



North Star DIMENSION™ Service Manual





NOTICE

North Star Computers, Inc. makes no representations or warranties with respect to this manual. Further, North Star Computers, Inc. reserves the right to make changes in the specifications of the product described in this manual at any time without notice and without obligation of North Star Computers, Inc. to notify any person of such revision or changes. All technical information, statements and recommendations in this document and in any manuals or related documents are believed to be reliable, but the accuracy or completeness thereof is not guaranteed.

DISCLAIMER OF WARRANTY

North Star Computers, Inc. makes no representations or warranties, either expressed or implied, by or with respect to hardware, software, or anything in this manual, and shall not be liable for any implied warranties of merchantability or fitness for a particular purpose or for any indirect, special or consequential damages. Some states do not allow the exclusion of incidental or consequential damages, so this exclusion may not apply to you.

COPYRIGHT NOTICE

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, mechanical, photocopying, recording or otherwise, without the prior written consent of North Star Computers, Inc. No patent liability is assumed with respect to the use of the information contained herein. While every precaution has been taken in the preparation of this manual, North Star Computers, Inc. assumes no responsibility for errors or omissions. Furthermore, this publication and features described herein, are subject to change without notice.

TRADEMARKS

- ☆ North Star DIMENSION is a trademark of North Star Computers, Inc.
- ☆ North Star NetWare is a trademark of North Star Computers, Inc.
- ☆ NetWare is a trademark of Novell Inc.
- ☆ MS-DOS is a trademark of Microsoft Corporation.
- ☆ IBM, IBM PC, and IBM XT are registered trademarks of International Business Machines
- ☆ 80186, 8254, 2732A, 2764, 8274, 8255A-5 and 8259A are registered trademarks of Intel Corporation
- ☆ SCN2682 is a trademark of Signetics Corporation
- ☆ uPD765A is a trademark of NEC Electronics USA Incorporated
- ☆ WD1010-00/01 is a trademark of Western Digital Corporation
- ☆ MC6845 and MC146818 are trademarks of Motorola Semiconductor Products

Copyright 1985 by North Star Computers, Inc.
All rights reserved.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: This equipment has been certified to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripheral devices (computer devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripheral devices may result in interference to radio and television reception.

Instructions To Users: This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions and reference manuals, may cause interference to radio and television reception.

If this equipment does cause interference to radio or television reception, the user is encouraged to try to correct the problem by employing one or more of the following measures:

- ☆ Reorient the receiving antenna.
- ☆ Relocate the equipment with respect to the receiver.
- ☆ Move the equipment away from the receiver.
- ☆ Plug the equipment into a different electrical outlet so that the equipment and receiver are on different branch circuits.
- ☆ Ensure that workstation circuit board mounting screws, peripheral device attachment screws, and ground wires are properly fastened.
- ☆ Ensure that workstation circuit board sheet-metal covers are in place when no workstation circuit boards are installed.

If necessary, consult your dealer for additional suggestions.

North Star Computers, Inc. is not responsible for radio or television interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

Caution: This equipment is equipped with a UL listed and CSA certified plug. It is to be used in conjunction with a properly grounded, 115VAC receptacle to avoid electrical shock.

The North Star DIMENSION is a versatile, fast, and reliable computer system that incorporates contemporary system design, imaginative use of electronic circuitry and components, and rigid manufacturing quality control. This service manual attempts to follow in these traditions.

A service manual that attempts to be all things to all people is asking for trouble. There are computer users who simply want to install their own systems; technicians who have only the responsibility of maintaining the equipment; engineers who need to understand the host-system in order to design hardware peripherals; and programmers who may wish to create alternative operating systems or application packages. This manual is not written for all of you.

If you are a system owner/user who wants to install your own equipment, we recommend reading the DIMENSION System Manual. It contains abbreviated hardware and operating system installation instructions that are tailored especially for you.

If you are a technician who needs a manual to help speed your troubleshooting, diagnosis, and repair of problems, this manual is for you. The manual is specifically designed for the field technician who must get in, fix the problem, and leave quickly. The manual contains no theories of operation, specifications, extensive parts lists or schematics. It does contain diagnostic charts, troubleshooting steps, and removal/replacement/adjustment procedures. The DIMENSION Service Manual is the field-accompaniment to the DIMENSION Technical Manual.

If you are an engineer who needs to know anything and everything about DIMENSION hardware, we recommend that you refer to the DIMENSION Technical Manual. It contains specifications, theories of operation, schematic diagrams, timing diagrams, and parts lists related to the system and each of its components.

If you are a programmer, and your task is to create alternative operating systems or application programs for our computer, we recommend reading the DIMENSION Programmer's Notebook. This manual contains only the very specialized information required by a programmer.

If you are still in doubt about the appropriateness of this manual to your area of interest, refer to the following paragraphs for a more in-depth discussion of the contents of the North Star DIMENSION Service Manual.

Chapter 1 - Hardware Installation discusses procedures used for installing all system hardware. This includes installation procedures for the central module and workstations as well as procedures and requirements for attaching shared and local printers, modems and local mouse devices.

Chapter 2 - Troubleshooting discusses the processes used for locating faults within the DIMENSION system. The chapter is comprised of in-depth discussions about the auto-boot diagnostic aid and power supply and central board troubleshooting procedures. An expanded troubleshooting chart that covers both hardware and software symptoms is also included.

Chapter 3 - Diagnostics discusses the four diagnostic aids that are provided with the DIMENSION system. These include:

- ☆ Self tests that checks critical central module hardware
- ☆ Service Diskette #1 that provides a further test of central module hardware
- ☆ Service Diskette #2 that tests and formats the diskette and fixed disk drives
- ☆ Service Diskette #3 that tests and evaluates the tape drive system

Chapter 4 - Subassembly Removal provides procedures used for removing all system hardware. The chapter is a shorthand device that explains in a concise manner all the steps necessary to remove any major subassembly from the central module.

Appendix A - Parts Lists contains parts lists for system subassemblies.

Appendix B - I/O Ports contains information about the four DIMENSION I/O ports.

INTRODUCTION TO THE DIMENSION SERVICE MANUAL	v
CHAPTER 1 - HARDWARE INSTALLATION	
Physical Location of the System Modules	1-2
Central Module Installation and Configuration	1-5
Opening the Central Module	1-7
Central Board Expansion RAM Installation	1-8
Workstation Board Expansion RAM Installation	1-10
8087 Board Installation	1-12
Workstation Board Installation	1-15
OMNINET Board Installation	1-17
Tape Drive and Tape Drive Interface Board Installation	1-19
Second Fixed Disk Drive Installation	1-25
Checking the Power Supply	1-31
Checking the Selectable Power Line Receptacle	1-33
Central Module Final Setup	1-37
Workstation Installation	1-39
Workstation Installation	1-40
Tilt and Swivel Installation	1-43
Shared Printer Installation	1-45
Shared Parallel Printer Installation	1-47
Shared Serial Printer Installation	1-48
Local Printer Installation	1-49
Local Modem Installation	1-53
Local Mouse Installation	1-56
CHAPTER 2 - TROUBLESHOOTING	
Auto-Boot Diagnostics	2-2
Preliminary Troubleshooting (Boot Sequence)	2-2
DIMENSION Service Manual	vii

TABLE OF CONTENTS (cont.)

System Troubleshooting	2-6
Boot Problems	2-7
Hang Problems	2-19
Printer Problems	2-22
Printer Problems in MAINT	2-28
Application Installation Problems	2-30
Asynchronous Communications Problems	2-33
TPA (Workstation Memory) Problems	2-35
dBase II Problems	2-37
Miscellaneous Application Problems	2-39
Fixed Disk Problems	2-42
Monitor Problems	2-47
Keyboard Problems	2-49
Miscellaneous Problems	2-51
Tape Drive Problems	2-55
Testing the Central Module Power Supply	2-57
Power Supply Troubleshooting Chart	2-59
Testing the Central Board	2-63

CHAPTER 3 - DIAGNOSTICS

Supplemental Tools	3-2
Self-tests	3-3
Service Diskettes	3-5
Loading Service Diskettes	3-6
Service Diskette #1	3-7
Test Options	3-10
Test Data Pointer Screen	3-13
Central Board Test Analysis Screen	3-14
Workstation Board Test Failure Screen	3-15
Communications Port Testing	3-16

Service Diskette #2	3-17
Test Options	3-18
Diskette Drive Test	3-23
Fixed Disk Format and Label Writer	3-25
Test Fixed Disk Drives	3-26
Park Fixed Disk Drive Heads	3-28
Using Fixed Disk Drive Extension Cables	3-29
Error Screens and Codes	3-31
Error Code Matrix	3-39
Service Diskette #3	3-45
Loading Service Diskette #3	3-46
Tape Diagnostic Main Menu	3-48
Test Options	3-49
Technician Menu	3-52
Test Options	3-53
Interpreting Drive Status Bytes	3-58
Error Message Interpretation	3-59

CHAPTER 4 - SUBASSEMBLY REMOVAL

Workstation Board	4-3
8087 Board	4-4
OMNINET Board	4-5
Tape Drive Interface Board	4-6
Workstation 128K/384K Expansion RAM Board	4-7
Power Supply	4-8
Central Board Expansion RAM	4-10
Bus Board	4-11
Central Board	4-12
Diskette Drive	4-14
Fixed Disk Drive	4-16
Tape Drive	4-17
Installing a New Central Board	4-19
Installing a New Bus Board	4-21

TABLE OF CONTENTS (cont.)

APPENDIX A - PARTS LISTS

Central Module	A-2
Miscellaneous Parts	A-2
Circuit Boards	A-4
Harnesses and Cables	A-5
Workstation	A-6
Miscellaneous Workstation Parts	A-6

APPENDIX B - I/O PORTS

Serial Ports S1 and S2	B-2
Serial Port Pinouts	B-3
Parallel Port P1	B-5
Parallel Port Pinouts	B-6
Workstation Interconnect Box Serial Port	B-8
Serial Port Pinouts	B-8

HARDWARE INSTALLATION

Overview

This chapter explains how to install DIMENSION computer system hardware including the central module, its workstations and peripheral devices such as printers.

DIMENSION computer systems may vary significantly in complexity. A simple system might contain two workstations and a shared printer; a complex system might contain as many as twelve workstations with shared and local printers and modems, and local mouse devices. Simple and complex systems use the installation procedures found on the following pages.

Because of the number of power cords and cables used to connect the components of the system, you should position the equipment before attaching cords and cables. Begin the installation by sketching your office area and determining where you plan to locate the central module, workstations and peripheral equipment. Then unpack and move the components to the locations suggested by your sketch. After you've finished positioning the equipment, begin using the installation procedures to connect the components.

You'll need a small slotted screwdriver and a medium Phillips screwdriver to complete the installation procedures.

SYSTEM HARDWARE INSTALLATION

Physical Location of the System Modules

General Requirements

Before you begin positioning the components of your computer system, consider the following requirements:

- o The central module and the video displays receive their power from standard 115VAC (U.S.) or 230VAC (international) three-conductor, grounded power outlets.

The central module and any peripheral devices attached to the central module must share power outlets that are part of a commonly fused and grounded electric circuit.

- o The length of the central module and video display power cables is fixed, so placement of these components is determined by power cable length and power outlet location. You may be able to install three-conductor, grounded extension cords if they are rated for at least 10 amps (115VAC) or 5 amps (230VAC).
- o A standard workstation cable is 25 feet long; 100-foot extensions are also available. Three 100-foot extensions may be used in conjunction with a standard 25-foot cable to create a maximum central module-to-workstation cable length of 325 feet.

When you are determining workstation cable lengths, take into account that cable placement should not stress cable connectors.

**General
Requirements**
(cont.)

- o Consider local fire, electrical and building codes as you are setting up your computer system. For example:
 - Don't allow cables to cross aisles--they may pose a safety hazard and might be accidentally disconnected.
 - Don't cover power cables with carpeting--this may create a fire hazard.
 - Don't use extension cords unless you are familiar with local electrical codes governing their use in office environments.

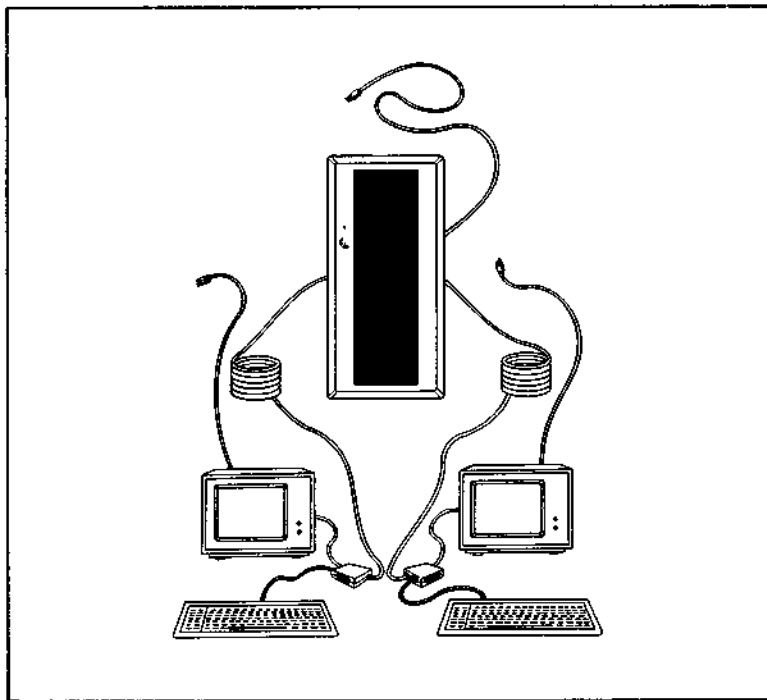
Make sure you follow local codes. Speak with someone knowledgeable (a building electrician or contractor) before you begin connecting the equipment.

SYSTEM HARDWARE INSTALLATION

Physical Location of the System Modules (cont.)

Cabling Diagram

The diagram on this page illustrates typical connections within a simple DIMENSION computer system. Note the lengths of the cables and cords and how the various components fit together.



**Cable and
Cord Lengths**

The following list of cord and cable lengths details physical constraints you should consider when locating the system components.

- o Central module power cord = 8 feet
- o Video display power cords = 6 feet
- o Keyboard cable (extended) = 6 feet
- o Workstation cable = 25 feet
- o Workstation extension cable = 100 feet

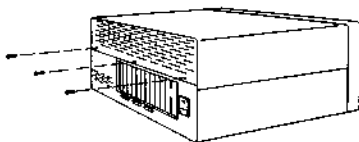
Procedure
Summary

After you have positioned the system components, the next step in the hardware installation procedure is to install and configure the central module. The procedures on the following pages describe how to:

- o Place the central module on its side and remove the cover.
- o Install the workstation circuit boards.
- o Set the thumbwheel switches of the workstation circuit boards.
- o Connect the workstation cables to the workstation circuit boards.
- o Install the workstation expansion RAM circuit boards. (Optional)
- o Install the central module expansion RAM circuit boards. (Optional)
- o Replace the cover.
- o Check the selectable power line receptacle for correct orientation of the voltage selection cam and proper fuse.
- o Install rubber feet to protect the base of the central module.
- o Return the central module to an upright position.
- o Install the power cord.

Procedure: Central Module Installation and Configuration

1. Place the central module on its side, unfasten the three screws which hold the cover in place and remove the cover.



2. If you have to install one or more expansion RAM circuit boards on the central board, proceed to step #3. If you have to install one or more expansion RAM circuit boards on workstation circuit boards, proceed to step #7. If you do not have to install expansion RAM circuit boards, proceed to step #10.
3. If you haven't already done so, unpack and examine the expansion RAM circuit board and the two plastic standoffs used with the central board. Compare these parts with the pictures in steps #4 and #5. Notice how the two circuit boards are connected.

An expansion RAM circuit board is fastened to the central board in three places:

- o by an edge connector which electrically mates the two circuit boards, and
 - o by the two plastic standoffs which physically fasten the expansion RAM circuit board to the central board.
-

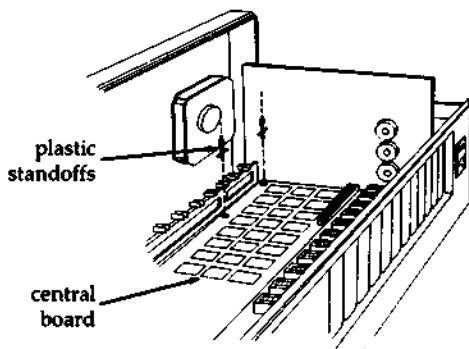
---->

SYSTEM HARDWARE INSTALLATION

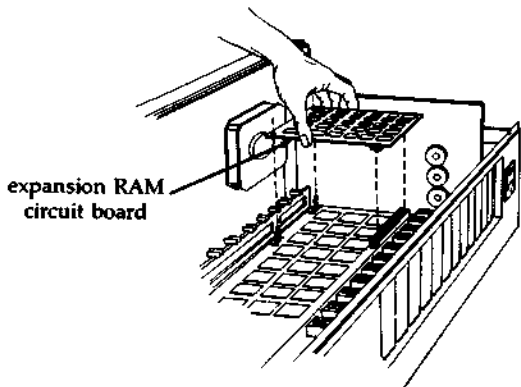
Central Module (cont.)

Procedure: Central Module Installation and Configuration

4. Mount the two plastic standoffs by pressing them in the appropriate holes in the central board.



5. Position the expansion RAM circuit board over the two plastic standoffs and the central board connector. Press the expansion RAM circuit board in place.



6. If you have to install workstation expansion RAM circuit boards, proceed to step #7; otherwise, proceed to step #10.
-

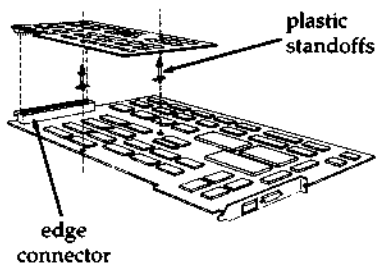
----->

Procedure: Central Module Installation and Configuration

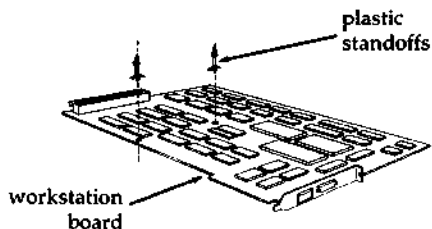
7. If you haven't already done so, unpack and examine the workstation expansion RAM circuit boards, the two plastic standoffs used with each, and all workstation circuit boards.

An expansion RAM circuit board is fastened to the workstation board in three places:

- o By an edge connector which electrically mates the two circuit boards, and
- o By the two plastic standoffs which physically fasten the expansion RAM circuit board to the workstation board.

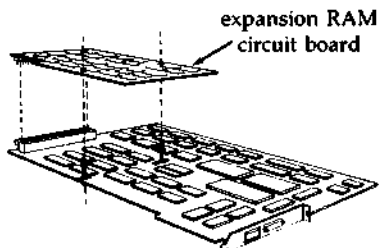


8. Mount the two plastic standoffs by pressing them in the appropriate holes in the workstation board.



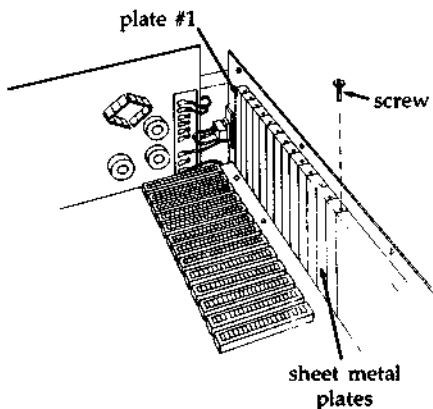
Procedure: Central Module Installation and Configuration

9. Position the expansion RAM circuit board over the two plastic standoffs and workstation board connector. Press the expansion RAM circuit board in place. Repeat steps #7 through #9 for each expansion RAM circuit board.



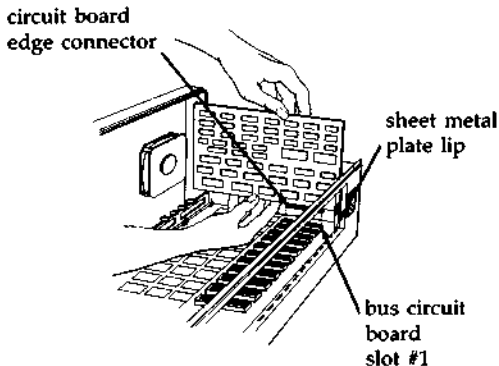
10. There are thirteen numbered, sheet-metal plates attached to the rear panel of the central module. The upper edges of the plates are fastened with a screw.

Count the number of workstations you plan to install, and, beginning with plate #1, consecutively remove as many of the plates as you have workstation circuit boards to install.



Procedure: Central Module Installation and Configuration

11. Beginning at position #1, install the workstation circuit boards in consecutive slots. Seat the circuit board edge connectors and mounted sheet-metal plates in the slots of the bus circuit board and central module rear panel.

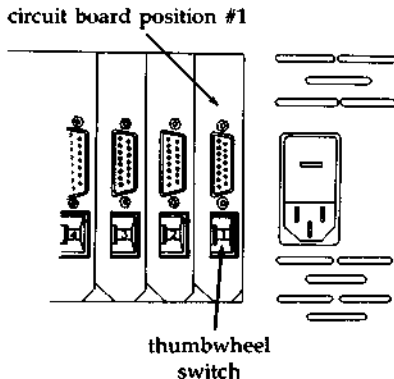


Note: Be careful not to bend the sheet-metal plates when inserting them in the central module rear panel slots.

12. Fasten the workstation circuit boards in place using the screws you removed in step #10.

13. Notice that there is a thumbwheel switch on the rear edge of each workstation circuit board.

Rotate each thumbwheel switch to a consecutive number, beginning with #1 in circuit board position #1.



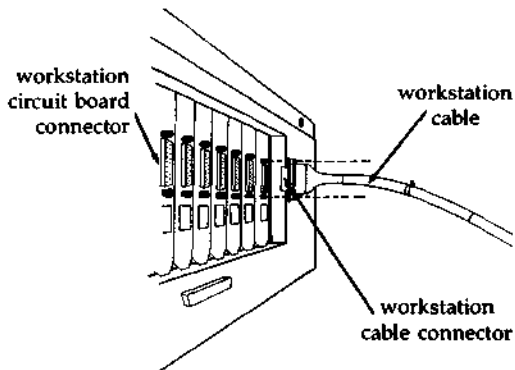
Note: No two switches may be set to the same number.

----->

Procedure: Central Module Installation and Configuration

14. Notice that each workstation circuit board has a connector which projects through the rear panel of the central module.

Uncoil the workstation cables and attach one cable to each of the connectors. Fasten the cables securely, using the screws attached to the cable plugs.



15. Replace the top cover of the central module, and fasten it with the three screws which you removed in step #1.
-

16. Notice the selectable power line receptacle located on the rear panel of the central module. It consists of a voltage selection cam, a fuse and fuse holder and a receptacle for the main power cord. (See the illustrations in steps #18 and #19.)

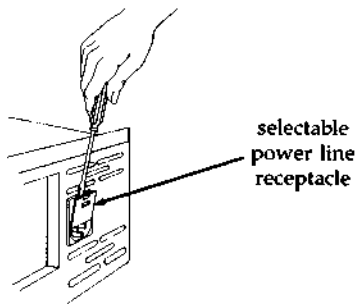
If the power outlets in your office supply the voltage shown in the window of the power receptacle, proceed to step #21.

If the power outlets in your office do not supply the voltage shown, proceed to step #17.

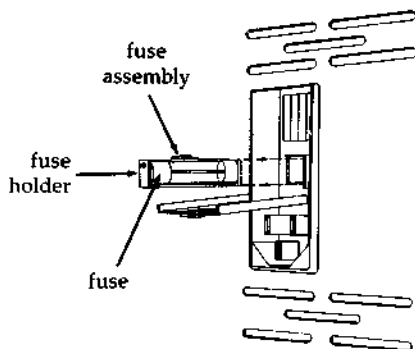
----->

Procedure: Central Module Installation and Configuration

17. Use a small slotted screwdriver to gently pry open the door of the selectable power line receptacle.



18. Remove the 115VAC (grey) or 230VAC (black) fuse assembly from the fuse receptacle. Replace this with the alternate assembly contained in your central module installation kit.



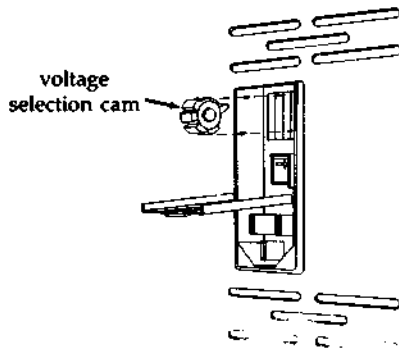
When you install the new fuse assembly, orient the arrow on the fuse assembly in the same direction as the arrows on the door of the power receptacle.

----->

Procedure: Central Module Installation and Configuration

19. Remove the voltage selection cam from the selectable power line receptacle.

Rotate the cam appropriately and replace it so the correct voltage sign (either 115VAC or 230VAC) appears when the door of the power receptacle is closed.



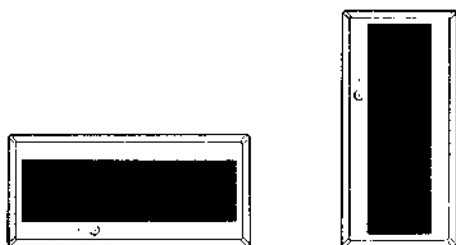
-
20. Close the door of the selectable power line receptacle.
-

----->

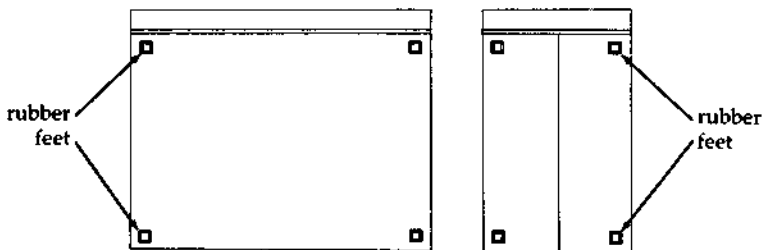
Procedure: Central Module Installation and Configuration

21. Four self-adhering rubber feet, used to protect the bottom surface of the central module, are contained in your installation kit.

Before mounting the feet, you must decide on an orientation for the module, because once attached, the feet are difficult to remove. Although vertical orientation is usually preferred (because less floor space is required), the module must be serviced while in a horizontal position.



After you have made your decision, place the central module on one of its sides. Remove the protective paper from the adhesive surface of each rubber foot. Mount the feet at the corners of the module base. For optimal stability, mount the feet as close to the corners of the base as possible.



SYSTEM HARDWARE INSTALLATION

Central Module (cont.)

Procedure: Central Module Installation and Configuration

22. Return the central module to the chosen orientation. Do not slide the module on its rubber feet until the adhesive has cured for at least three hours. Maximum adhesion takes 24 hours.
-
23. Plug one end of the central module main power cord in the selectable power line receptacle, and plug the other end in a wall outlet.

This completes the installation and configuration of the DIMENSION central module.

**Procedure
Summary**

After you have installed and configured the central module, the next step in the hardware installation procedure is to install and configure the workstations. The procedures on the following pages describe how to:

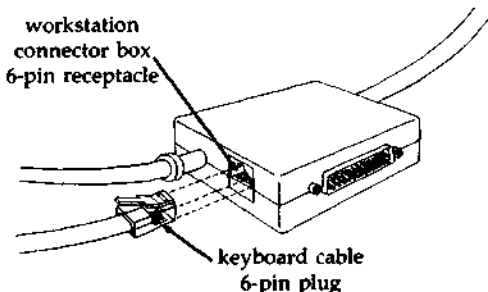
- o Plug the keyboard cable into the connector box.
- o Plug the video cable into the video display.
- o Mount the connector box.
- o Mount the workstation label.
- o Plug in the video display power cord.
- o Adjust the tilt-and-swivel mechanism.

Procedure: Workstation Installation and Configuration

1. Route the uncoiled workstation cables to the workstations.
-

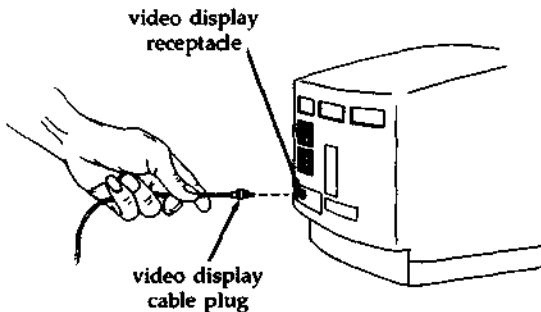
2. Notice that each keyboard cable ends in a six-pin plug. This plug mates with a six-pin receptacle in a workstation connector box.

Attach all the keyboard cables to their respective connector boxes.



3. A video display cable, which extends from each connector box, ends in a plug. This plug mates with a receptacle on the back panel of a video display.

Attach all the video display cables to their respective video displays.



----->

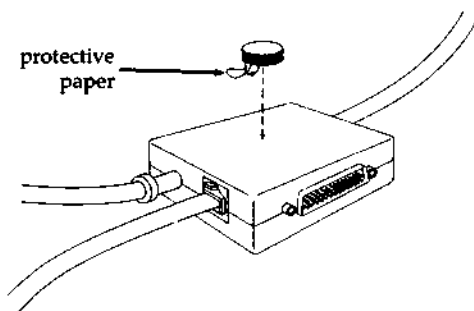
Procedure: Workstation Installation and Configuration

4. Notice the 3/4" circle of Dual Lock™ included with each workstation installation kit. It is used to fasten the connector box to a location close to the workstation video display.

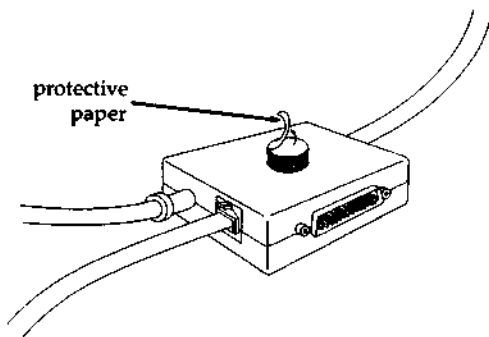
CAUTION

Once you have used the Dual Lock™ to attach the connector box to a suitable surface, you cannot easily reposition the connector box.

5. Remove the protective paper from one side of the Dual Lock™ circle, and attach the circle to the back of the connector box.

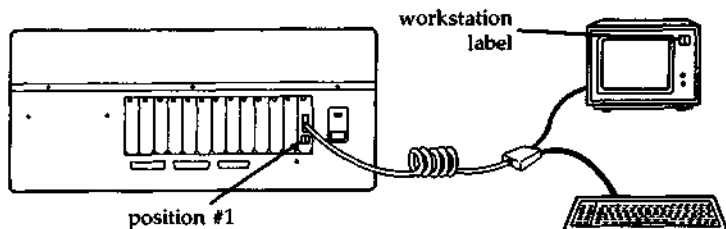


6. Remove the protective paper from the other side of the circle, and press the connector box against a surface near the video display.



Procedure: Workstation Installation and Configuration

7. You received twelve pre-numbered workstation labels as part of your central module installation kit. Starting at the back of the central module, trace the cable which connects workstation circuit board #1 (found in position #1) to a workstation. Attach workstation label #1 to the front of this workstation's video display. Repeat these steps until you have assigned and attached a pre-numbered label to the front of each video display.



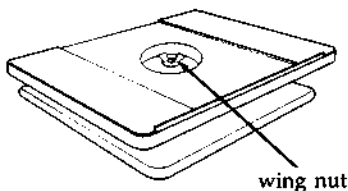
-
8. Plug the power cord of each video display into a wall outlet.
-

Tilt and Swivel

The optional North Star DIMENSION Tilt and Swivel mechanism is designed to allow adjustment of the workstation video display viewing angle.

Procedure: Tilt and Swivel Installation

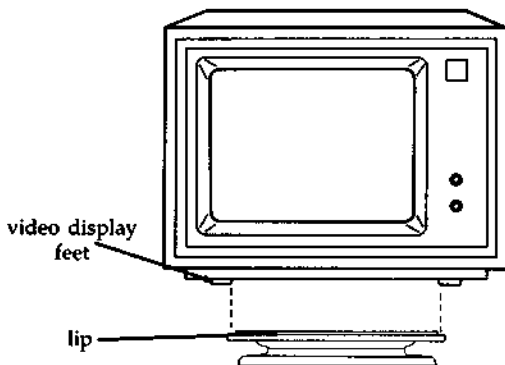
1. Loosen the wingnut of the tilt and swivel mechanism so the two sections may be moved freely.



2. Rotate the tilt and swivel mechanism so the edge of the swivel plate which has an upper lip is facing toward you.

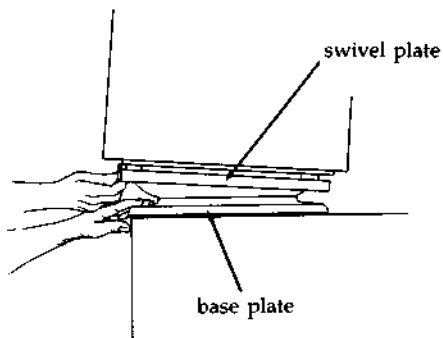


3. Place the workstation video display on the swivel plate so the feet of the display straddle the lip of the swivel plate.



Procedure: Tilt and Swivel Installation

4. Press down on the base plate of the tilt and swivel mechanism while grasping the swivel plate. Rotate the swivel plate to a comfortable viewing angle.



This completes the hardware installation procedures for the DIMENSION workstation.

**Central
Module
Printer
Installations**

This section of the chapter explains how to install printers at the DIMENSION central module. Up to three printers may be installed at one time, because the central module can accept one parallel and two serial printers simultaneously.

**Serial vs.
Parallel
Interfacing**

Before attaching a printer to the central module, you must determine if it uses a serial or parallel interface.

Serial and parallel interfacing are methods of data transmission used by the printer. Serial printers transmit data bits sequentially, while parallel printers transmit data bits simultaneously. If you are in doubt about the interface used by your printer, refer to your printer manual.

**Printer
Cables**

If your printer uses a serial interface, use a DIMENSION serial printer cable to attach the printer to the central module.

If your printer uses a parallel interface, use a DIMENSION parallel printer cable to attach the printer to the central module.

Installation Requirements There is only one specific requirement that must be met when attaching printers to the central module:

THE CENTRAL MODULE AND ITS PRINTERS MUST SHARE POWER OUTLETS THAT ARE PART OF A COMMONLY FUSED AND GROUNDED ELECTRICAL CIRCUIT.

This precaution eliminates ground loops which could cause erratic behavior of the printers, or the central module, or both.

Procedure Summary The following procedures describe how to:

- o Connect an interface cable between a shared serial or parallel printer and the central module.

- o Plug in the printer power cord.

Parallel Printer Installation The back panel of the central module has one connector which you may use for attaching a parallel printer. This connector is labeled "Parallel 1."

Procedure: Shared Parallel Printer Installation

1. Connect one end of a parallel printer cable to the parallel port connector ("Parallel 1") on the rear panel of the central module. Firmly fasten the cable using the screws attached to the cable connector.

2. Connect the other end of the parallel printer cable to the port connector of the parallel printer. Firmly fasten the cable using the screws attached to the cable connector.

3. Connect the printer main power cable to a 115VAC (or 230VAC) wall outlet which is commonly fused and grounded to the central module.

This completes the installation procedure for a shared parallel printer.

Serial Printer Installation The back panel of the central module has two connectors which you may use for attaching serial printers. These connectors are labeled "Serial 1" and "Serial 2."

Procedure: Shared Serial Printer Installation

1. Connect one end of a serial printer cable to either of the serial port connectors ("Serial 1" or "Serial 2") on the rear panel of the central module. Firmly fasten the cable using the screws attached to the cable connector.

2. Connect the other end of the serial printer cable to the serial port connector of the serial printer. Firmly fasten the cable using the screws attached to the cable connector.

3. Connect the printer main power cable to a 115VAC (or 230VAC) wall outlet which is commonly fused and grounded to the central module.

This completes the installation procedure for a shared serial printer.

**Workstation
Printer
Installations**

This section of the chapter explains how to install a printer at a DIMENSION workstation. Only one printer may be installed at each workstation, and the printer must use a serial interface compatible with the Electronic Industries Association RS-232C standard. This standard attempts to ensure interfacing compatibility between data terminal (DTE) and data communications (DCE) equipment.

**EIA RS-232C
Compatibility**

The portion of the standard which concerns the DIMENSION workstation states that signal grounds and shield (safety) grounds (of the printer, in this instance) must be wired in a manner which permits their isolation from each other. If you are in doubt about your printer's ability to meet this standard, refer to your printer manual.

Many commonly available printers meet the EIA RS-232C specification.

Some printers that have their signal and shield (safety) grounds wired together may be modified to meet the isolation requirements. The printer maintenance manuals may contain procedures that explain how to isolate the grounds.

If you have a printer in which the signal ground and shield (safety) ground are inseparably wired together, or if you have a printer which uses a parallel interface, this printer may not be connected to a DIMENSION workstation. Instead, consider using it as a shared printer at the central module.

**Serial vs.
Parallel
Printers**

Before attaching a printer to a workstation, you must ensure that it uses a serial interface.

As discussed earlier in this chapter, serial and parallel interfacing refers to the method of data transmission used by the printer. Serial printers transmit data bits sequentially, while parallel printers transmit data bits simultaneously. If you are in doubt about the interface used by your printer, refer to your printer owner's manual.

**Workstation
Serial Port**

Your printer owner's manual may provide you with the information to make your printer's serial port compatible with a number of different computers. If this is the case, the following chart may help you. It shows the signals used by your DIMENSION workstation when communicating with a serial printer.

Pin Number	Signal Name
1	Shield (safety) ground
2	Transmit Data - from computer to printer
3	Receive Data - from printer to computer
4	RTS (request to send) - always asserted output from computer
6	DSR (data set ready) - input to computer
7	Signal ground
20	DTR (data terminal ready) - always asserted output from computer

Printer Cables

Most serial printers which meet the EIA RS-232C standard may be attached to the DIMENSION workstation by using a "null modem" cable. The cable must have connectors of the proper gender which match the ports of the workstation connector box and your printer.

The wiring for a null modem cable is shown in the following chart:

DIMENSION Connector Pin Number	Printer Connector Pin Number
1	1
2	3
3	2
4	8
5	8
6	20
7	7
8	4 & 5
20	6

Procedure: Local Serial Printer Installation

1. Connect one end of a serial printer cable to the serial port of the workstation connector box. Firmly fasten the cable using the screws attached to the cable connector.

2. Connect the other end of the cable to the serial port connector of your printer. Firmly fasten the cable using the screws attached to the cable connector.

3. Connect the printer main power cable to a 115VAC (or 230VAC) wall outlet.

This completes the installation procedure for a local serial printer.

**Local Modem
Installation**

This section of the chapter explains how to install a modem at a DIMENSION workstation. Only one modem may be installed at each workstation, and the modem must use a serial interface compatible with the Electronic Industries Association RS-232C standard.

Most commonly available modems meet this industry specification; however, if you are in doubt, you should read your modem owner's manual.

**Serial vs.
Parallel
Modems**

Before attaching a modem to a workstation, you must ensure that it uses a serial interface.

As discussed earlier in this chapter, serial and parallel interfacing refers to the method of data transmission used by the modem. Serial modems transmit data bits sequentially, while parallel modems transmit data bits simultaneously. If you are in doubt about the interface used by your modem, refer to your modem owner's manual.

**Workstation
Serial Port**

Your modem owner's manual may provide you with the information to make your modem's serial port compatible with a number of different computers. If this is the case, the following chart may help you. It shows the signals used by your DIMENSION workstation when communicating with a serial modem.

PERIPHERAL EQUIPMENT INSTALLATION**Local Modems (cont.)****Workstation
Serial Port
(cont.)**

Pin Number	Signal Name
1	Shield (safety) ground
2	Transmit Data - from computer to modem
3	Receive Data - from modem to computer
4	RTS (request to send) - always asserted output from computer
6	DSR (data set ready) - input to computer
7	Signal ground
20	DTR (data terminal ready) - always asserted output from computer

**Modem
Cables**

Most serial modems which meet the EIA RS-232C standard may be attached to the DIMENSION workstation by using a "null modem" cable. The cable must have connectors of the proper gender which match the ports of the workstation connector box and your modem.

The wiring for a null modem cable is shown in the following chart:

DIMENSION Connector Pin Number	Printer Connector Pin Number
1	1
2	3
3	2
4	8
5	8
6	20
7	7
8	4 & 5
20	6

Procedure: Local Modem Installation

1. Connect one end of a serial cable to the serial port of the workstation connector box. Firmly fasten the cable using the screws attached to the cable connector.

2. Connect the other end of the cable to the serial port of the modem. Firmly fasten the cable using the screws attached to the cable connector.

3. Connect the modem main power cable to a 115VAC (or 230VAC) wall outlet.

This completes the installation procedure for a local modem.

Local Mouse Installation Only a mouse which uses a serial interface may be attached to a workstation. Additionally, the mouse must conform to EIA RS-232C specifications. A typical mouse meets this industry specification; however, if you are in doubt, you should read your owner's manual.

Procedure: Local Mouse Installation

1. Connect one end of a serial cable to the serial port of the workstation connector box. Firmly fasten the cable using the screws attached to the cable connector.
-
2. Due to differences in mouse interface connections, you should refer to your mouse owner's manual to complete the installation procedure.

This completes the hardware installation procedures for peripheral equipment.

TROUBLESHOOTING

Introduction This chapter contains DIMENSION troubleshooting information gathered from many sources. Systems programmers who tailored North Star's multi-user, multi-processor operating system, DIMENSION DOS, contributed to the chapter sections on automatic boot diagnostics. Diagnostic programmers wrote programs to test specific modules, such as the power supply voltage test procedures. And over a year's experience with the DIMENSION in a multitude of office environments has provided field service technicians with invaluable information that they have contributed to the database found in this chapter.

Use Chapters 2 and 3 (Diagnostics) simultaneously. Chapter 2 provides the direction for beginning problem analysis. It asks you to perform steps that may either resolve a problem or lead you into Chapter 3. Chapter 3 explains how to troubleshoot to subassembly (and occasionally component) level by using the diagnostic diskettes that accompany this manual.

After troubleshooting a symptom, refer to Chapter 3 and perform diskette diagnostic routines or proceed directly to Chapter 4 (Subassembly Removal) to remove a defective subassembly. At the conclusion of your service/maintenance call, you should use some combination of the automatic boot and diskette diagnostics to verify proper system operation.

TROUBLESHOOTING

Auto-Boot Diagnostics

Introduction This section of the chapter provides a sequence of events which you must observe when power is applied to the central module and the workstations. These events are controlled by diagnostic routines that are built into the central board boot PROM. The diagnostic routines are hereafter referred to as auto-boot diagnostics.

Preliminary Observations and Actions The primary tool you will use during initial system troubleshooting is observation. You must look at the central module and workstations when power is first turned on and ensure that the following events occur:

Procedure: Preliminary Troubleshooting (Boot Sequence)

1. When the keyswitch is turned on, the system status LED on the central module turns on and stays on.

If the system status LED doesn't turn on or if it turns off, it may indicate failure of the central board. Perform the following steps:

- ☆ Verify power supply voltages. Refer to the section on checking and adjusting the power supply.
 - ☆ Test the central board. Refer to the section in Chapter 3 on using Service Diskette #1.
 - ☆ Refer to the section on central board troubleshooting or replace the central board.
-

2. The operating system boots from the diskette drive or the fixed disk drive. The proper boot sequences are shown in the table on the following page.
-

---->

Procedure: Preliminary Troubleshooting (Boot Sequence)

2. Boot Sequences:

Fixed Disk Boot

1. System status LED on.
2. Diskette LED on.
3. Diskette LED off.
4. Sign-on screen appears at workstations.

Diskette Drive Boot

1. System status LED on.
 2. Diskette LED on.
 3. Insert diskette.
 4. Diskette LED off.
 5. Close drive.
 6. Diskette LED on.
-

3. If both the system status LED and the diskette drive LED turn off after booting from the diskette drive, it may indicate a defective or incorrect boot diskette or a defective diskette drive.

If the central module system status LED turns off after booting from the fixed disk drive, it may indicate damage to the data on the fixed disk or a defective fixed disk drive. Perform the following steps:

- ☆ Use another boot diskette.
 - ☆ Check DC power to the diskette and fixed disk drives.
 - ☆ Use Service Diskette #2 to verify operation of the diskette and fixed disk drives.
 - ☆ Use Service Diskette #2 to check the fixed disk label.
 - ☆ Replace the diskette or fixed disk drive.
-

---->

Procedure: Preliminary Troubleshooting (Boot Sequence)

4. The operating system loads and the sign-on screen appears at each of the workstations.

If one or more workstations display blank screens, it may indicate:

- ☆ Workstation board failure
- ☆ Workstation interconnect box/cable failure
- ☆ Video display failure
- ☆ Absence of power to the video display

If all workstations display blank screens, it may indicate failure of the +12VDC power supply or a defective central board. Perform the following steps:

- ☆ Check the workstation thumbwheel switch settings. Make certain that there are no duplicate switch settings.
- ☆ Verify power supply voltages. Refer to the section on checking and adjusting the power supply.
- ☆ Use Service Diskette #1 to check the central board and workstation boards.
- ☆ Replace workstation boards for all workstations displaying blank screens.

----->

Procedure: Preliminary Troubleshooting (Boot Sequence)

5. Users sign on at all workstations.

If one or more users are not able to sign-on, it may indicate defective workstation interconnect boxes/cables or keyboards. Perform the following step:

- ☆ Exchange the suspect keyboards or workstation interconnect box/cables with keyboards and cables which you know are working.
-

This concludes the initial troubleshooting procedure.

Introduction This section of the chapter is comprised of general and specific problems for which solutions have been found. The section is divided into subsections which deal with either particular categories of problems (such as boot or hang problems) or with problems related to specific subsystems in the computer.

How to Use The Trouble-Shooting Chart The best way to use this information is to decide whether a symptom is area specific (boot, hang, etc.) or subsystem specific (diskette drive, monitor, keyboard, etc.). Then read the entire section and look for a symptom/solution that appears to be similar. If nothing applies, you may need to refer to Chapter 3 and use the diagnostic disks.

Symptoms/explanation/solutions in the **BOOT** and **HANG** sections are organized by the sequence in which boot events occur. For example, diskette boot problems are discussed before fixed disk boot problems. "Sign-on" problems (the sign-on screen appears, but the **DIMENSION** DOS command prompt fails to appear after sign-on) are located at the conclusion of the **BOOT** section.

The **PRINTER** section is a supplement for the information found in printer interface notes (PINs), and PINs are included in **DIMENSION** application installation notes (DAINs) which are shipped to North Star distributors and dealers. If you are a North Star dealer and you have difficulty installing a printer not covered by a PIN, call North Star's Technical Support Center (at 415-357-8500) and ask for an update. (If you are not a North Star dealer, telephone your dealer and he will contact us for you.) If you succeed in installing a printer not covered in PINs, please contribute your knowledge by filling out a blank PIN form and send a copy to North Star Technical Support, 14440 Catalina Street, San Leandro, CA, 94577.

Symptom	Explanation	Solution
<p>The system does not boot from the diskette drive and nothing is suspected.</p>		<ol style="list-style-type: none">1. The fans turn. If they don't, check that:<ul style="list-style-type: none">o The power cord is seated in the socket, plugged in at both ends, etc.o The fuse is OKo The voltage selector cam is set and seated properlyo The power supply shorting plug is inserted in the correct socket 2. The system status LED (by the keyswitch) turns on.<ul style="list-style-type: none">o If it doesn't, or if it goes off, there may be a hardware problem. Refer to the section on "Distinguishing Between Central Board Failures and Power Supply Failures," below.o If the LED begins to flash, count the flashes in the pattern and refer to the following chart: <ul style="list-style-type: none">1 flash = unexpected hardware interrupt2 flashes = unexpected software interrupt3 flashes = server parity error4 flashes = server parity error

---->

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
---------	-------------	----------

(continued)

A series of three flashes or four flashes are the most useful, because they indicate where the problem is located. A series of two flashes usually indicates a defective 80186. If the 80186 is labeled S40050 or S40052 or has date codes 8321 or 8325, replace it.

Note: If your central module contains a multi-layer central board, you must remove the bus board in order to read the label on the 80186.

3. The diskette drive LED turns on.
 - o Insert the DIMENSION DOS System Diskette #1 into the drive. (Have the diskette in your hand before beginning this step.) If the LED turns off before you insert the diskette, begin again. (In some systems, the LED flashes once, goes out for approximately 10 seconds, then turns on. If you have a system like this, wait for the LED to turn on before inserting the diskette.)
4. The diskette drive LED flickers as the diskette is read.
 - o If it doesn't, check that:
 - The correct diskette is mounted
 - The diskette is mounted correctly
 - The drive lever is closed

---->

Symptom	Explanation	Solution
(continued)		<ul style="list-style-type: none">5. The diskette drive LED continues to flicker (with pauses) for 30 seconds or more (up to 2.5 minutes for a 12 user system).<ul style="list-style-type: none">o If the diskette drive stops reading and nothing further occurs, refer to the section on hardware problems. 6. The sign-on screen appears.<ul style="list-style-type: none">o If it doesn't, check that:<ul style="list-style-type: none">- All workstation board thumbwheel switches are set to numbers between 1-12- The each number is used only once- The workstation cable is securely fastened at both ends- The monitor is turned on and the brightness level is turned up o If you've checked all these items and a problem still exists, use a different workstation board. If the board has RAM expansion, remove it. If a problem still exists, refer to the section on hardware problems. o If blank screens appear at two or more workstations each time the central module is turned on, and if unplugging and reconnecting the keyboards resolves the problem on each occasion, suspect the +12VDC power supply. Refer to the +12VDC power supply discussion.

---->

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
(continued)		<ol style="list-style-type: none">7. Sign-on at a workstation.<ul style="list-style-type: none">o If no characters appear on the screen when you type, do the following:<ul style="list-style-type: none">- Unplug the keyboard and plug it back in again.- Turn off the central module, wait 30 seconds, then turn on it back on.- Replace the keyboard, workstation cable, or workstation board.o If the workstation hangs after the password has been typed, check that:<ul style="list-style-type: none">- Two or more workstation board thumbwheel switches are not set to the same setting8. The two line banner appears followed by the A> prompt.<ul style="list-style-type: none">o If the banner and prompt do not appear, try another diskette.
The system doesn't boot from the diskette drive, and a hardware problem is suspected.		<ol style="list-style-type: none">1. Disconnect all peripheral devices from the central module and workstation.2. Remove workstation boards. Reinstall one workstation board without expansion RAM.3. Remove central board expansion RAM board.

Symptom	Explanation	Solution
(continued)		<ol style="list-style-type: none"> 4. Reboot the system. If it still doesn't work, try a different workstation board. 5. Reboot the system. If it still doesn't work, disconnect the fixed disk drive/s (flat cables and power cable). If a tape drive and tape drive interconnect board are installed, disconnect them. 6. Reboot the system. If it still doesn't work, refer to the next subsection.

The system does not boot from the diskette drive and a central board or power supply problem is suspected.

1. Refer to the section on testing the central module power supply.
2. Locate connector J9 on the central board (this connector supplies DC power to the board). The brown and orange leads provide the brownout line and the reset line respectively. Measure the leads with respect to ground. They should be high (close to +5VDC). If either is low (less than +3.5VDC), replace the power supply.
3. If all voltages (including brownout and reset) are within specification, replace the central board.

Note: Several signals, including the power supply reset signal, may be verified at the "RES" test point near the bus board. If RES is always low, it is a good indication that the central board, rather than the power supply, is bad.

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
The central module fuse blows (Ulveco power supplies only).		<ol style="list-style-type: none">1. Make certain the fuse is #19341 10A from the American Fuse Company (North Star part number #68034). ALL OTHER FUSES BLOW EASILY.2. Use a meter to check the voltage between circuit ground on the bus board and chassis ground on one of the drive mount brackets. If the difference in potential is +5VDC, remove the power supply. Adjust the screws on the bottom of the power supply so they don't protrude past the bottom plate of the power supply. If the difference in potential is +12VDC, there are two possible sources.<ul style="list-style-type: none">o A beryllium-copper bar grounds the workstation board sheet metal panels. This bar must be installed under the plastic spacer or the +12VDC will short to ground.o In some older workstation cables, the metal hood at the end of the cable may pinch the +12VDC line and short it to ground. Unplug all workstation cables. If this resolves the problem, connect each cable one at a time until you identify the defective cable.

---->

Symptom	Explanation	Solution
(continued)		<p>3. If the DC voltages are not shorted to ground and the system continues to blow fuses, you may disconnect the power supply fuse-blowing circuit in Ulveco power supplies only. This circuit blows the fuse on a 110VAC system when it is plugged into 220VAC.</p> <p>A triac is located in the center of the top edge of the power supply (next to a black capacitor). Two leads protrude from the top of the triac. The longer lead is connected to a wire that plugs into the power supply circuit board through a single molex connector. Disconnect this connector to disable the fuse-blowing circuit.</p>
The system boots from the fixed disk intermittently.	The brake on the 30 megabyte drive may be binding.	If a 30 megabyte drive is installed in the system, refer to the January 1985, Field Change Notice. A procedure describes brake removal.

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
The computer boots from the diskette drive but not from the fixed disk drive.		<ol style="list-style-type: none">1. Observe the lamps on the front panel of the fixed disk drive while performing a boot from the diskette drive. (The front panel of the fixed disk drive faces the rear of the central module. You must remove the central module cover to observe the front lamps. You may have to slide the drive tower back.)2. The lamps on a working Rodime 80 megabyte drive flash on and off for approximately 15 seconds after power on. Then they stay on. The lamps on a defective drive flash a pattern of long and short bits. Refer to the chart below.

Code	Flash Pattern	Explanation
1	Short-short-short-long	No index track data burst
2	Short-short-long-short	No flag zero
3	Short-short-long-long	Motor speed outside ± 1 %
4	Short-long-short-short	Motor speed outside ± 10 %
5	Short-long-short-long	Flag zero always true
6	Short-long-long-short	Step received while gate true
7	Short-long-long-long	Write fault
8	Long-short-short-short	Not used
9	Long-short-short-long	Not used
10	Long-short-long-short	No index
11	Long-short-long-long	Motor not up to speed

---->

Symptom	Explanation	Solution
(continued)		<p>3. If error code #10 or #11 appears, remove the drive motor brake in the Rodime fixed disk drive as instructed in the FCN. Then retest the fixed disk drive. If a problem still exists, the drive circuit board may contain damaged transistors. Replace the transistors or replace the drive.</p> <p>4. If any other error codes appear, replace the drive.</p> <p>5. If the drive lamps indicate no error, sign on as a manager and request directories of drives C and E.</p> <p>Note: A diskette boot establishes different drive assignments from those used by the system manager.</p>

Drive	Assignment
A, B	Diskette drive; same as fixed disk boot
C	Partition 0 (contains operating system files)
D	Partition 1 (if it is 3Mbytes; otherwise you see trash)
E	Partition 33 (contains mailboxes and spool files)

---->

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
(continued)		<ol style="list-style-type: none">6. If "drive not ready" errors appear, ensure that the drive is connected properly. If errors still appear, replace the drive.7. If "sector not found" errors appear, reformat the drive using the DISKTOOL utility on Service Disk 2, and run SETUP again. If errors appear during this process, replace the drive.
The system boots and users are able to sign on, but workstations hang after the DOS banner appears on the screen.	To understand the possible causes, you need to understand the boot process after a password is entered.	<ul style="list-style-type: none">o If drive D contains both AUTOEXEC.BAT and COMMAND.COM files, DOS loads COMMAND.COM from drive D and executes the AUTOEXEC.BAT file from drive D. If drive D also contains a CONFIG.SYS file, DOS reads and executes it before executing the AUTOEXEC.BAT file.o If drive D does not contain both AUTOEXEC.BAT and COMMAND.COM files, DOS selects drive C, loads COMMAND.COM from there, and executes CONFIG.SYS and AUTOEXEC.BAT files from C if it finds them there.o If the COMMAND.COM file on drive D is contaminated, a banner appears and the central module hangs. The COMMAND.COM file in drive C is write-protected, but the file in drive D is not. It is very easy to over-write this file when copying an application from drive C to drive D.

---->

Symptom	Explanation	Solution
(continued)		<ul style="list-style-type: none">o If the CONFIG.SYS file in drive D has been changed (for example, the inclusion of a foreign device driver), the DOS banner appears and the central module hangs (occasionally with an error message).o If either the COMMAND.COM or the CONFIG.SYS files on drive D is contaminated, it must be repaired before the owner of the defective private partition can sign on. If you can reach that partition (the drive D that has the problem) by signing on as another user, do so and repair the offending file. You may have to run MAINT and reassign the defective partition to someone else--but don't make it their drive D!o If you are unable to sign on as a manager, and you are unable to reach the defective partition any other way, run SETUP or:<ul style="list-style-type: none">- Duplicate DOS System Disk #1.- Boot this new diskette and sign on as MANAGER and PASSWORD.- Copy the files PDT0.COM and UIT.COM from drive C onto the diskette.- Boot the diskette again and sign on using your normal manager ID and password.

---->

TROUBLESHOOTING

Boot Problems (cont.)

Symptom	Explanation	Solution
(continued)		<p>Note: Never have more than one user signed on or try to run applications when using this type of boot procedure. After signing on:</p> <ul style="list-style-type: none">- Repair the problem partition.- Perform a fixed disk boot. <p>o COMMAND.COM is always read from drive C when using DOS versions 1.2.0 and later. If this file is duplicated on drive D, it is ignored. The system selects drive D after loading COMMAND.COM from drive C and executes the AUTOEXEC.BAT and CONFIG.SYS from drive D if they are there. (If they aren't there, it gets them from C.)</p>

Symptom	Explanation	Solution
The system hangs occasionally.	Is the problem a central module hang (all workstations affected) or a workstation hang?	<ul style="list-style-type: none"><li data-bbox="496 359 1078 636">o Workstation Hangs - If the problem is a workstation hang, run the same software on another workstation with the same amount of RAM. Similar symptoms usually indicate a software problem. If you're using Sidekick or something similar, delete it and see if the problem disappears. If you are able, add RAM and see if this resolves the problem. Some programs halt gracefully if they are used with too little memory. If the problem appears to remain at one workstation board, replace the board. If that workstation has an expansion RAM, trade expansion RAM boards with another workstation. Workstation boards that tend to hang after they've warmed up may have defective LS390's (the RAM refresh counter). If an LS390 is defective, it tends to make the RAM forget after a while. If you suspect this is happening (and the problem cannot be duplicated on another board), replace the workstation board. There are more notes about workstation hangs in the "Application Problems" section.<li data-bbox="496 923 1078 1108">o Central Module Hangs - If the problem is a central module hang, determine if are you able to relate it to a particular action or program--"every time I run ... it crashes." If you are able to establish this type of connection, please call the North Star hotline and let us know. We will attempt to simulate the problem on our systems. (This applies to workstation crashes also.)

---->

TROUBLESHOOTING

Hang Problems (cont.)

Symptom	Explanation	Solution
(continued)		<p>Whenever you observe a central module hang problem, observe the system status LED. If it flashes in a series of three or four flashes, it is indicating a parity error in the server RAM. Run the memory diagnostic from Service Diskette #1. If the LED flashes a series of one or two flashes, note the following:</p> <ul style="list-style-type: none">- One flash indicates an unexpected hardware interrupt- Two flashes indicate an unexpected software interrupt
The central module is hanging intermittently.		<ol style="list-style-type: none">1. Use DOS versions 1.1.0 and later. They ignore the brownout line from the power supply.2. Adjust R132 on the power supply fully counter-clockwise. This reduces the sensitivity on the -12VDC supply.3. With a meter, measure for a difference in potential from ground on the bus board to one of the drive brackets. If you measure +5VDC or +12VDC, refer to the discussion regarding fuse blowing for a solution to this problem.4. Replace the power supply, then the central board. Replacing the fixed disk drive may resolve the problem. (If you are able to accomplish this easily, try this before changing the central board.)

Symptom	Explanation	Solution
The system resets occasionally--all screens go blank, then the sign-on screens appear.	The power supply is generating spurious reset signals.	<ol style="list-style-type: none">1. Turn potentiometer R132 on the power supply completely counter-clockwise.2. Replace the power supply.
If a batch file loops continuously, the workstation from which the file is run crashes after a few days.	This is a bug in MS-DOS 2.11.	Upgrade to a later version of the operating system.

TROUBLESHOOTING

Printer Problems

Symptom	Explanation	Solution
If files are spooled from multiple users, the files become intermixed on the printer. Occasionally a formfeed occurs in the wrong place.		Use the PRINTER command to change PAUSE or WAIT to a larger value. Never set PAUSE to 1.
An Epson printer prints garbage--sometimes quite a lot; sometimes only a single bad character.	Epsons cannot keep up at 9600 baud with only one stop bit.	If the printer is set to communicate at 9600 baud, make certain two stop bits are being transmitted.
When printing with cut-sheet paper, all sheets after the first page have problems.		Use the PRINTER command to set EJECT=OFF .

Symptom	Explanation	Solution
How do I set up forms for 132 columns (or anything else special)?	Look up FORMS in the index of the DOS Manual or refer to chapter #7 of the NetWare User's Manual.	<p>The DIMENSION does not actually control how a form comes out on the printer. The form letter is an arbitrary designation which means "stop the printer and do something to it".</p> <p>If the printer is only printing 80 columns and it should be printing 132 columns, check that:</p> <ol style="list-style-type: none">1. The printer switches are set for paper with a width greater than 8.5 inches.2. The application is set for 132 columns. <p>Note: The spooler NEVER adds carriage return-line feed sequences.</p>
A newly installed parallel printer does not print.	You may be using an incorrect printer interface cable.	Use a North Star cable instead of an IBM cable. If, with a North Star parallel cable, it still doesn't print, follow the troubleshooting instructions in the generic PIN (printer interface note).

TROUBLESHOOTING

Printer Problems (cont.)

Symptom	Explanation	Solution
The PRINTER command does not always change PAUSE and EJECT correctly. Frequently, no changes occur at all.	DOS 1.1.0 had a bug in the PRINTER command.	<ol style="list-style-type: none">1. Don't put spaces between the switches in the PRINTER command.2. Upgrade to DOS version 1.2.0 or later.
Using DOS, it is not possible to delete the files that are queued for the local printer.	The delete, terminate, change copies, etc., functions apply only to shared printers.	Sign off to delete these files.

Symptom	Explanation	Solution
The printer spaces down a quarter line instead of a full line with each line feed.	The program being run, possibly a word processor, is placing the printer in this mode and doesn't reset it. MultiMate does this with the Diablo 630.	Test this theory by turning the printer off/on; then print from DOS (e.g., DIR>PRN). If it prints, you have proven the theory. You'll have to determine the reset code for the printer and transmit this code after using the program. Refer to your printer manual.
Spooled files tend to get lost. Either they never print at all, or they are not printed until something else is spooled.	Two things can cause this to occur. Refer to the "Solutions" column and decide which instance applies.	<ul style="list-style-type: none">o Never sign off right after spooling a file. Wait until the spool pause timeout has occurred. Normally this pause is short (the default is five seconds), but if it has been set to a longer interval for some reason, you may have to wait quite a long while.o Under DOS, if you're printing many files and the print list for a single printer contains more than 30 files, the 31st spooled file doesn't show up in the print queue and it won't be printed. The file does remain in the spooler, however. When the queue is flushed and another (32nd file) is spooled, the 31st file appears in the queue and is printed.o Under NetWare, the spooler size is dynamic. Lost files may indicate the absence of room in the SYS: volume or the maximum number of directory entries has been exceeded.

TROUBLESHOOTING

Printer Problems (cont.)

Symptom	Explanation	Solution
In DOS, shared printing used to be possible, but now it isn't. Even turning the machine off/on doesn't help. Files don't even appear in the print list.	You may have attempted to spool a file larger than one megabyte. If this is the case, the file hung in such a way that it is in the spool partition but is listed as a "lost chain." In other words, the spooler space is used up and it can't be deallocated.	Perform a diskette boot, and run CHKDSK E:\F. (CHKDSK may be found on System Diskette #2.) If lost chains are located, they will be converted into files called FILE0000.CHK, FILE0001.CHK, etc. Delete these files and reboot from the fixed disk. Break the large file into several smaller files and send them to the spooler at intervals that permit the buffer to clear.

Symptom	Explanation	Solution
Files became contaminated in the spooler. On the print list they show up as S: . . . with no time code in the file name--the rest of the file name is blank.	The system clock is probably confused.	Read about the clock in the section called "Miscellaneous Problems."

TROUBLESHOOTING

Printer Problems in MAINT

Symptom	Explanation	Solution
MAINT is run and a printer is added. When [F6] is pressed to restart, the system status LED begins flashing--twice. If power is turned off/on, the system doesn't boot from the fixed disk. It does boot from the diskette drive, and DOS can be reinstalled. This occurs repeatedly.	This occurs if drive C contains 0 free bytes in partition #1 before adding the printer. MAINT tries to copy the printer driver into C:\SYSTEM and fails because there's no room. If you restart, the fixed disk boot fails because the CONFIG.SYS file on partition #0 (the system CONFIG.SYS file) is contaminated.	Perform a diskette boot and examine the CONFIG.SYS file on drive C, partition #0. Then copy CONFIG.SYS from System Disk #1 to drive C. (Compare these two files after the copying process is complete.) Reboot from the fixed disk, allocate space on partition #1 and reinstall the printers. If a problem is encountered when reinstalling printers, run UPDATE and reinstall the printers. Note: UPDATE initializes the printer configuration with a minimum of inconvenience.

Symptom	Explanation	Solution
<p>A printer exists on the system and MAINT doesn't permit editing or deleting its parameters. If an edit is attempted, MAINT says, "Can't find driver" or "Can't open driver," and quits.</p>	<p>An attempt has been made to edit the printer profiles.</p>	<p>If, for example, the system has two printers, SERIAL 1 and SERIAL 2, and someone decides to reverse them, they might call up the first one and edit SERIAL 1 to become SERIAL 2. This would work. But if they then called up the second one and edited SERIAL 2 to become SERIAL 1, this would fail. The driver for SERIAL 1 was deleted when they made the first change.</p> <p>Run UPDATE to delete the printer configuration entirely. Then reinstall the printers.</p>

TROUBLESHOOTING

Application Installation Problems

Symptom	Explanation	Solution
An application hangs during installation or does not successfully install.		<ol style="list-style-type: none">1. Check the RAM requirements of the program and read about TPA in later in this section.2. Some applications distinguish between a diskette installation and a fixed disk installation by the size of the partition in which the program is installed. Check the application's documentation to be sure this requirement is met.

The workstation hangs or garbage appears on the screen when the program is entered.

- o Check the RAM requirements of the program and read about TPA in this section.
- o Check the application documentation to determine if the program requires ANSI.SYS. Garbage on the screen is a good indication of this. (Some programs put garbage on the screen if ANSI.SYS is installed unnecessarily.)

To install ANSI.SYS, put the line:

```
device=C:\SYSTEM\ANSI.SYS
```

in the CONFIG.SYS file. The CONFIG.SYS file must be located on the same drive as AUTOEXEC.BAT. If the system is using DOS 1.1.0 or earlier, COMMAND.COM must also be located on that drive (whether the drive is C or D).

---->

Symptom	Explanation	Solution
(continued)		If the workstation hangs after the sign on banner, but before the DOS command prompt, after initially rebooting an installed application, suspect a foreign ANSI.SYS or other tinkering with the CONFIG.SYS file. Some programs provide their own ANSI.SYS file, and these may not run properly on the DIMENSION. If this happens, you must somehow enter the boot partition and fix it. Refer to the section on boot problems for ideas about accomplishing this.
Parts of the screen (fields of information) do not appear.	Colors are being used (by the program) which do not appear on the monochrome video display.	<ol style="list-style-type: none">1. Install a monochrome, rather than a color, driver.2. If the program does not permit a choice, look for "color" or "paint" commands that you may use to change field colors, and if possible set up a startup file to set them automatically.

TROUBLESHOOTING

Application Installation Problems (cont.)

Symptom	Explanation	Solution
<p>The word processing program is supposed to use on-screen underlining, but it doesn't show up.</p>		<p>Reinstall the application for color, rather than monochrome, use. This works as long as the program doesn't use colors that don't appear.</p> <p>The DIMENSION monochrome workstation board emulates a PC color graphics adaptor used in conjunction with a monochrome monitor. Thus, graphics and text may be mixed. (The PC monochrome board is text only--no graphics). One difference between the PC monochrome and color boards is that the monochrome board supports underlining of text and the color board doesn't. Because the North Star monochrome workstation board emulates the PC color board, there can be no underlining. If an application attempts to use underlining, nothing appears on the video monitor. The characters appear, but they aren't underlined.</p>

Symptom	Explanation	Solution
The system isn't able to transmit reliably at 9600 baud.	Asynchronous communications packages vary in the rate at which they are able to run reliably.	Use the following chart (when using DOS 1.2.0 and later) to determine maximum baud rates for sending large files. If transmitted files are 50K or less, use a faster baud rate.

Program	Sending	Receiving	Comments
CrossTalk	4800	4800	
Kermit	9600	9600	
Mite	9600	9600	
Open Access	1200	1200	Text transfer only; no XMODEM
PC-Phone	9600	9600	
PC-Talk III	300	300	Interpreted version
PC-Talk III	9600	9600	Compiled version
Phonelink	9600	9600	
Symphony	9600	1200	Many corrected errors
Transend	9600	9600	

TROUBLESHOOTING

Asynchronous Communications Problems (cont.)

Symptom	Explanation	Solution
CrossTalk crashes if BASIC is run afterward. CrossTalk also crashes if the modem is turned off.	CrossTalk versions prior to 3.5 changed some interrupt vectors and never restored them.	See the CrossTalk DAIN for details about fixing this debug problem.
CrossTalk doesn't hang up the phone line.	That's right, it doesn't.	If you use a Hayes modem, write a script for CrossTalk that sends attention characters to the modem and then tells it to hang up.

Symptom	Explanation	Solution
An application that ran in DOS 1.0.2 and doesn't run on DOS 1.1.0.	Most likely caused by insufficient workstation RAM. DOS 1.1.0, in its standard configuration, has 16K less TPA than DOS 1.0.2. You may "recover" most of the lost TPA.	<p>The compatibility enhancements of DOS 1.1.0 were in the form of in NSTAR1.DRV and ANSI.SYS. Drive C contains a file called CONFIG.SYS that causes these drivers to be loaded. It also sets up local MS-DOS buffers that use more space. The DOS 1.1.0 CONFIG.SYS file looks like this:</p> <pre>device = c:\system\nstar1.drv device = c:\system\ansi.sys files=12 buffers=10</pre> <p>The easiest way to retrieve the lost memory is to get rid of CONFIG.SYS--perhaps by renaming it. But you must have NSTAR1.DRV if you are running:</p> <ul style="list-style-type: none">o Bank Street Writero Harvard Project Managero Lotuso Prokeyo Rbase 4000o Sargon IIIo Symphonyo Think Tanko Transend

---->

TROUBLESHOOTING

TPA (Workstation Memory) Problems (cont.)

Symptom	Explanation	Solution
---------	-------------	----------

(continued)

Some applications require the file ANSI.SYS. (The application documentation should tell you if you need ANSI.SYS.) If the application requires either of these drivers, edit CONFIG.SYS to remove all the lines except the "device = ..." line for the driver you require. Remember that CONFIG.SYS is executed out drive D instead of drive C if you have AUTOEXEC.BAT and COMMAND.COM in D. This may require you to use the CONFIG.SYS in drive D instead of (or in addition to) the version in drive C.

Note: The utility called CHKDSK checks a workstation's TPA.

Symptom	Explanation	Solution
Has Ashton Tate has taken multi-user dBase II off the market?	Yes, in the U.S.A.	
Index files are contaminated when dbase II runs.		Call Ashton Tate and ask for the patch that fixes this.
dBase II 3COM doesn't run on the DIMENSION.	A patch on DOS 1.1.0 permits running dBase II 3COM.	Refer to the January 1985, dBase II DAIN.
dBase II 3COM was installed on a 3COM network, and now it can't be installed on the DIMENSION.	Ashton Tate only permits the application to be installed on one type of network.	

TROUBLESHOOTING

dbase II Problems (cont.)

Symptom	Explanation	Solution
dbase II contaminates the FAT in a shared partition. The partition loses data, gets "lost clusters," etc.		<p>Ensure that files are pre-allocated. (In other words, many null records need to be created when the manager is alone in the partition. When users "add" records, they're actually filling in the nulls. Then the files don't get longer when multiple users access the partition.)</p> <p>dBase II doesn't provide an automatic means of accomplishing this--the system manager has to write a program. The sample programs aren't able to do this either, but there is an example in the dBase manual.</p>

Symptom	Solution	Steps or Explanation of Solution
If first AutoCAD and then Datastore:LAN are run, the default cursor cannot be restored.		Reboot the workstation.
When the FORMSORT command is used in InfoStar, "disk full/directory full" messages appear even when there is adequate room.	FORMSORT creates three temporary duplicates of the source file, and this requires a great deal of space.	The duplicates are cleaned (erased) up when the utility has concluded its operation.
Index files are trashed when using PASCAL MT+ from Digital Research.	The compiler is creating temporary token files and not closing them.	Redirect the temporary files to another partition. The primary partition will be OK.

TROUBLESHOOTING

Miscellaneous Application Problems (cont.)

Symptom	Explanation	Solution
Unable to print from GWBASIC. After exiting from BASIC, print-screen and some other print functions don't work.		Don't use GBASIC (find a different version; we recommend Compaq's BASIC 2.1 upgrade). Reboot the workstation to regain printing capability.
The WordStar installation program doesn't look correct on the video monitor.		Use the PC-DOS version of WordStar (not the MS-DOS version). You can use the MS-DOS version if ANSI.SYS is installed. (Read about CONFIG.SYS in the DOS manual.)
While installing MAXAM, the message "MAXAM not installed. Metacharacter P in prompt line." appears.		Remove "\$P" from the PROMPT command, or load MAXAM before loading the PROMPT command in AUTOEXEC.BAT.

Symptom	Explanation	Solution
While using the INMAS MRP system, the printer occasionally prints garbage. The garbage looks like screen output.	Typing two [Ctrl]N's in quick succession puts this program into "echo-print" mode.	Wait for the screen to redraw between keystrokes.

TROUBLESHOOTING

Fixed Disk Problems

Symptom	Explanation	Solution
A newly installed second fixed disk drive doesn't work.		<ol style="list-style-type: none">1. Two flat cables (signal and control) connect the central board and the fixed disk drive/s. DC power harnesses are also connected to the drives' power inputs.2. The disk drive control cable (wide flat cable) loops first to the secondary disk drive (on top) and terminates at the primary disk drive (bottom).3. The two signal cables must be correctly attached to the central board--the primary drive signal cable is attached the connector at the lead edge of the board (connector pins face the front of the DIMENSION). The secondary drive signal cable is attached to the inboard connector (connector pins face up.)4. Only the primary drive uses a terminating resistor pack (because the final drive in a chain must be terminated). On HD15's, the pack is a DIP (two rows of pins like a normal IC) on the PC board, facing out the bottom of the drive. On HD30's, the pack is a SIP (one row of pins, like half an IC) near the gold fingers (peek inside to see it). MAKE NO OTHER CHANGES TO THE DRIVE. If the HD30 drive has any little wire jumpers unhooked, rehook them (look near the terminating resistor).

---->

Symptom	Explanation	Solution
(continued)		<ol style="list-style-type: none">5. If you are not using a North Star fixed disk drive installation kit, you must locate and use equivalent drive mounting hardware, including rubber grommets, plastic spacers, screws, etc. It is essential that the drive be shock mounted and electrically isolated from the drive tower.6. If the fixed disk drive was removed from a North Star ADVANTAGE or HORIZON or if it was shipped by North Star as a replacement drive, (unless it is specifically identified as a DIMENSION formatted drive) you must run the LABELER from Service Disk 2, and reformat the drive.7. Once you've installed the fixed disk drive physically, you must install it logically by running SETUP.
A replacement 30MB fixed disk drive doesn't work.		<ol style="list-style-type: none">1. The drive may be formatted for a North Star ADVANTAGE or HORIZON. It must be reformatted for the DIMENSION using Service Diskette #2.2. One or more of the four spring wire jumpers (on the disk drive circuit board) is improperly positioned. All must be "hooked."

TROUBLESHOOTING

Fixed Disk Problems (cont.)

Symptom	Explanation	Solution
The fixed disk has too many bad spots.	Although the fixed disk drive may appear to have too many bad tracks, the number may actually be within the specification tolerance.	<p>Run CHKDSK and read the DOS Manual for an explanation of this utility. 24 tracks (208896 bytes) are reserved as a bad track buffer zone. Up to 200,000 bad bytes (over the whole disk) are normal and do not result in the loss of disk space. As SETUP and MAINT detect bad tracks, they move the ends of the partitions out to make up for the lost space. After the 24 reserved track limitation has been exceeded, space is lost. However, the software can handle up to 90, and this is still acceptable.</p> <p>Read and compare the entries on the disk drive bad track label with the following table. The maximum allowed number of bad tracks follows:</p>

Drive Type	Production Limit of Bad Tracks	Field Service Limit of Bad Tracks	User Limit of Bad Tracks
HD15	16	24	90
HD30	24	48	90

Examples: An HD15 off the assembly line should have no more than 16 bad tracks; an HD15 returned from service should have no more than 24 bad tracks. If bad tracks increase during machine use, the software can accommodate up to 90.

Symptom	Explanation	Solution
Error messages appear when using SETUP or LABELER.		<p data-bbox="496 359 820 379">Is the error one of the following?</p> <ul data-bbox="496 402 1049 518" style="list-style-type: none"><li data-bbox="496 402 908 421">o RQB error 8109(H) - sector not found<li data-bbox="496 450 988 470">o RQB error 810D(H) - diskette drive not ready<li data-bbox="496 498 1005 518">o RQB error 812B(H) - fixed disk drive not ready <p data-bbox="496 547 669 567">If it is, check for:</p> <ul data-bbox="496 595 813 707" style="list-style-type: none"><li data-bbox="496 595 725 615">o disconnected cables<li data-bbox="496 644 645 663">o loose cables<li data-bbox="496 692 813 712">o improperly connected cables
The message "Bad Track 0--Disk Unusable" appears after attempting to format a partition.	Maximum partition size when using pre-DOS 1.2.0 is 16 Mbytes.	<ul data-bbox="496 777 1049 890" style="list-style-type: none"><li data-bbox="496 777 832 796">o Switch to DOS 1.2.0 or higher<li data-bbox="496 825 1049 845">o Use the FORMAT utility from DOS 1.2.0 or higher<li data-bbox="496 873 781 893">o Create smaller partitions

TROUBLESHOOTING

Fixed Disk Problems (cont.)

Symptom	Explanation	Solution
Use of DISKLOCK on a system with only one fixed disk drive produces an error message.	This is caused by a bug in DISKLOCK. The utility parks the heads before it generates the error message. (The error is caused by the code looking for a second fixed disk drive and not being able to find it.)	Ignore the error, unless other problems are evident. Note: This bug is corrected in DIMENSION DOS 1.3.0.

Symptom	Explanation	Solution
Bleed-through. The image from one screen shows up on another screen.	Bleed-through is caused by capacitive coupling of video signals to ground through the RFI filters on the DB15 connectors. (The filters are required to meet the radiation requirements of FCC Part 15.)	Move the workstation boards as far apart as possible.
Some workstation screens are not as bright as others.	(The solution applies only to monochrome workstation boards.)	<ol style="list-style-type: none">1. Adjust the brightness and contrast controls.2. Arrange monitors in areas of more subdued lighting.3. Trade workstation cables at the central module to isolate uniquely bad (dim) screens. If the problem follows the board, locate a resistor (R10 on older boards, R16 on newer boards) on the workstation board above the 15-pin connector (near the outside edge of the board). The resistive value should be 0 ohms. If the resistor has more than one stripe on it, replace it with a wire.

TROUBLESHOOTING

Monitor Problems (cont.)

Symptom	Explanation	Solution
The screen image is fuzzy.		<ol style="list-style-type: none">1. Allow the monitor to warm up completely (15 minutes).2. Adjust the horizontal hold control on the back of the monitor.
Problems of a general nature.		<ol style="list-style-type: none">1. Distinguish between Samsung and Sampo monitors by the size and position of the controls. Samsung monitors are smaller and the controls are positioned horizontally along the bottom instead of vertically along the side.2. If a monitor has vertical or horizontal hold problems, adjust the controls at the back of the unit. Adjustment of Samsung monitors requires use of a plastic or nylon tuning tool.3. If adjustments don't seem to help, measure resistance between signal ground (on the metal shield where the video cable plugs in) and chassis ground (on the 3rd prong of the AC cable). The grounds must not be shorted. <p>Monitors with shorted grounds do work in some environments. Don't let previously good behavior fool you if the monitor has been moved, or if the AC line conditions have changed.</p>

Symptom	Explanation	Solution
Incorrect characters appear on the screen.	(The solution applies only to monochrome workstation boards.)	<ol style="list-style-type: none">1. Trade keyboards.2. Refer to the section on hang problems and check for +5VDC or +12VDC shorts to ground. Resolve this problem as described in that section.3. If the problem only occurs when a local printer or other local device is connected, check the revision of the workstation board. Look on the board for a small box containing a single handwritten letter. If the letter is M or less (A, B, C, etc.), modify the board as follows. Change resistor R28 (located behind the DB15 connector) from 120 ohms to 4.7K ohms.
Sometimes the Caps Lock and Num Lock keys work backwards.	The workstation has no monitoring facility to determine the state of these keys. It always assumes they are turned off when the workstation is activated.	Turn off these keys before resetting a workstation or signing off.

TROUBLESHOOTING

Keyboard Problems (cont.)

Symptom	Explanation	Solution
The system occasionally fails after touching the keyboard.		<ol style="list-style-type: none">1. Reduce environmental static-electricity by using floor mats, carpet treatments, humidity control, or grounding workstation users before they touch their keyboards.
Sometimes touching the keyboard makes the Caps Lock and Num Lock lights turn on.		<ol style="list-style-type: none">2. Keyboard lockups are usually caused by failure of the workstation board. Failure during power-on is probably due to a defective 2681 device; failure after warmup is probably due to a defective 26LS32.

Symptom	Explanation	Solution
The workstation cable gets hot.		<ol style="list-style-type: none">1. The local printer (or other peripheral device) has signal ground shorted to chassis ground. Disconnect the device. If the peripheral device is a printer, use it as a shared printer.2. The workstation cable has +12VDC shorted to ground. Check the cable with an ohmmeter. Only pin #1 should be shorted to the metal shell of the connector--all other lines should be open. Check pin #14 particularly.
When running MAINT, it takes a minute and twenty seconds to get to the menu, and nothing can be done with printers.	There may be a problem with the fixed disk drive.	<ol style="list-style-type: none">1. 15 Mbyte drives: the drive contains an incorrect header.<ul style="list-style-type: none">o Remove the drive from the drive mount bracket.o Turn the drive over and locate the 16-pin jumper header near the middle of the printed circuit board. Check that the jumper from pin #1 to pin #16 is cut (broken).2. 30 Mbyte drives: something is wrong with the drive select logic on the central board, the fixed disk drive, or the drive cable.<ul style="list-style-type: none">o Isolate the problem to one of the above.

TROUBLESHOOTING

Miscellaneous Problems (cont.)

Symptom	Explanation	Solution
Errors appear when restoring from BACKUP diskettes. They sometimes say "file sequence error" or "Carry ___ flag-=[something]".		<ol style="list-style-type: none">1. BACKUP in pre-DOS 1.2.0 versions has bugs that appear when dealing with a large number (hundreds) of tiny files (IUS programs, for example). If these errors occur, update to DOS 1.2.0 or higher. If data must be recovered, try continuing even if sequence problems are indicated. If you are unable to continue, and if you have the expertise, use DEBUG to strip off the 128 byte header BACKUP adds to the files and concatenate the pieces.2. DOS 1.0.2 BACKUP throws out hex dumps when a problem is encountered. Update DOS to at least 1.1.0.3. DOS 1.2.0 BACKUP has only one known bug. When writing a very large file (five diskettes worth), the diskette's FAT may become contaminated. This is a bug in MS-DOS caused by DOS writing to the end of the disk, then returning to contaminate the FAT.4. Check backup diskettes by running CHKDSK. If errors are found, backup the affected files again.
The fans make too much noise.		<ol style="list-style-type: none">1. A humming sound is normal.2. If the fans sound as though there are marbles in the bearings, replace the fans.

Symptom	Explanation	Solution
The system clock doesn't keep time.	A central board jumper may be missing or the battery may be defective.	<ol style="list-style-type: none">1. Remove the bus board.2. Locate the battery on the central board. A mini-jumper should be installed near the battery.3. If the jumper is not installed, install one.4. If the jumper is installed, replace the battery.
When files are created, they appear in the directory with no date and time, or an incorrect date and time.	The system clock is confused.	<ol style="list-style-type: none">1. Set the date and time. Turn the power off/on.2. Check the battery (refer to the discussion in the previous problem).

TROUBLESHOOTING

Miscellaneous Problems (cont.)

Symptom	Explanation	Solution
<p>When using UPDATE the workstation locks up and the following message appears:</p> <p>SVC: Shell VERIFY ON Error Number: 264</p>	<p>Error 264 indicates too little TPA (workstation RAM). This occurs if UPDATE is used on a 128K RAM workstation board when ProKey or some other resident program is installed.</p>	<p>Use UPDATE when no programs are resident in memory. (Using UPDATE when SideKick is installed causes problems regardless of workstation board RAM capacity. Refer to the discussion in the following problem.</p>
<p>While using UPDATE, the utility hung. Now it's not possible to boot from the fixed disk drive.</p>	<p>Having SideKick or any other RAM intensive program loaded causes this problem. If the UPDATE is to DOS 1.2.0, perform the following steps.</p>	<ol style="list-style-type: none">1. Boot from the diskette drive using System Diskette #1.2. With System Diskette #1 still in the drive, type FD12[RETRN].3. Insert (when asked) the extra diskette that had to be provided for UPDATE. The system uses these files to fix partition #0.4. Boot from the fixed disk drive.5. Remove SideKick (or the offending program).6. Run UPDATE again.

Symptom	Explanation	Solution
Tape error #76 always occurs.		Turn the central module off, wait 30 seconds, and turn it back on.

Tape drive error codes.	Refer to the following table.
-------------------------	-------------------------------

Code	Problem
-1	Drive not formatted
-2	SVC failure (server not acknowledging messages from workstations)
2	Logic error (some internal problem; probably a bug in the workstation)
3	FAT write error (problem writing FAT to disk)
4	No FAT entries (internal error processing FAT--indicates the FAT has a problem)
5	MSL read error
6	PDT read error
7	Disk read error
8	Disk write error
9	FAT read error
10	End of tape
11	LDIR failure (was not able to find expected AU in linear directory)
12	LDIR full (more than 900 files in partition)
13	Too many subdirectories (more than 128 subdirectories in a partition)
14	Bit overflow (backup control table overrun--should never happen)
15	DFTT overflow (file restore control table overrun--should never happen)
16	TFTT overflow (same as 15)
17	Memory overflow (obsolete)
18	DRTT overflow (partition/disk restore control table overrun)

---->

TROUBLESHOOTING

Tape Drive Problems (cont.)

Symptom	Explanation	Solution
---------	-------------	----------

Code	Problem
------	---------

19	Too many bad spots (should never happen)
20	Directory entry not found (unable to locate file in directory--should never happen)
21	Subdirectories too deep (more than 12 layers in a partition)
64	Tape is write-protected
65	Unknown unit in drive
66	Drive not ready
67	Unknown command sent to drive
68	CRC error
69	Bad RQB length in message to server
70	Seek error
71	Bad media
72	Sector not found
73	Printer out of paper
74	Write fault
75	Read fault
76	General error
77	Cartridge not in drive
78	End of media
79	No more data on tape
80	Beginning of tape (not really an error)
81	Worn tape
82	Can't read status on tape
83	Stream buffer
84	Server tape task synchronization
85	Queue post
86	Illegal tape
87	Server cache deallocation error

Power Supply Voltages The DIMENSION central module power supply produces the following DC voltages:

- ☆ +5.0VDC @ > 8.5 amps and < 48.0 amps
- ☆ +12.0VDC @ > 2.2 amps and < 11.0 amps
- ☆ -12.0VDC @ > 0.0 amps and < 1.0 amps

If you need to check these three voltages, read this entire section and refer to the following procedure.

Power Supply Testing This is the test procedure for testing a Ulveco power supply using a resistance load box. No power supply parts other than the parts mentioned in the troubleshooting chart should be replaced.

Equipment Needed The following equipment is necessary for testing the power supply.

- ☆ Resistance load box (See diagram on page 2-62)
- ☆ Digital voltmeter

Procedure: **Testing the Power Supply**

1. Check to insure that J42 and J48 have shorting plugs attached.
-
2. Plug the load box cable into the power supply at connectors J45, J44, E8 and E6.
-

---->

TROUBLESHOOTING

Testing the Central Module Power Supply (cont.)

Procedure: Testing the Power Supply

3. Plug the AC input cord into the power supply at J43 and J41.
4. Plug the other end of the AC input cord into a 115VAC receptacle.
5. Carefully observe for any signs of smoke or component burning. If you detect no signs, proceed to step #6.
6. Attach the voltmeter's black (ground) lead to E9 on the power supply, then make voltage measurements as follows:

<u>Location</u>	<u>Voltage</u>
E6	+ 5VDC \pm 3%
J44, Pin 12	-12VDC \pm 5%
J44, Pin 1	+12VDC \pm 4%
J45, Pin 10	+ 5VDC \pm 3%
J45, Pin 11	+ 5VDC \pm 3%

7. If all voltages are correct, continue applying power to the power supply for 15 minutes and make the voltage measurements again. If the voltages are again correct, turn potentiometer R132 completely counterclockwise. The power supply may now be installed in a central module.
-

This concludes the procedure for testing the central module power supply. If one or more of the voltages are incorrect, use the chart on the following page to troubleshoot the supply and diagnose its problem.

Power Supply Troubleshooting Chart

Symptom	Explanation	Solution
+5VDC is low.	R146 is out of adjustment.	Set R146 for a bus board reading of +5.10VDC when making the adjustment.
No +5VDC.	IC1 failed; Either D30 or D31 is shorted.	Replace the power supply.
+12VDC is low.	R194 is out of adjustment.	Adjust R194 to specification.
No +12VDC.	Either D63, T14 or T15 is opened.	Replace the power supply.
No +5VDC, +12VDC or -12VDC.	IC1 failed; either D30 or D31 is shorted.	Replace the power supply.
No -12VDC.	IC2 failed.	Replace IC2 with a +12VDC regulator.

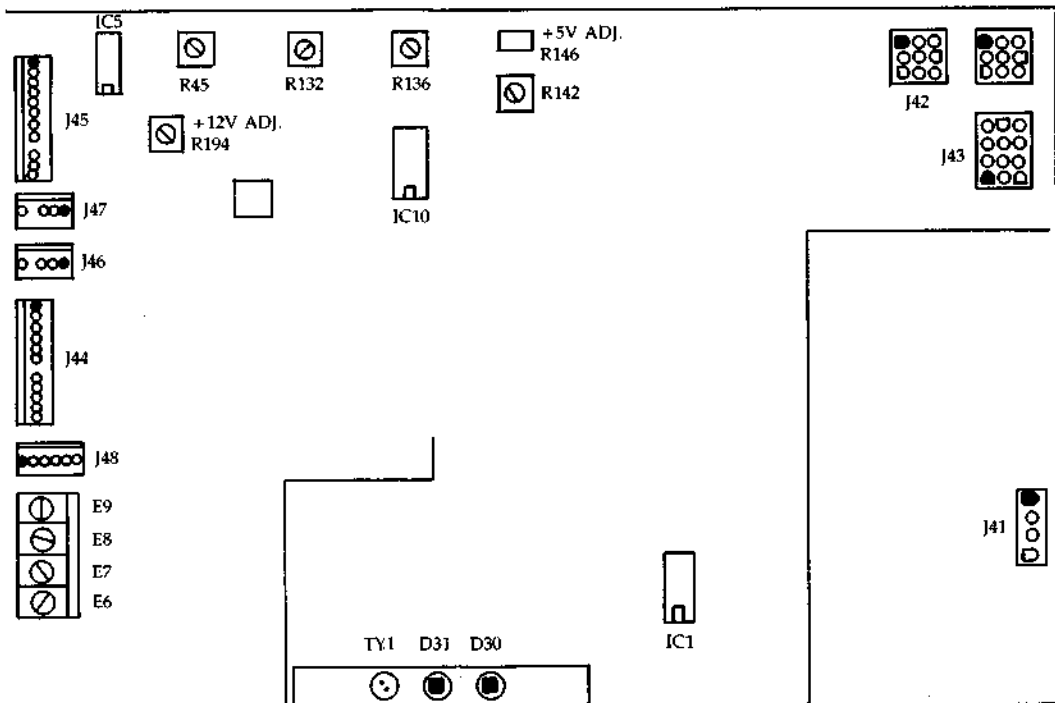
TROUBLESHOOTING

Testing the Central Module Power Supply (cont.)

Power Supply Troubleshooting Chart

Symptom	Explanation	Solution
No reset volts.	Either R132, R136 or R142 is out of adjustment.	Adjust R132 completely counterclockwise; adjust R136 to +1.90VDC (measure at IC10 pin #4); adjust R142 to +1.90VDC (measure at IC10 pin #6).
	IC10 failed.	Replace IC10 with an LM339 comparator.
No brownout volts.	R45 is out of adjustment.	Adjust R45 to +1.25VDC (measure at IC5 pin #10).
	IC5 failed.	Replace IC5 with an LM339 comparator.
Blows fuses.	The TRIAC is out of adjustment.	Adjust R155 1/16" clockwise.
	The TRIAC is shorted.	Replace with an identical device, if one is available; otherwise, replace the power supply.

TROUBLESHOOTING (cont.) Testing the Central Module Power Supply

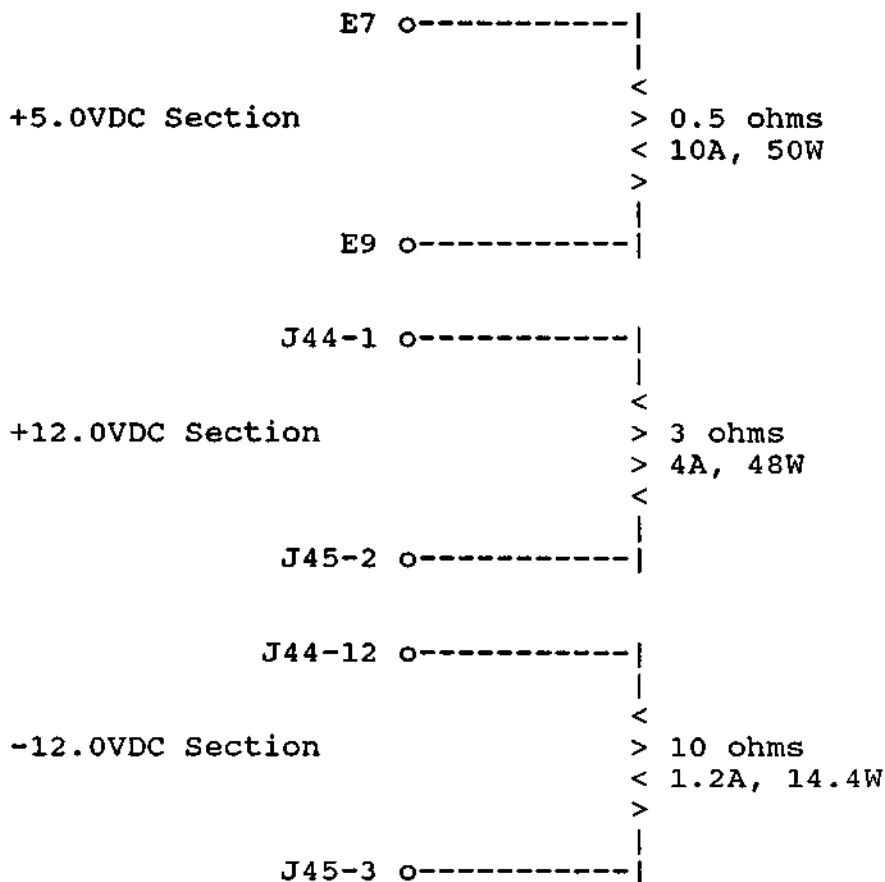


TROUBLESHOOTING

(cont.) Testing the Central Module Power Supply

Resistance Load Box

Use the following diagram to construct a resistance load box for testing the power supply.



Note: If voltage readings indicate a potentiometer out of adjustment, and if a resistance load box is not available, install the power supply in the central module in the normal manner (but do not install the power supply shield). Make the necessary adjustments to the power supply, and then install the power supply shield.

Introduction

This section of the chapter contains testing and troubleshooting procedures for the central board. Before using this section, verify that all power supply voltages are present and correct.

Note: The following procedure applies only to the multi-layer central board. Testing procedures for the double-layer central board will be available in future releases of this manual.

**Equipment
Needed**

North Star recommends use of a 100 MHz bandwidth, dual-trace oscilloscope.

Procedure: Testing the Central Board

1. Check all power supply voltages.

 2. Check the RESET* signal (TP8). It should be low at power up and then go high and stay high. If the signal is incorrect, go to the next step.

 3. Check the RES* input to the processor (TP9). It should be low at power up and then go high and stay high. If the signal is incorrect, go to the next step.

 4. Check the PUC signal from the power supply (pin #3 on the power connector). It should be low at power up and then go high and stay high. If the signal is incorrect, the power supply is not producing a power-up clear.
-

---->

TROUBLESHOOTING

Central Board (cont.)

Procedure: Testing the Central Board

5. Check the CLKOUT signal (TP7). A 6MHz square wave of about 50% duty cycle (or one half the Y2 crystal frequency in case the board is running at a different speed) should be present. If the signal is incorrect, check the Y2 crystal and the 80186 processor.

 6. Check ALE (TP17). It should normally have a high going pulse at the beginning of each bus cycle. If you are able to observe this high occasionally, it is sufficient. If no high is produced, one of four things has happened:
 - ☆ The processor read a halt instruction (possibly the result of a crash).
 - ☆ The SRDY line is stuck low (causing continuous wait states).
 - ☆ The processor is in HOLD.
 - ☆ The processor is completely defective.

 7. Check the HOLDA signal on the 80186. This comes from pin #40 of the gate array chip (a 48 pin chip). If HOLDA is low or low-pulsing high about every 18uS, go to the next step. If it is high, the refresh logic on the gate array is not functioning correctly. Replace the gate array.

 8. Check SRDY (TP3). If the signal is high, go to step #10, the TEST LOOP section.
-

---->

Procedure: Testing the Central Board

9. If SRDY is always low, check the READY signal (U98-13). If READY is low, you must determine the cause. Only expansion bus boards can pull it low (legally). If SRDY is high, the gate array logic might not have produced a READYK pulse correctly. Go to the step #10, the TEST LOOP section.
-

10. If an unresolved problem still exists, use the following test loop.

There is logic in the gate array that allows the processor to be reset for 112 clock pulses, then be taken out of reset for 224 clock pulses, then repeats the loop forever. This provides an excellent trigger for an oscilloscope when you want to view the first 40 bus cycles of the 80186 after a reset. Individual data bits, decode logic and other interesting things can be viewed in a stable state.

Installing mini-jumpers on W6 and W7 puts the central board in a test loop. W6 puts the gate array in test mode, causing it to produce the trigger on the 186TIMEINT* pin.

(Note: The 80186 will not be out of reset long enough to enable the interrupt, so sharing this pin is not a problem. W7 connects the 186TIMEINT* signal to PUC*. This resets the processor.

After the mini-jumpers are installed, reset the central board on the PUC line (either by turning on the power on, if a the board is connected to a DIMENSION power supply, or by installing and using a switch). After the reset occurs, the gate array, because it sees W6 installed, goes into test mode and remains there until W6 is removed.

Trigger the scope on the rising edge of RESET* (TP8), and proceed to step #11.

---->

TROUBLESHOOTING

Central Board (cont.)

Procedure: Testing the Central Board

11. The 80186 begins execution at location FFFF0. This is in the EPROM, which is accessed by the UCS* output of the 80186. The contents of the different versions of the EPROM are unknown at this time. In the steps that follow, pin numbers for the 28 pin EPROM are shown, and the 24 pin EPROM numbers are in parenthesis.

12. Check pin #20 (18) of the EPROM. It should go low after RESET for slightly longer than one microsecond; then it should go high and then low again. This selects the EPROMs. Most accesses at the beginning are from the EPROM so this pin jumps around a lot. If the EPROMs are being selected, go the next step.

13. The most frequent causes of problems at this point are caused by defective memory chips or bus drivers. Check that the EPROM data lines are active at the end of each EPROM cycle (about the time pin #20 (18) goes high). If a data line is hanging in an unstable state or if it seems to change from reset to reset, look for a cause. If the data appears to be correct at the EPROMs, check the lines at the processor. U25 and U23, pins #2-9, are good observation points. If the data is different or appears to be incorrect, check that bus drivers (U25 and U23) are turning on in the right direction, and that no other bus drivers are on (U26 and U27 are the only other choices).

14. Check the address lines. They should begin at location FFFF0, begin incrementing by two for an undetermined time, then branch off. If the address lines are unstable or change from reset to reset, check for a cause. The states of the address lines are indeterminate when the 80186 first comes out of reset because these states are dependent on where the 80186 was when it went into reset.

This concludes the procedure for testing the central board.

Introduction This chapter describes DIMENSION diagnostic and service utility programs.

Several diagnostic programs run automatically; the central module boot PROM stores the programs and runs them each time system power is turned on. Other diagnostic programs and service utility programs must be run by a technician; these programs are stored on three service diskettes. The three service diskettes, together with this manual, comprise the DIMENSION service pack.

- ☆ **Self-tests** - The principal DIMENSION diagnostic program consists of a group of central module self-tests. These tests are automatically invoked when the computer is turned on.
- ☆ **Service Diskettes** - Three service diskettes are available to technicians for testing the DIMENSION. These diskettes contain utility programs for formatting and labeling fixed disk drives, testing the tape drive, and extended testing of circuit boards, fixed disk and diskette drives. Future releases of the service diskettes will extend their capabilities.

CAUTION

Service Diskette #3, which is described in this release of the North Star DIMENSION Service Manual, must only be used in conjunction with the DOS operating system.

Supplemental Tools Two procedures in this chapter describe fixed disk drive tests. Although fixed disk drives can be tested when mounted in the central module, occasional testing of an unmounted drive is useful. To facilitate this process, three fixed disk drive extension cables are available:

- ☆ DC power extension cable; North Star part number 03898
- ☆ Signal extension cable; North Star part number 03899
- ☆ Control extension cable; North Star part number 03900

A procedure for attaching the extension cables is found in this chapter.

Service Precaution North Star Computers Inc. strongly recommends that service technicians always park fixed disk drive heads before turning off central module power. We also recommend that technicians pass this precaution along to their customers.

Parking the heads ensures that they will land on a safe, unwritten section of the disk drive platters, thus protecting the storage media.

There are three methods for parking the heads.

- ☆ Using the **DISKLOCK** utility if the system is running the DOS operating system
- ☆ Using the **DOWN** utility if the system is running the NetWare operating system
- ☆ Using the **PARK FIXED DISK DRIVE HEADS** option on Service Diskette #2

Self-test Definition Self-tests are integrity tests of central module critical hardware. They are invoked each time the central module is turned on. The test programs are stored within the central board boot PROM. When central module power is turned on, the programs load and test the hardware automatically. When the tests are complete, the boot PROM attempts to read in valid boot code from the diskette or fixed disk drives.

The tests execute very quickly and their operation is transparent to a system user. They do not impede a user's access to the computer, but they do provide assurance that the system is functioning properly.

Interfacing With Service Diskettes The self-tests permit service diskettes to be loaded from the diskette drive prior to reading a boot code. This feature enables extended hardware tests to be run.

Error Reporting If the self-tests detect a problem, specific errors are not shown. Testing stops, the system status LED (located on the front panel of the central module) turns off, and the computer fails to load the operating system. A successful test results in a normal operating system boot.

Test Features Self-tests of the central board check the following:

- ☆ PROM checksum
- ☆ Dynamic RAM (non-destructive)
- ☆ Processor internal register mapping
- ☆ Fixed disk buffer

**Diskette
Drive Boot
Sequence**

The following sequence of events occurs when booting from the diskette drive:

- ☆ If a diskette is inserted in the diskette drive after turning on system power, the diskette drive attempts to read boot tracks from the diskette. If no valid boot file is found or if an error occurs during reading, the boot process halts and the system status LED turns off.
- ☆ If the diskette contains a valid boot file and if no errors occur during reading, the central module executes the boot code.

**Fixed Disk
Drive Boot
Sequence**

The following sequence of events occurs when booting from the fixed disk drive:

- ☆ If a diskette is not inserted in the diskette drive, the fixed disk drive attempts to read boot tracks from the fixed disk platters. If no valid boot file is found, or if an error occurs during reading, or if the fixed disk label is not valid, the boot process halts and the system status LED turns off.
- ☆ If there is a valid boot file and if no errors occur during reading, the central module executes the boot code.

**Service
Diskette
Categories**

Service diskette diagnostics may be divided into two categories--those that test system electronics and those that test and format system mass storage.

- ☆ Service Diskette #1 tests system electronics; this includes identification of system configuration as well as testing and evaluation of central and workstation PCB's.
- ☆ Service Diskette #2 tests the fixed disk and diskette drives. This diskette also contains programs that format and write a label for the fixed disk drive.
- ☆ Service Diskette #3 tests the tape drive and tape drive interface board.

Each service diskette contains several programs which are menu selectable. Descriptions of the program options are found later in this chapter.

**Copying
Service
Diskettes**

Use the operating system utility called DISKCOPY of either North Star NetWare or DIMENSION DOS (version 1.3.0 or later) to make copies of the service diskettes. Do not attempt to copy the diskettes using any other process.

DIAGNOSTICS

Service Diskettes (cont.)

Loading Service Diskettes #1 and #2 Service Diskettes #1 and #2 contain operating system tracks. Boot these diskettes from the diskette drive using the following procedure.

Procedure: Loading Service Diskettes #1 and #2

1. Hold a service diskette in one hand while turning on power to the central module with the other.
-
2. Wait for the diskette drive LED to turn on, and insert the diskette in the drive. If the LED turns off before you insert the diskette, begin the sequence again. The system automatically reads the boot tracks and loads the diagnostic program menus.
-

This concludes the procedure for loading Service Diskettes #1 and #2.

Loading Service Diskette #3 Service Diskette #3 has no operating system tracks. Boot DIMENSION DOS (version 1.2.0 or later) from the fixed disk, sign on at a workstation, and use the DISKCOPY utility to make a working copy of Service Diskette #3. Request the diskette drive, place the working copy (without a write-protect tab) in the diskette drive, and change the current drive to A. Type TBU to request the diagnostic program menu. A procedure given later in this chapter explains how to run the Tape Diagnostics from the fixed disk.

Introduction Service Diskette #1 is available in two versions, a 6-MHz version and an 8-MHz version. They should be used with the six and eight megahertz central boards, respectively.

Both versions of Service Diskette #1 contain a menu driven set of programs that test and evaluate the central board and workstation boards. These programs offer more extensive circuit board testing than the self-tests performed during system power-on.

Workstation #1 serves as the test console and is not tested. If you wish to test this workstation, trade the thumbwheel switch setting of workstation #1 with the setting of a tested board.

After you boot Service Diskette #1, workstation #1 displays the system configuration screen. This screen indicates the amount of available central board memory, the number of testable workstation boards (excluding workstation #1), and specific information about each workstation.

The configuration screen also contains a field called "configuration word." This value, which contains the attributes of each workstation, when used in conjunction with options #8 and C of the Test Command Menu, allows a technician to test a workstation without also testing unrelated hardware.

DIAGNOSTICS

Service Diskette #1 (cont.)

Screen #1 After you boot Service Diskette #1 from the diskette drive, the following screen appears:

```
DIMENSION System Configuration
  The central board appears to have xxxKb of memory present.

  Number of workstation boards: ( xx )
  Thumbwheel switch setting
  Configuration word (for menu option #8)
  ┌
  V
  xx  xxxx Monochrome workstation, xxxKb
  xx  xxxx Color workstation, xxxKb

  DESCRIPTION
  Press <RETURN> for command list.
```

This screen, which describes system configuration, indicates:

- ☆ Central board RAM capacity
- ☆ Number of workstation boards
- ☆ Workstation board switch settings
- ☆ Workstation board RAM capacity
- ☆ Workstation board configuration word (a number assigned by the diagnostic program)

When you are ready to begin testing, press [Retrn].

**Test
Command
Menu**

When you press [Retrn] from the configuration screen, the Test Command Menu appears at workstation #1.

```
North Star DIMENSION System Tests -- Rev. 2.x.x
-- Test Command Menu --
0 - Test the central board only
1 - Test the complete system
2 - Run a single test (use with menu option #9)
3 - Change loop mode,          now = OFF
4 - Change abort on error,     now = OFF
5 - Change break on error,     now = OFF
6 - Change wait on break,      now = OFF
7 - Change loop detection,     now = OFF
8 - Select loop detection pattern now = xxxxH
9 - Select new test pointer    now = xxxxH
A - Connect to Automated Test System
B - Display system configuration
C - Test a single workstation board (I.D. from menu option #8)
D - Workstation character display test
E - Test all workstations
```

**Workstation
Screen**

During central module testing, the following screen appears at all workstation monitors (except workstation #1). This screen remains unchanged at individual monitors until they are tested.

```
The system is temporarily unavailable while routine
maintenance is performed. Your patience is appreciated.
                                Your System Manager
```

DIAGNOSTICS

Service Diskette #1 (cont.)

Test Options The following list describes the options available from the Test Command Menu.

- ☆ **Option 0** - checks the status of the following central PCB circuits:
 - RAM matrix integrity
 - Parity
 - 80186 DMA logic
 - 80186 timer logic
 - Fixed disk boot
 - 80186 instruction set
 - Gate array chip
 - 80186 interrupt set
 - Real time clock
 - CPU revision

- ☆ **Option 1** - evaluates the central PCB (described in the previous paragraph) and checks the status of the following workstation PCB circuits:
 - Boot RAM
 - Main RAM
 - Display RAM
 - Interrupt logic
 - BIOS emulation test
 - ROM parity detection circuit
 - Communication with server
 - Serial interface (internal loopback)

- ☆ **Option 2** - permits the user to run, as individual tests, most of the options described below. This option should be used only by experienced technicians.

- ☆ **Option 3** - is a toggle that allows a technician to run a test or sequence of tests continuously when switched ON.

Test Options
(cont.)

- ☆ Option 4 - is a toggle that informs the test sequencer to exit test mode and return to the Test Command Menu if an error occurs. This option is normally not used.
- ☆ Option 5 - is a toggle that informs the test sequencer to provide an expanded error report rather than a simple PASS/FAIL message.
- ☆ Option 6 - is a toggle that allows a user to extend options after an error has been reported. This option should be used only by experienced technicians.
- ☆ Option 7 - when used in conjunction with option #8 allows looping of a specific test on a known good circuit board. The output of this test can then be compared with outputs from the same test being performed on questionable boards. The option should be used only by experienced technicians. This option is normally not used.
- ☆ Option 8 - is used in conjunction with option #7. The number you should enter here is the value labeled "pattern" from a defective circuit board's extended error message. You may also use this option to skip all other tests and proceed to test a single workstation (using option C). The workstation board's configuration word is provided when the service diskette is booted and can be reviewed using option B. This option should only be used by experienced technicians.
- ☆ Option 9 - allows specifying a particular test (from the data pointers screen). This option is currently available only for central board testing and does not support an equivalent function for workstation boards. The option is particularly valuable for testing shared I/O ports. After a test value has been entered (only from those values shown on the test data pointers screen), select option #2 to execute the test.

DIAGNOSTICS

Service Diskette #1 (cont.)

- Test Options (cont.)
- ☆ Option A - permits factory testing of the system prior to shipment. In future releases of the service disk #1, this option will be used to support remote (TELCO) diagnostics.
 - ☆ Option B - causes the configuration screen to be displayed.
 - ☆ Option C - is used in conjunction with option #8. Refer to the earlier discussion.
 - ☆ Option D - loads all workstations with a screen that exercises the various attributes of alphanumeric mode. This option is not actually a test. It simply provides the means to set up a monitor to verify attribute functionality and adjustment.
 - ☆ Option E - permits a technician to forego central board tests and proceed directly to workstation board testing.
 - ☆ Option H - Note: this option selection letter does not appear on the menu screen.

This screen is provided for experienced technicians who have narrowed a problem to a specific circuit board. The option assists troubleshooting to the component level (only the central board is supported at this time) and testing (with the concurrent use of test connectors) the shared I/O ports.

When this option is selected, a special screen appears which illustrates a list of individual tests (central board only) and their associated "test pointer" values. An experienced technician may use these values in conjunction with option #9, Select new test data pointer. Option #2, Run a single test, invokes test execution.

Test Data
Pointer
Screen

If you wish to run a specific test rather than a series of tests, or if you wish to test either the serial or parallel port, use the test pointers from the following screen in conjunction with Test Command Menu options #9 and #2.

Test data pointers to be used with option #9:

Central board ..			
Incremental	- 7243	Instruction	- 7200
Parity	- 7387	Address/word	- 7402
Address/even	- 7442	Address/odd	- 7482
Address/segment	- 74EB	Gate array	- 7AB0
DMA logic	- 50E0	Interrupt	- 58E0
Timers	- 5588	Shared parallel port	- 5FE0*
Shared serial port	- 6070*	Clock/calendar	- 65B0
Fixed disk boot	- 7830	CPU revision	- 7680

* - denotes tests requiring special hardware

Press <RETURN> to continue

Note: The values listed above are only provided as examples of actual values which may appear when you run diagnostics.

DIAGNOSTICS

Service Diskette #1 (cont.)

Central Board Test Analysis Screen

The following screen permits in-depth examination of testing as it occurs. The screen provides extremely detailed information about individual tests and the pass or failure modes of those tests. Note that the information contained on this screen is available and open to interpretation only by experienced technicians.

```
***.....***
Pattern   Loop Cnt   # failures   TD Rev   TE - 01/21/86
0000      0000      0001         0000

    *** LAST ERROR DETECTED ***
Pattern   Loop Cnt   Err Type
0000      0000      FOUND VIA I/O REGISTER

    i/o addr   exp stat   act stat   i/o addr   exp stat   act stat
    000C      0001      0000

Press any key to continue or
A - Return to main menu
B - Set/clear break on error (toggle)
C - Clear loop and continue testing
L - Loop on last group until next keystroke
S - Single loop on last group
<ESC> - Connect to Automated Test System
>
```

**Workstation
Board
Test
Failure
Screen**

When individual workstations are being tested, a screen similar to the one below appears at each monitor. The screen provides a pass/fail synopsis of all workstation board tests after they are performed. This screen may be used by all technicians.

512 Kilobyte Color Workstation

MAIN RAM TEST

Filling bank: 1, 2, 3, 4, 5, 6, 7, 8

Verifying bank: 1, 2, 3, 4, 5, 6, 7, 8

(error message may appear here)

PARITY TEST

Passed forced parity error test

Scanning bank: 1, 2, 3, 4, 5, 6, 7, 8

(error message may appear here)

LOCAL SERIAL PORT TEST

Internal loopback test -- Passed

INTERRUPT TEST -- Passed

COUNTER/TIMER TEST -- Passed

VIDEO RAM TEST -- Passed

BIOS EMULATION TEST -- Passed

Please record the error messages highlighted above for your dealer. Thank you.

DIAGNOSTICS

Service Diskette #1 (cont.)

Communication Port Testing

Two test modules are not part of the normal test sequence. These modules verify the integrity of the shared parallel port and serial port #1. (Testing of serial port #2 will be implemented in a future release of the diagnostic program.)

These two tests are not run in the normal sequence because they require the installation of special test connectors. In order to install the test connectors, peripheral devices must be disconnected to run any test.

To use these two tests, you must construct two test connectors using the pinout charts illustrated below. The connectors are readily available from electronics parts supply houses (such as Radio Shack). Radio Shack part numbers are shown.

Serial Port #1
(Radio Shack #276-1547)
(Sub-D male connector)

Pin # ---> Pin #

#2 ---> #3
#4 ---> #5 ---> #22
#6 ---> #8 ---> #20
#15 ---> #17 ---> #24

Parallel Port
(Radio Shack #276-1548)
(Sub-D female connector)

Pin # ---> Pin #

#7 ---> #16
#19 ---> #21

Introduction Service Diskette #2 contains a menu-driven set of programs used for testing the diskette drive as well as testing, formatting and labeling the fixed disk drive(s). Samples of error screens that may appear during use of this diskette and an error code matrix are located later in this chapter.

Cautionary Notes ☆ Options A, B, C and D on Service Diskette #2 are destructive to stored data. Backup fixed disks before beginning these tests.

- ☆ Option A, the diskette drive test, is only as reliable as the blank diskette you use to conduct the test. If the test indicates a problem, rerun the test with a different blank diskette. Don't replace a diskette drive before confirming errors with a second diskette.

Suggestion: the following technique facilitates diagnosis of diskette drive alignment problems.

During system installation, create a reference diskette by copying the contents of Service Diskette #2 to a new diskette. When servicing the system in the future, have the diskette drive attempt to read the data on the reference diskette. If it cannot read the data without errors, the drive may require alignment.

- ☆ Before using options B, C and D on Service Diskette #2, remove the central module cover and copy the information from the fixed disk drive label. Make note of the five-character drive code and all entries in the Bad Track Table (cylinder and head locations of each bad track).
- ☆ Format and label fixed disks (option D) before using the Fixed Disk Drive Tests (options B and C). These tests automatically record bad tracks on the Bad Track Table; therefore, the table must be generated before the test begins.

DIAGNOSTICS

Service Diskette #2 (cont.)

Main Menu The following screen illustrates the main menu of Service Diskette #2. The diskette drive test option and fixed disk drive test options perform read/write tests on the media. Service Diskette #2 also contains programs that format the fixed disk and read and write its label.

```
North Star DIMENSION
Service Diskette #2
Version 1.0.0

Main Menu

a) Diskette Drive Test
b) Fixed Disk Drive #1 Test
c) Fixed Disk Drive #2 Test
d) Fixed Disk Format and Label Writer
e) Park Fixed Disk Drive Heads
```

- Test Options**
- ☆ **Option A** - You may test the diskette drive by selecting option A. This test verifies the integrity of the diskette drive by randomly writing and reading data patterns to a blank diskette. Format a blank diskette and have it ready for use before selecting the option. Although completion of this option takes approximately five hours, you have the option of stopping the test at any time. Pressing [Ctrl] and C stops the test and recalls the DIMENSION DOS command prompt.

 - ☆ **Options B/C** - You may test a fixed disk drive by selecting option B or C. These tests verify the integrity of the fixed disk drives by randomly writing and reading data patterns to the disks. At the completion of each test, bad tracks are automatically recorded on the Bad Track Table. Completion of this option takes approximately five hours.

**Test
Option
(cont.)**

☆ **Option D** - You may format or create a label for a fixed disk by selecting option D. This option is comprised of three menus. The first two menus are used for selecting the fixed disk drive number and drive type; the third is used for activity selection. Completion of this option takes approximately 70 seconds.

- **Drive Number Selection Menu** - Use this menu to select the number of the fixed disk drive you wish to format. Drive #1 is the bottom drive, nearest the base panel of the central module. Type [Retrn] to select Drive #1 automatically.
- **Drive Type Selection Menu** - Use this menu to select the type of fixed disk drive you wish to format. You must remove the top cover of the central module and look at the fixed disk paper label to obtain this information. When you are prepared to answer the screen prompt, type the number adjacent to the drive type rather than the five-character disk drive code. Type [Retrn] to select a Rodime 30 Mbyte drive automatically.

After you have made your selection, the program responds twice. First, it converts the single digit you typed into a five-character disk drive code. This step is included to ensure you have made a correct choice. Second, it presents the Activity Menu and waits for you to make a selection.

- **Activity Menu** - Use the Activity Menu to select various fixed disk options. The following options are available from the menu:

Option A (Add a bad track); use this option to add bad tracks (from the fixed disk paper label) to the Bad Track Table after formatting, labeling or testing the fixed disk.

DIAGNOSTICS

Service Diskette #2 (cont.)

Test Options (cont.)

Note: You must make entries to the Bad Track Table using the cylinder and head number of the bad track.

Option D (Display the Bad Track Table); use this option to list the bad tracks entered on the Bad Track Table.

Note: You are able to display the Bad Track Table only before formatting and labeling the fixed disk.

Option R (Remove a bad track); use this option to correct incorrect entries in the Bad Track Table.

Note: You must use bad track reference numbers--not head and cylinder locations--when removing entries from the Bad Track Table.

Option F (Format the disk and write a label with changes); use this option to format and write a new label to the fixed disk. Use of this option saves manual entries made to the Bad Track Table before formatting. This option returns you to the main menu after the disk has been formatted and labeled.

Option X (Exit to the Main Menu (without saving changes).) Use this option to leave the Activity Menu and recall the DIMENSION DOS command prompt.

- ☆ **Option E -** You may safely position the heads of the fixed disk drive by selecting option E. This option rotates the head mechanism so the heads are positioned over an area of the disk that does not contain data. Use this option before transporting or shipping a fixed disk drive.

**Loading
Service
Diskette #2**

The following procedure explains how to load Service Diskette #2 and how to properly use its features. It is very important to follow the steps in the order in which they are presented; misuse of the diskette may result in a loss of data, an inaccurately tested diskette or disk drive, or an improperly formatted and labeled fixed disk.

CAUTION

Before using options B, C or D on Service Diskette #2, remove the central module cover and copy the information from the fixed disk label. Note the five-character drive code and all entries in the Bad Track Table (cylinder and head locations of each bad track).

Procedure: Loading Service Diskette #2

1. Hold Service Diskette #2 in one hand and turn on central module power with the other.

 2. Wait for the diskette drive LED to turn on, and insert Service Diskette #2 in the diskette drive.

 3. When the sign on screen appears, type **MANAGER** for the "Name" entry, and type **PASSWORD** for the "Password" entry.
-

---->

DIAGNOSTICS

Service Diskette #2 (cont.)

Procedure: Loading Service Diskette #2

4. When A> appears,
type
DISKTOOL
- SERVICE DISKETTE #2**
- WARNING:** Use of Service Diskette #2 may be destructive to stored data. Backup fixed disks before beginning tests.
- [F6] proceeds, [F10] cancels
-
5. Press
[F6]
- North Star **DIMENSION**
Service Diskette #2
Version 1.0.0
- Main Menu**
- a) Diskette Drive Test
 - b) Fixed Disk Drive #1 Test
 - c) Fixed Disk Drive #2 Test
 - d) Fixed Disk Format and Label Writer
 - e) Park Fixed Disk Drive Heads
-
6. If you wish to test a diskette drive, refer to the procedure called Diskette Drive Test.
- If you wish to test a fixed disk drive, refer to the procedure called Fixed Disk Drive Test.
- If you wish to format and label a fixed disk, refer to the procedure called Fixed Disk Format and Label Writer.
- If you wish to transport or ship the fixed disk drive, refer to the procedure called Park Fixed Disk Drive Heads.
-

This concludes the procedure for loading Service Diskette #2.

**Diskette
Drive Test**

Use this procedure to test a DIMENSION diskette drive. Have a formatted, blank diskette ready before selecting this test option.

Note: The blank diskette must be formatted for 9 sectors per track on both sides. This is the default mode of the DIMENSION format utility.

CAUTION

The diskette drive test is only as reliable as the blank diskette used to conduct the test. If the test indicates a problem, use a different diskette. Don't replace a drive before confirming errors with a different diskette.

Procedure: Using the Diskette Test Option

1. After loading Service Diskette #2, type A to select the Diskette Drive Test.
-

---->

DIAGNOSTICS

Service Diskette #2 (cont.)

Procedure: Using the Diskette Test Option

2. Follow the instructions on the screen to complete the test. Note: The Diskette Drive Test normally takes approximately five hours to run to completion. You have the following options when the test is running:
 - ☆ You may pause the test by typing [Ctrl] and [Num Lock] or [Ctrl] and S. Press any key to continue.
 - ☆ You may pause the test to look at the current test parameters, the soft error summary, and the hard error summary by pressing the space bar. Press any key to continue.
 - ☆ You may stop the test and recall the DIMENSION DOS command prompt by pressing [Ctrl] and C. No error summaries are displayed when the test is stopped.
-

This concludes the procedure for using the diskette test option.

**Fixed Disk
Format and
Label Writer**

Use this procedure to format and label a DIMENSION fixed disk drive. This option must be used before testing a fixed disk drive and before manually adding bad tracks (from the fixed disk paper label) to the Bad Track Table.

CAUTION

Use of Service Diskette #2 may be destructive to stored data. Back up fixed disks before beginning tests.

Before using Service Diskette #2, remove the central module cover and copy the information from the fixed disk paper label. Note the five-character drive code and all entries in the bad track table (cylinder and head locations of each bad track).

Procedure: Fixed Disk Format and Label Writer Option

1. After loading Service Diskette #2, type **D** to select the Fixed Disk Format and Label Writer option.

2. Follow the instructions on the screen to complete the procedure. Refer to the last section of this chapter for information regarding error screens and error codes.

This concludes the procedure for formatting and labeling a fixed disk.

DIAGNOSTICS

Service Diskette #2 (cont.)

Test Fixed Disk Drives Use this procedure to test fixed disk drive #1 (the bottom drive) or fixed disk drive #2 (the top drive) in the DIMENSION central module.

CAUTION

Use of Service Diskette #2 may be destructive to stored data. Backup fixed disks before beginning tests.

Format and label the fixed disk before using the fixed disk tests. These tests automatically record bad tracks on the Bad Track Table; therefore, the table must exist before the test begins.

Procedure: Fixed Disk Drive #1 and #2 Test Options

1. Before loading Service Diskette #2, remove the top cover of the central module and copy the information contained on the fixed disk label.
 2. Load Service Diskette #2 and type **D** to select the Fixed Disk Format and Label Writer option.
 3. After formatting and writing a new label to the disk drive/s, type **B** to select Fixed Disk Drive #1 Test or **C** to select Fixed Disk Drive #2 Test.
-

---->

Procedure: Fixed Disk Drive #1 and #2 Test Options

4. Follow the instructions on the screen to complete the test. Refer to the last section of this chapter for information regarding error screens and error codes.
-

This concludes the procedure for testing fixed disk drive #1 or fixed disk drive #2.

DIAGNOSTICS

Service Diskette #2 (cont.)

**Park Fixed
Disk Drive
Heads**

Use this procedure to park a fixed disk drive head assembly before transporting or shipping a fixed disk drive.

Procedure: Park Fixed Disk Drive Heads Option

1. **After loading Service Diskette #2, type E to select the Park Fixed Disk Drive Heads option.**
 2. **Follow the instructions on the screen to complete the procedure.**
-

This concludes the procedure for parking the fixed disk drive heads.

Using Fixed Disk Drive Extension Cables The following procedure may facilitate testing, formatting and labeling a fixed disk drive that is not mounted in a DIMENSION central module. The procedure makes use of the three fixed disk drive extension cables specified in the beginning of this chapter.

Procedure: Fixed Disk Drive Extension Cable Installation

1. Detach the 20-pin (signal cable) connector from location J12 on the central board.

2. Detach the 34-pin (control cable) connector from location J13 on the central board.

3. Detach the 4-wire (DC power) connector from the back of the mounted fixed disk drive.

4. Attach the 20-wire (signal) extension cable to location J12 on the central board. The red stripe on the ribbon cable must be facing the power supply side of the central module.

5. Attach the 34-wire (control) extension cable to location J13 on the central board. The red stripe on the ribbon cable must be facing the power supply side of the central module.

6. Attach the 4-wire (DC power) extension cable to the fixed disk DC power cable.

---->

DIAGNOSTICS

Service Diskette #2 (cont.)

Procedure: Fixed Disk Drive Extension Cable Installation

7. Attach the unconnected ends of the three extension cables to the remote fixed disk drive circuit board.

Note: Orient the fixed disk drive with the rear edge of the drive facing the front of the central module and the circuit board facing down. Attach the ribbon cables with their red stripes facing the disk drive side of the central module.

8. Proceed to format, label and test the remote fixed disk drive.
-

This concludes the procedure for installing the fixed disk drive extension cable set.

- Introduction** This section of the chapter provides error codes that may appear if a failure is detected by the automatic self-tests. This section also illustrates error screens that may appear if a failure is detected when using Service Diskette #2.
- Error Codes** The error codes shown are applicable to failures detected by the automatic self-tests as well as diskette and fixed disk tests, because the codes are valid for all DIMENSION hardware, most diagnostic programs and the DIMENSION DOS operating system.
- Error Screens** The error screens shown in this section are those which may appear during tests of the diskette and fixed disk drives. Although most of the screens indicate that an error has occurred, some screens may appear only when you request information or at the conclusion of a test (for example, the diskette drive Current Test Parameters).
- Use of the Error Code Matrix** The error codes are shown in a matrix with the names of major DIMENSION hardware subsystems. Descriptions of these subsystems (for diagnostic purposes) are found later in this chapter.
- If an error occurs during system operation, self-testing, or service diskette testing, look up the code in the matrix. To the right of the error code, you will find one or more subsystems numbered #1 through #11. #1 indicates the most likely subsystem to have caused the failure; #11 the least likely.
- Note:** We recommend that if more than one subsystem is shown, replace more accessible parts before replacing those that are difficult to get to.

DIAGNOSTICS

Error Screens and Codes (cont.)

Use of the Error Code Matrix (cont.)

Example: It is faster to replace a workstation board before replacing a central board (if both are listed as possible causes of the failure) even if the matrix indicates that the central board is the more likely culprit.

Types of Error Screens

There are four types of error screens that may appear during diskette and fixed disk drive tests. They are:

- ☆ Reading errors
- ☆ Writing errors
- ☆ Soft errors
- ☆ Hard errors

Reading Errors

The following display is an example of an error message that appears if an error occurs during a read cycle of either a diskette or fixed disk test.

READING

Error code: xxxx
Error description:
 Iteration: xxxx
 Logical record number: xxxx
 Number of bad bytes: xxxx
 Expected data: xxxx
 Actual data: xxxx
 Sector location: xxxx

Writing Errors

The following display is an example of an error message that appears if an error occurs during a write cycle of either a diskette or fixed disk test.

```

WRITING

Error code: xxxx
Error description:
    Iteration: xxxx
    Logical record number: xxxx

Checking for bad tracks.
Number of errors: xxxx
    
```

Soft Errors

The following display is an example of a soft error summary that appears when diskette or fixed disk drive test is paused (by pressing the space bar) or completed.

```

Soft Error Summary Table

Characters that appear in parenthesis are not valid.

ITER  LRN  ERROR  COUNT  EXP  ACT  LOC

xxxx  xxxx  xxxx  xxxx  xxxx  xxxx  xxxx
xxxx  xxxx  xxxx  xxxx  xxxx  xxxx  xxxx
xxxx  xxxx  xxxx  xxxx  xxxx  xxxx  xxxx
    
```

DIAGNOSTICS

Error Screens and Codes (cont.)

Hard Errors

The following display is an example of a hard error (Bad Track) summary that appears when a fixed disk test is paused (by pressing the space bar) or completed.

Bad Track Summary Table

Ignore this summary during diskette drive testing.

ITER	LRN	Error
XXXX	XXXX	XXXX
XXXX	XXXX	XXXX
XXXX	XXXX	XXXX

Interrupt and End-of-test Screens

There are three types of interrupt and end-of-test screens that may appear during diskette and fixed disk tests. They are:

- ☆ Parameter screen (with soft and hard error summaries)
- ☆ Normal end-of-test screen
- ☆ Forced end-of-test screen

**Parameter
Screens**

The following display is an example of a parameter screen that appears when you begin or pause (by pressing the space bar) a diskette or fixed disk drive test.

```
Current Test Parameters

Testing LRM: x to xxx
Drive: x
Reads: xxxx
Write retry: xx
Seeks: (Sequential)(Random)
Data: (Fixed)(Random)
Compare: (On)(Off)
Iteration: 1/1
Error count: xxxx
```

If a test is paused and soft or hard errors have been recorded, summary tables showing these errors also appear.

**Normal
End-of-test
Screen**

The following displays are examples of normal end-of-test screens that appear after a diskette or fixed disk drive test has run to completion.

```
The drive has passed.

E   to list errors
P   to display test parameters
X   to exit
```

DIAGNOSTICS

Error Screens and Codes (cont.)

Normal End-of-test Screen (cont.)

```
*****  
**TEST DISKETTE MAY BE WORN OUT**  
*****  
  
*****  
*****REJECT DRIVE*****  
*****TOO MANY SOFT ERRORS*****  
*****  
  
E   to list errors  
P   to display test parameters  
X   to exit
```

Forced End-of-test Screen

You can obtain a summary of errors that have occurred during a test and stop the test at any point in its cycle by first pressing the space bar, then pressing the [Ctrl] and [C] keys simultaneously. An error summary will appear, followed by the message:

Terminate batch job (Y or N)?

If you type N, the Service Diskette #2 main menu reappears on your screen. If you type Y, the DIMENSION DOS command prompt reappears on your screen.

**Error Code
Matrix**

The error code matrix indicates possible causes for the appearance of an error code. There will usually be at least two items that you should investigate. The items will normally be DIMENSION hardware subsystems, but problems may also be caused by printer errors or misuse of system commands by one or more operators. Read the following list for a complete description of each error causing subsystem before you begin to troubleshoot an error code.

- ☆ **Central Board** - the problem may be located in the central board hardware. This may include a failure of circuit board components or failure of interfaces between the central board and other central module subassemblies.
- ☆ **Workstation Board** - the problem may be located in the workstation board hardware. This may include a failure of circuit board components, incorrect thumbwheel switch settings, or failure of interfaces (including the workstation cable and its connector box) between the workstation board and other subassemblies.
- ☆ **Bus Board** - the problem may be located in the bus PCB hardware. This may include a failure of circuit board components or failure of interfaces between the bus PCB and other circuit boards.
- ☆ **Diskette Drive** - the problem may be located in the diskette drive hardware. This may include failures of the diskette drive read/write head, the controller board, etc.
- ☆ **Diskette Media** - the problem may be located on the diskette. This may include flaws on or loss of data from the diskette or use of an improper diskette.
- ☆ **Fixed Drive** - the problem may be located in the fixed disk drive hardware. This may include failures of the fixed disk drive read/write heads, the controller board, etc.

DIAGNOSTICS

Error Screens and Codes (cont.)

Error Code Matrix (cont.)

- ☆ **Fixed Media** - the problem may be located on the fixed disk platter. This may include flaws on or loss of data from the platter.

- ☆ **Power Supply** - the problem may be located in the central module power supply assembly. This may include failure of circuit board components or failure of DC power interfaces between the power supply and subassemblies such as the bus board or fixed disk, diskette and tape backup drives.

- ☆ **System Software** - the problem may be due to a failure of the system software on the fixed disk. Data may be erased or contaminated. Reloading the software to the fixed disk from the diskette masters will usually resolve this type of problem.

- ☆ **Printer** - the problem may be located in the a shared or local printer. This may include failure of printer hardware, lack of power to the printer, or incorrect interface between the printer and the subassembly to which it is attached.

- ☆ **User Operation** - the problem may be due to user error. This may include errors that result from misuse of a system command or application program.

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media	Power Supply	System Software	Printer	User Operation
00	1								2		
01									1		
02									1		
03	See pages 3-41 through 3-43 (disk driver error codes) when this error code appears.										
04	4	3								1	2
05		2							3		1
06									2		1
07									2		1
08									2		1
09									2		1
0A									2		1
0B									2		1
0C									1		2
0D									2		1
0E									1		

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media	Power Supply	System Software	Printer	User Operation
0F									1		
10			4			3			2		1
11									2		1
12									2		1
13									2		1
14									1		
15									1		2
16									1		
17				4	3	2	1				
18				2	4	1	3	5	6		
19				2	4	1	3	5	6		

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media	Power Supply	System Software	Printer	User Operation
01 41 81 C1				3	2				4		1
03 43 83 C3				5	3	4	2		6		1
05 45 85 C5	3			4	1	5	2				
08 48 88 C8					1						2
09 49 89 C9	3			4	1	5	2				
0D 4D 8D CD				4	2	3	1		5		
12 52 92 D2	3			2	1						
13 53 93 D3	3			2	1						
14 54 94 D4	3			2	1						
15 55 95 D5	3			1		2					
16 56 96 D6	2			1							
17 57 97 D7	2			1							
19 59 99 D9					1				2		
1A 5A 9A DA									1		
1B 5B 9B DB									1		

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media	Power Supply	System Software	Printer	User Operation
1C 5C 9C DC	2			1							
1D 5D 9D DD	2			1							
1E 5E 9E DE	2					1					
1F 5F 9F DF	2					1					
20 60 A0 E0	2								1		
21 61 A1 E1	2			1							
22 62 A2 E2	2			1							
23 63 A3 E3	2			1							
24 64 A4 E4	2			1							
25 65 A5 E5	2					1					
26 66 A6 E6	2					1					
27 67 A7 E7	2					1					
28 68 A8 E8	2					1					
29 69 A9 E9	3			2		1					
2A 6A AA EA	2					1					

3-44 DIMENSION Service Manual

Introduction Service Diskette #3 contains a diagnostic program and support files that test the DIMENSION tape drive, tape drive interface board, interface harness and tape cassettes.

The test program, TBU.EXE, is completely menu-driven (explanations of the menu options follow). After a menu selection is made, no further attention to the program is required. The diagnostic program permits tests on the system to run for as long as 99 hours before indication of successful completion or failure. Test completion is clearly signaled and the status of the tape drive and associated electronics is indicated with PASS/FAIL/RETEST results.

A separate menu provides technicians with the means to alter test parameters. This menu also allows individual commands to be transmitted to the drive during evaluation or troubleshooting.

Program Customization The test program may be easily customized for special applications by saving alterations to the program in a file called INITXX.VAL. This file may then be used at any time.

The INITXX.VAL file is able to store two customized programs:

- ☆ one that may be used in a repair facility
- ☆ one that may be used in the field

Each test may be changed without affecting the other.

DOS and TBU.EXE You MUST use DIMENSION DOS version 1.2.0 or later from a fixed disk boot to run tape diagnostic program contained on Service Diskette #3.

DIAGNOSTICS

Service Diskette #3 (cont.)

Loading Service Diskette #3 The test must be stored in and run from the fixed disk drive. The following files must be present for the diagnostic program to run:

- ☆ TBU.EXE
- ☆ INITXX.VAL
- ☆ INIT09.VAL

Note: As the test runs, it creates another file called ERROR.LOG. This file stores results.

Procedure: Loading Service Diskette #3

1. **Boot DIMENSION DOS 1.2.0 or later from the fixed disk drive.**

2. **When the DIMENSION sign-on display appears, sign on as the system manager.**

3. **Type Manager On to enter manager mode.**

4. **Create a directory called "TAPE" in the manager's personal partition, and copy the files from Service Diskette #3 into the directory.**

5. **Load the test program by typing:**

TBU [Retrn]

---->

Procedure: Loading Service Diskette #3

6. Select an option from the main menu.
-

This completes the procedure for loading Service Diskette #3.

TROUBLESHOOTING

Service Diskette #3 (cont.)

Tape Diagnostic Menu

The following menu appears when the diagnostic program TBU.EXE is executed from Service Diskette #3.

Main Menu

```
[ F1] Quick System Test
[ F2] Functional Test
[ F3] Extended Functional Test
[ F4] Technician Menu
[ F5] Operator Changes Menu
[ F6] Tape Interchange Test
[ F7] Cartridge Test
[ F8] Display Final Results
[F10] Exit to Operating System
```

Saving Errors

The diagnostic program stores errors in a file called ERROR.LOG. The program never deletes or erases this file.

In order to use the "log errors" feature, enter **MANAGER MODE** before starting the diagnostic program TBU.EXE. The file ERROR.LOG is created and stored in the TAPE directory.

Periodically check the size of the ERROR.LOG file and delete it if it is becoming too large or if you no longer need the information that has been stored.

You may review the contents of the error log file by using the DOS command:

TYPE ERROR.LOG [Retrn]

Test Options The following list explains the selection key, test name, and test description of the options available from the main menu of the TBU.EXE program.

Key	Test Name	Test Description
[F1]	Quick System Test	<p>This option provides a fast, overall evaluation of the tape drive, tape drive interface board, interface harness and tape cassette.</p> <p>The tape drive is rewound and a file is written to the drive. This is followed by a read and compare of the data in the file. The test takes approximately 30 seconds.</p>
[F2]	Functional Test	<p>This option provides a more extensive analysis than the Quick System Test.</p> <p>The tape cassette is erased and files are written over the entire length of tape to check operation of all tape drive heads. Selected portions of the files are read and compared. The test takes about 20 minutes.</p>
[F3]	Extended Test	<p>This option thoroughly tests the entire tape drive system. Files are written over the entire length of tape and then read and compared.</p>

---->

DIAGNOSTICS

Service Diskette #3 (cont.)

Key	Test Name	Test Description
	(cont.)	<p>The test may be altered to meet special conditions by selecting options [F4] or [F5]. Features of the test that may be modified include:</p> <ul style="list-style-type: none">☆ the duration of the test☆ the number and length of files to be written☆ the number and length of files to be read☆ the test pattern to be written to the tape
[F4]	Technician Menu	<p>This menu option should only be used by a technician to change the setup of the functional or extended tests or to perform single, specific operations. A separate menu that indicates the options available with this menu choice follow in the section called "Using the Technician Menu."</p>
[F5]	Change Default	<p>This menu option permits alteration VALUES of the test features by a bench technician in a repair facility. Possible changes include:</p> <ul style="list-style-type: none">☆ whether to display errors on the screen☆ whether to route errors to a disk file☆ test duration

Key	Test Name	Test Description
[F6]	Tape Interchange Test	This option allows the interchange of tape cartridges after writing but before reading/comparing. This permits a test of read/write capabilities between tape cartridges.
[F7]	Cartridge Test	This option winds the tape cartridge from end-to-end ten times and tests the tape drive's ability to locate the end of the tape.
[F8]	Display Final Results	This option repaints test results on the screen if they are inadvertently deleted by selection of another option.
[F10]	Exit to OS	<p>This option permits an orderly exit from the diagnostic program.</p> <p>Note: Do NOT type [Ctrl] C to exit from the diagnostic program. Complex communications between the central board and the workstation board take place during an exit from the diagnostic routines. If these communications do not take place, the results are unpredictable. If [Ctrl] C is accidentally used to exit the program, reboot the DIMENSION to ensure proper system operation.</p>

DIAGNOSTICS

Service Diskette #3 (cont.)

Using the Technician Menu

You may change some of the parameters of the extended and functional tests by selecting option [F4], the Technician Menu.

Some of the options available from the Technician Menu require data input; others toggle a feature off or on. Options that request tape drive activity return an error code if a problem is encountered. The error code is displayed and you are prompted before test continuation is allowed.

Technician Menu

The following menu appears when option [F4] is selected from the main menu.

```

                                Technician Menu

F1 = Rewind tape.                F2 = Erase tape.
F3 = Write filemark(s).          F4 = Write pattern to file.
F5 = Read filemark(s).           F6 = Compare file to pattern.
F7 = Read current status.        F8 = Read last status.
F9 = Retention tape.             F10= Read file to diskfile.

A = Alternate values to use in tests.  [OFF]

W = Write file sec. count        S = Scroll operations on screen [OFF]
R = Read file sec. count         E = Ext. test change er/wr/rd [OFF]
N = Number of filemarks         C = Clear all error flags
U = Unit number (drive)         D = Diskfile name
T = Ticks per second            B = Bit error rate
H = Hours for ext. test

P = Data Pattern: [29 29 29 29 29 29 29 29 29 29 29 29 29]

ENTER CHOICE ([SPACEBAR] returns to main menu) --->
```

Test Options The following list explains the selection key, test name, and test description of the options available from the Technician Menu option, [F4], on the main menu.

Key	Test Name	Test Description
[F1]	Rewinds	This option rewinds the tape to its beginning.
[F2]	Erases	This option completely erases the tape and rewinds it to its beginning.
[F3]	Write "N" Filemarks	This option writes "N" number of filemarks to the tape. The value of "N" is always the same value used by the READ FILEMARK command. Choice "N" (description follows) changes the number of filemarks. Responsibility for keeping track of file and filemark locations belongs to the technician who changes the default value.
[F4]	Write "P" Pattern	This option writes a "P" pattern to the tape. This pattern repeats a 16-byte pattern for "W" sectors on the tape. To change the length of the file, use the "W" option. If "W" is less than "R," compare errors are generated when using the compare option. The only allowable next command is a WRITE or WRITE FILEMARK.

---->

DIAGNOSTICS

Service Diskette #3 (cont.)

Key	Test Name	Test Description
[F5]	Read "N" Filemarks	This option ignores file data and leaves the tape drive head ready to read the file following the "Nth" filemark. The only allowable next command is a READ or READ FILEMARK.
[F6]	Compare File to Pattern	This option reads a file of "R" length and compares the data in the file to "P" pattern. The option then reports data mismatches. There is a limit of 64 data mismatches; the test then stops comparing. The "R" value must be equal to or less than the "W" value used to write. If this is not the case, errors are generated.
[F7]	Read Current Status	This option reads the current status of the tape drive and displays the status as six hex bytes before prompting the operator to continue. A description of the bits in the status bytes is described in the section called "Interpreting Drive Status Bytes."
[F8]	Read Last Status	This option reads the last status of the tape drive (as it was stored by the central board). The option does not interrogate the drive for its current status.
[F9]	Retension Tape	This option retensions the tape by winding to end of the media then rewinding to the beginning.

---->

Key	Test Name	Test Description
[A]	Alternate Values	<p>This option selects and deselects alternate values for the tests found on this menu. The "A" key is the toggle switch.</p> <p>If the alternate values are in effect, the box says [ON]. If you deselect the alternate values, you have the option of saving them automatically into the file called INITXX.VAL. If the values are saved, they may be read and used by toggling the alternate values switch [ON].</p>
[B]	Bit Error Rate	<p>This option allows you to change the bit error rate that the tests expect to achieve by providing a multiplier for the basic rate of ten to the eighth power. The multiplier changes the bit error rate to some multiple of the basic rate. After each write/read of the bit error rate, a counter is incremented and the number in this counter is used to determine whether the number of recovered read errors is acceptable. The higher the number the more stringent the test. Default values are provided for each version of the test by selecting the number zero.</p>
[C]	Clear Error Flags	<p>This option clears all internal error flags, zeroes the timer and allows testing of previously failed tape drives. If the flags are not cleared, a tape drive that has failed before is immediately rejected.</p>

---->

DIAGNOSTICS

Service Diskette #3 (cont.)

Key	Test Name	Test Description
[E]	Extended Test Changes	This option allows running the extended test with different sector counts. If this option is toggled [ON] when the extended test is run from the main menu, questions are asked. Answering the questions allows bypassing erasure and selecting the number and size (in sectors) of files for both writes and reads.
[H]	Hours for Extended Test	This option allows extended test running time to be changed from a default value of 55 hours. Note that the read portion of the extended test takes a great deal of time, and the test may take up to an hour longer than the integer specified.
[N]	Number of Filemarks	This option is used by the WRITE and READ FILEMARK commands to determine how many filemarks to write/read.
[P]	Pattern to Use	<p>This option allows changing the pattern written and compared on the tape.</p> <p>The data pattern is a block of 16 hexadecimal bytes that are repeated over the length of any file written to the tape. If fewer than 16 hex bytes are entered, those bytes that have been entered are repeated into a 16-byte pattern. If the pattern specified and the pattern written onto the tape are different, errors are returned. If "LOG ERRORS" has been selected, the errors are written to disk. A limit of 64 errors are tolerated before the test is aborted.</p>

---->

Key	Test Name	Test Description
[R]	Read Sectors	This option selects the number of sectors to be read by the COMPARE command. Central board memory limits this option. If more than 35 sectors are selected, the read operation may have to occur in more than one start/stop operation. Streaming is not possible.
[S]	Scroll Operations	This option, when turned [ON], causes tape drive operations, which are normally displayed on line #25, to be displayed and scrolled up the screen to allow display of the next operation. If the option is turned [OFF], each new action overwrites the previous action. Thus, the menu is retained on the screen.
[T]	Ticks per Second	This option changes the speed of the software clock that times the tests. The smaller the number, the faster the clock. Selecting zero results in the default being selected.
[U]	Unit Number	This option is only used if a custom multiplexing board (which is able to control multiple tape drives) is installed. If a multiplexing board is used, this option selects a tape drive (by number) to test--because all drives are not tested simultaneously.
[W]	Write Sectors	This option selects the number of sectors to be written when using the Technician Menu WRITE command [F4].

DIAGNOSTICS

Service Diskette #3 (cont.)

Interpreting Drive Status Bytes

The status of a drive under test is returned as a six, hexadecimal-byte code if tape status options [F7] or [F8] are selected from the Single Test Menu. For a more complete description of the status bytes, refer to the Archive Scorpion handbook. An abbreviated description follows:

☆ Byte #0

- Bit 7 = Exception byte #0
- Bit 6 = Cartridge not in place
- Bit 5 = Drive not on line
- Bit 4 = Write protected
- Bit 3 = End of media
- Bit 2 = Unrecoverable data error
- Bit 1 = BIE not located
- Bit 0 = File mark detected

☆ Byte #1

- Bit 7 = Exception byte #1
- Bit 6 = Illegal command
- Bit 5 = No data detected
- Bit 4 = Eight or more read retries
- Bit 3 = Beginning of media
- Bit 2 = Reserved
- Bit 1 = Reserved
- Bit 0 = Reset/Power-up occurred

☆ Bytes #2 and #3

- Byte #2 = high byte
- Byte #3 = low byte

Interpreting Drive Status Bytes (cont.) For WRITE operations, count of the number of blocks rewritten. For READ operations, the count is the number of soft read errors.

- ☆ Bytes #4 and #5
 - Byte #2 = high byte
 - Byte #3 = low byte

For WRITE operations, the number of write underruns. For READ operations, the number of read underruns.

Error Message Interpretation The tape diagnostic program provides an on-screen, English language description for most error codes that may be transmitted from the central board. Note, however, that there may be occasions when unanticipated errors without English equivalencies are transmitted. In an effort to reduce the frustrations which might accompany such transmissions, the following list is provided. This list includes ALL possible error codes with descriptions of the errors.

<u>Hex Error Code</u>	<u>Description of Error</u>
40	Write protected
41	Unknown unit
42	Drive not ready
43	Unknown command
44	CRC error
45	Bad RQB length
46	Seek error
47	Bad media
48	Sector not found
49	Printer out of paper

DIAGNOSTICS

Service Diskette #3 (cont.)

<u>Error Message</u>	<u>Hex Error Code</u>	<u>Description of Error</u>
<u>Interpretation</u> (cont.)	4A	Write fault
	4B	Read fault
	4C	General error
	4D	Cartridge not in drive
	4E	EOM detected on write
	4F	No more data to read
	50	Beginning of tape
	51	Worn tape
	52	Cannot read status
	53	Stream buffer timeout
	54	D/T Mgr Sync (Server)
	55	Queue post error (Server)
	56	Illegal tape movement
	57	Insufficient memory
	58	Server internal error

SUBASSEMBLY REMOVAL

Introduction This chapter contains procedures for removing and reinstalling major DIMENSION subassemblies. The procedures include instructions for removing:

- ☆ Workstation board
- ☆ 8087 board
- ☆ OMNINET board
- ☆ Tape drive interface board
- ☆ Workstation 128K/384K expansion RAM board
- ☆ Power supply
- ☆ Central board expansion RAM
- ☆ Bus board
- ☆ Central board
- ☆ Diskette drive
- ☆ Fixed disk drive
- ☆ Tape drive

Procedures are also included for reinstalling a central board and a bus board.

References The subassembly removal procedures in this chapter are not illustrated. All procedures, except for the final ones regarding reinstallation of the central and bus boards, are reversals of the hardware installation procedures found in Chapter #1.

If you have any difficulty comprehending the steps in this chapter, refer to the illustrations in Chapter #1.

Tools The only non-standard tool required for subassembly removal is a 5/32" hex ball-driver. This tool is used for loosening two hex screws that fasten the power supply subassembly to the base panel of the central module.

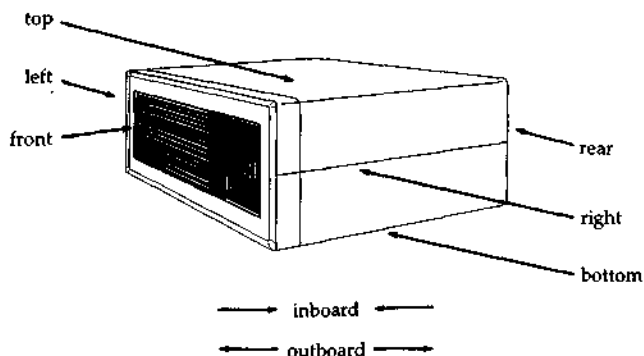
SUBASSEMBLY REMOVAL

Central Module Orientation

Central Module Orientation

The subassembly removal procedures use descriptions such as "right side," "left side," "front panel," "rear panel," etc. These terms indicate a subassembly's location within a central module and are based on a consistent orientation of the central module.

The following diagram indicates the standard orientation used for describing the six sides of the central module in the removal procedures.



Introduction Use this procedure to remove one or more workstation board subassemblies from the central module.

Procedure: Workstation Board Removal

1. Remove the Phillips screw that fastens the rear edge of the workstation board to the central module back panel.

2. Lift the workstation board straight up to disconnect it from the bus board socket. Continue lifting to remove the board from the central module.

3. Repeat steps #1 and #2 for each workstation board you wish to remove.

This concludes the procedure for removing a workstation board from the central module.

SUBASSEMBLY REMOVAL

8087 Board

Introduction Use this procedure for removing an 8087 board from a workstation board.

Procedure: 8087 Board Removal

1. Remove the workstation board from the central board. Lay the workstation board on a flat, well-supported surface.
-
2. After unlocking the plastic standoffs that connect the two circuit boards, gently pry first one edge and then an opposite edge of the 8087 board away from the workstation board.

CAUTION
Be very careful not to bend the pins of plug P1 on the 8087 board.

This concludes the procedure for removing an 8087 board.

Introduction Use this procedure for removing an OMNINET board from the central module.

Procedure: OMNINET Board Removal

1. Disconnect the 3-pin female connector (attached to the white OMNINET cable) from the OMNINET circuit board in the central module.

2. Remove the Phillips head screw that fastens the rear edge of the OMNINET board to the rear panel of the central module.

3. Lift the OMNINET board straight up and out of the central module.

This concludes the procedure for removing the OMNINET board.

SUBASSEMBLY REMOVAL

Tape Drive Interface Board

Introduction Use this procedure for removing a tape drive interface board from the central module.

Procedure: Tape Drive Interface Board Removal

1. Disconnect the tape drive interface harness from the back of the tape drive.

2. Remove the Phillips head screw that fastens the rear edge of the tape drive interface board to the rear panel of the central module.

3. Lift the tape drive interface board straight up and out of the central module.

This concludes the procedure for removing the tape drive interface board.

Introduction Use this procedure to remove a 128K or 384K expansion RAM board from a workstation board.

Procedure: Workstation 128K/384K Expansion RAM Removal

1. Remove the workstation board containing the 128K/384K expansion RAM board from the central module.

2. Place the workstation board on a flat, well-supported surface.

3. While lifting the corners of the 128K/384K expansion RAM board, unlock the two nylon standoffs until the memory board is released.

4. Lift the 128K/384K memory board from its socket on the workstation board, and continue lifting until the two circuit boards are separated.

This concludes the procedure for removing a workstation memory board.

SUBASSEMBLY REMOVAL

Diskette Drive

Introduction Use the following procedure to remove the diskette drive from the central module.

In order to remove the diskette drive, first remove the drive mount bracket in which the drive is mounted.

Procedure: Diskette Drive Removal

1. Loosen the four Phillips screws that fasten the drive mount bracket to the base panel of the central module.

2. Remove the screws that fasten the drive mount bracket to the front panel.

3. Disconnect the DC power and signal harnesses from the rear edges of the tape and diskette drives.

Note: If there are spare DC power harnesses tie-wrapped to the bracket, cut the tie wrap.

4. Slide the drive mount bracket toward the rear of the central module, and lift the bracket straight out of the central module.

 5. Bow the front panel mask and remove it from beneath the diskette drive bezel (and tape drive bezel, if one is installed).

 6. Remove the four Phillips screws that fasten the diskette drive to the drive mount bracket.
-

---->

Procedure: Diskette Drive Removal

7. Remove the diskette drive from the drive mount bracket.
-

This concludes the procedure for removing the diskette drive.

When replacing a diskette drive, reverse this procedure. The diskette cable connector on the central board is the one nearest the drive mount bracket. The signal cable's red leads are positioned nearest the power supply at the central board connector, and nearest the central board at the diskette drive.

SUBASSEMBLY REMOVAL

Fixed Disk Drive

Introduction Use this procedure to remove one or more fixed disk drives from the central module.

In order to remove the fixed disk drives, first remove the drive mount bracket in which the drives are mounted.

Procedure: Fixed Disk Drive Removal

1. Remove the four Phillips screws that fasten the rear panel of the drive mount bracket to the rear panel of the central module.

2. Disconnect the DC power, signal and control harnesses from the rear of the fixed disk drive/s.

Note: If there is a spare DC power harness tie-wrapped to the drive mount bracket, cut the tie wrap.

3. Slide the drive mount bracket toward the front of the central module to disconnect the bracket from the central module base panel.

Lift the drive mount bracket up and out of the central module.

4. Remove the four Phillips screws that fasten the fixed disk drive to the drive mount bracket.

5. Remove the fixed disk drive from the drive mount bracket.

This concludes the procedure for removing fixed disk drives.

Introduction Use the following procedure to remove the tape drive from the central module.

In order to remove the tape drive, first remove the drive mount bracket in which the drive is mounted.

Procedure: Tape Drive Removal

1. Loosen the four Phillips screws that fasten the drive mount bracket to the base panel of the central module.
-
2. Remove the two screws that fasten the drive mount bracket to the front panel.
-
3. Disconnect the DC power and signal harnesses from the rear edges of the tape and diskette drives.

Note: If there are spare DC power harnesses tie-wrapped to the bracket, cut the tie wrap.

4. Slide the drive mount bracket toward the rear of the central module, and lift the bracket straight out of the central module.
-
5. Remove the four Phillips screws that fasten the tape drive to the drive mount bracket.
-

---->

SUBASSEMBLY REMOVAL

Tape Drive (cont.)

Procedure: Tape Drive Removal

6. Slide the tape drive out the front of the drive mount bracket.

Note: You must replace the black plastic tape drive bezel when you install a replacement drive.

This concludes the procedure for removing the tape drive.

Introduction The central board is more difficult to replace than other circuit boards because its replacement involves more than a simple reversal of the removal procedure. Follow the steps below, and do not attempt to replace the board before reading the entire procedure.

Procedure: Installing a New Central Board

1. Check and replace any defective nylon standoffs used to support and connect the new central board to the central module base. Be certain all standoffs are completely seated in the base and biased toward the rear of the central module.

2. Check and replace any defective nylon standoffs used to support and connect the bus and central board expansion RAM boards to the central board.

3. Remove all sheet metal plates from unused slots in the central module rear panel.

4. Hold the new central board near its final assembly position, and elevate the front edge of the circuit board. Slide the board toward the rear of the central module, and fit the printer ports through the appropriate slots in the central module rear panel.

5. After biasing the circuit board against the central module rear panel, gently press the board onto the nylon standoffs.

Note: Do not allow the board to slide forward after you have seated it.

---->

Procedure: Installing a New Central Board

6. While continuing to press the board against the central module rear panel, insert two screws through the rear panel into connectors that are already attached the circuit board.
-

7. Attach the diskette and fixed disk drive signal and control cables to the front edge connectors of the central board.

Note: The diskette cable connector is located nearest the drive mount brackets. The signal and control cable red leads are located nearest the power supply assembly.

8. Be sure that the workstation board support rail is snapped into place on the base.
-

Note: The DIMENSION central module uses multilayer central boards (designated C5 CTL on the board) and double-layer central boards (designated Central/2 PCB). You may mount a 256K expansion RAM PCB on a multilayer central board; however, you may not mount this expansion RAM PCB on a double-layer central board even though both central boards have identical connectors.

If you're substituting a double-layer board for a multilayer board with 256K RAM expansion, do not mount the expansion RAM PCB on the new board.

This concludes the procedure for installing a new central board.

Introduction The bus board is more difficult to replace than other circuit boards because its replacement involves more than a simple reversal of the removal procedure. Follow the steps below, and do not attempt to replace the board before reading the entire procedure.

WARNING

Be sure all power is disconnected from the central module before performing the procedure.

Procedure: Installing a New Bus Board

1. Be sure that all sheet metal plates are removed from the central module rear panel.

 2. Place the bus board so that the standoffs that fasten the front edge of the bus board to the central board are aligned and gently press the connector on the disk drive side of the board into the socket on the central board. Press the board down over the standoffs to lock the board in place.

 3. Place the plastic spacer on the flat of the copper sheet metal ground spring strip and align the holes.
-

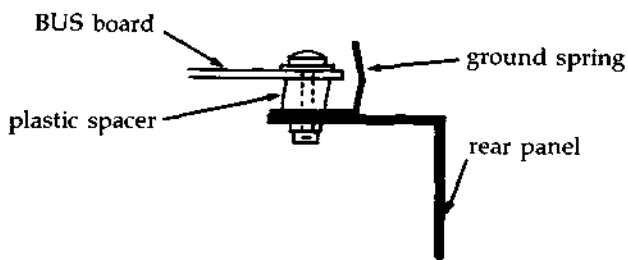
---->

SUBASSEMBLY REMOVAL

Installing a New Bus Board (cont.)

Procedure: Installing a New Bus Board

- Slide the ground spring together with the plastic spacer through the rear panel and under the rear edge of the bus board so that the holes are aligned with the holes in the bus board and the rear panel form as shown in the end view illustration at right.



- Insert and tighten the four Phillips screws along the rear edge of the bus board.
 - Connect the two red +5VDC leads and the three black ground lead with the five Phillips screws on the front edge of the bus board.
 - Plug the yellow +12VDC lead onto pin E3 on the disk drive side of the bus board.
-

This concludes the procedure for installing a new bus board.

- Introduction** This section of the chapter illustrates error screens and error codes that may appear if a failure is detected by either the self-tests or the DIMENSION service diskettes.
- Error Screens** The error screens illustrated in this section are those screens that might appear during tests of the diskette and fixed disk drives. Although most of the screens indicate that an error has occurred, some screens may appear (the diskette drive Current Test Parameters, for example) only when you request information or at the conclusion of a test.
- Error Codes** Most of the error codes shown are applicable only to the diskette and fixed disk tests--this is the reason for placing this information in this particular location. But you should bear in mind that the error codes are valid for all DIMENSION hardware, all diagnostic programs and the DIMENSION Operating System (DOS).
- Use of the Error Code Matrix** The error codes are shown in a matrix with the names of major DIMENSION hardware subsystems. Descriptions of these subsystems (for diagnostic purposes) are found later in this chapter.
- If an error occurs during system operation, self-testing, or service diskette testing, look up the code in the matrix. To the right of the error code, you will find one or more subsystems numbered #1 through #11. #1 indicates the most likely subsystem to have caused the failure; #11 the least likely.
- Note:** We recommend that if more than one subsystem is shown, replace more accessible parts before replacing those that are difficult to get to.
- Example:** It is faster to replace a workstation board before replacing a central board (if both are listed as possible causes of the failure) even if the matrix indicates that the central board is the more likely culprit.

Types of Error Screens There are four types of error screens that may appear during diskette and fixed disk drive tests. They are:

- o Reading errors
- o Writing errors
- o Soft errors
- o Hard errors

Reading Errors The following display is an example of an error message that appears if an error occurs during a read cycle of either a diskette or fixed disk test.

READING

```
Error code: xxxx
Error description:
  Iteration: xxxx
  Logical record number: xxxx
  Number of bad bytes: xxxx
  Expected data: xxxx
  Actual data: xxxx
  Sector location: xxxx
```

Writing Errors The following display is an example of an error message that appears if an error occurs during a write cycle of either a diskette or fixed disk test.

WRITING

```
Error code: xxxx
Error description:
  Iteration: xxxx
  Logical record number: xxxx

Checking for bad tracks.
  Number of errors: xxxx
```

Soft Errors

The following display is an example of a soft error summary that appears when diskette or fixed disk drive test is paused (by pressing the space bar) or completed.

Soft Error Summary Table

Characters that appear in parenthesis are not valid.

ITER	LRN	ERROR	COUNT	EXP	ACT	LOC
XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Hard Errors

The following display is an example of a hard error (Bad Track) summary that appears when a fixed disk test is paused (by pressing the space bar) or completed.

Bad Track Summary Table

Ignore this summary during diskette drive testing.

ITER	LRN	Error
XXXX	XXXX	XXXX
XXXX	XXXX	XXXX
XXXX	XXXX	XXXX

Interrupt and End-of-Test Screens

There are three types of interrupt and end-of-test screens that may appear during diskette and fixed disk tests. They are:

- o the parameter screen (with soft and hard error summaries)
- o the normal end-of-test screen
- o the forced end-of-test screen

Parameter Screen

The following display is an example of a parameter screen that appears when you begin or pause (by pressing the space bar) a diskette or fixed disk drive test.

Current Test Parameters

```
Testing LRN: x to xxx
Drive: x
Reads: xxxx
Write retry: xx
Seeks: (Sequential)(Random)
Data: (Fixed)(Random)
Compare: (On)(Off)
Iteration: 1/1
Error count: xxxx
```

If a test is paused and soft or hard errors have been recorded, summary tables showing these errors also appear.

**Normal
End-of-Test
Screen**

The following displays are examples of normal end-of-test screens that appear after a diskette or fixed disk drive test has run to completion.

The drive has passed.

E to list errors
P to display test parameters
X to exit

or

```
*****  
**TEST DISKETTE MAY BE WORN OUT**  
*****
```

```
*****  
*****REJECT DRIVE*****  
*****TOO MANY SOFT ERRORS*****  
*****
```

E to list errors
P to display test parameters
X to exit

**Forced
End-of-Test
Screen**

The following display is an example of a forced end-of-test screen that appears when a diskette or fixed disk drive test is halted before completion (by typing [Cntrl] and C).

Terminate batch job (Y or N)?

If you type **N**, the Service Diskette #2 main menu reappears on your screen. If you type **Y**, the DIMENSION Operating System (DOS) command prompt reappears on your screen.

Note: Before typing [Cntrl] and C to stop a test, press the space bar to see a summary of the errors that have occurred during the test.

**Error Code
Matrix**

The error code matrix indicates possible causes for the appearance of an error code. There will usually be at least two items that you should investigate. The items will normally be DIMENSION hardware subsystems, but problems may also be caused by printer errors or misuse of system commands by one or more operators. Read the following list for a complete description of each error causing subsystem before you begin to troubleshoot an error code.

- o Central Board - the problem may be located in the central board hardware. This may include a failure of circuit board components or failure of interfaces between the central board and other central module subassemblies.
- o Workstation Board - the problem may be located in the workstation board hardware. This may include a failure of circuit board components, incorrect thumbwheel switch settings, or failure of interfaces (including the workstation cable and its connector box) between the workstation board and other subassemblies.
- o Bus Board - the problem may be located in the bus PCB hardware. This may include a failure of circuit board components or failure of interfaces between the bus PCB and other circuit boards.
- o Diskette Drive - the problem may be located in the diskette drive hardware. This may include failures of the diskette drive read/write head, the controller board, etc.
- o Diskette Media - the problem may be located on the diskette. This may include flaws on or loss of data from the diskette or use of an improper diskette.
- o Fixed Drive - the problem may be located in the fixed disk drive hardware. This may include failures of the fixed disk drive read/write heads, the controller board, etc.

Error Code
Matrix
(cont.)

- o Fixed Media - the problem may be located on the fixed disk platter. This may include flaws on or loss of data from the platter.
- o Power Supply - the problem may be located in the central module power supply assembly. This may include failure of circuit board components or failure of DC power interfaces between the power supply and subassemblies such as the bus board or fixed disk, diskette and tape backup drives.
- o System Software - the problem may be due to a failure of the system software on the fixed disk. Data may be erased or contaminated. Reloading the software to the fixed disk from the diskette masters will usually resolve this type of problem.
- o Printer - the problem may be located in the a shared or local printer. This may include failure of printer hardware, lack of power to the printer, or incorrect interface between the printer and the subassembly to which it is attached.
- o User Operation - the problem may be due to user error. This may include errors that result from misuse of a system command or application program.

ERROR CODE MATRIX

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media
00	1						
01							
02							
03	See pages 4-35 through 4-39 (disk driver error codes)						
04	4	3					
05		2					
06							
07							
08							
09							
0A							
0B							
0C							
0D							
0E							

Id a	Power Supply	System Software	Printer	User Operation
		2		
		1		
		1		

when this error code appears.

			1	2
		3		1
		2		1
		2		1
		2		1
		2		1
		2		1
		2		1
		1		2
		2		1
		1		

ERROR CODE MATRIX

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixe Med
0F							
10			4			3	
11							
12							
13							
14							
15							
16							
17				4	3	2	1
18				2	4	1	3
19				2	4	1	3

ERROR CODE MATRIX

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media
01 41 81 C1				3	2		
03 43 83 C3				5	3	4	2
05 45 85 C5	3			4	1	5	2
08 48 88 C8					1		
09 49 89 C9	3			4	1	5	2
0D 4D 8D CD				4	2	3	1
12 52 92 D2	3			2	1		
13 53 93 D3	3			2	1		
14 54 94 D4	3			2	1		
15 55 95 D5	3			1		2	
16 56 96 D6	2			1			
17 57 97 D7	2			1			
19 59 99 D9					1		
1A 5A 9A DA							
1B 5B 9B DB							

	Power Supply	System Software	Printer	User Operation
		4		1
		6		1
				2
		5		
		2		
		1		
		1		

ERROR CODE MATRIX

Error Code	Central Board	Wrkstn Board	Bus Board	Diskette Drive	Diskette Media	Fixed Drive	Fixed Media
1C 5C 9C DC	2			1			
1D 5D 9D DD	2			1			
1E 5E 9E DE	2					1	
1F 5F 9F DF	2					1	
20 60 A0 E0	2						
21 61 A1 E1	2			1			
22 62 A2 E2	2			1			
23 63 A3 E3	2			1			
24 64 A4 E4	2			1			
25 65 A5 E5	2					1	
26 66 A6 E6	2					1	
27 67 A7 E7	2					1	
28 68 A8 E8	2					1	
29 69 A9 E9	2						

TROUBLESHOOTING

Introduction This chapter contains preliminary troubleshooting information for the DIMENSION. By using this information, a service technician may locate a defective subassembly, remove and replace the defective part (using Chapter 6), and verify that the system is operating correctly (using Chapter 4).

**Preliminary
Observations
and Actions**

The primary tool you must use during system troubleshooting is observation. You must look at the central module and workstations when power is first turned-on and make sure the following occur:

1. **The main power LED on the central module turns on and stays on.**

If the main power LED turns off, it may be an indication of a failure of the central PCB. If the LED turns off:

- o Verify power supply voltages. See the section on checking and adjusting the power supply.
- o Use Service Diskette #1 to check the central PCB.
- o Replace the central PCB.

2. **The operating system boots from the diskette drive or fixed disk drive.**

If you are booting from the diskette drive and you observe that both the main power LED and diskette drive LED turn off after an attempted boot, it may be an indication that you are attempting to boot from the wrong type of diskette. It may also be an indication that there has been a failure of the diskette drive.

If you are booting from a fixed disk and observe that the central module main power LED turns off after an attempted boot, it may be an indication of a failure of the fixed disk drive or damage to the data written on the fixed disk. In this case:

- o Use another boot diskette.
- o Verify DC power to the disk drive.
- o Use Service Diskette #2 to check the diskette and fixed disk drives.

**Preliminary
Observations
and Actions
(cont.)**

- o Use Service Diskette #2 to check the fixed disk label.
- o Replace the disk drive.

3. The operating system loads and the sign-on screen appears at each of the workstations.

If one or more workstations display a failure icon, it may be an indication of workstation PCB failure.

If one or more workstations display blank screens, it may indicate:

- o Workstation PCB failure
- o Workstation cable failure
- o Video display failure
- o No power to the video display

If all workstations display a failure icon, it may be an indication of +12VDC power supply or central board failure. If the display icon appears at all workstations:

- o Use Service Diskette #1 to check the central board and workstation PCB's.
- o Check the thumbwheel switch settings. Make certain that workstation numbers are not duplicated.
- o Replace workstation PCB's for all workstations displaying failure icons.
- o Verify power supply voltages. See the section on checking and adjusting the power supply.

TROUBLESHOOTING

System Troubleshooting (cont.)

Preliminary Observations and Actions (cont.)

4. Users sign-on at all workstations.

If one or more users are not able to sign-on, it may indicate defective workstation cables or keyboards. You should:

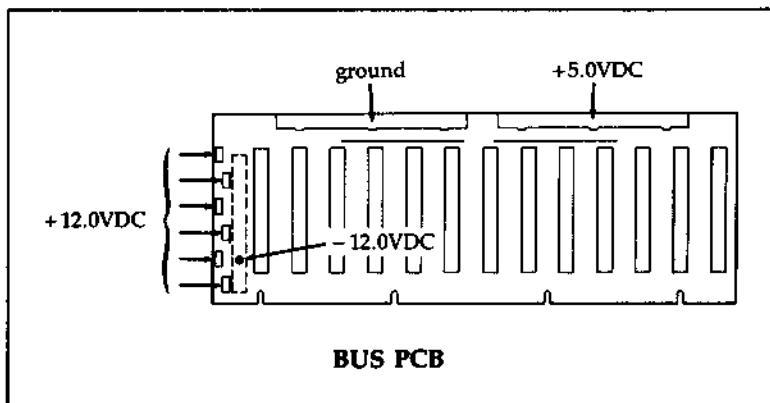
- o Exchange the suspect keyboards or workstation cables with keyboards and cables which you know are working.

Power Supply Voltages

The DIMENSION central module power supply produces the following DC voltages:

- o +5.0VDC @ ≥ 8.5 amps and ≤ 48.0 amps
- o +12.0VDC @ ≥ 2.2 amps and ≤ 11.0 amps
- o -12.0VDC @ ≥ 0.0 amps and ≤ 1.0 amps

If you need to check these three voltages, use access points and a reference ground found on the bus PCB.



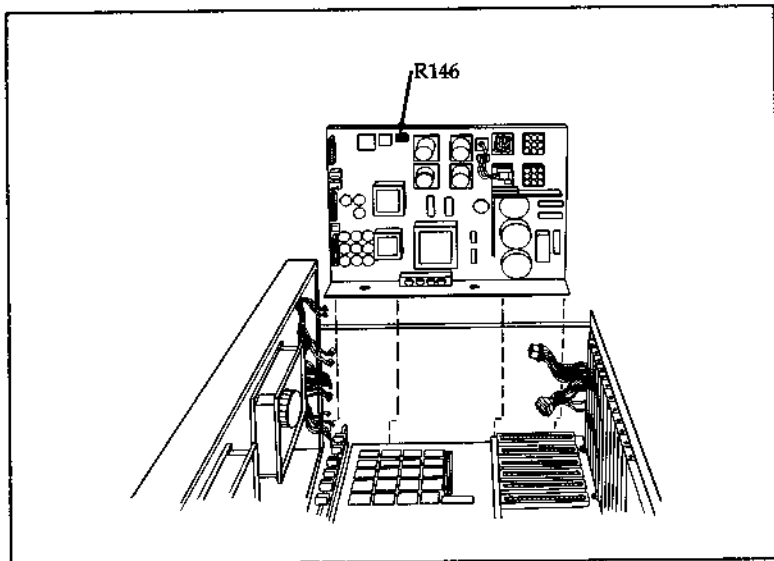
TROUBLESHOOTING

Verifying Power Supply Voltages (cont.)

Checking and Adjusting the +5VDC Supply

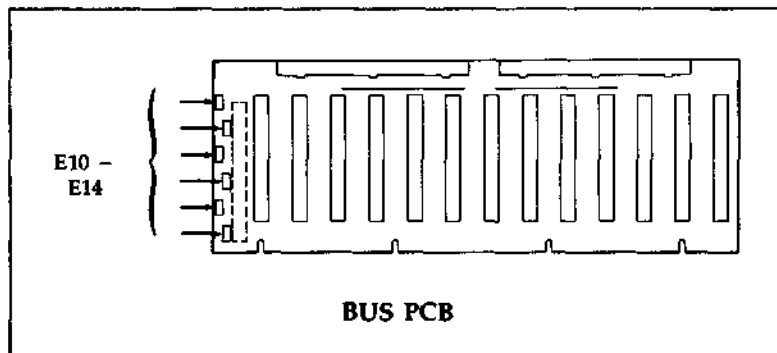
If you need to check or adjust the +5VDC supply, you should use the +5VDC bus on the bus PCB as your reference.

Use resistor R146 on the power supply circuit board to adjust the +5VDC supply voltage. (It is the only voltage which may be adjusted.) Set the resistor for a bus PCB reading of +5.10VDC when making the adjustment.



**Checking
the +12VDC
Supply**

If you need to check the +12VDC supply, you should use one of the connectors, E10 through E14, on the edge of the bus PCB as your reference.



TROUBLESHOOTING

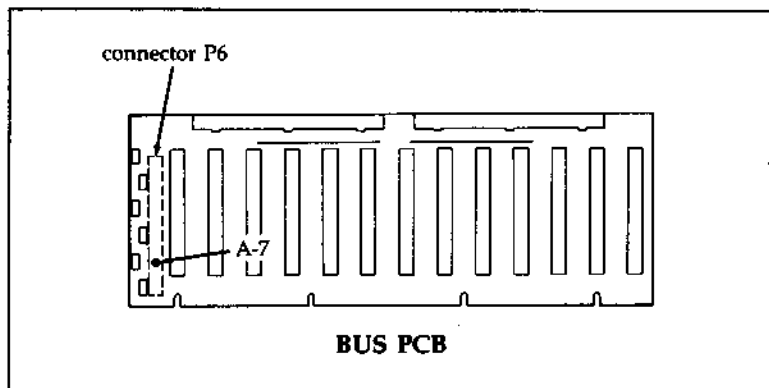
Verifying Power Supply Voltages (cont.)

Checking the -12VDC Supply

If you need to check the -12VDC supply, you should use pin A-7 on connector P6 of the bus PCB as your reference.

CAUTION

Do not check the -12VDC supply on the pins inside a workstation board edge connector socket. It is too easy to short these pins; a short may damage the power supply or other parts within the central module.



SUBASSEMBLY REMOVAL

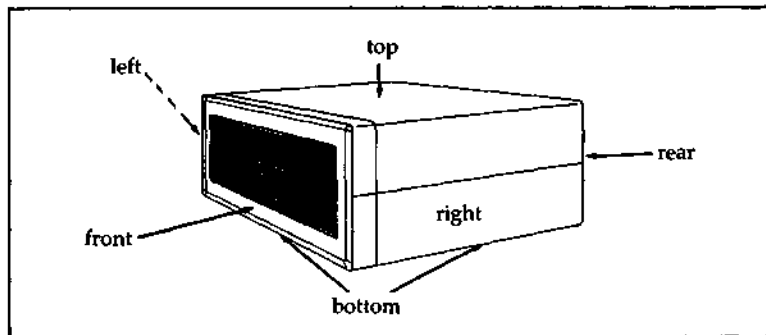
Introduction This chapter contains procedures for removing major subassemblies from the DIMENSION central module. The removal procedures include the:

- o Power supply
- o Workstation PCB
- o Workstation 128K/384K memory PCB
- o Central RAM expansion PCB
- o Bus PCB
- o Central PCB
- o Floppy disk drive
- o Fixed disk drive
- o Tape back-up drive

**Central
Module
Orientation**

The subassembly removal procedures use descriptions such as "right side," "left side," "right panel," "rear panel," etc. These terms denote the subassembly's location within a central module and are based on a consistent orientation of the central module.

The following diagram indicates the standard orientation used for describing the six sides of the central module in the removal procedures.



Tools

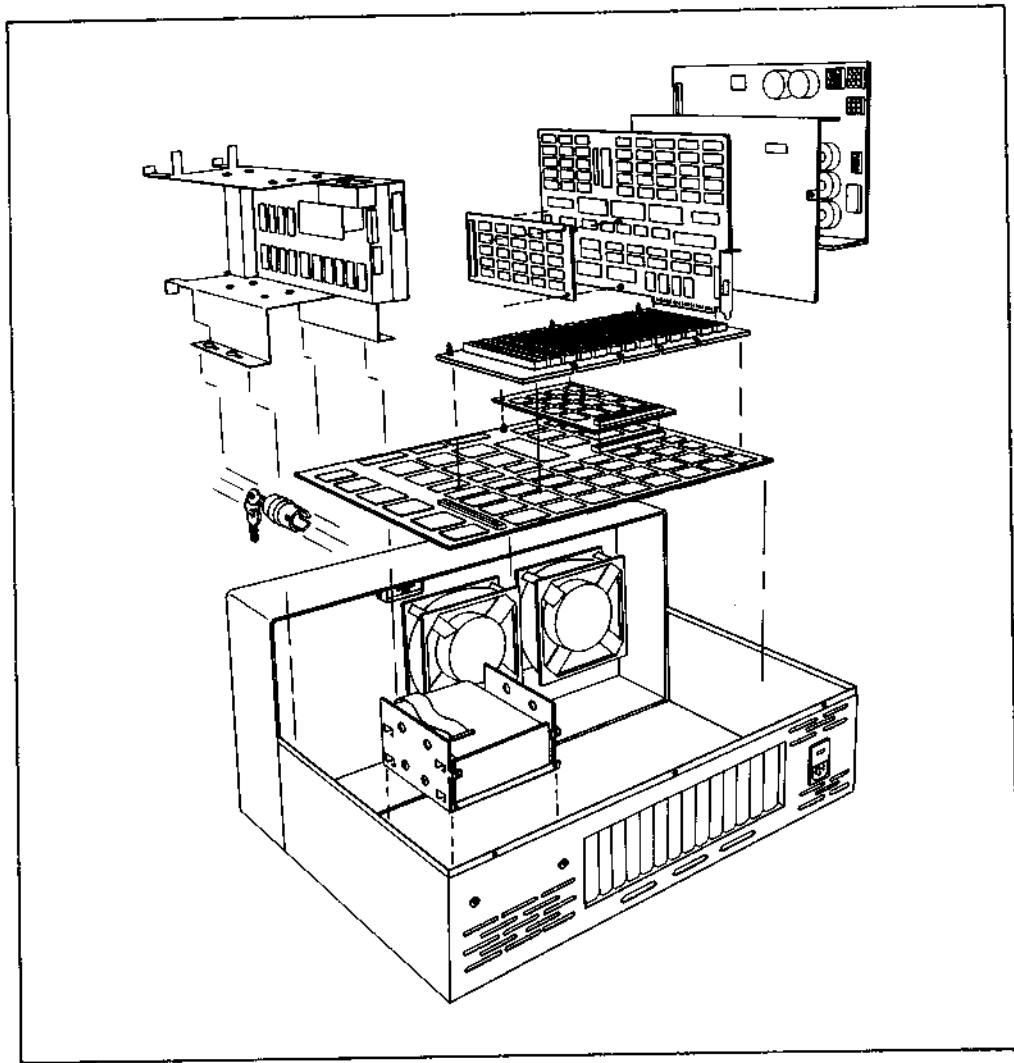
The only non-standard tool required for removal of subassemblies is a 5/32" hex ball-driver. This tool is used for loosening two hex screws which fasten the power supply subassembly to the base panel of the central module.

SUBASSEMBLY REMOVAL

Nomenclature of the Central Module

Component Names and Locations

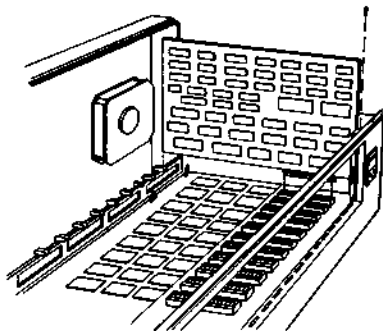
Use this exploded view diagram in conjunction with the subassembly removal sections in this chapter and the parts lists in Appendix A, to locate parts described in the following procedures.



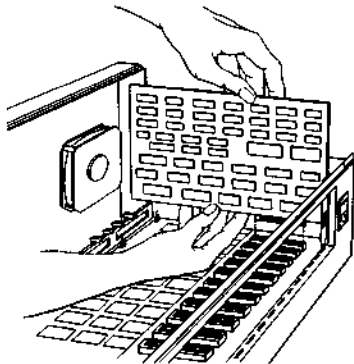
Introduction Use this procedure to remove a workstation PCB subassembly from the central module.

Procedure: Workstation PCB Removal

1. Remove the Phillips screw which fastens the rear edge of the workstation PCB to the central module.



2. Lift the workstation PCB to disconnect it from the bus PCB socket, and continue lifting to remove the workstation PCB from the central module.

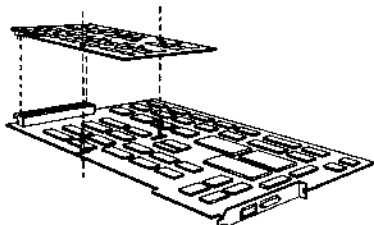


SUBASSEMBLY REMOVAL
Workstation 128K/384K Memory PCB

Introduction Use this procedure to remove a workstation 128K or 384K memory PCB from the central module.

Procedure: Workstation 128K/384K Memory PCB Removal

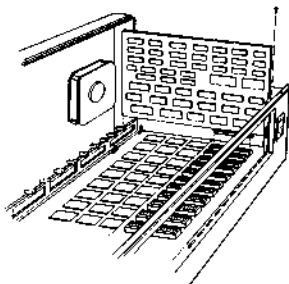
1. Remove the workstation PCB which contains the 128K/384K memory PCB from the central module.
2. Place the workstation PCB on a flat surface.
3. While lifting the appropriate corners of the 128K/384K memory PCB, squeeze the flanges of the two nylon standoffs until the memory PCB is released.
4. Lift the 128K/384K memory PCB from its socket on the workstation PCB, and continue lifting until the two circuit boards are separated.



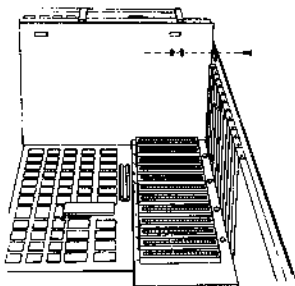
Introduction Use this procedure to remove the power supply subassembly from the central module.

Procedure: Power Supply Removal

1. Remove the workstation PCB from position #1 in the central module.



2. Remove the #6 nut and screw which fasten the rear edge of the power supply shield to the rear panel of the central module cabinet.

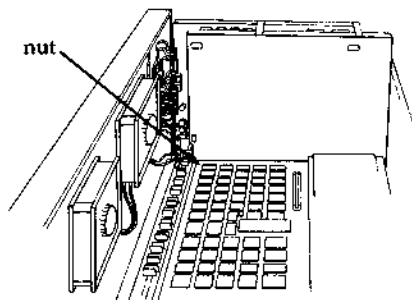


----->

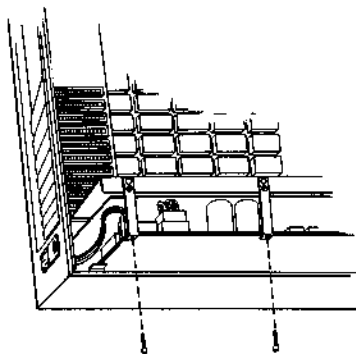
SUBASSEMBLY REMOVAL
Power Supply (cont.)

Procedure: Power Supply Removal

3. Remove the nut which fastens the power supply shield and two ground wires to the base panel of the central module.

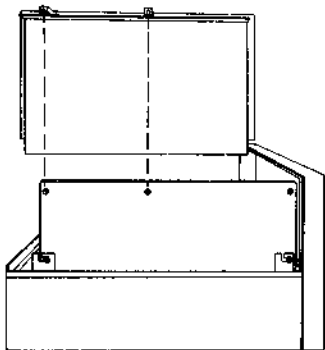


4. Remove the two screws which fasten the top of the power supply shield to the frame of the power supply.

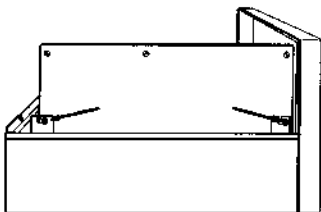


Procedure: Power Supply Removal

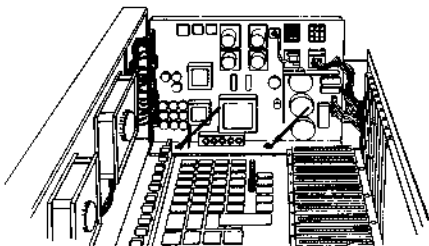
5. Lift and remove the power supply shield and its two insulator sheets.



6. Loosen the two #6 nuts which fasten the frame of the power supply to the side panel of the central module.



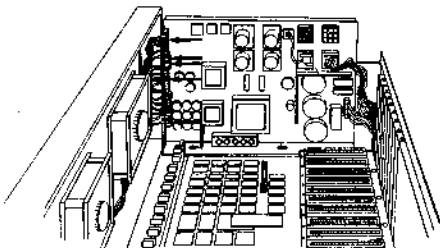
7. Loosen the two 5/32" hex screws which fasten the base of the power supply assembly to the base panel of the central module.



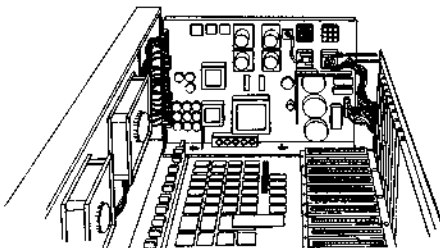
SUBASSEMBLY REMOVAL
Power Supply (cont.)

Procedure: Power Supply Removal

8. Remove the five plugs (P44, P45, P46, P47 and P48) and two red and two black leads from the front edge of the power supply assembly.

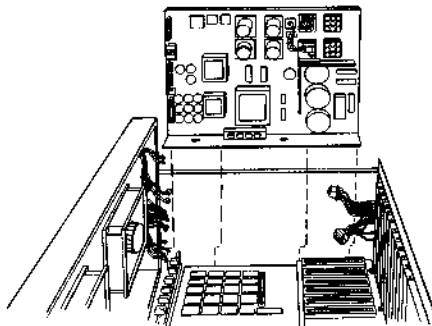


9. Remove the two plugs (P41 and P43) from the rear edge of the power supply assembly.



Procedure: Power Supply Removal

10. Slide the power supply assembly slightly to the rear, and lift it out of the central module.



SUBASSEMBLY REMOVAL

Central RAM Expansion PCB

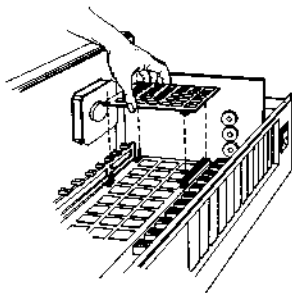
Introduction Use this procedure to remove the central RAM expansion PCB from the central module.

Procedure: Central RAM Expansion PCB Removal

1. Remove the workstation PCB's from positions #1 through #5 from the central module.

2. While lifting the appropriate corners of the RAM expansion PCB, squeeze the flanges of the two nylon standoffs until the RAM expansion PCB is released.

3. Lift the RAM expansion PCB from its socket on the central PCB, and continue lifting until the two circuit boards are separated.

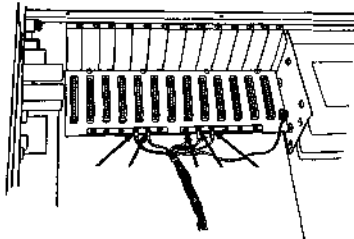


Introduction Use this procedure to remove the bus PCB from the central module.

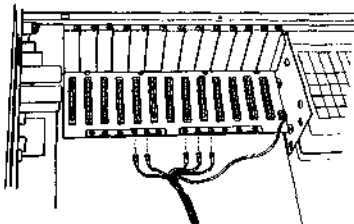
Procedure: Bus PCB Removal

1. Remove all workstation PCB's from the central module.

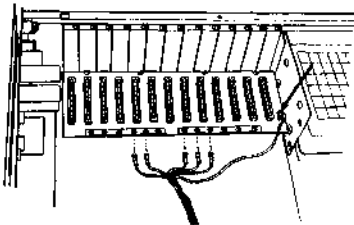
2. Loosen the five Phillips screws which fasten the two red +5VDC leads and the three black ground leads to the front edge of the bus PCB.



3. Disconnect the +5VDC and ground leads from the bus PCB.



4. Unplug the yellow +12VDC lead from the right edge of the bus PCB.



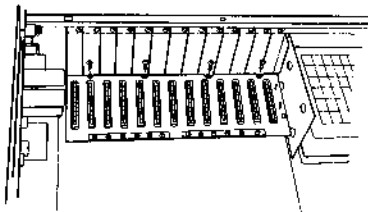
----->

SUBASSEMBLY REMOVAL

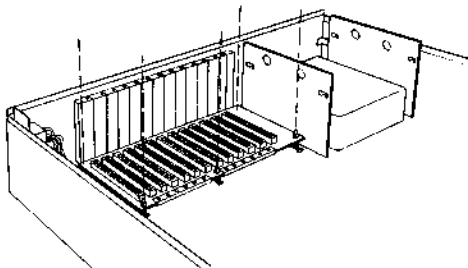
Bus PCB (cont.)

Procedure: Bus PCB Removal

5. Remove the four Phillips screws from the rear edge of the bus PCB.



6. While lifting the front edge of the bus PCB, squeeze the flanges of the three nylon standoffs which fasten the front edge of the bus PCB to the central PCB.



Lift the bus PCB from its socket on the central PCB socket, and continue lifting until the two circuit boards are separated.

Introduction Use this procedure to remove the central PCB from the central module.

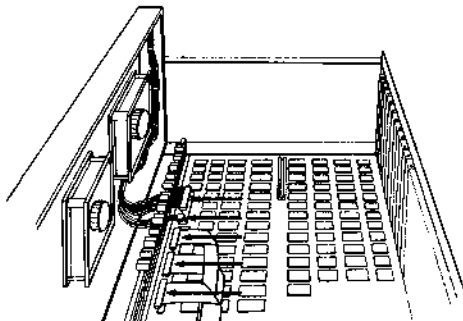
Note: Read the final subsection of this chapter (Installing a New Central PCB) before re-installing the central PCB. This circuit board may be damaged easily if you do not exercise care during replacement.

Procedure: Central PCB Removal

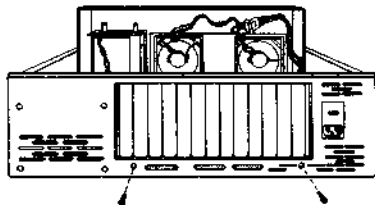
1. Remove all workstation PCB's from the central module.

2. Remove the bus PCB from the central module.

3. Remove the five plugs which are fastened to the front edge of the central PCB.



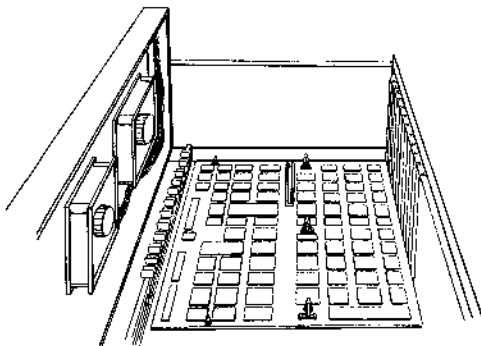
4. Remove the two Phillips screws which fasten the rear edge of the central PCB to the rear panel of the central module.



SUBASSEMBLY REMOVAL
Central PCB (cont.)

Procedure: Central PCB Removal

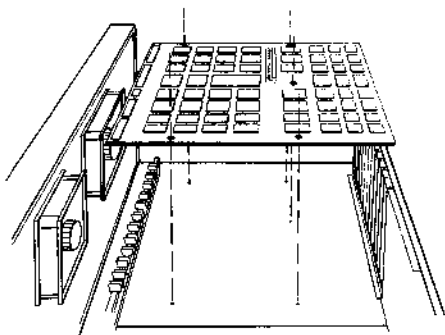
5. While lifting at a spot near each standoff, squeeze the flanges of the five nylon standoffs which fasten the central PCB to the base of the central module.



Note: After the central PCB has been disconnected from all of the standoffs, slide the circuit board toward the front of the central module until the rear edge of the circuit board clears the rear panel of the central module.

6. Lift the central PCB straight up to remove it from the central module.

Note: There may be jumper wires soldered to the underside of the circuit board. When lifting the PCB, look carefully and make certain that no wires are catching on nylon standoffs, screw heads, cabinet protrusions, etc.

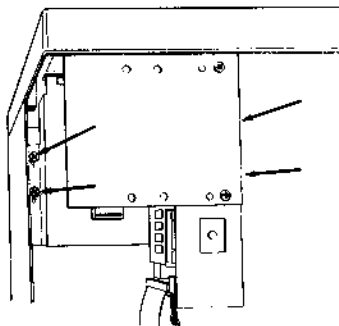


Introduction Use the following procedure to remove the diskette drive from the central module.

In order to remove the diskette drive, first remove the drive mount bracket in which the drive is mounted.

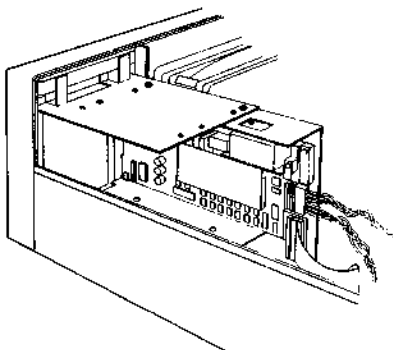
Procedure: Diskette Drive Removal

1. Loosen the four Phillips screws which fasten the drive mount bracket to the base panel of the central module.



2. Disconnect the DC power and signal harnesses from the rear edges of the tape back-up and diskette drives.

Note: If there are spare DC power harnesses tie-wrapped to the bracket, cut the tie wrap.

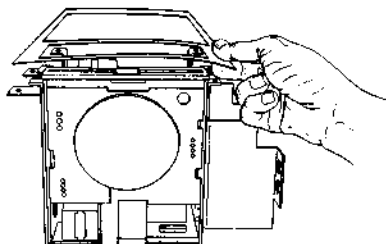


SUBASSEMBLY REMOVAL
Diskette Drive (cont.)

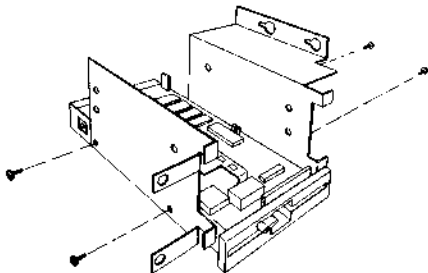
Procedure: Diskette Drive Removal

3. Slide the drive mount bracket toward the rear of the central module, and lift the bracket straight out of the central module.
-

4. Bow the front panel mask and remove it from beneath the diskette drive bezel (and tape back-up drive bezel, if one is installed).



5. Remove the four Phillips screws which fasten the diskette drive to the drive mount bracket.



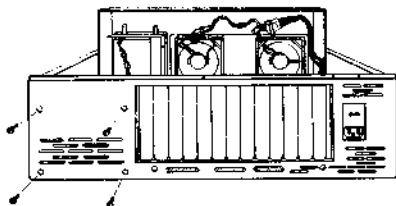
6. Remove the diskette drive from the drive mount bracket.
-

Introduction Use this procedure to remove fixed disk drives from the central module.

In order to remove the fixed disk drives, first remove the drive mount bracket in which the drives are mounted.

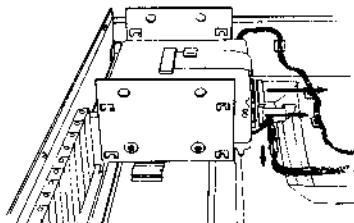
Procedure: Fixed Disk Drive Removal

1. Remove the four Phillips screws which fasten the rear panel of the drive mount bracket to the rear panel of the central module.



2. Disconnect the DC power, signal and control harnesses from the rear of the fixed disk drive.

Note: If there is a spare DC power harness tie-wrapped to the drive mount bracket, cut the tie wrap.



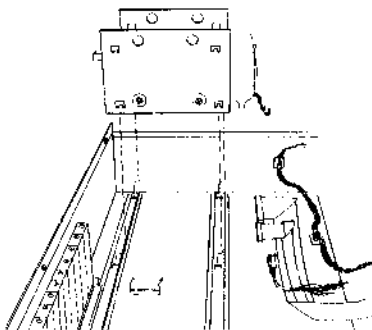
----->

SUBASSEMBLY REMOVAL
Fixed Disk Drives (cont.)

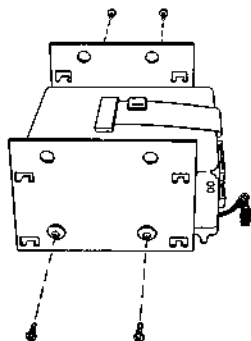
Procedure: Fixed Disk Drive Removal

3. Slide the drive mount bracket toward the front of the central module to disconnect the bracket from the central module base panel.

Lift the drive mount bracket up and out of the central module.



4. Remove the four Phillips screws which fasten the fixed disk drive to the drive mount bracket.



5. Remove the fixed disk drive from the drive mount bracket.
-

Introduction The central PCB is more difficult to replace than other circuit boards because its replacement involves more than a simple reversal of the removal procedure. Follow the steps below, and do not attempt to replace the PCB before reading through the entire procedure.

Procedure: Installing a New Central PCB

1. Check and replace any defective nylon standoffs used to support and attach the new central PCB to the central module base. Be certain all five standoffs are completely seated and biased toward the rear of the central module.

 2. Check and replace any defective nylon standoffs used to support and attach the bus and central RAM expansion PCB's to the central PCB.

 3. Hold the new central PCB near its final assembly position, and elevate the front edge of the circuit board. Slide the board toward the rear of the central module, and fit the printer ports through the appropriate slots in the central module rear panel.

 4. After biasing the circuit board against the central module rear panel, gently press the PCB onto the nylon standoffs.
Note: Do not allow to PCB to slide forward after you have seated it.

 5. While continuing to press the PCB against the central module rear panel, insert the two screws through the rear panel into the circuit board.
-

---->

SUBASSEMBLY REMOVAL

Installing a New Central PCB (cont.)

Procedure: Installing a New Central PCB

6. Attach the diskette drive and fixed disk drive signal and control cables to the front edge connectors of the central PCB.

Note: The diskette cable connector is located nearest the drive mount brackets. The signal and control cable red leads are located nearest the power supply assembly.

7. Remove the workstation PCB support rail from the old central PCB by lifting it straight up while working it from side-to-side. Install this support rail by positioning it over the new PCB, pressing down and firmly snapping it in place.
-

MAJOR SUBASSEMBLY PARTS LISTS

Introduction This appendix contains lists of parts and part numbers used in the DIMENSION computer. The lists are divided by subassembly and include assembly drawings which show the location of each part.

MAJOR SUBASSEMBLY PARTS LISTS
Workstation PCB Subassembly (cont.)

<u>ITEM</u>	<u>PART #</u>	<u>DESCRIPTION</u>	<u>REFERENCE</u>
93	43235	IC, 74LS379	U35
94	43236	IC, 74LS390	U45
95	43237	IC, 74LS399	U54
96	43241	IC, 8255A-5	U59
97	43242	IC, 8259A	U61
98	43245	IC, 25LS2538	U97
99	43246	IC, 74LS221	U62
101	61002	Resistor Network, 1K Ohm, 10 Pin, SIP	RN3
103	61078	Resistor Network, 1K Ohm, 8 Pin, SIP	RN1, RN2, RN4, RN5, RN9, RN10
105	61006	Resistor Network, 4.7K Ohm, 10 Pin, SIP	RN7, RN8
106	61135	Resistor Network, 100 Ohm, 8 Pin, SIP	RN6
107	61010	Resistor, 22 Ohm, 1/4W, 5%	R16
108	61011	Resistor, 100 Ohm, 1/4W, 5%, Carbon Film	R4, R15, R30, R31
110	61032	Resistor, 27K Ohm, 1/4W, 5%	R5
111	61049	Resistor, 16.9K Ohm, 1/4W, 1%	R9, R20, R21
112	61093	Resistor, 1.8K Ohm, 1/4W, 5%, Carbon Film	R1
116	65012	Transistor, 2N3904	Q1
120	68028	Switch, Thumbwheel	S1
121	38065-04	Washer, Flat, #4	P1 MTG (2)
122	38085-04	Nut, Hex, #4-40 w/lockwasher	P1 MTG
123	38087-06	Screw, Machine, Phillips, XREC	P1 MTG (2)
125	13028	Socket, IC, 16 Pin	U23
128	13034	Socket, IC, 28 Pin	U34
129	13036	Socket, IC, 40 Pin	U75
130	38147	Tape, Double-coated	For Y1
133	13111	Connector, Female, Right-angle, 15 Position, w/cap nut	P1