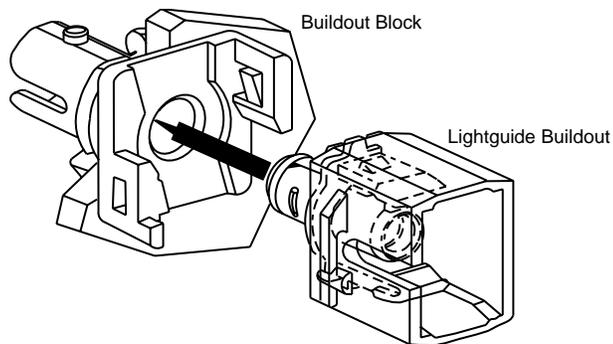
**Figure 6-4. BBF6 (T1EXT) Option Switches**



**Figure A. ST®-Type Universal Buildout**



**Figure B. FC/PC-Type Universal Buildout**

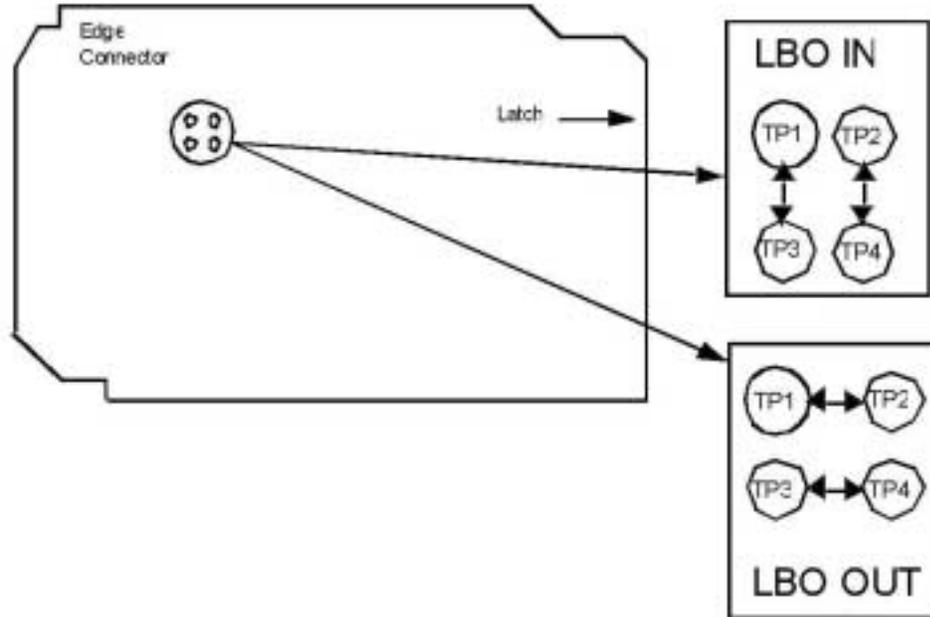


**Figure C. SC-Type Universal Buildout**

---

**Figure 6-5. Universal Buildout Types**

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**Cable Length**

| 735A<br>1735006A | 734A        | KS-19224, L2 | Plug<br>Setting<br>(Note) |
|------------------|-------------|--------------|---------------------------|
| 0 to 125         | 0 to 125    | 0 to 75      | LBO OUT                   |
| >125 to 245      | >225 to 450 | >75 to 150   | LBO OUT                   |

**Note:**

1. Set the LBO setting based on the type of cable used and the cable length

**Figure 6-6. BBG4B and BBG19 (DS3) Option Switches**

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# Wideband Shelf Release 2 Installation Tests

# 7

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## Contents

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|                                             |            |
|---------------------------------------------|------------|
| <b>Overview</b>                             | <b>7-1</b> |
| ■ Description                               | 7-1        |
| ■ LED, Pushbutton, and Display Descriptions | 7-2        |
| ■ Tools, Test Sets, and Accessories         | 7-4        |

---

|                                     |            |
|-------------------------------------|------------|
| <b>Use of Terminal</b>              | <b>7-4</b> |
| ■ Description                       | 7-4        |
| ■ Compatible Terminals              | 7-4        |
| ■ ASCII Terminal Setup              | 7-5        |
| ■ DDM-2000 FiberReach Command Notes | 7-5        |
| ■ Login Procedure                   | 7-6        |

---

|                                |            |
|--------------------------------|------------|
| <b>LED Test</b>                | <b>7-7</b> |
| ■ Description                  | 7-7        |
| ■ Procedure With a Terminal    | 7-8        |
| ■ Procedure Without a Terminal | 7-8        |

---

**Local Equipment and Cross-Connect Test** **7-8**

- Description 7-8
  - Fiber Connections 7-9
  - Provisioning 7-10
  - DS1 Tests 7-11
  - Remove DS1 Cross-Connects 7-11
- 

**Fiber Installation and Test** **7-12**

- Description 7-12
  - Fiber Installation 7-15
  - Test Fiber Connections 7-16
- 

**Establishing Cross-Connects and System Test** **7-17**

- Description 7-17
  - Explanation of Cross-Connects 7-17
  - Cross-Connect Procedure 7-19
  - Protection Switch Test 7-19
- 

**Final Operations** **7-20**

- Procedure 7-20

# Wideband Shelf Release 2 Installation Tests

# 7

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## Overview

---

This section provides test procedures for verifying the following on a Release 2 configured DDM-2000 FiberReach shelf:

- Shelf transmission
- Wiring to DS1 Cross-Connect (DSX-1)
- Fiber Installation and System Test.

## Description

---

The following information provides instructions on the use of an American Standard Code for Information Interchange (ASCII) terminal and the suggested installation tests which should be performed. If problems are encountered, refer to the "Troubleshooting" section at the end of this manual. For detailed troubleshooting, refer to *DDM-2000 FiberReach Multiplexer User/Service Manual 363-206-301*.

The installation tests verify transmission through the shelf, wiring to the cross-connect (or DACS IV-2000), fiber installation and end-to-end transmission as shown in Figure 7-1 on page 7-29 thru Figure 7-4 on page 7-32.

The following installation tests are run only in an out-of-service mode of operation. Interruption of service will result if these tests are run on an operating in-service system.

The user panel contains the EIA-232D connector and the LEDs used to perform the installation tests as shown in Figure 7-5 on page 7-33.

Before beginning the following tests the office alarm interface to the shelf J41 should be removed before tests are executed and replaced upon completion.

The following tests should be performed with the DDM-2000 FiberReach configured with the default parameters described under "Login Procedure", as described later in this section.

Observe the following notes:

 **WARNING:**  
*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*

 **NOTE:**  
To add a circuit pack to the SYSCTL's equipment list, the circuit pack needs only to be installed. However, to delete a circuit pack from the SYSCTL's equipment list, an UPD must be performed after the pack is unseated to clear alarms. If cross-connects exist they must be removed to clear a circuit pack. If in-service ports exist they must be set to auto to clear an in-service port.

 **NOTE:**  
It is important that circuit packs not be installed or replaced when the SYSCTL is not in place and operating normally. Replacing or installing circuit packs when the SYSCTL is not in-place and operating normally can result in unpredictable provisioning of the replaced/installed circuit pack.

## LED, Pushbutton, and Display Descriptions

The LEDs have a delay default of 2 seconds. Therefore, the LEDs will not light until an alarm condition has existed for 2 seconds. This delay can be altered with the `set-attr` command.

The following LEDs are located on the circuit packs:

| LED              | Description                             |
|------------------|-----------------------------------------|
| FAULT(solid)     | Circuit pack is failed                  |
| FAULT (flashing) | Circuit pack has lost its input signal* |
| ACTIVE           | Pack is carrying service**              |

\*\* DS1 packs do not have an ACTIVE LED but are assumed to be in-service unless other information is provided through the CIT.

The following LEDs are located on the user panel:

**Table 7-1. User Panel LEDs**

| <b>LED</b>                  | <b>Description</b>                                                                |
|-----------------------------|-----------------------------------------------------------------------------------|
| CR (Critical)               | Potential loss of service to greater than 96 DS0 customers                        |
| MJ (Major)                  | Potential loss of service to less than 96 DS0 customers                           |
| MN (Minor)                  | A non-service affecting failure                                                   |
| PMN (Power Minor)           | A switch from AC power to battery backup                                          |
| ACO (Alarm Cutoff)          | Audible office alarms are silenced and parallel telemetry indications are cut off |
| PWR ON A (Power On)         | The shelf is receiving a -48 V DC source A                                        |
| PWR ON B (Power On)         | The shelf is receiving a -48 V DC source B                                        |
| ABN (Abnormal)              | An abnormal condition initiated through craft interface terminal (CIT) command.   |
| NE ACTY (Near-End Activity) | One of the above conditions is present at this shelf                              |
| FE ACTY (Far-End Activity)  | One of the above conditions is present at a far-end shelf                         |

The following pushbuttons and display are located on the ECC1 User Panel and SYSCTL. See Figure 7-5 on page 7-33.

**Table 7-2. ECC1 User Panel and SYSCTL**

| <b>LED</b>                   | <b>Description</b>                                                                                                                                                                              |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACO (Alarm Cutoff)           | Silences existing audible office alarms and parallel telemetry indications                                                                                                                      |
| UPD/INIT (Update/Initialize) | Used to initialize SYSCTL upon replacement or update shelf equipment list after circuit pack or signal removal                                                                                  |
| FE SEL (Far-End Select)      | Used to display the LEDs activated at a site in the network                                                                                                                                     |
| 7-Segment Display            | Identifies the site address of the system status and alarms recently being displayed on the local user panel LEDs. Also may display the software version number currently running in the SYSCTL |

## Tools, Test Sets, and Accessories

---

The following items are required:

**Table 7-3. Tools, Test Sets and Accessories**

| Quantity   | Description                                                                                          |                                                                                                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection |                                                                                                                                                                                            |
| 1          | DSX-1 loopback cable (Note 1)                                                                        |                                                                                                                                                                                            |
| 1          | ASCII Terminal or PC configured as a terminal                                                        |                                                                                                                                                                                            |
|            | Optical fiber cables (recommended length is 2 feet) find your OLIU type below                        |                                                                                                                                                                                            |
|            | OLIU                                                                                                 | Optical fiber cable (See Table 7-9 on page 7-29)                                                                                                                                           |
| 1 per OLIU | 26G2-U                                                                                               | Single mode with ST <sup>®</sup> , FC/PC, or SC connectors on each end depending on Universal LBO used (ST <sup>®</sup> 0 dB LBO is standard See Table 7-8 on page 7-28). See Note 2 Below |

**Table 7-3 Notes:**

1. On the Wall DT the RJ45 jacks in the DSX are Looped back when no plug is installed.
2. When looping a 26G2-U OLIU back on itself a 15 dB LBO is required.

## Use of Terminal

---

### Description

---

This procedure describes which terminals are approved for use with the DDM-2000 FiberReach, how to set up the terminal, and the DDM-2000 FiberReach command structure which will be used.

### Compatible Terminals

---

The DDM-2000 FiberReach craft interface terminal (CIT) port will support rates of 300, 1200, 2400, 4800, 9600, and 19,200 baud and should be compatible with most ASCII terminals.

ASCII terminals that were compatible with DDM-1000 should be directly compatible with DDM-2000 FiberReach. See 363-206-301, *DDM-2000 FiberReach Multiplexer User/Service Manual* for a list of DDM-2000 FiberReach compatible terminals.

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The DDM-2000 FiberReach will output information to fit in a display area of 24 lines (default) by 72 characters. The number of display lines can be altered from 3 to 151 with the `set-link` command.

## ASCII Terminal Setup

---

The DDM-2000 FiberReach provides a serial ASCII terminal interface through a 25-pin female connector mounted on the user panel. The connector provides an EIA-232D interface for use with most common terminals provided that the following interface parameters are set properly:

|             |               |
|-------------|---------------|
| Full Duplex | 8 Data Bits   |
| 9600 Baud * | No Parity Bit |
| 1 Start Bit | 1 Stop Bit    |

\* The ASCII terminal can be set for baud rates of 300, 1200, 2400, 4800, 9600, or 19,200 and, the baud rate of the DDM-2000 FiberReach will be autobauded to match. When downloading a BBG8 SYCTL for the first time the baud rate must be set to 4800.

DDM-2000 FiberReach supports data rates up to 19,200 baud, but it does not provide flow control. Some terminals and PCs that can be set for higher data rates will not work properly at these rates with equipment like DDM-2000 FiberReach that does not provide flow control. The system may appear to stop working when reports or long prompts are displayed. If this happens, set the terminal for a lower baud rate.

## DDM-2000 FiberReach Command Notes

---

All DDM-2000 FiberReach commands will be issued through the ASCII terminal.

Commands can be entered in either upper or lower case (or a mixture).

If a command is partially entered, or if a ? is entered any time, the user will be prompted with a menu of available choices.

A complete list of DDM-2000 FiberReach command codes with their descriptions is contained in the 363-206-301, *DDM-2000 FiberReach Multiplexer User/Service Manual*.

The following special ASCII characters are supported:

- Semicolon (;) — Official and preferred man machine language (MML) command terminator.
- Carriage Return, Enter, or Dollar Sign (\$) — Alternative MML command terminators.
- Question Mark (?) — Suspends the present input operation and displays appropriate help which requires a user response.
- Backspace and Underbar (\_) — Erases the previous character input.
- At-sign (@) — Erases the current line.

- CANCEL, and DELETE — Terminates the current input line or currently running command.
- Hyphen (-) — Separates identifiers in the command mode.
- Colon (:) — Separates parameter blocks in a command.
- Comma (,) — Separates parameters within a parameter block in a command.

## Login Procedure

---

1. Connect one of the approved terminals (properly configured) to an EIA-232D port on one of the DDM-2000 FiberReachs in the bay.
2. Enter a Carriage Return to prompt the DDM-2000 FiberReach to autobaud.
3. After entering a second Carriage Return the user is presented with:

```
login<
```

**⇒ NOTE:**

There is a special login and password already programmed into the system for use during the execution of these tests. The login is **LUC01** and the password is **DDM-2000**.

**⇒ NOTE:**

The login and password must be uppercase.

After a successful login, the DDM-2000 FiberReach will display the system header followed by the alarm and status report:

```
DDM-2000 FiberReach Release a.b.c
TID date time
/* Active Alarms and Status Report */
<
```

**⇒ NOTE:**

Release a.b.c is the software release. TID is the Target Identifier of the shelf. Date and time are the current system time of the shelf.

Once logged on, the user can only issue commands to the online shelf. The session is terminated with the **log;** (LOGOUT) command.

4. Issue the command `init-sys:all;` (INITIALIZE-SYSTEM). This command will configure the DDM-2000 FiberReach with its default parameters.

**⇒ NOTE:**

After cross-connections are entered use `init-sys:all;` with extreme caution as it erases all cross-connects.

5. When initialization completes, (this may take several minutes), repeat steps 2 and 3 to log back into the shelf.
6. An AGNE alarm will exist upon completion of the initialization. To extinguish this alarm, set the AGNE to yes by using the `set-ne` (SET-NETWORK ELEMENT) command.
7. To change the TID, which is the name of the shelf, issue the command `set-ne` (SET-NETWORK ELEMENT). When prompted with TID= enter the desired TID consisting of up to 20 alphanumeric characters.
8. To change the number of lines displayed at a time (default = 24), issue the command `set-link` (SET-LINK). Respond to the page length prompt (pg) with the desired number of lines, between 3 and 150.
9. To change the time delay for alarms to be displayed or cleared, issue the command `set-attr-alm` (SET-ATTRIBUTE ALARM). To eliminate any alarm delay or clear delay, respond to the prompts with 0.
10. To change the time and date displayed, issue the command `set-date` (SET-DATE). Respond to the date and time prompts.

## LED Test

---

### Description

---

This test verifies proper operation of all the LEDs on the DDM-2000 FiberReach shelf. Operation of all the LEDs is necessary to assist in trouble isolation.

If there are any LED failures, determine if the problem is with the circuit pack or shelf and replace the faulty unit.

If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions.

## Procedure With a Terminal

---

Issue the command `test-led`.

The DDM-2000 FiberReach will respond with `In Progress . . . .` for the duration of the test and will issue a prompt `CMPLD` when the test has completed. All LEDs on the shelf under test should light for 10 seconds, then extinguish for 10 seconds. Then the proper LEDs will light to indicate the shelf's current status.

## Procedure Without a Terminal

---

Press and hold the ACO push-button on the user panel. While the push-button is pressed, all LEDs on the shelf under test should light.

- ⇒ NOTE:**  
If the ACO pushbutton is pressed for more than 2 seconds the 7-segment display will go blank, then it will display the currently running software release on this shelf one character at a time.

## Local Equipment and Cross-Connect Test

---

### Description

---

This test verifies proper operation of the circuit packs and the circuit pack positions, which are equipped in the DDM-2000 FiberReach shelf. It verifies proper cabling from the DDM-2000 FiberReach to the DSX cross-connect panel or connecting equipment. The shelf must successfully pass this test before testing any other feature of the DDM-2000 FiberReach.

Upon completion of this test all cross-connections will be deleted and later reentered to fit individual rings applications.

To understand cross-connects and the rings philosophy, refer to the 'Description Section' under 'Establishing Cross-Connects and System Test' of this manual.

- ⇒ NOTE:**  
If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions which have DSX cabling.

- ⇒ NOTE:**  
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 tests pass without failures.

 **NOTE:**  
Refer to the 363-206-301, DDM-2000 FiberReach Multiplexer User/Service Manual for complete command descriptions.

 **NOTE:**  
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

## **Fiber Connections**

---

1. If any optical fibers are connected to the DDM-2000 FiberReach, verify they are properly labeled.
2. Disconnect the optical fiber cables from the DDM-2000 FiberReach.
3. Connect the OLIU OUT to the OLIU IN of each OLIU, using optical fiber jumper cables. Refer to Figure 7-1 on page 7-29.

 **NOTE:**  
The optical fiber cables required are listed under "Tools, Test Sets, and Accessories" on page 7-4.

 **NOTE:**  
When looping a 262G-U OLIU back on itself a 15 dB LBO is required. See Table 7-8 on page 7-28.

 **NOTE:**  
Line Build Outs (LBOs) are installed at the "OUT" block on the 27G-type OLIU when the fiber is single mode and at "IN" block when the fiber is multimode. Loss of Frame (LOF) and DCC errors may occur otherwise.

 **NOTE:**  
If other than *ST*<sup>®</sup> type connectors are being used see Table 7-8 on page 7-28 for the universal LBOs needed and Table 7-9 on page 7-29 for the lightguide jumpers.

 **CAUTION:**  
*Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.*

## Provisioning

---

1. The 'Holdover' timing mode is required for the DSX-1 test. The timing modes are set using the 'switch-sync:' command. Enter the switch-sync command as follows:  

```
switch-sync:s=mode,pri=manual;
```
2. Check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT push-button on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
3. To test each DS1 channel through to the cross-connect panel or terminating equipment, its cross-connect map has to be made at the DDM FiberReach Shelf.
4. Enter DS1 cross-connects according to the FiberReach shelf configuration. Table 7-4 on page 7-20 contains the cross-connect map required to test DS1 service on this DDM-2000 FiberReach shelf.

5. Enter DS1 cross-connects as follows:

```
ent-crs-vt1:m-1-1-all,a-1-all:cct=twoway:y;
ent-crs-vt1:m-1-2-all,b-1-all:cct=twoway:y;
ent-crs-vt1:m-1-3-all,c-1-all:cct=twoway:y;
ent-crs-vt1:m-1-4-all,d-1-all:cct=twoway:y;
```

**⇒ NOTE:**

If the Wideband shelf is configured for 1x7 protection the following DS1 cross-connects must also be entered.

```
ent-crs-vt1:m-1-5-all,a-2-all:cct=twoway:y;
ent-crs-vt1:m-1-6-all,b-2-all:cct=twoway:y;
ent-crs-vt1:m-1-7-all,c-2-all:cct=twoway:y;
```

**⇒ NOTE:**

The addressed low-speed (LS) port must be equipped with a DS1 circuit pack to make the cross-connect.

**⇒ NOTE:**

The 'all' command can be used for a range of address'.

6. Assure the appropriate cross connect map is in place in the shelf by entering the command `rtrv-crs-vt1;`.

## DS1 Tests

---

1. Beginning with address 'a-1-1', place a physical DS1 loopback at ONLY this address at the DSX-1 panel. If more than one loopback is present incorrect wiring may not be apparent.

**⇒ NOTE:**

On the Wall DT the RJ45 jacks in the DSX are Looped back when no plug is installed.

2. The following command and parameters test the DS1 channel's cabling for 60 seconds.

Issue the command:

```
test-trmsn-t1:a-1-1
direction (mux)=demux
duration (1)=<return>
```

3. If transmission is not error-free, correct the problem by checking circuit packs and associated cabling.
4. Move the physical DS1 loopback to the next DS1 channel at the DSX-1 panel; press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist and continue testing the next channel.

**⇒ NOTE:**

If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions which have DSX cabling.

## Remove DS1 Cross-Connects

---

After all low speed slots are tested and verified as functioning properly, the cross-connect map needs to be deleted. There are two ways to delete cross-connects; choose the appropriate method.

1. For Release 2.0 to delete DS1 cross-connects issue the command:

```
dlt-crs-vt1:m-1-1-all,a-1-all:y;
dlt-crs-vt1:m-1-2-all,b-1-all:y;
dlt-crs-vt1:m-1-3-all,c-1-all:y;
dlt-crs-vt1:m-1-4-all,d-1-all:y;
```

**⇒ NOTE:**

If the Wideband shelf is configured for 1x7 protection the following DS1 cross-connects must also be entered.

```
dlt-crs-vt1:m-1-5-all,a-2-all:y;
```

```
dlt-crs-vt1:m-1-6-all,b-2-all:y;
dlt-crs-vt1:m-1-7-all,c-2-all:y;
```

⇒ **NOTE:**

If cross-connects remain, VT AIS alarms will remain ON.

2. To delete all cross-connects, an initialize system command is used.  
The `init-sys` command is a privileged user command and thus the appropriate login is necessary. Refer to the 'Login Procedure' Section earlier in this section. Issue the command `init-sys:all;`.
3. Remove the fiber loopbacks and the 15 dB LBOs from the 26 Type OLIU circuit packs. Incoming FiberReach LOS alarms will exist for main-1 and main-2 OLIUs. Incoming VT AIS alarms will exist for remaining cross connects.

## Fiber Installation and Test

---

### Description

---

There are three different ring configurations that the FiberReach can be set up in with OC-3 Host shelf/shelves with different fiber connections as described below.

- **Fiber Connections - Stand Alone OC-1 Access via OC-3 Host**  
To achieve transmission in both directions, fibers originating at the OC-3 CO shelf OLIU Slot Main-1 (M1) must connect to FiberReach RT1 OLIU Slot Main-2 (M2). RT1 OLIU M1 would connect to FiberReach RT2 OLIU M2 and this would continue (M1 connecting to M2) around the ring until all nodes in the ring are reached. Refer to Figure 7-2 on page 7-30.
- **Fiber Connections - Single Homed Application**  
To achieve transmission in both directions, fibers originating at the OC-3 shelf at RT2 OLIU in FN() Slot 1 must connect to FiberReach RT3 OLIU Slot Main-1 (M1). RT3 OLIU M2 would connect to FiberReach RT4 OLIU M1 and this would continue (M1 connecting to M2) around the ring until all FiberReach nodes in the ring are reached. At the last FiberReach node on the OC-1 ring the Main-2 OLIU (M2) must connect to the FN() 2(P) slot OLIU on the OC-3 shelf at RT2. Refer to Figure 7-3 on page 7-31.
- **Fiber Connections - Dual Homed Application**  
To achieve transmission in both directions, fibers originating at the OC-3 shelf at RT1 OLIU in FN() Slot 1 must connect to FiberReach RT3 OLIU Slot Main-1 (M1). RT3 OLIU M2 would connect to FiberReach RT4 OLIU M1 and this would continue (M1 connecting to M2) around the ring until all FiberReach nodes in the ring are reached. At the last FiberReach node on the OC-1 ring the Main-2 OLIU (M2) must connect to the FN() 2(P) slot OLIU on the OC-3 shelf at RT2. Refer to Figure 7-4 on page 7-32.

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1. Set each shelf in the system for the correct timing. In all DDM-2000 FiberReach shelves, the timing mode should be set for loop-timed. On the host DDM-2000 OC-3 system, normally in a central office (CO), the TGS must be set for either, external timing if the DDM-2000 OC-3 is being supplied an external DS1 clock or it should be set for free-running if a clock is not available.
2. If the FiberReach shelf is not in loop-timed mode, issue the command `switch-sync:s=mode,pri=reset` to switch the shelf from hold over to loop-timed.
3. Issue the `set-ne` command to provision each shelf for the following parameters:
  - a. Each shelf must have a unique TID (Target Identifier).
  - b. One shelf (and only one shelf) in the network must be set as the DSNE (Directory Services Network Element).

 **NOTE:**

The FiberReach shelf can not be set to the DNSE.

- c. The Alarm Group must be the same (default=255) for each shelf for complete alarm reporting throughout the network.
  - d. One shelf in the network (preferably not the shelf that's set as the GNE) must be set as the AGNE.
  - e. Site ID and NE (Network Element) combinations must be unique in each shelf.
  - f. Set Central Office shelves to CO and Remote Terminal shelves to RT.
  - g. Each shelf should be set to a unique TBOS Address.
  - h. The TBOS Link is to select whether the TBOS output is through the TBOS cable. Shelves in a CO that are directly cabled to TBOS the link is set for NORMAL. All shelves in the RT are set for NO-TBOS.
  - i. TBOS Remote allows TBOS to be reported over the DCC. In order for TBOS to be communicated from an RT, TBOS Remote must be enabled at both the CO and RT shelves. The disabled option is used when there are more than 8 NEs in a SONET network.
  - j. Idle Channel Signal should be set to AIS (default).
4. Issue the `set-fecom:dcc-all:com=enabled;` command to enable far-end communications in each shelf.

5. Issue the `rtrv-fecom;` command to verify User Side (us) and Network Side (ns) settings for each address corresponding to an OLIU per the following table:

| OLIU TYPE | Address  | US/NS Setting |
|-----------|----------|---------------|
| 26G2-U    | dcc-m1   | us            |
|           | dcc-m2   | ns            |
| 27G2-U    | dcc-m1-1 | us            |
|           | dcc-m1-2 | us            |
|           | dcc-m2-1 | us            |
|           | dcc-m2-2 | ns            |
|           | dcc-a1-1 | ns            |
|           | dcc-a1-2 | ns            |
|           | dcc-a2-1 | us            |
|           | dcc-a2-2 | us            |
|           | dcc-b1-1 | ns            |
|           | dcc-b1-2 | ns            |
|           | dcc-b2-1 | us            |
|           | dcc-b2-2 | us            |
|           | dcc-c1-1 | ns            |
|           | dcc-c1-2 | ns            |
|           | dcc-c2-1 | us            |
|           | dcc-c2-2 | us            |

If settings differ from the default values shown in the table, use the `set-fecom` command to change them to the values shown.

**⇒ NOTE:**

For the DDM-2000 OC-3 shelves containing 27G2-U OLIUs in the Main or Function Unit positions (i.e. FiberReach host nodes), when only one of the two OC-1s provided by the 27G2-U is to be used, set the other OC-1 to the not monitored state and disable it's FECOM.

For example, with a 27G2-U in function position a-1, and OC-1 #2 will not be used, enter the following command:

```
set-state-oc1:fn-a-1-2:ps=nmon;
```

Then enter the command:

```
set-fecom:dcc-a1-2:com=disabled;
```

## Fiber Installation

---

1. Refer to Figure 7-2 on page 7-30, Figure 7-3 on page 7-31, or Figure 7-4 on page 7-32 to understand the method of connecting ring fibers. Your ring, will differ from the above figures if you have more or less nodes, thus use an appropriate figure, adapted to your ring configuration, to connect the fibers.



**NOTE:**

If the proper LBO is not known for each optical fiber span see DLP-514 of the *DDM-2000 FiberReach Multiplexer User/Service Manual* to determine the LBO needed.



**NOTE:**

Line Build Outs (LBOs) are installed at the "OUT" block on the 27G-type OLIU when the fiber is single mode and at "IN" block when the fiber is multimode. Loss of Frame (LOF) and DCC errors may occur otherwise.



**CAUTION:**

*Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.*



**NOTE:**

After fiber connection is completed around the ring, continued flashing of the fault LED on 26 Type OLIU circuit packs may indicate incorrect connections.

2. To obtain a map of the SONET network to verify fiber connections, at CO, issue the command **rtrv-map-net;**

```
/* Network Map for CO
```

```
=====
System Name Comm Product NE Alarm
(TID) Status Type Type Group
=====
CO DDM-OC3 DSNE 255
RT1 FiberReach 255
RT2 FiberReach 255
RT3 FiberReach 255
*/
```

3. To obtain a neighbor map to verify fiber connections to shelves directly connected to Site1NE1 and which OLIU they are connected through, at Site1NE1 issue the command `rtrv-map-neig`;

Using Figure 7-2 on page 7-30 thru Figure 7-4 on page 7-32 (or an adapted version to match your ring) at Site1NE1, verify the following:

```
/* Neighbor Map for CO
=====
System Name Connected Comm Product
 (TID) Through Status Type
=====
CO DDM-OC3
RT1 main-1 FiberReach
RT2 main-2 FiberReach
*/
```

4. Continue around the ring verifying that the Neighbor Map "connected through" indications at each node match the indicated fiber connections of Figure 7-2 on page 7-30 thru Figure 7-4 on page 7-32 (or your individual map). If not, correct the fiber connections.
5. A Network Map containing all nodes in the network should be obtainable from any node in the ring.

## Test Fiber Connections

---

1. Alarms associated with fiber disconnects shall be tested. The following test should be performed at each site. Refer to Figure 7-2 on page 7-30 thru Figure 7-4 on page 7-32.
  1. At CO disconnect OLIU Main-1 Out. Use the '`rtrv-alm`' command to check for the following alarm (other alarms may exist) to verify proper fiber connection:

```
ne-acty main-1 ----- inc.OC1 FERF
```
  2. To verify correct fiber connection to RT1, do one of the following:
    - a. Remote login to RT1 and check for the following alarm (other alarms may exist) to verify proper fiber connection:

```
MINOR main-2 ----- inc.OC1 LOS
```
    - b. Locally verify main-2 is flashing, indicating loss of incoming signal.
  3. Correct fiber connections if alarms are not as specified. Reconnect the fiber at CO Main-1 Out and observe that alarms discussed above are clear.

**⇒ NOTE:**

VT AIS alarms due to cross-connections remaining from Local and DSX-1 Cross-Connect tests may be observed. Ignore them at this time.

4. Continue at CO by disconnecting OLIU M2 Out and observing alarms as described previously, but in accordance with the fiber disconnected.
5. Continue around the ring until all fiber has been tested.

## **Establishing Cross-Connects and System Test**

### **Description**

On initial installation/turn-up of a Release 2 system there are no default cross-connects, thus all cross-connects need to be entered. In Release 2.0 DS1 services only are provided and thus VT cross-connects only are applicable.

Due to the flexibility of cross-connects it is strongly recommended to document the cross-connects of each site and have a compilation located at each site. Therefore in the event the cross-connect map is lost, cross-connects can be reestablished expediently.

### **Explanation of Cross-Connects**

For DS1 service one can imagine 84 race tracks (timeslots/channels) around the ring. Travel (transmission) takes place in both directions (receiving end chooses best signal). Each track requires two "drop cross-connects" to enter/exit the track. All other points on the ring require a "pass-through" cross-connect.

Release 2 software is a two fiber path-switched ring. Each VT (DS1 signal) is transmitted in both directions (clockwise and counterclockwise) around the ring. The receiver monitors the signal from both directions and selects the "best" one. This receiver will select the signal from the incoming fiber on OLIU M1 as a default. The capacity of the ring is limited to the OC-1 line rate, which is 28 DS1 services. A timeslot or channel must be reserved all the way around the ring for each service, and also reserved all the way around the OC-3 ring.

Drop cross-connects are designated by a ring VT channel and an associated DS1 port. Pass-through cross-connects are designated by using the same ring VT twice. See Figure 7-6 on page 7-34 thru Figure 7-8 on page 7-36.

In Release 2 drop cross-connects are divided into two types.

- The standard two-way cross-connect, in which the ring VT channel is connected to the associated DS1 port of the node.
- The standard pass-through cross-connect, in which the ring VT channel is connected through to the next node on the ring.

Cross-connect address (to enter/exit the ring):

Example:        m-1-1-1, a-1-1  
                  a-1-1, m-1-1-1

'm-1-1-1' represents (Location of OC-1 signal)-(STS1 # within the OC-1)-  
(VT-Group # within the STS1)-(VT1.5 # within the VT-G) Address Range is:  
m-(1)-(1-7)-(1-4)

'a-1-1' represents (DS1 Pack)-(DS1 Port) Address Range for 1x1 protection is:  
(a-1, b-1, c-1, d-1)-(1-4) and the Address Range for 1x7 protection is: (a-1, b-1,  
c-1, d-1, a-2, b-2, c-2)-(1-4)

- The 'all' option may be used to specify a range of addresses:

Example: m-1-1-all, a-1-all

'm-1-all' represents (main OLIUs)-(STS)-(VT-Group)-(All VT1.5's)  
'a-1-all' represents (DS1 Pack)-(All DS1 Ports)

- Pass-through address at all nodes other than the entry/exit nodes is as follows:

Example: m-1-7-4 m-1-7-4

Pass-throughs must match.

**⇒ NOTE:**

Port cross-connects do not have to match. At one node a cross-connect may be established as:

m-1-1-3, a-1-3

At another node the cross-connect may be:

m-1-1-3, c-1-2

**⇒ NOTE:**

Typically, m-1-1-1 corresponds to a-1-1, m-1-1-2 to a-1-2, etc.

**⇒ NOTE:**

M1/Main-1 and M2/Main-2 refer to OLIU slots. In a timeslot address "m-1-1-1" the "m" refers to main of both OLIUs, and the 1 refers to the first STS-1.

**⇒ NOTE:**

If a pass-through is missing, alarms may not appear. If three two-way cross-connects exist, alarms may not appear (if traffic is currently routed in the other direction). Check each timeslot to verify two cross-connects exist and that the remainder are pass-throughs. See Figure 7-6 on page 7-34 thru Figure 7-8 on page 7-36.

## Cross-Connect Procedure

---

1. Use Office Records or fill in Table 7-5 thru Table 7-7 pages 7-21 thru 7-26 (use table for FiberReach application that matches yours) and enter cross-connections.

⇒ **NOTE:**

If at any point a '?' or <Return> is entered a menu will prompt you for further information.

2. Enter a DS1 pass-through as follows:

```
ent-crs-vt1:m-1-1-1,m-1-1-1:cct=twoway:y;
```

⇒ **NOTE:**

Cross-connects can be entered in groups using the 'all' option.

3. Enter an end DS1 cross-connect as follows:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway:y;
```

4. Check each ring timeslot to be sure it has 2 end cross-connections and all other nodes have pass-throughs configured. Use Office Records and Table 7-5 on page 7-21 thru Table 7-7 on page 7-26 to verify this.

## Protection Switch Test

---

This test verifies rings protection switching upon fiber cut.

1. At CO verify that no alarms exist.
2. Enter the command `rtrv-state-path;`.
3. Under the 'act' or active column, note whether traffic is received on M1 (main-1) OLIU or M2 (main-2) OLIU.
4. Disconnect the receive or 'IN' fiber of the OLIU receiving traffic (as determined by the previous step).
5. Enter the command `rtrv-state-path;`.
6. Verify that all traffic has switched from the OLIU with the disconnected fiber to the OLIU that is still connected.
7. Reconnect the receive or 'IN' fiber.
8. Verify that alarms clear. If alarms do not clear refer to the 'Troubleshooting' Section of this manual. Continue with the next shelf.

## Final Operations

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### Procedure

---

1. Verify that all test signals and loopbacks from the DDM-2000 FiberReach have been removed.
2. Take the DDM-2000 FiberReach out of the 'Holdover' timing mode. The timing modes are set using the 'switch-sync:' command. Enter the **switch-sync** command as follows:  

```
switch-sync:s=mode,pri=reset;
```
3. Press the UPD push-button on the SYSCTL.
4. Verify that the system is configured for normal operation and that no alarms are present
5. If alarms are present, refer to the "Troubleshooting" section of this manual.
6. Connect the office alarm cables if they have been disconnected.

**Table 7-4. Cross-Connections for DSX-1 Testing**

| <b>OC-1 Network Time Slot</b> | <b>Low Speed Port Address</b> |
|-------------------------------|-------------------------------|
| m-1-1-1                       | a-1-1                         |
| m-1-1-2                       | a-1-2                         |
| m-1-1-3                       | a-1-3                         |
| m-1-1-4                       | a-1-4                         |
| m-1-2-1                       | b-1-1                         |
| m-1-2-2                       | b-1-2                         |
| m-1-2-3                       | b-1-3                         |
| m-1-2-4                       | b-1-4                         |
| m-1-3-1                       | c-1-1                         |
| m-1-3-2                       | c-1-2                         |
| m-1-3-3                       | c-1-3                         |
| m-1-3-4                       | c-1-4                         |
| m-1-4-1                       | d-1-1                         |
| m-1-4-2                       | d-1-2                         |
| m-1-4-3                       | d-1-3                         |
| m-1-4-4                       | d-1-4                         |

**Table 7-5. Stand Alone OC-1 Address via OC-3 Host Ring Network Time Slot Assignments**

| OC-3 FiberReach Host Addresses TID: |           |              | FiberReach OC-1 Ring Addresses |                  |              |                  |              |                              |
|-------------------------------------|-----------|--------------|--------------------------------|------------------|--------------|------------------|--------------|------------------------------|
| OC-3 Time Slot (Path)               | Terminal  |              | OC-1 Network Time Slot (Path)  | Terminal         |              | Terminal         |              | TID's of Pass Thru Terminals |
|                                     | Pass Thru | Port Address |                                | Identifier (TID) | Port Address | Identifier (TID) | Port Address |                              |
| M-1-1-1                             |           |              | M-1-1-1                        |                  |              |                  |              |                              |
| M-1-1-2                             |           |              | M-1-1-2                        |                  |              |                  |              |                              |
| M-1-1-3                             |           |              | M-1-1-3                        |                  |              |                  |              |                              |
| M-1-1-4                             |           |              | M-1-1-4                        |                  |              |                  |              |                              |
| M-1-2-1                             |           |              | M-1-2-1                        |                  |              |                  |              |                              |
| M-1-2-2                             |           |              | M-1-2-2                        |                  |              |                  |              |                              |
| M-1-2-3                             |           |              | M-1-2-3                        |                  |              |                  |              |                              |
| M-1-2-4                             |           |              | M-1-2-4                        |                  |              |                  |              |                              |
| M-1-3-1                             |           |              | M-1-3-1                        |                  |              |                  |              |                              |
| M-1-3-2                             |           |              | M-1-3-2                        |                  |              |                  |              |                              |
| M-1-3-3                             |           |              | M-1-3-3                        |                  |              |                  |              |                              |
| M-1-3-4                             |           |              | M-1-3-4                        |                  |              |                  |              |                              |
| M-1-4-1                             |           |              | M-1-4-1                        |                  |              |                  |              |                              |
| M-1-4-2                             |           |              | M-1-4-2                        |                  |              |                  |              |                              |
| M-1-4-3                             |           |              | M-1-4-3                        |                  |              |                  |              |                              |
| M-1-4-4                             |           |              | M-1-4-4                        |                  |              |                  |              |                              |
| M-1-5-1                             |           |              | M-1-5-1                        |                  |              |                  |              |                              |
| M-1-5-2                             |           |              | M-1-5-2                        |                  |              |                  |              |                              |
| M-1-5-3                             |           |              | M-1-5-3                        |                  |              |                  |              |                              |
| M-1-5-4                             |           |              | M-1-5-4                        |                  |              |                  |              |                              |
| M-1-6-1                             |           |              | M-1-6-1                        |                  |              |                  |              |                              |

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Table 7-5. Stand Alone OC-1 Address via OC-3 Host Ring Network Time Slot Assignments (Continued)

| OC-3 FiberReach Host Addresses TID: |           |              |                               | FiberReach OC-1 Ring Addresses |              |                  |              |                              |
|-------------------------------------|-----------|--------------|-------------------------------|--------------------------------|--------------|------------------|--------------|------------------------------|
| OC-3 Time Slot (Path)               | Terminal  |              | OC-1 Network Time Slot (Path) | Terminal                       |              | Terminal         |              | TID's of Pass Thru Terminals |
|                                     | Pass Thru | Port Address |                               | Identifier (TID)               | Port Address | Identifier (TID) | Port Address |                              |
| M-1-6-2                             |           |              | M-1-6-2                       |                                |              |                  |              |                              |
| M-1-6-3                             |           |              | M-1-6-3                       |                                |              |                  |              |                              |
| M-1-6-4                             |           |              | M-1-6-4                       |                                |              |                  |              |                              |
| M-1-7-1                             |           |              | M-1-7-1                       |                                |              |                  |              |                              |
| M-1-7-2                             |           |              | M-1-7-2                       |                                |              |                  |              |                              |
| M-1-7-3                             |           |              | M-1-7-3                       |                                |              |                  |              |                              |
| M-1-7-4                             |           |              | M-1-7-4                       |                                |              |                  |              |                              |
| M-2-1-1                             |           |              | M-1-1-1                       |                                |              |                  |              |                              |
| M-2-1-2                             |           |              | M-1-1-2                       |                                |              |                  |              |                              |
| M-2-1-3                             |           |              | M-1-1-3                       |                                |              |                  |              |                              |
| M-2-1-4                             |           |              | M-1-1-4                       |                                |              |                  |              |                              |
| M-2-2-1                             |           |              | M-1-2-1                       |                                |              |                  |              |                              |
| M-2-2-2                             |           |              | M-1-2-2                       |                                |              |                  |              |                              |
| M-2-2-3                             |           |              | M-1-2-3                       |                                |              |                  |              |                              |
| M-2-2-4                             |           |              | M-1-2-4                       |                                |              |                  |              |                              |
| M-2-3-1                             |           |              | M-1-3-1                       |                                |              |                  |              |                              |
| M-2-3-2                             |           |              | M-1-3-2                       |                                |              |                  |              |                              |
| M-2-3-3                             |           |              | M-1-3-3                       |                                |              |                  |              |                              |
| M-2-3-4                             |           |              | M-1-3-4                       |                                |              |                  |              |                              |
| M-2-4-1                             |           |              | M-1-4-1                       |                                |              |                  |              |                              |
| M-2-4-2                             |           |              | M-1-4-2                       |                                |              |                  |              |                              |
| M-2-4-3                             |           |              | M-1-4-3                       |                                |              |                  |              |                              |
| M-2-4-4                             |           |              | M-1-4-4                       |                                |              |                  |              |                              |

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**Table 7-5. Stand Alone OC-1 Address via OC-3 Host Ring Network Time Slot Assignments (Continued)**

| OC-3 FiberReach Host Addresses TID: |           |              |                               | FiberReach OC-1 Ring Addresses |              |                  |              |                              |
|-------------------------------------|-----------|--------------|-------------------------------|--------------------------------|--------------|------------------|--------------|------------------------------|
| OC-3 Time Slot (Path)               | Terminal  |              | OC-1 Network Time Slot (Path) | Terminal                       |              | Terminal         |              | TID's of Pass Thru Terminals |
|                                     | Pass Thru | Port Address |                               | Identifier (TID)               | Port Address | Identifier (TID) | Port Address |                              |
| M-2-5-1                             |           |              | M-1-5-1                       |                                |              |                  |              |                              |
| M-2-5-2                             |           |              | M-1-5-2                       |                                |              |                  |              |                              |
| M-2-5-3                             |           |              | M-1-5-3                       |                                |              |                  |              |                              |
| M-2-5-4                             |           |              | M-1-5-4                       |                                |              |                  |              |                              |
| M-2-6-1                             |           |              | M-1-6-1                       |                                |              |                  |              |                              |
| M-2-6-2                             |           |              | M-1-6-2                       |                                |              |                  |              |                              |
| M-2-6-3                             |           |              | M-1-6-3                       |                                |              |                  |              |                              |
| M-2-6-4                             |           |              | M-1-6-4                       |                                |              |                  |              |                              |
| M-2-7-1                             |           |              | M-1-7-1                       |                                |              |                  |              |                              |
| M-2-7-2                             |           |              | M-1-7-2                       |                                |              |                  |              |                              |
| M-2-7-3                             |           |              | M-1-7-3                       |                                |              |                  |              |                              |
| M-2-7-4                             |           |              | M-1-7-4                       |                                |              |                  |              |                              |

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**Table 7-6. Single Homed Ring Network Time Slot Assignments**

| OC-3 Ring Addresses           |                  |              | OC-3 FiberReach Host TID:    |                                        | FiberReach OC-1 Ring Addresses |                  |              |                  |              |                              |
|-------------------------------|------------------|--------------|------------------------------|----------------------------------------|--------------------------------|------------------|--------------|------------------|--------------|------------------------------|
| OC-3 Network Time Slot (Path) | Terminal         |              | TID's of Pass Thru Terminals | OC-3 Function Unit Port Address FN-( ) | OC-1 Network Time Slot (Path)  | Terminal         |              | Terminal         |              | TID's of Pass Thru Terminals |
|                               | Identifier (TID) | Port Address |                              |                                        |                                | Identifier (TID) | Port Address | Identifier (TID) | Port Address |                              |
|                               |                  |              |                              | ( )-( )-1-1                            | M-1-1-1                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-1-2                            | M-1-1-2                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-1-3                            | M-1-1-3                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-1-4                            | M-1-1-4                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-2-1                            | M-1-2-1                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-2-2                            | M-1-2-2                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-2-3                            | M-1-2-3                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-2-4                            | M-1-2-4                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-3-1                            | M-1-3-1                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-3-2                            | M-1-3-2                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-3-3                            | M-1-3-3                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-3-4                            | M-1-3-4                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-4-1                            | M-1-4-1                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-4-2                            | M-1-4-2                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-4-3                            | M-1-4-3                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-4-4                            | M-1-4-4                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-5-1                            | M-1-5-1                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-5-2                            | M-1-5-2                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-5-3                            | M-1-5-3                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-5-4                            | M-1-5-4                        |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-6-1                            | M-1-6-1                        |                  |              |                  |              |                              |

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**Table 7-6. Single Homed Ring Network TIme Slot Assignments (Continued)**

| OC-3 Ring Addresses           |                  |              | OC-3 FiberReach Host TID:    | FiberReach OC-1 Ring Addresses         |                               |                  |              |                  |              |                              |
|-------------------------------|------------------|--------------|------------------------------|----------------------------------------|-------------------------------|------------------|--------------|------------------|--------------|------------------------------|
| OC-3 Network Time Slot (Path) | Terminal         |              | TID's of Pass Thru Terminals | OC-3 Function Unit Port Address FN-( ) | OC-1 Network Time Slot (Path) | Terminal         |              | Terminal         |              | TID's of Pass Thru Terminals |
|                               | Identifier (TID) | Port Address |                              |                                        |                               | Identifier (TID) | Port Address | Identifier (TID) | Port Address |                              |
|                               |                  |              |                              | ( )-( )-6-2                            | M-1-6-2                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-6-3                            | M-1-6-3                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-6-4                            | M-1-6-4                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-7-1                            | M-1-7-1                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-7-2                            | M-1-7-2                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-7-3                            | M-1-7-3                       |                  |              |                  |              |                              |
|                               |                  |              |                              | ( )-( )-7-4                            | M-1-7-4                       |                  |              |                  |              |                              |

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**Table 7-7. Dual Homing Ring Network Time Slot Assignments**

| OC-3 Ring Addresses                    |                     |                 | OC-3<br>FiberReach<br>Host TID:    | OC-3<br>FiberReach<br>Host TID:                   | FiberReach OC-1 Ring Addresses                    |                                        |                     |                 |                     |                 |                                    |
|----------------------------------------|---------------------|-----------------|------------------------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------------|---------------------|-----------------|---------------------|-----------------|------------------------------------|
| OC-3<br>Network<br>Time Slot<br>(Path) | Terminal            |                 | TID's of<br>Pass Thru<br>Terminals | OC-3<br>Function<br>Unit Port<br>AddressFN-(<br>) | OC-3<br>Function<br>Unit Port<br>AddressFN-(<br>) | OC-1<br>Network<br>Time Slot<br>(Path) | Terminal            |                 | Terminal            |                 | TID's of<br>Pass Thru<br>Terminals |
|                                        | Identifier<br>(TID) | Port<br>Address |                                    |                                                   |                                                   |                                        | Identifier<br>(TID) | Port<br>Address | Identifier<br>(TID) | Port<br>Address |                                    |
|                                        |                     |                 |                                    | ( )-( )-1-1                                       | ( )-( )-1-1                                       | M-1-1-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-1-2                                       | ( )-( )-1-2                                       | M-1-1-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-1-3                                       | ( )-( )-1-3                                       | M-1-1-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-1-4                                       | ( )-( )-1-4                                       | M-1-1-4                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-2-1                                       | ( )-( )-2-1                                       | M-1-2-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-2-2                                       | ( )-( )-2-2                                       | M-1-2-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-2-3                                       | ( )-( )-2-3                                       | M-1-2-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-2-4                                       | ( )-( )-2-4                                       | M-1-2-4                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-3-1                                       | ( )-( )-3-1                                       | M-1-3-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-3-2                                       | ( )-( )-3-2                                       | M-1-3-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-3-3                                       | ( )-( )-3-3                                       | M-1-3-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-3-4                                       | ( )-( )-3-4                                       | M-1-3-4                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-4-1                                       | ( )-( )-4-1                                       | M-1-4-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-4-2                                       | ( )-( )-4-2                                       | M-1-4-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-4-3                                       | ( )-( )-4-3                                       | M-1-4-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-4-4                                       | ( )-( )-4-4                                       | M-1-4-4                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-5-1                                       | ( )-( )-5-1                                       | M-1-5-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-5-2                                       | ( )-( )-5-2                                       | M-1-5-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-5-3                                       | ( )-( )-5-3                                       | M-1-5-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-5-4                                       | ( )-( )-5-4                                       | M-1-5-4                                |                     |                 |                     |                 |                                    |

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**Table 7-7. Dual Homing Ring Network Time Slot Assignments (Continued)**

| OC-3 Ring Addresses                    |                     |                 | OC-3<br>FiberReach<br>Host TID:    | OC-3<br>FiberReach<br>Host TID:                   | FiberReach OC-1 Ring Addresses                    |                                        |                     |                 |                     |                 |                                    |
|----------------------------------------|---------------------|-----------------|------------------------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------------|---------------------|-----------------|---------------------|-----------------|------------------------------------|
| OC-3<br>Network<br>Time Slot<br>(Path) | Terminal            |                 | TID's of<br>Pass Thru<br>Terminals | OC-3<br>Function<br>Unit Port<br>AddressFN-(<br>) | OC-3<br>Function<br>Unit Port<br>AddressFN-(<br>) | OC-1<br>Network<br>Time Slot<br>(Path) | Terminal            |                 | Terminal            |                 | TID's of<br>Pass Thru<br>Terminals |
|                                        | Identifier<br>(TID) | Port<br>Address |                                    |                                                   |                                                   |                                        | Identifier<br>(TID) | Port<br>Address | Identifier<br>(TID) | Port<br>Address |                                    |
|                                        |                     |                 |                                    | ( )-( )-6-1                                       | ( )-( )-6-1                                       | M-1-6-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-6-2                                       | ( )-( )-6-2                                       | M-1-6-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-6-3                                       | ( )-( )-6-3                                       | M-1-6-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-6-4                                       | ( )-( )-6-4                                       | M-1-6-4                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-7-1                                       | ( )-( )-7-1                                       | M-1-7-1                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-7-2                                       | ( )-( )-7-2                                       | M-1-7-2                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-7-3                                       | ( )-( )-7-3                                       | M-1-7-3                                |                     |                 |                     |                 |                                    |
|                                        |                     |                 |                                    | ( )-( )-7-4                                       | ( )-( )-7-4                                       | M-1-7-4                                |                     |                 |                     |                 |                                    |

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**Table 7-8. Universal Lightguide Buildouts**

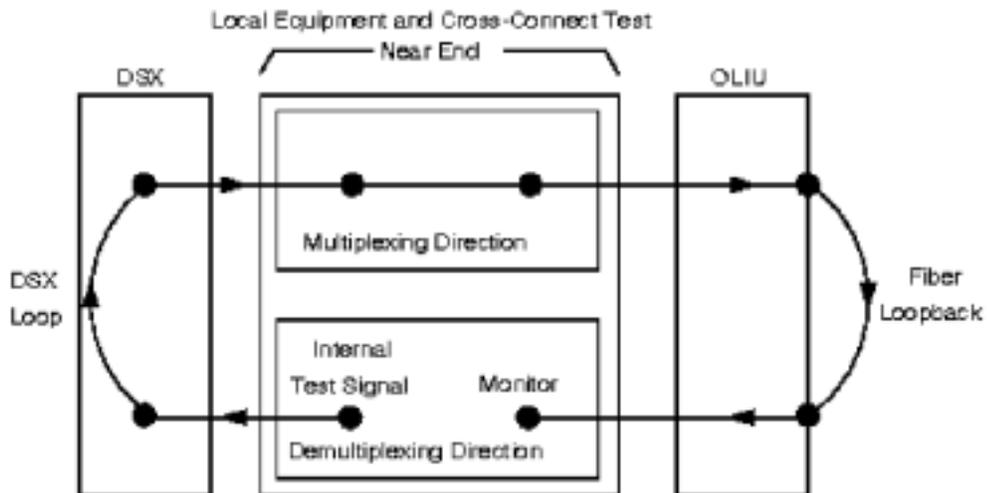
| Lightguide Buildout (LBO) | Code    | Connection | Comcode   | Connector Type  |
|---------------------------|---------|------------|-----------|-----------------|
| 0 dB                      | A3060   | SM-SM      | 106708951 | SC              |
| 5 dB                      | A3060B1 | SM-SM      | 107406142 | SC              |
| 10 dB                     | A3060D1 | SM-SM      | 107406159 | SC              |
| 15 dB                     | A3060F1 | SM-SM      | 107406167 | SC              |
| 0 dB                      | A3070   | SM-SM      | 106795354 | ST <sup>®</sup> |
| 5 dB                      | A3070B1 | SM-SM      | 107406183 | ST <sup>®</sup> |
| 10 dB                     | A3070D1 | SM-SM      | 107406191 | ST <sup>®</sup> |
| 15 dB                     | A3070F1 | SM-SM      | 107406209 | ST <sup>®</sup> |
| 0 dB                      | A3080   | SM-SM      | 106795404 | FC              |
| 5 dB                      | A3080B1 | SM-SM      | 107406225 | FC              |
| 10 dB                     | A3080D1 | SM-SM      | 107406233 | FC              |
| 15 dB                     | A3080F1 | SM-SM      | 107406241 | FC              |
| 5 dB                      | A3060B  | MM-MM      | 106795271 | SC              |
| 10 dB                     | A3060D  | MM-MM      | 106795289 | SC              |
| 15 dB                     | A3060F  | MM-MM      | 106795297 | SC              |
| 5 dB                      | A3070B  | MM-MM      | 106795313 | ST <sup>®</sup> |
| 10 dB                     | A3070D  | MM-MM      | 106795321 | ST <sup>®</sup> |
| 15 dB                     | A3070F  | MM-MM      | 106795339 | ST <sup>®</sup> |

**⇒ NOTE:**  
Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

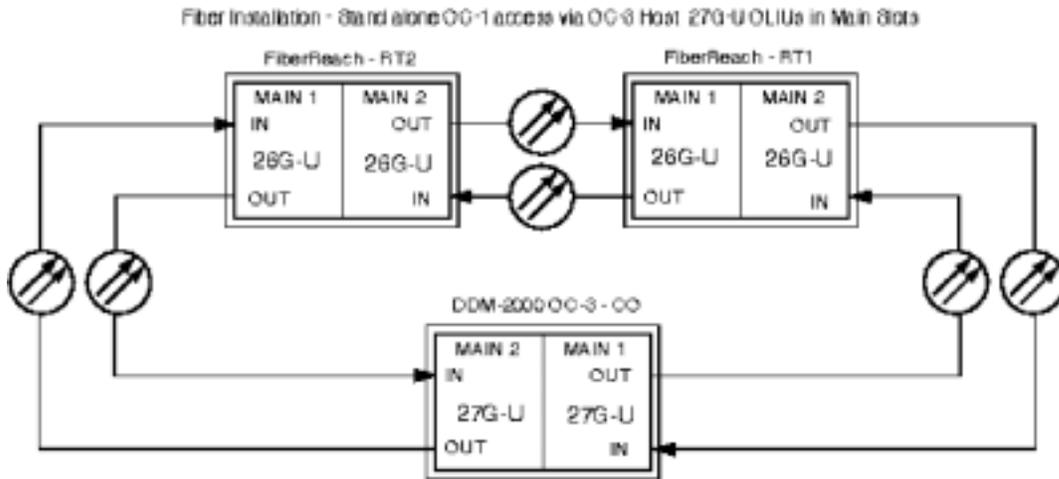
**⇒ NOTE:**  
A 15 db LBO is required to loop the 26G2-U OLIU back on itself.

**Table 7-9. Lightguide Jumpers**

| Lightguide Jumper Type | Code        | Comcode   | Connector Type                   | Length (Feet) |
|------------------------|-------------|-----------|----------------------------------|---------------|
| Single Mode            | FS1E-E-2    | 105357727 | ST <sup>®</sup> -ST <sup>®</sup> | 2             |
| Single Mode            | LS1FP-FP-10 | 106593825 | FC/PC-FC/PC                      | 10            |
| Single Mode            | LS1SC-SC-2  | 106908247 | SC-SC                            | 2             |
| Multimode              | FL1E-E-2    | 105351795 | ST <sup>®</sup> -ST <sup>®</sup> | 2             |
| Multimode              | LL1FC-FC-10 | 107095549 | FC/PC-FC/PC                      | 10            |
| Multimode              | LL1SC-SC-2  | 106908668 | SC-SC                            | 2             |



**Figure 7-1. Installation Test Connections**



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Figure 7-2. Fiber Connections Stand Alone OC-1 Access via OC-3 Host

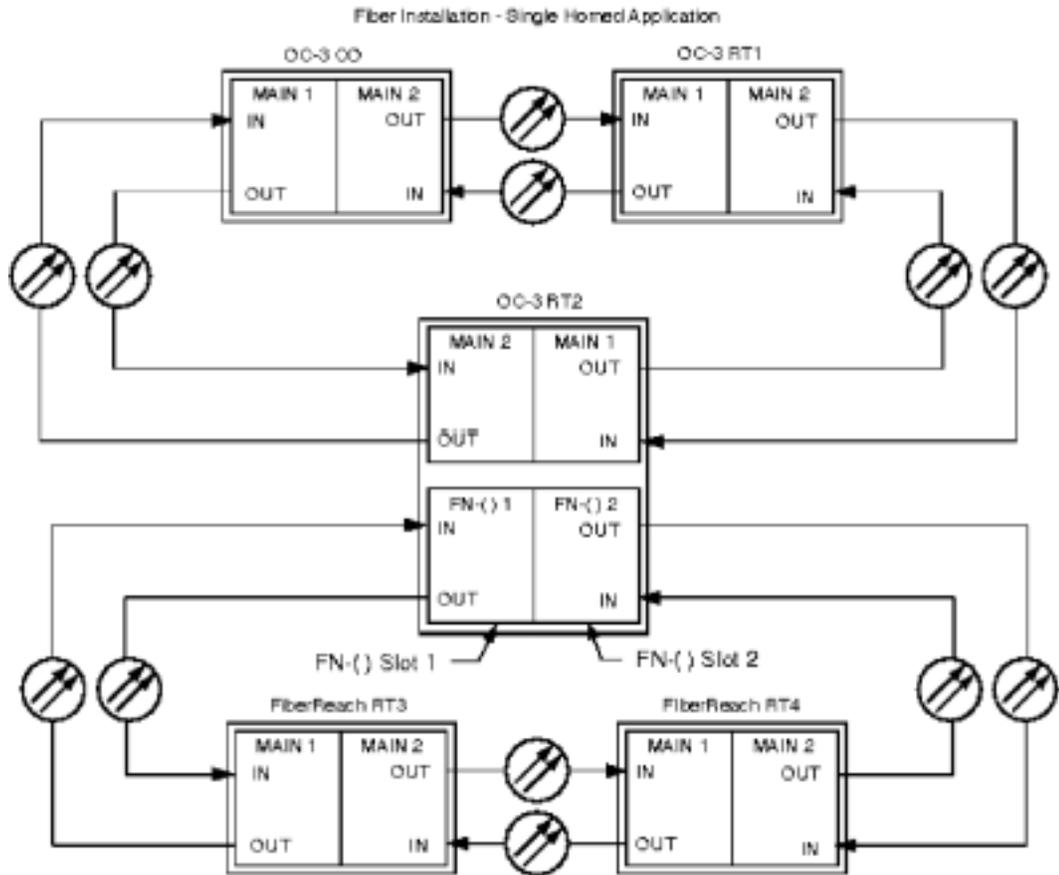


Figure 7-3. Fiber Connections - Single Homed Application

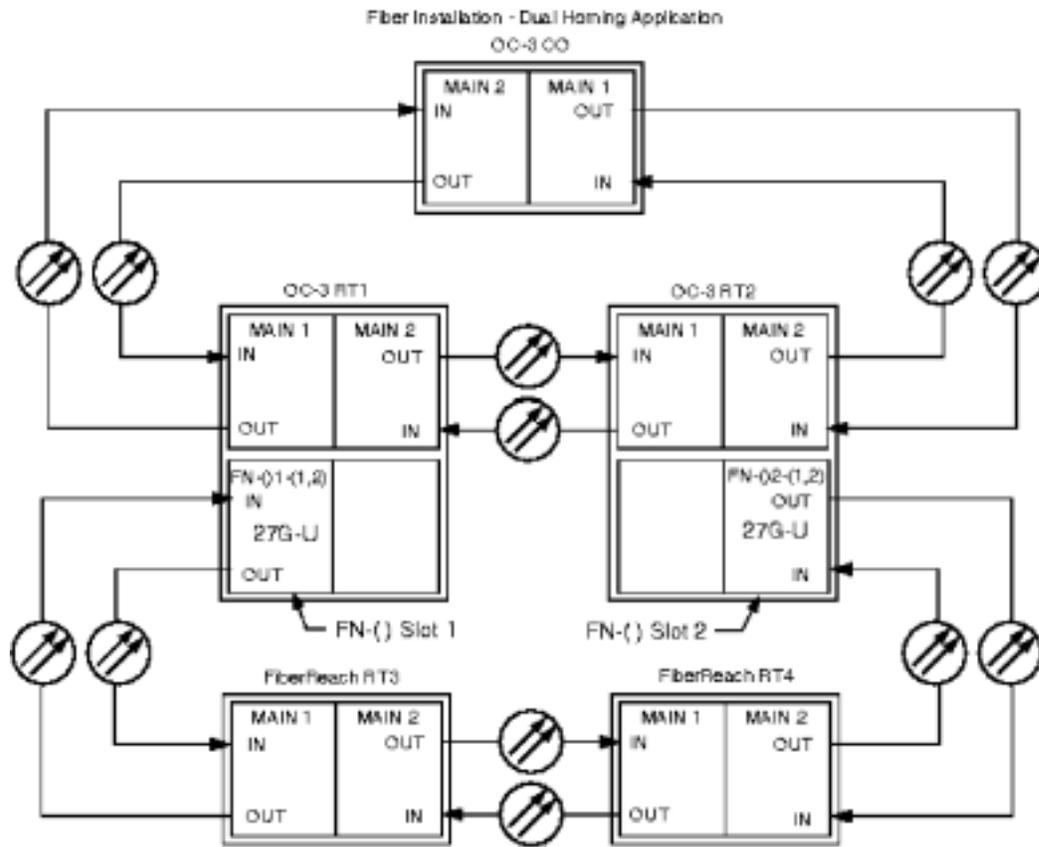


Figure 7-4. Fiber Connections - Dual Homed Application

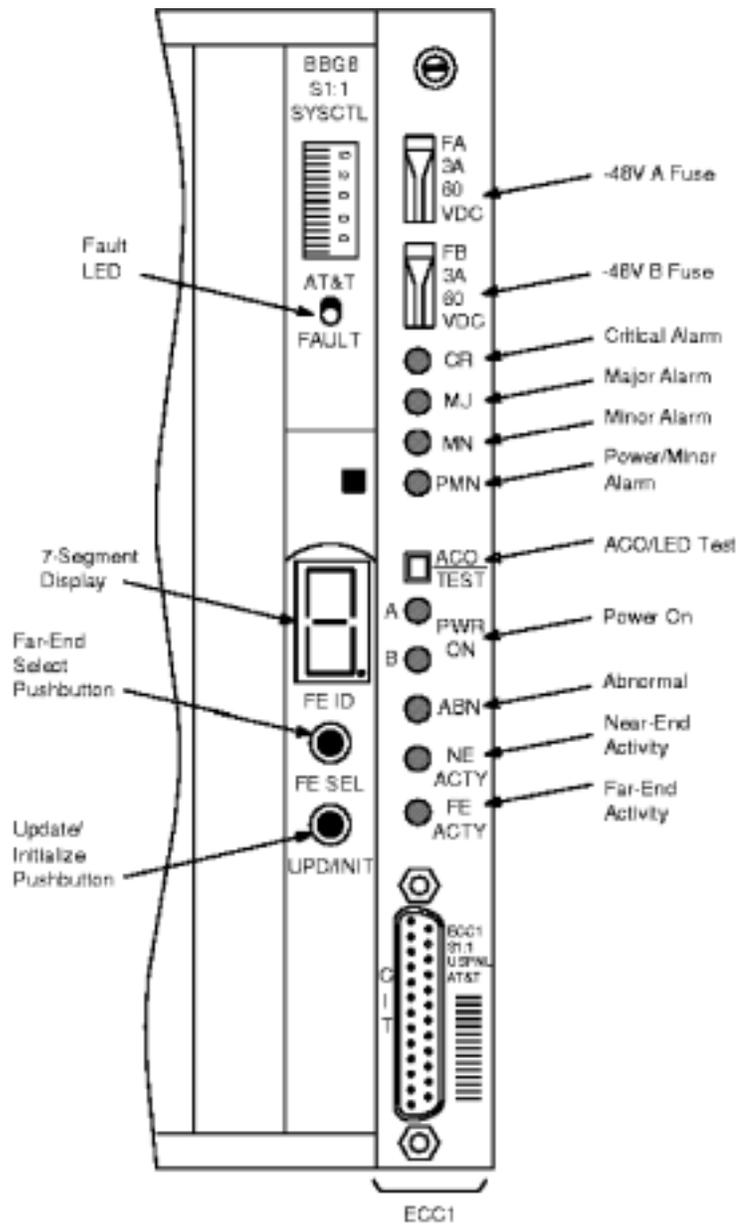


Figure 7-5. DDM-2000 FiberReach Wideband Shelf User Panel

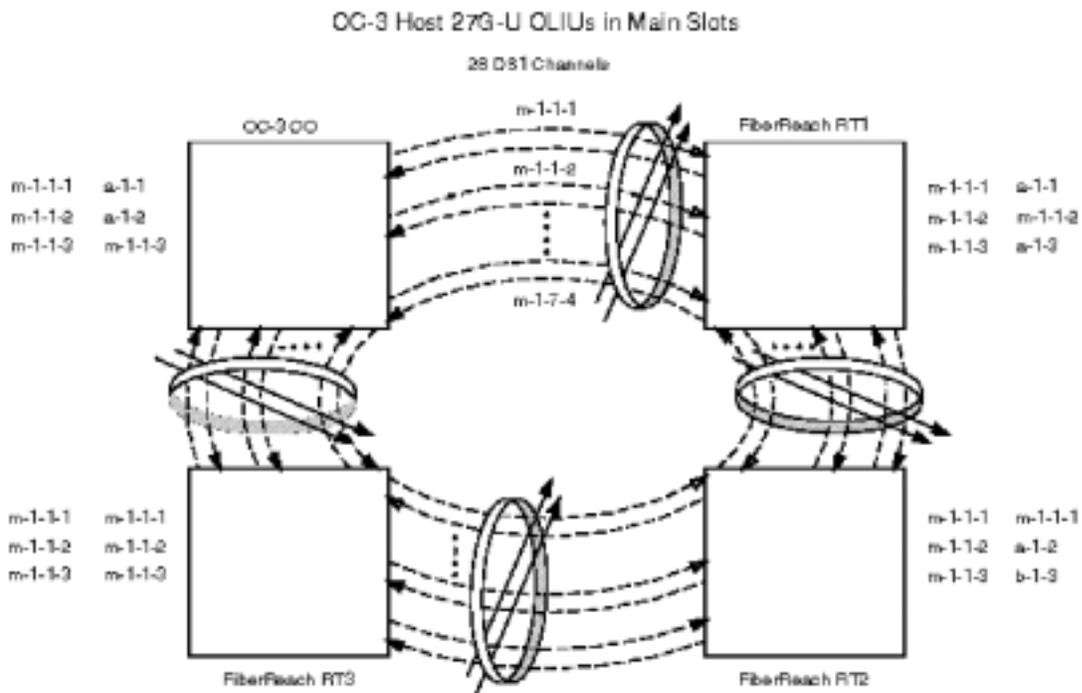


Figure 7-6. Establishing Cross-Connects Stand Alone OC-1 Access via OC-3 Host

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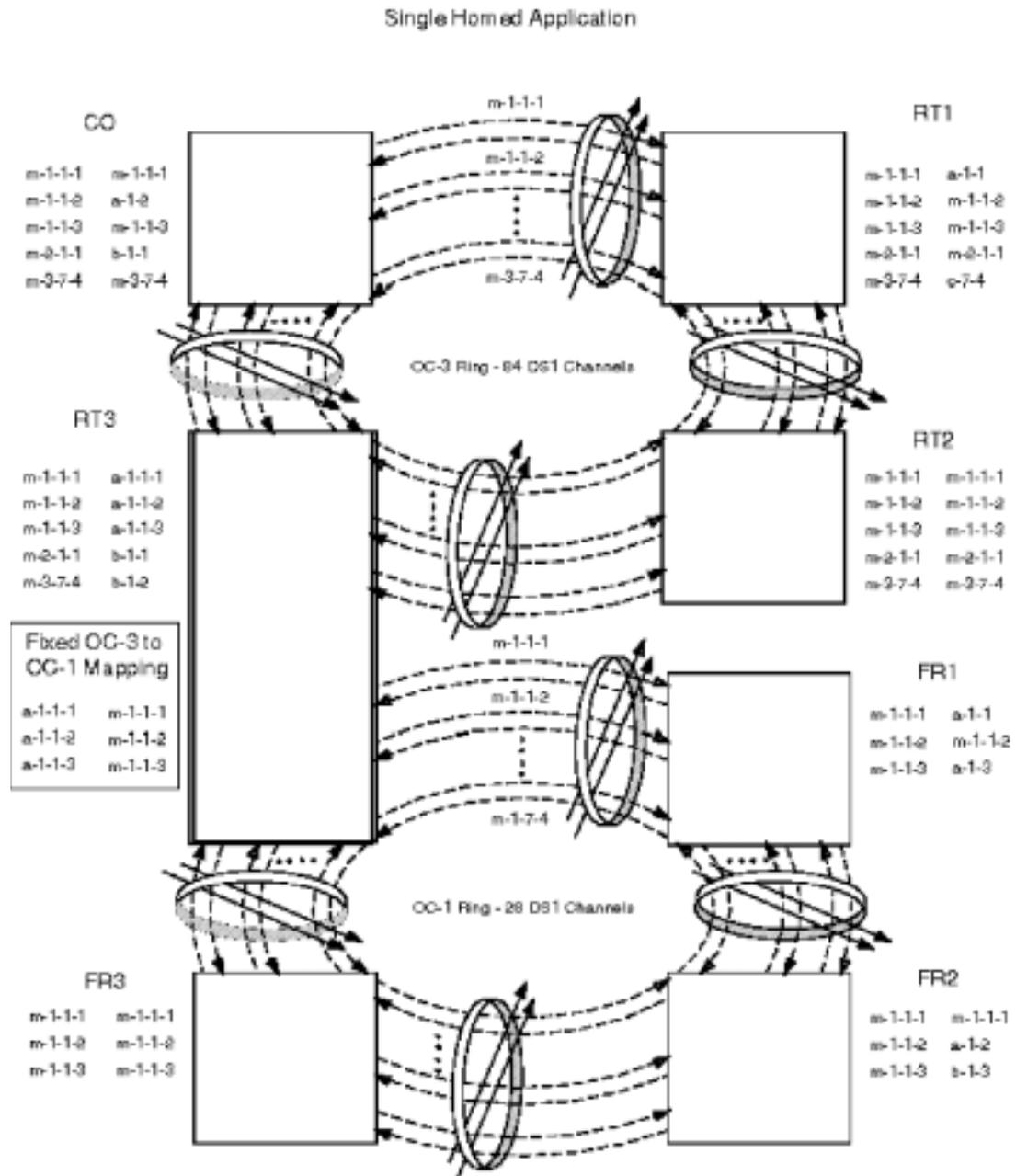


Figure 7-7. Establishing Cross-Connects - Single Homed Application

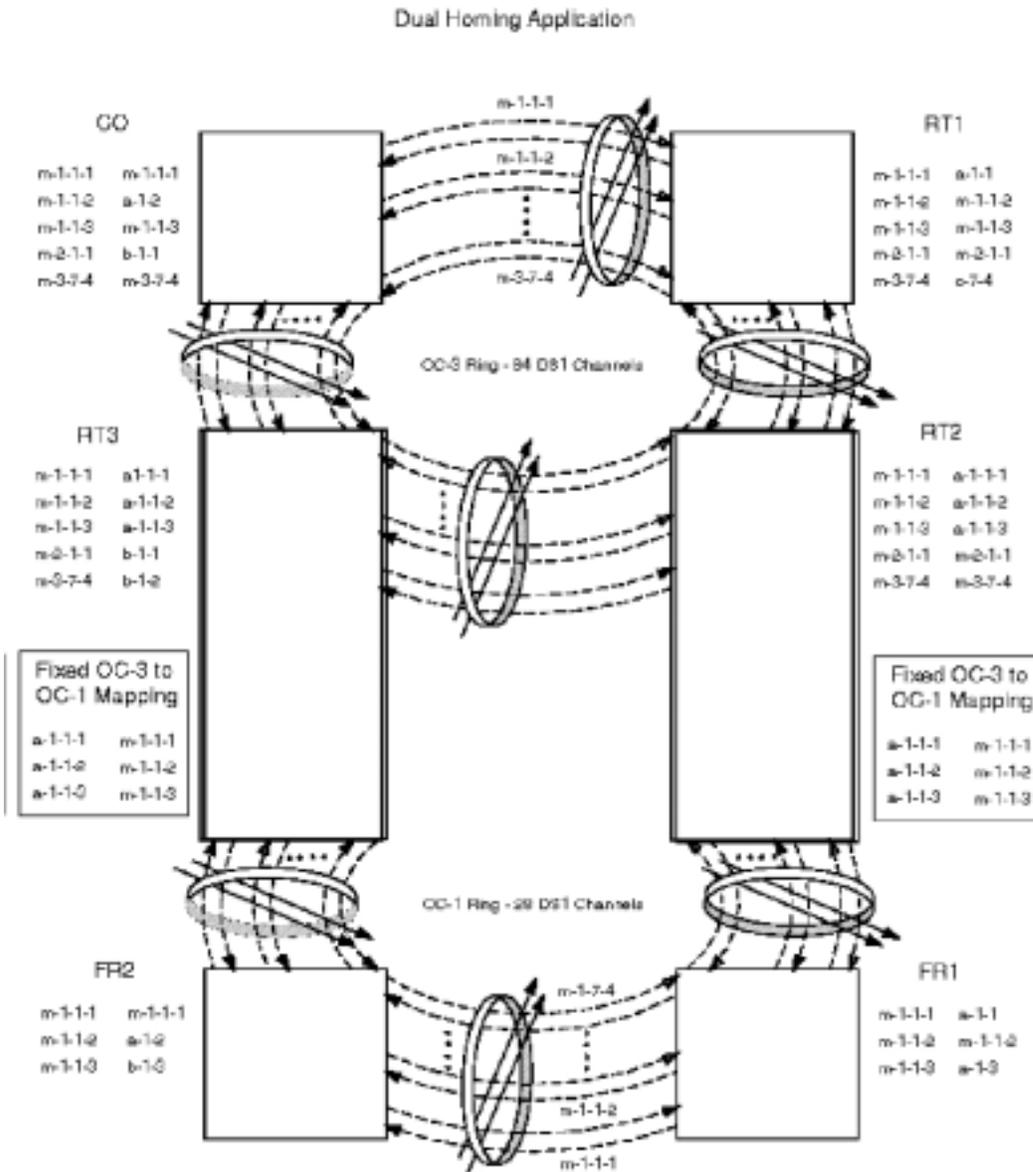


Figure 7-8. Establishing Cross-Connects - Dual Homed Application

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## Wideband Shelf Release 3 and 4 Installation Tests

# 8

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### Contents

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|                                              |            |
|----------------------------------------------|------------|
| <b>Overview</b>                              | <b>8-1</b> |
| ■ Description                                | 8-2        |
| ■ LED, Push-button, and Display Descriptions | 8-3        |
| ■ Tools, Test Sets, and Accessories          | 8-4        |

---

|                                     |            |
|-------------------------------------|------------|
| <b>Use of Terminal</b>              | <b>8-5</b> |
| ■ Description                       | 8-5        |
| ■ Compatible Terminals              | 8-5        |
| ■ ASCII Terminal Setup              | 8-5        |
| ■ DDM-2000 FiberReach Command Notes | 8-6        |
| ■ Login Procedure                   | 8-6        |

---

|                                |            |
|--------------------------------|------------|
| <b>LED Test</b>                | <b>8-8</b> |
| ■ Description                  | 8-8        |
| ■ Procedure With a Terminal    | 8-8        |
| ■ Procedure Without a Terminal | 8-8        |

---

**Local Equipment and Cross-Connect Test** **8-9**

- Description 8-9
  - Fiber Connection 8-9
  - Provisioning 8-10
  - DS1 Tests 8-11
  - Remove DS1 Cross-Connects 8-12
  - DS3 Tests 8-12
- 

**Final Operations** **8-13**

- Procedure 8-13

# Wideband Shelf Release 3 and 4 Installation Tests

# 8

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## Overview

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This section provides test procedures for verifying the DDM-2000 FiberReach WideBand Shelf (WBS):

DDM-2000 FiberReach WBS Releases 3 and 4 support multi-vendor interworking using Target Identifier Address Resolution (TARP) instead of Lucent Directory Services (DSNE).

**⇒ NOTE:**

DDM-2000 FiberReach WBS Release 3 and 4 are not compatible with previous non-TARP releases of DDM-2000 FiberReach, OC-2, OC-12 and FT-2000 OC-48.

- Shelf transmission
- Wiring to DS1 Cross-Connect (DSX-1)
- Wiring to DS3 Cross-Connect (DSX-3)

**⇒ NOTE:**

This Installation Manual does not cover installation tests for the narrowband shelf refer to *SLC-2000 Access System, User/Service Manual*, and the *SLC-2000 Multi-Services Distant Terminal (MSDT) Features, User/Service Manual*.

## Description

---

The following information provides instructions on the use of an American Standard Code for Information Interchange (ASCII) terminal and the suggested installation tests which should be performed. If problems are encountered, refer to the "Troubleshooting" section at the end of this manual. For detailed troubleshooting, refer to 363-206-305, *DDM-2000 FiberReach Multiplexer User/Service Manual*.

The following installation tests are run only in an out-of-service mode of operation. Interruption of service will result if these tests are run on an operating in-service system.

The user panel contains the EIA-232D connector and the LEDs used to perform the installation tests as shown in Figure 8-2 on page 8-17.

Before beginning the following tests the office alarm interface to the shelf J41 should be removed before tests are executed and replaced upon completion.

The following tests should be performed with the DDM-2000 FiberReach configured with the default parameters described under "Login Procedure", as described later in this section.

Observe the following notes:

 **WARNING:**  
*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*

 **NOTE:**  
To add a circuit pack to the SYSCTL's equipment list, the circuit pack needs only to be installed. However, to delete a circuit pack from the SYSCTL's equipment list, an UPD must be performed after the pack is unseated to clear alarms. If cross-connects exist they must be removed to clear a circuit pack. If in-service ports exist they must be set to auto to clear an in-service port.

 **NOTE:**  
It is important that circuit packs not be installed or replaced when the SYSCTL is not in place and operating normally. Replacing or installing circuit packs when the SYSCTL is not in-place and operating normally can result in unpredictable provisioning of the replaced/installed circuit pack.

## **LED, Push-button, and Display Descriptions**

The LEDs have a delay default of 2 seconds. Therefore, the LEDs will not light until an alarm condition has existed for 2 seconds. This delay can be altered with the `set-attr` command.

The following LEDs are located on the circuit packs:

| <b>LED</b>       | <b>Description</b>                     |
|------------------|----------------------------------------|
| FAULT(solid)     | Circuit pack is failed                 |
| FAULT (flashing) | Circuit pack has lost its input signal |
| ACTIVE           | Pack is carrying service**             |

\*\* DS1 packs do not have an ACTIVE LED but are assumed to be in-service unless other information is provided through the CIT.

The following LEDs are located on the user panel:

**Table 8-1. User Panel LEDs**

| <b>LED</b>                  | <b>Description</b>                                                                |
|-----------------------------|-----------------------------------------------------------------------------------|
| CR (Critical)               | Potential loss of service to greater than 96 DS0 customers                        |
| MJ (Major)                  | Potential loss of service to less than 96 DS0 customers                           |
| MN (Minor)                  | A non-service affecting failure                                                   |
| PMN (Power Minor)           | A switch from AC power to battery backup                                          |
| ACO (Alarm Cutoff)          | Audible office alarms are silenced and parallel telemetry indications are cut off |
| PWR ON A (Power On)         | The shelf is receiving a -48 V DC source A                                        |
| PWR ON B (Power On)         | The shelf is receiving a -48 V DC source B                                        |
| ABN (Abnormal)              | An abnormal condition initiated through craft interface terminal (CIT) command.   |
| NE ACTY (Near-End Activity) | One of the above conditions is present at this shelf                              |
| FE ACTY (Far-End Activity)  | One of the above conditions is present at a far-end shelf                         |

The following push-button and display are located on the ECC1 User Panel and SYSCTL. See Figure 8-2 on page 8-17.

**Table 8-2. ECC1 User Panel and SYSCTL**

| LED                          | Description                                                                                                                                                                                     |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACO (Alarm Cutoff)           | Silences existing audible office alarms and parallel telemetry indications                                                                                                                      |
| UPD/INIT (Update/Initialize) | Used to initialize SYSCTL upon replacement or update shelf equipment list after circuit pack or signal removal                                                                                  |
| FE SEL (Far-End Select)      | Used to display the LEDs activated at a site in the network                                                                                                                                     |
| 7-Segment Display            | Identifies the site address of the system status and alarms recently being displayed on the local user panel LEDs. Also may display the software version number currently running in the SYSCTL |

## Tools, Test Sets, and Accessories

The following items are required:

**Table 8-3. Tools, Test Sets and Accessories**

| Quantity   | Description                                                                                          |                                                                                                                                                                                              |
|------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection |                                                                                                                                                                                              |
| 1          | DSX-1 loopback cable (Note 1)                                                                        |                                                                                                                                                                                              |
|            | DSX-3 loopback cable                                                                                 |                                                                                                                                                                                              |
| 1          | ASCII Terminal or PC configured as a terminal                                                        |                                                                                                                                                                                              |
|            | Optical fiber cables (recommended length is 2 feet) find your OLIU type below                        |                                                                                                                                                                                              |
|            | OLIU                                                                                                 | Optical fiber cable (See Table 8-6 on page 8-16)                                                                                                                                             |
| 1 per OLIU | 26G2-U,<br>28G-U,<br>or 29G-U                                                                        | Single mode with ST <sup>®</sup> , FC/PC, or SC connectors on each end depending on Universal LBO used (ST <sup>®</sup> 0 dB LBO is standard. See Table 8-5 on page 8-15). See Note 2 below. |

**Table 8-3 Notes:**

1. On the Wall DT the RJ45 jacks in the DSX are Looped back when no plug is installed.
2. When looping a **26G2-U** OLIU back on itself a 15 dB LBO is required.



**NOTE:**

LBO's must be installed on an OLIU's OUTPUT port.

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## Use of Terminal

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### Description

---

This procedure describes which terminals are approved for use with the DDM-2000 FiberReach, how to set up the terminal, and the DDM-2000 FiberReach command structure which will be used.

### Compatible Terminals

---

The DDM-2000 FiberReach craft interface terminal (CIT) port will support rates of 300, 1200, 2400, 4800, 9600, and 19,200 baud and should be compatible with most ASCII terminals.

ASCII terminals that were compatible with DDM-1000 should be directly compatible with DDM-2000 FiberReach. See 363-206-305, *DDM-2000 FiberReach Multiplexer User/Service Manual* for a list of DDM-2000 FiberReach compatible terminals.

The DDM-2000 FiberReach will output information to fit in a display area of 24 lines (default) by 72 characters. The number of display lines can be altered from 3 to 151 with the `set-link` command.

### ASCII Terminal Setup

---

The DDM-2000 FiberReach provides a serial ASCII terminal interface through a 25-pin female connector mounted on the user panel. The connector provides an EIA-232D interface for use with most common terminals provided that the following interface parameters are set properly:

|             |               |
|-------------|---------------|
| Full Duplex | 8 Data Bits   |
| 9600 Baud * | No Parity Bit |
| 1 Start Bit | 1 Stop Bit    |

\* The ASCII terminal can be set for baud rates of 300, 1200, 2400, 4800, 9600, or 19,200 and, the baud rate of the DDM-2000 FiberReach will be autobauded to match. When downloading a BBG8 SYCTL for the first time the baud rate must be set to 4800.

DDM-2000 FiberReach supports data rates up to 19,200 baud, but it does not provide flow control. Some terminals and PCs that can be set for higher data rates will not work properly at these rates with equipment like DDM-2000 FiberReach that does not provide flow control. The system may appear to stop working when reports or long prompts are displayed. If this happens, set the terminal for a lower baud rate.

## **DDM-2000 FiberReach Command Notes**

---

All DDM-2000 FiberReach commands will be issued through the ASCII terminal.

Commands can be entered in either upper or lower case (or a mixture).

If a command is partially entered, or if a? is entered any time, the user will be prompted with a menu of available choices.

A complete list of DDM-2000 FiberReach command codes with their descriptions is contained in the 363-206-305, *DDM-2000 FiberReach Multiplexer User/Service Manual*.

The following special ASCII characters are supported:

- Semicolon (;) — Official and preferred man machine language (MML) command terminator.
- Carriage Return, Enter, or Dollar Sign (\$) — Alternative MML command terminators.
- Question Mark (?) — Suspends the present input operation and displays appropriate help which requires a user response.
- Backspace and Underbar (\_) — Erases the previous character input.
- At-sign (@) — Erases the current line.
- CANcel, and DElete — Terminates the current input line or currently running command.
- Hyphen (-) — Separates identifiers in the command mode.
- Colon (:) — Separates parameter blocks in a command.
- Comma (,) — Separates parameters within a parameter block in a command.

## **Login Procedure**

---

1. Connect one of the approved terminals (properly configured) to an EIA-232D port on one of the DDM-2000 FiberReaches in the bay.
2. Enter a Carriage Return to prompt the DDM-2000 FiberReach to autobaud. After entering a second Carriage Return the user is presented with:

```
login<
```



**NOTE:**

There is a special login and password already programmed into the 1UC01



**NOTE:**

The login and password must be in UPPERCASE.

After a successful login, the DDM-2000 FiberReach will display the system header followed by the alarm and status report:

```
DDM-2000 FiberReach Release a.b.c
TID date time
/* Active Alarms and Status Report */
```

**⇒ NOTE:**

Release a.b.c is the software release. TID is the Target Identifier of the shelf. Date and time are the current system time of the shelf.

Once logged on, the user can only issue commands to the on-line shelf. The session is terminated with the `log;` (LOGOUT) command.

3. Issue the command `init-sys:all;` (INITIALIZE-SYSTEM). This command will configure the DDM-2000 FiberReach with its default parameters.

**⇒ NOTE:**

After cross-connections are entered use `init-sys:all;` with extreme caution as it erases all cross-connects.

4. When initialization completes, (this may take several minutes), repeat steps 2 and 3 to log back into the shelf.
5. To change the TID, which is the name of the shelf, issue the command `set-ne` (SET-NETWORK ELEMENT). When prompted with TID= enter the desired TID consisting of up to 20 alphanumeric characters.
6. To change the number of lines displayed at a time (default = 24), issue the command `set-link` (SET-LINK). Respond to the page length prompt (pg) with the desired number of lines, between 3 and 150.
7. To change the time delay for alarms to be displayed or cleared, issue the command `set-attr-alm` (SET-ATTRIBUTE ALARM). To eliminate any alarm delay or clear delay, respond to the prompts with 0.
8. To change the time and date displayed, issue the command `set-date` (SET-DATE). Respond to the date and time prompts.

## LED Test

---

### Description

---

This test verifies proper operation of all the LEDs on the DDM-2000 FiberReach shelf. Operation of all the LEDs is necessary to assist in trouble isolation.

If there are any LED failures, determine if the problem is with the circuit pack or shelf and replace the faulty unit.

If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions.

### Procedure With a Terminal

---

Issue the command `test-led;`.

The DDM-2000 FiberReach will respond with `In Progress . . . .` for the duration of the test and will issue a prompt `CMPLD` when the test has completed. All LEDs on the shelf under test should light for 10 seconds, then extinguish for 10 seconds. Then the proper LEDs will light to indicate the shelf's current status.

### Procedure Without a Terminal

---

Press and hold the ACO push-button on the user panel. While the push-button is pressed, all LEDs on the shelf under test should light.

 **NOTE:**

If the ACO push-button is pressed for more than 2 seconds the 7-segment display will go blank, then it will display the currently running software release on this shelf one character at a time.

## **Local Equipment and Cross-Connect Test**

---

### **Description**

---

This test verifies proper operation of the circuit packs and the circuit pack positions, which are equipped in the DDM-2000 FiberReach shelf. It verifies proper cabling from the DDM-2000 FiberReach to the DSX cross-connect panel or connecting equipment. The shelf must successfully pass this test before testing any other feature of the DDM-2000 FiberReach.

Upon completion of this test all cross-connections will be deleted and later reentered to fit individual rings applications.

**⇒ NOTE:**  
If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions which have DSX cabling.

**⇒ NOTE:**  
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 tests pass without failures.

**⇒ NOTE:**  
Refer to 363-206-305, *DDM-2000 FiberReach Multiplexer User/Service Manual* for complete command descriptions.

**⇒ NOTE:**  
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.

### **Fiber Connection**

---

1. If any optical fibers are connected to the DDM-2000 FiberReach, verify they are properly labeled.
2. Disconnect the optical fiber cables from the DDM-2000 FiberReach.
3. Connect OLIU OUT to OLIU IN on each OLIU, using optical fiber jumper cables and appropriate LBO's if required as noted below. Refer to Figure 8-1 on page 8-16.

**⇒ NOTE:**  
The optical fiber cables required are listed under "Tools, Test Sets, and Accessories" on page 8-4.

 **NOTE:**  
When looping a 26G2-U OLIU back on itself a 15 dB LBO is required. See Table 8-5 on page 8-15. LBO's must be installed on the OLIU's OUTPUT port.

 **NOTE:**  
If other than ST<sup>®</sup> type connectors are being used see Table 8-5 on page 8-15 for the universal LBOs needed and Table 8-6 on page 8-16 for the lightguide jumpers.

 **CAUTION:**  
*Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.*

## Provisioning

---

1. The 'Holdover' timing mode is required for the DSX-1 test. The timing modes are set using the **switch-sync:** command. Enter the switch-sync command as follows:.

```
switch-sync:s=mode,pri>manual;
```

2. Check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT push-button on the SYCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
3. To test each DS1 channel through to the cross-connect panel or terminating equipment, its cross-connect map has to be made at the DDM FiberReach Shelf.
4. Enter DS1 cross-connects according to Table 8-1 on Page 8-15 for the 26G-U, 28G-U or 29G-U OLIU installed in Main slots to verify cabling from the DDM-2000 FiberReach to the DSX cross-connect panel.
5. Enter DS1 cross-connects as follows when 26G2-U OLIUs are equipped in the Main slots: See Table 8-4 on page 8-14 when the 28G-U or 29G-U OLIU are installed in Main slots.

```
ent-crs-vt1:m-1-1-all,a-1-all:cct=twoway:y;
```

```
ent-crs-vt1:m-1-2-all,b-1-all:cct=twoway:y;
```

```
ent-crs-vt1:m-1-3-all,c-1-all:cct=twoway:y;
```

```
ent-crs-vt1:m-1-4-all,d-1-all:cct=twoway:y;
```

⇒ **NOTE:**  
If the Wideband shelf is configured for 1x7 protection, the following DS1 cross-connects must also be entered.

```
ent-crs-vt1:m-1-5-all,a-2-all:cct=twoway:y;
ent-crs-vt1:m-1-6-all,b-2-all:cct=twoway:y;
ent-crs-vt1:m-1-7-all,c-2-all:cct=twoway:y;
```

⇒ **NOTE:**  
The addressed low-speed (LS) port must be equipped with a DS1 circuit pack to make the cross-connect.

⇒ **NOTE:**  
The 'all' command can be used for a range of address'.

6. Assure the appropriate cross connect map is in place in the shelf by entering the command `rtrv-crs-vt1;`.

## DS1 Tests

---

1. Beginning with address 'a-1-1', place a physical DS1 loopback at ONLY this address at the DSX-1 panel. If more than one loopback is present incorrect wiring may not be apparent.

⇒ **NOTE:**  
On the Wall DT the RJ45 jacks in the DSX are Looped back when no plug is installed.

2. The following command and parameters test the DS1 channel's cabling for 60 seconds.

Issue the command:

```
test-trmsn-t1:a-1-1
direction (mux)=demux
duration (1)=<return>
```

3. If transmission is not error-free, correct the problem by checking circuit packs and associated cabling.
4. Move the physical DS1 loopback to the next DS1 channel at the DSX-1 panel; press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist and continue testing the next channel.

⇒ **NOTE:**  
If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions which have DSX cabling.

## Remove DS1 Cross-Connects

---

After all low speed slots are tested and verified as functioning properly, the cross-connect map needs to be deleted. There are two ways to delete cross-connects; choose the appropriate method.

1. Delete DS1 cross-connects issue the following commands:

```
dlt-crs-vt1:m-1-1-all,a-1-all:y;
dlt-crs-vt1:m-1-2-all,b-1-all:y;
dlt-crs-vt1:m-1-3-all,c-1-all:y;
dlt-crs-vt1:m-1-4-all,d-1-all:y;
```

**⇒ NOTE:**

If the Wideband shelf is configured for 1x7 protection the following DS1 cross-connects must also be entered.

```
dlt-crs-vt1:m-1-5-all,a-2-all:y;
dlt-crs-vt1:m-1-6-all,b-2-all:y;
dlt-crs-vt1:m-1-7-all,c-2-all:y;
```

**⇒ NOTE:**

If cross-connects remain, VT AIS alarms will remain until cross-connects are entered for all remaining shelves in the ring.

## DS3 Tests

---

1. Beginning with the address "f", place a physical loopback cable at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent.
2. Enter the DS3 cross-connect as follows:  

```
ent-crs-sts1:f:cct=twoway:y;
```

**⇒ NOTE:**

The addressed Function Unit (FN) slot must be equipped with a DS3 circuit pack to make the cross-connect.

3. The following command and parameters test the DS3 channel's cabling for 60 seconds:

Issue the command:

```
test-trmsn-t3:f
direction (mux)=demux
duration (1)=<return>
```

4. If transmission is not error-free, correct the problem by checking circuit packs and associated cabling.
5. Remove the physical DS3 loopback from the DSX-3 panel; press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist.
6. Remove the DS3 cross-connect as follows:  

```
dlt-crs-sts1:f:cct=twoway:y;
```
7. To delete all cross-connects, an initialize system command is used.  
The `init-sys` command is a privileged user command and thus the appropriate login is necessary. Refer to the 'Login Procedure' in this chapter. Issue the command `init-sys:all;`.
8. Remove the fiber loopbacks and if 26-Type OLIUs are in the MAIN slots, remove the 15 dB LBOs.

## **Final Operations**

---

### **Procedure**

---

1. Verify that all test signals and loopbacks from the DDM-2000 FiberReach have been removed.
2. Take the DDM-2000 FiberReach out of the 'Holdover' timing mode. The timing modes are set using the 'switch-sync:' command. Enter the switch-sync command as follows:  

```
switch-sync:s=mode,pri=reset;
```
3. Press the UPD push-button on the SYSCTL.
4. Verify that the system is configured for normal operation and that no alarms are present
5. If alarms are present, refer to the "Troubleshooting" section of this manual.
6. Connect the office alarm cables if they have been disconnected.

**Table 8-4. 26G2-U Cross-Connections for DSX-1 Testing (see Note 1)**

| 26G2-U in Main Slots                                |                        | 28-U* in Main Slots    |                        | 29-U <sup>†</sup> in Main Slots |                        |
|-----------------------------------------------------|------------------------|------------------------|------------------------|---------------------------------|------------------------|
| OC-1 Network Time Slot                              | Low Speed Port Address | OC-3 Network Time Slot | Low Speed Port Address | OC-12 Network Time Slot         | Low Speed Port Address |
| m-1-1-all                                           | a-1-all                | m-{1-3}-1-all          | a-1-all                | m-{1-12}-1-all                  | a-1-all                |
| m-1-2-all                                           | b-1-all                | m-{1-3}-2-all          | b-1-all                | m-{1-12}-2-all                  | b-1-all                |
| m-1-3-all                                           | c-1-all                | m-{1-3}-3-all          | c-1-all                | m-{1-12}-3-all                  | c-1-all                |
| m-1-4-all                                           | d-1-all                | m-{1-3}-4-all          | d-1-all                | m-{1-12}-4-all                  | d-1-all                |
| Additional Cross-Connections for 1X7 Configurations |                        |                        |                        |                                 |                        |
| m-1-5-all                                           | a-2-all                | m-{1-3}-5-all          | a-2-all                | m-{1-12}-5-all                  | a-2-all                |
| m-1-6-all                                           | b-2-all                | m-{1-3}-6-all          | b-2-all                | m-{1-12}-6-all                  | b-2-all                |
| m-1-7-all                                           | c-2-all                | m-{1-3}-7-all          | c-2-all                | m-{1-12}-7-all                  | c-2-all                |

**Table 8-4 Notes:**

1. Consult Release 3 or Release 4 Software Release Description (SRD) for additional details on allowed cross-connections.
- \* Up to 28 VT1.5s on the OC-3 interface can be selected for VT cross-connection to Low Speed units. Up to 84 VT channels can be VT cross-connected as pass-throughs on the OC-3 ring.
- † Any of the twelve STS-1s on the OC-12 interface can be selected for VT cross-connections.

**Table 8-5. Universal Lightguide Buildouts**

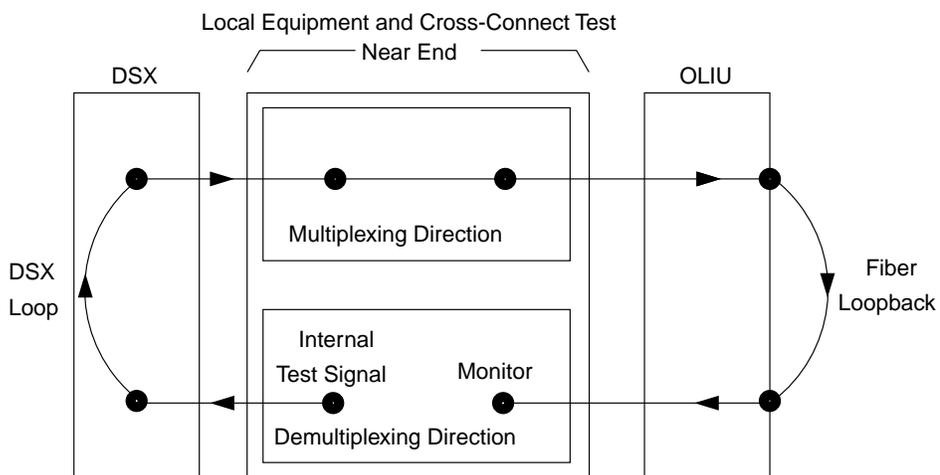
| Lightguide Buildout (LBO) | Code    | Connection | Comcode   | Connector Type  |
|---------------------------|---------|------------|-----------|-----------------|
| 0 dB                      | A3060   | SM-SM      | 106708951 | SC              |
| 5 dB                      | A3060B1 | SM-SM      | 107406142 | SC              |
| 10 dB                     | A3060D1 | SM-SM      | 107406159 | SC              |
| 15 dB                     | A3060F1 | SM-SM      | 107406167 | SC              |
| 0 dB                      | A3070   | SM-SM      | 106795354 | ST <sup>®</sup> |
| 5 dB                      | A3070B1 | SM-SM      | 107406183 | ST <sup>®</sup> |
| 10 dB                     | A3070D1 | SM-SM      | 107406191 | ST <sup>®</sup> |
| 15 dB                     | A3070F1 | SM-SM      | 107406209 | ST <sup>®</sup> |
| 0 dB                      | A3080   | SM-SM      | 106795404 | FC              |
| 5 dB                      | A3080B1 | SM-SM      | 107406225 | FC              |
| 10 dB                     | A3080D1 | SM-SM      | 107406233 | FC              |
| 15 dB                     | A3080F1 | SM-SM      | 107406241 | FC              |
| 5 dB                      | A3060B  | MM-MM      | 106795271 | SC              |
| 10 dB                     | A3060D  | MM-MM      | 106795289 | SC              |
| 15 dB                     | A3060F  | MM-MM      | 106795297 | SC              |
| 5 dB                      | A3070B  | MM-MM      | 106795313 | ST <sup>®</sup> |
| 10 dB                     | A3070D  | MM-MM      | 106795321 | ST <sup>®</sup> |
| 15 dB                     | A3070F  | MM-MM      | 106795339 | ST <sup>®</sup> |

**⇒ NOTE:**  
Do not put the LBO on to the fiber jumper before installation of the LBO on the OLIU. Installing the LBO with the fiber jumper attached could damage the OLIU.

**⇒ NOTE:**  
A 15 db LBO is required to loop the 26G2-U OLIU back on itself. A 10 db LBO is required to loop the 29G-U OLIU back on itself

**Table 8-6. Lightguide Jumpers**

| Lightguide Jumper Type | Code        | Comcode   | Connector Type                   | Length (Feet) |
|------------------------|-------------|-----------|----------------------------------|---------------|
| Single Mode            | FS1E-E-2    | 105357727 | ST <sup>®</sup> -ST <sup>®</sup> | 2             |
| Single Mode            | LS1FP-FP-10 | 106593825 | FC/PC-FC/PC                      | 10            |
| Single Mode            | LS1SC-SC-2  | 106908247 | SC-SC                            | 2             |
| Multimode              | FL1E-E-2    | 105351795 | ST <sup>®</sup> -ST <sup>®</sup> | 2             |
| Multimode              | LL1FC-FC-10 | 107095549 | FC/PC-FC/PC                      | 10            |
| Multimode              | LL1SC-SC-2  | 106908668 | SC-SC                            | 2             |



**Figure 8-1. Installation Test Connections**

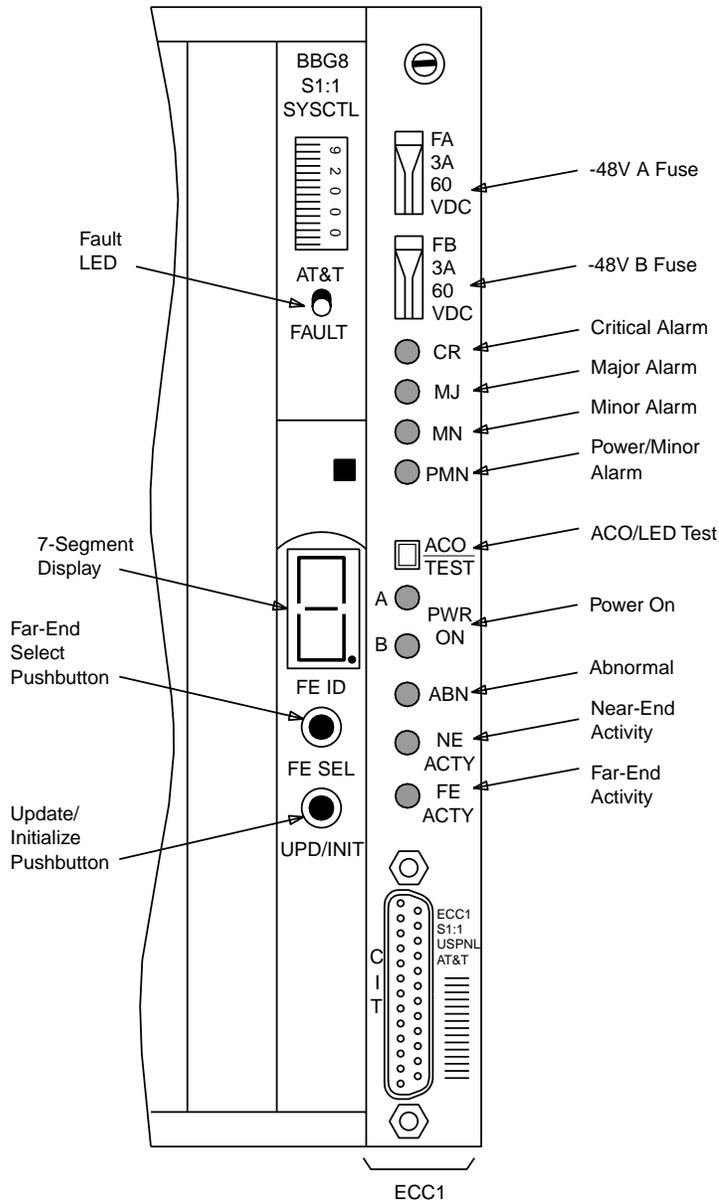


Figure 8-2. DDM-2000 FiberReach Wideband Shelf User Panel

**Lucent Technologies - Proprietary**  
See Notice on first page

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**Operational Tests - Wideband Shelf****9**

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**Contents**

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|                                                        |            |
|--------------------------------------------------------|------------|
| <b>Overview</b>                                        | <b>9-1</b> |
| ■ Test Equipment                                       | 9-1        |
| <b>Office Alarm Test</b>                               | <b>9-2</b> |
| ■ Description                                          | 9-2        |
| ■ Procedure With a Terminal                            | 9-3        |
| ■ Procedure Without a Terminal                         | 9-3        |
| <b>Automatic Protection Switching and Alarm Test</b>   | <b>9-4</b> |
| ■ Description                                          | 9-4        |
| ■ 26G2-U/28G-U/29G-U (OLIU)                            | 9-5        |
| ■ Low Speed, BBF1B (DS1), BBF3 (DS1PM) or BBF6 (T1EXT) | 9-5        |
| <b>Manual Protection Switching Test</b>                | <b>9-6</b> |
| ■ Description                                          | 9-6        |
| ■ Low Speed, BBF1B (DS1), BBF3 (DS1PM) or BBF6 (T1EXT) | 9-6        |
| ■ Low Speed, BBG4B (DS3)                               | 9-7        |
| <b>TBOS Telemetry Test</b>                             | <b>9-7</b> |

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**Miscellaneous Discrete Telemetry Test** **9-7**

- Description 9-7
  - Procedure With a Terminal 9-8
  - End-To-End Procedure 9-9
- 

**Final Operations** **9-10**

- Procedure 9-10

---

## Operational Tests - Wideband Shelf

# 9

---

### Overview

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 the "Troubleshooting" section of this manual. For detailed troubleshooting, refer to the *DDM-2000 FiberReach Multiplexer User/Service Manual* 363-206-301 for Release 2, or 363-206-305 for Release 3 and 4.

### Test Equipment

The following equipment is required:

| Quantity | Description                                                                                          |
|----------|------------------------------------------------------------------------------------------------------|
| 1        | Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection |
| 1        | ASCII Terminal or PC configured as a terminal                                                        |

**NOTE:**

All precautions should be observed when handling fiber.

**WARNING:**

*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments.*

⇒ **NOTE:**  
Most of the operational tests can be performed with or without a terminal. However, performing these tests with a terminal is preferred because it provides more diagnostic information.

⇒ **NOTE:**  
For a list of LED descriptions, DDM-2000 FiberReach commands, and more information on the use of a terminal, refer to the "Installation Test" section of this manual.

⇒ **NOTE:**  
The operational tests in this section are run only in an out-of-service mode of operation. Office alarms will only be connected during the office alarm test to prevent constant alarms throughout this section.

## Office Alarm Test

---

### Description

---

This test verifies proper operation/wiring of the office alarms in a new equipment building system (NEBS) (central office) environment.

⇒ **NOTE:**  
This test should be performed on all shelves.

⇒ **NOTE:**  
The office alarms should be connected at this time if they are not already connected. Table 9-1 on page 9-10 lists the office alarms connections.

⇒ **NOTE:**  
After completing the office alarm test, the DDM-2000 FiberReach office alarms should be disconnected from the office alarm system. This will prevent the office alarms from being activated while performing the other tests in this section.

⇒ **NOTE:**  
It is a requirement that alarms on the DDM-2000 FiberReach 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 DDM-2000 FiberReach should be examined after creating or clearing every alarm.

-  **NOTE:**  
The DDM-2000 FiberReach should be verified that it is clear of all alarms (that is, only green LEDs are lighted) prior to and after completing this test.

### Procedure With a Terminal

1. Issue the command `test-alm:md=all` (TEST-ALARM). At the repeat prompt, enter the desired number of times for this test to be performed.

-  **NOTE:**  
This test can be terminated at any time with the **CAN**cel or **DEL**ete command.

-  **NOTE:**  
This test will cycle through the following at 4-second intervals:

- No alarm
  - Critical (CR) alarm
  - Major (MJ) alarm
  - Minor (MN) alarm
  - No alarm.
2. Verify that both the audible and visual alarms are activated during this test.
  3. Repeat the office alarm test. This time during each alarm cycle press the alarm cutoff (ACO) push-button and verify that the audible alarms are silenced.

### Procedure Without a Terminal

-  **NOTE:**  
This procedure should be performed as described below. The circuit packs should not be reseated until instructed to do so.

1. Unseat one service (position A1 through D1) low-speed circuit pack.
2. Activated office alarms: MN visible, MN audible.

-  **NOTE:**  
Alarms will not be activated for the length of the alarm delay. The default time is 2 seconds.

-  **NOTE:**  
The NE ACTY LED will light if any FAULT LEDs light, thus the NE ACTY LED will be on throughout. Also, the NE ACTY and FAULT LEDs are unaffected by the alarm delay.

3. Press the ACO push-button on the user panel.
4. Activated office alarms: MN visible.
5. Unseat the protection low-speed circuit pack in the same low-speed group.
6. Activated office alarms: MJ visible, MJ audible.
7. Press the ACO push-button on the user panel.
8. Activated office alarms: MJ visible.
9. Unseat both OLIUs.
10. Activated office alarms: CR visible, CR audible.
11. Press the ACO push-button on the user panel.
12. Activated office alarms: CR visible.
13. Reseat both OLIUs.
14. Activated office alarms: MJ visible, MJ audible.
15. Reseat the protection low-speed circuit pack.
16. Activated office alarms: MN visible, MN audible.
17. Reseat the first service low-speed circuit pack.
18. Activated office alarms: None.



**NOTE:**

All unseated circuit packs should be resealed at this time.

## Automatic Protection Switching and Alarm Test

---

### Description

---

This test DOES NOT simulate circuit pack failures. This test will verify proper alarm reporting and LED indications when circuit packs are removed. All protected circuit packs will be tested.



**NOTE:**

A wrist strap must be worn while handling circuit packs.



**NOTE:**

This test can be performed with the DDM-2000 FiberReach configured for normal end-to-end transmission (or rings) or with the optical line interface units

(OLIUs) looped back on themselves (that is, the OLIU OUT connected to the OLIU IN).

⇒ **NOTE:**  
This test should be performed on all shelves.

⇒ **NOTE:**  
Prior to performing each test, the shelf under test must be clear of all alarms (that is, only green LEDs are lighted).

### **26G2-U/28G-U/29G-U (OLIU)**

---

1. Enter the following command: **rtrv-alarms;** Verify that no alarms exist.
2. Enter the following command: **rtrv-state-path;**
3. Under the 'act' or active column, note whether traffic is received on M1 (main-1) OLIU, M2 (main-2) OLIU, or both.
4. Unseat the OLIU (either one if both are receiving) receiving traffic, as determined by the previous step. On the user panel, the MN and NE ACTY alarms should light.
5. Enter the following command:  
**rtrv-state-path;**  
Verify that traffic switched from the unseated OLIU to the remaining OLIU.
6. Reseat the OLIU. On the user panel, the MN and NE ACTY alarms should extinguish.

### **Low Speed, BBF1B (DS1), BBF3 (DS1PM) or BBF6 (T1EXT)**

---

⇒ **NOTE:**  
This procedure should be performed on each low speed group equipped with protection (in 1x1 protection that is, a low speed pack in position A2(P), B2(P), C2(P), or D2(P)) (in 1x7 protection that is, a low speed pack in position D2(P)).

1. Unseat one service (positions A1 through D1 in 1x1 protection, or positions A1 through C2) low speed circuit pack. On the user panel, the MN and NE ACTY alarms should light.

⇒ **NOTE:**  
In 1x7 Protection mode any unequipped low speed slots must have 177 A Retainer circuit packs installed.

2. Unseat the protection low speed circuit pack in the same low speed group. On the user panel, the MN alarm should extinguish and the MJ alarm should light.
3. Reseat the first low speed pack which was removed. The FAULT LED on the reseated low speed pack will light for several seconds then extinguish. On the user panel, the MJ alarm should extinguish and the MN alarm should light.
4. Reseat the second low speed pack. The FAULT LED on the reseated low speed pack will light for several seconds then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

## **Manual Protection Switching Test**

---

### **Description**

---

This test will verify manual protection switching commands, using a terminal and proper LED indications. Perform this test on all shelves if a terminal is available.

### **Low Speed, BBF1B (DS1), BBF3 (DS1PM) or BBF6 (T1EXT)**

---

This procedure should be performed on each low speed group equipped with protection (in 1x1 protection that is, a low speed pack in position A2(P), B2(P), C2(P), or D2(P)) (in 1x7 protection that is, a low speed pack in position D2(P)).

1. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
2. Issue the command `switch-1s` (SWITCH LOW SPEED). Enter manual at the priority prompt. On the user panel, the ABN and NE ACTY alarms should light.
3. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
4. Issue the command `switch-1s` (SWITCH LOW SPEED). Enter reset at the priority prompt. On the user panel, the ABN and NE ACTY alarms should extinguish.
5. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).

## **Low Speed, BBG4B (DS3)**

---

This procedure should be performed on the FUNCTION UNIT slots equipped with BBG4B DS3 circuit pack.

1. Verify the status of the FUNCTION UNIT circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
2. Issue the command `switch-fn` (SWITCH FUNCTION UNIT). Enter manual at the priority prompt. On the user panel, the ABN and NE ACTY alarms should light.
3. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
4. Issue the command `switch-fn` (SWITCH FUNCTION UNIT). Enter reset at the priority prompt. On the user panel, the ABN and NE ACTY alarms should extinguish.
5. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).

## **TBOS Telemetry Test**

---



**NOTE:**

TBOS telemetry is not supported by DDM-2000 FiberReach shelves equipped with Release 3 or 4.

## **Miscellaneous Discrete Telemetry Test**

---

### **Description**

---

This test verifies correct operation/wiring of the miscellaneous (environmental) telemetry at a remote terminal (RT) shelf when provided.



**NOTE:**

Figure 9-1 on page 9-12 show the available miscellaneous (environmental) discrete alarm and control interface connections for a remote terminal (RT). Table 9-2 on page 9-11 lists the miscellaneous (environmental) discrete connections.

## Procedure With a Terminal

---

Use the following procedure to verify parallel telemetry wiring by activating alarm points and have the maintenance center observe for their appearance or by checking for activation with a volt meter.

**⇒ NOTE:**

This test can be terminated at any time with the CANCEL or DELETE key.

1. If the maintenance center interface is established skip to step 3.
2. Setup to test alarm interface with a ohmmeter, continuity tester, or buzzer.
  - a. Connect the Output - Common (See Table 9-2 on page 9-11) from the alarm cable to one lead of the tester.
  - b. Connect the second lead of the tester to the appropriate alarm designation.
3. Either:
  - a. Alert the maintenance center to observe for a specific alarm bit.  
or
  - b. Refer to Table 9-2 on page 9-11 and connect the tester lead to the alarm wire for a specific alarm bit and connect the second lead as described above, continuity will **NOT** be observed.
4. Issue the command `test-tlm-par` (TEST-TELEMETRY PARALLEL).
5. At the prompt mode, enter the mode identifier for the desired alarm bit.

**⇒ NOTE:**

An individual miscellaneous (environmental) discrete can be tested by entering output{1-4} at the prompt.

6. At the prompt repeat, enter a number 1 through 10.

**⇒ NOTE:**

Issuing the test telemetry command will activate the alarm bit for 20 seconds. The number selected for this prompt will determine the number of times that this bit will be activated for 20 seconds and then stay off for 20 seconds.

7. Either:
  - a. Verify that the maintenance center has observed the alarm bit. If the alarm bit indication is not observed by the maintenance center, verify alarm telemetry wiring. Refer to Table 9-2 on page 9-11 for wiring connection information.
  - b. The continuity should be observed. If the alarm bit indication is not observed at the office alarm interface, verify alarm telemetry wiring. Refer to Table 9-2 on page 9-11 for wiring connection information.

8. Repeat the miscellaneous (environmental) discrete test for each individual discrete point.

### **End-To-End Procedure**

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1. At the RT, provide a closure between miscellaneous (environmental) input #1 and input common.
2. At the CO, verify that a closure is observed between miscellaneous (environmental) output #1 and output common.
3. At the RT, remove the closure between miscellaneous (environmental) input #1 and input common.
4. At the CO, verify that the closure is removed.
5. Repeat for each miscellaneous (environmental) input (#2 through #16).
6. At the RT, turn off the AC power.
7. At the RT, verify that the AC power fail alarm appears in the alarm and status report with the `rtrv-alm` command.
8. At the RT, turn on the AC power.
9. At all the RTs downstream, verify that the fan fail alarm appears in the alarm and status report with the `rtrv-alm` command.
10. At the RT, set the MN alarm closure (this is usually set by a failure of non-DDM equipment, like removing a fuse from the fuse unit).
11. Also verify that the minor alarm appears in the alarm and status report with the `rtrv-alm` command.
12. At the RT, remove the minor alarm failure.
13. At the CO, provide a closure between miscellaneous (environmental) input #1 and input common.
14. At the RT, verify a closure is observed between miscellaneous (environmental) output #1 and output common.
15. At the CO, remove the closure between miscellaneous (environmental) input #1 and input common.
16. At the RT, verify that the closure is removed.
17. Repeat for each CO miscellaneous (environmental) input (#2 through #4).

## Final Operations

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### Procedure

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1. Verify that the system is configured for normal operation and that only green LEDs are lighted.
2. Movement of circuit packs or cables may cause the DDM-2000 FiberReach to report alarms due to a configuration mismatch between the SYSCTL and the transmission circuit packs. If this occurs, update the SYSCTL equipment list by issuing the command `upd;` (UPDATE).
3. Reconnect the office alarm cables if they have been disconnected.
4. Clear the FiberReach shelf (shelves) provisioning by issuing the `user` command: `init-sys:all;` (INITIALIZE SYSTEM).

The `init-sys` command is a privileged user command and thus the appropriate login is necessary. Refer to the "Login Procedure" on page 1-6 in Chapter 8

5. Terminate communication to the shelf with the `logout` command.

**Table 9-1. Office Alarm Connections**

| Name                          | Desig. | Conn. | Term | Color |
|-------------------------------|--------|-------|------|-------|
| Minor Alarm Visible           | MNV    | J41   | 1    | W-BL  |
| Minor Alarm Visible Return    | MNVR   |       | 14   | BL-W  |
| Minor Alarm Audible           | MN     |       | 2    | W-O   |
| Minor Alarm Audible Return    | MNR    |       | 15   | O-W   |
| Major Alarm Visible           | MJV    |       | 3    | W-G   |
| Major Alarm Visible Return    | MJVR   |       | 16   | G-W   |
| Major Alarm Audible           | MJ     |       | 4    | W-BR  |
| Major Alarm Audible Return    | MJR    |       | 17   | BR-W  |
| Critical Alarm Visible        | CRV    |       | 5    | W-S   |
| Critical Alarm Visible Return | CRVR   |       | 18   | S-W   |
| Critical Alarm Audible        | CR     |       | 6    | R-BL  |
| Critical Alarm Audible Return | CRR    |       | 19   | BL-R  |

**Table 9-1 Notes:**

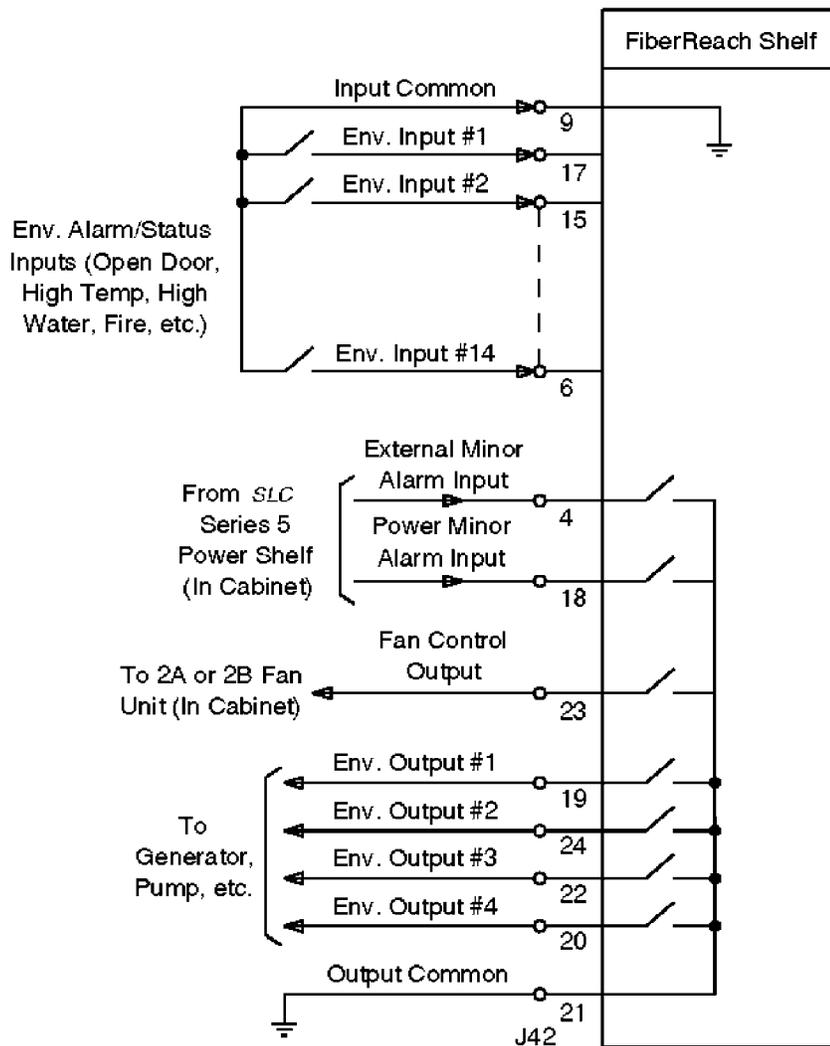
1. The office alarm cable is 26 gauge.

**Table 9-2. Miscellaneous (Environmental) Discrete Telemetry Connections**

| Name              | Desig.  | Term | Color | Conn. |
|-------------------|---------|------|-------|-------|
| Power Minor Alarm | PMNT-IN | 18   | W-S   | J42   |
| Fan Control       | FAN-CTL | 23   | R-S   |       |
| Input-Common      | TLMI-C  | 9    | BR-R  |       |
| Env. Input - #1   | TLMI-1  | 17   | W-BR  |       |
| Env. Input - #2   | TLMI-2  | 15   | W-O   |       |
| Env. Input - #3   | TLMI-3  | 13   | G-BK  |       |
| Env. Input - #4   | TLMI-4  | 11   | BL-BK |       |
| Env. Input - #5   | TLMI-5  | 7    | O-R   |       |
| Env. Input - #6   | TLMI-6  | 5    | S-W   |       |
| Env. Input - #7   | TLMI-7  | 3    | G-W   |       |
| Env. Input - #8   | TLMI-8  | 1    | BL-W  |       |
| Env. Input - #9   | TLMI-9  | 16   | W-G   |       |
| Env. Input - #10  | TLMI-10 | 14   | W-BL  |       |
| Env. Input - #11  | TLMI-11 | 12   | O-BK  |       |
| Env. Input - #12  | TLMI-12 | 10   | S-R   |       |
| Env. Input - #13  | TLMI-13 | 8    | G-R   |       |
| Env. Input - #14  | TLMI-14 | 6    | BL-R  |       |
| Output - Common   | TLMO-C  | 21   | R-G   |       |
| Env. Output - #1  | TLMO-1  | 19   | R-BL  |       |
| Env. Output - #2  | TLMO-2  | 24   | BK-BL |       |
| Env. Output - #3  | TLMO-3  | 22   | R-BR  |       |
| Env. Output - #4  | TLMO-4  | 20   | R-O   |       |
| No Connection     | NC      | 25   | BK-O  |       |

**Table 9-2 Notes:**

1. The designation "NC" means no connection.
2. Inputs to the minor alarm and power minor alarm connections are normally derived from the -48 volt alarm outputs of a SLC® Series 5 Carrier System power shelf. An external ground must be connected to output-common to access the alarm. Refer to Figure 9-1 on page 9-12.
3. The external inputs to the miscellaneous (environmental) discretes is a contact closure and is connected to the DDM-2000 by two leads (wires). For each of the miscellaneous (environmental) inputs 1 through 16 that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-X). Refer to Figure 9-1 on page 9-12.
4. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation.
5. The miscellaneous (environmental) discrete telemetry cable is 26 gauge.



**Figure 9-1. Remote Terminal Miscellaneous (Environmental) Discrete Functions**

**Notes:**

1. Miscellaneous (environmental) alarm input #1 is typically wired to the open door alarm in Lucent cabinet configurations.
2. Miscellaneous (environmental) alarm input #14 is typically wired to a fan shelf alarm in non-NEBs environment (noncabinet) applications where the fan shelf is required.
3. The output common must be wired to an external ground for fan control, external minor and power minor alarm inputs, and for miscellaneous (environmental) discrete outputs #1-4.

**Lucent Technologies - Proprietary**  
See Notice on first page

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**Wideband Shelf Troubleshooting****10**

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**Contents**

|                                              |             |
|----------------------------------------------|-------------|
| <b>Overview</b>                              | <b>10-1</b> |
| <b>Engineering and Installation Services</b> | <b>10-1</b> |
| <b>Basic Troubleshooting Techniques</b>      | <b>10-2</b> |
| ■ Description                                | 10-2        |
| ■ Procedure                                  | 10-3        |
| ■ Additional Procedure With a Terminal       | 10-4        |
| <b>Technical Support</b>                     | <b>10-5</b> |
| <b>Required Product Changes</b>              | <b>10-5</b> |



## Wideband Shelf Troubleshooting

# 10

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### Overview

This section covers engineering and installation services, some basic troubleshooting techniques, a description of upgrades/product changes (PCNs), and how to obtain technical support.

### Engineering and Installation Services

The Lucent Engineering and Installation Services organization is committed to providing customers with quality product support services. Whether you need assistance in engineering, installation, normal system maintenance, or disaster recovery, the support staff provides you with the quality technical support you need to get your job done. Each segment of the Lucent Installation organization organization regards the customer as its highest priority and understands your obligation to maintain quality service for your customer.

Within the Lucent Engineering and Installation Services organization is a highly skilled force of support personnel to provide customers with quality engineering and installation services. These engineering and installation specialists use state-of-the-art technology, equipment, and procedures to provide customers with highly competent, rapid response services. These services include analyzing your equipment request, preparing a detailed specification for manufacturing and installation, creating and maintaining job records, installing the equipment, and testing and turning over a working system. When the Engineering and Installation Services organization provides job records and installs the equipment, changes affecting operation of the system are automatically identified and applied to the system at no additional cost.

The Lucent Engineering and Installation Services organization provides the customer with an individually tailored, quality-tested job that meets our published high standards and the customer's operational requirements. The group ensures that the customer's system order is integrated into a complete working system tailored to office conditions

and preferences. This process provides for the customer's complete needs. It includes provisions for cabling, lighting, power equipment, and ancillary connections to local and/or remote alarm systems. The group will also respond to any customer changes that occur during installation.

All equipment engineered and installed by Lucent Technologies is thoroughly tested and integrated into a reliable system at cut-over. Once approved by Lucent Technologies' Quality Assurance Test group (the industry's toughest), the system is turned over to the customer.

The group also provides any specialized engineering and installation services required for unusual or highly individualized applications. These specialized services may include engineering consultations and data base preparation. Your local Account Executive can provide more information about these services.

## **Basic Troubleshooting Techniques**

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### **Description**

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This procedure covers some basic troubleshooting techniques used to isolate and correct failures during the installation phase. This procedure is directed toward troubleshooting out-of-service systems only and should not be performed on in-service equipment.

**⇒ NOTE:**  
For troubleshooting in-service equipment refer to *DDM-2000 FiberReach Multiplexer User/Service Manual*, 363-206-301 for Release 2 or 363-206-305 for Releases 3 and 4.

**⇒ NOTE:**  
If only green LEDs are lighted, there is no problem with the DDM-2000 FiberReach.

**⇒ NOTE:**  
If the BBG8 SYSCTL has a "L" in the window do the following:

1. Check the frame ground of the FiberReach shelf see procedure in Chapter 2.
2. Check the fuses in the shelf and at the power supply.
3. Check the voltage the shelf is receiving it should be above -40 volts DC.

**⇒ NOTE:**  
For a description of the LEDs, refer to the "Installation Test" chapters.

- ⇒ NOTE:**  
Movement of circuit packs or cables may cause the DDM-2000 FiberReach to report alarms due to a configuration mismatch between the SYSCTL and the transmission circuit packs.
- ⇒ NOTE:**  
Circuit packs should not be removed or installed unless the SYSCTL is present.
- ⇒ NOTE:**  
Whenever circuit packs are removed from the shelf, update the SYSCTL equipment list by pressing the UPD/INIT push-button on the SYSCTL, even if just reseating a circuit pack.
- ⇒ NOTE:**  
If the DDM-2000 FiberReach appears to be reporting inconsistent alarms, initialize the SYSCTL as follows:
- a. Unseat the SYSCTL.
  - b. Reseat the SYSCTL.
  - c. When the CR LED on the user panel starts to flash, press the UPD/INIT push-button on the front of the SYSCTL within 10 seconds.
- ⇒ NOTE:**  
A flashing FAULT LED indicates a loss of input signal, not a circuit pack failure.
- ⇒ NOTE:**  
A solid FAULT LED indicates a failure of the circuit pack, shelf, or possibly another circuit pack interfacing with the "failed circuit pack".
- ⇒ NOTE:**  
The OLIU is the only circuit pack which can have both circuit packs active at the same time.

## Procedure

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1. Verify that the system is configured for normal operation (that is, fibers are connected; no external test equipment is connected).
2. Update the SYSCTL equipment list by pressing the UPD/INIT push-button on the SYSCTL.

3. Verify that the timing mode selection is set properly. In all DDM-2000 Fiber-Reach shelves, the timing mode should be set for line-timed. On the host DDM-2000 OC-3 system, normally in a central office (CO), the TGS must be set for either, external timing if the DDM-2000 OC-3 is being supplied an external DS1 clock or it should be set for free-running if a clock is not available.
4. If on the host DDM-2000 OC-3 system the TGS is set properly for external timing and a problem still exists, disconnect the external timing and set the TGS for free-running.
5. If a problem still exists with the TGS, try the failed unit in the other TGS slot. If the TGS fails in both slots, replace the TGS circuit pack. If the TGS fails in only one slot, replace the shelf.
6. If a solid FAULT LED is lighted on any circuit pack, determine if the problem exists with the shelf or the pack.
7. If the FAULT LED is flashing on the SYSCTL, the shelf is having difficulty communicating over the data communication channel to the far end. Determine if the problem is with the transmission path [that is, optical line interface units (OLIUs) with flashing FAULT LEDs] or with the SYSCTL at the far end.

### **Additional Procedure With a Terminal**

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1. Diagnostic information is provided by the DDM-2000 FiberReach using the `rtrv` (RETRIEVE) commands.
2. Use the `rtrv-alm` (RETRIEVE-ALARM) command to display the alarms that the DDM-2000 FiberReach is reporting.
3. Use the `rtrv-eqpt` (RETRIEVE-EQUIPMENT) command to display the equipment installed in the DDM-2000 FiberReach.
4. Use the `rtrv-state` (RETRIEVE-STATE) command to display the state (which packs are active/standby, type of protection switching) of the DDM-2000 FiberReach.
5. Use the `rtrv-nmap` (RETRIEVE NETWORK MAP) command to display a list of the systems in the network and how they are connected to each other.
6. Use the `rtrv-crs` (RETRIEVE CROSS-CONNECTION) command to display the state of the VT1.5 cross-connections.
7. If problems still persist refer to *DDM-2000 FiberReach User/Service Manual*.

## **Technical Support**

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Lucent is committed to providing total product coverage 24 hours a day, troubleshooting installation or service problems over the phone, and if necessary on-site. Regional Technical Assistance Center (RTAC) organizations are established to provide the customer with a single point of contact supporting all of the Lucent transmission and switching products. For RTAC support, dial 1-800-225-4672 which will direct the call to the RTAC center supporting your location.

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

## **Required Product Changes**

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During the life of a product, changes in the field may be required to correct an existing or potential problem. Product changes are issued in the form of Product Change Notifications (PCNs). The customer is notified about PCNs through the Design Change Management System (DCMS). For more information regarding DCMS, contact (314) 891-4213 or (314) 891-3660.

**Table 10-1. BBG8 SYSCTL I/O Connections**

| Name    | Pin No. | Function                    | Name    | Pin No. | Function                  |
|---------|---------|-----------------------------|---------|---------|---------------------------|
| BMPD0   | 030     | Intrashelf<br>Processor Bus | LSICKP  | 110     | Intrashelf<br>Control Bus |
| BMPD1   | 031     |                             | LSICKN  | 010     |                           |
| BMPD2   | 032     |                             | LSICDP  | 109     |                           |
| BMPD3   | 033     |                             | LSICDN  | 009     |                           |
| BMPD4   | 130     |                             | LSIRD P | 108     |                           |
| BMPD5   | 131     |                             | LSIRD N | 008     |                           |
| BMPD6   | 132     |                             | TRMCKP  | 248     |                           |
| BMPD7   | 133     |                             | TRMCKN  | 247     |                           |
| BMPD8   | 306     |                             | TRMCSP  | 148     |                           |
| BMPD9   | 305     |                             | TRMCDN  | 147     |                           |
| BMPD10  | 304     |                             | CSRTLM  | 128     |                           |
| BMPD11  | 303     |                             | CSRTG1  | 121     |                           |
| BMPD12  | 206     |                             | CSRTG2  | 021     |                           |
| BMPD13  | 205     |                             | CSROL1  | 120     |                           |
| BMPD14  | 204     |                             | CSROL2  | 020     |                           |
| BMPD15  | 203     |                             | CSRHA1C | 119     |                           |
| BMPA1   | 313     |                             | SRHA2   | 019     |                           |
| BMPA2   | 312     |                             | CSRHB1  | 118     |                           |
| BMPA3   | 311     |                             | CSRHB2  | 018     |                           |
| BMPA4   | 310     |                             | CSRHC1  | 117     |                           |
| BMPA5   | 309     |                             | CSRHC2  | 017     |                           |
| BMPA6   | 308     |                             | CSRLA1  | 116     |                           |
| BMPA7   | 307     |                             | CSRLA2  | 115     |                           |
| BMPA8   | 212     |                             | CSRLA3  | 016     |                           |
| BMPA9   | 211     |                             | CSRLA4  | 015     |                           |
| BMPA10  | 210     |                             | CSRLA5  | 140     |                           |
| BMPA11  | 209     |                             | CSRLA6  | 139     |                           |
| BMPA12  | 208     |                             | CSRLA7  | 040     |                           |
| BMPA13  | 207     |                             | CSRLAP  | 039     |                           |
| BCKOUT  | 214     |                             | CSRLB1  | 114     |                           |
| TLMBSN  | 217     |                             | CSRLB2  | 113     |                           |
| BMPLRWN | 034     |                             | CSRLB3  | 014     |                           |
| BMPURWN | 314     |                             | CSRLB4  | 013     |                           |
| BMPASN  | 315     |                             | CSRLB5  | 138     |                           |
| BMPDSN  | 215     |                             | CSRLB6  | 137     |                           |
| MPINTN  | 316     | CSRLB7                      | 038     |         |                           |
| DSACK0N | 216     | CSRLBP                      | 037     |         |                           |
| FRCMJ   | 028     | CSRLC1                      | 112     |         |                           |
|         |         | CSRLC2                      | 111     |         |                           |
|         |         | CSRLC3                      | 012     |         |                           |
|         |         | CSRLC4                      | 011     |         |                           |

**Table 10-1. BBG8 SYSCTL I/O Connections (Continued)**

| Name    | Pin No. | Function                | Name                   | Pin No.    | Function               |
|---------|---------|-------------------------|------------------------|------------|------------------------|
| CSRLC5  | 136     | Intrashelf Control Bus  | FRXD                   | 323        | CIT Interface          |
| CSRLC6  | 135     |                         | FTXD                   | 223        |                        |
| CSRLC7  | 036     |                         | FDTR                   | 322        |                        |
| CSRLCP  | 035     |                         | FDTRC                  | 329        | Intrashelf Control Bus |
| BS0     | 105     |                         | FXMTBS                 | 331        |                        |
| BS1     | 104     |                         | FRCVBS                 | 330        |                        |
| BS2     | 103     |                         | FCLAIM                 | 332        |                        |
| BS3     | 006     |                         | Modem Interface        | RRXD       | 049                    |
| BS4     | 005     |                         |                        | RTXD       | 048                    |
| BS5     | 004     |                         |                        | RDTR       | 047                    |
| BS6     | 003     |                         |                        | RS232N     | 222                    |
| IICSCS  | 107     |                         | Intrashelf Control Bus | RDTRC      | 229                    |
| IICSDA  | 007     |                         |                        | RXMTBS     | 231                    |
| DSACK1N | 227     |                         |                        | RRCVBS     | 230                    |
| SHELFID | 226     |                         |                        | RCLAIM     | 232                    |
| OHRCKM1 | 127     |                         | Overhead Interface     | CRLED      | 321                    |
| OHRXM1  | 123     | MJLED                   |                        | 320        |                        |
| OHTCKM1 | 027     | MNLED                   |                        | 319        |                        |
| OHTXM1  | 022     | PMNLED                  |                        | 318        |                        |
| OHRCKM2 | 126     | FEALED                  |                        | 221        |                        |
| OHRXM2  | 122     | ABNLED                  |                        | 220        |                        |
| OHTCKM2 | 026     | ACOLED                  |                        | 219        |                        |
| OHTXM2  | 024     | NEALED                  |                        | 218        |                        |
| RYCRA1  | 146     | Office Alarms           | ACON                   | 328        | ACO Push-button        |
| RYCRA2  | 046     |                         |                        | 025        | Not Used               |
| RYCRV1  | 145     |                         |                        | 101        |                        |
| RYCRV2  | 045     |                         |                        | 124        |                        |
| RYMJA1  | 144     |                         |                        | 125        |                        |
| RYMJA2  | 044     |                         |                        | 134        |                        |
| RYMJV1  | 143     |                         |                        | 201        |                        |
| RYMJV2  | 043     |                         |                        | 224        |                        |
| RYMNA1  | 142     |                         |                        | 225        |                        |
| RYMNA2  | 042     |                         |                        | 235        |                        |
| RYMNV1  | 141     |                         |                        | 325        |                        |
| RYMNV2  | 041     |                         |                        | 326<br>327 |                        |
| RTBOSP  | 334     | Serial Telemetry (TBOS) | RMPDGN                 | 249        |                        |
| RTBOSN  | 234     |                         | TMPDGN                 | 149        |                        |
| XTBOSP  | 333     |                         | SWTDSN                 | 348        |                        |
| XTBOSN  | 233     |                         | EXRSTN                 | 228        |                        |

**Table 10-1. BBG8 SYSCTL I/O Connections (Continued)**

| Name   | Pin No. | Function          | Name   | Pin No. | Function       |     |
|--------|---------|-------------------|--------|---------|----------------|-----|
| TLMIC  | 339     | Telemetry Inputs  | PMNTIN | 243     | Power Monitor  |     |
| TLMI1  | 343     |                   | FANCTL | 346     | Fan Control    |     |
| TLMI2  | 342     |                   | -48VA2 | 200     | Power Input    |     |
| TLMI3  | 341     |                   |        | -48VA1  |                | 300 |
| TLMI4  | 340     |                   |        | -48VB2  |                | 001 |
| TLMI5  | 338     |                   |        | -48VB1  |                | 100 |
| TLMI6  | 337     |                   |        | -48VBT  |                | 301 |
| TLMI7  | 336     |                   | GRDFLT | 347     | Ground Input   |     |
| TLMI8  | 335     |                   |        | GRD     |                | 317 |
| TLMI9  | 242     |                   |        | GRD     |                | 213 |
| TLMI10 | 241     |                   |        | GRD     |                | 129 |
| TLMI11 | 240     |                   |        | GRD     |                | 106 |
| TLMI12 | 239     |                   |        | GRD     |                | 102 |
| TLMI13 | 238     |                   |        | LATEGRD |                | 029 |
| TLMI14 | 237     |                   |        | GRD     |                | 023 |
| TLMI15 | 236     |                   |        |         |                |     |
| TLMOC  | 345     | Telemetry Outputs | ESDGRD | 002     | ESD Protection |     |
| TLMO1  | 344     |                   | +5VOUT | 302     | Power Output   |     |
| TLMO2  | 246     |                   |        | 324     |                |     |
| TLMO3  | 245     |                   |        | 202     |                |     |
| TLMO4  | 244     |                   |        |         |                |     |

**Table 10-2. DS1 I/O Connections**

| Name   | Pin No. | Function       | Name           | Pin No. | Function                  |                              |
|--------|---------|----------------|----------------|---------|---------------------------|------------------------------|
| DSX01T | 209     | DS1 Interface  | TVTCSP         | 316     | VT-G Signals<br>(Service) |                              |
| DSX01R | 208     |                | TVTCSN         | 315     |                           |                              |
| DSX02T | 207     |                | TVTFMS         | 131     |                           |                              |
| DSX02R | 206     |                | TVTDAS         | 311     |                           |                              |
| DSX03T | 205     |                | RVTCSP         | 016     |                           |                              |
| DSX03R | 204     |                | RVTCSN         | 017     |                           |                              |
| DSX04T | 203     |                | RVTFMS         | 014     |                           |                              |
| DSX04R | 202     |                | RVTDAS         | 013     |                           |                              |
| DSXI1T | 217     |                | DS1 Protection | DC52SP  | 118                       | VT-G Signals<br>(Protection) |
| DSXI1R | 216     |                |                | DC52SN  | 018                       |                              |
| DSXI2T | 215     |                |                | TVTCPP  | 317                       |                              |
| DSXI2R | 214     |                |                | TVTCPN  | 318                       |                              |
| DSXI3T | 213     |                |                | TVTFMP  | 312                       |                              |
| DSXI3R | 212     |                |                | TVTDAP  | 310                       |                              |
| DSXI4T | 211     |                |                | RVTCPP  | 219                       |                              |
| DSXI4R | 210     |                |                | RVTCPN  | 218                       |                              |
| PSX01T | 109     | DS1 Protection | RVTFMP         | 015     | Control                   |                              |
| PSX01R | 108     |                | RVTDAP         | 012     |                           |                              |
| PSX02T | 107     |                | DC52PP         | 119     |                           |                              |
| PSX02R | 106     |                | DC52PN         | 019     |                           |                              |
| PSX03T | 105     |                | LSICKP         | 307     |                           |                              |
| PSX03R | 104     |                | LSICKN         | 306     |                           |                              |
| PSX04T | 103     |                | LSICDP         | 010     |                           |                              |
| PSX04R | 102     |                | LSICDN         | 009     |                           |                              |
| PSXI1T | 117     |                | LSIRDP         | 008     |                           |                              |
| PSXI1R | 116     |                | LSIRDN         | 007     |                           |                              |
| PSXI2T | 115     |                | CSR            | 200     |                           |                              |
| PSXI2R | 114     |                | BMPA11         | 303     |                           |                              |
| PSXI3T | 113     |                | BMPA10         | 304     |                           |                              |
| PSXI3R | 112     |                | BMPA9          | 305     |                           |                              |
| PSXI4T | 111     |                | BS1            | 302     |                           |                              |
| PSXI4R | 110     |                | BS2            | 201     |                           |                              |
| +5VS   | 301     | Power          | BS3            | 101     | Control                   |                              |
| +5VP   | 001     |                | IICSDA         | 003     |                           |                              |
| -48VAA | 308     |                | IICSCL         | 004     |                           |                              |
| -48VBB | 309     |                |                |         |                           |                              |
| -48VRT | 005     |                |                |         |                           |                              |
| -48VRT | 006     |                |                |         |                           |                              |
| ESDGND | 100     | ESD Protection |                |         |                           |                              |
| GRD    | 011     | Ground         |                |         |                           |                              |
| GRD    | 314     |                |                |         |                           |                              |
| GRD    | 300     |                |                |         |                           |                              |
| GRD    | 002     |                |                |         |                           |                              |

**Table 10-3. 26-Type OLIU I/O Connections**

| Name    | Pin No. | Function      | Name   | Pin No. | Function            |
|---------|---------|---------------|--------|---------|---------------------|
| TDC1SP  | 037     | STS-1 Signals | RDC1SP | 015     | STS-1 Signals       |
| TDC1SN  | 137     |               | RDC1SN | 115     |                     |
| TDC2SP  | 036     |               | RDC2SP | 014     |                     |
| TDC2SN  | 136     |               | RDC2SN | 114     |                     |
| TDC3SP  | 034     |               | RDC3SP | 012     |                     |
| TDC3SN  | 134     |               | RDC3SN | 112     |                     |
| TDC1PP  | 237     |               | RDC1PP | 215     |                     |
| TDC1PN  | 337     |               | RDC1PN | 315     |                     |
| TDC2PP  | 236     |               | RDC2PP | 214     |                     |
| TDC2PN  | 336     |               | RDC2PN | 314     |                     |
| TDC3PP  | 234     |               | RDC3PP | 212     |                     |
| TDC3PN  | 334     |               | RDC3PN | 312     |                     |
| 28FMPP2 | 027     |               | Timing | TOHCK   |                     |
| 28FMPN2 | 127     | TOHFR         |        | 140     |                     |
| 28FMPP1 | 026     | TOHDA         |        | 240     |                     |
| 28FMPN1 | 126     | ROHCK         |        | 139     |                     |
| 52CKPP2 | 227     | ROHFR         |        | 239     |                     |
| 52CKPN2 | 327     | ROHDA         |        | 339     |                     |
| 52CKPP1 | 226     | R3PR6P        |        | 238     | Companion Interface |
| 52CKPN1 | 326     | R3PR6N        |        | 338     |                     |
| 28FM2PP | 031     | R3PR5P        |        | 228     |                     |
| 28FM2NN | 131     | R3PR5N        |        | 328     |                     |
| 28FM1PP | 030     | R3PR4P        |        | 220     |                     |
| 28FM1NN | 130     | R3PR4N        |        | 320     |                     |
| 52CK2PP | 231     | R3PR3P        |        | 038     |                     |
| 52CK2NN | 331     | R3PR3N        |        | 138     |                     |
| 52CK1PP | 230     | R3PR2P        |        | 028     |                     |
| 52CK1NN | 330     | R3PR2N        |        | 128     |                     |
| MCLKOP  | 019     | R3PR1P        |        | 020     |                     |
| MCLKON  | 119     | R3PR1N        | 120    |         |                     |
| MCLPPP  | 018     | CO52TP        | 025    |         |                     |
| MCLKPN  | 118     | CO52TN        | 125    |         |                     |
| FSYNOP  | 219     | COFRTP        | 225    |         |                     |
| FSYNON  | 319     | COFRTN        | 325    |         |                     |
| FSYNPP  | 218     |               |        |         |                     |
| FSYNPN  | 318     |               |        |         |                     |
| MCLKOP  | 024     |               |        |         |                     |
| MCLKON  | 124     |               |        |         |                     |
| FSYNOP  | 224     |               |        |         |                     |
| FSYNON  | 324     |               |        |         |                     |

**Table 10-3. 26-Type OLIU I/O Connections (Continued)**

| Name    | Pin No. | Function          | Name    | Pin No. | Function |              |
|---------|---------|-------------------|---------|---------|----------|--------------|
| LSICKP  | 205     | Control Interface | -48VAA  | 300     | Power    |              |
| LSICKN  | 305     |                   | -48VAA  | 200     |          |              |
| LSICDP  | 206     |                   | -48VBB  | 100     |          |              |
| LSICDN  | 306     |                   | -48VBB  | 001     |          |              |
| LSIRDP  | 006     |                   | -48VRT  | 301     |          |              |
| LSIRDN  | 106     |                   | +5VCP   | 009     |          |              |
| CSR     | 104     |                   | +5VCP   | 109     |          |              |
| BMPA12  | 311     |                   | +5VCP   | 044     |          |              |
| BMPA11  | 103     |                   | +5VCP   | 144     |          |              |
| BMPA10  | 203     |                   | +5VCP   | 211     |          |              |
| BMPA9   | 303     |                   | +5VCP   | 246     |          |              |
| BS2     | 003     |                   | TVTD1   | 011     |          | VT-G Signals |
| BS1     | 004     |                   | TVTD2   | 111     |          |              |
| BS3     | 005     |                   | TVTD3   | 010     |          |              |
| IICSDA  | 304     |                   | TVTD4   | 110     |          |              |
| IIC_SCL | 204     |                   | TVTD5   | 046     |          |              |
| GRD     | 102     | TVTD6             | 146     |         |          |              |
| GRD     | 105     | TVTD7             | 045     |         |          |              |
| GRD     | 202     | TVTDP             | 145     |         |          |              |
| GRD     | 302     | TVTCBP            | 042     |         |          |              |
| GRD     | 013     | TVTCBN            | 142     |         |          |              |
| GRD     | 113     | TVTCAP            | 007     |         |          |              |
| GRD     | 213     | TVTCAN            | 107     |         |          |              |
| GRD     | 313     | TVTFMA            | 307     |         |          |              |
| GRD     | 021     | TVTFMB            | 342     |         |          |              |
| GRD     | 121     | RVTD1             | 210     |         |          |              |
| GRD     | 221     | RVTD2             | 310     |         |          |              |
| GRD     | 321     | RVTD3             | 209     |         |          |              |
| GRD     | 029     | RVTD4             | 309     |         |          |              |
| GRD     | 129     | RVTCBP            | 243     |         |          |              |
| GRD     | 229     | RVTCBN            | 343     |         |          |              |
| GRD     | 329     | RVTFMB            | 242     |         |          |              |
| GRD     | 035     | RVTD5             | 245     |         |          |              |
| GRD     | 135     | RVTD6             | 345     |         |          |              |
| GRD     | 235     | RVTD7             | 244     |         |          |              |
| GRD     | 335     | RVTDP             | 344     |         |          |              |
| GRD     | 047     | RVTCAP            | 208     |         |          |              |
| GRD     | 147     | DC52AP            | 008     |         |          |              |
| GRD     | 148     | DC52AN            | 108     |         |          |              |
| GRD     | 247     | DC52BP            | 043     |         |          |              |
| GRD     | 248     | DC52BN            | 143     |         |          |              |
| GRD     | 347     | RVTFMAP           | 207     |         |          |              |
| ESDGRD  | 002     | ESD Protection    | RVTCANP | 308     |          |              |

See Notice on first page

**Table 10-4. ECC1 User Panel I/O Connections**

| Name    | Pin No. | Function                    | Name                      | Pin No.         | Function      |
|---------|---------|-----------------------------|---------------------------|-----------------|---------------|
| BMPD0   | 0011    | Intrashelf<br>Processor Bus | FRXD                      | 1009            | CIT Interface |
| BMPD1   | 0012    |                             | FTXD                      | 1008            |               |
| BMPD2   | 0013    |                             | FDTR                      | 0009            |               |
| BMPD3   | 0014    |                             | Intrashelf<br>Control Bus | BS2             | 1006          |
| BMPD4   | 1011    |                             |                           | BS3             | 0006          |
| BMPD5   | 1012    |                             |                           | BS4             | 1007          |
| BMPD6   | 1013    |                             |                           | IICSCS          | 3024          |
| BMPD7   | 1014    |                             |                           | IICSDA          | 2024          |
| BMPD8   | 3009    |                             |                           | CSRTLM          | 1010          |
| BMPD9   | 3008    |                             |                           | LSICKP          | 1032          |
| BMPD10  | 3007    |                             |                           | LSICDP          | 1031          |
| BMPD11  | 3006    |                             |                           | LSIRDP          | 1030          |
| BMPD12  | 2009    |                             |                           | LSICKN          | 0032          |
| BMPD13  | 2008    |                             | LSICDN                    | 0031            |               |
| BMPD14  | 2007    |                             | LSIRDN                    | 0030            |               |
| BMPD15  | 2006    |                             | LEDs                      | CRLED           | 2035          |
| BMPA1   | 3016    |                             |                           | MJLED           | 1035          |
| BMPA2   | 3015    |                             |                           | MNLED           | 0035          |
| BMPA3   | 3014    |                             |                           | PMNLED          | 1033          |
| BMPA4   | 3013    |                             |                           | FEALED          | 2034          |
| BMPA5   | 3012    |                             |                           | ABNLED          | 1034          |
| BMPA6   | 3011    |                             |                           | ACOLED          | 0034          |
| BMPA7   | 3010    |                             |                           | NEALED          | 0033          |
| BMPA8   | 2015    |                             |                           | ACO Push-button | ACON          |
| BMPA9   | 2014    |                             | Ground                    |                 | GRD           |
| BMPA10  | 2013    |                             |                           | GRD             | 0037          |
| BMPA11  | 2012    |                             |                           | GRD             | 0038          |
| BMPA12  | 2011    |                             |                           | GRD             | 0039          |
| BMPA13  | 2010    |                             |                           | GRD             | 0040          |
| BCKOUT  | 2017    |                             |                           | GRD             | 0041          |
| TLMBNS  | 2020    |                             |                           | GRD             | 3036          |
| BMPURWN | 3017    |                             |                           | GRD             | 3037          |
| BMPLRWN | 0015    |                             |                           | GRD             | 3038          |
| BMPASN  | 3018    |                             |                           | GRD             | 3039          |
| BMPDSN  | 2018    |                             |                           | GRD             | 3040          |
| MPINTN  | 3019    | GRD                         | 3041                      |                 |               |
| DSACK0N | 2019    | ESD<br>Protection           | ESDGRD                    | 3000            |               |
| DSACK1N | 1016    |                             | ESDGRD                    | 3001            |               |
| TCK     |         |                             |                           |                 |               |
| RID     |         |                             |                           |                 |               |
| CTS     |         |                             |                           |                 |               |
| DCD     |         |                             |                           |                 |               |
| RTS     |         |                             |                           |                 |               |

**Table 10-4. ECC1 User Panel I/O Connections (Continued)**

| Name   | Pin No. | Function       | Name            | Pin No. | Function |      |
|--------|---------|----------------|-----------------|---------|----------|------|
| ROHCK1 | 3026    | SONET Overhead | +5VOUTS         | 1041    | Power    |      |
| ROHFR1 | 1026    |                | -48VRT          | 3043    |          |      |
| ROHDA1 | 3022    |                | -48VRT          | 3042    |          |      |
| ROHCK2 | 3025    |                | -48VA           | 2047    |          |      |
| ROHFR2 | 1015    |                | -48VA           | 2046    |          |      |
| ROHDA2 | 3021    |                | -48VA           | 2045    |          |      |
| TOHCK1 | 2026    |                | -48VAA          | 2044    |          |      |
| TOHFR1 | 0026    |                | -48VAA          | 2043    |          |      |
| TOHCK2 | 2025    |                | -48VAA          | 2042    |          |      |
| TOHFR2 | 1017    |                | RTNA            | 1047    |          |      |
| TOHDA1 | 2022    |                | RTNA            | 1046    |          |      |
| TOHDA2 | 2021    |                | RTNA            | 1045    |          |      |
| ROHCCS | 1023    |                | -48VAA          | 1044    |          |      |
| ROHCF5 | 1021    |                | -48VAA          | 1043    |          |      |
| ROHCDS | 1019    |                | -48VAA          | 1042    |          |      |
| ROHCCP | 1022    |                | RTNA            | 0047    |          |      |
| ROHCFP | 1020    |                | RTNA            | 0046    |          |      |
| ROHCDP | 1018    |                | RTNA            | 0045    |          |      |
| TOHCCS | 0023    |                | -48VRT          | 0044    |          |      |
| TOHCF5 | 0021    |                | -48VRT          | 0043    |          |      |
| TOHCCP | 0022    |                | -48VRT          | 0042    |          |      |
| TOHCFP | 0020    |                | -48VRT          | 3005    |          |      |
| TOHCDS | 0017    |                | -48VB           | 3004    |          |      |
| TOHCDP | 0018    |                | -48VB           | 3003    |          |      |
| RQ2P   | 3035    |                | LAN Interface   | -48VB   |          | 3002 |
| RQ2N   | 3034    |                |                 | -48VBB  |          | 2005 |
| XQ2P   | 3033    |                |                 | -48VBB  |          | 2004 |
| XQ2N   | 3032    |                |                 | -48VBB  |          | 2003 |
| TCK    | 3028    |                | RS232 Interface | -48VB   |          | 2002 |
| RID    | 3027    |                |                 | -48VB   |          | 2001 |
| CTS    | 2028    | -48VB          |                 | 2000    |          |      |
| DCD    | 2027    | -48VBB         |                 | 1005    |          |      |
| RTS    | 1029    | -48VBB         |                 | 1004    |          |      |
| DTR    | 1028    | -48VBB         |                 | 1003    |          |      |
| TDA    | 1027    | RTNB           |                 | 1002    |          |      |
| RCK    | 0029    | RTNB           |                 | 1001    |          |      |
| DSR    | 0028    | RTNB           |                 | 1000    |          |      |
| RDA    | 0027    | -48VRT         |                 | 0005    |          |      |
| -48VA  | 3047    |                | -48VRT          | 0004    |          |      |
| -48VA  | 3046    |                | -48VRT          | 0003    |          |      |
| -48VA  | 3045    |                | RTNB            | 0002    |          |      |
| -48VRT | 3044    |                | RTNB            | 0001    |          |      |
|        |         |                | RTNB            | 0000    |          |      |

**Table 10-5. BBF8 HDSL I/O Connections**

| Name   | Pin No. | Function       | Name   | Pin No. | Function       |
|--------|---------|----------------|--------|---------|----------------|
| DSX01T | 209     |                | PSXI3T | 113     |                |
| DSX01R | 208     |                | PSXI3R | 112     |                |
| DSX02T | 207     |                | PSXI4T | 111     | DS1 Protection |
| DSX02R | 206     |                | PSXI4R | 110     |                |
| DSX03T | 205     |                | TVTCSP | 316     |                |
| DSX03R | 204     |                | TVTCSN | 315     |                |
| DSX04T | 203     | HDSL Interface | TVTFMS | 313     |                |
| DSX04R | 202     |                | TVTDAS | 311     |                |
| DSXI1T | 217     |                | RVTCSP | 016     | VT-G Signals   |
| DSXI1R | 216     |                | RVTCSN | 017     | (Service)      |
| DSXI2T | 215     |                | RVTFMS | 014     |                |
| DSXI2R | 214     |                | RVTDAS | 013     |                |
| DSXI3T | 213     |                | DC52SP | 118     |                |
| DSXI3R | 212     |                | DC52SN | 018     |                |
| DSXI4T | 211     |                | TVTCPP | 317     |                |
| DSXI4R | 210     |                | TVTCPN | 318     |                |
| PSX01T | 109     |                | TVTFMP | 312     |                |
| PSX01R | 108     |                | TVTDAP | 310     |                |
| PSX02T | 107     |                | RVTCPP | 319     | VT-G Signals   |
| PSX02R | 106     |                | RVTCPN | 218     | (Protection)   |
| PSX03T | 105     |                | RVTFMP | 015     |                |
| PSX03R | 104     |                | RVTDAP | 012     |                |
| PSX04T | 103     | DS1 Protection | DC52PP | 119     |                |
| PSX04R | 102     |                | DC52PN | 019     |                |
| PSXI1T | 117     |                | LSICKP | 307     |                |
| PSXI1R | 116     |                | LSICKN | 306     | Control        |
| PSXI2T | 115     |                | LSICDP | 010     |                |
| PSXI2R | 114     |                |        |         |                |

**Table 10-6. BBG4B DS3 I/O Connections**

| Name   | Pin No. | Function         | Name              | Pin No. | Function       |        |
|--------|---------|------------------|-------------------|---------|----------------|--------|
| DSX3I  | 048     | DSX-3 Interface  | FSYNSP            | 224     | Timing Signals |        |
| PDSX3I | 149     |                  | FSYNSN            | 324     |                |        |
| DSX3O  | 348     | Companion DS3 CP | FSYNPP            | 225     |                |        |
| PDSX3O | 249     |                  | FSYNPN            | 325     |                |        |
| TDC1SP | 015     | STS-1 Interface  | -48VA1            | 300     | Power          |        |
| TDC1SN | 115     |                  | -48VA2            | 200     |                |        |
| TDC1PP | 215     |                  | -48VB1            | 100     |                |        |
| TDC1PN | 315     |                  | -48VB2            | 001     |                |        |
| RDC1SP | 037     |                  | -48VRT            | 301     |                |        |
| RDC1SN | 137     |                  | ESDGRD            | 002     | ESD Protection |        |
| RDC1PP | 237     |                  | Control Interface | GRD     | 102            | Ground |
| RDC1PN | 337     |                  |                   | GRD     | 202            |        |
| LSICKP | 205     | GRD              |                   | 302     |                |        |
| LSICKN | 305     | GRD              |                   | 013     |                |        |
| LSICDP | 206     | GRD              |                   | 113     |                |        |
| LSICDN | 306     | GRD              |                   | 213     |                |        |
| LSIRDP | 006     | GRD              |                   | 313     |                |        |
| LSIRDN | 106     | GRD              |                   | 021     |                |        |
| CSR    | 104     | GRD              |                   | 121     |                |        |
| BMPA11 | 103     | GRD              |                   | 221     |                |        |
| BMPA10 | 203     | GRD              |                   | 321     |                |        |
| BMPA9  | 303     | GRD              |                   | 029     |                |        |
| BS1    | 003     | GRD              |                   | 129     |                |        |
| BS2    | 004     | GRD              |                   | 229     |                |        |
| BS3    | 005     | GRD              |                   | 329     |                |        |
| IICSDA | 304     | GRD              |                   | 035     |                |        |
| IICSCS | 204     | GRD              |                   | 135     |                |        |
| TOHCK  | 040     | SONET Overhead   |                   | GRD     | 235            |        |
| TOHFR  | 140     |                  | GRD               | 335     |                |        |
| TOHDA  | 240     |                  | GRD               | 047     |                |        |
| ROHCK  | 139     |                  | GRD               | 147     |                |        |
| ROHFR  | 239     |                  | GRD               | 148     |                |        |
| ROHDA  | 339     |                  | GRD               | 247     |                |        |
| MCLKSP | 024     |                  | Timing Signals    | GRD     | 248            |        |
| MCLKSN | 124     | GRD              |                   | 347     |                |        |
| MCLKPP | 025     |                  |                   |         |                |        |
| MCLKPN | 125     |                  |                   |         |                |        |

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See Notice on first page

## Glossary

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### Numeric and Symbols

#### 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.

#### 1xN, 1x1

1xN protection switching pertains to circuit pack protection that provides a redundant signal path through the DDM-2000 (it does not cover protection switching of an optical facility; see "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

#### ABN

Abnormal (status condition)

#### ACO

Alarm Cutoff — A push-button switch available on the user panel that can be used to retire an audible office alarm.

#### ACO/TST

Alarm Cutoff and Test — The name of a push-button on the user panel.

**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.)

**ADM**

Add/Drop Multiplexer.

**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.

**ANSI**

American National Standards Institute

**APS**

Automatic Protection Switch

**AS&C**

Alarm, Status, and Control

**ASCII**

American Standard Code for Information Interchange — A standard 8-bit code used for exchanging information among data processing systems and associated equipment.

**ASN.1**

Abstract Syntax Notation 1

**ATM**

Asynchronous Transfer Mode

**Auto**

Automatic — One possible state of a DS1 or DS3 port. In this state, the port will automatically be put "in service" if a good signal is detected coming from the DSX panel.

**Automatic Protection Switch**

A protection switch that occurs automatically in response to an automatically detected fault condition.

**AUXCTL**

Auxiliary Control -- The name of the slot to the left of the SYSCTL slot on the DDM-2000 OC-3 shelf and to the right of the SYSCTL slot on the DDM-2000 OC-12 and FiberReach wideband shelves.

**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.

### **BDFB**

Battery Distribution and Fuse Bay.

### **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 synonymously with wideband.

## **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.

### **CEV**

Controlled Environment Vault

### **CIT**

Craft Interface Terminal

### **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.

### **CLF**

Carrier Line Failure Status

### **CLK**

Clock

**CMOS**

Complementary Metal Oxide Semiconductor

**CO**

Central Office

**COACH**

A system of on-line support tools aimed at providing product news and bulletins, diagnostic services, compatibility information, and on-line documents.

**CP**

Circuit Pack

**CR**

Critical (alarm status)

**CSA**

Carrier Serving Area

**CS&O**

Customer Support and Operations

**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-1000**

AT&T's Dual DS3 Multiplexer — A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or optical signal.

**DDM-2000**

AT&T's next generation network multiplexer that multiplexes DS1, DS3, or EC-1 inputs into an 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 by time-division multiplexing several digital signals into a single composite digital signal.

**DPLL**

Digital Phase-Locked Loop

**DRI**

Dual Ring Interworking.

**DS1**

Digital Signal Level 1 (1.544 M/bs)

**DS1 Circuit Pack**

The DS1 interface circuit pack interfaces to the DSX-1 panel.

**DS3**

Digital Signal Level 3 (44.736 M/bs)

**DSn**

Digital Signal Rate n — One of the possible digital signal rates at DDM-2000 interfaces: DS1 (1.544 Mb/s), 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 a non-TARP OSI maintenance subnetwork. There can be one DSNE per ring.

## **DSX**

Digital Cross-Connect Panel — A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-1 interconnects equipment operating at the DS1 rate.

## **DT**

Distant Terminal

## **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 0x1 Cross-Connection**

In a single-homed application, the DDM-2000 OC-3/OC-12 Multiplex uses a dual 0x1 cross-connection to map the VT1.5 channels between the DDM-2000 FiberReach OC-1 and the DDM-2000 OC-3/OC-12 rings. This dual 0x1 architecture means that the VT1.5 path switching is one in the DDM-2000 FiberReach and not in the host DDM-2000. Individual DS1 signals within an STS-1 can therefore be dropped to DDM-2000 OC-3 shelves at several nodes around the ring.

## **Dual Homing**

In DDM-2000 FiberReach, a network topology in which two OC-3 shelves serve as the DDM-2000 FiberReach Multiplex host supporting up to twelve OC-1 rings. Each DDM-2000 FiberReach Multiplex ring is interconnected between two separate hosts. Two SLC-2000 Access Systems serving as the DDM-2000 FiberReach hosts can support up to four OC-1 rings.

## **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 and 28 VT1.5s 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.

### **EEPROM**

Electrically Erasable Programmable Read-only Memory

|                |                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EIA</b>     | Electronic Industries Association                                                                                                                                                                                                                                                               |
| <b>EMC</b>     | Electromagnetic Compatibility                                                                                                                                                                                                                                                                   |
| <b>EMI</b>     | Electromagnetic Interference                                                                                                                                                                                                                                                                    |
| <b>EOOF</b>    | Excessive Out of Frame                                                                                                                                                                                                                                                                          |
| <b>EPROM</b>   | Erasable Programmable Read-only Memory                                                                                                                                                                                                                                                          |
| <b>EQ</b>      | Equipped (memory administrative state)                                                                                                                                                                                                                                                          |
| <b>ES</b>      | Errored Seconds — A performance monitoring parameter. ES "type A" is a second with exactly one error, ES "type B" is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs. |
| <b>ESD</b>     | Electrostatic Discharge                                                                                                                                                                                                                                                                         |
| <b>ESF</b>     | Extended Super Frame (format for DS1 signal)                                                                                                                                                                                                                                                    |
| <b>F</b>       |                                                                                                                                                                                                                                                                                                 |
| <b>FDDI</b>    | Fiber Distribution Data Interface                                                                                                                                                                                                                                                               |
| <b>FE</b>      | Far-End. Any other network element in a subnetwork other than the one the user is at or working on. Also called remote.                                                                                                                                                                         |
| <b>FE-ACTY</b> | Far End Activity — An LED on the user panel.                                                                                                                                                                                                                                                    |
| <b>FEBE</b>    | Far End Block Error — An indication returned to near-end transmitting node that an errored block has been detected at the far end.                                                                                                                                                              |
| <b>FE ID</b>   | Far End Identification — The 7-segment display on the faceplate of the SYSCTL circuit pack.                                                                                                                                                                                                     |

## **FEPROM**

Flash EPROM — A new technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

## **FERF**

Far-End-Receive Failure — An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure.

## **FE SEL**

Far End Select — An LED on the user panel.

## **FIT**

Failures in /10u9d 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**

AT&T'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, or C function unit slots on the DDM-2000 OC-3 Multiplexer, or in the A, B, C, or D function unit slots of the DDM-2000 OC-12 Multiplexer. The DDM-2000 FiberReach currently does not support circuit packs in its function unit slots.

## **G**

### **GNE**

Gateway Network Element — A network element that has an active X.25 link.

### **Group**

The eight slots that may be equipped.

### **GTP**

General Telemetry Processor

## **H**

### **Hairpin Routing**

A cross-connection between function units (*inter*-function unit). For example, function unit C to function units A or B. Also, 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. Eliminate the need for another shelf.

### **HECI**

Human Equipment Catalog Item

**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**

**ID**

Identifier. See shelf ID and site ID.

**IEC**

International Electrotechnology Commission

**IMF**

Infant Mortality Factor

**INC**

Incoming Status

**INCM**

A parallel telemetry point used to indicate incoming low-speed failures.

**I/O**

Input/Output

**IR**

Intermediate 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).

**ISDN**

Integrated Services Digital Network

**IS-3**

A proprietary interface provided by the 21D optical line interface units. Used for OC-3/OC12 intershelf interworking.

**ISO**

International Standards Organization. See OSI.

**J**

**Jitter**

Timing jitter is defined as short-term variations of the significant instants of a digital signal from their ideal positions in time.

## **L**

### **LAN**

Local Area Network

### **LAPD**

Link Access Procedure "D"

### **LBO**

Line Build Out — An equalizer network between the DDM-2000 Multiplexer and the DSX panel. It guarantees the proper signal level and shape at the DSX panel.

### **LCN**

Local Communications Network

### **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.

### **Local**

See Near-End.

### **LOF**

Loss of Frame — A failure to synchronize to an incoming signal.

### **Line Timing**

A The capability to directly derive clock timing from an incoming OC-N signal while providing the user the capability to provision whether switching to 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.

### **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 will be ignored.

### **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 to describe distances of 40 Km or more between optical transmitter and receiver without regeneration. See intermediate reach.

**LS**

Low-Speed

**M**

**Main**

Two slots on the DDM-2000 FiberReach shelf in which the 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.

**MD**

Mediation Device

**MJ**

Major Alarm

**MM**

Multimode

**MML**

huMan-Machine Language defined by CCITT

**MN**

Minor Alarm

**MSDT**

Multi-Services Distant Terminal

**MTBF**

Mean Time Between Failures

**MTBMA**

Mean Time Between Maintenance Activities

**Multiplexing**

The process of combining several distinct digital signals into a single composite digital signal.

**Mult**

Multiplying. 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.

**MUX**

Multiplex

## **MXRVO**

Circuit Pack for the DDM-2000 OC-3 The MXRVO circuit pack multiplexes seven VT-G signals from the DS1 circuit packs to an STS-1 signal for connection to the OLIU circuit packs.

## **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: one or more high- and low-speed transmission ports, built-in intelligence, synchronization and timing capability, 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 user panel.

### **NEBS**

Network Equipment-Building System

### **nm**

Nanometer (10<sup>9</sup> meters)

### **NMA**

Network Monitoring and Analysis — An operations system designed by Bellcore 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.)

### **NRZ**

Nonreturn to Zero

### **NSA**

Not Service Affecting

**NSAP**

Network Services Access Point — An address that identifies a network element. Used for subnetwork communication using the OSI protocol.

**O**

**OAM&P**

Operations, Administration, Maintenance, and Provisioning

**OC, OC-n**

Optical Carrier — The optical signal that results from an optical conversion of an STS signal; that is, OC-1 from STS-1 and OC-n from STS-n.

**OC-1**

Optical Carrier Level 1 Signal (51.84 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 signal equivalent to three STS-1s linked together with a single path overhead.

**OC-12**

Optical Carrier Level 12 Signal (622 Mb/s)

**OHCTL**

The overhead controller circuit pack provides user access to the SONET overhead channels on the DDM-2000 OC-3 and OC-12 shelves only.

**OLIU**

Optical Line Interface Unit

**OOF**

Out of Frame

**Operations Interface**

Any interface that provides information on the system performance or control. These include the equipment LEDs, user panel, CIT, office alarms, and all telemetry interfaces.

**OOL**

Out of Lock

**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 international standards organization (ISO).

**OSP**

Outside Plant

**P**

**Pass Through**

Paths that are cross-connected directly across an intermediate node in a ring.

**P-Bit**

Performance Bit

**PC**

Personal Computer

**PID**

Program Identification

**PINFET**

Positive Intrinsic Negative Field Effect Transistor

**PJC**

Pointer Justification Count

**Plesiochronous Network**

A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant. For example in SONET networks, each timing traceable to their own Stratum 1 clock are considered plesiochronous with respect to each other.

**PLL**

Phased-Locked Loop

**PM**

Performance Monitoring — Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

**PMN**

Power Minor Alarm

**POH**

Path Overhead

**POTS**

Plain Old Telephone Service

**Port**

The physical, electrical, or optical interface on a system. For example, DS1, DS3, EC-2, OC-3 and OC-12. See Channel.

**Port State Provisioning**

A feature allows a user to suppress alarm reposting 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 DDM-2000 OC-3 system, a *protection* line is a pair of fibers that terminate on an OLIU circuit pack in the **main-2**, **fn-a-2**, **fn-b-2**, or **fn-c-2** slot. (See "Service Line.")

**PRM**

Performance Report Message

**PROTN**

Protection

**Product Family**

Lucent's line of SONET standard network products providing total network solutions

**PRS**

Primary Reference Source

**PVC**

Permanent Virtual Circuit

**PWR**

Power

**R**

**RAM**

Random Access Memory

**Reactive Maintenance**

Refers to detecting defects/failures and clearing them.

**Remote**

See Far-End.

**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 any failure conditions that caused a protection switch to occur clear 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.

**RPP**

Reliability Prediction Procedure — Described in Bellcore TR-NWT-00032.

**RT**

Remote Terminal — An unstaffed equipment enclosure that may have a controlled or uncontrolled environment.

**RTAC**

Regional Technical Assistance Center (1-800-225-RTAC)

**RZ**

Return to Zero

**S**

**SA**

Service Affecting

**SCADA**

Supervisory Control and Data Acquisition

**SD**

Signal Degrade

**SDH**

Synchronous Digital Hierarchy

**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.

**SEFS**

Severely Errored Frame Seconds

**SEO**

Single-Ended Operations — The maintenance capability that provides remote access to all DDM-2000 systems from a single location over the DCC.

**Service Line**

On a DDM-2000 OC-3 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**, or **fn-a-1**, or **fn-b-1**, or **fn-c-1** slot. As defined by the SONET standard, the SONET APS channel is not defined on a service (or "working") line. (See "Protection Line.")

**SES**

Severely Errored Seconds — This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

**SF**

Super Frame (Format for DS1 signal)

**Shelf ID**

A switch settable parameter with values of from 1 to 8. Used to log into a selected shelf in a bay using the CIT.

**SID**

System Identification

### **Single 0x1 Cross-Connection**

In a dual-homed application, the DDM-2000 OC-3/OC-12 Multiplex uses a single 0x1 cross-connection to map the VT1.5 channels between the DDM-2000 FiberReach OC-1 and the DDM-2000 OC-3/OC-12 rings. The 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. See Dual 0x1.

### **Single Homing**

In DDM-2000 FiberReach, a network topology in which a single OC-3 shelf serves as a DDM-2000 FiberReach Multiplex host supporting up to six OC-1 rings. A SLC-2000 Access System serving as a host can support up to two OC-1 rings. See Dual 0x1.

### **SM**

Single Mode

### **SONET**

Synchronous Optical Network

### **SPE**

Synchronous Payload Envelope

### **SQU**

Sync Quality Unknown. Used in Kbyte synchronization messaging

### **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 a 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 logical building block signal with a rate of 51.840 Mb/s for an STS-1 signal and a rate of n times 51.840 Mb/s for an STS-n signal.

### **STS-1 SPE**

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.

### **STU**

Sync Trace Unknown . Used in Sbyte synchronization messaging

### **Subnetwork**

A subnetwork consists of a CO (or gateway network element), DDM-2000, and all remote DDM-2000s connected via SONET DCC that are enabled.

**Synchronization Messaging**

SONET synchronization messaging is used to output DS1 AIS when clock traceability is lost.

**SYSCTL**

The system controller circuit pack that provides overall administrative control of the terminal.

**T**

**T1EXT**

T1 Carrier Extension Circuit Pack

**T1X1 and T1M1**

The ANSI committees responsible for telecommunications standards.

**TABS**

Telemetry Asynchronous Byte Serial (Protocol)

**TARP**

TID Address Resolution Protocol

**TBOS**

Telemetry Byte-Oriented Serial (Protocol) — Defines one physical interface for direct connection between the telemetry remote and the monitored equipment. An RS-422 port is used to provide the operations system with sufficient alarm and status information to localize a problem to a given DDM-2000 and to determine the severity of the problem.

**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 is shown by TBOS and causes a message to be sent to NMA via the X.25/TL1 interface.

**TCVCXO**

Temperature-Compensated Voltage-Controlled Crystal Oscillator — A highly stable and accurate clock source used in the DDM-2000 TGS circuit pack.

**TGS**

The timing generator circuit pack generates clock signals for distribution to the transmit circuits. It operates in the free-running, loop-timing, phase-lock, and holdover modes.

**TID**

Target Identifier — The Bellcore name for the system name.

**TL1**

Transaction Language 1 — A Bellcore machine-to-machine communications language that is a subset of CCITT's human-machine language.

**TLB**

Timing Looped Back. Used in Kbyte synchronization messaging.

**TOP**

Task Oriented Practice

**TSA**

Time Slot Assignment

**TSI**

Time Slot Interchange

**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 the other line carrying traffic in the other direction. 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.

**UPD/INIT**

A push-button on the user panel.

**V**

**VF**

Voice Frequency

**VLSI**

Very Large Scale Integration — Refers to very complex state of the art integrated circuits.

**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 received from the 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

### Numerics

1x1, 2-5, 3-6  
 1x7, 2-5, 3-6  
 26G2-U/28G-U/29G-U (OLIU), 9-5  
 26G-U (OLIU), 6-6, 6-7, 6-8

### A

About This Document, xxi  
 Admonishments, xxii  
 ASCII Terminal Setup, 7-5, 8-5  
 AT&T Contacts, xli  
 Automatic Protection Switching and Alarm Test, 9-4

### B

Basic Troubleshooting Techniques, 10-2  
 BBF1B, 6-5  
 BBF3 (DS1PM) Circuit Pack, 6-5  
 BBF6, 6-5  
 BBF8, 6-6  
 BBF8 HDSL I/O Connections, 10-14  
 BBG19 (Data Services) Circuit Pack, 6-6  
 BBG4B (DS3PM) Circuit Pack, 6-6  
 BBG4B DS3 I/O Connections, 10-15  
 BBG8 (SYSCTL) Circuit Pack, 6-5  
 Bell Laboratories, 10-5  
 Bulletins, xxxvii

### C

Cabling, 2-14  
   office alarm for wideband shelf, 2-14  
 CCN, xxxvii  
 central office, xxxv

change notices, xxxvii  
 Circuit Pack Installation, 6-14  
 Circuit Pack Provisioning (Option Settings), 6-4  
 CN, xxxvii  
 compatibility data, xxxvii  
 Compatible Terminals, 7-4, 8-5  
 Cross-Connect Procedure, 7-19  
 CTAM, xxxvi  
 CTS (Customer Technical Service), xxxvi, xxxvii  
 CTS-CARES, xxxvi, xxxvii  
 Customer Information Center, xl  
 Customer Technical Support (CTS), 10-5

### D

DCMS, 10-5  
 DDM-2000 FiberReach Command Notes, 7-5, 8-6  
 DDM-2000 FiberReach Releases, 1-2  
 DDM-2000 FiberReach Wideband Shelf Description, 1-2  
 Design Change Management System (DCMS), 10-5  
 Diagnostic Dictionary, xxxvi  
 Drawings  
   DDM-2000 FiberReach, xxix  
   DDM-2000 OC-12, xxxi  
   DDM-2000 OC-3, xxx  
 DRI, xxxvi  
 DS1, 10-14  
 DS1 Cabling - Narrowband Shelf, 4-6  
 DS1 Cabling- Wall DT, 3-9  
 DS1 Cabling- Wideband Shelf, 2-8  
 DS1 Protection Option Plug Installation, 2-5, 3-6  
 DS1/T1 EXT Circuit Pack Installation Procedure, 6-16  
 DS3, xxxiii, xxxiv, 8-12, 10-15  
 DS3 Cabling- Wall DT, 3-10  
 DS3 Cabling- Wideband Shelf, 2-10  
 DS3 Circuit Pack Installation Procedure, 6-16  
 DS3 Testing, 8-12  
 DSX-3, 10-15  
 dual ring interworking, xxxvi

### E

Electronic Documentation, xli  
 Electrostatic Discharge (ESD) Considerations, xxiii

Engineering and Installation Services, xxxviii, 10-1  
Equipment, 1-6  
Equipment and Rear Access Cable Installation, 2-i,  
2-1, 4-1, 5-1  
Equipment Installation, 2-7, 3-7, 4-5  
ESD, 10-15  
Establishing Cross-Connects and System Test, 7-17  
Explanation of Cross-Connects, 7-17

---

## F

Fiber Cleaning, 6-15  
Fiber Connections, 6-15  
Dual Homed Application, 7-12  
Single Homed Application, 7-12  
Stand Alone OC-1 Access via OC-3 Host, 7-12  
Fiber Installation and Test, 7-12, 8-13  
FiberReach, xxxiv, xxxv  
Wideband Shelf Operation and Maintenance, xxxiv  
FT-2000, xxxvi

---

## G

GLOSSARY, GL-1  
ground, 10-15

---

## H

HDSL, 10-14  
How to Comment on This Document, xli  
How to Order Documents, xl

---

## I

IMPORTANT INSTALLATION SAFETY  
INSTRUCTIONS, xxvi  
IMPORTANT SAFETY INSTRUCTIONS, xxv  
interworking, xxxvi  
Introduction, 1-1  
ITU, xxxii

---

## L

LED Test, 7-7, 8-8  
LED, Pushbutton, and Display Descriptions, 7-2, 8-3  
Lightwave Safety, xxii  
linear, xxxiii  
Linear Networks  
DDM-2000 OC-3 Multiplexer, xxxiii  
Local Equipment and Cross-Connect Test, 7-8, 8-9  
Login Procedure, 7-6, 8-6  
loop, xxxv  
Low Speed, BBF1B (DS1), BBF3 (DS1PM) or BBF6  
(T1EXT), 9-5, 9-6  
Low Speed, BBG4B (DS3), 9-7

---

## M

Maintenance  
DDM-2000 OC-1 FiberReach Wideband Shelf,  
xxxiv  
DDM-2000 OC-12 Multiplexer Rings, xxxiv  
DDM-2000 OC-12 Multiplexer, xxxiv  
maintenance, xxxii, xxxiii, xxxiv, xxxv, xxxvi  
Manual Protection Switching Test, 9-6  
Miscellaneous (Environmental) Discrete Telemetry  
Cable Installation- Rear Access, 2-17, 3-18  
Miscellaneous (Environmental) Discrete Telemetry  
Test, 9-7  
Miscellaneous (Office) Alarm Cabling- Narrowband  
Shelf, 4-10  
Miscellaneous Equipment, 1-6  
monitoring, xxxv

---

## N

National Product Training Center, xxxiii  
News and Bulletins, xxxvii

---

## O

OAM&P, xxxiii, xxxiv, xxxv

---

Office Alarm Cabling- Wall DT, 3-16  
Office Alarm Cabling- Wideband Shelf, 2-14  
Office Alarm Test, 9-2  
OLIU Installation, 6-15  
Operational Tests - Wideband Shelf, 9-i, 9-1  
Operations  
    DDM-2000 OC-12 Multiplexer, xxxiv  
operations interface, xxxv  
Optical Fiber Cable Installation- Rear Access, 4-7  
Optical Fiber Cabling- Wall DT, 3-11  
Optical Fiber Cabling- Wideband Shelf, 2-10  
Order Documents, xl

---

## P

Power Cabling- Narrowband Shelf, 4-9  
Power Cabling- Wall DT Miscellaneously Powered,  
    3-15  
Power Cabling- Wall DT using 1145B1 Power Supply,  
    3-13  
Power Cabling- Wideband Shelf, 2-12  
Powering and Verification, 6-2  
Powering, Verification, and Circuit Pack Installation,  
    6-1  
Procedure for DS1 Testing, 7-11  
Procedure for Installing FiberReach Carrier Assembly in  
    Network Bay Frame, 2-7  
Procedure for Installing FiberReach Wideband Shelf in  
    the Carrier Assembly, 2-7  
Product Change Notifications (PCNs), 10-5  
Product Notifications, xxxvii  
Product Support, xxxvii  
Product Training, xxxii  
protection, 10-14, 10-15  
Protection Option Label Installation, 2-6  
Protection Switch Test, 7-19  
Provisioning  
    DDM-2000 OC-12 Multiplexer, xxxiv  
provisioning, xxxiii, xxxiv, xxxv, xxxvi

---

## Q

quality assurance, xxxviii

## R

Regional Technical Assistance Center (RTAC), 10-5  
Related Documentation, xxvii  
Release 1 Installation Tests, 7-1  
Required Product Changes, 10-5  
Ring  
    DDM-2000 OC-12 Multiplexer, xxxiv  
    DDM-2000 OC-3 Multiplexer, xxxiii  
ring, xxxiii, xxxvi  
RS422 Microwire Telemetry Cabling- Narrowband  
    Shelf, 4-12

---

## S

Safety Instructions, xxii  
shelf, xxxiv, xxxv  
Software Download Procedure, 6-9  
Solutions, xxxvi  
SONET, xxxii, 10-15  
standard, xxxii  
Standards  
    SONET, xxxii  
Standing Orders, xl  
STS-1, 10-15  
Synchronous Optical Network, xxxii

---

## T

TARP, xxxiii, xxxiv, xxxv, xxxvi  
TBOS Telemetry Cabling- Wall DT, 3-17  
TBOS Telemetry Cabling- Wideband Shelf, 2-16  
Technical Support, xxxvi  
Technical Support Services, xxxix  
Test Equipment, 1-7  
timing, 10-15  
Tools, Test Sets, and Accessories, 8-4  
training, xxxii  
Transmission and Timing Circuit Packs Provisioning,  
    6-5  
Troubleshooting, 10-1  
turnup, xxxiii, xxxiv

---

**U**

Use of Terminal, 7-4, 8-5

---

**V**

VT-G, 10-14

---

**X**

X.25, xxxv