Lucent Technologies
Bell Labs Innovations

DDM-2000 OC-12 Multiplexer

Releases 3, 5 and 7

Installation Manual

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

Security

In rare instances, unauthorized individuals make connections to the telecommunications network. In such an event, applicable tariffs require that the customer pay all network charges for traffic. Lucent Technologies cannot be responsible for such charges and will not make any allowance or give any credit for charges that result from unauthorized access.

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Document Title: **DDM-2000 OC-12 Multiplexer, Releases 3, 5 and 7, Installation Manual**

Document Number: **363-206-208**   Issue Number: **5**   Publication Date: **November 2000**

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

❏ Add more detail   ❏ Make it more concise/brief

❏ Improve the table of contents   ❏ Add more step-by-step procedures

❏ Improve the organization   ❏ Add more trouble shooting info.

❏ Include more figures   ❏ Make it less technical

❏ Add more examples   ❏ Add more/better quick reference aids

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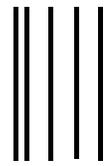Please provide details for the suggested improvement:

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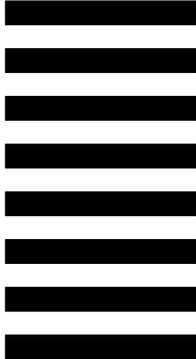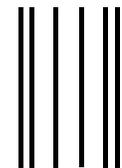
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About This Document

Purpose

This manual provides installation instructions for the DDM-2000 OC-12 Multiplexer for end users responsible for their own equipment installation. Refer to 363-206-207 (Releases through Release 3), 363-206-290 (Release 5) and 363-206-295 (Release 7) *DDM-2000 OC-12 Multiplexer User/Service Manual* for any activity involving circuit turnup, regular maintenance, or trouble analysis.

Intended Audiences

This installation manual is for DDM-2000 Multiplexer customers who maintain their own installation organization to install the equipment.

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-12 Multiplexer. The most significant changes are the addition of Release 7.0 information.

Multi-Vendor OI

To support multi-vendor OI, DDM-2000 OC-12 R7.0 supports Target ID Address Resolution Protocol (TARP) instead of Lucent Directory Service (LDS). DDM-2000 OC-3 R13.0, FiberReach R3.0, and FT-2000 OC-48 R8.0 also support TARP, thus Lucent 2000 Product Family OI compatibility is still supported but not OI compatibility with previous releases of DDM-2000 and FT-2000. TARP is the established multi-vendor standard for SONET NEs that support TL1 OS interfaces.

DDM-2000 OC-12 R7.0 is developed to be compatible with any other-vendor NEs that also support TARP, OSI, IAO LAN, and TL1/X.25 as specified in Bellcore GR-253. In addition, DDM-2000's TARP Manual Adjacency feature enables DDM-2000 to operate in networks that include CMISE-based NEs which may not support TARP propagation.

DDM-2000's compatibility with Tellabs TITAN * 5500/S R5.0 DCS, with TITAN serving as the TL1/X.25 GNE for DDM-2000 TL1-RNEs, has been confirmed through cooperative joint testing. DDM-2000's compatibility with some other-vendor NEs has also been tested by independent third-parties.

Because DDM-2000 OC-12 R7.0 is intended to facilitate OS-based centralized operations, and because TL1/X.25 OS access is the key standardized multi-vendor OI application, the following Remote NE Status features are not supported in DDM-2000 OC-12 R7.0:

- Remote office alarms
- Remote CIT alarm reports
- Remote user panel indications
- TBOS telemetry
- Parallel telemetry.

All of the above features depend on the proprietary exchange of information among Lucent NEs in a subnetwork, specifically the communication of each remote NE's alarm status to other NEs. Although the Remote NE Status features were supported in previous releases of DDM-2000, such Lucent-only operations features in multi-vendor subnetworks would not include other-vendor NEs, due to the lack of applicable standards, and thus would be incomplete.

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

DDM-2000 OC-12 Release 7.0

> ⇒ **NOTE:**
>
> DDM-2000 OC-12 Release 7.0 is NOT compatible with previous releases of DDM-2000 OC-12. Therefore, when upgrading a subnetwork, care should be taken to avoid isolating NEs that have not yet been upgraded to Release 7.0.

The following paragraphs provide brief descriptions of the DDM-2000 OC-12 Multiplexer Release 7.0:

Release 7.0 is an enhanced ring release which supports all features of R5.x. In addition, it supports the following:

- New Applications:

  - Interworking with Tellabs *TITAN*[*] 5500/S Release 5.0 Digital Cross-Connect System.

- New Features:

  - Target ID Address Resolution Protocol (TARP) and standard OSI stack for intervendor operations Interworking (OI).

    - Provides for large networks up to 256 NEs via level 1 area provisioning and level 2 routing.

  - Enhanced software download. Provides a software copy capability allowing compressed files containing the new software generic to be downloaded to the DDM-2000 system. This can be done while the current version is still running without affecting the operation of the system. When the appropriate command is initiated, the new generic is executed. Execution of the new generic can be scheduled (time and date), allowing coordination of cutover of several NEs in the subnetwork.

  - New IntrAOffice LAN between DDM-2000 and ITM SNC for enhanced software download and OS access.

  - New Stratum 3 timing generator circuit pack (BBF4). The TG3 operates with an internal oscillator of ±4.6 ppm long term accuracy.

  - Pointer Justification Count (PJC). This performance monitoring parameter indicates a frequency error in the network or other potential synchronization problem. It provides a threshold crossing alert (TCA) when the STS-1 pointer justification count in a performance bin exceeds a user provisioned threshold value.

  - STS-3c locked 0x1 cross-connect.

  - CPro-2000, ITM SNC support. Release 7.0 is supported by CPro-2000 Release 7.0; ITM SNC Release 5.0.

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Safety Instructions

Admonishments

Important safety instructions are in this manual. In addition to the instructions on the following page, there are other safety instructions you must follow. These instructions involve lasers, lightwave optical cable and connectors, and precautions when handling circuit packs to prevent damage from electrostatic discharge. This manual also contain 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 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 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 a direct inadvertent exposure to the end of an energized fiber, direct exposure at close distances should be avoided.

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

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

Electrostatic Discharge ESD) Considerations

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

In order to prevent damage by electrostatic discharge the following precautions should be observed when handling circuit packs:

- Assume all circuit packs contain solid state electronic components that can be damaged by ESD.

- When handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane, always wear a grounded wrist strap 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. 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.

To
Ground
Connection
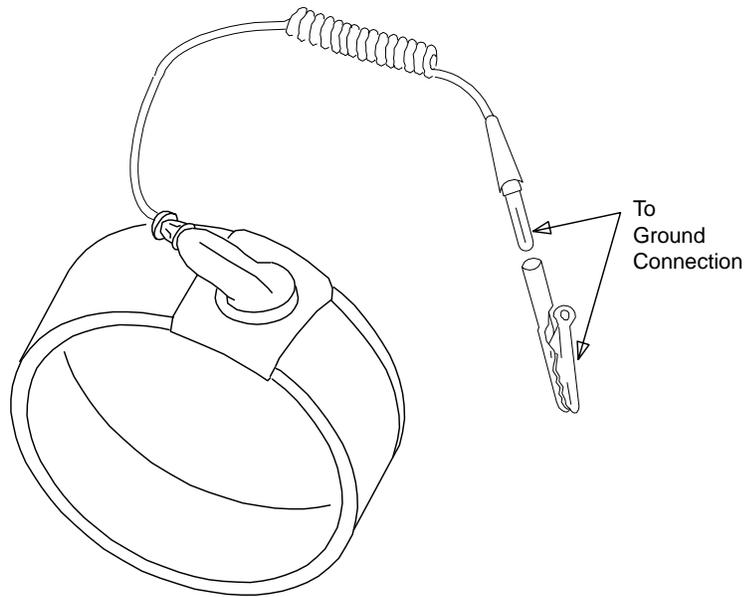
Figure 1. Static Control Wrist Strap

IMPORTANT SAFETY INSTRUCTIONS

(1)   Read and understand all instructions.

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

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

(4)   Slots and openings in this product cabinet and the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. This product should not be placed in a built-in installation unless proper ventilation is provided. For information on proper ventilation requirements, refer to "Equipment Installation Considerations" of this manual.

(5)   This product should be operated only from the type of power source indicated on the marking label. For information on proper electrical distribution and power requirements, refer to Power Cable Installation - Front Access" or "Power Cable Installation - Rear Access" of this manual.

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

(7)   To reduce the risk of electrical shock, do not disassemble this product.Service should be performed by trained personnel only. Opening or removing covers and/or circuit packs may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.

⚠ **CAUTION:**
Disconnect both power connections when removing power from the system.

(8)   Use only Lucent manufactured UL^* recognized circuit packs in this system. The following circuit packs are UL recognized for use in the DDM-2000 OC-12 Multiplexer: BBG8 (SYSCTL), BCP4 (OHCTL), BBF2B (TGS), BBF4 (TGS), BCP2 (TSI), BBG11 (3DS3), BBG12 (3STS1E), 21D-U (OLIU), 21G3-U (OLIU), 23G-U (OLIU), 23H-U (OLIU), 177B and 177C (APPBLK).

(9)   The DDM-2000 OC-12 Multiplexer is UL listed for restricted access installations in business and customer premises applications installed in accordance with Articles 110-16 and 110-17 of the National Electric Code, ANSI/NFPA Number 70-87. Other installations exempt from the requirements of the National Electric Code may be engineered according to the accepted practices of the local telecommunications utility.

SAVE THESE INSTRUCTIONS!!!

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*. Registered trademark of Underwriters Laboratories, Inc.

IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

1. Read and understand all instructions.

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

3. DS3 and OC-3 interfaces should not leave the building premises unless connected to telecommunication devices providing primary or secondary protection, as applicable.

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

5. Never install telecommunication wiring during a lightning storm.

6. Never install telecommunication connections in wet locations.

7. Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the DS3 or OC-3 interface.

8. Use caution when installing or modifying telecommunication lines.

SAVE THESE INSTRUCTIONS!!!

Related Documentation

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

OC-3

- 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: 363-206-204

  Title: *DDM-2000 OC-3 Multiplexer, Releases 3, 5 and 7, Installation Manual*
  Audience: Installation personnel
  Content: Installation instructions

- 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 and 9.0.

- 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 (TARP).

OC-12

- 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 .

⇒ **NOTE:**

The regenerator and uniquely associated circuit packs have been discontinued.

- 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

- 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, Releases 2. 3, and 4, Installation Manual*
  Audience: Installation personnel
  Content: Installation instructions

DDM-2000 Family Documents

- Number: 824-102-151

  Title: *DDM-2000 Multiplexers, Operations Systems Engineering Guide*
  Audience: Engineers
  Content: Operations systems engineering information for DDM-2000.

- 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

Applications, Planning, and Ordering Guide (APOG)

- 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. For OC-3 and OC-12.

- 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

- 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 2000 Product Family Operations Interworking Guide*
  Audience: Maintenance personnel
  Content: Operations interworking information for the Lucent 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.

Related Products

- 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.

DDM-2000 OC-12 Drawings

DDM-2000 OC-12 Drawings

Drawing No.	Drawing Title
ED-8C724-10	OC-3 and 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
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-8C727-37	OC-12 Release 7 Software Ordering
ED-8C733-30	Fan, Filter, and Baffle Assemblies
SD-7C513-01	OC-12 Application Schematic
T7C513-31	OC-12 Interconnect Wiring (Rear Access)
T7C513-32	OC-12 Interconnect Wiring (Front Access)
ED-8C906-30	DDM-2000 OC-3 / OC-12 Bay Arrangements
ED-8C900-20	Universal DS3 Cable Assemblies
801-525-168	Floor Plan Data Sheets

Related Drawings

DDM-2000 OC-3 Drawings

Drawing No.	Drawing Title
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 (Releases 2 and 3)
ED-8C724-37	OC-3 Software Ordering (Release 6)
ED-8C724-38	OC-3 Software Ordering (Release 7)
ED-8C724-39	OC-3 Software Ordering (Release 8)
ED-8C724-40	OC-3 Software Ordering (Release 9)
ED-8C724-41	OC-3 Software Ordering (Release 11)
ED-8C724-42	OC-3 Software Ordering (Release 13)
ED-8C724-43	OC-3 Software Ordering (Release 15)
SD-7C510-01	OC-3 Application Schematic
T7C510-31	OC-3 Interconnect Wiring (Rear Access)
T7C510-32	OC-3 Interconnect Wiring (Front Access)
ED-8C906-30	DDM-2000 OC-3 / OC-12 Bay Arrangements
ED-8C900-20	Universal DS3 Cable Assemblies

Loop Enclosure Lucent Practices

The following is a list of loop enclosure Lucent 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 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*

Additional Documents

The following documents provide additional information about related equipment:

- 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.*

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

Product Training

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

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

General

- Number TR0510:

  Title: *Transmission Principles (Self-Paced)*

  Audience: Transmission operations, maintenance, and administration personnel and their supervisors, as well as personnel involved with sales, planning, or engineering functions.

  Prerequisites: None.

  Content: This course is designed to teach students to:

  - Describe the transmission network.

  - Explain the different types of transmission media.

  - Describe the characteristics of a voice or data signal.

  - Explain the different methods of modulations.

  - Explain the different types of multiplexing.

  - Define North American, ITU, and SONET (Synchronous Optical Network) standards.

  - Describe the typical tests done on transmission signals.

- Number TR9203

  Title: *Synchronous Optical Network (SONET) Overview*

  Audience: Technicians, engineers, and management personnel who will be operating, maintaining, or installing equipment that utilizes the SONET standard.

  Prerequisites: None.

  Content: Basic description of the SONET standard.

OC-3

- Number: LW2603

  Title: *DDM-2000 OC-3 Multiplexer Linear Operations, Maintenance and Administration*

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

  Prerequisites: Previous transmission experience or TR0510.

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

- Number: LW2604

  Title: *DDM-2000 OC-3 Multiplexer Ring / Linear Network Operation and Maintenance*

  Audience: Personnel involved with the OAM&P (Operation, Administration, Maintenance and Provisioning) functions of the DDM-2000 (Dual DS3 Multiplexer).

  Prerequisites: TR9203, LW2211, and LW2604

  Content: Procedures required for system turnup, provisioning and maintenance of the multiplexer.

- Number: LW2605

  Title: *DDM-2000 OC-3 Multiplexer Rings Operation and Maintenance for TARP Networks*

  Audience: Personnel involved with the OAM&P (Operation, Administration, Maintenance and Provisioning) functions of the DDM-2000 (Dual DS3 Multiplexer) operating in OC-3 TARP networks.

  Prerequisites: TR9203 and LW2211

  Content: Procedures required for system turnup,provisioning and maintenance of the multiplexer.

OC-12

- Number: LW2612

  Title: *DDM-2000 OC-12 Multiplexer Operations, Maintenance and Administration*

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

  Prerequisites: TR9203 and LW2604.

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

- Number LW2613:

  Title: *DDM-2000 OC-12 Multiplexer Rings Operations and Maintenance for TARP Networks*

  Audience: Personnel involved with the Operation, Administration, Maintenance and Provisioning (OAM&P) functions of the DDM-2000 (Dual DS3 Multiplexer) OC-12 operating in TARP Networks.

  Prerequisites: TR9203 and LW2605.

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

FiberReach

- Number 2610

  Title: *DDM-2000 OC-1 FiberReach Wideband Shelf Operation and Maintenance*

  Audience: Personnel involved with the OAM&P (Operations, Administration, Maintenance, and Provisioning) functions of the DDM-2000 OC-1 Wideband Shelf

  Prerequisites: TR9203, LW2211 and LW2610

  Content: Procedures required for the equipment acceptance, system turnup, provisioning, and maintenance of the DDM-2000 OC-1 multiplexer.

- Number: 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: TR9203, LW2211 and LW2604

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

- Number LW2615

  Title: *DDM-2000 OC-1 FiberReach Wideband Shelf Operation and Maintenance forTARP Networks*

  Audience: Personnel involved with the OAM&P (Operations, Administration, Maintenance and Provisioning) functions of the DDM-2000 OC-1 Wideband Shelf operating in TARP networks.

  Prerequisites: TR9203, LW2211 and LW2605

  Content: Details that are required to perform the tasks associated with the overall operation of the DDM-2000 OC-1 system in a TARP environment.

Multi-Product

- Number: LW2212

  Title: *DDM-2000 OC-3 and OC-12 Multiplexer Applications and Architecture*

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

  Prerequisites: TR9203 is recommended.

  Content: General information about the DDM-2000 OC-3 and OC-12 Multiplexers including a product overview, applications, architecture, and deployment planning. This course is a replacement for LW2203.

- Number: LW2312

  Title: *DDM-2000 OC-3 and OC-12 Multiplexer Equipment Engineering and Planning*

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

  Prerequisites: LW2212; TR9203 is recommended.

  Content: Information and guidelines required to plan and order DDM-2000 OC-3 and OC-12 Multiplexer equipment for loop feeder and interoffice applications. This course is a replacement for LW2203.

- Number: LW2614

  Title: *2000 Product Family Surveillance and Performance Monitoring*

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

  Prerequisites: TR9203, LW2604 and LW2612.

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

- Number: 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: LW2604 and LW2616

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

- Number: LW2619

  Title: *Advance Ring Network Applications, Operations and Maintenance (TARP Releases)*

  Audience: Technicians, supervisors, maintenance engineers, and operation support personnel involved in day-to-day operations of FT-2000 and/or DDM-2000 OC-3/OC-12 rings having dual ring interworking (DRI) traffic.TARP Releases)

  Prerequisites: LW2605 and LW2617

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

Technical Support

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

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

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

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

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

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

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

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

The following CTS-CARES tools are available:

- Solutions (formerly Diagnostic Dictionary).

  Contains previously encountered problems and their solutions.

- Product Notifications (formerly News and Bulletins).

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

- CTS-CARES User's Guide

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

Customer
 Customer Technicians
 Customers Escalation Procedures

Lucent Technologies RTAC
 First Lucent Technologies Contact
 Supports Customers
 Supports Lucent Technologies Installer

Lucent Technologies CTS
 RTAC Assistance
 Problem Diagnosis/Isolation
 Provide Solutions/Workaround
 Consultations

Lucent Technologies Bell Laboratories
 Highest Level of Support
 Design Modifications and Updates
 Enhancements

Figure 2. Product Support

Engineering and Installation Services

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

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

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

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

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

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

Technical Support Services

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

Typical Extended Technical Support Services include:

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

Typical Value Added Services include:

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

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

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

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Lucent Contacts

Topic	Contact Location	Telephone
Technical Assistance	North American Regional Technical Assistance Center	**1-800-225-RTAC** **(1-800-225-7822)** *(Staffed 24 hours a day)*
Document Support	Document Development Organization Attention: Publishing Services Department 2400 Reynolda Road Winston-Salem, NC 27106	**1-800-334-0404** *or* **1-919-727-6681** *Monday through Friday* *8:00 a.m. to 4:00 p.m. EST*

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

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

Lucent Technolgies

Manager, Customer Technical Support

Dept. JJ19110B0

1600 Osgood St.

N. Andover, MA 01845

Introduction

1

Contents

Introduction

1

Overview

⚠ **CAUTION:**
Procedures in this installation manual are only to be performed by trained person-nel.

This installation manual is intended to provide basic installation instructions for customers who employ their own installation organization to install equipment. Information on traditional central office activities normally following equipment installation is provided in 363-206-207 (Releases prior to 5), 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual.*

This document was developed by the organization that provides technical support, both phone and on site, for DDM-1000, DDM-2000 OC-3, OC-12 and FiberReach. This organization interfaces directly with all types of customers on a regular basis and is sensitive to the customer's installation needs and concerns.

This manual is only intended for central office environment (NEBS) installation and tests performed prior to turnover to central office personnel. This manual is not a service manual. Refer to the 363-206-207 (Releases prior to 5), 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual* for any activity involving circuit turnup, normal maintenance, or trouble analysis.

If installing a DDM-2000 OC-3/OC-12 interworking system, 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*, will be necessary for installing the DDM-2000 OC-3 part of the system. Any cabling and testing between the DDM-2000 OC-12 shelf and DDM-2000 OC-3 shelves is covered in this manual.

DDM-2000 OC-12 Releases

The DDM-2000 OC-12 Multiplexer features will be released in distinct phases. This manual covers installation of Release 3 (STS-1 Path-Switched Ring), Release 5 (New controllers providing data communication channel (DCC) connectivity interworking with FT-2000), and Release 7 (Interoperability with multivendor SONET networks) applications for the OC-12 Multiplexer. This manual will be updated to cover additional releases as they become available.

DDM-2000 OC-12 Multiplexer Shelf Description

The DDM-2000 OC-12 shelf is divided into several distinct areas. The following areas are described, beginning at the right of the shelf working toward the left side.

On the right side of the shelf is the user panel. Each shelf is equipped with a user panel which 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 electrostatic discharge (ESD) grounding jack.

Located next to the user panel is the required OHCTL circuit pack. The OHCTL provides order wire capabilities, parallel elemetry indications, and miscellaneous discrete outputs. In addition, the OHCTL provides DCC between the DDM-2000 OC-12 shelves for single-ended operation (SEO).

> **NOTE:**
> Parallel telemetry is not available in OC-12, Release 7.

Located to the left of the OHCTL is the required system controller (SYSCTL) circuit pack. The SYSCTL serves as the main controller for the system and oversees operations of the DDM-2000 OC-12 Multiplexer (switching, performance monitoring, etc.). Located on the SYSCTL is a 7-segment display and far-end select (FE SEL) and update/initialize (UPD/INIT) pushbuttons. These controls and displays are used for single-ended operation (SEO) and executing installation self tests.

Located to the left of the SYSCTL are the FUNCTION UNITS (FN) low speed transmission circuit packs. There are four pairs of FN packs with each pair responsible for the bidirectional transport of three DS3 low speed input signals when BBG12B 3DS3 circuit packs are used, three EC-1 ow speed input signals when the BBG11 3STS-1E circuit packs are used, or one OC-3 input signal where 21G-U or 21D-U optical line interface units (OLIUs) are used. Each FN pair consists of a working and standby circuit pack which provides 1x1 low speed protection. The 3DS3 or 3STS-1E circuit packs receive three DS3 or EC-1 signals respectively, and maps them into three distinct STS-1 signals which are sent to the time slot interchange (TSI) circuit packs. The FN OLIU circuit packs receive an OC-3 signal and map it into three distinct STS-1 signals which are sent to the TSI circuit packs.

Located to the left of the FN circuit packs are two TSI circuit packs. The TSI circuit packs act as a bidirectional interface for the STS-1 signals between the MAIN OLIU

circuit packs and the FN circuit packs. The TSI circuit packs also take a 51.84 Mb/s clock signal and an   8 kb/s frame synchronization signal from the TGS circuit pack and distributes them to the MAIN OLIU and FN circuit packs. The TSI-1 is dedicated to the Main-B-1 OLIU and TSI-2 to the Main-B-2 OLIU. The BCP3 TSI circuit pack provides flexible STS-1 cross-connect capability.

Located to the left of the TSI circuit packs are two MAIN OLIU circuit packs. Each MAIN OLIU will receive 12 STS-1 signals, perform frame alignment and pointer processing, and map them into 1 STS-12 signal. This STS-12 signal is then converted to an optical signal and transmitted to the far-end via single mode fiber. The OLIU also receives an OC-12 optical signal and demultiplexes it to 12 STS-1 signals which are then routed to the TSI circuit packs. Each OLIU is a bidirectional circuit pack. There are two OLIU circuit packs to provide to provide path protection switching.

Located at the top of the OC-12 shelf are two TGS timing circuit packs. These circuit packs will provide a 51.84 Mb/s clock signal and a 8 Kb/s frame synchronization signal. The timing packs are 1x1 protected.

DDM-2000 OC-12 Fan Shelf Description

Forced air cooling is always required for the DDM-2000 OC-12 multiplexer shelf. The DDM-2000 fan shelf, ED-8C733-30, G8, provides forced air cooling for DDM-2000 OC-12 shelves that are bay mounted in a controlled environment [for example, central office (CO), controlled environment vault (CEV)].

The number of fan shelves required in a bay is determined by the number of DDM-2000 OC-12 shelves in the bay (each shelf requiring a fan shelf). 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

Miscellaneous Equipment

Miscellaneous equipment is listed in Table 1-1 on page 1-4.

NOTE:
Not all equipment is required for each installation.

Test Equipment

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	
Seismic Network Bay Frame (Front or Rear Access - 7 ft.)	ED-8C800-50, G1	
Seismic Network Bay Frame (Front Access Only - 7 ft.)	ED-8C801-50, G1	
Stile Cover Assemblies[*]		846108843
Stile Cover Brackets*		846170017
DDM-2000 OC-12 Shelf Assembly	ED-8C727-30, G1 or G4	
Heat Baffle Assembly	ED-8C733-30, G1	
Fan Shelf Assembly[†]	ED-8C733-30, G8	
DDM-2000 OC-12 Cable Assemblies	ED-8C727-20, -21	
Bracket	4.82" for ED-8C500 or 8C800 Frame	846592913
Bracket	5.94" for ED-8C500 or 8C800 Frame	846593002
Bracket	2.00" for ED-8C501 or 8C801 Frame	846600229
Bracket	3.82" for ED-8C501 or 8C801 Frame	846592905

Table 1-1   Miscellaneous Equipment (Continued)

Item	Equipment Code or Commercial Code	Comcode
PANDUIT‡ Cable Channel for ED-8C500 or ED-8C800 Frame (Rear)	E1.5X.75LG78.0-A	
PANDUIT Cable Channel for ED-8C500 or ED-8C800 Frame (Front) or ED-8C501 or ED-8C801 Frame	E1.5X.75LG78.0	
PANDUIT Cover	C1.5LG78.0	
User Panel Fuses (10 Amp, Qty. 5)		406203190

*   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 G8 Fan Shelf Assemblies G3 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		
Vacuum Cleaner		2
Drill Hammer		
Safety Goggles		
Level		
Anti-Oxidation Material	NO-OX-ID* "A" Compound	3
Thomas & Betts[†] Crimping Tool	WT-414	4
Paladin[‡] Coaxial Wire Stripper	PA1208	
Replacement *Paladin* Cassette	PA2201	
ESD Wrist Strap > 6-1/2" circumference	901011320	
ESD Wrist Strap < 6-1/2" circumference	900557075	
Optical Fiber Cables (Min. of 2)		5
15 dB Lightguide Buildout Assembly		
20 dB Lightguide Buildout Assembly		
DSX-3/STSX Patch Cords (Min. of 2)		
Optical Power Meter with ST type connector		6
MS-DOS[**] Compatible Personal Computer		76
EIA-232 Cable (35 Pin)		
Microduster Air (Clean) (12 Cans/Case)	406100339	
Microduster Nozzle Assembly	406100321	
Absorbond Cleaner (300 Wipes/Pkg.)	900709379	
963TR 1038A Contact Hand Tool	106077654	
PANDUIT[††] Duct Notching Tool	DNT-100	8

* Registered trademark of Sanchem, Inc.
† Registered trademark of Thomas & Betts corporation.
‡ Registered trademark of Paladin Corporation.
** Registered trademark of Microsoft Corporation.
†† Registered trademark of Panduit Corporation.

Table 1-2 Notes:

1. The multimeter must be capable of measuring DC voltage in the 40 to 60 volt range.

2. Required when installing ED8C906-30 OC3/OC12 Bay.

3. Available from Sanchem Inc., Chicago, IL. Required if the bay has been scraped to make the ground connection.

4. The crimping tool and wire stripper are required if installing rear access DS3 cables, ED-8C727-20, Group 100, 103, 106, 109, 110, 120, 123, 126, 130, 133, or 136 or front access DS3 cables, ED-8C724-20, Group 323, 325, 327, 328, 330, 332, or 333. TheseDS3 cable groups have one end terminated with a connector and the other end shipped loose.

> ⇒ **NOTE:**
> ED-8C727-20, Group 100, 103, 106, 109, 110, 120, 123, 126, 130, 133, or 136 and ED-8C724-20, Group 323, 325, 327, 328, 330, 332, or 333 are manufacture discontinued (MD) and replaced by ED8C900-20 cables which are connectorized at each end.

5. Refer to the various tables of the "Local Equipment Test" portion of Section 8 in this manual, for the preferred lightguide buildout assembly (*ST*®, SC or FC/PC) and it's associated optical fiber jumper for each Universal type OLIU.

6. An optical power meter is required during end-to-end installation testing to determine what value of buildout assembly will be placed on the transmit fiber. The *ST* to biconic fiber jumper is required for connection between the *ST* buildout assembly and the optical power meter.

7. An *MS-DOS* compatible personal computer and EIA-232 cable are required for software downloading.

8. Tool used to install PANDUIT cable channels

Equipment and Rear Access Cabling for the DDM-2000 OC-12 Multiplexer

2

Contents

Equipment and Rear Access Cabling for the DDM-2000 OC-12 Multiplexer

2

Overview

This section provides the information for rear access installation and covers the installation of 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 "Introduction" section of this manual.

Description

This section should be performed on all rear access DDM-2000 OC-12 Multiplexer shelf installations. For front access Multiplexer shelf installations, refer to the "Equipment and Front Access Installation for DDM-2000 OC-12 Multiplexer" section of this manual.

- This section requires previous bay frame installation and grounding.

- The shelf is grounded by its mounting screws.

- This section is best performed if each procedure, for example, "DS3 Cabling - Rear Access", is performed on every shelf in the bay before proceeding to the next procedure.

- Circuit packs must not be installed at this point.

- The locations of all backplane plugs and jacks are shown in Figure 2-1 on page 2-48.

- To install the cabling for the maximum capacity of three DDM-2000 OC-12 rear access shelves in a bay follow the procedure in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50 (depending on the bay arrangement).

■ It is important to carefully follow the cabling procedures in this section to ensure that the bay will accommodate all of the cables and that the backplane cover will fit properly.

■ Cables should be installed starting from the bottom shelf in the bay and working toward the top. The procedure described in this section should be followed for optimum utilization of the bay cable channels.

■ Cable assembly options are listed in Tables 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 and 2-7 on pages 2-32 through 2-54. Connector pinouts are provided in Figure 2-4 on page 2-51.

■ All of the cables, except power and the optical fibers, are connected to the DDM-2000 OC-12 backplane.

■ It is a requirement that the DDM-2000 OC-12 Multiplexer be equipped with a protective backplane cover at the completion of the installation.

■ Install cable brackets as required.

Tools, Test Sets, and Accessories

The following tools are required:

Quantity	Description
1	*Thomas & Betts*[*] WT-414 Crimping Tool[†]
2	*Paladin*[‡] Coaxial Wire Stripper PA1208[‡]
	Replacement Paladin 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 DS3 cable Groups 100, 103, 106, 109, 110, 120, 123, 126, 130, 133, or 136.
[‡]   Registered trademark of Paladin Corporation.
[**]   A wrist strap must be worn when touching the DDM-2000 OC-12 backplane and when connecting cables. Use an available electrostatic discharge jack.
[††]   A wire wrap gun is required to make connections on 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 with the appropriate head(s) is required for mounting the shelf, heat baffles, fan, and cable brackets; for removing the front cover, rear cover; and for some cables to the backplane.

Planning

The DDM-2000 OC-12 may be mounted as follows:

  a. Mounted in network bay frame. The recommended network bay frames for rear access are ED-8C500-50 and ED-8C501-50 or Seismic bay frames ED-8C800-50 and EC-8C801-50. Refer to Figure 2-5 on page 2-52, Figure 2-6 on page 2-53, and Figure 2-7 on page 2-54 for DDM-2000 OC-12 shelf placement in a network bay frame.

  b. Miscellaneously mounted, which meets requirements in "Equipment Installation Considerations".

  c. The DDM-2000 OC-12 shelf/shelves may also be factory installed in the ED-8C906-30 OC3/OC12 bay. Refer to Section 5 of this manual for installing instructions if required.

Equipment Installation Considerations

Detailed network bay frame installation information is contained in ED-8C727-10, "Typical Bay Arrangements". The information in this paragraph is of a general nature.

The equipment listed below has the following height dimensions:

ED-8C727-30, G1 or G4	DDM-2000 OC-12 Shelf	14.0 inches
ED-8C733-30, G1	Heat Baffle	4.0 inches
ED-8C733-30, G8	DDM-2000 OC-12 Fan Shelf	4.0 inches

Each DDM-2000 OC-12 shelf installed must have an air gap of at least 3.0 inches between the bottom of the DDM-2000 OC-12 shelf and the equipment (or bay frame if the shelf is installed at the bottom of the bay).

A fan shelf and heat baffle are required above each DDM-2000 OC-12 shelf.

NOTE:
DDM-2000 OC-12 heat baffles must be used where required. There is no equivalent air gap.

The fan shelf mounts directly above the DDM-2000 OC-12 shelf, and the heat baffle mounts directly above the fan shelf.

Inspection

Description

Perform the following procedure before the DDM-2000 OC-12 Multiplexer installation or cable installation.

Procedure

(1) Verify that the frame or structure into which the DDM-2000 OC-12 Multiplexer will be installed is properly grounded.

➡ **NOTE:**
Each DDM-2000 OC-12 shelf, heat baffle, and fan shelf comes equipped with a pouch, attached to the shelf (or baffle), containing the hardware required for mounting and grounding and an installation kit.

The installation kit for the baffle contains:

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

The installation kit for the shelf contains:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
2	Fuses

➡ **NOTE:**
Each DDM-2000 OC-12 shelf also comes equipped with a copy of 363-206-207, *DDM-2000 OC-12 Multiplexer User/Service Manual*.

The installation kit for the fan shelf contains:

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

(2) Remove the front and rear covers from the DDM-2000 OC-12 shelf.

⇒ **NOTE:**
The covers must be installed later to assure proper air flow for cooling and fan filter alarm sensing as well as for compliance with electromagnetic interference (EMI) requirements.

(3) Inspect the DDM-2000 OC-12 shelf for visible damage including bent or touching backplane pins.

(4) Determine the type of bay frame the DDM-2000 OC-12 shelf will mount in. Reposition the DDM-2000 OC-12 shelf side mounting brackets, if necessary. Refer to Figure 2-8 on page 2-55.

⇒ **NOTE:**
To ensure 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) Reposition the side mounting brackets on the heat baffle and fan shelf. Refer to Figure 2-8 on page 2-55.

(6) If this is a DDM-2000 OC-3/OC-12 combined bay application, position the mounting brackets on the lightguide slack storage shelf such that the distance between the mounting brackets and the front of the shelf is similar to that of the DDM-2000 OC-12 shelf (that is when mounted, the face of the slack storage shelf should line up with the face of the DDM-2000 OC-12 shelf).

Equipment Installation

Description

This procedure describes how to install equipment in a bay that is accessible from both the front and rear.

⇒ **NOTE:**
The special mounting screws provided with the DDM-2000 OC-12 shelves must be used when mounting the shelves to ensure proper grounding to the frame.

Procedure

(1) Mount the DDM-2000 OC-12 shelves, fan 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 on page 2-52. Position the shelves and heat baffles in the bay frame as shown in Figure 2-6 on page 2-53 and Figure 2-7 on page 2-54 for DDM-2000 OC-3/OC-12 combined bay. Use the hardware provided in the installation kits to mount the shelves and baffles. When installing the fan shelves, refer to the "Fan Shelf Installation" procedure.

➡ **NOTE:**
For a DDM-2000 OC-3/OC-12 combined bay arrangement, the lightguide slack storage shelf is mounted with the top hole of the mounting brackets aligned with the third mounting hole up from the bottom of the bay. The DDM-2000 OC-12 shelf then mounts three inches above the slack storage shelf as shown in Figure 2-7 on page 2-54.

(2) Verify with an ohmmeter that the DDM-2000 OC-12 is grounded to the bay frame.

(3) Install the required shelf brackets as shown in Figure 2-5 on page 2-52 and Figure 2-6 on page 2-53.

➡ **NOTE:**
For an ED-8C501-50 or ED-8C801-50 type frame, there are two brackets required per shelf to hold the fiber protection channel for the optical fiber cables in place.

(4) Install the required fiber protection channel for the optical fiber cables as shown in Figure 2-5 on page 2-52 and Figure 2-6 on page 2-53.

Fan Shelf Installation - Rear Access

Description

This procedure describes how to install the fan shelf.

Procedure

The WP-92311, L5 fan shelf mounts directly above a DDM-2000 OC-12 shelf. Refer to Figure 2-6 on page 2-53 and Figure 2-7 on page 2-54.

(1) Reposition the fan shelf mounting brackets, if necessary, to fit within the bay footprint for the DDM-2000 OC-12 shelf.

(2) Remove the front cover by turning the two locking screws. Provision the fan shelf set point for 400 fpm (feet per minute) by setting the 4-position switch with positions 1, 3, and 4 to ON and position 2 to OFF.

⇒ **NOTE:**
The RESET button on the Fan shelf must be depressed and held for a few seconds whenever these switch settings are changed after the Fan shelf has been powered.

(3) Reinstall the front cover and mount the fan shelf in the bay above the DDM-2000 OC-12 shelf.

(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. Connect the other end of the cable to the frame, using the taptite screw provided with the fan 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) Locate the filter provided with the fan shelf. Install the filter up against the bottom of the DDM-2000 OC-12 shelf located directly below this fan shelf per Figure 2-9 on page 2-56.

DS3 Cabling - Rear Access

Description

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

■ The DS3 cables used are dependent on the equipment that the DDM-2000 OC-12 will connect to (DACS V-2000, DACS III-2000, DSX-3, or FT-2000 OC-48), the cable length, and the number of center conductors required (2 or 6).

■ Refer to Table 2-1 on page 2-32 or Table 2-2 on page 2-34 for the possible DS3 cables to be used.

⇒ **NOTE:**
DS3 cables in Table 2-1 on page 2-32 are rated Discontinued Availability (D.A.) which means they can no longer be ordered. Table 2-2 on page 2-34 shows information about the new DS3 cables per ED-8C900-20 and Table 2-3 on page 2-35 shows the ED-8C900-20 cable group numbers and associated cable lengths.

■ Six conductor cable (1735006A) provides three DS3 In and three DS3 Out cables to accommodate one full muldem on the DDM-2000 OC-12 shelf. The 734A, 735A, and KS-19224, L2 cables provide one DS3 In cable and one DS3 Out cable to accommodate a partially equipped muldem.

■ DS3 cables come in a fixed lengths or in a length specified by the customer.

■ For cable groups with the connector for one end of the cable shipped loose, be sure to use the proper procedure and crimp tool when assembling this end of the cable.

⚠ **CAUTION:**
Several cable groups come assembled with a connector on each end. Cutting the cable to a shorter length and installing a new connector on the cable may result in cable quality substandard to that in the factory and subsequent service outages may occur. If a new connector must be installed, use the correct connector and proper crimp tool.

■ Groups 126 (D.A.) and 136 (D.A.) come with a second cable assembly, ED-7G001-23, Group 204 cable with a 219P connector on one end, which is then spliced to the first cable assembly.

■ Perform the appropriate procedure depending on the cable group being installed.

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.

Procedure

NOTE:
Perform the following procedure if this installation involves DS3 cabling.

(1) All the DS3 cable assemblies can be used for any muldem. DDM-2000 OC-12 DS3 backplane connectors are J30 through J35 (for muldem A), J36 through J41 (for muldem B), J42 through J47 (for muldem C), and J48 through J53 (for muldem D). Connect the cables to the appropriate backplane BNC connectors as shown in Figure 2-10 on page 2-57.

(2) Route the cables out of the DDM-2000 OC-12 bay per Figure 2-10 on page 2-57, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(3) Dress and tie the cables as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(4) Unless the cables are Group 126 (D.A.) or 136 (D.A.), route and connect the cables along the cable rack and into the terminating equipment bay.

(5) When installing Group 126 (D.A.) or 136 (D.A.) cables, perform the following cable preparation procedure before proceeding:

    a. Determine where to cut the 734A cable in the terminating equipment bay so that the ED-7G001-23 cable can be connected with enough slack allowance for dressing and avoidance of sharp bends.

    b. Cut the 734A cable to the required length. The ED-7G001-23, Group 204 cable is not to be modified. Both the 734A cable and 219P splice should be vertical in the terminating equipment bay to allow easy access to the 219P connector.

    c. Prepare the 734A cable for connecting to the 219P splice as shown in Figure 2-11 on page 2-58.

    d. Remove the outer shield of the 219P splice by removing the screw and sliding the shield along the ED-7G001-23, Group 204 cable.

    e. Using a soldering iron, connect the 734A cable to the 219P splice.

➡ **NOTE:**
The 219P splice comes with a solder slug on it. This is the right amount of solder required; therefore, do not add or remove solder to/from this splice. Hold the end of the 734A cable and the 219P in a splice horizontal position during soldering; otherwise the solder will run. Heat the solder by heating the metal underneath the solder slug, not the solder directly.

    f. When the solder joint is cooled, reconnect the 219P shield and return the 734A cable to its vertical position.

    g. Label the DS3 cables, indicating bay, shelf, muldem (A, B, C or D), and direction (IN or OUT of the bay) at each end.

Optical Fiber Cable Installation

Description

This paragraph describes how to connect the fiber optic cables to the shelf and route the cables within and out of the bay and to the lightguide interconnection equipment/module (LCIE/M) or *LGX*® optical cross-connections. This paragraph does not cover routing the optical fiber cable between central office locations.

■ The optical fiber cable is fragile and must be protected. The fibers should be placed in a protective tube or channel, such as PVC tubing, when running the cable from the DDM-2000 OC-12 to the cable rack. The fibers should be placed in the cable rack in a protective channel with nothing on top of them. DO NOT use cable ties with the optical fiber cables.

■ The recommended fiber protection system is listed in the "Introduction" section of this manual.

■ The fiber from the DDM-2000 OC-12 transmitter and receiver to the *LGX* optical cross-connection must be single mode.

■ For DDM-2000 OC-12 shelves that contain OC-3 links, fiber from the DDM-2000 OC-3 transmitters and receivers to the DDM-2000 OC-12 FUNCTION UNITS OLIUs must be single mode with the exception of 21D-U OLIUs which require multimode fiber.

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

⚠ **WARNING:**
Invisible laser radiation when open. Avoid direct exposure to beam.

■ Prior to connecting the optical fiber cables examine them to ensure that the fibers are clean.

■ The fibers can be cleaned with optical lint-free tissue or with a compressed air duster.

■ The optical fiber cables require *ST*® connectors for connection to the DDM-2000 OC-3 or OC-12 Multiplexer.

■ The optical fiber cables will be connected to the DDM-2000 OC-12 Multiplexer after the circuit packs are installed.

Procedure

(1) Connect the optical cables to the *LGX* optical cross-connect 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* optical cross-connection into the DDM-2000 OC-12 bay, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(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).

(5) Remove the fiber tray cover from the bottom front of the DDM-2000 OC-12 shelf. This cover is attached to the fiber tray with three screws.

(6) Place the optical fiber cables in the fiber tray through the "dog ear" cutouts in the MAIN B and any applicable function unit positions, and route the cables out the side of the fiber tray.

(7) If this is not a DDM-2000 OC-3/OC-12 combined bay application, replace the fiber tray cover on the shelf.

OC-3/OC-12 Bay Fiber Connections

➡ **NOTE:**
For a DDM-2000 OC-3/OC-12 combined bay application, run optical fiber cables from each DDM-2000 OC-3 shelf MAIN OLIU position to the respective DDM-2000 OC-12 shelf FUNCTION UNITS OLIU position per the following procedure.

(1) Fiber cable lengths from the DDM-2000 OC-12 shelf to the DDM-2000 OC-3 shelf positions 1, 2, 3, and 4 are 8-feet, 9-feet, 10-feet, and 11-feet respectively.

(2) Remove the fiber tray cover from the bottom front of the DDM-2000 OC-3 shelf.

(3) Place the optical fiber cables in the fiber tray through the "dog ear" cutouts in the MAIN positions, and route the cables out the side of the fiber tray.

(4) Run the optical fiber cables, in the protective tube or channel, down to the DDM-2000 OC-12 shelf.

(5) Place the optical fiber cables in the fiber tray through the "dog ear" cutouts in the respective FUNCTION UNITS positions, and route the cables out the side of the fiber tray.

(6) Store any fiber cable slack in the lightguide slack storage shelf located at the bottom of the bay.

(7) Replace the fiber tray covers on the DDM-2000 OC-3 and OC-12 shelves.

Power Cabling - Rear Access

Description

Two feeders (A and B) are required from the battery distribution fuse board (BDFB) to the DDM-2000 OC-12 bay.

Power Cable Installation

(1) Obtain either a single shelf power cable or a bay power cable. The bay power cable is configured to power up to three DDM-2000 OC-12 shelves and up to three fan shelves. Refer to Table 2-7 on page 2-40.

> **NOTE:**
> The bay power cable assembly has three break points with three cables at each break point. The bay power cable should be positioned so that break points are located in the bay such that each break point is lined up with its corresponding DDM-2000 OC-12 shelf. At each break point, one cable connects to the corresponding DDM-2000 OC-12 shelf and one cable connects to the fan shelf directly above the DDM-2000 OC-12 shelf. The remaining cable in the break point is not used.

> **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.

(2) For each DDM-2000 OC-12 shelf:

    a. Locate the ED-8C727-20, Group 150 DDM-2000 OC-12 shelf power cable.

    b. Prepare the ends of the wires on the cable and insert them into the J25 terminal strip on the rear of the shelf per Figure 2-12 on page 2-59 and the following table:

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

c. Connect the P1 and P2 connectors at the other end of the Group 150 cable to the J1 and J2 connectors, respectively, of the corresponding breakout cable of an ED-8C724-20, Group 372 bay power cable or the J1 and J2 connectors of an ED-8C724-20, Group 371 single shelf power cable.

(3) For each fan shelf:

a. Locate the ED-8C727-20, Group 148 an 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 per Figure 2-12 on page 2-59 and the following table:

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

c. To insert the wires into the terminal strip, insert an object such as a small screwdriver into one of the holes on the rear of the terminal strip and press forward while simultaneously inserting the prepared wire into the corresponding hole on the top of the terminal strip. Removing the screwdriver should then cause the wire to be "grabbed" by the terminal strip.

d. Connect the P3 and P4 connectors at the other end of the Group 148 cable to the J3 and J4 connectors, respectively, of the corresponding breakout cable of an ED-8C724-20, Group 372 bay power cable or the J3 and J4 connectors of an ED-8C724-20, Group 371 single shelf power cable.

(4) Route the 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 on page 2-49 or Figure 2-3 on page 2-50.

⇒ **NOTE:**
The DDM-2000 OC-12 is powered by 48 V DC.

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

(5) Splice feeders from the BDFB to the DDM-2000 OC-12 Multiplexer 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.

(6) 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 at least 25 amperes for bay
> arrangements and at least 15 amperes for a single shelf.

(7) Leave the BDFB fuses out or breakers off until you are ready to do the Power-
ing, Verification, and Circuit Pack Installation" section of this manual.

Office Alarm Cabling - Rear Access

Description

Office alarms are the common method used in a central office for maintenance
personnel to quickly isolate a failure to the correct system. Refer to the following
information if connection to the office alarm system is to be made.

- 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 24 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 suppress-
  ing 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,
  then 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-12 shelf to limit transient voltages
  and currents.

- Office alarm cable options are listed in Table 2-7 on page 2-40.

- Office alarm connections are listed in Table 2-8 on page 2-41.

Office Alarm Cabling - Shelf 1

> **NOTE:**
> Office alarms are cabled to the bottom DDM-2000 OC-12 shelf in the bay. Office
> alarms for the other DDM-2000 OC-12 shelves in the bay are daisy-chained up
> the bay from the bottom shelf.

(1) Obtain a Group 174, 191, 192 or 175 (D.A.) office alarm cable listed in Table 2-7 on page 2-40.

(2) Connect the cable to connector J63 of shelf 1.

⇒ NOTE:
If shelf 1 is not being installed at this time, provide enough cable length 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 bay per Figure 2-13 on page 2-60 to the office alarm panel, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(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 on page 2-41.

OC-12 Intershelf Office Alarm Cabling

⇒ NOTE:
Perform the following procedure for multing the other shelves to the bottom shelf. The cable added in this procedure mults office alarms from other shelves in a bay to shelf 1. In this procedure, shelf 1 will be connected to shelf 2 and shelf 2 connected to shelf 3.

⇒ 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. Do not skip any shelves.

(1) Obtain a Group 176, 177 (D.A.) or 193 office alarm cable listed in Table 2-7 on page 2-40.

(2) Connect the cable to connector J63 of the shelf.

(3) Route the office alarm cable to the side of the bay and connect to connector J64 of the shelf below as shown in Figure 2-13 on page 2-60.

(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.

OC-3/OC-12 Bay Intershelf Office Alarm Cabling

(1) For a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) office alarms are to be multed to the DDM-2000 OC-12 shelf, obtain an ED-8C724-20, Group 383 office alarm cable listed in Table 2-7 on page 2-40 and connect it to J64 of the DDM-2000 OC-12 shelf.

(2) Route the office alarm cable to the side of the bay and connect to P56 of the DDM-2000 OC-3 shelf directly above the DDM-2000 OC-12 shelf, as shown in Figure 2-14 on page 2-61.

> **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual.*

(3) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

Parallel Telemetry Cabling - Rear Access

> **NOTE:**
> Parallel Telemetry is not available in OC-12, Release 7.

Description

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.

Unless otherwise specified, shelf 1, the bottom shelf in the bay, should be cabled directly to the parallel telemetry equipment 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, then 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 2-4 on page 2-37.

■ Parallel telemetry connections are listed in Table 2-9 on page 2-42.

Parallel Telemetry Shelf 1

➡ **NOTE:**
This procedure connects shelf 1 directly to the telemetry system.

(1) Obtain a Group 160 or 161 (D.A.) parallel telemetry cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J21 of shelf 1.

(3) Route the parallel telemetry cable out of the DDM-2000 OC-12 bay per Figure 2-13 on page 2-60 to the telemetry system, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(4) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 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 unconnected end of the parallel telemetry cable to the telemetry system, making connections as shown in Table 2-9 on page 2-42.

OC-12 Intershelf Parallel Telemetry Cabling

➡ **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 and shelf 2 to shelf 3.

➡ **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. Do not skip any shelves.

(1) Obtain a Group 162 or 163 (D.A.) parallel telemetry cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J21 of the shelf.

(3) Route the cable to the side of the bay and down and connect to connector J22 of the shelf below as shown in Figure 2-13 on page 2-60.

(4) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

(5) Repeat for each shelf in the bay.

OC-3/OC-12 Bay Intershelf Parallel Telemetry Cabling

(1) For a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) parallel telemetry is to be multed to the DDM-2000 OC-12 shelf, obtain an ED-8C724-20, Group 386 parallel telemetry cable listed in Table 2-5 on page 2-38 and connect it to J22 of the DDM-2000 OC-12 shelf.

(2) Route the parallel telemetry cable to the side of the bay and connect to P54 of the DDM-2000 OC-3 shelf directly above the DDM-2000 OC-12 shelf, as shown in Figure 2-14 on page 2-61.

NOTE:
Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(3) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

TBOS Telemetry Cabling - Rear Access

NOTE:
TBOS is not available in OC-12, Release 7.

Description

Telemetry byte-oriented serial (TBOS) is a serial telemetry interface providing system alarm and status data to a maintenance center and remote equipment switch (RS) 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-12 shelves (a 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-12 shelves in the bay may be assigned remaining displays associated with the single interface connection. This is accomplished using intershelf mult cabling.

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

■ As mentioned in the above description, a TBOS cable is required to be routed from the TBOS telemetry system to the DDM-2000 OC-12 bay to accommodate the maximum of three shelves in a bay.

■ The TBOS intershelf mult cable also provides intershelf mults for the craft inter-face terminal (CIT) and modem (when provided). Installation of this mult cable is covered in the "Mult Cable Installation Procedure".

■ TBOS telemetry cable options are listed in Table 2-4 on page 2-37.

■ TBOS telemetry connections are listed in Table 2-10 on page 2-43.

TBOS Cabling

⇒ 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 cabled to the telemetry equipment.

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

(1) Obtain a Group 157, 158 (D.A.), 185 or 180 (D.A.), 195, 196 TBOS telemetry cable listed in Table 2-4 on page 2-37.

(2) Connect TBOS telemetry cable to connector J62 on the rear of the shelf.

⇒ NOTE:
If the DDM-2000 OC-12 shelf telemetry is being connected to a general telemetry processor (GTP) shelf, a Group 180 (D.A.), 195 or 196 cable is preferred. However, if using a Group 157, 158 (D.A.), or 185 cable and the DDM-2000 OC-12 shelf telemetry is being connected to a GTP shelf, a Group 159 cable will need to be connected between the shelf connector J62 and P62 of the Group 157, 158 (D.A.), or 185 cable going to the GTP equipment. This cable contains a resistive circuit in one of its connectors to provide compatibility between the DDM-2000 OC-12 and the GTP.

(3) Route the TBOS cable out of the DDM-2000 OC-12 bay per Figure 2-15 on page 2-62 to the telemetry system.

(4) Stack the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(5) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(6) Cut the TBOS cable to the desired length at the telemetry panel.

(7) Wire-wrap the loose end of the TBOS cable to the telemetry system making connections as shown in Table 2-10 on page 2-43.

(8) Repeat this procedure for each shelf to be cabled directly to the telemetry system.

Intershelf Mult Cabling - Rear Access

Description

The cabling added in the following procedure mults the CIT and TBOS telemetry and modem, when provided, between shelf 1 (the bottom shelf) and shelf 2 and shelves 2 and 3.

➡ **NOTE:**
TBOS is not available in OC-12, Release 7.

OC-12 Intershelf TBOS, CIT, and Modem Cabling

(1) Obtain a Group 169, 187 or 170 (D.A.) CIT, modem with TBOS cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J72 of the shelf.

(3) Route the cable to the side of the bay and down to connector J73 of the shelf below as shown in Figure 2-1 on page 2-48.

(4) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

(5) Repeat this procedure for each shelf in the bay that is to have TBOS multed.

OC-3/OC-12 Bay Intershelf TBOS, CIT, and Modem Cabling

(1) For a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) TBOS, CIT, and modem are to be multed to the DDM-2000 OC-12 shelf, obtain an ED-8C724-20, Group 389 TBOS, CIT, and modem cable listed in Table 2-4 on page 2-37 and connect it to J73 of the DDM-2000 OC-12 shelf.

(2) Route the TBOS, CIT, and modem cable to the side of the bay and connect it to J58 of the DDM-2000 OC-3 shelf directly above the DDM-2000 OC-12 shelf as shown in Figure 2-16 on page 2-63.

➡ **NOTE:**
Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000OC-3 Multiplexer Installation Manual*.

(3) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

TL1/X.25 Interface Cabling - Rear Access

Description

The TL1 interface (also referred to as a TL1X.25 interface) is a message-based telemetry system. It is an alternative to TBOS or parallel telemetry. The TL1 telemetry interfaces with a maintenance center to provide DDM-2000 OC-12 system status information and remote command capability.

> **NOTE:**
> Parallel telemetry is not available in OC-12, Release 7.

> **NOTE:**
> TL1 interface telemetry is not available with DDM-2000 OC-12 Release 1.0.

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

Procedure

> **NOTE:**
> The TL1 interface telemetry requires that each shelf in the bay be cabled directly to the telemetry system.

(1) Obtain a Group 165, 186 or 166 (D.A.) TL1 interface cable listed in Table 2-5 on page 2-38.

(2) Connect the cable to connector J61 on the rear of the shelf.

(3) Route the cable out of the DDM-2000 OC-12 bay per Figure 2-17 on page 2-64 to the telemetry interface.

(4) Stack the cables in the bay cable channel as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(5) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins. Refer to Table 2-11 on page 2-43.

(6) Connect the other end of the cable as specified in the job specification.

(7) Repeat this procedure for each shelf, if required.

Miscellaneous Discrete Telemetry Cabling - Rear Access

Description

The miscellaneous discrete telemetry access allows the maintenance center to control and monitor equipment located with the DDM-2000 OC-12 shelf(s).

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

The miscellaneous discrete alarm status indications allow up to 14 (Releases prior to 5) or 20 (Release 5) miscellaneous user-set alarm status indications (SI) at the remote terminal for transmission toward the central office. A fifteenth external discrete dedicated for an external power minor alarm monitoring is also optionally accessible.

Refer to Figure 2-18 on page 2-65 (Releases prior to 5) for a description of the external interconnection requirements for utilizing the miscellaneous discrete telemetry feature at a remote terminal or Figure 2-19 on page 2-66 (Releases prior to 5) at a central office. For Release 5, refer to Figure 2-20 on page 2-67.

- There is no multing between shelves of miscellaneous discrete telemetry cables.

- This procedure should be performed for each shelf requiring miscellaneous discrete telemetry.

- Miscellaneous discrete telemetry cable options are listed in Table 2-4 on page 2-37.

- Miscellaneous discrete telemetry connections are listed in Table 2-12 on page 2-44 for Remote Terminal and Table 2-13 on page 2-45 for Central Office applications.

Procedure

(1) Obtain a Group 178, 194 or 179 (D.A.) miscellaneous discrete telemetry cable listed in Table 2-4 on page 2-37.

⇒ **NOTE:**
The cable is connected to the shelf requiring miscellaneous discrete telemetry.

(2) Connect the cable to connector P67 at a central office (CO), or to connector P68 at a remote terminal (RT).

(3) For remote terminal applications requiring more than 14 user definable environmental inputs (Release 5 only), connect a second Group 178 or 179 cable to P67 (in addition to the Group 178, 194 or 179 (D.A.) cable on P68).

(4) For remote terminal applications requiring more than 14 user definable environmental inputs (Release 5 only), connect a second Group 178, 194 or 179 (D.A.) cable to P67 (in addition to the Group 178, 194 or 179 (D.A.) cable on P68).

(5) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

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

(7) Wire-wrap the loose end of the miscellaneous discrete telemetry cable to the wire-wrap terminal strip, making connections as shown in Table 2-12 on page 2-44 and Table 2-13 on page 2-45, and Figures 2-18, 2-19 and 2-20 on pages 2-65, 2-66 and 2-67.

> **NOTE:**
> Each miscellaneous discrete telemetry designation is connected to the DDM-2000 OC-12 by two leads (wires).

> **NOTE:**
> For each input, connect one lead to input-common and the other lead to the appropriate alarm indication.

> **NOTE:**
> For each output, connect one lead to output-common and the other lead to the appropriate alarm indication.

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

DS1 Timing Cabling - Rear Access

Description

The following procedure is required for cabling to a DS1 timing:external external timing source for synchronous operation.

> **NOTE:**
> For shelves equipped with BBF2B/BBF4 timing circuit packs that are provisioned for deriving synchronous input timing from the incoming OC-12 optical line, skip this procedure and continue with "DS1 Timing Cable Installation for Sync Input".

■ DS1 timing cable options are listed in Table 2-6 on page 2-39.

■ DS1 timing connections are listed in Table 2-14 on page 2-46.

Connections to Timing Source

⮕ **NOTE:**
The cabling from the DS1 reference clock timing source should connect to the bottom shelf in the bay. Other DDM-2000 OC-12 shelves in the bay are daisy-chained up from the bottom shelf.

(1) Obtain a Group 151, 152, 182, 183 or 153 (D.A.) DS1 timing cable listed in Table 2-6 on page 2-39.

(2) Connect the cable to connector J66 of shelf 1.

(3) Route the timing cable out of the DDM-2000 OC-12 bay per Figure 2-17 on page 2-64 to the DS1 timing reference, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(4) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(5) Cut the cable to the desired length. If the bottom shelf (shelf 1) position is unequipped for future growth, leave enough cable to allow moving the cable down to the bottom position when the shelf is eventually added.

(6) Wire-wrap the loose end of the DS1 timing cable to the DS1 reference clock making connections as shown in Table 2-14 on page 2-46.

OC-12 Intershelf Timing Connections

⮕ **NOTE:**
These procedures should be performed to daisy-chain the timing for the remaining shelves in the bay to the shelf that is directly connected to the DS1 reference clock. For DS1 timing to be delivered to all shelves in the bay, DS1 timing cable mults from shelf to shelf must be daisy-chained down to the bottom shelf. No shelf should be skipped.

(1) Obtain a Group 154, 184 or 155 (D.A.) DS1 timing cable listed in Table 2-6 on page 2-39.

(1) Connect the cable to connector J66 of the shelf.

(1) Route the cable to the side of the bay and down and connect to connector J65 of the shelf below as shown in Figure 2-17 on page 2-64.

(1) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

(1) Repeat for each shelf in the bay.

OC-3/OC-12 Bay Intershelf DS1 Timing Cabling

(1) For a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) DS1 timing is to be multed to the DD2000 OC-12 shelf, obtain an ED-8C724-20, Group 380 DS1 timing cable listed in Table 2-6 on page 2-39 and connect it to J65 of the DDM-2000 OC-12 shelf.

(2) Route the DS1 timing cable to the side of the bay and connect to J37 of the DDM-2000 OC-3 shelf directly above the DDM-2000 OC-12 shelf as shown in Figure 2-21 on page 2-68.

⟹ **NOTE:**
   Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(3) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

DS1 Timing Cabling for Sync Input - Rear Access

Description

Perform the following procedure for shelves equipped with BBF2B/BBF4 timing circuit packs provisioned for deriving sync input from the incoming OC-12 optical line.

- DS1 timing cable options are listed in Table 2-6 on page 2-39.

- DS1timing cable connections are listed in Table 2-14 on page 2-46.

Timing Source for Sync Input Connection

⟹ **NOTE:**
   The cabling from the DS1 reference clock timing source should connect to the bottom shelf in the bay. Other DDM-2000 OC-12 shelves in the bay are daisy-chained up from the bottom shelf.

(1) Obtain a Group 394 Sync Input timing cable listed in Table 2-6 on page 2-39 and connect to J66 of the shelf that will be receiving DS1 timing on it's incoming OC-12 optical fiber.

➡ NOTE:
For bays containing multiple shelves that will have DS1 timing multed between the shelves, the shelf that will be providing sync to the reference clock should be mounted at the bottom of the bay.

(2) Obtain a Group 151, 152, 182, 183 or 153 (D.A.) DS1 timing cable listed in Table 2-6 on page 2-39 and connect to J266 of the Group 394 cable.

(3) Route the timing cable out of the DDM-2000 OC-12 bay per Figures 2-22, 2-23 or 2-24 on pages 2-69, 2-70, 2-71 to the DS1 timing reference, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(4) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(5) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 2-14 on page 2-46.

(6) Obtain a second Group 151, 152, 182, 183 or 153 (D.A.) DS1 timing cable and connect to J65 of this same shelf.

(7) Wire-wrap the loose end of this DS1 timing cable to the SYNC INPUT of the DS1 reference clock making connections as shown in Table 2-14 on page 2-46.

OC-12 Intershelf DS1 Timing Connections

➡ NOTE:
Perform these procedures to daisy-chain the timing for the remaining shelves in the bay and to connect them to the same DS1 reference clock as the shelf that is providing the synchronous timing.

➡ NOTE:
For DS1 timing to be delivered to all shelves in the bay, DS1 timing cable mults from shelf to shelf must be daisy-chained down to the bottom shelf. Do not skip any shelves.

(1) Obtain a Group 151, 152, 182, 183 or 153 (D.A.) DS1 timing cable listed in Table 2-6 on page 2-39 and connect it to J66 of the 2nd shelf up from the bottom of the bay per Figure 2-23 on page 2-70.

(2) Route the timing cable out of the DDM-2000 OC-12 bay to the same DS1 timing reference that is connected to the bottom shelf, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(3) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(4) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 2-14 on page 2-46.

(5) Obtain a Group 154, 184 or 155 (D.A.) DS1 timing mult cable listed in Table 2-6 on page 2-39.

(6) Connect the cable to connector J66 of the top OC-12 shelf in the bay.

(7) Route the cable to the side of the bay and down and connect to connector J65 of the shelf below as shown in Figure 2-23 on page 2-70.

(8) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

OC-3/OC-12 Bay Intershelf DS1 Timing Cabling

(1) Obtain an ED-8C724-30, Group 339, 340, 530, 531 or 341 (D.A.) DS1 timing cable and connect it to J37 of the bottom DDM-2000 OC-3 shelf in the bay per Figure 2-24 on page 2-71.

(2) Route the timing cable out of the bay to the same DS1 timing reference that is connected to the DDM-2000 OC-12 shelf, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(3) Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.

(4) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 2-14 on page 2-46.

(5) Connect an ED-8C724-20, Group 373 or 374 (D.A.) DS1 timing mult cable to J37 of the top DDM-2000 OC-3 shelf in the bay.

(6) Route the cable to the side of the bay and down and connect to connector J44 of the shelf below as shown in Figure 2-24 on page 2-71.

(7) Repeat the previous two steps until all DDM-2000 OC-3 shelves in the bay have DS1 cabling multing them to each other.

(8) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

Modem Cabling - Rear Access

Description

The use of a modem allows the DDM-2000 OC-12 Multiplexer to be accessed remotely.

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

- Modem cable options are listed in Table 2-4 on page 2-37.

Modem Cabling - Shelf 1

> **NOTE:**
> Perform this procedure for shelf 1 which will be directly connected to a modem or a distribution frame (DF) (if specified in the order).

(1) Obtain a Group 189, 190 or 173 (D.A.) modem cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J60 of shelf 1.

(3) Route the modem cable out of the DDM-2000 OC-12 bay per Figure 2-17 on page 2-64 to the modem or DF, stacking the cables as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(4) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(5) Connect the modem cable to the modem or distribution frame.

OC-12 Intershelf CIT and Modem Without TBOS Cabling

> **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 connected to shelf 3.

> **NOTE:**
> This procedure is not to be performed for shelves previously multed together with TBOS intershelf mult cables. The Group 169, 187 or 170 (D.A.) cables contain the mult for the modem as well as TBOS. This procedure is only for those shelves which are to have the modem multed without having TBOS multed as well.

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

> **NOTE:**
> 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. Do not skip any shelves.

(1) Obtain a Group 171, 188 or 172 (D.A.) CIT modem cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J72 of the shelf.

(3) Route the cable to the side of the bay and down to connector J73 of the shelf below as shown in Figure 2-15 on page 2-62.

(4) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane pins.

(5) Repeat this procedure for each shelf that is to have a modem multed to it.

OC-3/OC-12 Bay Intershelf CIT and Modem Without TBOS Cabling

> **NOTE:**
> This procedure is not to be performed for shelves previously multed together with a TBOS intershelf mult cable. The Group 389 cable contains the mult for the modem as well as TBOS. This procedure is only for those shelves which are to have the modem multed without having TBOS multed as well.

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

(1) For a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) CIT and modem without TBOS are to be multed to the DDM-2000 OC-12 shelf, obtain an ED-8C724-20,Group 548 or 391 (D.A.) CIT and modem without TBOS cable listed in Table 2-4 on page 2-37 and connect it to J73 of the DDM-2000 OC-12 shelf.

(2) Route the CIT and modem without TBOS cable to the side of the bay and connect to J58 of the DDM-2000 OC-3 shelf directly above the DDM-2000 OC-12 shelf, as shown in Figure 2-16 on page 2-63.

> **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual.*

(3) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

Order Wire Interface Connections — Rear Access

Description

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-12 system.

Procedure

(1) Obtain a Group 167 or ED8C724-22, Group 31 order wire cable listed in Table 2-4 on page 2-37.

(2) Connect the cable to connector J20 on the rear of the shelf.

(3) Route the cable to the order wire interface.

(4) Stack the cable in the bay cable channel as shown in Figure 2-2 on page 2-49 or Figure 2-3 on page 2-50.

(5) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 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 on page 2-46.

Fan Shelf Alarm Connections - Rear Access

Description

The DDM-2000 OC-12 fan shelf is optionally provided, as required. An alarm indication is generated by the fan shelf in the event of a functional failure. This alarm can be input to the DDM-2000 OC-12 shelf as a miscellaneous discrete indication miscellaneous discrete #14).

Procedure

The fan shelf alarm output should connect to the DDM-2000 OC-12 shelf located below the fan shelf. This connection may be made in one of two ways:

a. If no other miscellaneous discrete inputs are being connected to the DDM-2000 OC-12 shelf, connect a Group 149 cable between the connector on the fan shelf alarm cable and connector J68 on the rear of the DDM-2000 OC-12 shelf.

b. If other miscellaneous discrete inputs, in a addition to the fan shelf alarm, are being connected to the DDM-2000 OC-12 shelf, connect a Group 181 or 147 (D.A.) cable between the connector on the fan shelf alarm cable and the appropriate wires on the Group 194, 178 or 179 (D.A.) miscellaneous discrete cable via a miscellaneous terminal strip, in accordance with information provided in the job specification. Refer to Table 2-4 on page 2-37, Table 2-12 on page 2-44 and Table 2-13 on page 2-45, and the procedure in "Miscellaneous Discrete Telemetry Cabling - Rear Access" on page 2-22.

Final Operations

Procedure

(1) Verify that all the cables are properly dressed.and properly labeled.

(2) Verify that designation where cables were wire-wrapped is properly labeled.

(3) Attach the backplane cover and verify that it fits properly.

Table 2-1   Discontinued Availability (D.A.) DS3 Cable Assemblies (see Note 1)

Application (Note 2)	ED-8C727-20 Group	Cable Length (ft.) (Note 3)	Cable Type (Note 3)	Other End Connector (Note 5)
To DSX-3 or FT-2000 OC-48*	100 (D.A.)	150	1735006A	KS-23558,L6 BNC
	101 (D.A.)	250 (max.)		
	103 (D.A.)	150	735A	
	104 (D.A.)	250 (max.)		
	106 (D.A.)	150	KS-19224, L2	KS-23558,L4 BNC
	107 (D.A.)	150 (max.)		
	109 (D.A.)	450 (max.)	734A/735A	KS-23558,L5 BNC
	110 (D.A.)	450 (max.)	734A	
To DACS III -2000	120 (D.A.)	150	1735006A	9821AE
	121 (D.A.)	500 (max.)		
	123 (D.A.)	150	735A	
	124 (D.A.)	500 (max.)		
	126 (D.A.)	900 (max.)	734A/735A	†
To DACS IV -2000	130 (D.A.)	150	1735006A	9821EA & 9821FA
	131 (D.A.)	500 (max.)		
	133 (D.A.)	150	735A	
	134 (D.A.)	500 (max.)		
	136 (D.A.)	900 (max.)	734A/735A	‡

Table 2-1   Discontinued Availability (D.A.) DS3 Cable Assemblies (see Note 1) (Continued)

Application (Note 2)	ED-8C727-20 Group	Cable Length (ft.) (Note 3)	Cable Type (Note 3)	Other End Connector (Note 5)

Table 2-1 Notes:

1. Discontinued Availability means cable can no longer ordered.

2. All the DS3 cable assemblies can be used for any muldem. DDM-2000 OC-12 DS3 backplane connectors are J30-J35 (for muldem A), J36-J41 (for muldem B), J42-J47 (for muldem C), and J48-J53 (for muldem D).

3. Cable lengths are specified by the customer for all cables designated as having a (max.) length. All other cable lengths are fixed.

4. A 1735006A six conductor cable provides three DS3 IN and three DS3 OUT cables to accommodate one full muldem on the DDM-2000 OC-12 shelf. 734A, 735A, and KS-19224, L2 cables provide one DS3 IN cable and one DS3 OUT cable to accommodate a partially equipped muldem.

5. 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.

Table 2-2   ED-8C900-20 DS3 Cable Assemblies

Application (Note 1)	Length Per Table 2-3* Column	Factory Term. Groups†	Cable Type (Note 2)	Connectors Types	Cables Per Muldm	Cables per Shelf
DSX-3 or FT-2000	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
OC-48	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LA	734D		6	24
DACS III-2000						
With BNC Interconnect Shelf	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LB	734D		6	24
Without BNC Interconnect Shelf	1A	AC, LB	735A	9821AE to Right Angle BNC	6	24
	2A	6BC, 6LB	1735006A		1	6
	4A	DBD, LCD	735A-734D-735A		6	24
DACS IV-2000						
With BNC Interconnect Shelf	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LA	734D		6	24
Without BNC Interconnect Shelf	1A	AE, LB	735A	9821FA/ 9821AE to Right Angle BNC	3	12
		AD, LB			3	12
	2A	6BJ, 6LB	1735006A		1	6
	4A	DBD, LED	735A-734D-735A	9821AE to Right Angle BNC	3	12
		DBD, LDD			3	12

Table 2-2 Notes:

*   1A, 2A and 4A refer to Table 2-3 on page 2-35 columns on providing the cable lengths and associated Cable Group numbers. This information is also shown on ED8C900-20.

†   This column lists the ED8C900-20 Groups for factory terminations at each end of the cable.

1.   All the DS3 cable assemblies can be used for any muldem. The OC-12 DS3 backplane connectors are J30-J35 (for muldem A), J36-J41 (for muldem B), J42-J47 (for muldem C), and J48-J53 (for muldem D).

2.   Cable lengths are specified by the customer for all cables designated as having a (max.) length. All other cable lengths are fixed.

Table 2-3   ED-8C900-20 DS3 Cable Groups

Length (ft.)	1A Cable Groups 735A Cable	2A Cable Groups 1735006A Cable	4A Cable Groups 735D Cable
75	1	101	301
100	2	102	302
150	3	103	303
250	4	104	304
40	6	106	306
50	7	107	307
60	8	108	308
80	9	109	309
120	11	111	311
140	13	113	313
160	14	114	314
180	16	116	316
200	18	118	318
220	20	120	320
240	22	122	322
3	23	123	323
10	24	124	324
20	25	125	325
30	26	126	326
260	27	127	327
280	28	128	328
300	29	129	329
320	30	130	330
340	31	131	331
360	32	132	332
380	33	133	333
400	34	134	334
420	35	135	335
440	36	136	336
460	37	137	337

Table 2-3   ED-8C900-20 DS3 Cable Groups (Continued)

Length (ft.)	1A Cable Groups 735A Cable	2A Cable Groups 1735006A Cable	4A Cable Groups 735D Cable
480	38	138	338
500	39	139	339
550			340
600			341
650			342
700			343
750			344
800			345
850			346
900			347

Table 2-3 Notes:
When loose BNC Connectors are required, the following numbers should be used:

Comcode	Description
407068782	734D Straight BNC
407068816	734D Right Angle BNC
407068790	735A Straight BNC
407068824	735A Right Angle BNC

Table 2-4   Telemetry and Modem Cable Assemblies

Description	ED-8C727-20 Group (Note 1)	Cable Length (ft.) (Note 2)	Cable Type	DDM-2000 Backplane Connections
Modem Interface for Any Shelf	164	75	812AS	J60
	189	50		
	190	150		
	173 (D.A.)	As Reqd.		
Order Wire	167	3	812AS	J20
	ED8C724-22 G31	17		
TBOS[3] Direct Connection	157	150	812AS	J62
	185	300		
	158 (D.A.)	As Reqd.		
TBOS[3] Resistor Adapter	159	2' 6"	812AS	J62
GTP to TBOS Interface Cable	196	250	812AS	J62
	195	150		
	180 (D.A.)	As Reqd.		
TBOS[3] and, Mode MULT. for Additional OC-12 Shelves (Shelves 2 and 3)	169	4	807AS	J73 to J72 on Lower Shelf
	187	8		
	170 (D.A.)	As Reqd.		
Modem Mult, w/o TBOS[3] for Additional OC-12 Shelves (Shelves 2 and 3)	171	4	807AS	J73 to J72 on Lower Shelf
	188	8		
	172 (D.A.)	As Reqd.		
Modem Mult, w/o TBOS[3] for Additional OC-3 Shelf	ED-8C724-20 G548	20	807AS	J73 OC-12 Shelf to J58 OC-3 Shelf
	ED-8C724-20 G391 (D.A.)	4		
TBOS[3], Modem for Additional OC-3 Shelf	ED-8C724-20 G389	4	807AS	J73 OC-12 Shelf to J58 OC-3 Shelf
Parallel Telemetry[3] for Shelf 1	160	150	807AS	J21 (non-adja-cent shelves)
	161 (D.A.)	As Reqd.		
Parallel Telemetry[3] MULT. for Additional OC-12 Shelves	162	4	807AS	J22 to J21on Lower Shelf
	163 (D.A.)	As Reqd.		
Parallel Telemetry[3] MULT.for Additional OC-3 Shelves	ED-8C724-20 G386	4	807AS	J22 OC-12 Shelf to P54 OC-3Shelf

Table 2-4   Telemetry and Modem Cable Assemblies (Continued)

Description	ED-8C727-20 Group (Note 1)	Cable Length (ft.) (Note 2)	Cable Type	DDM-2000 Backplane Connections
Misc. (Env.) Discrete Telemetry 1 per Shelf	178	150 ft.	807AS	J67 (at CO) J68 (at RT)
	194	50		
	179 (D.A.)	As Reqd.		

Table 2-4 Notes:
1. Discontinued Availability means cable can no longer ordered.
2. All cables are 26 gauge.
3. TBOS is not available in OC-12, Release 7.
4. Parallel telemetry is not available in OC-12, Release 7.

Table 2-5   ED-8C724-22 Telemetry and LAN Cable Assemblies

Description	ED-8C724-22 Group	Cable Length (ft.) (Notes 1 & 2)	Cable Type	DDM-2000 Backplane Connections
TL1/X.25 Interface - 1 per shelf	15	50	811AS	J61
	16	75		
	17	100.		
	18	125		
	28	125		
	70	250		
	ED-8C727-20 G165	150		
	ED-8C727-20 G186	300		
	ED-8C727-20 G166 (D.A.)	As Req'd.		
IOA LAN One per shelf	41	150		J74
	41A	30		
	41B	75		
	42	300.		

Table 2-6   DS1 Timing Cable Assemblies

Description	ED-8C727-20 Group	Cable Length(ft.)	Cable Type	DDM-2000 Backplane Connections
DS1 Timing Reference Input	151	100	BF†	J66/J65
	152	300		
	182	150		
	183	450		
	153 (D.A.)*	As Reqd.		
DS1 Timing MULT for Additional OC-12 Shelves	154	5	745AS‡	J66 toJ65 (Lower Shelf)
	155 (D.A.)*	As Reqd.	BF†	J66 toJ65 (None adjacent)
	184	50		
DS1 Timing MULT for Additional OC-3 Shelf	ED-8C724-20 G380	4	BF†	P65 (OC-12 Shelf) to P37 (OC-3 Shelf Pos. 1)
Sync Input Timing (Prevents Timing Loop)	ED-8C724-20 G394‡	3	BF†	J65 to P237(OC-12 Shelf), J237 to Incoming external reference cable
DS1 Timing Termination Plug	ED-8C724-20 G397			J65
DS1 Timing from FT-2000	ED-8C724-22 G29	75	BF†	J66 to FT-2000
	ED-8C724-22 G71	50		
	ED-8C724-22 G72	150		
	ED-8C724-22 G30 (D.A.)*	655		

Table 2-6 Notes:

*   Discontinued Availability means cable can no longer ordered.

†   The BF type cable is 22 gauge.

‡   745AS cable is 26 gauge

** The ED-8C724-20 Group 394 sync input cable is required ONLY if the DDM-2000 OC-12 shelf is equipped with BBF2B/BBF4 circuit packs configured for providing a sync output for the BITS clock and the BBF2B/BBF4 circuit packs are externally timed to a DS1 reference. The Group 394 cable connects to P66 on the DDM-2000 OC-12 shelf in series with the cable that is providing the incoming external reference signal.

Table 2-7   Power and Alarm Cable Assemblies

Description	ED-8C727-20 Group	Cable Length (ft.)	Cable Type	DDM-2000 Backplane Connections
Office Alarms for Bottom Shelf	174	150	816AS‡	J63
	191	50		
	192	250		
	175 (D.A.)*	As Reqd.		
Office Alarms for Additional OC-12 Shelves	176	4' 6"	816AS‡	J64 to J63 (Lower Shelf)
	193	20		J64 to J63 (Non-Adjacent Shelves)
	177 (D.A.)*	As Reqd.		
Office Alarms for first shelf in typical bay or individual basis	ED-8C724-22 G46	250	816AS‡	J63
Office Alarms MULT from OC-3 Shelf	ED-8C724-22 G36	4'2"		P57 (OC-3) to P63 (OC-12)
Office Alarms MULT to Additional OC-3 Shelf	ED-8C724-20 G383	4'	816AS‡	J64 (OC-12 Shelf) to P56 (OC-3 Shelf)
OC-12 Shelf Power Cable	150	2	12GA	J25
Power Cable for Single OC-12 Shelf	ED-8C724-20 G371	15	12GA	P1, P2 of G150 Cable or P3, P4 of G148 Cable.
Power Cable Riser for Bay Arrangements	ED-8C724-20 G372	8	10GA	P1, P2 of G150 Cable and P3, P4 of G148 Cable.
Fan Shelf Alarm Cable	149	3' 4"	812AS‡	J68
	181	150		
	147 (D.A.)*	As Reqd.		
Fan Shelf Power Cable	148	2	12GA	P1, P2 (Fan Shelf)

Table 2-7 Notes:

*   Discontinued Availability means cable can no longer ordered.

‡   812AS and 816AS cable is 26 gauge

Table 2-8   Office Alarm Connections

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J63	1	BL-W
Minor Alarm Visible Return	MNVR		14	W-BL
Minor Alarm Audible	MN		2	O-W
Minor Alarm Audible Return	MNR		15	W-O
Major Alarm Visible	MJV		3	G-W
Major Alarm Visible Return	MJVR		16	W-G
Major Alarm Audible	MJ		4	BR-W
Major Alarm Audible Return	MJR		17	W-BR
Critical Alarm Visible	CRV		5	S-W
Critical Alarm Visible Return	CRVR		18	W-S
Critical Alarm Audible	CR		6	BL-R
Critical Alarm Audible Return	CRR		19	R-BL

Table 2-8 Notes:

1. The SYSCTL pack reports office alarms.

2. The office alarm cable is 26 gauge.

3. Ground all shielded cables at the customer equipment end.

4. Some cables may be manufactured using wires following old color code standards.
   A color code cross-reference is located in Table 2-12 on page 2-44.

Table 2-9   Parallel‡ Telemetry Connections

Name	Desig.	Conn.	Term	Color
ACO Control - Output	ACO-O	J21	4	BR-W
ACO Control - Input	ACO-I		22	R-BR
Output - Common	COM-O		20	R-O
Critical Alarm	CR		8	G-R
Major Alarm	MJ		7	O-R
Minor Alarm	MN		6	BL-R
Power Minor Alarm	PMN		5	S-W
Near-End Status	NE		21	R-G
Carrier Line Failure Status	CLF		2	O-W
Incoming Status	INCM		1	BL-W
Shelf Identifier - Shelf 1	SID1		3	G-W
Shelf Identifier - Shelf 2	SID2		12	O-BK
Shelf Identifier - Shelf 3	SID3		11	BL-BK
Shelf Identifier - Shelf 4	SID4		10	S-R
Shelf Identifier - Shelf 5	SID5		9	BR-R
Shelf Identifier - Shelf 6	SID6		25	BK-O
Shelf Identifier - Shelf 7	SID7		24	BK-BL
Input - Common	COM-I		23	R-S
Far-End Site ID - Site 1	FE1		19	R-BL
Far-End Site ID - Site 2	FE2		18	W-S
Far-End Site ID - Site 3	FE3		17	W-BR
Far-End Site ID - Site 4	FE4		16	W-G
Far-End Site ID - Site 5	FE5		15	W-O
Far-End Site ID - Site 6	FE6		14	W-BL

Table 2-9 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. Ground all shielded cables at the customer equipment end.

5. Some cables may be manufactured using wires following old color code standards. A color code cross-reference is located in Table 2-12 on page 2-44.

‡ Parallel telemetry is not available in OC-12, Release 7.

Table 2-10   TBOS Serial Telemetry Connections

Name	Desig.	Conn.	Term	Color
Transmitted True Data To Telem. Equip.	TDP	J62	2	O-W
Transmitted Inverted Data To Telem. Equip.	TDN		7	W-O
Received True Data To Telem. Equip	RDP		1	BL-W
Received Inverted Data To Telem. Equip.	RDN		6	W-BL
Table 2-10 Notes: 1. The TBOS telemetry cable is 26 gauge. 2. Ground all shielded cables at the customer equipment end.				

⟹ **NOTE:**
TBOS is not available in OC-12, Release 7.

Table 2-11   TL1/X.25 Interface Connections

Name	Desig.	Conn.	Term	Color
Transmitted Data	TDA	J61	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	W-BR
Ring Indicator	RID		22	R-BL
Table 2-11 Notes: 1. The TL1 interface cable is 26 gauge. 2. Ground all shielded cables at the customer equipment end.				

Table 2-12   Miscellaneous Discrete Telemetry Connections (RT)

Remote Terminal (All Releases)			Remote Terminal Additional Environmental Inputs (Release 5 only)				
Name	Desig.	Conn.	Name	Desig.	Conn.	Term	Color
Minor Alarm Power Minor Alarm Fan Control Input - Common	MN PMNT-IN FAN-CTL -48RET	J68	Env. Input - #20 Input - Common	TLMI-20 TLMI-C	J67	2 9 25 18	O-W BR-R BK-O W-S
Env. Input - #1 Env. Input - #2 Env. Input - #3 Env. Input - #4	TLMI-1 TLMI-2 TLMI-3 TLMI-4					22 21 20 19	R-BR R-G R-O R-BL
Env. Input - #5 Env. Input - #6 Env. Input - #7 Env. Input - #8	TLMI-5 TLMI-6 TLMI-7 TLMI-8					17 16 15 14	W-BR W-G W-O W-BL
Env. Input - #9 Env. Input - #10 Env. Input - #11 Env. Input - #12	TLMI-9 TLMI-10 TLMI-11 TLMI-12		Env. Input - #16 Env. Input - #17	TLMI-16 TLMI-17		8 7 6 5	G-R O-R BL-R S-W
Env. Input - #13 Env. Input - #14 Output - Common Env. Output - #1	TLMI-13 TLMI-14 TLMO-C TLMO-1		Env. Input - #18 Env. Input - #19	TLMI-18 TLMI-19		4 3 24 23	BR-W G-W BK-BL R-S
Env. Output - #2 Env. Output - #3 Env. Output - #4 No Connection	TLMO-2 TLMO-3 TLMO-4 NC		Env. Input - #21	TLMI-21		12 11 10 1	O-BK BL-BK S-R BL-W

Table 2-12 Notes:

1. The designation "NC" means no connection.

2. Inputs to the minor alarm and power minor alarm connections are normally derived from the -48 volt alarm outputs of a SLC® Series 5 Carrier System power shelf. An external ground must be connected to Output-Common to access the alarm. Refer to Figure 2-18 on page 2-65 (Releases 1, 2 and 3) or Figure 2-20 on page 2-67 (Releases 5 and 7).

3. The external inputs to the miscellaneous discretes are a contact closure and are connected to the DDM-2000 OC-12 by two leads (wires). For each of the miscellaneous inputs 1 through 15 that are being used, connect one lead to input-common (-48RET) and the other lead to the appropriate alarm designation (TLMI-X). Refer to Figure 2-18 on page 2-65 (Releases 1, 2 and 3) or Figure 2-20 on page 2-67 (Releases 5 and 7).

4. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation

Table 2-13   Miscellaneous Discrete Telemetry Connections (CO)

Central Office (Releases prior to 5)			Central Office (Releases 5)				
Name	**Desig.**	**Conn.**	**Name**	**Desig.**	**Conn.**	**Term**	**Color**
Env. Output - #15 No Connection No Connection Input-Common	TLMO-15 NC NC TLMI-C	J67	 No Connection No Connection Input - Common	 NC NC TLMI-C	J67	2 9 25 18	O-W BR-R BK-O W-S
Env. Input - #1 Env. Input - #2 Env. Input - #3 Env. Input - #4	TLMI-1 TLMI-2 TLMI-3 TLMI-4		Env. Input - #1 Env. Input - #2 Env. Input - #3 Env. Input - #4	TLMI-1 TLMI-2 TLMI-3 TLMI-4		22 21 20 19	R-BR R-G R-O R-BL
Env. Output - #5 Env. Output - #6 Env. Output - #7 Env. Output - #8	TLMO-5 TLMO-6 TLMO-7 TLMO-8		Env. Output - #5 Env. Output - #6 Env. Output - #7 Env. Output - #8	TLMO-5 TLMO-6 TLMO-7 TLMO-8		17 16 15 14	W-BR W-G W-O W-BL
Env. Output - #9 Env. Output - #10 Env. Output - #11 Env. Output - #12	TLMO-9 TLMO-10 TLMO-11 TLMO-12		Env. Output - #9 Env. Output - #10	TLMO-9 TLMO-10		8 7 6 5	G-R O-R BL-R S-W
Env. Output - #13 Env. Output - #14 Output - Common Env. Output - #1	TLMO-13 TLMO-14 TLMO-C TLMO-1		 Output - Common Env. Output - #1	 TLMO-C TLMO-1		4 3 24 23	BR-W G-W BK-BL R-S
Env. Output - #2 Env. Output - #3 Env. Output - #4 No Connection	TLMO-2 TLMO-3 TLMO-4 NC		Env. Output - #2 Env. Output - #3 Env. Output - #4	TLMO-2 TLMO-3 TLMO-4		12 11 10 1	O-BK BL-BK S-R BL-W

Table 2-13 Notes:
1. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation. Refer to Figure 2-19 on page 2-66 (Releases 1, 2 and 3) or Figure 2-20 on page 2-67 (Releases 5 and 7).

Table 2-14 DS1 Timing Reference Connections

Name	Desig.	Conn.	Term	Color
Received from Primary DS1 Reference	T R	J66	6 1	BK O
Received from Secondary DS1 Reference	T R		7 2	R G
Table 2-14 Notes: 1. The DS1 timing cable is 22 gauge. 2. Ground all shielded cables at the customer equipment end.				

Table 2-15 Order Wire Interface Connections

Name	Desig.	DDM Conn.	Term	Color	Dantel Pin #
Received Data	RDAO RCKO	J20	1 6	BL-W W-BL	43 45
Transmitted Data	TDAO TCKO		2 7	O-W W-O	47 51
Ground	GND		3	G	29
Table 2-15 Notes: 1. The order wire interface cable is 26 gauge. 2. Ground all shielded cables at the customer equipment end.					

Table 2-16 Fan Shelf Alarm Connections

Designation	Conn.	Terminal	Wire Color of Group 147 Cable
TLM-14		4	BL-W
TLM-OC	J1	5	BR-W
-48RET		8	W-BL
Table 2-16 Notes: 1. Ground all shielded cables at the customer equipment end.			

Table 2-17   Color-Code Cross-Reference

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

Table 2-17 Notes:
1. Some cables may be manufactured using wires following old color code standards. This tables provides a color code cross-reference.
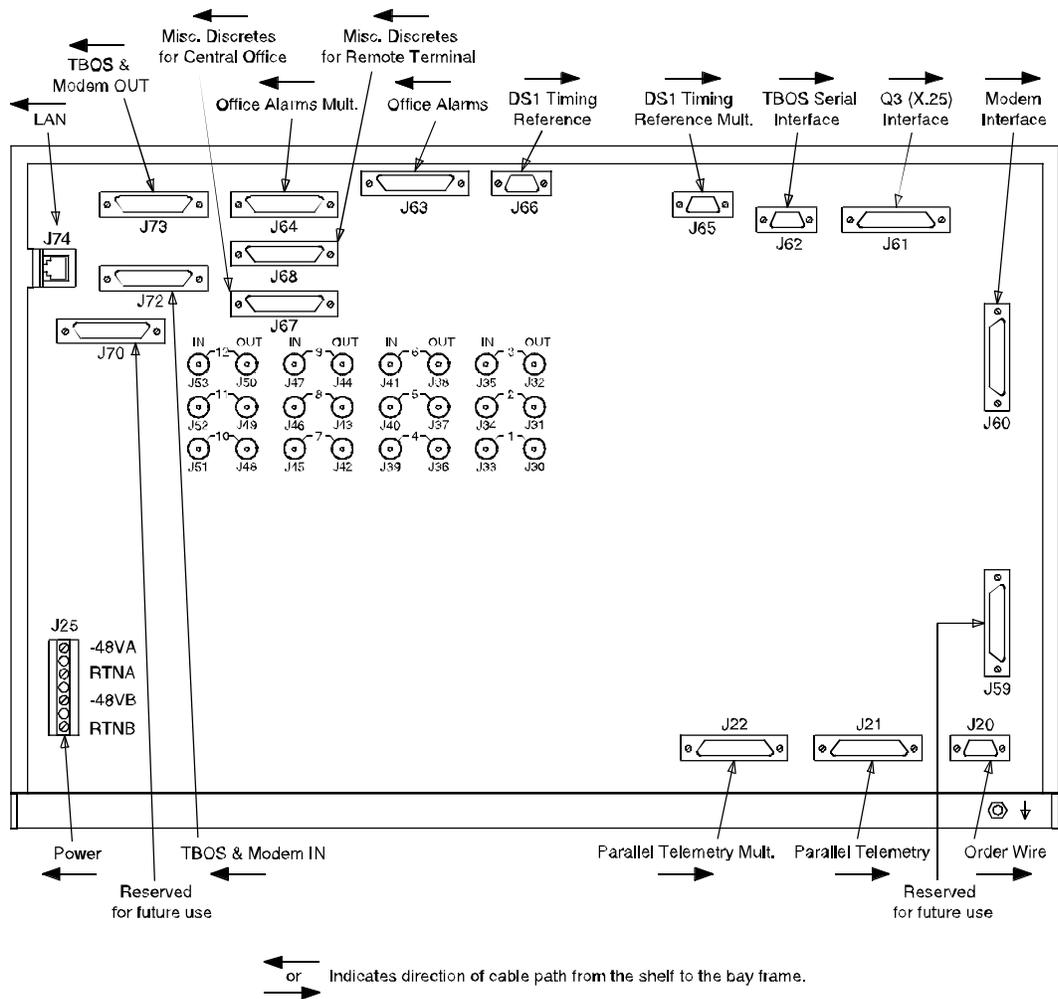
Note: All cables connected to backplane dress in the direction indicated, and then downward, to be routed beneath the shelf.

Figure 2-1. DDM-2000 OC-12 Backplane
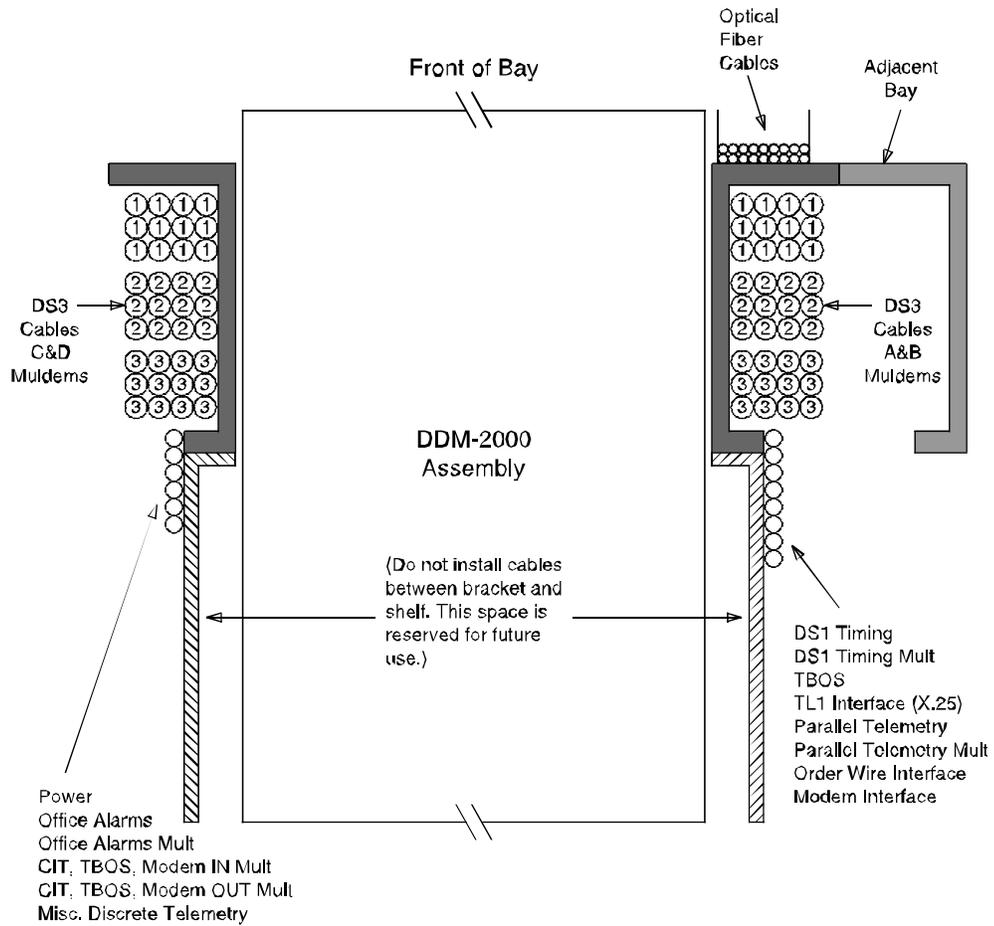
Note: The cabling stacking order is shown in the figure. The numbers on the cables indicate the shelf associated with that cable.

Figure 2-2.   ED-8C500 or 8C800 Frame, Rear Access Cable Placement
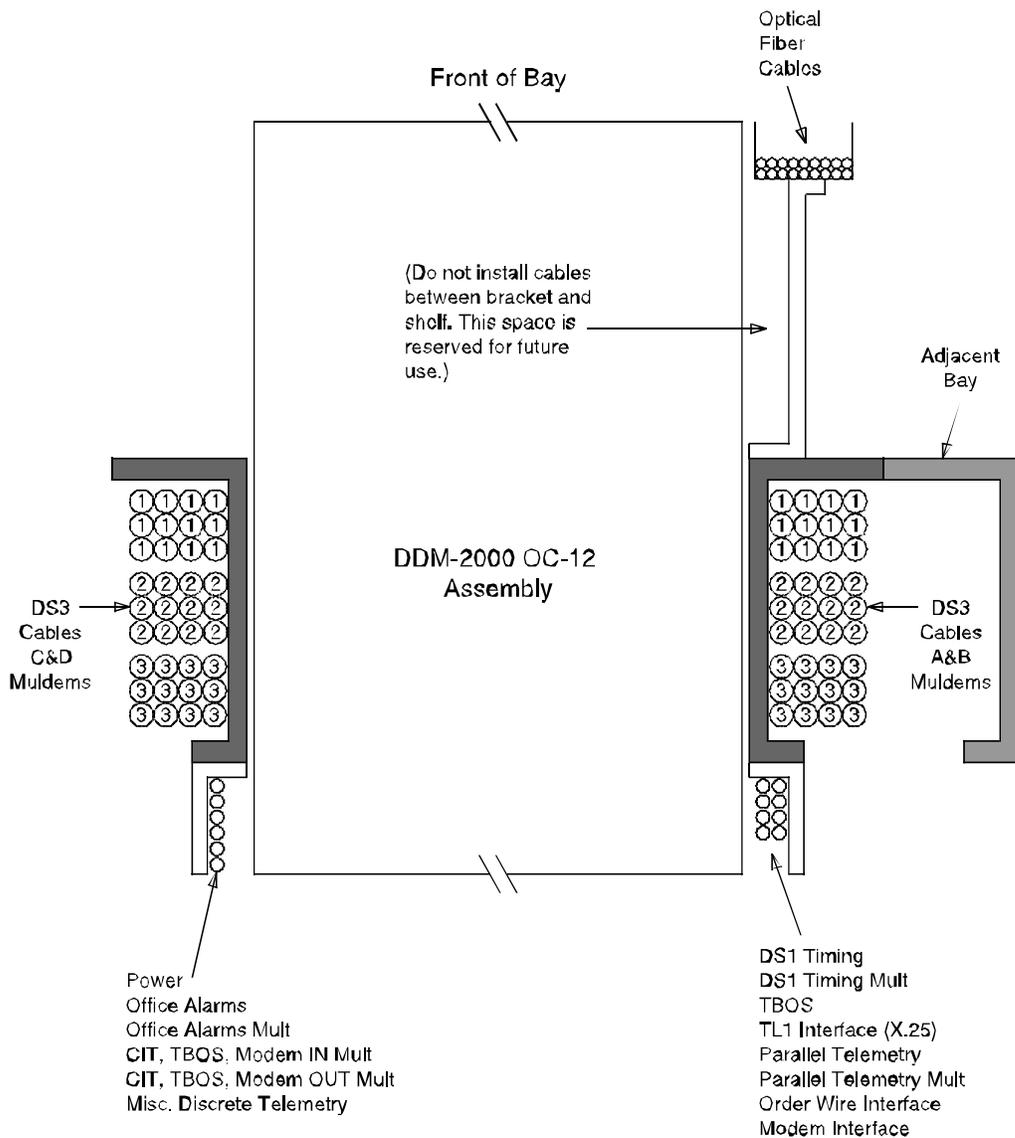
Note: The cabling stacking order is shown in the figure. The numbers on the cables indicate the shelf associated with that cable.

Figure 2-3.   ED-8C501 or 8C801 Frame, Rear Access Cable Placement
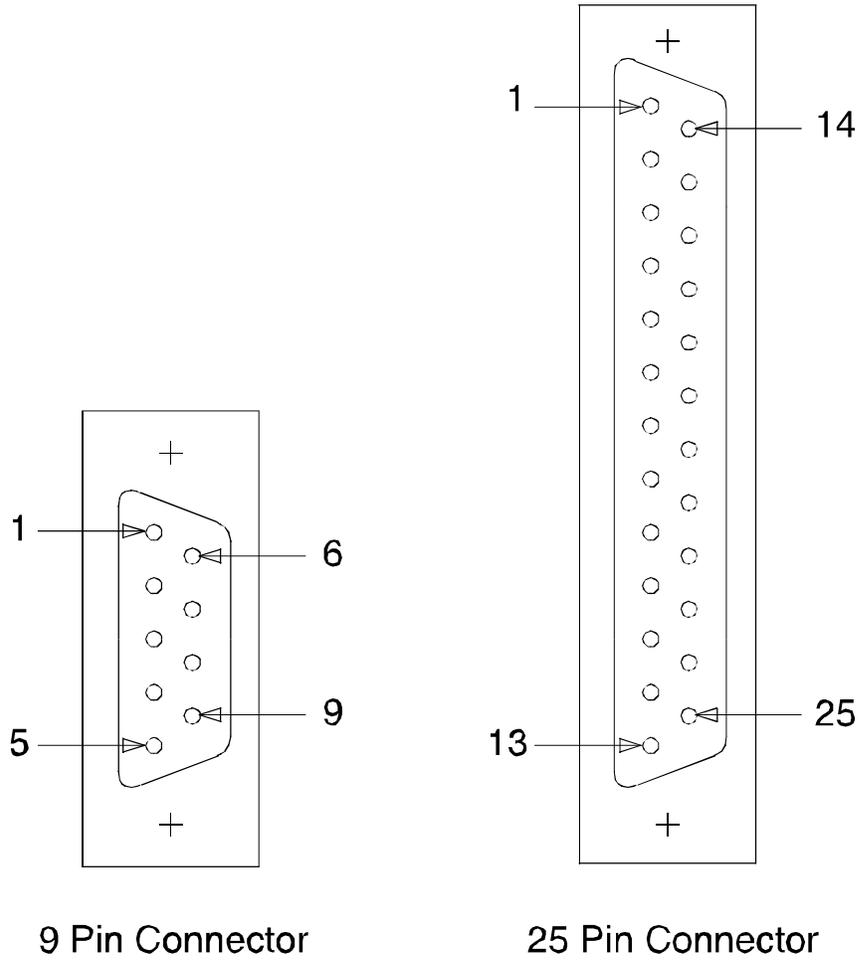
9 Pin Connector   **25 Pin Connector**

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

Figure 2-4.   Connector Pin Outs
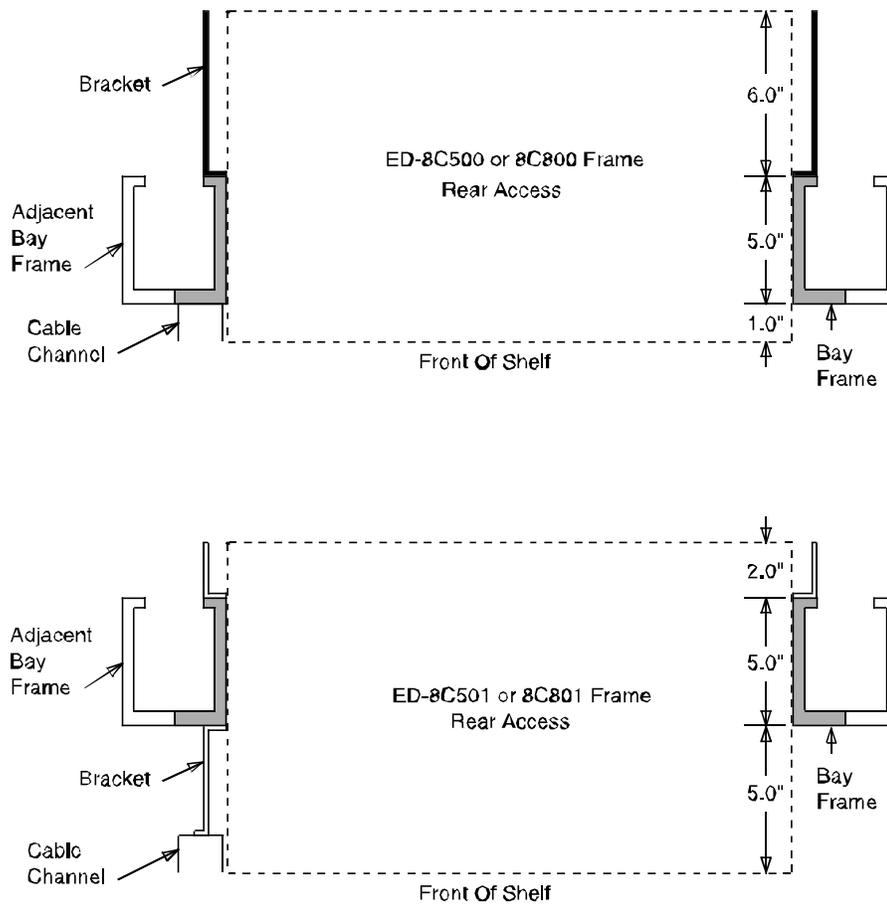
Note: There are two brackets required per shelf to hold the cable channel in place.

Figure 2-5.   DDM-2000 OC-12 Shelf Mounting (Top View)
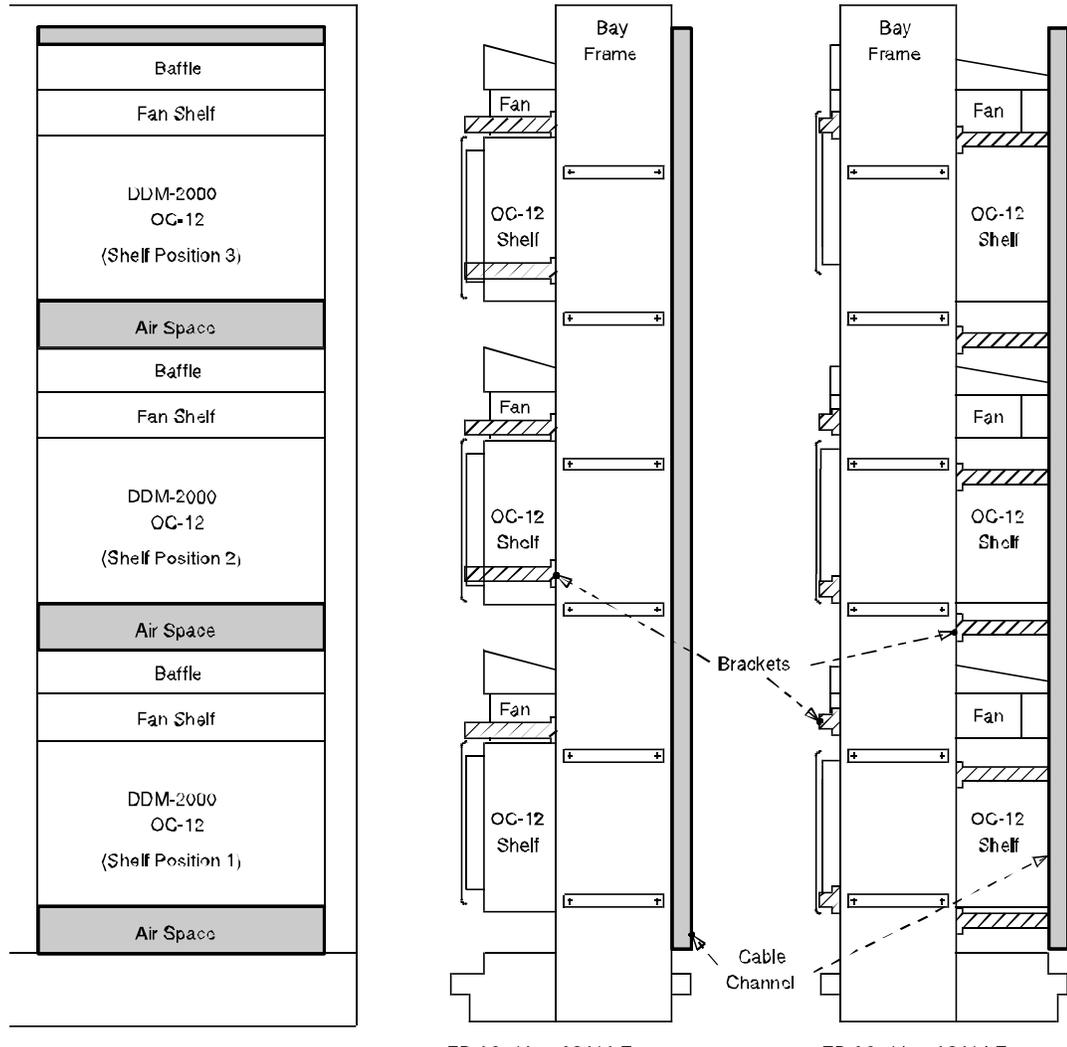
Note: Refer to ED-8C727-10 for specific equipment locations within a bay.

Figure 2-6.   Bay Mounting Arrangement for DDM-2000 OC-12 Bay
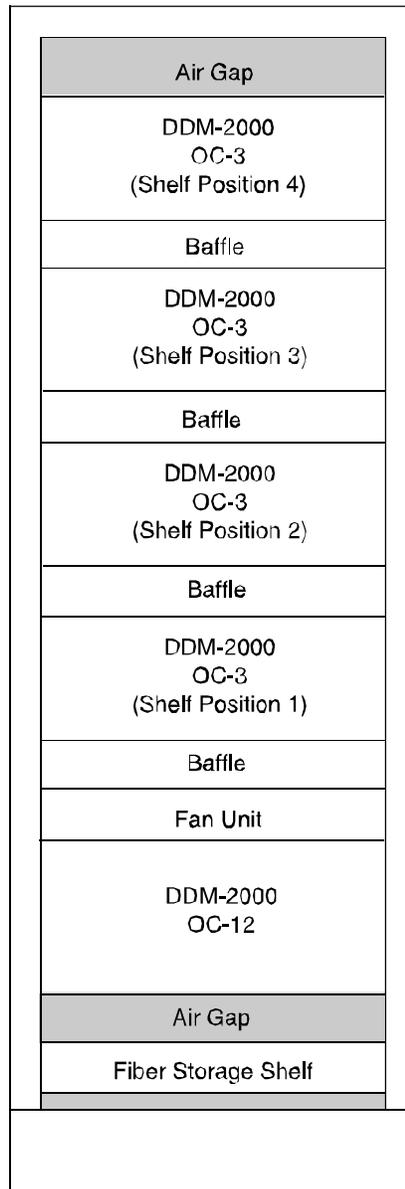
Note: Refer to ED-8C724-10 for specific equipment locations within a bay.

Figure 2-7. Bay Mounting Arrangement for OC-3/OC-12 Bay

Left Side Of DDM-2000 OC-12 Shelf
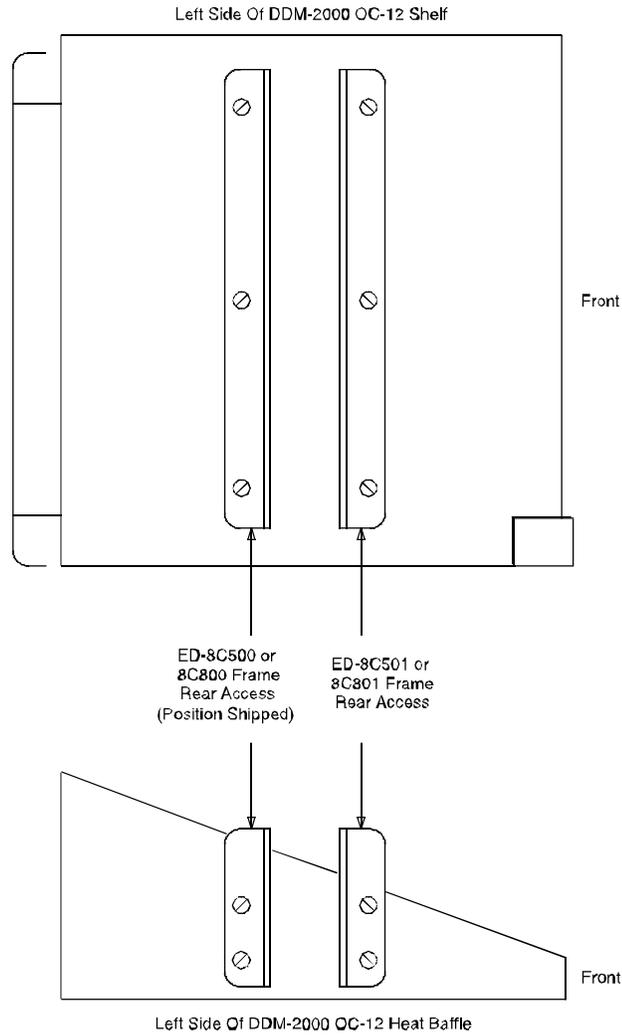
Front

ED-8C500 or
8C800 Frame
Rear Access
(Position Shipped)

ED-8C501 or
8C801 Frame
Rear Access

Front

Left Side Of DDM-2000 OC-12 Heat Baffle

Note: Reposition the DDM-2000 OC-12 shelf, fan shelf, and heat baffle side mounting brackets, if necessary, according to the bay frame they are being mounted in.

Figure 2-8.   Side Mounting Bracket Positions
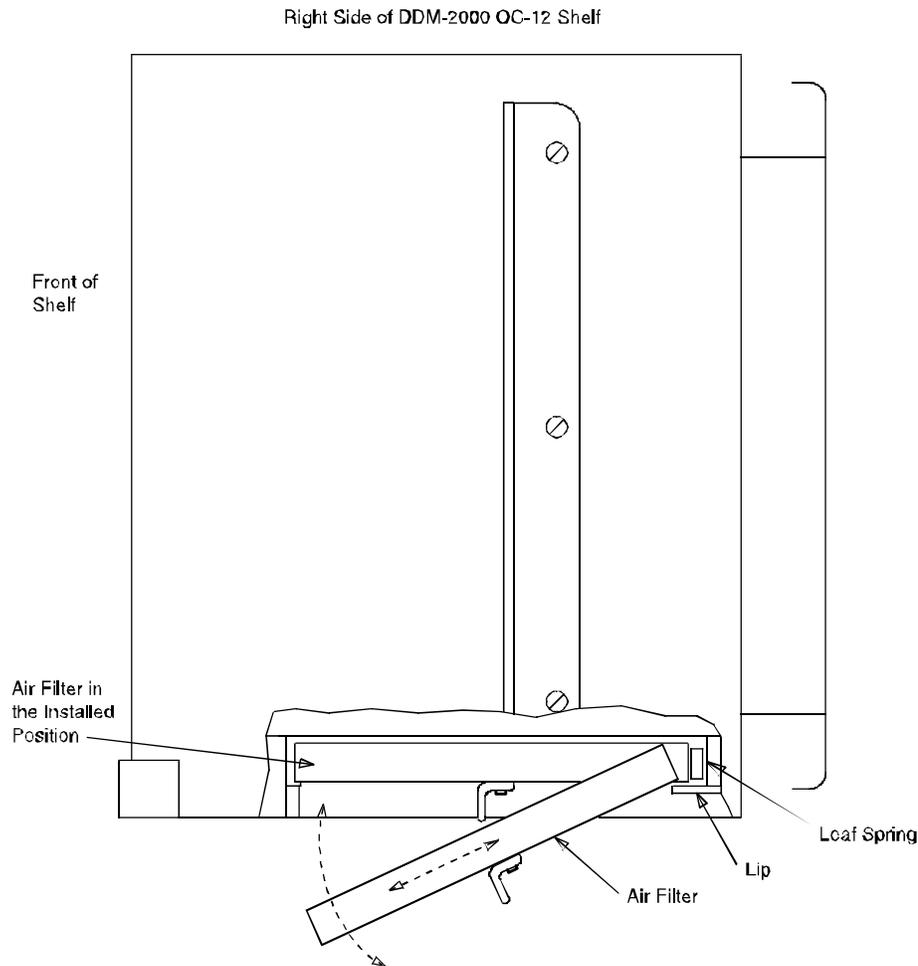
Right Side of DDM-2000 OC-12 Shelf

Front of
Shelf

Air Filter in
the Installed
Position

Leaf Spring

Lip

Air Filter

Notes:

1. Lift the air filter, using the plastic tabs, into the cavity at the bottom of the DDM-2000 OC-12 shelf at an angle as shown.

2. Place the rear edge of the filter on top of the shelf "lip" and push forward to compress the leaf springs attached to the shelf.

3. While applying enough pressure to keep the leaf springs compressed, rotate the front of the filter upward until it contacts the bottom of the shelf cavity.

4. Release the filter and ensure that the leaf springs force the filter forward to the position shown, securing it within the shelf cavity.

Figure 2-9.   Fan Filter Installation
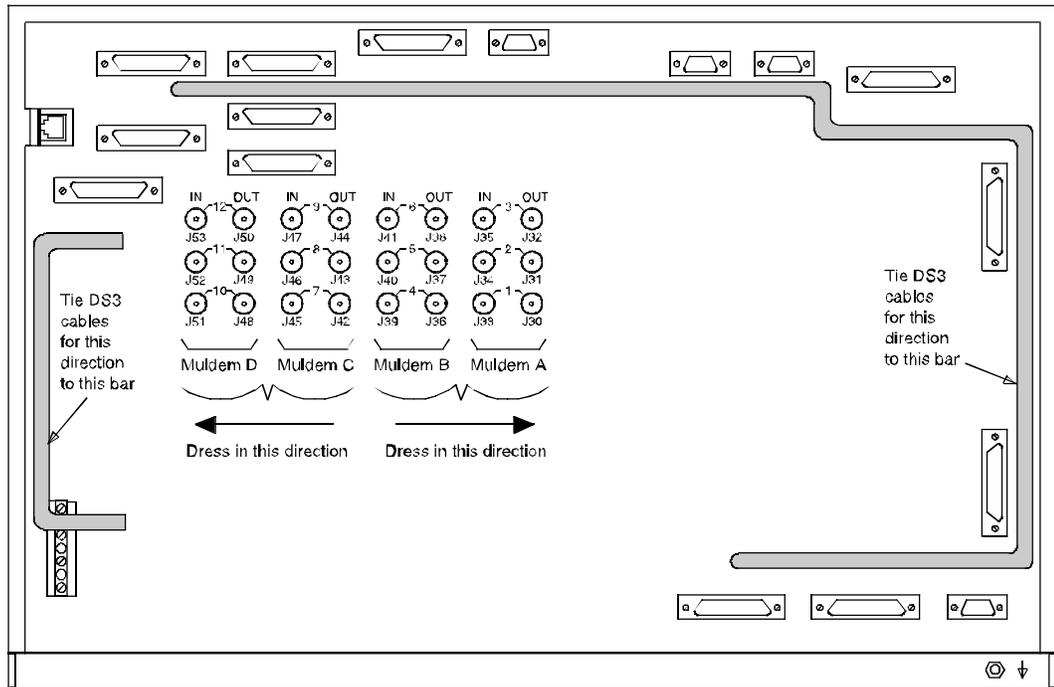
Note: Refer to Table 2-1 on page 2-32 for specific DS3 cable assemblies.

Figure 2-10. Rear Access DS3 Cabling

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

Inner foil shield should be removed from this area
(leaving the braided shield only).

1/8"

7/16"   1/16"

Center conductor to be tinned

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

KS-15712, L20 Outer shield

Fan braided shield and foil slightly

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

Outer shield

Solder slug

Cable dielectric

Terminal of the 219P connector should slide
over cable dielectric but under braided shield

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 219P connector must be done after the 219
connector has been assembled and crimped.

STEP 6:   Apply soldering iron on bottom of barrel (opposite side of solder
slug) of the 219P connector. Do not add any additional solder; the
solder slug is all that is required.

STEP 7:   Slide outer shell over 219P connector and secure with screw.

Figure 2-11. Cable Preparation for 219N Connector

* Registered Trademark of Thomas & Betts Corporation.
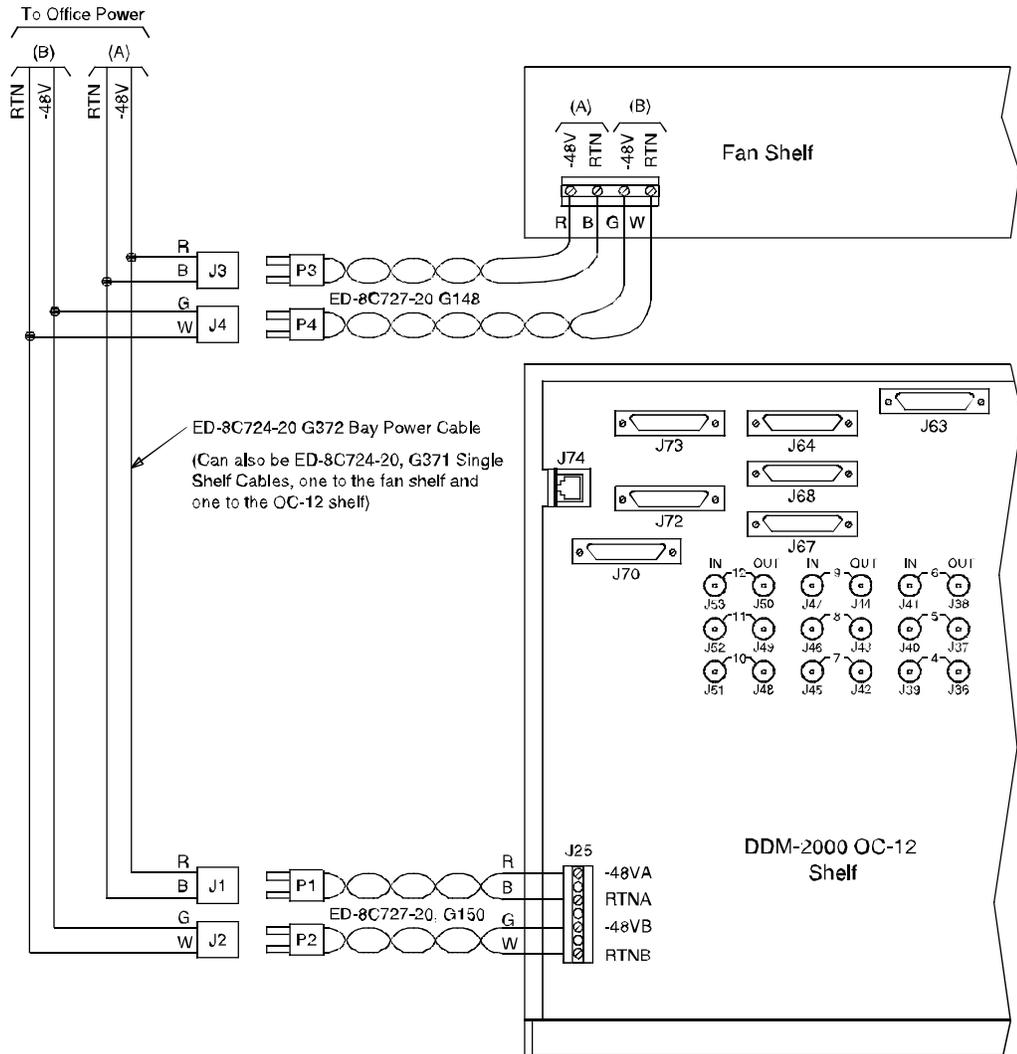
Figure 2-12. Power Cabling
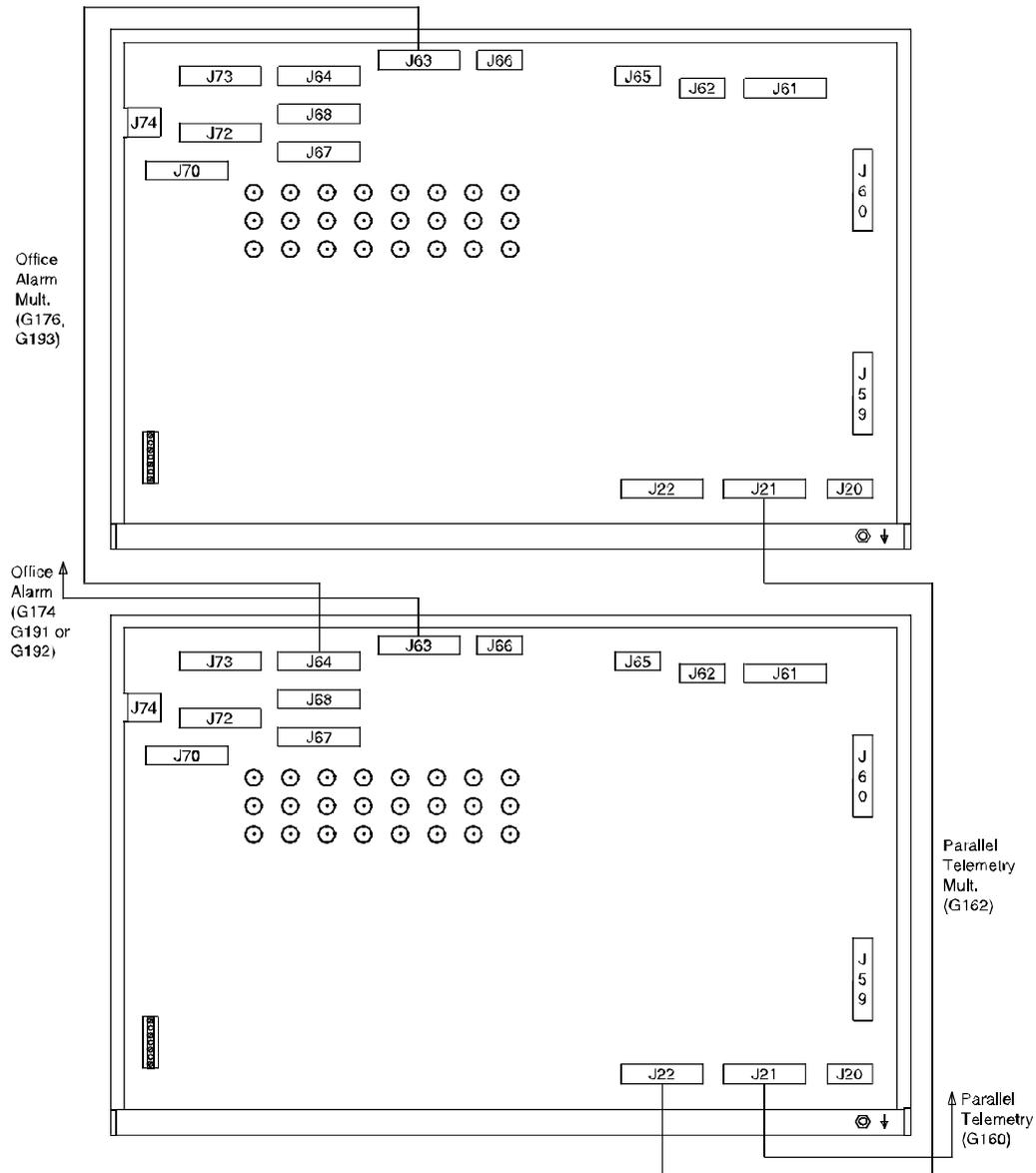
Notes:

Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Parallel telemetry is not available in OC-12, Release 7.

Figure 2-13. Office Alarm and Parallel Telemetry Cabling
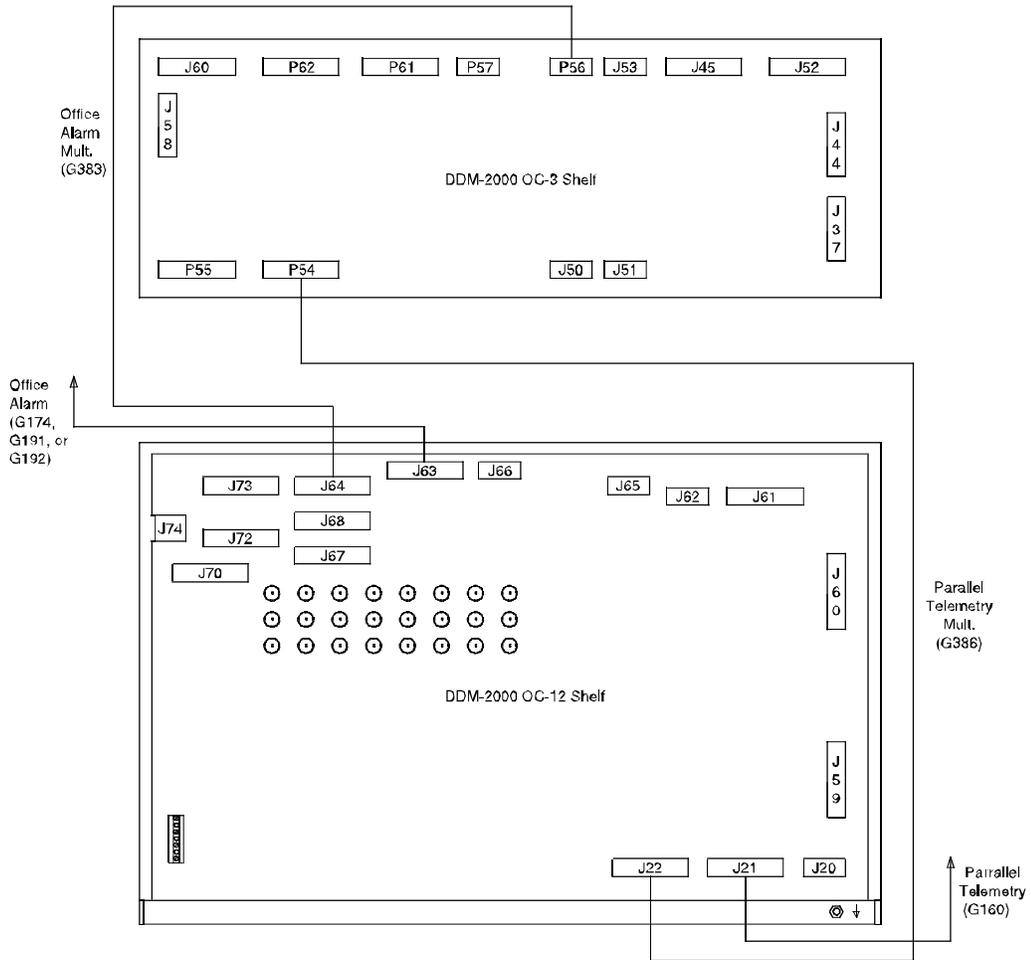
Notes:

Parallel telemetry is not available in OC-12, Release 7.

Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Figure 2-14. Office Alarm and Parallel Telemetry Mult Cabling for OC-3/OC-12 Bay
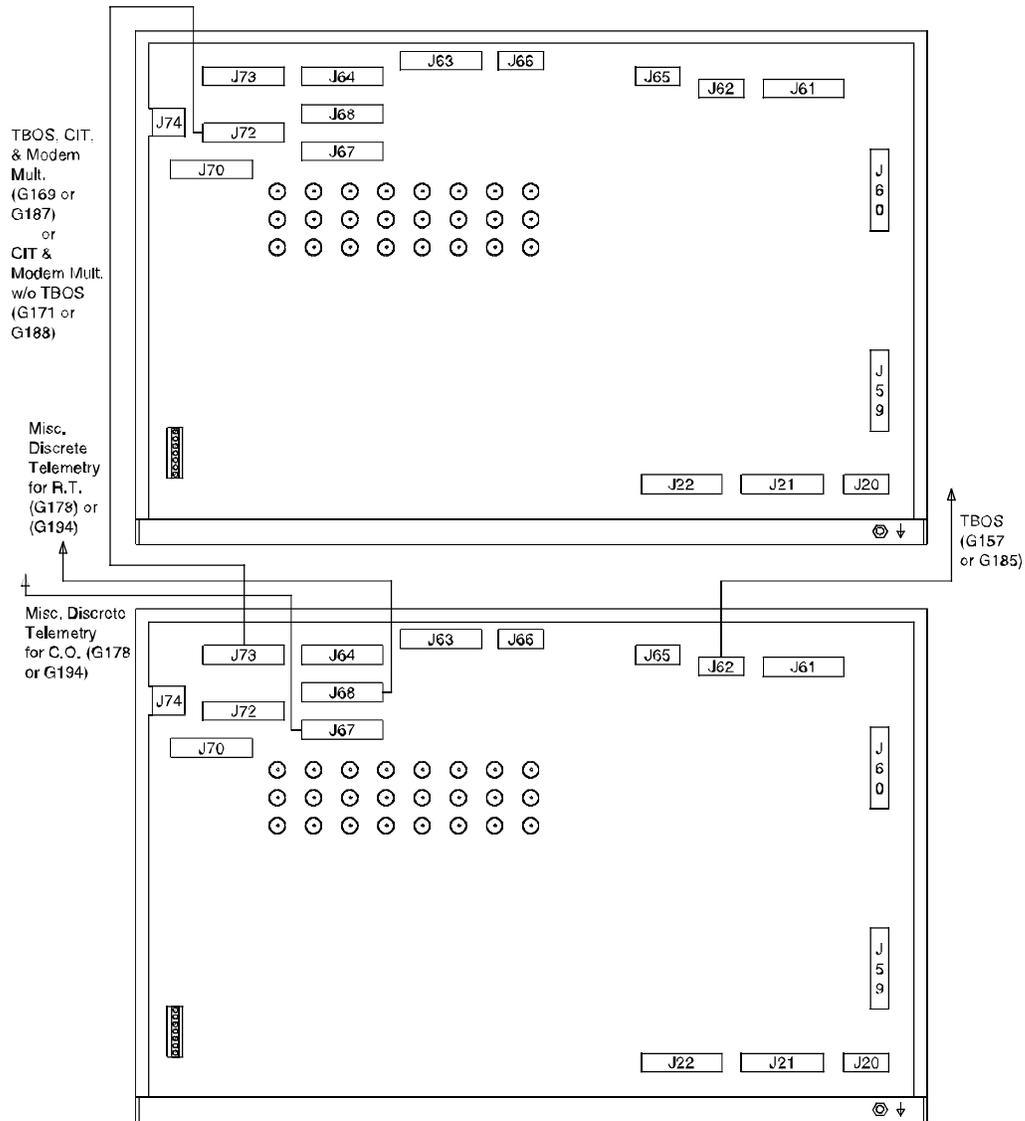
Note: Refer to Table 2-2 on page 2-34 for specific cable assemblies.

Figure 2-15. TBOS and Miscellaneous Discrete Telemetry Cabling

➡ **NOTE:**
TBOS is not available in OC-12, Release 7.
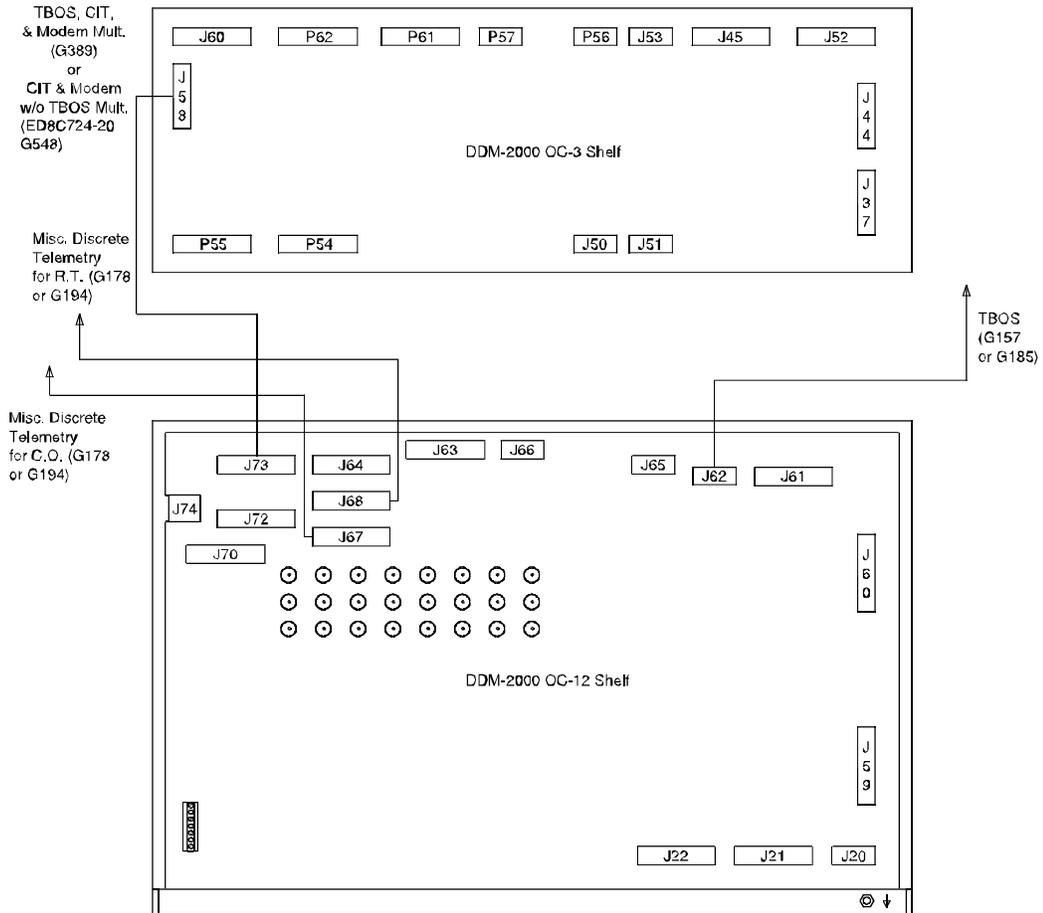
Note: Refer to Table 2-2 on page 2-34 for specific cable assemblies.

Figure 2-16. TBOS and Miscellaneous Discrete Telemetry Cabling for OC-3/OC-12 Bay

NOTE:
TBOS is not available in OC-12, Release 7.

Note: Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Figure 2-17. DS1 Timing, TL1 Interface, Order Wire, and Modem Cabling

Notes:

1. Miscellaneous alarm input #1 is typically wired to the open door alarm in Lucent cabinet configurations.

2. Miscellaneous alarm input #14 is typically used for fan shelf alarm in controlled environment (noncabinet) applications.

3. The output common must be wired to an external ground for fan control, external minor and power minor alarm inputs, and for miscellaneous discretes #1-4.

Figure 2-18. Remote Terminal Miscellaneous Discrete Functions (Releases prior to 5)

Notes:

1. The output common must be wired to an external ground for miscellaneous outputs #1-4.

2. The alarm input from the fan shelf is connected to miscellaneous input #14 via J68 terminal 3) on the DDM-2000 OC-12 shelf.

Figure 2-19. CO Terminal Miscellaneous Discrete Functions (Releases prior to 5)
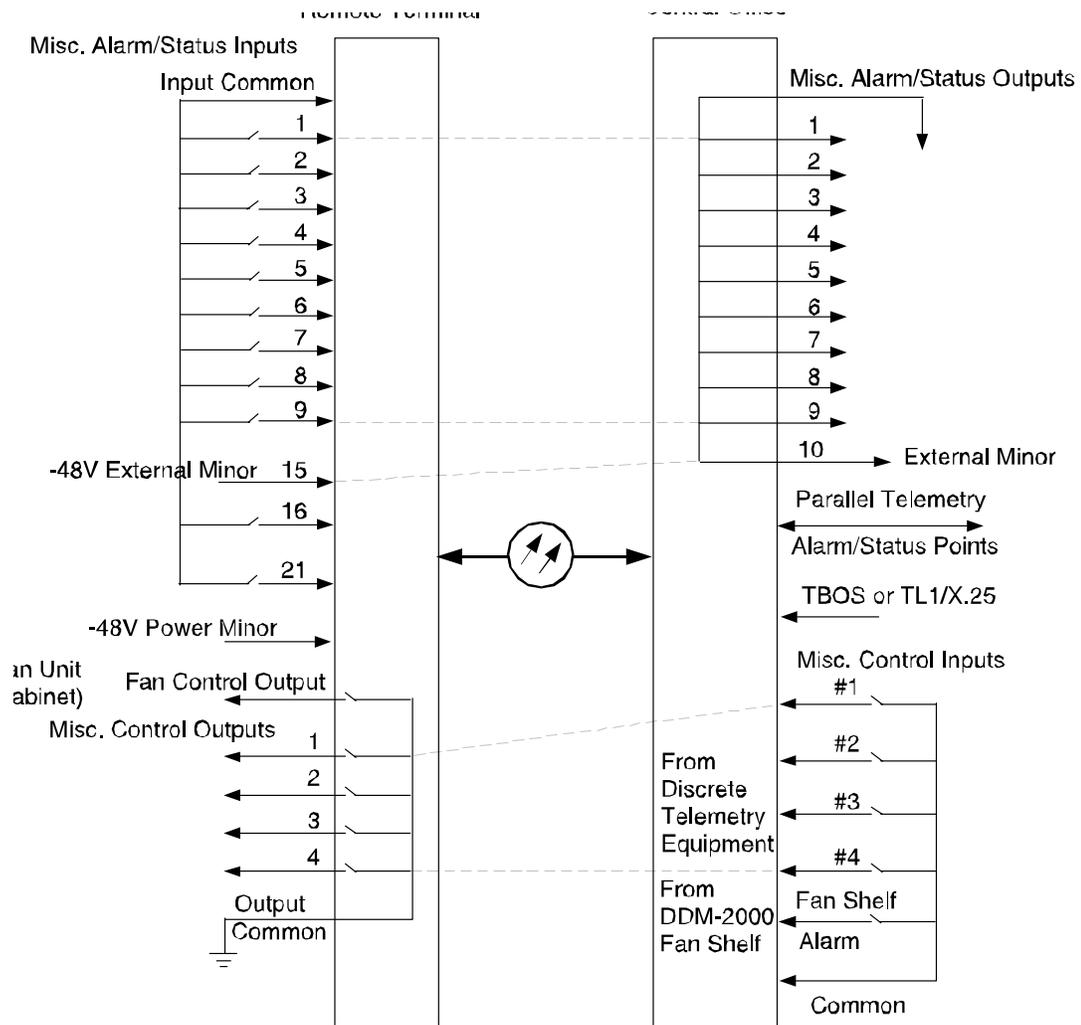
Notes:

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-10.

2. Miscellaneous (environmental) alarm input #14 (terminal 3 on J58) is typically wired to DDM-2000 OC-12 fan shelf.

Figure 2-20. Miscellaneous (Environmental) Discrete Functions (Releases 5)
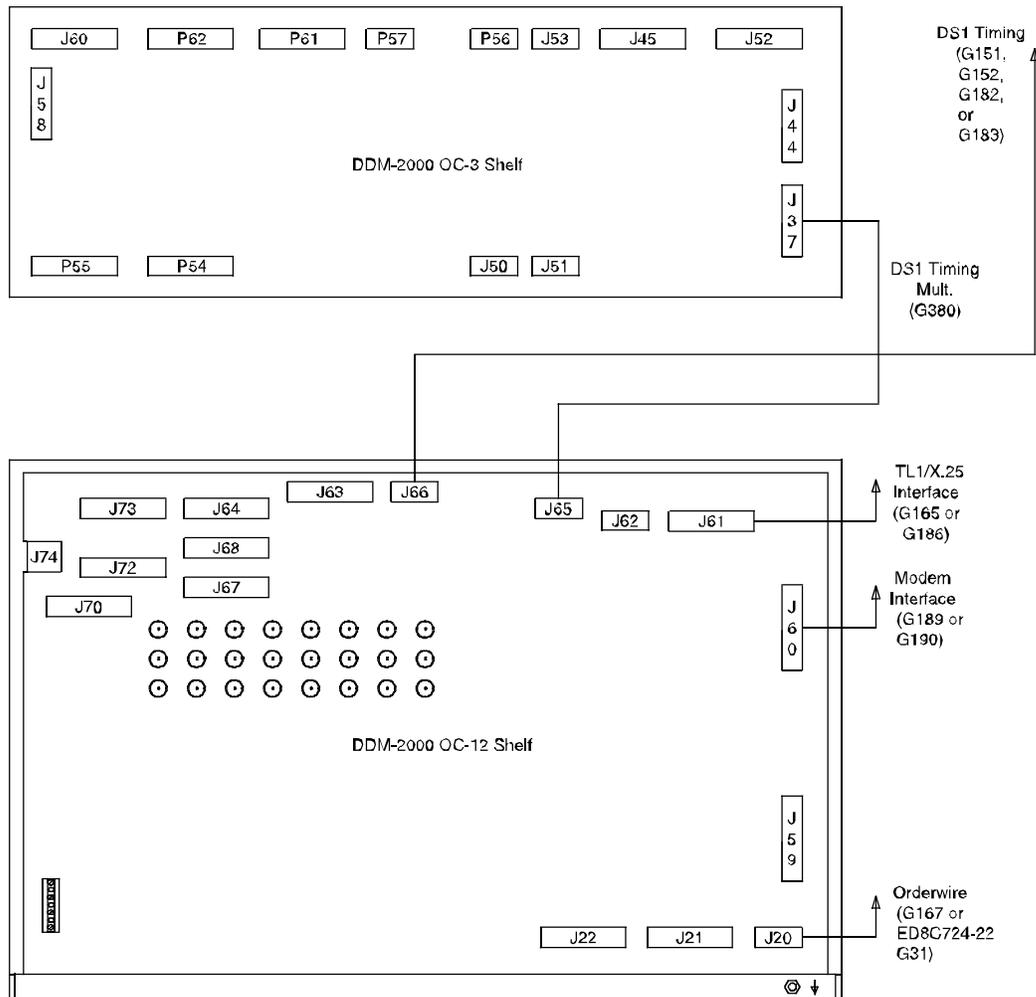
Note: Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Figure 2-21. DS1 Timing, TL1 Interface, Order Wire, and Modem Cabling for OC-3/OC-12 Bay
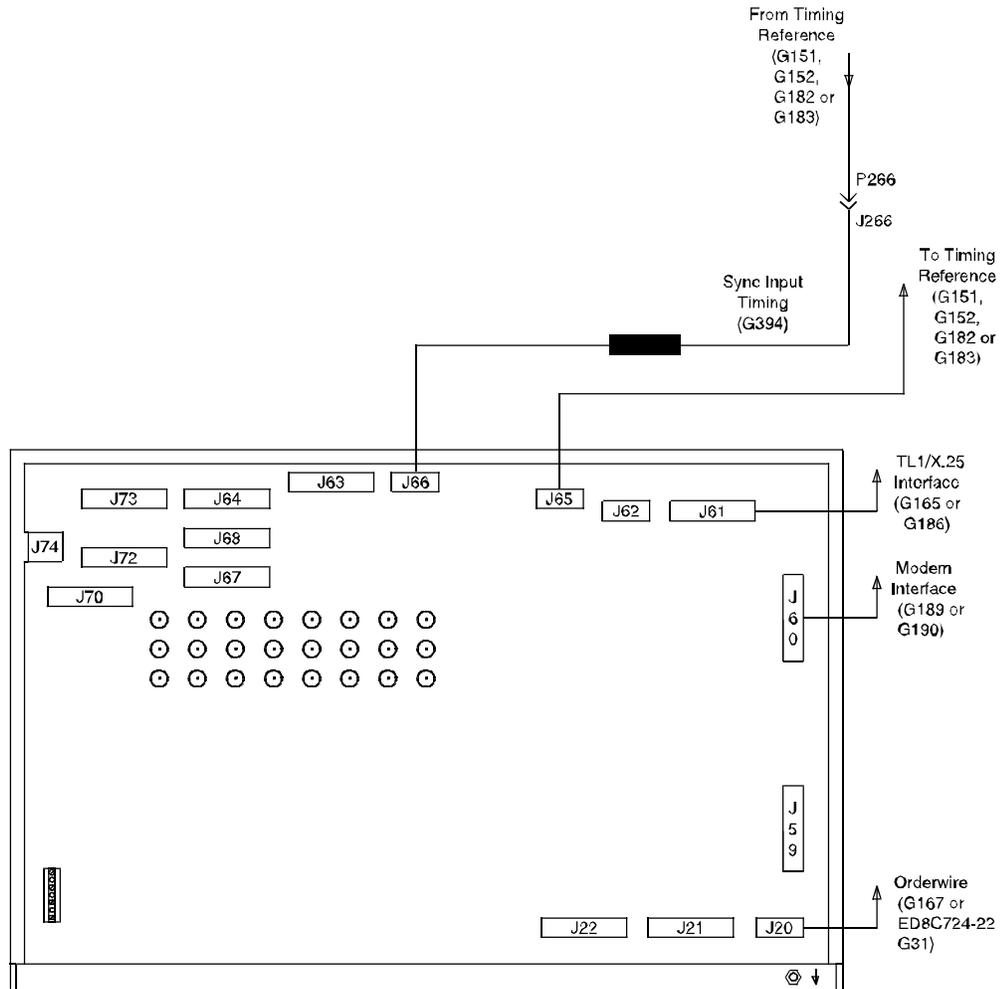
Note: Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Figure 2-22. Single Shelf DS1 Sync Timing, TL1 Interface, Order Wire, and Modem Cabling

Figure 2-23. DS1 Sync Timing, TL1 Interface, Order Wire, and Modem Cabling

Note: Refer to Table 2-2 on page 2-34 and Table 2-3 on page 2-35 for specific cable assemblies.

Figure 2-24. DS1 Sync Timing, TL1 Interface, Order Wire, and Modem Cabling for OC-3/OC-12 Bay

Equipment and Front Access Cable Installation for the DDM-2000 OC-12 Multiplexer

3

Contents

Equipment and Front Access Cable Installation for the DDM-2000 OC-12 Multiplexer

3

Overview

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 "Introduction" section.

Description

This section should be performed for front access installations. for rear access installations, refer to the "Equipment and Rear Access Installation for the DDM-2000 OC-12 Multiplexer" section of this manual. for DDM-2000 OC-12 Regenerator installation refer to the "Equipment and front Access Cable Installation for the DDM-2000 OC-12 Regenerator. Observe the following notes:

- This section requires previous bay frame installation and grounding.

- The shelf is grounded by its mounting screws.

- This section is best performed if each procedure like "Equipment Installation" is performed on every shelf in the bay before proceeding to the next procedure.

- Circuit packs must not be installed at this point.

- The locations of all backplane plugs and jacks are shown in Figure 3-1 on page 3-46.

- The cabling for the maximum capacity of three DDM-2000 OC-12 front-access shelves in a bay is shown in Figure 3-2 on page 3-47.

- Cables should be installed starting from the lowest shelf in the bay and working toward the top. The procedures described in this section should be followed for optimum utilization of the bay cable ducts.

- Cable assembly options are listed in Tables 3-1 through 3-6 on pages 3-32 through on Page 3-38. Connector pin outs are provided in Figure 3-3 on page 3-48.

- All of the front access cables, except the optical fibers, are connected to the DDM-2000 OC-12 backplane.

- It is a requirement that the DDM-2000 OC-12 be equipped with a protective backplane cover before mounting in the bay.

- 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.

Tools, Test Sets, and Accessories

The following tools are required:

Quantity	Description
1	*Thomas & Betts*[*] WT-414 Crimping Tool[†]
2	*Paladin*[‡] Coaxial Wire Stripper PA1208[‡]
	Replacement Paladin 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 DS3 cable Groups 100, 103, 106, 109, 110, 120, 123, 126, 130, 133, or 136.
[‡] Registered trademark of Paladin Corporation.
[**] A wrist strap must be worn when touching the DDM-2000 OC-12 backplane and when connecting cables. Use an available electrostatic discharge jack.
[††] A wire wrap gun is required to make connections on 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 with the appropriate head(s) is required for mounting the shelf, heat baffles, fan, and cable brackets; for removing the front cover, rear cover; and for some cables to the backplane.

Planning

The DDM-2000 OC-12 may be mounted as follows:

a. Mounted in network bay frame. The recommended network bay frame for front access is the ED-8C500 or ED-8C800. Refer to Figures 3-4, 3-5, and 3-6 on Pages 3-49 through Page 3-51 for DDM-2000 OC-12 placement in a network bay frame.

b. Miscellaneously mounted, meeting requirements in "Equipment Installation Considerations".

Equipment Installation Considerations

Detailed network bay frame installation information is contained in ED-8C727-10, "Typical Bay Arrangements". The information in this paragraph is of a general nature.

The equipment listed below has the following height dimensions:

ED-8C727-30, G1	DDM-2000 OC-12 Shelf	14.0 inches
ED-8C733-30, G1	Heat Baffle	4.0 inches
ED-8C733-30, G8	DDM-2000 OC-12 Fan Shelf	4.0 inches

Each DDM-2000 OC-12 shelf installed must have an air gap of at least 3.0 inches between the bottom of the DDM-2000 OC-12 shelf and the equipment (or bay frame if the shelf is installed at the bottom of the bay) below it.

A fan shelf and heat baffle are required above each DDM-2000 OC-12 shelf. Refer to the bay layout shown in Figure 3-5 on page 3-50 and Figure 3-6 on page 3-51.

A heat baffle must be installed below the DDM-2000 OC-12 if any heat generating equipment is located below the DDM-2000 OC-12.

➡ **NOTE:**
DDM-2000 OC-12 heat baffles must be used where required. There is no equivalent air gap.

Inspection

Description

Perform the following procedure before the DDM-2000 OC-12 Multiplexer installation or cable installation.

Procedure

(1) Verify that the frame or structure into which the DDM-2000 OC-12 Multiplexer will be installed is properly grounded.

NOTE:
Each DDM-2000 OC-12 shelf, heat baffle, and fan shelf comes equipped with a pouch attached to the shelf, heat baffle, or fan shelf, containing the hardware required for mounting and grounding and an installation kit

The installation kit for the baffle contains:

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

The installation kit for the shelf contains:

Quantity	Description
4	0.216-24 x 5/16" Screws (C803535012)
2	Fuses

NOTE:
Each DDM-2000 OC-12 shelf also comes equipped with a copy of 363-206-207, *DDM-2000 OC-12 Multiplexer User/Service Manual.*

The installation kit for the fan contains:

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

(2) Remove the front and rear covers from the DDM-2000 OC-12 shelf.

⇒ **NOTE:**
> The covers must be installed later to assure proper air flow for cooling and fan filter alarm sensing as well as for compliance with electromagnetic interference (EMI) requirements.

(3) Inspect the DDM-2000 OC-12 shelf for visible damage including bent or touching backplane pins.

(4) Position the DDM-2000 OC-12 shelf side mounting brackets accordingly. Refer to Figure 3-7 on page 3-52.

⇒ **NOTE:**
> To ensure 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 DDM-2000 OC-12 heat baffle and fan shelf side mounting brackets accordingly. Refer to Figure 3-7 on page 3-52.

⇒ **NOTE:**
> To ensure that the shelf is grounded through the bay frame, the mounting brackets must be positioned so that the head of the mounting screws make contact with the unpainted surface of the bracket.

(6) If this is a DDM-2000 OC-3/OC-12 combined bay application, position the mounting brackets on the lightguide slack storage shelf such that the distance between the mounting brackets and the front of the shelf is similar to that of the DDM-2000 OC-12 shelf (that is, when mounted, the face of the slack storage shelf should line up with the face of the DDM-2000 OC-12 shelf).

Equipment Installation

Description

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

■ Shelves and heat baffles should be spaced as shown in Figure 3-5 on page 3-50 and Figure 3-6 on page 3-51.

■ for backplane connections refer to Figure 3-1 on page 3-46.

■ Cables should be placed in the bay frame as shown in Figure 3-2 on page 3-47.

Preshelf Equipment Installation

(1) Obtain the front access DS3 cables per Tables 3-1 through 3-4 on pages 3-32 through 3-36 and note the cable to be used with each muldem.

(2) Connect the DS3 cables to their respective connectors on the DDM-2000 OC-12 backplane. Refer to Figure 3-8 on page 3-53.

(3) Dress the DS3 cables, ensuring that the cables will not obstruct the backplane cover from being installed, per Figure 3-8 on page 3-53.

(4) Refer to Table 3-5 on page 3-37 and Table 3-6 on page 3-38 and attach the following front access shelf cables, as required, to the backplane:

    a. DS1 timing

    b. TL1/X.25 interface

    c. Order wire

    d. Modem

    e. Telemetry byte-oriented serial (TBOS)

    f. Parallel telemetry

⇒ **NOTE:**
Parallel telemetry and TBOS are not available in OC-12, Release 7.

    g. Office alarms

    h. Miscellaneous discrete.

(5) Attach the following front access mult cables, listed in Table 3-5 on page 3-37 and Table 3-6 on page 3-38, to the backplane:

    a. DS1 timing mult.

b. Parallel telemetry mult.

c. Office alarms mult.

d. TBOS mult.

➤ **NOTE:**
A Group 226 or 227 TBOS mult cable is not attached to J72 if the shelf is the bottom shelf in a bay.

➤ **NOTE:**
All front access cabling to be connected to the DDM-2000 OC-12 backplane will be routed through the space below the shelf.

(6) Connect a Group 150 shelf power cable to terminal strip J25 on the DDM-2000 OC-12 backplane, per the following:

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

(7) Dress and tie the front access cables per Figure 3-2 on page 3-47.

(8) Temporarily tie the loose ends of these cables in such a way that they extend beyond the front of the shelf.

(9) Verify that the cables have been connected without bending or touching any backplane pins.

(10) Attach the backplane cover to the shelf.

OC-12 Shelf Installation

➤ **NOTE:**
The special mounting screws provided with the DDM-2000 OC-12 shelves must be used when mounting the shelves to ensure proper grounding to the frame.

(1) Mount the DDM-2000 OC-12 shelves, fan shelves, and heat baffles in the bay frame, referring to Figure 3-5 on page 3-50 and Figure 3-6 on page 3-51, leaving room for cables as shown. Use the hardware provided in the installation kits to mount the shelves and baffles. When installing fan shelves, refer to the "Fan Shelf Installation" procedure.

NOTE:
for a DDM-2000 OC-3/OC-12 combined bay application, the lightguide slack storage shelf is mounted with the top hole of the mounting brackets aligned with the third mounting hole up from the bottom of the bay. The DDM-2000 OC-12 shelf then mounts three inches above the slack storage shelf as shown in Figure 3-6 on page 3-51.

(2) Using the ohmmeter (optional) verify that the DDM-2000 OC-12 shelf is grounded to the bay frame.

(3) Install the required shelf brackets as shown in Figure 3-2 on page 3-47 and Figure 3-4 on page 3-49.

NOTE:
These brackets are required to hold the fiber protection channel in place.

(4) Install the required fiber protection channel for the optical fiber cables as shown in Figure 3-2 on page 3-47.

Fan Shelf Installation - Front Access

Description

Each fan shelf mounts directly above a DDM-2000 OC-12 shelf. Refer to Figure 3-5 on page 3-50 and Figure 3-6 on page 3-51. Perform the following procedure to install the fan shelf.

Procedure

(1) Remove the front cover by turning the two locking screws. Provision the fan shelf set point for 400 fpm (feet per minute) by setting the 4 position switch: set position 2 to OFF and positions 1, 3 and 4 to ON.

NOTE:
The RESET button on the Fan shelf must be depressed and held for a few seconds whenever these switch settings are changed after the Fan shelf has been powered.

(2) Connect and route a Group 148 fan shelf power cable assembly for front access as follows:

a. Unscrew the fan shelf slide plate by removing its five mounting screws along the bottom front.

b. Remove the four fan packs, starting with the middle two first, by removing the two mounting screws for each fan.

c. Remove the black HEYCO* bushing, surrounding the alarm cable, from the rear of the shelf. This is done by compressing the bushing and pulling forward.

d. Pull the slide plate forward.

e. Cut the cable ties securing the alarm cable running through the rear of the shelf and redress the cable through the cutout on the right side of the shelf.

f. Route the unconnectorized ends of the shelf power cable into the shelf through the cutout on the right side of the shelf and out of the shelf through the rear cutout.

g. Prepare the ends of the wires on the cable assembly and insert them into the terminal strip on the rear of the fan shelf according to the following:

Terminal Designation	Wire Color
-48 VA	Red
RTNA	Black
-48 VA	Green
RTNB	White

h. To insert the wires into the terminal strip, insert an object such as a small screwdriver into one of the holes on the rear of the terminal strip and press forward while simultaneously inserting the prepared wire into the corresponding hole on the top of the terminal strip. Removing the screwdriver should then cause the wire to be "grabbed" by the terminal strip.

i. Locate the grounding cable provided with the fan shelf and run the cable into the shelf through the cutout on the right side of the shelf and out of the shelf through the rear cutout. Connect the grounding cable to the ground lug on the left side of the rear of the shelf.

j. Tie down the alarm, power, and grounding cables using the cable ties provided with the shelf.

(3) Reassemble the fan shelf and reinstall the front cover.

(4) Place the HEYCO bushing around the power and grounding cables and reinsert it into the rear cutout.

(5) Mount the fan shelf in the bay above the DDM-2000 OC-12 shelf.

(6) Connect the loose end of the grounding cable to the frame, using the taptite screw provided with the fan shelf.

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* Registered trademark of HEYCO, Inc.

(7) Locate the filter provided with the fan shelf. Install the filter up against the bottom of the DDM-2000 OC-12 shelf located directly below this fan shelf per Figure 3-9 on page 3-54.

DS3 Cabling - Front Access

Description

This procedure describes how to connect the DS3 cables to the front access cables and route the cables out of the bay to the DS3 terminating equipment.

> **NOTE:**
> The DS3 cables used are dependent on the equipment that the DDM-2000 OC-12 will connect to (DACS V 2000, DACS III 2000, DSX-3, or FT-2000 OC-48), the cable length, and the number of center conductors required.

> **NOTE:**
> Refer to Tables 3-2, 3-3, and 3-4 on pages 3-32 though 3-36 and ED8C900-20 to determine the appropriate DS3 interface cables to be used.

> **NOTE:**
> DS3 interface cables per Table 3-1 on page 3-32 have been rated Discontinued Available (D. A.) which means they can no lo be ordered.

> **NOTE:**
> A 1735006A six conductor cable provides three DS3 IN and three DS3 OUT cables to accommodate one full muldem on the DDM-2000 OC-12 shelf. 734A, 735A, and KS-19224, L2 cables provide one DS3 IN cable and one DS3 OUT cable to accommodate a partially equipped muldem.

> ⚠ **CAUTION:**
> *New cable groups come assembled with a connector on each end. Cutting the cable to a shorter length and installing a new connector on the cable may result in cable quality substandard to that in the factory and subsequent service outages may occur. If a new connector must be installed, use the correct connector and proper crimp tool.*

⟹ **NOTE:**
Group 327 (D.A.) and 332 (D.A.) tables come with a second cable assembly of ED-7G001-23, Group 204 cable with a 219P connector on one end which is then spliced to the first assembly.

⟹ **NOTE:**
Perform the appropriate procedure depending on the cable group being installed.

DS3 Cabling

(1) All the DS3 cable assemblies can be used for any muldem. Connect the cables to the appropriate front access DS3 cables previously attached to the backplane DS3 front access cable connectors are J30-J35 (for muldem A), J36-J41 (for muldem B), J42-J47 (for muldem C), and J48-J53 (for muldem D).

(2) Route the cables out of the DDM-2000 OC-12 bay per Figure 3-8 on page 3-53, stacking the cables as shown in Figure 3-2 on page 3-47.

(3) Dress and tie the cables as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(4) Unless the cables are Group 327 (D.A.) or 332 (D.A.), route and connect the cables along the cable rack and into the terminating equipment bay.

(5) When installing Group 327 (D.A.) or 332 (D.A.) cables, perform the following cable preparation procedure before proceeding:

    a. Determine where to cut the 734A cable in the terminating equipment bay so that the ED-7G001-23 cable can be connected with enough slack to allow for dressing and avoidance of sharp bends.

    b. Cut the 734A cable to the required length. The ED-7G001-23, Group 204 cable is not to be modified. Both the 734A cable and 219P splice should be vertical in the terminating equipment bay to allow easy access to the 219A connector.

    c. Prepare the 734A cable for connecting to the 219A splice as shown in Figure 3-10 on page 3-55.

    d. Remove the outer shield of the 219P splice by removing the screw and sliding the shield along the ED-7G001-23, Group 204 cable.

    e. Using a soldering iron, connect the 734A cable to the 219A splice.

⟹ **NOTE:**
The 219A splice comes with a solder slug on it. This is the right amount of solder required; therefore, do not add to or remove from this splice. Hold the end of the 734A cable and the 219A splice horizontal during soldering; otherwise, the solder will run. Heat the solder by heating the metal underneath the solder slug, not the solder directly.

      f. When the solder joint is cooled, reconnect the 219A shield and return the 734A cable to its vertical position.

(6) Label the DS3 cables, indicating bay, shelf, muldem (A, B, C, or D), and direction (IN or OUT of the bay) at each end.

> **NOTE:**
> When cabling to a DSX, the DSX becomes an extention 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

Description

This procedure describes how to connect the fiber optic cables to the shelf and route the cables out of the bay to the lightguide cable interconnection equipment/module (LCIE/M) or *LGX*® optical cross-connection.

This procedure does not cover routing the optical fiber cable between central office locations.

Procedure

> **NOTE:**
> The optical fiber cables for front access and rear access are installed in the same manner.

(1) Perform the "Optical Fiber Cable Installation - Rear Access" procedure 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 on page 3-47.

Power Cable Installation - Front Access

Description

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 cables as shown in Figure 3-2 on page 3-47.

> **NOTE:**
>
> The front access interbay power cables are installed in the same manner as the rear access power cables, except that the Group 150 shelf power cable has been routed to the front of the shelf. This is also true for the Group 148 fan shelf power cable.

Office Alarm Cabling - Front Access

Description

> **NOTE:**
>
> This procedure should be performed if specified in the order.

Office alarms are the common method 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, this is the bottom shelf position, referred to as shelf 1. 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 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, perform "Intershelf Office Alarm Cabling Procedure".

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 24 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, then 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-12 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 3-6 on page 3-38.

- Office alarm connections are listed in Table 3-7 on page 3-39.

Office Alarms Connections

> ⇒ **NOTE:**
> Perform this procedure for the shelf being connected directly to the office alarms.

(1) Obtain a Group 234 or 235 office alarm cable listed in Table 3-7 on page 3-39.

(2) Connect to P263 of the Group 222 or 223 front access cable already connected to the shelf.

(3) Route the office alarm cable out of the DDM-2000 OC-12 bay to the office alarm panel stacking the cable as shown in Figure 3-2 on page 3-47.

(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 3-8 on page 3-39.

(7) Dress and secure the cable in the bay.

Intershelf Office Alarm Cabling

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

> ⇒ **NOTE:**
> 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.

OC-12 Intershelf Office Alarm Cabling

(1) Connect the Group 222 or 223 office alarm cable P263 of each shelf to the Group 224 or 225 office alarm mult cable J263 of each "lower" shelf per Figure 3-11 on page 3-56.

> ⇒ **NOTE:**
> These cables were previously connected to the backplanes and routed to the front of the shelves.

(2) Repeat for each additional shelf in the bay.

(3) Dress and secure all cables in the bay.

OC-3/OC-12 Bay Intershelf Office Alarm Cabling

(1) for a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) office alarms are to be multed to the DDM-2000 OC-12 shelf, connect the ED-8C727-21, Group 224 or Group 225 office alarm mult cable J256 of the DDM-2000 OC-12 shelf to the ED-8C724-21, Group 423 office alarm cable P256 of the DDM-2000 OC-3 shelf mounted directly above the DDM-2000 OC-12 shelf per Figure 3-12 on page 3-57.

> **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(2) Dress and secure all cables in the bay.

Parallel Telemetry Cabling - Front Access

> **NOTE:**
> Parallel telemetry is not available in OC-12, Release 7.

Description

> **NOTE:**
> Perform this procedure 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, and 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, then 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 3-5 on page 3-37.

■   Parallel telemetry connections are listed in Table 3-9 on page 3-40.

Telemetry Equipment Connections

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

(1) Obtain a Group 232 or 213 parallel telemetry cable listed in Table 3-7 on page 3-39.

(2) Connect the cable to P221 of the Group 218 or 219 front access cable, which is already connected to shelf 1.

(3) Route the parallel telemetry cable out of the DDM-2000 OC-12 bay to the telemetry system, stacking the cable as shown in Figure 3-2 on page 3-47.

(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 3-9 on page 3-40.

(6) Dress and secure the cable in the bay.

OC-12 Intershelf Parallel Telemetry Cabling

> **NOTE:**
> 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 connected to shelf 3, etc.

> **NOTE:**
> 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 Group 218 or 219 parallel telemetry cable P221 of each shelf to the Group 220 or 221 parallel telemetry mult cable J221 of the shelf below it per Figure 3-11 on page 3-56.

> **NOTE:**
> These cables were previously connected to the backplanes and routed to the front of the shelves.

(2) Repeat for each additional shelf in the bay.

(3) Dress and secure all cables in the bay.

OC-3/OC-12 Bay Intershelf Parallel Telemetry Cabling

(1) for a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) parallel telemetry is to be multed to the DDM-2000 OC-12 shelf, connect the ED-8C727-21, Group 220 parallel telemetry mult cable J254 of the DDM-2000 OC-12 shelf to the ED-8C724-21, Group 421 parallel telemetry cable P254 of the DDM-2000 OC-3 shelf mounted directly above the DDM-2000 OC-12 shelf per Figure 3-12 on page 3-57.

> **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(2) Dress and secure all cables in the bay.

TBOS Telemetry Cabling - Front Access

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

Description

> **NOTE:**
> Telemetry byte-oriented serial (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 equipment 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-12 shelves (a 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-12 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-12 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 in the description, a TBOS cable is required to be routed from the TBOS telemetry system to the DDM-2000 OC-12 bay to accommodate the maximum of three 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 in the "Intershelf Mult Cable Installation - Front Access" procedure.

Procedure

> **NOTE:**
> 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 cabled to the telemetry equipment.

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

(1) Connect a Group 157, 158, or 180 TBOS cable P262 to the Group 217 front access TBOS cable J262 previously connected to shelf 1.

> **NOTE:**
> If the DDM-2000 OC-12 shelf telemetry is being connected to a general teleme-try processor (GTP) shelf, a Group 195 or 196 cable is preferred. However, if using a Group 157 or 185 cable and the DDM-2000 OC-12 shelf telemetry is being connected to a GTP shelf, a Group 159 cable will need to be connected between J262 of the Group 217 front access cable and P262 of the Group 157 or 185 cable going to the GTP equipment. This cable contains a resistive circuit in one of its connectors to provide compatibility between the DDM-2000 OC-12 and the GTP.

(2) Route the TBOS cable out of the bay, stacking cables as shown in Figure 3-2 on page 3-47.

(3) Cut the TBOS cable to the desired length at the telemetry panel.

(4) Wire-wrap the loose end of the TBOS cable to the telemetry system, making connections as shown in Table 3-10 on page 3-41.

Intershelf Mult Cabling - Front Access

Description

The cable added in this procedure is to mult TBOS, CIT, and modem from other shelves in a bay to shelf 1. In this procedure shelf 1 will be connected to shelf 2, shelf 2 connected to shelf 3, etc.

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

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

OC-12 Intershelf TBOS, CIT, and Modem Cabling

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

(1) Connect the Group 226 or 227 TBOS mult cable J273 of each shelf to the Group 228 or 229 TBOS mult cable P273 of the shelf below it per Figure 3-13 on page 3-58.

> **NOTE:**
> These cables were previously connected to the backplanes and routed to the front of the shelves.

(2) Dress and secure all cables in the bay.

OC-3/OC-12 Bay Intershelf TBOS, CIT, and Modem Cabling

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

(1) for a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) TBOS, CIT and modem are to be multed to the DDM-2000 OC-12 shelf, connect from the DDM-2000 OC-12 shelf J73 with the ED-8C727-21, Group 228 TBOS, CIT, and Modem mult cable P258 to the ED-8C724-21, Group 425 TBOS, CIT, and modem cable J258 of the DDM-2000 OC-3 shelf J58 mounted directly above the DDM-2000 OC-3 shelf per Figure 3-14 on page 3-59.

> **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(2) Dress and secure all cables in the bay.

TL1/X.25 Interface Cabling - Front Access

Description

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-12 system status information and remote command capability.

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

> **NOTE:**
> Parallel telemetry is not available in OC-12, Release 7.

> **NOTE:**
> TL1/X.25 Interface telemetry is not available with DDM-2000 OC-12 Release 7.0.

Procedure

> **NOTE:**
> The TL1/X.25 interface telemetry requires that each shelf in the bay be cabled directly to the telemetry system.

(1) The TL1 interface cable installation procedure for front access and rear access is performed in the same manner, with the exception that the Group 165, 186 or 186 (D.A.) TL1 interface cable P261 connects to J261 of the (Group 214) front access cable instead of the OC-12 backplane. Refer to the "TL1/X.25 Interface Cabling - Rear Access" in the "Equipment and Rear Access Installation" section.

(2) Route the cables out of the bay, stacking cables as shown in Figure 3-2 on page 3-47.

(3) Cut the TL1 cables to the desired length at the TL1 equipment.

(4) Wire-wrap the loose end of the TL1 cables to the TL1 equipment, making connections as shown in Table 3-11 on page 3-41.

Miscellaneous Discrete Telemetry Cabling - Front Access

Description

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

The DDM-2000 OC-12 allows up to 14 (Releases prior to 5) or 20 (Releases 5 and 7) miscellaneous user-settable alarm status indications (SI) at the remote terminal for transmission toward the central office and four remote equipment switch (RS) inputs at the central office (CO) for transmission toward the remote terminal (RT).

Refer to Figure 3-15 on page 3-60 (Releases prior to 5) for a description of the external interconnection requirements for utilizing the miscellaneous discrete telemetry feature at a remote terminal or Figure 3-16 on page 3-61 (Releases prior to 5) at a central office. for Releases 5 and 7, refer to Figure 3-17 on page 3-62.

■ There is no multing of miscellaneous discrete telemetry cables.

■ This procedure should be performed for each shelf requiring miscellaneous discrete telemetry.

■ Miscellaneous discrete telemetry connections are listed in Table 3-12 on page 3-42 for Remote Terminal and Table 3-13 on page 3-43 for Central Office applications.

Procedure

(1) Obtain a Group 178 or 179 miscellaneous discrete telemetry cable.

(2) Connect the cable to connector J267 of the Group 230 front access cable for a central office (CO), or to connector J268 of the Group 231 front access cable for a remote terminal (RT).

(3) for remote terminal applications requiring more than 14 user definable environmental inputs (Releases 5 and 7), connect a second Group 178 or 179 cable to J267 (in addition to the Group 178 or 179 cable connected to J268).

(4) Route the cable out of the DDM-2000 OC-12 bay to a wire-wrap panel (or where connections can be made), stacking the cables as shown in Figure 3-2 on page 3-47.

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

(6) Wire-wrap the loose end of the miscellaneous discrete telemetry cable to the wire-wrap panel making connections as shown in Table 3-12 on page 3-42 and Table 3-13 on page 3-43 and Figures 3-15, 3-16 and 3-17 on pages 3-60 through 3-62.

➡ **NOTE:**
Each miscellaneous discrete telemetry designation is connected to the DDM-2000 OC-12 by two leads (wires).

➡ **NOTE:**
for each input, connect one lead to input-common and the other lead to the appropriate alarm indication.

➡ **NOTE:**
for each output, connect one lead to output-common and the other lead to the appropriate alarm indication.

(7) Clearly label the use of each discrete input/output on the panel.

(8) Dress and secure all cables in the bay.

DS1 Timing Cabling - Front Access

Description

The following procedure is required for cabling to a DS1 external timing source for synchronous operation.

➡ **NOTE:**
for shelves equipped with BBF2B/BBF4 timing circuit packs that are provisioned for deriving sync input timing from the incoming OC-12 optical line, skip this procedure and continue with "DS1 Timing Cable Installation for Sync Input - Front Access".

There are two options for cabling DS1 timing:

- Cable directly to the DS1 timing equipment
- Cable to another shelf.

Unless otherwise specified, shelf 1 (bottom shelf) should be cabled directly to the DS1 timing equipment. To do this perform "Procedure for Shelf 1".

All the other shelves in the same bay should be part of a daisy chain connecting to shelf 1. for shelves, other than shelf 1, perform "Procedure for Other Shelves".

DS1 Timing Cabling for Shelf 1

> **NOTE:**
> The DS1 timing procedure for shelf 1 for front access and rear access is performed in the same manner, with the exception that the Group 151, 152, or 153,DS1 timing cable P266 connects to J266 of the Group 210 or 211 front access cable instead of the backplane. Refer to "DS1 Timing Cable Installation - Rear Access" in the "Equipment and Rear Access Cable Installation" section.

(1) Route the cable out of the bay, stacking cables as shown in Figure 3-2 on page 3-47.

(2) Cut the DS1 timing cable to the desired length at the DS1 reference clock.

(3) Wire-wrap the loose end of the DS1 timing cable to the DS1 reference clock, making connections as shown in Table 3-14 on page 3-441.

OC-12 Intershelf DS1 Timing Cabling

> **NOTE:**
> Perform this procedure when shelf 1 in the same bay will 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 connected to shelf 3, etc.

> **NOTE:**
> 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 Group 210 or 211 DS1 timing cable of each shelf J266 to the Group 212 or 213 DS1 timing mult cable P266 of each "lower" shelf per Figure 3-18 on page 3-63.

> **NOTE:**
> These cables were previously connected to the backplanes and routed to the front of the shelves.

(2) Repeat for each additional shelf in the bay.

(3) Dress and secure all cables in the bay.

OC-3/OC-12 Bay Intershelf DS1 Timing Cabling

(1) for a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) DS1 timing is to be multed to the DDM-2000 OC-12 shelf, connect the ED-8C727-21, Group 210 or 212 DS1 timing mult cable P237 of the DDM-2000 OC-12 shelf to the ED-8C724-21, Group 414 DS1 timing cable J237 of the DDM-2000 OC-3 shelf mounted directly above the DDM-2000 OC-12 shelf per Figure 3-19 on page 3-64.

⇒ **NOTE:**
> Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(2) Dress and secure all cables in the bay.

DS1 Timing Cabling for Sync Input - Front Access

Description

Perform the following procedure for shelves equipped with BBF2B timing circuit packs. These circuit packs are provisioned for deriving sync input timing from the incoming OC-12 optical line.

⇒ **NOTE:**
> DS1 timing cable options are listed in Table 3-5 on page 3-37. DS1 timing connections are listed in Table 3-14 on page 3-44.

Timing Source for Sync Input Connections

⇒ **NOTE:**
> The cabling from the DS1 reference clock timing source should connect to the bottom shelf in the bay. Other DDM-2000 OC-12 shelves in the bay are daisy-chained up from the bottom shelf.

(1) Obtain an ED-8C724-20, Group 394 DS1 timing cable and connect to J266 of the Group 210 front access cable of the DDM-2000 OC-12 shelf that will be receiving DS1 timing on it's incoming OC-12 optical fiber.

> ⇒ **NOTE:**
> for bays containing multiple shelves that will have DS1 timing multed between the shelves, the shelf that will be providing sync to the reference clock should be mounted at the bottom of the bay.

(2) Obtain a Group 151, 152, 182, 183 or 153 (D.A.) DS1 timing cable listed in Table 3-6 on page 3-38 and connect it to J266 of the Group 394 cable connected in the last step.

(3) Route the timing cable out of the DDM-2000 OC-12 bay per Figure 3-20 on page 3-65 or Figure 3-21 on page 3-66 to the DS1 timing reference, stacking the cables as shown in Figure 3-2 on page 3-47.

(4) Dress and tie the cables in the bay and as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(5) . If the bottom shelf (shelf 1) position is unequipped for future growth, leave enough cable to allow moving the cable down to the bottom position when the shelf is eventually added.

(6) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 3-14 on page 3-44.

(7) Obtain an ED-8C724-21, Group 458 DS1 timing cable and connect it to P266 of the Group 212 front access cable of the same shelf.

(8) Wire-wrap the loose end of this DS1 timing cable to the sync input of the DS1 reference clock making connections as shown in Table 3-14 on page 3-44.

OC-12 Intershelf DS1 Timing Connections

> ⇒ **NOTE:**
> Perform this procedure to daisy chain the timing for the remaining shelves in the bay and to connect them to the same DS1 reference clock as the shelf that is providing the synchronous timing.

> ⇒ **NOTE:**
> for DS1 timing to be delivered to all shelves in the bay, DS1 timing cable mults from shelf to shelf must be daisy chained down to the bottom shelf. Do not skip any shelves.

(1) Obtain a Group 151, 152, 182, 183, or 153 (D.A.) DS1 timing cable listed in Table 3-6 on page 3-38 and connect it to J266 of the Group 210 front access cable of the 2nd shelf up from the bottom of the bay per Figure 3-21 on page 3-66.

(2) Route the timing cable out of the DDM-2000 OC-12 bay to the same DS1 timing reference that is connected to the bottom shelf, stacking the cables as shown in Figure 3-3 on page 3-48 or Figure 3-4 on page 3-49.

(3) Dress and tie the cables in the bay as close to the DDM-2000 OC-12 backplane as possible without touching any backplane pins.

(4) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 3-14 on page 3-44.

(5) Connect J266 of the Group 210 or 211 front access timing cable of this shelf to P266 of the Group 212 or 213 front access timing cable P266 of the DDM-2000 OC-12 shelf directly above it per Figure 3-21 on page 3-66.

(6) Dress and tie the cables in the bay as close to the backplane as possible without touching any backplane.

OC-3/OC-12 Bay Intershelf DS1 Timing Cabling

(1) Obtain an ED-8C724-20, Group 339, 340, 530, 531, or 341 (D.A.) DS1 timing cable and connect it to J237 of the front access timing cable of the bottom DDM-2000 OC-3 shelf in the bay per Figure 3-22 on page 3-67.

(2) Route the timing cable out of the bay to the same DS1 timing reference that is connected to the DDM-2000 OC-12 shelf, stacking the cables as shown in Figure 3-3 on page 3-48 or Figure 3-4 on page 3-49.

(3) Dress and tie the cables in the bay as close to the DDM-2000 OC-3 backplane as possible without touching any backplane pins.

(4) Cut the cable to the desired length and wire-wrap the loose end of the DS1 timing cable to the output of the DS1 reference clock making connections as shown in Table 3-14 on page 3-44.

(5) Connect P237 of the Group 415 front access timing cable of this shelf to J237 of the Group 414 of the DDM-2000 OC-3 shelf directly above it.

(6) Repeat the previous step for any additional DDM-2000 OC-3 shelves in the bay.

(7) Dress and tie the cables as close to the backplane as possible without touching any backplane pins.

Modem Cabling - Front Access

Description

The use of a modem will allow the DDM-2000 OC-12 Multiplexer to be accessed remotely.

> **NOTE:**
> Connection to the modem port does not require the use of a null modem.

Modem Cabling - Shelf 1

> **NOTE:**
> The modem cable installation procedure for shelf 1 for front access and rear access is performed in the same manner, with the exception that the Group 189, 190, or 173 (D.A.) modem interface cable P260 connects to J260 of the Group 216 front access cable instead of the backplane. Refer to Modem Cable Installation - Rear Access" in the "Equipment and Rear Access Cable Installation" section.

(1) Route the cables out of the bay, stacking cables as shown in Figure 3-2 on page 3-47.

(2) Connect the other end of the modem cable to a modem or distribution frame (DS) as specified in the order.

Modem Cabling - Other Shelves

> **NOTE:**
> TBOS is not available in OC-12, Release 7.

> **NOTE:**
> Perform this procedure only if it is desired to mult modem and CIT without mult-ing TBOS between shelves.

> **NOTE:**
> If TBOS is to be multed as well as modem and CIT, this has been done in the "Procedure for Other Shelves" portion of the "TBOS Telemetry Cable Installation - Front Access" procedure.

⇒ **NOTE:**
For CIT and modem in a shelf other than shelf 1 to be accessible, all CIT and modem mults between that shelf and shelf 1 must be in place. Do not skip any shelves.

OC-12 Intershelf CIT and Modem Without TBOS Cabling

⇒ **NOTE:**
TBOS is not available in OC-12, Release 7.

(1) Connect the Group 226, 227, 228, or 229 TBOS mult cable J258A of each shelf to P258A of a ED-8C724-21, Group 427 mult w/o TBOS cable.

(2) Connect the other end of the ED-8C724-21, Group 427 mult w/o TBOS cable J258A to P258A on the Group 228 or 229 TBOS mult cable of the shelf below it per Figure 3-6 on page 3-51.

(3) The TBOS mult front access cables were previously connected to the backplanes and routed to the front of the shelves.

(4) Repeat for each additional shelf in the bay.

(5) Dress and secure all cables in the bay.

OC-3/OC-12 Bay Intershelf CIT and Modem Without TBOS Cabling

⇒ **NOTE:**
TBOS is not available in OC-12, Release 7.

(1) for a DDM-2000 OC-3/OC-12 combined bay application where the DDM-2000 OC-3 shelf (or shelves) CIT and modem without TBOS is to be multed to the DDM-2000 OC-12 shelf, obtain an ED-8C724-21, Group 427 mult without TBOS cable listed in Table 3-6 on page 3-38.

(2) Connect the ED-8C727-21, Group 228 or 229TBOS mult cable P258A of the DDM-2000 OC-12 shelf to J258A of the ED-8C724-21, Group 427 mult without TBOS cable.

(3) Connect P258A (on the other end of the ED-8C724-21, Group 427 mult without TBOS cable) to the ED-8C724-21 Group 425TBOS cable J258A of the DDM-2000 OC-3 shelf mounted directly above the DDM-2000 OC-3 shelf mounted directly above the DDM-2000 OC-12 shelf per Figure 3-14 on page 3-59.

⇒ **NOTE:**
Multing between additional DDM-2000 OC-3 shelves in the bay is covered in 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual*.

(4) Dress and secure all cables in the bay.

Order Wire Interface Cabling - Front Access

Description

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-12 system.

Procedure

(1) Connect a Group 167 or ED8C724-22, Group 31 order wire cable P20 to the Group 215 front access order wire cable J220 previously connected to the shelf.

(2) Route the cable to the orderwire interface. Stack the cables in the bay duct as shown in Figure 3-2 on page 3-47.

(3) Wire-wrap the unterminated end of the cable assembly to the order wire interface. Refer to Table 3-15 on page 3-44.

Fan Shelf Alarm Connections - Front Access

Description

The DDM-2000 OC-12 fan shelf is optionally provided, as required. An alarm indication is generated by the fan shelf in the event of a functional failure. This alarm can be input to the DDM-2000 OC-12 shelf as a miscellaneous discrete indication (miscellaneous discrete #14).

Procedure

The fan shelf alarm output should connect to the DDM-2000 OC-12 shelf located below the fan shelf. This connection may be made in one of two ways:

(1) If no other miscellaneous discrete inputs are being connected to the DDM-2000 OC-12 shelf, connect a Group 149 cable between the J1 connector on the fan shelf alarm cable and J268 of the Group 231 miscellaneous discrete front access cable of the DDM-2000 OC-12 shelf.

(2) If other miscellaneous discrete inputs in addition to the fan shelf alarm are being connected to the DDM-2000 OC-12 shelf, connect a Group 181 or Group 147 (D.A.) cable between the J1 connector on the fan shelf alarm cable and the appropriate wires on the Group 178 or 179 (D.A.) miscellaneous discrete cable via a miscellaneous terminal strip, in accordance with information provided in the job specification. Refer to Fan Shelf alarm connections per Table 3-16 on page 3-44 and the "Miscellaneous Discrete Telemetry Cable Installation" procedure.

Final Operations

Procedure

(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 designation where cables were wire-wrapped are properly labeled.

Table 3-1   DS3 Cable Assemblies

Description (Note 1)	ED-8C724-20 Group	Cable Length (ft.) (Note 2)	Cable Type (Note 3)	Other End Connector (Note 4)
To DSX-3 or FT-2000 OC-48†	335 (D.A.)*	150	1735006A	KS-23558,L6 BNC
	336 (D.A.)*	250 (max.)		
	333 (D.A.)*	150	735A	
	334 (D.A.)*	250 (max.)		
	338	150	KS-19224, L2	KS-23558,L4 BNC
	337	450 (max.)	734A/735A	KS-23558,L5 BNC
To DACS III-2000	330 (D.A.)*	150	1735006A	9821AE
	331 (D.A.)*	500 (max.)		
	328 (D.A.)*	150	735A	
	329 (D.A.)*	500 (max.)		
	332 (D.A.)*	900 (max.)	734A/735A	‡
To DACS IV-2000	325 (D.A.)*	150	1735006A	9821EA & 9821FA
	326 (D.A.)*	500 (max.)		
	323 (D.A.)*	150	735A	
	324 (D.A.)*	500 (max.)		
	327 (D.A.)*	900 (max.)	734A/735A	**

Table 3-1 Notes:

1. All the DS3 cable assemblies can be used for any muldem. DDM-2000 OC-12 DS3 backplane connectors are J30-J35 (for muldem A), J36-J41 (for muldem B), J42-J47 (for muldem C), and J48-J53 (for muldem D).

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 IN and three DS3 OUT cables to accommodate one full muldem on the DDM-2000 OC-12 shelf. 734A, 735A, and KS-19224, L2 cables provide one DS3 IN cable and one DS3 OUT cable to accommodate a partially equipped muldem.

4. All the Group 323 to 338 cables have a BNC KS-23626, L6 connector on one end except Group 338 which has a BNC KS-23626, L4 connector on one end.

* Discontinued Availability (D.A.) means cable can no longer ordered.

† 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 332 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 an 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 327 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.

See Notice on first page

Table 3-2   ED8C900-20 DS3 Cable Assemblies

Application (Note 1)	Length Per Table 2-2* Column	Factory Term. Groups†	Cable Type (Note 2)	Connectors Types	Cables Per Muldm	Cables per Shelf
DSX-3 or FT-2000	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
OC-48	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LA	734D		6	24
DACS III-2000						
With BNC Interconnect Shelf	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LB	734D	9821AE to Right Angle BNC	6	24
Without BNC Interconnect Shelf	1A	AC, LB	735A		6	24
	2A	6BC, 6LB	1735006A		1	6
	4A	DBD, LCD	735A-734D-735A		6	24
DACS IV-2000						
With BNC Interconnect Shelf	1A	AB, LA	735A	Straight BNC to Right Angle BNC	6	24
	2A	6BB, 6LA	1735006A		1	6
	4A	DBD, 1LA	735A-734D		6	24
	4A	DB, 1LA	734D		6	24
Without BNC Interconnect Shelf	1A	AE, LB	735A	9821FA/ 9821AE to Right Angle BNC	3	12
		AD, LB			3	12
	2A	6BJ, 6LB	1735006A		1	6
	4A	DBD, LED	735A-734D-735A	9821AE to Right Angle BNC	3	12
		DBD, LDD			3	12

Table 3-2 Notes:

1. All the DS3 cable assemblies can be used for any muldem. The OC-12 DS3 backplane connectors are J30-J35 (for muldem A), J36-J41 (for muldem B), J42-J47 (for muldem C), and J48-J53 (for muldem D).

* 1A, 2A and 4A refer to Table 2-3 columns on Pages 2-35 and 2-36 providing the cable lenghts and associated Cable Group numbers. This information is also shown on ED8C900-20.

† This column lists the ED8C900-20 Groups for factory terminations at each end of the cable.

Table 3-3   ED8C900-20 DS3 Cable Groups

Length (ft.)	1A Cable Groups 735A Cable	2A Cable Groups 1735006A Cable	4A Cable Groups 735D Cable
75	1	101	301
100	2	102	302
150	3	103	303
250	4	104	304
AS REQ'D	5	105	305
40	6	106	306
50	7	107	307
60	8	108	308
80	9	109	309
120	11	111	311
140	13	113	313
160	14	114	314
180	16	116	316
200	18	118	318
220	20	120	320
240	22	122	322
3	23	123	323
10	24	124	324
20	25	125	325
30	26	126	326
260	27	127	327
280	28	128	328
300	29	129	329
320	30	130	330
340	31	131	331
360	32	132	332
380	33	133	333
400	34	134	334
420	35	135	335
440	36	136	336

Table 3-3   ED8C900-20 DS3 Cable Groups (Continued)

Length (ft.)	1A Cable Groups 735A Cable	2A Cable Groups 1735006A Cable	4A Cable Groups 735D Cable
460	37	137	337
480	38	138	338
500	39	139	339
550			340
600			341
650			342
700			343
750			344
800			345
850			346
900			347

Note 1

When loose BNC Connectors are required, the following numbers should be used:

KS23558L15	407068782	734D Straight BNC
KS23626L15	407068816	734D Right Angle BNC
KS23558L16	407068790	735A Straight BNC
KS236626L16	407068824	735A Right Angle BNC

Table 3-4   Front Access DS3 Cable Assemblies

Description	ED-8C727-21 Group	Cable Length (ft.)	Cable Connector (to Backplane)	Other End Connector
Cable From OC-12 Backplane To Front of Shelf MULDEM A	201	3' 4"	P30	J30-1A
			P31	J31-2A
			P32	J32-3A
			P33	J33-1A
			P34	J34-2A
			P35	J35-3A
Cable From OC-12 Backplane To Front of Shelf MULDEM B	202	3.5	P36	J36-1B
			P37	J37-2B
			P38	J38-3B
			P39	J39-1B
			P40	J40-2B
			P41	J41-3B
Cable From OC-12 Backplane To Front of Shelf MULDEM C	203	2' 11"	P42	J42-1C
			P43	J43-2C
			P44	J44-3C
			P45	J45-1C
			P46	J46-2C
			P47	J47-3C
Cable From OC-12 Backplane To Front of Shelf MULDEM D	204	2' 9"	P48	J48-1D
			P49	J49-2D
			P50	J50-3D
			P51	J51-1D
			P52	J52-2D
			P53	J53-3D

Table 3-5   Front Access Shelf Cable Assemblies

Description	ED-8C727-21 Group	Cable Length (ft.) (Note 1)	Cable Connector (to OC-12 Backplane)	Other End Connector
DS1 Timing	210	3' 5"	P66	J266
	211 (D.A.)[4]	As Reqd.		
DS1 Timing Reference to Additional OC-3 Shelf	ED-8C724-21 Group 415	2' 4"	J44 OC-3 Shelf	P237
DS1 Timing Reference to Additional OC-3 Shelf	ED-8C724-21 Group 414	2' 4"	J37 OC-3 Shelf	P237
TL1/X.25 Interface	214 (D.A.)[4]	3	P61	J261
	ED8C727-20 Group 167			
Order Wire	215	1	P20	J220
Modem	216	2' 5"	P60	J260
TBOS[1]	217	3' 2"	P62	J262
Parallel Telemetry [2]	218	2' 10"	P21	P221
	219 (D.A.)[4]	As Reqd.		
Office Alarms	222	3' 3"	P63	P263
	223 (D.A.)[4]	As Reqd.		
Misc. Discrete for RT	230	2' 11"	P68	J268
Misc. Discrete for CO	231	2' 10"	P67	J267

Table 3-5 Notes:

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

2. TBOS is not available in OC-12, Release 7

3. Parallel telemetry is not available in OC-12, Release 7.

4. Discontinued Availability (D.A.) means cable can no longer be ordered.

Table 3-6   Front Access Mult Cable Assemblies

Description	ED-8C727-21 Group	Cable Length (ft.) (Note)	Cable Connector (to OC-12 Backplane)	Other End Connector (To Mating Cable)
DS1 Timing Mult.	212	4' 4"	P65	P266
	213 (D.A.)[2]	As Reqd.		
Sync Input Timing	ED-8C724-20 Group 394	3	P266 *	J266/J237
Parallel Telemetry** Mult.	220	4' 1"	P22	J221
	221 (D.A.)[2]	As Reqd.		
Office Alarms Mult.	224	4	P64	J263
	225 (D.A.)[2]	As Reqd.		
TBOS‡ Mult.	226	2' 8"	P72	J273/J258A
	227 (D.A.)[2]	As Reqd.		
TBOS‡ Mult.	228	3' 10"	P73	P273/P258A
	229 (D.A.)[2]	As Reqd.		
Mult w/o TBOS‡	ED-8C724-20 Group 427	5"	P258A†	J258A

Table 3-6 Notes:

*   The ED-8C724-20, Group 394 sync input timing cable is required ONLY if the DDM-2000 OC-12 shelf is equipped with BBF2B/BBF4 circuit packs configured for providing a sync output for the BITS clock. The BBF2B/BBF4 circuit packs are externally timed to a DS1 reference. The Group 394 cable connects to J266 of the Group 210 cable on the DDM-2000 OC-12 shelf in series with the cable that is providing the incoming external reference signal.

†   This cable does not connect to the backplane. It is used between the TBOS mult cables, when CIT and modem are to be multed without TBOS.

‡   TBOS is not available in OC-12, Release 7.

** Parallel telemetry is not available in OC-12, Release 7.

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

2. Discontinued Availability (D.A.) means cable can no longer ordered.

Table 3-7   Front Access Interbay Cable Assemblies

Description	ED-8C727-21 Group	Cable Length (ft.)[1]	Cable Type[2]	DDM-2000 OC-12 Connections
Parallel Telemetry[3] -for Lowest Shelf	232	150	807AS	P221 of Group 218 or 219 Parallel Telemetry Front Access Cable
	227 (D.A.)[4]	As Reqd.		
Office Alarms - for Lowest Shelf	234	150	816AS	P263 of Group 222 or 223 Office Alarms Front Access Cable
	235 (D.A.)[4]	As Reqd.		
DS1 Timing Reference	ED-8C724-21 Group 458	As Reqd.	BF	P266 of Group 212*

Table 3-7 Notes:

*   Only used when the DDM-2000 OC-12 shelf is providing sync timing derived from the incoming OC-12 optical line via the BBF2B/BBF4 timing circuit packs.

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

2. All cables are 26 gauge.

3. Parallel telemetry is not available in OC-12, Release 7.

4. Discontinued Availability (D.A.) means cable can no longer ordered.

Table 3-8   Office Alarm Connections

Name	Desig.	Conn.	Term	Color
Minor Alarm Visible	MNV	J263	1	BL-W
Minor Alarm Visible Return	MNVR		14	W-BL
Minor Alarm Audible	MN		2	O-W
Minor Alarm Audible Return	MNR		15	W-O
Major Alarm Visible	MJV		3	G-W
Major Alarm Visible Return	MJVR		16	W-G
Major Alarm Audible	MJ		4	BR-W
Major Alarm Audible Return	MJR		17	W-BR
Critical Alarm Visible	CRV		5	S-W
Critical Alarm Visible Return	CRVR		18	W-S
Critical Alarm Audible	CR		6	BL-R
Critical Alarm Audible Return	CRR		19	R-BL

Table 3-8 Notes:

1. The SYSCTL pack reports office alarms.

2. The office alarm cable is 26 gauge.

3. Ground all shielded cables at the customer equipment end.

4. Some cables may be manufactured using wires following old color code standards.
   A color code cross-reference is located in Table 3-14 on page 3-44.

Table 3-9   Parallel Telemetry* Connections

Name	Desig.	Conn.	Term	Color
ACO Control - Output	ACO-O	J221	4	BR-W
ACO Control - Input	ACO-I		22	R-BR
Output - Common	COM-O		20	R-O
Critical Alarm	CR		8	G-R
Major Alarm	MJ		7	O-R
Minor Alarm	MN		6	BL-R
Power Minor Alarm	PMN		5	S-W
Near End Status	NE		21	R-G
Carrier Line Failure Status	CLF		2	O-W
Incoming Status	INCM		1	BL-W
Shelf Identifier - Shelf 1	SID1		3	G-W
Shelf Identifier - Shelf 2	SID2		12	O-BK
Shelf Identifier - Shelf 3	SID3		11	BL-BK
Shelf Identifier - Shelf 4	SID4		10	S-R
Shelf Identifier - Shelf 5	SID5		9	BR-R
Shelf Identifier - Shelf 6	SID6		25	BK-O
Shelf Identifier - Shelf 7	SID7		24	BK-BL
Input - Common	COM-I		23	R-S
Far End Site ID - Site 1	FE1		19	R-BL
Far End Site ID - Site 2	FE2		18	W-S
Far End Site ID - Site 3	FE3		17	W-BR
Far End Site ID - Site 4	FE4		16	W-G
Far End Site ID - Site 5	FE5		15	W-O
Far End Site ID - Site 6	FE6		14	W-BL

Table 3-9 Notes:

* Parallel telemetry is not available in OC-12, Release 7.

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. Ground all shielded cables at the customer equipment end.

5. Some cables may be manufactured using wires following old color code standards. A color code cross-reference is located in Table 3-15 on page 3-44.

Table 3-10 TBOS* Serial Telemetry Connections

Name	Desig.	Conn.	Term	Color
Transmitted True Data To Telem. Equip.	TDP	J262	2	O-W
Transmitted Inverted Data To Telem. Equip.	TDN		7	W-O
Received True Data To Telem. Equip	RDP		1	BL-W
Received Inverted Data To Telem. Equip.	RDN		6	W-BL

Table 3-10 Notes:

*   TBOS is not available in OC-12, Release 7.

1. The TBOS telemetry cable is 26 gauge.

2. Ground all shielded cables at the customer equipment end.

Table 3-11 TL1/X.25 Interface Connections

Name	Desig.	Conn.	Term	Color
Transmitted Data	TDA	J261	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	W-BR
Ring Indicator	RID		22	R-BL

Table 3-11 Notes:

1. The TL1 interface cable is 26 gauge.

2. Ground all shielded cables at the customer equipment end.

Table 3-12   Miscellaneous Discrete Telemetry Connections

Remote Terminal (All Releases)			Remote Terminal Additional Environmental Inputs (Releases 5 and 7)				
Name	**Desig.**	**Conn.**	**Name**	**Desig.**	**Conn.**	**Term**	**Color**
Minor Alarm	MN	J268	Env. Input - #20	TLMI-20	J267	2	O-W
Power Minor Alarm	PMNT-IN					9	BR-R
Fan Control	FAN-CTL					25	BK-O
Input-Common	-48RET		Input-Common	TLMI-C		18	W-S
Env. Input - #1	TLMI-1					22	R-BR
Env. Input - #2	TLMI-2					21	R-G
Env. Input - #3	TLMI-3					20	R-O
Env. Input - #4	TLMI-4					19	R-BL
Env. Input - #5	TLMI-5					17	W-BR
Env. Input - #6	TLMI-6					16	W-G
Env. Input - #7	TLMI-7					15	W-O
Env. Input - #8	TLMI-8					14	W-BL
Env. Input - #9	TLMI-9					8	G-R
Env. Input - #10	TLMI-10					7	O-R
Env. Input - #11	TLMI-11		Env. Input - #16	TLMI-16		6	BL-R
Env. Input - #12	TLMI-12		Env. Input - #17	TLMI-17		5	S-W
Env. Input - #13	TLMI-13		Env. Input - #18	TLMI-18		4	BR-W
Env. Input - #14	TLMI-14		Env. Input - #19	TLMI-19		3	G-W
Output - Common	TLMO-C					24	BK-BL
Env. Output - #1	TLMO-1					23	R-S
Env. Output - #2	TLMO-2					12	O-BK
Env. Output - #3	TLMO-3					11	BL-BK
Env. Output - #4	TLMO-4					10	S-R
No Connection	NC		Env. Input - #21	TLMI-21		1	BL-W

Table 3-12 Notes:

1. The designation "NC" means no connection.

2. Inputs to the minor alarm and power minor alarm connections are normally derived from the -48 volt alarm outputs of a SLC® Series 5 Carrier System power shelf. An external ground must be connected to Output-Common to access the alarm. Refer to Figure 3-15 on page 3-60 (Releases prior to 5) or Figure 3-17 on page 3-62 (Releases 5 and 7).

3. The external inputs to the miscellaneous discretes are a contact closure and are connected to the DDM-2000 OC-12 by two leads (wires). for each of the miscellaneous inputs 1 through 15 that are being used, connect one lead to input-common (-48RET) and the other lead to the appropriate alarm designation (TLMI-X). Refer to Figure 3-15 on page 3-60 (Releases prior to 5) or Figure 3-17 on page 3-62 (Releases 5 and 7).

4. For each output, connect one lead to output-common and the other lead to the appropriate alarm designation.

Table 3-13   Miscellaneous Discrete Telemetry Connections (CO)

Central Office (Releases prior to 5)			Central Office (Releases 5 and 7)				
Name	**Desig.**	**Conn.**	**Name**	**Desig.**	**Conn.**	**Term**	**Color**
Env. Output - #15	TLMO-15	J267			J267	2	O-W
No Connection	NC		No Connection	NC		9	BR-R
No Connection	NC		No Connection	NC		25	BK-O
Input-Common	TLMI-C		Input-Common	TLMI-C		18	W-S
Env. Input - #1	TLMI-1		Env. Input - #1	TLMI-1		22	R-BR
Env. Input - #2	TLMI-2		Env. Input - #2	TLMI-2		21	R-G
Env. Input - #3	TLMI-3		Env. Input - #3	TLMI-3		20	R-O
Env. Input - #4	TLMI-4		Env. Input - #4	TLMI-4		19	R-BL
Env. Output - #5	TLMO-5		Env. Output - #5	TLMO-5		17	W-BR
Env. Output - #6	TLMO-6		Env. Output - #6	TLMO-6		16	W-G
Env. Output - #7	TLMO-7		Env. Output - #7	TLMO-7		15	W-O
Env. Output - #8	TLMO-8		Env. Output - #8	TLMO-8		14	W-BL
Env. Output - #9	TLMO-9		Env. Output - #9	TLMO-9		8	G-R
Env. Output - #10	TLMO-10		Env. Output - #10	TLMO-10		7	O-R
Env. Output - #11	TLMO-11					6	BL-R
Env. Output - #12	TLMO-12					5	S-W
Env. Output - #13	TLMO-13					4	BR-W
Env. Output - #14	TLMO-14					3	G-W
Output - Common	TLMO-C		Output - Common	TLMO-C		24	BK-BL
Env. Output - #1	TLMO-1		Env. Output - #1	TLMO-1		23	R-S
Env. Output - #2	TLMO-2		Env. Output - #2	TLMO-2		12	O-BK
Env. Output - #3	TLMO-3		Env. Output - #3	TLMO-3		11	BL-BK
Env. Output - #4	TLMO-4		Env. Output - #4	TLMO-4		10	S-R
No Connection	NC					1	BL-W

Table 3-13 Notes:

1. For each output, connect one lead to output-common and the other lead to the appropriate alarm desig-
   nation. Refer to Figure 3-16 on page 3-61 (Releases prior to 5) or Figure 3-17 on page 3-62 (Releases 5
   and 7).

Table 3-14   DS1 Timing Reference Connections

Name	Desig.	Conn.	Term	Color
Received from Primary DS1 Reference	T R	J266	6 1	BK O
Received from Secondary DS1 Reference	T R		7 2	R G

Table 3-14 Notes:

1. The DS1 timing cable is 22 gauge.

2. Ground all shielded cables at the customer equipment end.

Table 3-15   Order Wire Interface Connections

Name	Desig.	DDM Conn.	Term	Color	Dantel Pin #
Received Data	RDAO RCKO	J220	1 6	BL-W W-BL	43 45
Transmitted Data	TDAO TCKO		2 7	O-W W-O	47 51
Ground	GND		3	G	29

Table 3-15 Notes:

1. The order wire interface cable is 26 gauge.

2. Ground all shielded cables at the customer equipment end.

Table 3-16   Fan Shelf Alarm Connections

| Designation	Conn.	Terminal	Wire Color of Group 147 Cable
TLM-14		4	BL-W
TLM-OC	J1	5	BR-W
-48RET		8	W-BL

Table 3-16 Notes:

Ground all shielded cables at the customer equipment end.

Table 3-17   Color Code Cross-Reference

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	BR2BS2BK	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

Table 3-17 Notes:

Some cables may be manufactured using wires following old color code standards. This table provides a color code cross-reference.
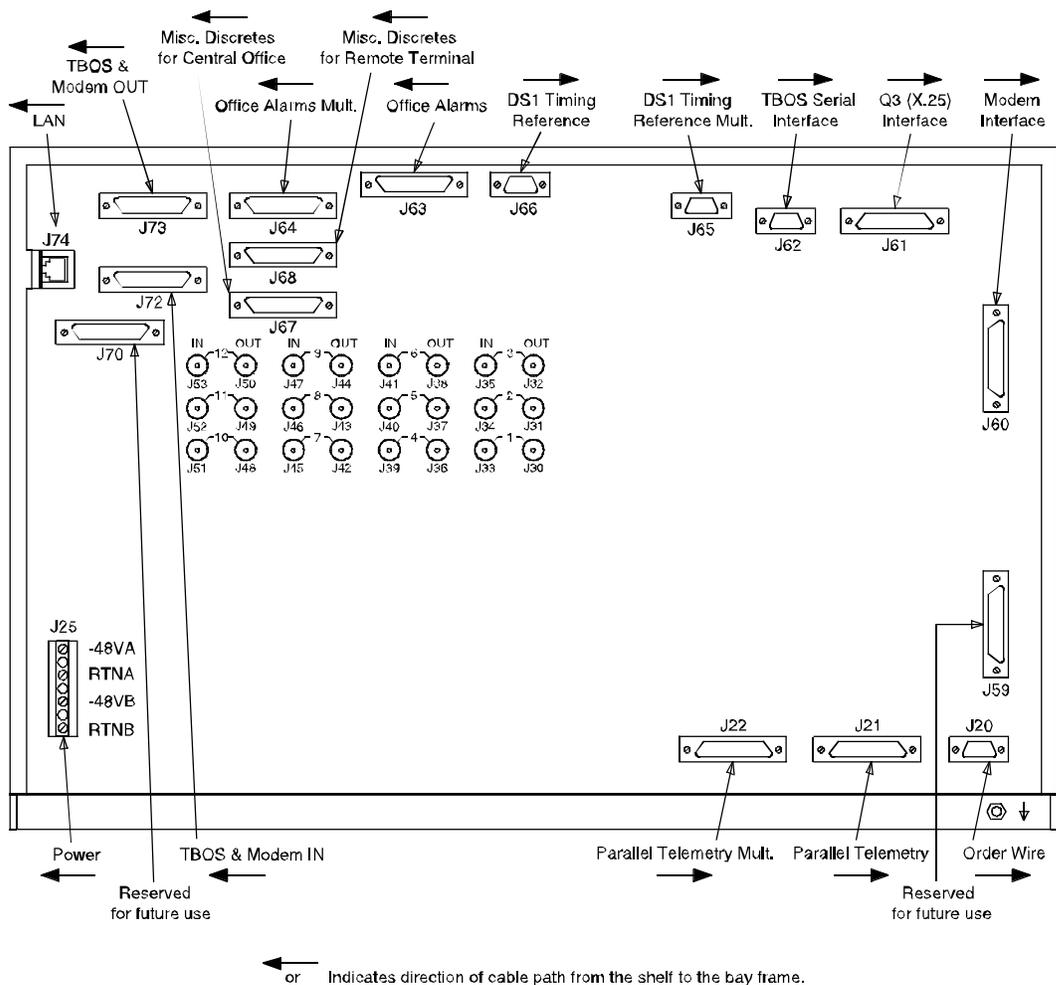
Note: All cables connected to backplane dress in the direction indicated, and then downward, to be routed beneath the shelf.

Figure 3-1.   DDM-2000 OC-12 Backplane
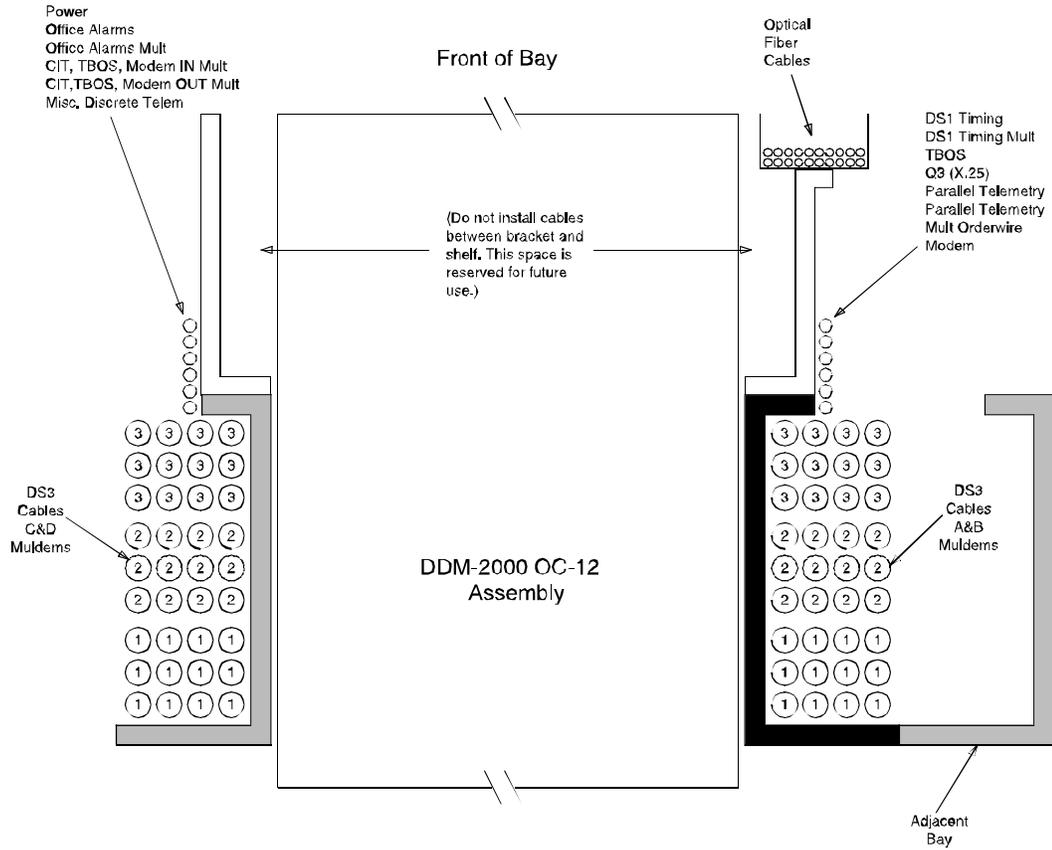
Note: The cabling stacking order is shown in the figure. The numbers on the cables indicate the shelf associated with that cable.

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

9 Pin Connector   25 Pin Connector
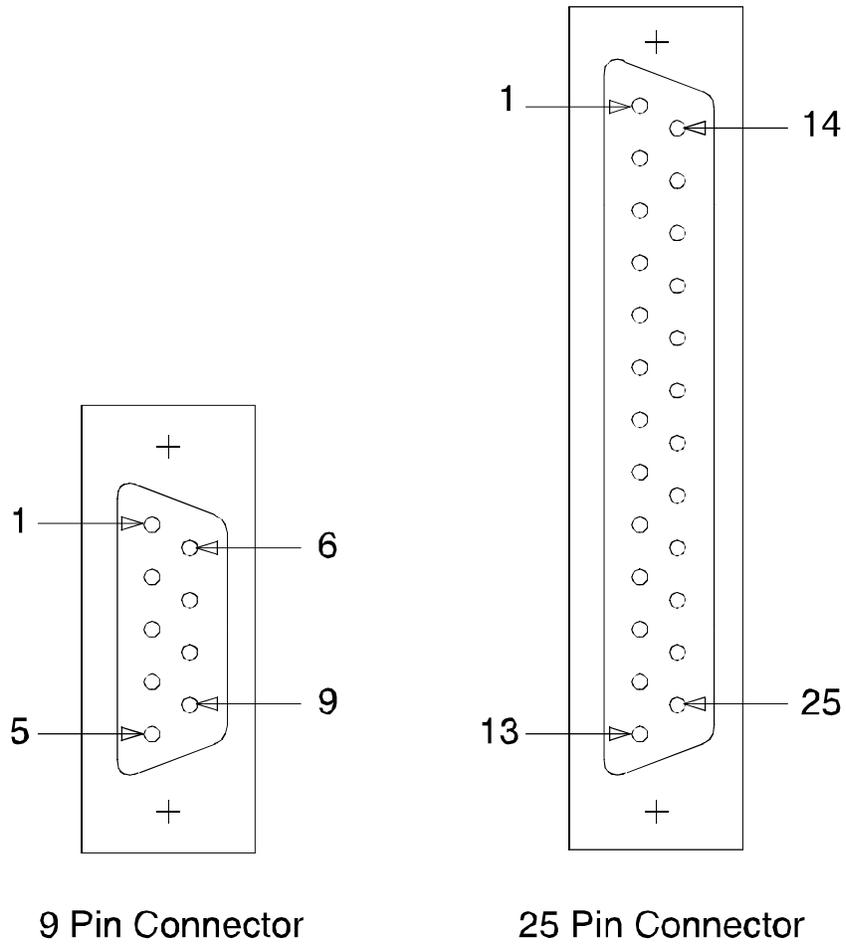
Note: Terminals are numbered by looking at the connector from the wiring side.

Figure 3-3. Connector Pin Outs

Bay
Frame

Adjacent
Bay
Frame

1.0"

5.0"

ED-8C500 or 8C800 Frame
Front Access

Bracket

6.0"

Cable
Channel

Front Of Shelf

Figure 3-4.   DDM-2000 OC-12 Shelf Mounting (Top View)

Baffle	Bay Frame
Fan Unit	Fan
DDM-2000 OC-12 (Shelf Position 3)	OC-12 Shelf
Space	
Baffle	
Fan Unit	Fan
DDM-2000 OC-12 (Shelf Position 2)	OC-12 Shelf — Brackets
Space	
Baffle	
Fan Unit	Fan
DDM-2000 OC-12 (Shelf Position 1)	OC-12 Shelf
Space	Cable Channel
Typical Front Access OC-12 Bay Arrangement	ED-8C500 or 8C800 Type Frame Left Side View
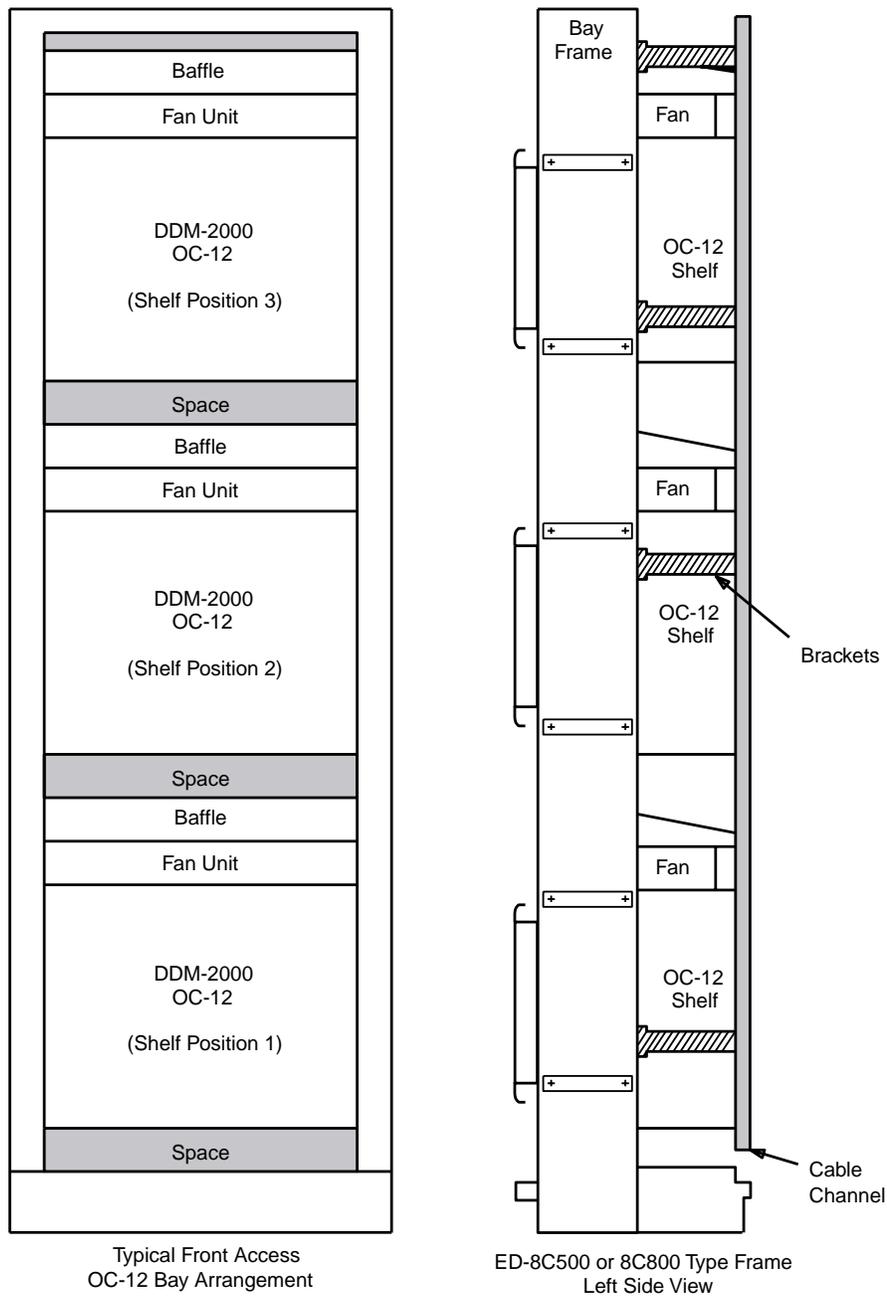
Note: Refer to ED-8C727-10 for specific equipment locations within a bay.

Figure 3-5.   Bay Mounting Arrangement

Air Gap
DDM-2000 OC-3 (Shelf Position 4)
Baffle or Fan Unit
DDM-2000 OC-3 (Shelf Position 3)
Baffle
Air Gap
DDM-2000 OC-3 (Shelf Position 2)
Baffle or Fan Unit
DDM-2000 OC-3 (Shelf Position 1)
Baffle
Fan Unit
DDM-2000 OC-12
Air Gap
Fiber Storage Shelf
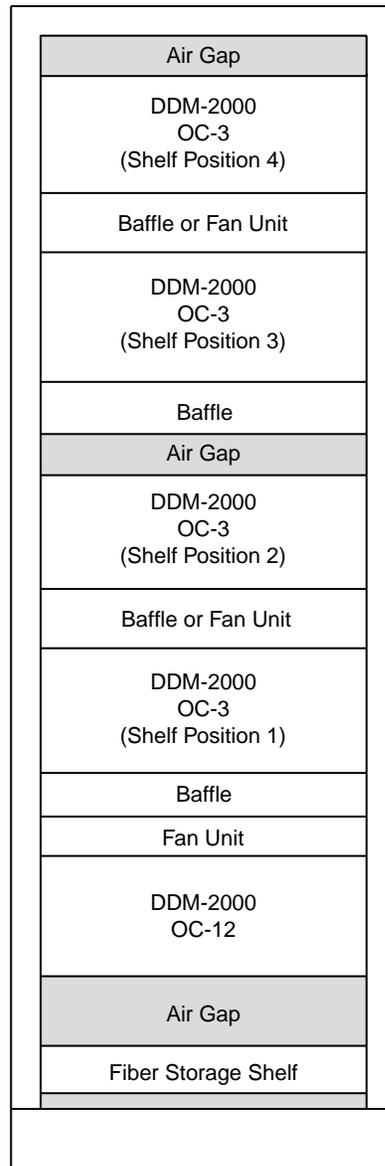
Typical OC-3/OC-12
Combination Bay Arrangement

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

Figure 3-6.   Bay Mounting Arrangement for DDM-2000 OC-3/OC-12 Combined Bay

Left Side Of DDM-2000 OC-12 Shelf

Front

Position Shipped

ED-8C500 or 8C800 Frame
Front Access

Front

Left Side Of DDM-2000 OC-12 Heat Baffle
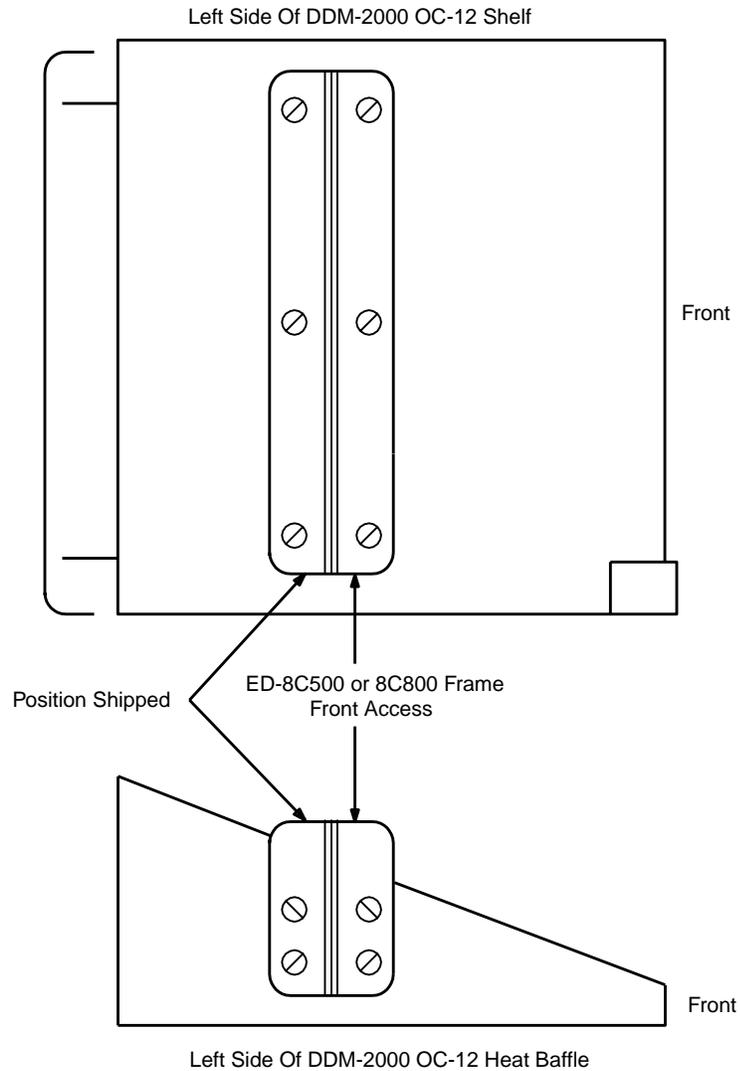
Note: Reposition the DDM-2000 OC-12 shelf, fan shelf and heat baffle side mounting brackets to the front access position.

Figure 3-7.   Side Mounting Bracket Positions
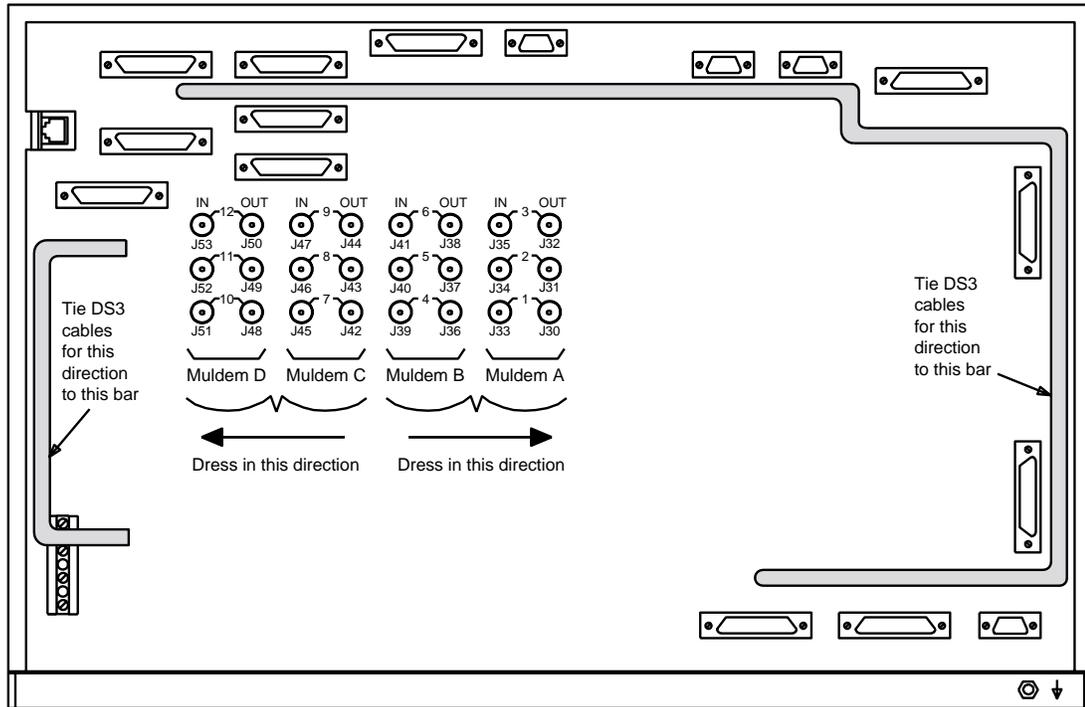
Notes:

1. Refer to Table 3-1 on page 3-32 for specific DS3 cable assemblies.

2. All DS3 cables dress in the direction indicated, and then downward, to be routed beneath the shelf.

Figure 3-8.   Front Access DS3 Cabling

Right Side of DDM-2000 OC-12 Shelf

Front of
Shelf

Air Filter in
the Installed
Position

Leaf Spring

Lip

Air Filter

Notes:

1. Lift the air filter, using the plastic tabs, into the cavity at the bottom of the OC-12 shelf at an angle as shown.

2. Place the rear edge of the filter on top of the shelf "lip" and push forward to compress the leaf springs attached to the shelf.
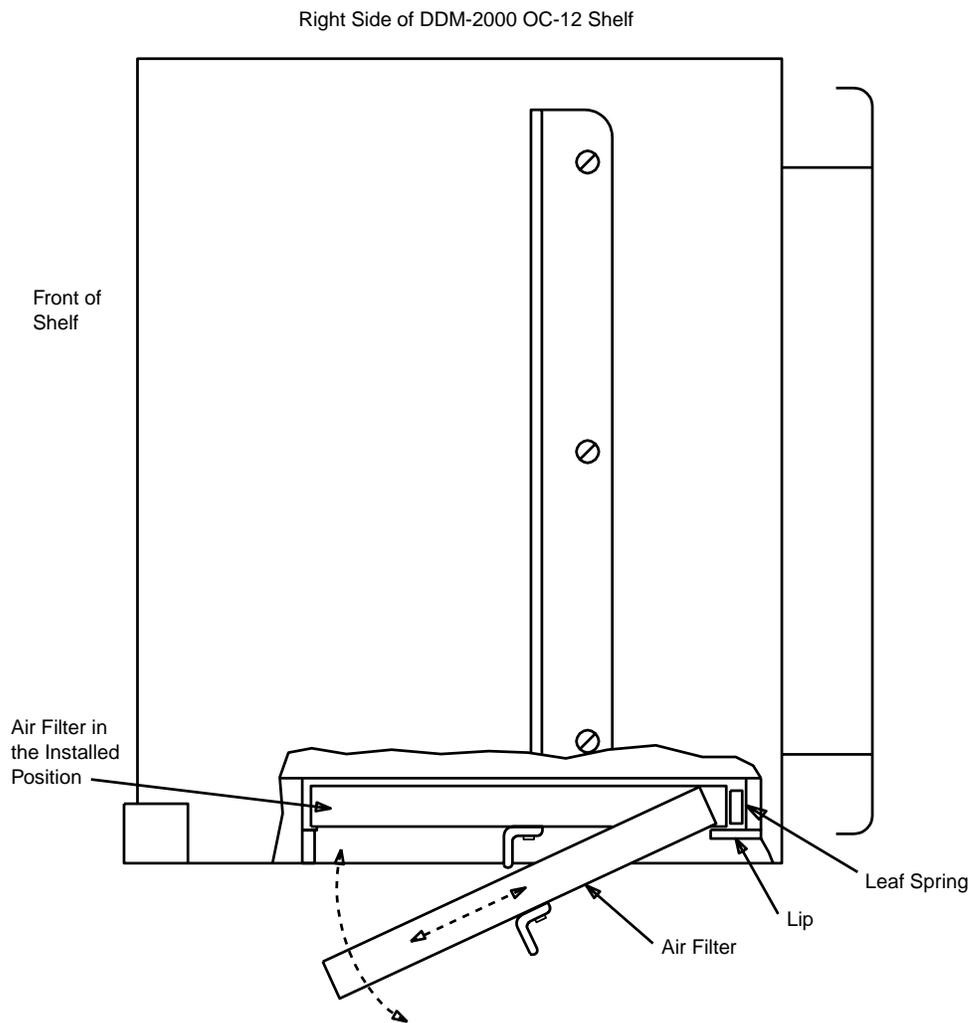
3. While applying enough pressure to keep the leaf springs compressed, rotate the front of the filter upward until it contacts the bottom of the shelf cavity.

4. Release the filter and ensure that the leaf springs force the filter forward to the position shown, securing it within the shelf cavity.

Figure 3-9.   Fan Filter Installation

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

Inner foil shield should be removed from this area
(leaving the braided shield only).

1/8"

7/16"   1/16"

Center conductor to be tinned

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

KS-15712, L20 Outer shield

Fan braided shield and foil slightly

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

Outer shield

Solder slug

Cable dielectric

Terminal of the 219P connector should slide
over cable dielectric but under braided shield

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 219P connector must be done after the 219
           connector has been assembled and crimped.

STEP 6:   Apply soldering iron on bottom of barrel (opposite side of solder
           slug) of the 219P connector. Do not add any additional solder; the
           solder slug is all that is required.

STEP 7:   Slide outer shell over 219P connector and secure with screw.

STEP 8:   Cover the 219P connector with KS-21886, L1 tubing.

Figure 3-10. Cable Preparation for 219N Connector
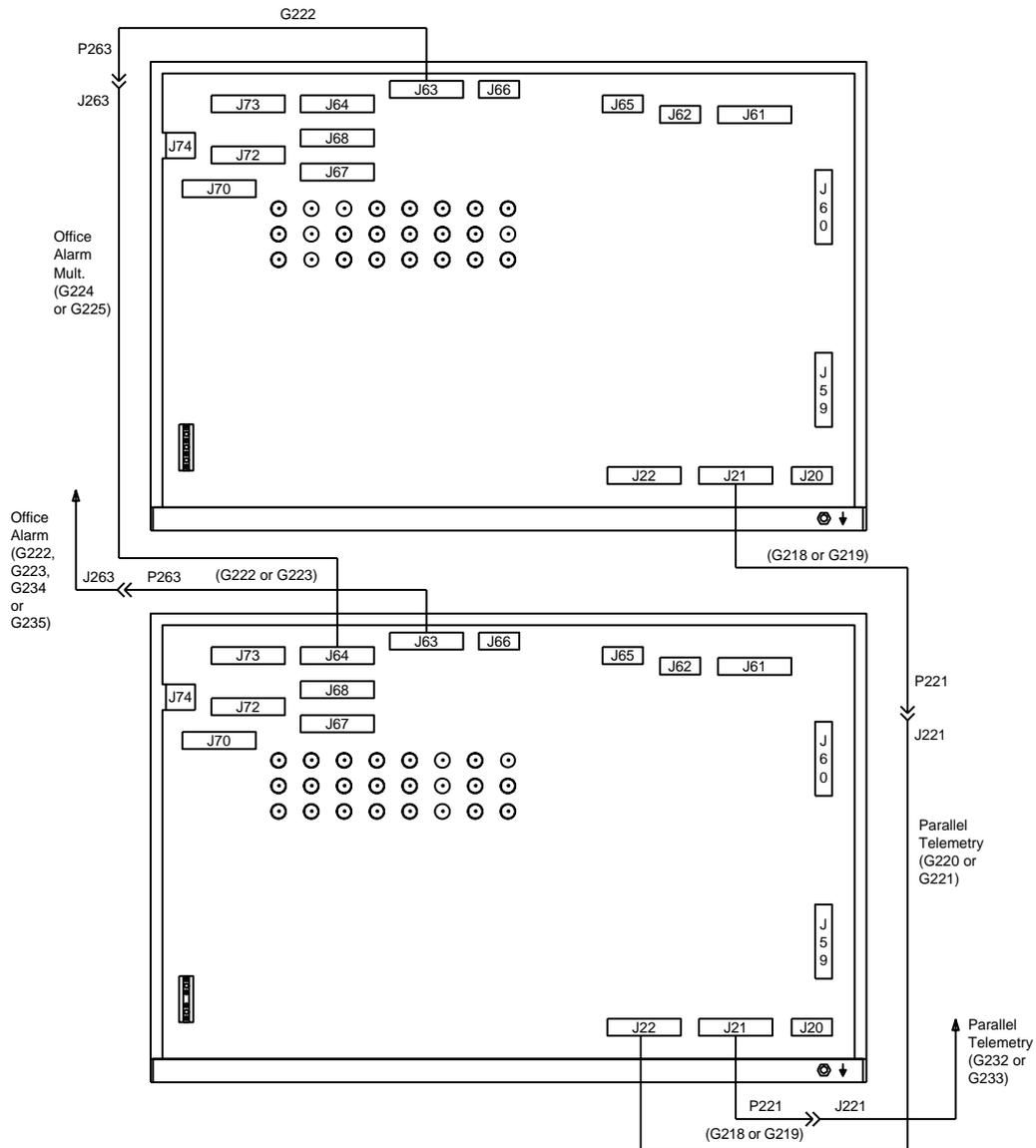
* Registered Trademark of Thomas & Betts Corporation.

Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-11. Office Alarm and Parallel Telemetry Cabling

➡ **NOTE:**
Parallel telemetry is not available in OC-12, Release 7.
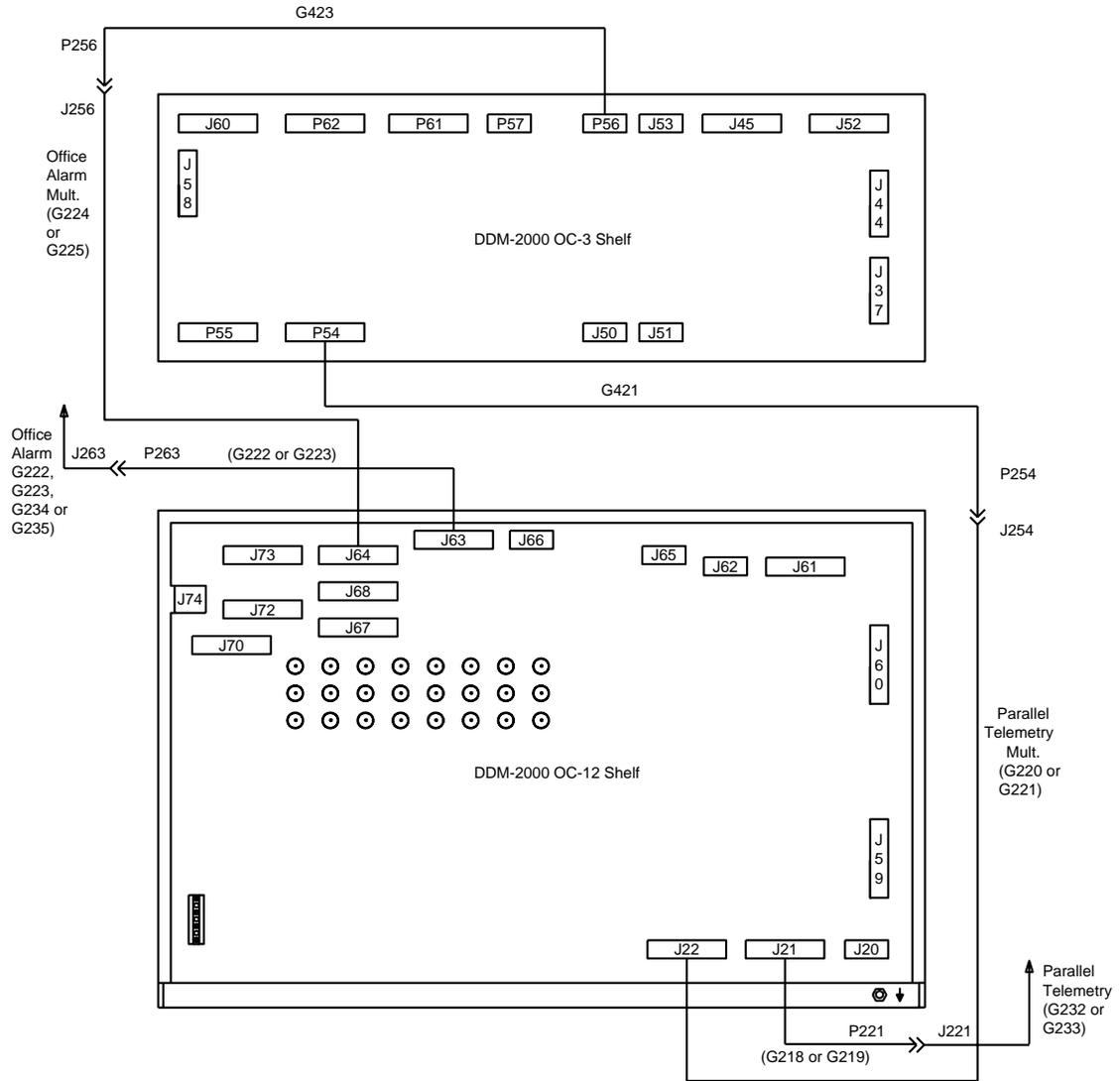
Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-12. Office Alarm and Parallel Telemetry Mult Cabling for DDM-2000 OC-3/OC-12 Combined Bay

➡ **NOTE:**
Parallel telemetry is not available in OC-12, Release 7.
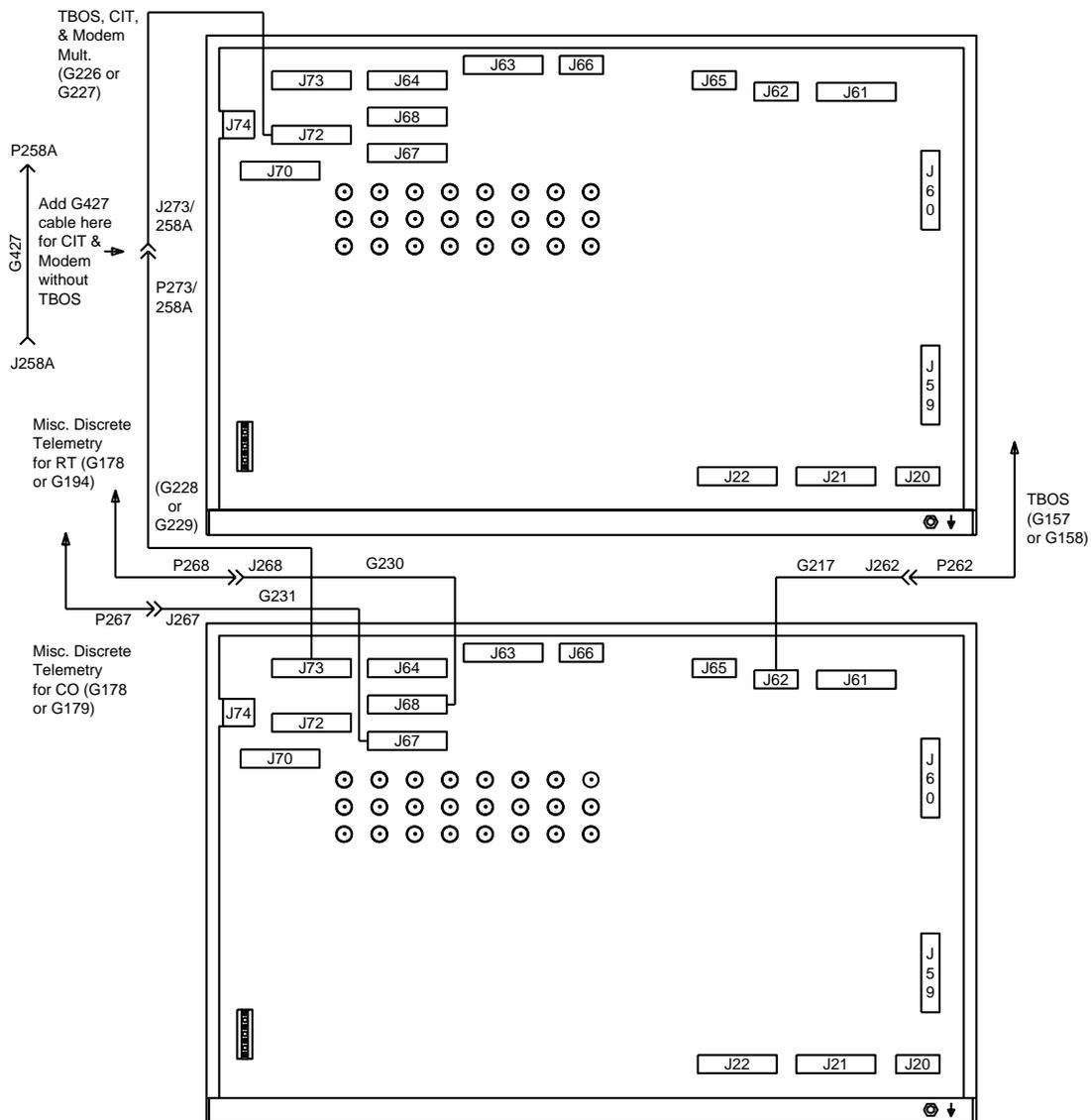
Note: Refer to Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-13. TBOS and Miscellaneous Discrete Telemetry Cabling

⇒ **NOTE:**
TBOS is not available in OC-12, Release 7.
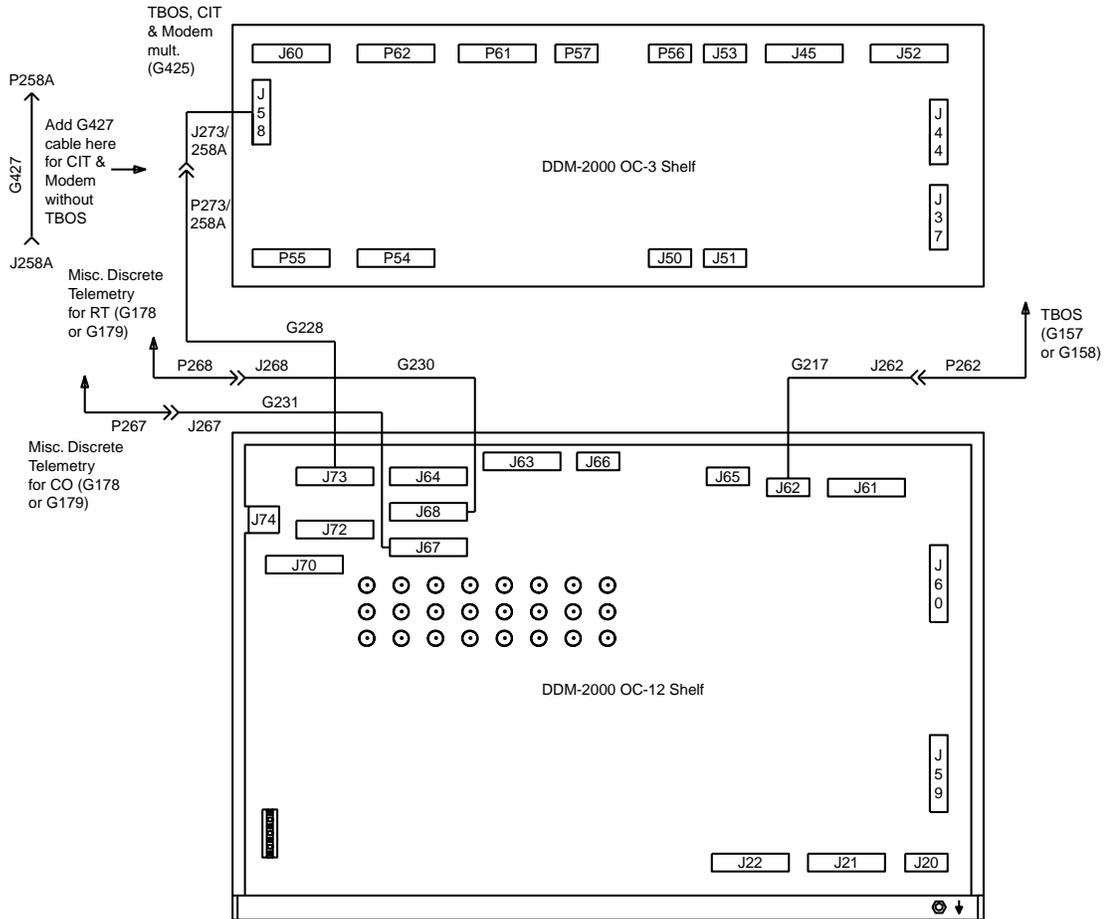
Note: Refer to Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-14. TBOS and Miscellaneous Discrete Telemetry Cabling for DDM-2000 OC-3/OC-12 Combined Bay

⇒ **NOTE:**
TBOS is not available in OC-12, Release 7.
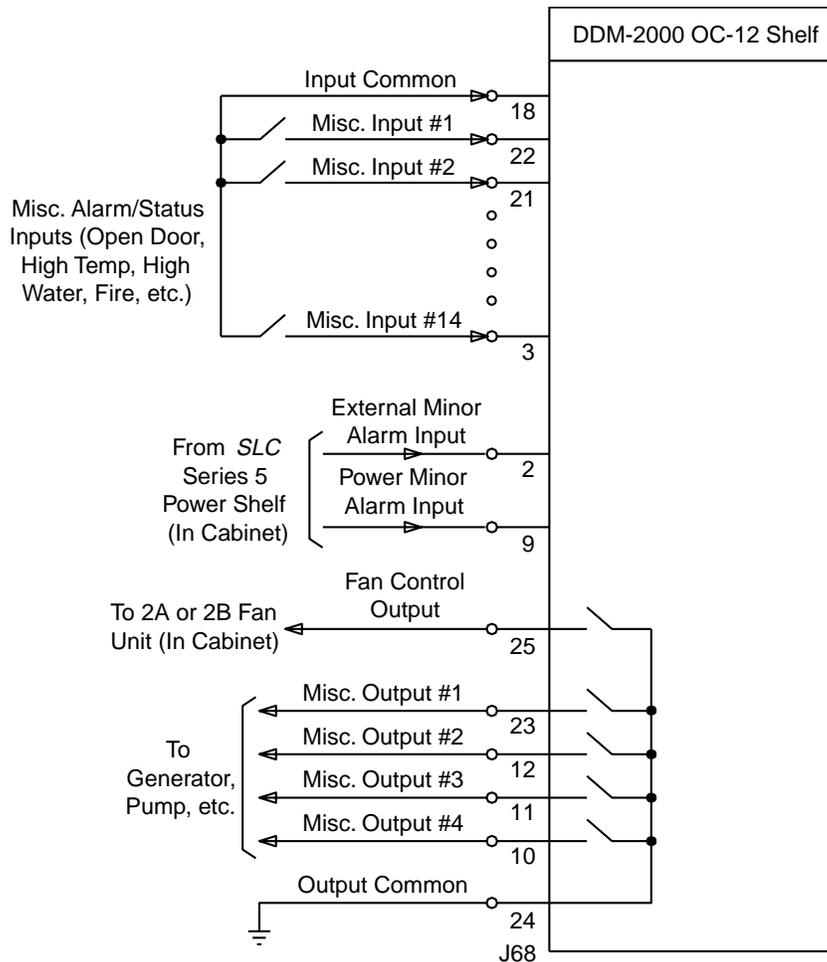
Notes:

1. Miscellaneous alarm input #1 is typically wired to the open door alarm in Lucent cabinet configurations.

2. Miscellaneous alarm input #14 is typically used for fan shelf alarm in controlled environment (noncabinet) applications.

3. The output common must be wired to an external ground for fan control, external minor and power minor alarm inputs, and for miscellaneous discretes #1-4.

Figure 3-15. Remote Terminal Miscellaneous Discrete Functions (Releases prior to 5)
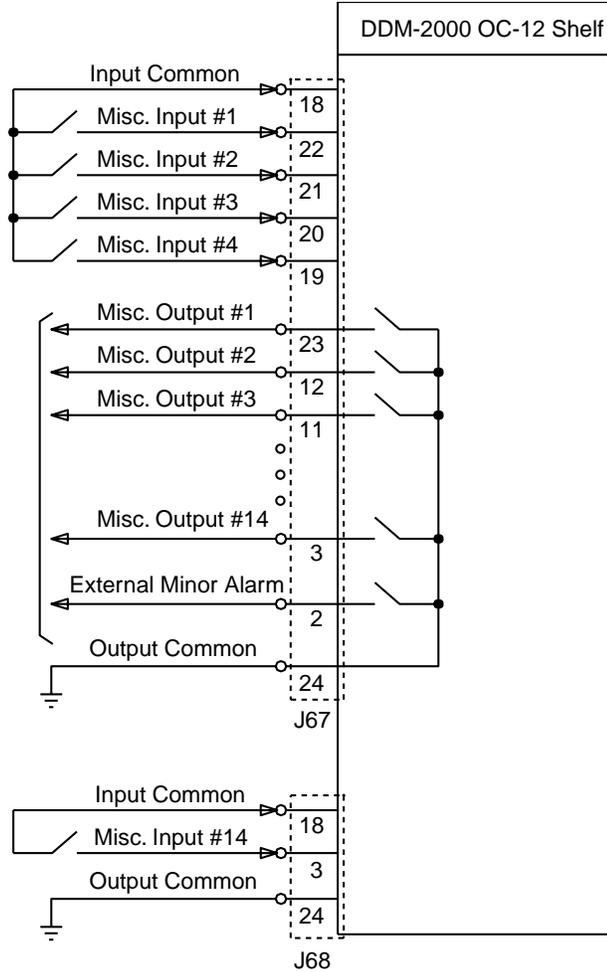
Notes:

1. The output common must be wired to an external ground for miscellaneous outputs #1-4.

2. The alarm input from the fan shelf is connected to miscellaneous input #14 via J68 (terminal 3) on the DDM-2000 OC-12 shelf.

Figure 3-16. Central Office Terminal Miscellaneous Discrete Functions (Releases prior to 5)
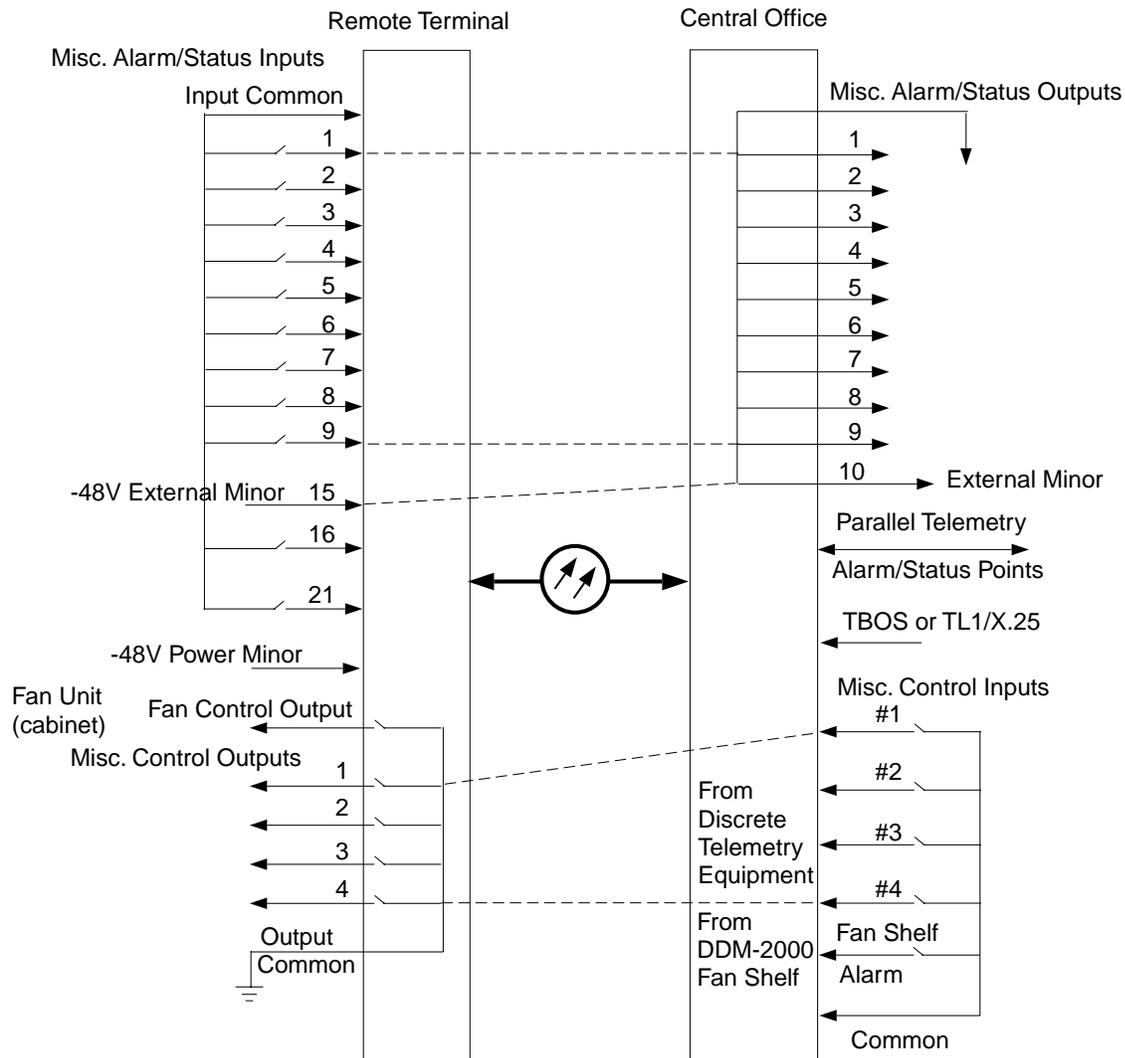
Notes:

1. The output common must be wired to an external ground for miscellaneous (environmental) outputs #1-10.

2. Miscellaneous (environmental) alarm input #14 (terminal 3 on J58) is typically wired to DDM-2000 OC-12 fan shelf.

Figure 3-17. Miscellaneous (Environmental) Discrete Functions (Releases 5 and 7)
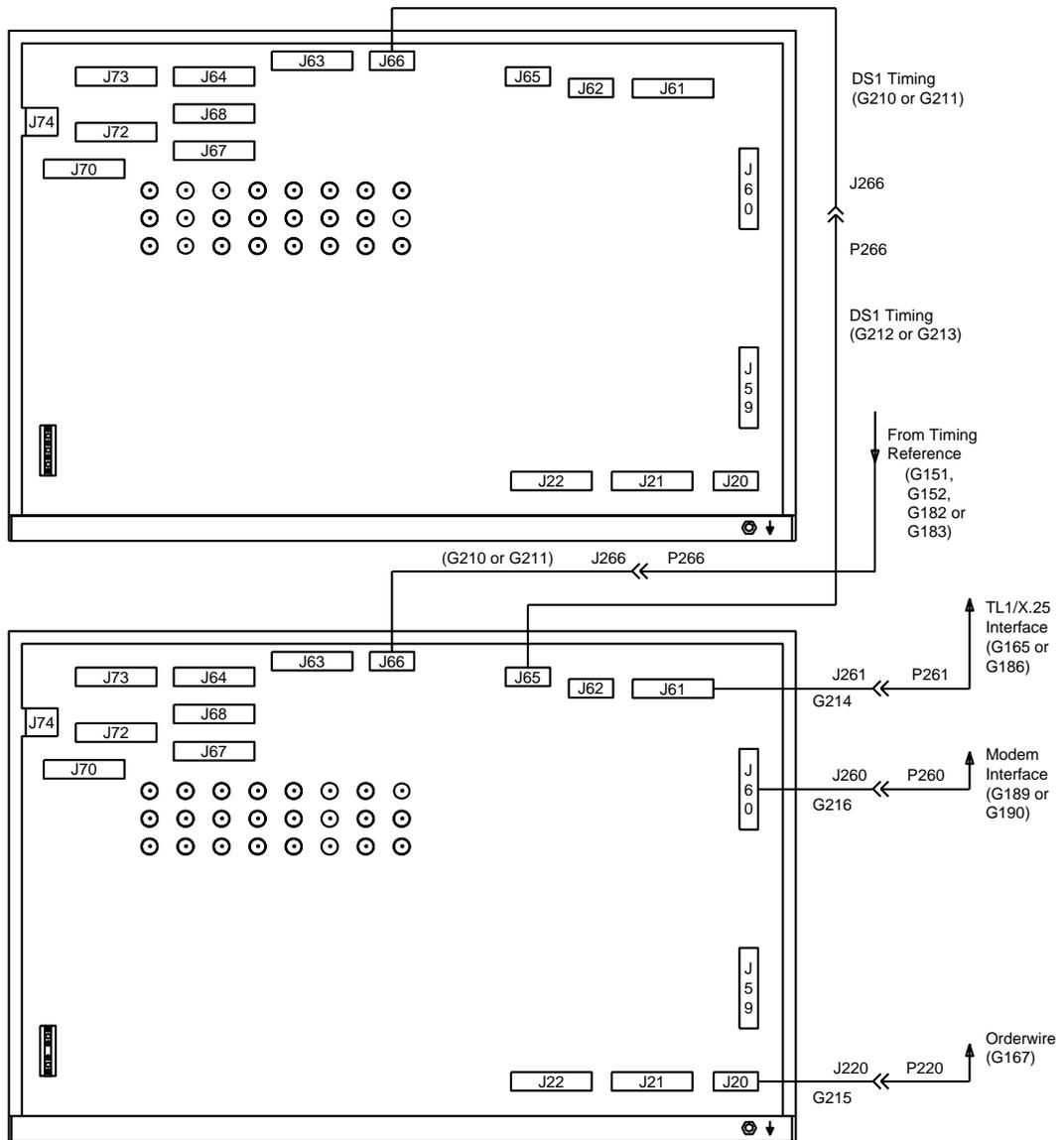
Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-18. DS1 Timing, TL1/X.25 Interface, Order Wire, and Modem Cabling
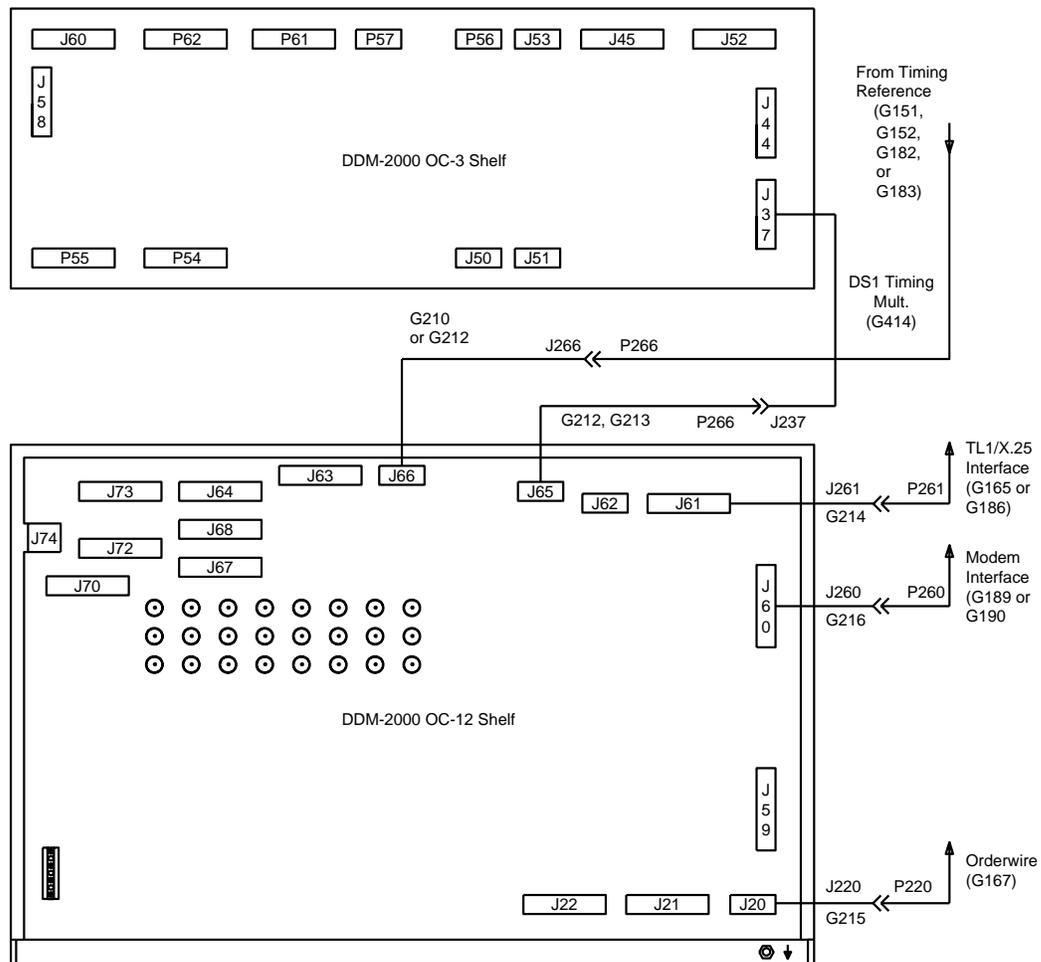
Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-19. DS1 Timing, TL1/X.25 Interface, Order Wire, and Modem Cabling for DDM-2000 OC-3/OC-12 Combined Bay
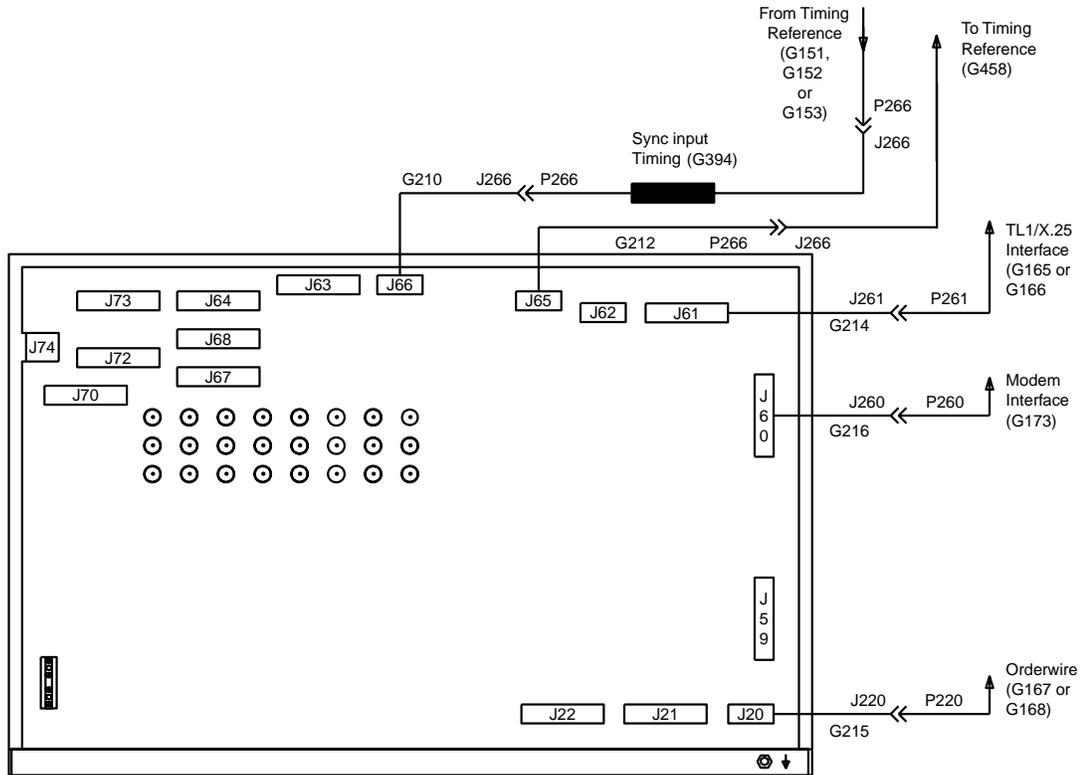
Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-20. Single Shelf DS1 Sync Timing, TL1/X.25 Interface, Order Wire, and Modem Cabling
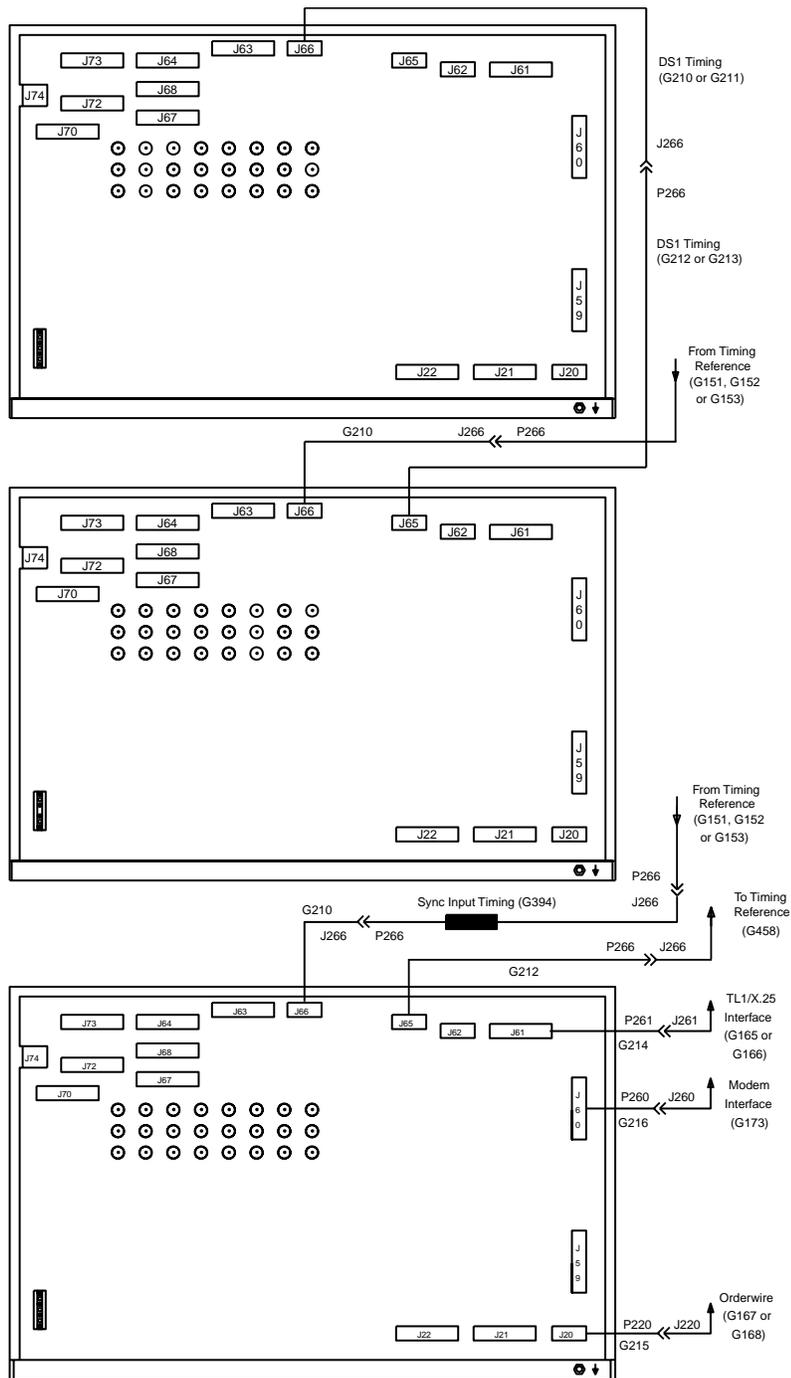
Figure 3-21. DS1 Sync Timing, TL1/X.25 Interface, Order Wire, and Modem Cabling
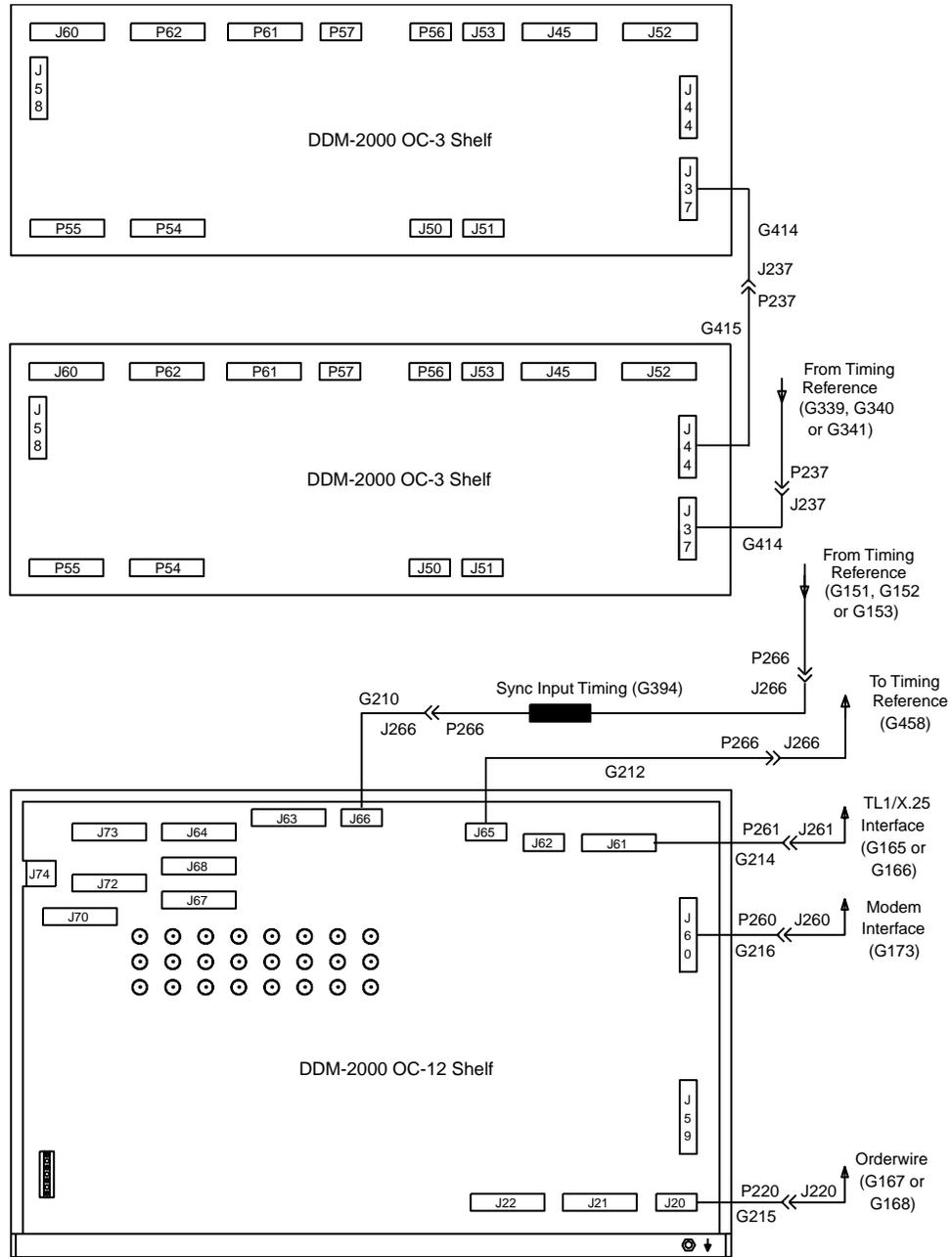
Note: Refer to Table 3-3 on page 3-34 and Table 3-4 on page 3-36 for specific cable assemblies.

Figure 3-22. DS1 Sync Timing, TL1/X.25 Interface, Order Wire, and Modem Cabling for DDM-2000 OC-3/OC-12 Combined Bay

DDM-2000 OC-3/OC-12 Bay Installation

4

Contents

DDM-2000 OC-3/OC-12 Bay
Installation

4

Overview

This section provides installation information for the ED8C906-30 OC-3/OC-12 Bay.

Description

This section should be performed when DDM-2000 OC-3 and OC-12 shelves are factory furnished in the ED8C906-30 OC-3/OC-12 Bay. The ED8C906-30 OC-3/ OC-12 bay provides six configurations of OC-3 and OC-12 shelves and associated fan shelves, heat baffles. An optional fuse panel may also be furnished. See table below for ED8C906-30 Bay configurations.

ED-8C906-30	DDM-2000 Shelves Equipped	Fuse Panel
Group 1	(6) OC-3 Shelves	No
Group 2	(6) OC-3 Shelves	Yes
Group 3	(4) OC-3 Shelves, (1) OC12 Shelf	No
Group 4	(4) OC-3 Shelves, (1) OC12 Shelf	Yes
Group 5	(3) OC-12 Shelves	No
Group 6	(3) OC-12 Shelves	Yes

Figure 4-1 on page 4-11 shows the bay layout for the Group 4 and Group 6 bay configurations. Typically the DDM-2000 OC-3 & OC-12 bay frame type is a 7-foot network[*] bay framework. The 7-foot seismic network[†] bay framework is also available.

---

[*] ED-8C500-50 or ED8C501-50

[†] ED8C600-50 or ED8C801-50

OC-3/OC-12 Bay Planning

Plan the DDM-2000 OC-3/OC-12 bay installation as follows:

a. Refer to floor plan in the job specifications for the bay location. Mark the bay name and number on the floor in the space where the frame is to be located.

b. If there is more than one bay in the lineup, plan to leave a 1/16-inch clearance between bay framework.

c. Bay mounting hardware is provided with the DDM-2000 bay. However the building may require specific mounting hardware. Verify that this material has been provided per job specifications.

d. Bays should not be shipped or stored in a standing position.

e. Circuit packs must not be installed at this point.

f. Perform bay cabling per Chapters 2 and 3 after this chapter.

This chapter of the installation manual contains the latest installation information at the time of issue. For additional bay installation information refer to the document 065-215-250 Bay Frame Installation Guide for 500/800-Type Bay Frames.

You may order the installation guide from:

Lucent Technologies Inc. Customer Information Center,
P.O. Box 19901,
Indianapolis, IN 46219
1-(888)-582-3688.

The installation guide lists tools required and provides framework assembly diagrams, floor drilling, bay grounding and AC power connection information.

Bay Anchoring

Network bay frames are approved for Seismic Zones 0, 1, 2 only, while Seismic bay frames are approved for all Seismic Zones. The bay anchor type and quantity required for bay installation are shown below:

Qty	Description
4	402980056 Hilti Fastening Systems #590024.500[*]
4	406899229 Hilti Fastening Systems #00217742[†]
2	402980056 Hilti Fastening Systems #590024.500[‡]
2	406899229 Hilti Fastening Systems #00217742[**]

[*] Drop-In Anchors for floor supported only Network type frames in Seimic Zone 0, 1,2.
[†] Heavy Duty Anchors for floor supported only 600 type frames in all Seimic Zones.
[‡] Drop-In Anchors for top and floor supported Network type frames in Seimic Zone 0, 1,2.
[**] Heavy Duty Anchors for top and floor supported Seimic type frames in all Seimic Zones.

Tools, Test Sets, and Accessories

The following tools or equivalent are required:

Quantity	Description
1	Vacuum Cleaner[*]
1	Drill Hammer (for 5/8 drill)[†]
1	Safety Goggles[‡]
1	406902049 Anchor Setting Tool (for drop-in anchors)[**]
1	3/4" Torque Wrench (25 ft.-lbs for 1/2 bolt)[††]
1	Rope and 5/8-11-inch eye bolt[‡‡]
1	Level[***]

[*] Required for cleaning area after floor drilling.
[†] Required for drilling floor.
[‡] Safety requirement when floor drilling.
[**] Required for setting drop-in anchors.
[††] Required for proper anchor nut torque.
[‡‡] Accessories for uprighting bay if other means of lifting not available
[***] Required during bay alignment

Equipment Installation

Description

Below is an outline of the steps for installing the DDM-2000 OC-3/OC-12 bay.

- Floor Preparation
- Unpacking
- Bay Positioning
- Bay Erecting
- Bay Alignment
- Secure bay to floor
- Frame Grounding
- Central Office Power Connections

Unpacking and Floor Layout

⚠ CAUTION:
Make precautions to avoid personal injury and to prevent damage to equipment and in-service systems.

(1) The bay is shipped in a length-wise position with it's backside resting on a shipping skid. Unpack the bay as follows:

    a. Verify that the box is not damaged. It is important that all containers be handled with care and not dropped.

    b. Place the packed DDM-2000 bay on a dolly truck and bring it into the building for unpacking.

    c. Remove the top and side packing material with care so damage to the equipment will not occur. Remove any plastic or other foreign material.

    d. The DDM-2000 bay is now resting on its shipping skid and ready for moving to it's assigned floor position.

(2) Locate the bay footprint template shipped with the DDM-2000 bay. Referring to the job floor plan, use a pencil or felt pen and mark the bay footprintthe bay using the footprint template. Also mark the drilling locations on the floor.

Floor Drilling

⇒ NOTE:
Local Central Office practices always supersede this document.

(1) Determine the number of anchors required.

ED8C805-50, Group 1 furnishes the anchors shown below:

Qty		Description
2[*]	4[†]	402980056 Hilti Fastening Systems #590024.500

* Drop-In Anchors for top supported bays
† Drop-In Anchors for floor supported only bays

(2) Drill the floor for each anchor per job specifications or as follows:

    a. For drop-in anchors, drill a 5/8 inch diameter hole to a depth of 2-1/8 inches.

    b. Vacuum or otherwise remove all dust from the hole.

    c. Place the drop-in anchor into the hole and verify that the anchor is flush or under flush to within 1/16 inches with concrete surface.

    d. Set the anchor using the setting tool per the anchor manufacturer's requirements. Verify that the anchor is not loose and has properly expanded.

Alignment and Hold Down Procedure

(1) Move the bay to its designated location. Take care when moving the bay to avoid sudden shock or strain to the equipment.

(2) The bay can be lifted upright by two or more people. For added safety, located at the very top of the bay are three 5/8-inch by 11 UNC (UNified Coarse) holes. These holes are for lifting. When required, assemble eye bolt (5/8-inch by 11 UNC) into these holes, and tie off with some rope temporarily to some solid structure overhead or use a hoist. Lift the bay and move it to the proper location in the lineup. Visually inspect for obvious damage.

(3) The bay frame has a center line marking on the front and rear base of the frame which should be use for aligning the frame to its center line marked on the floor.

(4) Thread the studs into the drop-in anchor and continue threading the bolts until they reach the full depth in their the anchors. ED8C805-50, Group 1 provides four 841068208 Continuous Thread Studs (1/2-13 x 3-1/4')

(5) Remove the front and rear guard rail covers.

➡️ **NOTE:**
See Figure 4-2 on page 4-12 for a graphic of bay shimmimg.

(6) Verify that the bay is plumb. If necessary, use shims to plumb bay. If there is an adjacent bay, the DDM-2000 bay should be aligned until the junction plates holes match up. Maintain a distance of 1/16 inches between adjacent bays.

Shims furnished per ED8C805-50, Group 5 are shown below.

Qty*	Qty†	Code	Description
4	2	846897213	0.250 Shim
4	2	846897205	0.125 Shim
4	2	846897197	0.063 Shim
4	2	846897189	0.031 Shim‡

* For floor supported only bays in Seimic Zone 0, 1, 2
† For top and floor supported bays in Seimic Zone 0, 1, 2
‡ Not shown in Figure 4-2.

(7) Assemble the hold-down parts as follows:

    a. Install hold-down plates over each threaded stud inside the base of the frame. See Figure 4-2 on page 4-12.

    b. Install hold-down washers over the hold-down plates.

The following hold-down parts are furnished per ED8C501-50, Group 1:.

Qty*	Qty†	Code	Description
4	2	841628784	Hold-Down Plate
4	2	847020427	Hold-Down Washer, Square

* For floor supported only bays in Seimic Zone 0, 1, 2
† For top and floor supported bays in Seimic Zone 0, 1, 2

(8) Install the remaining parts required for bay hold-down as follows:

    a. Install the insulating bushings (if required).

    b. Install the plain washers.

    c. Install the hex nuts on each threaded stud and hand tighten.

    d. Torque the hold-down assembly to 25-foot-pounds (requirement for drop-in anchors).

The following hold-down parts are furnished per ED8C805-50, Groups 1 and 7.

Qty*	Qty†	Code	Description
4	2	843059809	Insulating Bushing
4	2	8412519147	Plain Washer (0.090 steel)
4	2	841064793	Hex Nut (1/2-13 1/2)

 * For floor supported only bays in Seimic Zone 0, 1, 2
 † For top and floor supported bays in Seimic Zone 0, 1, 2

(9) Install the rear and front guard rail covers. Install and adjust the guard rail extender until it is flush with the floor (hiding the shims if any were used).

The following guard rail parts are furnished per ED8C805-50, Groups 1:.

Qty	Code	Description
1	844218552	Guard Rail, Fixed (Rear)
1	844218529	Guard Rail Cover (Front)

(10) If required, fasten the base of the bay adjacent to the DDM-2000 bay by installing two spacers between the bays at the base (bottom front). See Figure 4-3 on page 4-13. Push the specified screw through the DDM-2000 bay into the adjacent bay and fasten with a washer and a hex nut.

(11) If required, install three junction plates on the wide flange on the DDM-2000 bay and the adjacent bay.

The following material is furnished per ED8C501-50 Group 1 for fastening the DDM-2000 bay to an adjacent bay:

Qty	Code	Description
3	845490168	Junction Plate
12	840060164	Screw .216-24 x 14
2	846897163	Spacer, Gap*
1	802102244	Screw Hex Washer Head Cap.375-16 X 5/8 Steel (P210224)
2	801831496	Washer, External Tooth Lock .216 (P183149)
2	802065185	Nut, Hex.164-32 Steel (P206518)

 * See ED8C501-50 Section A-A.

Frame Grounding

Description

All ground connections to the frame shall be made in such a manner as to ensure a low-resistance contact with the metal framework.

Procedure

(1) The #6 bare wire ground assembly comes rolled up and attached to the top of the DDM-2000 bay. The bay ground assembly can be removed and repositioned or replaced to conform with local grounding codes.

(2) Whenever the ground strap is repositioned, remove the paint as much as necessary to ensure a low-resistance ground and apply an oxidation preventive such as NO-OX-ID "A" or equivalent.

(3) Connect the ground wire to the Central Office Ground wire with the Thomas & Betts 54720 "C" compression terminal lug,

The following material is provided by ED8C501-50, Group 1 for frame grounding:

Qty	Code	Description
1	846781680	Frame Ground Connection Assembly
1	997775952	Lug, Terminal #54720 T&B Co.
2	840026827	Screw Hex Washer Head .216-24 X.5 Self Tapping

Power Cable Installation

Description

When installing a DDM-2000 OC-3/OC-12 bay equipped with a fuse panel, two pairs of Central Office feeders are required for connection to BAT and GRD on the DDM-2000 OC3/OC12 bay fuse panel. See Figure 4-4 on page 4-14.

When installing a DDM-2000 OC-3/OC-12 bay that is not equipped with a fuse panel, the factory installed power riser cables are tapped to the Central Office feeder.

⇒ **NOTE:**
The DDM-2000 OC-3/OC-12 bay is powered by -48 V DC.

⇒ **NOTE:**
Each feeder will be fused for at least 25 amperes for DDM-2000 bay arrangements.

⇒ **NOTE:**
The C. O. battery and ground cables must be a minimum of 10 gauge for DDM-2000 bay arrangements.

Bays with Fuse Panel

When the DDM-2000 bay is equipped with a fuse panel, provide office power to the DDM-2000 bay as follows:

1. Remove the BDFB fuses or set the breakers to off until you are ready to do the "Powering, Verification and Circuit Pack installation" section in this manual.

2. Remove the cover from the rear of the fuse panel. See Figure 4-4 on page 4-14.

3. Label the four Central Office feeders from the BDFB at the DDM-2000 bay as BAT A, BAT B, GRD A, and GRD B.

4. Prepare the ends of "A" feeders and attach lugs. Connected the "A" battery power feeder to the "A BAT" and the "A" ground feeder to "A GRD" on the fuse panel. See Figure 4-4 on page 4-14.

⇒ **NOTE:**
Fuse panel lugs are not furnished with the DDM-2000 bay.

5. Prepare the ends of "B" power feeders and attach lugs. Connected the "B" battery power feeder to the "B BAT" and the "B" ground feeder to "B GRD" on the fuse panel

6. Dress and tie the battery and ground cables as required.

7. Remount the cover on the rear of the fuse panel.

⇒ **NOTE:**
Leave the BDFB fuses out or breakers off until you are ready to do the "Powering, Verification and Circuit Pack installation" section in this manual.

Bays without a Fuse Panel

When the DDM-2000 bay is NOT equipped with a fuse panel bay, connect office power to the DDM-2000 bay as follows:

⚠️ **WARNING:**
Verify that the circuit breakers associated with the power feeders are off or that the fuses ar not installed at the BDFB.

1. At the top of the DDM-2000 bay, unroll the ED-8C724-22 Group 13 riser power cable shipped with bay. This cable is installed by the factory and connects power to each equipped OC3 and OC12 shelf. The Group 13 cable consists of four power feeders for connection with C. O. power: "A" and "B" battery and ground cables.

2. Label the feeders at the DDM-2000 bay as BAT A, BAT B, GRD A, and GRD B.

3. Prepare the Group 13 feeders:

    e. Allow sufficient wire length to reach where the C. O. feeder will be tapped.

    f. Tap in each battery and ground wire to the Central Office BAT A, BAT B, GRD A, and GRD B cables with the "C" clamp or equivalent furnished according to job specifications.

4. Dress and tie the Group 13 battery and ground cables as required.

➡️ **NOTE:**
Maintain BDFB fuses removed or breakers off until you are ready to do the "Powering, Verification and Circuit Pack installation" section in this manual.

Final Operations

Procedure

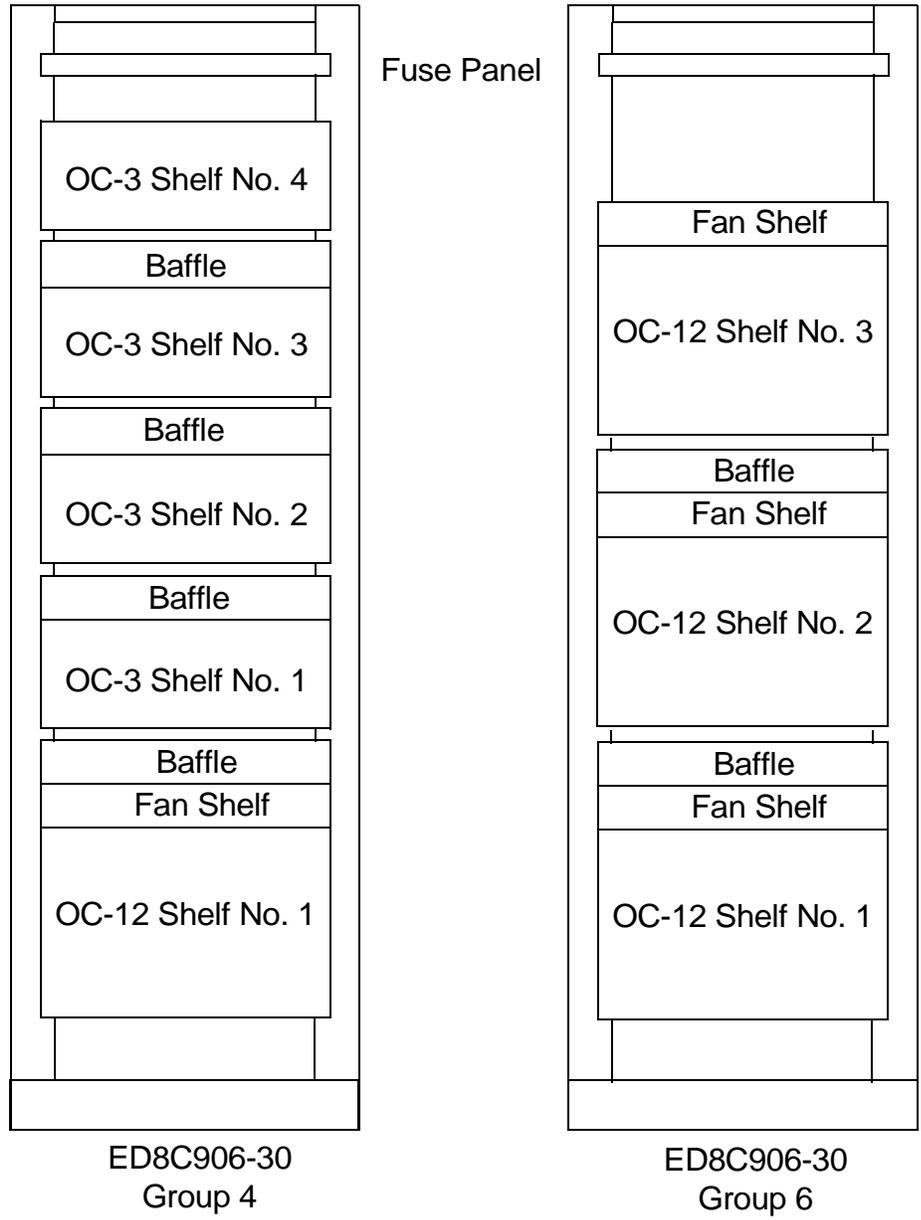(1) Verify that all BDFB fuses removed or breakers off.

```
┌─────────────────────┐              ┌─────────────────────┐
│ ┌─────────────────┐ │   Fuse Panel │ ┌─────────────────┐ │
│ ├─────────────────┤ │              │ ├─────────────────┤ │
│ │                 │ │              │ │                 │ │
│ │ OC-3 Shelf No. 4│ │              │ │                 │ │
│ │                 │ │              │ ├─────────────────┤ │
│ ├─────────────────┤ │              │ │    Fan Shelf    │ │
│ │     Baffle      │ │              │ ├─────────────────┤ │
│ ├─────────────────┤ │              │ │                 │ │
│ │                 │ │              │ │ OC-12 Shelf No.3│ │
│ │ OC-3 Shelf No. 3│ │              │ │                 │ │
│ │                 │ │              │ │                 │ │
│ ├─────────────────┤ │              │ ├─────────────────┤ │
│ │     Baffle      │ │              │ │     Baffle      │ │
│ ├─────────────────┤ │              │ │    Fan Shelf    │ │
│ │                 │ │              │ ├─────────────────┤ │
│ │ OC-3 Shelf No. 2│ │              │ │                 │ │
│ │                 │ │              │ │ OC-12 Shelf No.2│ │
│ ├─────────────────┤ │              │ │                 │ │
│ │     Baffle      │ │              │ │                 │ │
│ ├─────────────────┤ │              │ ├─────────────────┤ │
│ │                 │ │              │ │     Baffle      │ │
│ │ OC-3 Shelf No. 1│ │              │ │    Fan Shelf    │ │
│ │                 │ │              │ ├─────────────────┤ │
│ ├─────────────────┤ │              │ │                 │ │
│ │     Baffle      │ │              │ │ OC-12 Shelf No.1│ │
│ │    Fan Shelf    │ │              │ │                 │ │
│ ├─────────────────┤ │              │ │                 │ │
│ │                 │ │              │ └─────────────────┘ │
│ │ OC-12 Shelf No.1│ │              │                     │
│ │                 │ │              │                     │
│ └─────────────────┘ │              │                     │
│                     │              │                     │
└─────────────────────┘              └─────────────────────┘
      ED8C906-30                           ED8C906-30
        Group 4                              Group 6
```

Figure 4-1.   ED8C906-300 Groups 4 and 6 OC-3/OC-12 Bays

1	Hex Nut 1/2-13
2	1/2-inch Washer
3	Insulating Bushing*
4	Hold Down Washer
5	Hold Down Plate
6	0.063 Shim
7	0.125 Shim
8	0.250 Shim
9	Anchor Bolt
10	Drop-in Anchor

* If Required

Bottom of Bay Frame

Not to Scale
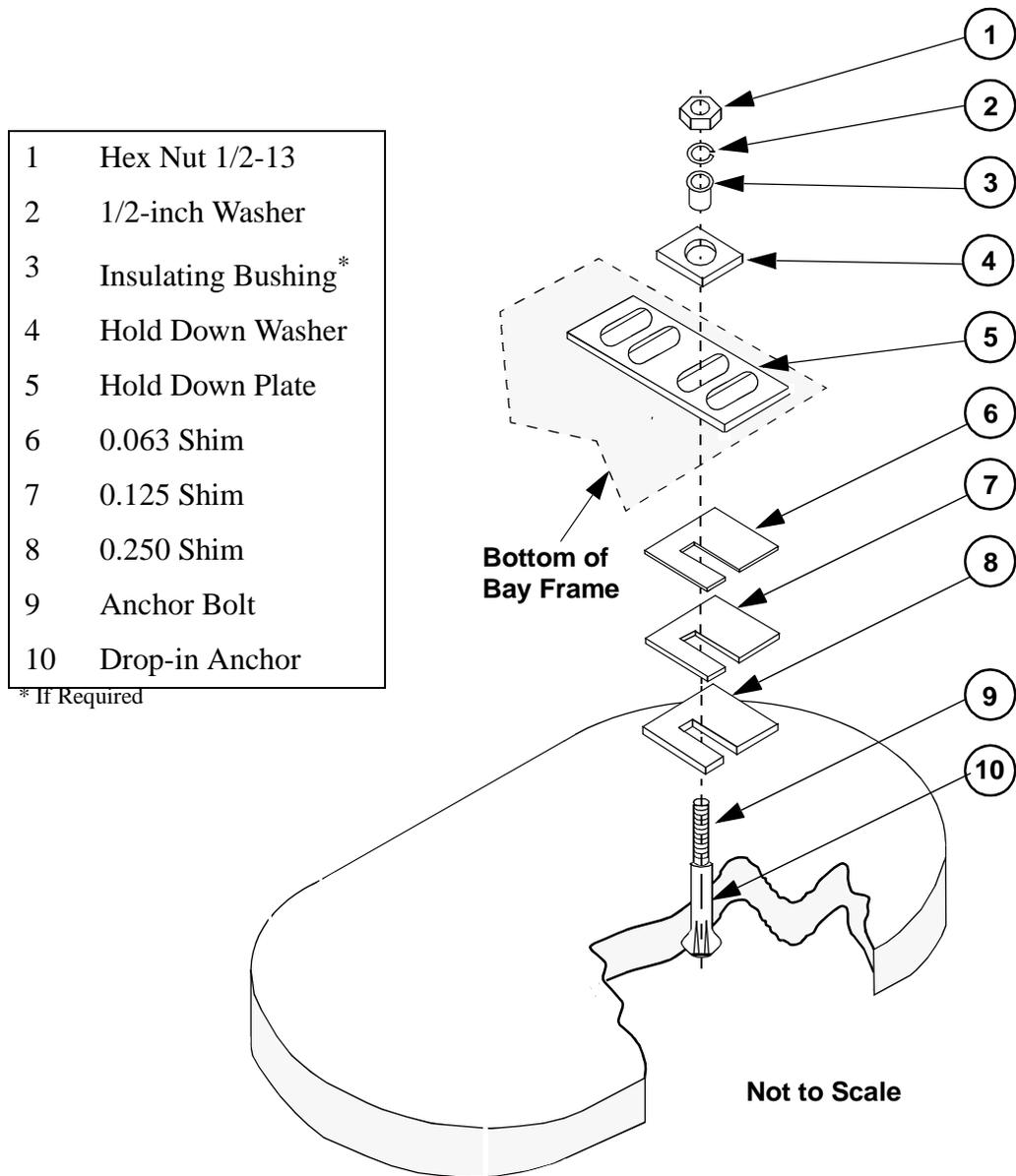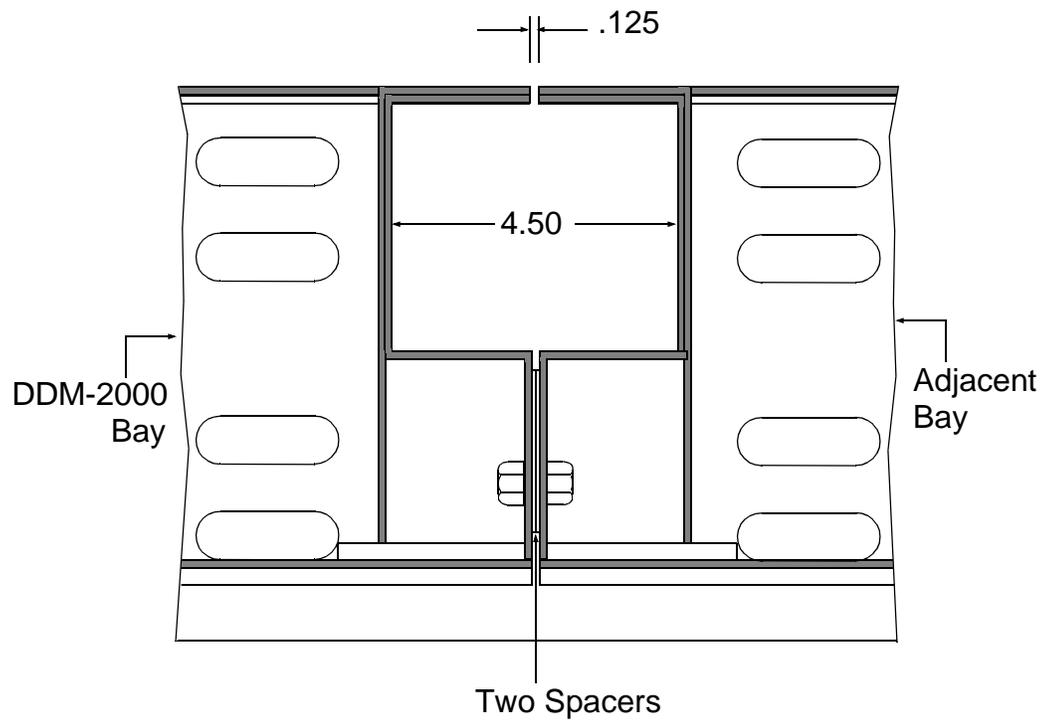
Figure 4-2.   OC3/OC12 Bay Installation

.125

4.50

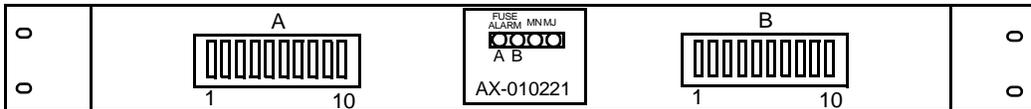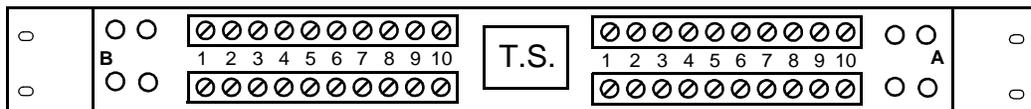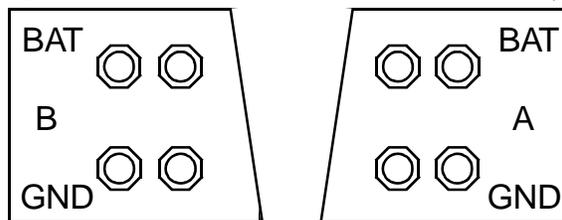DDM-2000
Bay

Adjacent
Bay

Two Spacers

Figure 4-3.   Junction at Bottom of Adjacent Bays

FUSE PANEL - FRONT VIEW

FUSE PANEL - REAR VIEW

INSTALLER BATTERY CONNECTIONS

Figure 4-4.   DDM-2000 OC3/OC12 Bay Fuse Panel

Powering, Verification, and Circuit Pack Installation for the DDM-2000 OC-12 Multiplexer

5

Contents

Powering, Verification, and Circuit Pack Installation for the DDM-2000 OC-12 Multiplexer

5

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 363-206-290 (Release 5), 363-206-295 (Release 7) or 363-206-207 (Releases prior to 5) *DDM-2000 OC-12 Multiplexer User/Service Manual.*

Software Download

The software download procedure in this section is required for all DDM-2000 OC-12 shelves, as the BBG8 SYSCTL and BCP4 OHCTL (Release 5 and 7) or BBG5 SYSCTL and BCP1 OHCTL (Releases prior to 5) circuit packs are shipped from the factory without the software installed. 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 as shown in Table 5-1 on page 5-14.

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.

⟹ **NOTE:**

If office alarms are connected, it is advisable to disconnect them while perform-
ing this section to prevent spurious alarms from being reported.

Tools, Test Sets, and Accessories

The following is required:

Quantity	Description
1	Multimeter[*]
1	Wrist Strap[†]
1	Personal Computer[‡]
1	EIA-232 cable (35 pin)[‡]

[*] The voltmeter must be capable of measuring DC voltage in the 40 to 60 volt range.

[†] A wrist strap must be worn when touching the DDM-2000 OC-12 backplane and
when connecting cables. Use the electrostatic discharge jack on the user panel.

[‡] Software download requires an MS-DOS compatible personal computer (PC) and an
EIA-232 interface cable.

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-12 shelf is
installed is properly grounded.

(2) Verify that the DDM-2000 OC-12 shelf is properly grounded to the frame or
structure.

(3) Verify that a 10 ampere fuse is installed in the DDM-2000 OC-12 user panel for
each feeder.

(4) Refer to Figure 5-1 on page 5-15 and disconnect the power cable from the back-
plane cable (P1 from J1 and P2 from J2).

(5) Install a 25 ampere fuse for a bay arrangement or a 15 ampere fuse for a single shelf at the customer's battery distribution fuse board (BDFB) that fuses the DDM-2000 OC-12 shelf.

(6) If breakers are being used, verify a 25 ampere breaker is being used for a bay arrangement or 15 ampere breaker is being used for a single shelf.

(7) If breakers are being used, put the breakers in the ON position.

(8) Using a voltmeter, measure the voltage between BAT A and BAT A RTN, and then BAT B and BAT B RTN on the power cable. If a bay arrangement cable is being used, measure the voltage between BAT A and BAT A RTN or BAT B and BAT B RTN on each connector of the power cable.

Terminal Designation	Wire Color
BAT A	Red
BAT A RTN	Black
BAT B	Green
BAT B RTN	White

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

(9) Reconnect the "A" feed of the power cable to the backplane cable (P1 to J1).

(10) Verify that the PWR ON LED on the DDM-2000 OC-12 user panel is lighted with only the "A" feed connected.

(11) Disconnect the "A" feed of the power cable to the backplane cable (P1 from J1).

(12) Reconnect the "B" feed of power cable to the backplane cable (P2 to J2).

(13) Verify that the PWR ON LED on the DDM-2000 OC-12 user panel is lighted with only the "B" feed connected.

(14) Reconnect the "A" feed of the power cable to the backplane cable (P1 to J1).

(15) Verify that the PWR ON LED on the DDM-2000 OC-12 user panel is lighted with both the "A" and "B" feeds connected.

(16) Repeat the above powering procedure for the DDM-2000 OC-12 fan shelf, if provided, and verify that the POWER 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 Provisioning (Option Settings)

Description

This section provides instructions for setting circuit pack options on all of the available DDM-2000 OC-12 circuit packs.

Verify that the POWER ON LED on the user panel is lighted.

> **NOTE:**
> Ignore the instructions for circuit packs not provided. After circuit packs have been optioned, they should be placed in the shelf but NOT fully installed.

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

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

Controller Pack Provisioning

BBG5 SYSCTL Circuit Pack

The BBG5 SYSCTL is used for OC-12 Releases prior to Release 5.0

(1) The BBG5 SYSCTL has four option switches for assigning the following:

- 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 the customer specifies otherwise, the CO site address should be set for site 7.

(2) Set the BBG5 SYSCTL circuit pack option switches per customer engineering records or requirements as shown in Figure 5-3 on page 5-17.

> **NOTE:**
> In the absence of engineering records refer to Table 5-1 on page 5-15 for suggested BBG5 SYSCTL circuit pack option settings.

> **NOTE:**
> The data rate (baud rate) on the BBG5 SYSCTL circuit pack (switch 3) 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 usage rate higher than 9600 baud is not recommended.

(3) Place, but do not fully install, the BBG5 SYSCTL circuit pack into the shelf.

BBG8 SYSCTL Circuit Pack

The BBG8 SYSCTL is required for OC-12 Release 5 and 7.

(1) The BBG8 SYSCTL circuit pack has two option switches for assigning:

- Product Identification
- TBOS termination

> **NOTE:**
> TBOS is not supported by OC-12, Release 7.

(2) Set the SYSCTL circuit pack option switches as shown in Figure 5-4 on page 5-21.

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

BCP1 OHCTL Pack

The BCP1 OHCTL is required for OC-12 Releases prior to Release 5.0.

The BCP1 OHCTL circuit pack contains three option switches: switch S1, S2, and S3. Switch S1 provides network element number selection for each shelf. The network element number and the site ID form a unique address for a shelf at a site. Switch S2 provides DCC identification for Open Systems Interconnection (OSI) Interworking.

(1) Determine the network element number from the customer and set S1 as shown in Figure 5-5 on page 5-23.

(2) For Releases 2 and 3, switch S2 must be set as "Network Side" or "User Side" with the network elements on each end of an optical span set for opposite values. Set S2 as shown in Figure 5-5 on page 5-23.

> **NOTE:**
> Switch S3 is not used at this time, and Switch S2 is not used in Release 1, however, these switches should be set as shown in Figure 5-5 on page 5-23.

(3) Place, but do not fully install, the BCP1 in the shelf.

BCP4 OHCTL Pack

The BCP4 OHCTL is required for OC-12 Release 5 and 7.

(1) The BCP4 OHCTL circuit pack has no option switches.

(2) Place, but do not fully install, the OHCTL circuit pack into the shelf.

Transmission and Timing Circuit Pack Provisioning

BCP3 TSI Circuit Pack

The BCP3 TSI circuit pack has no customer set options.

Place, but do not fully install, the BCP3 TSI circuit packs into the shelf.

BBG11/BBG11B 3DS3 Circuit Pack

The BBG11/BBG11B 3DS3 circuit pack has two option jumpers for line build out (LBO) of each DS3 signal path, a total of six jumpers. The BBG11B is required in Release 5 and 7 to support enhanced DS3 performance monitoring.

The order of the DS3 signals are 1 to 3, from top to bottom of the circuit pack.

(1) Set the 3DS3 circuit pack option jumpers per customer engineering records or requirements as shown in Figure 5-7 on page 5-26.

(2) Place, but do not fully install, the 3DS3 circuit packs into the shelf.

BBG12 3STS1E Circuit Pack

The BBG12 3STS1E circuit pack has two option jumpers for line build out (LBO) of each STS1E signal path, a total of six jumpers.

The order of the STS1E signals are 1 to 3, from front to back of the circuit pack.

(1) Set the 3STS1E circuit pack option jumpers per customer engineering records or requirements as shown in Figure 5-6 on page 5-25.

(2) Place, but do not fully install, the 3STS1E circuit packs into the shelf.

BBF2B/BBF2C/BBF4 TGS Circuit Packs

The BBF2B, BBF2C and BBF4 TGS circuit packs have two option switches for assigning the following:

- DS1 line code (AMI or B8ZS)

- Frame format (superframe or extended superframe)

- Timing format (external, free running, or line-timed)

- DS1 output (derive or do not derive, sync out from received OC-12 optical line)

- Equalization (set equalization for DS1 output cable length).

 (1) Set the TGS circuit pack option switch per customer engineering records or requirements as shown in Figure 5-8 on page 5-27.

 (2) Place, but do not fully install, the TGS circuit pack into the shelf.

After being In holdover mode for 24 hours the BBF2B/BBF4 TGS will gradually return to its free running accuracy of ±15 parts-per-million and the BBF4 will gradually return to its free running accuracy of ±4.6 parts-per-million (Stratum 3).

23G-U OLIU

The 23G-U OLIU has no customer set options.

Place, but do not fully install, the 23G-U OLIU circuit packs into the Main B circuit pack positions of the DDM-2000 OC-12 shelf.

23H-U OLIU

The 23H-U OLIU has no customer set options.

Place, but do not fully install, the 23H-U OLIU circuit packs into the Main B circuit pack positions of the DDM-2000 OC-12 shelf.

21G3-U OLIU

The 21G3-U OLIU circuit pack has no customer set options.

Place, but do not fully install, the 21G3-U OLIU circuit packs into the function unit circuit pack positions of the DDM-2000 OC-12 shelf.

21D-U OLIU

The 21D-U OLIU circuit pack has no customer set options.

Place, but do not fully install, the 21D-U OLIU circuit packs into the function unit circuit pack positions of the DDM-2000 OC-12 shelf.

Software Download

Preparation

Verify that the following is available:

- Diskettes containing DDM-2000 OC-12 Multiplexer software

- *DDM-2000 OC-12 Multiplexer Software Release Description* [provided with the software diskettes.]

Also have available the appropriate copies of the following:

- 363-206-207, *DDM-2000 OC-12 Multiplexer User/Service Manual (Release 3)*

- 363-206-290, *DDM-2000 OC-12 Multiplexer User/Service Manual (Release 5)*

- 363-206-295, *DDM-2000 OC-12 Multiplexer User/Service Manual (Release 7)*

Refer to the "Install New Generic Program" detailed level procedure (DLP) (DLP-527) of the user/service manual provided with the DDM-2000 OC-12 shelf while performing the following procedure. If unfamiliar with the operation of the PC, refer to "Introduction to the PC" (DLP-528) of the user/service manual.

Release 3 Software Download Procedure

> **NOTE:**
> If there are any unpowered DDM-2000 shelves in the bay that have craft inter-face terminal (CIT) multed to this DDM-2000 OC-12 shelf, verify that the BBG5 SYSCTL circuit packs in the unpowered shelves are not fully seated in their shelf slots.

(1) Fully insert the BCP1 OHCTL circuit pack into the shelf. The FAULT LED on the circuit pack will light.

(2) Fully insert the BBG5 SYSCTL circuit pack into the shelf.

> **NOTE:**
> The FAULT LED on the BBG5 SYSCTL circuit pack will light for several seconds and then extinguish. The letter "P" should be displayed in the FE ID display. This indicates that the BBG5 SYSCTL and BCP1 OHCTL circuit packs are not equipped with software.

(3) Verify that the PC is set for the same baud rate as the BBG5 SYSCTL circuit pack.

(4) With the PC NOT connected to the DDM-2000 OC-12 shelf, insert the first dis-kette into the PC.

(5) Use the appropriate *MS-DOS*† command (for example, a: or b:) to go to the drive where the diskette is installed.

(6) Enter the "`term`" command and press the RETURN (or ENTER) key twice on the PC. Observe for the following response:

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

(7) Connect the PC to the CIT connector on the front of the shelf user panel.

(8) Enter a question mark(**?**) or press the RETURN key.

Response:

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

(9) Enter a question mark(**?**) or press the RETURN key.

Response: `In Progress .....`

(10)The software download is in progress as indicated by the series of dots following the `In Progress` message and will continue while the software is downloading.

(11) If the software is contained on more than one diskette, a prompt will be printed when the next diskette is required. Remove the existing diskette and insert the next one.

(12)After completion of download, the message: `ins-prog: TID  COMPLD` will appear.

(13)Repeat the download procedure for all spare BBG5 SYSCTL and BCP1 OHCTL circuit packs.

Releases 5 and 7 Software Download Procedure

⟹ NOTE:
If there are any unpowered DDM-2000 shelves in the bay that have craft interface terminal (CIT) multed to this DDM-2000 OC-12 shelf, verify that the BBG8 SYSCTL circuit packs in the unpowered shelves are not fully seated in their shelf slots.

(1) Fully insert the BCP4 OHCTL circuit pack into the shelf. The FAULT LED on the circuit pack will light.

(2) Fully insert the BBG8 SYSCTL circuit pack into the shelf.

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† Registered trademark of Microsoft Corporation

➤ NOTE:
The FAULT LED on the BBG8 SYSCTL circuit pack will light for several seconds and then extinguish. The letter "P" should be displayed in the FE ID display. This indicates that the BBG8 SYSCTL and BCP4 OHCTL circuit packs are not equipped with software.

(3) With the PC NOT connected to the DDM-2000 OC-12 shelf, insert the first diskette into the PC.

(4) Use the appropriate *MS-DOS* command (for example, a: or b:) to go to the drive where the diskette is installed.

(5) Connect the PC to the CIT connector on the front of the shelf user panel.

(6) Perform the following steps for Release 5, if downloading Release 7, skip to Step 8:

    a. Enter the `"term"` command. Observe the message that is printed. 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
```

    b. Connect the PC to the CIT connector on the front of the shelf user panel.

    c. Press the RETURN (or ENTER) key twice on the PC.

       Response: PC prompts with:

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

    d. 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) If the download does not start, as indicated by the rows of dots after the `"In progress"` message, change the CTRM baud rate. If the baud rate is currently set to 9600, change it to 4800 or if baud rate is currently set to 4800, change it to 9600 as follows.

    ■ Simultaneously depress the "Alt" and "C" keys on the PC to access the CTRM Change Parameters screen.

    ■ Press the RETURN (or enter) key once to move to the "Speed" field.

    ■ Press the "Space" bar until the desired rate is displayed.

■ Press the "Escape/Esc" key to activate the new baud rate and return to CTRM.

(8) The following steps are for downloading Release 7:

a. Enter the "`term`" command. Observe the message that is printed. The message gives the user the choice to continue or not continue with the download procedure. Disregard the message:

`Can't find script <init>`

b. A brief messages appears next and will ask you to:

`Press any key to continue`

c. Within 2 minutes, you will see the following

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

Searching for optimal transfer rate.
Handshake established at <baudrate> baud.


In Progress .....
```

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

(9) After completion of the Release 5 or Release 11 downloading, the following message will appear:

`ins-prog: TID  COMPLD`

(10) 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:**
The AGNE is not supported in OC-12, Release 7.

(11) Repeat the download procedure for all spare BBG8 SYSCTL and BCP4 OHCTL circuit packs.

Circuit Pack Installation

The following procedure provides the recommended order for circuit pack installation.

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

> **NOTE:**
> Circuit packs are keyed to prevent being inserted into the wrong shelf position.

> **NOTE:**
> When installing the circuit packs, be careful to insert them straight to avoid damaging the LEDs.

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

> **NOTE:**
> The UPD/INIT push-button on the BBG5 or BBG8 SYSCTL circuit pack is recessed and will require a pointed object, like a ballpoint pen, to press it.

For circuit packs that have latches on the bottom as well as the top of the faceplate, insert per the following method:

(1) Insert circuit pack into slot with both latches in the fully open position. Push pack in until the latches clear the key strip area and latches can engage on latch channel on shelf.

(2) Apply a small amount of force to both the top and bottom latch evenly and simultaneously.

(3) Do not apply excess force, the connectors of these packs do not need a high level of force to mate. If excessive resistance is met, withdraw pack slightly to remove cause of binding and continue with Step 2.

> **NOTE:**
> All other circuit packs require some force to insert.

> **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/INIT must be performed after the circuit pack is unseated. Otherwise, the system will alarm.

(4) Fully insert the BCP2 or BCP3 TSI circuit packs into the shelf.

(5) Fully insert the BBF2B or BBF4 TGS circuit packs into the shelf.

(6) Fully insert the BBG11 or BBG11B 3DS3 circuit packs into the shelf.

(7) Fully insert the BBG12 3STS1E circuit packs into the shelf.

(8) DO NOT fully insert the 23G-U, 23H-U, 21G3-U, or 21D-U OLIU circuit packs at this time.

(9) Insert 177B apparatus blanks in all function unit positions NOT equipped with circuit packs.

(10) Insert 177C apparatus blanks in the MAIN A shelf positions.

Final Operations

Procedure

(1) Verify that all circuit packs, other than the OLIU circuit packs, are installed.

(2) If there are any FAULT LEDs ON, press the UPD/INIT push-button on the SYSCTL.

(3) If, after the UPD/INIT, there are still FAULT LEDs lit, ignore them until the installation process is completed. Any failures will be isolated in the following sections.

(4) Leave the office alarm cables disconnected at this time.

Table 5-1   DDM-2000 OC-12 Circuit Pack Codes

Product Code	Description	Max/ Shelf (Note 1)	Min/ Shelf (Note 2)
ED-8C727-30, G1	DDM-2000 Shelf Assembly	-	-
BBG5 or BBG8 *	SYSCTL Circuit Pack	1	1
BCP1 or BBG4 *	OHCTL Circuit Pack	1	1
BCP3	TSI Circuit Pack	2	2
BBF2B or BBF4	TGS Circuit Pack	2	2
BBG11/BBG11B	3DS3 Circuit Pack	8 †	2 †
BBG12	3STS1E Circuit Pack		
21G3-U	OLIU Regenerator		
21D-U	OLIU Regenerator		
23G-U or 23H-U ††	OLIU Regenerator	2	2
177B §	Apparatus Blank (8")	6	0
177C §§	Apparatus Blank (12")	2	2

Table 5-1 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.

*   The BBG8 SYSCTL and BCP4 OHCTL are used with Release 5 or 7.

†   The function unit slot positions may be equipped with BBG11 3DS3s, BBG12 3STS1Es, 21G3-U OLIUs, or 21D-U OLIUs, or some other combination of pairs of these circuit packs, (Release 3.0 Ring software will not accept OLIUs in function unit positions).

†† The 23H-U OLIU is a 1550nm long reach regenerator.

§   Unequipped function unit shelf position slots MUST be filled with 177B apparatus blanks to ensure proper air flow.

§§ Unequipped MAIN shelf position slots MUST be filled with 177C apparatus blanks to ensure proper air flow.

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

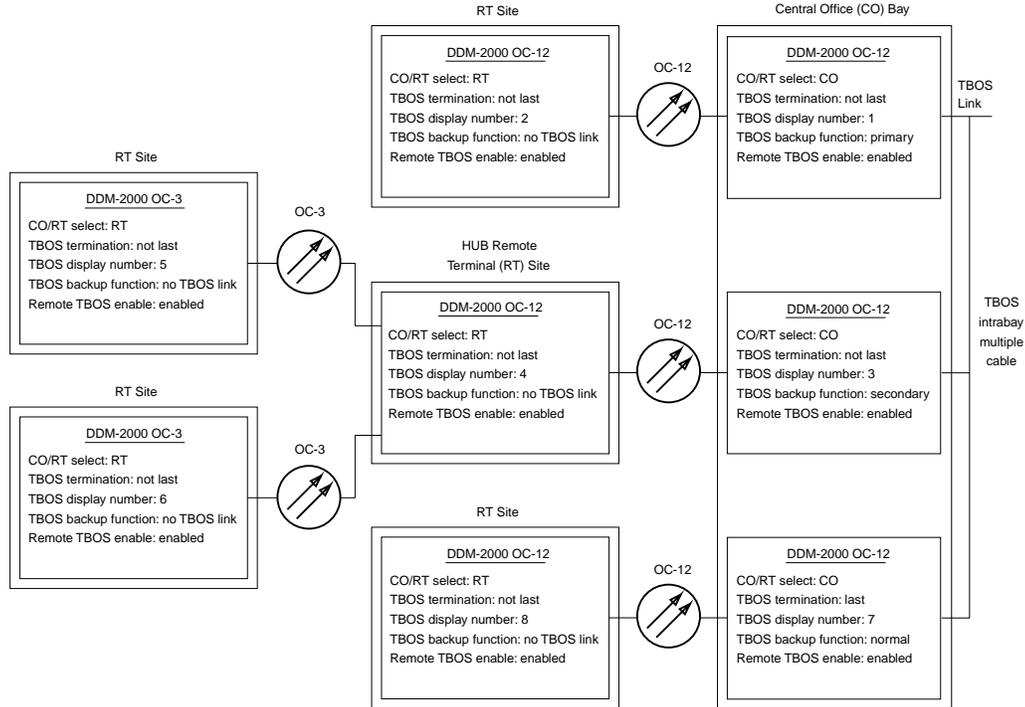Example of TBOS-Related Provisioning for DDM-2000 OC-12 Applications

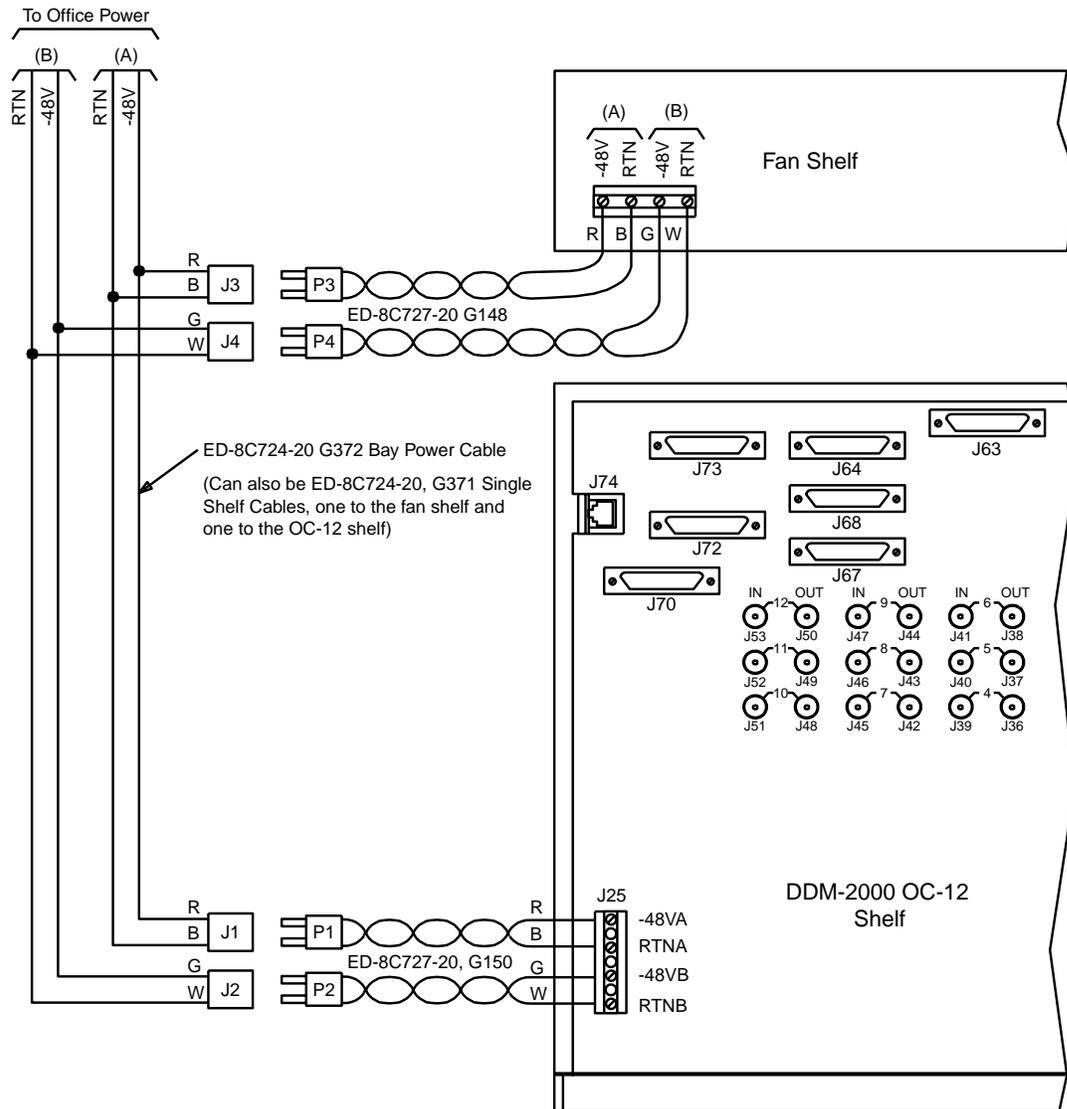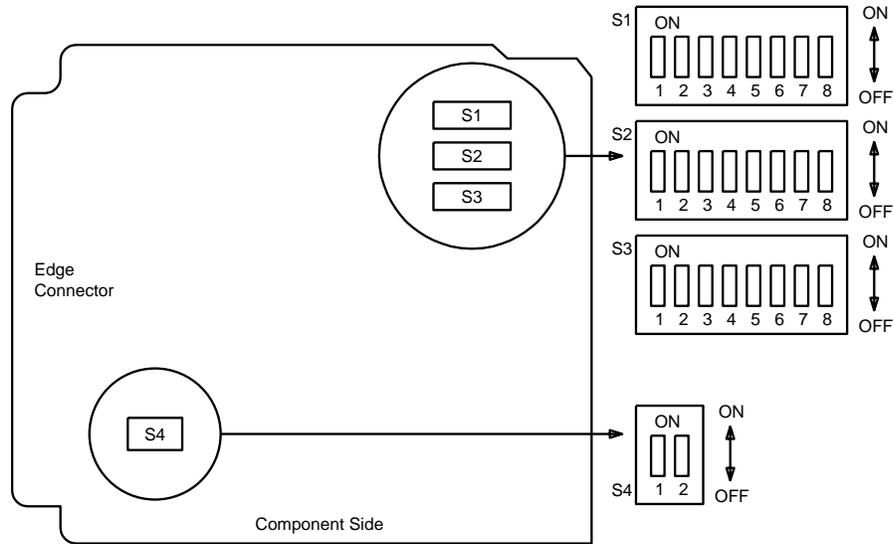**Figure 5-1.   BBG5 SYSCTL Option Setting Guidelines**

Figure 5-2.   Power Cabling

BBG5 SYSCTL Option Notes*:

1. The SYSCTL has four option switches which must be properly set. Refer to the option switch settings on the following two pages.

2. All switches should be set per the customers engineering records.

3. In the absence of engineering records, refer to Figure 5-1 on page 5-15.

Figure 5-3.   BBG5 SYSCTL Option Switches (Sheet 1 of 4)

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	N	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							

‡ TBOS is not available in OC-12, Release 7.

SYSCTL Switch 1 Notes:

1. The TBOS display number is the order the shelves will report TBOS information when prompted. Typically on point-to-point applications associated with Release 1, odd-numbered TBOS displays are in the CO, and even-numbered TBOS displays are in the corresponding RTs. The TBOS display number assignments for shelves
in a Release 2 configured system will be deter-
mined by the number of RT sites in the system.

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 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 enables or disables TBOS reporting from the shelf.

5. Switch section 8 is not used at the present time and must be set OFF to avoid alarm and fault light generation on the SYSCTL.

Figure 5-3 (Continued).   BBG5 SYSCTL Option Switches (Sheet 2 of 4)

Switch 2 Settings

Site Address						Shelf ID Number			
Value	**Sec 1**	**Sec 2**	**Sec 3**	**Sec 7**	**Sec 8**	**Value**	**Sec 4**	**Sec 5**	**Sec 6**
1	ON	ON	ON	ON	ON	1	ON	ON	ON
2	OFF	ON	ON	ON	ON	2	OFF	ON	ON
3	ON	OFF	ON	ON	ON	3	ON	OFF	ON
4	OFF	OFF	ON	ON	ON	4	OFF	OFF	ON
5	ON	ON	OFF	ON	ON	5	ON	ON	OFF
6	OFF	ON	OFF	ON	ON	6	OFF	ON	OFF
7	ON	OFF	OFF	ON	ON	7	ON	OFF	OFF
8	OFF	OFF	OFF	ON	ON	8	OFF	OFF	OFF
9	ON	ON	ON	OFF	ON				
10	OFF	ON	ON	OFF	ON				
11	ON	OFF	ON	OFF	ON				
12	OFF	OFF	ON	OFF	ON				
13	ON	ON	OFF	OFF	ON				
14	OFF	ON	OFF	OFF	ON				
15	ON	OFF	OFF	OFF	ON				
16	OFF	OFF	OFF	OFF	ON				
17	ON	ON	ON	ON	OFF				
18	OFF	ON	ON	ON	OFF				
19	ON	OFF	ON	ON	OFF				
20	OFF	OFF	ON	ON	OFF				
21	ON	ON	OFF	ON	OFF				
22	OFF	ON	OFF	ON	OFF				
23	ON	OFF	OFF	ON	OFF				
24	OFF	OFF	OFF	ON	OFF				
25	ON	ON	ON	OFF	OFF				
26	OFF	ON	ON	OFF	OFF				
27	ON	OFF	ON	OFF	OFF				
28	OFF	OFF	ON	OFF	OFF				
29	ON	ON	OFF	OFF	OFF				
30	OFF	ON	OFF	OFF	OFF				
31	ON	OFF	OFF	OFF	OFF				
32	OFF	OFF	OFF	OFF	OFF				

SYSCTL Switch 2 Note:

* Only site addresses 1-8 are supported prior to Release 2.1 (linear) and Release 3.0 (ring). For prior Releases, Switch 2 sections 7 and 8 must be set to the ON position as indicated.

Figure 5-3 (Continued).   BBG5 SYSCTL Option Switches (Sheet 3 of 4)

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		

SYSCTL 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 SYSCTL FAULT LED, and set TBOS point 14.

> ⇒ **NOTE:**
> TBOS is not available in OC-12, Release 7.

Switch 4 Settings

TBOS Terminator

Shelf Location	Sec 1	Sec 2
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 termi-nator 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 5-3 (Continued). BBG5 SYSCTL Option Switches (Sheet 4 of 4)
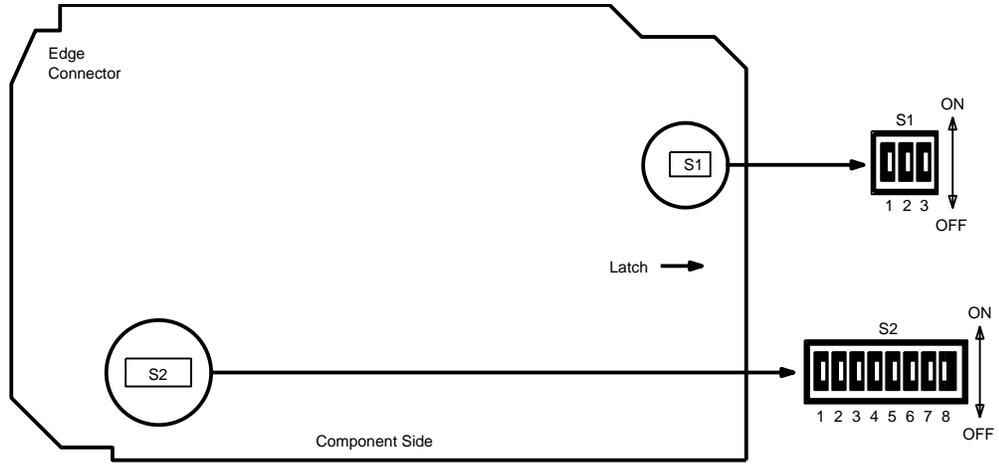
Switch 1 Settings

Product Identification	Sec 1	Sec 2	Sec 3
DDM-2000/SLC-2000/ DDM-2000 FiberReach	OFF	OFF	OFF

SYSCTL Switch 1 Note:

1. For DDM-2000 OC-12 applications, switch 1 sections 1, 2 and 3 must be set to the OFF position.

Figure 5-4.   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

‡ TBOS is not available in OC-12, Release 7.

SYSCTL 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

SYSCTL Switch 2 sections 3 and 8 Note:

1. For DDM-2000 OC-12 applications, switch 2 sections 3 through 8 must be set to the OFF position.

Figure 5-4 (Continued).   BBG8 SYSCTL Option Switches (Sheet 2 of 2)
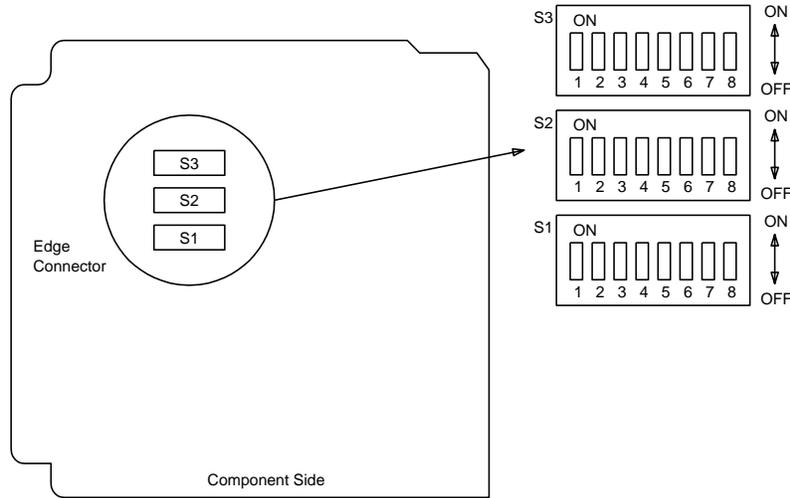
Switch 1 Settings

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. If an invalid setting is selected, the fault LED lights and an alarm is generated.

2. 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.

3. Switch 1, sections 4, 5, 6, 7, and 8 must be to the **ON** position.

Figure 5-5.   BCP1 OHCTL Option Switches (Sheet 1 of 2)

Switch 2 sections 1 through 6 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 2 **Sec 1** thru **Sec 6** are set to OFF for the Network Side and ON for the User Side of network elements in an optical span.

NOTE:
    Release 2 multiplexer software requires the BCP1 to be a series S2:3 or later, Release 3 software requires the BCP1 to be series S2:4 or later.

NOTE:
    Release 1 Multiplexer software and Release 1 and 2 Regenerator software, does not contain the OSI feature and therefore Switch 2 should be set to the factory default values shown in the following table:

Switch 2 Settings for Linear Applications

main-a Sec 1	main-b Sec 2	fn-a Sec 3	fn-b Sec 4	fn-c Sec 5	fn-d Sec 6	Sec 7	Sec 8
OFF	ON	OFF	OFF	OFF	OFF	ON	ON

For Release 2 systems, refer to Figure 5-6 on page 5-25 on the following page for an example system configuration, noting the opposite values set at each terminating node. The effected switch settings are highlighted in bold type. Set Switch 2 settings according to work order or office records using this example as a guide. Switch 2 **Sec 7** and **Sec 8** must be set to ON.

NOTE:
    OSI settings on DDM-2000 OC-3 shelves are located on the BBG7 OHCTL.

Switch 2 Settings for Ring Applications

main-b-2 Sec 1	main-b-1 Sec 2	fn-a Sec 3	fn-b Sec 4	fn-c Sec 5	fn-d Sec 6	Sec 7	Sec 8
OFF	ON	OFF	OFF	OFF	OFF	ON	ON

For Release 3 Ring systems, since OLIUs are connected main-b-1 of one node to main-b-2 of another node, the Switch 2 factory default settings shown in the above table will be correct for each DDM-2000 OC-12 shelf in the ring. However, for Release 3.1 Rings systems containing OC-3 optical extensions, Switch 2 **Sec 3** thru **Sec 6** must be set to values opposite than the values of the corresponding OSI settings on the BBG7 circuit packs of the DDM-2000 OC-3 terminating nodes. Switch 2 **Sec 7** and **Sec 8** must be set to ON.

For all Multiplexer and Regenerator Releases, Switch 3 **Sec 1** thru **Sec 8** are set to ON.

Figure 5-5 (Continued). BCP1 OHCTL Option Switches (Sheet 2 of 2)
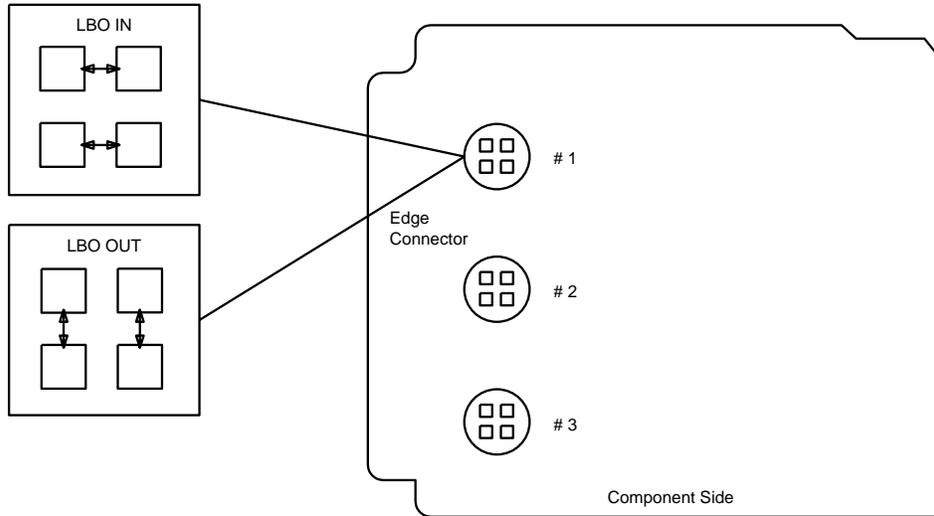
Cable Length (ft.)			LBO Settings (Note)
735A 1735006A	734A	KS-19224, L2	
0 to 125	0 to 225	0 to 75	LBO IN
>125 to 245	>225 to 450	>75 to 150	LBO OUT

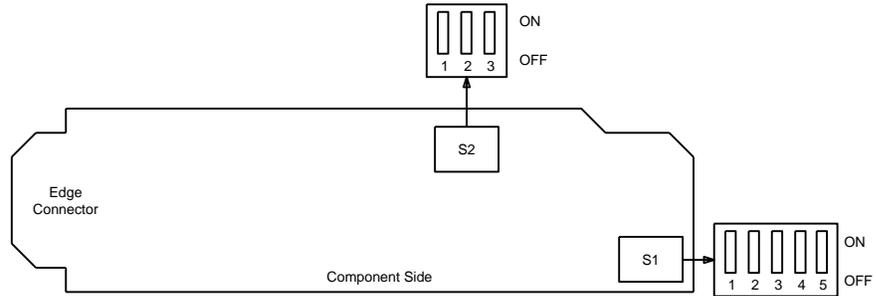**Note:** Set the LBO setting based on the type of cable used and the cable length.

Figure 5-6.   BBG11/BBG11B 3DS3 Option Jumpers
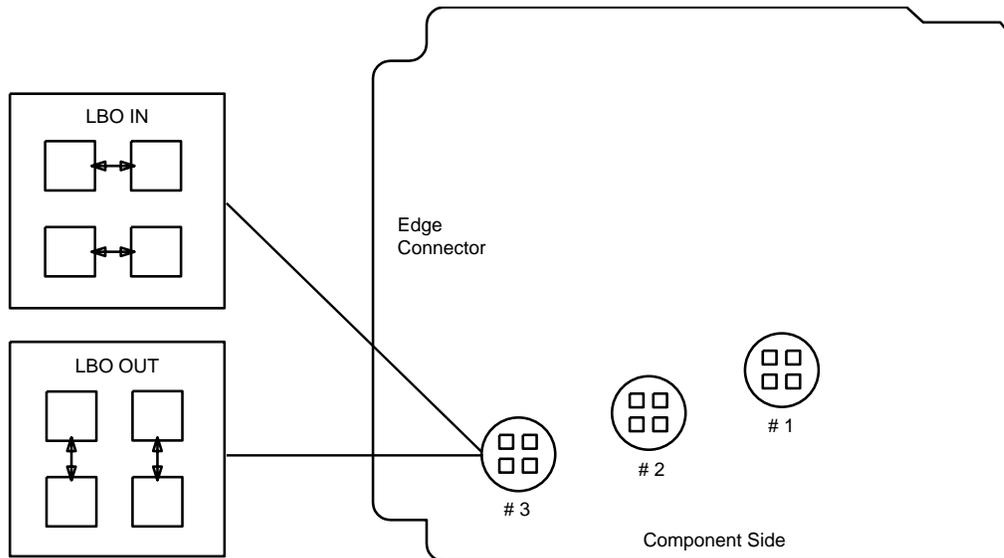
Cable Length (ft.)			LBO Settings (Note)
735A 1735006A	**734A**	**KS-19224, L2**	
0 to 125	0 to 225	0 to 75	LBO IN
>125 to 245	>225 to 450	>75 to 150	LBO OUT

Note: Set the LBO setting based on the type of cable used and the cable length.

Figure 5-7.   BBG12 3STS1E Option Jumpers

Notes:

1. The switches are set by moving the slide toward the desired position.

2. If the invalid switch setting is selected, the FAULT LED lights and an alarm is generated.

Switch 1 Settings

DS1 Line Coding	Sec 1	DS1 Frame Format	Sec 2
AMI*	ON	SF*	ON
B8ZS	OFF	ESF	OFF

Note: Controls line coding and frame format for both DS1 input and output.

* Factory default

Switch 1 Settings

Timing Mode	Sec 3	Sec 4	Sec 5 (DS1 Output)
Free Running	ON	ON	OFF
DS1 External, MULT OUT Mode*	OFF	ON	OFF
Line Timing	OFF	OFF	OFF
Line Timing, SYNC OUT Mode	OFF	OFF	ON
DS1 External, SYNC OUT Mode	OFF	ON	ON
(Invalid)	ON	OFF	ON
(Invalid)	ON	OFF	OFF
(Invalid)	ON	ON	ON

* Factory default

Figure 5-8.   BBF2B/BBF4 TGS Option Switches for OC-12 Multiplexer (Sheet 1 of 2)

Notes:

1. If the shelf is located in a CO and the DDM-2000 OC-12 IS NOT connected to a DS1 clock (J66 on backplane), set the Timing Mode for "Free Running".

2. If the shelf is located in a CO and the DDM-2000 OC-12 IS connected to a DS1 clock (J66 on backplane) and the DS1 output (Sync Out) will not be derived from the received OC-12 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-12 line for network timing distributions, set the Timing Mode for "line-timed".

4. If the shelf is located in an RT and DS1 output (Sync Out) is to be derived from the received OC-12 line for network timing distribution, set the Timing Mode for "line-timed, SYNC OUT Mode".

5. If the shelf is located in a CO and the DDM-2000 OC-12 IS connected to a DS1 clock (J66 on backplane) and DS1 output (Sync Out) is to be derived from the received OC-12 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)	Sec 1	Sec 2	Sec 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 J65 of the DDM-2000 OC-12 shelf to the timing reference when the BBF2B/BBF4 TGS is set for SYNC OUT mode.

2. Distance in feet for 22-gauge PIC (ABAM) cable.

Figure 5-8 (Continued).   BBF2B/BBF4 TGS Option Switches for OC-12 Multiplexer (Sheet 2 of 2)

Stand-Alone (Local) Installation Tests for the DDM-2000 OC-12 Multiplexer

6

Contents

Stand-Alone (Local) Installation Tests for the DDM-2000 OC-12 Multiplexer

6

Overview

This section provides instructions on the use of an American Standard Code for Information Interchange (ASCII) terminal and the stand-alone installation tests which should be performed.

The stand-alone installation tests verify the following:

■ Shelf transmission

■ Wiring to DSX-3/STSX

■ Nontransmission wiring

■ Protection switching.

Description

These installation tests are for the DDM-2000 OC-12 Multiplexer. The installation tests in this chapter should be 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.

If problems are encountered, refer to the "Troubleshooting" section of this manual. For detailed troubleshooting, refer to 363-206-207 (Releases prior to 5), 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual*.

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

⚠ **WARNING:**
Invisible laser radiation when open. Avoid direct exposure to beam. Observe all precautions when handling fiber.

⇛ **NOTE:**
Prior to beginning the installation tests, disconnect the office alarms from the shelf to prevent alarming during tests.

⇛ **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/INIT must be performed after the pack is unseated; otherwise, the system will alarm.

⇛ **NOTE:**
It is important that circuit packs be installed or replaced only when the SYSCTL is in place and operating normally. Replacing or installing circuit packs when the SYSCTL is not in place and operating normally can result in unpredictable provisioning of the replaced/installed circuit pack.

LED, Push-button, and Display Descriptions

The LEDs have a delay default of 2 seconds. Therefore, the LEDs will not light until the problem has existed for 2 seconds. This delay can be altered with the `set-attr` command.

The user panel contains the EIA-232D connector and the LEDs required to perform the installation tests and is shown in Figure 6-1 on page 6-33.

The following LEDs are located on the circuit packs:

LED	Description
FAULT(solid)	Circuit pack is failed
FAULT (flashing)	Circuit pack has lost its input signal*
ACTIVE	Pack is carrying service

* A flashing FAULT LED on the OHCTL indicates a loss of communication with the FAR END

The following LEDs are located on the user panel:

LED	Description
CR (Critical)	Potential loss of service to greater than 96 DS0 customers
MJ (Major)	Potential loss of service to fewer than 96 DS0 customers
MN (Minor)	A non-service-affecting (nsa) 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 inter-face 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

† Parallel telemetry is not available in OC-12, Release 7.

The following push-buttons and display are located on the SYSCTL:

LED	Description
ACO (Alarm Cutoff)	Silences existing audible office alarms and parallel telemetry† indications
UPD/INIT (Update/Initialize)	Used to initialize SYSCTL upon replacement or update of 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

† Parallel telemetry is not supported in OC-12, Release 7.

Tools, Test Sets, and Accessories

The following items are required:

Quantity	Description			Comcode
1	Electrostatic discharge wrist strap[*]			901011320
3 per BBG11B or BBG12B	DSX-3 or STSX loopback cables[†]			
1	ASCII Terminal or PC (personal computer) configured as a terminal			
1 per 23G-U OLIU	15 dB Universal LBO (Type dependent on type of fiber connection desired)	**LBO Type**		
		ST		106795388
		SC		106708985
		FC/PC		106795438
1 per 23H-U OLIU	20 dB Universal LBO (Type dependent on type of fiber connection desired)	*ST*		106795396
		SC		106708993
		FC/PC		106795446
1 per 23G-U, 23H-U or 21G3-U OLIU	Singlemode optical fiber cable (Type dependent on Universal LBO type used)	**Fiber Type**		
		ST-ST		105357727
		SC-SC		106908247
		FC/PC-FC/PC		106593825
1 per 21D-U OLIU	Multimode optical fiber cable (Type dependent on Universal LBO type used)	*ST-ST*		105351795
		SC-SC		106908668
		FC-FC		107095549

* A wrist strap must be worn when handling circuit packs. Use the ESD jack provided on the user panel.

† Only required if the DDM-2000 OC-12 is cabled to a DSX-3 or STSX cross-connect.

Use of Terminal

Description

This paragraph describes which terminals are approved for use with the DDM-2000 OC-12, how to set up the terminal, and some DDM-2000 OC-12 command notes. The use of a terminal is optional.

Compatible Terminals

The DDM-2000 OC-12 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.

The DDM-2000 OC-12 will output information to fit in a display area of 24 lines (default) by 72 characters. The number of display lines can be altered with the **set-link** command.

ASCII Terminal Setup

The DDM-2000 OC-12 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-12 (which is controlled by the switches on the SYSCTL) and the ASCII terminal must agree.

DDM-2000 OC-12 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-12 Command Notes

> **NOTE:**
> All DDM-2000 OC-12 commands will be issued through the ASCII terminal.

> **NOTE:**
> For a list of the DDM-2000 OC-12 command codes refer to Table 6-1 on page 6-27. A complete list of DDM-2000 OC-12 command codes with their descriptions is contained in the 363-206-207 (Releases prior to 5), 363-206-290 (Release 5), or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual.*

> **NOTE:**
> Commands can be entered in either upper, lower or mixed case.

> **NOTE:**
> If a command is partially entered, or if **?** is entered any time, the user will be prompted with a menu of available choices.

> **NOTE:**
> The following special ASCII characters are supported:

- Semicolon (;) — the official and preferred huMan-Machine Langauge (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 Underscore (_) — erases the previous character input.

- At-sign (@) — erases the current line.

- CANcel and DELete — terminates the current input line.

- 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-12s 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 for Releases 5 and 7) to prompt the
DDM-2000 OC-12 to request a shelf address.

The DDM-2000 OC-12 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) Enter a valid shelf number.
The shelf returns with a login < prompt.

⇒ NOTE:
A return/enter at this point will log you into the shelf as a general user which will
not allow execution of privileged user commands that will be necessary. Be sure
to use the following default login and password to log into the shelf as a privileged user. The login and password must be entered in uppercase as shown.

(4) Enter **LUC01;**
The shelf will then return with a password < prompt.

(5) Enter **DDM-2000;**

After a successful login the DDM-2000 OC-12 will display the system header followed by the alarm and status report:

```
Lucent Technologies
DDM-2000 OC-12 Release a.b.c
TID date time
/* Active Alarms and Status Report */
<
```

⟹ **NOTE:**

Release a.b.c is the software release.

(6) Once logged in, the user can only issue commands to the on-line shelf. To communicate with another shelf in the bay, through the other shelf's CIT, the user will first have to terminate the session with the current shelf. The session is terminated with the **log;** (LOGOUT) command.

⟹ **NOTE:**

To communicate with another shelf it is possible to log in remotely while still logged in to the local shelf. It is not possible to remotely log in to another shelf without being logged in to the local shelf through its CIT.

(7) Issue the command **init-sys:all;** (INITIALIZE SYSTEM). This command will configure the DDM-2000 OC-12 with its default parameters.

(8) When initialization completes, repeat steps 2 through 5 to log back into the shelf.

(9) For Releases 5, 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.

(10) To change the target identifier (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. For Releases prior to 5, at the GNE= prompt enter no at this time.

(11) 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**.

(12) 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, i.e., to clear delay, respond to the prompts with **0**.

(13) 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-12 shelf. Operation of all the LEDs is necessary to assist in trouble isolation.

> **NOTE:**
> If there are any LED failures, determine if the problem is with the circuit pack or shelf and replace the faulty unit.

> **NOTE:**
> If the shelf is not fully equipped, move circuit packs around and repeat the test. Test all circuit pack positions.

Procedure

Issue the command **test-led;**

The DDM-2000 OC-12 will respond with `"In Progress . . . ."` for the duration of the test and will issue a prompt < 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-12 shelf. The shelf must successfully pass this test before testing any other feature of the DDM-2000 OC-12.

> **NOTE:**
> After completing the local equipment 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.

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

⚠ **WARNING:**
Invisible laser radiation when open. Avoid direct exposure to beam.

Loopback OC-12 Shelf

(1) If the DDM-2000 OC-12 is a remote terminal (RT), change the timing mode on the BBF2B/BBF2C/BBF4 TGS circuit packs from "line timed" to "free running" (refer to Chapter 3). When the timing mode is changed, press the UPD/INIT push-button on the SYSCTL after the change is complete.

(2) Remove each 23G-U OLIU circuit pack from the shelf and replace the 0 dB lightguide buildout (LBO) assembly of the OUT (transmit) connector on each 23G-U OLIU with a 15 dB buildout assembly per the following table and Figure 6-2 on page 6-34.

23G-U Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	ConnectorType
15 dB	A3060F	106708985	SC
15 dB	A3070F	106795388	ST
15 dB	A3080F	106795438	FC/PC

⚠ **CAUTION:**
Do not install optical loopback cables without 15 dB lightguide buildouts as this will cause damage to the receivers.

(3) Remove each 23H-U OLIU circuit pack from the shelf and replace the 0 dB light-guide buildout (LBO) assembly of the OUT (transmit) connector on each 23H-U OLIU with a 20 dB buildout assembly per the following table and Figure 6-2 on page 6-34.

23H-U Lightguide Buildouts

Lightguide Buildout (LBO)	Code	Comcode	ConnectorType
20 dB	A3060H	106708993	SC
20 dB	A3070H	106795396	ST
20 dB	A3080H	106795446	FC/PC

⚠ CAUTION:
Do not install optical loopback cables without 20 dB lightguide buildouts as this will cause damage to the receivers.

(4) Place the OLIU packs [including any function units (FN) OLIUs] into their respective shelf positions and fully insert them.

➡ NOTE:
Release 3.0 ring software does not support OLIUs in function unit positions.

(5) For Releases 5 and 7 applications with DDM-2000 OC-3 Release 8 Linear (1+1) extensions, use the **set-oc3** command to provision the desired function unit address to the 1+1 application. For DDM-2000 OC-3 ring releases, leave this parameter set to the default value(0x1).

(6) Connect the OLIU OUT to the OLIU IN of each OLIU using optical fiber jumper cables per the following tables and Figure 6-2 on page 6-34, local equipment test.

➡ NOTE:
21D-U OLIUs in FN slots require multimode fiber jumpers.

Singlemode Lightguide Jumpers

Code	Comcode	Length (feet)	Connectors
FS1E-E-2	105357727	2	ST-ST
LS1SC-SC-2	106908247	2	SC-SC
LS1FP-FP-10	106593825	10	FC/PC-FC/PC

Multimode Lightguide Jumpers

Code	Comcode	Length (feet)	Connectors
FL1E-E-2	105351795	2	ST-ST
LL1SC-SC-2	106908668	2	SC-SC
LL1FC-FC-10	107095549	10	FC-FC

After a few moments, no alarms should be present (that is, no FAULT LED lighted on any circuit packs). If alarms are present, press the UPD/INIT push-button on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.

(7) The DCC must be disabled to prevent an "inconsistent DCC switches" alarm condition when the shelf is looped back on itself. Issue the command **set-fecom:dcc-all:com=disabled;** to disable DCC.

DSX-3/STSX Transmission Tests

NOTE:
This test requires a BBG11B 3DS3 circuit pack for testing of STSX as well as DSX-3 cabling. Ensure the Function Unit position associated with the cabling under test is equipped with a BBG11B circuit pack. If necessary, remove BBG12B circuit packs and move a BBG11B from slot to slot to test all DSX-3/STSX cabling.

NOTE:
Press the UPD/INIT push-button whenever a circuit pack is removed.

(1) Unseat the OLIUs from the shelf and press the UPD/INIT button on the SYSCTL circuit pack.

(2) Place a loopback cable at the DSX-3/STSX for the function group under test.

(3) Enter the command **test-trmsn-t3** followed by a carriage return.

(4) Enter the address of the DS3 muldem under test at the address prompt, followed by a carriage return.

NOTE:
Entering a **?** at any time will provide a help menu.

(5) Enter **demux** at the direction prompt, followed by a carriage return.

(6) Enter a **1** at the duration prompt for a 1-minute test, followed by a carriage return. This test should pass without any errors.

(7) Isolate and correct the problem if errors are observed.

(8) Remove the loopback cable at the DSX-3/STSX.

(9) Press the UPD/INIT push-button on the user panel.

(10) Repeat this procedure, steps 1 through 9, for all DS3/EC-1 cabling.

(11) Return any circuit packs moved in this procedure to their original slots and update the SYSCTL by pressing the UPD/INIT button.

(12) Reinsert the OLIU circuit packs into their shelf positions.

Office Alarm Test

Description

This test verifies proper operation and wiring of the office alarms in a network equipment building system (NEBS) (central office) environment.

> **NOTE:**
> Perform this test on all shelves where office alarms are connected.

> **NOTE:**
> After completing the office alarm test, disconnect the DDM-2000 OC-12 office alarms 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-12 do not affect and are not affected by other equipment via office alarm connections. During this test, examine the alarm state of other equipment connected to the same office alarms as the DDM-2000 OC-12 after creating or clearing every alarm.

> **NOTE:**
> Prior to and after completing this test, verify the DDM-2000 OC-12 is clear, of all alarms (that is, only green LEDs are lighted). If alarms do not clear refer to the "Troubleshooting" section of this manual.

Procedure

(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 key.

⇒ **NOTE:**
This test will cycle through the following at 4-second intervals:

- No alarm
- CR alarm
- MJ alarm
- 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, immediately press the ACO push-button and verify the audible alarms are silenced.

Fan Alarm Test

Description

This test verifies shelf alarm operation and alarm cabling between the fan shelf and the DDM-2000 OC-12 shelf.

Perform the following test for each ED-8C733-30, G8 fan shelf.

Procedure

(1) Depress 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 that 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 power cable from its mate on the bay power cable.

(4) Verify that the POWER FAULT LED lights on the fan shelf and the MN alarm and NE ACTY LEDs light on the DDM-2000 OC-12 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-12 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.

The following circuit packs are protected and will be tested:

- BBF2B, BBF2C or BBF4 TGS circuit pack

- BBG11B 3DS3 circuit pack

- BBG12 3STS1E circuit pack

- 21G3-U circuit pack

- 21D-U circuit pack

Perform this test on all shelves.

> **NOTE:**
> A wrist strap must be worn while handling circuit packs.

> **NOTE:**
> Verify that the OLIUs are looped back on themselves (that is, the OLIU OUT is connected to the OLIU IN).

> **NOTE:**
> Prior to performing each test, the shelf under test must be clear of all alarms (that is, only green LEDs are lighted). If alarms do not clear, refer to the "Troubleshooting" section of this manual.

> **NOTE:**
> The office alarm cable on the backplane (J63) of the DDM-2000 OC-12 may be disconnected so that office alarms are not activated during testing.

BBF2B/BBF4 TGS Protection Switch

(1) Unseat the active TGS circuit pack. The ACTIVE LED on the other TGS circuit pack and the MN and NE ACTY alarms on the user panel should light.

(2) Unseat the second TGS circuit pack. On the user panel, the MN alarm should extinguish and the CR alarm should light.

(3) Reseat the first TGS circuit pack which was removed. The ACTIVE LED on the reseated TGS circuit pack should light and the FAULT LED on the TGS circuit pack will light for several seconds, then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light.

(4) Reseat the second TGS circuit pack. The ACTIVE LED on the first TGS circuit pack should remain on and the ACTIVE LED on the second TGS circuit pack should remain off. The FAULT LED on the replaced TGS circuit pack will light for several seconds and then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

BBG11B 3DS3 Protection Switch

(1) Perform the following steps for each pair of 3DS3 circuit packs.

(2) Unseat the active 3DS3 circuit pack. The ACTIVE LED on the other 3DS3 and the MN and NE ACTY alarms on the user panel should light.

(3) Unseat the second 3DS3 circuit pack. On the user panel, the MN alarm should extinguish and the CR alarm should light.

(4) Reseat the first 3DS3 circuit pack which was removed. The ACTIVE LED on the reseated 3DS3 circuit pack should light and the FAULT LED on the 3DS3 circuit pack will light for several seconds, then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light. The NE ACTY LED should still be active.

(5) Reseat the second 3DS3 circuit pack. The ACTIVE LED on the first 3DS3 circuit pack should remain on and the ACTIVE LED on the second 3DS3 circuit pack should remain off. The FAULT LED on the replaced 3DS3 circuit pack will light for several seconds and then extinguish. On the user panel, the MN and NE ACTY alarms should extinguish.

BBG12 3STS1E Protection Switch

(1) Perform the following steps for each pair of 3STS1E circuit packs.

(2) Unseat the active 3STS1E circuit pack. The ACTIVE LED on the other 3STS1E and the MN and NE ACTY alarms on the user panel should light.

(3) Unseat the second 3STS1E circuit pack. On the user panel, the MN alarm should extinguish and the CR alarm should light.

(4) Reseat the first 3STS1E circuit pack which was removed. The ACTIVE LED on the reseated 3STS1E circuit pack should light and the FAULT LED on the 3STS1E circuit pack will light for several seconds, then extinguish. On the user panel, the CR alarm should extinguish and the MN alarm should light. The NE ACTY LED should still be active.

(5) Reseat the second 3STS1E circuit pack.

a. The ACTIVE LED on the first 3STS1E circuit pack should remain ON

b. The ACTIVE LED on the second 3STS1E circuit pack should remain OFF.

c.   The FAULT LED on the replaced 3STS1E circuit pack will light for several sec-
onds and then extinguish. On the user panel, the MN and NE ACTY alarms
should extinguish.

21G3-U/21D-U OLIU Protection Switch

> **NOTE:**
> Skip this test for Release 3.1 or Releases 5 or 7 unless you provision the applica-
> tion value for 1+1 as shown in this procedure. The 1+1 application value is used
> for OC-3 linear extensions.

> **NOTE:**
> This test cannot be applied when the application value is 0x1 because both
> OLIUs of an FN pair are simultaneously active.

(1) Perform this test for FN positions equipped with OLIU circuit packs.

(2) In order to perform this test, change the application value from 0x1 to 1+1 as fol-
lows:

Release 5.0:

```
set-oc3:fn-{a, b, c, or d},dgr=,kbyte=,app=1+1, aisalm=;
```

Release 5.1 and higher:

```
set-oc3:fn-{a, b, c, or d},dgr=,syncmsg=,app=1+1,
aisalm=;
```

(3) Perform the following steps for each pair of 21G3-U or 21D-U FN OLIU circuit
packs.

(4) Disconnect the lightguide jumper from the IN connector of the active OLIU cir-
cuit pack.

The FAULT LED on the OLIU should begin to flash and the ACTIVE LED on the
other OLIU of the circuit pack pair should light. On the user panel the MN and NE
ACTY alarms should light.

(5) Disconnect the lightguide jumper from the IN connector of the second OLIU cir-
cuit pack of the pair.

The FAULT LED on the OLIU should begin to flash, the MN alarm should extin-
guish and the CR alarm should light on the user panel.

(6) Reconnect the lightguide jumper on the first OLIU.

After a few moments, the FAULT LED should stop flashing and the ACTIVE LED on the OLIU circuit pack should light. On the user panel the CR alarm should extinguish and the MN and NE ACTY alarms should be lit.

(7) Reconnect the lightguide jumper on the second OLIU.

After a few moments, the FAULT LED should stop flashing on the OLIU and all 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.

BBF2B/BBF2C/BBF4 TGS Protection Switch

(1) Issue the command **switch-sync** (SWITCH TGS).

    a. Enter **circuitpack** at the SyncFunction prompt.

    b. Enter **manual** at the priority prompt.

    c. Enter **y** at the execute prompt.

(2) Verify that the ACTIVE LED, previously noted to be lit, extinguishes and the ACTIVE LED on the other BBF2B/BBF4 TGS circuit pack lights.

BBG11 3DS3 or BBG12 3STS1E Protection Switch

(1) Perform this test for FN positions equipped with BBG11B or BBG12B circuit packs.

(2) Note which Function Unit of the pair to be tested has it's ACTIVE LED lit and issue the command **switch-fn** (SWITCH LOW SPEED).

    a. Enter **fn-a**, **fn-b**, **fn-c**, or **fn-d** at the address prompt.

    b. Enter **manual** at the priority prompt.

    c. Enter **y** at the execute prompt.

(3) Verify that the ACTIVE LED, previously noted to be lit, extinguishes and the ACTIVE LED on the other circuit pack of the pair lights.

(4) Repeat this procedure for each pair of 3DS3 or 3STS1E circuit packs.

(5) If the shelf is not fully loaded (that is, a 3DS3 or 3STS1E in each FN slot), after testing the equipped FN slots, move the existing circuit packs to the unequipped slots until all FN slots have been tested.

(6) Return any circuit packs moved in this procedure to their original slots.

21G3-U or 21D-U OLIU Protection Switch

⊫▷ **NOTE:**
Skip this test for Release 3.1 or Releases 5 or 7 unless you provision the application value for 1+1 as shown below for this procedure. The 1+1 application value is used for OC-3 linear extensions.

⊫▷ **NOTE:**
This test cannot be applied when the application value is 0x1 because both OLIUs of an FN pair are simultaneously active.

(1) Perform this test for FN positions equipped with OLIU circuit packs.

(2) In order to perform this test, change the application value from 0x1 to 1+1 as follows:

Release 5.0:
```
set-oc3:fn-{a, b, c, or d},dgr=,kbyte=,app=1+1, aisalm=;
```

Release 5.1 and higher:
```
set-oc3:fn-{a, b, c, or d},dgr=,syncmsg=,app=1+1,
aisalm=;
```

(3) Note which FN OLIU of the pair to be tested has it's ACTIVE LED lit and issue the command **switch-line** (SWITCH LINE).

    a. Enter **fn-a**, **fn-b**, **fn-c**, or **fn-d** at the address prompt.

    b. Enter **manual** at the priority prompt.

    c. Enter **y** at the execute prompt.

(4) Verify that the ACTIVE LED, previously noted to be lit, extinguishes and the ACTIVE LED on the other FN OLIU of the pair lights. There should be no lighted alarms on the user panel.

(5) If the shelf is not fully loaded (that is 3DS3, 3STS1E, or OLIU circuit pack in each FN slot) after testing the equipped FN slots, move the existing OLIU circuit packs to the unequipped slots until all FN slots have been tested.

(6) Return any OLIU circuit packs moved in this procedure to their original slots.

OC-12 to OC-3 Fiber Connection Test

Description

> **NOTE:**
> OC-12 Release 3.0 ring software does not support OLIUs in Function Unit positions.

This procedure involves fiber connection and verification between DDM-2000 OC-12 FN OLIUs and DDM-2000 OC-3 MAIN OLIUs.

Perform the following procedure for DDM-2000 OC-12 shelves equipped with OLIUs in the FN slots that are to be connected to DDM-2000 OC-3 MAIN OLIUs.

Procedure

(1) Remove the fiber jumper cables from a DDM-2000 OC-12 FN OLIU and the OLIU in the MAIN slot position of the DDM-2000 OC-3 shelf it is to connect to.

(2) Connect the previously run fiber from this DDM-2000 OC-12 FN slot OLIU OUT connector to the corresponding DDM-2000 OC-3 shelf MAIN OLIU IN connector and the DDM-2000 OC-12 FN OLIU IN connector to OC-3 MAIN OLIU OUT connector.

> **NOTE:**
> The DDM-2000 OC-12 FN-(A, B, C, or D)-1 OLIU connects to the DDM-2000 OC-3 MAIN-1 OLIU and the DDM-2000 OC-12 FN-(A, B, C, or D)-2 OLIU to the DDM-2000 OC-3 MAIN-2 OLIU.

(3) Verify that, after a few moments, no alarms are present in either the DDM-2000 OC-12 or OC-3 shelves (that is no FAULT LED lighted on any circuit pack). If alarms are present, press the UPD push-button on the SYSCTL of the corresponding shelf.

(4) If alarms do not clear in the DDM-2000 OC-12 shelf, refer to the "Troubleshooting" section of this manual.

(5) If alarms do not clear in the DDM-2000 OC-3 shelf, refer to the "Troubleshooting" section of 363-206-204, *DDM-2000 OC-3 Multiplexer Installation Manual.*

(6) Repeat this procedure for each DDM-2000 OC-12 FN OLIU to DDM-2000 OC-3 MAIN OLIU.

Fiber Verification

(1) Disconnect the fiber cable from the OUT jack on a DDM-2000 OC-12 FN OLIU. Verify that the appropriate DDM-2000 OC-3 MAIN OLIU FAULT LED is flashing, indicating loss of signal (LOS).

(2) Reconnect this fiber and repeat this procedure for the OUT jack of that same DDM-2000 OC-3 MAIN OLIU. Verify that the appropriate DDM-2000 OC-12 FN OLIU FAULT LED is flashing, indicating LOS.

(3) Repeat this procedure for each fiber connection between the DDM-2000 OC-12 and OC-3 shelves.

TBOS Telemetry Test

> **NOTE:**
> TBOS is not supported in OC-12, Release 7.

Description

This test verifies proper operation/wiring of the Telemetry Byte-Oriented Serial (TBOS) telemetry. This test can only be performed if the TBOS link to the maintenance center has been established or a TBOS telemetry simulator is available.

Perform this test on all shelves connected to a TBOS telemetry system.

Procedure

(1) Issue the command `test-tlm-ser` (TEST TELEMETRY SERIAL).

(2) At the display prompt, enter the shelf's display number (which is set by switches on the SYSCTL).

(3) At the point prompt enter **even**

(4) At the repeat prompt enter **1**

(5) Verify that all the even number of display points are set for 20 seconds.

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See Notice on first page

Parallel and Miscellaneous Discrete Telemetry Test

> **NOTE:**
> Parallel telemetry is not supported in OC-12, Release 7.

Description

This test verifies correct operation/wiring of the parallel and miscellaneous telemetry at a central office 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-12's shelf number. For the following tests, verify that the appropriate SID point is set.

Use the following procedure to verify parallel telemetry wiring by activating alarm points and having the maintenance center observe for their appearance or by checking for activation with a voltmeter.

Procedure

> **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 6-2 on page 6-31 and Table 6-3 on page 6-32) 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 6-2 on page 6-31 and Table 6-3 on page 6-32 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-tlm-par** (TEST TELEMETRY PARALLEL).

(5) At the mode prompt, enter the "mode identifier" for the desired alarm bit as determined from Table 6-2 on page 6-31 and Table 6-3 on page 6-32.

An individual telemetry point or miscellaneous discrete point can be tested by entering **cr**, **mj**, **mn**, **pmn**, **aco**, **clf**, **inc**, **ne**, **fe1**, **fe2**, **fe3**, **fe4**, **fe5**, **fe6**, or **output 1–15** at the mode prompt.

➡ NOTE:
output 11 through **output 15** are not available with Releases 5 and 7 software.

(6) At the repeat prompt 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, See Table 6-1 on page 6-27 and Table 6-2 on page 6-31 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 6-2 on page 6-31 and Table 6-3 on page 6-32 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-12's shelf number).

(9) Repeat the parallel telemetry test for each individual telemetry point.

Modem Connection Test

Description

This test will verify the proper login procedure using a CIT terminal connected through a pair of modems.

Perform this test only if specified in the order and if the customer has provided two modems and two working phone lines.

> **NOTE:**
> The modem interface port (J60) does not require the use of a null modem.

> **NOTE:**
> The use of a terminal through a modem is the same as connecting a terminal to the EIA-232D port on the user panel.

> **NOTE:**
> For more detailed information regarding modem setup, refer to DLP-521 (Detailed Level Procedure) "Condition and Connect Modems Establish Communication From Remote Location" in 363-206-290 (Releases 5 and 7) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual.*

Procedure

Connecting to the DDM-2000 OC-12 through a modem requires the following:

- Two modems
- Two phone lines
- DDM-2000 OC-12 modem cable
- An ASCII terminal.

(1) At the DDM-2000 OC-12 location perform the following:

    a. Verify that one end of the modem cable is properly connected to the DDM-2000 OC-12 modem interface port (backplane connector J60).

    b. Connect the other end of the modem cable to a modem.

    c. Verify the modem is set up properly and that the data rate of the modem and the DDM-2000 OC-12 rear access port agree.

    d. Connect a working telephone line to the modem.

(2) At a second location perform the following:

 a. Configure an ASCII terminal for communication with a DDM-2000 OC-12.

 b. Set the data rate of the terminal to agree with the DDM-2000 OC-12.

 c. Connect the terminal to a modem.

 d. Verify the modem is set up properly and that the data rate of the modem agrees with the DDM-2000 OC-12.

 e. Connect a working telephone line to the modem.

 f. Dial up the modem connected to the DDM-2000 OC-12.

If a successful login is established through a modem, the modem connection has been verified.

Final Operations

Procedure

(1) Remove all test signals from the DDM-2000 OC-12.

(2) Leave any OLIU circuit packs looped on themselves with the fiber jumpers, in the looped back state at this time.

(3) If the system is in an RT, change the timing mode on the BBF2B/BBF4 TGS circuit pack to "`line timed`".

(4) Press the UPD push-button on the **SYSCTL**.

(5) Leave the office alarm cable disconnected.

Table 6-1   DDM-2000 OC-12 Command Codes

Command Verb	First Modifier	Second Modifier	Abbreviation
Delete	Cross-Connection	STS1	dlt-crs-sts1
	TID Address Map		dlt-tadrmap
Enter	Cross-Connection	STS1	ent-crs-sts1
	Upper Layer Section DCC		ent-ulsdcc
Help			?
Initialize	Performance Monitoring		init-pm
	System		init-sys
Install	Program		ins-prog
Logout			log
Operate	Alarm Cutoff		opr-aco
	Loopback	T3	opr-lpbk-t3
Remote Login			rlgn
Release	Loopback	T3	rls-lpbk-t3
Reset			reset
Retrieve	Alarm (and Status)		rtrv-alm
	Attribute	Alarm	rtrv-attr-alm
		Control	rtrv-attr-cont
		Environment	rtrv-attr-env
	Cross-Connection	STS1	rtrv-crs-sts1
	Equipment		rtrv-eqpt
	Feature		rtrv-feat
	Far End Communications		rtrv-fecom
	History		rtrv-hsty
	Login		rtrv-lgn
	Link		rtrv-link
	Network Map		rtrv-nmap (Release 3) rtrv-map (Releases 5 and 7)
	Network Element		rtrv-ne
	OC12		rtrv-oc12

Table 6-1   DDM-2000 OC-12 Command Codes (Continued)

Command Verb	First Modifier	Second Modifier	Abbreviation
Retrieve	OC3		rtrv-oc3
	Performance Monitoring	Line	rtrv-pm-line
		Section	rtrv-pm-sect
		STS1	rtrv-pm-sts1
		T3	rtrv-pm-t3
	Security		rtrv-secu
	State		rtrv-srate
	STS1		rtrv-sts1
	Synchronization		rtrv-sync
	T3		rtrv-t3
	Upper Layer Section DCC		rtrv-ulsdcc

Table 6-1   DDM-2000 OC-12 Command Codes (Continued)

Command Verb	First Modifier	Second Modifier	Abbreviation
Set	Alarm Attribute	Alarm	set-attr-alm
		Control	set-attr-cont
		Environment	set-attr-env
	Date		set-date
	Feature		set-feat
	Far End Communications		set-fecom
	Login		set-lgn
	Link		set-link
	Network Element		set-ne
	OC12		set-oc12
	OC3		set-oc3
	Password		set-passwd
	Performance Monitoring Threshold	Line	set-pmthresh-line
		Section	set-pmthresh-sect
		STS1	set-pmthresh-sts1
		T3	set-pmthresh-t3
	Security		set-secu
	State	T3	set-state-t3
	STS1		set-sts1
	Synchronization		set-sync
	T3		set-t3
Switch	Function Unit		switch-fn
	Line		switch-line
	Path	STS1	switch-path-sts1
	Synchronization		switch-sync
	Time Slot Interchange		switch-tsi

Table 6-1   DDM-2000 OC-12 Command Codes (Continued)

Command Verb	First Modifier	Second Modifier	Abbreviation
Test	Test Alarm		test-alm
	Auto Turnup		test-auto
	LED		test-led
	System Controller		test-sysctl
	Telemetry	Parallel†	test-tlm-par
	Telemetry	Serial	test-tlm-ser
	Transmission	T3	test-trmsn-t3
Toggle			tog (Ctrl-t)
Update			upd

Table 6-1 Notes:

† Parallel telemetry is not available in OC-12, Release 7.

1. Commands are entered in the form: command verb[-modifier 1][-modifier 2][:TID][:AID][:NDB];   [ ] means may not be required

Table 6-2   DDM-2000 OC-12 Parallel Telemetry† Connections

Name	Desig.	Conn.	Term	Color
ACO Control - Output	ACO-O	J21	4	BR-W
ACO Control - Input	ACO-I		22	R-BR
Output - Common	COM-O		20	R-O
Critical Alarm	CR		8	G-R
Major Alarm	MJ		7	O-R
Minor Alarm	MN		6	BL-R
Power Minor Alarm	PMN		5	S-W
Near End Status	NE		21	R-G
Carrier Line Failure Status	CLF		2	O-W
Incoming Status	INCM		1	BL-W
Shelf Identifier - Shelf 1	SID1		3	G-W
Shelf Identifier - Shelf 2	SID2		12	O-BK
Shelf Identifier - Shelf 3	SID3		11	BL-BK
Shelf Identifier - Shelf 4	SID4		10	S-R
Shelf Identifier - Shelf 5	SID5		9	BR-R
Shelf Identifier - Shelf 6	SID6		25	BK-O
Shelf Identifier - Shelf 7	SID7		24	BK-BL
Input - Common	COM-I		23	R-S
Far End Site ID - Site 1	FE1		19	R-BL
Far End Site ID - Site 2	FE2		18	W-S
Far End Site ID - Site 3	FE3		17	W-BR
Far End Site ID - Site 4	FE4		16	W-G
Far End Site ID - Site 5	FE5		15	W-O
Far End Site ID - Site 6	FE6		14	W-BL

Table 6-2 Notes:

† Parallel telemetry is not available in OC-12, Release 7.

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).

Table 6-3   DDM-2000 OC-12 Miscellaneous Discrete Connections

Name	Mode ID	Conn.	Term	Color
Output Common	-	J67	24	BK-BL
Miscellaneous Output - #1	output1		23	R-S
Miscellaneous Output - #2	output2		12	O-BK
Miscellaneous Output - #3	output3		11	BL-BK
Miscellaneous Output - #4	output4		10	S-R
Miscellaneous Output - #5	output5		17	W-BR
Miscellaneous Output - #6	output6		16	W-G
Miscellaneous Output - #7	output7		15	W-O
Miscellaneous Output - #8	output8		14	W-BL
Miscellaneous Output - #9	output9		8	G-R
Miscellaneous Output - #10	output10		7	O-R
Miscellaneous Output - #11	output11		6	BL-R
Miscellaneous Output - #12	output12		5	S-W
Miscellaneous Output - #13	output13		4	BR-W
Miscellaneous Output - #14	output14		3	G-W
Miscellaneous Output - #15	output15		2	O-W

Table 6-3 Notes:

1. Miscellaneous Output #11 through #15 are not available in Releases 5 and 7 software.

2. For each Miscellaneous Discrete connection, a pair of leads is connected between the Miscellaneous Output point and the Output Common.
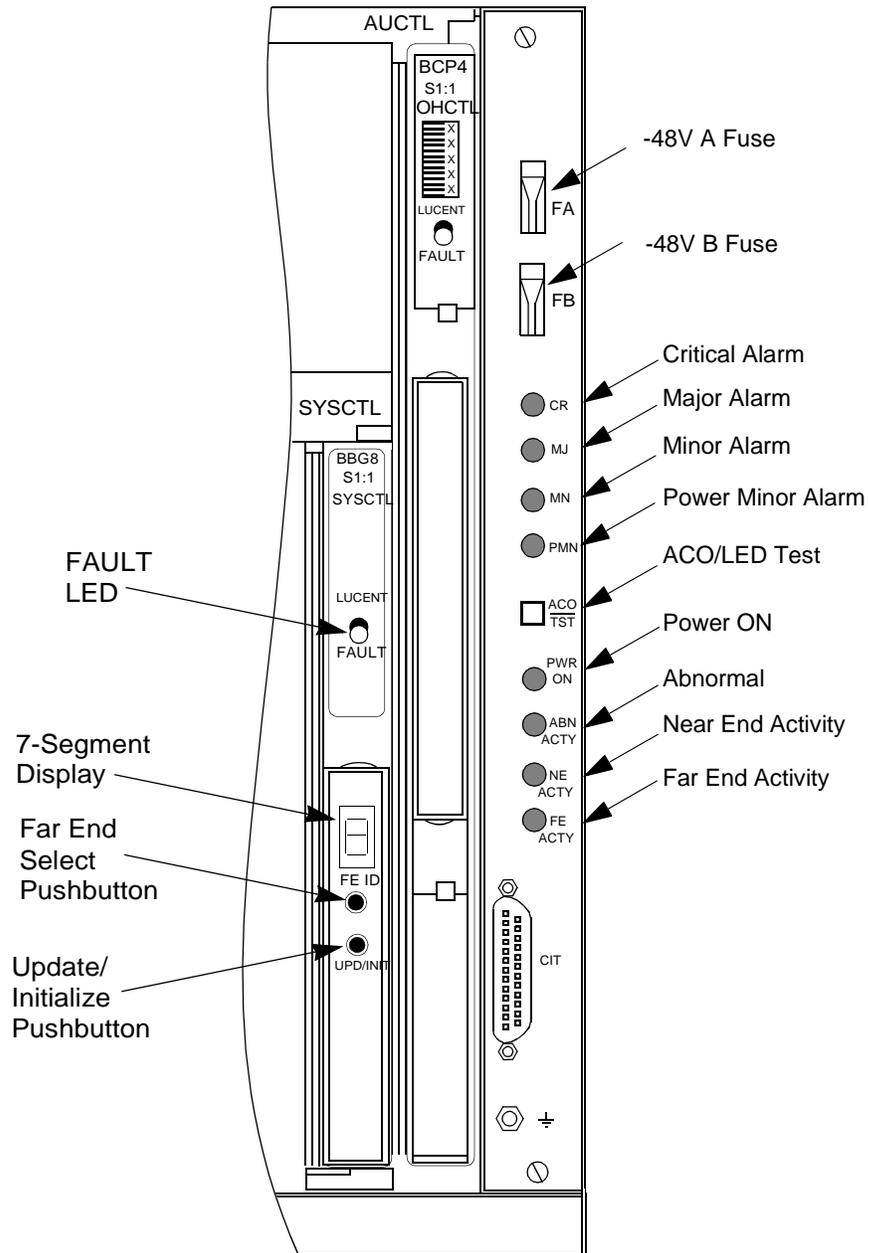
Figure 6-1.   DDM-2000 OC-12 User Panel

23G-U or 23H-U OLIU *ST*®-Type Universal Buildout

23G-U or 23H-U OLIU SC-Type Universal Buildout

23G-U or 23H-U OLIU FC/PC-Type Universal Buildout

Figure 6-2.   Lightguide Buildout Assembly Change Procedure

End-To-End Installation Tests for Ring Applications of the DDM-2000 OC-12 Multiplexer

7

Contents

End-To-End Installation Tests for Ring Applications of the DDM-2000 OC-12 Multiplexer

7

Overview

Description

This section provides instructions to verify optical fiber connections, test end-to-end transmission, and test miscellaneous discrete telemetry for ring applications of the DDM-2000 OC-12 Multiplexer.

This section can ONLY be performed after each end has been tested. For central offices, the "Stand-Alone Installation Test" section MUST have been previously completed. This section requires personnel at both ends of the system. Office alarms should be disconnected to prevent constant alarms throughout this section.

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.

If problems are encountered, refer to the "Troubleshooting" section of this manual. For detailed troubleshooting, refer to 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual*.

Descriptions of LEDs, push-buttons, the 7-segment display, and the use of a terminal are located in the "Stand-Alone Installation Test" section.

Tools, Test Sets, and Accessories

The following is required:

Quantity	Description
1	ASCII Terminal or PC configured as a terminal
1	Optical Power Meter[*]

* An optical power meter is required to determine the value of the light-guide buildout assembly to be connected to each Main optical line interface unit (OLIU) transmit connector. This power meter must be capable of accepting $ST^®$ type connections.

Timing Verification

Procedure

Verify that each shelf in the system is set for the correct timing option. Typically, one node in the ring (usually the central office) is set for either "external" or "free running" and the remaining nodes are set for "line timed".

⇒ NOTE:
Timing selection is a switch option setting on the BBF2B or BBF4 TGS circuit pack.

If the shelf is optioned for "external" it must be connected to an external clock through J66 on the shelf backplane, and 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."

⇒ NOTE:
Refer to the "Powering, Verification, and Circuit Pack Installation" section of this manual for TGS circuit pack switch settings.

If the timing mode selection on any TGS circuit pack is changed, press the UPD/INIT push-button on the SYSCTL.

Fiber Connection and Verification

Description

> **NOTE:**
> Release 3 ring software does not support OLIUs in the Function Unit positions.

> **NOTE:**
> Observe all precautions when handling fiber optic cables. When fiber cables are not connected to 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 "Rear Access Installation" section.

> **NOTE:**
> Before connecting the fiber or buildout, verify that it is clean. The fiber can be cleaned with optical quality lint-free tissue or with a compressed air duster.

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

Preparation

> **NOTE:**
> For Release 3 DDM-2000 OC-12 systems, the User/Network Switches on the OHCTL switches must be set correctly for the Data Communications Channel (DCC) to function properly between shelves. This should have been done previously when performing Chapter 6 of this manual.

> **NOTE:**
> For simplification during this procedure, the DDM-2000 OC-12 shelf that will be providing timing to the network, will be referred to as the first node in the ring. It is important to begin at this node as the following procedures will require proper timing as each node is added to the ring.

(1) At the DDM-2000 OC-12 shelf providing external timing to the ring (first node) remove the 23-type OLIU circuit packs from the MAIN-B slot positions of the shelf. Depress the UPD/INIT push-button on the SYSCTL to remove alarms.

(2) Remove the fiber jumper cables from these OLIU circuit packs.

(3) Replace the 15 dB or 20 dB lightguide buildout assembly on the OUT (transmit) connector with a 0 dB buildout assembly per Figure 7-1 on page 7-17.

➡ **NOTE:**
The 0 dB buildout was replaced by a 15 dB or 20 dB buildout in the "Stand-Alone Installation Tests" section.

Optical Power Measurement

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

⚠ **WARNING:**
Invisible laser radiation when open. Avoid direct exposure to beam.

(1) At the first node of the ring, connect the optical fiber transmit cable that is to transmit in the clockwise direction of the ring, to the DDM-2000 OC-12 23-type MAIN-B-2 OLIU OUT connection and fully insert the OLIU into the shelf.

(2) At the next node in the clockwise direction, measure the optical power of the optical fiber receive cable (same fiber connected to the OLIU in the previous step) using the optical power meter.

(3) If the optical power reading is less than or equal to -8.0 dBm for a 23G-U and 23H-U OLIU, the 0 dB buildout assembly will remain on the OUT connector of the OLIU.

(4) If the optical power reading is greater than the value in Step 3 above, replace the 0 dB buildout assembly on the OUT connector of the OLIU per Figure 7-1 on page 7-17 with the appropriate buildout assembly that will attenuate the power reading to be slightly less than or equal to this value. Table 7-1 on page 7-5 lists the various lightguide buildout assemblies available.

Table 7-1   Lightguide Buildout Assemblies

Loss(dB)	23G-U or 23H-U OLIU					
	ST® Type		SC Type			
	Code	Comcode	Code	Comcode	Code	Comcode
0	A3070	106795354	A3060	106708951	A3080	106795404
5	A3070B	106795362	A3060B	106708969	A3080B	106795412
10	A3070D	106795370	A3060D	106708977	A3080D	106795420
15	A3070F	106795388	A3060F	106708985	A3080F	106795438
20	A3070H	106795396	A3060H	106708993	A3080H	106795446

Fiber Connection

(1) After the appropriate optical power measurement is achieved, connect this receive fiber to the MAIN-B-1 23-type OLIU IN (receive) connector at the node where the power measurement is being taken.

⇒ NOTE:
In ring applications, the MAIN-B-1 OLIU transmit connects to the MAIN-B-2 OLIU receive connector at the preceding node in the ring. Likewise, the MAIN-B-2 OLIU transmit connects to the MAIN-B-1 OLIU receive connector of the succeeding node in the ring. This pattern remains true for each node throughout the ring.

(2) At this same node, connect the optical fiber transmit cable, that is to transmit in the counterclockwise direction of the ring, to the DDM-2000 OC-12 23-type MAIN-B-1 OLIU OUT connection and fully insert the OLIU into the shelf.

(3) Back at the first node, measure the optical power of the optical fiber receive cable (this is the same fiber connected to the OLIU OUT in the previous step) using the optical power meter.

(4) After the required optical power measurement is achieved, by adding the appropriate buildout, connect this receive fiber to the MAIN-B-2 23-type OLIU IN (receive) connector at the node where the power measurement is being taken.

(5) Verify that, after a few moments, no alarms are present (that is, no FAULT LED lighted on any circuit pack). If alarms are present, press the UPD/INIT push-button on the SYSCTL. If alarms do not clear, refer to the "Troubleshooting" section of this manual.

Provision the Network Element

(1) For Release 5 shelves, enter the **set-ne** command.

- **TID**: Each shelf must have a unique TID (Target Identifier).

- **DSNE**: One shelf (and only one shelf) in the network must be set as the DSNE (Directory Services Network Element). To simplify the following test procedures, temporarily set the first node as both DSNE and AGNE.

- **Alarm Group**: The Alarm Group must be the same (default=255) for each shelf for complete alarm reporting throughout the network.

- **AGNE**: One shelf in the network (preferably not the shelf that's directly connected to the X.25 interface) must be set as the AGNE.

- **Site NE**: Site ID and NE (Network Element) combinations must be unique in each shelf.

- **Shelf**: Shelf numbers must be unique when shelves are located within the same bay.

- **CO/RT**: Set Central Office shelves to CO and Remote Terminal shelves to RT.

- **TBOS Address**: Each shelf should be set to a unique TBOS Address.

- **TBOS Link**: 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 PRI-MARY 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.

- **TBOS Remote**: 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.

(2) For Release 7 shelves, enter the **set-ne** command.

- **TID**: Each shelf must have a unique TID (Target Identifier).

- **Shelf**: Shelf numbers must be unique when shelves are located within the same bay.

- **CO/RT**: Set Central Office shelves to CO and Remote Terminal shelves to RT.

- **Idle**: Idle Channel Signal should be set to AIS (default).

(3) Release 5 applications with DDM-2000 OC-3 Release 8 Linear (1+1) extensions should have been provisioned for 1+1 application using the **- set-oc3** command in the "Stand-Alone (Local) Installation Tests for the DDM-2000 OC-12 Multiplexer" section of this manual. Otherwise this parameter should have been left at the 0x1 default setting.

Verify proper provisioning of this parameter by entering the `rtrv-oc3:all;` command.

(4) For Release 5 applications, issue the **rtrv-fecom;** command to verify User Side (us) and Network Side (ns) settings for each address occupied by an OLIU per the following table:

Address		US/NS Setting
dcc-mb1		us
dcc-mb2		ns
0x1 Applications	**1+1 Applications**	
dcc-a1	dcc-a	ns
dcc-a2	-	us
dcc-b1	dcc-b	ns
dcc-b2	-	us
dcc-c1	dcc-c	ns
dcc-c2	-	us
dcc-d1	dcc-d	ns
dcc-d2	-	us

If settings differ from the default values shown in the table, use the **set-fecom** command to change them to the values shown.

⇒ NOTE:

User Side (us) and Network Side (ns) settings for DDM-2000 OC-3 shelves, optically connected to the OC-12 shelf function units, must be set as follows:

Address		US/NS Setting
OC-3 Release 8	**OC-3 Release 7 or 9**	
dcc-m	dcc-m1	us
	dcc-m2	ns
dcc-a	dcc-a	ns
dcc-b	dcc-b	ns
dcc-c	dcc-c	ns

(5) Enable Far End Communications for the Main-B-2 OLIU at the first node using the **set-fecom:dcc-mb2:com=enabled;** command.

If this shelf has function unit OLIUs that have previously been optically connected to DDM-2000 OC-3 shelves, enable communications between those shelves also as follows:

Issue the **set-fecom:dcc-**address**:com=enabled;** command at the OC-12 shelf for the function unit addresses of those OLIUs, and then at the OC-3 shelf for the Main OLIU addresses.

(6) Enable Far End Communications at the Main-B-1 OLIU at the next node using the **set-fecom:dcc-mb1:com**=**enabled;** command.

If this shelf has function unit OLIUs that have previously been optically connected to DDM-2000 OC-3 shelves, enable communications between those shelves also as follows:

Issue the **set-fecom:dcc-***address***:com**=**enabled;** command at the OC-12 shelf for the function unit addresses of those OLIUs, and then at the OC-3 shelf for the Main OLIU addresses.

(7) For Release 3 applications, temporarily set the first node as the Gateway Network Element by using the **set-ne:tid**=*tid***:gne**=**yes;** command.

(8) Allow the shelves a few moments to reset, and then verify communications between nodes by entering the **rtrv-map-network;** command (Release 5) or the **rtrv-nmap;** command (Release 3).

All nodes that have been connected together via fiber and have had far end communications enabled, should appear in the output report displayed on the CIT.

Fiber Verification

(1) Disconnect the fiber cable from the OUT jack on the MAIN-B-2 OLIU at the first node of the ring. At the next node, verify that the MAIN-B-1 OLIU FAULT LED is flashing, indicating loss of signal (LOS).

(2) Reconnect this fiber and verify that alarms extinguish after a few moments.

(3) At that same node, disconnect the fiber cable from the OUT jack on the MAIN-B-1 OLIU at the node. At the first node, verify that the MAIN-B-2 OLIU FAULT LED is flashing, indicating loss of signal (LOS).

(4) Reconnect this fiber and verify that alarms extinguish after a few moments.

DSNE and AGNE/GNE (Releases 3 and 5)

(1) Repeat this entire "Fiber Connection and Verification" procedure for each node in the ring, working in a clockwise direction from node to node, leaving the first node temporarily set as the DSNE and AGNE (Release 5) or GNE (Release 3), until the entire ring is connected.

(2) After verification of communications between all nodes in the ring has been established, the DSNE and/or AGNE (Release 5) or GNE (Release 3) may be moved to a different node, as determined by the customer, as follows:

(3) Use the **set-ne** command to set the DSNE (Release 5) or GNE (Release 3) to **no** in the first node before setting it to **yes** in another node. An AGNE (Release 5) can be established in another node without first removing it from the first node since multiple AGNEs are allowed.

(4) If the DSNE and/or AGNE (Release 5) or GNE (Release 3) is moved to a different node, allowing several minutes for the controllers to reestablish the network, verify that communications between all nodes in the ring has been reestablished by entering the **rtrv-map;** command (Release 5) or the **rtrv- nmap;** command (Release 3).

Make STS1 Cross-Connections

➡ **NOTE:**
In ring configurations, cross-connections consist of terminating cross-connections at terminating nodes, as well as pass-through cross-connections at each node between the terminating nodes. Once an STS-1 has been provisioned with a terminating cross-connect, that STS-1 is committed throughout the ring. Thus a DDM-2000 OC-12 ring is limited to twelve STS-1 channels.

➡ **NOTE:**
In order to remove a BBG11B or BBG12 circuit pack from the shelf's equipment list, the cross-connections to that circuit pack must be deleted first using the **dlt-crs-sts1** command.

(1) Determine from the work or circuit order, the terminating (drop) nodes as well as the pass-through nodes for the service being established.

(2) Use the **rtrv-eqpt;** command at each node to verify each shelf is properly equipped with the proper circuit packs for the service being established.

(3) At all nonterminating nodes in the network, use the **ent-crs-sts1** command to provision pass-through connections. An example for a pass-through connection for STS-1 #1 would be as follows:

Example: **ent-crs-sts1:mb-1,mb-1:cct=twoway;**

➡ **NOTE:**
Use the **rlgn:**tid**;** command to login to each node required, to provision pass-through cross-connections.

(4) At all terminating nodes in the network, use the **ent-crs-sts1** command to provision terminating cross-connections. An example for a terminating cross-connection would be as follows:

Example: **ent-crs-sts1:a-1,mb-1:cct=twoway;**

➡ **NOTE:**
Use the `rlgn:tid;` command to login to each node required, to provision terminating cross-connections.

(5) Upon completion of entering the various pass-through and terminating cross-connects, enter the `rtrv-crs-sts1:all;` command to verify each cross-connect has been entered correctly.

End-To-End Transmission Tests

Description

This test verifies proper operation of the DS3/EC-1 transmission path between nodes.

> **NOTE:**
> If a valid DS3 signal is applied to the DDM-2000 OC-12 and then removed, the FAULT LED on the 3DS3 circuit pack will flash. Press the UPD push-button on the SYSCTL to stop any flashing LEDs.

DS3/EC-1 Transmission Tests

> **NOTE:**
> Perform this procedure for each DS3/EC-1 circuit to be put into service.

> **NOTE:**
> 3STS1E circuit packs do not have `test-trmsn-t3` capability. If one terminating node of an STS-1 channel is equipped with an 3STS1E circuit pack to provide EC-1 service and the other terminating node is equipped with a 3DS3 circuit pack, this test must be performed from the DS3 terminating node.

> **NOTE:**
> If both terminating nodes of an STS-1 channel are equipped with 3STS1E circuit packs, the EC-1 cabling can be tested by replacing a 3STS1E circuit pack at one node with a 3DS3 circuit pack for the duration of this test.

> **NOTE:**
> To replace a BBG12 circuit pack pair with a BBG11B pair or vice versa, it is not necessary to delete cross connects. Remove one circuit pack, press the UPD/INIT push-button, remove the second circuit pack of the pair, insert the new circuit pack pair, then press the UPD/INIT push-button.

(1) At one terminating node of a DS3/EC-1 circuit in the ring, change the DS3 violation monitoring mode from violation, monitor, and removal (VMR) to clear channel (CC) by entering the following command:

  `set-t3:all:md=cc;ais=no;`

(2) Respond to the `Execute (Y/N)?` prompt with a **y**.

(3) Establish a remote login from this node to the other terminating node of that DS3/EC-1 circuit using the **rlgn-***tid***;** command.

(4) Change the violation monitoring mode from VMR to CC in the same manner as at the other terminating node.

(5) Perform a DS3 or EC-1 loopback on all DS3 and/or EC-1 groups at this node by issuing the following command:

> a. Issue the command **opr-lpbk-t3:***address***;**
>   and/or **opr-lpbk-ec1:***address***;**
>
> b. At the execute prompt, enter **Y**
>
> c. Verify that loopbacks are present by entering **rtrv-alm**

(6) Enter the **toggle** command to return CIT communications to the other terminating node.

(7) Enter the command **test-trmsn-t3** followed by a carriage return.

(8) Enter the address of the DS3/EC1 circuit under test at the address prompt, followed by a carriage return.

> ⇒ **NOTE:**
> This command can only be executed by the 3DS3 circuit pack.

(9) Enter **mux** at the direction prompt, followed by a carriage return.

(10) Enter a **1** at the duration prompt for a 1-minute test, followed by a carriage return. This test should pass without any errors.

(11) Isolate and correct the problem if errors are observed.

(12) Repeat this procedure for each equipped DS3/EC-1 circuit.

(13) After completion of DS3/EC-1 testing release, the DS3 loop backs by performing the following:

⇒ **NOTE:**
Leave EC-1 loopbacks up at this time.

> a. Enter the **toggle** command to return CIT communications to the looped-back terminating node.
>
> b. Issue the command **rls-lpbk-t3:***address***;**
>
> c. Verify DS3 loopbacks are no longer present by entering **rtrv-alm;**

(14) Enter the **toggle** command to return CIT communications to the other terminating node.

(15) Enter the **upd;**command to update the SYSCTL.

(16) If circuit packs were moved to different slot positions to perform this test, remove those circuit packs, enter the **upd;** command to update the SYSCTL, and return the circuit packs to their original positions.

(17) If violation monitor removal was set differently than the desired mode in order to perform this test, return these nodes to the desired mode using the **set-t3** command.

(18) If there are more than two terminating nodes in the ring, repeat this procedure at other terminating nodes until all DS3/EC-1 circuits to be put into service have been tested.

(19) For EC-1 circuits that terminate with a 3STS1E circuit pack at one end and a 3DS3 circuit pack at the other end, leave EC-1 loopbacks up at the 3STS1E end until service is applied. This will eliminate incoming STS-1 AIS alarms at the 3DS3 end.

(20) For EC-1 circuits that terminate with 3STS1E circuit packs at both ends, delete STS-1 cross-connections associated with these circuit packs until EC-1 service is applied. This will eliminate incoming STS-1 AIS alarms generated by the 3STS1E circuit packs when a valid EC-1 signal is absent. Use the **dlt-crs-sts1** command to delete terminating as well as all pass-through cross-connects for these EC-1 circuits throughout the ring. The EC-1 loopbacks may be released using the **rls-lpbk-ec1** command**.**

Automatic Protection Switching

Description

This test will verify ring protection switching in the event of a fiber cut.

Procedure

(1) At any node in the ring, verify that no alarms exist.

(2) Enter the command **rtrv-state-path;**

(3) Under the 'act' or active column, note whether a 'y' is in mb-1 (main-b-1) OLIU or mb-2 (main-b-2) OLIU.

(4) Disconnect the receive (IN) fiber of the active OLIU receiving the traffic (as determined by the previous step).

(5) Enter the command **rtrv-state-path;**

(6) Verify that all traffic has switched from the previously active OLIU to the OLIU with the fiber still connected.

(7) Reconnect the receive fiber.

(8) Verify alarms clear and repeat this procedure at each node in the ring.

Miscellaneous Discrete Telemetry Test

Description

This test will verify proper operation and wiring of the miscellaneous telemetry.

> **NOTE:**
> This procedure requires personnel at both ends [central office (CO) and remote terminal (RT)] of the DDM-2000 OC-12 system.

Remote Terminal Towards the Central Office Telemetry Test

(1) At the Remote Terminal (RT), provide a closure between miscellaneous input #1 and input common. (This is usually the open door alarm.)

(2) At the Central Office (CO), verify that a closure is observed between miscellaneous output #1 and output common.

(3) At the RT, remove the closure between miscellaneous input #1 and input common.

(4) At the CO, verify that removal of the closure is observed.

(5) Repeat for each miscellaneous input cabled (#2 to #14 for Release 3 or #2 to #20 for Release 5).

(6) At the RT, turn off the AC power.

(7) At the RT, verify PMN LED lights on the user panel.

(8) At the CO, verify the MN and FE ACTY LEDs are lighted.

(9) At the CO, establish communication with the RT using the `rlgn-tid` command.

(10) Perform a `rtrv-alm` command and verify that the "power minor" alarm appears in the alarm and status report.

(11) At the CO, depress the FE SEL push-button to select the RT. Verify that the PMN LED lights on the user panel.

> **NOTE:**
> After 15 seconds the user panel will revert to CO indications.

(12) At the RT, turn on the AC power.

(13) At the CO, verify the MN and FE ACTY LEDs extinguish.

(14) At the RT, disconnect one of the power feeds (either A or B) to the fan shelf by disconnecting one of the connectors of the fan power cable from its mate on the bay power cable.

(15) At the RT, verify that the POWER FAULT LED lights on the fan shelf and the MN alarm and NE ACTY LEDs light on the DDM-2000 OC-12 shelf user panel.

(16) At the CO, verify the MN and FE ACTY LEDs are lighted.

(17) At the CO, while remotely logged in at the RT, perform a **rtrv-alm** command and verify that the "environmental #14" alarm appears in the alarm and status report.

(18) At the RT, 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-12 shelf user panel extinguish.

(19) At the CO, verify the MN and FE ACTY LEDs extinguish.

(20) 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).

(21) At the RT, verify the MN and NE ACTY LEDs are lighted.

(22) At the CO, verify the MN and FE ACTY LEDs are lighted.

(23) At the CO, while remotely logged in at the RT, perform a **rtrv-alm** command and verify that the "minor" alarm appears in the alarm and status report.

(24) At the RT, remove the minor alarm failure.

(25) At the RT, verify the MN and NE ACTY LEDs extinguish.

(26) At the CO, verify the MN and FE ACTY LEDs extinguish.

(27) Terminate the remote login to the RT with the **logout** command.

Central Office Toward the Remote Terminal Telemetry Test

(1) At the CO, provide a closure between miscellaneous input #1 and input common.

(2) At the RT, verify a closure is observed between miscellaneous output #1 and output common.

(3) At the CO, remove the closure between miscellaneous input #1 and input common.

(4) At the RT, verify that removal of the closure is observed.

(5) Repeat for each CO miscellaneous input cabled (#2 to #4).

Final Operations

Procedure

(1) Verify that all test signals and loopbacks from the DDM-2000 OC-12 have been removed.

(2) Press the UPD push-button on the SYSCTL.

(3) Verify that the system is configured for normal operation and that no alarms are present (that is, no FAULT LED lighted on any circuit pack). If alarms are present, refer to the "Troubleshooting" section of this manual.

(4) Connect the office alarm cables if they have been disconnected.

(5) Clear the OC-12 shelf of all provisioning by issuing the command: **init-sys:all;** (INTIALIZE SYSTEM).

   The **init-sys** command is a privileged user command and thus the appropriate login is necessary. Refer to the "Login Procedure" section in Chapter 6 on page 6-7.

(6) Terminate communication to the shelf with the **logout** command.

23G-U or 23H-U OLIU *ST*®-Type Universal Buildout
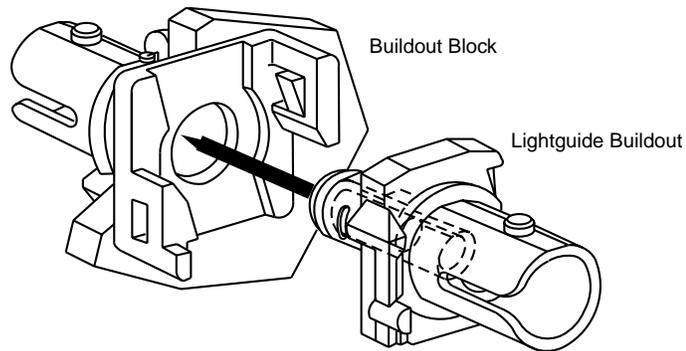
23G-U or 23H-U OLIU SC -Type Universal Buildout
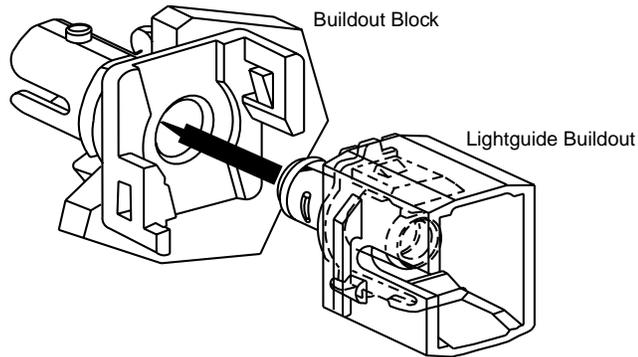
23G-U or 23H-U OLIU FC/PC -Type Universal Buildout
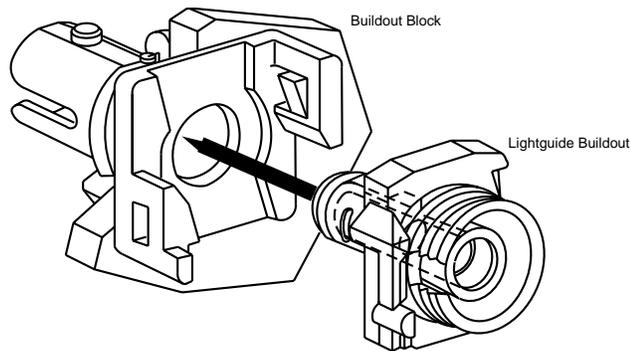
Figure 7-1.   Lightguide Buildout Assembly Change Procedure

Troubleshooting

8

Contents

Troubleshooting

8

Overview

This section covers engineering and installation services, some basic troubleshooting techniques, in-field upgrades/product change notifications (PCNs), and how to obtain technical support.

Engineering and Installation Services

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

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

When the Lucent installation organization provides job records and installs the equipment, changes affecting operation of the system are automatically identified and applied to the system at no additional cost.

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

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

The Lucent installation 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

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 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual*.

> **NOTE:**
> If only green LEDs are lighted, there is no problem with the DDM-2000.

> **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 to report alarms due to a configuration mismatch between the SYSCTL and the transmission circuit packs.

> **NOTE:**
> Circuit packs should not be removed or installed unless the SYSCTL is present.

➡ NOTE:
Whenever circuit packs are removed from the shelf, update the SYSCTL equipment list by pressing the UPD/INIT push-button on the SYSCTL, even if you are just reseating a circuit pack.

➡ NOTE:
If the DDM-2000 appears to be reporting inconsistent alarms, initialize the SYSCTL as follows:

a. Unseat the SYSCTL.

b. Reseat the SYSCTL.

c. When the CR LED on the user panel starts to flash, press the UPD/INIT push-button on the front of the SYSCTL within 10 seconds.

➡ NOTE:
A flashing FAULT LED indicates a loss of input signal, not a circuit pack failure.

➡ NOTE:
A solid FAULT LED indicates a failure of the circuit pack, shelf, or possibly another circuit pack interfacing with the "failed circuit pack."

➡ NOTE:
The OLIU is the only circuit packs 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 8-1 through 8-10 on pages 8-6 through 8-30.

OC-12 Multiplexer Troubleshooting

(1) Verify that the system is configured for normal operation (that is, fibers are connected; no external test equipment is connected).

(2) Update the SYSCTL equipment list by pressing the UPD/INIT push-button on the SYSCTL.

(3) Install at least one timing generator (TGS) circuit pack.

(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. In a central office (CO), the TGS should be set for external if the DDM-2000 is being supplied an external DS1 clock and 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 muldem, if one function unit (3DS3) 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.

Troubleshooting with a Terminal

(1) Diagnostic information is provided by the DDM-2000 using the `rtrv` (RETRIEVE) commands.

(2) Use the `rtrv-alm` (RETRIEVE-ALARM) command to display the alarms that the DDM-2000 is reporting.

(3) Use the `rtrv-eqpt` (RETRIEVE-EQUIPMENT) command to display the equipment installed in the DDM-2000.

(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.

(5) If problems still persist, refer to or 363-206-290 (Release 5) or 363-206-295 (Release 7), *DDM-2000 OC-12 Multiplexer User/Service Manual*.

Technical Support

Lucent is committed to providing total product coverage 24 hours a day, troubleshooting installation or service problems over the phone, and if necessary on-site.North American Regional Technical Assistance Center (NARTAC) organizations are established to provide the customer with a single point of contact supporting all of the Lucent transmission and switching products. For NARTAC support, dial 1-800-225-4672 which will direct the call to the NARTAC center supporting your location.

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

Required Product Changes

During the life of a product, changes in the field may be required to correct an existing or potential problem. Product changes are issued in the form of Product Change Notifications (PCNs). The customer is notified about PCNs through the Design Change Management System (DCMS). For more information regarding DCMS, contact (314) 891-4213 or (314) 891-3660.

Table 8-1   BBG5 SYSCTL I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
BMPD8	306	Intrashelf	TRMCKP	248	
BMPD9	305	Processor Bus	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	
BMPASN	315		CSRLB2	113	Inrtrashelf
BMPDSN	215		CSRLB3	014	Control Bus
MPINTN	316		CSRLB4	013	
DTACKN	216		CSRLB5	138	
FRCMJ	028		CSRLB6	137	
LSICKP	110		CSRLB7	038	
LSICKN	010		CSRLBP	037	
LSICDP	109	Inrtrashelf	CSRLC1	112	
LSICDN	009	Control Bus	CSRLC2	111	
LSIRDP	108		CSRLC3	012	
LSIRDN	008		CSRLC4	011	

Table 8-1   BBG5 SYSCTL I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
CSRLC5	136		FRXD	323	
CSRLC6	135		FTXD	223	CIT Interface
CSRLC7	036		FDTR	322	
CSRLCP	035		FDTRC	329	
BS0	105		FXMTBS	331	Inrtrashelf
BS1	104		FRCVBS	330	Control Bus
BS2	103		FCLAIM	332	
BS3	006	Inrtrashelf	RRXD	049	
BS4	005	Control Bus	RTXD	048	Modem
BS5	004		RDTR	047	Interface
BS6	003		RS232N	222	
IICSCL	107				
IICSDA	007				
LINKEN	227		RDTRC	229	
SHELFID	226		RXMTBS	231	Inrtrashelf
ACK1	225		RRCVBS	230	Control Bus
ACK2	325		RCLAIM	232	
	327	Not Used	CRLED	321	
	326		MJLED	320	
	127		MNLED	319	
	126		PMNLED	318	User Panel
	125		FEALED	221	LEDs
	124		ABNLED	220	
	123		ACOLED	219	
	122		NEALED	218	
	224		ACON	328	User Panel
	027				ACO Pushbutton
	025		RYCRA1	146	
	026		RYCRA2	046	
	024		RYCRV1	145	
	022		RYCRV2	045	
	235		RYMJA1	144	
	134		RYMJA2	044	
	133		RYMJV1	143	Office Alarms
	132		RYMJV2	043	
	131		RYMNA1	142	
	130		RYMNA2	042	
	032		RYMNV1	141	
	031		RYMNV2	041	
	030				
	201				
	101				

Table 8-1   BBG5 SYSCTL I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
RTBOSP RTBOSN XTBOSP XTBOSN	334 234 333 233	Serial Telemetry (TBOS‡)	RMPDGN TMPDGN SANDSN EXRSTN	249 149 348 228	Test Interface
TLMIC TLMI1 TLMI2 TLMI3 TLMI4 TLMI5 TLMI6 TLMI7 TLMI8 TLMI9 TLMI10 TLMI11 TLMI12 TLMI13 TLMI14 TLMI15	339 343 342 341 340 338 337 336 335 242 241 240 239 238 237 236	Telemetry Inputs	PMNTIN	243	Power Monitor
			FANCTL	346	Fan Control
			-48VA2 -48VA1 -48VB2 -48VB1 -48VBT	200 300 001 100 301	Power Input
			GRDFLT GRD GRD GRD GRD GRD LATEGRD GRD	347 317 213 129 106 102 029 023	Ground Input
TLMOC TLMO1 TLMO2 TLMO3 TLMO4	345 344 246 245 244	Telemetry Outputs	ESDGRD	002	ESD Protection
			+5VOUT +5VOUT +5VOUT	302 324 202	Power Output

‡ TBOS is not available in OC-12, Release 7.

Table 8-2   BBG8 SYSCTL I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
BMPD0	030	Intrashelf	LSICKP	110	Intrashelf
BMPD1	031	Processor Bus	LSICKN	010	Control Bus
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 8-2   BBG8 SYSCTL I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
CSRLC5 CSRLC6 CSRLC7 CSRLCP BS0 BS1 BS2 BS3 BS4 BS5 BS6 IICSCL IICSDA DSACK1N SHELFID	136 135 036 035 105 104 103 006 005 004 003 107 007 227 226	Intrashelf Control Bus	FRXD FTXD FDTR	323 223 322	CIT Interface
			FDTRC FXMTBS FRCVBS FCLAIM	329 331 330 332	Intrashelf Control Bus
			RRXD RTXD RDTR RS232N	049 048 047 222	Modem Interface
			RDTRC RXMTBS RRCVBS RCLAIM	229 231 230 232	Intrashelf Control Bus
OHRCKM1 OHRXM1 OHTCKM1 OHTXM1 OHRCKM2 OHRXM2 OHTCKM2 OHTXM2	127 123 027 022 126 122 026 024	Overhead Interface	CRLED MJLED MNLED PMNLED FEALED ABNLED ACOLED NEALED	321 320 319 318 221 220 219 218	User Panel LEDs
RYCRA1 RYCRA2 RYCRV1 RYCRV2 RYMJA1 RYMJA2 RYMJV1 RYMJV2 RYMNA1 RYMNA2 RYMNV1 RYMNV2	146 046 145 045 144 044 143 043 142 042 141 041	Office Alarms	ACON	328	ACO Pushbutton
				025 101 124 125 134 201 224 225 235 325 326 327	Not Used
RTBOSP RTBOSN XTBOSP XTBOSN	334 234 333 233	Serial Telemetry (TBOS‡)	RMPDGN TMPDGN SWTDSN EXRSTN	249 149 348 228	Test Interface

Table 8-2   BBG8 SYSCTL I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
TLMIC	339	Telemetry Inputs	PMNTIN	243	Power Monitor
TLMI1	343		FANCTL	346	Fan Control
TLMI2	342				
TLMI3	341		-48VA2	200	Power Input
TLMI4	340		-48VA1	300	
TLMI5	338		-48VB2	001	
TLMI6	337		-48VB1	100	
TLMI7	336		-48VBT	301	
TLMI8	335		GRDFLT	347	Ground Input
TLMI9	242		GRD	317	
TLMI10	241		GRD	213	
TLMI11	240		GRD	129	
TLMI12	239		GRD	106	
TLMI13	238		GRD	102	
TLMI14	237		LATEGRD	029	
TLMI15	236		GRD	023	
TLMOC	345	Telemetry Outputs	ESDGRD	002	ESD Protection
TLMO1	344		+5VOUT	302	Power Output
TLMO2	246		+5VOUT	324	
TLMO3	245		+5VOUT	202	
TLMO4	244				

‡ TBOS is not available in OC-12, Release 7.

Table 8-3   BCP1 OHCTL I/O Connections

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
3077	GRD	2077	-48VRT	1077	-48VB2	0077	-48VB1
3076	GRD	2076	-48VRT	1076	-48BV2	0076	-48BV1
3075	GRD	2075	-48VRT	1075	-48VB2	0075	-48VB1
3074	GRD	2074	GRD	1074	-48VA2	0074	-48VA1
3073	GRD	2073	GRD	1073	-48VA2	0073	-48VA1
3072	GRD	2072	GRD	1072	-48VA2	0072	-48VA1
3071	RESV1	2071	RESV3	1071	ACK1	0071	SHELFID
3070	RESV2	2070	NC	1070	ACK2	0070	LINKEN
3069	NC	2069	NC	1069	NC	0069	NC
3068	NC	2068	UU4	1068	UU9	0068	OHRSTN
3067	SANDSN	2067	UU5	1067	UU10	0067	DEVRXD
3066	GRDFLT	2066	UU6	1066	MPLDSN	0066	DEVTXD
3065	NC	2065	NC	1065	NC	0065	NC
3064	TOFCD2	2064	UU7	1064	ROFCC1	0064	TOFCC1
3063	TLMOC	2063	ROFDC2	1063	ROFCC2	0063	TOCC2
3062	ROFDC1	2062	ROFDF2	1062	ROFCF1	0062	TOFCF1
3061	NC	2061	NC	1061	NC	0061	NC
3060	ROFDF1	2060	ROFDD2	1060	ROFCF2	0060	TOFCF2
3059	ROFDD1	2059	TLMO9	1059	ROFCD1	0059	GRDT
3058	TOFBD2	2058	TLMO10	1058	ROFCD2	0058	TOFCD1
3057	NC	2057	NC	1057	NC	0057	NC
3056	TOMAD2	2056	TLMO11	1056	ROFBC1	0056	TOFBC1
3055	TLMIC	2055	TLMO12	1055	ROFBC2	0055	TOFBC2
3054	TLMO5	2054	TLMO13	1054	ROFBF1	0054	TOFBF1
3053	NC	2053	NC	1053	NC	0053	NC
3052	TLMO6	2052	TLMO14	1052	ROFBF2	0052	TOFBF2
3051	TLMO7	2051	TLMO15	1051	ROFBD1	0051	GRD
3050	TLMO8	2050	TLMO16	1050	ROFBD2	0050	TOFBD1
3049	NC	2049	NC	1049	NC	0049	NC
3048	BMPD0	2048	BMPD1	1048	BMPD2	0048	BMPD3
3047	BMPD4	2047	BMPD5	1047	BMPD6	0047	BMPD7
3046	Q3RTS	2046	Q3RCK	1046	ROFAC1	0046	ROFAC2
3045	NC	2045	NC	1045	NC	0045	NC
3044	Q3TCK	2044	Q3CTS	1044	ROFAF1	0044	ROFAF2
3043	Q3DTR	2043	Q3DSR	1043	ROFAD1	0043	ROFAD2
3042	Q3RID	2042	Q3DCD	1042	GRD	0042	GRD

Table 8-3   BCP1 OHCTL I/O Connections (Continued)

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
3041	NC	2041	NC	1041	NC	0041	NC
3040	UU1	2040	EXRSTN	1040	CSRTLM	0040	FRCMJ
3039	TOFAC1	2039	TOFAC2	1039	ROMBC1	0039	TOMBC1
3038	TOFAF1	2038	TOFAF2	1038	ROMBC2	0038	TOMBC2
3037	NC	2037	NC	1037	NC	0037	NC
3036	TOFAD1	2036	TOFAD2	1036	ROMBF1	0036	TOMBF1
3035	UU2	2035	TOMBD2	1035	ROMBF2	0035	TOMBF2
3034	Q3TDA	2034	Q3RDA	1034	ROMBD1	0034	GRD
3033	NC	2033	NC	1033	NC	0033	NC
3032	RTBAP	2032	RTBAN	1032	ROMBD2	0032	TOMBD1
3031	XTBAP	2031	XTBAN	1031	ROMAC1	0031	TOMAC1
3030	TOFDC1	2030	TOFDC2	1030	ROMAC2	0030	TOMAC2
3029	NC	2029	NC	1029	NC	0029	NC
3028	TOFDF1	2028	TOFDF2	1028	ROMAF1	0028	TOMAF1
3027	TOFDD1	2027	TOFDD2	1027	ROMAF2	0027	TOMAF2
3026	GRD	2026	TLMBSN	1026	ROMAD1	0026	GRD
3025	NC	2025	NC	1025	NC	0025	NC
3024	MPINTN	2024	DTACKN	1024	ROMAD2	0024	TOMAD1
3023	BMPASN	2023	MPUDSN	1023	PTCR	0023	PTNE
3022	BMPRWN	2022	BCKOUT	1022	PTMJ	0022	PTCOM
3021	NC	2021	NC	1021	NC	0021	NC
3020	BMPA1	2020	GRD	1020	PTMN	0020	PTFE1
3019	BMPA2	2019	BMPA8	1019	PTPMN	0019	PTFE2
3018	BMPA3	2018	BMPA9	1018	PTACOO	0018	PTFE3
3017	NC	2017	NC	1017	NC	0017	NC
3016	BMPA4	2016	BMPA10	1016	PTSID	0016	PTFE4
3015	BMPA5	2015	BMPA11	1015	PTCLF	0015	PTFE5
3014	BMPA6	2014	BMPA12	1014	PTINCM	0014	PTFE6
3013	NC	2013	NC	1013	NC	0013	NC
3012	BMPA7	2012	BMPA13	1012	GRD	0012	PTACOI
3011	BMPD8	2011	BMPD12	1011	RQ2P	0011	XQ2P
3010	BMPD9	2010	BMPD13	1010	RQ2N	0010	XQ2N
3009	NC	2009	NC	1009	NC	0009	NC
3008	BMPD10	2008	BMPD14	1008	ROWDAT	0008	TOWDAT
3007	BMPD11	2007	BMPD15	1007	ROWCLK	0007	TOWCLK
3006	UU3	2006	UU8	1006	GRDB	0006	NC
3005	GRD	2005	-48VRT	1005	-48VA2	0005	-48VA1
3004	GRD	2004	-48VRT	1004	-48VA2	0004	-48VA1
3003	GRD	2003	-48VRT	1003	-48VA2	0003	-48VA1
3002	ESDGRD	2002	GRD	1002	-48VB2	0002	-48VB1
3001	ESDGRD	2001	GRD	1001	-48VB2	0001	-48VB1
3000	ESDGRD	2000	GRD	1000	-48VB2	0000	-48VB1

Table 8-4   BCP4 OHCTL I/O Connections

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
3077	GRD	2077	-48VRT	1077	-48VB2	0077	-48VB1
3076	GRD	2076	-48VRT	1076	-48BV2	0076	-48BV1
3075	GRD	2075	-48VRT	1075	-48VB2	0075	-48VB1
3074	GRD	2074	GRD	1074	-48VA2	0074	-48VA1
3073	GRD	2073	GRD	1073	-48VA2	0073	-48VA1
3072	GRD	2072	GRD	1072	-48VA2	0072	-48VA1
3071	RESV1	2071	RESV3	1071	RESV4	0071	RESV6
3070	RESV2	2070	NC	1070	RESV5	0070	BMPDSAC
3069	NC	2069	NC	1069	NC	0069	K1N
3068	NC	2068	UU4	1068	UU9	0068	NC
3067	SANDSN	2067	UU5	1067	UU10	0067	OHRSTN
3066	GRDFLT	2066	UU6	1066	BMPLRWN	0066	DEVRXD
							DEVTXD
3065	NC	2065	NC	1065	NC	0065	NC
3064	TOFCD2	2064	UU7	1064	ROFCC1	0064	TOFCC1
3063	TLMOC	2063	ROFDC2	1063	ROFCC2	0063	TOCC2
3062	ROFDC1	2062	ROFDF2	1062	ROFCF1	0062	TOFCF1
3061	NC	2061	NC	1061	NC	0061	NC
3060	ROFDF1	2060	ROFDD2	1060	ROFCF2	0060	TOFCF2
3059	ROFDD1	2059	TLMO9	1059	ROFCD1	0059	GRDT
3058	TOFBD2	2058	TLMO10	1058	ROFCD2	0058	TOFCD1
3057	NC	2057	NC	1057	NC	0057	NC
3056	TOMAD2	2056	TLMI16	1056	ROFBC1	0056	TOFBC1
3055	TLMIC	2055	TLMI17	1055	ROFBC2	0055	TOFBC2
3054	TLMO5	2054	TLMI18	1054	ROFBF1	0054	TOFBF1
3053	NC	2053	NC	1053	NC	0053	NC
3052	TLMO6	2052	TLMI19	1052	ROFBF2	0052	TOFBF2
3051	TLMO7	2051	TLMI20	1051	ROFBD1	0051	GRD
3050	TLMO8	2050	TLMI21	1050	ROFBD2	0050	TOFBD1
3049	NC	2049	NC	1049	NC	0049	NC
3048	BMPD0	2048	BMPD1	1048	BMPD2	0048	BMPD3
3047	BMPD4	2047	BMPD5	1047	BMPD6	0047	BMPD7
3046	Q3RTS	2046	Q3RCK	1046	ROFAC1	0046	ROFAC2
3045	NC	2045	NC	1045	NC	0045	OWUMD
3044	Q3TCK	2044	Q3CTS	1044	ROFAF1	0044	ROFAF2
3043	Q3DTR	2043	Q3DSR	1043	ROFAD1	0043	ROFAD2
3042	Q3RID	2042	Q3DCD	1042	GRD	0042	GRD

Table 8-4   BCP4 OHCTL I/O Connections (Continued)

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
3041	TOWUN	2041	TE1DAT	1041	NC	0041	TE1CLK
3040	UU1	2040	EXRSTN	1040	CSRTLM	0040	FRCMJ
3039	TOFAC1	2039	TOFAC2	1039	ROMBC1	0039	TOMBC1
3038	TOFAF1	2038	TOFAF2	1038	ROMBC2	0038	TOMBC2
3037	ROWUN	2037	RE1DAT	1037	NC	0037	RE1CLK
3036	TOFAD1	2036	TOFAD2	1036	ROMBF1	0036	TOMBF1
3035	UU2	2035	TOMBD2	1035	ROMBF2	0035	TOMBF2
3034	Q3TDA	2034	Q3RDA	1034	ROMBD1	0034	GRD
3033	NC	2033	NC	1033	NC	0033	NC
3032	RTBAP	2032	RTBAN	1032	ROMBD2	0032	TOMBD1
3031	XTBAP	2031	XTBAN	1031	ROMAC1	0031	TOMAC1
3030	TOFDC1	2030	TOFDC2	1030	ROMAC2	0030	TOMAC2
3029	NC	2029	NC	1029	NC	0029	NC
3028	TOFDF1	2028	TOFDF2	1028	ROMAF1	0028	TOMAF1
3027	TOFDD1	2027	TOFDD2	1027	ROMAF2	0027	TOMAF2
3026	GRD	2026	TLMBSN	1026	ROMAD1	0026	GRD
3025	NC	2025	NC	1025	NC	0025	NC
3024	MPINTN	2024	BMPD-SACKON	1024	ROMAD2	0024	TOMAD1
3023	BMPASN	2023	BMPDSN	1023	PTCR	0023	PTNE
3022	BMPRWN	2022	BCKOUT	1022	PTMJ	0022	PTCOM
3021	NC	2021	NC	1021	NC	0021	NC
3020	BMPA1	2020	GRD	1020	PTMN	0020	PTFE1
3019	BMPA2	2019	BMPA8	1019	PTPMN	0019	PTFE2
3018	BMPA3	2018	BMPA9	1018	PTACOO	0018	PTFE3
3017	NC	2017	NC	1017	NC	0017	NC
3016	BMPA4	2016	BMPA10	1016	PTSID	0016	PTFE4
3015	BMPA5	2015	BMPA11	1015	PTCLF	0015	PTFE5
3014	BMPA6	2014	BMPA12	1014	PTINCM	0014	PTFE6
3013	NC	2013	NC	1013	NC	0013	NC
3012	BMPA7	2012	BMPA13	1012	GRD	0012	PTACOI
3011	BMPD8	2011	BMPD12	1011	RQ2P	0011	XQ2P
3010	BMPD9	2010	BMPD13	1010	RQ2N	0010	XQ2N
3009	NC	2009	NC	1009	NC	0009	NC
3008	BMPD10	2008	BMPD14	1008	ROWDAT	0008	TOWDAT
3007	BMPD11	2007	BMPD15	1007	ROWCLK	0007	TOWCLK
3006	UU3	2006	UU8	1006	GRDB	0006	NC

Table 8-4   BCP4 OHCTL I/O Connections (Continued)

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
3005	GRD	2005	-48VRT	1005	-48VA2	0005	-48VA1
3004	GRD	2004	-48VRT	1004	-48VA2	0004	-48VA1
3003	GRD	2003	-48VRT	1003	-48VA2	0003	-48VA1
3002	ESDGRD	2002	GRD	1002	-48VB2	0002	-48VB1
3001	ESDGRD	2001	GRD	1001	-48VB2	0001	-48VB1
3000	ESDGRD	2000	GRD	1000	-48VB2	0000	-48VB1

Table 8-5   TGS I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
MCLK1P	014	Timing	BS1-3	003-5	Control
MCLK1N	114		IICSCL	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 8-6   BBG11 I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
DS3I1	348	DS3 Signals	LSICKP	205	Control Signals
PI1	149		LSICKN	305	
RL1	249		LSICDP	206	
DS3O1	010		LSICDN	306	
PO1	049		LSIRDP	006	
DS3I2	345		LSIRDN	106	
PI2	146		CSR	104	
RL2	246		BMPA11	103	
DS3O2	009		BMPA10	203	
PO2	046		BMPA9	303	
DS3I3	343		BS1	003	
PI3	144		BS2	004	
RL3	244		BS3	005	
DS3O3	008		IICSDA	304	
PO3	044		IICSCL	204	
TDC3SP	012	STS-1 Signals	BDRMVL1	302	
TDC3SN	112		BDRMVL2	335	
TDC3PP	212		MCLKSP	024	Timing Signals
TDC3PN	312		MCLKSN	124	
RDC3SP	034		MCLKPP	025	
RDC3SN	134		MCLKPN	125	
RDC3PP	234		FSYNSP	224	
RDC3PN	334		FSYNSN	324	
TDC2SP	014		FSYNPP	225	
TDC2SN	114		FSYNPN	325	
TDC2PP	214		-48VA1	300	Power
TDC2PN	314		-48VA2	200	
RDC2SP	036		-48VB1	100	
RDC2SN	136		-48VB2	001	
RDC2PP	236		-48VRTN	301	
RDC2PN	336		ESDGRD	002	ESD Ground
TDC1SP	015		GRD	007	Ground
TDC1SN	115		GRD	011	
TDC1PP	215		GRD	013	
TDC1PN	315		GRD	021	
RDC1SP	037		GRD	029	
RDC1SN	137		GRD	035	
RDC1PP	237		GRD	042	
RDC1PN	337		GRD	043	

Table 8-6   BBG11 I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
GRD	045		GRD	208	
GRD	047		GRD	209	
GRD	048		GRD	213	
GRD	102		GRD	221	
GRD	107		GRD	229	
GRD	108		GRD	235	
GRD	109		GRD	242	
GRD	110		GRD	243	
GRD	111	Ground	GRD	245	Ground
GRD	113		GRD	247	
GRD	121		GRD	248	
GRD	129		GRD	307	
GRD	135		GRD	309	
GRD	141		GRD	313	
GRD	143		GRD	321	
GRD	145		GRD	329	
GRD	147		GRD	342	
GRD	148		GRD	344	
GRD	202		GRD	346	
GRD	207		GRD	347	

Table 8-7   BBG12 I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
STS1EI1	348		LSICKP	205	
PI1	149		LSICKN	305	
RL1	249		LSICDP	206	
STS1EO1	010		LSICDN	306	
PO1	049		LSIRDP	006	
STS1EI2	345		LSIRDN	106	
PI2	146	EC-1 Signals	CSR	104	
RL2	246		BMPA11	103	Control Signals
STS1EO2	009		BMPA10	203	
PO2	046		BMPA9	303	
STS1EI3	343		BS1	003	
PI3	144		BS2	004	
RL3	244		BS3	005	
STS1EO3	008		IICSDA	304	
PO3	044		IICSCL	204	
TDC3SP	012		SLOTID	105	
TDC3SN	112		MCLKSP	024	
TDC3PP	212		MCLKSN	124	
TDC3PN	312		MCLKPP	025	
RDC3SP	034		MCLKPN	125	
RDC3SN	134		FSYNSP	224	Timing Signals
RDC3PP	234		FSYNSN	324	
RDC3PN	334		FSYNPP	225	
TDC2SP	014		FSYNPN	325	
TDC2SN	114		-48VA1	300	
TDC2PP	214		-48VA2	200	
TDC2PN	314		-48VB1	100	Power
RDC2SP	036		-48VB2	001	
RDC2SN	136		-48VRTN	301	
RDC2PP	236	STS-1 Signals	ESDGRD	002	ESD Ground
RDC2PN	336		GRD	007	
TDC1SP	015		GRD	011	
TDC1SN	115		GRD	013	
TDC1PP	215		GRD	021	Ground
TDC1PN	315		GRD	029	
RDC1SP	037		GRD	035	
RDC1SN	137		GRD	042	
RDC1PP	237		GRD	043	
RDC1PN	337				

Table 8-7   BBG12 I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
GRD	045		GRD	208	
GRD	047		GRD	209	
GRD	048		GRD	213	
GRD	102		GRD	221	
GRD	107		GRD	229	
GRD	108		GRD	235	
GRD	109		GRD	242	
GRD	110		GRD	243	
GRD	111	Ground	GRD	245	Ground
GRD	113		GRD	247	
GRD	121		GRD	248	
GRD	129		GRD	307	
GRD	135		GRD	309	
GRD	141		GRD	313	
GRD	143		GRD	321	
GRD	145		GRD	329	
GRD	147		GRD	342	
GRD	148		GRD	344	
GRD	202		GRD	346	
GRD	207		GRD	347	

Table 8-8   TSI I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
TFA11P	3107		TFD21P	1015	
TFA11N	2107		TFD21N	0015	
TFA21P	1107		TFD12P	3014	
TFA21N	0107		TFD12N	2014	
TFA12P	3106		TFD22P	1014	Function Unit
TFA12N	2106		TFD22N	0014	Transmit Data
TFA22P	1106		TFD13P	3013	
TFA22N	0106		TFD13N	2013	
TFA13P	3105		TFD23P	1013	
TFA13N	2105		TFD23N	0013	
TFA23P	1105		RFA11P	3067	
TFA23N	0105		RFA11N	2067	
TFB11P	3096		RFA21P	1067	
TFB11N	2096		RFA21N	0067	
TFB21P	1096		RFA12P	3066	
TFB21N	0096		RFA12N	2066	
TFB12P	3095		RFA22P	1066	
TFB12N	2095		RFA22N	0066	
TFB22P	1095	Function Unit	RFA13P	3065	
TFB22N	0095	Transmit Data	RFA13N	2065	
TFB13P	3094		RFA23P	1065	Function Unit
TFB13N	2094		RFA23N	0065	Receive Data
TFB23P	1094		RFB11P	3063	
TFB23N	0094		RFB11N	2063	
TFC11P	3025		RFB21P	1063	
TFC11N	2025		RFB21N	0063	
TFC21P	1025		RFB12P	3062	
TFC21N	0025		RFB12N	2062	
TFC12P	3024		RFB22P	1062	
TFC12N	2024		RFB22N	0062	
TFC22P	1024		RFB13P	3061	
TFC22N	0024		RFB13N	2061	
TFC13P	3023		RFB23P	1061	
TFC13N	2023		RFB23N	0061	
TFC23P	1023		RFC11P	3059	
TFC23N	0023		RFC11N	2059	
TFD11P	3015		RFC21P	1059	
TFD11N	2015		RFC21N	0059	

Table 8-8   TSI I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
RFC12P	3058		TB205P	1118	
RFC12N	2058		TB205N	0118	
RFC22P	1058		TB106P	3117	
RFC22N	0058		TB106N	2117	
RFC13P	3057		TB206P	1117	
RFC13N	2057		TB206N	0117	
RFC23P	1057		TB107P	3051	
RFC23N	0057		TB107N	2051	
RFD11P	3055	Function Unit	TB207P	1051	
RFD11N	2055	Receive Data	TB207N	0051	
RFD21P	1055		TB108P	3050	
RFD21N	0055		TB108N	2050	Main-B Unit
RFD12P	3054		TB208P	1050	Transmit Data
RFD12N	2054		TB208N	0050	
RFD22P	1054		TB109P	3049	
RFD22N	0054		TB109N	2049	
RFD13P	3053		TB209P	1049	
RFD13N	2053		TB209N	0049	
RFD23P	1053		TB110P	3029	
RFD23N	0053		TB110N	2029	
TB101P	3123		TB210P	1029	
TB101N	2123		TB210N	0029	
TB201P	1123		TB111P	3028	
TB201N	0123		TB111N	2028	
TB102P	3122		TB211P	1028	
TB102N	2122		TB211N	0028	
TB202P	1122		TB112P	3027	
TB202N	0122	Main-B Unit	TB112N	2027	
TB103P	3121	Transmit Data	TB212P	1027	
TB103N	2121		TB212N	0027	
TB203P	1121		RB101P	3089	
TB203N	0121		RB101N	2089	
TB104P	3119		RB201P	1089	
TB104N	2119		RB201N	0089	Main-B Unit
TB204P	1119		RB102P	3088	Receive Data
TB204N	0119		RB102N	2088	
TB105P	3118		RB202P	1088	
TB105N	2118		RB202N	0088	

Table 8-8   TSI I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
RB103P	3087		MCLKSP	3227	
RB103N	2087		MCLKSN	2227	Clock and Frame
RB203P	1087		FSYNSP	3125	From TGS-1
RB203N	0087		FSYNSN	2125	
RB104P	3085				
RB104N	2085				
RB204P	1085		MCLKPP	1127	
RB204N	0085		MCLKPN	0127	Clock and Frame
RB105P	3084		FSYNPP	1125	From TGS-2
RB105N	2084		FSYNPN	0125	
RB205P	1084				
RB205N	0084				
RB106P	3083		TSICKIP	3101	
RB106N	2083		TSICKIN	2101	Clock and Frame
RB206P	1083		FSYNSP	1101	from Other TSI
RB206N	0083		FSYNSN	0101	FIXED
RB107P	3075				
RB107N	2075	Main-B Unit			
RB207P	1075	Receive Data			
RB207N	0075		TSICKOP	3103	
RB108P	3074		TSICKON	2103	Clock and Frame
RB108N	2074		FSYNSP	1103	from Other TSI
RB208P	1074		FSYNSN	0103	FIXED
RB208N	0074				
RB109P	3073		FA1CKOP	3081	
RB109N	2073		FA1CKON	2081	
RB209P	1073		FA2CKOP	1081	
RB209N	0073		FA2CKON	0081	
RB110P	3071		FB1CKOP	3079	
RB110N	2071		FB1CKON	2079	
RB210P	1071		FB2CKOP	1079	Clock to
RB210N	0071		FB2CKON	0079	Function Units
RB111P	3070		FC1CKOP	3077	
RB111N	2070		FC1CKON	2077	
RB211P	1070		FC2CKOP	1077	
RB211N	0070		FC2CKON	0077	
RB112P	3069		FD1CKOP	3047	
RB112N	2069		FD1CKON	2047	
RB212P	1069		FD2CKOP	1047	
RB212N	0069		FD2CKON	0047	

Table 8-8   TSI I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
FA1FROP	3021		CSR	1008	CSR
FA1FRON	2021		BMPA12	0007	Future Release
FA2FROP	1021				
FA2FRON	0021		BMPA11	1007	Control Link
FB1FROP	3020		BMPA10	2007	Address Inputs
FB1FRON	2020		BMPA9	3007	
FB2FROP	1020	Frame Sync to	BS1	0008	
FB2FRON	0020	Function Units	BS2	0009	Board Select
FC1FROP	3018		BS3	1009	
FC1FRON	2018				
FC2FROP	1018		BS4	0011	Future Release
FC2FRON	0018		IICSDA	3008	100 kHz Control
FD1FROP	3017				Bus Data
FD1FRON	2017		IICSCL	2008	100 kHz Control
FD2FROP	1017				Bus Clock
FD2FRON	0017				
A1CKOP	3099		-48VA1	0140	
A1CKON	2099	Future Release	-48VA1	0139	
A2CKOP	1099		-48VA1	0138	
A2CKON	0099		-48VA1	0005	
B1CKOP	3092		-48VA1	0004	
B1CKON	2092	Clock to	-48VA1	0003	
B2CKOP	1092	Main-B Units	-48VA2	1140	
B2CKON	0092		-48VA2	1139	
A1FROP	3098		-48VA2	1138	
A1FRON	2098	Future Release	-48VA2	1005	
A2FROP	1098		-48VA2	1004	Input Power
A2FRON	0098		-48VA2	1003	
B1FROP	3091		-48VB1	0143	
B1FRON	2091	Frame Sync to	-48VB1	0142	
B2FROP	1091	Main-B Units	-48VB1	0141	
B2FRON	0091		-48VB1	0002	
LSICKP	3009	Clock for	-48VB1	0001	
LSICKN	2009	Control Link	-48VB1	0000	
LSICDP	3010	Command Data	-48VB2	1143	
LSICDN	2010	from Control Link	-48VB2	1142	
LSIRDP	1010	Response Data	-48VB2	1141	
LSIRDN	0010	for Control Link	-48VB2	1002	
			-48VB2	1001	
			-48VB2	1000	

Table 8-8   TSI I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
-48VRT	2143	-48V Return Path	GRD	3056	Signal Ground
-48VRT	2142		GRD	3052	
-48VRT	2141		GRD	3048	
-48VRT	2005		GRD	3046	
-48VRT	2004		GRD	3042	
-48VRT	2003		GRD	3038	
ESDGRD	3002	ESD Ground	GRD	3034	
ESDGRD	3001		GRD	3030	
ESDGRD	3000		GRD	3026	
GRD	3143	Signal Ground	GRD	3022	
GRD	3142		GRD	3019	
GRD	3141		GRD	3016	
GRD	3140		GRD	3012	
GRD	3139		GRD	3006	
GRD	3138		GRD	3005	
GRD	3137		GRD	3004	
GRD	3136		GRD	3003	
GRD	3132		GRD	2140	
GRD	3128		GRD	2139	
GRD	3126		GRD	2138	
GRD	3124		GRD	2137	
GRD	3120		GRD	2136	
GRD	3116		GRD	2132	
GRD	3112		GRD	2128	
GRD	3108		GRD	2126	
GRD	3104		GRD	2124	
GRD	3102		GRD	2120	
GRD	3100		GRD	2116	
GRD	3097		GRD	2112	
GRD	3093		GRD	2108	
GRD	3090		GRD	2104	
GRD	3086		GRD	2102	
GRD	3082		GRD	2100	
GRD	3080		GRD	2097	
GRD	3078		GRD	2093	
GRD	3076		GRD	2090	
GRD	3072		GRD	2086	
GRD	3068		GRD	2082	
GRD	3064		GRD	2080	
GRD	3060		GRD	2078	

Table 8-8   TSI I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
GRD	2076	GRD	1100	GRD	0116
GRD	2072	GRD	1097	GRD	0112
GRD	2068	GRD	1093	GRD	0108
GRD	2064	GRD	1090	GRD	0104
GRD	2060	GRD	1086	GRD	0102
GRD	2056	GRD	1082	GRD	0100
GRD	2052	GRD	1080	GRD	0097
GRD	2048	GRD	1078	GRD	0093
GRD	2046	GRD	1076	GRD	0090
GRD	2042	GRD	1072	GRD	0086
GRD	2038	GRD	1068	GRD	0082
GRD	2034	GRD	1064	GRD	0080
GRD	2030	GRD	1060	GRD	0078
GRD	2026	GRD	1056	GRD	0076
GRD	2022	GRD	1052	GRD	0072
GRD	2019	GRD	1048	GRD	0068
GRD	2016	GRD	1046	GRD	0064
GRD	2012	GRD	1042	GRD	0060
GRD	2006	GRD	1038	GRD	0056
GRD	2002	GRD	1034	GRD	0052
GRD	2001	GRD	1030	GRD	0048
GRD	2000	GRD	1026	GRD	0046
GRD	1136	GRD	1022	GRD	0042
GRD	1132	GRD	1019	GRD	0038
GRD	1128	GRD	1016	GRD	0034
GRD	1126	GRD	1012	GRD	0030
GRD	1124	GRD	1006	GRD	0026
GRD	1120	GRD	0136	GRD	0022
GRD	1116	GRD	0132	GRD	0019
GRD	1112	GRD	0128	GRD	0016
GRD	1108	GRD	0126	GRD	0012
GRD	1104	GRD	0124	GRD	0006
GRD	1102	GRD	0120		

Table 8-9   21 TYPE OLIU I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
TDA1SP	027		RDB1PN	319	
TDA1SN	127		RDB2PP	218	
TDA2SP	026		RDB2PN	318	
TDA2SN	126		RDC1SP	015	
TDA1PP	227		RDC1SN	115	STS-1 Signals
TDA1PN	327		RDC2SP	014	
TDA2PP	226		RDC2SN	114	
TDA2PN	326		RDC3SP	012	
TDB1SP	031		RDC3SN	112	
TDB1SN	131		RDC1PP	215	
TDB2SP	030		RDC1PN	315	
TDB2SN	130		RDC2PP	214	
TDB1PP	231		RDC2PN	314	
TDB1PN	331		RDC3PP	212	
TDB2PP	230		RDC3PN	312	
TDB2PN	330		TOHCK	040	
TDC1SP	037		TOHFR	140	
TDC1SN	137		TOHDA	240	SONET Overhead
TDC2SP	036	STS-1 Signals	ROHCK	139	
TDC2SN	136		ROHFR	239	
TDC3SP	034		ROHDA	339	
TDC3SN	134		MCLKSP	024	
TDC1PP	237		MCLKSN	124	
TDC1PN	337		FSYNSP	224	
TDC2PP	236		FSYNSN	324	
TDC2PN	336		LTCKS	341	Timing Signals
TDC3PP	234		LTCKP	241	
TDC3PN	334		MCLKPP	025	
RDA1SP	023		MCLKPN	125	
RDA1SN	123		FSYNPP	225	
RDA2SP	022		FSYNPN	325	
RDA2SN	122		LSICKP	205	
RDA1PP	223		LSICKN	305	
RDA1PN	323		LSICDP	206	
RDA2PP	222		LSICDN	306	
RDA2PN	322		LSIRDP	006	Control Interface
RDB1SP	019		LSIRDN	106	
RDB1SN	119		CSR	104	
RDB2SP	018		BMPA11	103	
RDB2SN	118		BMPA10	203	
RDB1PP	219				

Table 8-9   21 TYPE OLIU I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
BMPA9	303	Control Interface	GRD	313	Ground
BS1	003		GRD	021	
BS2	004		GRD	121	
BS3	005		GRD	221	
IICSDA	304		GRD	321	
IICSCL	204		GRD	029	
SLOTID	105		GRD	129	
ON/OFF	041		GRD	021	
-48VA1	300	Power	GRD	229	
-48VA2	200		GRD	329	
-48VB1	100		GRD	035	
-48VB2	001		GRD	135	
-48VRTN	301		GRD	235	
ESDGND	002	ESD ground	GRD	335	
GRD	102	Ground	GRD	047	
GRD	202		GRD	147	
GRD	302		GRD	247	
GRD	013		GRD	347	
GRD	113		GRD	148	
GRD	213		GRD	248	

Table 8-10   23 TYPE OLIU I/O Connections

Name	Pin No.	Function	Name	Pin No.	Function
T01SP	3117		T10SP	3081	
T01SN	2117		T10SN	2081	
T01PP	1115		T10PP	1079	
T01PN	0115		T10PN	0079	
T02SP	3113		T11SP	3077	
T02SN	2113		T11SN	2077	Transmit STS-1 Signals
T02PP	1111		T11PP	1075	
T02PN	0111		T11PN	0075	
T03SP	3109		T12SP	3073	
T03SN	2109		T12SN	2073	
T03PP	1107		T12PP	1071	
T03PN	0107		T12PN	0071	
T04SP	3105		R01SP	1045	
T04SN	2105		R01SN	0045	
T04PP	1103		R01PP	3043	
T04PN	0103	Transmit STS-1 Signals	R01PN	2043	
T05SP	3101		R02SP	1049	
T05SN	2101		R02SN	0049	
T05PP	1099		R02PP	3047	
T05PN	0099		R02PN	2047	
T06SP	3097		R03SP	1033	
T06SN	2097		R03SN	0053	
T06PP	1095		R03PP	3051	Receive STS-1 Signals
T06PN	0095		R03PN	2051	
T07SP	3093		R04SP	1053	
T07SN	2093		R04SN	0033	
T07PP	1091		R04PP	3031	
T07PN	0091		R04PN	2031	
T08SP	3089		R05SP	1037	
T08SN	2089		R05SN	0037	
T08PP	1087		R05PP	3035	
T08PN	0087		R05PN	2035	
T09SP	3085		R06SP	1041	
T09SN	2085		R06SN	0041	
T09PP	1083		R06PP	3039	
T09PN	0083		R06PN	2039	

Table 8-10   23 TYPE OLIU I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
R07SP	1021		C51PP	3069	
R07SN	0021		C51PN	2069	
R07PP	3019		F51PP	1059	
R07PN	2019		F51PN	0059	
R08SP	1025		LTCK1	0055	
R08SN	0025		LSICKP	1011	
R08PP	3023		LSICKN	0011	
R08PN	2023		LSICDP	3009	
R09SP	1029		LSICDN	2009	
R09SN	0029		LSIRDP	3013	
R09PP	3027		LSIRDN	2013	
R09PN	2027		CSR	0015	
R10SP	1009	Receive STS-1	BMPA12	3017	
R10SN	0009	Signals	BMPA11	0019	
R10PP	3007		BMPA10	3021	
R10PN	2007		BMPA9	0023	
R11SP	1013		BS1	3029	
R11SN	0013		BS2	0027	
R11PP	3011		BS3	3025	
R11PN	2011		BS4	0031	
R12SP	1017		IICSDA	3033	
R12SN	0017		IICSCL	0035	
R12PP	3015		TOHCK	2065	
R12PN	2015		TOHFR	0065	
C51SP	1067		TOHDA	1065	
C51SN	0067		ROHCK	3061	
F51SP	3057		ROHFR	1061	
F51SN	2057		ROHDA	2061	
LTCK0	1055				

Table 8-10   23 TYPE OLIU I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
-48VA1	0122		ESDGRD	3002	
-48VA1	0121		ESDGRD	3001	ESD Ground
-48VA1	0120		ESDGRD	3000	
-48VA1	0005		GRD	3125	
-48VA1	0004	Input Power	GRD	2125	
-48VA1	0003	(Feeder A)	GRD	3124	
-48VA2	1122		GRD	2124	
-48VA2	1121		GRD	3123	
-48VA2	1120		GRD	2123	
-48VA2	1005		GRD	3122	
-48VA2	1004		GRD	2122	
-48VA2	1003		GRD	3121	
-48VB1	0125		GRD	3120	
-48VB1	0124		GRD	1117	
-48VB1	0123		GRD	3115	
-48VB1	0002		GRD	2115	Signal Ground
-48VB1	0001		GRD	1113	
-48VB1	0000	Input Power	GRD	0113	
-48VB2	1125	(Feeder B)	GRD	3111	
-48VB2	1124		GRD	2111	
-48VB2	1123		GRD	1109	
-48VB2	1002		GRD	0109	
-48VB2	1001		GRD	3107	
-48VB2	1000		GRD	2107	
-48VRT	2122		GRD	1105	
-48VRT	2121		GRD	0105	
-48VRT	2120	-48V Return Path	GRD	3103	
-48VRT	2005		GRD	2103	
-48VRT	2004		GRD	1101	
-48VRT	2003		GRD	0101	
			GRD	3099	

Table 8-10 23 TYPE OLIU I/O Connections (Continued)

Name	Pin No.	Function	Name	Pin No.	Function
GRD	2099		GRD	3055	
GRD	1097		GRD	2055	
GRD	0097		GRD	3053	
GRD	3095		GRD	2053	
GRD	2095		GRD	1051	
GRD	1093		GRD	0051	
GRD	0093		GRD	3049	
GRD	3091		GRD	2049	
GRD	2091		GRD	1047	
GRD	1089		GRD	0047	
GRD	0089		GRD	3045	
GRD	3087		GRD	2045	
GRD	2087		GRD	1043	
GRD	1085		GRD	0043	
GRD	0085		GRD	3041	
GRD	3083		GRD	2041	
GRD	2083		GRD	1039	
GRD	1081		GRD	0039	
GRD	0081	Signal Ground	GRD	3037	Signal Ground
GRD	3079		GRD	2037	
GRD	2079		GRD	1035	
GRD	1077		GRD	2033	
GRD	0077		GRD	1031	
GRD	3075		GRD	2029	
GRD	2075		GRD	1027	
GRD	1073		GRD	2025	
GRD	0073		GRD	1023	
GRD	3071		GRD	2021	
GRD	2071		GRD	1019	
GRD	1069		GRD	2017	
GRD	0069		GRD	1015	
GRD	3067		GRD	1007	
GRD	2067		GRD	3005	
GRD	3065		GRD	3004	
GRD	0061		GRD	3003	
GRD	3059		GRD	2002	
GRD	2059		GRD	2001	
GRD	1057		GRD	2000	
GRD	0057				

Glossary

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.

CP

Circuit Pack

CR

Critical (alarm status)

CSA

Carrier Serving Area.

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 contains24 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 — An 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. TARP releases do not use the DSNE.

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 DSNE 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. Parallel telemetry is not available in OC-12, Release 7.

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 mant 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 face-plate 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

Obsolete 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.

M

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

    Man-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

NARTAC

    North American Regional Technical Assistance Center. Previously known as RTAC.

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 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.

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.

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) Previous name for NARTAC (North American Regional Technical Assistance Center).

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.

TABS

Telemetry Asynchronous Byte Serial (Protocol).

TARP

TID Address Resolution Protocol. TARP supports multi-vendor operation and allows partitioning of large subnetworks.

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. TBOS is not available in OC-12, Release 7 or OC-3, Release 13.

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 holdover modes.

TID

Target Identifier

TL1

Transaction Language 1 — A 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.

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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