

**DDM-2000 OC-3 Multiplexer  
Software Releases 6, 7, 8, 9, 11 and 13**

**Installation Manual**

**363-206-204  
Issue 9  
October 1998**

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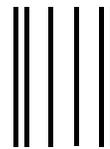
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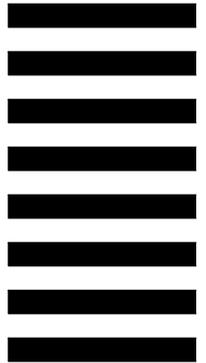
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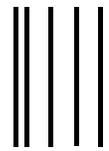
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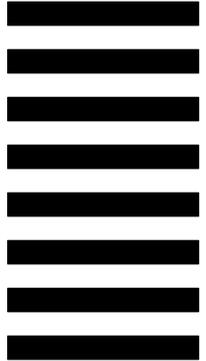
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## About This Document

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### **Purpose**

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This manual provides installation instructions for the DDM-2000 OC-3 Multiplexer for end users responsible for their own equipment installation. Refer to 363-206-202, DDM-2000 OC-3 *Multiplexer User/Service Manual* (up through Release 7.2), 363-206-280, DDM-2000 OC-3 *Multiplexer User/Service Manual* (Releases 8 through 11) and 363-206-285, DDM-2000 OC-3 *Multiplexer User/Service Manual* (Release 13) for any activity involving circuit turnup, 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 OC-3 Multiplexer. The most significant changes (Issue 8) are the addition of Release 13 information to the Powering, Verification, and Circuit Pack Installation Section, the Equipment and Rear Access Cable Installation and the Release 13 Installation Tests Section. Another important addition is the IAO LAN capability. Additionally, the new HDSL circuit pack, BBF8, the Megastar OHCTL, BBG10, and the trans-mux circuit pack, BBG20, are described.

Issue 9 adds more complete information on the IAO LAN feature in Chapter 2. Also, more cable information is included in Tables 2-12 and 3-8.

## Safety Instructions

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### 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

---

A 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.

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

---

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

## **Electrostatic Discharge(ESD) Considerations**

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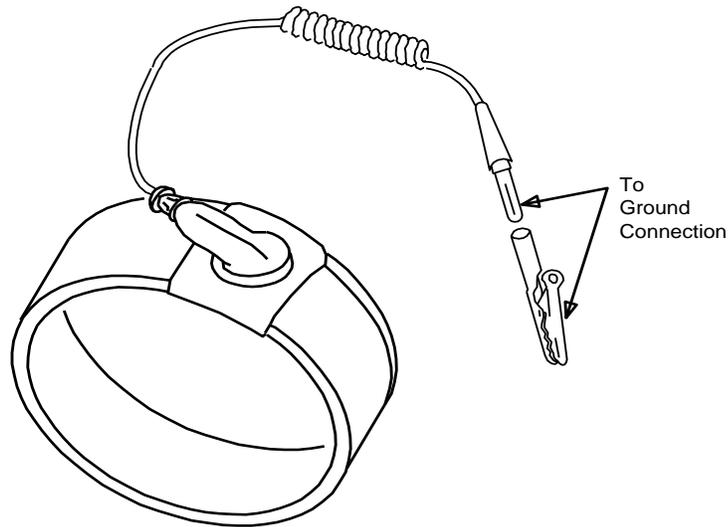
### **CAUTION:**

*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 styrofoam containers away from all circuit packs. Upon removal from bay, immediately put circuit packs into static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.

To reduce the possibility of ESD damage, assemblies are equipped with grounding jacks to enable personnel to ground themselves using wrist straps (see Figure 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.



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**Figure 1. Static Control Wrist Strap**

**SAVE THESE INSTRUCTIONS.**

**IMPORTANT SAFETY INSTRUCTIONS**

Read and understand all instructions.

Follow all warnings and instructions marked on the product.

Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.

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.

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.

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.

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 (P1 and P2) connectors from their mating (J1 and J2) power connectors when removing power from the system.*

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 OC-3 Multiplexer: BBF1B (TGS), BBF2 (TGS), BBF2B (TGS), BBF3 (DS1PM), BBF4 (TGS)†, BBF8 (HDSL), BBG2 (MXRVO), BBG4/BBG4B (DS3), BBG5 (SYSCTL), BBG6 (STS-1E), BBG7 (OHCTL), BBG8 (SYSCTL), BBG9 (OHCTL), BBG10 (OHCTL), BBG20 (TMUX), 21D (OLIU), 21D-U (OLIU), 22D-U (OLIU), 22F (OLIU), 22F-U (OLIU), 22F2-U (OLIU), 21G (OLIU), 21G-U (OLIU), 22G-U (OLIU), 22G2-U (OLIU), 22G3-U, 24G-U (OLIU), 27G-U (OLIU) and 177A (low speed -DS1- slot) and 177B (DS3 slot) retainers.

The DDM-2000 OC-3 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 and 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.

† Available third quarter 1998. This circuit pack will contain a Stratum 3 timing generator.

\* Registered Trademark of Underwriters Laboratories, Inc.

**SAVE THESE INSTRUCTIONS.**

**IMPORTANT INSTALLATION SAFETY INSTRUCTIONS**

Read and understand all instructions.

Installation and maintenance procedures must be followed and performed by trained personnel only.

All DS1, DS3, and STS-1E interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.

For information on proper mounting instructions, consult the appropriate section in this installation manual.

Never install telecommunication wiring during a lightning storm.

Never install telecommunication connections in wet locations.

Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS1, DS3 or STS-1E interface.

Use caution when installing or modifying telecommunication lines. **SAVE THESE INSTRUCTIONS.**

## **Related Documentation**

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

### **OC-3**

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■ 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 for DDM-2000 OC-3 Multiplexers through Release 7.2.

■ Number: 363-206-202

Title: *DDM-2000 OC-3 Multiplexer User/Service Manual*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures for DDM-2000 OC-3 Multiplexers through Release 7.2.

■ Number: 363-206-280

Title: *DDM-2000 OC-3 Multiplexer User/Service Manual*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures for DDM-2000 OC-3 Multiplexers Releases 8.0, 9.0 and 11.0.

- Number: 363-206-281

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

Audience: Maintenance personnel

Content: Abbreviated list of system commands and parameters for DDM-2000 OC-3 Multiplexers Releases 8.0, 9.0, 11.0 and 13.0.

- Number 363-206-285

Title: *DDM-2000 OC-3 Multiplexer User/Service Manual*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures for DDM-2000 OC-3 Multiplexer Release 13.0.

## **OC-12**

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- 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 for DDM-2000 OC-12 Multiplexers through Release 3.1.

- 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 for DDM-2000 OC-12 Multiplexers through Release 3.1 and OC-12 Regenerator through Release 2.0.

- Number: 363-206-208

Title: *DDM-2000 OC-12 Multiplexer/Regenerator Installation Manual*

Audience: Installation personnel

Content: 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: 363-206-223

Title: *DDM-2000 OC-12 Regenerator - System Commands Quick Reference*

Audience: Maintenance personnel

Content: Abbreviated list of system commands and parameters

- Number: 363-206-290

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 for DDM-2000 OC-12 Multiplexer Release 5.0.

- Number: 363-206-291

Title: *DDM-2000 OC-12 Multiplexer - System Commands Quick Reference*

Audience: Maintenance personnel

Content: Abbreviated list of system commands and parameters for DDM-2000 OC-12 Multiplexer Release 5.0.

- Number: 363-206-295

Title: *DDM-2000 OC-12 Multiplexer User/Service Manual, Volumes I and II*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports (Volume I), and operations and maintenance procedures (Volume II) for DDM-2000 OC-12 Multiplexer Release 7.0

## **FiberReach**

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- Number: 363-206-301

Title: *DDM-2000 FiberReach Multiplexer Wideband Shelf User/Service Manual*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, commands and reports, and operations and maintenance procedures for DDM-2000 FiberReach Multiplexer Wideband Shelf.

- Number: 363-206-305

Title: *DDM-2000 FiberReach Multiplexer Wideband/Narrowband TARP Shelf User/Service Manual*

Audience: Maintenance personnel

Content: Detailed description, technical specifications, and O&M procedures for the DDM-2000 FiberReach Multiplexer Wideband Shelf.

- Number: 363-206-310

Title: *DDM-2000 FiberReach Multiplexer Installation Manual*

Audience: Installation personnel

Content: Installation instructions

## **Applications, Planning, and Ordering Guide (APOG)**

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- Number: 363-206-200

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

Audience: Network planners and equipment engineers

Content: Features, applications, high-level description, operations, administration, maintenance, and provisioning (OAM&P), system planning, ordering, product support, reliability information, a synchronous optical network (SONET) overview, and technical specification.

- Number: 363-206-300

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

Audience: Network Planners, Equipment engineers and Sales teams

Content: Features, applications, high-level description, operations, administration, maintenance, and provisioning (OAM&P), system planning, ordering, product support, reliability information, a synchronous optical network (SONET) overview, and technical specification.

## **Multi-Product**

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- Number: 824-102-144

Title: *Lucent Technologies 2000 Product Family Multi-Vendor Operations Interworking Guide*

Audience: System planners and engineers

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

- Number: 824-102-147

Title: *Lucent Technologies 2000 Product Family Operations Interworking Guide*

Audience: Maintenance personnel

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

- Number: 824-102-148

Title: *2000 Family of Products Operations Systems Engineering Guide*

Audience: Engineers

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

- Number: 824-102-151

Title: *DDM-2000 Multiplexers Operations Systems Engineering Guide*

Audience: Engineers

Content: Operations systems engineering information for DDM-2000.

## **Related Products**

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- Number: 365-576-130 (User Manual only) Release 7.0  
Number: 365-576-131 (User Manual & Software) Release 7.0

Title: *CPro-2000 User Manual*

Audience: Maintenance personnel

Content: Using the tool to provision and maintain ring networks

- Number: 824-102-149

Title: *SLC-2000 Access System Operations Systems Engineering Guide*

Audience: Engineers

Content: Operations systems engineering information for SLC-2000.

## **Loop Enclosure Lucent Technologies practices**

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The following is a list of loop enclosure Lucent Technologies practices:

- Number: 626-500-105

Title: *80-Type Cabinets Ordering Information and Lettering Guide*

- Number: 626-500-115

Title: *90-Type Cabinets Coding and Ordering Information*

- Number: 626-500-121

Title: *90A Cabinet Coding Scheme Ordering Information*

- Number: 626-500-122

Title: *80D Cabinet Description and Coding*

- Number: 640-250-239  
Title: *51A Cabinet Splicing for DDM-2000*
- Number: 631-600-248  
Title: *80E Bulk Power Description and Coding*
- Number: 640-250-264  
Title: *80D Cabinet Fiber, Installation and Splicing for DDM-2000*
- Number: 640-250-265  
Title: *80E Cabinet Bulk Power, Fiber Installation and Splicing for DDM-2000*
- Number: 640-250-271  
Title: *90A Cabinet Description, Installation and Splicing*
- Number: 640-250-285  
Title: *90A Cabinet RT UL Considerations*

### **SLC® Series 5 carrier system Lucent practices**

The following is a list of SLC® Series 5 carrier system Lucent Technologies practices that include DDM-2000 interface information:

- Number: 363-205-010  
Title: *SLC Series 5 Carrier System Applications and Planning Guide*
- Number: 363-205-100  
Title: *SLC Series 5 Carrier System General Description*
- Number: 363-205-401  
Title: *SLC Series 5 Carrier System Remote Terminal Acceptance and Turnup*
- Number: 363-205-406  
Title: *SLC Series 5 Carrier System End-to-End Tests (TOP)*
- Number: 363-205-500  
Title: *SLC Series 5 Carrier System Maintenance and Trouble Clearing (TOP)*
- Number: 915-710-115  
Title: *SLC Series 5 Carrier System Application Engineering*

### **DDM-2000 OC-3 Drawings:**

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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 Application Schematic
T7C510-31	OC-3 Interconnect Wiring (Rear Access)
T7C510-32	OC-3 Interconnect Wiring (Front Access)
801-525-168	Floor Plan Data Sheets

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### **Related Drawings:**

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ED-8C724-10	OC-3/OC-12 Combined 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

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ED-8C727-34	OC-12 Release 2 Software Ordering
ED-8C727-35	OC-12 Release 3 Software Ordering
ED-8C727-36	OC-12 Release 5 Software Ordering
ED-8C727-41	OC-12 Regenerator Release 2 Software Ordering
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

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### **Additional Documents**

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The following documents provide additional information about related equipment:

- Number: 363-206-150  
Title: *DDM-Plus User/Service Manual*
- Number: 363-206-151  
Title: *DDM-Plus Installation Manual*
- Number: 363-206-156  
Title: *DDM-Plus Equipment Engineering and Ordering Guide*
- Number: 365-301-130  
Title: *System III DSX-3/4 Planning, Engineering, Installation, and Operation System Reference Guide*
- Number: 365-303-102  
Title: *DSX-3 Cross-Connect Bay Description, Operation, and Maintenance Manual*
- Number: 365-331-000  
Title: *DACS III-2000 Release 2.0 Applications, Planning, and Ordering Guide*
- Number: 365-340-004  
Title: *DACS IV-2000 Release 2.1 Reference Manual*
- Number: 365-575-100  
Title: *FT-2000 OC-48 Lightwave System Applications, Planning, and Ordering Guide*
- Number: 636-299-120

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

- Number: C107564270

Title: *ITM SNC Users 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.*

## **Related Training**

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

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

- Number: LW1030

Title: Digital SONET, DDM-1000/2000 Seminar

Audience: Fundamental planners, current planners, account management personnel, and telecommunications managers.

Content: Practical overview of digital transmission principles and the synchronous optical network (SONET) and a working knowledge of the DDM-1000 multiplexer and the DDM-2000 multiplexers.

- 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.

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.

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: LW2603

Title: DDM-2000 OC-3 Multiplexer Linear Networks Operations and Maintenance - Hands-on.

Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day provisioning and maintenance.

Content: Information supporting operations, maintenance, and provisioning the DDM-2000 multiplexer.

■ Number: LW2608

Title: DDM-2000 OC-3 Multiplexer Ring Networks Operations and Maintenance

Audience: Technicians, Supervisors, Maintenance engineers and operation support personnel involved with the functions of the Ring Network.

Prerequisite: LW2603

Content: Information required to perform the tasks associated with the overall operation of the DDM-2000 OC-3 Ring Network. On-site shelves are used for extensive hands-on experience.

■ Number: LW2611

Title: DDM-2000 FiberReach Multiplexer Release 1.0 Self-Paced Course

Audience: Technicians, Supervisors, Maintenance engineers and operation support personnel involved in DDM-2000 FiberReach network functions..

Prerequisite: LW2212, LW2312, LW2603 or LW2608

Content: Information supporting system engineering and planning, applications, operations, maintenance, and provisioning of DDM-2000 FiberReach networks.

■ Number: LW2612

Title: DDM-2000 OC-12 Multiplexer Operations and Maintenance

Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day provisioning and maintenance.

Content: Information supporting operations, maintenance, and provisioning the DDM-2000 OC-12 Multiplexer.

■ 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.

Content: Information supporting operations interfaces using X.25 links to an operations center.

■ Number: LW2618

Title: Advanced Ring Network Applications, Operations and Maintenance

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..

Prerequisites: LW2608 and LW2616

Content: Information supporting operations, maintenance, and provisioning of DRI networks..

## **Technical Support**

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Assistance in maintaining your installed system is available through the Regional Technical Assistance Center (RTAC) and the Customer Technical Support Organization (CTS). As shown in Figure 2, your single point of contact is the RTAC. RTAC personnel troubleshoot field problems 24 hours a day over the phone and, if necessary, on site. For technical assistance, simply call **1-800-225-RTAC**. One call guarantees support.

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

The CTS has also established a dial-up technical support medium called COACH. COACH is a system of on-line support tools aimed at providing product news and bulletins, diagnostic services, compatibility information, and on-line documents. COACH tools provide you with the most up-to-date product information so that problems are either prevented or quickly resolved.

Many Lucent Technologies transmission products including DDM-2000 Multiplexers are supported by COACH.

Once connected to COACH, the user specifies which product to access and COACH grants the appropriate combination of tools and commands. The user reaches each one of these tools and commands through a centralized, menu-driven computer program. Every screen provides help in making appropriate menu selections. COACH users will achieve proficiency quickly because of the consistency of menu selections among products.

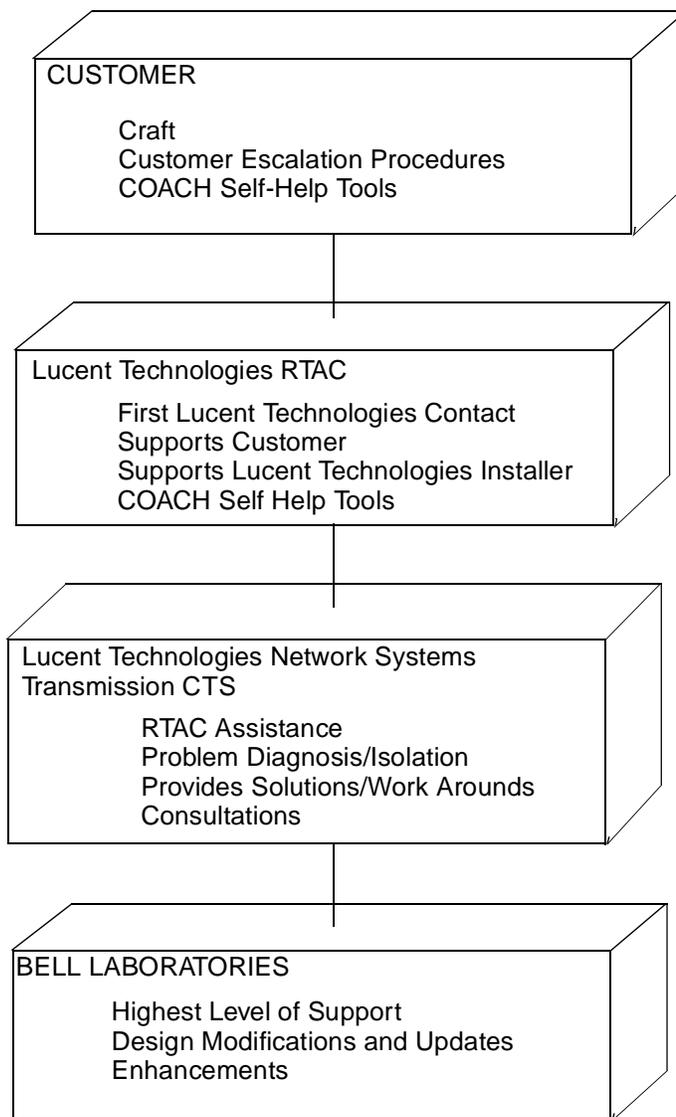
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### **Figure 2. Product Support**

The COACH tools reside on a dedicated time-share computer accessible over toll-free lines and are available 24 hours a day, 7 days a week.

The following COACH tools are available:

- Diagnostic Dictionary  
Contains previously encountered problems and their solutions.



■ News and Bulletins

Immediately after a user logs into COACH, the news and bulletins tool displays bulletins containing urgent information related to the product. Users are informed about the presence of news items, which are less urgent, and can be read at their leisure.

■ Compatibility Data

This tool lists solutions to hardware/firmware configuration problems in the form of product changes which are available.

■ COACH User's Guide

This is an on-line version of how to use COACH.

■ Change Notice

This tool lists existing change notices (CNs and CCNs), including descriptions and implementation procedures.

For information on obtaining a COACH login, contact:

COACH Software Development

Department jc09320d0

Lucent Technologies

1600 Osgood St.

North Andover, MA. 01845

Telephone: **1-800-238-4021**

OR

FAX to: **1-978-960-1772**

## **Engineering and Installation Services**

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The Lucent Technologies Customer Technical Support (CTS) organization 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 CTS organization regards the customer as its highest priority and understands your obligation to maintain quality service for your customer.

Within the CTS organization, the Engineering and Installation Services group provides 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 CTS organization 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 Technologies is thoroughly tested and integrated into a reliable system at cutover. Once approved by Lucent Technologies'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.

## **Transmission Systems Technical Support Services**

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The goal of Lucent Technologies's Transmission Systems Technical Support Services is to keep Lucent Technologies Transmission Systems products operating at maximum performance and to prevent problems from interrupting service to customers. The Transmission Systems 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 Technologies's Transmission Systems 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 Technologies's Transmission Systems Technical Support Services, contact your Lucent Technologies 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 and Canada: <b>1-888-582-3688</b> <i>7:30 a.m. to 6:30 p.m. EST</i> Europe, Middle East and Africa: Toll: <b>1-317-322-6416</b> Caribbean, Latin America and Canada: Toll: <b>1-317-322-6646</b> Asia, Pacific: <b>1-317-322-6641</b> Worldwide FAX: <b>1 800-566-9568</b>
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.

### **Standing Orders**

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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**

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<b>Topic</b>	<b>Contact Location</b>	<b>Telephone</b>
Technical Assistance	Regional Technical Assistance Center	<b>1-800-225-RTAC</b> <b>(1-800-225-7822)</b> <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	<b>1-800-334-0404</b> or (toll) <b>1-910-727-6681</b> <i>Monday through Friday</i> <i>8:00 a.m. to 4:00 p.m. ET</i>

### **How to Comment on This Document**

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

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

Manager, Technical Support Engineering  
Lucent Technologies  
Dept. JC09110B0  
1600 Osgood St.  
N. Andover, MA 01845-9985

## **Electronic Documentation**

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Documentation for the DDM-2000 OC-3 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 (1-800-432-6600).
- For pricing information, contact your Lucent Technologies Network Systems Account Executive, or the Lucent Technologies Customer Information Center(1-800-432-6600).
- For technical information, call Lucent Technologies Documentation Support: (1-800-334-0404).

## Introduction

# 1

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## Introduction

# 1

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## Overview

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**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 (major interexchange carriers, Lucent Technologies installers, 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 OC-3 at the same time, perform each section on all the DDM-2000 OC-3s 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 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* (up through Release 7.2), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) and 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13) for any activity involving circuit turnup, normal maintenance, or trouble analysis.

DDM-2000 OC-3 installation procedures are also available for traditional loop enclosure arrangements such as 51-type, 80-type, and 90-type cabinets, controlled environment vaults (CEV), etc. These procedures are covered in a

number of Lucent Technologies practices which are referenced in 363-205-000, *SLC® Series 5 Carrier System Ordering Guide*.

It is strongly recommended that, if any multi-vendor operation is anticipated, or if there is interface with an IAO LAN, a copy of *Lucent Technologies 2000 Product Family Multi-Vendor Operations Interworking Guide*, 824-102-144, be immediately available.

## **DDM-2000 OC-3 Releases**

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The DDM-2000 OC-3 features are released in distinct phases.

- Release 2 supports optical point-to-point, hubbing and linear drop applications. (New installations not available.)
- Release 3 supports, in addition to Release 2 features, VT add/drop applications. (New installations not available.)
- Release 5 supports VT and STS-1 path switched rings applications, with DS1, DS3 and EC-1 interfaces in addition to Release 3 features. (New installations not available.)
- Release 6 supports, in addition, EC-1 High and low speed interfaces.
- Release 7 supports, in addition to Release 5 features, EC-1 Dual Ring Interworking with VT/STS-1 drop and continue, and OC-3 ring with OC-3 optical extensions.
- Release 7.2 supports, in addition to Release 7 features, OC-3 Operations Interworking with FT-2000 with DCC conductivity, and Interworking between BBG5/BBG7 and BBG8/BBG9 controller platforms.
- Release 8 supports, in addition to Release 6 features, OC-3 Operations Interworking with FT-2000 with DCC conductivity, and linear OC-3/IS-3 extension from an OC-12 ring.
- Release 9 supports, in addition to Release 7.2 features, DDM-2000 FiberReach host, and VT Hairpin topology.
- Release 11 supports, in addition to Release 9 features, operation of an OC-12 ring through the OC-3 shelf and front panel separate access to each of the DS3 circuit packs.
- Release 13 supports, in addition to all Release 11 transmission features, enhanced FiberReach topologies, transmultiplexer DS3 path termination, High data rate Digital Subscriber Line (HDSL)\*, and interworking with Tellabs *TITAN*† 5500/S Release 5.0 Digital Cross-Connect System.

† *TITAN* is a trademark of Tellabs, Inc.



**NOTE:**

DDM-2000 OC-3 Release 13 is NOT compatible with previous releases of DDM-2000 OC-3. Therefore, when upgrading a subnetwork, care should be taken to avoid isolating NEs that have not yet been upgraded to Release 13.0. To provide compatibility with equipment of other vendors, in Release 13, TBOS, AGNE, DSNE and parallel telemetry are no longer available.

This manual covers installation of Release 6 through Release 13 systems. It will be updated to cover additional releases as they become available.

\*The HDSL circuit pack also can be installed in DDM-2000 OC-3 shelves running linear Release 6.2 and later and ring Release 7.1 and later. Refer to information included with each circuit pack for provisioning instructions.

## **DDM-2000 OC-3 Shelf Description**

The DDM-2000 OC-3 shelf is capable of supporting Release 6, Release 7, Release 7.2, Release 8, Release 9, Release 11 or Release 13 configurations. Releases 6 and 8 are for linear configurations. Release 6 configurations provide all that previous releases contain with the addition of high and low speed EC-1 interfaces. Release 8 configurations provide all that Release 6 contains with the addition of OC-3 Operations Interworking with FT-2000 with DCC conductivity, and linear OC-3/IS-3 extension from an OC-12 ring.

Releases 7, 7.2, 9, 11 and 13 are for ring configurations. Release 7 configurations provide all that previous releases contain with the addition of EC-1 dual ring interworking with VT/STS-1 drop and continue, an OC-3 ring with OC-3 optical extensions. Release 7.2 configurations provide all that Release 7 contains with the addition of OC-3 Operations (1) Interworking with FT-2000 with DCC conductivity and (2) Interworking between BBG5/BBG7 and BBG8/BBG9 controller platforms. Release 9 configurations provide all that Release 7.2 contains and adds (1) DDM-2000 FiberReach host and (2) VT Hairpin topology. The configuration is determined by the selection of circuit packs with which the shelf is equipped. Release 11 adds the ability to connect with an OC-12 ring directly from the OC-3 shelf, without having to add an OC-12 shelf and front panel independent access to each of the DS3 circuit packs.

Release 13 adds multi-vendor operational interworking (OI) compatibility and Lucent 2000 Product Family OI compatibility for OC-12 Release 7.0 and later, FiberReach Release 3.0 and later and FT-2000 Releases 8.0 and later. Earlier releases are not compatible because of multi-vendor OI support. It also adds support for subnetworks up to 256NEs and IntraOffice LAN (IAO LAN). Other additional features are a Stratum 3 timing generator on the new BBF4 circuit pack, STS-1 hairpin

The DDM-2000 OC-3 shelf is divided into several distinct areas as shown in Figure 1-1 (Release 6), Figure 1-2 Release 7 (including Release 7.2), Figure 1-3 (Release 8), and Figure 1-4 (Releases 9, 11 and 13).

The 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, EIA-232D port for connection with a craft interface terminal (CIT), and an electrostatic discharge (ESD) grounding jack.

The SYSCTL circuit pack is located immediately to the left of the 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 as well as far end select (FE SEL) and update/initialize (UPD/INIT) push-buttons.

The slot to the left of the SYSCTL circuit pack is equipped with an OHCTL. The OHCTL circuit pack provides supplementary functions to the SYSCTL circuit pack.

The DS1 circuit packs (low speed units) are located to the left of the OHCTL slot. The DS1 circuit packs, consisting of seven service packs and one protection pack, are arranged in groups of eight for each function group. 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. If DS1 circuit packs are used, MXRVO circuit packs are required. If DS1 protection is desired, all DS1 service slots in that function group must be equipped with DS1 circuit packs or 177A retainers.

The six slots located to the left of the DS1 slots are Function Unit slots. In Releases 6 and 8 the Function Unit slots can accommodate all circuit packs from previous releases and adds the STS-1E Circuit Pack. In Releases 7, 9, 11 and 13 the Function Unit B and C slots also can accommodate OLIU circuit packs. In Releases 11 and 13 the Function Unit slots are able to accommodate the OLIUs that enable interoperation with an OC-12 ring.

For each function group equipped with DS1 circuit packs, two MXRVO circuit packs are to be equipped in the appropriate positions if protection is desired. The MXRVO circuit pack multiplexes/demultiplexes the VT-Gs from/to the DS1 circuit packs into and out of an STS-1 signal. If DS3 service is desired, DS3 circuit packs are equipped in the appropriate function unit positions, and the associated DS1 slots must remain unequipped. The DS3 circuit pack provides a mapping of an incoming DS3 signal to an STS-1 signal. The STS-1E circuit pack takes an STS-1, composed of either DS1 or DS3 service, and provides a high or low speed interface to the DACS IV-2000 or FT-2000.

Located to the left of the function units are the optical line interface unit (OLIU) regenerators. The OLIU multiplexes the STS-1s into an STS-3, and then converts the STS-3 into an OC-3, or, in the case of Releases 11 and 13, an OC-12 optical signal for transmission onto the fiber. The reverse is performed in the demultiplex direction.

Located to the left of the OLIUs, at the far left side of the shelf, are the timing generator (TGS) circuit packs. The TGS circuit packs, which are always required, provide timing for the shelf and allow the DDM-2000 OC-3 to become part of a synchronous network. TGS circuit packs that provide external timing are available. Only one TGS circuit pack is required, and may be used in either slot, if protection is not desired.

## **DDM-2000 Fan Shelf Description**

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Forced air cooling is required *only* if the DDM-2000 shelf is installed in *non-NEBS environments* (air inlet temperature exceeding 50 degrees Celsius see Bellcore TR-64 Iss. 4). The DDM-2000 fan shelf, ED-8C733-30, G7, provides forced air cooling for DDM-2000 shelves that are *bay* mounted in a *non-NEBS environment*.

The number of fan shelves required in a bay is determined by the number of DDM-2000 OC-3 shelves in the bay and by their configuration (front or rear access). Refer to the "Equipment and Rear Access Cable Installation" or "Equipment and Front Access Cable Installation" section of this manual for fan shelf requirements.

## **Equipment**

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### **Miscellaneous Equipment**

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Miscellaneous equipment is listed in Table 1-1.



**NOTE:**

Not all equipment is required for each installation.

### **Test Equipment**

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



**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-8C501-50, G1	-
Stile Cover Assemblies*		846108843
Stile Cover Brackets*		846170017
DDM-2000 OC-3 Shelf Assembly	ED-8C724-30, G4	-
Heat Baffle Assembly	ED-8C733-30, G1	-
Fan Shelf Assembly†	ED-8C733-30, G7	-
DDM-2000 Cable Assemblies	ED-8C724-20, -21 ED8C727-20	-
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
963T-16 Connector		105772818
963PH Contact	For 963T Connector	845381235
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 (5 Amp, Qty. 5)		406203976

\*. Two front stile cover assemblies and six brackets form a hardware package that provides a flush-look appearance for DDM-2000 OC-3 when mounted in a 7-foot network bay frame.

†. Prior to G7 Fan Shelf Assemblies G2 were used.

‡. 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 &amp; Betts</i> * Crimping Tool	WT-414	3
<i>Paladin</i> † Coaxial Wire Stripper	PA1208	
Replacement <i>Paladin</i> Cassette	PA2201	
ESD Wrist Strap	900486994	
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	
<i>PANDUIT</i> Duct Notching Tool	DNT-100	7

\*. Registered trademark of Thomas & Betts corporation.

†. Registered trademark of Paladin Corporation.

‡. Registered trademark of Microsoft Corporation.

**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 only are 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 normally are available for use with the DSX jack fields.
7. Available from PANDUIT Corporation. Provides easy method to notch wiring duct side-walls 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. An MS-DOS® compatible PC and EIA-232D cable are required for software download.

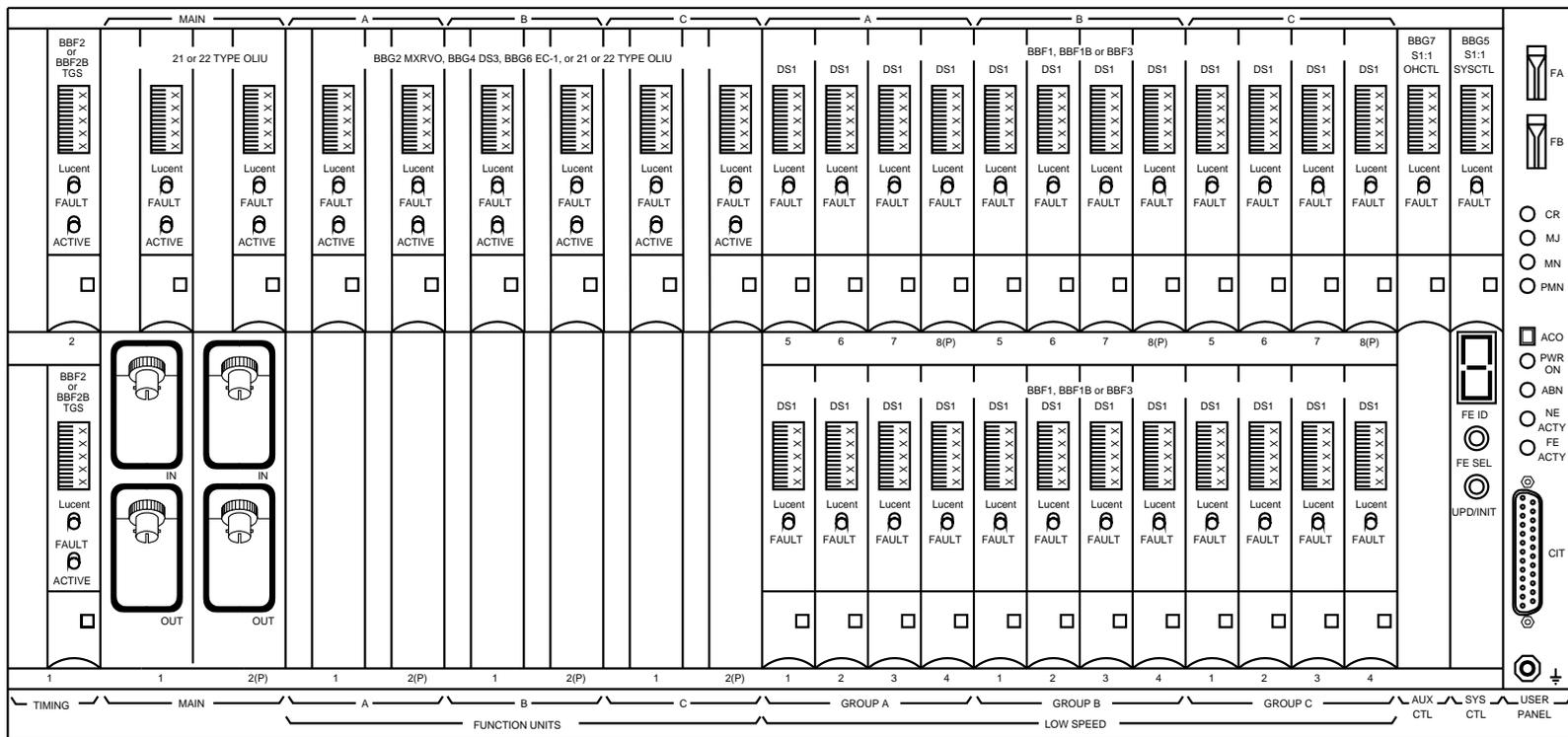


Figure 1-1. DDM-2000 OC-3 Shelf with Circuit Packs (Release 6)

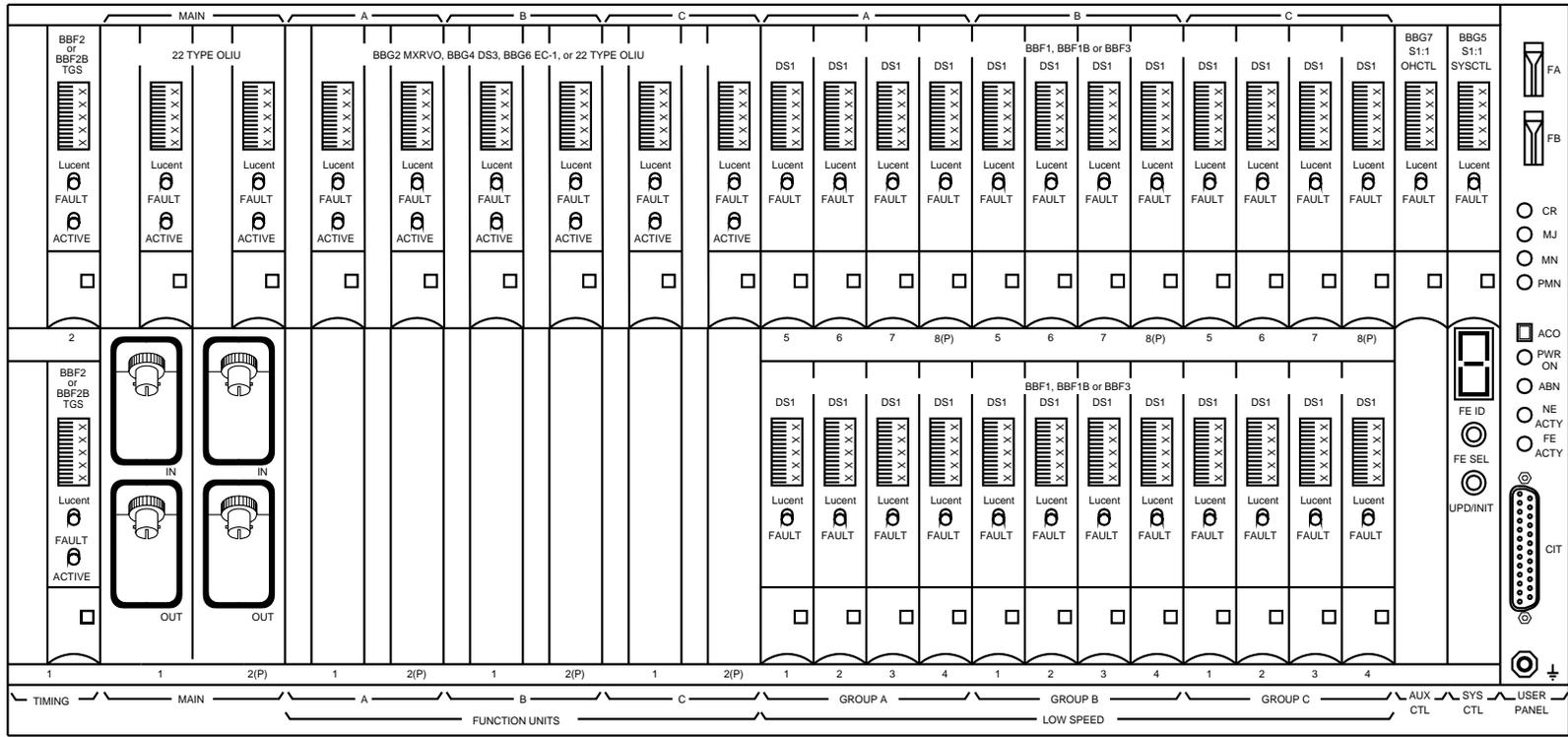


Figure 1-2. DDM-2000 OC-3 Shelf with Circuit Packs (Releases 7.1 and 7.2)



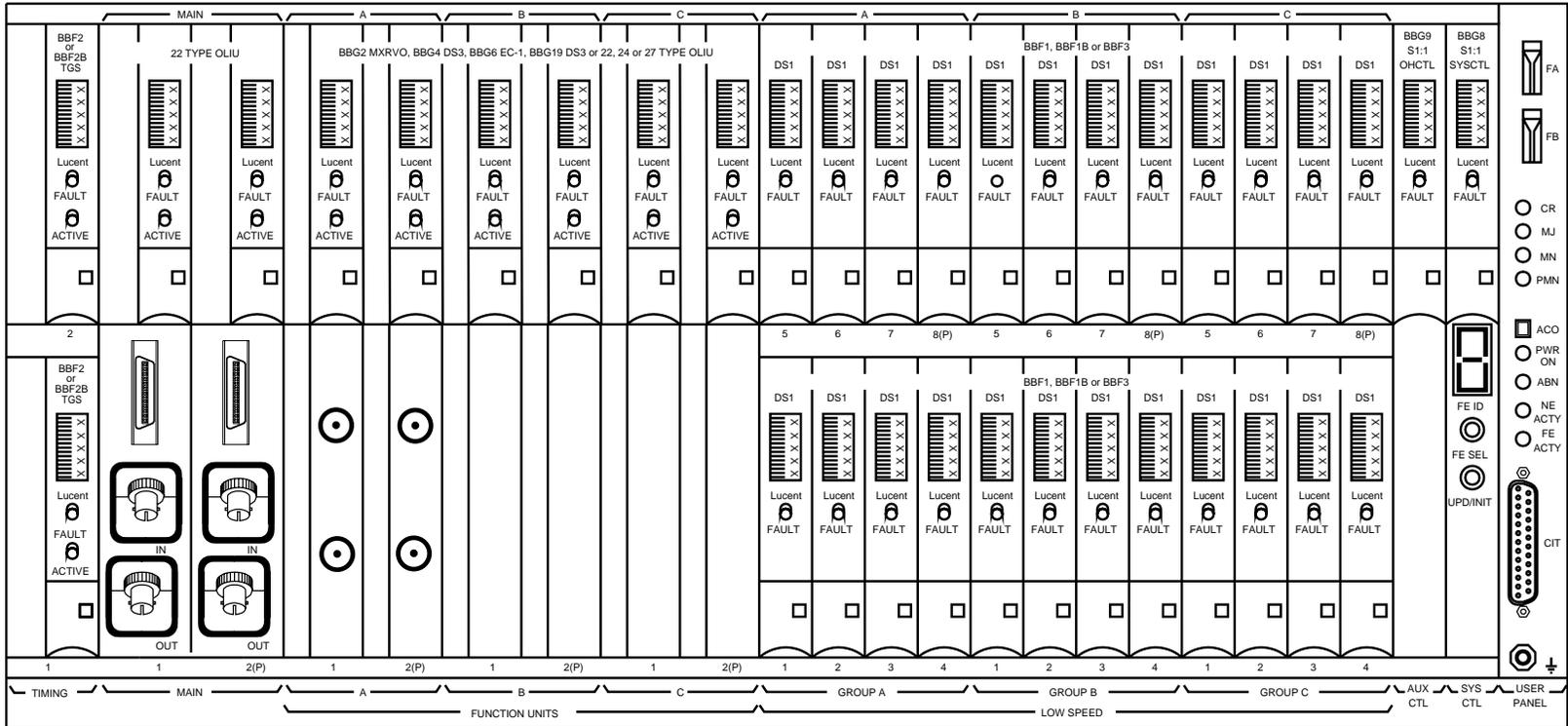


Figure 1-4. DDM-2000 OC-3 Shelf with Circuit Packs (Releases 9, 11 and 13)

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# Equipment and Rear Access Cable Installation

# 2

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# Equipment and Rear Access Cable Installation

# 2

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## Overview

This section provides the information for rear access installation and covers the installation information for the shelf, heat baffles, fans, 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. For front access installations, refer to the "Equipment and Front Access Cable Installation" section of this manual. In Releases 11 and 13, certain cables, associated with specific circuit packs, require front installation between packs and, therefore, their installation is discussed in the section on circuit pack installation.

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 important to carefully follow the procedures in this section to ensure that the bay will accommodate all of the cables and that the backplane cover will fit properly.
- ⇒ NOTE:**  
It is recommended that ONLY designated Lucent Technologies cables be used.
- ⇒ NOTE:**  
This section is best performed if each procedure such as "DS1 Cable Installation - Rear Access" 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 cables, except power and the optical fibers, are connected to the DDM-2000 OC-3 backplane. In some configurations of Releases 11 and 13, there is a cable to be connected between the fronts of two OLIU circuit packs and another that is connected to the front panel of specific DS3 circuit packs. Also, in some Release 11 and 13 configurations, an extended front cover, such as used with form 4 shelves, must be used to provide clearance wherever these front-installed cables are used.
- ⇒ NOTE:**  
The locations of all backplane plugs and jacks are shown in Figure 2-1.
- ⇒ NOTE:**  
The cabling for the maximum capacity of six DDM-2000 OC-3 rear-access shelves in a bay is shown in Figure 2-2 or Figure 2-3 (depending on the bay arrangement).
- ⇒ NOTE:**  
Cables are to be installed from the bottom shelf in the bay toward the top. The cable installation procedure described in this section should be followed for maximum utilization of the bay cable ducts.
- ⇒ NOTE:**  
Cable assembly options are listed in Tables 2-1 through 2-5. Connector pinouts are provided in Figure 2-4.
- ⇒ NOTE:**  
Cable brackets should be installed as required.



**NOTE:**

It is a requirement that the DDM-2000 OC-3 be equipped with both the DS1 cable chamber cover and protective backplane cover at the completion of the installation.

## Tools, Test Sets, and Accessories

---

The following tools are required:

Quantity	Description
1	<i>Thomas &amp; Betts</i> WT-414 Crimping Tool†
2	<i>Paladin</i> ‡ Coaxial Wire Stripper PA1208† Replacement <i>Paladin</i> Cassette PA2201†
1	Soldering Iron
1	Wrist Strap**
1	Wire-Wrap Gun††
1	Ohmmeter‡‡ Screwdriver(s)***

\*. Registered trademark of Thomas & Betts Corporation.

†. The crimping tool, wire stripper, and soldering iron are only required if installing the Group 327 or 332 cable. The replacement cassette is for the wire stripper tool.

‡. Registered trademark of Paladin Corporation.

\*\* A wrist strap must be worn when touching the DDM-2000 OC-3 backplane and when connecting cables. Use an available electrostatic discharge jack. 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.

‡‡. An ohmmeter is required to verify that the DDM-2000 OC-3 is properly grounded.

\*\*\*. A screwdriver(s) with the appropriate head(s) is(are) required for mounting the shelf, heat baffles, fan, and cable brackets; for removing the front cover, rear cover, and DS1 chamber cover; and for connecting some cables to the backplane.

## Planning

---

The DDM-2000 OC-3 may be mounted as follows:



**NOTE:**

The mounting brackets on the DDM-2000 OC-3 Heat Baffle, and Fan Shelf 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 and Figure 2-6 for DDM-2000 OC-3 shelf placement in a network bay frame.
- b. Mounted in seismic network bayframe. The ED-8C800-500 and ED-8C801-501 seismic network bay frames are designed for use in all earthquake zones, and in general, do not require top support at the 7-foot level. These frames meet Pacific Bell Equipment Framework Standard PBS-000-102PT. 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, OC-3 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-8C724-30, G4	DDM-2000 OC-3 Shelf	9.0 inches
ED-8C733-30, G1	Heat Baffle	4.0 inches
ED-8C733-30, G7	DDM-2000 OC-3 Fan Shelf	4.0 inches

If the DDM-2000 OC-3 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 OC-3.

A heat baffle or fan shelf is required between each pair of DDM-2000 OC-3 shelves as described below. If the DDM-2000 OC-3 is being installed at the top of a 7-foot bay frame, a heat baffle or fan shelf is not required above the sixth (top) shelf.

A heat baffle is not required below the DDM-2000 OC-3 unless heat-generating equipment is located below the DDM-2000 OC-3.

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

A DDM-2000 OC-3 fan shelf is required *only* if the DDM-2000 shelf is installed in *non-NEBS environments* (air inlet temperature exceeding 50 degrees Celsius see Bellcore TR-64 Iss. 4). The DDM-2000 fan shelf, ED-8C733-30, G7, provides forced air cooling for DDM-2000 shelves that are bay mounted in a *non-NEBS environment*.

A fan shelf, when required, mounts between each two DDM-2000 OC-3 shelves in place of a heat baffle (Figure 2-7). No air gaps should exist between fan shelf and OC-3 shelf to ensure proper cooling.

## Inspection

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### Description

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Perform the following procedure before the DDM-2000 OC-3 Multiplexer installation or cable installation.

### Procedure

---

1. Verify that the frame or structure into which the DDM-2000 OC-3 will be installed is properly grounded.



#### NOTE:

Each DDM-2000 OC-3 shelf, heat baffle, and fan shelf comes equipped with an installation kit, a pouch attached to the shelf (or baffle) containing the hardware required for mounting and grounding. The installation kit for the baffle has the following:

Quantity	Description
4	0.216-24 x 5/16" Thread Cutting Screws (C803535012)

The installation kit for the DDM-2000 OC-3 shelf has the following:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
2	Fuses and Fuse Caps
2	26 Gauge Cable Clamps
1	ED-8C724-20 G378 Termination

The installation kit for the fan shelf has the following:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
6	Cable Ties
1	Taptite Screw
1	Grounding Cable

2. Remove the front, rear, and DS1 cable chamber covers from the DDM-2000 OC-3 shelf.



**NOTE:**

The covers must be installed later to assure compliance with electromagnetic induction requirements. Also to ensure proper cooling when used with a fan shelf.

3. Inspect the DDM-2000 OC-3 shelf for visible damage, including bent or touching backplane pins.
4. Determine the type of bay frame the DDM-2000 OC-3 shelf will mount in. The DDM-2000 OC-3 shelf side mounting brackets may have to be moved, according to bay type. Position them accordingly, refer to Figure 2-7.



**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 OC-3 heat baffle and/or fan shelf (if provided) accordingly. Refer to Figure 2-7.

## Equipment Installation

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### Description

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

### Procedure

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1. Mount the DDM-2000 OC-3 shelves 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. Position the shelves and heat baffles in the bay frame as shown in Figure 2-6 and Figure 2-7. 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. Install the fan shelves (if required). Refer to "Fan Shelf Installation - Rear Access".
3. Verify with an ohmmeter that the DDM-2000 OC-3 is grounded to the bay frame.
4. Install the required shelf brackets as shown in Figure 2-5.



**NOTE:**

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

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

## **Fan Shelf Installation - Rear Access**

---

### **Description**

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This procedure describes how to install the fan shelf.

### **Procedure**

---



**NOTE:**

The ED-8C733-30, G7 fan shelf, when required, mounts directly above a single DDM-2000 OC-3 shelf that requires cooling or between two shelves (Figure 2-6) that require cooling.

1. Position the fan shelf mounting brackets (if necessary) to fit within the bay footprint for the DDM-2000 OC-3 shelf.



**NOTE:**

When installing a fan shelf between two DDM-2000 OC-3 shelves, the filler bar attached at the top of the fan shelf front cover must be removed to provide clearance for the fiber tray on the DDM-2000 OC-3 shelf located above the fan shelf. This filler bar is secured by two screws located on the inside of the fan shelf's front cover (remove the front cover by turning the two locking screws).

2. Verify that the fan shelf set point is provisioned for 400 fpm (feet per minute) (positions 1, 3 and 4 of the 4-position switch should be ON [UP] and position 2 should be OFF [down] ).



**NOTE:**

If the bay includes a DDM-2000 OC-12 shelf (Figure 2-6), the fan shelf set point for the fan shelf located above the DDM-2000 OC-12 shelf must be set for 400 fpm (switch positions 1, 3 and 4 to ON and position 2 to OFF).

3. Install the front cover and mount the fan shelf in the bay directly above the DDM-2000 OC-3 shelf.

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\*. Registered trademark of Panduit Corporation.

4. Connect one end of the grounding cable (provided with the fan shelf) to the ground lug on the left side of the rear of the shelf.



**NOTE:**

The cable ties provided with the shelf are *only* required when the fan shelf is being installed in a front access bay configuration.

5. Connect the other end of the cable to the bay frame using the taptite screw provided with the fan shelf.
6. Install the filter (provided with the fan shelf), which is equipped with magnetic strips around the edges, up against the bottom of the DDM-2000 OC-3 shelf located below the fan shelf.

## **DS1 Cable Installation - Rear Access**

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### **Description**

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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 electromagnetic interference (EMI) requirements.*



**NOTE:**

Different cables are required depending on the function group being connected as shown in Table 2-1.



**NOTE:**

Cables are available in 22 or 26 gauge.



**NOTE:**

DS1 cable length of 655 feet for 22 gauge cable (613C type) or 440 feet for 26 gauge cable (1249C type) should not be exceeded.



**NOTE:**

Cables are stacked in the bay as shown in Figure 2-2 or Figure 2-3.



**NOTE:**

Cables are routed out of the bay as shown in Figure 2-8.



**NOTE:**

The cables are connectorized at the DDM-2000 OC-3 end and must be wire-wrapped at the DSX end. Cables are wire-wrapped at the DSX-1 end as shown in Table 2-6.

## Procedure

---

1. Obtain the DS1 cables per Table 2-1 and note which function group each cable is to be used with.
2. Remove the front, rear, and DS1 cable chamber covers from the DDM-2000 OC-3 shelf, if this has not already been done.



**NOTE:**

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

3. Remove the DS1 cable chamber clamps from the DS1 chamber.
4. Connect the function group B cables at the DDM-2000 OC-3 end, carefully matching the correct connector with the appropriate backplane plugs as shown in Figure 2-8.



**NOTE:**

All backplane cables must route underneath the rear cover mounting assemblies racks to allow the backplane cover to fit after the cable installation. The rear cover mounting assemblies racks are removable.



**NOTE:**

Retainers must be in place on the DS1 backplane pins.



**NOTE:**

The DS1 backplane plug identifications are stenciled to the right of the plugs.



**NOTE:**

The cables must be attached so that the wired side of the connector attaches to the left column of pins in the retainer area. Each retainer accommodates two DS1 cable connectors.

5. Dress the DS1 cables to ensure that the cables will fit properly in the DS1 cable chamber.
6. Repeat Steps 1 through 5 for the function group A cables.
7. Repeat Steps 1 through 5 for the function group C cables.

8. Peel back the blue mylar on the DS1 cables to expose the silver foil. The foil provides a ground connection to the cable shield through the shelf cable clamp.
9. Wrap a single layer of electrical tape around the loose wires of the cable assembly where they fit through the access slots on the side of the chamber. This will help to prevent the wire insulation from being cut by the sharp edges on the slots.
10. Place the DS1 cables in the cable chamber clamps as shown in Figure 2-8.



**NOTE:**

The shelf is equipped with cable clamps for the 22 gauge cable assemblies (Groups 301-303, 307-309, or 313-315). If 26 gauge cable assemblies (Groups 304-306, 310-312, or 316-318) are being used, replace these with the cable clamps, provided as spare parts, with the shelf).



**NOTE:**

DS1 cables **MUST** be placed in the cable clamp so the silver foil makes a good electrical connection with the cable clamp.

11. Attach the DS1 cable clamps and the cable chamber cover.
12. Route the cabling along the backplane per Figure 2-8 and out of the bay to the DSX per Figure 2-2 or Figure 2-3.
13. Tie the cables to the side rear cover mounting assemblies racks.
14. Verify that the DS1 cables are not touching any backplane pins.
15. Verify that no backplane pins were bent when routing the DS1 cable along the backplane.
16. 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.

17. Referring to Table 2-6, carefully observe color codes and wire-wrap the cables at the DSX-1.

## **DS3/EC-1 Cable Installation - Rear Access**

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### **Description**

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This procedure describes how to connect the DS3 or EC-1 cables to the shelf and route the cables out of the bay and to the DS3/EC-1 terminating equipment. Perform this procedure if DS3/EC-1 cables are required.

⇒ **NOTE:**  
DS3/EC-1 cable options are listed in Tables 2-2 and 2-3. There are some configurations of Releases 11 and 13 that require installation of a cable on the front panel of BBG19 DS3 circuit packs. The connection to these circuit packs is discussed in this section and in the section on circuit pack installation.

⇒ **NOTE:**  
The DS3/EC-1 cables used are dependent on the equipment the DDM-2000 OC-3 will connect to (FT-2000, DACS IV-2000, DACS III-2000, or DSX-3), the cable length, and the number of function groups equipped with DS3/EC-1 circuit packs (2 or 6).

⇒ **NOTE:**  
The six conductor cable (1735006A) provides three DS3/EC-1 IN and three DS3/EC-1 OUT cables to accommodate the maximum number of DS3/EC-1 function groups that can be equipped in one shelf. The two conductor cable (734A, 735A) provides one DS3/EC-1 IN and one DS3/EC-1 OUT cable to accommodate a pair of DS3/EC-1 cables for one function group.

⇒ **NOTE:**  
DS3/EC-1 cables come in a fixed length of 150 feet or they can come in a fixed length specified by the customer. All the cables come with a connector on one end and are loose on the other end. Connectors that were put on in the factory should not be altered.

⇒ **NOTE:**  
**Caution:** Cables going to the front of BBG19 DS3 circuit packs (Releases 11 and 13) must be longer than those going to the backplane. There must be enough additional length to take the cable from the blackplane over the baffle below the shelf and up to the front of the BBG19. These cables, ED-8C724-22, Groups 37 and 38, have right angle connectors for the connection to the circuit packs. Group 37 cables are 150 feet long and are pre-terminated at both ends. Group 38 cables are terminated at the circuit pack end, have variable length up to 250 feet, and, after cutting to length, must be terminated with a straight connector at the end away from the circuit packs. The far-end connector is KS23558L16. Additionally, there are a clamp and screws to secure and ground the cable to the shelf front. Four cables, connectors, clamp and screws will be delivered when ED-8C724-22 is ordered.

⇒ **NOTE:**  
Cutting the DS3/EC-1 cable to a shorter length and reterminating (reattaching a connector on the end that has been cut) may result in cable quality substandard to that of factory DS3/EC-1 cable and subsequent service outages may occur. If cables must be reterminated, use the correct connector and proper crimp tool.



**NOTE:**

The appropriate procedure should be performed depending on the cable group being installed.

## **Procedure**

---

1. Connect the cables to the appropriate backplane BNC connectors J38-J43) as shown in Figure 2-1. If BBG19s are being used, those cables must be left unconnected. Connect them per the next step.
2. Route the BBG19 cables over the baffle below the shelf and lay them in the front tray that normally carries the fiber. **Be sure that these cables lie beneath any fibers.** Fibers come down the front of the bay frame. DS3 cables will need to be routed to the rear of the bay by feeding over the baffle below the shelf.
3. Connect the BBG19 cables to the BNC connectors on the front panel of each circuit pack.
4. Route the cables out of the DDM-2000 OC-3 bay per Figure 2-9.
5. Stack the cables as shown in Figure 2-2 or Figure 2-3.
6. Dress and tie the cables as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
7. Route the cables along the cable rack and into the terminating bay.
8. Label the DS3/EC-1 cables, indicating bay, shelf, function group (A, B, or C), and direction (IN or OUT of the bay) at each end.



**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.

## **Optical Fiber Cable Installation - Rear Access**

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### **Description**

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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*<sup>®</sup> fiber optic distributing frame). This procedure does not cover routing the optical fiber cable between central office (CO) locations. Perform this procedure if optical fiber cable is required.



**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 OC-3 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 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 OC-3 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 OC-3 receiver to the *LGX*® fiber optic distributing frame must be multimode or the same mode as exists between the *LGX*® fiber optic distributing frames.



**NOTE:**

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



**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 of the eyes 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 optical fiber cables require *ST*® type connectors for connection to 21G, 21D, and 22F OLIUs only. The 21G-U, 22G-U, 21D-U, and 22D-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 2-18.

-  **NOTE:**  
The optical fiber cables will be connected to the DDM-2000 OC-3 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 OC-3 bay, stacking the cables as shown in Figure 2-2 or Figure 2-3.
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 Cable Installation - Rear Access**

---

### **Description**

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Two feeders (A and B) are required from the battery distribution fuse board (BDFB) to the DDM-2000 OC-3 bay. The bay power cable is used to power up to six shelves and up to three fan shelves (refer to Table 2-5).

### **Procedure**

---

1. Obtain either a single shelf power cable (G371) or a bay power cable (G372).

-  **NOTE:**  
The bay power cable assembly has three break points with three cables at each break point. The break points should be located in the bay between shelves 1 and 2, 3 and 4, and 5 and 6.

2. Connect a cable to the lower DDM-2000 OC-3 shelf at *each* break point.

3. Connect a cable to the upper DDM-2000 OC-3 shelf at *each* break point.



**NOTE:**

The remaining cable in the break point connects to a fan shelf (when provided).



**NOTE:**

If the bottom shelf position is not being equipped and a bay power cable assembly is being installed, locate the breakouts on the cable so that a connector will be available for future addition of the shelf.

4. Connect the power cable to the DDM-2000 OC-3 backplane cable (P1 and P2) as shown in Figure 2-1. Refer to Table 2-7.
5. Do the following when cabling a fan shelf:
  - a. Obtain the ED-8C724-20, G377 fan shelf power cable.
  - b. Prepare the ends of the wires on the cable and insert them into the terminal strip on the rear of the shelf as follows:

Terminal Designation	Wire Color
-48 V	Red
RTN	Black
-48 V	Green
RTN	White



**NOTE:**

Locations of -48V and RTN on the fan shelf have been changed. Fan unit kits, ED-8C733-30 G7, have power arrangements of -48, RTN, -48, RTN. Older kits, ED-8C733-30 G2 have power arrangements of -48, RTN, RTN - 48. The connections for both are as above.

- c. Connect the G377 cable to a single shelf power cable (G371) or to the bay power cable (G372).
6. Route the G371 or G372 power cable out of the bay and toward the BDFB or other protection equipment, stacking the cable in the bay as shown in Figure 2-2 or 2-3.



**NOTE:**

The DDM-2000 OC-3 is powered by -48 V DC.



**WARNING:**

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

7. Splice feeders from the BDFB to the DDM-2000 OC-3 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.

8. 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 25 amperes for bay arrangements and 10 amperes for a single shelf.

9. 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 Cable Installation - Rear Access**

---

### **Description**

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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 OC-3 to limit transient voltages and currents.

 **NOTE:**  
Office alarm cable options are listed in Table 2-5.

 **NOTE:**  
Office alarm connections are listed in Table 2-8.

### **Procedure for Shelf 1**

---

 **NOTE:**  
Office alarms are cabled to shelf 1 (bottom DDM-2000 OC-3 shelf) in the bay. Office alarms for the other DDM-2000 OC-3 shelves in the bay are daisy-chained up the bay from shelf 1 (bottom shelf).

1. Obtain an office alarm cable Group 357 or 358 (refer to Table 2-5).
2. Connect the cable to P56 of shelf 1.

 **NOTE:**  
If shelf 1 is not being installed at this time, enough cable length should be provided to allow the cable connector to be moved down to shelf 1 in the future.

3. Route the office alarm cable from the bottom shelf out of the DDM-2000 OC-3 bay per Figure 2-12 to the office alarm panel, stacking the cables as shown in Figure 2-2 or Figure 2-3.
4. Dress and tie the cables as close to the backplane as possible without touching any backplane pins.
5. Inspect the office alarm panel and add a contact protection network (if required).
6. Cut the office alarm cable to the desired length.
7. Wire-wrap the loose end of the office alarm cable to the alarm panel, making connections as shown in Table 2-8.

### **Procedure for Other Shelves**

---

 **NOTE:**  
This procedure should be performed when shelf 1 in the same bay will be directly connected to the office alarms. The cable added in this procedure is to mult office alarms in a bay to shelf 1. In this procedure shelf 1 will be connected to shelf 2, shelf 2 will be connected to shelf 3, etc.

**⇒ NOTE:**

In order for office alarms in a shelf (other than shelf 1) to be reported, all office alarm cable mults from that shelf to shelf 1 must be in place. No shelf should be skipped.

1. Obtain an office alarm cable Group 359 or 361 (refer to Table 2-5).
2. Connect the cable to P56 of the shelf.
3. Route the office alarm cable to the side of the bay and connect it to P57 of the shelf below as shown in Figure 2-12.
4. Dress and tie the cables as close to the backplane as possible without touching any backplane pins.
5. Repeat this procedure for each shelf in the bay.

## **Parallel Telemetry Cable Installation - Rear Access**

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**⇒ NOTE:**

Parallel telemetry is not available in Release 13 software.

### **Description**

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Parallel telemetry provides a set of alarm and status outputs in the form of contact closures which can be reported to a maintenance center through a telemetry system. Connection of parallel telemetry requires a parallel telemetry system in the office, and thus parallel telemetry is only used in a central office environment. Perform this procedure if specified in the order.

Unless otherwise specified, shelf 1 (bottom shelf in the bay) should be cabled directly to the parallel telemetry equipment. Additional shelves in the bay are daisy-chained up from shelf 1. The shelf identification (SID) number for the parallel telemetry is determined by the backplane wiring and the wiring assignments within the mult cable. If shelf positions are skipped in a bay, then SID numbers for shelves above the empty position will not match the shelf positions in the bay.

**⇒ NOTE:**

Parallel telemetry cable options are listed in Table 2-4.

**⇒ NOTE:**

Parallel telemetry connections are listed in Table 2-9.

### **Procedure for Shelf 1**

---



**NOTE:**

This procedure should be performed for shelf 1 which will be directly connected to the telemetry system.

1. Obtain a parallel telemetry cable Group 362 or 363 (refer to Table 2-4).
2. Connect the cable to P54 of shelf 1.
3. Route the parallel telemetry cable out of the DDM-2000 OC-3 bay per Figure 2-12 to the telemetry system, stacking the cables as shown in Figure 2-2 or Figure 2-3.
4. Dress and tie the cables in the bay and as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
5. Cut the parallel telemetry cable to the desired length at the telemetry panel.
6. Wire-wrap the loose end of the parallel telemetry cable to the telemetry system, making connections as shown in Table 2-9.

### **Procedure for Other Shelves**

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**NOTE:**

This procedure should be performed when shelf 1 in the bay is connected to the parallel telemetry system. The cable added in this procedure is to mult parallel telemetry from other shelves in a bay to shelf 1. In this procedure shelf 1 will be connected to shelf 2, shelf 2 will be connected to shelf 3, etc.



**NOTE:**

For parallel telemetry in shelves other than shelf 1 to report, all parallel telemetry cable mults from that shelf to shelf 1 must be in place. No shelf should be skipped.

1. Obtain a parallel telemetry cable Group 364 or 366 (refer to Table 2-4).
2. Connect the cable to P54 of the shelf.
3. Route the cable to the side of the bay and down and connect it to P55 of the shelf below as shown in Figure 2-12.
4. Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.
5. Repeat Steps 1 through 4 for each shelf in the bay.

## **TBOS Telemetry Cable Installation - Rear Access**

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### **Description**

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**⇒ NOTE:**  
TBOS is not available in Release 13 software.

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 OC-3 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. Additionally, other DDM-2000 OC-3 shelves in the bay may be assigned remaining displays associated with the single interface connection by using intershelf mult cabling. Bays equipped with more than two DDM-2000 OC-3 shelves may require additional TBOS connections to the telemetry equipment.

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:**  
As mentioned above, at least two TBOS cables are required to be routed from the TBOS telemetry system to the DDM-2000 OC-3 bay to accommodate the maximum of six shelves in a bay.

**⇒ NOTE:**  
The TBOS intershelf mult cable also provides the intershelf mult for the craft interface terminal (CIT) and modem (if necessary). Information for installation of the mult cable is provided in the "Intershelf Mult Cable Installation".

**⇒ NOTE:**  
TBOS telemetry cable options are listed in Table 2-4.

**⇒ NOTE:**  
TBOS telemetry connections are listed in Table 2-10.

## Procedure

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### NOTE:

Unless otherwise specified, shelf 1 (bottom shelf) should be cabled directly to the telemetry equipment. If additional shelves are being installed in the bay, determine from installation information whether any additional shelves will be connected to the telemetry equipment.

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 348 or 349 (refer to Table 2-4). For non-*ACORN* TBOS processors, obtain a Group 352 cable to be used in conjunction with G348 or G349 cables or obtain a Group 395 or 396 cable to be used alone.
2. For *ACORN* processors, connect Group 348 or 349 TBOS telemetry cable to J53 on the rear of the shelf.
3. For non-*ACORN* processors using the Group 352, 395 or 396 cable, these cables contain a resistive circuit in its connector to provide compatibility between the DDM-2000 and the TBOS processor. A jumper strap is required when any of these cables are used. The jumper must be wire-wrapped onto the DDM-2000 backplane which has a metal cover over the backplane pins. Instructions to remove the cover and connect this jumper strap are packaged and shipped with the cable assemblies.
4. Route the TBOS cable out of the DDM-2000 OC-3 bay per Figure 2-13 to the telemetry system.
5. Stack the cables as shown in Figure 2-2 or Figure 2-3.
6. Dress and tie the cables in the bay and as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
7. Cut the TBOS cable to the desired length at the telemetry panel.
8. Wire-wrap the loose end of the TBOS cable to the telemetry system making connections as shown in Table 2-10.
9. Repeat this procedure for each shelf to be cabled directly to the telemetry system.

## **Intershelf Mult Cable Installation - Rear Access**

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### **Description**

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**⇒ NOTE:**  
TBOS is not available in Release 13 software.

An intershelf mult cable connects the CIT, TBOS telemetry, and modem, if necessary, between shelves in a bay.

**⇒ NOTE:**  
CIT and modem connections between shelves associated with different TBOS links require a different cable than that used for multing shelves that share a TBOS link.

### **Procedure for Shelves with No TBOS or Sharing a TBOS Link**

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**⇒ NOTE:**  
TBOS is not available in Release 13 software.

1. Connect a Group 351 or 353 TBOS, CIT, and modem cable to J58 of the shelves sharing a TBOS Link.
2. Route the cable to the side of the bay and down to J60 of the shelf below as shown in Figure 2-13.
3. Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

### **Procedure for Multing Shelves Associated with Different TBOS Links**

---

**⇒ NOTE:**  
TBOS is not available in Release 13 software.

1. Obtain a Group 354 or 356 modem/CIT mult cable (refer to Table 2-4).
2. Connect the cable to J58 of upper shelf.

3. Route the cable to the side of the bay and down and connect it to J60 of the lower shelf as shown in Figure 2-14.
4. Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

## **TL1/X.25 Interface Cable Installation - Rear Access**

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### **Description**

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The TL1/X.25 interface is a message-based telemetry system. It is an alternative to TBOS or parallel telemetry.

 **NOTE:**  
TBOS is not available in Release 13 software.

 **NOTE:**  
Parallel telemetry is not available in Release 13 software.

The TL! telemetry interfaces with a maintenance center to provide DDM-2000 OC-3 system status information and remote command capability.

### **Procedure**

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-  **NOTE:**  
TL1/X.25 interface telemetry requires that each shelf in the bay be cabled directly to the telemetry system.
1. Obtain a Group 342 or 343 cable (refer to Table 2-4).
  2. Connect the cable to connector J45 on the rear of the shelf.
  3. Route the cable out of the DDM-2000 OC-3 bay (refer to Figure 2-13) to the telemetry interface.
  4. Stack the cables as shown in Figure 2-2 or Figure 2-3.
  5. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching the backplane pins. Refer to Table 2-11.
  6. Connect the other end of the cable as specified in the job specification.
  7. Repeat the above procedure for each shelf (as required).

## Miscellaneous (Environmental) Discrete Telemetry Cable Installation - Rear Access

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### Description

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The miscellaneous (environmental) discrete telemetry access allows the maintenance center to control and monitor equipment collocated with the DDM-2000 OC-3.

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 (Releases 6 and 7) or 20 (Releases 8, 9, 11 and 13) miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office. An additional external discrete (#15), dedicated for external power minor alarm monitoring, is available (optional).

For external interconnection requirements using the miscellaneous discrete telemetry feature (Releases 6 and 7) at a remote terminal, refer to Figure 2-15 or Figure 2-16 for a central office. For Releases 8, 9, 11 and 13, refer to Figure 2-17.

Remote applications not using environmental telemetry or fan alarm connections require terminations.



**NOTE:**

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



**NOTE:**

Miscellaneous (environmental) discrete telemetry cable options are listed in Table 2-4.



**NOTE:**

Miscellaneous (environmental) discrete telemetry connections are listed in Table 2-12 for remote terminal applications and Table 2-13 for central office applications.

### Procedure

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1. Obtain a miscellaneous (environmental) discrete telemetry cable Group 369 or 370 (Table 2-4). The cable is connected to the shelf requiring miscellaneous (environmental) discrete telemetry.

2. For RT applications not using environmental telemetry or fan alarm connections a G378 termination must be connected to P62 on the rear of the shelf. The G378 termination is included in the shelf installation kit.
3. Connect the cable to P61 if at a CO or P62 if at an RT.
4. For remote terminal applications requiring more than 14 user definable environmental inputs (Releases 8, 9, 11 and 13), connect an ED-8C724-22 Group 33 or 34 cable to P61 (in addition to the Group 369 or 370 cable on P62).
5. Route the cable(s) out of the DDM-2000 OC-3 bay per Figure 2-13 to a wire-wrap terminal strip (or where connections will be made).
6. Stack the cables as shown in Figure 2-2 or Figure 2-3.
7. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
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 Tables 2-12 and 2-13 and Figure 2-15, 2-16 or 2-17.



**NOTE:**

Each miscellaneous (environmental) discrete telemetry designation is connected to the DDM-2000 OC-3 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.

## IAO LAN Cable Installation

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### Description

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DDM-2000 OC-3, Release 13 supports an IntraOffice LAN (IAO LAN) interface for operations data communications. The IAO LAN is a software-only enhancement that is necessary to support the following features:

- ITM SNC as the TL1-GNE,
- ITM SNC software download and
- Join multiple subnetworks.

Since the IAO LAN is effectively an extension of the SONET DCC, the IAO LAN may also be used to join multiple, otherwise separate subnetworks. All NE-to-NE OI features that are supported by PF-2000 over the DCC are also supported over the IAO LAN.

New cables, ED8C724-22, Groups 39 (150 ft), 39A (30 FT), 39B (75 FT) and 40 (300 ft), (See Table 2-4) have been created to accommodate this added capability. These cables should be connected to any shelf to be used as home for an IAO LAN. Connector J50, formerly unassigned, is used for connection to the IAO LAN. Color codes for the cable are given in Tables 2-19 and 2-20. Diagrams of the RJ45 connectors are shown in Figure

For any of the above applications it is necessary to connect the desired network element to a LAN hub. The LAN must be enabled. To determine if the LAN is enabled, enter the following command:

```
rt-fecom:lan (RETRIEVE FAREND COMMUNICATIONS:LAN)
```

Use the following command to enable the LAN if it is not enabled:

```
set-fecom:lan (SET FAREND COMMUNICATIONS:LAN)
```

Once the LAN is enabled test it using the following command:

```
test-iaolan (TEST INTRAOFFICE LAN)
```

#### NOTE:

It is important that the LAN be enabled as described above.

The final, definitive test is to retrieve a map of the network. If the LAN is enabled, retrieving a map will verify that the LAN is properly connected and working. Connectivity of two or more network elements to the LAN hub can be verified by entering either, or both, of the following commands:

```
rt-map-neighbor (RETRIEVE MAP NEIGHBOR)
```

```
rt-map-network (RETRIEVE MAP NETWORK)
```

Successful retrieval of a map verifies that the LAN is connected and working properly. If it is not possible to retrieve a map, return to the **rt-fecom:lan** and **set-fecom:lan** commands and make sure that the LAN is enabled. Refer to 824-102-147, *Lucent Technologies 2000 Product Family Operations Working Guide* for further information.

## **DS1 Timing Cable Installation - Rear Access**

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### **Description**

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A DS1 timing cable is required if the shelf is to be externally timed. Multiple cables are required if the timing from the shelf directly connected to the DS1 Reference clock is to be daisy-chained to the remaining shelves in the bay. A termination connector must be used on the output of the last shelf in a mult. (See Table 2-5.)

DS1 external timing is provided by the BBF2B TGS Circuit Pack to time a BITS clock. When the shelf is configured to provide a sync output and the BBF2B Circuit Packs are externally timed to a DS1 Reference a Sync Input timing cable is required.



**NOTE:**

DS1 timing cable options are listed in Table 2-5.



**NOTE:**

DS1 timing connections are listed in Table 2-14.

### **Procedure for Connections to Timing Source**

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**NOTE:**

The cabling from the DS1 reference clock timing source should be connected to the bottom shelf in the bay. Other DDM-2000 OC-3 shelves in the bay are daisy-chained up from the bottom shelf.

1. Obtain a DS1 timing cable Group 339, 340, or 341 (refer to Table 2-5).
2. Connect the cable to J37 of shelf 1 (bottom shelf).
3. Route the timing cable out of the DDM-2000 OC-3 bay per Figure 2-14 to the DS1 timing reference.
4. Stack the cables as shown in Figure 2-2 or Figure 2-3.
5. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
6. Cut the cable to the desired length. If the bottom shelf (shelf 1) position is unequipped, leave enough cable so the cable can reach the bottom position when the shelf is eventually added.
7. Wire-wrap the loose end of the DS1 timing cable to the DS1 reference clock making connections per Table 2-14.

### **Procedure for Intershelf Timing Connections**

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**⇒ NOTE:**

This procedure should be performed to daisy-chain the timing from the shelf that is directly connected to the DS1 reference clock to the remaining shelves in the bay. For DS1 timing to be delivered to all shelves in the bay, DS1 timing cable mults from shelf to shelf must be daisy-chained up from the bottom shelf. No shelf should be skipped.

1. Obtain a DS1 timing cable listed in Group 373 or 374 (Table 2-5).
2. Connect the cable to J37 of the shelf.
3. Route the cable to the side of the bay and down and connect it to J44 of the shelf below as shown in Figure 2-14.
4. Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.
5. Repeat Steps 1 through 4 for each shelf in the bay (as required).

### **Procedure for Connections to Provide External Timing to BITS Clock**

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**⇒ NOTE:**

The Group 394 cable is used when the shelf is configured to provide sync output for the BITS clock and when the BBF2B circuit packs are externally timed from a DS1 reference out of a BITS clock. The Group 394 cable should not be used when the shelf is configured for DS1 MULT output operation or when the BBF2B circuit packs are loop timed.

**⇒ NOTE:**

The Group 394 Cable is installed in series with the incoming external reference signal on P37 of the OC-3.

1. Obtain two DS1 timing cables Group 339, 340 or 341 and a Group 394 Sync Output Cable (Table 2-5). Refer to Figure 2-18.
2. Connect the Group 394 to J37.
3. Connect Group 394 connector J237 to Group 339, 340 or 341 connector P237.
4. Route the timing cables out of the DDM-2000 OC-3 bay per Figure 2-14 to the DS1 timing reference output.
5. Connect Group 339, 340 or 341 to connector J44.
6. Route the timing cables out of the DDM-2000 OC-3 bay per Figure 2-14 to the DS1 timing reference input.

7. Stack the cables as shown in Figure 2-2 or Figure 2-3.
8. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
9. Cut the cable to the desired length. If the bottom shelf (shelf 1) position is unequipped, leave enough cable so the cable can reach the bottom position when the shelf is eventually added.
10. Wire-wrap the loose end of the DS1 timing cable to the DS1 reference clock making connections per Table 2-14.

## Modem Cable Installation - Rear Access

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### Description

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The use of a modem will allow the DDM-2000 OC-3 to be accessed remotely.



**NOTE:**

Connection to the modem port does not require the use of a null modem.



**NOTE:**

Modem cable options are listed in Table 2-4.

### Procedure for Shelf Connected to Modem

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**NOTE:**

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

1. Obtain a modem cable Group 350 (refer to Table 2-4).
2. Connect the cable to J52 of shelf 1.
3. Route the modem cable out of the DDM-2000 OC-3 bay per Figure 2-14 to the modem or distribution frame, stacking the cables as shown in Figure 2-2 or Figure 2-3.
4. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
5. Connect the modem cable to the modem or distribution frame.

### Procedure for Other Shelves

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**NOTE:**

This procedure should be performed when shelf 1 in the same bay is to connect directly to a modem or distribution frame. The cable added in this procedure is to mult modem connections in a bay to shelf 1. In this procedure, shelf 1 will be connected to shelf 2, shelf 2 will be connected to shelf 3, etc.



**NOTE:**

In order for modem connections to be established with shelves other than shelf 1, modem cable mults from that shelf to shelf 1 must be in place. No shelf should be skipped.

## **Order Wire Interface Cable Installation - Rear Access**

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### **Description**

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The order wire interface provides access for optional connection to an external order wire system allowing point-to-point voice communication between adjacent nodes in a DDM-2000 OC-3 system.

### **Procedure**

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1. Obtain a Group 346 or a ED-8C724-22 Group 31 cable (refer to Table 2-4).
2. Connect the cable to connector J51 on the rear of the shelf.
3. Route the cable to the order wire interface.
4. Stack the cable in the bay duct as shown in Figure 2-2 or Figure 2-3.
5. Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.
6. Wire-wrap the unterminated end of the cable assembly to the order wire interface. Refer to Table 2-15.

## **Fan Shelf Alarm Connections - Rear Access**

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### **Description**

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The DDM-2000 OC-3 fan shelf is provided as required. An alarm indication is generated by the fan shelf in the event of a functional failure. The alarm can be input to the DDM-2000 OC-3 shelf as miscellaneous discrete information (environmental alarm #14).

## **Procedure**

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The fan shelf alarm output should be connected to the DDM-2000 OC-3 shelf located below the fan shelf. The connection can be made in one of the two ways:

- a. If no other environmental alarm inputs are being connected to the DDM-2000 OC-3 shelf, connect a G375 cable between the connector on the fan shelf alarm cable and P62 on the rear of the DDM-2000 OC-3 shelf.
- b. If other environmental alarm inputs, in addition to the fan shelf alarm, are being connected to the DDM-2000 OC-3 shelf, connect a G376 cable via a miscellaneous terminal strip to the appropriate wires on the G369 or G370 miscellaneous (environmental) discrete cable in accordance with information provided in the job specification. Refer to Table 2-12, 2-16 and to the "Miscellaneous (Environmental) Discrete Telemetry Cable Installation".

## **Final Operations**

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### **Procedure**

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1. Verify that all the cables are properly dressed.
2. Verify that all cables are properly labeled.
3. Verify that designations where cables were wire-wrapped are properly labeled.
4. Attach the backplane cover and make sure that it fits properly.

**Table 2-1. DS1 Cable Assemblies**

Description	ED-8C724-20 Group (Note 1)	Cable Length (ft.) (Note 2)	Cable Type (Note 3)	DDM-2000 Backplane Connections
ED-8C724-30, G1 Shelf TX and RX: LS INTFC 1-7 Function Group A	G301	75	613C	P101-P114
	G302	150		
	G303	30 to 655		
	G304	75	1249C	
	G305	150		
	G306	30 to 440		
ED-8C724-30, G1 Shelf TX and RX: LS INTFC 1-7 Function group B	G307	75	613C	P115-P128
	G308	150		
	G309	30 to 655		
	G310	75	1249C	
	G311	150		
	G312	30 to 440		
ED-8C724-30, G1 Shelf TX and RX: LS INTFC 1-7 Function Group C	G313	75	613C	P129-P142
	G314	150		
	G315	30 to 655		
	G316	75	1249C	
	G317	150		
	G318	30 to 440		

**Notes:**

1. Each group listed includes all the DS1 cables for one function group.
2. The length (30 to 440 feet) of Groups 306, 312, and 318 is specified by the customer. The length (30 to 655 feet) of Groups 303, 309, and 315 is specified by the customer.
3. 613C type cable is 22 gauge (maximum length is 655 feet).
4. 1249C type cable is 26 gauge (maximum length is 440 feet).
5. Cables are terminated in 963P-16 or 963TR-16 connectors at the DDM-2000 OC-3 end and unterminated at the other end for wire-wrap installation.

**Table 2-2. DS3/EC-1 Cable Assemblies**

Description (Note 1)	Old Cable ED8C727-20 Group	New Cable ED8C900-20 Group ****	Cable Length (ft.) (Note 2)	Cable Type (Note 3)	Other End Connector (Note 4)
To DSX-3 or FT-2000, OC-48*	100	G103 F/E 6BB, 6LA	150	1735006A	KS-23558,L6 BNC
	101	G105 ( ) F/E 6BB, 6LA	250 (max.)		
	103	†G3 F/E AB, LA	150	735A	
	104	†G5 ( ) F/E AB, LA	250 (max.)		
	106	Do not use.	150	KS-19224, L2	KS-23558,L4 BNC
	107	Do not use.	150 (max.)		
	109	†G305 ( ) F/E DBD, 1LA	450 (max.)	734A/735A	KS-23558,L5 BNC
To DACS III- 2000	120	G103 F/E 6BC, 6LB	150	1735006A	9821AE
	121	G105 ( ) F/E 6BC, 6LB	500 (max.)		
	123	†G3 F/E AC, LB	150	735A	
	124	†G5 ( ) F/E AC, LB	500 (max.)		
	126	†G305 ( ) F/E DBD, LCD	900 (max.)	734A/735A	**
To DACS IV- 2000	130	G103 F/E 6BJ, 6LB	150	1735006A	9821EA & 9821FA
	131	G105 ( ) F/E 6BJ, 6LB	500 (max.)		
	133	‡G3 F/E AD, LB, and G3 F/E AE, LB	150	735A	
	134	‡G5 ( ) F/E AD, LB and G5 ( ) F/E AE, LB	500 (max.)		
	136	‡G305 ( ) F/E DBD, LDD and G305 ( ) F/E DBD, LED	900 (max.)	734A/735A	***

† Use two (2) cables.

‡ Use one of each.

Table 2-2. DS3/EC-1 Cable Assemblies (Cont.)

*Notes:*

1. All the DS3/EC-1 cable assemblies can be used for any function group. DDM-2000 OC-3 DS3/EC-1 backplane connectors are J38-J43.
  2. Cable lengths are specified by the customer for all cables designated as having a (max.) length. All other cable lengths are fixed.
  3. A 1735006A six conductor cable provides three DS3/EC-1 IN and three DS3/EC-1 OUT cables to accommodate one full function group on the DDM-2000 OC-12 shelf. 734A, 735A, and KS-19224, L2 cables provide one DS3/EC-1 IN cable and one DS3/EC-1 OUT cable to accommodate a partially equipped function group.
  4. All the Group 100 to 136 cables have a BNC KS-23558, L6 connector on one end except the following: Groups 106 and 107 cables have a BNC KS-23558, L4 connector on one end. The Group 110 cable has a BNC KS-23626, L5 (right angle) connector on one end.
- \* For cables going to DACS III-2000 and DACS IV-2000 equipped with a BNC I/O panel, cable lengths designated as 250 (max.) and 450 (max.) become 500 (max.) and 900 (max.), respectively.
- \*\* The Group 126 cable consists of two 734A cables (1-900 feet) with a BNC connector on one end and no connector on the other end. This group also includes two 13-foot 735A cables with a 219P connector on one end and a ED-7G001-23, Group 204 cable assembly on the other end. The 735A cable will have to be spliced to the 734A cable per the 219P connector.
- \*\*\* The Group 136 cable consists of two 734A cables (1-900 feet) with a BNC connector on one end and no connector on the other end. This group also includes two 13-foot 735A cables with a 219P connector on one end and a 9821EA or 9821FA connector on the other end. The 735A cable will have to be spliced to the 734A cable per the 219P connector.
- \*\*\*\* All ED8C900 cable groups identified with an L (such as G103 F/E 6BB, 6LA) come with the connector for one end shipped loose; i.e., the cable is terminated only on one end.

**Table 2-3. DS3/EC-1 Cable Assemblies (These cables are no longer available.)**

Description (Note 1)	ED-8C724-20 Group (Note 2)	Cable Length (ft.) (Note 3)	Cable Type (Note 4)	Other End Connector (Note 5)
To DACS IV-2000	323	150	735A	9821E & 9821F
	324	250 (max.)		
	325	150	1735006A	
	326	250 (max.)		
	327	250 to 450	734A	*
To DACS III-2000	328	150	735A	9821AE
	329	250 (max.)		
	330	150	1735006A	
	331	250 (max.)		
	332	250 to 450	734A	**
To DSX-3	333	150	735A	KS-23558,L6 BNC
	334	250 (max.)		
	335	150	1735006A	
	336	250 (max.)		
	337	250 to 450	734A	KS-23558,L5 BNC
	338	150	KS-1922 ,L2	KS-23558,L4 BNC

*Notes:*

1. All the DS3/EC-1 cable assemblies can be used for function group A, B, or C. DDM-2000 OC-3 DS3/EC-1 backplane connectors are J38-J43.
2. ED-8C727-20 cables in Table 2-2 are recommended as they have right angle connectors and thus there is greater clearance in the backplane.
3. The 150-foot cables are fixed length. The 250 (max.) or 250 to 450 foot cable lengths are specified by the customer.
4. 1735006A type cable has six conductors in one shield to provide all the DS3/EC-1 cables for one DDM-2000 OC-3 shelf. The 734A, 735A, and KS-19224, L2 type cables have two conductors in one shield to provide the DS3/EC-1 cables for one DDM-2000 OC-3 function group.
5. All the Group 319 to 338 cables have a BNC KS-23558, L6 connector on one end except the following: Groups 327, 332, and 337 have a BNC KS-23558, L5 connector on one end. Group 338 has a BNC KS-23558, L4 connector on one end.

Continued on Next Page

DS3/EC-1 Cable Assemblies (Contd)

- \* The Group 327 cable consists of two 734A cables (250-450 feet) with a BNC connector on one end and no connector on the other end. This group also includes two 3-foot KS-19224, L2 cables with a 219N connector on one end and a 9821E or 9821F connector on the other end. The KS-19224, L2 cable will have to be spliced to the 734A cable.
- \*\* The Group 332 cable consists of two 734A cables (250-450 feet) with a BNC connector on one end and no connector on the other end. This group also includes two 15-foot KS-19224, L2 cables with a 219N connector on one end and a 846369346 cable assembly on the other end. The KS-19224, L2 cable will have to be spliced to the 734A cable.

**Table 2-4. Telemetry, Modem and LAN Cable Assemblies**

Description	ED-8C724-20 Group	Cable Length (ft.) (Notes 1 & 2)	DDM-2000 Back- plane Connections
TL1/X.25 Interface- 1 per Shelf	342	150 ft.	J45
	343	As Reqd.	
Order wire	346	3 ft.	J51
	ED-8C724-22, G31	17 ft.	
TBOS Resistor Interface Cable	352	18 in.	J53
TBOS Serial Telemetry Direct Connection to an Acorn TBOS Processor	348	150 ft.	J53
	349	As Reqd.	
TBOS Serial Telemetry*	395	As Reqd.	J53
	396	150 ft.	
Modem Interface for Any Shelf	350	As Reqd.	J52
	319	75 ft.	
TBOS, CIT, Modem for Additional Shelves (Mult)	351	2 ft. 7 in.	J58 to J60 (Lower Shelf)
	353	As Reqd.	
CIT, Modem Mult, Without TBOS	354	2 ft. 7 in.	J58 (Shelf 5) to J60 (Shelf 4)
	356	As Reqd.	
Parallel Telemetry for Shelf 1	362 (See NOTE below.)	150 ft.	P54
	363	As Reqd.	
Parallel Telemetry Additional Shelves	364 (See NOTE below.)	2 ft. 7 in.	P54 to P55 (Lower Shelf)
	366	As Reqd.	
Misc. (Env.) Discrete Telemetry 1 per Shelf	369	150 ft.	P61 (at CO) P62 (at RT)
	370	As Reqd.	
** Additional Misc. (Env.) Discrete Telemetry	ED-8C724-22, G33	150 ft.	P61 (at RT)
	ED-8C724-22, G34	As Reqd.	
IAO LAN	ED-8C724-22, G39, or	150 ft	J50
	ED-8C724-22, G39A	30 ft	
	ED-8C724-22, G39B	75 ft	
	ED-8C724-22, G40	300 ft	



**NOTE:**

Parallel telemetry is not available in Release 13 software.

*Notes:*

\* For CO locations this cable can be used for TBOS applications in place of the following cables: Group 352 with Group 348 or Group 349.

\*\* Used only when more than 14 user definable environmental inputs are required (Releases 8, 9, 11 and 13).

1. Cable lengths listed as required are specified by the customer.
2. All cables are 26 gauge.

**Table 2-5. Power, Alarm, and Synchronization Cable Assemblies**

Description	ED-8C724-20 Group	Cable Length 3.03 (Note 1)	DDM-2000 Backplane Connections
DS1 Timing Reference for Bottom Shelf/DS1 External Sync Out Timing	339	100 ft.	J37/J44
	340	300 ft.	
	341	As Reqd.	
Sync Input Timing	394	4 ft.	J37 to P237 on G339, 340 or 341
Office Alarms for Bottom Shelf	357	150 ft.	P56
	358	As Reqd.	
Office Alarms for Additional Shelves	359	3 ft. 3 in.	P56 to P57 (Lower Shelf)
	361	As Reqd.	
Power Cable for Single Shelf	371	15 ft.	P1, P2
Power Cable Arrangements Bay	372	15 ft.	P1, P2
DS1 Timing Reference for Additional Shelves	373	3 ft.	J37 to J44 (Lower Shelf)
	374	As Reqd.	
Fan Shelf Alarm Cable	375	2 ft.	J62
	376	As Reqd.	-
	378*	-	J62
Fan Shelf Power Cable	377	2 ft.	P1, P2 on Fan Shelf

*Notes:*

1. Cable lengths listed as required are specified by the customer.

\* For RT applications, this termination is required for each shelf when Groups 369, 370, or 376 are not provided for fan alarm.

**Table 2-6. DS1 Transmission Connections**

GR	Chan DS1	Chan HDSL(1) (BBF8)	T/R Term	613C (22Gauge) T/R Color (Note 1)	1249C (26Gauge) T/R Color (Note1)	Function Group A Conn.		Function Group B Conn.		Function Group C Conn.	
						Out (Note2)	In (Note3)	Out (Note2)	In (Note3)	Out (Note2)	In (Note3)
1	1 (1)	1	B8, B7	W-BL, BL-W	W, BL	J101	J108	J115	J122	J129	J136
	2 (2)		B6, B5	W-O, O-W	W, O						
	3 (3)		B4, B3	W-G, G-W	W, G						
	4 (4)		B2, B1	W-BR, BR-W	W, BR						
2	1 (5)	1	B8, B7	W-S, S-W	W, S	J102	J109	J116	J123	J130	J137
	2 (6)		B6, B5	R-BL, BL-R	R, BL						
	3 (7)		B4, B3	R-O, O-R	R, O						
	4 (8)		B2, B1	R-G, G-R	R, G						
3	1 (9)	1	B8, B7	R-BR, BR-R	R, BR	J103	J110	J117	J124	J131	J138
	2 (10)		B6, B5	R-S, S-R	R, S						
	3 (11)		B4, B3	BK-BL, BL-BK	BK, BL						
	4 (12)		B2, B1	BK-O, O-BK	BK, O						
4	1 (13)	1	B8, B7	BK-G, G-BK	BK, G	J104	J111	J118	J125	J132	J139
	2 (14)		B6, B5	BK-BR, BR-BK	BK, BR						
	3 (15)		B4, B3	BK-S, S-BK	BK, S						
	4 (16)		B2, B1	Y-BL, BL-Y	Y, BL						
5	1 (17)	1	B8, B7	Y-O, O-Y	Y, O	J105	J112	J119	J126	J133	J140
	2 (18)		B6, B5	Y-G, G-Y	Y, G						
	3 (19)		B4, B3	Y-BR, BR-Y	Y, BR						
	4 (20)		B2, B1	Y-S, S-Y	Y, S						
6	1 (21)	1	B8, B7	V-BL, BL-V	V, BL	J106	J113	J120	J127	J134	J141
	2 (22)		B6, B5	V-O, O-V	V, O						
	3 (23)		B4, B3	V-G, G-V	V, G						
	4 (24)		B2, B1	V-BR, BR-V	V, BR						
7	1 (25)	1	B8, B7	V-S, S-V	V, S	J107	J114	J121	J128	J135	J142
	2 (26)		B6, B5	W-BL, BL-W	W, BL						
	3 (27)		B4, B3	W-O, O-W	W, O						
	4 (28)		B2, B1	W-G, G-W	W, G						

*Notes:*

1. The pairs W-BR/BR-W and W-S/S-W are contained in the second binder as spares.
2. All DS1 Out cables are the CA1 portion of the Group cable.
3. All DS1 In cables are the CA2 portion of the Group cable.

**Table 2-7. Power Connections**

Name	Design.	Conn.	Term	Color
-48 V (A)	BAT A	J1	1	R
RTN (A)	BAT A RTN	(Note1)	2	BK
-48 V (B)	BAT B	J2	1	G
RTN (B)	BAT B RTN	(Note2)	2	W

*Notes:*

1. Located on the CA1 portion of the Group 371 or 372 cable.
2. Located on the CA2 portion of the Group 371 or 372 cable.

**Table 2-8. Office Alarm Connections**

Name	Design	Conn.	Term	Color
Minor Alarm Visible	MNV	J56	1	BL-W
Minor Alarm Visible Return	MNVR		2	W-BL
Minor Alarm Audible	MN		3	O-W
Minor Alarm Audible Return	MNR		4	W-O
Major Alarm Visible	MJV		5	G-W
Major Alarm Visible Return	MJVR		6	W-G
Major Alarm Audible	MJ		7	BR-W
Major Alarm Audible Return	MJR		8	W-BR
Critical Alarm Visible	CRV		9	S-W
Critical Alarm Visible Return	CRVR		10	W-S
Critical Alarm Audible	CR		11	BL-R
Critical Alarm Audible Return	CRR		12	R-BL

*Notes:*

1. The SYSCTL circuit pack reports office alarms.
2. The office alarm cable is 26 gauge.
3. Some cables may be manufactured using wires following old color code standards. A color code cross-reference is located in Table 2-16.

**Table 2-9. Parallel Telemetry Connections** (See NOTE below.)

Name	Design.	Conn.	Term	Color
ACO Control - Output	ACO-O	J54	7	BR-W
ACO Control - Input	ACO-I		18	R-BR
Output - Common	COM-O		14	R-O
Critical Alarm	CR		15	G-R
Major Alarm	MJ		13	O-R
Minor Alarm	MN		11	BL-R
Power Minor Alarm	PMN		9	S-W
Near End Status	NE		16	R-G
Carrier Line Failure Status	CLF		3	O-W
Incoming Status	INCM		1	BL-W
System Identifier - Shelf 1	SID1		5	G-W
System Identifier - Shelf 2	SID2		23	O-BK
System Identifier - Shelf 3	SID3		21	BL-BK
System Identifier - Shelf 4	SID4		19	S-R
System Identifier - Shelf 5	SID5		17	BR-R
System Identifier - Shelf 6	SID6		24	BK-O
System Identifier - Shelf 7	SID7		22	BK-BL
Input - Common	COM-I		20	R-S
Far End Site ID - Site 1	FE1		12	R-BL
Far End Site ID - Site 2	FE2		10	W-S
Far End Site ID - Site 3	FE3		8	W-BR
Far End Site ID - Site 4	FE4		6	W-G
Far End Site ID - Site 5	FE5		4	W-O
Far End Site ID - Site 6	FE6		2	W-BL



**NOTE:**

Parallel telemetry is not available in Release 13 software.

*Notes:*

1. For ACO control - input, a pair of leads is connected between ACO-I and COM-I.
2. For all other parallel telemetry connections, a pair of leads is connected between the telemetry point and COM-O.
3. The parallel telemetry cable is 26 gauge.
4. Some cables may be manufactured using wires following old color-code standards. A color-code cross-reference is located in Table 2-16.

**Table 2-10. TBOS Serial Telemetry Connections**

Name	Design.	Conn.	Term	Color
Transmitted True Data To Telem. Equip.	TDP	P53	2	O-W or BR-W*
Transmitted Inverted Data To Telem. Equip.	TDN		7	W-O or W-BR*
Received True Data To Telem. Equip	RDP		1	BL-W or G-W*
Received Inverted Data To Telem. Equip.	RDN		6	W-BL or W-G*

*Notes:*

\* TBOS cables have shipped with various wire color assignments. These cables are correct for G348 and G349 cables with manufacturing dates of 5/92 or later. Cables with colors assignments varying from the above table should be continuity tested using the lead designation and connector terminal number to determine proper wire color assignment.

1. The TBOS telemetry cable is 26 gauge.

**Table 2-11. TL1/X.25 Interface Connections**

Name	Design.	Conn.	Term	Color
Transmitted Data	TDA	J45	2	BL-W
Received Data	RDA		3	O-W
Request to Send	RTS		4	G-W
Clear to Send	CTS		5	BR-W
Data Set/DCE Ready	DSR		6	S-W
Signal Ground	GRD		7	BL-R
Received Line Signal Detector	CDC		8	O-R
Transmitter Signal Element Timing	TCK		15	W-BL
Receiver Signal Element Timing	RCK		17	W-G
Data Terminal/DTE Ready	DTR		20	R-BL
Ring Indicator	RID		22	R-G

*Note:* The TL1/X.25 interface cable is 26 gauge.

**Table 2-12. Miscellaneous (Environmental) Discrete Telemetry Connections (RT)**

Remote Terminal (All Releases)			Remote Terminal Additional Environmental Inputs (Releases 8, 9, 11 and 13)			ED8C704-20 Cable (J61)		ED8C724-22 Cable (J62)
Name	Design.	Conn.	Name	Design.	Conn.	Term	Color	Color
Minor Alarm	MN	J62	Env. Input - #20	TLMI-20	J61	4	W-O	W-BL
Power Minor Alarm	PMNT-IN					18	R-BR	
Fan Control	FAN-CTL					23	O-BK	
Input-Common	TLMI-C		Input-Common	TLMI-C		9	S-W	BR-W
Env. Input - #1	TLMI-1					17	BR-R	
Env. Input - #2	TLMI-2					15	G-R	
Env. Input - #3	TLMI-3					13	O-R	
Env. Input - #4	TLMI-4					11	BL-R	
Env. Input - #5	TLMI-5					7	BR-W	
Env. Input - #6	TLMI-6					5	G-W	
Env. Input - #7	TLMI-7					3	O-W	
Env. Input - #8	TLMI-8					1	BL-W	
Env. Input - #9	TLMI-9					16	R-G	
Env. Input - #10	TLMI-10					14	R-O	
Env. Input - #11	TLMI-11		Env. Input - #16	TLMI-16		12	R-BL	W-G
Env. Input - #12	TLMI-12		Env. Input - #17	TLMI-17		10	W-S	G-W
Env. Input - #13	TLMI-13		Env. Input - #18	TLMI-18		8	W-BR	W-O
Env. Input - #14	TLMI-14		Env. Input - #19	TLMI-19		6	W-G	O-W
Output - Common	TLMO-C					21	BL-BK	
Env. Output - #1	TLMO-1					19	S-R	
Env. Output - #2	TLMO-2					24	BK-O	
Env. Output - #3	TLMO-3					22	BK-BL	
Env. Output - #4	TLMO-4					20	R-S	
No Connection	NC		Env. Input - #21	TLMI-21		2	W-BL	BL-W

**Notes:**

1. 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 (Releases 6 and 7) or Figure 2-17 (Releases 8, 9, 11 and 13).
2. The external inputs to the miscellaneous (environmental) discretetes is a contact closure and is connected to the DDM-2000 by two leads (wires). For each of the miscellaneous (environmental) inputs that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-#).. Refer to Figure 2-15 (Releases 6 and 7) or Figure 2-17 (Releases 8, 9, 11 and 13).

**Table 2-13. Miscellaneous (Environmental) Discrete Telemetry Connections (CO)**

Central Office (Releases 6 and 7)			Central Office (Releases 8, 9, 11 and 13)				
Name	Design.	Conn.	Name	Design.	Conn.	Term	Color
Minor Alarm	MN	J61	No Connection	NC	J61	4	W-O
No Connection	NC		No Connection	NC		18	R-BR
No Connection	NC		No Connection	NC		23	O-BK
Input-Common	TLMI-C		Input-Common	TLMI-C		9	S-W
Env. Input - #1	TLMI-1	J61	Env. Input - #1	TLMI-1	J61	17	BR-R
Env. Input - #2	TLMI-2		Env. Input - #2	TLMI-2		15	G-R
Env. Input - #3	TLMI-3		Env. Input - #3	TLMI-3		13	O-R
Env. Input - #4	TLMI-4		Env. Input - #4	TLMI-4		11	BL-R
Env. Output - #5	TLMO-5	J61	Env. Output - #5	TLMO-5	J61	7	BR-W
Env. Output - #6	TLMO-6		Env. Output - #6	TLMO-6		5	G-W
Env. Output - #7	TLMO-7		Env. Output - #7	TLMO-7		3	O-W
Env. Output - #8	TLMO-8		Env. Output - #8	TLMO-8		1	BL-W
Env. Output - #9	TLMO-9	J61	Env. Output - #9	TLMO-9	J61	16	R-G
Env. Output - #10	TLMO-10		Env. Output - #10	TLMO-10		14	R-O
Env. Output - #11	TLMO-11	J61			J61	12	R-BL
Env. Output - #12	TLMO-12					10	W-S
Env. Output - #13	TLMO-13	J61			J61	8	W-BR
Env. Output - #14	TLMO-14					6	W-G
Output - Common	TLMO-C		Output - Common	TLMO-C		21	BL-BK
Env. Output - #1	TLMO-1		Env. Output - #1	TLMO-1		19	S-R
Env. Output - #2	TLMO-2	J61	Env. Output - #2	TLMO-2	J61	24	BK-O
Env. Output - #3	TLMO-3		Env. Output - #3	TLMO-3		22	BK-BL
Env. Output - #4	TLMO-4		Env. Output - #4	TLMO-4		20	R-S
No Connection	NC					2	W-BL

*Notes:*

1. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation. Refer to Figure 2-16 (Releases 6 and 7) or Figure 2-17 (Releases 8, 9, 11 and 13).

**Table 2-14. DS1 Timing Reference Connections**

Name	Design	Conn.	Term	Color
Received from Primary DS1 Reference	T	P37, P237, P44	6	BK
	R		1	O
Received from Secondary DS1 Reference	T		7	R
	R		2	G

*Notes:*

1. Refer to the appropriate procedure for the timing connections.
2. The DS1 timing cable is 22 gauge.

**Table 2-15. Order wire Interface Connections**

Name	Design	Conn.	Term	Color
Received Data	RDAO	P51	1	BL-W
	RCKO		6	W-BL
Transmitted Data	TDAO		2	O-W
	TCKO		7	W-O
Ground	GND		3	G

**Note:** The order wire interface cable is 26 gauge.

**Table 2-16. Fan Shelf Alarm Connections**

Terminal	Wire Color	Fan Shelf Connector Designation
4	BL-W	TLM-14
5	BR-W	TLM-OC
8	W-BL	-48VRT

**Table 2-17. Color Code Cross Reference Connections**

Number	Color		Paired With	
	Old	New	Old	New
1C or 26C	BL1W	W-BL	BL2W	BL-W
2C or 27C	O1W	W-O	O2W	O-W
3C or 28C	G1W	W-G	G2W	G-W
4C or 29C	BR1W	W-BR	BR2W	BR-W
5C or 30C	S1W	W-S	S2W	S-W
6C or 31C	BL1R	R-BL	BL2R	BL-R
7C or 32C	O1R	R-O	O2R	O-R
8C or 33C	G1R	R-G	G2R	G-R
9C or 34C	BR1R	R-BR	BR2R	BR-R
10C or 35C	S1R	R-S	S2R	S-R
11C or 36C	BL1BK	BK-BL	BL2BK	BL-BK
12C or 37C	O1BK	BK-O	O2BK	O-BK
13C or 38C	G1BK	BK-G	G2BK	G-BK
14C or 39C	BR1B	BK-	BR2B	BR-
15C or 40C	K	BR	K	BK
	S1BK	BK-S	S2BK	S-BK
16C or 41C	BL1Y	Y-BL	BL2Y	BL-Y
17C or 42C	O1Y	Y-O	O2Y	O-Y
18C or 43C	G1Y	Y-G	G2Y	G-Y
19C or 44C	BR1Y	Y-BR	BR2Y	BR-Y
20C or 45C	S1Y	Y-S	S2Y	S-Y
21C or 46C	BL1V	V-BL	BL2V	BL-V
22C or 47C	O1V	V-O	O2V	O-V
23C or 48C	G1V	V-G	G2V	G-V
24C or 49C	BR1V	V-BR	BR2V	BR-V
25C or 50C	S1V	V-S	S2V	S-V

**Note:** Some cables may be manufactured using wires following old color code standards

**Table 2-18. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

**Table 2-19. IAO LAN Connector Pin Identification - Shelf End (P50)**

Pin No.	Color	Function
1	White on Black	RQ3P
2	White on Orange	XQ3P
6	Black on White	RQ3N
7	Orange on White	XQ3N

Note: Pins 3, 4, 5, 8 and 9 are not used.

**Table 2-20. IAO LAN Connector Pin Identification - Opposite End (RJ45 type)**

---

<b>Pin No.</b>	<b>Color</b>	<b>Function</b>
1	White on Orange	XQ3P
2	Orange on White	XQ3N
3	White on Black	RQ3P
6	Black on White	RQ3N

Note: Pins 4, 5, 7 and 8 are not used.

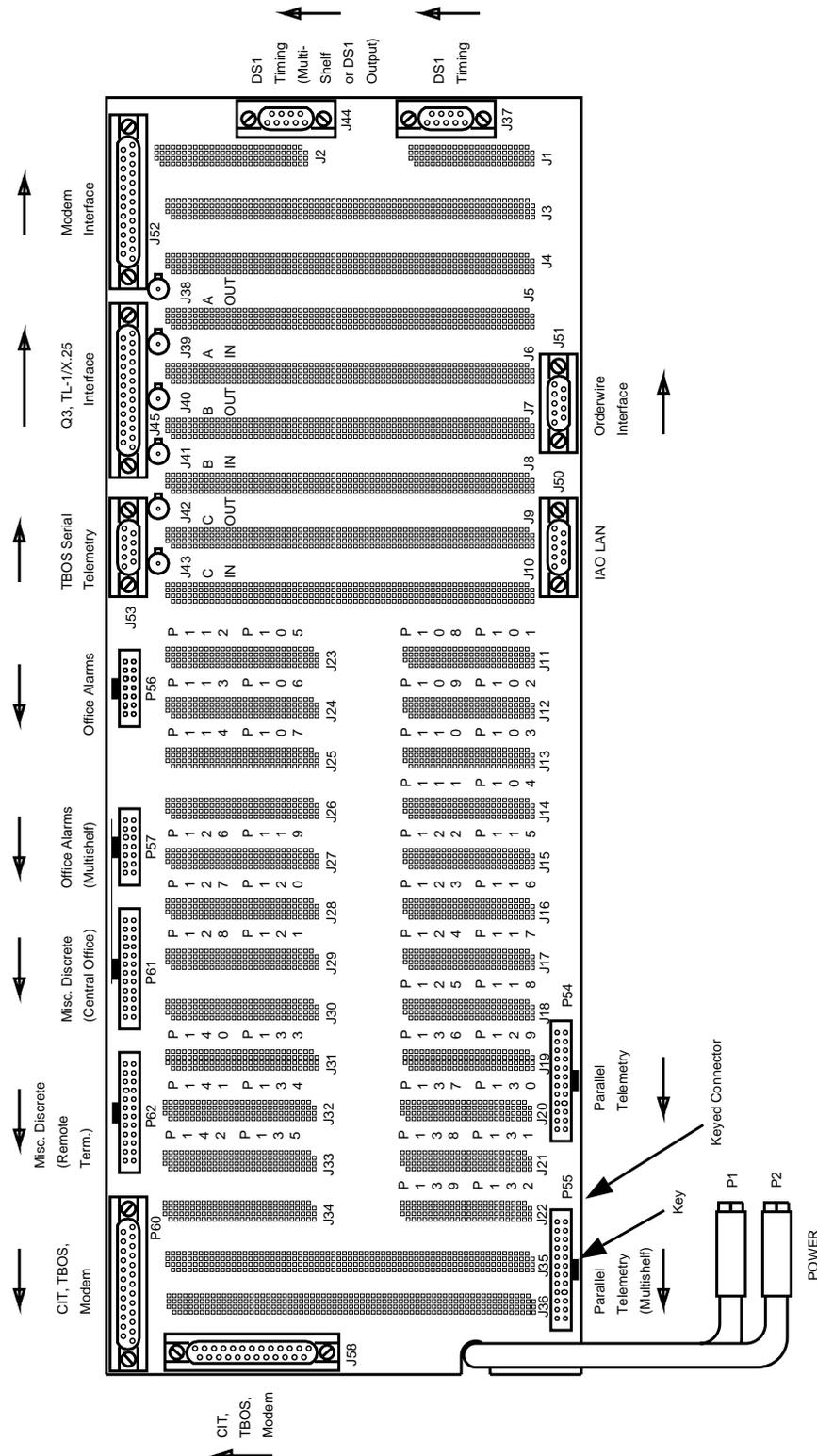
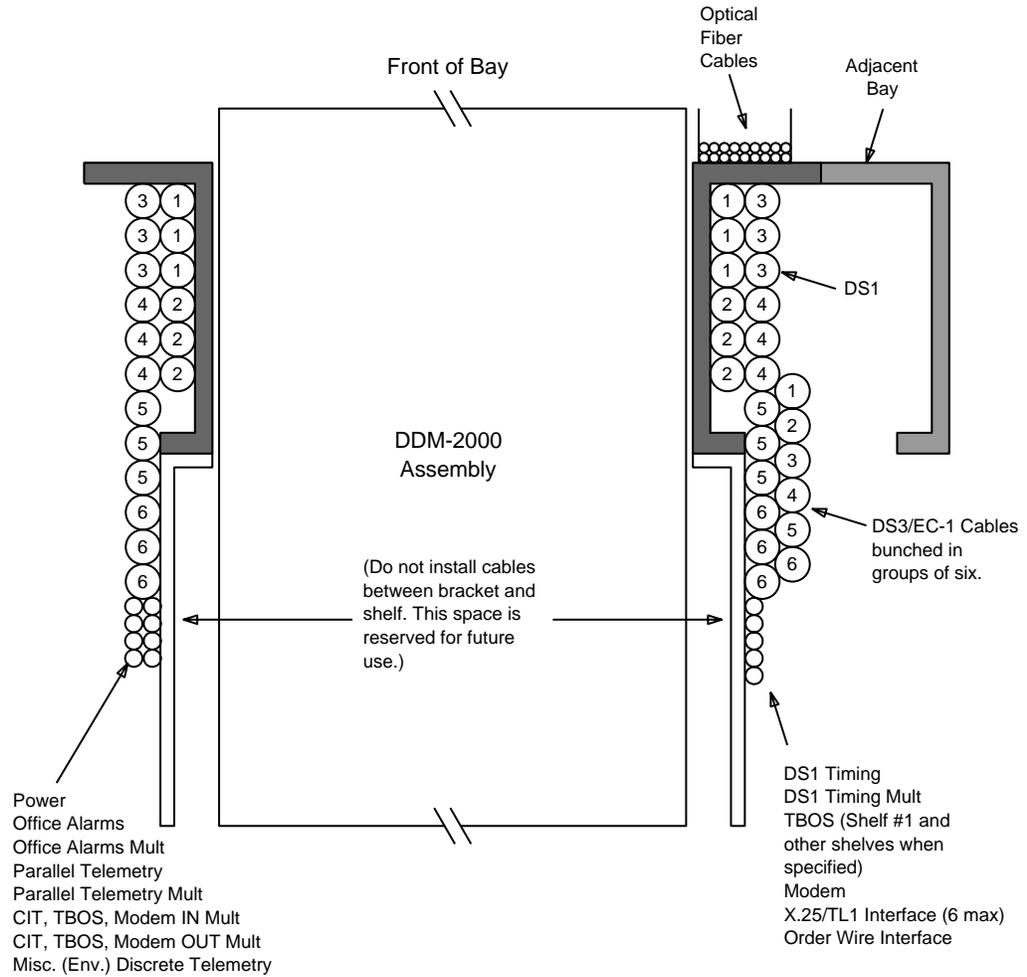
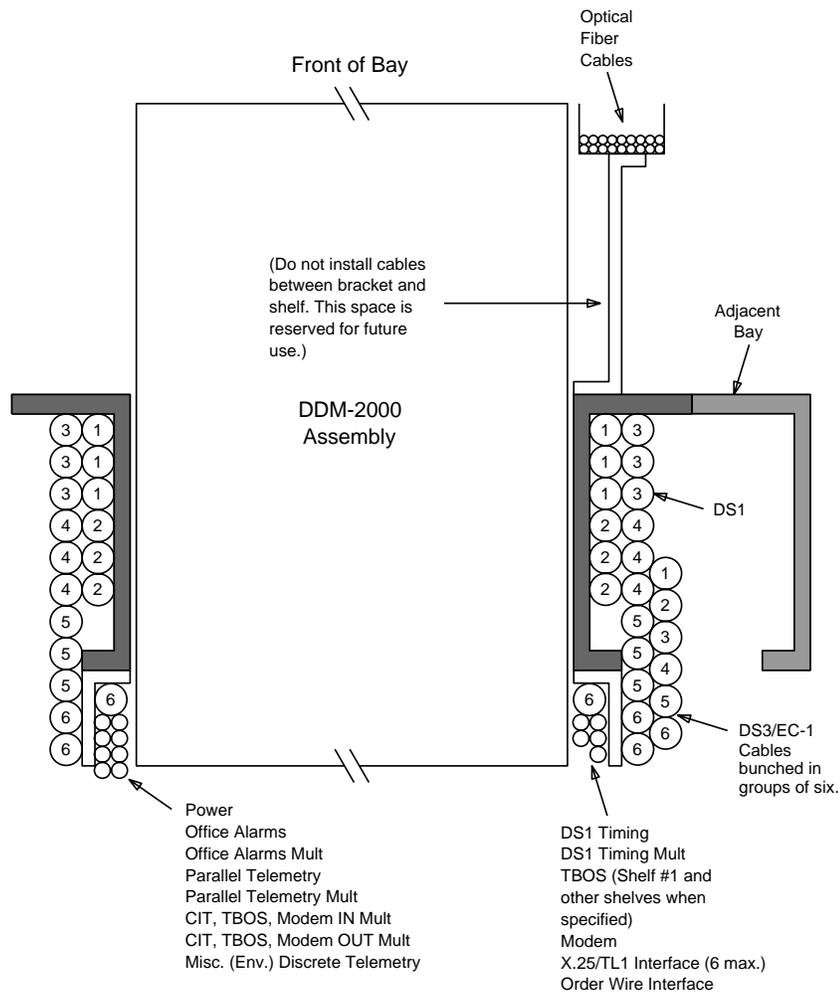


Figure 2-1. DDM-2000 OC-3 Backplane

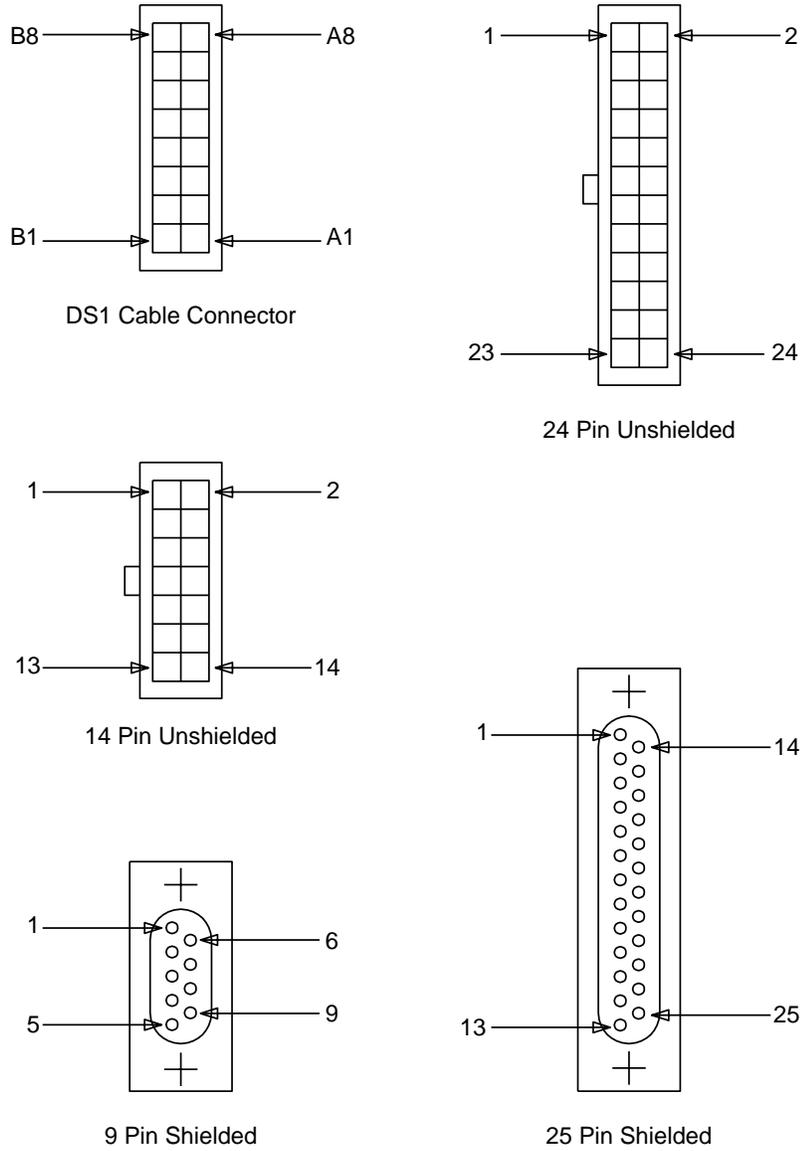


**Note:** The cabling stacking order is shown above. The numbers on the cables indicate the shelf associated with that cable.

**Figure 2-2. ED-8C500 Frame, Rear Access Cable Placement**



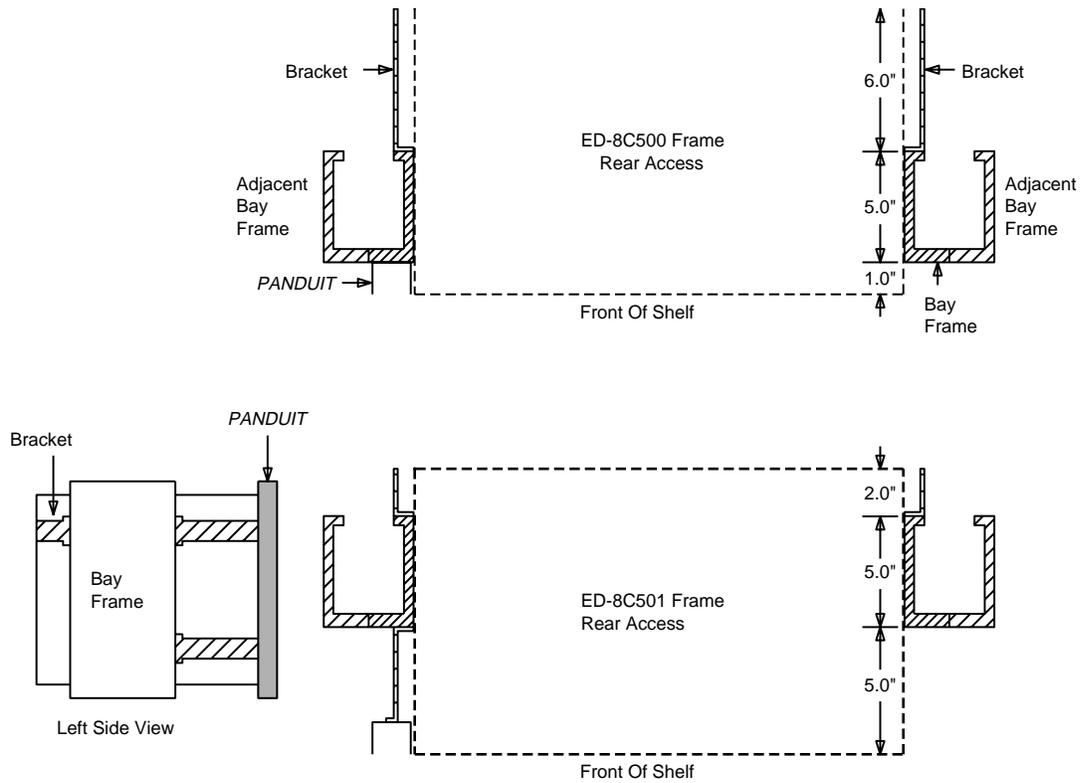
**Figure 2-3. ED-8C501 Frame, Rear Access Cable Placement**



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

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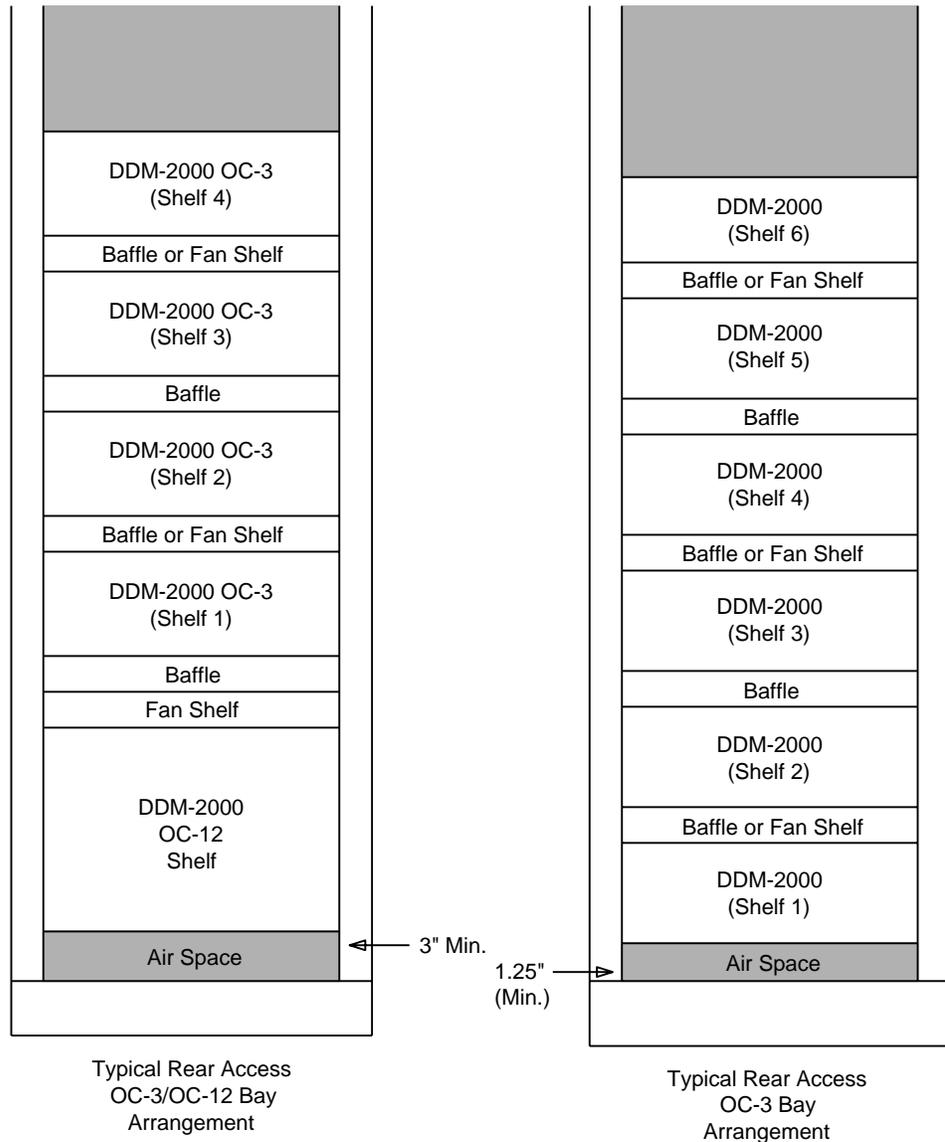
**Figure 2-4. Connector Pinouts**



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

**Figure 2-5. DDM-2000 OC-3 Shelf Mounting (Top View)**

\* Registered Trademark of Panduit Corporation.



**Note:** Refer to ED-8C724-10 for specific equipment locations within a bay.

**Figure 2-6. DDM-2000 Bay Mounting Arrangement**

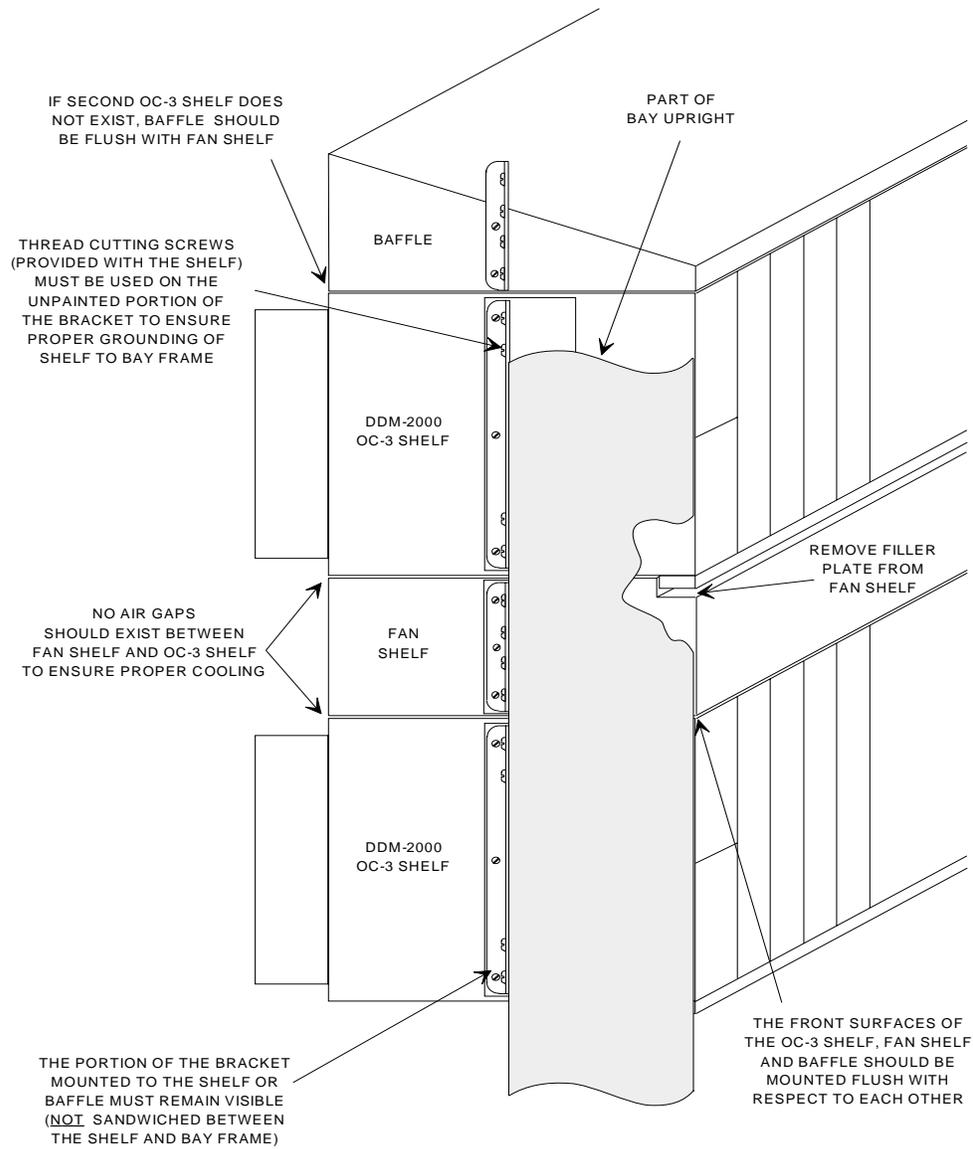


Figure 2-7. Side Mounting Bracket Positions (Sheet 1 of 2)

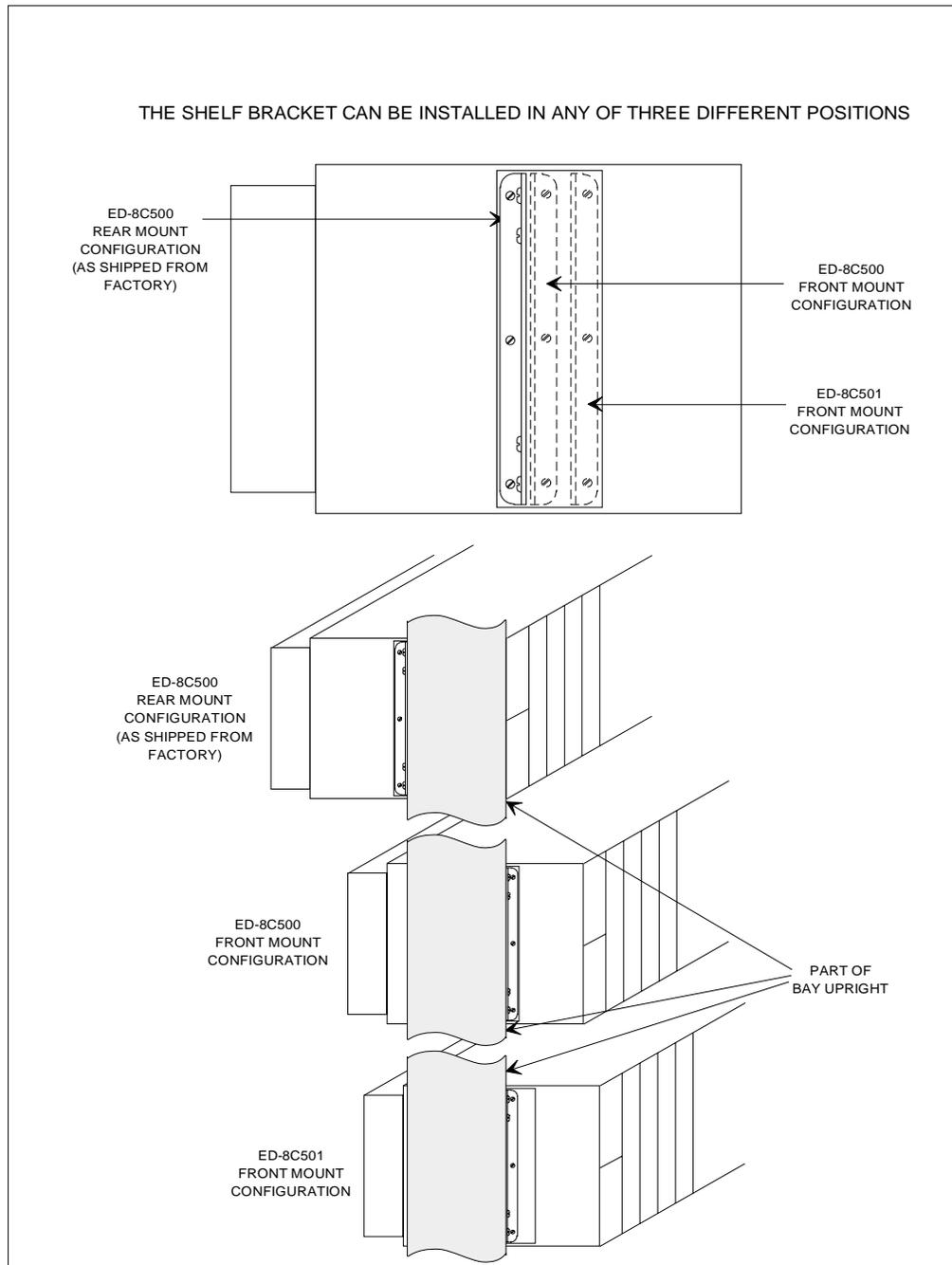
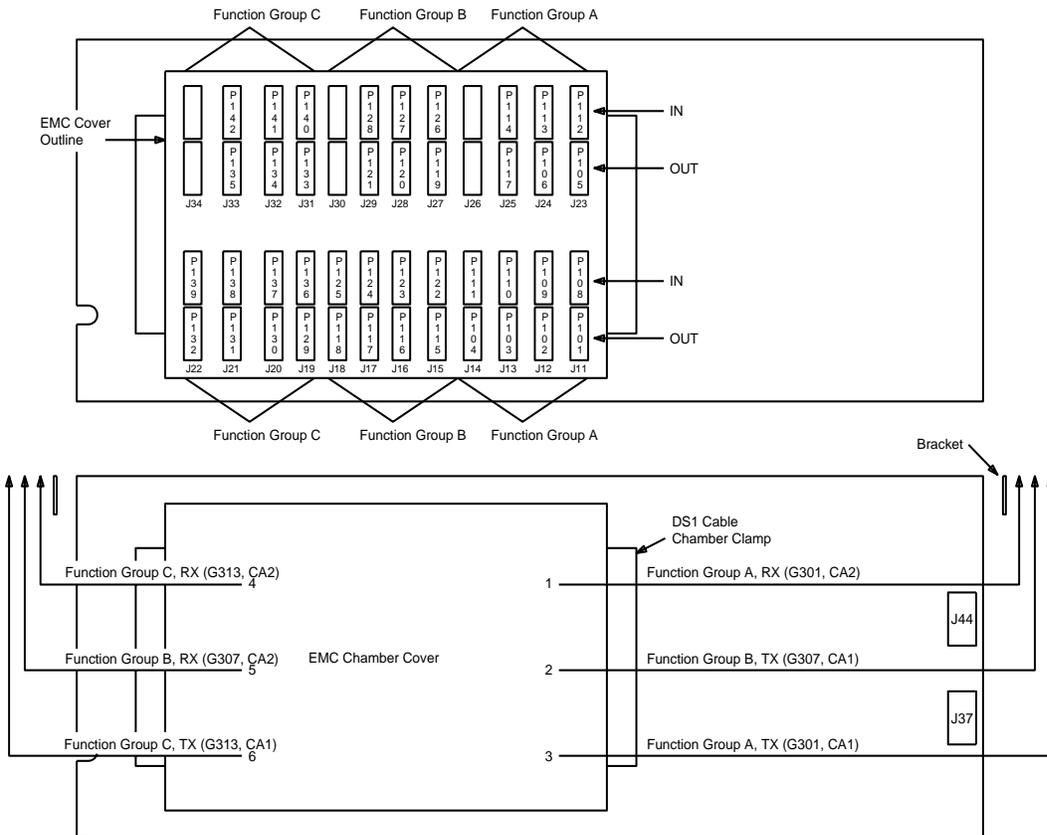


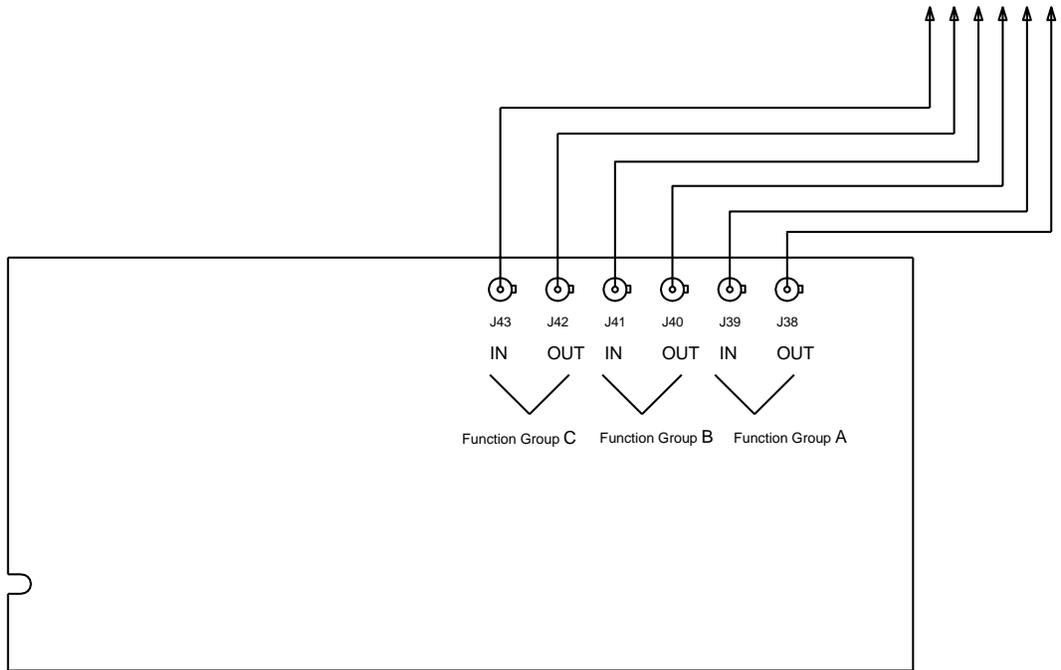
Figure 2 -7. Side Mounting Bracket Positions (Sheet 2 of 2)



**Notes:**

1. Refer to Table 2-1 for specific DS1 cable assemblies.
2. Separate DS1 cables are required for each shelf.

**Figure 2-8. Rear Access DS1 Cabling**

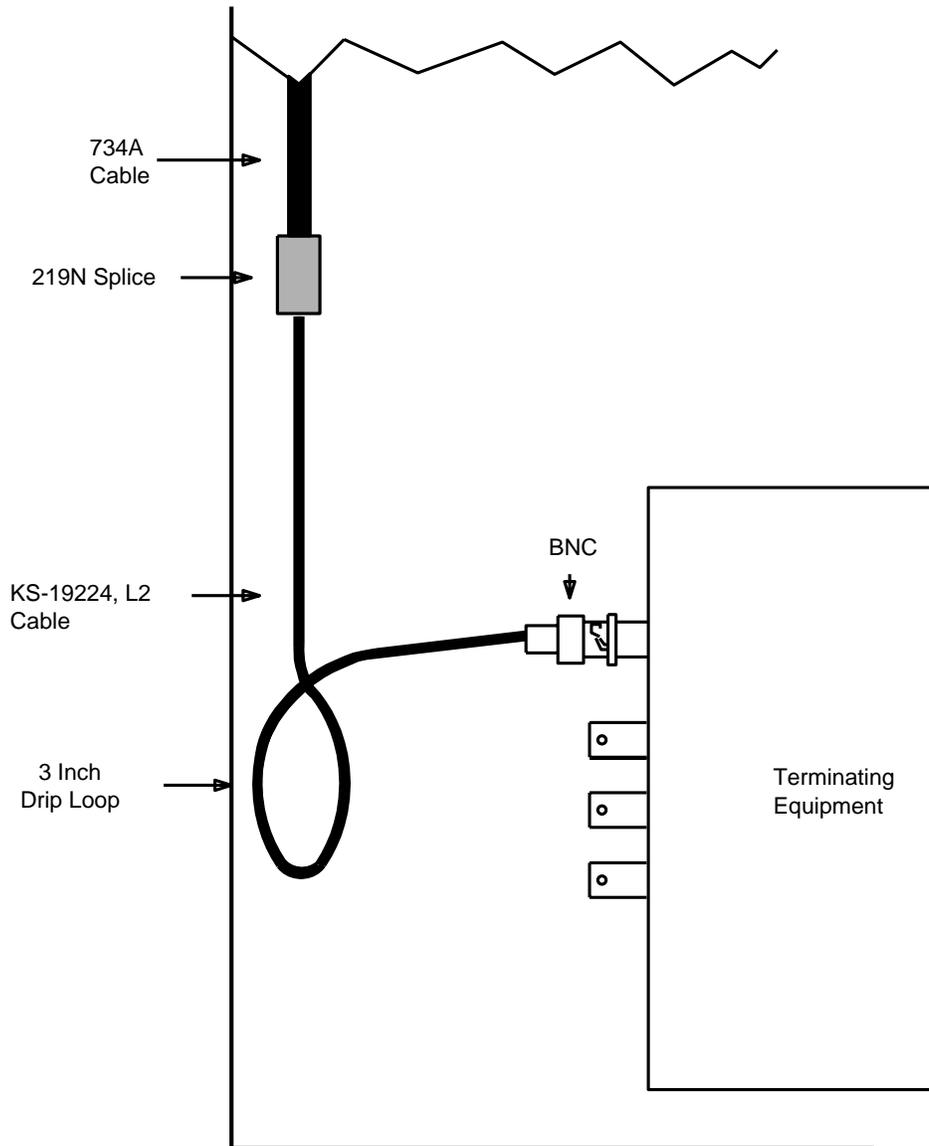


*Notes:*

1. Refer to Table 2-2 for specific DS3/EC-1 cable assemblies.
2. Separate DS3/EC-1 cables are required for each shelf.

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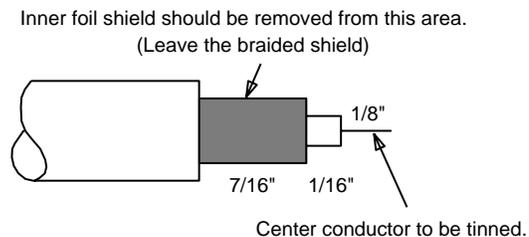
**Figure 2-9. Rear Access DS3/EC-1 Cabling**



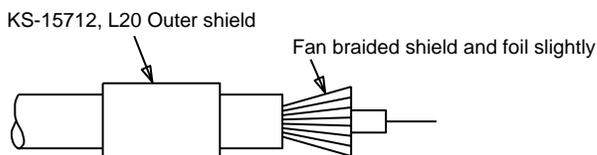
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**Figure 2-10. DS3/EC-1 Cable (KS-19224, L2) Termination**

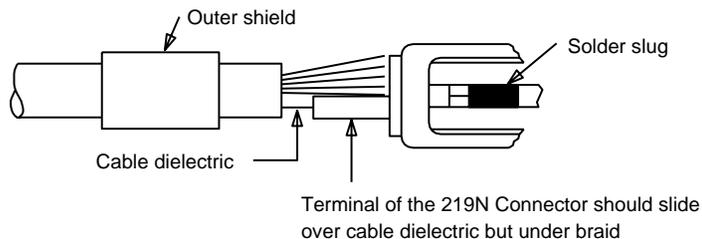
STEP 1: Prepare the 734A Cable as shown in the following figure:



STEP 2: Slide the KS-15712, L20 over the 734A Cable as shown in the following figure:



STEP 3: Slide outer shield over braid and terminal of 219 Connector as shown in the following figure:

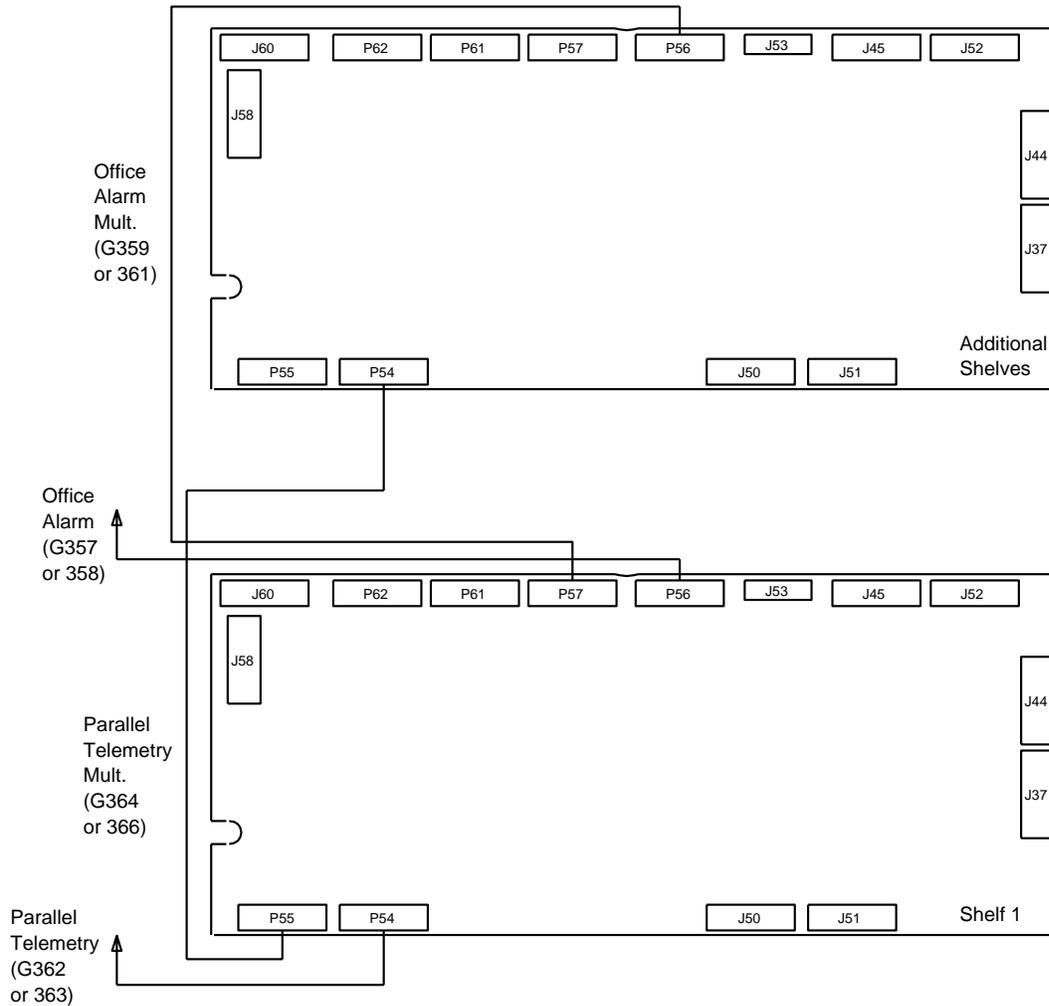


- STEP 4: Make sure center conductor is visible in barrel of 219 Connector. Crimp KS-15712, L20 outer shield using *Thomas & Betts\** WT-414 crimp tool or equivalent.
- STEP 5: Soldering of the 219N Connector must be done after the 219N Connector has been assembled and crimped.
- STEP 6: Apply soldering iron on bottom of barrel (opposite side of solder slug) of the 219N Connector. Do not add any additional solder, the solder slug is all that is required.
- STEP 7: Slide outer shell over 219N Connector and secure with screw.
- STEP 8: Cover the 219N Connector several times with tape.

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**Figure 2-11. Cable Preparation for 219N Connector**

\* Registered Trademark of Thomas & Betts Corporation



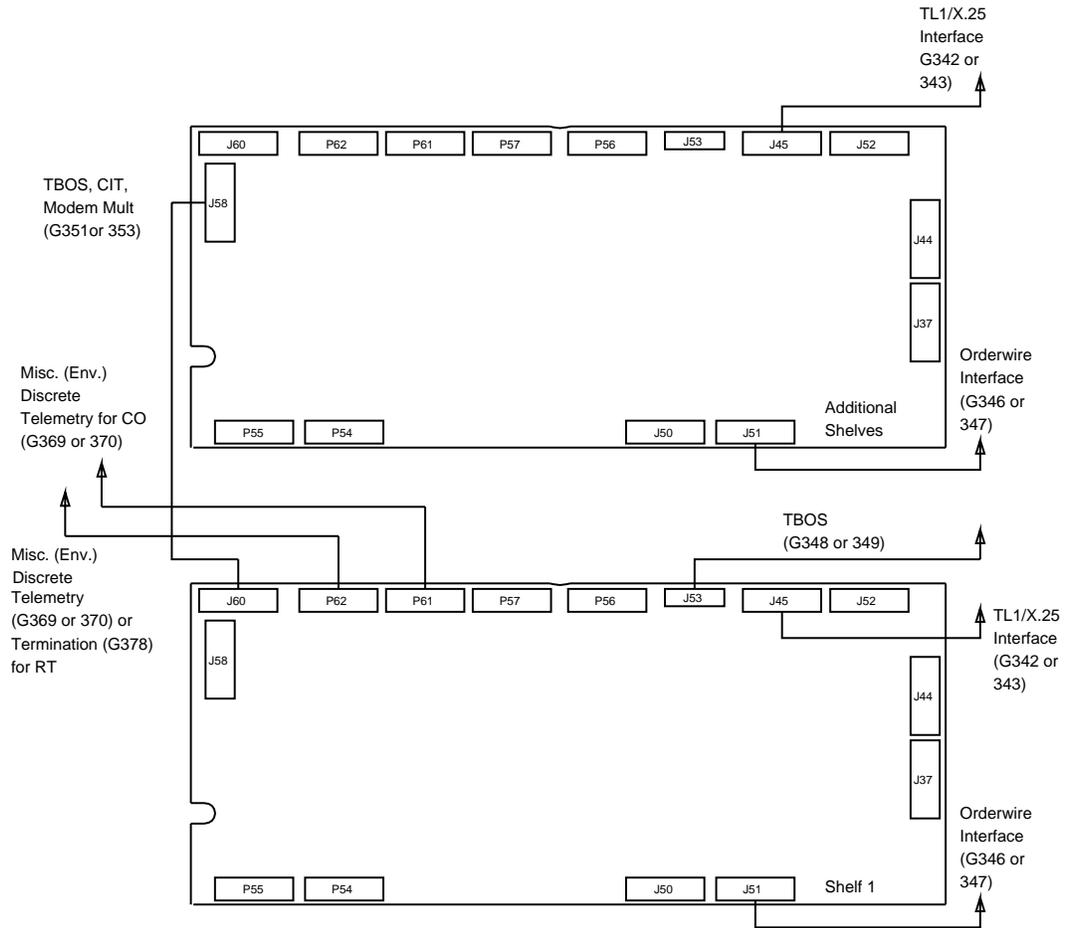
**Note:** Refer to Tables 2-3 and 2-4 for specific cable assemblies.

**Figure 2-12. Office Alarm and Parallel Telemetry Cabling**



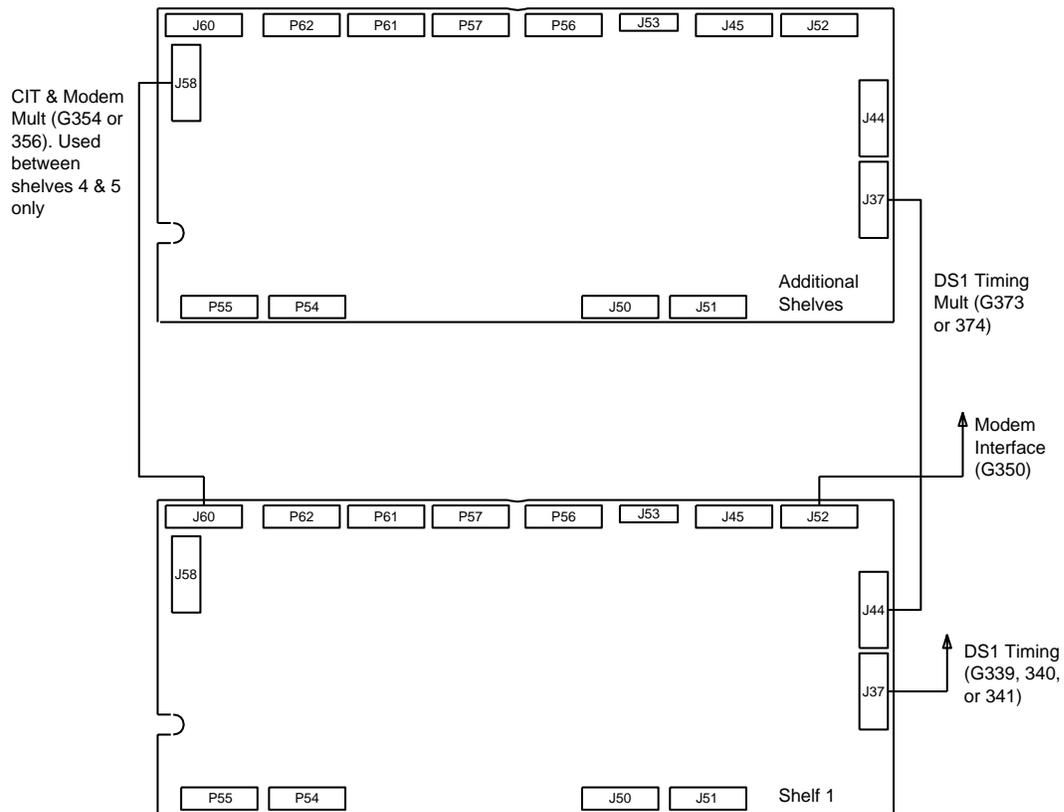
**NOTE:**

Parallel telemetry is not available in Release 13 software.



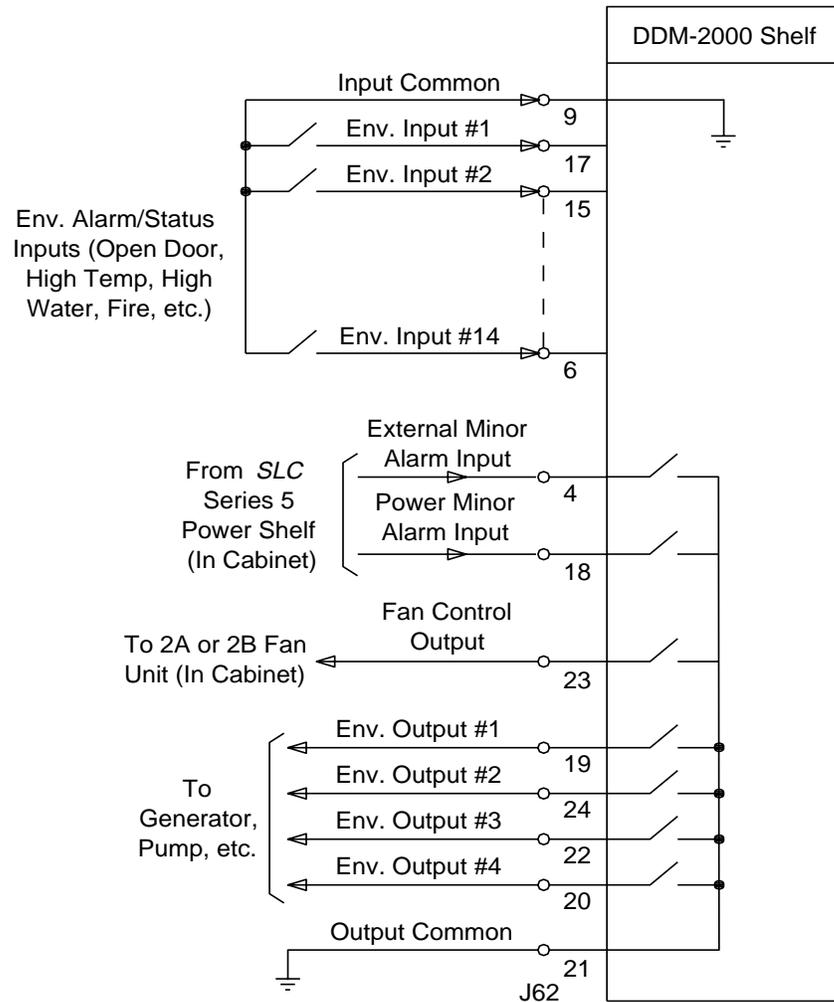
Note: Refer to Table 2-3 for specific cable assemblies.

**Figure 2-13. TBOS, Order wire, TL1/X.25 Interface, and Miscellaneous (Environmental) Discrete Telemetry Cabling**



**Note:** Refer to Table 2-3 for specific cable assemblies.

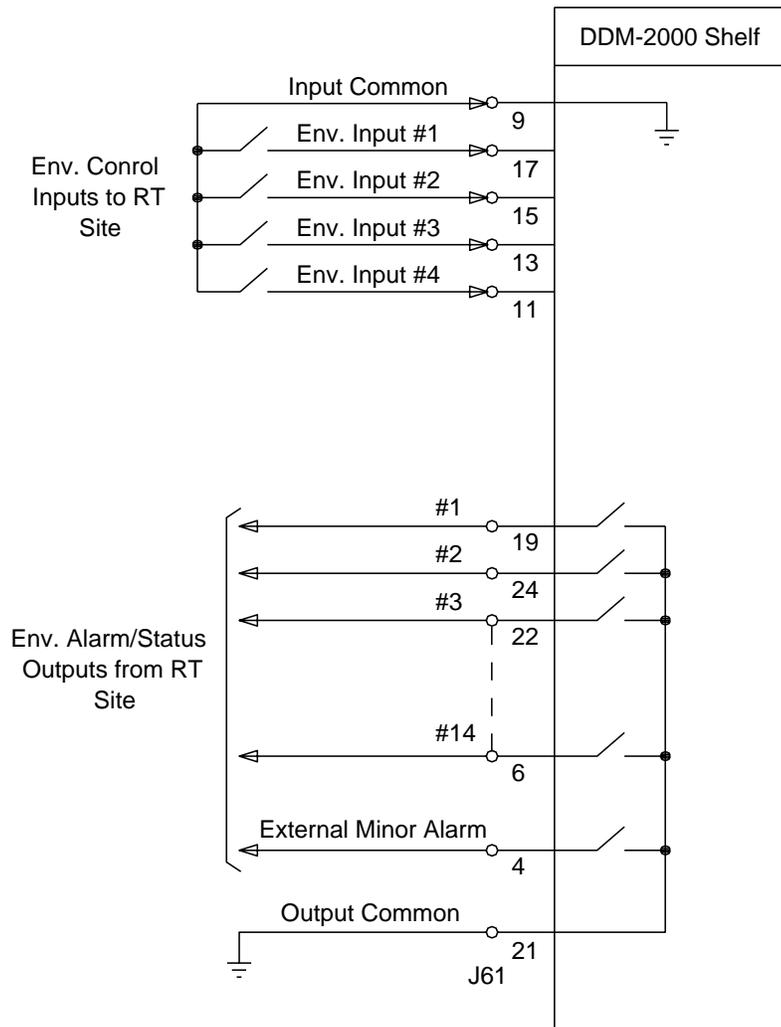
**Figure 2-14. DS1 Timing and Modem Cabling**



**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 DDM-2000 OC-3 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.

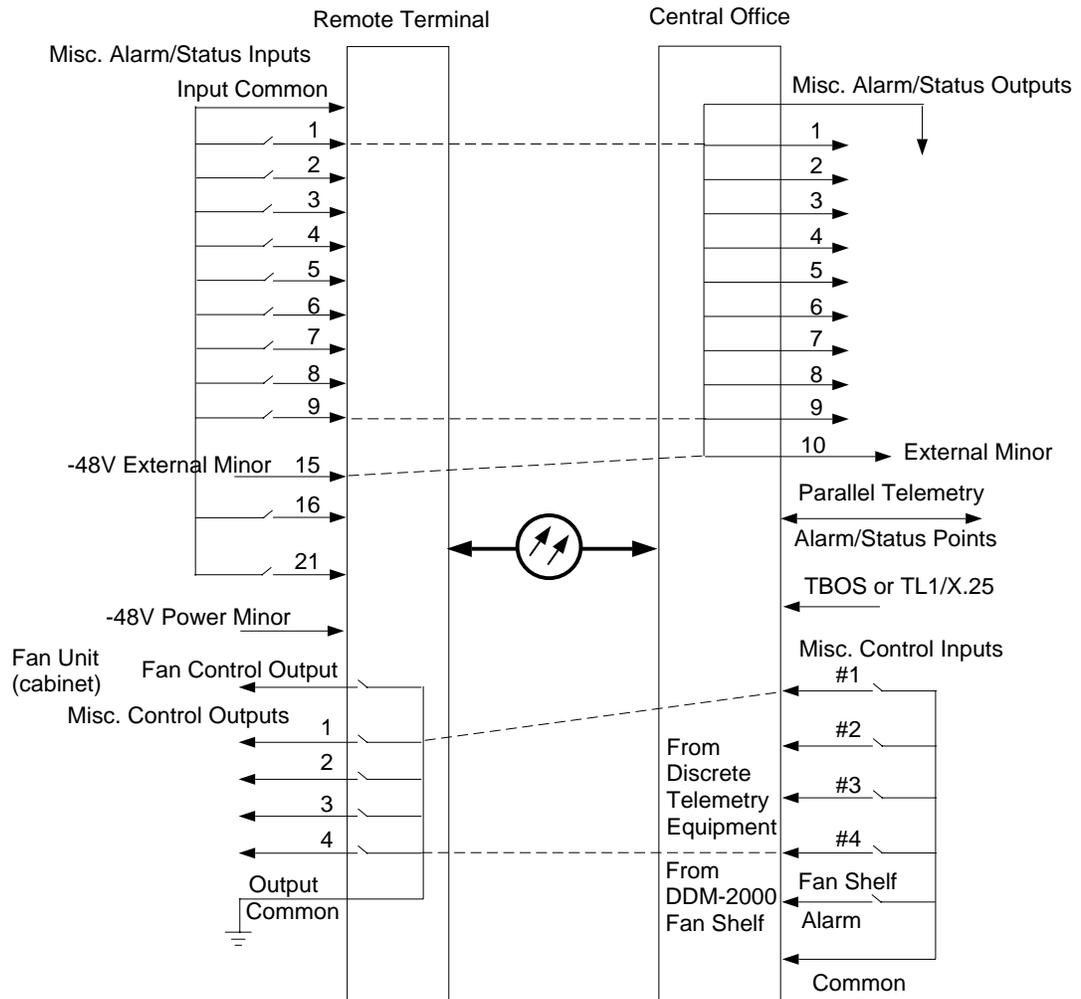
**Figure 2-15. Remote Terminal Miscellaneous (Environmental) Discrete Functions (Releases 6 and 7).**



**Notes:**

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-14.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J62) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBS environment (noncabinet where air inlet temperature exceeds 50 degrees Celsius) applications where the fan shelf is required.

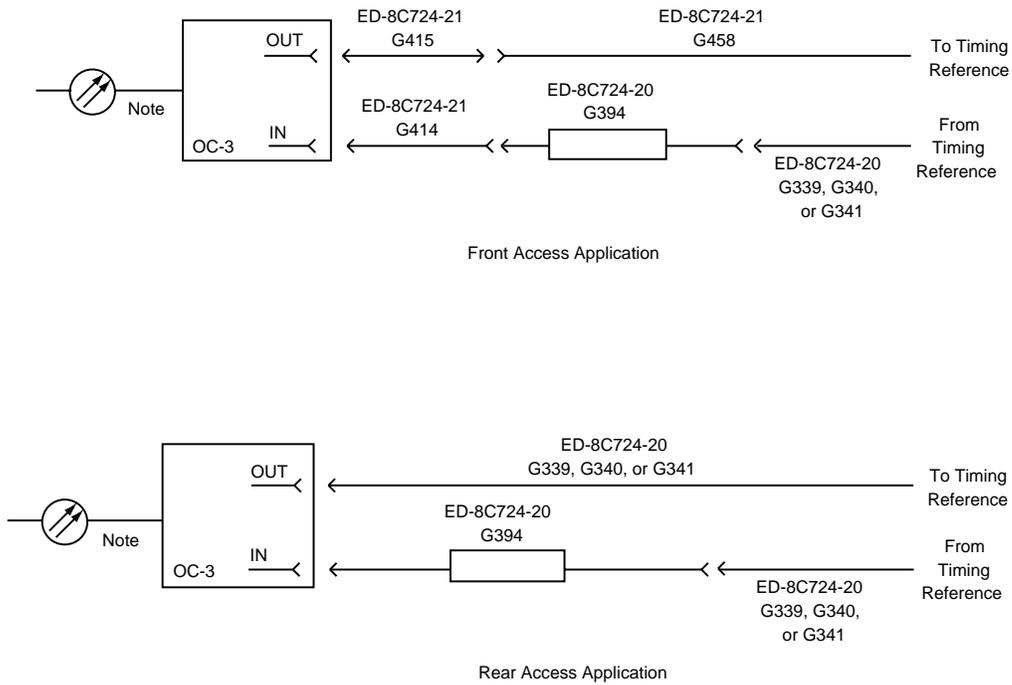
**Figure 2-16. Central Office Terminal Miscellaneous (Environmental) Discrete Functions (Releases 6 and 7).**



**Notes:**

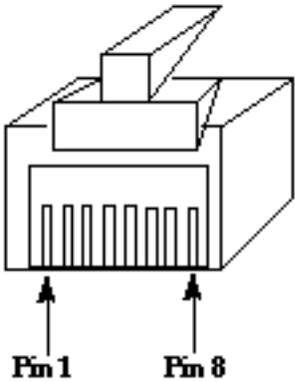
1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-10.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J62) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBS environment (noncabinet where air inlet temperature exceeds 50 degrees Celsius) applications where the fan shelf is required.

**Figure 2-17. Miscellaneous (Environmental) Discrete Functions (Releases 8, 9, 11 and 13).**

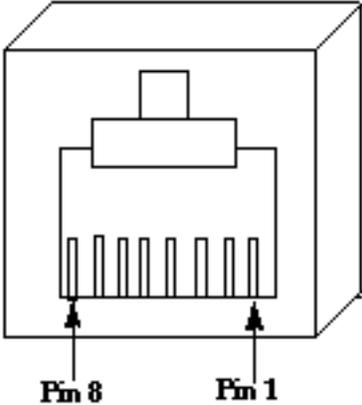


**Note:** Fiber carrying DS1 timing signal traceable to the primary reference source (PRS).

**Figure 2-18. Sync Output Timing Connections**



**RJ-45 Jack Plug**



**RJ-45 Jack Face**

---

Figure 2-19. RJ-45 Plug and Face



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## Equipment and Front Access Cable Installation

# 3

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# Equipment and Front Access Cable Installation

# 3

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## Overview

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This section provides the information for front access installation and covers the installation information for the shelf, heat baffles, fans, front 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

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Procedures in this section should be performed on all front access shelf installations. For rear access installations, refer to the "Equipment and Rear Access Cable Installation" section of this manual. 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 important to carefully follow the procedures in this section to ensure that the bay will accommodate all of the cables and that the backplane cover will fit properly.

**NOTE:**

It is recommended that ONLY designated Lucent Technologies cables be used.

- ⇒ **NOTE:**  
This section is best performed if each procedure like "DS1 Cable Installation - Rear Access" 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 power and the optical fibers, are connected to the DDM-2000 OC-3 backplane. For Releases 11 and 13, certain DS3 cables associated with BBG19 circuit packs and jumpers between 24G-U OLIUs are connected in the front. The DS3 cables for Releases 11 and 13 are discussed in Section 2, **Equipment and Rear Access Cable Installation**, and the jumper between the 24G-U OLIUs is discussed in Section 4, **Powering, Verification, and Circuit Pack Installation**.
- ⇒ **NOTE:**  
The locations of all backplane plugs and jacks are shown in Figure 3-1.
- ⇒ **NOTE:**  
The cabling for the maximum capacity of six DDM-2000 OC-3 front-access shelves in a bay is shown in Figure 3-2.
- ⇒ **NOTE:**  
Cables are to be installed from the bottom shelf in the bay toward the top. The cable installation procedure provided in this section should be followed for maximum utilization of the bay cable ducts.
- ⇒ **NOTE:**  
Cable assembly options are listed in Tables 3-1 through 3-4. Connector pinouts are provided in Figure 3-3.
- ⇒ **NOTE:**  
Cable brackets should be installed as required.
- ⇒ **NOTE:**  
It is a requirement that the DDM-2000 OC-3 be equipped with both the DS1 cable chamber cover and protective backplane cover at the completion of the installation.

## Tools, Test Sets, and Accessories

---

The following tools are required:

Quantity	Description
1	<i>Thomas &amp; Betts</i> <sup>†</sup> WT-414 Crimping Tool <sup>†</sup>
2	<i>Paladin</i> <sup>‡</sup> Coaxial Wire Stripper PA1208 <sup>†</sup> Replacement Paladin Cassette PA2201 <sup>†</sup>
1	Soldering Iron
1	Wrist Strap <sup>**</sup>
1	Wire-Wrap Gun <sup>††</sup>
1	Ohmmeter <sup>‡‡</sup> Screwdriver(s) <sup>***</sup>

\*. Registered trademark of Thomas & Betts Corporation.

†. The crimping tool, wire stripper, and soldering iron are only required if installing the Group 327 or 332 cable. The replacement cassette is for the wire stripper tool.

‡. Registered trademark of Paladin Corporation.

\*\* . A wrist strap must be worn when touching the DDM-2000 OC-3 backplane and when connecting cables. Use an available electrostatic discharge jack. 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.

‡‡. An ohmmeter is required to verify that the DDM-2000 OC-3 is properly grounded.

\*\*\*. A screwdriver(s) with the appropriate head(s) is(are) required for mounting the shelf, heat baffles, fan, and cable brackets; for removing the front cover, rear cover, and DS1 chamber cover; and for connecting some cables to the backplane.

## Planning

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The DDM-2000 OC-3 may be mounted as follows:

### NOTE:

The mounting brackets on the DDM-2000 OC-3, Heat Baffle, and Fan Shelf 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 frame for front access is the ED-8C500. Refer to Figure 3-4 and Figure 3-5 for DDM-2000 OC-3 shelf placement in a network bay frame.
- b. Mounted in seismic network bayframe. The ED-8C800-500 and ED-8C801-501 seismic network bay frames are designed for use in all earthquake zones, and in general, do not require top support at the 7-foot level. These frames meet Pacific Bell Equipment Framework Standard PBS-000-102PT. 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, OC-3 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-8C724-30, G4	DDM-2000 OC-3 Shelf	9.0 inches
ED-8C733-30, G1	Heat Baffle	4.0 inches
ED-8C733-30, G7	DDM-2000 OC-3 Fan Shelf	4.0 inches

If the DDM-2000 OC-3 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 OC-3.

A heat baffle or fan shelf is required between each pair of DDM-2000 OC-3 shelves. Cable access space must be provided between every other shelf. Refer to the bay layout shown in Figure 3-5.

A heat baffle is required below the DDM-2000 OC-3 if heat-generating equipment is located below the DDM-2000 OC-3.

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

A DDM-2000 OC-3 fan shelf is required *only* if the DDM-2000 shelf is installed in *non-NEBS environments* (air inlet temperature exceeding 50 degrees Celsius see Bellcore TR-64 Iss. 4). The DDM-2000 fan shelf, ED-8C733-30, G7, provides forced air cooling for DDM-2000 shelves that are *bay* mounted in a *non-NEBS environment*.

Front access cables of odd-numbered shelves should be to the front below the shelf, and even-numbered shelves should be to the front above the heat baffle and above the shelf. Refer to Figure 3-5.

## Inspection

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### Description

---

Perform the following procedure before the DDM-2000 OC-3 Multiplexer installation or cable installation.

### Procedure

---

1. Verify that the frame or structure into which the DDM-2000 OC-3 will be installed is properly grounded.



#### NOTE:

Each DDM-2000 OC-3 shelf, heat baffle, and fan shelf (when provided) comes with an installation kit, a pouch attached to the shelf, baffle, or fan shelf, containing the hardware required for mounting and grounding. The installation kit for the baffle and fan shelf has the following contents:

Quantity	Description
4	0.216-24 x 5/16" Thread Cutting Screws (C803535012)

The installation kit for the DDM-2000 OC-3 shelf has the following:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
2	Fuses and Fuse Caps
2	26 Gauge Cable Clamps
1	ED-8C724-20 G378 Termination

The installation kit for the fan shelf has the following:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
6	Cable Ties
1	Taptite Screw
1	Grounding Cable

2. Remove the front, rear, and DS1 cable chamber covers from the DDM-2000 OC-3 shelf.



**NOTE:**

The covers must be installed later to assure compliance with electromagnetic induction requirements. Also to ensure proper cooling when used with a fan shelf.

3. Inspect the DDM-2000 OC-3 shelf for visible damage including bent or touching backplane pins.
4. Determine the type of bay frame the DDM-2000 OC-3 shelf will mount in. Position the DDM-2000 OC-3 shelf side mounting brackets (if necessary), accordingly. Refer to Figure 3-6.



**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 OC-3 heat baffle and/or fan shelf (if provided), accordingly. Refer to Figure 3-6.

## **Equipment Installation - Front Access**

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### **Description**

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This procedure describes how to install equipment that will **ONLY** be accessible from the front. This procedure requires attaching the backplane cables to the shelf prior to mounting the shelf in the bay.



**NOTE:**

Shelves, heat baffles, and/or fan shelves should be spaced as shown in Figure 3-5 and Figure 3-6.



**NOTE:**

For backplane connections refer to Figure 3-1.



**NOTE:**

Cables should be placed in the bay frame as shown in Figure 3-2.

## **Preshelf Installation Procedure**

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1. Obtain the DS1 cables per Table 3-1 and note which function group each cable is to be used with.
2. Remove the DS1 cable chamber clamps from the DS1 chamber.
3. Connect the function group B cables at the DDM-2000 OC-3 end carefully matching the correct connector with the appropriate backplane plugs as shown in Figure 3-7.

**⇒ NOTE:**  
Retainers must be in place on the DS1 backplane pins.

**⇒ NOTE:**  
The DS1 backplane plug identifications are stenciled to the right of the plugs.

**⇒ NOTE:**  
The cables must be attached so that the wired side of the connector attaches to the left column of pins in the retainer area. Each retainer accommodates two DS1 cable connectors.

4. Dress the DS1 cables to ensure that the cables will fit properly in the DS1 cable chamber.
5. Repeat Steps 1 through 4 for the function group A cables.
6. Repeat Steps 1 through 4 for the function group C cables.
7. Peel back the blue mylar on the DS1 cables to expose the silver foil.
8. Place the DS1 cables in the cable chamber clamps as shown in Figure 3-7.

**⇒ NOTE:**  
Each DS1 cable chamber slot accommodates two front access DS1 cables.

**⇒ NOTE:**  
The shelf is equipped with cable clamps for 22 gauge cables that should be replaced with the 26 gauge cable clamps included in the pouch of parts provided with the shelf.

**⇒ NOTE:**  
The DS1 cables **MUST** be placed in the cable clamp so the silver foil makes a good electrical connection.

9. Attach the DS1 cable clamps and the cable chamber cover.

10. Refer to Table 3-2 and attach the following front access shelf cables, as required, to the backplane:

- DS3/EC-1
- DS1 timing
- X.25/TL1 interface
- Order wire
- Modem
- Telemetry byte-oriented serial (TBOS)

 **NOTE:**  
TBOS is not available in Release 13 software.

- Parallel telemetry

 **NOTE:**  
Parallel telemetry is not available in Release 13 software.

- Office alarms
- Miscellaneous (environmental) discrete
- Power.

11. Refer to Table 3-3 and attach the following front access mult cables to the backplane:

- DS1 timing mult
- TBOS mult

 **NOTE:**  
TBOS is not available in Release 13 software.

- Parallel telemetry mult

 **NOTE:**  
Parallel telemetry is not available in Release 13 software.

- Office alarms mult.

 **NOTE:**  
A TBOS mult cable (G425) is not attached to J58 if the shelf is the bottom shelf in the bay.

 **NOTE:**  
The TBOS mult cable (G425) is the only mult cable to be attached to the top shelf in a bay if, in the future, additional shelves are NOT going to be installed above.

12. Route the cables above or below the shelf depending on the location of the shelf in the bay frame. Refer to Figure 3-5.
13. Place a string around the DDM-2000 OC-3 cable assemblies, and tie the string to the shelf in such a way that the cable assemblies extend beyond the front of the shelf.
14. Verify that the cables have been connected without bending or touching any backplane pins.
15. Attach the rear cover to the shelf.

### **DDM-2000 OC-3 Shelf Installation Procedure**

**⇒ NOTE:**

The cable assemblies should not come off the backplane connectors during the shelf installation.

1. Mount the DDM-2000 OC-3 shelf and heat baffles in the bay frame (Figure 3-5 and Figure 3-6) and leave room for cables. 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. Install the fan shelves (if required). Refer to "Fan Shelf Installation".
3. Using the ohmmeter (optional), verify that the DDM-2000 OC-3 is grounded to the bay frame.
4. Install the required shelf brackets as shown in Figure 3-4.

**⇒ NOTE:**

There are two brackets required per shelf to hold the *PANDUIT*<sup>\*</sup> cable channel in place.

5. Install the required *PANDUIT* cable channel for the optical fiber cables as shown in Figure 3-4.

### **Fan Shelf Installation Procedure**

**⇒ NOTE:**

The DDM-2000 OC-3 fan shelf, when required, mounts directly above a single DDM-2000 OC-3 shelf that requires cooling or between two shelves that require cooling per Figure 3-5.

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\*. Registered trademark of Panduit Corporation.

**⇒ NOTE:**

When installing the fan shelf between two DDM-2000 OC-3 shelves, the filler bar attached at the top of the fan shelf front cover must be removed to provide clearance for the fiber tray on the DDM-2000 OC-3 shelf located above the fan shelf. The filler bar is secured by two screws located on the inside of the fan shelf's front cover (the front cover should be removed by turning the two locking screws).

1. Verify that the set point of the fan shelf is provisioned for 400 fpm (feet per minute) (positions 1, 3 and 4 of the 4-position switch should be ON and position should be OFF).

**⇒ NOTE:**

If the bay includes a DDM-2000 OC-12 shelf (Figure 3-5), the fan shelf set point for the fan shelf located above the DDM-2000 OC-12 shelf must be set for 400 fpm (switch positions 1,3 and 4 to ON and position 2 to OFF).

2. Connect and route power, alarm, and grounding cabling associated with the fan shelf for front access configuration as follows:
  - a. Unscrew the fan shelf front faceplate by removing its five mounting screws.
  - b. Remove the four fan packs starting with the middle two first.
  - c. Remove the 2-inch diameter cap plugged into the dumbbell-shaped cutouts at the rear and right side of the shelf. Route the unconnected ends of a G377 fan shelf power cable and the grounding cable, provided with the fan shelf, into the shelf through the cutouts on the right side of the shelf and out of the shelf through the rear cutout.
  - d. Connect the grounding cable to the ground stud located on the left side of the rear of the shelf.
  - e. Cut the cable ties, which secure the alarm cable running through the rear of the shelf, and redress the cable through the cutout on the right side of the shelf. Secure it with the cable ties provided with the shelf.
  - f. Prepare the ends of the wires on the cable assembly and insert them into the terminal strip on the rear of the fan shelf as follows:

<b>Terminal Designation</b>	<b>Wire Color</b>
-48 V	Red
RTN	Black
-48 V	Green
RTN	White

 **NOTE:**

Locations of -48V and RTN on the fan shelf have been changed. Fan unit kits, ED-8C733-30 G7, have power arrangements of -48, RTN, -48, RTN. Older kits, ED-8C733-30 G2 have power arrangements of -48, RTN, RTN - 48. The connections for both are as above.

- g. Reassemble the fan shelf.
3. Reposition the fan shelf mounting brackets, if necessary, and mount the fan shelf in the bay directly above the DDM-2000 OC-3 shelf.
4. Install the filter (provided with the fan shelf) which is equipped with magnetic strips around the edges, up against the bottom of the DDM-2000 OC-3 shelf located below the fan shelf.
5. Connect the G377 fan shelf power cable (installed previously) to a single (G371) or a bay (G372) power cable.
6. Connect the end of the grounding cable to the bay frame, using the tap-tite screw provided with the fan shelf.

## **DS1 Cable Installation - Front Access**

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### **Description**

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This procedure describes how to connect the DS1 transmission cables to the front access DS1 cables, 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 EMI requirements.*

 **NOTE:**

DS1 cable length of 655 feet for 22 gauge cable (613C type) or 440 feet for 26 gauge cable (1249C type) should not be exceeded.

 **NOTE:**

The cables are connectorized at the DDM-2000 OC-3 end and must be wire-wrapped at the DSX end.

## Procedure

---

1. Install the interbay DS1 cables (Table 3-1) and connect them to the front access DS1 cables.
2. Route the DS1 cables out of the bay, stacking cables as shown in Figure 3-2.



**CAUTION:**

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

3. Remove the slack and cut the cables to the desired length at the DSX-1.
4. Tie cables to the bay cable brackets.
5. Referring to Table 3-5, carefully observe color codes and wire-wrap the cables at the DSX-1.

## DS3/EC-1 Cable Installation -Front Access

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### Description

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The DS3/EC-1 front access interbay cables are installed (if required) in the same manner as the DS3/EC-1 rear access cables, except that they connect to the front access cables instead of the backplane.

Follow the "DS3/EC-1 Cable Installation - Rear Access" in the "Equipment and Rear Access Cable Installation" section (see note). The cables should be routed out of the bay, stacking the cables as shown in Figure 3-2.



**NOTE:**

Cables to the BBG19 DS3 circuit pack will be connected to the front of the circuit pack after circuit pack installation.



**NOTE:**

Where the procedure states "connect to backplane" the connection should be made to the "front access cables" instead, which in turn is connected to the backplane.

## **Optical Fiber Cable Installation - Front Access**

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### **Description**

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The optical fiber cable installation connects the fiber optic cables to the shelf and routes the cables out of the bay to the optical cross-connect panel (*LGX*<sup>®</sup> fiber optic distributing frame). It does not cover routing the optical fiber cable between central office locations.

Follow the "Optical Fiber Cable Installation - Rear Access" in the "Equipment and Rear Access Cable Installation" section. The cables should be routed out of the bay, stacking the cables as shown in Figure 3-2.

 **NOTE:**

Fiber optic cables should not be under any other cables, such as the DS3 cables for the BBG19 circuit pack. These DS3 cables, which share the fiber cable routing to the front, should be laid before the fiber optic cables.

## **Power Cable Installation - Front Access**

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### **Description**

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For the power cable installation, follow the "Power Cable Installation - Rear Access" in the "Equipment and Rear Access Cable Installation" section (see note). The cables should be routed out of the bay, stacking the cables as shown in Figure 3-2.

 **NOTE:**

The front access interbay power cables are installed in the same manner as the rear access power cables, except that they connect to a front access cable instead of to the cable which comes out of the backplane.

## Office Alarm Cable Installation - Front Access

---

### Description

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**⇒ NOTE:**

This procedure should be performed if specified in the order.

Office alarms are the common methods used in a central office for maintenance personnel to quickly isolate a failure to the correct system.

There are two options for cabling office alarms:

- Cable directly to office alarm equipment
- Cable to another shelf.

Unless otherwise specified, the lowest shelf in the bay should be cabled directly to the office alarm equipment as described in "Interbay Alarm Connections".

Typically, the bottom shelf position is referred to as Shelf 1. If the bottom shelf position (Shelf 1) is unequipped and saved for future growth, leave enough cable to allow moving the cable down to the bottom position when the shelf is eventually added.

All the other shelves in the same bay should be part of a daisy chain connecting to the lowest shelf. For interconnecting other shelves in the bay to the lowest shelf, follow the instructions under "Intershelf Office Alarm Cabling".

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

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

In all cases, and as a matter of good practice, suppression devices such as diodes or contact protection networks must be provided across any external relay coil being driven by the DDM-2000 OC-3 in order to limit transient voltages and currents.

Cable options for interconnecting the lowest shelf in the bay to the office alarms are listed in Table 3-4. Office alarm connections are listed in Table 3-6.

### Connection to Office Alarms Procedure

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Perform this procedure for the shelf being connected directly to the office alarms.

1. Obtain an office alarm cable Group 439 or 440 (refer to Table 3-4).

2. Connect the cable to P256 of the front access cable already connected to the shelf.
3. Route the office alarm cable out of the DDM-2000 OC-3 bay to the office alarm panel, stacking the cable as shown in Figure 3-2.
4. Inspect the office alarm panel and add a contact protection network (if required).
5. Cut the office alarm cable to the desired length. If the bottom shelf position (Shelf 1) is unequipped for future growth, leave enough cable to allow moving the cable down to the bottom position when a shelf is eventually added to that position.
6. Wire wrap the loose end of the office alarm cable to the alarm panel making connections as shown in Table 3-6.
7. Dress and secure the cable in the bay.

### **Intershelf Office Alarm Cabling Procedure**

Perform this procedure to daisy-chain office alarms from the remaining shelves in the bay to the shelf connected to the office alarm system.

For office alarms in a shelf other than the bottom shelf to be reported, office alarm cable mults from each shelf to the bottom shelf must be in place. Do not skip any shelves.

1. Connect the office alarm cable (G423, P256) of each shelf to the office alarm cable (G424, J256) of each "lower" shelf.
2. Repeat procedure for each additional shelf in the bay.
3. Dress and secure all cables in the bay.

### **Parallel Telemetry Cable Installation - Front Access**



**NOTE:**

Parallel telemetry is not available in Release 13 software.

### **Description**



**NOTE:**

This procedure should be performed if specified in the order.

Parallel telemetry is a minimum set of alarm and status outputs in the form of contact closures, which can be reported to a maintenance center through a

telemetry system. Connection of parallel telemetry requires a parallel telemetry system in the office, thus parallel telemetry is only used in a central office environment.

There are two options for cabling parallel telemetry:

- Cable directly to telemetry equipment
- Cable to another shelf.

Unless otherwise specified, Shelf 1, the bottom shelf in the bay, should be cabled directly to the office parallel telemetry per the following procedure.

Additional shelves in the bay are daisy-chained up from Shelf 1. The shelf identification (SID) number for the parallel telemetry is determined by backplane wiring and the wiring assignments within the mult cable. If shelf positions in a bay are skipped, SID numbers for shelves above the empty position will not match the shelf positions in the bay.

Parallel telemetry cable options are listed in Table 3-4. Parallel telemetry connections are listed in Table 3-7.

### **Procedure for Connections to Office Alarms**

---

Perform this procedure for shelf 1, which will be directly connected to the telemetry system.

1. Obtain a parallel telemetry cable Group 437 or 438 (refer to Table 3-4).
2. Connect the cable to P254 of the front access cable, which is already connected to Shelf 1.
3. Route the parallel telemetry cable out of the DDM-2000 OC-3 bay to the telemetry system, stacking the cable as shown in Figure 3-2.
4. Cut the parallel telemetry cable to the desired length at the telemetry panel.
5. Wire-wrap the loose end of the parallel telemetry cable to the telemetry system, making connections as shown in Table 3-7.
6. Dress and secure the cable in the bay.

### **Procedure for Other Shelves**

---

Perform the following procedure for multing the other shelves to shelf 1. The cable added in this procedure is to mult parallel telemetry from other shelves in a bay to shelf 1. In this procedure, shelf 1 will be connected to shelf 2; shelf 2 will be connected to shelf 3; etc.

For parallel telemetry in a shelf other than shelf 1 to be reported, all parallel telemetry cable mults between that shelf and shelf 1 must be in place. Do not skip any shelves.

1. Connect the parallel telemetry cable (G421, P254) of each shelf to the parallel telemetry cable (G422, J254) of the shelf below it.

2. Repeat procedure for each additional shelf in the bay.
3. Dress and secure all cables in the bay.

## **TBOS Telemetry Cable Installation - Front Access**

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### **Description**

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**⇒ NOTE:**  
TBOS is not available in Release 13 software.

**⇒ NOTE:**  
TBOS telemetry cable installation should be performed if specified in the order.

TBOS is a serial telemetry interface, providing system alarm and status data to a maintenance center and remote switch (RS) capability from a maintenance center.

One connection from the telemetry equipment provides up to eight displays and can accommodate up to eight DDM-2000 OC-3 shelves (each shelf is assigned a display). A central office shelf and its associated remote terminal shelf (or shelves) will typically be assigned displays associated with this single interface connection.

Additionally, other DDM-2000 OC-3 shelves in the bay may be assigned remaining displays associated with the single interface connection. This is accomplished using intershelf mult cabling. Bays equipped with more than two DDM-2000 OC-3 shelves may require additional TBOS connections to the telemetry equipment.

Connection of TBOS telemetry requires a TBOS telemetry system in the office, and thus TBOS telemetry is only used in a central office environment.

There are two options for cabling TBOS:

- Cable directly to TBOS equipment
- Cable to another shelf.

As mentioned above, at least two TBOS cables are required to be routed from the TBOS telemetry system to the DDM-2000 OC-3 bay to accommodate the maximum of six shelves in a bay.

The cable for multing TBOS also provides the intershelf mults for the craft interface terminal (CIT) and modem. This mult cable will be installed per "Intershelf Mult Cable Installation - Front Access".

## Cable Installation Procedure

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Unless otherwise specified, shelf 1 will always cable directly to the telemetry equipment. If additional shelves are being installed in the bay, determine from installation information whether any additional shelves will be connected by cable to the telemetry equipment. Perform the following procedure for the shelves that need cabling to the telemetry equipment.

The TBOS procedure for connecting a shelf to the telemetry equipment for front access and rear access is performed in the same manner with the exception that connection is made to J253 of the front access TBOS cable previously installed, instead of J53 on the backplane. Refer to Section 2, "TBOS Telemetry Cable Installation - Rear Access" in the "Equipment and Rear Access Installation". The cables should be routed out of the bay, stacking cables as shown in Figure 3-2.

## Intershelf Mult Cable Installation - Front Access

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### Description

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 **NOTE:**  
TBOS is not available in Release 13 software.

An intershelf mult cable connects the CIT, TBOS telemetry, and modem between shelves in a bay.

 **NOTE:**  
CIT and modem connections between shelves associated with different TBOS links require a different cable than that used for multing shelves that share a TBOS link.

### Procedure

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1. For Multing Shelves Associated with Different TBOS Links:
  - a. Connect the mult without TBOS cable (G427, P258A) to the upper shelf TBOS OUT cable (G425, J258A).
  - b. Connect the mult without TBOS cable (G427, J258A) to the lower shelf TBOS IN cable (G426, P258A).
2. For Shelves with No TBOS or Sharing a TBOS Link:
  - a. Connect the "upper shelf" TBOS cable (G425, J258) to the "lower shelf" TBOS cable (G426, P258).
3. Dress and secure all cables in the bay.

## **TL1/X.25 Interface Cable Installation - Front Access**

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### **Description**

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The TL1/X.25 interface is a message-based telemetry system. It is an alternative to TBOS or parallel telemetry. The TL1/X.25 telemetry interfaces with a maintenance center to provide DDM-2000 OC-3 system status information and remote command capability.



#### **NOTE:**

Parallel telemetry is not available in Release 13 software.

### **Procedure**

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The TL1/X.25 interface telemetry requires separate cable assembly connections to each shelf in the bay.

The TL1/X.25 interface cable installation procedure for front access and rear access is performed in the same manner with the exception that connection is made to J245 of the front access TL1/X.25 cable previously installed, instead of J45 on the backplane. Refer to the "TL1/X.25 Interface Cable Installation - Rear Access" in the "Equipment and Rear Access Installation" section. The cables should be routed out of the bay, stacking cables as shown in Figure 3-2.

## **Miscellaneous (Environmental) Discrete Telemetry Cable Installation - Front Access**

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### **Description**

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Miscellaneous (environmental) discrete telemetry is the method to provide environmental closures at the remote terminal for transmission to the central office and interpretation at an operations system (OS) maintenance center.

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 (Releases 6 and 7) or 20 (Releases 8, 9, 11 and 13) miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office. An additional external discrete (#15), dedicated for external power minor alarm monitoring, is available (optional).

For external interconnection requirements using the miscellaneous discrete telemetry feature (Releases 6 and 7) at a remote terminal, refer to Figure 3-8 or Figure 3-9 for a central office. For Releases 8, 9, 11 and 13 refer to Figure 3-10.

Remote applications not using environmental telemetry or fan alarm connections require terminations.

## Procedure

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⇒ **NOTE:**  
There is no mulding of miscellaneous (environmental) discrete telemetry cables.

⇒ **NOTE:**  
This procedure should be performed for each shelf requiring miscellaneous (environmental) discrete telemetry.

⇒ **NOTE:**  
Miscellaneous (environmental) discrete telemetry cable options are listed in Table 3-4.

⇒ **NOTE:**  
Miscellaneous (environmental) discrete telemetry connections are listed in Table 3-8 for remote terminal applications and Table 3-9 for central office applications.

1. Obtain a miscellaneous (environmental) discrete telemetry cable Group 441 or 442 (refer to Table 3-4).

⇒ **NOTE:**  
The cable is connected to the front access cable on a shelf requiring miscellaneous (environmental) discrete telemetry.

For RT applications not using environmental telemetry or fan alarm connections (when Groups 441, 442 or 457 are not used) a G456 termination must be connected to J262 on the cable.

2. Connect the cable to P261 if at a CO, or P262 if at an RT.
3. For remote terminal applications requiring more than 14 user definable environmental inputs (Releases 8, 9, 11 and 13 only), connect a second Group 441 or 442 cable to P261 of the Group 463 front access cable previously installed.

⇒ **NOTE:**  
The front access cable must be Group 463 and NOT Group 428 or 429 for this application.

4. Route the cable out of the DDM-2000 OC-3 bay to a wire-wrap panel (or where connections can be made), stacking cables as shown in Figure 3-2.
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-wrapped panel, making connections as shown in Table 3-8 and 3-9 and Figure 3-8, 3-9 or 3-10.

⇒ **NOTE:**  
Each miscellaneous (environmental) discrete telemetry designation is connected to the DDM-2000 OC-3 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.

## **DS1 Timing Cable Installation - Front Access**

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### **Description**

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A DS1 timing cable is required if the shelf is to be externally timed. Mult cables are required if the timing from the shelf directly connected to the DS1 Reference clock is to be daisy-chained to the remaining shelves in the bay.

DS1 external timing is provided by the BBF2B TGS circuit pack to time a BITS clock. When the shelf is configured to provide a sync output and the BBF2B circuit packs are externally timed to a DS1 Reference, a Sync Input timing cable is required.

Connection of DS1 timing requires access to DS1 signals referenced from a Stratum 3 or better clock.

## **Procedure for Shelves Connected to a Timing Source/Timing a BITS Clock**

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The DS1 timing procedures front access and rear access are performed in the same manner with the exception that connection is made to J237 of the front access DS1 timing cable previously installed, instead of J37 on the backplane. Refer to "DS1 Timing Cable Installation - Rear Access" in the "Equipment and Rear Access Installation" section. The cables should be routed out of the bay, stacking cables as shown in Figure 3-2.

## **Procedure for Other Shelves**

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Perform this procedure when shelf 1 in the same bay is to be directly connected to the DS1 reference clock. The cable added in this procedure is to mult DS1 timing in a bay to shelf 1. In this procedure, shelf 1 will be connected to shelf 2; shelf 2 will be connected to shelf 3; etc.

For DS1 timing to be delivered to a shelf other than shelf 1, DS1 timing cable mults from that shelf to shelf 1 must be in place. Do not skip any shelves.

1. Connect the DS1 timing cable (G414, J237) of each shelf to the DS1 timing cable (G415, P237) of each "lower" shelf.
2. Repeat procedure for each additional shelf in the bay.
3. Dress and secure all cables in the bay.

## **Modem Cable Installation - Front Access**

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### **Description**

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The use of a modem will allow the DDM-2000 OC-3 to be accessed remotely.

#### **⇒ NOTE:**

Connection to the modem port does not require the use of a null modem.

The modem cable installation procedures for shelf 1 front access and rear access are performed in the same manner with the exception that connection is made to J252 of the front access Modem cable previously installed, instead of J52 on the backplane. Refer to the "Modem Cable Installation - Rear Access" in the "Equipment and Rear Access Installation" section. The cables should be routed out of the bay, stacking cables as shown in Figure 3-2.

The modem cable installation procedure for other shelves (other than shelf 1) should be performed following the instructions in the "TBOS Telemetry Cable Installation - Front Access" (if it has not already been performed).

## **Order wire Interface Cable Installation - Front Access**

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### **Description**

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The order wire interface provides access for optional connection to an external order wire system allowing point-to-point voice communication between adjacent nodes in a DDM-2000 OC-3 system. The front access order wire cable previously connected to the backplane, is wire-wrapped to the order wire interface in the same manner as in rear access procedures. Refer to the "Order wire Interface Cable Installation - Rear Access" in the "Equipment and Rear Access Installation" section. The cables should be routed out of the bay, stacking cables as shown in Figure 3-2

## **Fan Shelf Alarm Connections - Front Access**

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### **Description**

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The DDM-2000 OC-3 fan shelf is provided as required. An alarm indication is generated by the fan shelf in the event of a functional failure. The alarm can be input to the DDM-2000 OC-3 shelf as miscellaneous discrete information (environmental alarm #14).

### **Procedure**

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The fan shelf alarm output should be connected to the DDM-2000 OC-3 shelf located below the fan shelf. The connection can be made in one of the two ways:

- a. If no other environmental alarm inputs are being connected to the DDM-2000 OC-3 shelf, connect a G457 cable between the connector on the fan shelf alarm cable and J262 of the front access Miscellaneous Discrete cable previously connected to the backplane.
- b. If other environmental alarm inputs, in addition to the fan shelf alarm, are being connected to the DDM-2000 OC-3 shelf, connect a G460 or G461 cable via a miscellaneous terminal strip to the appropriate wires on the G441 or G442 miscellaneous (environmental) discrete cable in accordance with information provided in the job specification. Refer to Table 3-8 and to the "Miscellaneous (Environmental) Discrete Telemetry Cable Installation".

## **Final Operations**

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### **Procedure**

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1. Verify that all the cables are properly dressed and secured in the bay.
2. Verify that all cables are properly labeled.
3. Verify that designations where cables were wire-wrapped are properly labeled.

**Table 3-1. Front Access DS1 Cable Assemblies**

Description (Note)	ED-8C724-21 Group	Cable Length	One Cable Connector	Other Connector
Cable from Backplane to Front of Shelf Function Group A (1400016A)	401	4 ft. 8 in.	J101-J104	J1A
	402		J105-J107	J2A
	403		J108-J111	J3A
	404		J112-J114	J4A
Cable from Backplane to Front of Shelf Function Group B (1400016A)	405	4 ft.11 in.	J115-J118	J1B
	406		J119-J121	J2B
	407		J122-J125	J3B
	408		J126-J128	J4B
Cable from Backplane to Front of Shelf Function Group C (1400016A)	409	4 ft.11 in	J129-J132	J1C
	410		J133-J135	J2C
	411		J136-J139	J3C
	412		J140-J142	J4C
From Front of Shelf	*	25 ft.	P1(), P2() P2(), P3()	Wire Wrap
From Front of Shelf to DSX (608C)**	431	75 ft.	P1(), P2() P3(), P4()	Wire Wrap
	432	150 ft.		
	433***	30 ft. to 655 ft.		
From Front of Shelf to DSX (1249C)**	434	75 ft.	P1(), P2() P3(), P4()	Wire Wrap
	435	150 ft.		
	436***	30 ft. to 655 ft.		

**Note:**

The description includes the cable type in parentheses.

1400016A type cable is 26 gauge.

608C type cable is 22 gauge (maximum length is 655 feet).

1249C type cable is 26 gauge (maximum length is 440 feet).

\* Filtered DS1 Cable Assemblies are for use when using less than 30 feet.

\*\* These are the interbay DS1 cables. Each of these groups will accommodate one function group only.

\*\*\* The length of groups 433 and 436 is specified by the customer.

**Table 3-2. Front Access Shelf Cable Assemblies**

Description	ED-8C724-21 Group	Cable Length	One Cable Connector (Note)	Other Connector
DS3 Cables from Backplane to Front of Shelf	413	2 ft. 11 in.	P38-P43	J38A, J39A, J40B J41B, J42C, J43C
DS1 Timing	414	2 ft. 3 in.	P37	J237
TL1/X.25 Interface	416	2 ft. 5 in.	P45	P245
Order wire	417	3 ft.	P51	None
	ED-8C724-22 Group 31	17 ft.		
Modem	419	2 ft. 7 in.	P52	J252
TBOS	420	2 ft. 9 in.	P53	J253
Parallel Telemetry (See NOTE below.)	421	3 ft. 1 in.	J54	P254
Office Alarms	423	3 ft. 1 in.	J56	P256
Misc. (Env.) Discrete A**	428	3 ft.	J61	J261
Misc. (Env.) Discrete B***	429	3 ft.	J62	J262
Misc. (Env.) Discrete†	463	3 ft.	J61	J261
Power	443††	1 ft. 3 in.	J1, J2	P201, P202

⇒ **NOTE:**  
Parallel telemetry is not available in Release 13 software.

⇒ **NOTE:**  
TBOS is not available in Release 13 software.

**Note:**

The "one cable connector" end connects to its mate on the DDM-2000 OC-3 backplane (that is, P37 on the G414 cable connects to J37 on the backplane).

\* The G413 cable accommodates all the DS3s for one shelf.

\*\* For miscellaneous (environmental) discrete at the CO.

\*\*\* For miscellaneous (environmental) discretets at the RT.

† This cable is required (in addition to the Group 429 cable on J62) for remote terminal applications when more than 14 user definable environmental inputs are required. This is a feature of Releases 8, 9, 11 and 13.

†† G443 cables are used for DDM-2000 OC-3 shelves and for fan shelves.

**Table 3-3. Front Access Mult Cable Assemblies**

Description	ED-8C724-21 Group	Cable Length	One Cable Connector (Note)	Other Connector
DS1 Timing Mult.	415	2 ft. 3 in.	P44	P237
Q2 In Mult*	418	3 ft. 6 in.	P50	P251
Parallel Telemetry Mult. (See NOTE below.)	422	3 ft. 1 in.	J55	J254
Office Alarms Mult.	424	3 ft. 1 in.	J57	J256
TBOS Mult.	425	2 ft. 5 in.	P58	J258/J258A
TBOS Mult.	426	2 ft. 5 in.	P60	P258/P258A
Mult without TBOS**	427	5 in.	P258A	J258A

 **NOTE:**  
 Parallel telemetry is not available in Release 13 software.

 **NOTE:**  
 TBOS is not available in Release 13 software.

**Note:**

The "one cable connector" end connects to its mate on the DDM-2000 OC-3 backplane (that is, P37 on the G414 cable connects to J37 on the backplane).

\* This cable is for future applications.

\*\* This cable does not connect to the backplane. It is used to connect the CIT and modem mult between shelves that are not of the same TBOS link.

**Table 3-4. Telemetry and Modem Cable Assemblies**

Description	ED-8C724-21 Group	Cable Length (ft.) (Notes 1, 2 &3)	DDM-2000 Backplane Connections
Parallel Telemetry- For Bottom Shelf (See NOTE below.)	437	150	P254 of Front Access Cable
	438	As Reqd.	
Office Alarms- For Lowest Shelf	439	150	P56 of Front Access Cable
	440	As Reqd.	
Misc. (Env.) Discrete Telemetry- 1 per Shelf	441	150	P261 (at CO) P62 (at RT) of Front Access Cable
	442	As Reqd.	
Fan Alarm Interface cable	457	2	J262 of Front Access
	460	150	Wire wrap to terminal strip
	461	As Reqd.	

**⇒ NOTE:**  
 Parallel telemetry is not available in Release 13 software.

**Note:**

1. Cable lengths listed, as required, are specified by the customer.
2. All cables are part of ED-8C724-21 and they connect to a front access cable, not to the backplane.
3. All cables are 26 gauge.

**Table 3-5. Front Access DS1 Transmission Connections**

Group	CHAN (DS1)	Connector PIN OUT T/R TERM	608C (22 Gauge) T/R COLOR	1249C (26 Gauge) T/R COLOR	Cable Connector		Cable Assembly (Note)	
					OUT	IN	OUT	IN
1	1 (1)	20, 1	W-BL, BL-W	W, BL	P1()*	P3()	CA1	CA3
	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				
2	1 (5)	24, 5	W-S, S-W	W, S				
	2 (6)	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				
3	1 (9)	28, 9	R-BR, BR-R	R, BR				
	2 (10)	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				
4	1 (13)	32, 13	BK-G, G-BK	BK, G				
	2 (14)	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				
5	1 (17)	20, 1	W-BL, BL-W	W, BL	P2()	P4()	CA2	CA4
	2 (18)	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				
6	1 (21)	24, 5	W-S, S-W	W, S				
	2 (22)	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				
7	1 (25)	28, 9	R-BR, BR-R	R, BR				
	2 (26)	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				

**Note:**

Each group consists of four cable assemblies (CAs). One group is required per function group.

\* The connectors will be stamped P1A, P1B, or P1C, depending on the function group the cable is to be used with.

**Table 3-6. Office Alarm Connections**

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J56	1	BL-W
Minor Alarm Visible Return	MNVR		2	W-BL
Minor Alarm Audible	MN		3	O-W
Minor Alarm Audible Return	MNR		4	W-O
Major Alarm Visible	MJV		5	G-W
Major Alarm Visible Return	MJVR		6	W-G
Major Alarm Audible	MJ		7	BR-W
Major Alarm Audible Return	MJR		8	W-BR
Critical Alarm Visible	CRV		9	S-W
Critical Alarm Visible Return	CRVR		10	W-S
Critical Alarm Audible	CR		11	BL-R
Critical Alarm Audible Return	CRR		12	R-BL

**Note:**

1. If the office is not equipped for critical alarm display, critical alarm cables should be multited to major alarm cables.
2. The SYSCTL circuit pack reports office alarms.
3. The office alarm cable is 26 gauge.
4. Some cables may be manufactured using wires following old color-code standards. A color-code cross-reference is located in Table 3-9.

**Table 3-7. Parallel Telemetry Connections** (See NOTE below.)

Name	Desig.	Conn.	Term	Color
ACO Control - Output	ACO-O	J54	7	BR-W
ACO Control - Input	ACO-I		18	R-BR
Output - Common	COM-O		14	R-O
Critical Alarm	CR		15	G-R
Major Alarm	MJ		13	O-R
Minor Alarm	MN		11	BL-R
Power Minor Alarm	PMN		9	S-W
Near-End Status	NE		16	R-G
Carrier Line Failure Status	CLF		3	O-W
Incoming Status	INCM		1	BL-W
System Identifier - Shelf 1	SID1		5	G-W
System Identifier - Shelf 2	SID2		23	O-BK
System Identifier - Shelf 3	SID3		21	BL-BK
System Identifier - Shelf 4	SID4		19	S-R
System Identifier - Shelf 5	SID5		17	BR-R
System Identifier - Shelf 6	SID6		24	BK-O
System Identifier - Shelf 7	SID7		22	BK-BL
Input - Common	COM-I		20	R-S
Far End Site ID - Site 1	FE1		12	R-BL
Far End Site ID - Site 2	FE2		10	W-S
Far End Site ID - Site 3	FE3		8	W-BR
Far End Site ID - Site 4	FE4		6	W-G
Far End Site ID - Site 5	FE5		4	W-O
Far End Site ID - Site 6	FE6		2	W-BL



**NOTE:**

Parallel telemetry is not available in Release 13 software.

**Notes:**

1. For ACO Control - Input, a pair of leads is connected between ACO-I and COM-I.
2. For all other parallel telemetry connections, a pair of leads is connected between the telemetry point and COM-O (output-common).
3. The parallel telemetry cable is 26 gauge.
4. Some cables may be manufactured using wires following old color-code standards. A color-code cross-reference is located in Table 3-9.

**Table 3-8. Miscellaneous (Environmental) Discrete Telemetry Connections (RT)**

Remote Terminal (All Releases)			Remote Terminal Additional Environmental Inputs (Releases 8, 9, 11 and 13)			ED8C704-20 Cable (J61)		ED8C724-22 Cable (J62)	
Name	Desig.	Conn.	Name	Desig.	Conn.	Term	Color	Color	
Minor Alarm	MN	J262	Env. Input - #20	TLMI-20	J261	4	W-O	W-BL	
Power Minor Alarm	PMNT-IN						18	R-BR	
Fan Control	FAN-CTL						23	O-BK	
Input-Common	TLMI-C		Input-Common	TLMI-C			9	S-W	BR-W
Env. Input - #1	TLMI-1						17	BR-R	
Env. Input - #2	TLMI-2						15	G-R	
Env. Input - #3	TLMI-3						13	O-R	
Env. Input - #4	TLMI-4						11	BL-R	
Env. Input - #5	TLMI-5						7	BR-W	
Env. Input - #6	TLMI-6						5	G-W	
Env. Input - #7	TLMI-7						3	O-W	
Env. Input - #8	TLMI-8						1	BL-W	
Env. Input - #9	TLMI-9						16	R-G	
Env. Input - #10	TLMI-10				14	R-O			
Env. Input - #11	TLMI-11		Env. Input - #16	TLMI-16	12	R-BL	W-G		
Env. Input - #12	TLMI-12		Env. Input - #17	TLMI-17	10	W-S	G-W		
Env. Input - #13	TLMI-13		Env. Input - #18	TLMI-18	8	W-BR	W-O		
Env. Input - #14	TLMI-14		Env. Input - #19	TLMI-19	6	W-G	O-W		
Output-Common	TLMO-C				21	BL-BK			
Env. Output - #1	TLMO-1				19	S-R			
Env. Output - #2	TLMO-2				24	BK-O			
Env. Output - #3	TLMO-3				22	BK-BL			
Env. Output - #4	TLMO-4				20	R-S			
No Connection	NC		Env. Input - #21	TLMI-21	2	W-BL	BL-W		

**Notes:**

1. 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 3-8 (Releases 6 and 7) or Figure 3-10 (Releases 8, 9, 11 and 13).
2. 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 that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-#). Refer to Figure 3-8 (Releases 6 and 7) or Figure 3-10 (Releases 8, 9, 11 and 13).
3. J262 and J261 refer to the cable connector at the end of the dangler.

**Table 3-9. Miscellaneous (Environmental) Discrete Telemetry Connections (CO)**

Central Office (Releases 6 and 7)			Central Office (Releases 8, 9, 11, and 13)			Term	Color
Name	Desig.	Conn.	Name	Desig.	Conn.		
Minor Alarm	MN	J261	No Connection	NC	J261	4	W-O
No Connection	NC		No Connection	NC		18	R-BR
No Connection	NC		No Connection	NC		23	O-BK
Input-Common	TLMI-C		Input-Common	TLMI-C		9	S-W
Env. Input - #1	TLMI-1		Env. Input - #1	TLMI-1		17	BR-R
Env. Input - #2	TLMI-2		Env. Input - #2	TLMI-2		15	G-R
Env. Input - #3	TLMI-3		Env. Input - #3	TLMI-3		13	O-R
Env. Input - #4	TLMI-4		Env. Input - #4	TLMI-4		11	BL-R
Env. Output - #5	TLMO-5		Env. Output - #5	TLMO-5		7	BR-W
Env. Output - #6	TLMO-6		Env. Output - #6	TLMO-6		5	G-W
Env. Output - #7	TLMO-7		Env. Output - #7	TLMO-7		3	O-W
Env. Output - #8	TLMO-8		Env. Output - #8	TLMO-8		1	BL-W
Env. Output - #9	TLMO-9		Env. Output - #9	TLMO-9		16	R-G
Env. Output - #10	TLMO-10		Env. Output - #10	TLMO-10		14	R-O
Env. Output - #11	TLMO-11					12	R-BL
Env. Output - #12	TLMO-12					10	W-S
Env. Output - #13	TLMO-13					8	W-BR
Env. Output - #14	TLMO-14					6	W-G
Output - Common	TLMO-C		Output - Common	TLMO-C		21	BL-BK
Env. Output - #1	TLMO-1		Env. Output - #1	TLMO-1		19	S-R
Env. Output - #2	TLMO-2		Env. Output - #2	TLMO-2		24	BK-O
Env. Output - #3	TLMO-3		Env. Output - #3	TLMO-3		22	BK-BL
Env. Output - #4	TLMO-4		Env. Output - #4	TLMO-4		20	R-S
No Connection	NC					2	W-BL

*Notes:*

1. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation. Refer to Figure 3-9 (Releases 6 and 7) or Figure 3-10 (Releases 8, 9, 11 and 13).
2. J262 and J261 refer to the cable connector at the end of the dangler.

**Table 3-10. Color Code Cross Reference Connections**

Number	Color		Paired With	
	Old	New	Old	New
1C or 26C	BL1W	W-BL	BL2W	BL-W
2C or 27C	O1W	W-O	O2W	O-W
3C or 28C	G1W	W-G	G2W	G-W
4C or 29C	BR1W	W-BR	BR2W	BR-W
5C or 30C	S1W	W-S	S2W	S-W
6C or 31C	BL1R	R-BL	BL2R	BL-R
7C or 32C	O1R	R-O	O2R	O-R
8C or 33C	G1R	R-G	G2R	G-R
9C or 34C	BR1R	R-BR	BR2R	BR-R
10C or 35C	S1R	R-S	S2R	S-R
11C or 36C	BL1BK	BK-BL	BL2BK	BL-BK
12C or 37C	O1BK	BK-O	O2BK	O-BK
13C or 38C	G1BK	BK-G	G2BK	G-BK
14C or 39C	BR1BK	BK-BR	BR2BK	BR-BK
15C or 40C	S1BK	BK-S	S2BK	S-BK
16C or 41C	BL1Y	Y-BL	BL2Y	BL-Y
17C or 42C	O1Y	Y-O	O2Y	O-Y
18C or 43C	G1Y	Y-G	G2Y	G-Y
19C or 44C	BR1Y	Y-BR	BR2Y	BR-Y
20C or 45C	S1Y	Y-S	S2Y	S-Y
21C or 46C	BL1V	V-BL	BL2V	BL-V
22C or 47C	O1V	V-O	O2V	O-V
23C or 48C	G1V	V-G	G2V	G-V
24C or 49C	BR1V	V-BR	BR2V	BR-V
25C or 50C	S1V	V-S	S2V	S-V

**Note:** Some cables may be manufactured using wires following old color-code standards

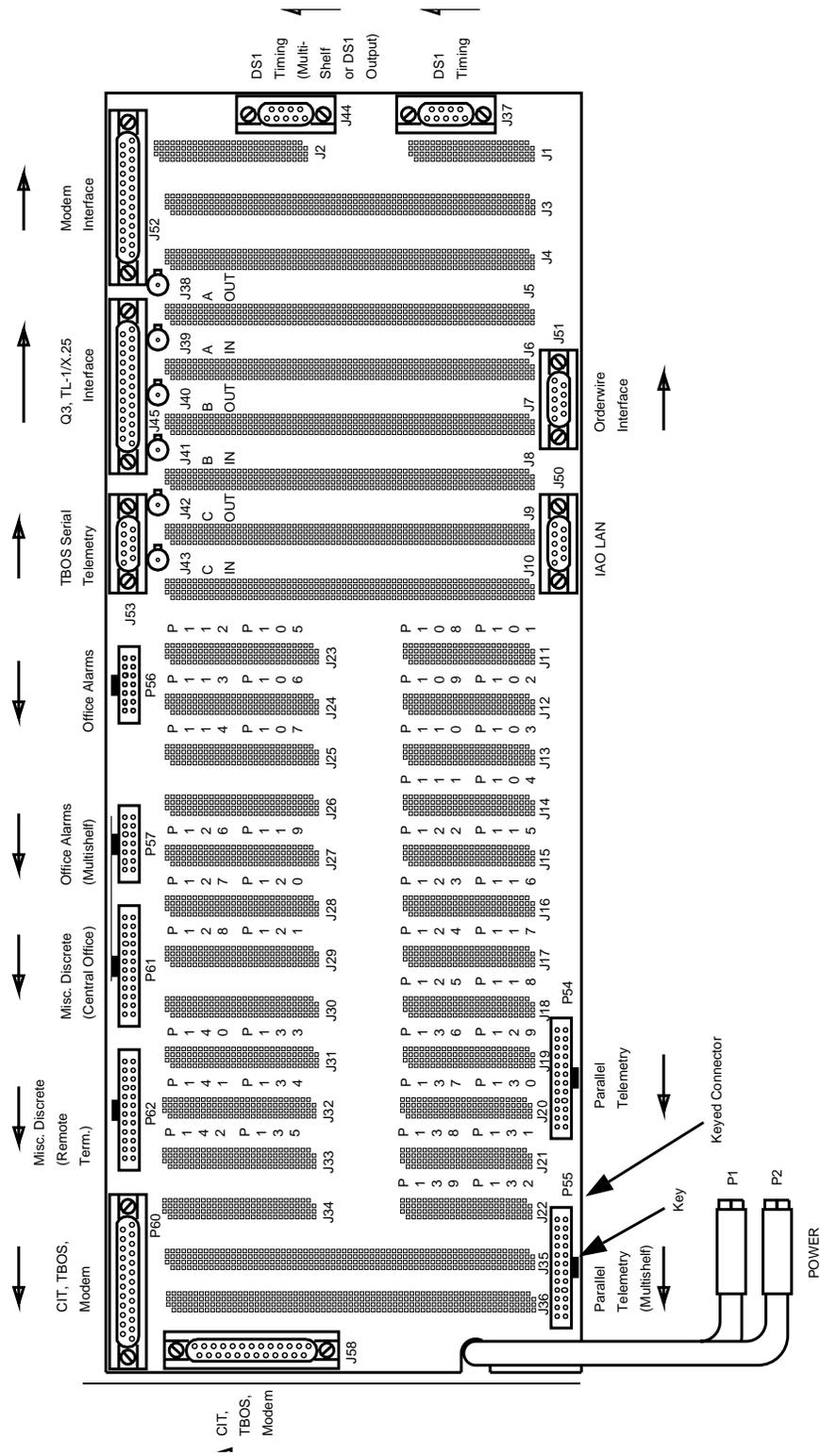
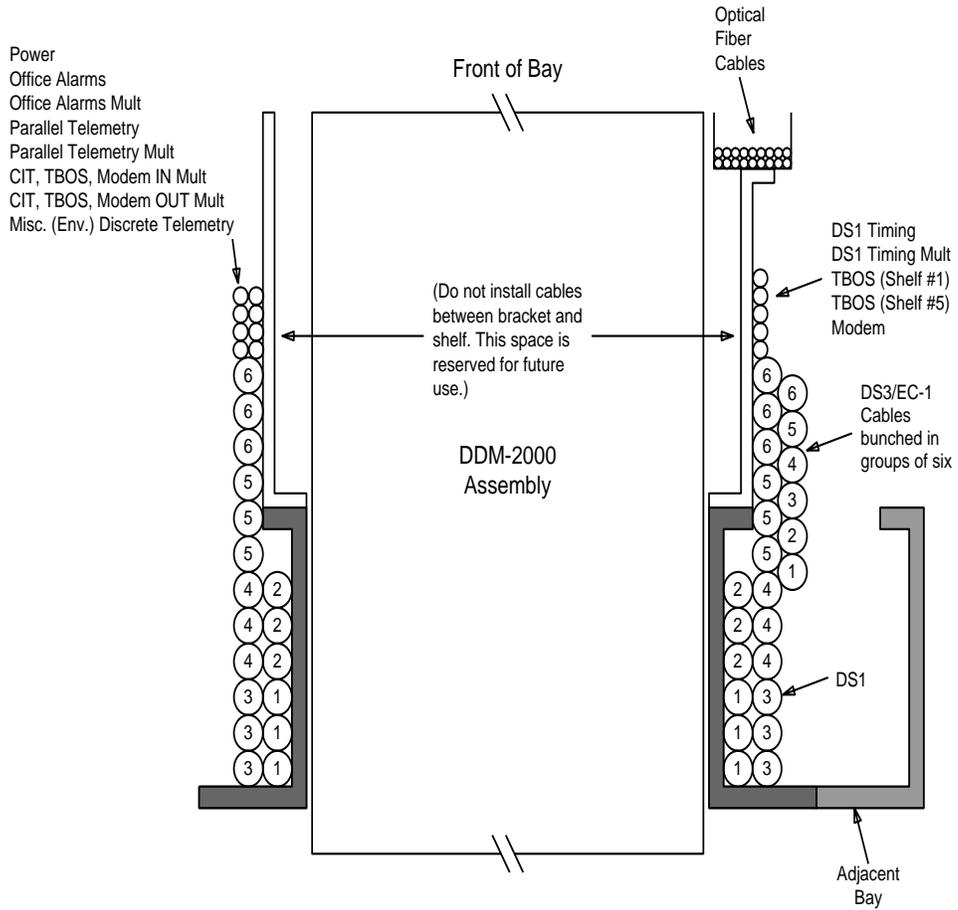
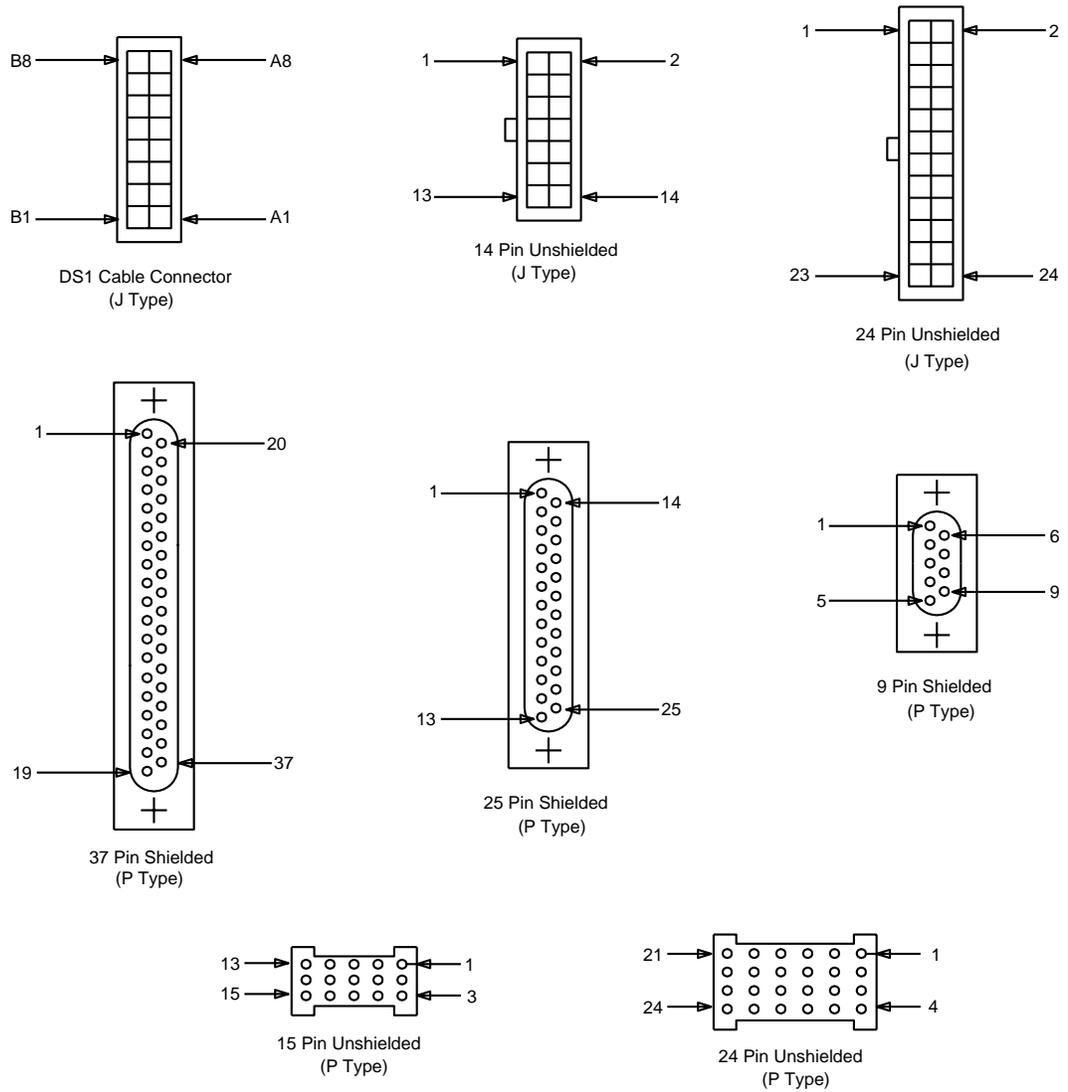


Figure 3-1. DDM-2000 OC-3 Backplane



**Note:** The cable stacking order is shown in the figure. The numbers on the cables indicate the shelf associated with that cable.

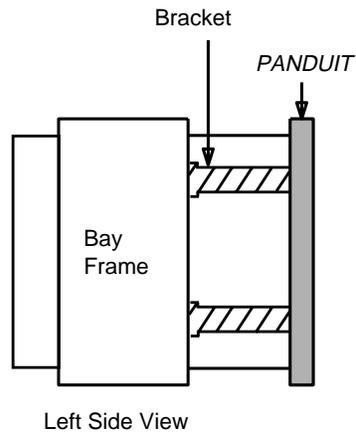
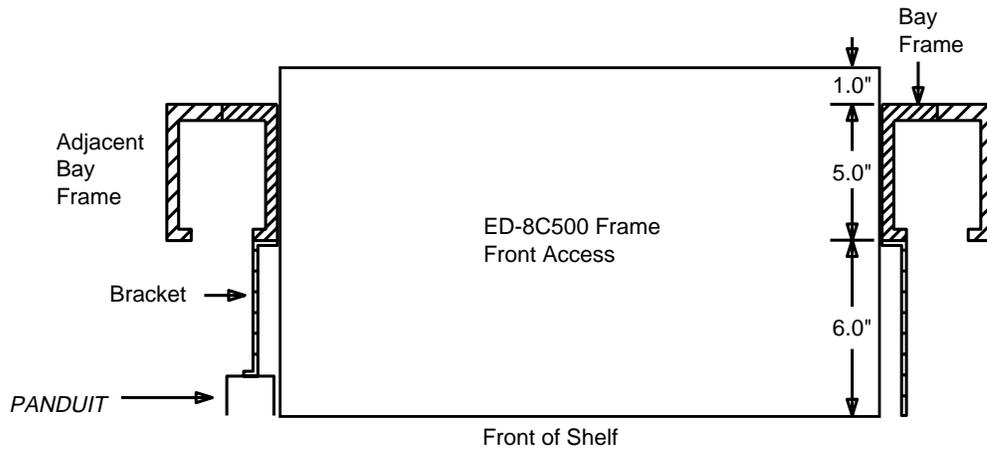
**Figure 3-2. ED-8C500 Frame, Front Access Cable Placement**



**Note 1:** Terminals are numbered by looking at the connector from the wiring side.

**Note 2:** J and P connector pinouts are a mirror image of one another.

**Figure 3-3. Connector Pinouts**

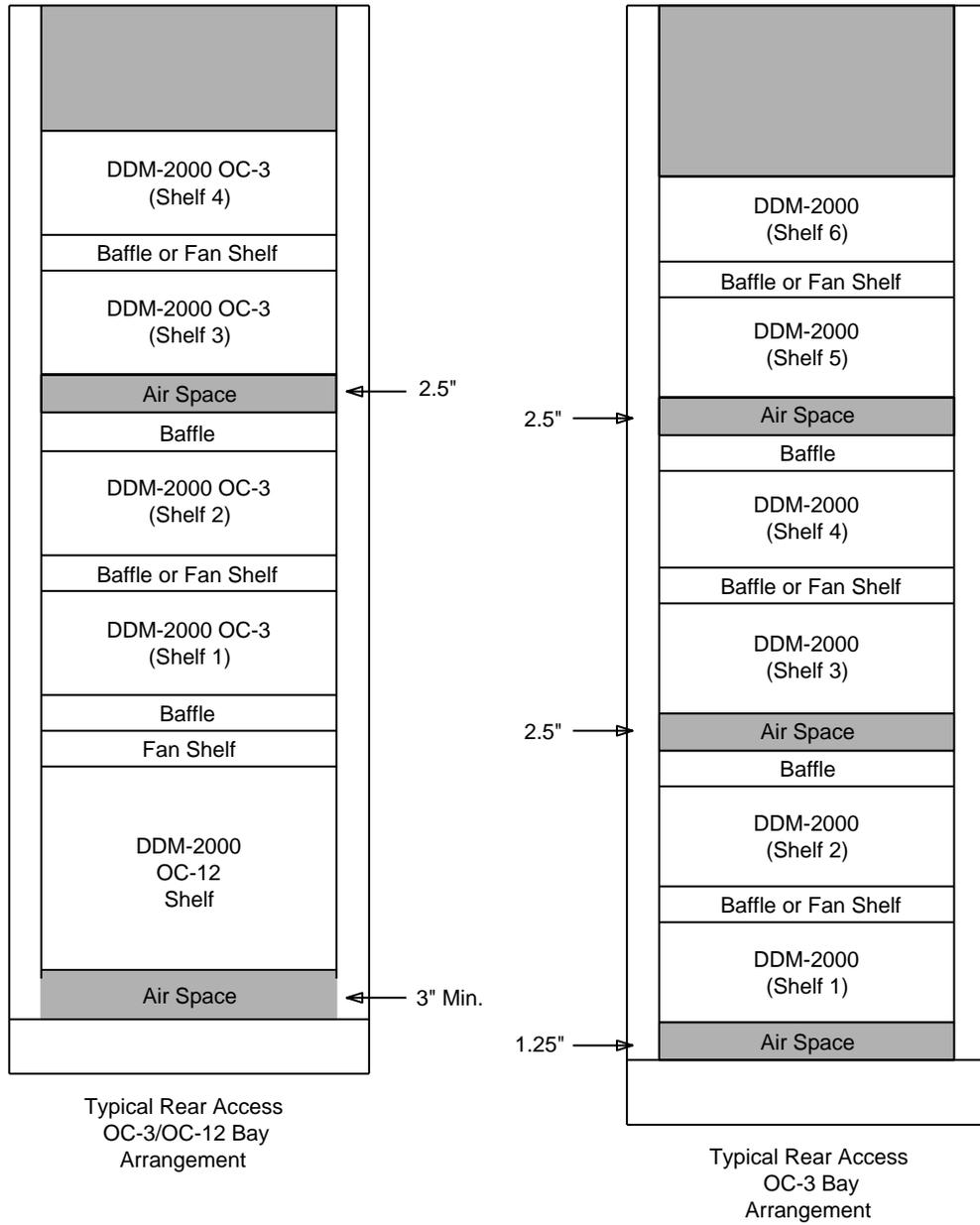


**Note:** There are two brackets required per shelf to hold the *PANDUIT*\* cable channel in place.

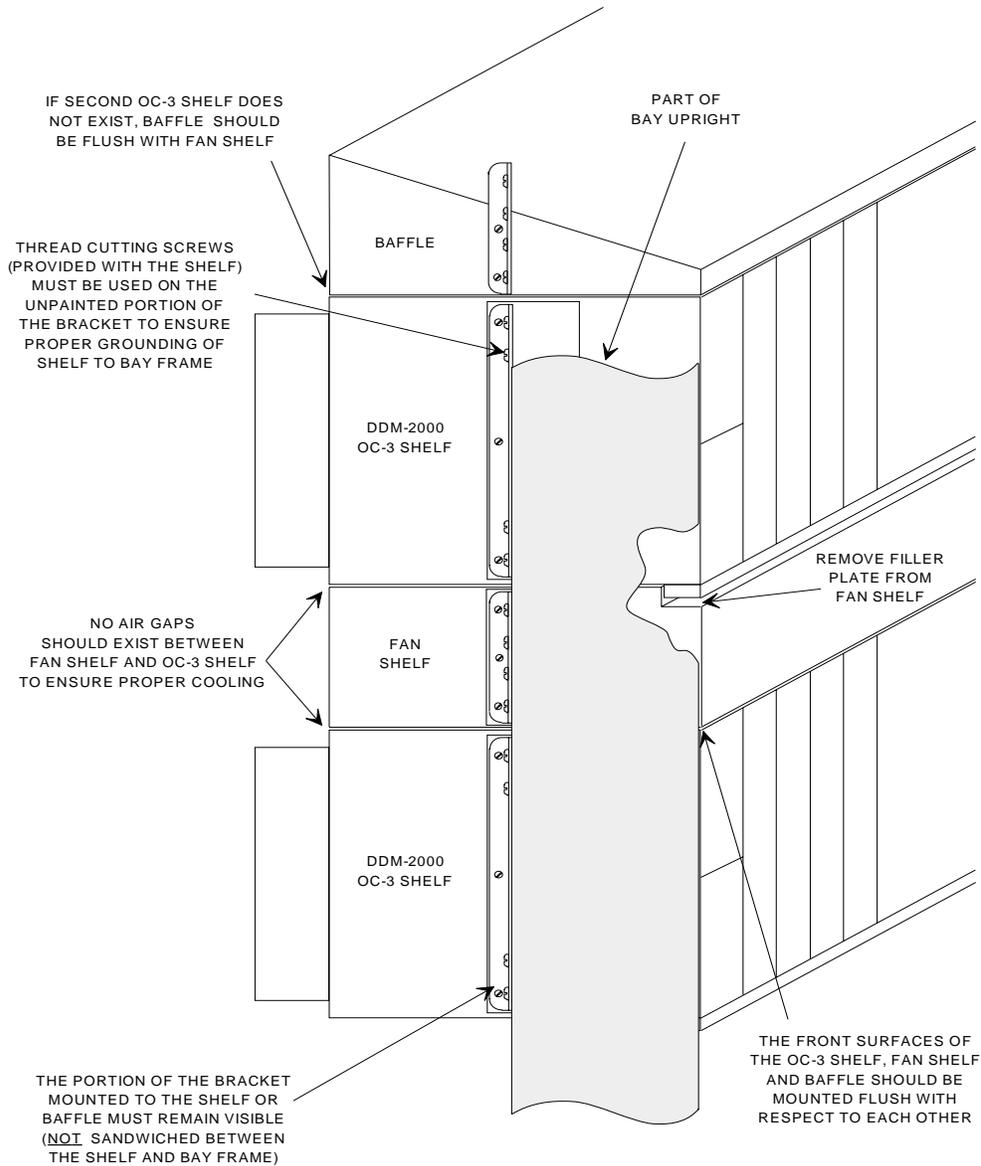
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**Figure 3-4. DDM-2000 Shelf Mounting (Top View)**

\* Registered Trademark of Panduit Corporation

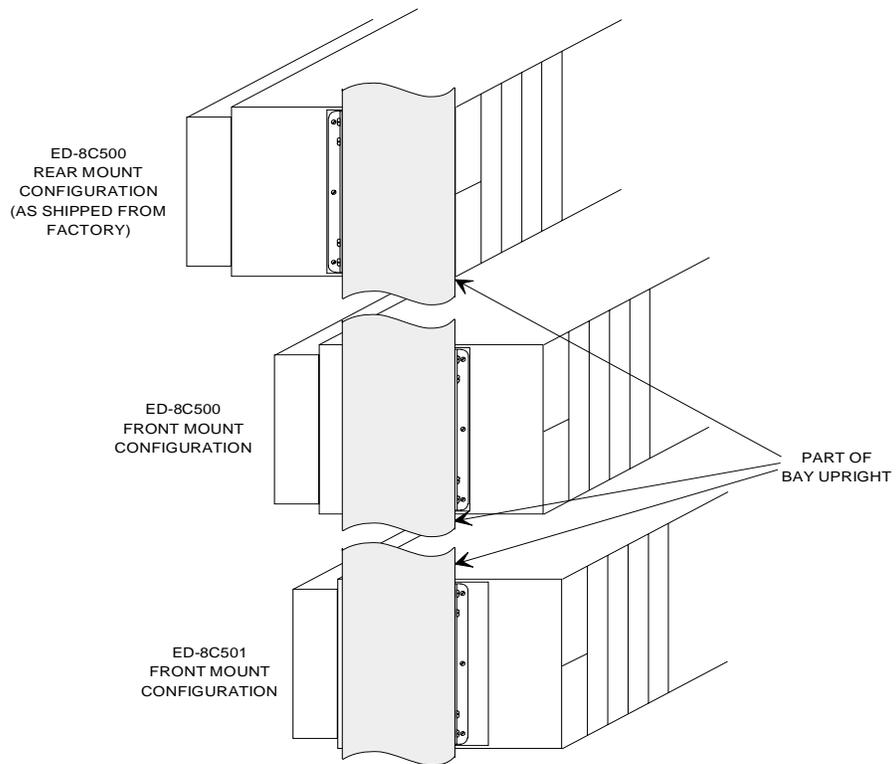
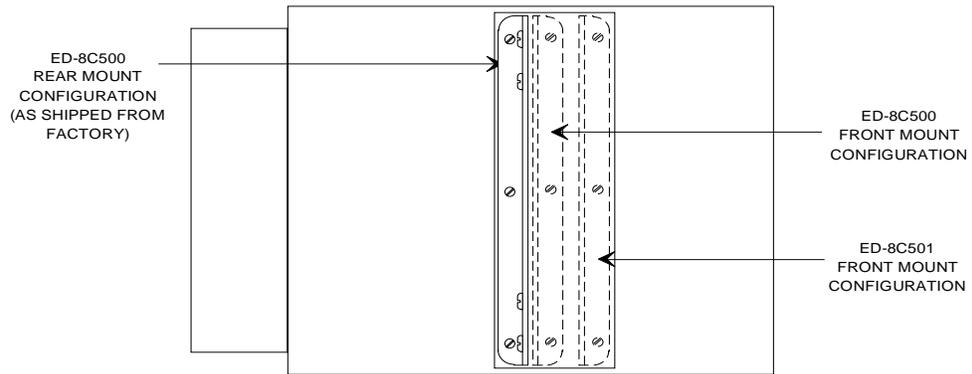


**Figure 3-5. Bay Mounting Arrangements**



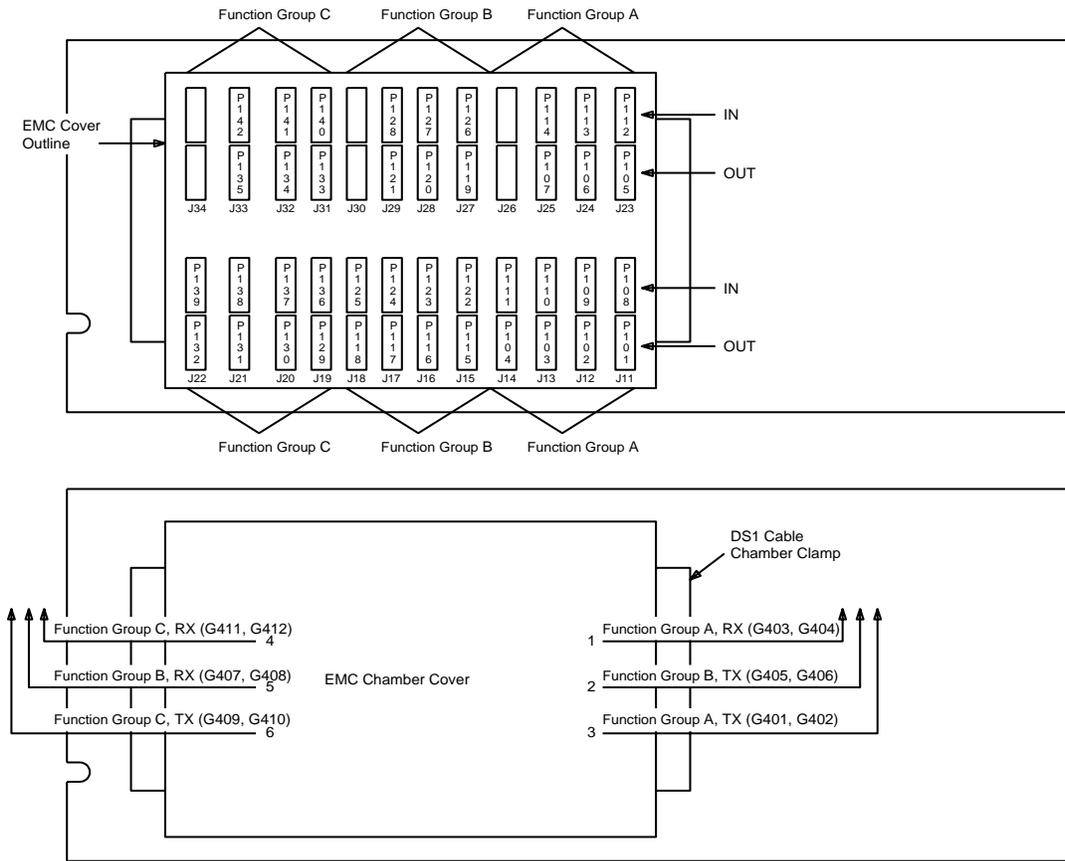
**Figure 3-6. Side Mounting Bracket Positions**

THE SHELF BRACKET CAN BE INSTALLED IN ANY OF THREE DIFFERENT POSITIONS



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**Figure 3-7. Side Mounting Bracket Positions (Contd)**

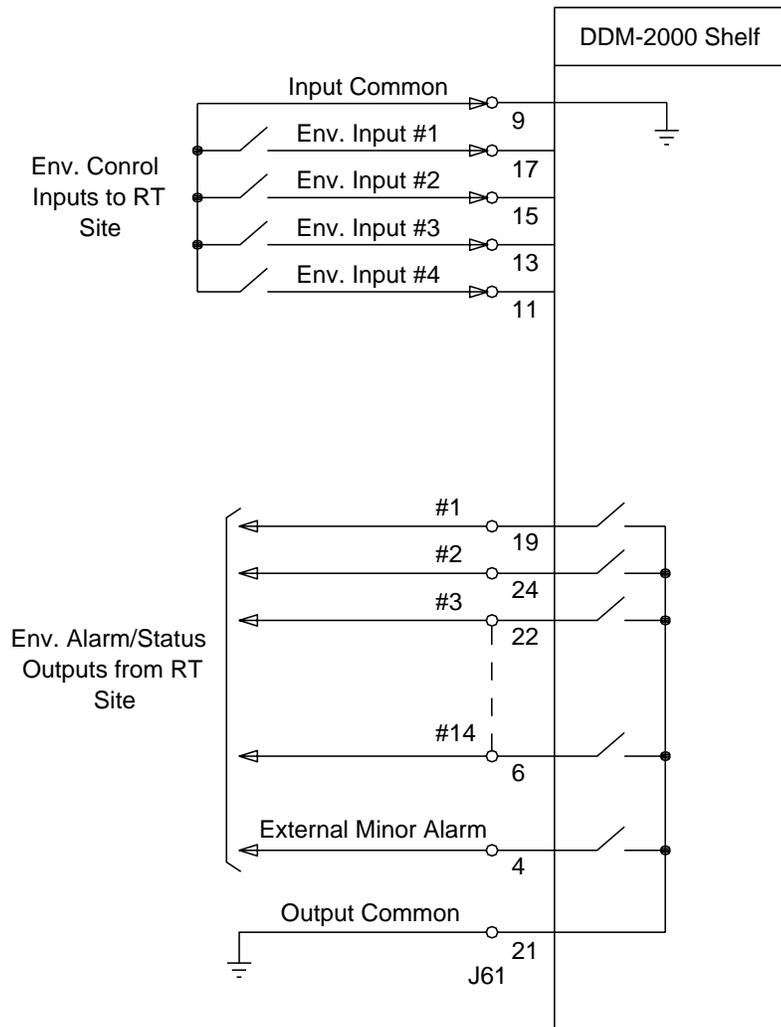


**Note 1:** Refer to Table 3-1 for specific DS1 cable assemblies.

**Note 2:** Separate DS1 cables are required for each shelf.

**Figure 3-8. Front Access DS1 Cabling**

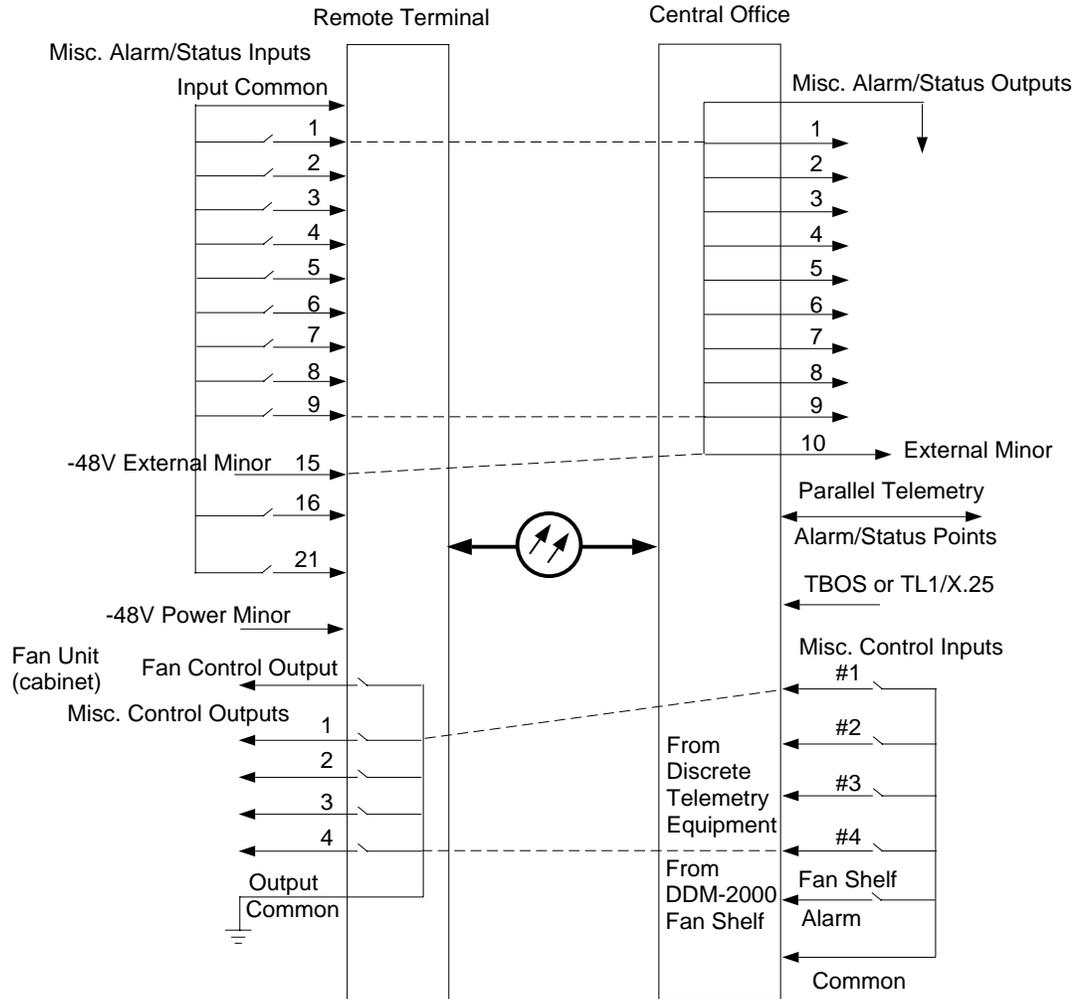




**Notes:**

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-14.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J262) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBS environment (noncabinet where air inlet temperature exceeds 50 degrees Celsius) applications where the fan shelf is required.

**Figure 3-10. Central Office Terminal Miscellaneous (Environmental) Discrete Functions (Releases 6 and 7).**



**Notes:**

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-10.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J262) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBS environment (noncabinet where air inlet temperature exceeds 50 degrees Celsius) applications where the fan shelf is required.

**Figure 3-11. Miscellaneous (Environmental) Discrete Functions (Releases 8, 9, 11 and 13).**



# Powering, Verification, and Circuit Pack Installation

# 4

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## Powering, Verification, and Circuit Pack Installation

# 4

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### Overview

This section provides information for verifying that the 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 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Through Release 7), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) or 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13), current issue.

### Release 6, 7, 8, 9, 11 and 13 Software Download

The software download procedure mentioned in this section is required for shelves equipped with Releases 6 and 7 (BBG5 SYSCTL and BBG7 OHCTL) circuit packs or for Releases 8, 9, 11 and 13 (BBG8 SYSCTL and BBG9 or BBG10 OHCTL) circuit packs. The SYSCTL and OHCTL circuit packs are 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 4-1.

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.

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\*. Registered trademark of Microsoft Corporation.

## **Tools, Test Sets, and Accessories**

---

The following is required:

<b>Quantity</b>	<b>Description</b>
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 user panel.

## **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.

### **Procedure**

---

1. Verify that the frame or structure into which the DDM-2000 OC-3 is installed is properly grounded.
2. Verify that the DDM-2000 OC-3 is properly grounded to the frame or structure.
3. Verify that a 5 ampere fuse is installed in the DDM-2000 OC-3 user panel for each feeder.
4. Disconnect the power cable from the backplane cable (P1 from J1 and P2 from J2).
5. If a single shelf is used, install a 10 ampere fuse in the battery distribution fuse board (BDFB) that fuses the DDM-2000 OC-3. If a bay arrangement is used install a 25 ampere fuse or circuit breaker in the BDFB.
6. If breakers are being used, verify that a 25 ampere breaker is being used if in a bay arrangement or a 10 ampere breaker is being used if in a single shelf.
7. If breakers are being used, put the breaker in the ON position.

- 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. If a bay arrangement cable is being used, measure the voltage between BAT A and BAT A RTN and between BAT B and BAT B RTN on each connector of the power cable.

<b>Designation</b>	<b>Color</b>
BAT A	Red
BAT A RTN	Black
BAT B	Green
BAT B RTN	White

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

- Reconnect the "A" feed of the power cable to the backplane cable (P1 to J1).
- Verify the PWR ON LED on the DDM-2000 OC-3 user panel is lighted with only the "A" feed connected.
- Disconnect the "A" feed of the power cable from the backplane cable (P1 from J1).
- Reconnect the "B" feed of the power cable to the backplane cable (P2 to J2).
- Verify the PWR ON LED on the DDM-2000 OC-3 user panel is lighted with only the "B" feed connected.
- Reconnect the "A" feed of the power cable to the backplane cable (P1 to J1).
- Verify that the PWR ON LED on the DDM-2000 OC-3 user panel is lighted with both the "A" and "B" feed connected.
- Repeat the above powering procedure for the ED-8C733-30, G2 or G7 fan shelf, if provided, and verify that the PWR ON LED on the fan shelf lights and the fans operate. Press the RESET button on the fan shelf to extinguish the fan shelf alarm indication.

## **Circuit Pack Compatibility - Release 13**

Table 4-1 lists the circuit packs that are compatible with Release 13.

**Table 4-1. Release 13 Circuit Pack Compatibility (Sheet 1 of 2)**

TG	Slot Name					LS Group*	AUXCTL	SYSCTL
	Main	Fn-A	Fn-B	Fn-C				
BBF2 BBF2B† BBF4	22F/22F-U/ 22F2-U§ 22D-U 22G-U/22G2-U 22G3-U 24G-U†† 27G-U/ 27G2-U¶¶	22D-U 22F/22F-U/ 22F2-U 22G-U/22G2-U 22G3-U 26G2-U†† 27G-U/ 27G2-U¶¶ BBG2 BBG4/4B*** BBG6(ls)††† BBG19††† BBG20	22D-U 22F/22F-U/ 22F2-U 22G-U/22G2-U 22G3-U 26G2-U†† 27G-U/ 27G2-U¶¶ BBG2 BBG4/4B*** BBG6(ls)††† BBG19††† BBG20	22D-U 22F/22F-U/ 22F2-U 22G-U/22G2-U 22G3-U 26G2-U†† 27G-U/ 27G2-U¶¶ BBG2 BBG4/4B*** BBG6(ls)††† BBG19††† BBG20	22D-U 22F/22F-U/ 22F2-U 22G-U/22G2-U 22G3-U 26G2-U†† 27G-U/ 27G2-U¶¶ BBG2 BBG4/4B*** BBG6(ls)††† BBG19††† BBG20	BBF1B BBF3/ BBF3B¶ BBF5** BBF8§§	BBG9/ BBG10	BBG8/ BBG8B

177A Retainer card must be installed in unused slots of a partially equipped function group. Not required with BBF5.

†

The 22-type OLIUs must be present in Main-1 and Main-2 for proper ring operation. If signal degrade protection is not used, the 22F/22F-U and 22G-U/22G2-U/22G3-U OLIUs can be mixed in the same shelf. The 22F2-U provides signal degrade protection switching and can be mixed with 22G-U/22G2-U/22G3-U OLIUs. The BBF2B TGS is recommended for rings to minimize protection switching times in case of a manual circuit pack removal.

‡

The BBF2B circuit pack optionally provides DS1 timing outputs. It is recommended for rings to minimize protection switching times in case of a manual circuit pack removal.

§

Signal degrade protection switching requires 22D-U, 22G-U/22G2-U/22G3-U or 22F2-U OLIUs.

¶

The BBF3 is the DS1PM circuit pack which can be used in place of or mixed with the BBF1/BBF1B. If mixed within a low-speed group the protection circuit pack must be a BBF3. If the DS1PM feature is "enabled" using the `set-feat` command, the BBF3 has additional performance monitoring capabilities. The BBF3B can perform individual DS1 loopbacks using R13 or later.

\*\*

Required in Group 1 and Group 3 shelves functioning as DDM-2000 single home Fiber-Reach hosts with 27G-U/27G2-U OLIUs.

**Table 4-1. Release 13 Circuit Pack Compatibility (Sheet 2 of 2)**

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††

When 24G-Us are used in a G3 shelf (the 24G-Us must be deployed in pairs), the front cover must be modified using the G3 to G4 Front Cover Modification Kit, 847544177 to provide clearance for the front connectors and cables. The 24G-Us also require an Interconnect Cable Assembly 847721271.

‡‡

26G2-U requires OC-3 Group 4 shelf.

§§

Up to three BBF8s can be installed per low-speed group. Future enhancements may support higher density.

¶¶¶

The 27G2-U is required for some enhanced FiberReach host topologies with Release 13.0. When the 27G-U/27G2-U is used in a G3 shelf, the front cover must be modified using the G3 to G4 Front Cover Modification Kit, 847544177, to provide clearance for the front connectors and cables.

BBG4B DS3 is required to support enhanced DS3 performance monitoring.

†††

The BBG6(l)s is the BBG6 circuit pack with its switch set for low-speed.

‡‡‡

Due to cable congestion, it is recommended that no more than four BBG19s be used per shelf. A G4 shelf or G3 to G4 Front Cover Modification Kit, 847544177, is required to provide clearance for the front connectors and cables.

Notes:

The following circuit packs require the G4 Shelf, or G3 to G4 Front Cover Upgrade Kit (847544177): 24G-U OLIU, 27G-U/27G2-U OLIUs, 26G2-U OLIU (always requires G4 Shelf for backplane compatibility), and BBG19 DS3. Additionally, the G3 to G4 upgrade kit is recommended wherever fiber contusion and/or cable dressing is a concern.

The BBF1, BBF2, BBG4, 21G, 21D, 22F, 22F-U and 22G-U circuit packs have been rated discontinued availability (DA).

## **Circuit Packs and Circuit Pack Provisioning (Option Settings)**

---

### **Description**

---

This section provides descriptions of circuit packs and 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:**

Circuit Pack descriptions in the appropriate User/Service Manual (See list in "About This Document", preceding Section 1.) should be read before beginning installation.



**NOTE:**

Locations of circuit pack units are shown in Figure 4-1 for Release 6 configurations, Figure 4-2 for Release 7 configurations, Figure 4-3 for Release 8 configurations and Figure 4-4 for Releases 9 and 11 configurations. Release 13 configurations for the HDSL and TMUX applications are shown in Figure 4-5 and Figure 4-6, respectively.



**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 Packs

---

### BBG5 (SYSCTL) Circuit Pack

---

1. The SYSCTL (BBG5) circuit pack (Releases 6 and 7) has four option switches for assigning:
  - Telemetry byte-oriented serial (TBOS) display number
  - TBOS backup number
  - Central office (CO) or remote terminal (RT) location
  - Site address
  - Shelf ID number
  - Front access data rate
  - Rear access data rate
  - Alarm indication of power minor
  - Shelf terminator selection.



**NOTE:**

At the CO, the far-end telemetry closure number is dependent upon the CO and RT site addresses. Unless otherwise specified, the CO site address should be set for Site 7.

2. Set the SYSCTL circuit pack option switches as shown in Figure 4-7.



**NOTE:**

In the absence of specified settings, the suggested SYSCTL option setting guidelines are located in Table 4-2 (TBOS figure included).

3. Place, but do not fully install, the SYSCTL circuit pack into the shelf.

### BBG8 (SYSCTL) Circuit Pack

---

1. The SYSCTL (BBG8) circuit pack (Releases 8, 9, 11 and 13) has two option switches for assigning:
  - Product Identification
  - TBOS termination



**NOTE:**

TBOS is not available in Release 13 software.

2. Set the SYSCTL circuit pack option switches as shown in Figure 4-8.

3. Place, but do not insert into the shelf connector [fully install], the SYSCTL circuit pack into the shelf.

### **BBG7 (OHCTL) Circuit Pack**

---

The BBG7 circuit pack (Releases 6 and 7) has two option switches, S1 and S2.

1. Switch S1 sets the network element number of the shelf. The network element number and the site ID form a unique address for a shelf at a site. Determine the network element number from system engineering information and set S1 as shown in Figure 4-9.
2. For use in Releases 6 and 7 the switch should be set as shown in Figure 4-9. Switch S2 is used to control the identification of the DCC for open systems interconnection (OSI) interworking.
3. Place, but do not insert into the shelf connector [fully install], the BBG7 circuit pack in the shelf.

### **BBG9 (OHCTL) Circuit Pack**

---

1. The OHCTL (BBG9) (Releases 8, 9, 11 and 13) has no option switches. All options are exercised through software commands.
2. Place, but do not insert into the shelf connector [fully install], the SYSCTL circuit pack into the shelf.

### **BBG10 (OHCTL) Circuit Pack**

---

1. The BBG10 is for use with the Megastar system. It is used in place of the BBG9 OHCTL.
2. The OHCTL (BBG10) (Releases 8, 9, 11 and 13) has no option switches but does have a jumper to select between E1-Only or Multiplexed order wire capability.
3. Place, but do not insert into the shelf connector [fully install], the SYSCTL circuit pack into the shelf.

## **Transmission and Timing Circuit Packs**

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### **BBG2 (MXRVO) Circuit Pack**

---

The BBG2 circuit packs are required if the low-speed slots in the same function group are to be equipped with BBF1B (DS1) or BBF3 (DS1PM) circuit packs.

1. The BBG2 circuit pack has no customer set options.
2. Place, but do not fully install, the BBG2 circuit pack(s) into the shelf.

### **BBG4 (DS3) or BBF4B (DS3PM) Circuit Pack**

---

The BBG4 (DS3) or BBF4B (DS3PM) circuit pack is used when the low speed input is to be a DS3 signal. The low speed DS1 slots in the same function group will be unequipped when a BBG4 circuit pack is used.

The BBG4 or BBG4B circuit pack has two option jumpers for line build out (LBO).

1. Set the BBG4 or BBG4B circuit pack option jumpers (for distance to the DSX) as shown in Figure 4-10.
2. Place, but do not fully install, the circuit pack(s) into the shelf.

### **BBG19 (DS3) Circuit Pack**

---

The BBG19 circuit pack has the input and output connections on the faceplate rather than on the backplane. There are two versions of the BBG19. The s1:1 BBG19 is a modified BBG4B on which the DS3 input and output connections are brought to the front of the pack via coaxial cables. The s1:2 BBG19 has a redesigned printed wiring board on which the DS3 input and output are brought to the faceplate through the printed wiring board. Refer to the BBG4B description for further information. Circuit pack option jumpers are shown in Figure 4-10 and are identical to those for the BBG4B.

### **BBG20 (Transmultiplexer) Circuit Pack**

---

The new TMUX circuit pack (BBG20) provides path termination functions for an M13 or C-bit parity DS3 signal. It demultiplexes the DS3 into 28 DS1s, performs DS1 PM, maps each DS1 into a VT1.5, and multiplexes the 28 VT1.5s into an STS-1. The BBG20 circuit pack has LBO jumpers to set the level and shape of signal for the DSX-3.

1. Set the jumper for the cable length to be used as shown in Figure 4-11.
2. Place, but do not insert into the shelf connector [fully install], the BBG20 circuit pack into the shelf.

## **BBF1B (DS1) and BBF3 (DS1PM) Circuit Packs**

---

The BBF1B and BBF3 (DS1PM) circuit packs requires that the function unit slots in the same function group be equipped with BBG2 (MXRVO) or BBG6 (EC-1) circuit packs set to high speed option.

The BBF1B (DS1) and BBF3 (DS1PM) circuit packs 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, must be set to OFF for the BBF3.



**NOTE:**

When a BBF3 circuit pack is used anywhere within a low speed group and DS1 protection is desired, the DS1 circuit pack occupying the protection slot of that group must be a BBF3.



**NOTE:**

Each DS1 channel's line code can be individually set. 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 4-12.
2. Place, but do not fully install, the DS1 circuit pack(s) into the shelf.



**NOTE:**

If the function group is equipped for low speed protection, a 177A retainer **MUST** be inserted in all vacant low speed service slots in a partially equipped function group.

3. If 177As are required, place but do not fully install, the 177As into the shelf.

## **BBF2/BBF2B (TGS) Circuit Packs**

---

The BBF2 circuit pack has one option switch for assigning the following:

- DS1 line code (AMI or B8ZS)
  - Frame format (superframe or extended superframe)
  - Timing format (external, free running, or loop-timed).
1. Set the BBF2 circuit pack option switch per office timing source as shown in Figure 4-13.
  2. Place, but do not fully install, the BBF2 circuit packs into the shelf.

The BBF2B circuit pack has two option switches for assigning the following:

- DS1 line code (AMI or B8ZS)
  - Frame format (superframe or extended superframe)
  - Timing format (external, free running, loop-timed or sync out mode).
  - Equalizer Setting (0-655ft).
1. Set the BBF2B circuit pack option switches per office timing source and required equalization as shown in Figure 4-14.
  2. Place, but do not fully install, the BBF2B circuit pack(s) into the shelf.

### **BBF8 (HDSL) Circuit Pack**

---

The BBF8 circuit pack has one option switch for assigning the following:

- HDSL start-up (master or slave)
  - HDSL management (local or through)
1. Set the option switch for operation as planned as shown in Figure 15.
  2. Place, but do not fully install, the BBF8 circuit packs into the shelf.



**NOTE:**

Only three BBF8 circuit packs can be used in a function group. See 363-206-285 *DDM-2000 OC-3 Multiplexer User/Service Manual* for more details on use of this circuit pack.

### **Optical Line Interface Units**

---



**CAUTION:**

*For all OLIUs, if a single mode fiber is used, any LBO, other than 0 dB, must be placed in the transmit (OUT) connector of the circuit pack. For multimode fibers, such an LBO must be on the receive (IN) connector.*

### **21G (OLIU) Regenerator**

---

The 21G OLIU circuit pack (Releases 6 and 8) has one option switch for assigning the output power.

1. Set the 21G OLIU circuit pack option switch for low-output power per Figure 4-16.
2. Place, but do not fully install, the 21G circuit pack(s) into the shelf.

 **NOTE:**

Releases 6 and 8 configurations may require (depending on the configuration) 21G optical line interface unit (OLIU) circuit packs in function unit positions and also in the Main OLIU positions. Releases 7, 9, 11 and 13 do not use the 21G OLIU.

### **22F/22F-U/22F2-U (OLIU) Circuit Packs**

The 22F OLIU circuit packs are required for ring configurations (Releases 7, 9, 11 and 13) and linear configurations if the add/drop function is being utilized (Releases 6 and 8).

1. The 22F OLIU circuit pack has no customer set options.
2. Place, but do not fully install, the 22F OLIU circuit pack(s) into the shelf.

### **22G-U/22G2-U/22G3-U (OLIU) Circuit Packs**

The 22G3-U circuit pack replaces all 22F and all previous 22G circuit packs. Care should be taken if the circuit pack at the other end of the fiber is a 22F or a 22G-U circuit pack because the latter two are not designed to accept the greater optical power levels emitted by the 22G3-U (or by the 22G2-U).

The 22G-U and 22G3-U OLIU circuit packs have no customer switch set options.

3. The 22G-U OLIU circuit pack is shipped with a 0 dB *S7*<sup>®</sup> universal LBO installed. If an SC or FC/PC connector or different LBO is required; the universal LBO can be ordered separately. See Table 4-3
  1. To remove the universal LBO.
  2. Depress the locking tab on the buildout until it 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 4-16 for the specific buildout type.
  3. To install the universal LBO.

Do not attach the LBO 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 4-16 for the specific buildout type.
4. Place, but do not fully install, the 22G-U OLIU circuit pack(s) into the shelf.

## **21D (OLIU)**

---

The 21D OLIU circuit packs provide an economical advantage to the 21G OLIU for very short fiber spans and are typically used to optically interface with the DDM-2000 OC-12.

1. The 21D OLIU circuit pack has no customer set options.
2. Place, but do not fully install, the 21D OLIU circuit pack(s) into the shelf.

## **22D-U (OLIU)**

---

The 22D-U OLIU circuit packs provide an economical advantage to the 22F or 22G-U OLIU for very short fiber spans and are typically used to optically interface two shelves within the same office.

1. The 22D-U OLIU circuit pack has no customer switch set options.
2. The 22D-U OLIU circuit pack is shipped with a 0 dB ST<sup>®</sup> universal LBO installed. If an SC or FC/PC connector or different LBO is required; the universal LBO can be ordered separately. See Table 4-3
  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 4-19 for the specific buildout type.
  3. To install the universal LBO.

### **NOTE:**

Do not attach the LBO 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 4-19 for the specific buildout type.
3. Place, but do not fully install, the 22D-U OLIU circuit pack(s) into the shelf.

## **27G-U (OLIU)**

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The 27G-U OLIU is used in Releases 9, 11 and 13 configurations for shelves acting as DDM-2000 FiberReach host nodes.

1. The 27G-U OLIU circuit pack has no customer set options.
2. For DDM-2000 OC-3 shelves serving as FiberReach host nodes in a dual homing application, the function unit slot in which the 27G-U OLIU is to be inserted is crucial for proper operation. This function unit position must be coincident with the Main OLIU that is receiving its signal from the direction of the node where the signal was originated (not from the direction of the other FiberReach host). When this is the Main-1 OLIU, the 27G-U OLIU must be inserted in the function unit a-1, b-1, or c-1 position since function unit position 1 is associated with Main-1. When this is the Main-2 OLIU, the 27G-U OLIU must be inserted in the function unit a-2, b-2, or c-2 position since function unit position 2 is associated with Main-2. For an example of a FiberReach dual homing application, refer to Figure 4-17.
3. Place, but do not fully install, the 27G-U OLIU circuit pack(s) into the shelf.

## **24G-U (OLIU)**

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The 24G-U OLIU is used in Releases 11 and 13 configurations for shelves acting as DDM-2000 OC-12 interconnections. This allows an OC-3 shelf to be connected into an OC-12 ring without needing an OC-12 shelf.

1. The 24G-U OLIU circuit pack has no customer set options.
2. The functionality of the 24G-U is similar to the 22-type OLIU circuit packs, with add/drop and ring configurations with its VT1.5 and STS-1 TSI capabilities, but supports OC-12 long reach applications from an OC-3 shelf. The 24G-U OLIU's TSI performs cross-connections from the Main shelf position and it has access to the entire capacity of the OC-12 signal. Up to three of the 12 STS-1s in the OC-12 payload are presented to the TSI, but all 12 STS-1s are passed through a faceplate connector to the other Main 24G-U for ring functionality. This requires a jumper cable that is connected from the faceplate connector of one 24G-U to the faceplate connector of the second 24G-U in the adjacent slot.
3. Place, but do not fully install, the 24G-U OLIU circuit pack(s) into the shelf.

## Other Circuit Packs

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### BBF5 (Jumper) Circuit Pack

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The BBF5 (jumper) circuit pack is required only for DDM-2000 OC-3 shelves (prior to Group 4) with 27G-U / 27G2-U OLIUs in both slot positions of a function unit group.

1. Place, but do not fully install, the BBF5 circuit pack in the low speed group protection slot 8(P) associated with the function unit group where 27G-U OLIUs are equipped or in protection slot 8(P) and slot 4 where 27G2-U are equipped.



**NOTE:**

BBF5 circuit packs are not required for Group 4 shelves.



**NOTE:**

The BBF5 is NOT required when a single slot of a function unit pair is occupied by a 27G-U or 27G2-U (such as host nodes for a dual homed Fiber-Reach application).

### BBG6 (STS-1E) Circuit Pack

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The BBG6 circuit pack (Releases 6, 7, 8, 9, 11 and 13) is used to provide bidirectional transport of one EC-1 signal through the DDM-2000 Multiplexer.

The BBG6 circuit pack has two option switches:

- High/Low speed switch where the STS-1E high speed mode interfaces with the DS1 circuit packs in a function unit group at the VT-G rate. STS1E low speed mode interfaces with the OLIU circuit pack at the STS-1 rate.



**NOTE:**

The BBG6 (STS1E) high speed mode is only available with Release 6.0 or higher **linear** systems.

- Line build out switch (distance to DSX or terminating equipment)

1. Set the BBG6 circuit pack option switches as shown in Figure 4-18.
2. Place, but do not fully install, the BBG6 circuit packs into the shelf.

## Software Download Procedure

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### Preparation

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1. Verify that the following is available:
  - Diskettes containing the DDM-2000 OC-3 Release software required
  - 363-206-2##, *DDM-2000 OC-3 Multiplexer, Software Release Description* (provided with the software diskettes)
  - 363-206-202 (Releases 6 and 7), 363-206-280 (Releases 8, 9 and 11) or 363-206-285 (Release 13) *DDM-2000 OC-3 Multiplexer, User/Service Manual*, as appropriate (provided with the DDM-2000 shelf).
2. Verify that the PWR ON (power on) LED on the DDM-2000 OC-3 shelf user panel is lighted.
3. Insert the BBG7 or BBG9/BBG10 (OHCTL) circuit pack into the shelf position. The FAULT LED on the circuit pack will light.
4. For BBG5 circuit packs, option the "front access data rate" as follows (BBG8 circuit packs are autobaud and require no switch settings):

 **NOTE:**

The data rate (baud rate) on the BBG5 circuit pack must be set to be compatible with that of the PC. The higher the rate used for communicating, the faster the software can be downloaded. A rate higher than 9600 baud is NOT recommended.

- Locate the switch S3 (Figure 4-7) on the BBG5 circuit pack. It is the lower of the three switches mounted near the faceplate end of the printed wiring board and "S3" is stamped adjacent to it.
  - Set the "front access data rate" using the first three positions of the S3 switch (refer to Figure 4-7). Ignore all other switch settings at this time.
5. Insert the BBG5 or BBG8 (SYSCTL) circuit pack into the slot adjacent to the user panel.

 **NOTE:**

Installing the circuit pack requires some force.

The FAULT LED on the BBG5 or 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 SYSCTL and OHCTL circuit packs are not equipped with software.

## Download Procedure

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### NOTE:

Refer to the "Install New Generic Program" (DLP-532) of 363-206-202 (Releases 6 and 7), 363-206-280 (Releases 8, 9 and 11) and 363-206-285 (Release 13), *DDM-2000 OC-3 Multiplexer, User/Service Manual* while performing the following procedure. If unfamiliar with the operation of the PC, refer to the "Introduction to the PC" (DLP-533) of any of these DDM-2000 OC-3 Multiplexer, User/Service Manuals.

1. With the PC **not** connected to the DDM-2000 OC-3 shelf, insert the first diskette into the PC.
2. Use the appropriate MS-DOS command (for example, a: or b:) to go to the drive where the diskette is inserted.
3. Enter the term command. Observe the message that is printed. Verify that the PC is set for the same baud rate as the BBG5 circuit pack. The message gives the user the choice to continue or not continue with the download procedure. If the user chooses to continue, observe the following response:

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

4. Connect the PC to the CIT connector on the front of the shelf user panel.
5. Press the RETURN (or ENTER) key on the PC (press twice for Releases 8, 9, 11 and 13).

Response:

```
/*Enter a shelf number from 1 to 8*/  
shelf [default]=
```

6. Again press the RETURN (or ENTER) key.

Response:

```
In Progress .....
```



### NOTE:

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

7. Remove the existing diskette and insert the next diskette.

After the completion of the software download, a message **ins-prog: TID COMPLD** will appear.

8. For Releases 7.2, 8, 9 and 11, an AGNE alarm will exist upon completion of the download. To extinguish this alarm, set the AGNE to yes by using the **set-ne** command.

 **NOTE:**  
AGNE is not available in Release 13.

9. Repeat the software download procedure for the spare SYSCTL and OHCTL circuit packs.

## Circuit Pack Installation

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### Description

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This section provides the recommended order for circuit pack installation.

Locations of circuit pack units are shown in Figure 4-1 for Release 6, Figure 4-2 for Release 7, Figure 4-3 for Release 8, Figure 4-4 for Releases 9 and 11 and either Figure 4-4, 4-5 or 4-6 for Release 13.

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 pushbutton on the SYSCTL 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

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1. The BBG7 or BBG9/BBG10 (OHCTL) circuit pack should already be in place from the previous software download procedure.
2. Remove the BBG5 or BBG8 (SYSCTL) circuit pack and reinsert it into the shelf.
3. When the user panel CR LED flashes, depress the UPD/INIT pushbutton 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.

4. Fully insert the BBF2 or BBF2B (TGS) circuit packs into the shelf.
5. Fully insert the BBG4 (DS3), BBG4B (DS3PM), BBG2 (MXRVO) or BBG6 (STS-1E) circuit packs into the shelf.

**⇒ NOTE:**

For BBG6 (STS-1E) circuit packs set for high speed mode, place an EC-1 loopback at the DSX cross-connect panel. If a DSX is not used, place a BNC to BNC connector at the end of the respective DS3 cables or have Craft Personnel place an internal loopback at the terminating equipment (FT-2000/DACS IV 2000).

6. Fully insert the BBF1B (DS1), BBF3 ((DS1PM) or BBF5 (jumper) circuit pack(s) into the shelf.

**⇒ NOTE:**

If a function group is equipped for DS1 protection, a 177A retainer MUST be inserted in all vacant service slots.

## **OLIU Preparation**

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### **Preparation Procedure**

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For ED-8C724-30, Group 1 shelves remove the fiber tray cover from the bottom front of the DDM-2000 OC-3 shelf. This cover is attached to the fiber tray by two screws.

For ED-8C724-30, Group 3 shelves turn the J-hooks in the fiber tray to the horizontal position, to later allow fiber to pass under the hook.

**⇒ NOTE:**

The main OLIU slot positions at the left side of the shelf will be equipped with OLIU circuit packs. Some shelf configurations may require OLIU circuit packs in some of the function unit positions.

## Cleaning Procedure

---



**NOTE:**

All *ST@* connectors and couplings should be cleaned before doing initial connections or reconnections following the procedure.

1. On the printed wiring board side of the OLIU circuit pack's faceplate, disconnect one of the *ST@* connectors from the faceplate coupling.
2. Clean the end and sides of the connector tips with a lint-free, optical quality tissue.
3. Blow any lint or dust from the connector, using a canned air duster 3 inches from the face of the connector.
4. Clean the coupling on the faceplate of the OLIU by rotating a pipe cleaner, moistened with isopropyl alcohol, inside the coupling.
5. Install the *ST@* connectors 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.
6. Replace but do not fully insert OLIUs in their respective shelf slot positions at this time.



**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.



**NOTE:**

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.



**CAUTION:**

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



**CAUTION:**

*Cables for any front connecting BBG19-U circuit packs should be laid in the front fiber tray before the optical fiber cables are put in place. This avoids crushing of the optical fibers by the BBG19-U cables.*

7. For Group 3 shelves place the optical fiber cables in the fiber tray under the J-hooks, turn the J-hooks from the horizontal back to vertical, and route the cables out the side of the fiber tray. Group 4 shelves do not have J-hooks.

The cables for the BBG19-U should be installed in this tray before the optical fiber cables. Then the optical fiber cables should be placed in the fiber tray. The BBG19-U circuit packs can be used in a Group 3 shelf if the optional deep front cover (G3 to G4 Front Cover Modification Kit, 847544177) is used and the BBG19-U cables are installed before the optical fiber cables.

8. Attach the fiber tray cover to the DDM-2000 OC-3 shelf.

## **Final Operations**

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### **Procedure**

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1. Fully insert all circuit packs, except OLIUs. Verify that all circuit packs other than the OLIUs are installed.
2. If there are any FAULT LEDs ON, press the UPD/INIT pushbutton on the SYSCTL circuit pack.
3. If there are still FAULT LEDs ON, ignore them until the installation process is completed. Any failures will be isolated in the following sections.
4. Leave office alarm cables disconnected until all testing has been completed.

**Table 4-2. DDM-2000 OC-3 Shelf Circuit Pack Codes**

Product Code	Description	Max/ Shelf (Note1)	Min/ Shelf (Note2)
ED-8C724-30, G3/G4	DDM-2000 Shelf Assembly	-	-
BBG2	MXRVO Circuit Pack	6†	-
BBG4/BBG4B	DS3 Circuit Pack	6	-
BBG19	DS3 Circuit Pack	6	-
BBG20	Trans-Mux	-	-
BBG5/BBG8	SYSCTL Circuit Pack	1	1
BBG6	STS-1E Circuit Pack	6	-
BBG7/BBG9/BBG10	OHCTL Circuit Pack	1	1
BBF2/BBF2B	TGS Circuit Pack	2	2
BBF1B/BBF3	DS1PM Circuit Pack	24†† *	-
BBF8	HDSL Circuit Pack	9#	-
177A	Retainer*	.*	-
21G	OLIU	-‡	-
21D	OLIU	-‡	-
22F	OLIU	-‡	-
22G-U	OLIU	-‡	-
22D-U	OLIU	-‡	-
24G-U	OLIU	2	-
27G-U	OLIU	-‡	-

*Notes:*

1. Maximum per shelf is based on Point-to-Point applications only.
  2. Minimum functionality, as defined here, includes protection switching, thus protection circuit packs are included.
- † An even number of MXRVOs, DS3s and/or EC-1s must be installed to accommodate protection switching. Also, the sum of MXRVOs, DS3s and EC-1s cannot exceed six.
- †† For every function group equipped with MXRVOs, between two and eight DS1s must be installed.
- \* Unequipped DS1 service slots in an in-service low speed group MUST be terminated with 177A retainers. The sum of DS1s and 177As MUST total eight per function group to accommodate protection switching.
- ‡ For 21 and 22 type OLIUs, minimum and maximum circuit pack quantities are determined by network topology. 21 type OLIUs are not used with ring Releases 7, 9, 11 and 13. 27G-U OLIUs are used only with Releases 9, 11 and 13 shelves configured as DDM-2000 FiberReach hosts.
- # A maximum of 3 BBF8 circuit packs can be used per function group.

**Table 4-3. SYSTL Option Setting Guidelines**

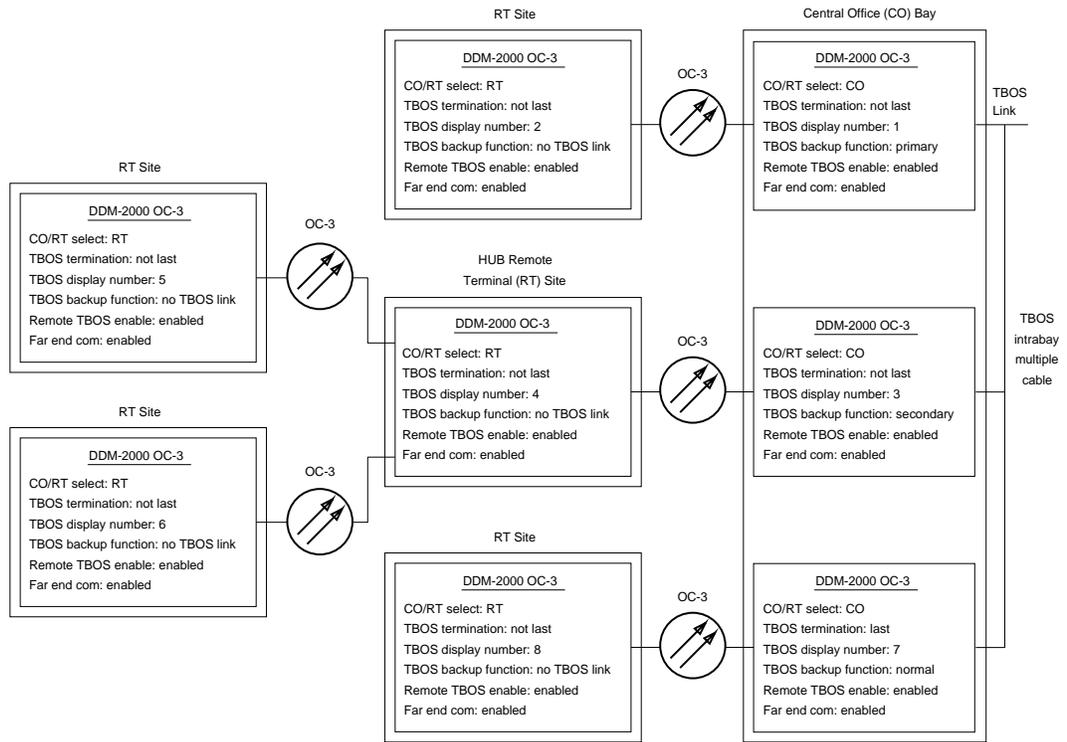
Examples in a CO:

- Set CO/RT switch for CO
- Set site address for site 7
- Set front and rear access data rate for 9600
- Set power minor for office minor
- Set the first shelf in the TBOS link to primary (if applicable, set to secondary)

Examples in an RT:

- Set CO/RT switch for RT
- Set site address for a site other than 7
- Set front and rear access data rate for 9600
- Set power minor for office minor
- Set TBOS Display number, one number higher than the CO shelf number it is linked to
- Set TBOS backup number for no TBOS

Example of TBOS-Related Provisioning for DDM-2000 OC-3 Only Applications



**Table 4-4. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red



**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.

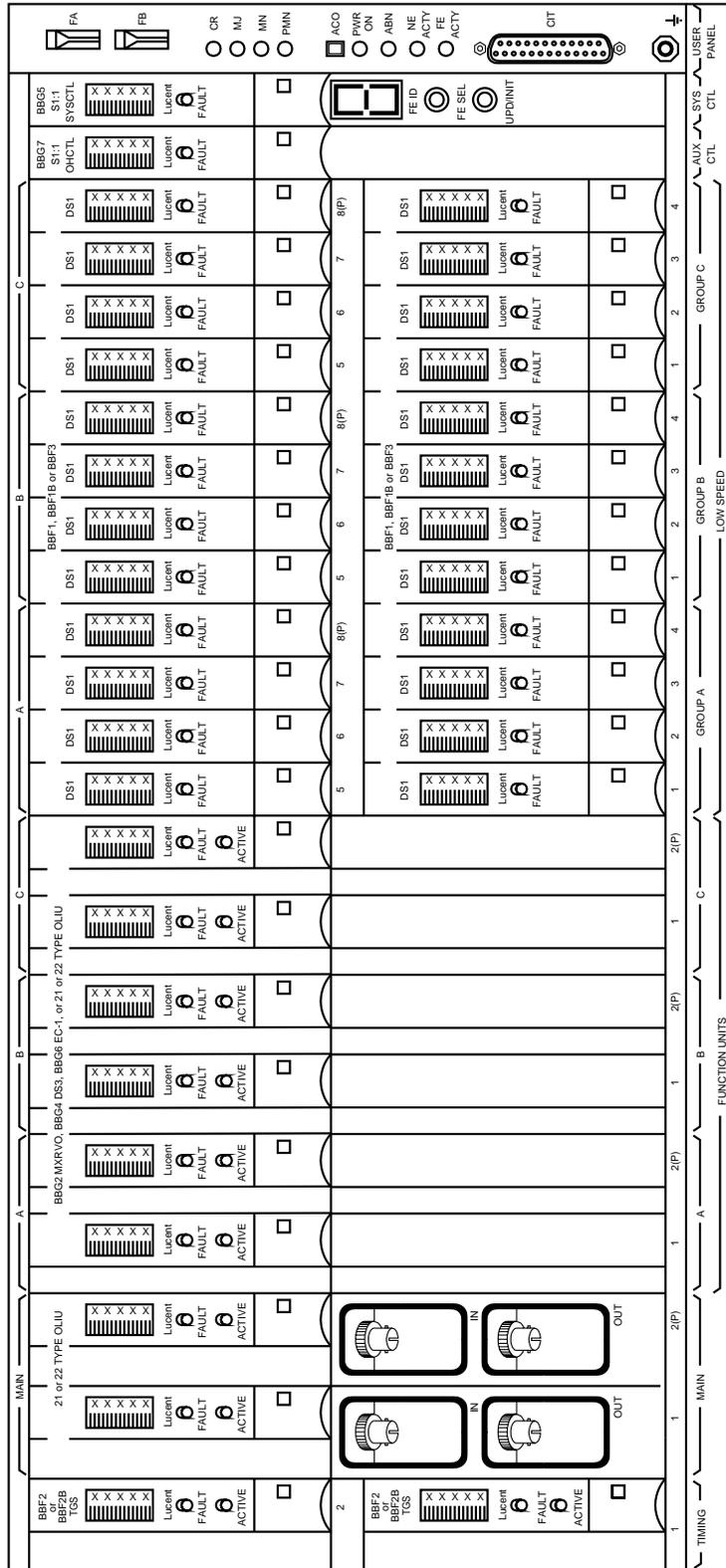


Figure 4-1. DDM-2000 OC-3 Shelf with Circuit Packs (Release 6)

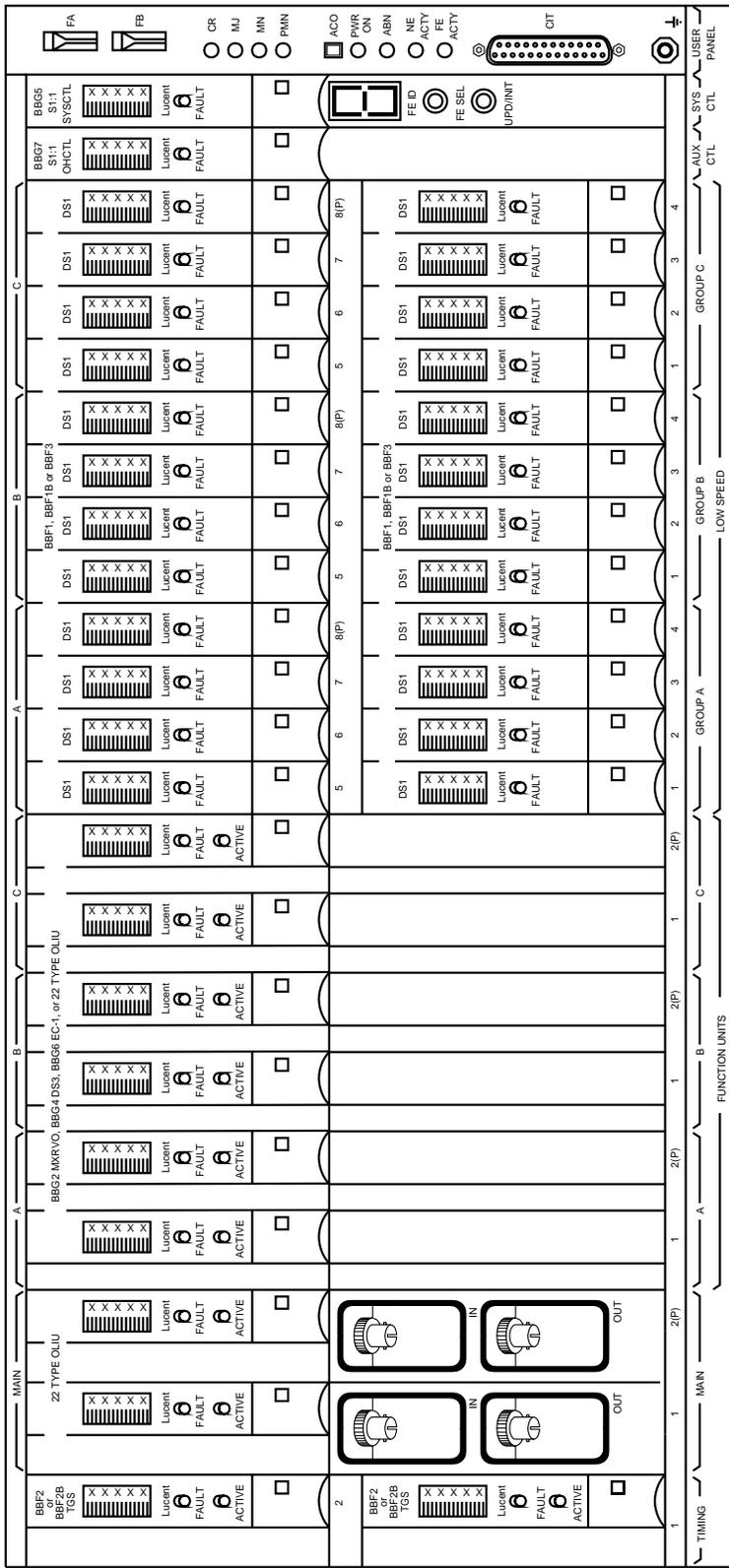


Figure 4-2. DDM-2000 OC-3 Shelf with Circuit Packs (Releases 7 and 7.2)

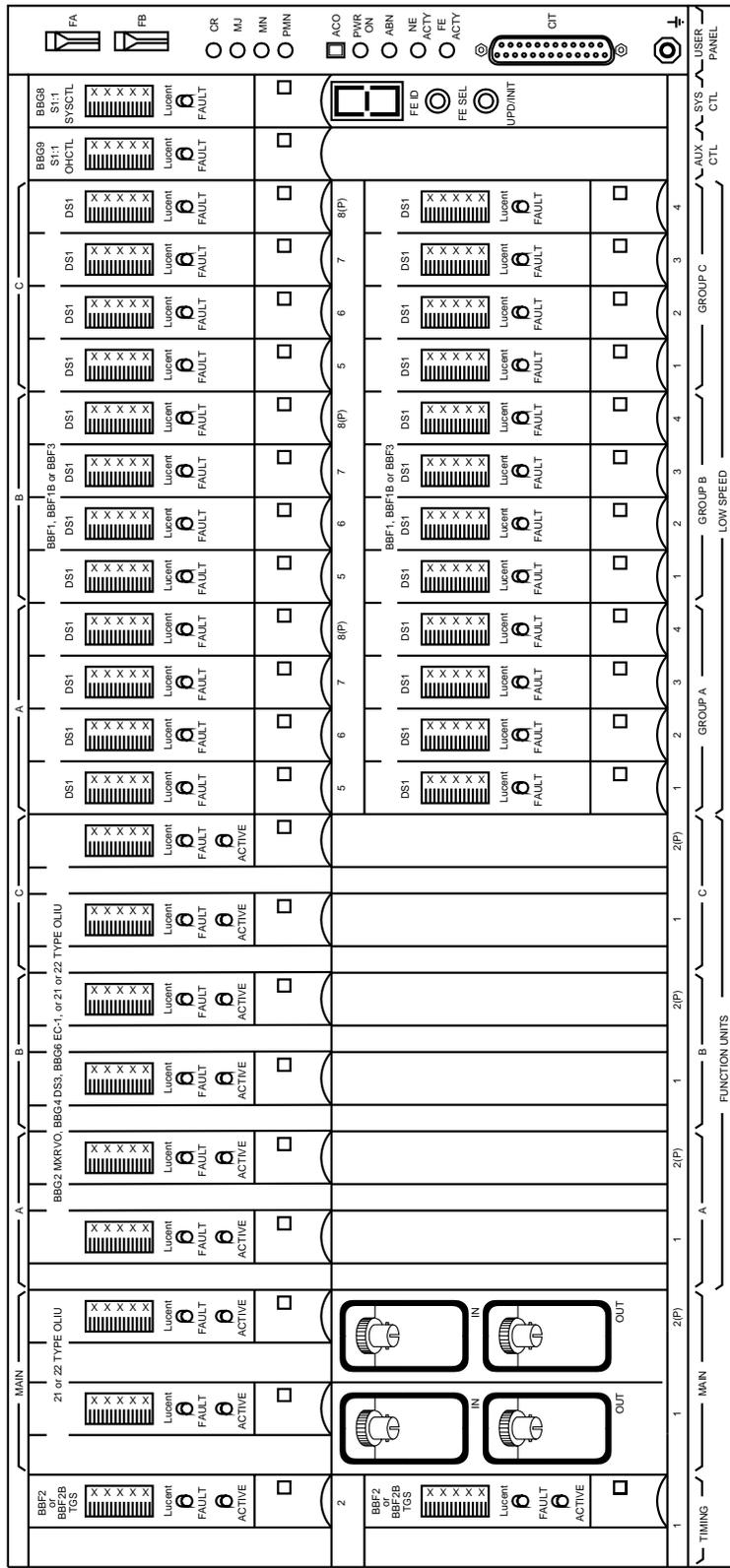


Figure 4-3. DDM-2000 OC-3 Shelf with Circuit Packs (Release 8)

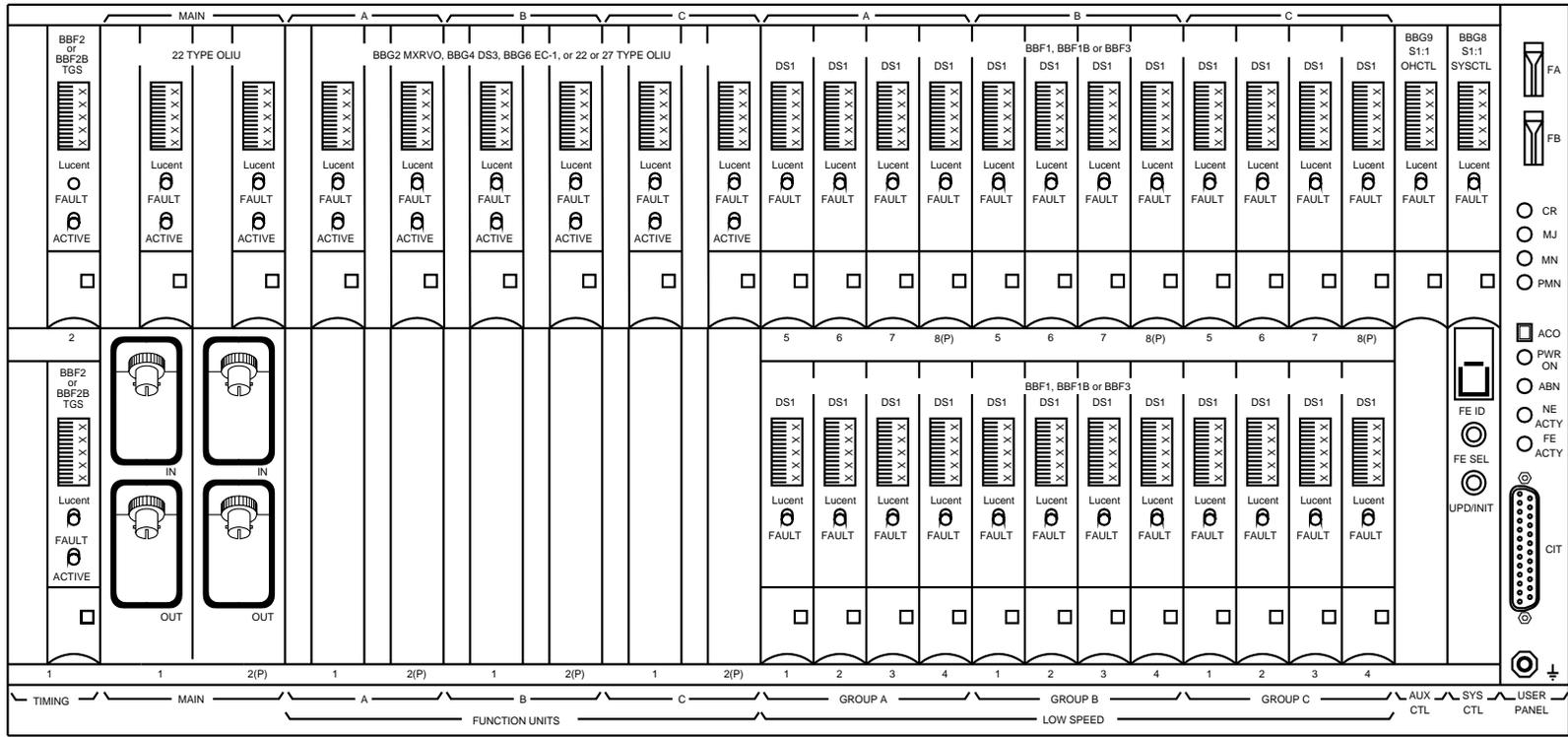


Figure 4-4. DDM-2000 OC-3 Shelf with Circuit Packs (Releases 9, 11 and 13)

**NOTE:**  
See Figures 4-5 and 4-6 for other Release 13 configurations.

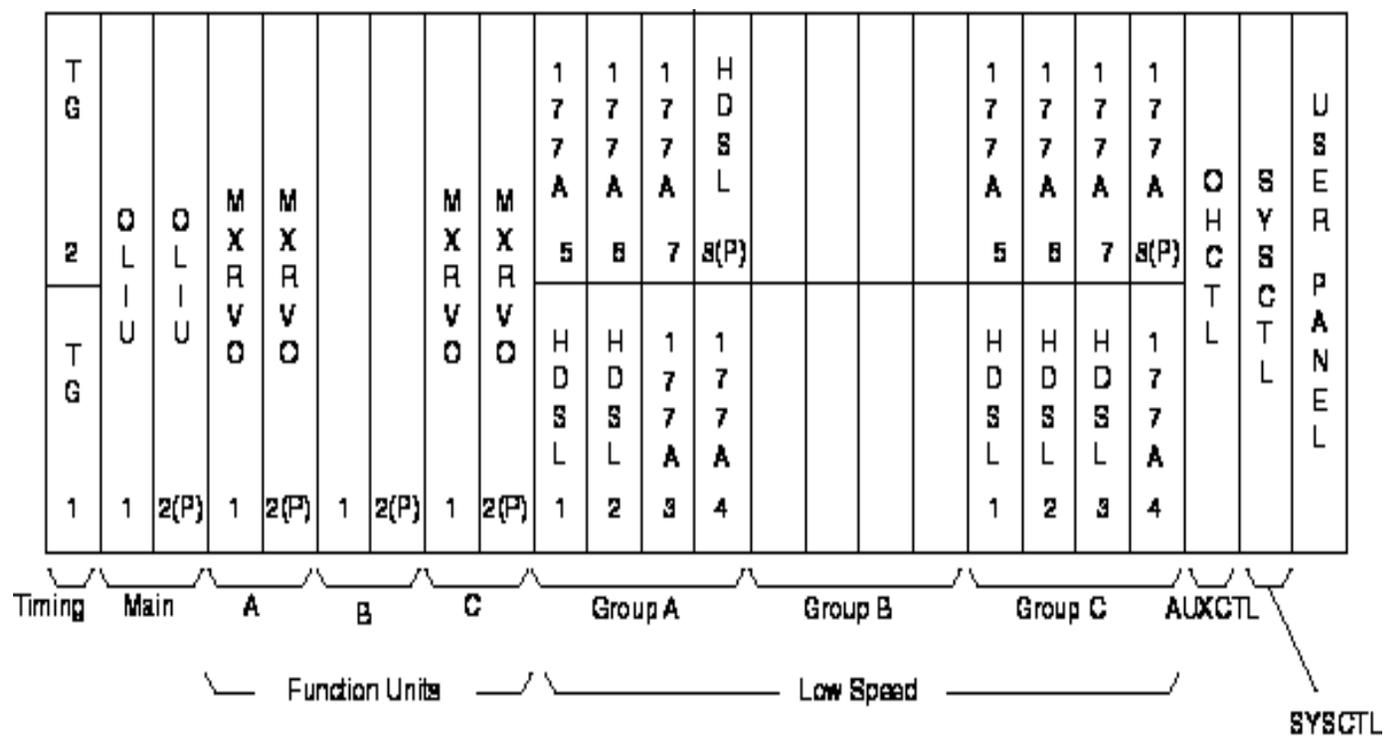


Figure 4-5. DDM-2000 OC-3 Shelf with HDSL Circuit Pack Configurations

**NOTE:**  
 Power considerations limit the number of HDSL packs in each function group to three.

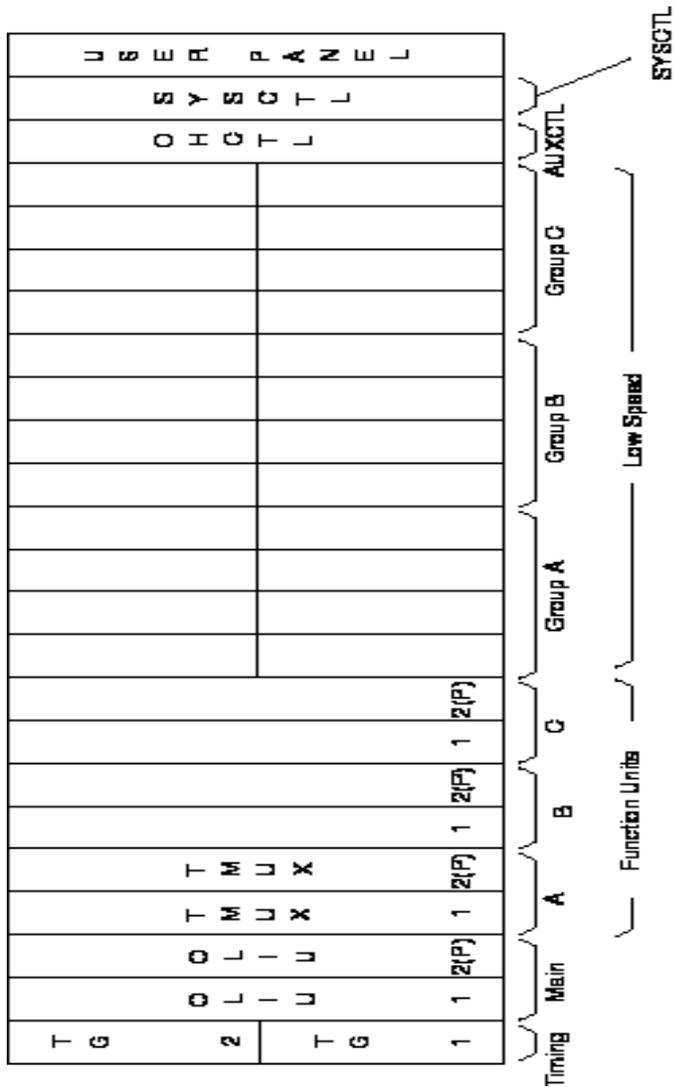
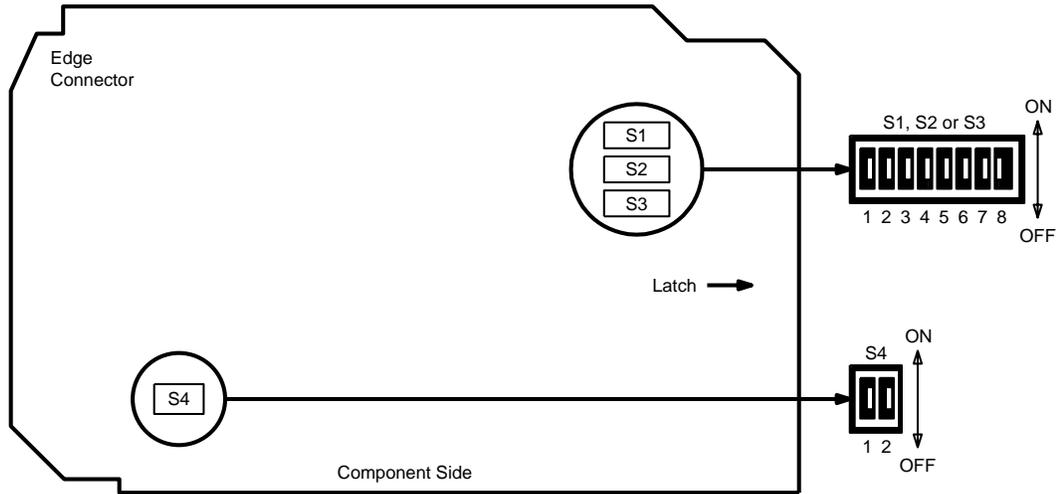


Figure 4-6. DDM-2000 OC-3 Shelf with TMUX Circuit Pack Configuration



***BBG5 (SYSCTL) Option Notes:***

1. The SYSCTL has four option switches which must be properly set. Refer to the option switch settings of Figure 4-5 on the following pages.
2. All switches should be set per the customer's engineering records. In the absence of engineering records, refer to Table 4-2

---

**Figure 4-7. BBG5 (SYSCTL) Option Switches (Sheet 1 of 5)**

Switch 1 Settings

TBOS Display Number				TBOS Backup Number			CO/RT		Remote TBOS	
Value	Sec 1	Sec 2	Sec 3	Value	Sec 4	Sec 5	Value	Sec 6	Value	Sec 7
1	ON	ON	ON	Primary	ON	ON	RT	OFF	Enabled	OFF
2	OFF	ON	ON							
3	ON	OFF	ON	Secondary	OFF	ON				
4	OFF	OFF	ON							
5	ON	ON	OFF	Normal	OFF	OFF	CO	ON	Disabled	ON
6	OFF	ON	OFF							
7	ON	OFF	OFF	No-TBOS	ON	OFF				
8	OFF	OFF	OFF							

**SYSCTL Switch 1 Notes:**

1. The TBOS display number is the order in which the shelves will report TBOS information when prompted. Typically only point-to-point, odd numbered TBOS displays are in the CO, and even-numbered TBOS displays are in the corresponding RTs.
2. The TBOS backup number is for shelves in a CO connected to TBOS. It prevents failure of a single shelf in a bay from causing a TBOS link failure. The TBOS primary setting assigns a shelf as a backup for a group of shelves that share the same TBOS link. The secondary setting provides a secondary backup. Typically, the shelf cabled to the TBOS is set for PRIMARY and the second shelf in the bay is set for secondary. All other shelves in the CO bay that are associated with that TBOS link are set for NORMAL. All shelves in the RT are set for NO-TBOS.
3. Switch section 6 is set for the shelf's location.
4. Switch section 7 is set for communication to the RT. If either CO or RT is disabled TBOS communication is disabled.
5. Switch section 8 is not used at the present time and must be set to OFF to avoid alarm and fault light generation on the SYSCTL.
6. Even if TBOS is not being used switch sections 1, 2, 3, 4, 5, and 7 of Switch 1 must be properly set. The recommended settings if **TBOS is not being used** are:
  - Sections 1, 2, and 3 of Switch 1 should be set to match sections 1, 2, and 3 of Switch 2.
  - Sections 4 and 5 of Switch 1 should be set to ON and OFF for the No TBOS setting.
  - Section 7 of Switch 1 should be set to ON the disabled setting.

**Figure 4 -7. BBG5 (SYSCTL) Option Switches (Sheet 2 of 5)**

Switch 2 Settings

Site ID Address						Shelf ID Number			
Value	Sec 1	Sec 2	Sec 3	Sec 7 <sup>1</sup>	Sec 8 <sup>1</sup>	Value	Sec 4	Sec 5	Sec 6
1 <sup>2</sup>	ON	ON	ON	ON	ON	1	ON	ON	ON
2 <sup>2</sup>	OFF	ON	ON	ON	ON	2	OFF	ON	ON
3 <sup>2</sup>	ON	OFF	ON	ON	ON	3	ON	OFF	ON
4 <sup>2</sup>	OFF	OFF	ON	ON	ON	4	OFF	OFF	ON
5 <sup>2</sup>	ON	ON	OFF	ON	ON	5	ON	ON	OFF
6 <sup>2</sup>	OFF	ON	OFF	ON	ON	6	OFF	ON	OFF
7 <sup>2</sup>	ON	OFF	OFF	ON	ON	7	ON	OFF	OFF
8 <sup>2</sup>	OFF	OFF	OFF	ON	ON	8	OFF	OFF	OFF
9 <sup>3</sup>	ON	ON	ON	OFF	ON				
10 <sup>3</sup>	OFF	ON	ON	OFF	ON				
11 <sup>4</sup>	ON	OFF	ON	OFF	ON				
12 <sup>4</sup>	OFF	OFF	ON	OFF	ON				
13 <sup>4</sup>	ON	ON	OFF	OFF	ON				
14 <sup>4</sup>	OFF	ON	OFF	OFF	ON				
15 <sup>4</sup>	ON	OFF	OFF	OFF	ON				
16 <sup>4</sup>	OFF	OFF	OFF	OFF	ON				
17 <sup>4</sup>	ON	ON	ON	ON	OFF				
18 <sup>4</sup>	OFF	ON	ON	ON	OFF				
19 <sup>4</sup>	ON	OFF	ON	ON	OFF				
20 <sup>4</sup>	OFF	OFF	ON	ON	OFF				
21 <sup>4</sup>	ON	ON	OFF	ON	OFF				
22 <sup>4</sup>	OFF	ON	OFF	ON	OFF				
23 <sup>4</sup>	ON	OFF	OFF	ON	OFF				
24 <sup>4</sup>	OFF	OFF	OFF	ON	OFF				
25 <sup>4</sup>	ON	ON	ON	OFF	OFF				
26 <sup>4</sup>	OFF	ON	ON	OFF	OFF				
27 <sup>4</sup>	ON	OFF	ON	OFF	OFF				
28 <sup>4</sup>	OFF	OFF	ON	OFF	OFF				
29 <sup>4</sup>	ON	ON	OFF	OFF	OFF				
30 <sup>4</sup>	OFF	ON	OFF	OFF	OFF				
31 <sup>4</sup>	ON	OFF	OFF	OFF	OFF				
32 <sup>4</sup>	OFF	OFF	OFF	OFF	OFF				

Figure 4 - 7. BBG5 (SYSCTL) Option Switches (Sheet 3 of 5)

**SYSCTL Switch 2 Notes:**

1. Switch sections 7 and 8 are not used prior to Release 6.1 (linear) and Release 7.0 (rings) and must be set to the **ON** position. If they are set to the **OFF** position, the **FAULT LED** on the **SYCTL** will light and an alarm will be generated.
2. Only site addresses 1-8 are supported prior to Release 6.1 (linear) and Release 7.0 (rings). For releases prior to these, if more than 8 sites are allowed, you should use unique combinations of the Site ID(SYSTCTL) and NE(OHCTL) settings to prevent duplicate site/ne settings in the same subnetwork.
3. Site addresses 1-10 are supported for Release 6.1 (linear) and Release 7.0 (rings), or later. Switch sections 7 and 8 are used in conjunction with sections 1, 2, and 3 to support the new site addresses.
4. Site addresses 11-16 are will be supported in Release 7.1 (rings) and then only when interworking with OC-12. Switch sections 7 and 8 are used in conjunction with sections 1, 2, and 3 to support the new site addresses.
5. Site addresses 11-32 are will be supported in future releases. Switch sections 7 and 8 are used in conjunction with sections 1, 2, and 3 to support the new site addresses.

**Switch 3 Settings**

Front Access Data Rate				Rear Access Data Rate				Power Minor	
Value	Sec 1	Sec 2	Sec 3	Value	Sec 4	Sec 5	Sec 6	Value	Sec 7
300	OFF	OFF	OFF	300	OFF	OFF	OFF	Office Minor	OFF
1200	OFF	OFF	ON	1200	OFF	OFF	ON		
2400	OFF	ON	OFF	2400	OFF	ON	OFF		
4800	OFF	ON	ON	4800	OFF	ON	ON		
9600	ON	OFF	OFF	9600	ON	OFF	OFF	Office Major	ON
19200	ON	OFF	ON	19200	ON	OFF	ON		
(Invalid)	ON	ON	OFF	(Invalid)	ON	ON	OFF		
(Invalid)	ON	ON	ON	(Invalid)	ON	ON	ON		

**SYCTL Switch 3 Notes:**

1. Switch section 8 must be set to OFF.
2. An invalid data rate setting will revert to 1200 baud, generate an alarm, light the SYCTL FAULT LED, and set TBOS point 14.

**Figure 4 -7. BBG5 (SYCTL) Option Switches (Sheet 4 of 5)**

**Switch 4 Settings**

**TBOS Terminator**

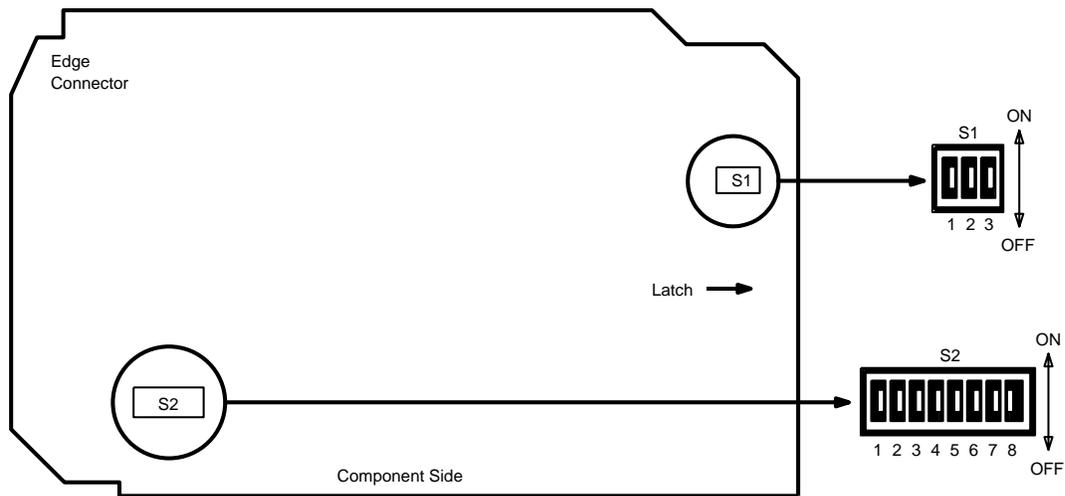
<b>Shelf Location</b>	<b>Sec 1</b>	<b>Sec 2</b>
Not Last	OFF	OFF
Last	ON	OFF

***SYSCTL Switch 4 Notes:***

1. The TBOS terminator is the physical termination of the telemetry daisy-chain. Set the TBOS terminator for "last" if the shelf is the last shelf position on the telemetry daisy-chain at the CO, where the initial link is made.
2. Set the TBOS terminator for "not last" if the shelf is not the last shelf on the telemetry daisy-chain.
3. Set all RT applications as "not last".

---

**Figure 4 -7. BBG5 (SYSCTL) Option Switches (Sheet 5 of 5)**



**Switch 1 Settings**

Product Identification	Sec 1	Sec 2	Sec 3
DDM-2000/SLC-2000/ DDM-2000 FiberReach	OFF	OFF	OFF
MegaStar-2000 R1	OFF	OFF	ON
MegaStar-2000 R2	OFF	ON	ON

***SYSCTL Switch 1 Note:***

1. For DDM-2000 OC-3 applications, switch 1 sections 1, 2 and 3 must be set to the OFF position.

**Figure 4-8. BBG8 (SYSCTL) Option Switches (Sheet 1 of 2)**

**Switch 2 Settings**

**TBOS Terminator**

Shelf Location	Sec 1	Sec 2
Last	ON	OFF
Not Last	OFF	OFF

***SYCTL Switch 2 sections 1 and 2 Notes:***

1. The TBOS terminator is the physical termination of the telemetry daisy-chain. Set the TBOS terminator for "last" (switch 2 section 1 to ON and section 2 to OFF) if the shelf is the last shelf position on the telemetry daisy-chain at the CO, where the initial link is made.
2. Set the TBOS terminator for "not last" (switch 2 section 1 to OFF and section 2 to OFF) if the shelf is not the last shelf on the telemetry daisy-chain.
3. Set all RT applications as "not last" (switch 2 section 1 to OFF and section 2 to OFF).

**Switch 2 Settings (Cont.)**

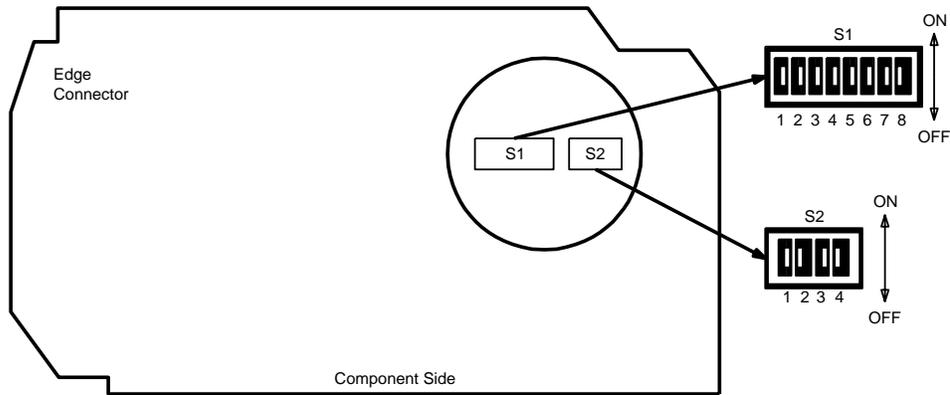
Product Type	Sec 3	Sec 4	Sec 5	Sec 6	Sec 7	Sec 8
FiberReach Wideband Shelf	ON	ON	ON	ON	ON	ON
All other applications	OFF	OFF	OFF	OFF	OFF	OFF

***SYCTL Switch 2 sections 3 and 8 Note:***

1. For DDM-2000 OC-3 applications, switch 2 sections 3 through 8 must be set to the OFF position.

---

**Figure 4 -8. BBG8 (SYCTL) Option Switches (Sheet 2 of 2)**



**Switch 1 Settings**

Network Element	Sec 1	Sec 2	Sec 3
1	ON	ON	ON
2	OFF	ON	ON
3	ON	OFF	ON
4	OFF	OFF	ON
5	ON	ON	OFF
(Invalid)	OFF	ON	OFF
(Invalid)	ON	OFF	OFF
(Invalid)	OFF	OFF	OFF

**Notes:**

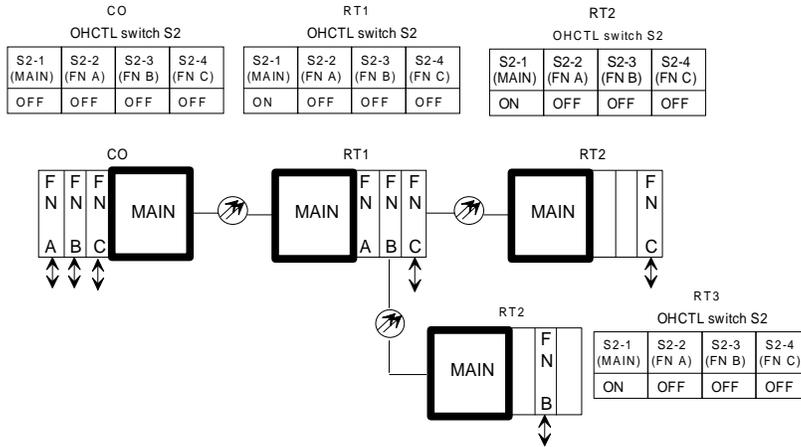
1. Switch S1 sets the network element number of the shelf. The network element number and the site ID number form a unique address for a shelf at a site. Obtain the network element number from the customer.
2. Switch 1, sections 6, 7, and 8 must be set to the ON position. Otherwise, the FAULT LED on the OHCTL circuit pack will light and an alarm will be generated.
3. Switch S2 is unused in early releases, but should be provisioned for section 1 set to ON and sections 2, 3, and 4 to OFF for ease of future upgrading. Any subsequent settings should adhere to specific release specifications.

**Figure 4-9. BBG7 (OHCTL) Option Switches (Sheet 1 of 3)**

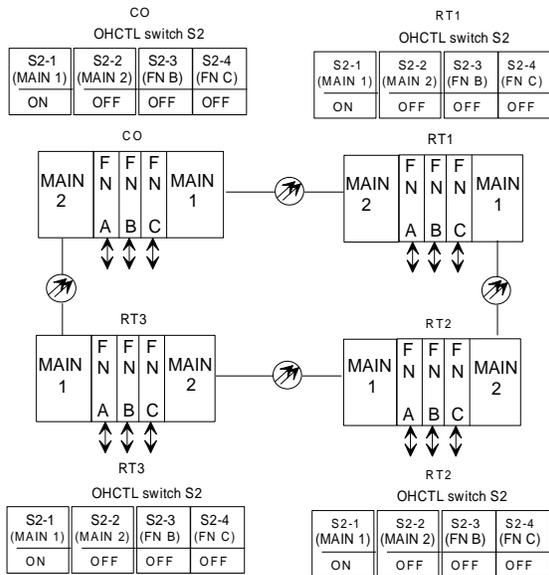
4. In Release 6, switches S2-1 through S2-4 are used to control the identification of the DCC for open systems interconnection (OSI) interworking. For a given optical span, the network elements that terminate on each side of the optical span must have their "network side"/"user side" parameters set to opposite values to avoid an "inconsistent DCC switches" alarm. Switch S2 is set to OFF for the Network Side and ON for the User Side. In linear releases switch S2-1 is associated with the OLIUs in the MAIN slots, switch S2-2 is associated with the OLIUs in the FUNCTION UNIT A slots, switch S2-3 is associated with the OLIUs in the FUNCTION UNIT B slots, and switch S2-4 is associated with the OLIUs in the FUNCTION UNIT C slots. The following figure illustrates the S2 switch settings for switches associated with OLIUs in the MAIN and FUNCTION UNITS slots at each end of the interconnected optical spans for linear/hub configurations.
5. In Release 7 switches S2-1 through S2-4 are used to control the identification of the DCC for open systems interconnection (OSI) interworking. For a given optical span, the network elements that terminate on each side of the optical span must have their "network side"/"user side" parameters set to opposite values to avoid an "inconsistent DCC switches" alarm. Switch S2 is set to OFF for the Network Side and ON for the User Side. In ring releases switch S2-1 is associated with the OLIU in the MAIN 1 slot, switch S2-2 is associated with the OLIU in the MAIN 2 slot, switch S2-3 is associated with the OLIUs in the FUNCTION UNIT B slots, and switch S2-4 is associated with the OLIUs in the FUNCTION UNIT C slots. The following figure illustrates the S2 switch settings for switches associated with OLIUs in the MAIN slots at each end of the optical spans for ring configurations.

---

**Figure 4 -9. BBG7 (OHCTL) Option Switches (Sheet 2 of 3)**

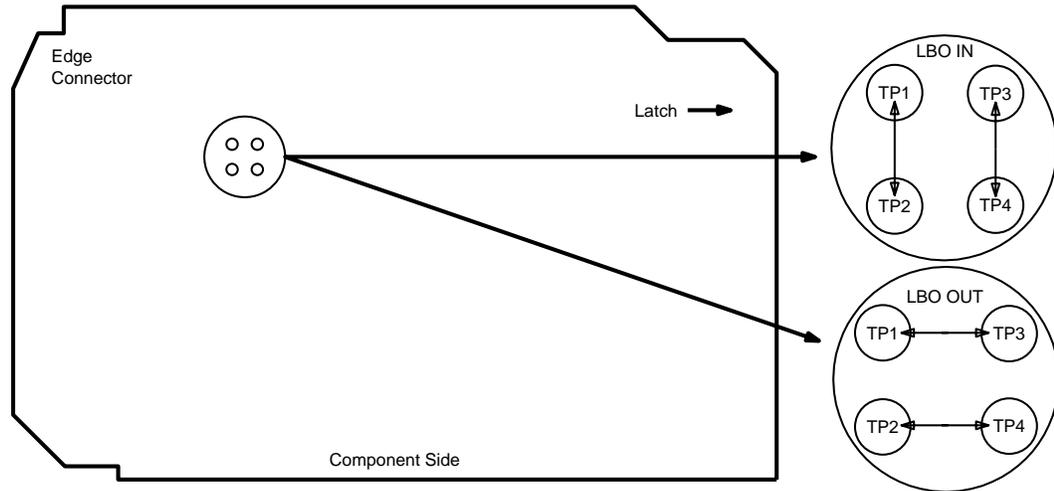


BBG7 (OHCTL) Option switches for linear systems.



BBG7 (OHCTL) Option switches for ring applications.

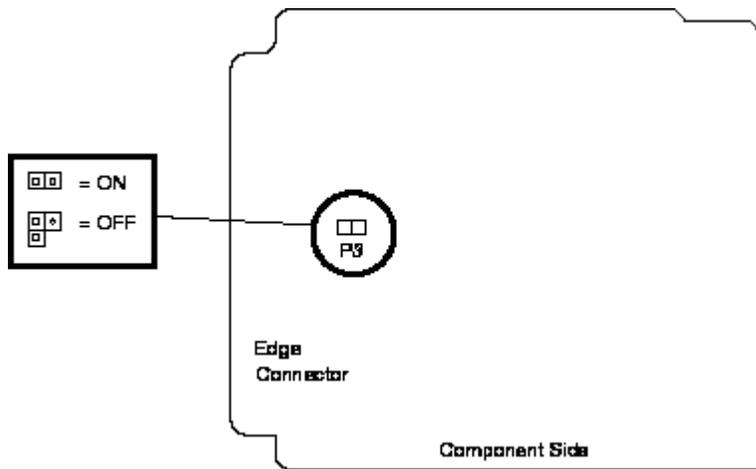
Figure 4 -9. BBG7 (OHCTL) Option Switches (Sheet 3 of 3)



Cable Length (ft.)			Plug Settings (Note)
735A 1735006A	734A	KS-19224, L2	
0 to 125	0 to 125	0 to 75	LBO IN
>125 to 245	>225 to 450	>75 to 150	LBO OUT

**Note:** Set the LBO setting based on the type of cable used and the cable length.

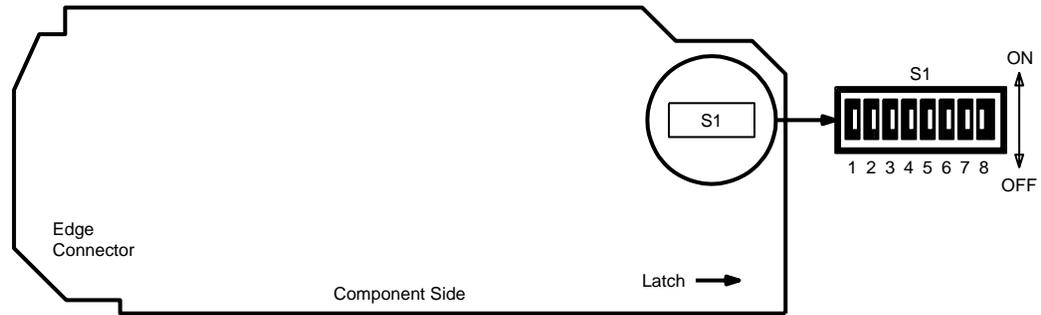
**Figure 4-10. BBG4 and BBG19 (DS3) Option Switches**



BBG20 TMUX LBO Settings

Cable Length (ft)		LBO Setting
735A Cable	734D Cable	
0 to 65	0 to 120	LBO ON
>65 to 250	>120 to 450	LBO OFF

**Figure 4-11. BBG20 (TMUX) LBO Option Switches**



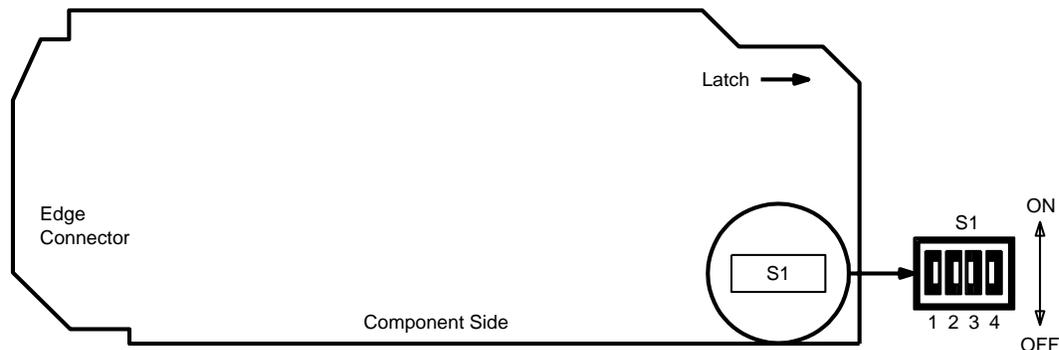
Switch 1 Settings

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
>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. 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 4-12. BBF1B (DS1) and BBF3 (DS1PM) Option Switches



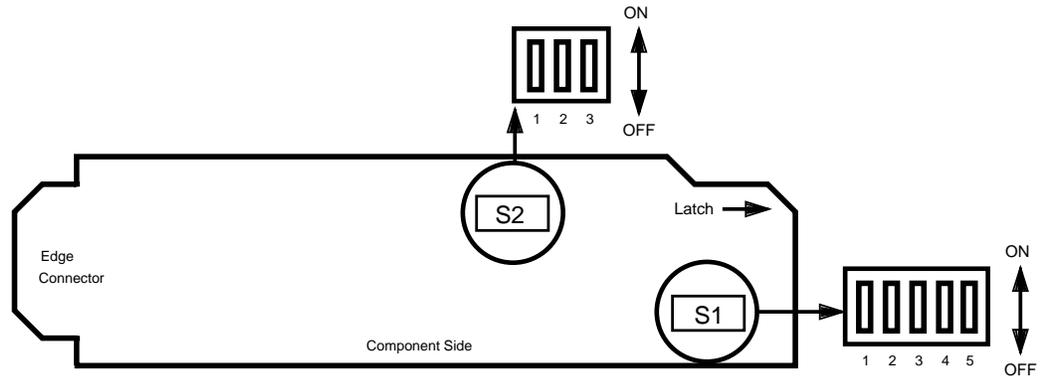
**Switch 1 Settings**

Line Code Selection		Frame Selection		Timing Mode Selection		
Pulse Format	Sec 1	Frame Format	Sec 2	Timing Format	Sec 3 Chan 1	Sec 4 Chan 2
AMI	ON	SF	ON	Free Run	ON	ON
				External	OFF	ON
B8ZS	OFF	ESF	OFF	Loop-Main	ON	OFF
				(Invalid)	OFF	OFF

**Notes:**

1. If the shelf is located in an RT, set the timing mode for "Loop-Main".
2. If the shelf is located in a CO and the DDM-2000 OC-3 is NOT connected to a DS1 clock (J37 on backplane), set the timing mode for "free run".
3. If the shelf is located in a CO and the DDM-2000 OC-3 is connected to a DS1 clock (J37 on backplane), set the timing mode for "external".
4. The pulse format (AMI or B8ZS) and frame format (superframe or extended superframe) are set for the attributes of the external clock if external timing is selected. In the absence of DS1 clock information, set line code for AMI and frame format for superframe.

**Figure 4-13. BBF2 TGS Option Switches**



**Switch 1 Settings**

DS1 Line Coding	Switch	DS1 Frame Format	Switch
	S1-1		S1-2
AMI*	ON	SF*	ON
B8ZS	OFF	ESF	OFF

**Note:** Controls line coding and frame format for both DS1 input and output.

\* Factory default

\* Factory default # Main OLIU is default; function unit C by set-sync command.

**Switch 1 Settings**

Timing Mode	Switch Settings		
	S1-3	S1-4	S1-5 (DS1 Output)
Free Running	ON	ON	OFF
DS1 External, MULT OUT Mode*	OFF	ON	OFF
Loop Timing Main#	ON	OFF	OFF
Loop Timing Main#, SYNC OUT Mode	ON	OFF	ON
DS1 External, SYNC OUT Mode	ON	ON	ON
(Invalid)	OFF	OFF	ON
(Invalid)	OFF	OFF	OFF
(Invalid)	OFF	ON	ON

**Figure 4-14. BBF2B TGS Option Switches (Sheet 1 of 2)**

**Notes:**

1. If the shelf will not be timed from the incoming optical line (loop timed) and is not connected to a DS1 clock (J37 on backplane), set the Timing Mode for "Free Running".

2. If the shelf is connected to a DS1 clock (J37 on backplane) and the DS1 output (Sync Out) will not be derived from the received OC-3 line for network timing distribution, set the Timing Mode for "DS1 External, MULT OUT Mode".
3. If the shelf is located in an RT and DS1 output (Sync Out) will not be derived from the received OC-3 line for network timing distributions, set the Timing Mode for "Loop-Timed".
4. If the shelf DS1 timing output (Sync Out) is to be derived from the received OC-3 line for network timing distribution, set the Timing Mode for "Loop-Timed, SYNC OUT Mode".
5. If the shelf is connected to a DS1 clock (J37 on backplane) and DS1 output (Sync Out) is to be derived from the received OC-3 line for network timing distribution, set the Timing Mode for "DS1 External, SYNC OUT Mode".
6. The pulse format (AMI or B8ZS) and frame format (superframe or extended superframe) are set for the attributes of the external clock if "External" timing is selected. In the absence of DS1 clock information set DS1 line code for AMI and Frame Format for Superframe.

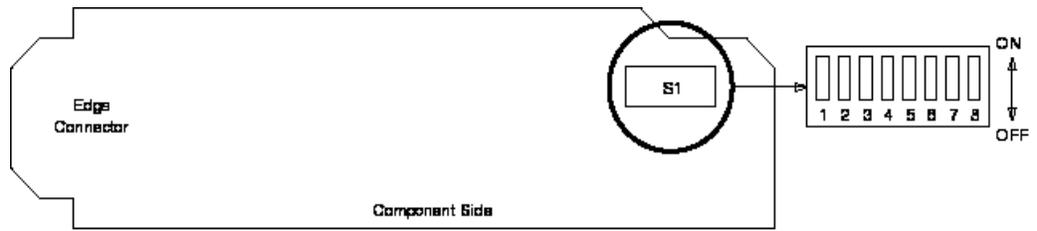
**Switch 2 Settings**

Equalization (Notes)	Switch Settings		
	S2-1	S2-2	S2-3 (DS1 Output)
0' to 131'	ON	ON	OFF
>131' to 262'	ON	OFF	ON
>262' to 393'	ON	OFF	OFF
>393' to 524'	OFF	ON	ON
>524' to 655'	OFF	ON	OFF
(Invalid)	OFF	OFF	OFF
(Invalid)	OFF	OFF	ON
(Invalid)	ON	ON	ON

**Notes:**

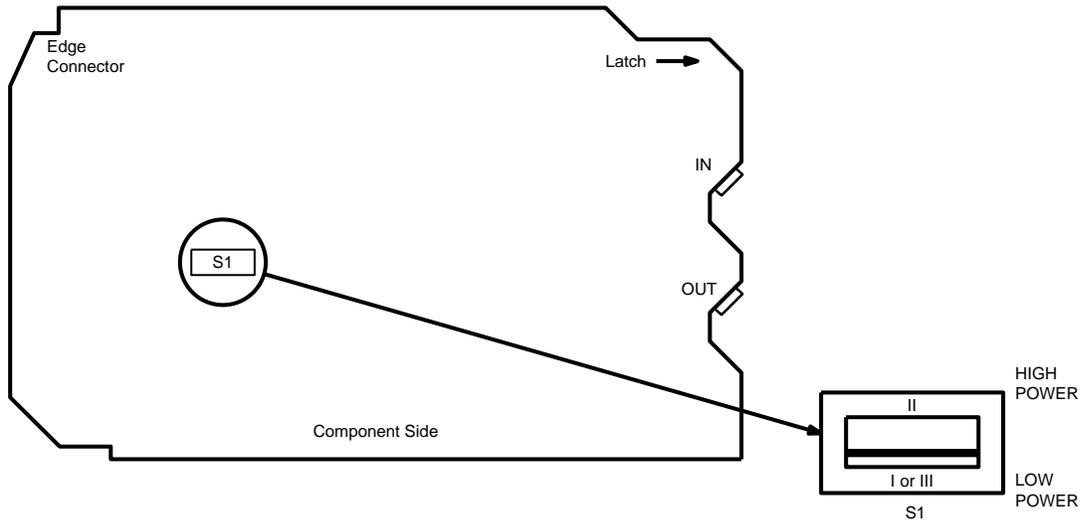
1. Equalization is set according to the length of the DS1 external timing cable, running from J44 of the DDM-2000 OC-3 shelf to the timing reference when the BBF2B TGS is set for SYNC OUT mode.
2. Distance in feet for 22-gauge PIC (ABAM) cable.

**Figure 4 -14. BBF2B TGS Option Switches (Sheet 2 of 2)**



**Figure 4-15. HDSL DIP Switch Settings**

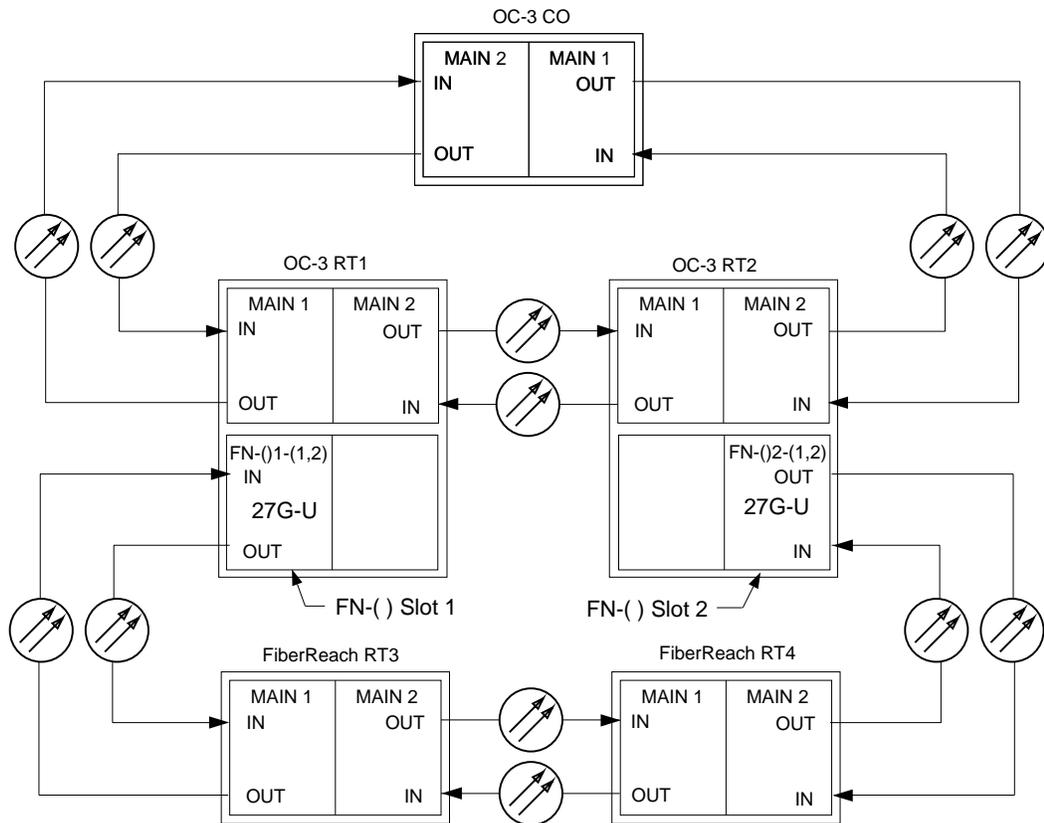
HDSL Options		DIP Switch Settings			
		HDSL Port #1		HDSL Port #2	
		S1-1	S1-2	S1-3	S1-4
<b>HDSL START-UP</b>	Master	—	OFF	—	OFF
	Slave	—	ON	—	ON
<b>HDSL MANAGEMENT</b>	Local	OFF	—	OFF	—
	Through	ON	—	ON	—



**Switch 1 Settings**

Output Power	Selection
-3.5 dBm	HIGH
-8.5 dBm	LOW

**Figure 4-16. 21G (OLIU) Option Switches**

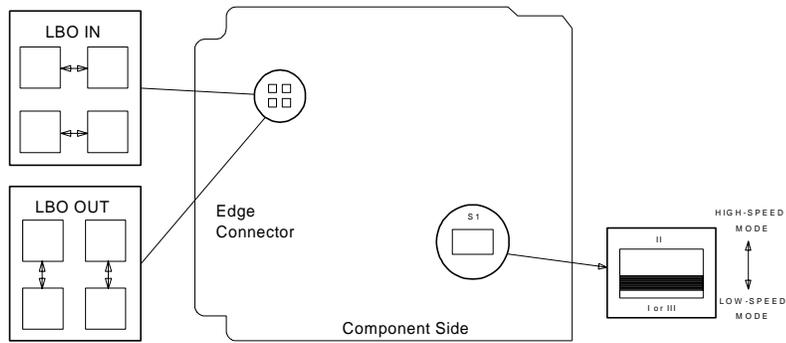


**Notes:**

1. In this example traffic originating at the OC-3 CO node flows in one direction to Main-1 of FiberReach host node OC-3 RT1, through its function unit slot a-1, b-1 or c-1 to Main-1 of FiberReach RT3. Likewise, traffic originating at the OC-3 CO node flows in the other direction to Main-2 of FiberReach host node OC-3 RT2, through its function unit slot a-2, b-2 or c-2 to Main-2 of FiberReach RT4.
2. Failure to place the 27G-U OLIUs in the correct function unit positions (for example if the 27G-Us were placed in function unit slot 2 of OC-3 RT1 and function unit slot 1 of OC-3 RT2) will result in failure of traffic flow between the FiberReach and the correct OC-3 nodes.

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**Figure 4-17. FiberReach Dual Homing Application**



**Notes:**

1. The BBG6 (STS-1E) high speed mode is only available with Release 6.0 or higher **linear** systems.

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**Figure 4-18. BBG6 STS-1E Option Switches**

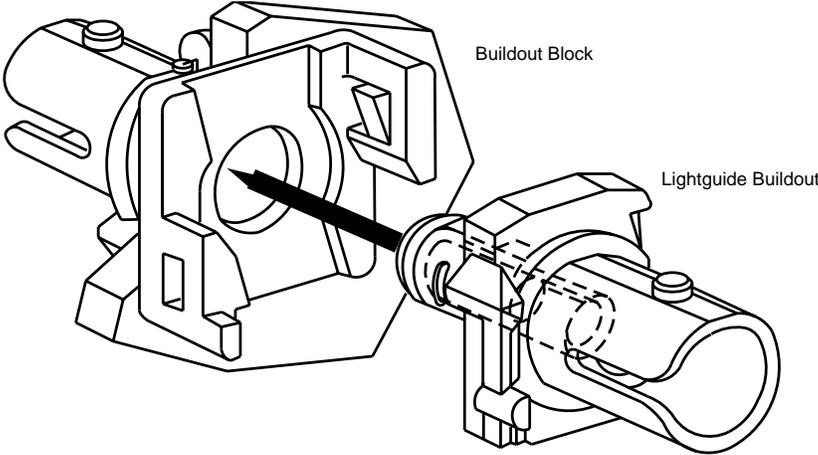


Figure 4-19 (A). ST<sup>®</sup>-Type Universal Buildout

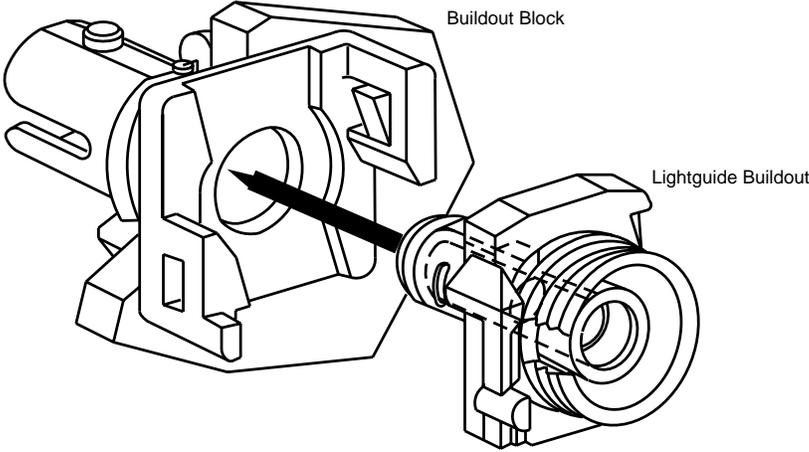


Figure 4-19 (B). FC/PC-Type Universal Buildout

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**Figure 4-19. Universal Buildout Types (Sheet 1 of 2)**

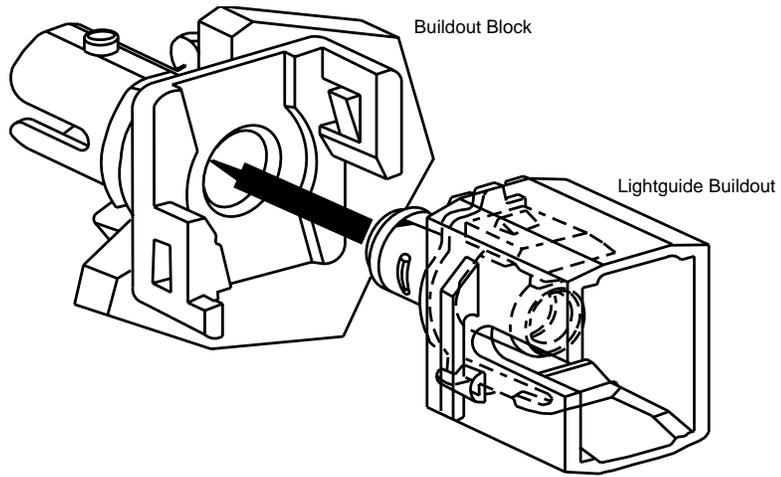


Figure 4-19 (C). SC-Type Universal Buildout

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**Figure 4 -19. Universal Buildout Types (Sheet 2 of 2)**

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## Release 6 Installation Tests

# 5

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## Release 6 Installation Tests

# 5

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### Overview

This section provides test procedures for verifying the following on a Release 6 configured DDM-2000 OC-3 shelf:

- Shelf transmission
- Wiring to DSX Cross-Connect (DSX-1)
- Wiring to DSX/EC-1 Cross-Connect (DSX-3) or FT-2000/DACS IV 2000
- Fiber verification

---

### Description

The following information provides instructions on the use of an American Standard Code for Information Interchange II (ASCII) terminal and the suggested installation tests which should be performed. If problems are encountered, refer to the "Troubleshooting" section of this manual. For detailed troubleshooting, refer to 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual*.

The installation tests verify transmission through the shelf, wiring to the cross-connect or wiring to FT-2000/DACS IV-2000, fiber installation and end-to-end transmission as shown in Figure 5-1.

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 5-2.

Prior to beginning the following tests the office alarm interface to this shelf (either J56 or J57) should be removed before tests are executed and replaced upon completion.

The following tests should be performed with the DDM-2000 OC-3 configured with the default parameters described under "Login Procedure", as described later in this section.

Observe the following notes:



**WARNING:**

*Unterminated optical connector 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.



**NOTE:**

All the installation 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:**

If the system is between a central office (CO) and a remote terminal (RT), the installation tests should be performed in the following order:

- The LED, local equipment, and local wiring cross-connect test should be performed at the RT (or CO).
- The LED, local equipment, local wiring cross-connect, and end-to-end system test should be performed at the CO (or RT).

## **LED, Pushbutton, and Display Descriptions**

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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 user panel:

<b>LED</b>	<b>Description</b>
CR (Critical)	Potential loss of service to 96 or more DS0 customers
MJ (Major)	Potential loss of service to fewer 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 (Power On)	The shelf is receiving a -48 V source
ABN (Abnormal)	An abnormal condition initiated through craft interface terminal (CIT) command (that is, loopback, forced manual switch)
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 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**

The following pushbuttons and display are located on the User Panel and SYSCTL. See Figure 5-2.

<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 removal 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 presently being displayed on the local user panel LEDs. Also may display the software version number currently running in the SYSCTL

---

\* A flashing FAULT LED on the OHCTL indicates a loss of communication with the FAR-END SYSCTL

\*\* DS1 packs do not have an ACTIVE LED but are assumed to be in-service unless other information is provided through the CIT.

## Tools, Test Sets, and Accessories

---

The following items are required:

Quantity	Description	
1	Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection	
1	DSX-1 loopback cable	
1	DSX-3 loopback cable or/and BNC to BNC connector (for wiring to equipment not DSX-3)	
1	ASCII Terminal or PC configured as a terminal	
	Optical fiber cable (recommended length is 2 feet) find your OLIU type below	
	OLIU	Optical fiber cable (See Table 5-2)
1 per OLIU	22F	Single mode with ST <sup>®</sup> connector on each end
1 per OLIU	21G	Single mode with ST <sup>®</sup> connector on each end
1 per OLIU	21D	Multimode with ST <sup>®</sup> connector on each end
1 per OLIU	21D-U 22D-U	Multimode with ST <sup>®</sup> , FC/PC, or SC connector on each end depending on Universal LBO used (ST <sup>®</sup> 0 dB LBO is standard See Table 5-1)
1 per OLIU	21G-U 22G-U	Single mode with ST <sup>®</sup> , FC/PC, or SC connector on each end depending on Universal LBO used (ST <sup>®</sup> 0 dB LBO is standard See Table 5-1) See Note Below



### NOTE:

When looping a 22G-U OLIU back on itself a 10 dB LBO is required.

## Use of Terminal

---

### Description

---

This procedure describes which terminals are approved for use with the DDM-2000 OC-3, how to set up the terminal, and the DDM-2000 OC-3 command structure which will be used.

### Compatible Terminals

---

The DDM-2000 OC-3 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 OC-3. See 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* for a list of DDM-2000 OC-3 compatible terminals.

The DDM-2000 OC-3 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 OC-3 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. However, the baud rate of the DDM-2000 OC-3 (which is controlled by the switches on the SYSCTL) and the ASCII terminal must agree.

DDM-2000 OC-3 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 OC-3 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 DDM-2000 OC-3 and the terminal for a lower baud rate.

## DDM-2000 OC-3 Command Notes

---

All DDM-2000 OC-3 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 OC-3 commands with their descriptions is contained in the 363-206-202, *DDM-2000 OC-3 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 OC-3s in the bay.



**NOTE:**

If properly cabled, connection to any EIA-232D in the bay will allow communication to any shelf in the bay.

2. Enter a ? to prompt the DDM-2000 OC-3 to request a shelf address.

The DDM-2000 OC-3 will respond:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```



**NOTE:**

The default shelf is the one physically connected to the CIT. If you press "Enter" without entering a shelf number, the default shelf will be selected.

3. After entering a valid shelf number 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`. For circuit packs and shelves manufactured up to, but not including, 1 October 1996, the login is `ATT01`. Both login and password must be UPPERCASE.



**NOTE:**

The login and password *must* be uppercase.

After a successful login, the DDM-2000 OC-3 will display the system header followed by the alarm and status report:

AT&T DDM-2000 OC-3 Release a.b.c (before October 1, 1996) or Lucent Technologies DDM-2000 OC-3 Release a.b.c (October 1, 1996 and later). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

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. To communicate with another shelf in the bay, the user will first have to terminate the session with the current 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 OC-3 with its default parameters.

 **CAUTION:**

*After cross-connections are entered, use **init-sys:all** with extreme caution as it erases all cross-connects. Do **not** use this command on a system that is in service unless you intend to lose service.*

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 OC-3 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 in all circuit pack positions.

### Procedure With a Terminal

---

Issue the command `test-led;`.

The DDM-2000 OC-3 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 pushbutton on the user panel. While the pushbutton 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 software version currently running on the system, one character at a time.

## Local Equipment Test

---

### Description

---

This test verifies proper operation of the circuit packs and the circuit pack positions, which are equipped in the DDM-2000 OC-3 shelf. The shelf must successfully pass this test before testing any other feature of the DDM-2000 OC-3.

 **WARNING:**  
*Unterminated optical connector may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*

 **NOTE:**  
After completing the shelf test, isolate and replace any failed units. If any units are replaced, repeat the LED test and local equipment test until both tests pass without failures.

 **NOTE:**  
If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions.

### **Preparation Procedure**

---

1. If the DDM-2000 OC-3 is in an RT, change the timing mode on the BBF2/BBF2B (TGS) circuit packs from loop timed to free running. If the timing mode is changed, press the UPD/INIT pushbutton on the SYSCTL after the change is completed.
2. Fully insert the OLIUs into the shelf.
3. Connect the OLIU OUT to the OLIU IN of each OLIU (loopback), using optical fiber cable. Refer to Figure 5-1.

 **NOTE:**  
The optical fiber cable required are listed under "Tools, Test Sets, and Accessories".

4. During the loopback test the far-end communications must be disabled. Issue the command `set-fecom` and set the `address=dcc-all` and `communications=disabled` (far-end communications).
5. After a few moments, check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.

 **NOTE:**  
If BBG6 (STS-1E) circuit packs are present 'INC. EC-1 LOS' alarms will exist until EC-1 loopback connections are made as the BBG6 transmits an internal test signal at all times. When EC-1 loopbacks are present, 'INC. STS AIS' alarms may exist at the far-end for low speed applications utilizing VT cross-connects.

## **Procedure**

---

Issue the command `test-auto:md=local` (TEST-AUTO TURNUP).

The CR and MJ LEDs on the user panel will light. This indicates the start of the shelf test. Any circuit pack failing this test will light its FAULT LED during the test. When the test has successfully completed, all LEDs will go out.

The results will be displayed on the CIT, with a **g** indicating good, an **F** indicating failure, and **a** - indicating unequipped under each pack designation.

Leave the optical fiber loopbacks in place.

## **Local Wiring Cross-Connect Test**

---

### **Description**

---

This test verifies proper cabling from the DDM-2000 OC-3 to the DSX-1 or DSX-3/EC-1 cross-connect panels, or to the FT-2000/DACS IV 2000.



**NOTE:**

After completing the DSX cabling test, isolate and correct any incorrect wiring. If any cabling is corrected, repeat the DSX test until the test passes without failures.



**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.

### **Preparation Procedure**

---

1. Loop the DS1 signals at the DSX cross-connect panel (if applicable). It is best to loop all the DS1s, but the minimum looping is in groups of four.



**NOTE:**

It is best to unequip the low speed positions without loopbacks to speed up the DSX cabling test. This is done by unseating the undesired low speed packs, then pressing the UPD/INIT pushbutton on the SYSCTL.

2. Loop the DS3/EC-1 signals at the DSX cross-connect panel (if applicable).
3. If cross-connect panel is not used, place a BNC to BNC connector at the end of the DS3 cables OR have Craft Personnel place an internal loopback at the terminating equipment (FT-2000/DACS IV 2000).

4. The optical fiber loopbacks should still be in place. Refer to Figure 5-1, DSX cabling test.

## **Procedure**

---

1. Issue the command `test-auto:md=dsx` (TEST-AUTO TURNUP).

The CR, MJ, and MN LEDs on the user panel will light. This indicates the start of the DSX test. Any DSX cabling failures will be indicated by a flashing FAULT LED on the corresponding circuit pack during the test. When the test has successfully completed, all LEDs will go out. The results will be displayed on the CIT, with a `g` indicating good, an `F` indicating failure, and a `-` indicating unequipped under each cross-connect designation.

2. Remove all the DSX cross-connect, BNC connector or Internal loopbacks for DS1 and DS3 service. The loopbacks for EC-1 interfaces should remain, as the BBG6 transmits an internal signal at all times and an 'INC. EC1 LOS' alarm will result if loopbacks are removed. When EC-1 loopbacks are present, 'INC. STS AIS' alarms may exist at the far-end for low speed applications utilizing VT cross-connects.
3. If DS1 circuit packs without loopbacks at the DSX-1 were removed to speed up testing, reinstall them.
4. Press the UPD/INIT pushbutton on the SYSCTL.

## **End-To-End System Test**

---

### **Description**

---

This test verifies proper fiber optic cabling and OLIU circuit packs.

On initial installation/turn-up of a Release 6 System default cross-connects exist. For applications as in Figure 5-3 or 5-4 the default cross-connects may have to be deleted and reentered to fit the individual application.

An EC-1 interface composed of DS1 services should be cross-connected at the VT level as opposed to the STS-1 level. Thus in the event of one VT (or more) failure the channel protection switch would occur. An EC-1 interface composed of DS3 services should be cross-connected at the STS-1 level.

### **Preparation**

---

1. Verify that each shelf in the system is set for the correct timing option. Typically, a CO is set for either external or free running and the other sites are set for
2. loop timed.



**NOTE:**

Timing selection is a switch option setting on the BBF2/BBF2B (TGS) circuit pack.

3. If the shelf is optioned for external, make sure it is connected to an external clock through J37 on the shelf backplane; the line code and the frame selection must be set for the attributes of the clock.



**NOTE:**

In the absence of engineering records, set the line code for AMI and the frame selection for superframe.

4. If the timing mode selection on any TGS circuit pack is changed, press the UPD/INIT pushbutton on the SYSCTL.
5. For end-to-end service communications must be enabled. Verify far-end communications are enabled using the `rtrv-fecom` command. If communications are disabled issue the command `set-fecom` and set the `address=dcc-all` and `communications=enabled` to enable far-end communications.



**NOTE:**

An inconsistent DCC switch settings alarm will be present while the OLIUs are optically looped back on themselves.

6. Enter the appropriate cross-connects at each shelf to fit individual applications using the commands as described in the 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual*.
7. Verify that each shelf in the network has a unique Site NE (Site-Network Element) address. OSI interworking will not operate with duplicate addresses.
8. One shelf (and only one shelf) in the network must be set as the Gateway Network Element (GNE). Using the `set-ne` command, set one shelf to be the GNE.

## **Fiber Verification Procedure and Optical Test**

---

The following procedure verifies that the optical fiber cable are properly connected.



**WARNING:**

*Unterminated optical connector may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*



**NOTE:**

The procedure requires personnel at both ends of the DDM-2000 OC-3 point-to-point system or hubbing application.

1. Determine the fiber interconnections for a multispan system configuration. Refer to Figure 5-3 and Figure 5-4.
2. Disconnect the optical loopback fibers from the OLIUs and connect the transmission fibers to their predetermined OLIU connector.
3. Verify that the transmission cables are set up for normal operation.
4. After a few moments, verify that no alarms are present (other than the BBG6 associated alarms as described below). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.



**NOTE:**

If BBG6 (STS-1E) circuit packs are present 'INC. EC-1 LOS' alarms will exist until EC-1 loopback connections are made as the BBG6 transmits an internal test signal at all times. When EC-1 loopbacks are present, 'INC. STS/AIS' alarms may exist at the far-end for low speed applications utilizing VT cross-connects.

5. Disconnect the fiber cable from the OUT jack on the Main-1 OLIU or Fn-1 OLIU (when provided) at one end of the span. At the other end, verify that the appropriate OLIU FAULT LED is flashing, indicating loss of signal.



**NOTE:**

Figures 5-3 and 5-4 show examples of multispan system configurations.

6. Reconnect the fiber and repeat this procedure for the opposite direction of transmission.
7. To obtain a map of the SONET network to verify fiber connections, issue the command `rtrv-nmap;`. Verify that all shelves interconnected via optical fiber are reported in the Network Map.

The optical span test checks the transmission across the optical interfaces. Signals are monitored at both ends of the span. Results from the far-end are sent back to the near-end for reporting. No manual loopbacks are required for this test.

1. Issue the command `test-auto:md=optics` (TEST-AUTO TURNUP).

The CR, MJ, MN and PMN LEDs on the user panel will light. This indicates the start of the optics test. Any pack failures will be indicated by a flashing FAULT LED on the corresponding circuit pack during the test. When the test has successfully completed, all LEDs will go out.

The results will be displayed on the CIT, with a **g** indicating good, an **F** indicating failure, and an **a** - indicating unequipped under each cross-connect designation.

## **DS1/DS3 Verification Tests (Optional)**

The following test verifies proper operation of the DS1 or DS3 transmission paths between sites. Typically, the entire DDM-2000 OC-3 shelf will pass or fail this test, indicating that the transmission path is good or bad.

The STS-1E circuit packs can not be tested with the test transmission commands directly, thus the BBG6 (STS-1E) circuit pack must be tested with a MXRVO or DS3 circuit pack. The BBG6 must be located at the far-end where the loopback connections are made.

1. If a problem is isolated to the path, determine and correct the path problem and repeat the system test.
2. If the path is trouble-free but a problem still exists, isolate and correct the circuit pack, shelf, or/and cable problem(s). Repeat any of the installation tests as necessary.

### **⇒ NOTE:**

If a valid DS1, DS3, EC-1 signal is applied to the DDM-2000 OC-3 and then removed, the FAULT LED on the DS1, DS3 or EC-1 circuit pack will flash. Press the UPD pushbutton on the SYSCTL to stop any flashing LEDs.

3. Determine the transmission paths for each equipped function group. Figure 5-3 shows typical transmission configurations for an add/drop system arrangement. Figure 5-4 shows typical configurations for a hubbing arrangement. The actual add/drop and hub connections should be similar to those shown.
4. DDM-2000 OC-3 Release 6 can be placed into the default or manual cross-connect mode using the `set-ne` command. See the `ent-crs` or `dlt-crs` commands in the 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* to enter the proper cross-connects for individual applications.
5. Log out of the RT site using the `log(out)` command.
6. Depending upon the system configuration, repeat this procedure at each site that requires cross-connecting.

## **DS1 Verification Procedure**

The activity in the following procedure is performed from the CO location.

In the following test, internal DS1 loopbacks are established in the DDM-2000 OC-3 shelf at the associated RT site. A DS1 test signal is internally generated from the CO shelf and measured by the CO shelf. Refer to Figure 5-1.

1. Perform a remote login from the CO to the RT site, using the `rlogn:tid` command.

2. At the CO, perform a DS1 loopback on all DS1 or EC-1 channels at the RT site as follows:
  - a. Issue the command `opr-lpbk-t1` or `opr-lpbk-ec1`;
  - b. At the address prompt, enter `fn-all`
  - c. At the execute prompt, enter `Y`
  - d. Verify that loopbacks are present by entering `rtrv-alm`
3. At the CO, perform a DS1 test as follows:
  - a. Issue the `toggle` command to return CIT communications to the CO shelf
  - b. Issue the command `test-trmsn-t1`.
  - c. At the address prompt, enter `a-1-1` or the appropriate address as in step 2b.
  - d. At the direction prompt, enter `mux`
  - e. At the duration prompt, enter `1`.



**NOTE:**

This command will initiate a 1-minute DS1 transmission test from the CO shelf to the RT shelf and looped back to the CO shelf.

4. If the test was not error free, isolate the problem by checking DS1 circuit packs and associated wiring.
5. Repeat this DS1 transmission test for each equipped DS1.
6. Perform a remote login to the RT site, using the `toggle` command.
7. Release the loopbacks as follows:
  - a. Issue the command `rls-lpbk-t1` or `rls-lpbk-ec1`;
  - b. At the address prompt, enter `ls-all`.
  - c. At the execute prompt, enter `Y`.
  - d. Perform the `upd` command.

### **DS3 Verification Procedure**

---

The activity in the following procedure is performed from the CO location. Perform this procedure on all DS3 circuit packs installed.

1. At the CO, change the DS3 violation monitoring mode from VMR to VM by entering the following command:  

```
set-t3:all:md=vm;alm=mj;ais=yes;fth=3
```
2. Establish a remote login from the CO to the RT site, using the `rlgn-tid` command.

3. Change the violation monitoring mode from VMR to VM in the same manner as at the CO (Step 1).
4. Perform a DS3 or EC-1 loopback on all DS3/EC-1 groups at the RT by issuing the following command:
  - a. Issue the command `opr-lpbk-t3` or `opr-lpbk-ec1`.
  - b. At the address prompt, enter `fn-all`.
  - c. At the execute prompt, enter `Y`.
  - d. Verify that loopbacks are present by entering `rtrv-alm`.
5. At the CO, perform a DS3 test as follows:
  - a. Issue the `toggle` command to return CIT communications to the CO shelf
  - b. Issue the command `test-trmsn-t3`.
  - c. At the address prompt, enter `'a'` or the appropriate address corresponding to the loopback at the far-end
  - d. At the direction prompt, enter `mux`.
  - e. At the duration prompt, enter `1`.

 **NOTE:**

This command will initiate a 1-minute DS3 transmission test from the CO shelf to the RT shelf and looped back to the CO shelf.

6. If transmission is not error-free, isolate and correct the problem by checking DS3 circuit packs and associated cabling.
7. Change the DS3 violation monitoring mode back to VMR at the CO and RT, using the `set-t3` command.
8. Repeat the procedure for each function group equipped with DS3 packs.
9. After completion of DS3 testing, release the DS3 loopbacks at the RT by performing the following:
  - a. Issue the command `rls-lpbk-t3` or `rls-lpbk-ec1`.
  - b. At the address prompt, enter `fn-all`.
  - c. At the execute prompt, enter `Y`.
  - d. Verify loopbacks are no longer present by entering `rtrv-alm`.
10. Remove all test signals from the DDM-2000 OC-3.
11. Press the UPD pushbutton on the SYSCTL.

## Final Operations

---

### Procedure

---

1. Verify that all test signals and loopbacks from the DDM-2000 OC-3 have been removed.



**NOTE:**

If BBG6 (STS-1E) circuit packs are present 'INC. EC-1 LOS' alarms will exist unless EC-1 loopbacks are in place connections as the BBG6 transmits an internal test signal at all times. When EC-1 loopbacks are present, 'INC. STS AIS' alarms may exist at the far-end for low speed applications utilizing VT cross-connects.

2. Press the UPD pushbutton on the SYSCTL.
3. Verify that the system is configured for normal operation and that no alarms are present (other than the BBG6 alarms described previously). If alarms are present, refer to the "Troubleshooting" section of this manual.
4. Connect the office alarm cables if they have been disconnected.

**Table 5-1. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

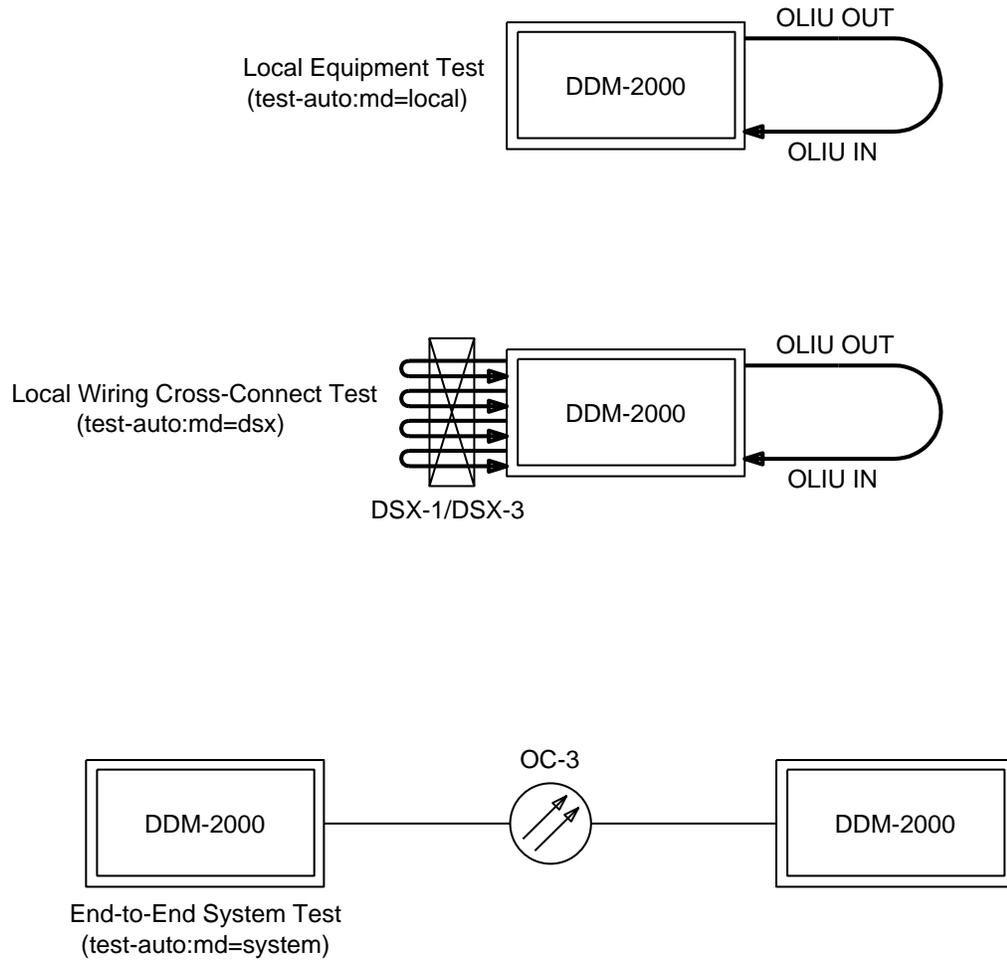


**NOTE:**

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.

**Table 5-2. Lightguide Jumpers**

<b>Lightguide Jumper Type</b>	<b>Code</b>	<b>Comcode</b>	<b>Connector Type</b>	<b>Length (Feet)</b>
Single Mode	FS1E-E-2	105357727	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	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	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	2
Multimode	LL1FC-FC-10	107095549	FC/PC-FC/PC	10
Multimode	LL1SC-SC-2	106908668	SC-SC	2



---

**Figure 5-1. Installation Test Connections**

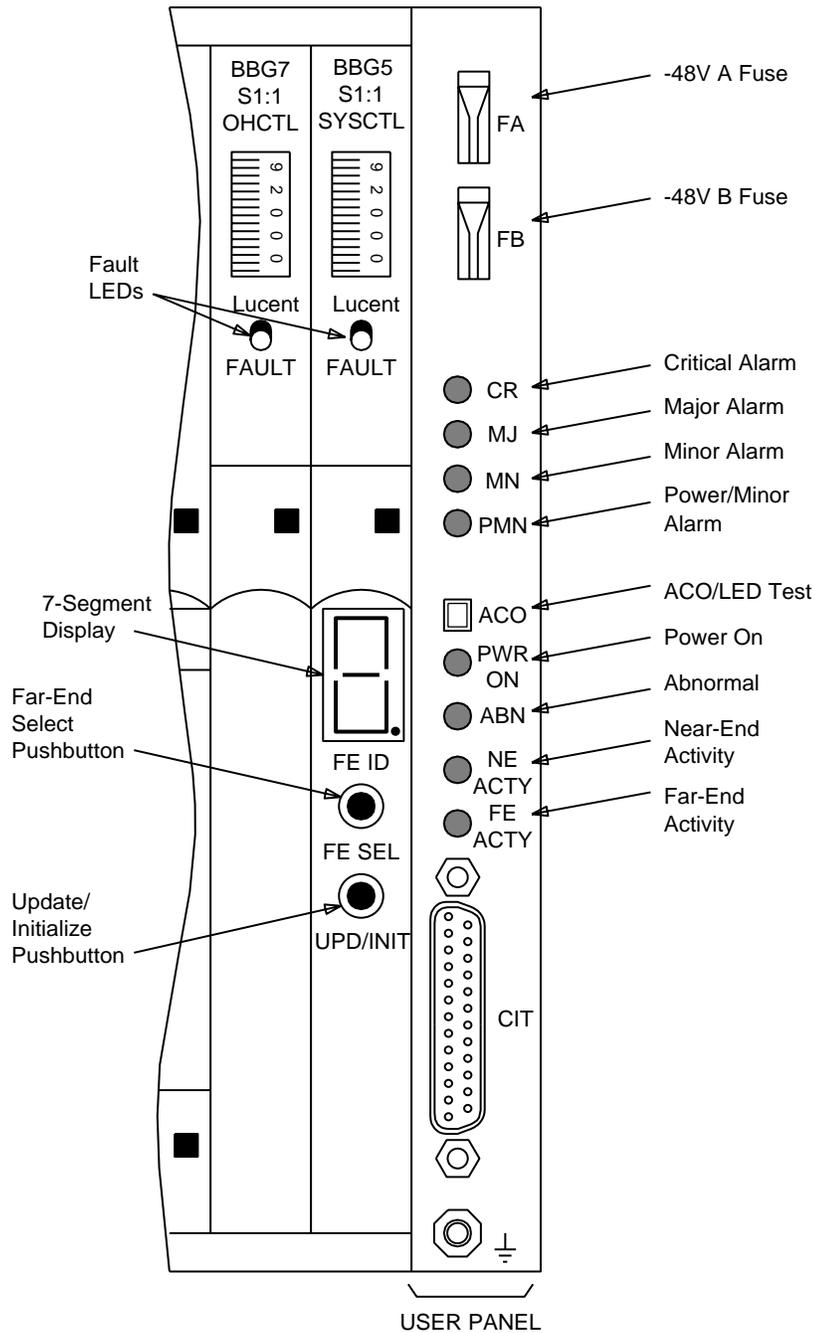
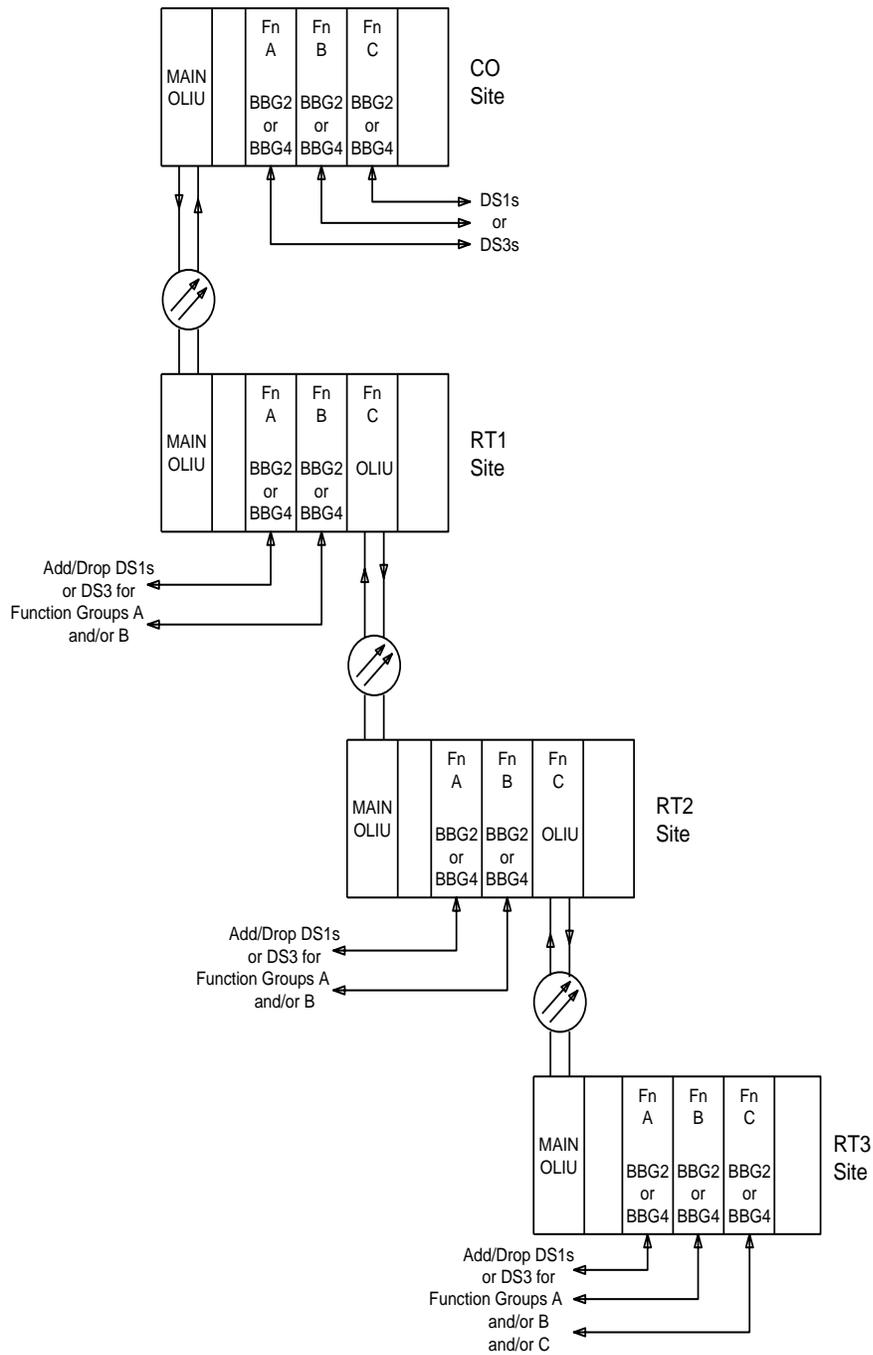


Figure 5-2. DDM-2000 User Panel



**Figure 5-3. Typical Release 6 Linear Add/Drop System Configuration**

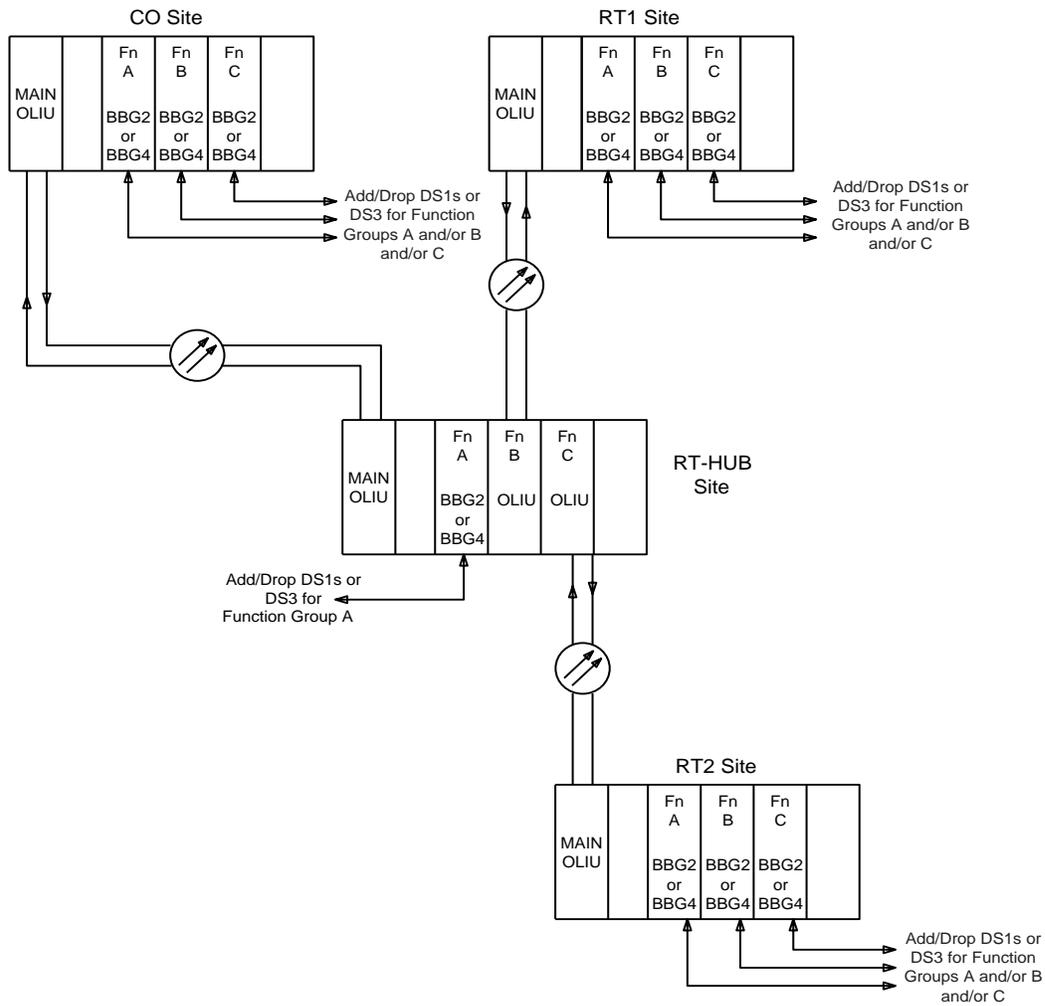


Figure 5-4. Typical Release 6 Hubbing System Configuration

---

## Release 7 Installation Tests

# 6

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---

## Release 7 Installation Tests

# 6

---

### Overview

This section provides test procedures for verifying the following on a Release 7 configured DDM-2000 OC-3 shelf:

- Shelf transmission
- Wiring to DS1 Cross-Connect (DSX-1)
- Wiring to DS3/EC-1 Cross-Connect (DSX-3) or DACS IV-2000
- 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 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual*.

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 6-1.

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 6-2.

Before beginning the following tests the office alarm interface to the shelf (either J56 or J57) should be removed before tests are executed and replaced upon completion.

The following tests should be performed with the DDM-2000 OC-3 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:

<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**

\* A flashing FAULT LED on the OHCTL indicates a loss of DCC communications with the FAR-END SYSCTL

\*\* 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:

<b>LED</b>	<b>Description</b>
CR (Critical)	Potential loss of service to 96 or more DS0 customers
MJ (Major)	Potential loss of service to fewer 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 (Power On)	The shelf is receiving a -48 V DC source
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 User Panel and SYSCTL. See Figure 6-2.

<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:

Quantity	Description	
1	Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection	
1	DSX-1 loopback cable	
1	DSX-3 loopback cable or/and BNC to BNC connector (for wiring to equipment not DSX-3)	
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 6-4)
1 per OLIU	22F	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	21G	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	21D	Multimode with ST <sup>®</sup> connectors on each end
1 per OLIU	21D-U 22D-U	Multimode 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 6-3)
1 per OLIU	21G-U 22G-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 6-3) See Note Below



### NOTE:

When looping a 22G-U OLIU back on itself a 10 dB LBO is required.

## Use of Terminal

### Description

This procedure describes which terminals are approved for use with the DDM-2000 OC-3, how to set up the terminal, and the DDM-2000 OC-3 command structure which will be used.

### Compatible Terminals

The DDM-2000 OC-3 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 OC-3. See 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* for a list of DDM-2000 OC-3 compatible terminals.

The DDM-2000 OC-3 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 OC-3 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. However, the baud rate of the DDM-2000 OC-3 (which is controlled by the switches on the SYSCTL) and the ASCII terminal must agree.

DDM-2000 OC-3 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 OC-3 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 DDM-2000 OC-3 and the terminal for a lower baud rate.

## DDM-2000 OC-3 Command Notes

---

All DDM-2000 OC-3 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 OC-3 commands with their descriptions is contained in the 363-206-202, *DDM-2000 OC-3 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 OC-3s in the bay.



**NOTE:**

If properly cabled, connection to any EIA-232D in the bay will allow communication to any shelf in the bay.

2. Enter a ? to prompt the DDM-2000 OC-3 to request a shelf address.

The DDM-2000 OC-3 will respond:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```



**NOTE:**

The default shelf is the one physically connected to the CIT.

3. After entering a valid shelf number 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 `LUCC01` and the password is `DDM-2000`. For circuit packs and shelves manufactured up to, but not including, 1 October 1996, the login is `ATT01`. Both login and password must be UPPERCASE.

After a successful login, the DDM-2000 OC-3 will display the system header followed by the alarm and status report:

```
AT&T DDM-2000 OC-3 Release a.b.c (before October 1, 1996) or Lucent  
Technologies DDM-2000 OC-3 Release a.b.c (October 1, 1996 and later).  
This will be in a banner and additional text describing the use restrictions  
and proprietary status will follow.
```

```
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. To communicate with another shelf in the bay, the user will first have to terminate the session with the current 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 OC-3 with its default parameters.



**CAUTION:**

*After cross-connections are entered, use `init-sys:all` with extreme caution as it erases all cross-connects.*

5. When initialization is completely finished, repeat steps 2 and 3 to log back into the shelf.
6. For Release 7.2, an AGNE alarm will exist upon completion of the initialization. To extinguish this alarm, set the AGNE to yes by using the `set-ne` 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 OC-3 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 in all circuit pack positions.

### Procedure With a Terminal

---

Issue the command `test-led;`.

The DDM-2000 OC-3 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 pushbutton on the user panel. While the pushbutton 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 OC-3 shelf. It verifies proper cabling from the DDM-2000 OC-3 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 OC-3.

On initial installation/turn-up of a Release 7 system there are no default cross-connects, thus all cross-connects need to be entered for the Release 7 tests. In Release 7 VT and STS-1 cross-connects are allowed and can be entered as a group, rather than individually.

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 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual*, for complete command descriptions.

**⇒ NOTE:**

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

## **Preparation Procedure**

---

1. The 'Free Running' timing configuration is required for the DSX-1 test. The timing parameters are set on the TGS pack. Refer to Section 4 of this manual for option switch settings. Set timing to 'Free Running'.
2. Fully insert the OLIUs into the shelf.
3. Connect the OLIU OUT to the OLIU IN of each OLIU (loopback), using optical fiber jumper cables. Refer to Figure 6-1.

**⇒ NOTE:**

The optical fiber cables required are listed under "Tools, Test Sets, and Accessories".

**⇒ NOTE:**

When looping a 22G-U OLIU back on itself a 10 dB LBO is required.

⇒ **NOTE:**

If any of the OLIUs are of the universal type (ex: 22G-U) and other than ST<sup>®</sup> type connectors are being used see Table 6-3 for the universal LBOs needed and Table 6-4 for the lightguide jumpers.

4. During the loopback test the far-end communications must be disabled. Issue the command **set-fecom** and set the **address=dcc-all** and **communications=disabled** (far-end communications).
5. After a few moments, check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
6. To test each DS1 or DS3 channel through to the cross-connect panel or terminating equipment, its cross-connect map has to be made at the DDM OC-3 Shelf.
7. Enter DS1 or DS3/EC-1 cross-connects according to the OC-3 shelf configuration. Table 6-1 contains the cross-connect map required to test DS1 service on function groups A,B and C of this DDM-2000 OC-3 shelf.
8. Enter DS1 cross-connects as follows:

```
ent-crs-vt1:m-1-all,a-all:cct=twoway:y;
```

⇒ **NOTE:**

The 'all' command can be used for a range of address'.

9. Enter DS3/EC-1 cross-connects as follows:

```
ent-crs-sts1:m-1,a:y;
```

10. Assure the appropriate cross-connect map is in place in the shelf by entering the command **rtrv-crs-vt1;**

### **Procedure for DS1 Testing**

---

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.
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.

### **Procedure for DS3 Testing**

---

1. Beginning with address 'a', place a physical DS3 loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. The following command and parameters test the DS1 channel's cabling for 60 seconds.

Issue the command:

```
test-trmsn-t3:a  
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 DS3 loopback to the next DS3 channel at the **DSX-1** panel or place a loopback at the terminating equipment. Press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist and continue testing the next channel.

### **Procedure for EC-1 Testing**

---

1. Beginning with address 'a', place a physical DS3(EC-1) loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3/EC-1 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. Remove the DS3(EC-1) loopback.
3. Issue the `rtrv-alm` command and observe that an 'Inc. EC-1 LOS' alarm exists for this address.
4. Replace the DS3(EC-1) loopback.
5. Issue the `rtrv-alm` command and observe that the 'Inc. EC-1 LOS' no longer exists. If the alarm exists, correct the problem by checking circuit packs and associated cabling. An 'Inc. STS AIS' will occur if VT cross-connects exist.

6. The physical DS3(EC-1) loopback can remain until service is applied. Verify that no 'Inc. EC1 LOS' alarms exist and continue testing the next channel.

## **Procedure for Removing Cross-Connects**

---

After all function groups 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. To delete DS1 cross-connects issue the command:

```
dlt-crs-vt1:m-1-all,a-all:y;
```

Replace 'm-1-all,a-all' with the address to be deleted.

2. To delete DS3/EC-1 cross-connects, issue the command:

```
dlt-crs-sts1:m-1,a:y;
```

Replace 'm-1,a' with the address to be deleted.



### **NOTE:**

If cross-connects remain, VT AIS alarms will remain until cross-connects are entered for all remaining shelves in the ring.

3. 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;`



### **CAUTION:**

*Remember that the `init-sys:all` command should be used with extreme caution in an in-service system as it deletes all cross-connects.*

Remove the fiber loopbacks from the 22 Type OLIU circuit packs. Incoming OC-3 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**

---

The following procedure describes fiber connection and test. To achieve transmission in both directions for a two fiber ring, fibers originating at Node 1 (Shelf 1) OLIU Slot Main-1 (M1) must connect to Node 2 Slot Main-2 (M2). Node 2 OLIU M1 would connect to Node 3 OLIU M2 and this would continue (M1

connecting to M2) around the ring until all nodes in the ring are reached. Refer to Figure 6-1.

1. Set each shelf in the system for the correct timing. Conventionally, one node in the ring will be set for either free running or externally timed and the others will be looped timed. Only one node may be free running. More than one node can be externally timed if traceable to the same source clock, and the remainder looped. Check that external connections are completed if option is set for external.
2. If TGS Circuit Pack option switch is changed, an update must be done by momentarily depressing the UPD/INIT button on the SYSCTL after the TGS pack is installed.
3. Issue `set-ne` to check TID to verify that each shelf within the network has a unique TID.
4. Check shelf numbers. Shelves located in the same bay require unique shelf numbers, to be distinguished from one another when addressed by the same CIT.
5. For Releases other than 7.2, one shelf (and only one shelf) in the network must be set as the Gateway Network Element (GNE). Using the `set-ne` command, set one shelf to be the GNE.
6. For Release 7.2, one shelf (and only one shelf) in the network must be set as the Directory Services Network Element (DSNE). The shelf designated as the DSNE should not be set as an Alarm Gateway Network Element (AGNE). Using the `set-ne` command, set one shelf to be the DSNE and set AGNE to no.
7. For Release 7.2, one shelf in the network must be set as the AGNE. Leave one shelf (other than the DSNE shelf) set as the AGNE. Using the `set-ne` command, set AGNE to no in all other shelves.
8. Issue the command `set-fecom:dcc-all:com=enabled;` at each shelf to enable far-end communications.

### **Procedure for Installation**

---

1. Refer to Figure 6-1 to understand the method of connecting ring fibers. Your ring, will differ from Figure 6-1 if you have more or less than four nodes, thus use an appropriate figure, adapted to your ring configuration. Connect fibers using the following instructions, adapted to fit your ring:

If the proper LBO is not known for each optical fiber span see DLP-514 of 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* to determine the LBO needed.

Location	Slot	Connector	<-->	Location	Slot	Connector
Site1NE1	M2	OUT	<-->	Site2NE1	M1	IN
Site1NE1	M2	IN	<-->	Site2NE1	M1	OUT
Site2NE1	M2	OUT	<-->	Site3NE1	M1	IN
Site2NE1	M2	IN	<-->	Site3NE1	M1	OUT
Site3NE1	M2	OUT	<-->	Site4NE1	M1	IN
Site3NE1	M2	IN	<-->	Site4NE1	M1	OUT
Site4NE1	M2	OUT	<-->	Site1NE1	M1	IN
Site4NE1	M2	IN	<-->	Site1NE1	M1	OUT



**NOTE:**

Up to 10 sites are permitted in a Release 7 ring. Up to 16 sites are permitted when Release 7.1 is interworking with an OC-12 ring.

- To obtain a map of the SONET network to verify fiber connections, at Site1NE1 for Releases other than 7.2, issue the command **rtrv-nmap;**



**NOTE:**

After fiber connection is completed around the ring, continued flashing of the fault LED on 22 Type OLIU circuit packs may indicate incorrect connections.

- Using Figure 6-1 (or an adapted version to match your ring) at Site1NE1, verify the following:

```
/* Network Map for Site1NE1
```

```

=====
System Name      Connected      Neighbor      Communication      GNE
   (TID)          Through
=====
Site1NE1
Site2NE1          main-1        yes
Site3NE1          main-2        yes
Site4NE1          -             no
*/

```

- If the map is not as shown (adapted to your individual map), with 'connected through' connecting to two different sites, with your figure, correct fibers in agreement with Figure 6-1 (or your individual map).
- For Release 7.2, use the **rtrv-map-network;** command to view the network map which should display all shelves interconnected via fiber, and the **rtrv-map-neighbor;** command to view the neighbor map which should display all shelves directly connected to the shelf you're currently logged into, as well as which OLIU they are connected through.

6. Continue around the ring checking each map until the ring is complete. Upon completion of the ring, correct any discrepancies in the map according to Figure 6-1 (or your individual map).

### **Test Fiber Connections**

---

1. Alarms associated with fiber disconnects shall be tested. The following test should be performed at each site. Refer to Figure 6-1.
  1. At Site1NE1 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.OC3 FERF
```
  2. To verify correct fiber connection to Site2NE1, do one of the following:
    - a. Remote login to Site2NE1 and check for the following alarm (other alarms may exist) to verify proper fiber connection:  

```
MINOR main-2 ----- inc.OC3 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 Site1NE1 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 Site1NE1 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 7 system there are no default cross-connects, thus all cross-connects need to be entered. In Release 7, DS1 or DS3

services and EC-1 interfaces are provided and thus VT and STS-1 cross-connects are applicable.

Due to the flexibility and complexity 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 expeditiously.

## **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 7 software is a two fiber path-switched ring. Each VT or STS-1 (DS1 or DS3 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 OLIUM1 as a default. The capacity of the ring is limited to the OC-3 line rate, which is 84 DS1 services or 3 STS-1's or a combination of the two. A timeslot or channel must be reserved all the way around the ring for each service.

Drop cross-connects are designated by a ring VT/STS-1 channel and an associated DS1/DS3/EC-1 port. Pass-through cross-connects are designated by using the same ring VT/STS twice. See Figure 6-3.

In Release 7 drop cross-connects are divided into two types.

- The standard twoway cross-connect, in which the ring VT/STS-1 channel is connected to the associated DS1/DS3/EC-1 port of the node.
- The drop and continue cross-connect, in which a VT/STS-1 signal is cross-connected into an EC-1 port on a "drop and continue" node. At the same time that this cross-connect is made, a second cross-connect is made that continues a copy of that VT/STS-1 signal, on the same timeslot of the ring that it came into this node on, transmitting it to the next node downstream on the ring.



**NOTE:**

A BBG6 (STS-1E) circuit pack is required in the function unit slots to make a drop and continue cross-connect.



**NOTE:**

The "drop and continue" nodes on a ring system must be setup in pairs, otherwise there will be a loss of service when the ring path is switched.

An EC-1 interface composed of DS1 services should be cross-connected at the VT level as opposed to the STS-1 level. Thus in the event of one VT (or more) failure the channel protection switch would occur. An EC-1 interface composed of DS3 services should be cross-connected at the STS-1 level.

- Cross-connect address (to enter/exit the ring):

Ex. m-1-1-1, a-1-1  
a-1-1, m-1-1-1

'm-1-1-1' represents (Location of OC-3 signal) - (STS-1 # within the OC-3)-  
(VT-Group # within the STS-1)-(VT1.5 # within the VT-G) Address Range is:  
m-(1-3)-(1-7)-(1-4)

'a-1-1' represents (low speed group)-(DS1 Pack)-(DS1 Port) Address  
Range is: (a,b,c)-(1-7)-(1-4)

- In Release 7 the 'all' option may be used to specify a range of addresses:

Ex. m-1-all, a-all

'm-1-all' represents (main OLIUs)-(STS Group)-(All DS1 Ports)

'a-all' represents (function unit)-(All DS1 Ports)

- Pass-through address at all nodes other than the entry/exit nodes is as follows:

Ex. m-3-7-4 m-3-7-4

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, a-3-6

**⇒ 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 twoway 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 6-3.

## Cross-Connect Procedure

---

1. Use Office Records or fill in Table 6-2 (for DS1 service) 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;
```

3. Enter a DS3 pass-through as follows:

```
ent-crs-sts1:m-1,m-1:cct=twoway:y;
```



**NOTE:**

In Release 7 cross-connects can be entered in groups using the 'all' option.

4. Enter an end DS1 cross-connect as follows:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway:y;
```

5. Enter an end DS3/EC-1 cross-connect as follows:

```
ent-crs-sts1:m-1,a:cct=twoway:y;
```

6. Enter a drop and continue DS1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m1:y;
```

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m2:y;
```

7. Enter a drop and continue DS3/EC-1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m1:y;
```

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m2:y;
```

8. Check each ring timeslot to be sure it has two end cross-connect and all other nodes have pass-throughs configured. Use Office Records and Table 6-2 to verify this.

## **Protection Switch Test**

---

This test verifies rings protection switching upon fiber cut.

1. At Site1NE1 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**

---

### **Procedure**

---

1. Verify that all test signals and loopbacks from the DDM-2000 OC-3 have been removed.
2. Press the UPD pushbutton on the SYSCTL.
3. Verify that the system is configured for normal operation and that no alarms are present
4. If alarms (other than BBG6 alarms as previously described) are present, refer to the "Troubleshooting" section of this manual.
5. Connect the office alarm cables if they have been disconnected.

**Table 6-1. Cross-Connections for DSX-1 Testing**

Function Group A	Function Group B	Function Group C
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-2-1-1,b-1-1 m-2-1-2,b-1-2 m-2-1-3,b-1-3 m-2-1-4,b-1-4	m-3-1-1,c-1-1 m-3-1-2,c-1-2 m-3-1-3,c-1-3 m-3-1-4,c-1-4
m-1-2-1,a-2-1 m-1-2-2,a-2-2 m-1-2-3,a-2-3 m-1-2-4,a-2-4	m-2-2-1,b-2-1 m-2-2-2,b-2-2 m-2-2-3,b-2-3 m-2-2-4,b-2-4	m-3-2-1,c-2-1 m-3-2-2,c-2-2 m-3-2-3,c-2-3 m-3-2-4,c-2-4
m-1-3-1,a-3-1 m-1-3-2,a-3-2 m-1-3-3,a-3-3 m-1-3-4,a-3-4	m-2-3-1,b-3-1 m-2-3-2,b-3-2 m-2-3-3,b-3-3 m-2-3-4,b-3-4	m-3-3-1,c-3-1 m-3-3-2,c-3-2 m-3-3-3,c-3-3 m-3-3-4,c-3-4
m-1-4-1,a-4-1 m-1-4-2,a-4-2 m-1-4-3,a-4-3 m-1-4-4,a-4-4	m-2-4-1,b-4-1 m-2-4-2,b-4-2 m-2-4-3,b-4-3 m-2-4-4,b-4-4	m-3-4-1,c-4-1 m-3-4-2,c-4-2 m-3-4-3,c-4-3 m-3-4-4,c-4-4
m-1-5-1,a-5-1 m-1-5-2,a-5-2 m-1-5-3,a-5-3 m-1-5-4,a-5-4	m-2-5-1,b-5-1 m-2-5-2,b-5-2 m-2-5-3,b-5-3 m-2-5-4,b-5-4	m-3-5-1,c-5-1 m-3-5-2,c-5-2 m-3-5-3,c-5-3 m-3-5-4,c-5-4
m-1-6-1,a-6-1 m-1-6-2,a-6-2 m-1-6-3,a-6-3 m-1-6-4,a-6-4	m-2-6-1,b-6-1 m-2-6-2,b-6-2 m-2-6-3,b-6-3 m-2-6-4,b-6-4	m-3-6-1,c-6-1 m-3-6-2,c-6-2 m-3-6-3,c-6-3 m-3-6-4,c-6-4
m-1-7-1,a-7-1 m-1-7-2,a-7-2 m-1-7-3,a-7-3 m-1-7-4,a-7-4	m-2-7-1,b-7-1 m-2-7-2,b-7-2 m-2-7-3,b-7-3 m-2-7-4,b-7-4	m-3-7-1,c-7-1 m-3-7-2,c-7-2 m-3-7-3,c-7-3 m-3-7-4,c-7-4

**Table 6-2. Ring Network Time Slot Assignments**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-1-1-1					
M-1-1-2					
M-1-1-3					
M-1-1-4					
M-1-2-1					
M-1-2-2					
M-1-2-3					
M-1-2-4					
M-1-3-1					
M-1-3-2					
M-1-3-3					
M-1-3-4					
M-1-4-1					
M-1-4-2					
M-1-4-3					
M-1-4-4					
M-1-5-1					
M-1-5-2					
M-1-5-3					
M-1-5-4					
M-1-6-1					
M-1-6-2					
M-1-6-3					
M-1-6-4					
M-1-7-1					
M-1-7-2					
M-1-7-3					
M-1-7-4					

*Continued on Next Page*

**Table 6-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-2-1-1					
M-2-1-2					
M-2-1-3					
M-2-1-4					
M-2-2-1					
M-2-2-2					
M-2-2-3					
M-2-2-4					
M-2-3-1					
M-2-3-2					
M-2-3-3					
M-2-3-4					
M-2-4-1					
M-2-4-2					
M-2-4-3					
M-2-4-4					
M-2-5-1					
M-2-5-2					
M-2-5-3					
M-2-5-4					
M-2-6-1					
M-2-6-2					
M-2-6-3					
M-2-6-4					
M-2-7-1					
M-2-7-2					
M-2-7-3					
M-2-7-4					

*Continued on Next Page*

**Table 6-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-3-1-1					
M-3-1-2					
M-3-1-3					
M-3-1-4					
M-3-2-1					
M-3-2-2					
M-3-2-3					
M-3-2-4					
M-3-3-1					
M-3-3-2					
M-3-3-3					
M-3-3-4					
M-3-4-1					
M-3-4-2					
M-3-4-3					
M-3-4-4					
M-3-5-1					
M-3-5-2					
M-3-5-3					
M-3-5-4					
M-3-6-1					
M-3-6-2					
M-3-6-3					
M-3-6-4					
M-3-7-1					
M-3-7-2					
M-3-7-3					
M-3-7-4					

**Table 6-3. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

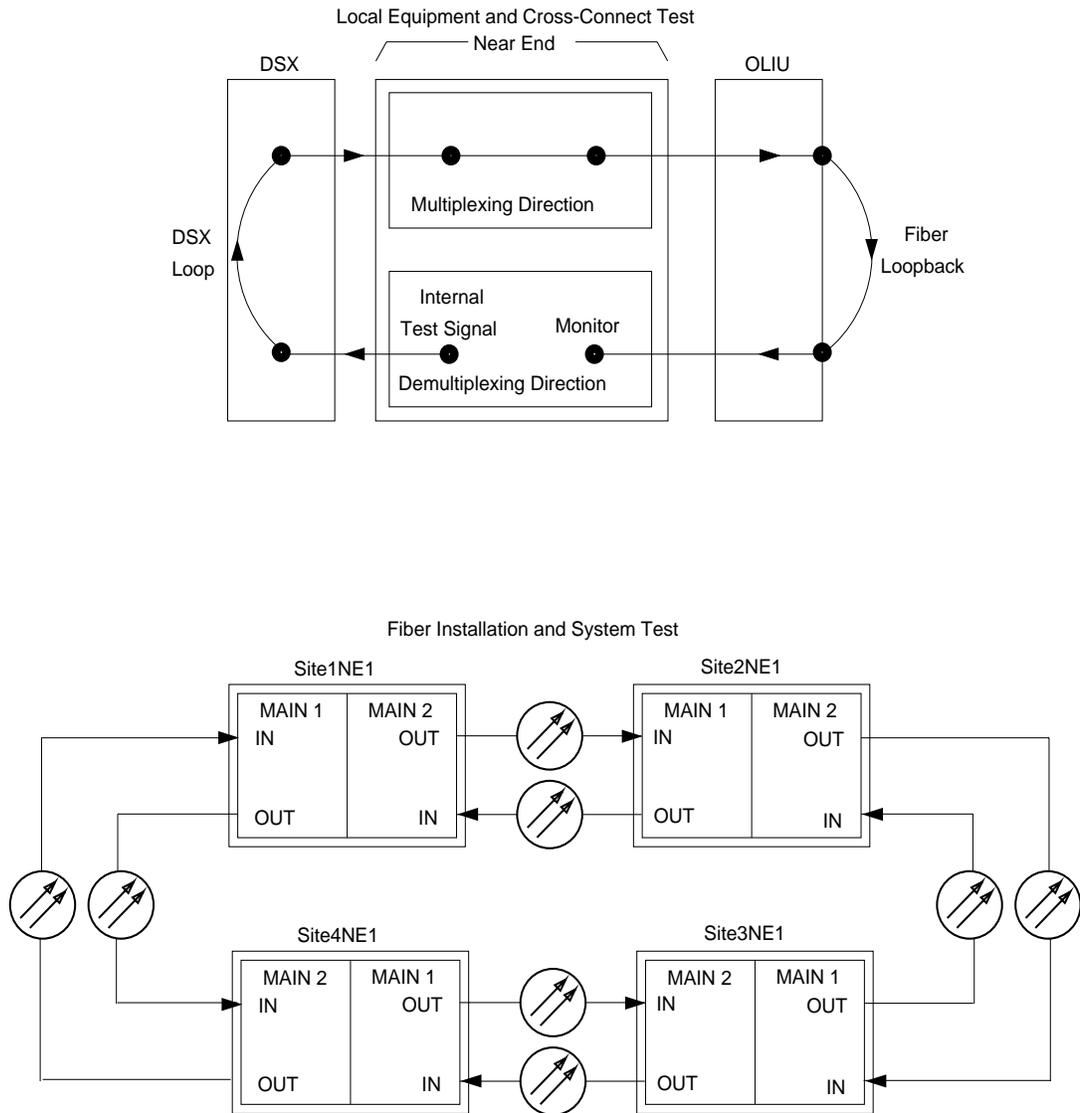


**NOTE:**

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.

**Table 6-4. Lightguide Jumpers**

<b>Lightguide Jumper Type</b>	<b>Code</b>	<b>Comcode</b>	<b>Connector Type</b>	<b>Length (Feet)</b>
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 6-1. Installation Test Connections**

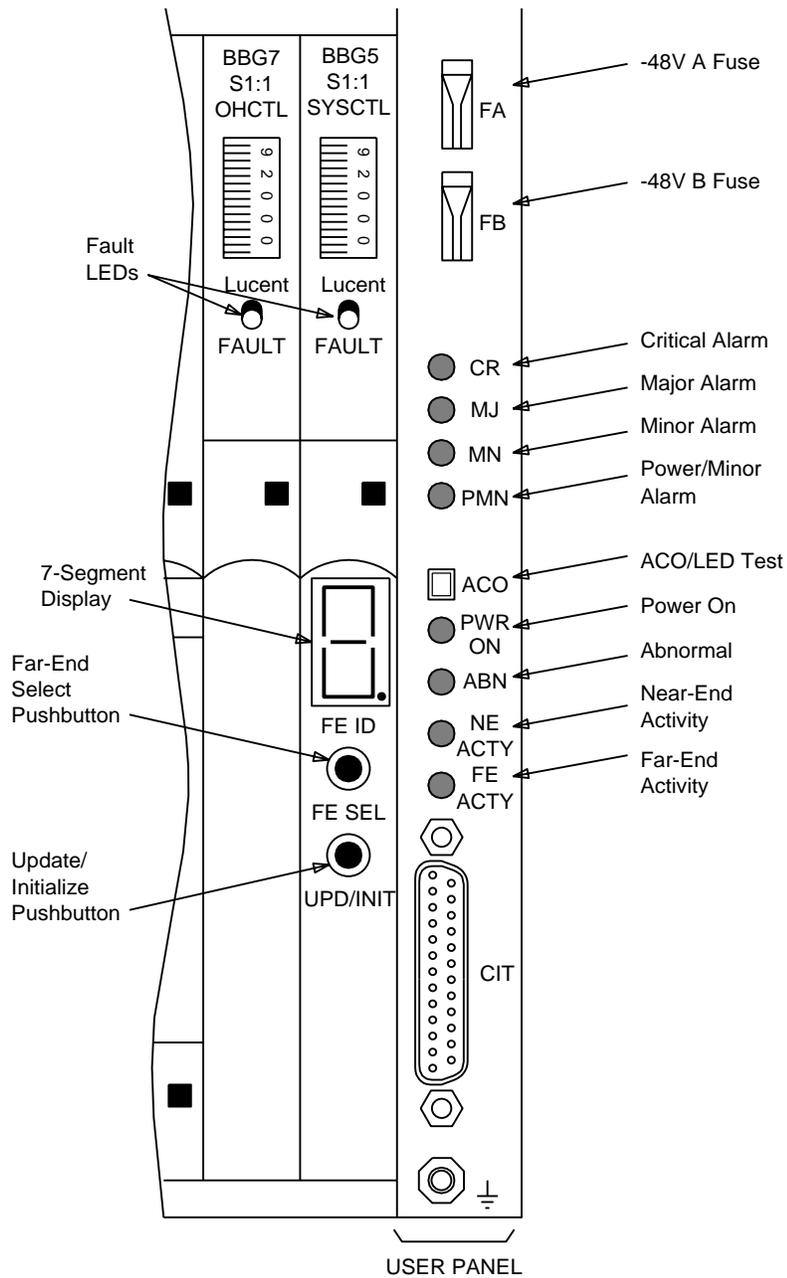
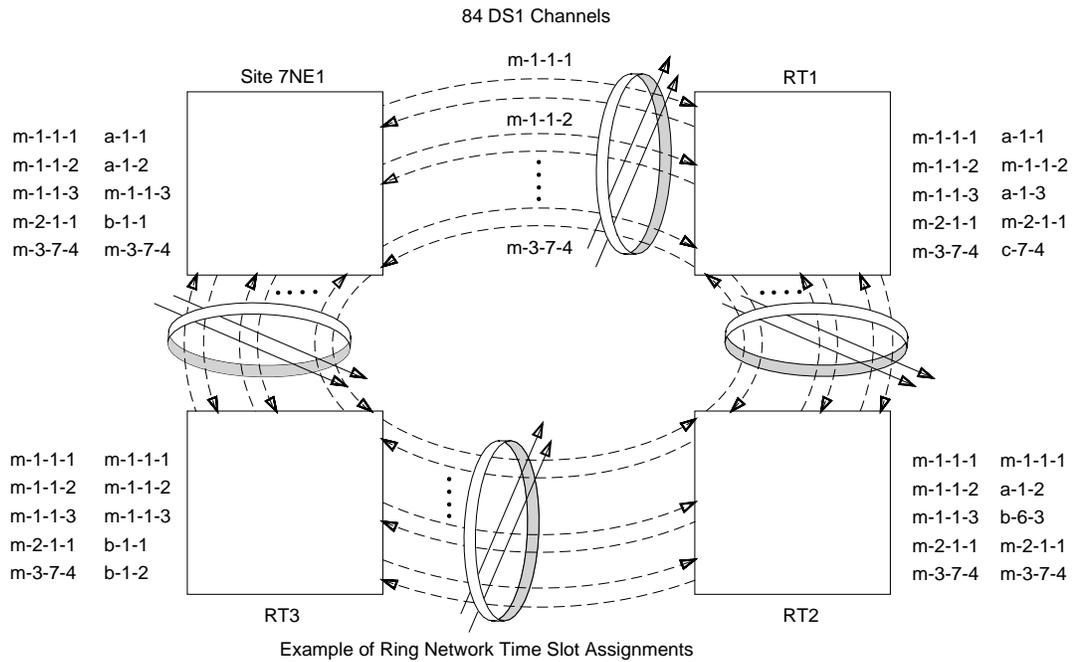


Figure 6-2. DDM-2000 User Panel



Network Time Slot (Path)	Terminal		Terminal		TID's of Pass Thru Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
m-1-1-1	Site 7NE1	a-1-1	RT1	a-1-1	RT2, RT3
m-1-1-2	Site 7NE1	a-1-2	RT2	a-1-2	RT1, RT3
m-1-1-3	RT1	a-1-3	RT2	b-6-3	Site7NE1, RT2
m-2-1-1	Site 7NE1	b-1-1	RT3	b-1-1	RT1, RT2
m-3-7-4	RT2	c-7-4	RT3	b-1-2	Site7NE1, RT2

**Figure 6-3. Establishing Cross-Connects**



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## Release 8 Installation Tests

# 7

---

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## Release 8 Installation Tests

# 7

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### Overview

This section provides test procedures for verifying the following on a Release 8 configured DDM-2000 OC-3 shelf:

- Shelf transmission
- Wiring to DSX Cross-Connect (DSX-1)
- Wiring to DSX/EC-1 Cross-Connect (DSX-3) or FT-2000/DACS IV 2000
- Fiber verification

---

### Description

The following information provides instructions on the use of an American Standard Code for Information Interchange II (ASCII) terminal and the suggested installation tests which should be performed. If problems are encountered, refer to the "Troubleshooting" section of this manual. For detailed troubleshooting, refer to 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual*.

The installation tests verify transmission through the shelf, wiring to the cross-connect or wiring to FT-2000/DACS IV-2000, fiber installation and end-to-end transmission as shown in Figure 7-1.

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 7-2.

Prior to beginning the following tests the office alarm interface to this shelf (either J56 or J57) should be removed before tests are executed and replaced upon completion.

The following tests should be performed with the DDM-2000 OC-3 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:

<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**

\* A flashing FAULT LED on the OHCTL indicates a loss of communication with the far-end SYSCTL

\*\* 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:

<b>LED</b>	<b>Description</b>
CR (Critical)	Potential loss of service to 96 or more DS0 customers
MJ (Major)	Potential loss of service to fewer 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 (Power On)	The shelf is receiving a -48 V source
ABN (Abnormal)	An abnormal condition initiated through craft interface terminal (CIT) command (that is, loopback, forced manual switch)
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 User Panel and SYSCTL. See Figure 7-2.

<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 removal 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 presently 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:

Quantity	Description	
1	Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection	
1	DSX-1 loopback cable	
1	DSX-3 loopback cable or/and BNC to BNC connector (for wiring to equipment not DSX-3)	
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 7-2)
1 per OLIU	22F	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	21G	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	21D	Multimode with ST <sup>®</sup> connectors on each end
1 per OLIU	21D-U 22D-U	Multimode 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 7-1 )
1 per OLIU	21G-U 22G-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 7-1 ) See Note Below



**NOTE:**

When looping a 22G-U OLIU back on itself a 10 dB LBO is required.

## Use of Terminal

### Description

This procedure describes which terminals are approved for use with the DDM-2000 OC-3, how to set up the terminal, and the DDM-2000 OC-3 command structure which will be used.

## **Compatible Terminals**

---

The DDM-2000 OC-3 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 OC-3. See 363-206-240, *DDM-2000 OC-3 Multiplexer User/Service Manual* for a list of DDM-2000 OC-3 compatible terminals.

The DDM-2000 OC-3 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 OC-3 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.

DDM-2000 OC-3 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 OC-3 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 DDM-2000 OC-3 and the terminal for a lower baud rate.

## **DDM-2000 OC-3 Command Notes**

---

All DDM-2000 OC-3 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 OC-3 command codes with their descriptions is contained in the 363-206-280, *DDM-2000 OC-3 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 OC-3s in the bay.



**NOTE:**

If properly cabled, connection to any EIA-232D in the bay will allow communication to any shelf in the bay.

2. Press the Return (or Enter) key twice, to set the SYSCTL autobaud rate and prompt the DDM-2000 OC-3 to request a shelf address.

The DDM-2000 OC-3 will respond:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```



**NOTE:**

The default shelf is the one physically connected to the CIT. To determine what shelves can be entered enter a **?**.

3. After entering a valid shelf number 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**. For circuit packs and shelves manufactured up to, but not including, 1 October 1996, the login is **ATT01**. Both login and password must be UPPERCASE.

 **NOTE:**

The login and password must be entered in uppercase as shown.

After a successful login, the DDM-2000 OC-3 will display the system header followed by the alarm and status report:

AT&T DDM-2000 OC-3 Release a.b.c (before October 1, 1996). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

Lucent DDM-2000 OC-3 Release a.b.c (October 1, 1996 and later). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

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. To communicate with another shelf in the bay, the user will first have to terminate the session with the current 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 OC-3 with its default parameters.

 **CAUTION:**

*After cross-connections are entered, use **init-sys:all** with extreme caution as it erases all manual cross-connects.*

5. When initialization completes, 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**. 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 OC-3 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 in all circuit pack positions.

### Procedure

---

Issue the command `test-led;`

The DDM-2000 OC-3 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.

## Local Equipment Test

---

### Description

---

This test verifies proper operation of the circuit packs and the circuit pack positions, which are equipped in the DDM-2000 OC-3 shelf. The shelf must successfully pass this test before testing any other feature of the DDM-2000 OC-3.



**WARNING:**

*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*



**NOTE:**

After completing the shelf test, isolate and replace any failed units. If any units are replaced, repeat the LED test and local equipment test until both tests pass without failures.



**NOTE:**

If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions.

## **Preparation Procedure**

---

1. If the DDM-2000 OC-3 is in an RT, change the timing mode on the BBF2/BBF2B (TGS) circuit packs from loop timed to free running. If the timing mode is changed, press the UPD/INIT pushbutton on the SYSCTL after the change is completed.
2. Fully insert the OLIUs into the shelf.
3. Connect the OLIU OUT to the OLIU IN of each OLIU (loopback), using optical fiber cables. Refer to Figure 7-1.



**NOTE:**

The optical fiber cables required are listed under "Tools, Test Sets, and Accessories".



**NOTE:**

When looping a 22G-U OLIU back on itself a 10 dB LBO is required.

4. During the loopback test the far-end communications must be disabled. Issue the command `set-fecom:dcc-all:com=disabled;`.
5. After a few moments, check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.

## **Procedure**

---

Issue the command `test-auto:md=local` (TEST-AUTO TURNUP).

The CR and MJ LEDs on the user panel will light. This indicates the start of the shelf test. Any circuit pack failing this test will light its FAULT LED during the test. When the test has successfully completed, all LEDs will go out.

The results will be displayed on the CIT, with a **g** indicating good, an **F** indicating failure, and a **-** indicating unequipped under each pack designation.

Leave the optical fiber loopbacks in place.

## Local Wiring Cross-Connect Test

---

### Description

---

This test verifies proper cabling from the DDM-2000 OC-3 to the DSX-1 or DSX-3/EC-1 cross-connect panels, or to the FT-2000/DACS IV 2000.



**NOTE:**

After completing the DSX cabling test, isolate and correct any incorrect wiring. If any cabling is corrected, repeat the DSX test until the test passes without failures.



**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.

### Preparation Procedure

---

1. Loop the DS1 signals at the DSX cross-connect panel (if applicable). It is best to loop all the DS1s, but the minimum looping is in groups of four.

It is best to unequip the low-speed positions without loopbacks to speed up the DSX cabling test. This is done by unseating the undesired low speed packs, then pressing the UPD/INIT pushbutton on the SYSCTL.

2. Loop the DS3/EC-1 signals at the DSX cross-connect panel (if applicable).
3. If cross-connect panel is not used, place a BNC to BNC connector at the end of the DS3 cables OR have Craft Personnel place an internal loopback at the terminating equipment (FT-2000/DACS IV 2000).
4. The optical fiber loopbacks should still be in place. Refer to Figure 7-1, DSX cabling test.

### Procedure

---

1. Issue the command `test-auto:md=dsx` (TEST-AUTO TURNUP).

The CR, MJ, and MN LEDs on the user panel will light. This indicates the start of the DSX test. Any DSX cabling failures will be indicated by a flashing FAULT LED on the corresponding circuit pack during the test. When the test has successfully completed, all LEDs will go out. The results will be displayed on the CIT, with a **g** indicating good, an **F** indicating failure, and a **-** indicating unequipped under each cross-connect designation.

2. Remove all the DSX cross-connect, BNC connectors or Internal loopbacks for DS1 and DS3 service. The loopbacks for EC-1 interfaces should remain, as the BBG6 transmits an internal signal at all times and an 'inc. EC-1 LOS' alarm will result if loopbacks are removed. When EC-1 loopbacks are present, 'Inc. STS AIS' alarms may exist at the far-end for low speed applications utilizing VT cross-connects.
3. If DS1 circuit packs without loopbacks at the DSX-1 were removed to speed up testing, reinstall them.
4. Press the UPD/INIT pushbutton on the SYSCTL.

## **End-To-End System Test**

---

### **Description**

---

This test verifies proper fiber optic cabling and OLIU circuit packs.

On initial installation/turn-up of a Release 8 System default cross-connects exist. For applications as in Figure 7-3 or 7-4 the default cross-connects may have to be deleted and reentered to fit the individual application.

An EC-1 interface composed of DS1 services should be cross-connected at the VT level as opposed to the STS-1 level. Thus in the event of one VT (or more) failure the channel protection switch would occur. An EC-1 interface composed of DS3 services should be cross-connected at the STS-1 level.

### **Preparation**

---

1. Verify that each shelf in the system is set for the correct timing option. Typically, a CO is set for either external or free running and the other sites are set for loop timed.



**NOTE:**

Timing selection is a switch option setting on the BBF2/BBF2B (TGS) circuit pack.

2. If the shelf is optioned for external, make sure it is connected to an external clock through J37 on the shelf backplane; the line code and the frame selection must be set for the attributes of the clock.



**NOTE:**

In the absence of engineering records, set the line code for AMI and the frame selection for superframe.

3. If the timing mode selection on any TGS circuit pack is changed, press the UPD/INIT pushbutton on the SYSCTL.

4. 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).
  - 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 DSNE) must be set as the AGNE.
  - e. Site ID and NE (Network Element) combinations must be unique in each shelf.
  - f. Shelf numbers must be unique when shelves are located within the same bay.
  - g. Cross-Connect Mode (CrsMode) defaults to the default cross-connect map. Set this parameter to manual only if it is desired to deviate from the default cross-connect map.
  - h. Set Central Office shelves to CO and Remote Terminal shelves to RT.
  - i. Each shelf should be set to a unique TBOS Address.
  - j. The TBOS Link is for shelves in a CO connected to TBOS. It prevents failure of a single shelf in a bay from causing a TBOS link failure. The TBOS primary setting assigns a shelf as a backup for a group of shelves that share the same TBOS link. The secondary setting provides a secondary backup. Typically, the shelf cabled to the TBOS is set for PRIMARY and the second shelf in the bay is set for secondary. All other shelves in the CO bay that are associated with that TBOS link are set for NORMAL. All shelves in the RT are set for NO-TBOS.
  - k. 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.
  - l. Idle Channel Signal should be set to AIS (default).
5. Issue the `set-fecom:dcc-all:com=enabled;` command to enable far-end communications in each shelf.



**NOTE:**

An inconsistent DCC switch settings alarm will be present while the OLIUs are optically looped back on themselves.

6. For each optical span, the network elements that terminate on each side of the optical span must have their OSI "Network Side"/"User Side" parameters set to opposite values. Issue the `rtrv-fecom;` command at each

shelf to verify that Network Side (ns) and User Side (us) parameters are set to opposite values at the OLIU slot addresses of each optical span. Refer to the "OSI User Side/Network Side Settings" Table at the bottom of Figure 7-4 to see how these parameters should be set for the network shown.

If User Side/Network Side parameters are not opposite at the ends of an optical span, change the setting at one end using the `set-fecom;` command.

## **Fiber Verification Procedure and Optical Test**

---

The following procedure verifies that the optical fiber cables are properly connected.



### **WARNING:**

*Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.*



### **NOTE:**

The procedure requires personnel at both ends of the DDM-2000 OC-3 point-to-point system or hubbing application.

1. Determine the fiber interconnections for a multispan system configuration. Refer to Figure 7-3 and Figure 7-4.
2. Disconnect the optical loopback fibers from the OLIUs and connect the transmission fibers to their predetermined OLIU connectors.



### **NOTE:**

For OLIUs with LBOs on the connectors for loopback purposes, determine whether the LBO should be changed per the span length and change if necessary before connecting transmission fibers.

3. After a few moments, verify that no alarms are present. If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
4. Disconnect the fiber cable from the OUT jack on the Main-1 OLIU or Fn-1 OLIU (when provided) at one end of the span. At the other end, verify that the appropriate OLIU FAULT LED is flashing, indicating loss of signal.



### **NOTE:**

Figures 7-3 and 7-4 show examples of multispan system configurations.

5. Reconnect the fiber and repeat this procedure for the opposite direction of transmission.
6. To obtain a map of the SONET network to verify fiber connections, issue the command `rtrv-map-net;`. Verify that all shelves interconnected via optical fiber are reported in the Network Map.

The optical span test checks the transmission across the optical interfaces. Signals are monitored at both ends of the span. Results from the far-end are sent back to the near end for reporting. No manual loopbacks are required for this test.

1. Issue the command `test-auto:md=optics` (TEST-AUTO TURNUP).

The CR, MJ, MN and PMN LEDs on the user panel will light. This indicates the start of the optics test. Any pack failures will be indicated by a flashing FAULT LED on the corresponding circuit pack during the test. When the test has successfully completed, all LEDs will go out.

The results will be displayed on the CIT, with a **g** indicating good, an **F** indicating failure, and **a** - indicating unequipped under each cross-connect designation.

## **DS1/DS3 Verification Tests (Optional)**

The following test verifies proper operation of the DS1 or DS3 transmission paths between sites. Typically, the entire DDM-2000 OC-3 shelf will pass or fail this test, indicating that the transmission path is good or bad.

The STS-1E circuit packs can not be tested with the test transmission commands directly, thus the BBG6 (STS-1E) circuit pack must be tested with a MXRVO or DS3 circuit pack. The BBG6 must be located at the far-end where the loopback connections are made.

1. If a problem is isolated to the path, determine and correct the path problem and repeat the system test.
2. If the path is trouble-free but a problem still exists, isolate and correct the circuit pack, shelf, or/and cable problem(s). Repeat any of the installation tests as necessary.



### **NOTE:**

If a valid DS1, DS3, EC-1 signal is applied to the DDM-2000 OC-3 and then removed, the FAULT LED on the DS1, DS3 or EC-1 circuit pack will flash. Press the UPD pushbutton on the SYSCTL to stop any flashing LEDs.

3. Determine the transmission paths for each equipped function group. Figure 7-3 shows typical transmission configurations for an add/drop system arrangement. Figure 7-4 shows typical configurations for a hubbing arrangement. The actual add/drop and hub connections should be similar to those shown.
4. DDM-2000 OC-3 Release 8 permits the shelf to be placed into default or manual cross-connect mode, using the `set-ne` command. See the `ent-crs` or `dlt-crs` commands in the 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* to enter the proper cross-connects for individual applications. Make any necessary cross-connect changes at the CO shelf.

5. Use the `r1gn-tid`; (TID = the TID previously designated by the `set-ne` command) command to log into the RT for changing cross-connects if applicable.
6. Log out of the RT site using the `log (out)` command.
7. Depending upon the system configuration, repeat this procedure at each site that requires cross-connecting.

### **DS1 Verification Procedure**

---

The activity in the following procedure is performed from the CO location.

In the following test, internal DS1 loopbacks are established in the DDM-2000 OC-3 shelf at the associated RT site. A DS1 test signal is internally generated from the CO shelf and measured by the CO shelf. Refer to Figure 7-1.

1. Perform a remote login from the CO to the RT site, using the `r1gn-tid` command.
2. At the CO, perform a DS1 loopback on all DS1 or EC-1 channels at the RT site as follows:
  - a. Issue the command `opr-lpbk-t1` or `opr-lpbk-ec1`;
  - b. At the address prompt, enter `fn-all`
  - c. At the execute prompt, enter `y`
  - d. Verify that loopbacks are present by entering `rtrv-alm`
3. At the CO, perform a DS1 test as follows:
  - a. Issue the `toggle` command to return CIT communications to the CO shelf
  - b. Issue the command `test-trmsn-t1`
  - c. At the address prompt, enter `a-1-1` or the appropriate address as in step 2b.
  - d. At the direction prompt, enter `mux`
  - e. At the duration prompt, enter `1`



**NOTE:**

This command will initiate a 1-minute DS1 transmission test from the CO shelf to the RT shelf and looped back to the CO shelf.

4. If the test was not error free, isolate the problem by checking DS1 circuit packs and associated wiring.
5. Repeat this DS1 transmission test for each equipped DS1.
6. Perform a remote login to the RT site, using the `toggle` command.

7. Release the loopbacks as follows:
  - a. Issue the command `rls-lpbk-t1` or `rls-lpbk-ec1`;
  - b. At the address prompt, enter `ls-all`
  - c. At the execute prompt, enter `Y`
  - d. Perform the `upd` command.

### **DS3 Verification Procedure**

---

The activity in the following procedure is performed from the CO location. Perform this procedure on all DS3 circuit packs installed.

1. At the CO, change the DS3 violation monitoring mode from VMR to VM by entering the following command:  

```
set-t3:all:md=cc;
```
2. Establish a remote login from the CO to the RT site, using the `rlgn-tid` command.
3. Change the violation monitoring mode from VMR to CC in the same manner as at the CO (Step 1).
4. Perform a DS3 or EC-1 loopback on all DS3/EC-1 groups at the RT by issuing the following command:
  - a. Issue the command `opr-lpbk-t3` or `opr-lpbk-ec1`;
  - b. At the address prompt, enter `fn-all`
  - c. At the execute prompt, enter `Y`
  - d. Verify that loopbacks are present by entering `rtrv-alm`
5. At the CO, perform a DS3 test as follows:
  - a. Issue the `toggle` command to return CIT communications to the CO shelf
  - b. Issue the command `test-trmsn-t3`
  - c. At the address prompt, enter `'a'` or the appropriate address corresponding to the loopback at the far-end.
  - d. At the direction prompt, enter `mux`
  - e. At the duration prompt, enter `1`



**NOTE:**

This command will initiate a 1-minute DS3 transmission test from the CO shelf to the RT shelf and looped back to the CO shelf.

6. If transmission is not error-free, isolate and correct the problem by checking DS3 circuit packs and associated cabling.

7. Change the DS3 violation monitoring mode back to VMR at the CO and RT, using the `set-t3` command.
8. Repeat the procedure for each function group equipped with DS3 packs.
9. After completion of DS3 testing, release the DS3 loopbacks at the RT by performing the following:
  - a. Issue the command `rls-lpbk-t3` or `rls-lpbk-ec1`;
  - b. At the address prompt, enter `fn-all`
  - c. At the execute prompt, enter `Y`
  - d. Verify loopbacks are no longer present by entering `rtrv-alm`
10. Remove all test signals from the DDM-2000 OC-3.
11. Press the UPD pushbutton on the SYSCTL.

## **Final Operations**

---

### **Procedure**

---

1. Verify that all test signals and loopbacks from the DDM-2000 OC-3 have been removed.
2. Press the UPD pushbutton on the SYSCTL.
3. Verify that the system is configured for normal operation and that no alarms are present (other than the BBG6 alarms described previously). If alarms are present, refer to the "Troubleshooting" section of this manual.
4. Connect the office alarm cables if they have been disconnected.

**Table 7-1. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

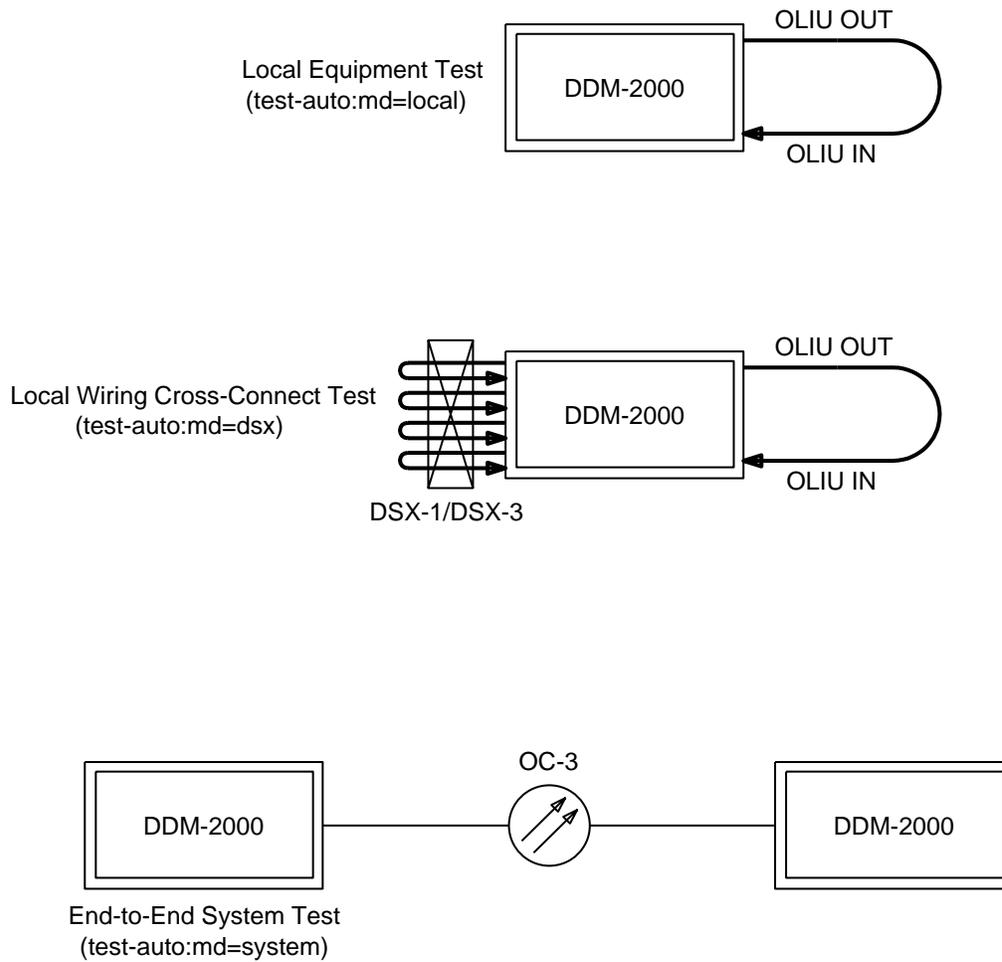


**NOTE:**

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.

**Table 7-2. Lightguide Jumpers**

<b>Lightguide Jumper Type</b>	<b>Code</b>	<b>Comcode</b>	<b>Connector Type</b>	<b>Length (Feet)</b>
Single Mode	FS1E-E-2	105357727	ST@-ST@	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@-ST@	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**

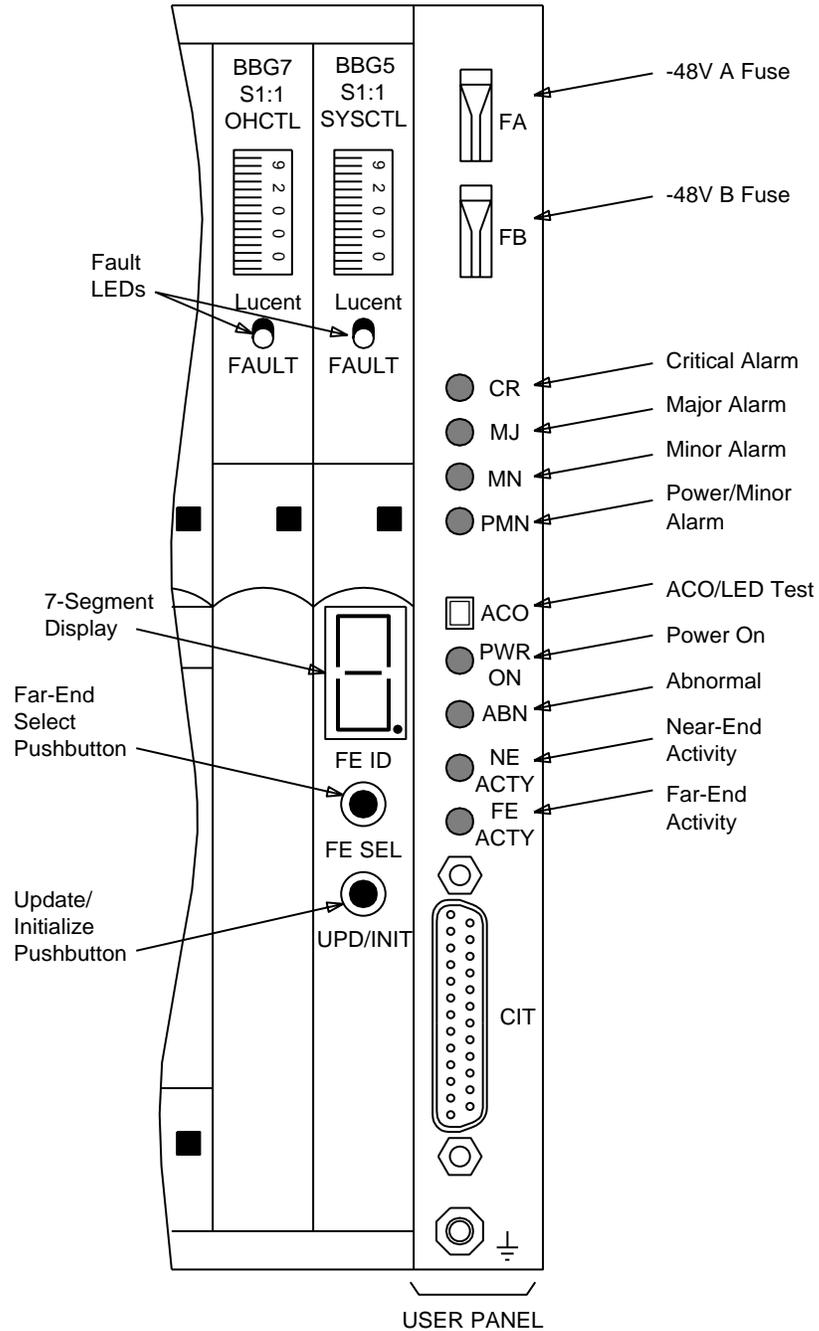
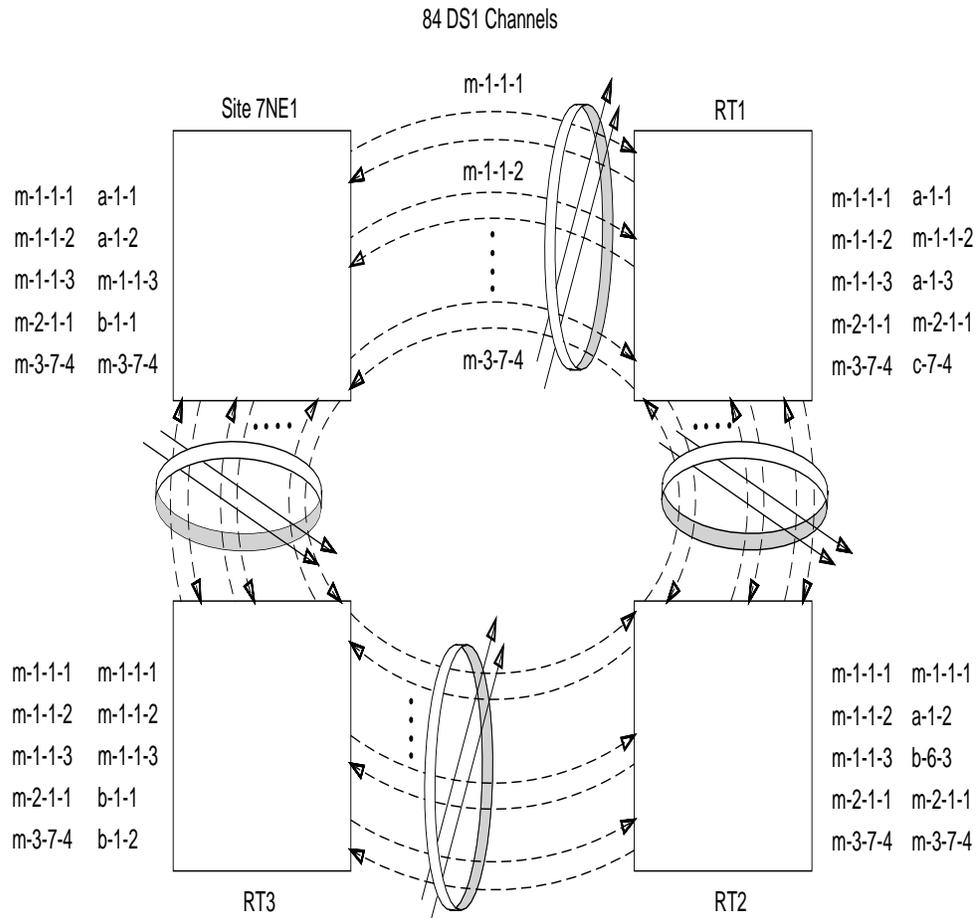


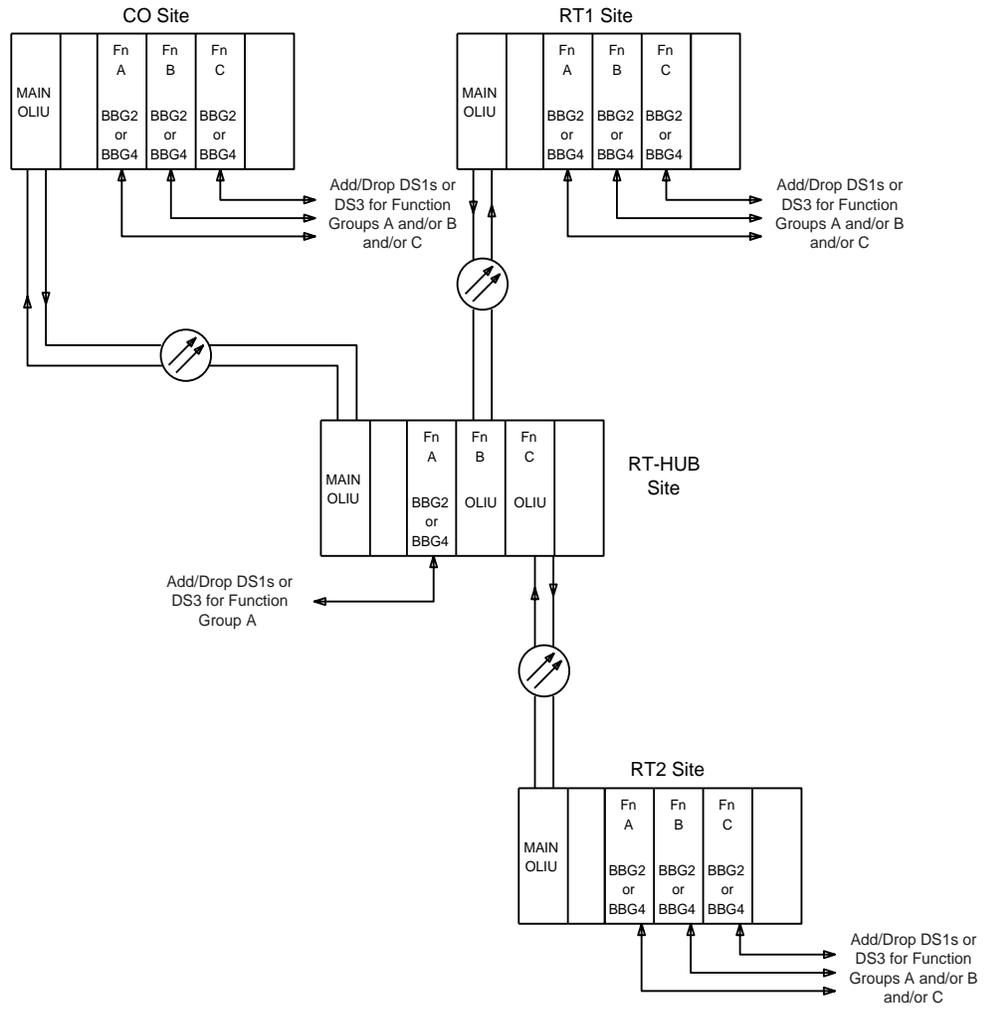
Figure 7-2. DDM-2000 User Panel



Example of Ring Network Time Slot Assignments

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass Thru Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
m-1-1-1	Site 7NE1	a-1-1	RT1	a-1-1	RT2, RT3
m-1-1-2	Site 7NE1	a-1-2	RT2	a-1-2	RT1, RT3
m-1-1-3	RT1	a-1-3	RT2	b-6-3	Site7NE1, RT2
m-2-1-1	Site 7NE1	b-1-1	RT3	b-1-1	RT1, RT2
m-3-7-4	RT2	c-7-4	RT3	b-1-2	Site7NE1, RT2

**Figure 7-3. Typical Release 8 Linear Add/Drop System Configuration**



OSI User Side/Network Side Settings		
Site Name	OLIU Slot	US/NS Setting
CO	Main	US
RT-HUB	Main	NS
	Fn-B	NS
	Fn-C	NS
RT1	Main	US
RT2	Main	US

Figure 7-4. Typical Release 8 Hubbing System Configuration



---

## Releases 9 and 11 Installation Tests

# 8

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■ Cross-Connect Procedure	<a href="#"><u>8-20</u></a>
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---

## Releases 9 and 11 Installation Tests

# 8

---

### Overview

This section provides test procedures for verifying the following on Releases 9 and 11 configured DDM-2000 OC-3 shelves:

- Shelf transmission
- Wiring to DS1 Cross-Connect (DSX-1)
- Wiring to DS3/EC-1 Cross-Connect (DSX-3) or DACS IV 2000
- 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 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual*.

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 8-1.

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.

For Releases 9 and 11 configurations interconnecting with DDM-2000 FiberReach, refer to 363-206-310, *DDM-2000 FiberReach Installation Manual*, for the FiberReach portion of the installation.

The user panel contains the EIA-232D connector and the LEDs used to perform the installation tests as shown in Figure 8-2.

Before the following tests are executed the office alarm interface to the shelf (either J56 or J57) should be removed. Replace the interface upon completion.

The following tests should be performed with the DDM-2000 OC-3 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:

<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**

\* A flashing FAULT LED on the OHCTL indicates a loss of DCC communications with the FAR-END SYSCTL

\*\* 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:

<b>LED</b>	<b>Description</b>
CR (Critical)	Potential loss of service to 96 or more DS0 customers
MJ (Major)	Potential loss of service to fewer 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 (Power On)	The shelf is receiving a -48 V DC source
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 User Panel and SYSCTL. See Figure 8-2.

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:

Quantity	Description	
1	Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection	
1	DSX-1 loopback cable	
1	DSX-3 loopback cable or/and BNC to BNC connector (for wiring to equipment not DSX-3)	
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 8-4)
1 per OLIU	22F	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	22D-U	Multimode 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 8-3 )
1 per OLIU	22G-U or 24G-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 8-3 )
2 per OLIU	27G-U	See Note Below

**⇒ NOTE:**

When looping a 22G-U or 24G-U OLIU back on itself a 10 dB LBO is required for each output. When looping a 27G-U OLIU back on itself a 15 dB LBO is required for each output.

## Use of Terminal

---

### Description

---

This procedure describes which terminals are approved for use with the DDM-2000 OC-3, how to set up the terminal, and the DDM-2000 OC-3 command structure which will be used.

### Compatible Terminals

---

The DDM-2000 OC-3 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 OC-3. See 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* for a list of DDM-2000 OC-3 compatible terminals.

The DDM-2000 OC-3 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 OC-3 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.

DDM-2000 OC-3 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 OC-3 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 OC-3 Command Notes**

---

All DDM-2000 OC-3 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 OC-3 command codes with their descriptions is contained in the 363-206-280, *DDM-2000 OC-3 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 OC-3s in the bay.



### **NOTE:**

If properly cabled, connection to any EIA-232D in the bay will allow communication to any shelf in the bay.

2. Press the Return (or Enter) key twice, to set the SYSCTL autobaud rate and prompt the DDM-2000 OC-3 to request a shelf address.

The DDM-2000 OC-3 will respond:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```



**NOTE:**

The default shelf is the one physically connected to the CIT. To determine what shelves can be entered enter a **?**.

3. After entering a valid shelf number and pressing the return (or Enter) key the user is presented with:

```
login<
```



**NOTE:**

If the Return (or Enter) key is pressed without entering a shelf number the shelf to which you are physically attached will be accessed.



**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**. For circuit packs and shelves manufactured up to, but not including, 1 October 1996, the login is **ATT01**. This older login may have been upgraded to **LUC01** if newer software has been installed. Both login and password must be UPPERCASE



**NOTE:**

The login and password must be entered in uppercase as shown.

After a successful login, the DDM-2000 OC-3 will display the system header followed by the alarm and status report:

Lucent DDM-2000 OC-3 Release a.b.c (October 1, 1996, and later). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

AT&T DDM-2000 OC-3 Release a.b.c (before October 1, 1996). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

```
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. To communicate with another shelf in the bay, the user will first have to terminate the session with the current shelf. The session is terminated with the **log;** (LOGOUT) command.

4. Issue the command **init-sys:a11;** (INITIALIZE-SYSTEM). This command will configure the DDM-2000 OC-3 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, 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`. 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 OC-3 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 in all circuit pack positions.

### Procedure

---

Issue the command `test-led;`

The DDM-2000 OC-3 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.

## 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 OC-3 shelf. It verifies proper cabling from the DDM-2000 OC-3 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 OC-3.

On initial installation/turn-up of Releases 9 and 11 systems there are no default cross-connects; thus all cross-connects need to be entered for the tests. In Releases 9 and 11 VT and STS-1 cross-connects are allowed and can be entered as a group, rather than individually.

Upon completion of this test all cross-connections will be deleted and later reentered to fit individual ring applications.

To understand cross-connects and the ring philosophy, refer to the 'Description Section' under 'Establishing Cross-Connects and System Test' of this section.



**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 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual*, Issue 1 for complete command descriptions.



**NOTE:**

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

## Preparation Procedure

---

1. The 'Free Running' timing configuration is required for the DSX-1 test. The timing parameters are set on the TGS pack. Refer to Section 4 of this manual for option switch settings. Set timing to 'Free Running'.
2. Fully insert the OLIUs into the shelf.
3. Connect the OLIU OUT to the OLIU IN of each OLIU, using optical fiber jumper cables. Refer to Figure 8-1.



**NOTE:**

The optical fiber cables required are listed under "Tools, Test Sets, and Accessories".



**NOTE:**

When looping a 22G-U (or 24G-U) OLIU back on itself a 10 dB LBO is required. When looping a 27G-U OLIU back on itself two 15 dB LBOs are required.



**NOTE:**

If any of the OLIUs are of the universal type (ex: 22G-U) and other than ST<sup>®</sup> type connectors are being used see Table 8-3 for the universal LBOs needed and Table 8-4 for the lightguide jumpers.

4. During the loopback test the far-end communications must be disabled. Issue the command `set-fecom` and set the `address=dcc-all` and `communications=disabled` (far-end communications).
5. After a few moments, check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
6. To test each DS1 or DS3 channel through to the cross-connect panel or terminating equipment, its cross-connect map has to be made at the DDM OC-3 Shelf.
7. Enter DS1 or DS3/EC-1 cross-connects according to the OC-3 shelf configuration. Table 8-1 contains the cross-connect map required to test DS1 service on function groups A,B and C of this DDM-2000 OC-3 shelf.
8. Enter DS1 cross-connects as follows:

```
ent-crs-vt1:m-1-all,a-all:cct=twoway:y;
```



**NOTE:**

The 'all' command can be used for a range of address'.

9. Enter DS3/EC-1 cross-connects as follows:

```
ent-crs-sts1:m-1,a:y;
```

10. Ensure the appropriate cross-connect map is in place in the shelf by entering the command `rtrv-crs-vt1;`.

### **Procedure for DS1 Testing**

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.
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.

### **Procedure for DS3 Testing**

1. Beginning with address 'a', place a physical DS3 loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. The following command and parameters test the DS3 channel's cabling for 60 seconds.

Issue the command:

```
test-trmsn-t3:a  
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 DS3 loopback to the next DS3 channel at the DSX-3 panel or place a loopback at the terminating equipment. Press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist and continue testing the next channel.

## **Procedure for EC-1 Testing**

---

1. Beginning with address 'a', place a physical DS3(EC-1) loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3/EC-1 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. Remove the DS3(EC-1) loopback.
3. Issue the `rtrv-alm` command and observe that an 'Inc. EC-1 LOS' alarm exists for this address.
4. Replace the DS3(EC-1) loopback.
5. Issue the `rtrv-alm` command and observe that the 'Inc. EC-1 LOS' no longer exists. If the alarm exists, correct the problem by checking circuit packs and associated cabling. An 'Inc. STS AIS' will occur if VT cross-connects exist.
6. The physical DS3(EC-1) loopback can remain until service is applied. Verify that no 'Inc. EC-1 LOS' alarms exist and continue testing the next channel.

## **Procedure for Removing Cross-Connects**

---

After all function groups 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. To delete DS1 cross-connects issue the command:

```
dlt-crs-vt1:m-1-all,a-all:y;
```

Replace 'm-1-all,a-all' with the address to be deleted.

2. To delete DS3/EC-1 cross-connects, issue the command:

```
dlt-crs-sts1:m-1,a:y;
```

Replace 'm-1,a' with the address to be deleted.

### **⇒ NOTE:**

If cross-connects remain, VT AIS alarms will remain until cross-connects are entered for all remaining shelves in the ring.

3. 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;`.



**CAUTION:**

*Remember that the `init-sys:all` command should be used with extreme caution in an in-service system as it deletes all cross-connects.*

Remove the fiber loopbacks from the OLIU circuit packs. Incoming OC-3 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**

---

The following procedure describes fiber connection and test. To achieve transmission in both directions for a two fiber ring, fibers originating at Node 1 (Shelf 1) OLIU Slot Main-1 (M1) must connect to Node 2 Slot Main-2 (M2). Node 2 OLIU M1 would connect to Node 3 OLIU M2 and this would continue (M1 connecting to M2) around the ring until all nodes in the ring are reached. Refer to Figure 8-1.

1. Set each shelf in the system for the correct timing. Conventionally, one node in the ring will be set for either free running or externally timed and the others will be looped timed. Only one node may be free running. More than one node can be externally timed if traceable to the same source clock, and the remainder looped. Check that external connections are completed if option is set for external.
2. If TGS Circuit Pack option switch is changed, an update must be done by momentarily depressing the UPD/INIT button on the SYSCTL after the TGS pack is installed.
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).
  - 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 DSNE) must be set as the AGNE.
  - e. Site ID and NE (Network Element) combinations must be unique in each shelf.
  - f. Shelf numbers must be unique when shelves are located within the same bay.

- g. Set Central Office shelves to CO and Remote Terminal shelves to RT.
  - h. If TBOS is enabled, each shelf should be set to a unique TBOS Address.
  - i. The TBOS Link is for shelves in a CO connected to TBOS. It prevents failure of a single shelf in a bay from causing a TBOS link failure. The TBOS primary setting assigns a shelf as a backup for a group of shelves that share the same TBOS link. The secondary setting provides a secondary backup. Typically, the shelf cabled to the TBOS is set for PRIMARY and the second shelf in the bay is set for secondary. All other shelves in the CO bay that are associated with that TBOS link are set for NORMAL. All shelves in the RT are set for NO-TBOS.
  - j. 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.
  - k. 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
22 series	dcc-m1	us
	dcc-m2	ns
	dcc-fn-a	ns
	dcc-fn-b	ns
	dcc-fn-c	ns
27G-U	dcc-m1-1	ns
	dcc-m1-2	ns
	dcc-m2-1	us
	dcc-m2-2	us
	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.

For shelves containing 27G-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 27G-U is to be used, set the other OC-1 to the not monitored state and disable its FECOM. Refer to Figure 8-3.

For example, with a 27G-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;
```

## Procedure for Installation

---

1. Refer to Figure 8-1 to understand the method of connecting ring fibers. Your ring, will differ from Figure 8-1 if you have more or less than three nodes, thus use an appropriate figure, adapted to your ring configuration. Use the following instructions, adapted to the size of your ring, to connect fibers. Connect fibers as follows:

### NOTE:

If the proper LBO is not known for each optical fiber span see DLP-514 of the 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* to determine the LBO needed.

Location	Slot	Connector	<-->	Location	Slot	Connector
Site1NE1	M1	OUT	<-->	Site2NE1	M2	IN
Site1NE1	M1	IN	<-->	Site2NE1	M2	OUT
Site2NE1	M1	OUT	<-->	Site3NE1	M2	IN
Site2NE1	M1	IN	<-->	Site3NE1	M2	OUT
Site3NE1	M1	OUT	<-->	Site4NE1	M2	IN
Site3NE1	M1	IN	<-->	Site4NE1	M2	OUT
Site4NE1	M1	OUT	<-->	Site1NE1	M2	IN
Site4NE1	M1	IN	<-->	Site1NE1	M2	OUT

### NOTE:

After fiber connection is completed around the ring, continued flashing of the fault LED on 22 Type OLIU circuit packs may indicate incorrect connections.

2. To obtain a map of the SONET network to verify fiber connections around the ring, at Site1NE1 issue the command `rtrv-map-net`;

Using Figure 8-1 (or an adapted version to match your ring) at Site1NE1, verify the following:

```
/* Network Map for Site1NE1
```

```
=====
System Name      Comm.      Product      NE      Alarm
(TID)           Status    Type         Type    Group
=====
Site1NE1                DDM-OC3      DSNE      255
Site2NE1                DDM-OC3                255
Site3NE1                DDM-OC3                255
Site4NE1                DDM-OC3                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-net**;

Using Figure 8-1 (or an adapted version to match your ring) at Site1NE1, verify the following:

```
/* Neighbor Map for Site1NE1
```

```
=====
System Name      Connected  Comm.      Product
(TID)           Through   Status     Type
=====
Site1NE1                DDM-OC3
Site2NE1             main-1    DDM-OC3
Site4NE1             main-2    DDM-OC3
*/
```

4. Continue around the ring verifying that the Neighbor Map "connected through" indications at each node match the indicated fiber connections of Figure 8-1 (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 8-1.
  1. At Site1NE1 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.OC3 FERF
```

2. To verify correct fiber connection to Site2NE1, do one of the following:
  - a. Remote login to Site2NE1 and check for the following alarm (other alarms may exist) to verify proper fiber connection:  

```
MINOR main-2 ----- inc.OC3 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 Site1NE1 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 Site1NE1 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 Releases 9 and 11 systems there are no default cross-connects, thus all cross-connects need to be entered. In Releases 9 and 11, DS1 or DS3 services and EC-1 interfaces are provided and thus VT and STS-1 cross-connects are applicable.

Due to the flexibility and complexity 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 expeditiously.

### **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.

Releases 9 and 11 software are two fiber path-switched rings. Each VT or STS-1 (DS1 or DS3 signal) is transmitted in both directions (clockwise and counter-clockwise) 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-3 line rate, which is 84 DS1 services or 3 STS-1's or a combination of the two. A timeslot or channel must be reserved all the way around the ring for each service.

Drop cross-connects are designated by a ring VT/STS-1 channel and an associated DS1/DS3/EC-1 port. Pass-through cross-connects are designated by using the same ring VT/STS twice. See Figure 8-4.

In Release 7 drop cross-connects are divided into two types.

- The standard twoway cross-connect, in which the ring VT/STS-1 channel is connected to the associated DS1/DS3/EC-1 port of the node.
- The drop and continue cross-connect, in which a VT/STS-1 signal is cross-connected into an EC-1 port on a "drop and continue" node. At the same time that this cross-connect is made, a second cross-connect is made that continues a copy of that VT/STS-1 signal, on the same timeslot of the ring that it came into this node on, transmitting it to the next node downstream on the ring.



**NOTE:**

A BBG6 (STS-1E) circuit pack is required in the function unit slots to make a drop and continue cross-connect.



**NOTE:**

The "drop and continue" nodes on a ring system must be setup in pairs, otherwise there will be a loss of service when the ring path is switched.

An EC-1 interface composed of DS1 services should be cross-connected at the VT level as opposed to the STS-1 level. Thus in the event of one VT (or more) failure the channel protection switch would occur. An EC-1 interface composed of DS3 services should be cross-connected at the STS-1 level.

- Cross-connect address (to enter/exit the ring):

Ex. m-1-1-1, a-1-1  
a-1-1, m-1-1-1

'm-1-1-1' represents (Location of OC-3 signal) - (STS-1 # within the OC-3)-  
(VT-Group # within the STS-1)-(VT1.5 # within the VT-G) Address Range  
is: m-(1-3)-(1-7)-(1-4)

'a-1-1' represents (low speed group)-(DS1 Pack)-(DS1 Port) Address  
Range is: (a,b,c)-(1-7)-(1-4)

- In Releases 9 and 11 the 'all' option may be used to specify a range of addresses:

Ex. m-1-all, a-all

'm-1-all' represents (main OLIUs)-(STS Group)-(All DS1 Ports)  
'a-all' represents (function unit)-(All DS1 Ports)

- Pass-through address at all nodes other than the entry/exit nodes is as follows:

Ex. m-3-7-4 m-3-7-4

Pass-throughs must match.

**⇒ NOTE:**

Typically, m-1-1-1 corresponds to a-1-1, m-1-1-2 to a-1-2, etc.

However, 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, a-3-6

**⇒ 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:**

For 27G-U circuit packs in the main slot positions, in a timeslot address "m-1-2-2" the "m" refers to main of both OLIUs, and the "1" corresponds to the first STS-1 which is dedicated with OC-1 #1 (the bottom IN/OUT connections) of the 27G-U OLIUs OC-1 pair. Likewise in a timeslot address "m-2-1-1" the "2" corresponds to the 2nd STS-1 which is associated with OC-1 #2 (the top IN/OUT connections). Since there are only two OC-1s in a 27G-U OLIU a timeslot address beginning with "m-3" is not allowed. Refer to Figure 8-3.

**⇒ NOTE:**

For 27G-U circuit packs in function unit slot positions, in a timeslot address "a-1-2-2" the "a" corresponds to the OLIU in either of the function unit positions, and the "1" corresponds to the first STS-1 which is associated with OC-1 #1 (the bottom IN/OUT connections) of the 27G-Us OC-1 pair. Likewise in a timeslot address "a-2-1-1" the "2" corresponds to the 2nd STS-1 which is associated with OC-1 #2 (the top IN/OUT connections). Since there are only two OC-1s in a 27G-U OLIU a timeslot address beginning with "a-3" is not allowed. Refer to Figure 8-3.



**NOTE:**

If a pass-through is missing, alarms may not appear. If three twoway 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 8-4.

### **Cross-Connect Procedure**

---

1. Use Office Records or fill in Table 8-2 (for DS1 service) 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;
```

3. Enter a DS3 pass-through as follows:

```
ent-crs-sts1:m-1,m-1:cct=twoway:y;
```



**NOTE:**

Release 7 cross-connects can be entered in groups using the 'all' option.

4. Enter an end DS1 cross-connect as follows:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway:y;
```

5. Enter an end DS3/EC-1 cross-connect as follows:

```
ent-crs-sts1:m-1,a:cct=twoway:y;
```

6. Enter a drop and continue DS1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m1:y;
```



**NOTE:**

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.



**NOTE:**

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.

⇒ **NOTE:**

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m2:y;
```

7. Enter a drop and continue DS3/EC-1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m1:y;
```

⇒ **NOTE:**

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.

⇒ **NOTE:**

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.

⇒ **NOTE:**

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m2:y;
```

8. Check each ring timeslot to be sure it has two end cross-connections and all other nodes have pass-throughs configured. Use Office Records and Table 8-2 to verify this.

## **Protection Switch Test**

---

This test verifies rings protection switching upon fiber cut.

1. At Site1NE1 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**

---

### **Procedure**

---

1. Verify that all test signals and loopbacks from the DDM-2000 OC-3 have been removed.
2. Press the UPD pushbutton on the SYSCTL.
3. Verify that the system is configured for normal operation and that no alarms are present
4. If alarms are present, refer to the "Troubleshooting" section of this manual.
5. Connect the office alarm cables if they have been disconnected.

**Table 8-1. Cross-Connections for DSX-1 Testing**

Function Group A	Function Group B	Function Group C
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-2-1-1,b-1-1 m-2-1-2,b-1-2 m-2-1-3,b-1-3 m-2-1-4,b-1-4	m-3-1-1,c-1-1 m-3-1-2,c-1-2 m-3-1-3,c-1-3 m-3-1-4,c-1-4
m-1-2-1,a-2-1 m-1-2-2,a-2-2 m-1-2-3,a-2-3 m-1-2-4,a-2-4	m-2-2-1,b-2-1 m-2-2-2,b-2-2 m-2-2-3,b-2-3 m-2-2-4,b-2-4	m-3-2-1,c-2-1 m-3-2-2,c-2-2 m-3-2-3,c-2-3 m-3-2-4,c-2-4
m-1-3-1,a-3-1 m-1-3-2,a-3-2 m-1-3-3,a-3-3 m-1-3-4,a-3-4	m-2-3-1,b-3-1 m-2-3-2,b-3-2 m-2-3-3,b-3-3 m-2-3-4,b-3-4	m-3-3-1,c-3-1 m-3-3-2,c-3-2 m-3-3-3,c-3-3 m-3-3-4,c-3-4
m-1-4-1,a-4-1 m-1-4-2,a-4-2 m-1-4-3,a-4-3 m-1-4-4,a-4-4	m-2-4-1,b-4-1 m-2-4-2,b-4-2 m-2-4-3,b-4-3 m-2-4-4,b-4-4	m-3-4-1,c-4-1 m-3-4-2,c-4-2 m-3-4-3,c-4-3 m-3-4-4,c-4-4
m-1-5-1,a-5-1 m-1-5-2,a-5-2 m-1-5-3,a-5-3 m-1-5-4,a-5-4	m-2-5-1,b-5-1 m-2-5-2,b-5-2 m-2-5-3,b-5-3 m-2-5-4,b-5-4	m-3-5-1,c-5-1 m-3-5-2,c-5-2 m-3-5-3,c-5-3 m-3-5-4,c-5-4
m-1-6-1,a-6-1 m-1-6-2,a-6-2 m-1-6-3,a-6-3 m-1-6-4,a-6-4	m-2-6-1,b-6-1 m-2-6-2,b-6-2 m-2-6-3,b-6-3 m-2-6-4,b-6-4	m-3-6-1,c-6-1 m-3-6-2,c-6-2 m-3-6-3,c-6-3 m-3-6-4,c-6-4
m-1-7-1,a-7-1 m-1-7-2,a-7-2 m-1-7-3,a-7-3 m-1-7-4,a-7-4	m-2-7-1,b-7-1 m-2-7-2,b-7-2 m-2-7-3,b-7-3 m-2-7-4,b-7-4	m-3-7-1,c-7-1 m-3-7-2,c-7-2 m-3-7-3,c-7-3 m-3-7-4,c-7-4

**Table 8-2. Ring Network Time Slot Assignments**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-1-1-1					
M-1-1-2					
M-1-1-3					
M-1-1-4					
M-1-2-1					
M-1-2-2					
M-1-2-3					
M-1-2-4					
M-1-3-1					
M-1-3-2					
M-1-3-3					
M-1-3-4					
M-1-4-1					
M-1-4-2					
M-1-4-3					
M-1-4-4					
M-1-5-1					
M-1-5-2					
M-1-5-3					
M-1-5-4					
M-1-6-1					
M-1-6-2					
M-1-6-3					
M-1-6-4					
M-1-7-1					
M-1-7-2					
M-1-7-3					
M-1-7-4					

Continued on Next Page

**Table 8-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-2-1-1					
M-2-1-2					
M-2-1-3					
M-2-1-4					
M-2-2-1					
M-2-2-2					
M-2-2-3					
M-2-2-4					
M-2-3-1					
M-2-3-2					
M-2-3-3					
M-2-3-4					
M-2-4-1					
M-2-4-2					
M-2-4-3					
M-2-4-4					
M-2-5-1					
M-2-5-2					
M-2-5-3					
M-2-5-4					
M-2-6-1					
M-2-6-2					
M-2-6-3					
M-2-6-4					
M-2-7-1					
M-2-7-2					
M-2-7-3					
M-2-7-4					

*Continued on Next Page*

**Table 8-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-3-1-1					
M-3-1-2					
M-3-1-3					
M-3-1-4					
M-3-2-1					
M-3-2-2					
M-3-2-3					
M-3-2-4					
M-3-3-1					
M-3-3-2					
M-3-3-3					
M-3-3-4					
M-3-4-1					
M-3-4-2					
M-3-4-3					
M-3-4-4					
M-3-5-1					
M-3-5-2					
M-3-5-3					
M-3-5-4					
M-3-6-1					
M-3-6-2					
M-3-6-3					
M-3-6-4					
M-3-7-1					
M-3-7-2					
M-3-7-3					
M-3-7-4					

**Table 8-3. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

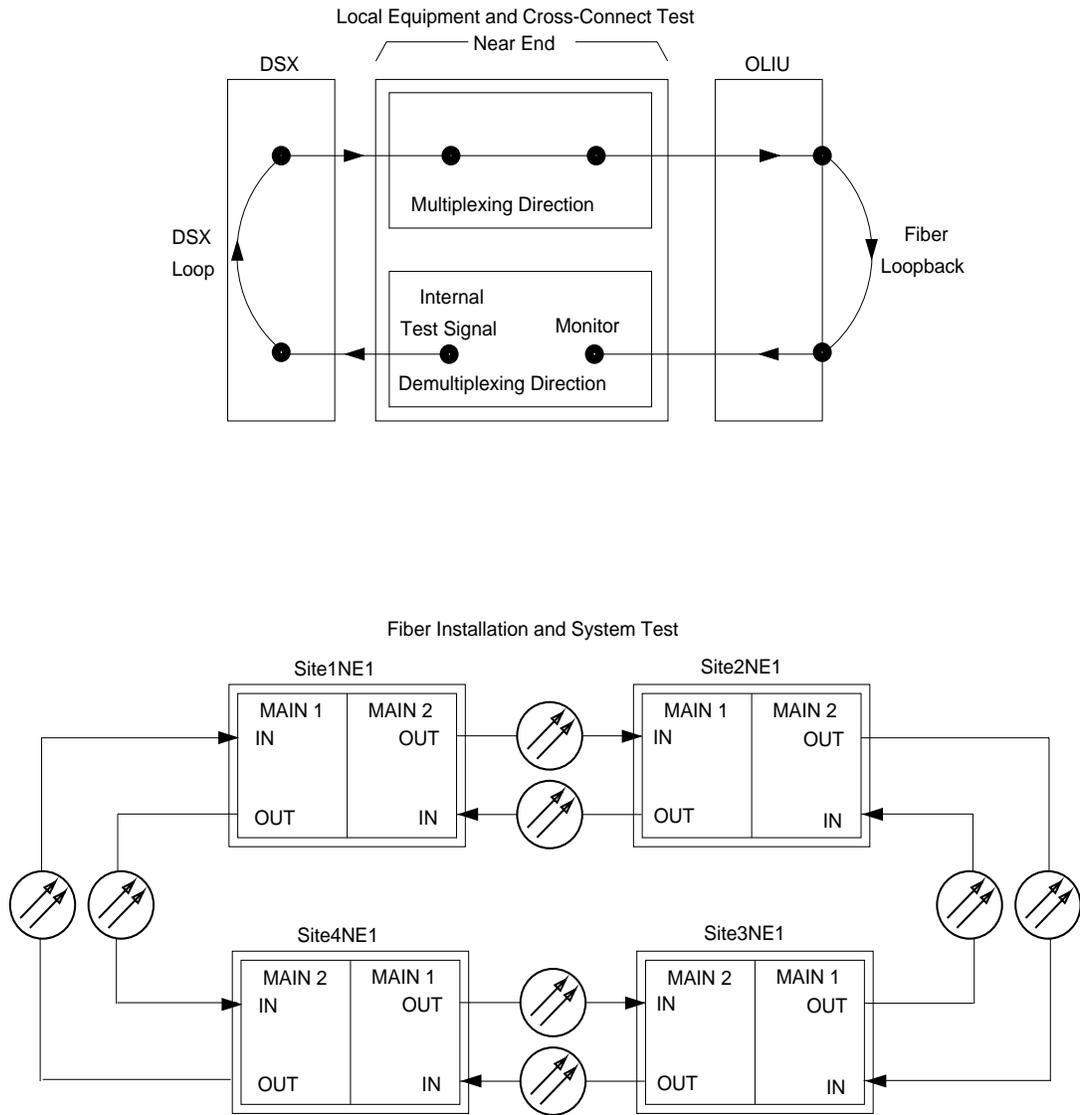


**NOTE:**

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.

**Table 8-4. Lightguide Jumpers**

<b>Lightguide Jumper Type</b>	<b>Code</b>	<b>Comcode</b>	<b>Connector Type</b>	<b>Length (Feet)</b>
Single Mode	FS1E-E-2	105357727	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	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	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	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**

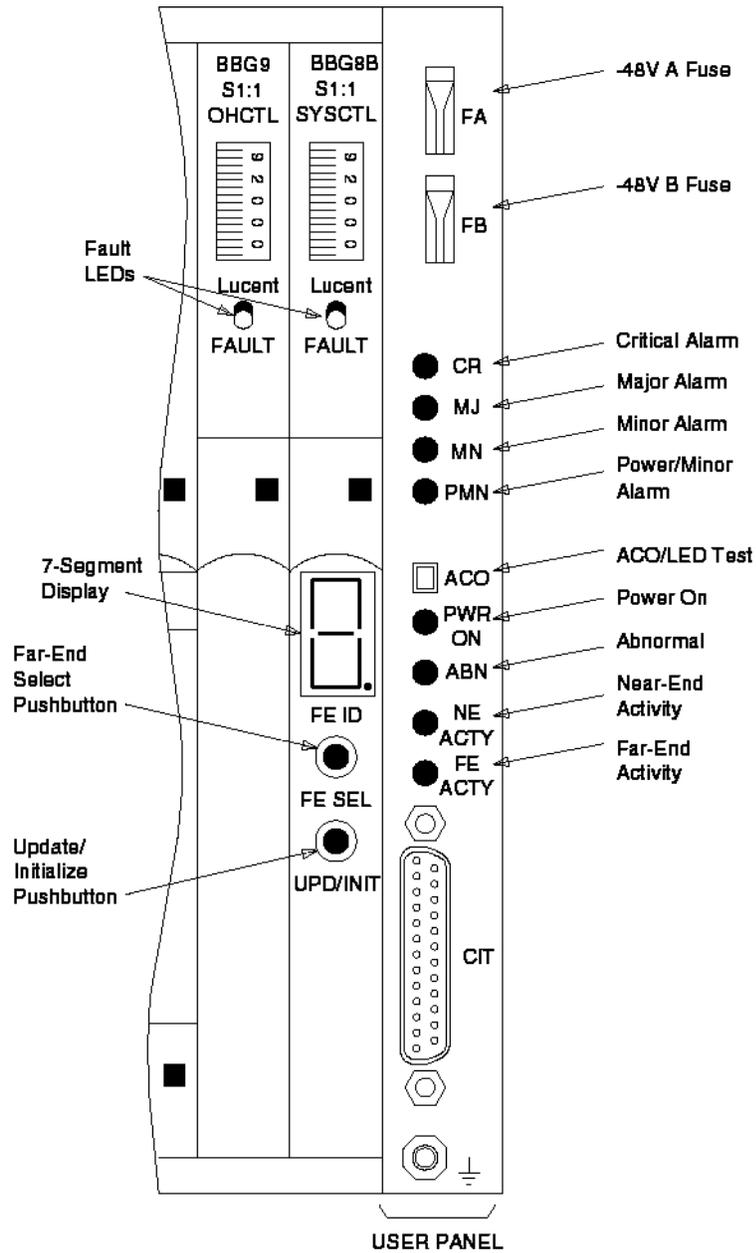
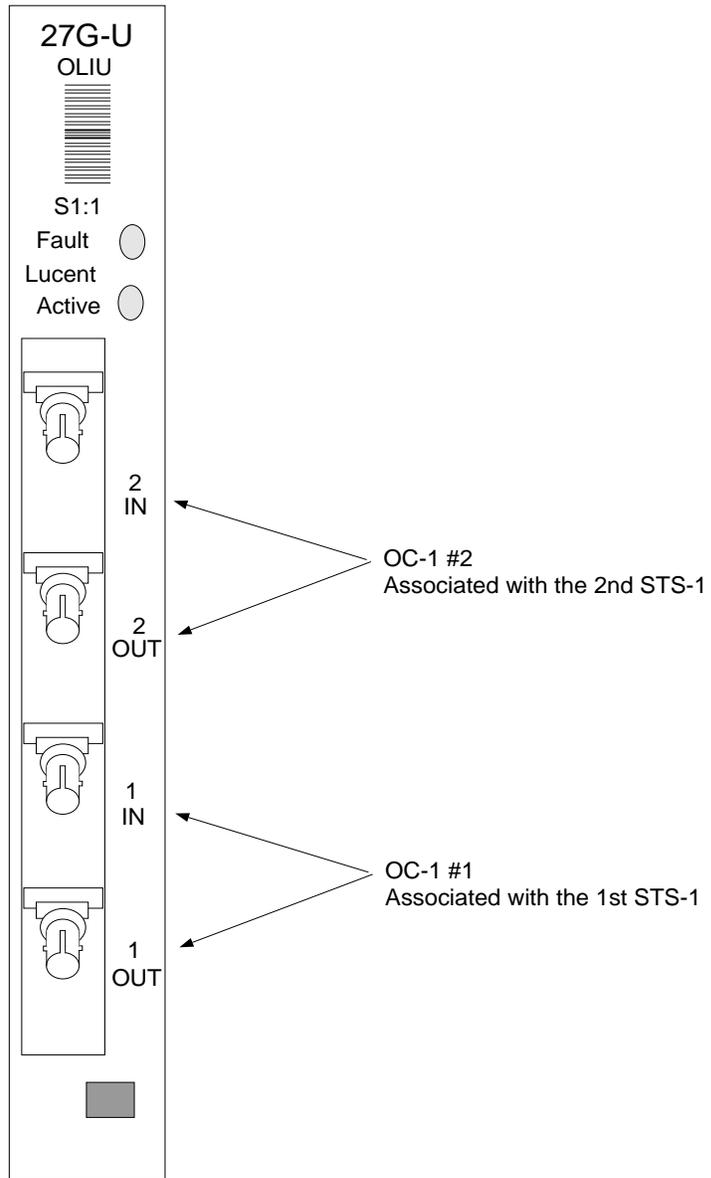
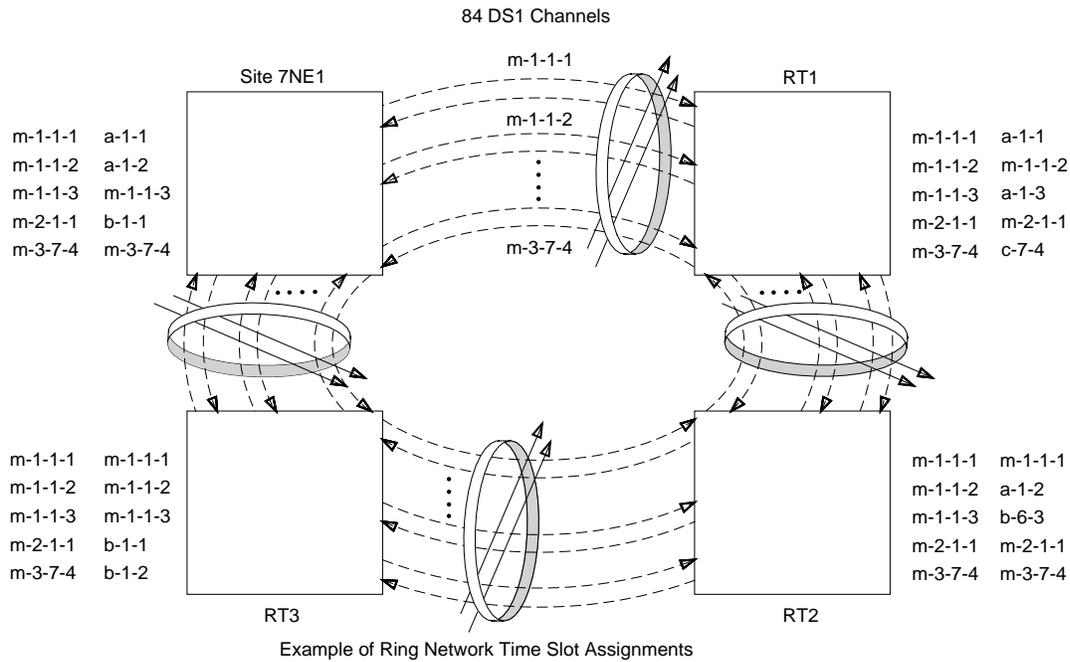


Figure 8-2. DDM-2000 User Panel



---

**Figure 8-3. 27G-U OLIU**



Network Time Slot (Path)	Terminal		Terminal		TID's of Pass Thru Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
m-1-1-1	Site 7NE1	a-1-1	RT1	a-1-1	RT2, RT3
m-1-1-2	Site 7NE1	a-1-2	RT2	a-1-2	RT1, RT3
m-1-1-3	RT1	a-1-3	RT2	b-6-3	Site7NE1, RT2
m-2-1-1	Site 7NE1	b-1-1	RT3	b-1-1	RT1, RT2
m-3-7-4	RT2	c-7-4	RT3	b-1-2	Site7NE1, RT2

**Figure 8-4. Establishing Cross-Connects**

---

## Release 13 Installation Tests

# 9

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## Release 13 (TARP) Installation Tests

# 9

---

### Overview

This section provides test procedures for verifying the following on Release 13 configured DDM-2000 OC-3 shelves:

- Shelf transmission
- Wiring to DS1 cross-connect (DSX-1)
- Wiring to DS3/EC-1 cross-connect (DSX-3) or DACS IV-2000
- Fiber Installation and System Test.
- For the IAO LAN features, after installation of shelf, refer to 363-206-285, *DDM-2000 OC-3 Multiplexer 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 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual*.

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 9-1.

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.

For Release 13 configurations interconnecting with DDM-2000 FiberReach, refer to 363-206-310, *DDM-2000 FiberReach Installation Manual*, for the FiberReach portion of the installation.

The user panel contains the EIA-232D connector and the LEDs used to perform the installation tests as shown in Figure 9-2.

Before the following tests are executed the office alarm interface to the shelf (either J56 or J57) should be removed. Replace the interface upon completion.

The following tests should be performed with the DDM-2000 OC-3 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:

<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**

\* A flashing FAULT LED on the OHCTL indicates a loss of DCC communications with the FAR-END SYSCTL

\*\* 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:

<b>LED</b>	<b>Description</b>
CR (Critical)	Potential loss of service to 96 or more DS0 customers
MJ (Major)	Potential loss of service to fewer 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 (Power On)	The shelf is receiving a -48 V DC source
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

The following pushbuttons and display are located on the user panel and SYSCTL. See Figure 9-2.

<b>LED</b>	<b>Description</b>
ACO (Alarm Cutoff)	Silences existing audible office alarms
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)	Not functional with Release 13.
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:

Quantity	Description	
1	Wrist strap connected to the electrostatic discharge (ESD) jack on the user panel for ESD protection	
1	DSX-1 loopback cable	
1	DSX-3 loopback cable or/and BNC to BNC connector (for wiring to equipment not DSX-3)	
1	ASCII Terminal or PC configured as a terminal	
	Optical fiber cables (recommended length is 2 feet) find the OLIU type below	
	OLIU	Optical fiber cable (See Table 9-4)
1 per OLIU	22F	Single mode with ST <sup>®</sup> connectors on each end
1 per OLIU	22D-U	Multimode 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 9-3)
1 per OLIU	22G-U or 24G-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 9-3)
2 per OLIU	27G-U	See Note Below



### NOTE:

When looping a 22G-U or 24G-U OLIU back on itself a 10 dB LBO is required for each output. When looping a 27G-U OLIU back on itself a 15 dB LBO is required for each output.

## Use of Terminal

### Description

This procedure describes which terminals are approved for use with the DDM-2000 OC-3, how to set up the terminal, and the DDM-2000 OC-3 command structure which will be used.

### Compatible Terminals

The DDM-2000 OC-3 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 OC-3. See 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* for a list of DDM-2000 OC-3 compatible terminals.

The DDM-2000 OC-3 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 OC-3 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.

DDM-2000 OC-3 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 OC-3 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 OC-3 Command Notes

---

All DDM-2000 OC-3 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 OC-3 command codes with their descriptions is contained in the 363-206-285, *DDM-2000 OC-3 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 OC-3s in the bay.



**NOTE:**

If properly cabled, connection to any EIA-232D in the bay will allow communication to any shelf in the bay.

2. Press the Return (or Enter) key twice, to set the SYSCTL autobaud rate and prompt the DDM-2000 OC-3 to request a shelf address.

The DDM-2000 OC-3 will respond:

```
/* Enter a shelf number from 1 to 8 */  
shelf [default] =
```



**NOTE:**

The default shelf is the one physically connected to the CIT. To determine what shelves can be entered enter a **?**.

3. After entering a valid shelf number and pressing the return (or Enter) key the user is presented with:

```
login<
```



**NOTE:**

If the Return (or Enter) key is pressed without entering a shelf number the shelf to which you are physically attached will be accessed.



**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**. For circuit packs and shelves manufactured up to, but not including, 1 October 1996, the login is **ATT01**. This older login may have been upgraded to **LUC01** if newer software has been installed. Both login and password must be UPPERCASE

⇒ **NOTE:**

The login and password must be entered in uppercase as shown.

After a successful login, the DDM-2000 OC-3 will display the system header followed by the alarm and status report:

Lucent DDM-2000 OC-3 Release a.b.c (circuit packs manufactured on October 1, 1996, and later). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

AT&T DDM-2000 OC-3 Release a.b.c (circuit packs manufactured before October 1, 1996). This will be in a banner and additional text describing the use restrictions and proprietary status will follow.

```
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.

⇒ **NOTE:**

Once logged on, the user can only issue commands to the on-line shelf. To communicate with another shelf in the bay, the user will first have to terminate the session with the current shelf. The session is terminated with the `log;` (LOGOUT) command.

4. Issue the command `init-sys:a11;` (INITIALIZE-SYSTEM). This command will configure the DDM-2000 OC-3 with its default parameters.

⇒ **NOTE:**

After cross-connections are entered use `init-sys:a11;` with extreme caution as it erases all cross-connects.

5. When initialization completes, repeat steps 2 and 3 to log back into the shelf.
6. To change the TID, which is the name of the shelf, issue the command `set-ne`. When prompted with TID= enter the desired TID consisting of up to 20 alphanumeric characters.
7. 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.
8. 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.
9. 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 OC-3 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 in all circuit pack positions.

### Procedure

---

Issue the command `test-led;`.

The DDM-2000 OC-3 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.

## 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 OC-3 shelf. It verifies proper cabling from the DDM-2000 OC-3 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 OC-3.

On initial installation/turn-up of Release 13 systems there are no default cross-connects; thus all cross-connects need to be entered for the tests. In Release 13 VT and STS-1 cross-connects are allowed and can be entered as a group, rather than individually.

Upon completion of this test all cross-connections will be deleted and later reentered to fit individual ring applications.

To understand cross-connects and the ring philosophy, refer to the 'Description Section' under 'Establishing cross-connects and System Test' of this section.

**⇒ 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 units pass without failures.

**⇒ NOTE:**  
Refer to 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual*, (latest issue) for complete command descriptions.

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

### **Preparation Procedure**

---

1. The 'Free Running' timing configuration is required for the DSX-1 test. The timing parameters are set on the TGS pack. Refer to Section 4 of this manual for option switch settings. Set timing to 'Free Running'.
2. Fully insert the OLIUs into the shelf.
3. Connect the OLIU OUT to the OLIU IN of each OLIU, using optical fiber jumper cables. Refer to Figure 9-1.

**⇒ NOTE:**  
The optical fiber cables required are listed under "Tools, Test Sets, and Accessories".

**⇒ NOTE:**  
When looping a 22G-U (or 24G-U) OLIU back on itself a 10 dB LBO is required. When looping a 27G-U OLIU back on itself two 15 dB LBOs are required.

**⇒ NOTE:**  
If any of the OLIUs are of the universal type (ex: 22G-U) and other than ST<sup>®</sup> type connectors are being used, see Table 9-3 for the universal LBOs needed and Table 9-4 for the lightguide jumpers.

4. During the loopback test the far-end communications must be disabled. Issue the command

**set-fecom**

and set the  
**address=dcc-all**  
and  
**communications=disabled**  
(far-end communications).

5. After a few moments, check that no alarms are present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT pushbutton on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.
6. To test each DS1 or DS3 channel through to the cross-connect panel or terminating equipment, its cross-connect map has to be made at the DDM OC-3 Shelf.
7. Enter DS1 or DS3/EC-1 cross-connects according to the OC-3 shelf configuration. Table 9-1 contains the cross-connect map required to test DS1 service on function groups A,B and C of this DDM-2000 OC-3 shelf.
8. Enter DS1 cross-connects as follows:

```
ent-crs-vt1:m-1-all,a-all:cct=twoway:y;
```

 **NOTE:**

The 'all' command can be used for a range of address'.

9. Enter DS3/EC-1 cross-connects as follows:

```
ent-crs-sts1:m-1,a:y;
```

10. Assure the appropriate cross-connect map is in place in the shelf by entering the command **rtrv-crs-vt1;**.

## **Procedure for DS1 Testing**

---

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.
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.

### **Procedure for DS3 Testing**

---

1. Beginning with address 'a', place a physical DS3 loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. The following command and parameters test the DS3 channel's cabling for 60 seconds.

**Issue the command:**

```
test-trmsn-t3:a  
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 DS3 loopback to the next DS3 channel at the DSX-3 panel or place a loopback at the terminating equipment. Press UPD to clear the alarm caused by removing the loopback plug. Verify that no alarms exist and continue testing the next channel.

### **Procedure for EC-1 Testing**

---

1. Beginning with address 'a', place a physical DS3(EC-1) loopback at ONLY this address at the DSX-3 panel. If more than one loopback is present incorrect wiring may not be apparent. If DS3/EC-1 cabling connects directly to DACS IV 2000 have Craft personnel put up an internal loopback or connect the DS3 'in' cable to the DS3 'out' cable using a BNC to BNC connector.
2. Remove the DS3(EC-1) loopback.
3. Issue the `rtrv-alm` command and observe that an 'Inc. EC-1 LOS' alarm exists for this address.
4. Replace the DS3(EC-1) loopback.
5. Issue the `rtrv-alm` command and observe that the 'Inc. EC-1 LOS' no longer exists. If the alarm exists, correct the problem by checking circuit packs and associated cabling. An 'Inc. STS AIS' will occur if VT cross-connects exist.
6. The physical DS3(EC-1) loopback can remain until service is applied. Verify that no 'Inc. EC-1 LOS' alarms exist and continue testing the next channel.

## Procedure for Removing Cross-Connects

---

After all function groups 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. To delete DS1 cross-connects issue the command:

```
dlt-crs-vt1:m-1-all,a-all:y;
```

Replace 'm-1-all,a-all' with the address to be deleted.

2. To delete DS3/EC-1 cross-connects, issue the command:

```
dlt-crs-sts1:m-1,a:y;
```

Replace 'm-1,a' with the address to be deleted.

### NOTE:

If cross-connects remain, VT AIS alarms will remain until cross-connects are entered for all remaining shelves in the ring.

3. 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;`.

### CAUTION:

*Remember that the `init-sys:all` command should be used with extreme caution in an in-service system as it deletes all cross-connects.*

Remove the fiber loopbacks from the OLIU circuit packs. Incoming OC-3 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

---

The following procedure describes fiber connection and test. To achieve transmission in both directions for a two fiber ring, fibers originating at the first shelf (Shelf 1) OLIU Slot Main-1 (M1) must connect to the second shelf Slot Main-2 (M2). The second shelf OLIU M1 would connect to the third shelf OLIU M2 and this would continue (M1 connecting to M2) around the ring until all shelves in the ring are connected. Refer to Figure 9-1.

1. Set each shelf in the system for the correct timing. Conventionally, one shelf in the ring will be set for either free running or externally timed and the others will be looped timed. Only one shelf may be free running. More than one shelf can be externally timed if traceable to the same source clock, and the remainder looped. Check that external connections are completed if option is set for external.
2. If the TGS Circuit Pack option switch is changed, an update must be done by momentarily depressing the UPD/INIT button on the SYSCCTL after the TGS pack is installed.
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. The Alarm Group must be the same (default=255) for each shelf for complete alarm reporting throughout the network.
  - c. Shelf numbers must be unique when shelves are located within the same bay.
  - d. Set Central Office shelves to CO and Remote Terminal shelves to RT.

 **NOTE:**

If it is desired to insert miscellaneous discretes at the CO, it should be provisioned as an RT instead. Readout is via a TL1 link. There is no disadvantage to provisioning all sites as RTs. A CO has no advantages in Release 13.

- e. 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
22 series	dcc-m1	us
	dcc-m2	ns
	dcc-fn-a	ns
	dcc-fn-b	ns
	dcc-fn-c	ns
27G-U	dcc-m1-1	ns
	dcc-m1-2	ns
	dcc-m2-1	us
	dcc-m2-2	us
	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.

- For shelves containing 27G-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 27G-U is to be used, set the other OC-1 to the not monitored state and disable it's FECOM. Refer to Figure 9-3.

For example, with a 27G-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;
```

## Procedure for Installation

Refer to Figure 9-1 to understand the method of connecting ring fibers. Your ring, will differ from Figure 9-1 if you have more or fewer than three shelves, thus use an appropriate figure, adapted to your ring configuration. Use the following instructions, adapted to the size of your ring, to connect fibers. Connect fibers as follows:

### NOTE:

If the proper LBO is not known for each optical fiber span see DLP-514 of the 363-206-285 *DDM-2000 OC-3 Multiplexer User/Service Manual*, Issue 1, to determine the LBO needed.

Location	Slot	Connector	<-->	Location	Slot	Connector
First Site	M1	OUT	<-->	Second Site	M2	IN
First Site	M1	IN	<-->	Second Site	M2	OUT
Second Site	M1	OUT	<-->	Third Site	M2	IN
Second Site	M1	IN	<-->	Third Site	M2	OUT
Third Site	M1	OUT	<-->	Fourth Site	M2	IN
Third Site	M1	IN	<-->	Fourth Site	M2	OUT
Fourth Site	M1	OUT	<-->	First Site	M2	IN
Fourth Site	M1	IN	<-->	First Site	M2	OUT



**NOTE:**

After fiber connection is completed around the ring, continued flashing of the fault LED on 22 Type OLIU circuit packs may indicate incorrect connections.

To obtain a map of the SONET network to verify fiber connections around the ring, at the first site issue the command **rtrv-map-net**;

Using Figure 9-1 (or an adapted version to match your ring) at the first site, verify the following:

For Release 13 the form of the response to **rtrv-map-net** is

```
rtrv-map-network: COMPLD
/* Network Map for DDM4
```

```
=====
TID          Product Type          Level 2 IS          NSAP
=====
```

DDM4	DDM-OC3		
39840F 80	000000 0000 0000 0001	08006A1AE231 00	
DDM3			
39840F 80	000000 0000 0000 0001	08006A1AE2B1 00	
DDM8			
39840F 80	000000 0000 0000 0001	08006A1A000C 00	
DDM9			
39840F 80	000000 0000 0000 0001	08006A1ABF5A 00	
FR5			39840F 80 000000 0000
0000 0001	08006A1AE428 00		
FR6			39840F 80 000000 0000
0000 0001	08006A1AE27E 00		
FR7			39840F 80 000000 0000
0000 0001	08006A1AA76A 00		
FT10			39840F 80 000000 0000
0000 0001	08006A062630 00		
FT2		Y	39840F 80 000000 0000
0000 0001	08006A061069 00		

```
*/
```

7. To obtain a neighbor map to verify fiber connections to shelves directly connected to the first site and which OLIU they are connected through, at the first site issue the command `rtrv-map-net`;

Using Figure 9-1 (or an adapted version to match your ring) at the first site verify the following:

For Release 13 the response to `rtrv-map-neighbor` is

```
M rtrv-map-neighbor: COMPLD
/* Neighbor Map for DDM4
=====
TID                Connected Thru    Product Type    Level 2 IS
NSAP
=====
DDM4                DDM-OC3
39840F 80  000000 0000 0000 0001  08006A1AE231 00
DDM8                main-1
39840F 80  000000 0000 0000 0001  08006A1A000C 00
DDM3                main-2
39840F 80  000000 0000 0000 0001  08006A1AE2B1 00
```

8. Continue around the ring verifying that the Neighbor Map "connected through" indications at each node match the indicated fiber connections of Figure 9-1 (or your individual map). If not, correct the fiber connections.
9. A Network Map containing all nodes in the network should be obtainable from any node in the ring.

## Test Fiber Connections

---

Alarms associated with fiber disconnects shall be tested. The following test should be performed at each site. Refer to Figure 9-1.

1. At the first site 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.OC3 FERF
```

2. To verify correct fiber connection to the first site, do one of the following:
3. Remote login to the first site and check for the following alarm (other alarms may exist) to verify proper fiber connection:

**MINOR main-2 ----- inc.OC3 LOS**

4. Locally verify main-2 is flashing, indicating loss of incoming signal.
5. Correct fiber connections if alarms are not as specified. Reconnect the fiber at the first site 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.

6. Continue at the first site by disconnecting OLIU M2 Out and observing alarms as described previously, but in accordance with the fiber disconnected.
7. Continue around the ring until all fiber has been tested.

## **Establishing Cross-Connects and System Test**

---

### **Description**

---

On initial installation/turn-up of Release 13 systems there are no default cross-connects, thus all cross-connects need to be entered. In Release 13, DS1 or DS3 services and EC-1 interfaces are provided and thus VT and STS-1 cross-connects are applicable.

Due to the flexibility and complexity 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 expeditiously.

### **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 13 software is a two fiber path-switched ring. Each VT or STS1 (DS1 or DS3 signal) is transmitted in both directions (clockwise and counter-clockwise) 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-3 line rate, which is 84 DS1 services or 3 STS-1's or a combination of the two. A timeslot or channel must be reserved all the way around the ring for each service.

Drop cross-connects are designated by a ring VT/STS-1 channel and an associated DS1/DS3/EC-1 port. Pass-through cross-connects are designated by using the same ring VT/STS twice. See Figure 9-4.

Drop cross-connects are divided into two types:

- The standard twoway cross-connect, in which the ring VT/STS1 channel is connected to the associated DS1/DS3/EC-1 port of the node.
- The drop and continue cross-connect, in which a VT/STS1 signal is cross-connected into an EC-1 port on a "drop and continue" node. At the same time that this cross-connect is made, a second cross-connect is made that continues a copy of that VT/STS1 signal, on the same timeslot of the ring that it came into this node on, transmitting it to the next node downstream on the ring.



**NOTE:**

A BBG6 (STS1E) circuit pack is required in the function unit slots to make a drop and continue cross-connect.



**NOTE:**

The "drop and continue" nodes on a ring system must be setup in pairs, otherwise there will be a loss of service when the ring path is switched.

An EC-1 interface composed of DS1 services should be cross-connected at the VT level as opposed to the STS-1 level. Thus in the event of one VT (or more) failure the channel protection switch would occur. An EC-1 interface composed of DS3 services should be cross-connected at the STS-1 level.

- Cross-connect address (to enter/exit the ring):

**Ex. m-1-1-1, a-1-1**  
**a-1-1, m-1-1-1**

'm-1-1-1' represents (Location of OC-3 signal) - (STS-1 # within the OC-3)-  
(VT-Group # within the STS-1)-(VT1.5 # within the VT-G) Address Range  
is: m-(1-3)-(1-7)-(1-4)

'a-1-1' represents (low speed group)-(DS1 Pack)-(DS1 Port) Address  
Range is: (a,b,c)-(1-7)-(1-4)

- In Release 13 the 'all' option may be used to specify a range of addresses:

**Ex. m-1-all, a-all**

'm-1-all' represents (main OLIUs)-(STS Group)-(All DS1 Ports)  
'a-all' represents (function unit)-(All DS1 Ports)

- Pass-through address at all nodes other than the entry/exit nodes is as follows:

**Ex.** m-3-7-4 m-3-7-4

Pass-throughs must match.



**NOTE:**

Typically, m-1-1-1 corresponds to a-1-1, m-1-1-2 to a-1-2, etc.

However, 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, a-3-6



**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:**

For 27G-U circuit packs in the main slot positions, in a timeslot address "m-1-2-2" the "m" refers to main of both OLIUs, and the "1" corresponds to the first STS-1 which is dedicated with OC-1 #1 (the bottom IN/OUT connections) of the 27G-U OLIUs OC-1 pair. Likewise in a timeslot address "m-2-1-1" the "2" corresponds to the 2nd STS-1 which is associated with OC-1 #2 (the top IN/OUT connections). Since there are only two OC-1s in a 27G-U OLIU a timeslot address beginning with "m-3" is not allowed. Refer to Figure 9-3.



**NOTE:**

For 27G-U circuit packs in function unit slot positions, in a timeslot address "a-1-2-2" the "a" corresponds to the OLIU in either of the function unit positions, and the "1" corresponds to the first STS-1 which is associated with OC-1 #1 (the bottom IN/OUT connections) of the 27G-Us OC-1 pair. Likewise in a timeslot address "a-2-1-1" the "2" corresponds to the 2nd STS-1 which is associated with OC-1 #2 (the top IN/OUT connections). Since there are only two OC-1s in a 27G-U OLIU a timeslot address beginning with "a-3" is not allowed. Refer to Figure 9-3.



**NOTE:**

If a pass-through is missing, alarms may not appear. If three twoway 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 9-4.

## Cross-Connect Procedure

---

1. Use Office Records or fill in Table 9-2 (for DS1 service) 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;
```

3. Enter a DS3 pass-through as follows:

```
ent-crs-sts1:m-1,m-1:cct=twoway:y;
```

4. Enter an end DS1 cross-connect as follows:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=twoway:y;
```

5. Enter an end DS3/EC-1 cross-connect as follows:

```
ent-crs-sts1:m-1,a:cct=twoway:y;
```

6. Enter a drop and continue DS1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m1:y;
```



**NOTE:**

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.



**NOTE:**

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.



**NOTE:**

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-vt1:m-1-1-1,a-1-1:cct=dc,ring=m2:y;
```

7. Enter a drop and continue DS3/EC-1 cross-connect as follows:

1. At the first drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m1:y;
```



**NOTE:**

The parameter ring defines the direction of the continued signal. Where the traffic must be continued on the ring transmitting to the neighboring drop and continue node. See Note Below.



**NOTE:**

Ring **m1** is the ring that is received on the main-1 OLIU and is transmitted on the main-2 OLIU.

Ring **m2** is the ring that is received on the main-2 OLIU and is transmitted on the main-1 OLIU.



**NOTE:**

For VT1.5 cross-connections, once the first VT drop and continue cross-connection defines the ring direction, all other VT drop and continue cross-connections at that node are forced to use that ring rotation.

2. At the second drop and continue node enter:

```
ent-crs-sts1:m-1,a:cct=dc,ring=m2:y;
```

8. Check each ring timeslot to be sure it has two end cross-connections and all other nodes have pass-throughs configured. Use Office Records and Table 9-2 to verify this.

## Protection Switch Test

---

This test verifies rings protection switching upon fiber cut.

1. At the first site 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

### Procedure

1. Verify that all test signals and loopbacks from the DDM-2000 OC-3 have been removed.
2. Press the UPD pushbutton on the SYSCTL.
3. Verify that the system is configured for normal operation and that no alarms are present
4. If alarms are present, refer to the "Troubleshooting" section of this manual.
5. Connect the office alarm cables if they have been disconnected.

**Table 9-1. Cross-Connections for DSX-1 Testing**

Function Group A	Function Group B	Function Group C
m-1-1-1,a-1-1	m-2-1-1,b-1-1	m-3-1-1,c-1-1
m-1-1-2,a-1-2	m-2-1-2,b-1-2	m-3-1-2,c-1-2
m-1-1-3,a-1-3	m-2-1-3,b-1-3	m-3-1-3,c-1-3
m-1-1-4,a-1-4	m-2-1-4,b-1-4	m-3-1-4,c-1-4
m-1-2-1,a-2-1	m-2-2-1,b-2-1	m-3-2-1,c-2-1
m-1-2-2,a-2-2	m-2-2-2,b-2-2	m-3-2-2,c-2-2
m-1-2-3,a-2-3	m-2-2-3,b-2-3	m-3-2-3,c-2-3
m-1-2-4,a-2-4	m-2-2-4,b-2-4	m-3-2-4,c-2-4
m-1-3-1,a-3-1	m-2-3-1,b-3-1	m-3-3-1,c-3-1
m-1-3-2,a-3-2	m-2-3-2,b-3-2	m-3-3-2,c-3-2
m-1-3-3,a-3-3	m-2-3-3,b-3-3	m-3-3-3,c-3-3
m-1-3-4,a-3-4	m-2-3-4,b-3-4	m-3-3-4,c-3-4
m-1-4-1,a-4-1	m-2-4-1,b-4-1	m-3-4-1,c-4-1
m-1-4-2,a-4-2	m-2-4-2,b-4-2	m-3-4-2,c-4-2
m-1-4-3,a-4-3	m-2-4-3,b-4-3	m-3-4-3,c-4-3
m-1-4-4,a-4-4	m-2-4-4,b-4-4	m-3-4-4,c-4-4
m-1-5-1,a-5-1	m-2-5-1,b-5-1	m-3-5-1,c-5-1
m-1-5-2,a-5-2	m-2-5-2,b-5-2	m-3-5-2,c-5-2
m-1-5-3,a-5-3	m-2-5-3,b-5-3	m-3-5-3,c-5-3
m-1-5-4,a-5-4	m-2-5-4,b-5-4	m-3-5-4,c-5-4
m-1-6-1,a-6-1	m-2-6-1,b-6-1	m-3-6-1,c-6-1
m-1-6-2,a-6-2	m-2-6-2,b-6-2	m-3-6-2,c-6-2
m-1-6-3,a-6-3	m-2-6-3,b-6-3	m-3-6-3,c-6-3
m-1-6-4,a-6-4	m-2-6-4,b-6-4	m-3-6-4,c-6-4
m-1-7-1,a-7-1	m-2-7-1,b-7-1	m-3-7-1,c-7-1
m-1-7-2,a-7-2	m-2-7-2,b-7-2	m-3-7-2,c-7-2
m-1-7-3,a-7-3	m-2-7-3,b-7-3	m-3-7-3,c-7-3
m-1-7-4,a-7-4	m-2-7-4,b-7-4	m-3-7-4,c-7-4

**Table 9-2. Ring Network Time Slot Assignments**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-1-1-1					
M-1-1-2					
M-1-1-3					
M-1-1-4					
M-1-2-1					
M-1-2-2					
M-1-2-3					
M-1-2-4					
M-1-3-1					
M-1-3-2					
M-1-3-3					
M-1-3-4					
M-1-4-1					
M-1-4-2					
M-1-4-3					
M-1-4-4					
M-1-5-1					
M-1-5-2					
M-1-5-3					
M-1-5-4					
M-1-6-1					
M-1-6-2					
M-1-6-3					
M-1-6-4					
M-1-7-1					
M-1-7-2					
M-1-7-3					
M-1-7-4					

*Continued on Next Page*

**Table 9-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-2-1-1					
M-2-1-2					
M-2-1-3					
M-2-1-4					
M-2-2-1					
M-2-2-2					
M-2-2-3					
M-2-2-4					
M-2-3-1					
M-2-3-2					
M-2-3-3					
M-2-3-4					
M-2-4-1					
M-2-4-2					
M-2-4-3					
M-2-4-4					
M-2-5-1					
M-2-5-2					
M-2-5-3					
M-2-5-4					
M-2-6-1					
M-2-6-2					
M-2-6-3					
M-2-6-4					
M-2-7-1					
M-2-7-2					
M-2-7-3					
M-2-7-4					

*Continued on Next Page*

**Table 9-2. Ring Network Time Slot Assignments (Contd)**

Network Time Slot (Path)	Terminal		Terminal		TID's of Pass-Through Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
M-3-1-1					
M-3-1-2					
M-3-1-3					
M-3-1-4					
M-3-2-1					
M-3-2-2					
M-3-2-3					
M-3-2-4					
M-3-3-1					
M-3-3-2					
M-3-3-3					
M-3-3-4					
M-3-4-1					
M-3-4-2					
M-3-4-3					
M-3-4-4					
M-3-5-1					
M-3-5-2					
M-3-5-3					
M-3-5-4					
M-3-6-1					
M-3-6-2					
M-3-6-3					
M-3-6-4					
M-3-7-1					
M-3-7-2					
M-3-7-3					
M-3-7-4					

**Table 9-3. Universal Lightguide Buildouts**

Lightguide Buildout (LBO)	Code	Comcode	Connector Type	Label Color
0 dB	A3070	106795354	ST <sup>®</sup>	None
5 dB	A3070B	106795362	ST <sup>®</sup>	Blue
10 dB	A3070D	106795370	ST <sup>®</sup>	Black
15 dB	A3070F	106795362	ST <sup>®</sup>	Green
20 db	A3070H	106795362	ST <sup>®</sup>	Red
0 dB	A3080	106795404	FC/PC	None
5 dB	A3080B	106795412	FC/PC	Blue
10 dB	A3080D	106795420	FC/PC	Black
15 dB	A3080F	106795438	FC/PC	Green
20 db	A3080H	106795446	FC/PC	Red
0 dB	A3060	106708951	SC	None
5 dB	A3060B	106708969	SC	Blue
10 dB	A3060D	106708977	SC	Black
15 dB	A3060F	106708985	SC	Green
20 db	A3060H	106708993	SC	Red

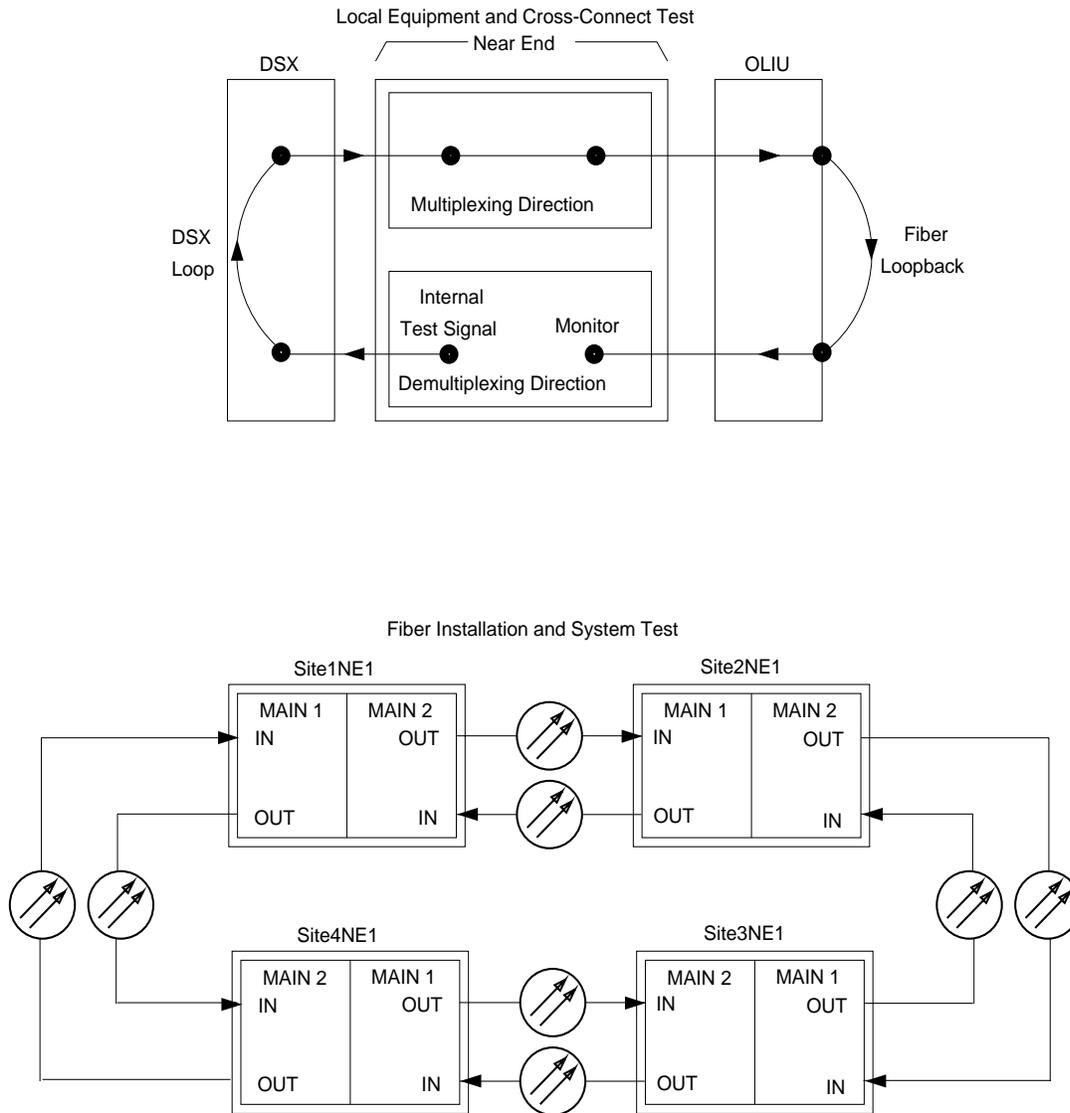


**NOTE:**

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.

**Table 9-4. Lightguide Jumpers**

<b>Lightguide Jumper Type</b>	<b>Code</b>	<b>Comcode</b>	<b>Connector Type</b>	<b>Length (Feet)</b>
Single Mode	FS1E-E-2	105357727	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	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	<i>ST<sup>®</sup>-ST<sup>®</sup></i>	2
Multimode	LL1FC-FC-10	107095549	FC/PC-FC/PC	10
Multimode	LL1SC-SC-2	106908668	SC-SC	2



**Figure 9-1. Installation Test Connections**

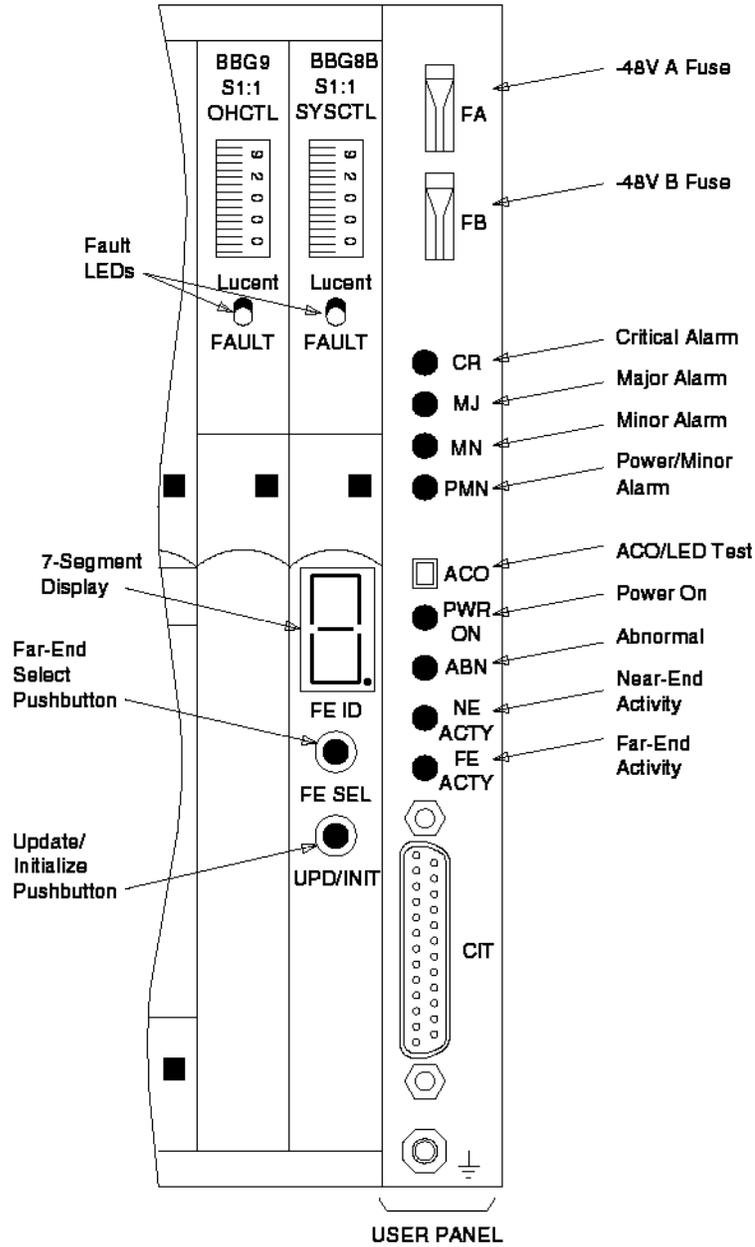
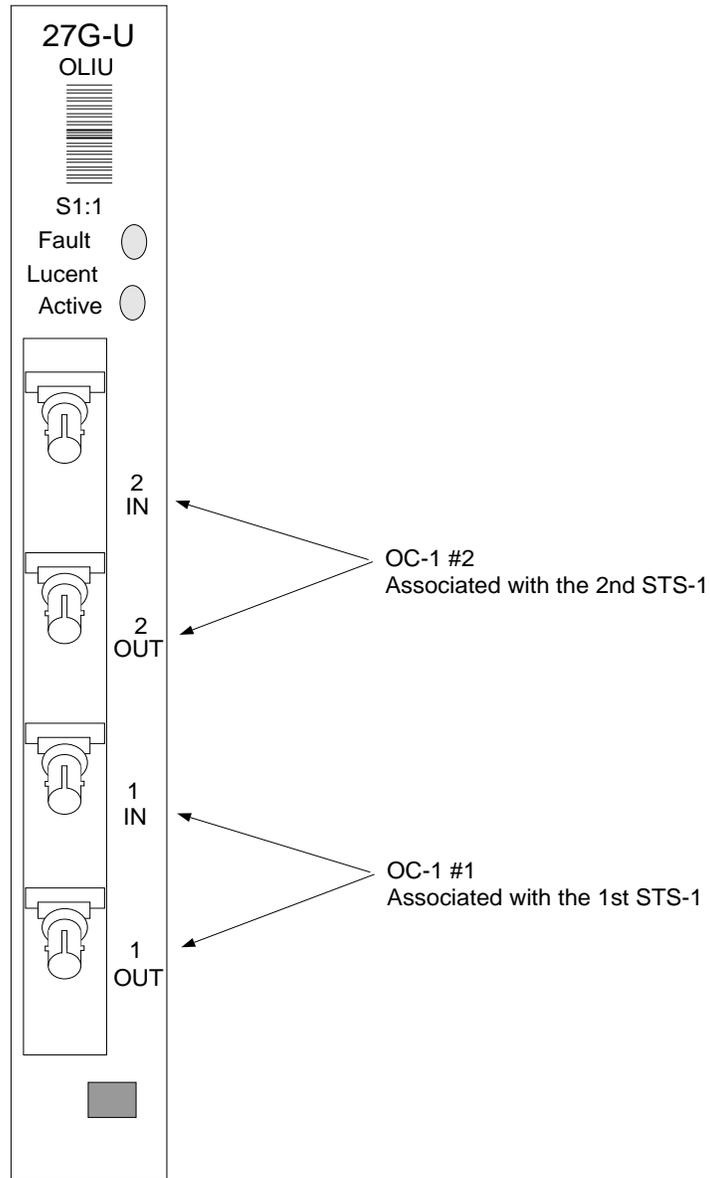
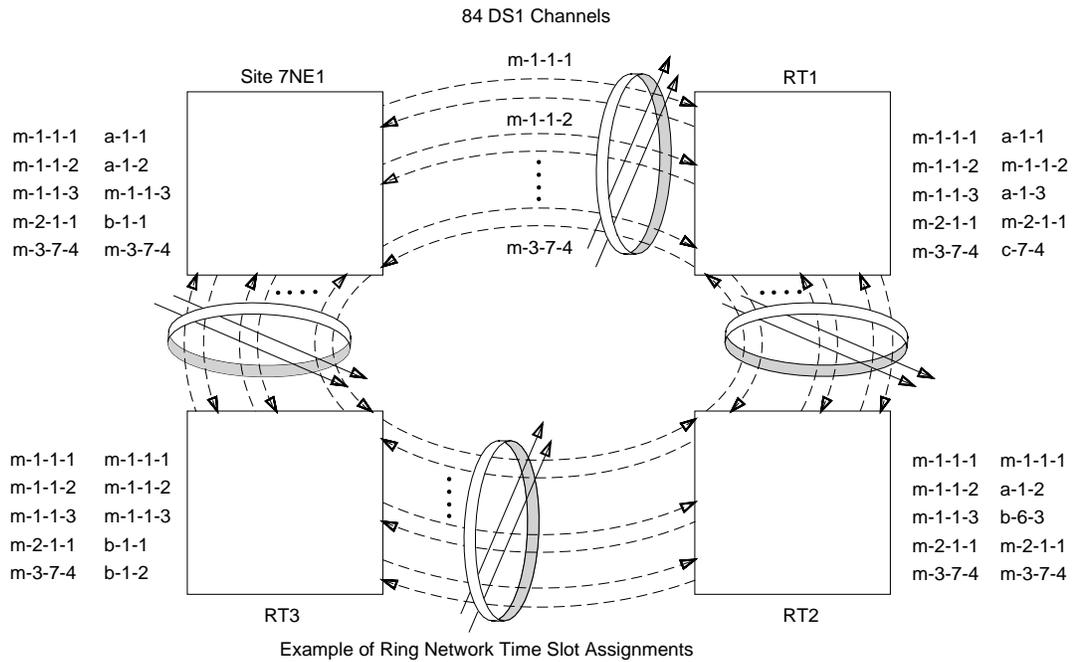


Figure 9-2. DDM-2000 User Panel



---

**Figure 9-3. 27G-U OLIU**



Network Time Slot (Path)	Terminal		Terminal		TID's of Pass Thru Terminals
	Identifier (TID)	Port Address	Identifier (TID)	Port Address	
m-1-1-1	Site 7NE1	a-1-1	RT1	a-1-1	RT2, RT3
m-1-1-2	Site 7NE1	a-1-2	RT2	a-1-2	RT1, RT3
m-1-1-3	RT1	a-1-3	RT2	b-6-3	Site7NE1, RT2
m-2-1-1	Site 7NE1	b-1-1	RT3	b-1-1	RT1, RT2
m-3-7-4	RT2	c-7-4	RT3	b-1-2	Site7NE1, RT2

**Figure 9-4. Establishing Cross-Connects**



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## Operational Tests

# 10

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## Operational Tests

# 10

### Overview

This section provides instructions to test protection switching and the nontransmission 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 363-206-202 (Releases 6 and 7), 363-206-280 (Releases 8, 9 and 11) or 363-206-285 (Release 13) *DDM-2000 OC-3 Multiplexer User/Service Manual*.

### 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 OC-3 commands, and more information on the use of a terminal, refer to the "Installation Test" section of this manual.

 **CAUTION:**  
*The operational tests in this section are run only in an out-of-service mode of operation. Office alarms will be connected only 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 9-3 lists the office alarms connections.

 **NOTE:**  
After completing the office alarm test, the DDM-2000 OC-3 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 OC-3 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 OC-3 should be examined after creating or clearing every alarm.



**NOTE:**

The DDM-2000 OC-3 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 CAnCel or DELeTe 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) pushbutton 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 1 through 7) 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 pushbutton on the user panel.
4. Activated office alarms: MN visible.
5. Unseat a second service low speed circuit pack in the same function group.
6. Activated office alarms: MJ visible, MJ audible.
7. Press the ACO pushbutton on the user panel.
8. Activated office alarms: MJ visible.
9. Unseat a pair of function units.
10. Activated office alarms: CR visible, CR audible.
11. Press the ACO pushbutton on the user panel.
12. Activated office alarms: CR visible.
13. Reseat the pair of function units.
14. Activated office alarms: MJ visible, MJ audible.
15. Reseat the second service 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 reseated at this time.

## **Fan Alarm Test**

---

### **Description**

---

The fan alarm test is performed when the ED-8C724-30, G3 or G7 fan shelf is provided. This test verifies fan shelf alarm operation and alarm cabling between the fan shelf and the DDM-2000 OC-3 shelf.

## Procedure

---

1. Press and hold the TEST button on the front of the fan shelf until the four FAN FAULT LEDs and the FILTER REPLACE LED on the front of the fan shelf light.
2. Depress the RESET button on the fan shelf and verify the FAN FAULT LEDs and the FILTER REPLACE LED on the fan shelf extinguish.
3. Disconnect one of the power feeds (either A or B) to the fan shelf by disconnecting one of the connectors of the fan shelf power cable from its mate on the bay power cable.
4. Verify the POWER FAULT LED lights on the fan shelf and the MN alarm and NE ACTY LEDs light on the DDM-2000 OC-3 shelf user panel.
5. Reconnect the disconnected fan power cable connector. Depress the RESET button on the fan shelf and verify that the POWER FAULT LED extinguishes on the fan shelf and the MN and NE ACTY LEDs on the DDM-2000 OC-3 shelf user panel extinguish.

## 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 OC-3 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).

## **21 or 22 Type OLIU (Releases 6 and 8)**

---

1. Observe the pair or pairs of OLIU circuit packs. Perform the following if both OLIUs of a pair are active (each OLIU has its green LED lighted).



### **NOTE:**

Some DDM-2000 OC-3 shelves may be equipped with pairs of OLIUs in both the main slots and function unit slots.

- a. Unseat one OLIU. On the user panel, the MN and NE ACTY alarms should light.
- b. Reseat the OLIU. The ACTIVE LED on the reseated OLIU should remain off. The FAULT LED on the reseated OLIU will light for several seconds then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

Now, the DDM-2000 OC-3 should be configured so that only one OLIU of a pair is active.

2. Unseat the ACTIVE OLIU. The ACTIVE LED on the other OLIU should light. On the user panel, the MN and NE ACTY alarms should light.
3. Unseat the second OLIU. On the user panel, the MN alarm should extinguish and the CR alarm should light.
4. Reseat the first OLIU which was removed. The ACTIVE LED on the reseated OLIU should light, and the FAULT LED on the OLIU will light for several seconds then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light.
5. Reseat the second OLIU. The ACTIVE LED on the first OLIU should remain on, and the ACTIVE LED on the second OLIU should remain off. The FAULT LED on the replaced OLIU will light for several seconds then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.
6. If a shelf is equipped with more than one pair of OLIUs, repeat the test for each pair.

## **22 Type OLIU (Releases 7, 9, 11 and 13) , 27G-U OLIU (Releases 9, 11 and 13), 24G-U OLIU (Release 13)**

---

1. 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 all traffic has 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.

**Function Units, BBG4/BBG4B (DS3), BBG2 (MXRVO), (all Releases), BBG6 (STS-1E) (Releases 6 through 13), BBG19 (Releases 11 and 13) and BBG20 (TMUX)**

---



**NOTE:**

This procedure should be performed on each function unit (FN) pair.

1. Unseat the active FN. The ACTIVE LED on the other FN and the MN and NE ACTY alarms on the user panel should light.
2. Unseat the second FN. On the user panel, the MN alarm should extinguish and the CR alarm should light.
3. Reseat the first FN which was removed. The ACTIVE LED on the reseated FN should light, and the FAULT LED on the FN will light for several seconds then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light.



**NOTE:**

If BBG2s are reseated, the FAULT LEDS on the BBF1Bs in the same function group will light since they receive power from the BBG2.

4. Reseat the second FN. The ACTIVE LED on the first FN should remain on, and the ACTIVE LED on the second FN should remain off. The FAULT LED on the replaced FN will light for several seconds then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

**Timing Generator, BBF2/BBF2B (TGS)**

---

1. Unseat the active TGS. The ACTIVE LED on the other TGS and the MN and NE ACTY alarms on the user panel should light.

2. Unseat the second TGS. On the user panel, the MN alarm should extinguish and the CR alarm should light. Also, due to the loss of timing other circuit packs may alarm.
3. Reseat the first TGS which was removed. The ACTIVE LED on the reseated TGS should light, and the FAULT LED on the TGS will light for several seconds then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light. If other circuit packs are in alarm due to loss of timing, wait until their alarms clear.
4. Reseat the second TGS. The ACTIVE LED on the first TGS should remain on, and the ACTIVE LED on the second TGS should remain off. The FAULT LED on the replaced TGS will light for several seconds then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

**Low Speed, BBF1B (DS1) (all Releases),  
BBF3 (DS1PM) (Releases 6 through 9)  
or BBF8 (HDSL)**

---

**⇒ NOTE:**

This procedure should be performed on each low speed function group equipped with protection (that is, a low speed pack in position 8).

1. Unseat one service (positions 1 through 7) low speed circuit pack. On the user panel, the MN and NE ACTY alarms should light.
2. Unseat a second service low speed circuit pack in the same function 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. If a Group 2 shelf is equipped with more than one pair of OLIUs, repeat the test for each pair of OLIUs.

## **21, 22, 24 or 27 Type OLIU**

---

1. Perform the following for Releases 7, 9, 11 and 13. For Releases 6 and 8 perform the following if both of the OLIUs of a pair are active (each OLIU has its green LED lighted).
  - a. Unseat one OLIU. On the user panel the MN and NE ACTY alarms should light.
  - b. Reseat the OLIU. For Releases 6 and 8 the ACTIVE LED on the resealed OLIU should remain off.

For Releases 7, 9, 11 and 13 traffic is now received on the OLIU that was not removed, but the active LED on both will be lit. The FAULT LED on the resealed OLIU will light for several seconds then extinguish. On the user panel the MN and NE ACTY alarms should extinguish.
2. For Release 6 or 8, the DDM-2000 OC-3 should be configured so that only one OLIU is active.
3. For Releases 6 and 8, verify the status of the OLIUs by issuing the command **rtrv-state** (RETRIEVE STATE). For Releases 7, 9, 11 and 13, verify the state of VT paths by issuing the command **rtrv-state-path** (RETRIEVE STATE PATH).
4. For Releases 6, and 8 issue the command **switch-line** (SWITCH LINE). At the address prompt, enter **main** if testing OLIU switching in a main slot or a, b, or c if testing OLIU switching in a function slot. The ACTIVE LEDs should be lighted on both of the OLIUs of a pair.

### **NOTE:**

Both of the OLIUs of a pair will be active since the **switch-line** command only switches the OLIU receiver, not the transmitter.

For Releases 7, 9, 11 and 13 issue the command **switch-path-vt1** (SWITCH PATH VT1). At the address prompt, enter **m1-all** or **m2-all** depending on which one is currently receiving. At the priority prompt, enter **manual**.

5. For Releases 6 and 8 verify the status of the OLIUs by issuing the command **rtrv-state** (RETRIEVE STATE). For Releases 7, 9, 11 and 13 verify the status of the OLIUs by issuing the command **rtrv-state-path** (RETRIEVE STATE PATH).
6. For Releases 6 and 8, issue the command **switch-line** (SWITCH LINE). Enter **manual** at the priority prompt. The ACTIVE LED should be lighted on only one OLIU. For Releases 7, 9, 11 and 13 this does not apply.

### **Function Units, BBG4 (DS3), BBG2 (MXRVO), (all Releases) and BBG6 (STS-1E) (Release 6 through 13)**

---

**⇒ NOTE:**

This procedure should be performed on each function unit pair.

1. Verify the status of the function units by issuing the command `rtrv-state` (RETRIEVE STATE). For Releases 7, 9, 11 and 13 enter the command `rtrv-state-eqpt` (RETRIEVE STATE EQUIPMENT).
2. Issue the command `switch-fn` (SWITCH FUNCTION UNIT). Enter `fn-a`, `fn-b`, or `fn-c` at the address prompt. Enter manual at the priority prompt. The ACTIVE LED which is presently lighted will extinguish, and then ACTIVE LED on the other function unit will light.
3. Verify the status of the function units by issuing the command `rtrv-state` (RETRIEVE STATE). For Releases 7, 9, 11 and 13 enter the command `rtrv-state-eqpt` (RETRIEVE STATE EQUIPMENT).

### **Timing Generator, BBF2/BBF2B (TGS)**

---

1. Verify the status of the TGS circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
2. Issue the command `switch-sync` (SWITCH SYNCHRONIZATION). Enter circuit pack at the sync function prompt. Enter manual at the priority prompt. The ACTIVE LED which is presently lighted will extinguish, and the ACTIVE LED on the other TGS will light.
3. Verify the status of the TGS circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).

### **Low Speed, BBF1B (DS1) (all Releases), BBF3 (DS1PM) (Releases 6 through 9) or BBF8 (HDSL)**

---

This procedure should be performed on each low speed function group equipped with protection (that is, a low speed pack in position 8).

1. Verify the status of the low speed circuit packs by issuing the command `rtrv-state` (RETRIEVE STATE).
2. Issue the command `switch-ls` (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).

## Telemetry Byte-Oriented Serial (TBOS) Telemetry Test

---

 **NOTE:**  
TBOS is not available in Release 13 software.

### Description

---

This test verifies proper operation/wiring of the TBOS telemetry when equipped. To perform this test, the shelf must be connected to a TBOS telemetry system or a TBOS simulator. Perform this test on all shelves connected to a TBOS telemetry system.

### Procedure With a Terminal

---

 **NOTE:**  
This test can be terminated at any time with the CANcel or DElete key.

1. Issue the command `test-t1m-ser` (TEST TELEMETRY SERIAL).
2. At the display prompt, enter the shelf's display number (which is set by switches on the SYSCTL circuit pack).
3. At the prompt point, enter `even`
4. At the prompt repeat, enter `1`
5. Verify that all of the even number display points are set for 20 seconds.

### Procedure Without a Terminal

---

1. At the TBOS telemetry equipment, set control point 28 (DDM-2000 OC-3 command equivalent `switch-fn:fn-a:pri=forced`).
2. Verify the following status points are set:
  - 54 (forced/inhibit function unit protection switch)
  - 57 (abnormal condition)

- 58 (valid command received).
3. At the TBOS telemetry equipment, set control point 25 (DDM-2000 OC-3 command equivalent `switch-fn:fn-a:pri=reset`).
  4. Verify that the following status points are retired:
    - 54 (forced/inhibit function unit protection switch)
    - 57 (abnormal condition).
  5. Verify that the following status point is set:
    - 58 (valid command received).

## Parallel and Miscellaneous (Environmental) Discrete Telemetry Test

---

 **NOTE:**  
Parallel telemetry is not available in Release 13 software.

### Description

---

This test verifies correct operation/wiring of the parallel and miscellaneous (environmental) telemetry at a central office (CO) shelf when provided.

 **NOTE:**  
When a system sets a parallel telemetry point, it also sets its corresponding system identification (SID) point. The SID point that is set is the same as the DDM-2000 OC-3's shelf number. For the following tests it should be verified that the appropriate SID point is set. Issue the command `rtrv-ne` (RETRIEVE NETWORK ELEMENT) to check the shelf number.

 **NOTE:**  
Figure 9-1 and 9-2 show the available miscellaneous (environmental) discrete alarm and control interface connections for a remote terminal (RT) and a CO, respectively for Release 7. Figure 9-3 shows these connections for both RT and CO for Releases 8, 9, 11 and 13. Table 9-1 lists the parallel telemetry connections (Parallel telemetry is not available in Release 13.) and Tables 9-2 and 9-3 list 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 voltmeter.
  - a. Connect the Output - Common (See Table 9-1) from the alarm cable to ground.
  - b. Connect the negative lead of the voltmeter to -48 volts.
    1. If you cannot access -48 volts powering the shelf any other way disconnect J2 from P2.
    2. Connect the negative lead of the voltmeter to green wire in J2
3. Either:
  - a. Alert the maintenance center to observe for a specific alarm bit or
  - b. Refer to Table 9-1 and connect the voltmeter positive lead to the alarm wire for a specific alarm bit and connect the negative lead as described above, 0 volts will be measured.
4. Issue the command `test-t1m-par` (TEST-TELEMETRY PARALLEL).
5. At the prompt mode, enter the mode identifier for the desired alarm bit as determined from Table 9-1.

**⇒ NOTE:**

An individual telemetry point or miscellaneous (environmental) discrete can be tested by entering `cr`, `mj`, `mn`, `pmn`, `aco`, `clf`, `inc`, `ne`, `fe1`, `fe2`, `fe3`, `fe4`, `fe5`, `fe6`, `sid`, or output at the prompt mode as listed in Table 9-1.

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 9-1 for wiring connection information.
  - or
  - b. The voltmeter should read 48 volts. If the alarm bit indication is not observed at the office alarm interface, verify alarm telemetry wiring. Refer to Table 9-1 for wiring connection information.
8. Verify that the correct SID indication is activated (that is, the SID indication should be the same as the DDM-2000 OC-3's shelf number) by entering 'SID' at the mode prompt. If the alarm bit indication is not observed by the maintenance center or at the office alarm interface, verify alarm telemetry wiring. Refer to Table 9-1 for wiring connection information.
9. Repeat the parallel telemetry test for each individual telemetry point.

### **Procedure Without a Terminal**

---



**NOTE:**

The proper SID setting should be verified for all telemetry points.



**NOTE:**

This procedure verifies the following parallel telemetry points can be set in the CO: CR, MJ, MN, ACO, CLF, INC and NE.

1. Unseat one service (positions 1 through 7) low speed circuit pack.  
Activated telemetry points: MN, NE.
2. Unseat a second service low speed circuit pack in the same function group.  
Activated telemetry points: MJ, NE.
3. Unseat a pair of function units.  
Activated telemetry points: CR, NE.
4. Press the ACO pushbutton on the user panel.  
Activated telemetry points: ACO, NE.
5. Reseat all circuit packs.  
Activated telemetry points: None.
6. Connect a DS1 or DS3 input signal to the DDM-2000 OC-3. Remove the input signal.  
Activated telemetry points: INC, NE.

7. Press the UPD/INIT pushbutton on the SYSCTL circuit pack.

Activated telemetry points: None.

8. Disconnect the optical fiber cable from the OLIU IN jack on one of the OLIUs. The FAULT LED on the OLIU will flash.

Activated telemetry points: CLF, MN, NE.

9. Reconnect the optical fiber cable. The flashing FAULT LED on the OLIU should extinguish within several seconds.

All telemetry points should clear.

### **End-To-End Procedure**

---

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.
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 the RT, remove the fan fuses or fail the fan.
10. At all the RTs downstream, verify that the fan fail alarm appears in the alarm and status report with the `rtrv-alm` command.
11. At the RT, replace the fan fuses or reset the fan.
12. 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).
13. Also verify that the minor alarm appears in the alarm and status report with the `rtrv-alm` command.
14. At the RT, remove the minor alarm failure.
15. At the CO, provide a closure between miscellaneous (environmental) input #1 and input common.
16. At the RT, verify a closure is observed between miscellaneous (environmental) output #1 and output common.

17. At the CO, remove the closure between miscellaneous (environmental) input #1 and input common.
18. At the RT, verify that the closure is removed.
19. Repeat for each CO miscellaneous (environmental) input (#2 through #4).

## **Modem Connection Test**

---

### **Description**

---

This test will verify the proper login procedure using a craft interface terminal (CIT) (rear CIT only) connected to a modem, which is connected to the modem port. Only test if a modem is required.

### **Procedure**

---

1. Verify that the modem cable is properly connected to the DDM-2000 OC-3 CIT-2 port (backplane connector J52).



**NOTE:**

The CIT-2 port (J52) does not require the use of a null modem if it is connected to a modem.



**NOTE:**

If you are unfamiliar with the use of a terminal, refer to the "Use of Terminal" in the "Installation Test" section of this manual.



**NOTE:**

If a successful login is established through a modem, the modem connection has been verified. The use of a terminal through a modem is the same as connecting a terminal to the EIA-232D port on the user panel.

2. Verify operation through the modem by performing the "Manual Protection Switching Test" of this section using the present modem connection.

## **TL1/X.25 Connection Test**

---

For Releases 6 and 7, the DDM-2000 OC-3 shelf directly connected to the X.25 interface must be provisioned as the GNE (Gateway Network Element) with the `set-ne;` command. For Releases 8, 9, 11 and 13, no provisioning is necessary.

## Procedure

---

1. For Release 6.0 there are no retrieve commands via CIT that provide X.25 report information. For these releases, the X.25 cabling is tested by activating the interface with the telemetry equipment (or test pad) and verifying correct message reporting.
2. For Releases 6.1 and 7, the **rtrv-fecom;** command generates an X.25 Communication Report at GNE shelves. Information provided in this report indicates whether or not the DDM-2000 shelf is communicating with the telemetry equipment. Refer to the RETRIEVE FECOM command in the Commands and Reports section of the 363-206-202 *DDM-2000 OC-3 Multiplexer User/Service Manual* (Through Release 7), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) or 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13).
3. For Releases 8, 9, 11 and 13, the **rtrv-x25;** command generates X.25 Link Provisioning, Communication and Event History Reports. Information provided in these reports indicate whether or not the DDM-2000 shelf is communicating with the telemetry equipment.

There is also a **set-x25;** command which provides a choice of packet size of the X.25 link. A packet size of 128 or 256 may be set.

Refer to the **rtrv-x25** and **set-x25** commands in the Commands and Reports section of the 363-206-202 *DDM-2000 OC-3 Multiplexer User/Service Manual* (Through Release 7), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) or 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13).

## 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 OC-3 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.

**Table 10-1. Parallel Telemetry Alarm and Status Points (See NOTE below)**

Name	Desig.	Conn.	Term	Color
ACO Control - Output	ACO-O	J54	7	BR-W
ACO Control - Input	ACO-I		18	R-BR
Output - Common	COM-O		14	R-O
Critical Alarm	CR		15	G-R
Major Alarm	MJ		13	O-R
Minor Alarm	MN		11	BL-R
Power Minor Alarm	PMN		9	S-W
Near-End Status	NE		16	R-G
Carrier Line Failure Status	CLF		3	O-W
Incoming Status	INCM		1	BL-W
System Identifier - Shelf 1	SID1		5	G-W
System Identifier - Shelf 2	SID2		23	O-BK
System Identifier - Shelf 3	SID3		21	BL-BK
System Identifier - Shelf 4	SID4		19	S-R
System Identifier - Shelf 5	SID5		17	BR-R
System Identifier - Shelf 6	SID6		24	BK-O
System Identifier - Shelf 7	SID7		22	BK-BL
Input - Common	COM-I		20	R-S
Far-End Site ID - Site 1	FE1		12	R-BL
Far-End Site ID - Site 2	FE2		10	W-S
Far-End Site ID - Site 3	FE3		8	W-BR
Far-End Site ID - Site 4	FE4		6	W-G
Far-End Site ID - Site 5	FE5		4	W-O
Far-End Site ID - Site 6	FE6		2	W-BL



**NOTE:**

Parallel telemetry is not available in Release 13 software.

**Notes:**

1. For ACO Control - Input, a pair of leads is connected between ACO-I and COM-I.
2. For all other parallel telemetry connections, a pair of leads is connected between the telemetry point and COM-O (output-common).
3. The parallel telemetry cable is 26 gauge.
4. Some cables may be manufactured using wires following old color code standards. A color code cross-reference is located in Table 3-9.

**Table 10-2. Miscellaneous (Environmental) Discrete Telemetry Connections (RT)**

Remote Terminal (All Releases)			Remote Terminal Additional Environmental Inputs (Releases 8, 9, 11 and 13 only)			Term	Color	
Name	Desig.	Conn.	Name	Desig.	Conn.			
Minor Alarm	MN	J62	Env. Input - #17	TLMI-17	J61	4	W-O	
Power Minor Alarm	PMNT-IN		18					R-BR
Fan Control	FAN-CTL		23					O-BK
Input-Common	TLMI-C		9	Input-Common		TLMI-C		S-W
Env. Input - #1	TLMI-1						17	BR-R
Env. Input - #2	TLMI-2						15	G-R
Env. Input - #3	TLMI-3						13	O-R
Env. Input - #4	TLMI-4						11	BL-R
Env. Input - #5	TLMI-5						7	BR-W
Env. Input - #6	TLMI-6						5	G-W
Env. Input - #7	TLMI-7				3	O-W		
Env. Input - #8	TLMI-8				1	BL-W		
Env. Input - #9	TLMI-9				16	R-G		
Env. Input - #10	TLMI-10				14	R-O		
Env. Input - #11	TLMI-11		Env. Input - #21	TLMI-21		12	R-BL	
Env. Input - #12	TLMI-12		Env. Input - #20	TLMI-20		10	W-S	
Env. Input - #13	TLMI-13		Env. Input - #19	TLMI-19		8	W-BR	
Env. Input - #14	TLMI-14		Env. Input - #18	TLMI-18		6	W-G	
Output - Common	TLMO-C					21	BL-BK	
Env. Output - #1	TLMO-1					19	S-R	
Env. Output - #2	TLMO-2					24	BK-O	
Env. Output - #3	TLMO-3					22	BK-BL	
Env. Output - #4	TLMO-4					20	R-S	
No Connection	NC		Env. Input - #16	TLMI-16		2	W-BL	

**Notes:**

1. 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. 9 external ground must be connected to output-common to access the alarm. Refer to Figure 9-1 (Releases 6 and 7) or Figure 9-3 (Releases 8, 9, 11 and 13).
2. 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 that are being used, connect one lead to input-common (TLMI-C) and the other lead to the appropriate alarm designation (TLMI-#). Refer to Figure 9-1 (Releases 6 and 7) or Figure 9-3 (Releases 8, 9, 11 and 13).

**Table 10-3. Miscellaneous (Environmental) Discrete Telemetry Connections (CO)**

Central Office (Releases 6 and 7)			Central Office (Releases 8, 9, 11 and 13)			Term	Color
Name	Desig.	Conn.	Name	Desig.	Conn.		
Minor Alarm	MN	J61	No Connection	NC	J61	4	W-O
No Connection	NC		No Connection	NC		18	R-BR
No Connection	NC		No Connection	NC		23	O-BK
Input-Common	TLMI-C		Input-Common	TLMI-C		9	S-W
Env. Input - #1	TLMI-1		Env. Input - #1	TLMI-1		17	BR-R
Env. Input - #2	TLMI-2		Env. Input - #2	TLMI-2		15	G-R
Env. Input - #3	TLMI-3		Env. Input - #3	TLMI-3		13	O-R
Env. Input - #4	TLMI-4		Env. Input - #4	TLMI-4		11	BL-R
Env. Output - #5	TLMO-5		Env. Output - #5	TLMO-5		7	BR-W
Env. Output - #6	TLMO-6		Env. Output - #6	TLMO-6		5	G-W
Env. Output - #7	TLMO-7		Env. Output - #7	TLMO-7		3	O-W
Env. Output - #8	TLMO-8		Env. Output - #8	TLMO-8		1	BL-W
Env. Output - #9	TLMO-9		Env. Output - #9	TLMO-9		16	R-G
Env. Output - #10	TLMO-10		Env. Output - #10	TLMO-10		14	R-O
Env. Output - #11	TLMO-11					12	R-BL
Env. Output - #12	TLMO-12					10	W-S
Env. Output - #13	TLMO-13					8	W-BR
Env. Output - #14	TLMO-14					6	W-G
Output - Common	TLMO-C		Output - Common	TLMO-C		21	BL-BK
Env. Output - #1	TLMO-1		Env. Output - #1	TLMO-1		19	S-R
Env. Output - #2	TLMO-2		Env. Output - #2	TLMO-2		24	BK-O
Env. Output - #3	TLMO-3		Env. Output - #3	TLMO-3		22	BK-BL
Env. Output - #4	TLMO-4		Env. Output - #4	TLMO-4		20	R-S
No Connection	NC					2	W-BL

*Notes:*

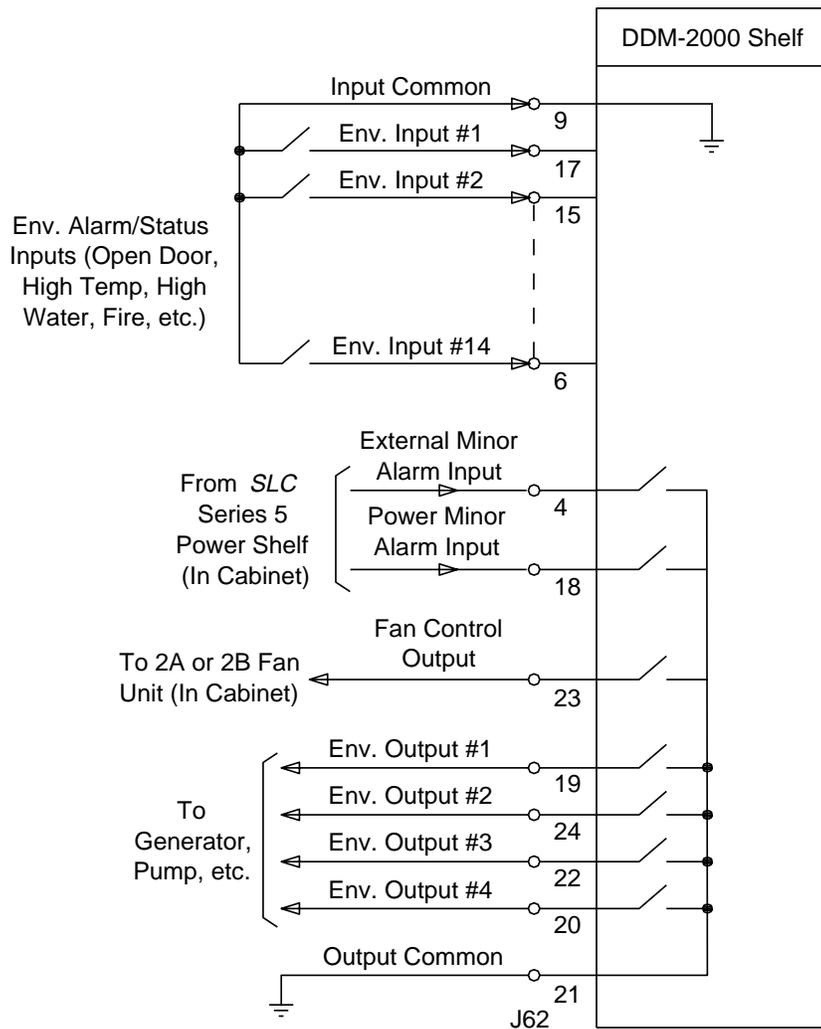
1. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation. Refer to Figure 9-2 (Releases 6 and 7) or Figure 9-3 (Releases 8, 9, 11 and 13).

**Table 10-4. Office Alarm Connections**

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J56	1	BL-W
Minor Alarm Visible Return	MNVR		2	W-BL
Minor Alarm Audible	MN		3	O-W
Minor Alarm Audible Return	MNR		4	W-O
Major Alarm Visible	MJV		5	G-W
Major Alarm Visible Return	MJVR		6	W-G
Major Alarm Audible	MJ		7	BR-W
Major Alarm Audible Return	MJR		8	W-BR
Critical Alarm Visible	CRV		9	S-W
Critical Alarm Visible Return	CRVR		10	W-S
Critical Alarm Audible	CR		11	BL-R
Critical Alarm Audible Return	CRR		12	R-BL

Notes:

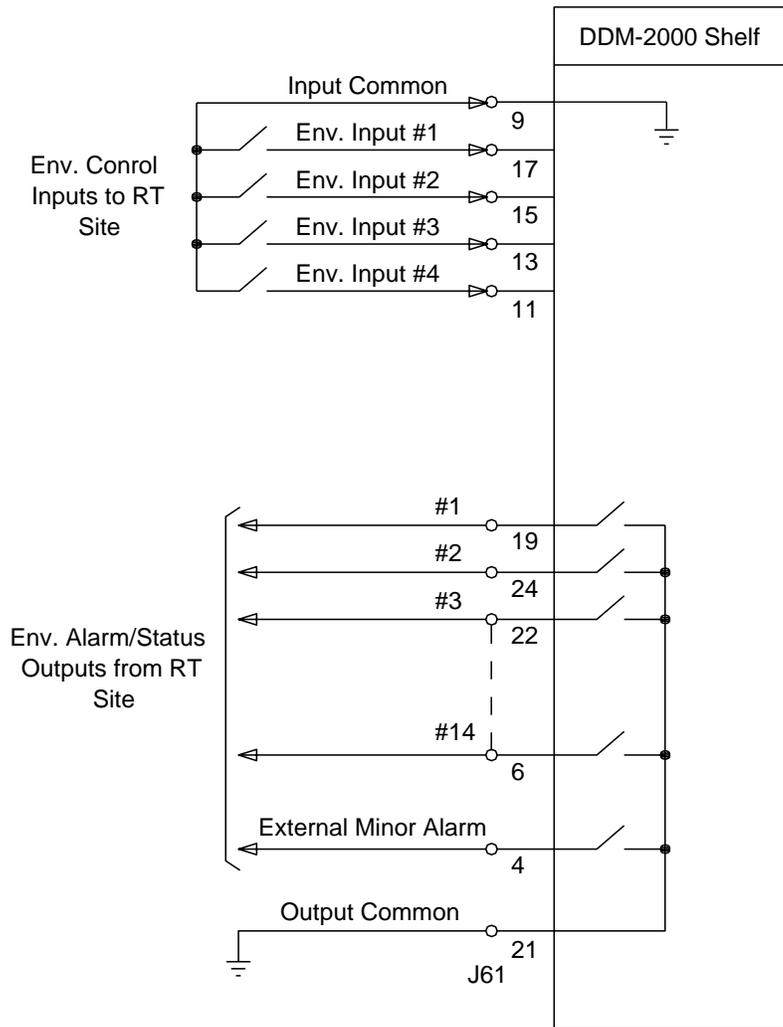
1. The SYSCTL circuit pack reports office alarms.
2. The office alarm cable is 26 gauge.
3. Some cables may be manufactured using wires following old color code standards. A color code cross-reference is located in Table 3-9.



**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 DDM-2000 OC-3 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.

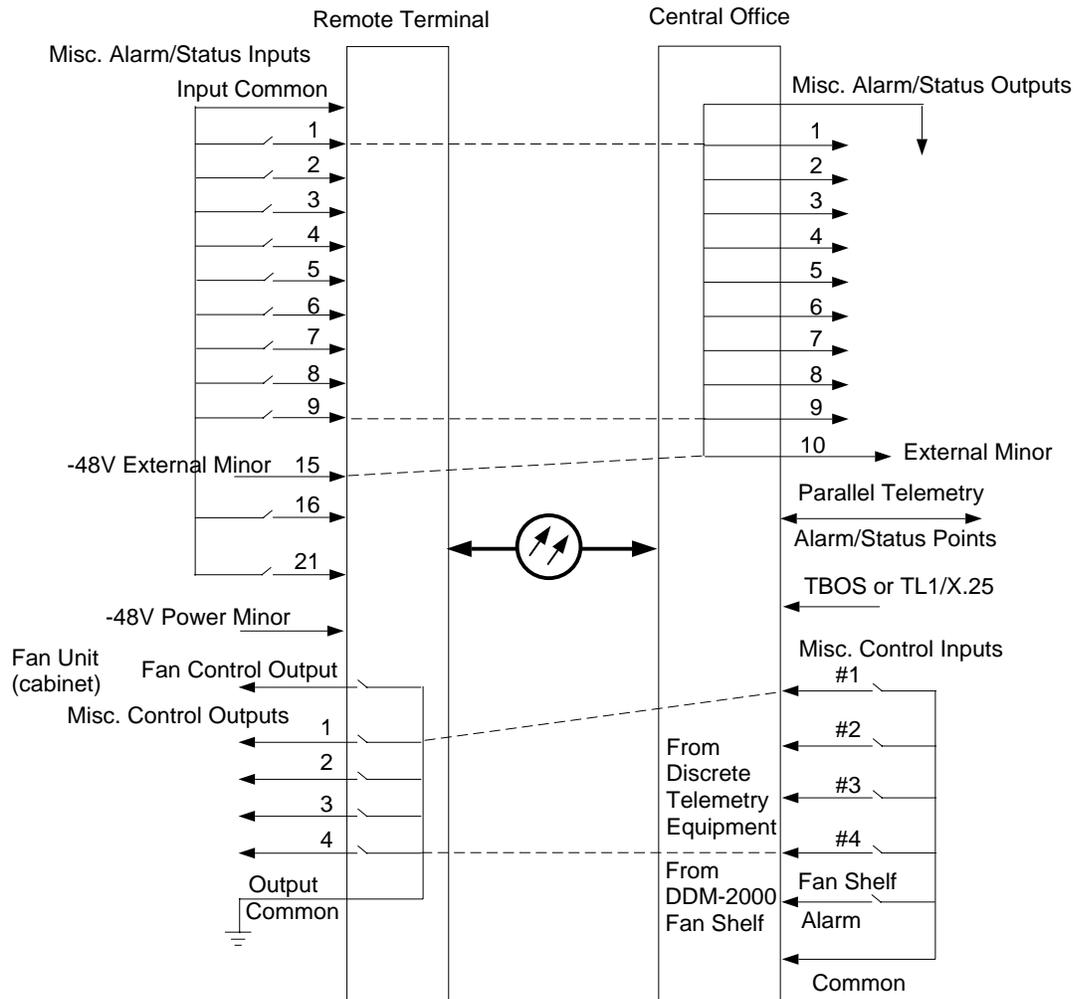
**Figure 10-1. Remote Terminal Miscellaneous (Environmental) Discrete Functions (Releases 6 and 7).**



**Notes:**

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-14.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J62) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBs environment (noncabinet) applications where a fan shelf is required.

**Figure 10-2. Central Office Terminal Miscellaneous (Environmental) Discrete Functions (Releases 6 and 7).**



**Notes:**

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-10.
2. Miscellaneous (environmental) alarm input #14 (terminal 6 on J62) is typically wired to DDM-2000 OC-3 fan shelf in non-NEBs environment (noncabinet where air inlet temperature exceeds 50 degrees Celsius) applications where the fan shelf is required.

**Figure 10-3. Miscellaneous (Environmental) Discrete Functions (Releases 8, 9, 11 and 13).**

# Troubleshooting

# 11

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## Troubleshooting

# 11

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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 Technologies Customer Technical Support (CTS) 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 CTS organization regards the customer as its highest priority and understands your obligation to maintain quality service for your customer.

Within the CTS organization, the Engineering and Installation Services group provides 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 CTS 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 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 Technologies is thoroughly tested and integrated into a reliable system at cutover. Once approved by Lucent Technologies' 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 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

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 363-206-202, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Through Release 7), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) or 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13).

#### **⇒ NOTE:**

If only green LEDs are lighted, there is no problem with the DDM-2000 OC-3.

#### **⇒ NOTE:**

For a description of the LEDs, refer to the "Installation Test" section.

#### **⇒ NOTE:**

Movement of circuit packs or cables may cause the DDM-2000 OC-3 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 pushbutton on the SYSCTL, even if just reseating a circuit pack.
- ⇒ NOTE:**  
If the DDM-2000 OC-3 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 pushbutton on the front of the SYSCTL within 10 seconds.
- ⇒ NOTE:**  
DS3 and DS1 circuit packs cannot be installed in the same function group.
- ⇒ NOTE:**  
STS-1E and DS1 circuit packs can only be installed in the same function group when the STS-1E circuit packs are set for the High-Speed mode (Release 6.0 or greater LINEAR only). When the STS-1E circuit packs are set for the High-Speed mode only STS-1E circuit packs are allowed in the shelf (No OLIUs in the main or function unit slots).
- ⇒ 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.
- ⇒ NOTE:**  
For more intensive troubleshooting (down to the signal level), backplane connector pin assignments are provided in Tables 10-1 through 10-12.

## 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 pushbutton on the SYSCTL.
3. At least one timing generator (TGS) circuit pack **MUST** be installed.
4. If one TGS is installed, its ACTIVE LED should be lighted. If two TGSs are installed, then one should have its ACTIVE LED lighted and the other should have no LED lighted.
5. If the TGSs are not working as described, verify that the timing mode selection is set properly. In a remote terminal (RT), the TGS should be set for loop timed. One shelf in a 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.
6. If the TGS is set properly for external timing and a problem still exists, disconnect the external timing and set the TGS for free-running.
7. 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.
8. In each function group, if one function unit (DS3, STS-1E or MXRVO) is installed, its ACTIVE LED should be lighted. If two function units are installed, one should have its ACTIVE LED lighted and the other should have no LED lighted.
9. If a solid FAULT LED is lighted on any circuit pack, determine if the problem exists with the shelf or the pack.
10. 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 OC-3 using the `rtrv` (RETRIEVE) commands.
2. Use the `rtrv-alm` (RETRIEVE ALARM) command to display the alarms that the DDM-2000 OC-3 is reporting.
3. Use the `rtrv-eqpt` (RETRIEVE EQUIPMENT) command to display the equipment installed in the DDM-2000 OC-3.

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 OC-3.
  
5. If testing a Release 6 or 8 multispan configuration, or a Releases 5, 7, 9, 11 and 13 ring configuration perform the following:
  - 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. For some (later) releases such as 9, 11 and 13 the command is `rtrv-map`. The software will then ask if a neighbor or network map is desired.
  - Use the `rtrv-crs` (RETRIEVE CROSS-CONNECTION) command to display the state of the STS-1 or VT1.5 cross-connection state.
  
6. If problems still persist refer to 363-206-202, *DDM-2000 OC-3 User/Service Manual* (Through Release 7), 363-206-280, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Releases 8 through 11) or 363-206-285, *DDM-2000 OC-3 Multiplexer User/Service Manual* (Release 13).

## **Technical Support**

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Lucent Technologies 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 Technologies transmission and switching products. Each of the following RTACs supports a specific territory:

Cockeysville, MD

Atlanta, GA

Denver, CO

For RTAC support, dial 1-800-225-7822 which will direct the call to the RTAC center supporting your location.

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

## **COACH Description**

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The DDM-2000 is fully supported by COACH. COACH is a system of on-line support tools which provide product news and bulletins, diagnostic services, compatibility information, and on-line documents. The COACH tools reside on a dedicated time-share computer accessible over toll-free lines and are available 24 hours a day, 7 days a week. The following COACH tools are available:

Diagnostic Dictionary	Contains previously encountered problems and their solutions.
News and Bulletins	Immediately after a user logs into COACH, the news and bulletins tool displays bulletins containing urgent information related to the product. Users are informed about the presence of news items, which are less urgent, and can be read at their leisure.
Compatibility Data	This tool lists solutions to hardware/firmware configuration problems in the form of product changes which are available.
COACH User's Guide	This is an on-line version of how to use COACH
CN (Change Notice) Tool	This tool contains all change notices.

For information on obtaining a COACH login, contact:

COACH Software Development  
Department jc09320d0  
Lucent Technologies  
1600 Osgood St.  
North Andover, MA. 01845  
Telephone: **1-800-238-4021**  
OR  
FAX to: **1-978-960-1772**

## **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), which is an on-line tool similar to COACH. For more information regarding DCMS, contact 1-314-891-4213 or 1-314-891-3660.

**Table 11-1. BBF8 HDSL I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
DSX01T	209	HDSL Interface	PSXI3T	113	DS1 Protection
DSX01R	208		PSXI3R	112	
DSX02T	207		PSXI4T	111	
DSX02R	206		PSXI4R	110	
DSX03T	205		TVTCSP	316	VT-G Signals (Service)
DSX03R	204		TVTCSN	315	
DSX04T	203		TVTFMS	313	
DSX04R	202		TVTDAS	311	
DSXI1T	217		RVTCSP	016	
DSXI1R	216		RVTCSN	017	
DSXI2T	215		RVTFMS	014	
DSXI2R	214		RVTDAS	013	
DSXI3T	213		DC52SP	118	VT-G Signals (Protection)
DSXI3R	212		DC52SN	018	
DSXI4T	211		TVTCPP	317	
DSXI4R	210		TVTCPN	318	
PSX01T	109	DS1 Protection	TVTFMP	312	VT-G Signals (Protection)
PSX01R	108		TVTDAP	310	
PSX02T	107		RVTCPP	319	
PSX02R	106		RVTCPN	218	
PSX03T	105		RVTFMP	015	
PSX03R	104		RVTDAP	012	
PSX04T	103		DC52PP	119	
PSX04R	102		DC52PN	019	
PSXI1T	117		LSICKP	307	Control
PSXI1R	116		LSICKN	306	
PSXI2T	115		LSICDP	010	
PSXI2R	114				

**Table 11-2. BBG5 SYSCTL I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
BMPD8	306	Intrashelf Processor Bus	TRMCKP	248	
BMPD9	305		TRMCKN	247	
BMPD10	304		TRMCSP	148	
BMPD11	303		TRMCDN	147	
BMPD12	206		CSRTLM	128	
BMPD13	205		CSRTG1	121	
BMPD14	204		CSRTG2	021	
BMPD15	203		CSROL1	120	
BMPA1	313		CSROL2	020	
BMPA2	312		CSRHA1C	119	
BMPA3	311		SRHA2	019	
BMPA4	310		CSRHB1	118	
BMPA5	309		CSRHB2	018	
BMPA6	308		CSRHC1	117	
BMPA7	307		CSRHC2	017	
BMPA8	212	CSRLA1	116		
BMPA9	211	CSRLA2	115		
BMPA10	210	CSRLA3	016		
BMPA11	209	CSRLA4	015		
BMPA12	208	CSRLA5	140		
BMPA13	207	CSRLA6	139		
BCKOUT	214		CSRLA7	040	
TLMBSN	217		CSRLAP	039	
BMPRWN	314		CSRLB1	114	Intrashelf Control Bus
BMPASN	315		CSRLB2	113	
BMPDSN	215		CSRLB3	014	
MPINTN	316		CSRLB4	013	
DTACKN	216		CSRLB5	138	
FRCMJ	028		CSRLB6	137	
LSICKP	110		CSRLB7	038	
LSICKN	010	Intrashelf Control Bus	CSRLBP	037	
LSICDP	109		CSRLC1	112	
LSICDN	009		CSRLC2	111	
LSIRDPA	108		CSRLC3	012	
LSIRDN	008		CSRLC4	011	

**Table 11-2. BBG5 SYSCTL I/O Connections (Contd)**

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		Intrashelf Control Bus	RRXD	049	Modem Interface	
BS4	005			RTXD	048		
BS5	004			RDTR	047		
BS6	003			RS232N	222		
IICSL	107			Intrashelf Control Bus	RDTRC	229	Intrashelf Control Bus
IICSDA	007				RXMTBS	231	
LINKEN	227		RRCVBS		230		
SHELFID	226		RCLAIM		232		
ACK1	225		Not Used		CRLED	321	User Panel LEDs
ACK2	325				MJLED	320	
	327				MNLED	319	
	326			PMNLED	318		
	127			FEALED	221		
	126	ABNLED		220			
	125	ACOLED		219			
	124	NEALED		218			
	123	ACON		328	User Panel ACO Pushbutton		
	122	Office Alarms		RYCRA1	146		
	122			RYCRA2	046		
	224			RYCRV1	145		
	027			RYCRV2	045		
	025			RYMJA1	144		
	026			RYMJA2	044		
	024			RYMJV1	143		
	022			RYMJV2	043		
	235		RYMNA1	142			
	134		RYMNA2	042			
	133	RYMNV1	141				
	132	RYMNV2	041				
	131						
	130						
	032						
	031						
	030						
	201						
	101						

**Table 11-2. BBG5 SYSCTL I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function	
RTBOSP	334	Serial Telemetry (TBOS) (See NOTE below.)	RMPDGN	249	Test Interface	
RTBOSN	234		TMPDGN	149		
XTBOSP	333		SANDSN	348		
XTBOSN	233		EXRSTN	228		
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					

**⇒ NOTE:**  
 TBOS is not available in Release 13.

**Table 11-3. BBG8 SYSTL I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
BMPD0	030	Intrashelf Processor Bus	LSICKP	110	Intrashelf Control Bus
BMPD1	031		LSICKN	010	
BMPD2	032	LSICDP	109		
BMPD3	033	LSICDN	009		
BMPD4	130	LSIRDP	108		
BMPD5	131	LSIRDN	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 11-3. BBG8 SYSCTL I/O Connections (Contd)**

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	Modem Interface
BS3	006		RRXD	049	
BS4	005		RTXD	048	
BS5	004		RDTR	047	Intrashelf Control Bus
BS6	003		RS232N	222	
IIC_SCL	107		RDTRC	229	
IIC_SDA	007		RXMTBS	231	Intrashelf Control Bus
DSACK1N	227		RRCVBS	230	
SHELFID	226		RCLAIM	232	
OHRCKM1	127	Overhead Interface	CRLED	321	User Panel LEDs
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 Pushbutton
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	
			327		

**Table 11-3. BBG8 SYSCTL I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function	
RTBOSP	334	Serial Telemetry (TBOS) (See NOTE below.)	RMPDGN	249	Test Interface	
RTBOSN	234		TMPDGN	149		
XTBOSP	333		SWTDSN	348		
XTBOSN	233		EXRSTN	228		
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					

**⇒ NOTE:**  
 TBOS is not available in Release 13.

**Table 11-4. BBG7 OHCTL I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
BMPD8	306	Intrashelf Processor Bus	TLMO12	239	Discrete Telemetry Outputs	
BMPD9	305		TLMO13	238		
BMPD10	304		TLMO14	237		
BMPD11	303		TLMO15	236		
BMPD12	206		TLMO16	235		
BMPD13	205		TLMOC	345		
BMPD14	204		TLMIC	339		
BMPD15	203		TLMI1	343		
BMPA1	313		TLMI2	342		
BMPA2	312		TLMI3	341		
BMPA3	311		TLMI4	340		
BMPA4	310		PTCOM	014		Parallel Telemetry (See NOTE BELOW.)
BMPA5	309		PTCR	115		
BMPA6	308		PTMJ	114		
BMPA7	307		PTMN	113		
BMPA8	212		PTPMN	112		
BMPA9	211		PTACOO	111		
BMPA10	210		PTACOI	007		
BMPA11	209		PTSID	110		
BMPA12	208		PTCLF	109		
BMPA13	207		PTINCM	108		
BCKOUT	214		PTNE	015		
TLMBSN	217		PTFE1	013		
BMPWRN	314		PTFE2	012		
BMPASN	315		PTFE3	011		
BMPDSN	215		PTFE4	010		
MPINTN	316		PTFE5	009		
DTACKN	216		PTFE6	008		
CSRTLTM	128		Intrashelf Control Bus	FRCMJ	028	
RTBPMP	334		Serial Telemetry (TBOS) Pass-Through (See NOTE below.)	ROWCLK	103	Orderwire
RTBPMN	234			ROWDAT	104	
XTBPMP	333			TOWCLK	003	
XTBPMN	233			TOWDAT	004	
TLMO1	344	Discrete Telemetry Outputs	RRXD	249	Modem Pass-Through	
TLMO2	246		RTXD	248		
TLMO3	245		RDTR	247		
TLMO4	244		RRXDR	149		
TLMO5	338		RTXDR	148		
TLMO6	337		RDTRR	147		
TLMO7	336		ROHCK1	127	SONET Overhead	
TLMO8	335		ROHFR1	125		
TLMO9	242		ROHDA1	123		
TLMO10	241		ROHCK2	126		
TLMO11	240		ROHFR2	124		

**Table 11-4. BBG7 OHCTL I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
ROHDA2	122	SONET Overhead	Q3RTS	332	TL1 Interface
TOHCK1	027		Q3TCK	331	
TOHFR1	025		Q3DTR	330	
TOHCK2	026		Q3RID	329	
TOHFR2	024		Q3TDA	323	
TOHDA1	022		Q3RCK	232	
TOHDA2	224		Q3CTS	231	
ROHAC1	121		Q3DSR	230	
ROHAF1	119		Q3DCD	229	
ROHAD1	117		Q3RDA	223	
ROHAC2	120		OHRSTN	049	Test Interface
ROHAF2	118		DEV RXD	220	
ROHAD2	116		DEV TXD	320	
TOHAC1	021		WDDISN	348	Power
TOHAF1	019		-48VRT	301	
TOHAC2	020		-48VA1	300	
TOHAF2	018		-48VA2	200	
TOHAD	016		-48VB1	100	
ROHBC1	140		-48VB2	001	Ground
ROHBF1	138		GRD	317	
ROHBD1	136		GRD	213	
ROHBC2	139		GRD	129	
ROHBF2	137		GRD	107	
ROHBD2	135		GRD	102	
TOHBC1	040		GRD	029	
TOHBF1	038		GRD	023	
TOHBC2	039		GRD	036	
TOHBF2	037		GRD	042	
TOHBD	035		GRD	017	
ROHCC1	146		GRD	029	
ROHCF1	144				
ROHCD1	142				
ROHCC2	145				
ROHCF2	143				
ROHCD2	141				
TOHCC1	046				
TOHCF1	044				
TOHCC2	045				
TOHCF2	043				
TOHCD	041				

⇒ **NOTE:**  
 TBOS is not available in Release 13.

⇒ **NOTE:**  
 Parallel telemetry is not available in Release 13 software

**Table 11-5. BBG9/BBG10 OHCTL I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
BMPD0	030	Intrashelf Processor Bus	TLMO1	344	Discrete Telemetry Outputs
BMPD1	031		TLMO2	246	
BMPD2	032		TLMO3	245	
BMPD3	033		TLMO4	244	
BMPD4	130		TLMO5	338	
BMPD5	131		TLMO6	337	
BMPD6	132		TLMO7	336	
BMPD7	133		TLMO8	335	
BMPD8	306		TLMO9	242	
BMPD9	305		TLMO10	241	
BMPD10	304		TLMI16	240	
BMPD11	303		TLMI17	239	
BMPD12	206		TLMI18	238	
BMPD13	205		TLMI19	237	
BMPD14	204		TLMI20	236	
BMPD15	203		TLMI21	235	
BMPA1	313		TLMOC	345	
BMPA2	312		TLMIC	339	
BMPA3	311		TLMI1	343	
BMPA4	310		TLMI2	342	
BMPA5	309		TLMI3	341	
BMPA6	308	TLMI4	340		
BMPA7	307	PTCOM	014	Parallel Telemetry (See NOTE below table.)	
BMPA8	212	PTCR	115		
BMPA9	211	PTMJ	114		
BMPA10	210	PTMN	113		
BMPA11	209	PTPMN	112		
BMPA12	208	PTACOO	111		
BMPA13	207	PTACOI	007		
BCKOUT	214	PTSID	110		
TLMBSN	217	PTCLF	109		
BMPURWN	314	PTINCM	108		
BMPLRWN	034	PTNE	015		
BMPASN	315	PTFE1	013		
BMPDSN	215	PTFE2	012		
MPINTN	316	PTFE3	011		
DSACK0N	216	PTFE4	010		
DSACK1N	227	PTFE5	009		
RRXD	249	PTFE6	008		
RTXD	248	FRCMJ	028		
RDTR	247	EXRSTN	228	Test Interface	
RRXDR	149	OHRSTN	049		
RTXDR	148	DEVRXD	220		
RDTRR	147	DEVTXD	320		
CSRTL	128	Intrashelf Control Bus	WDDISN	348	

**Table 11-5. BBG9/BBG10 OHCTL I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
ROHCK1	127	SONET Overhead	RQ2P	106	LAN Interface
ROHFR1	125		RQ2N	105	
ROHDA1	123		XQ2P	006	
ROHCK2	126		XQ2N	005	
ROHFR2	124		Q3RTS	332	
ROHDA2	122		Q3TCK	331	
TOHCK1	027		Q3DTR	330	
TOHFR1	025		Q3RID	329	
TOHCK2	026		Q3TDA	323	
TOHFR2	024		Q3RCK	232	
TOHDA1	022		Q3CTS	231	
TOHDA2	224		Q3DSR	230	
ROHAC1	121		Q3DCD	229	
ROHAF1	119		Q3RDA	223	
ROHAD1	117		ROWCLK	103	Orderwire
ROHAC2	120		ROWDAT	104	
ROHAF2	118		TOWCLK	003	
ROHAD2	116		TOWDAT	004	
TOHAC1	021		RTBPMP	334	Serial Telemetry (TBOS) Pass-Through (See NOTE below.)
TOHAF1	019		RTBPMN	234	
TOHAF2	018		XTBPMP	333	
TOHAD	016		XTBPMN	233	
ROHBC1	140		+5VOUT	202	Power
ROHBF1	138		+5VOUT	302	
ROHBD1	136		-48VRT	301	
ROHBC2	139		-48VA1	300	
ROHBF2	137		-48VA2	200	
ROHBD2	135		-48VB1	100	
TOHBC1	040		-48VB2	001	
TOHBF1	038		SURGE	324	
TOHBC2	039		ESDGRD	002	Ground
TOHBF2	037		GRDFLT	347	
TOHBD	035		GRD	317	
ROHCC1	146		GRD	213	
ROHCF1	144		GRD	129	
ROHCD1	142		GRD	107	
ROHCC2	145		GRD	102	
ROHCF2	143		GRD	029	
ROHCD2	141		GRD	023	
TOHCC1	046		GRD	036	
TOHCF1	044	GRD	042		
TOHCC2	045	GRD	017		
TOHCF2	043	GRD	007		
TOHCD	041	GRD	029		

**NOTE:**  
 TBOS is not available in Release 13.

**Table 11-6. TGS I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
MCLK1P	014	Timing	BS1-3	003-5	Control
MCLK1N	114		IICSCS	204	
MCLK2P	013		IICSDA	304	
MCLK2N	113		BMPA9	303	
MCLK3P	012		BMPA10	203	
MCLK3N	112		BMPA11	103	
MCLK4P	011		CSR	104	
MCLK4N	111		DS1TIP	118	DS1 Interface
MCLK5P	009		DS1RNG	119	
MCLK5N	109		DS1TIPO	218	
MCLK6P	008		DS1RINGO	219	
MCLK6N	108		LTCKSO	019	Loop Timing Reference
MCLK7P	007		LTCKPO	318	
MCLK7N	107		LTCKSA	217	
MCLK8P	006		LTCKPA	317	
MCLK8N	106		LTCKPC	305	
FSYN1P	214		LTCKSC	205	
FSYN1N	314		XREFI	117	Cross-Coupled Reference
FSYN2P	213		XREFO	017	
FSYN2N	313		XSANI	116	Service/Protection Cross Coupling
FSYN3P	212		XSANO	016	
FSYN3N	312		XSTATI	115	
FSYN4P	211		XSTATO	015	
FSYN4N	311		-48VA2	200	Power
FSYN5P	209		-48VA1	300	
FSYN5N	309		-48VB2	001	
FSYN6P	208		-48VB1	100	
FSYN6N	308		-48VRT	301	
FSYN7P	207	GND	102	Ground	
FSYN7N	307	GND	202		
FSYN8P	206	GND	302		
FSYN8N	306	GND	010		
DIAGR	316	GND	110		
DIAGT	315	GND	210		
DIAGEN	216	GND	310		
SANDIS	215	GND	018		
SLOTID	105	GND	118		
		ESDGND	002		ESD Ground

**Table 11-7. DS1 I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
DSXO1T	209	DS1 Interface	TVTCSP	316	VT-G Signals (Service)	
DSXO1R	208		TVTCSN	315		
DSXO2T	207		TVTFMS	131		
DSXO2R	206		TVTDAS	311		
DSXO3T	205		RVTCSP	016		
DSXO3R	204		RVTCSN	017		
DSXO4T	203		RVTFMS	014		
DSXO4R	202		RVTDAS	013		
DSXI1T	217		DS1 Protection	DC52SP	118	VT-G Signals (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	
PSXO1T	109	DS1 Protection	RVTFMP	015	Control	
PSXO1R	108		RVTDAP	012		
PSXO2T	107		DC52PP	119		
PSXO2R	106		DC52PN	019		
PSXO3T	105		LSICKP	307		
PSXO3R	104		LSICKN	306		
PSXO4T	103		LSICDP	010		
PSXO4R	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		
ESDGND	100	ESD Protection	IICSCS	004		
GRD	011		Ground			
GRD	314					
GRD	300					
GRD	002					

**Table 11-8. MXRVO I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function
TDC1SP	015	STS-1 Signals	MCLKSP	024	Timing Signals
TDC1SN	115		MCLKSN	124	
TDC1PP	215		MCLKPP	025	
TDC1PN	315		MCLKPN	125	
RDC1SP	037		FSYNSP	224	
RDC1SN	137		FSYNSN	324	
RDC1PP	237		FSYNPP	225	
RDC1PN	337		FSYNPN	325	
TVTD1	011	VT-G Signals	LSICKP	205	Control Signals
TVTD2	111		LSICKN	305	
TVTD3	010		LSICDP	206	
TVTD4	110		LSICDN	306	
TVTCAP	007		LSIRDP	006	
TVTCAN	107		LSIRDN	106	
TVTFMA	307		CSR	104	
TVTD5	046		BMPA11	103	
TVTD6	146		BMPA10	203	
TVTD7	045		BMPA9	303	
TVTDP	145		BS1	003	
TVTCBP	042		BS2	004	
TVTCBN	142		BS3	005	
TVTFMB	342		IICSDA	304	
RVTD1	210		IICSDL	204	
RVTD2	310		ROHCK	139	Overhead Channel
RVTD3	209		ROHFR	239	
RVTD4	309		ROHDA	339	
RVTCBP	243		TOHCK	040	
RVTCBN	343		TOHFR	140	
RVTFMB	242	TOHDA	240	Power	
RVTD5	245	-48VA1	300		
RVTD6	345	-48VA2	200		
RVTD7	244	-48VB1	100		
RVTDP	344	-48VB2	001		
RVTCAP	208	-48VRT	301		
DC52AP	008				
DC52AN	108				
DC52BP	043				
DC52BN	143				

**Table 11-8. MXRVO I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
+5V	009	Power	GRD	102	Ground
+5V	109		GRD	202	
+5V	044		GRD	302	
+5V	144		GRD	013	
+5V	211		GRD	113	
+5V	246		GRD	213	
ESDGND	002		ESD ground	GRD	
GRD	221	Ground	GRD	121	
GRD	321		GRD	235	
GRD	029		GRD	335	
GRD	129		GRD	047	
GRD	021		GRD	147	
GRD	229		GRD	247	
GRD	329		GRD	347	
GRD	035		GRD	148	
GRD	135		GRD	248	

**Table 11-9. 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		GRD	102	Ground
RDC1PN	337		GRD	202	
LSICKP	205	Control Interface	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				

**Table 11-10. STS-1E I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
TDC1SP	015	Main/Protection OLIU Interface	MCLKSP	024	Timing Signals	
TDC1SN	115		MCLKSN	124		
TDC1PP	215		MCLKPP	025		
TDC1PN	315		MCLKPN	125		
RDC1SP	037		FSYNSP	224		
RDC1SN	137		FSYNSN	324		
RDC1PP	237		FSYNPP	225		
RDC1PN	337		FSYNPN	325		
TVTD1	011	VT-G Interface	LTCKS	341	Control Interface	
TVTD2	111		LTCKP	241		
TVTD3	010		LSICKP	205		
TVTD4	110		LSICKN	305		
TVTCAP	007		LSICDP	206		
TVTCAN	107		LSICDN	306		
TVTFMA	307		LSIRDP	006		
TVTD5	046		LSIRDN	106		
TVTD6	146		CSR	104		
TVTD7	045		BMPA11	103		
TVTDP	145		BMPA10	203		
TVTCBP	042		BMPA9	303		
TVTCBN	142		BS1	003		
TVTFMB	342		BS2	004		
RVTD1	210		BS3	005		
RVTD2	310		IICSDA	304		
RVTD3	209		IICSCL	204		
RVTD4	309		ON/OFF	041		
RVTCBP	243		ROHCK	139		SONET Overhead
RVTCBN	343		ROHFR	239		
RVTFMB	242		ROHDA	339		
RVTD5	245		TOHCK	040		
RVTD6	345		TOHFR	140		
RVTD7	244		TOHDA	240		
RVTDP	344	STS1	048	STSX-1 Interface		
RVTCAP	208	PSTS1XI	149			
RVTCAN	308	STS1XO	348			
RVTFMA	207	PSTS1XO	249			
DC52AP	008	Power	-48VA1	300		
DC52AN	108		-48VA2	200		
DC52BP	043		-48VB1	100		
DC52BN	143		-48VB2	001		
			-48VRTN	301		

**Table 11-10. STS-1E I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
+5V	009	Power	GRD	102	Ground
+5V	109		GRD	202	
+5V	044		GRD	302	
+5V	144		GRD	013	
+5V	211		GRD	113	
+5V	246		GRD	213	
ESDGND	002		ESD ground	GRD	
GRD	221	Ground	GRD	121	
GRD	321		GRD	235	
GRD	029		GRD	335	
GRD	129		GRD	047	
GRD	021		GRD	147	
GRD	229		GRD	247	
GRD	329		GRD	347	
GRD	035		GRD	148	
GRD	135		GRD	248	

**Table 11-11. 21 TYPE OLIU I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
TDA1SP	027	STS-1 Signals	RDC1SN	115	STS-1 Signals	
TDA1SN	127		RDC2SP	014		
TDA2SP	026		RDC2SN	114		
TDA2SN	126		RDC3SP	012		
TDA1PP	227		RDC3SN	112		
TDA1PN	327		RDC1PP	215		
TDA2PP	226		RDC1PN	315		
TDA2PN	326		RDC2PP	214		
TDB1SP	031		RDC2PN	314		
TDB1SN	131		RDC3PP	212		
TDB2SP	030		RDC3PN	312		
TDB2SN	130		TOHCK	040		SONET Overhead
TDB1PP	231		TOHFR	140		
TDB1PN	331		TOHDA	240		
TDB2PP	230		ROHCK	139		
TDB2PN	330		ROHFR	239		
TDC1SP	037		ROHDA	339		
TDC1SN	137		MCLKSP	024	Timing Signals	
TDC2SP	036		MCLKSN	124		
TDC2SN	136		FSYNSP	224		
TDC3SP	034		FSYNSN	324		
TDC3SN	134		LTCKS	341		
TDC1PP	237		LTCKP	241		
TDC1PN	337		MCLKPP	025		
TDC2PP	236		MCLKPN	125		
TDC2PN	336		FSYNPP	225		
TDC3PP	234		FSYNPN	325		
TDC3PN	334		LSICKP	205	Control Interface	
RDA1SP	023		LSICKN	305		
RDA1SN	123		LSICDP	206		
RDA2SP	022		LSICDN	306		
RDA2SN	122		LSIRDP	006		
RDA1PP	223		LSIRDN	106		
RDA1PN	323	CSR	104			
RDA2PP	222	BMPA11	103			
RDA2PN	322	BMPA10	203			
RDB1SP	019	BMPA9	303			
RDB1SN	119	BS1	003			
RDB2SP	018	BS2	004			
RDB2SN	118	BS3	005			
RDB1PP	219	IICSDA	304			
RDB1PN	319	IICSDL	204			
RDB2PP	218	SLOTID	105			
RDB2PN	318	ON/OFF	041			
RDC1SP	015					

**Table 11-11. 21 TYPE OLIU I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
-48VA1	300	Power	GRD	321	Ground
-48VA2	200		GRD	029	
-48VB1	100		GRD	129	
-48VB2	001		GRD	021	
-48VRTN	301		GRD	229	
ESDGND	002		ESD ground	GRD	
GRD	102	Ground	GRD	035	
GRD	202		GRD	135	
GRD	302		GRD	235	
GRD	013		GRD	335	
GRD	113		GRD	047	
GRD	213		GRD	147	
GRD	313		GRD	247	
GRD	021		GRD	347	
GRD	121		GRD	148	
GRD	221		GRD	248	

**Table 11-12. 22 TYPE OLIU I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
TDA1SP	027	STS-1 Signals	RDC1SP	015	STS-1 Signals	
TDA1SN	127		RDC1SN	115		
TDA2SP	026		RDC2SP	014		
TDA2SN	126		RDC2SN	114		
TDA1PP	227		RDC3SP	012		
TDA1PN	327		RDC3SN	112		
TDA2PP	226		RDC1PP	215		
TDA2PN	326		RDC1PN	315		
TDB1SP	031		RDC2PP	214		
TDB1SN	131		RDC2PN	314		
TDB2SP	030		RDC3PP	212		
TDB2SN	130		RDC3PN	312		
TDB1PP	231		RN1RIP	238		
TDB1PN	331		RN1RIN	338		
TDB2PP	230		RN2RIP	228		
TDB2PN	330		RN2RIN	328		
TDC1SP	037		RN3RIP	220		
TDC1SN	137		RN3RIN	320		
TDC2SP	036		RN1TOP	038		
TDC2SN	136		RN1TON	138		
TDC3SP	034		RN2TOP	028		
TDC3SN	134		RN2TON	128		
TDC1PP	237		RN3TOP	020		
TDC1PN	337		RN3TON	120		
TDC2PP	236		TOHCK	040		SONET Overhead
TDC2PN	336		TOHFR	140		
TDC3PP	234		TOHDA	240		
TDC3PN	334		ROHCK	139		
RDA1SP	023		ROHFR	239		
RDA1SN	123		ROHDA	339		
RDA2SP	022		RPH1CK	333		
RDA2SN	122		RPH1FR	233		
RDA1PP	223		RPH1DA	133		
RDA1PN	323		TPH1CK	033		
RDA2PP	222	TPH1FR	039			
RDA2PN	322	TPH1DA	340			
RDB1SP	019	RPH2CK	117			
RDB1SN	119	RPH2FR	017			
RDB2SP	018	RPH2DA	032			
RDB2SN	118	TPH2CK	132			
RDB1PP	219	TPH2FR	232			
RDB1PN	319	TPH2DA	332			
RDB2PP	218	RPH3CK	016			
RDB2PN	318	RPH3FR	116			

**Table 11-12. 22 TYPE OLIU I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function
RPH3DA	216	SONET Overhead	-48VA1	300	Power
TPH3CK	316		-48VA2	200	
TPH3FR	317		-48VB1	100	
TPH3DA	217		-48VB2	001	
			-48VRT	301	
MCLKSP	024	Timing Signals	ESDGRD	002	ESD Protection
MCLKSN	124		GRD	102	Ground
FSYNSP	224		GRD	202	
FSYNSN	324		GRD	302	
LTCKS	341		GRD	013	
LTCKP	241		GRD	113	
MCLKPP	025		GRD	213	
MCLKPN	125		GRD	313	
FSYNPP	225		GRD	021	
FSYNPN	325		GRD	121	
LSICKP	205	Control Interface	GRD	221	
LSICKN	305		GRD	321	
LSICDP	206		GRD	029	
LSICDN	306		GRD	129	
LSIRD P	006		GRD	229	
LSIRD N	106		GRD	329	
CSR	104		GRD	035	
BMPA12	311		GRD	135	
BMPA11	103		GRD	235	
BMPA10	203		GRD	335	
BMPA9	303		GRD	047	
BS1	003		GRD	147	
BS2	004		GRD	148	
BS3	005		GRD	247	
IICSDA	304		GRD	248	
IIC SCL	204		GRD	347	
DLY	105				
22FTP11	141				
22FTP10	346				
ON/OFF	041				
22FTSTON	210				

**Table 11-13. 27 G-U OLIU I/O Connections**

Name	Pin No.	Function	Name	Pin No.	Function	
TDA1SP	027	STS-1 Signals	RDC1SP	015	STS-1 Signals	
TDA1SN	127		RDC1SN	115		
TDA2SP	026		RDC2SP	014		
TDA2SN	126		RDC2SN	114		
TDA1PP	227		RDC3SP	012		
TDA1PN	327		RDC3SN	112		
TDA2PP	226		RDC1PP	215		
TDA2PN	326		RDC1PN	315		
TDB1SP	031		RDC2PP	214		
TDB1SN	131		RDC2PN	314		
TDB2SP	030		RDC3PP	212		
TDB2SN	130		RDC3PN	312		
TDB1PP	231		RJ11RIP	208		
TDB1PN	331		RJ1RIN	308		
TDB2PP	230		RJ1TOP	007		
TDB2PN	330		RJ1TON	107		
TDC1SP	037		RJ2RIP	243		
TDC1SN	137		RJ2RIN	343		
TDC2SP	036		RJ2TOP	042		
TDC2SN	136		RJ2TON	142		
TDC3SP	034		RN1RIP	238		
TDC3SN	134		RN1RIN	338		
TDC1PP	237		RN2RIP	228		
TDC1PN	337		RN2RIN	328		
TDC2PP	236		RN1TOP	038		
TDC2PN	336		RN1TON	138		
TDC3PP	234		RN2TOP	028		
TDC3PN	334		RN2TON	128		
RDA1SP	023		DCCRTSO2	020		SONET Overhead
RDA1SN	123		DCCRTSI2	220		
RDA2SP	022		DCCRTSI1	242		
RDA2SN	122		DCCRTSO1	342		
RDA1PP	223		TOHCK	040		
RDA1PN	323		TOHFR	140		
RDA2PP	222		TOHDA	240		
RDA2PN	322		ROHCK	139		
RDB1SP	019		ROHFR	239		
RDB1SN	119		ROHDA	339		
RDB2SP	018		RPH1CK	333		
RDB2SN	118		RPH1FR	233		
RDB1PP	219		RPH1DA	133		
RDB1PN	319		TPH1CK	033		
RDB2PP	218		TPH1FR	039		
RDB2PN	318		TPH1DA	340		

**Table 11-13. 27G-U OLIU I/O Connections (Contd)**

Name	Pin No.	Function	Name	Pin No.	Function	
RPH2CK	117	SONET Overhead	IDRS	309	Jumper Pack CSR Interface	
RPH2FR	017		IDRP	344		
RPH2DA	032		IDTS	110		
TPH2CK	132		IDTP	145		
TPH2FR	232		Timing Signals	+5JS1	211	Power
TPH2DA	332			+5JP1	144	
TPH3FR	317			-48VA1	300	
TPH3DA	217			-48VA2	200	
MCLKSP	024	-48VB1		100		
MCLKSN	124	-48VB2		001		
FSYNSP	224	Control Interface	-48VRT	301	Ground	
FSYNSN	324		ESDGRD	002		ESD Protection
LTCKS	341		GRD	102		
LTCKP	241		GRD	202		
MCLKPP	025		GRD	302		
MCLKPN	125		GRD	013		
FSYNPP	225		GRD	113		
FSYNPN	325		GRD	213		
LSICKP	205		GRD	313		
LSICKN	305		GRD	021		
LSICDP	206		GRD	121		
LSICDN	306		GRD	221		
LSIRD	006		GRD	321		
LSIRDN	106		GRD	029		
CSR	104		GRD	129		
BMPA12	311		GRD	229		
BMPA11	103		GRD	329		
BMPA10	203	GRD	035			
BMPA9	303	GRD	135			
BS1	003	GRD	235			
BS2	004	GRD	335			
BS3	005	GRD	047			
IICSDA	304	GRD	147			
IICSCL	204	GRD	148			
DLY	105	GRD	247			
		GRD	248			
		GRD	347			

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# 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) indicated by an LED on the user panel. An abnormal condition, loopback, forced manual switch, etc., is initiated through a craft interface terminal command

### ACO/TST

Alarm Cutoff and Test — The name of a pushbutton on the user panel. it retires an audible office alarm. It has other functions when used in combination with other pushbuttons and controls.

### 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.

### AGNE

Alarm Gateway Network Element — A user designated Network Element in an alarm group through which members of the alarm group exchange information.

### AIS

Alarm Indication Signal — A code transmitted downstream in a digital network that shows that an upstream failure has been detected and alarmed.

### AMI

Alternate Mark Inversion — A line code that employs a ternary signal to convey binary digits, in which successive binary ones are represented by signal elements that are normally of alternating, positive and negative polarity but equal in amplitude, and in which binary zeros are represented by signal elements that have zero amplitude.

### ANSI

American National Standards Institute. The United States organization that coordinates creation of voluntary standards.

### APS

Automatic Protection Switch - Switching of receivers in response to an indication of loss of signal or other problem with a transmission path.

### 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. If that signal is then lost, deliberately or accidentally, an alarm will occur. The alarm can be eliminated by resetting.

**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. Currently, the OHCTL fills this slot.

**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.

**BRI**

Basic Rate Interface.

**Broadband**

Any communications channel with greater bandwidth than a voice channel; sometimes used synonymously with wideband. However, wideband FM is not the same as broadband.

**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. The connector on the front of a shelf which is used to gain access to the condition of the shelf and system and through which system parameters and values can be changed

**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. This function is now under the auspices of the ITU (International Telecommunications Union). See ITU.

**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.

**CTS**

Customer Technical Support

**CTS**

Clear to Send in TL1/X.25 telemetry.

**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 receiver terminal of a terminal other than the one to which you are physically connected.

**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 Terminating 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**

Lucent Technologies's Dual DS3 Multiplexer — A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or into an optical signal.

**DDM-2000**

Lucent Technologies's network multiplexer that multiplexes DS1, DS3, or EC-1 inputs into EC-1, OC-3 or OC-12 outputs.

**Default Provisioning**

The parameter values that are preprogrammed into a circuit pack, shelf or other electronics before it is shipped from the factory. Usually, these values can be set to other values in the field, if desired.

**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 electronics that accomplishes demultiplexing. "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.) This level contains 24 DS0 (24 digitized voice channels at 64 kBs/s each) channels plus overhead.

**DS1 Circuit Pack**

The DS1 interface circuit pack that is inserted into the OS-3 shelf and interfaces to the DSX-1 panel.

**DS3**

Digital Signal Level 3 (44.736 M/bs). This level contains 28 DS1 signals plus overhead.

**DS3 Circuit Pack**

The DS3 circuit pack that is inserted into the OS-3 shelf and interfaces to the DSX-3 panel.

**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 NE (network element) that provides directory services translation in an OSI subnetwork. Can also be a GNE. A single DSNE for a network must be set in Release 7.2 and later. The DSNE recognizes, communicates with and controls DCC traffic between all network elements.

**DSX**

Digital Cross-Connect Panel — A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

**DT**

Distant Terminal (See, also, “FE” and “remote”.)

**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.

**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.

**EIA**

Electronic Industries Alliance, formerly the Electronic Industries Association.

**EMC**

Electromagnetic Compatibility.

**EMI**

Electromagnetic Interference.

**EOOF**

Excessive Out of Frame.

**EPROM**

Erasable Programmable Read-Only Memory.

**EQ**

Equipped (memory administrative state).

**ES**

Errored Seconds — 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.

**ESD**

Electrostatic Discharge.

**ESF**

Extended Super Frame (format for DS1 signal).

**F**

**FDDI**

Fiber Distribution Data Interface.

**FE**

Far-End. Any other network element in a subnetwork other than the one the user is at or working on. Also called remote.

**FE ACTY**

Far-End Activity — An LED on the user panel.

**FEBE**

Far-End Block Error — An indication returned to the near-end transmitting node that an errored block has been detected at the far-end.

**FE ID**

Far-End Identification — The 7-segment display on the faceplate of the SYSCTL circuit pack.

**FEPROM**

Flash EPROM — A 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  $/10^9$  hours of operation.

**Free Running**

An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

**FT-2000**

Lucent Technologies's SONET OC-48 lightwave system

**Function Group (Fn)**

The set of circuit pack slots into which a set of function units can be inserted. These may be Fn A, B or C.

**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, in the A, B, C, or D function unit slots of the DDM-2000 OC-12 Multiplexer, or in such slots in the FiberReach.

## G

**GNE**

Gateway Network Element — A network element that funnels information between several network elements and their supporting operations systems. Can also be a DSNE. Beginning with Release 7.2 the GNE is whichever terminal is being used as an X.25 port. There can be more than one DNE in a network. Prior to Release 7.2 (Releases 7.1 and 6.x) the DNE was set (provisioned) manually.

**Group**

The eight related slots that may be equipped.

**GTP**

General Telemetry Processor.

## H

**HDSL**

High data rate Digital Subscriber Line

**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/OC-12 intershelf interworking.

### ISO

International Standards Organization. A standards organization that creates, writes compiles and distributes standards for many systems and interfaces that must be used in international technology and business communities. See OSI.

### ITU

International Telecommunications Union. An international advisory committee under United Nations' sponsorship that has composed and recommended for adoption worldwide standards for international communications. The ITU consists of the ITU-R (radio, that is, free space) and the ITU-T (telecommunications, meaning any mode that uses a medium other than radio. Fiber optics and coaxial cable are examples of transmission technology falling under ITU-T.) The International Telecommunications Union replaced the CCITT. See CCITT.

## **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".

### **laser**

A semiconductor device. Used on a circuit pack as a source of coherent light for communications.

### **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. See also, optical LBO.

### **LCN**

Local Communications Network.

### **LED**

Light Emitting Diode — A semiconductor device. Used on a circuit pack or shelf faceplate to show failure (red) or service state. It is also used to show the alarm and status condition of the system.

### **Local**

See NE (Near-End.)

### **LOF**

Loss of Frame — A failure to synchronize to an incoming signal.

### **Line Timed**

A timing mode in which the terminal derives its transmit timing from the received line signal. Formerly called "loop timed".

### **Loop Timed**

The former name for line timed.

### **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.

**LS**

Low-Speed.

**N**

**Main**

Two slots on the DDM-2000 OC-3 shelf in which the OLIU circuit packs are installed.

**Midspan Meet**

The capability to interface between signals from two lightwave terminals of different vendors. This applies to high-speed optical interfaces.

**MD**

Mediation Device.

**MJ**

Major Alarm.

**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.

**Muldem**

An older term for function group; now seldom used.

**Multiplexing**

The process of combining several distinct digital signals into a single composite digital signal.

## **Mult**

The cascading of signals between shelves 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. A device that multiplexes.

## **MXRVO**

Circuit Pack. 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. Do not confuse with NE as used to mean Network Element. The difference can be discerned by the context of the material in which it appears.

### **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. Do not confuse with NE as used to mean Near-End. The difference can be discerned by the context of the material in which it appears.

### **NE ACTY**

Near-End Activity — An LED on the user panel.

### **NEBS**

Network Equipment-Building System.

### **nm**

Nanometer ( $10^{-9}$  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**

Non Service Affecting. An occurrence or activity in a system where there is no interruption of transmission of the payload traffic.

**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 (electrical) 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. Currently, this circuit pack is inserted into the AUXCTL slot.

**OI**

Operations Interworking. The ability of equipment from different vendors to work together in a system.

**OLIU**

Optical Line Interface Unit. This circuit pack contains, among other things, the optical transmitter and receiver.

**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.

**Optical LBO**

An optical attenuator that is inserted into a fiber optic line to decrease the optical power.

**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 Plan.

**P**

**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.

### **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 failure or signal degrade defect (for example, performance monitoring).

### **POH**

Path Overhead.

### **POTS**

Plain Old Telephone Service

### **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. This pair of fibers serves as backup for the pair normally carrying traffic. (See "Service Line.")

### **PRM**

Performance Report Message.

### **PROTN**

Protection.

### **PRS**

Primary Reference Source.

### **PVC**

Permanent Virtual Circuit. (X.25)

### **PWR**

Power.

## **R**

### **RAM**

Random Access Memory.

### **Reactive Maintenance**

Refers to detecting defects/failures and clearing them.

### **Remote**

See "Far-End" ("FE") and "DT".

### **Revertive**

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration after any failure conditions that caused a protection switch to occur clear or after any external switch commands are reset. (That is, the service equipment is active, and the protection equipment is standby, unless the active equipment is currently in a failure mode.) (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 two neighbors and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch (both transmitters are always transmitting and the receiver selects one or the other signal to process.) 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**

Lucent Technologies Regional Technical Assistance Center (1-800-225-RTAC)

### **RZ**

Return to Zero.

## **S**

### **SA**

Service Affecting.

### **SD**

Signal Degrade.

**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. Also, Shelf Identification. See NOTE, 10-12.

**Site ID**

A switch settable parameter with values of from 1 to 8. Displayed on SYSCTL circuit pack to indicate to which site the user panel alarms and LEDs apply.

**SONET**

Synchronous Optical Network.

**SPE**

Synchronous Payload Envelope.

**SPE STS-1**

Synchronous Payload Envelope — A 125-microsecond frame structure composed of STS path overhead and the STS-1 payload.

**SRD**

Software Release Description.

**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**

The basic logical building block signal with a rate of 51.840 Mb/s.

**STS-3c**

Synchronous Transport Level 3 concatenated Signal. See OC-3c.

**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**

**T1X1 and T1M1**

The ANSI committees responsible for telecommunications standards.

**TA**

Bellcore Technical Advisory

**TABS**

Telemetry Asynchronous Byte Serial (Protocol).

**TARP**

Target ID Address Resolution Protocol. This protocol enables multi-vendor OI (operations interworking).

**TBOS**

Telemetry Byte-Oriented Serial (Protocol) — Defines one physical interface for direct connection between the telemetry remote and the monitored equipment. An EIA 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, 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 hold-over modes.

**TID**

Target Identifier — The Bellcore name for a system shelf.

**TL1**

Transaction Language 1 — A Bellcore machine-to-machine communications language that is a subset of ITU'S (formerly CCITT) human-machine language.

**TMUX**

Trans-mux or trans-multiplex. The new TMUX circuit pack (BBG20) provides path termination functions for an M13 or C-bit parity DS3 signal. It demultiplexes the DS3 into 28 DS1s, performs DS1 PM, maps each DS1 into a VT1.5, and multiplexes the 28 VT1.5s into an STS-1.

**TOP**

Task Oriented Practice.

**TR**

Bellcore Technical Requirement

**TSA**

Time Slot Assignment.

**TSI**

Time Slot Interchange.

## U

### UAS

Unavailable Seconds. In performance monitoring, the count of seconds (1) in which a signal is declared failed or, (2) 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 pushbutton 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).

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