Lucent Technologies
Bell Labs Innovations

WaveStar™ DACS 4/4/1 Digital Access and Cross-Connect System Release 2.1

Installation Testing Manual

Volume 1

365-367-405
Issue 1
November 2000

Notice

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

European CE Mark

The CE Mark affixed to this equipment means that it conforms to the European Union Electromagnetic Compatibility Directive (89/336/EEC).

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Ordering Information

The ordering number for this document is **365-367-405**. For additional ordering information refer to the "*How to Order Documentation*" paragraph.

Customer Assistance and Technical Support

For technical support assistance regarding this document, refer to the *"Technical Support"* paragraph.

Acknowledgments

This document was developed by the Lucent Technologies Customer Technical Support (CTS) organization at the Merrimack Valley Works in North Andover, Massachusetts USA.

Contents

Pre-Conditioning

Core Complex Verification Process

Port Subrack Verification Process

Conclusion

A Units, Modules, and MO Disks

B Laser Safety Guidelines

Attachments

How Are We Doing?

Title: ***WaveStar*™ DACS 4/4/1, Installation Testing Manual**

Identification No.: **365-367-405** Issue No.: **1.0** Date: **November 2000**

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- ❒ Add more detail
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LUCENT TECHNOLOGIES
Customer Technical Support Organization
***WaveStar*™ DACS 4/14/1 Technical Support Manager**
1600 Osgood Street
North Andover, MA 01845-9985
USA

About This Document

Purpose

This installation testing manual (IM) provides installation testing instructions for the *WaveStar*™DACS 4/4/1 System. This manual contains instructions for testing preconditioning, power system verification, system hardware verification, station interface verification, and system testing troubleshooting information.

Since the *WaveStar*™DACS 4/4/1 System has a phased release plan, this installation testing manual currently covers the installation verification of all system hardware which is supported by Release 2.1 of the Generic Software, and will be updated to cover additional releases as they become available.

Intended Audiences

This document is primarily for end users responsible for maintaining and installing the *WaveStar*™ DACS 4/4/1, including, but not limited to:

- Lucent Technologies Installation Personnel
- Lucent Technologies Field Support Engineers
- Customer Field Technicians
- Customer Station Engineers

How to Use This Document

The Installation Manual is devided into two volumes with the contents of each listed below. Each volume in this manual are marked with appropriate tabs, and provide the following information:

VOLUME 1

— **"About This Document"**

This section describes the purpose, intended audiences, reason for reissue, and organization of this document. This section also presents safety information, reference documentation, and explains how to order and make comments to this document.

— **"General Description"**

This chapter briefly describes the scope, installation requirements, technical support information, Risk assessments, required Items, and precautions/ recommendations.

— **"Pre-Conditioning"**

This chapter describes the necessary steps to properly precondition the *WaveStar*™ DACS 4/4/1 System for hardware verification.

— **"Core Complex Verification Process"**

This chapter describes the process for provisioning and starting up the Main Controller Subrack in the Matrix Controller Complex Rack, the Matrix Sync Subrack in the Matrix Sync Complex Rack, and all ten Matrix units (BSSU).

— **"Port Interface Subrack Verification Process"**

This chapter describes the procedures for provisioning and starting up a port subrack (STM-1, or STM-0) which is contained in a Port Complex Rack.

— **"Conclusion"**

This chapter describes the procedures to perform after installation testing of all the system hardware is complete, and prior to turning-over to the customer.

— **Appendix A, “Units”**

This appendix contains the specific details for installing or removing the *WaveStar*™ DACS 4/4/1 circuit packs (units).

— **Appendix B, “Laser Safety Guidelines”**

This appendix contains the safety guidelines when using lasers contained in the *WaveStar*™ DACS 4/4/1 System.

— **“Attachments”**

This section contains all the process checklists for each type of subrack, and the completion signoff form.

VOLUME 2

— **“General Test Procedures”**

This chapter describes many general procedures used during various points in the start-up and verification tests of different subracks in the *WaveStar*™ DACS 4/4/1 System.

Safety Instructions

Admonishments

This document may contain admonishments in the form of **DANGERS**, **WARNINGS**, **CAUTIONS**, and **NOTES.** These admonishments, listed in order of priority, 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. Caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.*

NOTE:
Indicates extra information regarding the current topic.

Lightwave Safety

The *WaveStar*™ DACS 4/4/1 and associated optical test sets use semiconductor laser transmitters only for external port interfaces (internal optics are provided by LED transmitters). The lasers emit lightwaves, at or near infrared wavelengths, into lightguide cables. This light is at the red end of the visible spectrum. Direct exposure at close distances should be avoided.

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

Electrostatic Discharge (ESD) Considerations

To reduce the possibility of ESD damage, subracks are equipped with grounding jacks to enable personnel to ground themselves using wrist straps, while handling circuit packs or working on subracks. The jacks for connection of wrist straps are located on each the sides of each rack (under stile strips). These jacks are properly labeled with the “ESD” symbol. Where grounding jacks are not provided, an alligator clip adapter can be used to enable a proper connection to the bay frame ground. The wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.

⚠ 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.

Basic Safety Precautions

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

- Read and understand all instructions.
- Follow all warnings and instructions marked on the product.
- Slots and openings in this product and the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.
- Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock.
- Never spill liquid of any kind on the product.
- Never install telecommunication wiring during a lightning storm.
- Never install telecommunication connections in wet locations unless the connection is specifically designed for wet locations.
- Never touch uninsulated telecommunication wires or terminals unless the telecommunications line has been disconnected at the network interface.
- Grounding/bonding circuit continuity is vital for safe operation of this equipment. Installation must include an independent frame ground conductor to building ground. Never operate with grounding/bonding conductor disconnected.

- For continued protection against risk of fire, replace fuses only with equivalent fuses of same type and rating.
- Use only circuit packs manufactured and recognized by Lucent Technologies Inc., in this system. Refer to the “Appendix A - Units” for a list of recognized circuit packs.
- Installation and maintenance procedures must be followed and performed by trained personnel only.
- This product has two input power feeders. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect two power supply cables when removing power from the rack.

Systems Supported

This document contains installation testing instructions for hardware verification of the *WaveStar*™ DACS 4/4/1 System using Release 2.1 of the Core System Software.

System verification can be successfully performed using the XC-CIT user interface software application which is provided with the Release 2.1 of the Core System Software.

Related Documentation/Training

Practices

The following Lucent Technologies practices provide reference information about the *WaveStar*™ DACS 4/4/1 System.

- Number: 365-367-100

  TItle: *WaveStar*™ DACS 4/4/1 *Applications, Planning and Ordering Guide*

  Audience: System planners, engineers, and sales teams.

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

- Number: 365-367-403

  TItle: *WaveStar*™ DACS 4/4/1 *Quick Reference Card*

  Audience: System operations, maintenance and support personnel.

  Content: Reference system descriptions, equipent identification information and user interface information.

- Number: 365-367-404

  TItle: *WaveStar*™ DACS 4/4/1 *Installation Assembly Manual*

  Audience: System installers, maintenance and support personnel.

  Content: System installation instructions for hardware assembly and construction of the equipment to customer order.

- Number: 365-367-412

  TItle: *WaveStar*™ DACS 4/4/1 *Provisioning Guide*

  Audience: System operations, maintenance and support personnel.

  Content: System provisioning information and instructions.

- Number: 365-367-413

  TItle: *WaveStar*™ DACS 4/4/1 *Administration and Maintenance Guide*

  Audience: System operations, maintenance and support personnel.

  Content: General descriptions, system configurations, service procedures, support procedures, maintenance procedures, and technical specification information.

Training Courses

The Lucent Technologies Corporate Education and Training Organization (CE&T) provides training for telecommunications technicians and installers in installation, operations, and maintenance. Suitcases of these courses is negotiable.

Contact the Corporate Education and Training Organization (CE&T) on **1-800-TRAINER (1-800-872-4637)** for information or to enroll in training classes.

Product Courses:

- Number: DG3204

  Title: *WaveStar*™ DACS 4/4/1 *Overview Course*

- Number: TR3562

  Title: *WaveStar*™ DACS 4/4/1 *Operations and Maintenance Course*

Related Courses:

- Number: TR5901

  Title: *Digital Multiplex System Introduction Course*

- Number: TR5951

  Title: *SDH Introduction Course*

- Number: OC3100

  Title: *Synchronous Digital Hierarchy (SDH) Course*

How to Order Documentation

To order additional copies of this document please contact your Lucent Technologies Local Field Support Organization (LFS) or directly to the Lucent Technologies Customer Information Center (CIC).

The ordering number for this document is **365-367-405**.

To order by Mail, write to:

Lucent Technologies Inc.
Customer Information Center
Attention: Order Entry Section
2855 N. Franklin Road
P.O. Box 19901
Indianapolis, Indiana 46219
U.S.A.

Place telephone orders Monday through Friday, To order by telephone, call:

From inside the U.S.A.: 1-888-LUCENT-8 (or 888-582-3688)

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Lucent Technologies, Inc.
Customer Technical Support Organization
WaveStar™DACS 4/4/1 Technical Support Manager
1600 Osgood Street
North Andover, MA 01845

General Description

Scope

Description

This Installation Testing Manual (365-367-405) describes the necessary hardware verification procedures to perform, in order to fully verify all the *WaveStar*™ DACS 4/4/1 System hardware installed according to the assembly instructions contained in the Installation Assembly Manual (365-367-404). All the tests outlined in this manual are performed using the Core Software Release 2.1. This manual provides a source of general test information, and required procedures necessary to fully power-up, and test the *WaveStar*™ DACS 4/4/1 System, in accordance with specified system configurations.

These installation procedures will only instruct the verification of the *WaveStar*™ DACS 4/4/1 System as a “stand alone” system, and **not** the installation or verification of any equipment connecting to any of the external interfaces (except for alarms) on the *WaveStar*™ DACS 4/4/1 System connector panels. All the testing can be performed from the XC-CIT user interface via the Workstation using an ethernet connection to the system EXLAN, and an serial connection to the CIT port using a software asynchronous terminal emulator with VT100 capabilities.

At the completion of all the installation procedures and tests in this manual, all installer provided system hardware (i.e. subracks, units, cables, power, etc.) will have been fully installed and hardware verified.

All tests in this manual should be performed in the proper sequence as outlined in the manual, in order to properly evaluate the installation of any system configuration.

⚠ CAUTION:
*Do **not** alter the procedures outlined in this manual, without prior contact with the Lucent Technologies Customer Technical Support Organization.*

System Test Process:

The system **must** be tested in the following sequence:

1. Motorola Controller Subrack
2. Sync Subracks and Matrix Units
3. Port Subrack (Multi-Port Subrack Configurations)

Installation Requirements

Training

The following table defines the installation requirements that the installer must possess in order for this procedure to be implemented on the *WaveStar*™ DACS 4/4/1 system. If you have any questions regarding these requirements, contact your local Lucent Technologies Customer Technical Support Representative.

Knowledge and Experience

It is recommended that the installer complete as many of the following conditions below:

- Successfully completes the *WaveStar*™ DACS 4/4/1 Installation and Assembly course.
- Successfully completes the *WaveStar*™ DACS 4/4/1 Installation and Test course.
- Successfully completes the *WaveStar*™ DACS 4/4/1 Operation and Maintenance course.
- Familiar with installation/testing of Lucent Technologies SDH Transmission Equipment

Installer Information

Number of Installers: One installer is required to execute test procedures

Labor Code: Not applicable

Technical Support

Contacts

If any problems are encountered, or if any of the steps specified in this procedure cannot be completed as indicated, contact the next level of support.

Table 1. Technical Support Contacts

Customer Location	Lucent Technologies Support Contact
Peoples Republic of China, - Northern Provinces	Lucent Technologies China Beijing China (86) 10-500-4455
Peoples Republic of China, - Southern Provinces	Lucent Technologies China Guangzhou, China (86) 20-331-1600
Indonesia	Lucent Technologies Indonesia Jawabarat, Indonesia (62) 21-898-0840
Japan	Lucent Technologies Japan Tokyo, Japan (81) 35-561-3000
Saudi Arabia	Lucent Technologies Saudi Arabia Riyadh, Saudi Arabia (96) 61-241-1055
USA and Canada [a]	Lucent Technologies CTAM (1) 800-225-4672
Europe, Middle East, and Africa (all countries not listed above)	Lucent Technologies - NSI Hilversum, The Netherlands (31) 35-87-1555
Asia and Pacific Rim (all countries not listed above)	Lucent Technologies Singapore Singapore (65) 390-5450
Central America (all countries not listed above)	Lucent Technologies de Guatemala Guatemala City, Guatemala (502) 233-4211
South America (all countries not listed above)	Lucent Technologies de Argentina Argentina (54) 149-7231

a. During normal working hours of **7:30 a.m.** to **4:15 p.m. Monday-Friday**, your call is answered by a *WaveStar*™DACS 4/4/1 engineer. Outside normal working hours (and occasionally during them), your call is transferred to CTAM (Lucent Support answering service) who will request the product assistance information then contact an engineer who will return your call as quickly as possible.

Risk Assessments

Implementation Risk Assessment

Rating

LOW This procedure has a **LOW** Application risk rating, since there is **NO** potential for a service interruption to the end customer, if any procedural deviations or procedure specific equipment failures occur during the procedure. This procedure can be performed at any traffic period as determined by the Customer.

Specific Assessment

None.

Service Risk Assessment

Rating

LOW This procedure has a **LOW** Service risk rating, since there is **NO** potential service loss if this procedure is not implemented immediately. This procedure can be implemented at any time as desired by the Customer.

Specific Assessment

None.

Time Estimates

Procedural Time

The following chart provides time estimates for each phase in this procedure, and the actual time may vary slightly due to experience.

Pre-Conditioning	10 min
Core Complex Verification Process	8 hours
Port Subrack Verification Process	4 hours/subrack (average equipage)
Conclusion	30 min

Out-Of-Service Time

The following chart provides system out-of-service time or reduced system control time estimates.

System Out-of-Service	n/a
Controller Out-of-Service	n/a

Required Items

Items Supplied By Lucent Technologies

COMCODE	QTY	DESCRIPTION
108399593	1	ITE-7110 *WaveStar*™ DACS 4/4/1 Installation Test Accessory Kit[a]

a. The contents of this kit are found in Table 2.

The Installation Test Equipment (ITE) item listed in above table can be acquired from the Lucent Technologies Installation Material Distribution and Repair Center (IMDARC).

Address:

Lucent Technologies - IMDARC
1111 Woodsmill Road
Town and Country, MO 63017
Contact: Nancy Downey
(314) 891-3024

Items Supplied By Customer

COMCODE	QTY	DESCRIPTION
Compaq Model AP400 or equivalent	1	Workstation Computer
848613477	1	Rel 2.1 Core Software Set[a]
108896606	1	System Documentation Kit[b]
108900358	1	Installation Documentation Kit[c]

a. The Rel 2.1 Core Software Set contains 2 Magneto-Optic Disks (OS Disk, NEF Disk), one CDROM disk (XC-CIT User Interface), two Database Backup MO disks, and SRD Rel 2.1 .
b. Rel 2.1 System Documentation Kit () contains Quick Ref. Card (303-367-403), Provisioning Guide (365-367-412), and Admin & Maintenence Guide (303-367-413).
c. Rel 2.1 Installation Documentation Kit () contains Installation Assembly Manual (303-367-404), and Installation Testing Manual (365-367-405).

Table 2. Contents of *WaveStar*™ DACS 4/4/1 Install. Test Accessory Kit

Description	QTY	Installation Code No.	COMCODE
Kit Shipping Case	1	ITE-7110,D11	408060101
Null-Modem "Y" LAN Cable	1	ITE-6998	407444645
CIT Adapter (9 pin)	3	ITE-6999	407444652
Null-Modem LAN Cable - 10 in	6	ITE-7002	407444686
RJ45 Coupler	2	ITE-7015	407445386
25 ft. 10 Base T cable	3	ITE-7016	407445477
BNC Barrel Adapter (Female-Female)	2	ITE-7018	407445527
BNC Coax Cable (Male - Male) - 10 ft.	2	ITE-7019	407445535
Coax Loopback Cable - 15 inch (Push-on BNC/Push-on BNC)	17	ITE-8656	106727019
ESD Straps	2	ITE-7029	407446145
Gender Changer Kit (LCOM)	1	ITE-7098	407899210
SC-SC Loopback Adapter	17	ITE-7099	407903186
Fluke 87 Digital Multimeter	1	ITE-6379A	-
10MM Hex Driver	1	R-5954	407495555
Screwdriver Set	1	R-5955	407495639
Cotton Tipped Swabs (50cnt)	1	R-5998	407903160
3/16 inch Hex Tip Screwdriver	1	R-6020	408060119
Utility Bags (set of 3)	1	R-5948	407446160
Specification and Checklistt	1	ITE-7110	-

Precautions and Recommendations

Precautions

- Read each step completely before performing the action specified, and perform the steps in the provided sequence.
- ESD wrist straps must be worn during the entire procedure, when touching the *WaveStar*™DACS 4/4/1 System equipment or handling related system components.
- ESD straps must be tested before starting the procedure.
- All jewelry (rings, watches, etc.) should be removed before starting this procedure.
- Be careful when working near all power cables, shorting these cables could cause a loss of service.

Recommendations

- Procedural stopping points (break points) should only be taken at the end of any procedure. Do not stop in the middle of any procedure.
- Autonomous log-out occurs when the XC-CIT Inactivity Timer is exceeded. You will be required to log back into the system.
- Wait for the appropriate response before continuing to the next step.
- Do not proceed with testing if a command does not successfully complete; contact your next level of support.
- Approximate command execution times are given in each step. If no time is given, the command completes in under one minute.
- If any problems or service loss occur, contact your next level of support immediately. If the solution is known, have one person continue correcting the problem while the other person calls the next level of support.

Pre-Conditioning

Pre-Conditioning Procedure

Description

This section of the document will ensure that all customer/installers have reviewed this procedure, all materials are available, and all representatives are properly prepared to proceed with the implementation procedure.

Procedure

❑ *Step 1:* Contact your next level of support, in order to verify that this procedure is the latest version.

CAUTION:
*Do **not** continue if the procedure to be used is **not** the latest version.*

❑ *Step 2:* Verify the presence of all the items listed in the **Required Items** paragraph in the *"General Description"* section of this document.

NOTE:
Verify all the equipment is available and not damaged. If all the material and documents are not available or any equipment is missing or damaged, do not continue, contact your next level of support.

❑ *Step 3:* Test all ESD wrist straps before beginning the procedure. Use an approved ESD wrist strap tester or an ohmmeter. Follow the directions for the wrist strap tester when using this method or if using an ohmmeter, approximately 1 Meg ohm must be measured from the banana plug to the webbing of the wrist strap.

❑ *Step 4:* Verify that an outside phone line is present, functional (i.e. phone attached and working), and near to the *WaveStar*™DACS 4/4/1 System location. This communication line will be used to contact the next level of support in the event of problems during the implementation procedure.

❑ *Step 5:* Get authorization from the customer to begin the hardware verification phase of the installation process on the *WaveStar*™DACS 4/4/1 System.

⚠ CAUTION:
*Do **not** proceed until receiving authorization from customer to continue with testing procedure.*

❑ *Step 6:* This completes the "*Pre-Conditioning*" section of this procedure, proceed to next chapter "*Core Complex Verification Process*".

Core Complex Verification Process

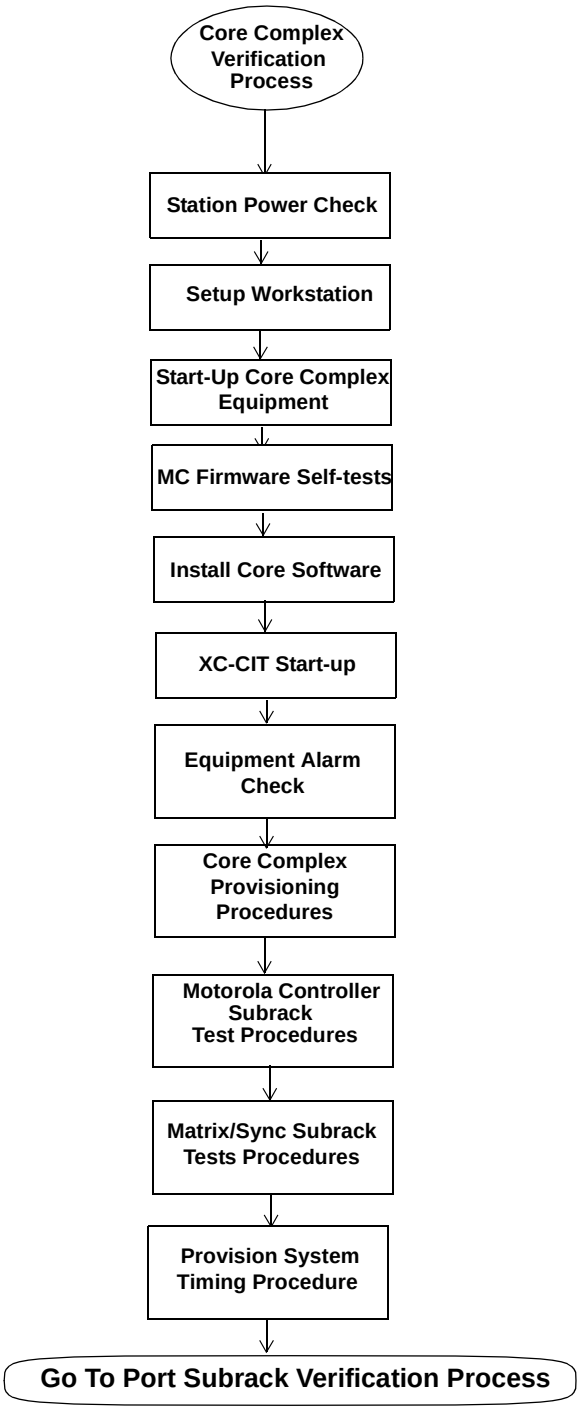
Verification Process

Description

This section will describe the required process for starting-up and testing the Core Complex of the *WaveStar*™ DACS 4/4/1 System. The Core Complex consists of the Main Controller Rack (MC) and the Matrix Sync Rack (MS). The Main Controller Rack contains the Motorola Controller Subrack and the first five of the Matrix Cross-connect units (BSSU 1-5). The Matrix Sync Rack contains the working and protection Sync Shelfs of the MS Subrack and the second five Matrix Cross-connect units (BSSU 6-10). This process is a mandatory process after assembling the equipment for any *WaveStar*™ DACS 4/4/1 system configuration during initial system installation.

The Core Complex verification process **must** be performed first, prior to performing any Port Subrack verification process.

Process Flow Chart



Procedure

Use the ❑ boxes to check off the steps as they are completed.

❑ *Step 1:* Open the front doors of the MC Complex Rack and MS Complex Rack, and remove the EMI Shields from the front of the MC Subrack, and the front of **both** Sync Shelves of the MS Subrack.

❑ *Step 2:* Verify station power to **all** the Power and Alarm Distribution Panels in the Core Complex Racks (i.e. MC Rack and MS Rack) by performing the following procedure.

MC Rack:

❑ Station Power Check - *{Refer to GTP 1}*

❑ Front Panel ❑ Rear Panel

MS Rack:

❑ Station Power Check - *{Refer to GTP 1}*

❑ Front Panel ❑ Rear Panel

❑ *Step 3:* Setup the Workstation Computer (recommended workstation is Compaq Model AP400) to communicate with the *WaveStar*™ DACS 4/4/1System.

❑ Workstation Computer Setup - *{Refer to GTP 2}*

❑ XC-CIT Software Installation - *{Refer to GTP 3}*

❑ *Step 4:* Equip and power-up the following equipment (MC & MS) in the Core Complex by performing the following procedures.

❑ Simplex Main Controller Check - {*Refer to GTP 4}*.

❑ Motorola Controller Start-up - {*Refer to GTP 5}*.

❑ Matrix/Sync Start-up - {*Refer to GTP 6}*.

❑ Motorola Controller Firmware Self-Tests - *{Refer to GTP 7}*

❑ *Step 5:* Install the system core software onto the hard disk of the Motorola Controller Subrack by performing the following software installation procedure.

❑ Core Software Installation - *{Refer to GTP 8}*

❑ *Step 6:* Start-up the System User Interface (XC-CIT) by performing the following procedures.

❑ Setting the EXLAN IP Address - *{Refer to GTP 10}*

❑ System Login Procedure - *{Refer to GTP 11}*

❑ *Step 7:* Setup the Core Complex by performing the following procedures.

- ❑ Provisioning the System Date/Time - *{Refer to GTP 15}*
- ❑ Provisioning the Core Rack Location - *{Refer to GTP 16}*
- ❑ Provisioning the System ID - *{Refer to GTP 17}*

❑ *Step 8:* Check for any Equipment Alarms present in the Core Complex at this time by performing the following procedure. (No alarms should be present)

- ❑ Equipment Alarm Check - *{Refer to GTP 21}*

❑ *Step 9:* Perform the following diagnostic test procedures on the Motorola Controller Subrack.

Required Tests:

- ❑ Subrack LED Test - *{Refer to GTP 22}*
- ❑ MC Subrack Power Test - *{Refer to GTP 23}*
- ❑ Unit Diagnostic Test Setup - *{Refer to GTP 27}*
- ❑ MC Units Diagnostic Tests - *{Refer to GTP 28}*
- ❑ System User Panel Test - *{Refer to GTP 39}*
- ❑ Rack Top Alarms Test **(Front Only)** - *{Refer to GTP 40 }*

Optional Tests (If Connected):

- ❑ End of Suite Alarms Test - *{Refer to GTP 41}*
- ❑ Station Alarms Test - *{Refer to GTP 42}*
- ❑ Miscellaneous Discrete Output Alarms Test - *{Refer to GTP 43}*
- ❑ Miscellaneous Discrete Input Alarms Test - *{Refer to GTP 44}*

❑ *Step 10:* Perform the following diagnostic test procedures for the Matrix/Sync Subrack (MS).

Required Tests:

- ❑ Subrack LED Test - *{Refer to GTP 22}*
- ❑ Sync Shelf Power Test - *{Refer to GTP 24}*
  - ❑ Working Sync Shelf ❑ Protection Sync Shelf
- ❑ BSSU Unit Power Test - *{Refer to GTP 25}*
  - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08 ❑ 09 ❑ 10
- ❑ Unit Diagnostic Test Setup - *{Refer to GTP 27}*
- ❑ SRC Unit Diagnostic Tests - *{Refer to GTP 29}*
  - ❑ SRC-1 Slot ❑ SRC-2 Slot
- ❑ STU Unit Diagnostic Tests - *{Refer to GTP 30}*
  - ❑ STU-1 Slot ❑ STU-2 Slot
- ❑ BSC Unit Diagnostic Tests - *{Refer to GTP 31}*
  - ❑ BSC-1 Slot ❑ BSC-2 Slot
- ❑ BSSU Unit Diagnostic Tests - *{Refer to GTP 32}*
  - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08 ❑ 09 ❑ 10
- ❑ Rack Top Alarms Test **(Front & Rear)** - *{Refer to GTP 40}*
  - ❑ From Working Sync Shelf ❑ From Protection Sync Shelf

Optional Tests (If Connected):

- ❑ End of Suite Alarms Test **(Front & Rear)** - *{Refer to GTP 41}*
  - ❑ From Working Sync Shelf ❑ From Protection Sync Shelf

❑ *Step 11:* Provision the **System Timing (Input and Output)** for the *WaveStar*™ DACS 4/4/1 System.

- Provisioning the System Timing - *{Refer to GTP 45}*

❑ *Step 12:* This completes the "*Core Complex Verification Process*", proceed to the next chapter "*Port Subrack Verification Process*".

Port Subrack Verification Process

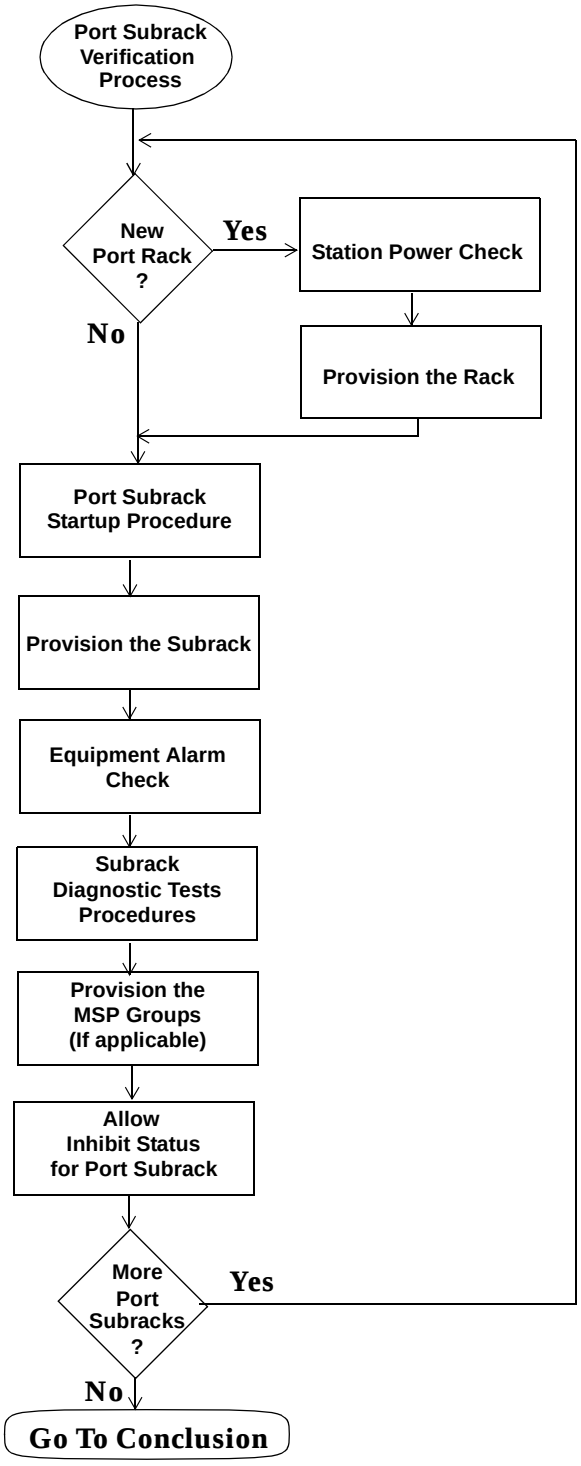
Verification Process

Description

This section will describe the required process for provisioning, starting-up, and verifying the different types of *WaveStar*™ DACS 4/4/1 Port Subracks (STM-0, STM-1, and STM-4/16). This process is a mandatory process after assembling the equipment for any *WaveStar*™ DACS 4/4/1 system configuration during initial system installation.

The Port Subrack Verification Process **must not** be performed until after the Core Complex verification process has been successfully completed.

Process Flow Chart



Procedure

Use the ❑ boxes to check off the steps as they are completed.

❑ *Step 1:* Open the front doors of the port rack assembly containing the selected port subrack, and remove the EMI Shield from the front of the subrack.

❑ *Step 2:* Perform **one** of the following procedural options below, based on the status of the rack assembly corresponding to the selected port subrack:

- If the selected port subrack is contained in an *existing* rack assembly, which is already provisioned/powered, then proceed directly to **Step 5**.
- If the selected port subrack is contained in a *new* rack assembly, which is not provisioned/powered, then proceed to the next step.

❑ *Step 3:* Verify station power to the *Power Distribution Panel* in the port rack assembly corresponding to the selected port subrack by performing the following procedure.

❑ Station Power Check - *{Refer to GTP 1}*

⚠ **CAUTION:**
*Do **not** perform this rack power check on existing racks containing **in-service** subracks, or a service interruption will occur!*

❑ *Step 4:* Provision the port rack assembly corresponding to the selected port subrack by performing the following procedure.

❑ Provisioning a Port Rack - *{Refer to GTP 18}*

❑ *Step 5:* Start-up the selected port subrack by performing the following procedure.

❑ Port Subrack Startup - *{Refer to GTP 19}*

❑ *Step 6:* Provision the selected port subrack by performing the following procedure.

❑ Provisioning a Port Subrack - *{Refer to GTP 20}*

❑ *Step 7:* Check for any equipment alarms present in the selected port subrack by performing the following procedure (No equipment alarms should be present).

❑ Equipment Alarm Check - *{Refer to GTP 21}*

❑ *Step 8:* Verify the selected port subrack hardware, by performing the following diagnostic test procedures.

NOTE:
Perform unit diagnostic test procedures for only *equipped units*. It is not necessary to relocate units to test unequipped slots.

Required Tests:

- ❑ Subrack LED Test - *{Refer to GTP 22}*
- ❑ Port Subrack Power Test - *{Refer to GTP 26}*
- ❑ Unit Diagnostic Test Setup - *{Refer to GTP 27}*
- ❑ SRC Unit Diagnostic Tests - *{Refer to GTP 29}*
  - ❑ SRC-1 Slot
- ❑ BSIU Unit Diagnostic Tests - *{Refer to GTP 33}*
  - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08 ❑ 09 ❑ 10
- ❑ DTU Unit Diagnostic Tests - *{Refer to GTP 34}*
  - ❑ DTU-1 Slot ❑ DTU-2 Slot
- ❑ Port Unit Diagnostic Tests (STM0, STM1, STM-4 or STM16):
  - — STM1 Unit Diagnostic Tests - *{Refer to GTP 35}*
    - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08 ❑ 09
    - ❑ 11 ❑ 12 ❑ 13 ❑ 14 ❑ 15 ❑ 16 ❑ 17 ❑ 18 ❑ 19
  - — STM0 Unit Diagnostic Tests - *{Refer to GTP 36}*
    - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08
    - ❑ 11 ❑ 12 ❑ 13 ❑ 14 ❑ 15 ❑ 16 ❑ 17 ❑ 18
  - — STM4 Unit Diagnostic Tests - *{Refer to GTP 37}*
    - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08
  - — STM16 Unit Diagnostic Tests - *{Refer to GTP 38}*
    - ❑ 01 ❑ 02 ❑ 03 ❑ 04 ❑ 05 ❑ 06 ❑ 07 ❑ 08
- ❑ Rack Top Alarms Test **(Front and Rear)** - *{Refer to GTP 40}*

Optional Tests (If Connected):

- ❑ End of Suite Alarms Test **(Front and Rear)** - *{Refer to GTP 41}*

❑ *Step 9:* If any odd/even pair of port interface units in the selected port subrack are to be provisioned for line protection operation (MSP), perform the following procedure to provision the MSP Groups.

- ❑ Provisioning the MSP Groups - *{Refer to GTP 46}*

❑ *Step 10:* Allow matrix protection switching for the selected port subrack by performing the following procedure.

NOTE:
The default state of the protection switching for the port subrack is "Inhibit" for no protection allowed for the port subrack.

- ❑ Provisioning Port Subrack Inhibit Status - *{Refer to GTP 47}*

❑ *Step 11:* Perform **one** of the following procedural options below:

- If other installed port subracks need to be provisioned and tested, return to the beginning of this procedure, and repeat for another port subrack.
- If all installed port subracks have been provisioned and tested, proceed to the chapter "*Conclusion*".

Conclusion

Completion Procedure

Description

This section will ensure that all system preparations that were previously made are returned back to their original states, and any external hardware that was previously removed are replaced onto the system. This procedure will also verify that the system is left with no additional alarms and a new system database will be created for emergency restoration.

Procedure

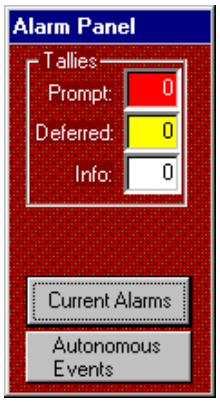
Use the ❑ boxes to check off the steps as they are completed.

❑ *Step 1:* Verify that the XC-CIT Workstation is currently logged into the *WaveStar*™ DACS 4/4/1 and the GUI Window is visable on the screen.

If **not**, connect and login to the system.
(*See GTP 11 - System Login Procedure*)

❑ *Step 2:* From the ***Alarm Panel Window***, verify there are **no** alarms.

If there are **no** alarms present on the system as indicated in output response below, then proceed directly to next step.



Otherwise, if there **are** alarms currently on the system, press the Current Alarms button in the ***Alarm Panel Window*** in order to obtain a list of all the alarms. Print the list of alarms, then try to troubleshoot all alarms. Do **not** leave the system with any unexplained alarms.

❑ *Step 3:* Create a database backup of the final system configuration onto a backup MO disk from the MC Subrack in the *WaveStar*™ DACS 4/4/1 System.

- Database Backup Procedure - *{Refer to GTP 12}*

❑ *Step 4:* Reinstall all subrack EMI shields and close the rack doors on all the remaining common equipment.

❑ *Step 5:* Copy and fill-out the completion form in the back of the Attachment Section, and retain for records.

❑ *Step 6:* This completes the "*Completion Procedure*".

STOP- This completes the System Installation Process!

Units, Modules, and MO Disks

A

Purpose

This appendix contains information about the *WaveStar*™ DACS 4/4/1 System unit/modules and the procedures for removing and installing them.

Unit is the term for the hardware that is inserted into the front of an equipment shelf (subrack), and generally provides the circuit functionality. It is also called a plug-in, circuit pack, or pack.

Module is the term for the hardware that is inserted into the rear of an equipment shelf (subrack), and generally provides connection point of interface to the various units or between units.

Unit/Module Precautions

When handling units/modules, keep the following precautions in mind:

- Before handling a unit/module, make sure you are at the same electrical potential as the frame by attaching a wrist strap from you to the frame.
- Never hand a unit/module to a person who is not at the same electrical potential as the frame.
- Keep units/modules away from possible sources of static electricity, such as clothing and common plastics.
- Handle units/modules only one at a time, and solely by the faceplate, latch, or by the top and bottom edges.
- Never touch the leads, connectors, pins or components of units/modules.
- Never attach gummed labels or transparent tape to units/modules.
- Observe warning labels on bags and cartons.

Unit/Module Codes

Table 1-1 provides a list of unit names and the codes for Release 2.1.

Table 1-1. Unit Codes & Usable Series (as of August 2000)

Subrack	Unit	Code	Comcode	Usable Series
Motorola Controller	MPU	MVME 2700 761 I/O	408420313	1
	MSU	VME DRIVE MOD	408151421 or 408346724	1:1
	ARU TM	SMM 712-129	408091668	1:1
	SERIAL TM	XR 712-121	408091650	1:1
	NIC TM	XR2X 100BTTM	408091643	1:1
	LHU TM	VMA1	108371535	
	SCSI TM	MVME 712-104	408091676	1:1
	SCSI-Term	P417K	408091718	
	PSP		408091742	
Matrix/Sync	SRC	LAH49	107893240	1:2, 1:3, 1:4
		LAH50[a]	108440157	1:1, 1:2
	STU	LAH102	108004706	1:2, 1:3, 1:4
		LAH105[a]	108440108	1:1
		LAH105B[a]	108630591	1:1
	STU-64	LAH103	108268426	1:2, 1:3, 1:4
		LAH106[a]	108440116	1:1
	BSC	LAH101	107893265	1:1, 1:2, 1:3
	BSC-512	LAH101B	108387531	1:2,1:3
		LAH107[a]	108440124	1:1
	OLU	IMO4	108001785	1:1, 1:2
	BSSU	LAC4	108539065	5:5 thru 5:15
	BSSU 512	LAC5	108507328	1:1
	PTM	IME2	107940082	1:2, 1:3
SUP	ACP	IME3	108361494	1:3, 1:4

Table 1-1. Unit Codes & Usable Series (as of August 2000)

Subrack	Unit	Code	Comcode	Usable Series
PSA or PSB	SRC	LAH49	107893240	1:2, 1:3, 1:4
		LAH50[a]	108440157	1:1, 1:2
	DTU	LAH100	107893257	1:3, 1:4, 1:5, 1:6, 1:7
		LAH104[a]	108440090	1:1
	STM0 PU	LAH200	107893273	1:4, 1:5, 1:6
		LAH202[a]	108440132	1:1
	STM1 PU	LAH201	107893281	1:4, 1:5, 1:6
		LAH203[a]	108440140	1:1
	BSIU	IMO3	107899437	1:3, 1:4, 1:5, 1:6, 1:7, 1:8, 1:9
	STM0 OIM	IMO2	107899429	1:2
		IMO8[a]	108349499	1:2
	STM1 EIM	IME1	107899403	1:4, 1:5, 1:6
	STM1 OIM-NTT	IMO1	107899411	1:1
		IMO6[a]	108349473	1:1
	STM1 OIM-ITU	IMO5	108168212	1:1
		IMO7[a]	108349481	1:1
	PTM	IME2	107940082	1:2, 1:3
PSC	SRC	LAH50[a]	108440157	1:1, 1:2
	DTU	LAH108	108568106	1:1
	BSIU-128	LAL65	108505264	1:1
	STM-4 PU	LAC6	108504846	1:1
	STM-16 PU	LAC8	108504861	1:1
	PTM	IME2B	108727884	1:2, 1:3

a. Requires Software Release 1.0.2 or higher

Unit Insertion/Removal Procedures

Removing a Unit

Description

Perform the following procedures only when you are required to replace a defective unit, or anytime a unit needs to be disengaged from the subrack slot.You can easily damage units by improperly removing them. Read the entire procedure before removing the unit.

NOTE:
For removing VME units from the Motorola Controller Subrack, see supplied manual from Motorola.

CAUTION:
Never remove more than one unit at a time. This can cause damage to each unit and/or the backplane.

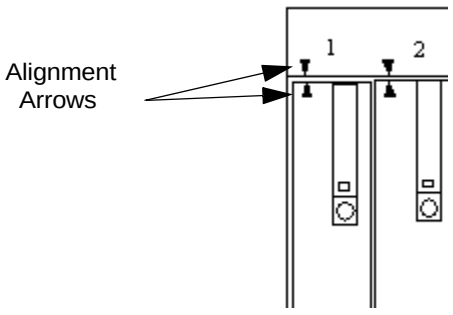
Procedure

❑ *Step 1:* Before handling the unit, make sure you are at the same electrical potential as the frame by attaching an approved ESD wrist strap from you to the ESD jack located on the subrack.

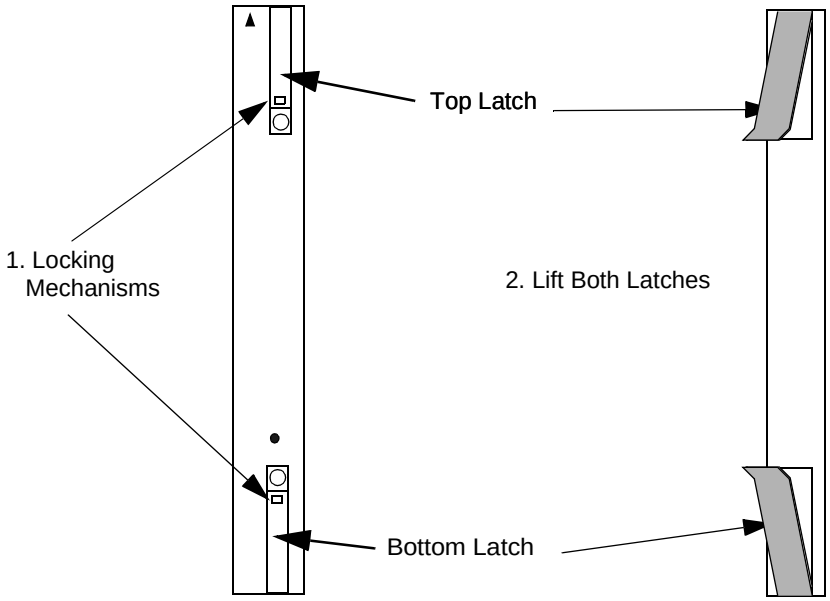
❑ *Step 2:* If this unit has cables (or fibers) attached on the front of the unit faceplate, remove the cables (or fibers) from the unit.

❑ *Step 3:* Position the unit so that the trianglular shaped orientation marks (arrow heads) provided on both the subrack and the units are touching for proper alignment.

NOTE:
Because of the architecture of the *WaveStar*™ DACS 4/4/1 System, it is necessary to rotate the circuit packs 180 degrees before inserting into the upper shelf.

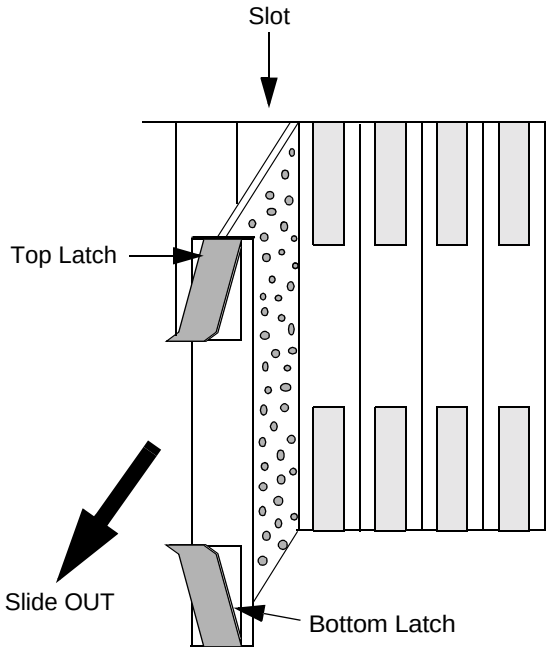


❑ *Step 4:* *Simultaneously*, unlock the latch locking mechanisms and open the **top** and **bottom** faceplate latches until the unit becomes disengaged from the backplane connector.



Front View

❑ *Step 5:* While grasping **both** of the faceplate latches, pull evenly to slide the unit out of the subrack slot



❑ *Step 6:* This completes the units removal from the subrack slot.

Installing a Unit

Description

The following procedure describes how to correctly install a unit into the front of any subrack slot.

NOTE:
For installing VME units from the Motorola Controller Subrack, see supplied manual from Motorola.

NOTE:
Units can only be installed in correctly designated slots, since each subrack slot type has different keying pins.These keying pins are used to prevent the installation of an improper unit into the wrong slot.

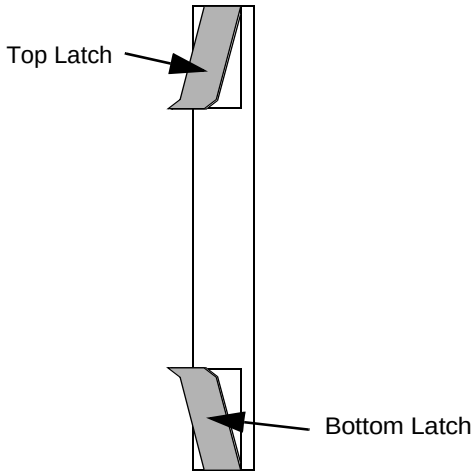
CAUTION:
Never install more than one unit at a time. This can cause damage to each unit and/or the backplane.

Procedure

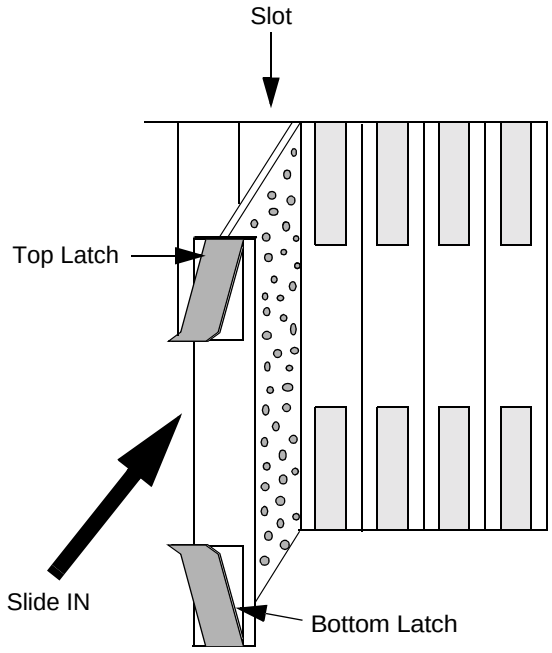
❑ *Step 1:* Before handling the unit, make sure you are at the same electrical potential as the frame by attaching an approved ESD wrist strap from you to the ESD jack located on the subrack.

❑ *Step 2:* Unpack the unit from the shipping material and remove any connector protectors.

❑ *Step 3:* Open the latches at the **top** and **bottom** of the unit.



❑ *Step 4:* While holding the latches **open**, with one continuous even motion, slide the unit into the desired subrack slot until it engages the backplane connector or meets increased resistance.



❑ *Step 5:* Push evenly on the center of the faceplate of the unit, and the unit should seat itself by moving forward flush with the front of the subrack or adjacent units.

CAUTION:
If the unit offers excessive resistance to this action, remove the unit and check for bent or broken contacts. If damage is detected, do not try to use that unit. If no damage is found, make sure you are inserting the unit in the correct slot, and try again to insert the unit.

❑ *Step 6:* Fully close the **top** and **bottom** faceplate latches until they enage the locking mechanism.

❑ *Step 7:* This completes the units installation into the subrack slot.

Module Insertion/Removal Procedures

Removing a Module

Description

Perform the following procedures only when you are required to replace a defective module, or anytime a module needs to be disengaged from the rear of any subrack slot.You can easily damage modules by improperly removing them. Read the entire procedure before removing the unit.

NOTE:
For removing TM modules from the Motorola Controller Subrack, see supplied manual from Motorola.

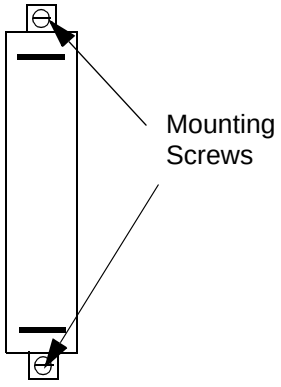
CAUTION:
Never remove more than one module at a time. This can cause damage to each module and/or the backplane.

Procedure

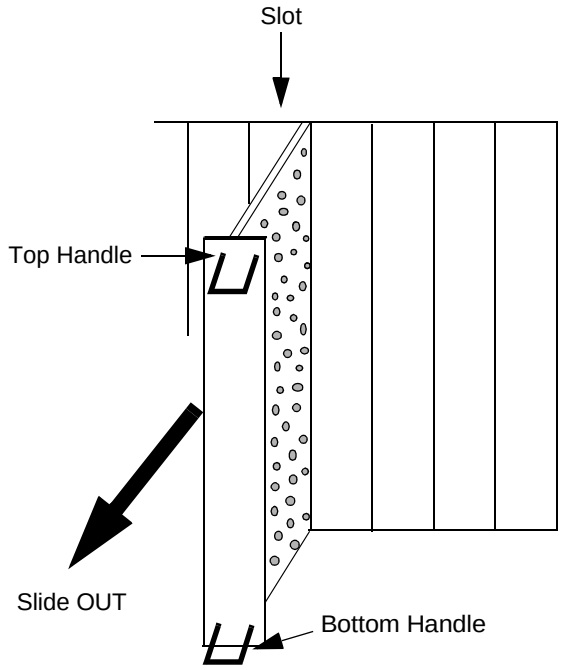
❑ *Step 1:* Before handling the unit, make sure you are at the same electrical potential as the frame by attaching an approved ESD wrist strap from you to the ESD jack located on the subrack.

❑ *Step 2:* If this module has cables (or fibers) attached on the front of the module faceplate, remove the cables (or fibers) from the module.

❑ *Step 3:* *Unscrew* the **top** and **bottom** mounting screws for the module.



❑ *Step 4:* While grasping both the **top** and **bottom** module handles, pull *evenly* to slide the module out of the subrack slot.



❑ *Step 5:* This completes the module removal from the subrack slot.

Installing a Module

Description

The following procedure describes how to correctly install a module into the rear of any subrack slot.

NOTE:
For installing TM modules from the Motorola Controller Subrack, see supplied manual from Motorola.

NOTE:
Units can only be installed in correctly designated slots, since each sub-rack slot type has different keying pins.These keying pins are used to prevent the installation of an improper unit into the wrong slot.

CAUTION:
Never install more than one module at a time. This can cause damage to each module and/or the backplane.

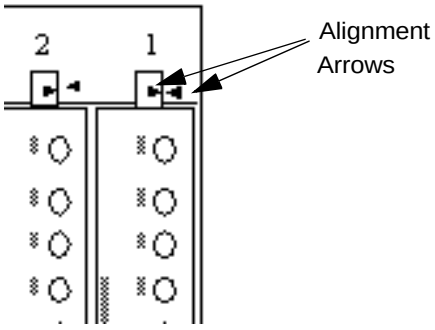
Procedure

❑ *Step 1:* Before handling the unit, make sure you are at the same electrical potential as the frame by attaching an approved ESD wrist strap from you to the ESD jack located on the subrack.

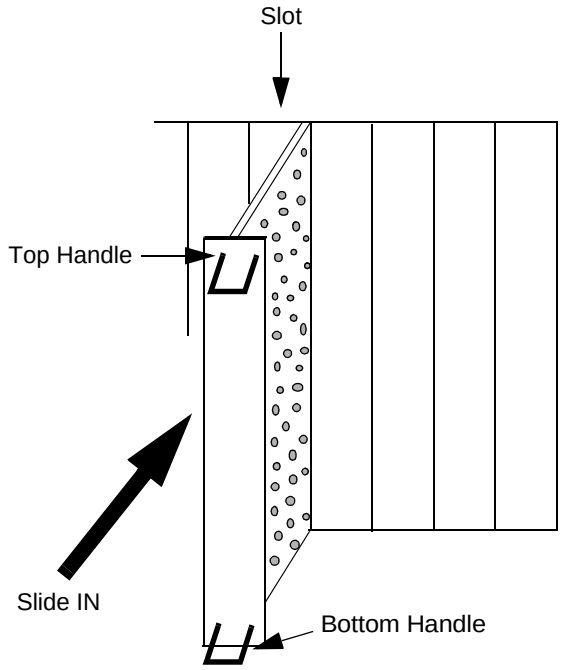
❑ *Step 2:* Unpack the module from the shipping material and remove any connector protectors.

❑ *Step 3:* Position the module so that the trianglular shaped orientation marks (arrow heads) provided on both the subrack and the modules are touching for proper alignment.

NOTE:
Because of the architecture of the *WaveStar*™ DACS 4/4/1 System, it is necessary to rotate the modules 180 degrees before inserting into the upper shelf.



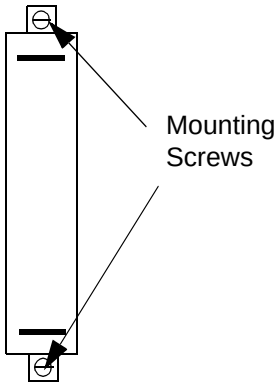
❑ *Step 4:* While holding the **top** and **bottom** handles, with one continuous even motion, slide the module into the desired subrack slot until it engages the backplane connector or meets increased resistance.



❑ *Step 5:* Push in *evenly* on the **top** and **bottom** module handles, and the module should seat itself by moving forward flush with the rear of the subrack or adjacent modules.

CAUTION:
If the module offers excessive resistance to this action, remove the module and check for bent or broken contacts. If damage is detected, do not try to use that module again. If no damage is found, make sure you are inserting the module in the correct slot, and try again to insert the module.

❑ *Step 6:* Secure the modules to the subrack, by screwing down the attached **top** and **bottom** mounting screws.



❑ *Step 7:* This completes the module installation into the subrack slot.

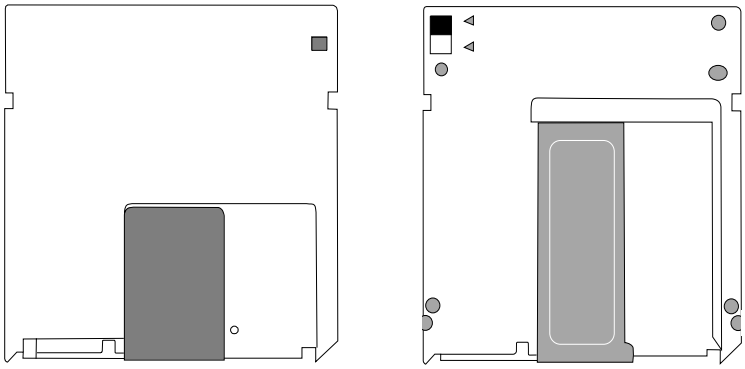
MO Insertion/Removal Procedures

MO disks are used for:

- Backing up memory
- Loading software onto the *WaveStar*™ DACS 4/4/1 System.

These disks have:

- A direction arrow on the top to assist in insertion
- A write protect slide on the bottom to protect recorded data. The write protection slide is activated from the back side of the MO disk.



Front *Back*

CAUTION:
Store MO disks in a dust free, low humidity environment away from excessive heat, cold, and magnetism. Do not touch or allow external objects to touch exposed surfaces.

Inserting an MO Disk

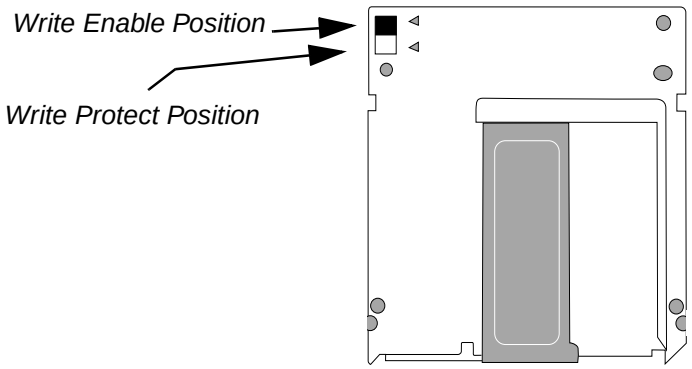
Description

The following steps explain the procedure for inserting an MO disk into the MO disk drive located near the bottom of the MSU unit:

Procedure

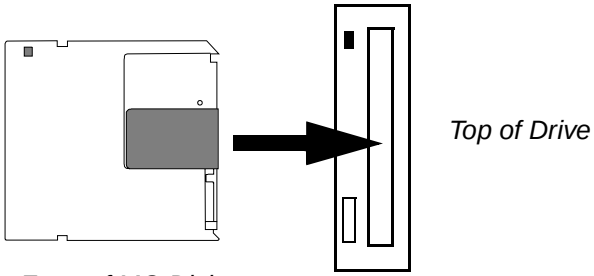
❑ *Step 1:* Make sure the write protect slide of your disk is in the proper position for the operation you wish to perform:

- Write enabled (labelled non-protected or recordable on the disk) — if you are going to write to or format this disk
- Write protected (labelled protected or non-recordable on the disk) — if you are only going to read from this disk.



Back of MO Disk

❑ *Step 2:* Position the disk so that the front of the disk faces the top side of the drive and then insert the diskall the way into the drive until it clicks into place..



Front of MO Disk

Front of MO Drive

❑ *Step 3:* This completes the MO Insertion procedure.

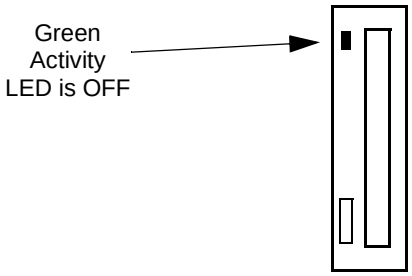
Removing an MO Disk

Description

The following steps explain the procedure for removing an MO disk from the MO disk drive located near the bottom of the MSU unit:

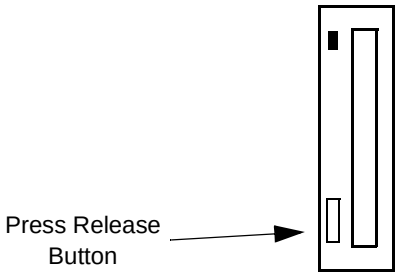
Procedure

❑ *Step 1:* Make certain the drive is not active (the drive's activity LED should be off).



Front of MO Drive

❑ *Step 2:* Press the disk release button on the front of the drive and wait until the disk releases from the drive.



Front of MO Drive

NOTE:
If the rack has lost power, use the Optical Disk Ejection tool to remove the MO disk, by inserting into small hole in the front of the drive unit.

❑ *Step 3:* Remove the MO disk from the drive at this time.

❑ *Step 4:* This completes the MO Removal procedure.

Laser Safety Guidelines

B

Purpose

This appendix contains the suggested laser safety guidelines.

General Laser Information

Lightwave/lightguide systems, their associated test sets, and similar operating systems use semiconductor laser transmitters that emit light at wavelengths between approximately 800 nanometers and 1600 nanometers. The emitted light is above the red end of the visible spectrum, which is normally not visible to the human eye. Although radiant energy at near-infrared wavelengths is officially designated invisible, some people can see the shorter wavelength energy even at several power levels below any that have been shown to cause injury to the eye.

Conventional lasers can produce an intense beam of monochromatic light. The term monochromaticity means a single wavelength output of pure colour that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small the power density (also called irradiance) is very high. Consequently, lasers and laser products are subject to international standards for their safe operation.

A conventional laser beam expands very little over distance and conventional laser irradiance remains relatively constant over distance. However, lasers used in lightwave systems have a large beam divergence, typically 10 to 20 degrees. Here, irradiance obeys the inverse square law (doubling the distance reduces the irradiance by a factor of 4) and rapidly decreases over distance.

Lasers and Eye Damage

Light energy emitted by laser and high-radiance LEDs in the 400-1400 nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye magnifies the irradiance. The irradiance of the energy that reaches the retina is approximately 10^5 or 100,000 times that at the cornea and, if sufficiently intense, may cause a burn on the retina.

The wavelengths used in telecommunications cause eye damage from heat. The heat damage is not instantaneous. It occurs only when one looks at the light long enough to cause damage. Light energies above 1400 nm cause surface and skin burns without affecting the retina.

Classification of Lasers

Manufacturers classify each laser or laser product as belonging to one of four major classes: I, II, IIa, IIIb, or IV. Lasers are classified according to the emission limits and the potential for causing injury. The *WaveStar*™ DACS 4/4/1 system is classified as class I because the *WaveStar*™ DACS 4/4/1 is designed with optical fibres that enclose the laser with protective housing. Covers are also in place over the unit shelves.

According to IEC Publication 825, for lasers of the class I type, no laser shutdown facilities are required. *WaveStar*™ DACS 4/4/1 Port Interface subracks that house optical interfaces with class I lasers have a warning label located on the unit.

Lightwave Safety Precautions

In its normal operating mode, a lightwave system is totally enclosed and presents no risk of eye injury. This makes it a class I system.

The lightguide cables that interconnect various components of a lightwave system can disconnect or break and may expose people to lightwave emission. Also, certain measures and maintenance procedures may expose the technician to emission from the semiconductor laser during installation and servicing. Unlike more familiar laser devices, such as solid-state and gas lasers, the emission pattern of a semiconductor laser results in a highly divergent beam. In a divergent beam, the irradiance (power density) decreases rapidly with distance. The greater the distance, the less energy will enter the eye, and the less potential risk for eye injury.

Inadvertently viewing a broken or damaged fibre with the unaided eye at distances greater than 5 to 6 inches normally will not cause eye injury provided the power in the fibre is less than a few MW at the shorter wavelengths and higher at the longer wavelengths. However, damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fibre end.

⚠ CAUTION:
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Precautions for Enclosed Systems

Manufacturers

Since viewing lightwave emission directly with an optical instrument such as an eye loupe greatly increases the risk of eye damage, manufacturers must place an appropriate label in plain view on the front of the main frame or lightguide termination/interconnection equipment. The label shall read as follows:

NOTE:
Broken optical connectors may emit laser radiation. Avoid direct exposure to the beam. Do not view this beam with optical instruments.

Technicians

Under normal operating conditions, lightwave transmission systems are completely enclosed. Nevertheless, technicians must observe the following precautions:

- Do **not** disconnect any lightwave cable or splice and stare into the optical connectors terminating the cables.
- Complete an approved training course before performing lightwave/ lightguide operations.

Precautions for Unenclosed Systems

During service, maintenance, or restoration; a lightwave transmission system is considered unenclosed. Under these conditions, follow these practices:

- Only authorized, trained personnel are permitted to do service maintenance, and restoration. Avoid exposing the eye to emissions from broken, energized optical connectors at close distances. Connectors associated with lightwave regenerators are recessed, which limits the exposure distance. However, technicians removing or replacing regenerators should not stare or look directly into the vacant regenerator slot with optical instruments or magnifying lenses. (Normal eye wear or indirect viewing instruments such as Find-R-Scope are not considered magnifying lenses or optical instruments.)
- Only authorized, trained personnel shall use the lightwave test equipment during installation or servicing since this equipment contains semiconductor lasers. (Some examples of lightguide test equipment are OTDRs, Hand-Held Test Sets, and Feature Finders.)
- Under no circumstances shall any personnel scan a fibre with an optical test set without verifying that all lightwave sources on the fibre are off.
- All unauthorized personnel shall be excluded from the immediate area of lightwave transmission systems during installation and service.

Attachments

List of Attachments

The following attachments contains the following forms:

- Completion Form

Completion Form

Lucent Technologies
Bell Labs Innovations

Document Title: *WaveStar*™ DACS 4/4/1, Release 2.1 Installation Testing Manual

Identification No.: 365-367-405 **Issue No.:** Issue 1.0 **Date:** November 2000

Location Information

This procedure was completed:

Start Date: _____ **Completion Date:** _____

Station Location: _____

Country: _____

Participants

	Names (Printed)	Company
1.		
2.		
3.		
4.		
5.		
6.		

Customer Acceptance Signature

Please read and sign the statement below:

I have witnessed and/or accepted the successful installation of all equipped equipment in the WaveStar™ *DACS 4/4/1 System.*

_____ _____

Customer Signature *Date*

Note: This Completion Form is to be retained by the Lucent Technologies Representative as a record of successfully completion of this implementation procedure.