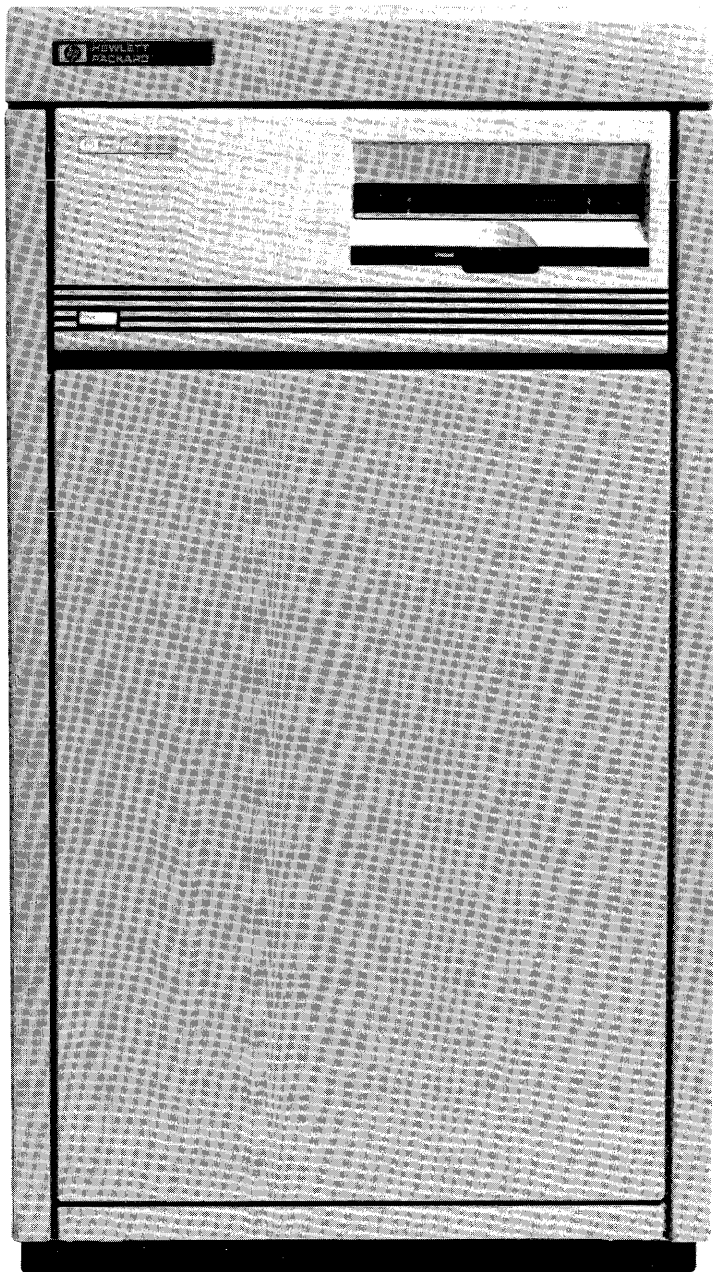


HP 7914CT Disc/Tape Drive

Installation, Operating and Service Manual





INSTALLATION, OPERATING AND SERVICE MANUAL

HP 7914CT DISC/TAPE DRIVE

Manual part no. 35414-90000

PRINTED: DEC 1984
Printed in U.K.

35414-90000
E1284

OPTIONS COVERED

In addition to the standard model, this manual covers the following options: 015,140.

FOR U.S.A. ONLY

The Federal Communications Commission (in 47 CFR 15.818) has specified that the following notice be brought to the attention of the users of this product.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

HEWLETT-PACKARD LIMITED
BRISTOL ENGLAND BS12 6QZ

PRINTING HISTORY

New editions incorporate all update material since the previous edition. Updating Supplements, which are issued between editions, contain additional and revised information to be incorporated into the manual by the user. The date on the title page changes only when a new edition is published.

First Edition NOV 1984
Second Edition DEC 1984

NOTICE

The information contained in this document is subject to change without notice.

HEWLETT-PACKARD MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied or reproduced without the prior written consent of Hewlett-Packard Limited.

Copyright^(C) 1984 by HEWLETT-PACKARD LIMITED

SAFETY CONSIDERATIONS

GENERAL - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal.

WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure or practice which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

SAFETY EARTH GROUND - This is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

BEFORE APPLYING POWER - Verify that the product is configured to match the available main power source according to the input power configuration instructions provided in this manual.

If this product is to be operated with an autotransformer make sure that the common terminal is connected to the earth terminal of the main power source.

SERVICING

WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by service-trained personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged after the product has been disconnected from the main power source.

To avoid a fire hazard, fuses with the proper current rating and of the specified type (normal blow, time delay, etc.) must be used for replacement.

To install or remove a fuse, first disconnect the power cord from the device. Then, using a small flat-bladed screw driver, turn the fuseholder cap counterclockwise until the cap releases. Install either end of a properly rated fuse into the cap. Next, insert the fuse and fuseholder cap into the fuseholder by pressing the cap inward and then turning it clockwise until it locks in place.

CONTENTS

Section 1 GENERAL INFORMATION

1-1. INTRODUCTION	1-1
1-2. GENERAL DESCRIPTION	1-1
1-3. POWER REQUIREMENTS	1-1
1-4. DOCUMENTATION	1-1
1-5. OPERATING SPECIFICATIONS	1-2
1-6. OVERALL CHARACTERISTICS	1-2
1-7. ENVIRONMENTAL REQUIREMENTS	1-3
1-8. SAFETY	1-3
1-9. SYSTEM CONFIGURATIONS	1-3
1-10. OPTIONS AVAILABLE	1-3
1-11. ACCESSORIES SUPPLIED	1-3

Section 2 INSTALLATION

2-1. INTRODUCTION	2-1
2-2. INITIAL INSPECTION	2-1
2-3. MANUALS	2-1
2-4. CLAIMS PROCEDURE	2-1
2-5. EQUIPMENT IDENTIFICATION	2-1
2-6. SITE PREPARATION	2-2
2-7. ENVIRONMENTAL REQUIREMENTS	2-2
2-8. COOLING REQUIREMENTS	2-2
2-9. MOUNTING REQUIREMENTS	2-3
2-10. TAPE DRIVE INSTALLATION INFORMATION	2-3
2-11. UPDATING MANUALS	2-3
2-12. TEST EQUIPMENT	2-3
2-13. UNPACKING THE TAPE DRIVE	2-3
2-14. PREPARATION PROCEDURES	2-3
2-15. ACCESS	2-4
2-16. TOP COVER	2-4
2-17. LOWER FRONT PANEL	2-4
2-18. UPPER FRONT PANEL FILLER STRIPS	2-4
2-19. TAPE DRIVE INSTALLATION	2-4
2-20. TAPE DRIVE INSTALLATION CHECK	2-6
2-21. INTERCONNECTION INSTRUCTIONS	2-6
2-22. HP-IB CABLING	2-6
2-23. HP-IB DEVICE ADDRESS	2-6
2-24. DISC DRIVE INSTALLATION INFORMATION	2-9
2-25. UPDATING MANUALS	2-9
2-26. TOOLS	2-9
2-27. TEST EQUIPMENT	2-9
2-28. UNPACKING THE DISC DRIVE	2-9
2-29. PREPARATION PROCEDURES	2-12
2-30. PANEL REMOVAL AND REPLACEMENT	2-12

CONTENTS (continued)

2-31. TOP COVER	2-12
2-32. LOWER FRONT PANEL	2-13
2-33. UPPER FRONT PANEL FILLER STRIPS	2-13
2-34. REAR PANEL	2-13
2-35. SIDE PANELS	2-13
2-36. INTERNAL SHIELDING	2-13
2-37. SHIPPING SPACER REMOVAL	2-15
2-38. REAR PANEL SOUND Baffle INSTALLATION	2-15
2-39. SHIPPING LOCKS	2-15
2-40. UNLOCKING THE SHIPPING LOCKS	2-15
2-41. RESEATING CARD CAGE PCA's	2-16
2-42. POWER REQUIREMENTS	2-17
2-43. AC POWER OUTLET AND EXTERNAL GROUND	2-17
2-44. FUSE RATING CHECK	2-17
2-45. VOLTAGE SELECTION	2-17
2-46. VOLTAGE STRAPPING	2-20
2-47. FREQUENCY CONVERSION	2-20
2-48. DRIVE BELT COVER REMOVAL AND REPLACEMENT	2-20
2-49. FREQUENCY CONVERSION PROCEDURE	2-49
2-50. DISC DRIVE POWER CORD INSTALLATION	2-23
2-51. INSTALLATION CHECKS	2-26
2-52. POWER-ON SEQUENCE	2-26
2-53. CONTROLLER INSTRUCTION SET	2-27
2-54. REPACKAGING FOR SHIPMENT	2-31
2-55. DISC DRIVE REPACKAGING	2-31
2-56. TAPE DRIVE REPACKAGING	2-31

Section 3 OPERATION

3-1. OPERATING PRECAUTIONS	3-1
3-2. CONTROLS CONNECTORS AND INDICATORS	3-1
3-3. BUSY LIGHT	3-1
3-4. PROTECT LIGHT	3-3
3-5. EJECT BUTTON	3-3
3-6. UNLOAD BUTTON	3-3
3-7. HP-IB CONNECTORS	3-3
3-8. SELF-TEST SWITCHES	3-3
3-9. STATUS READOUTS	3-3
3-10. DIAGNOSTIC SWITCH	3-3
3-11. HP-IB ADDRESS SWITCHES	3-4
3-12. DISC DRIVE FUSE	3-4
3-13. POWER OUTLET FUSE	3-4
3-14. TAPE DRIVE FUSE	3-4
3-15. LINE CONNECTOR	3-4
3-16. POWER SWITCHES	3-4
3-17. DISC DRIVE POWER INDICATOR	3-4
3-18. TAPE CARTRIDGE INFORMATION	3-5
3-19. TAPE CARTRIDGE DESCRIPTION	3-5

CONTENTS (continued)

3-20. TAPE CARTRIDGE LOADING	3-5
3-21. TAPE CARTRIDGE UNLOADING	3-7
3-22. TAPE DRIVE MAINTENANCE	3-7
3-23. TAPE CAPSTAN CLEANING	3-7
3-24. TAPE HEAD CLEANING	3-8
3-25. POWER-DOWN SEQUENCE	3-8

Section 4 SERVICE

4-1. INTRODUCTION	4-1
4-2. SERVICE PREPARATION	4-1
4-3. MAINTENANCE	4-1
4-4. REMOVAL/REPLACEMENT	4-1
4-5. CABINET PANELS	4-2
4-6. HP 9144A TAPE DRIVE	4-2
4-7. HP 7914 DISC DRIVE REPLACEABLE PARTS	4-2

Section 5 REPLACEABLE PARTS

5-1. INTRODUCTION	5-1
5-2. ORDERING INFORMATION	5-1

CONTENTS (continued)

Section 1

GENERAL INFORMATION

Figure 1-1. HP 7914CT DISC/TAPE DRIVE	1-4
---	-----

Section 2

INSTALLATION

Figure 2-1. SUBSYSTEM INTERNAL AIRFLOW	2-2
Figure 2-2. TAPE DRIVE INSTALLATION	2-5
Figure 2-3. FRONT AND REAR PANELS	2-7
Figure 2-4. MAXIMUM CABLE LENGTH FOR HP-IB CHANNELS	2-8
Figure 2-5. HP 7914CT DISC DRIVE SHIPPING PACKAGE	2-10
Figure 2-6. HP 7914CT DISC DRIVE UNPACKING	2-11
Figure 2-7. INTERNAL SHIELDING	2-14
Figure 2-8. SHIPPING LOCKS	2-16
Figure 2-9. TERMINAL BOARD TB1 IDENTIFICATION	2-18
Figure 2-10. VOLTAGE STRAPPING CONFIGURATIONS	2-19
Figure 2-11. SERVICE ENGINEER ACCESSABLE CONTROLS	2-21
Figure 2-12. FREQUENCY CONVERSION	2-24
Figure 2-13. AC POWER CORD SETS	2-25
Figure 2-14. STATE DIAGRAM SYMBOLS	2-28
Figure 2-15. DISC DRIVE INTERNAL DIAGNOSTIC STATES	2-29
Figure 2-16. TAPE DRIVE INTERNAL DIAGNOSTIC STATES	2-30

Section 3

OPERATION

Figure 3-1. CONTROLS, CONNECTORS, AND INDICATORS	3-2
Figure 3-2. TAPE CARTRIDGE FORMATS	3-5
Figure 3-3. TAPE UNIT CLEANING & TAPE CARTRIDGE IDENTIFICATION	3-6

Section 4

SERVICE

Figure 4-1. HDA FITTING CLEARANCE	4-2
---	-----

Section 5

REPLACEABLE PARTS

Figure 5-1. HP 7914CT EXPLODED VIEW	5-4
---	-----

CONTENTS (continued)

Section 1 GENERAL INFORMATION

No tables

Section 2 INSTALLATION

Table 2-1. HP-IB ADDRESSES	2-6
Table 2-2. SPECIAL TOOLS	2-9
Table 2-3. DISC DRIVE FUSE RATINGS	2-17
Table 2-4. DISC DRIVE VOLTAGE RANGES	2-17

Section 3 OPERATION

No tables

Section 4 SERVICE

No tables

Section 5 REPLACEABLE PARTS

Table 5-1. REPLACEABLE PARTS	5-2
Table 5-2. ABBREVIATIONS	5-5
Table 5-3. CODE LIST OF MANUFACTURERS	5-6

1-1. INTRODUCTION

This section contains general information about the HP 7914CT Disc/Tape Drive. This information consists of a general description, power requirements, documentation, characteristics, and available options.

1-2. GENERAL DESCRIPTION

The HP 7914CT Disc/Tape Drive, often referred to as the subsystem, consists of an HP 35414CT Disc Drive (an HP 7914 Disc Drive mounted in an HP 92211 style cabinet) along with an integral HP 9144A Tape Drive. The subsystem is designed for connection to the Hewlett-Packard Interface Bus (HP-IB)*. The disc and tape drives have separate HP-IB connections, but may be connected to the host via a common HP-IB cable. Two 1-metre HP-IB cables are supplied.

Although the HP 7914CT subsystem contains an HP 7914 Disc Drive and an HP 9144A Tape Drive in one cabinet, it should be noted that they must be considered as separate devices when configuring a computer system.

The HP 7914's Power Distribution Unit (PDU) supplies switched power to the disc drive and unswitched power to the tape drive via a CEE-22 female receptacle mounted on the top of the PDU. The subsystem is supplied with three power cords, two are suitable for use in the country of destination and one is an internal cable used to connect the HP 9144A to the disc drive's PDU. Of the two local use power cords, one is used to connect the disc drive's PDU to the line supply and the other is a spare.

1-3. POWER REQUIREMENTS

The disc drive is available with two input power configurations: the standard drive is configured

for 120V 60 Hz operation; the option 015 drive is configured for 220V 50 Hz operation. In addition, the drive can be configured for 100V 60 Hz, 100V 50 Hz, 120V 50 Hz or 240V 50 Hz operation. The power specification label, which is installed on the rear panel of the cabinet during production, reflects the current drive power configuration.

The tape drive has its own Power Distribution Unit (PDU). A voltage selector switch on the tape drive's rear panel is used to set the nominal line voltage: to either "115V" (covers 100V - 120V) or "230V" (covers 220V - 240V).


CAUTION

As the tape drive obtains its power supply via the disc drive's PDU, ensure that the voltage selected is compatible whenever a tape unit is fitted.

1-4. DOCUMENTATION

The following documentation is supplied:

- *HP 7914CT Disc/Tape Drive Installation, Operating and Service Manual*, part no. 35414-90000.
- *HP 7914CT Operator Controls Card*, part no. 35414-90001.
- *HP 7911/12/14 Disc/Tape Drives Operator Instructions*, part no. 07912-90901.
- *HP 7911, 7912, and 7914 Disc/Tape Drives Operating and Installation Manual*, part no. 07912-90902.
- *Site Environmental Requirements for Disc/Tape Drives*, part no. 5955-3456.
- *HP 9144A Tape Drive Operator's Manual*, part no. 09144-90000.

 Not just IEEE-488, but the hardware, documentation and support that delivers the shortest path to a computer system.

General Information

The following documentation, which may be ordered from the nearest Hewlett-Packard Sales and Support Office listed in the rear of this manual, provides additional information on the operation and service of the individual components of the drive:

- *HP7911, 7912, and 7914 Disc/Tape Drives Service Manual*, part no. 07912-90903.
- *HP 9144A Tape Drive Service Manual*, part no. 09144-90030.
- *CS/80 Instruction Set Programming Manual*, part no. 5955-3442.
- *CS/80 External Exerciser Manual*, part no. 5955-3462

1-5. OPERATING SPECIFICATIONS

Disc drive performance

Average controller overhead time: 4.0 ms
 Average seek time: 28.1 ms
 Average rotational delay: 8.3 ms
 Average time to transfer 1 kbyte: 1.2 ms
 Total average transaction time: 41.6 ms
 (excluding system overhead)

Maximum disc transactions per second, for 1 kbyte transfers, less system overhead: 24.0*

* *Refers to fundamental disc performance; true I/O rates must include the individual system configuration specifications and are application dependent.*

Disc drive storage capacity

Data Capacity	Data Bits Per	Data Bytes Per	Sectors Per	Tracks Per
Byte	8			
Sector	2,048	256		
Track	131,072	16,384	64*	
7914 Head	150,994,944	18,874,368	73,728	1,152**
7914CT***	1,056,964,608	132,120,576	516,096	8,064

* *Total number of sectors per track is 65, one is a spare.*
 ** *Total number of tracks per head is 1,164; eight are spares for defective track allocation and two are maintenance tracks. Two additional tracks are reserved for future use.*
 *** *The HP 7914CT utilizes two heads per surface.*

Tape drive performance

Tape Read/Write Speed: 60 ips

Tape Search/Rewind Speed: 90 ips

Data Transfer Rate†: 2 Mbytes/minute

† *Maximum sustained transfer rate does not necessarily reflect system throughput which varies depending upon application, file structure and host/tape driver implementation.*

Tape drive storage capacity

Data Capacity	Bits Per	Bytes Per	Frames Per	Blocks Per	Tracks Per
Byte	8				
Frame	2,048	256			
Block	8,192	1,024	4*		
Track**	33,488,896	4,186,112	16,384	4,088***	
Tape**	535,822,336	66,977,792	262,144	65,408+	16

* *Total number of frames per block is 6 (4 frames for data and 2 for data recovery).*

** *600 foot cartridge*

*** *Total number of blocks per track is 4,096, 8 are used for spares.*

+ *Total number of blocks per 600 foot cartridge is 65,776; 128 are spares and 240 are maintenance blocks.*

1-6. OVERALL CHARACTERISTICS

Interface

HP-IB using CS80 protocol

Electromagnetic emissions

Radiated and conducted interference:

U.S.A.: designed to meet FCC Rules Part 15, Class A computing devices requirements.

Europe: designed to meet VDE 0871 for level A computing devices. FTZ licensed on some HP systems. Refer to your local sales representative for more information.

Sound emission

Sound power: 63 dBA

Sound pressure: 50 dBA

Power requirements

Voltage Range*	Current (47.5- to-55 Hz)	Current (54- to-66 Hz)
100 Volts	8.8 Amps	8.0 Amps
120 Volts	7.4 Amps	7.0 Amps
220 Volts	4.0 Amps	-
240 Volts	3.7 Amps	-

* *All voltages +5%, -10%*

Power ~ 700 Watts

Heat dissipation

700 Watts (2,389 Btu/hr) maximum

Dimensions

Height: 720 mm (28.4 in.)

Width: 375 mm (14.8 in.)

Depth: 774 mm (30.5 in.) including baffle

Weight

Net Installed: Disc + Tape Drive 109 kg (239 lb)

Shipping: Disc Drive 135 kg (297 lb)
Tape Drive 9 kg (19 lb)

1-7. ENVIRONMENTAL REQUIREMENTS

Before installing an HP 7914CT, refer to the "Site Environmental Requirements Manual", publication number 5955-3456. Copies of this publication are available from your local Hewlett Packard Sales and Support Office, and a copy is shipped with every HP 7914CT.

1-8. SAFETY

- CSA Certified to CSA 22.2 No. 154
- Meets all applicable safety standards of IEC 380 and IEC 435.
- UL Listed to UL 114 and UL 478

1-9. SYSTEM CONFIGURATIONS

For specific configurations the appropriate System Configuration Guide should be consulted. However, the following general conditions should be noted:

- Total cable length is limited to one metre per equivalent load.
- Each controller places one equivalent load on each of the HP-IB lines.
- The disc drive includes one metre of internal cabling.

1-10. OPTIONS AVAILABLE

015 - 220V 50 Hz or 240V 50 Hz operation
140 - Orders the disc drive only, the HP 9144A cartridge tape drive is deleted.

1-11. ACCESSORIES SUPPLIED

NOTE

The rear panel sound baffle is shipped in the disc drive's accessory box. This component must be fitted to the rear panel before operating the subsystem. Fitting instructions are given in paragraph 2-38.

Shipped with the HP 7914CT:

HP 7914CT Installation, Operating and Service Manual: 35414-90000

HP 7914CT Operator Controls Card: 35414-90001

HP 7911, 7912 and 7914 Operator Instructions: 07912-90901

HP 7911, 7912 and 7914 Operating and Installation Manual: 07912-90902

Site Environmental Requirements Manual: 5953-3456

Two HP-IB Cables (1-metre long): 10833A

Two Module Locks: 92211-40002

Two Power Cables: *One suitable for country of destination* and one for connecting the HP 9144A to the HP 7914 power distribution unit*

Shipped with the HP 9144A:

HP 9144A Operator's Manual: 09144-90000

Tape Cartridge (600 foot, 67 Mbyte): 88140LC**

Tape Head Cleaner Solution***: 8500-1251

Lint-free Swabs (plastic shaft)***: 9300-0767

Power Cable: *Suitable for country of destination**

* *One of these power cords will be a spare.*

** *"C" denotes factory certified tapes.*

*** *Periodic cleaning of the HP 9144A read/write heads is required to ensure correct operation (after a new cartridge is inserted, when read errors occur or at least once a week).*

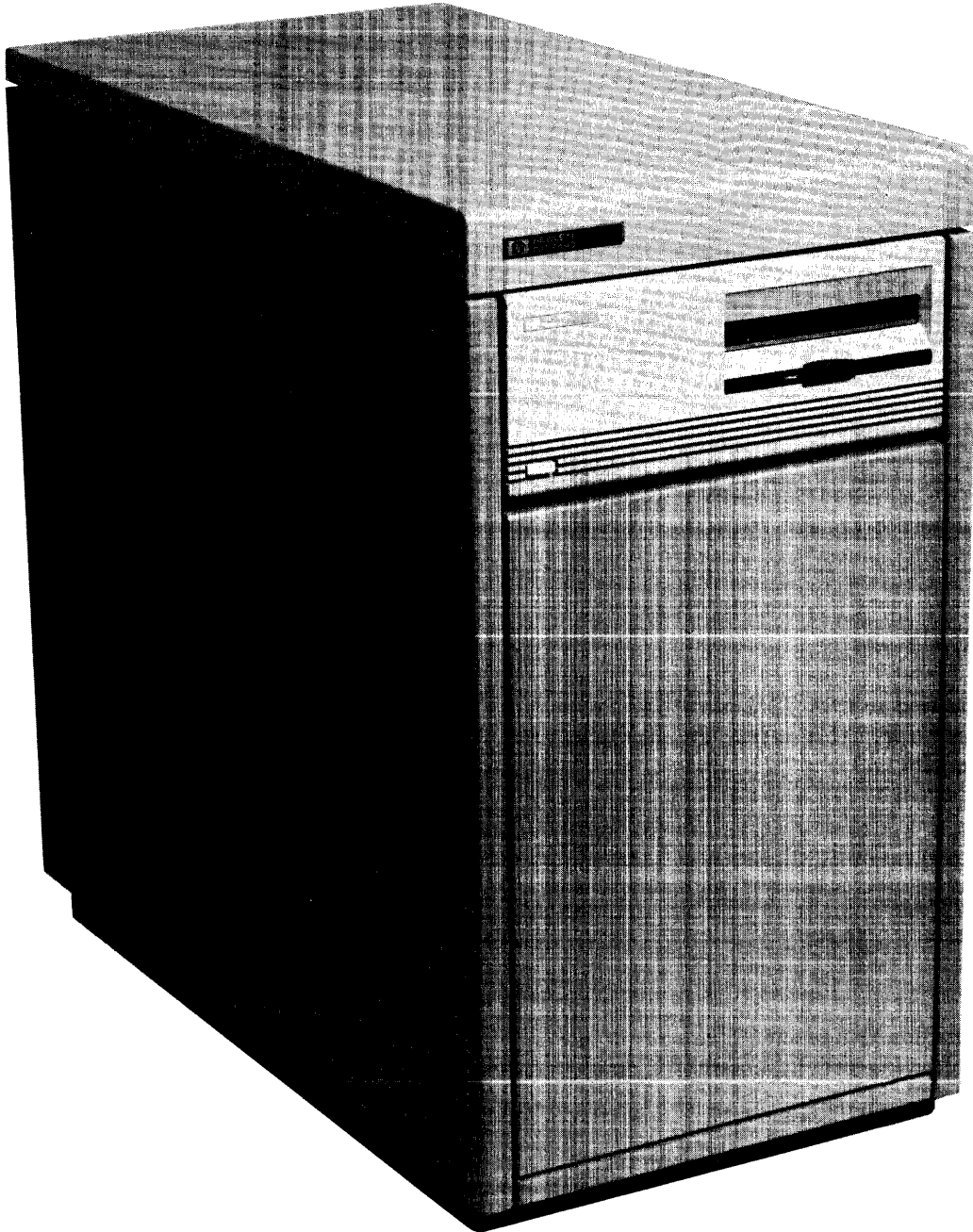


Figure 1-1. HP 7914CT Disc/Tape Drive

2-1. INTRODUCTION

This section contains information needed for normal initial set-up and checkout of the subsystem. This section also contains information necessary for shipment of the subsystem and, consequently, it should be retained for reference. For servicing the component parts of the subsystem reference should be made to the *HP 7911, 7912, and 7914 Disc/Tape Drive Service Manual*, part no. 07912-90903, and the *HP 9144A Tape Drive Service Manual*, part no. 09144-90030. Refer to the publication *Site Environmental Requirements for Disc/Tape Drives*, publication no. 5955-3436, for environmental information relating to the installation.

2-2. INITIAL INSPECTION

The component parts, i.e. the disc and tape drive units, of the HP 7914CT are shipped in reusable containers. When the shipment arrives, ensure that the containers have been received as specified by the carrier's bill of lading. Inspect the shipping containers immediately upon receipt for evidence of mishandling during transit. If the containers are damaged or water-stained, request that the carrier's agent is present when the containers are unpacked.

If the containers appear to be in satisfactory condition, proceed with the unpacking instructions.

2-3. MANUALS

The following manuals are shipped with each disc drive:

- *HP 7911/12/14 Disc/Tape Drives Operator Instructions*, part no. 07912-90901.
- *HP 7911, 7912, and 7914 Disc/Tape Drives Operating and Installation Manual*, part no. 07912-90902.

- *HP 7914CT Disc/Tape Drive Installation, Operating and Service Manual*, part no. 35414-90000.
- *Site Environmental Requirements for Disc/Tape Drives*, part no. 5955-3456.

The following manual is shipped with the tape drive:

- *HP 9144A Tape Drive Operator's Manual*, part no. 09144-90000.

2-4. CLAIMS PROCEDURE

WARNING

To avoid dangerous electrical shock, do not apply power to the drive when there are signs of physical damage to any portion of the outer enclosure.

If the shipment is incomplete or if the equipment is damaged or fails to meet specifications, notify your nearest Hewlett-Packard Sales and Support Office. If damage occurred in transit, notify the carrier as well. Hewlett-Packard will arrange for replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the shipping container(s) and packaging material for inspection.

2-5. EQUIPMENT IDENTIFICATION

The disc drive model number and full serial number are stamped on two identification labels. One is located behind the front panel and the other is located on the left-hand side of the lower, rear frame member. This can be seen without removing the rear panel. The model number and serial number for the tape drive are stamped on a similar label on its rear panel. Be sure to include the model numbers and serial numbers in any correspondence with Hewlett-Packard about this product.

2-6. SITE PREPARATION

WARNING

The subsystem does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and maintenance activities to service trained personnel.

The site must be prepared in accordance with the information provided in the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456.

2-7. ENVIRONMENTAL REQUIREMENTS

CAUTION

To avoid damage to the drive, ensure that it is operated within the limits specified in the manual listed in paragraph 2-6.

CAUTION

The drive has been designed to operate within a temperature range of $+10^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ (50°F to 104°F) with the rate of change not to exceed 10°C (18°F) per hour.

The cartridge tapes used with the tape drive are designed to operate within a temperature range from $+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ (41°F to 104°F), and within a humidity range from 20% to 80% with a maximum wet bulb temperature (non-condensing) not to exceed 26°C (79°F).

The drive has been designed to operate within the environmental limits specified in the manual listed in paragraph 2-6. Operation of the drive outside the specified limits may result in degradation or failure and may not be covered by warranty.

2-8. COOLING REQUIREMENTS

Fans in the drives provide adequate ventilation when the drives are operated in the appropriate environment (refer to the manual listed in paragraph 2-6). As shown in figure 2-1, cooling air is drawn into the subsystem through the front and is exhausted through the rear panel.

NOTE

To obtain maximum cooling efficiency, ensure that the airflow through the front and rear of the subsystem is not restricted.

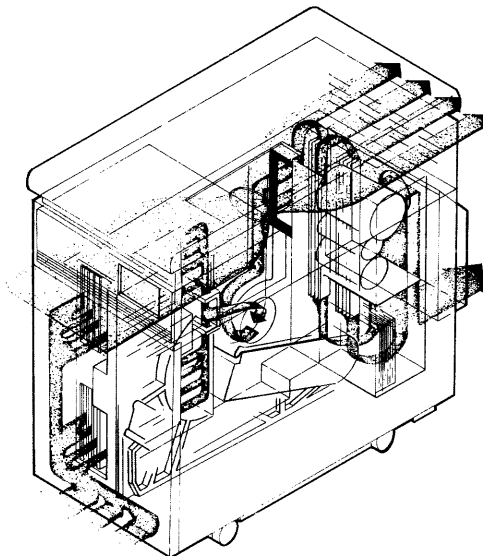


Figure 2-1. Subsystem Internal Airflow

2-9. MOUNTING REQUIREMENTS

CAUTION

Do not operate the drive until the leveling feet have been lowered and are holding the drive in a stable, horizontal position.

The drive is equipped with both casters and leveling feet. The casters should only be used when moving the drive. Before operating the drive, the leveling feet must be lowered such that they make contact with the floor and hold the drive in a stable, horizontal position. A small, adjustable wrench will assist in adjustment of the leveling feet.

2-10. TAPE DRIVE INSTALLATION INFORMATION

WARNING

The tape drive must not be used until the rear panel sound baffle is fitted to the subsystem cabinet.

WARNING

The HP 7914CT is not customer installable. The procedures here are intended to guide the service engineer in installing/removing an HP 9144A.

The following paragraphs provide the necessary information to install the HP 9144A Tape Drive. The information includes instructions on updating manuals, tools and test equipment.

2-11. UPDATING MANUALS

Before installing the tape drive, read all updating supplements supplied for the drive manuals and any related manuals.

2-12. TEST EQUIPMENT

Test equipment capable of measuring the environmental and power specification limits should be used to check the installation site.

2-13. UNPACKING THE TAPE DRIVE

To unpack the tape drive proceed as follows:

- a. Open the top of the shipping carton.
- b. Lift the upper protective foam insert from the carton.
- c. Lift the tape drive from its recess in the lower protective foam insert.

NOTE

Retain the shipping containers and packing material for future use.

2-14. PREPARATION PROCEDURES

WARNING

To avoid dangerous electrical shock, do not perform any installation/removal/ replacement operation until the ac mains power is removed from the disc drive.

Installation of the tape drive requires that the disc drive (i.e. the primary subsystem power supply) power cord be disconnected. To remove the power cord proceed as follows:

- a. Set the power switch on the disc drive rear panel to the 0 (Off) position.
- b. Set the power switch on the front of the HP 9144A to the 0 (off) position.
- c. Disconnect the ac power cord from the wall outlet and from the receptacle on the rear of the drive.

Installation of the tape drive requires that the HP-IB cable to the host is disconnected. Disconnect the HP-IB cables as follows:

CAUTION

Do not connect/disconnect the HP-IB cable(s) from the subsystem while the system bus is in an active state.

- a. Loosen the two thumb screws which hold the HP-IB connector in place.
- b. Disconnect the HP-IB cable(s).

To reconnect the HP-IB cable(s), first ensure that the system bus is not in an active state, then reverse the procedure.

2-15. ACCESS

NOTE

Do not attempt to force any panel away from the subsystem. Always follow the logical sequence given and refer to figure 2-2 if necessary.

2-16. TOP COVER. To remove the top cover proceed as follows:

- a. Unlock the rear panel with the key supplied.
- b. While holding the front of the top cover down, pull up on its rear edge, as shown in figure 2-2, until it is clear of its locating studs.
- c. Lift the top cover clear of its front edge locating lugs with a forward movement.

2-17. LOWER FRONT PANEL. To remove the lower front panel, proceed as follows:

- a. Remove the top cover (refer to paragraph 2-16.).
- b. Loosen the two retractable captive screws from the top of the front panel. These were previously hidden by the top panel and should be finger-tight.

- c. Lower the top of the panel away from the framework and then lift it away from its lower edge locating lugs.

2-18. UPPER FRONT PANEL FILLER STRIPS. To remove the upper front panel filler strips, proceed as follows:

- a. Remove the lower front panel (refer to paragraph 2-17).
- b. Remove each of the five plastic filler strips by pressing the ends inward and pulling them clear of the framework, one at a time.

2-19. TAPE DRIVE INSTALLATION

The procedure given here deals with fitting the tape drive into the HP 7914CT, if more detailed information is required on the tape drive refer to the HP 9144A Tape Drive Service Manual, part no. 09144-90030.

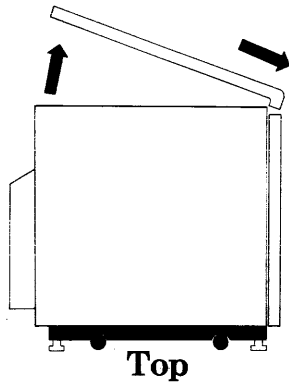
To install an HP 9144A tape drive in the HP 7914CT subsystem, proceed as follows:

- a. Perform the preparation procedures if necessary (refer to paragraph 2-14).
- b. Gain access to the subsystem cabinet (refer to paragraphs 2-16 through 2-18).
- c. Slide the tape drive into position, rear first from the front of the subsystem.
- d. Fit one black plastic module lock (provided) to each side of the tape drive refer to figure 2-2.
- e. Connect up the tape drives power supply using the inter-unit cable supplied.

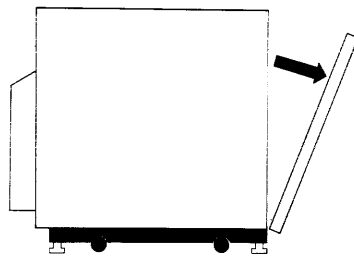
NOTE

The tape drive must be supplied with its power from the disc drive's PDU output. The inter-unit cable supplied must be used.

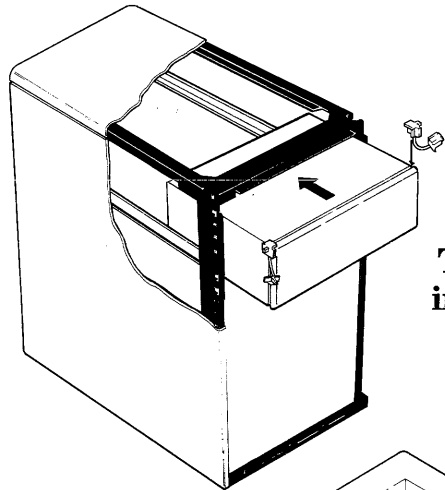
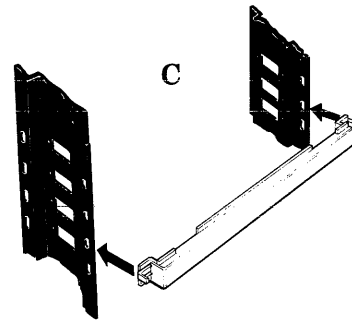
A Panel removal



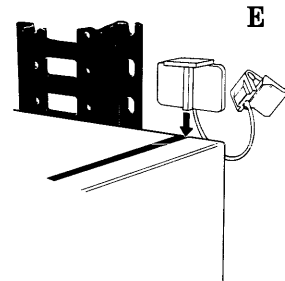
B Lower Front



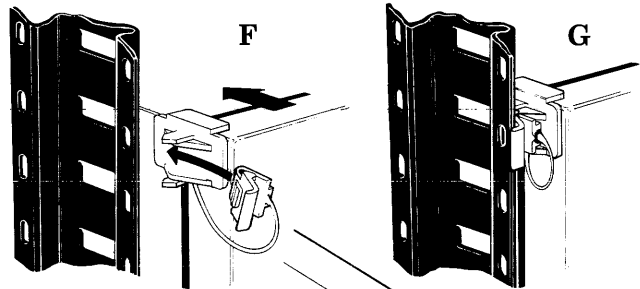
Installation



D Tape Drive installation



E Module lock operation



F

G

I HP-IB Cable

H Cable routing

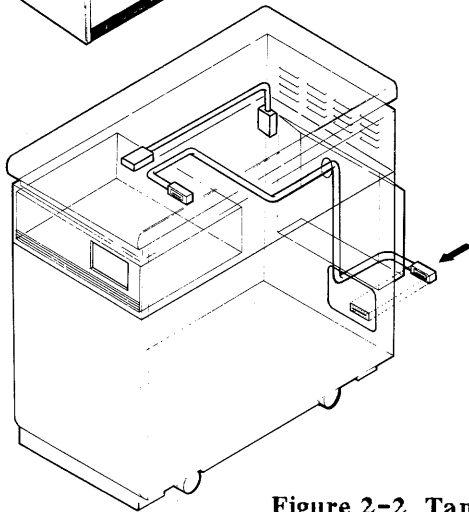


Figure 2-2. Tape Drive Installation

f. Connect up the tape drives HP-IB interface cable. Use one of the 1-metre HP-IB cables supplied and route it to the disc drive's lower HP-IB connector. (The upper connector is not used.) The cable should be routed through the rear panel sound baffle. Cable routing is shown in figure 2-2 and the HP-IB connectors in figure 2-3.

h. Replace the lower front panel and top cover.

i. Reconnect the disc drive (subsystem) ac power supply

Removal is a reversal of the above procedures.

g. Check that the tape drive HP-IB address is set to the correct address.

2-20. TAPE DRIVE INSTALLATION CHECK

Whenever the HP 9144A Tape Drive is switched on it will perform a series of selftests. If any of these tests fail, the drive's FAULT light will light up and maintenance should be referred to service trained personnel. Under normal circumstances the selftest takes about 7 seconds (several minutes if a tape cartridge is fitted). Further information on the self test routines is given in paragraph 2-52.

2-21. INTERCONNECTION INSTRUCTIONS

The subsystem is connected to a system using 1-metre HP-IB cables, model number 10833A (part no. 8120-3445). One cable is used to connect the tape drive's HP-IB connector to that of the disc drive and a second cable connects the subsystem to the system bus. The locations of the HP-IB connectors for the drives are shown in figure 2-3. The major HP-IB considerations concerning the subsystem are contained in the following paragraphs

Although the HP 7914CT subsystem contains an HP 7914 Disc Drive and an HP 9144A Tape Drive in one cabinet, it should be noted that they must be considered as separate devices when configuring a computer system.

2-22. HP-IB CABLING.

The Hewlett-Packard Interface Bus (HP-IB) has certain rules which must be observed for successful installation of the subsystem. Cabling is limited to one metre per HP-IB load. Typically the Central Processing Unit (CPU) is 7 equivalent loads and the drive is one equivalent load. However, in the case of the HP 7914CT, the disc drive includes one additional metre of internal cabling, while the disc drive and tape drive each represent one equivalent load. This causes the complete HP 7914CT to represent two equivalent loads (see figure 2-4).

The CPU adheres to an HP-IB standard which allows seven metres of HP-IB cable between it

and the nearest device connected to it and one metre of cable between each additional device. The maximum configuration is eight devices (excluding the CPU) per HP-IB channel or a maximum of 15 metres or 15 equivalent loads.

NOTE

The maximum number of drives that can be connected to a single HP-IB channel is host dependent. This information is contained in the appropriate host configuration guide.

2-23. HP-IB DEVICE ADDRESS

The HP-IB address switches are located on the rear panels of each drive (see figure 2-3). The HP-IB address switches permit the setting of one of eight unique addresses. The address switches can be set with any pointed tool. Addresses which are generally set one time, are as shown in table 2-1.

Table 2-1. HP-IB Addresses

Switch Settings (msb)* 3 2 1 (lsb)	HP-IB Address
0 0 0	0
0 0 1	1
0 1 0	2
0 1 1	3
1 0 0	4
1 0 1	5
1 1 0	6
1 1 1	7

*LSB = least significant bit

MSB = most significant bit

NOTE

When setting the HP-IB address switches, disregard any markings on the switch bodies. Set the switches according to the markings on the rear panel.

NOTE

Check the HP-IB address switches and ensure that no two devices in the system have the same address.

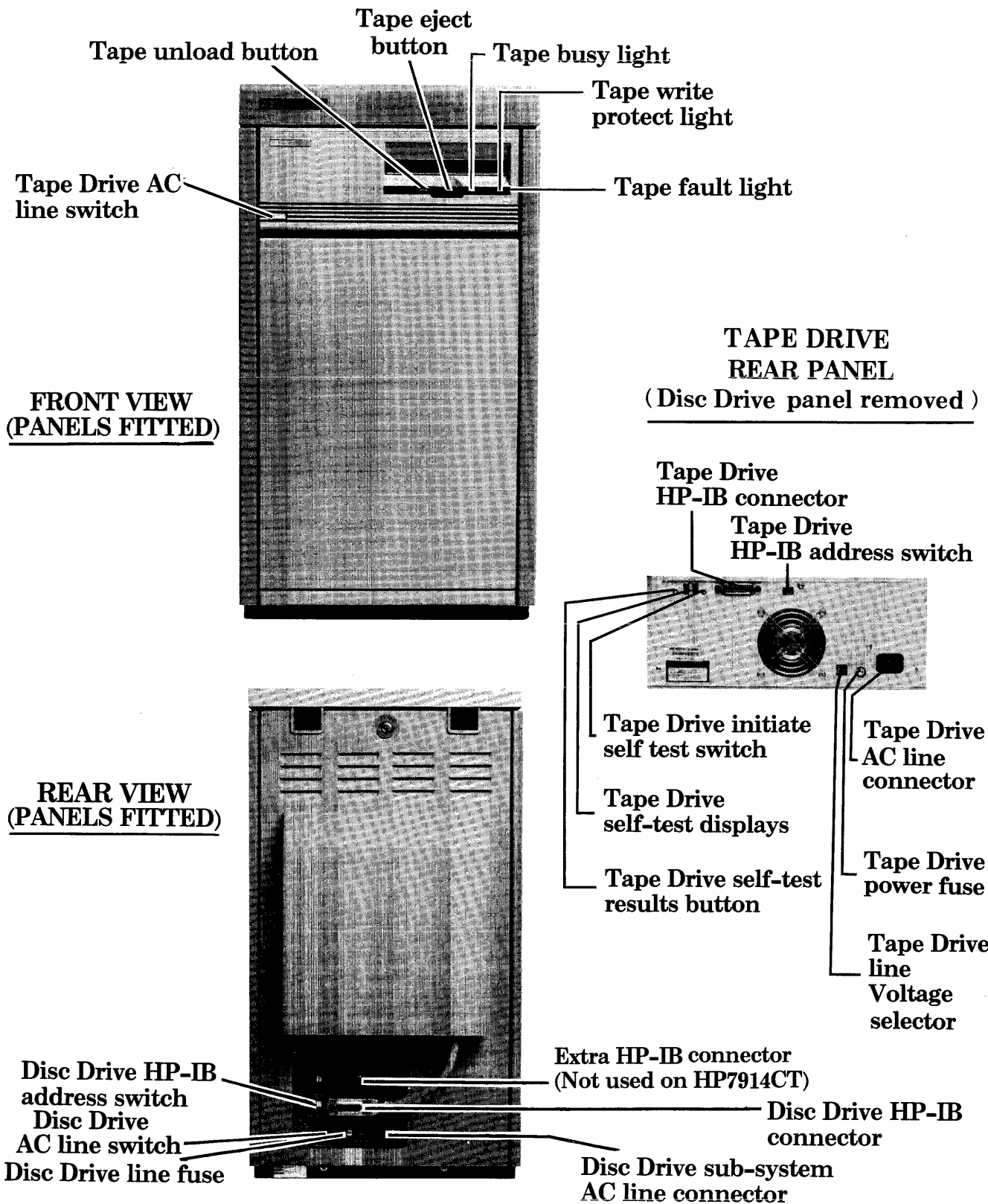
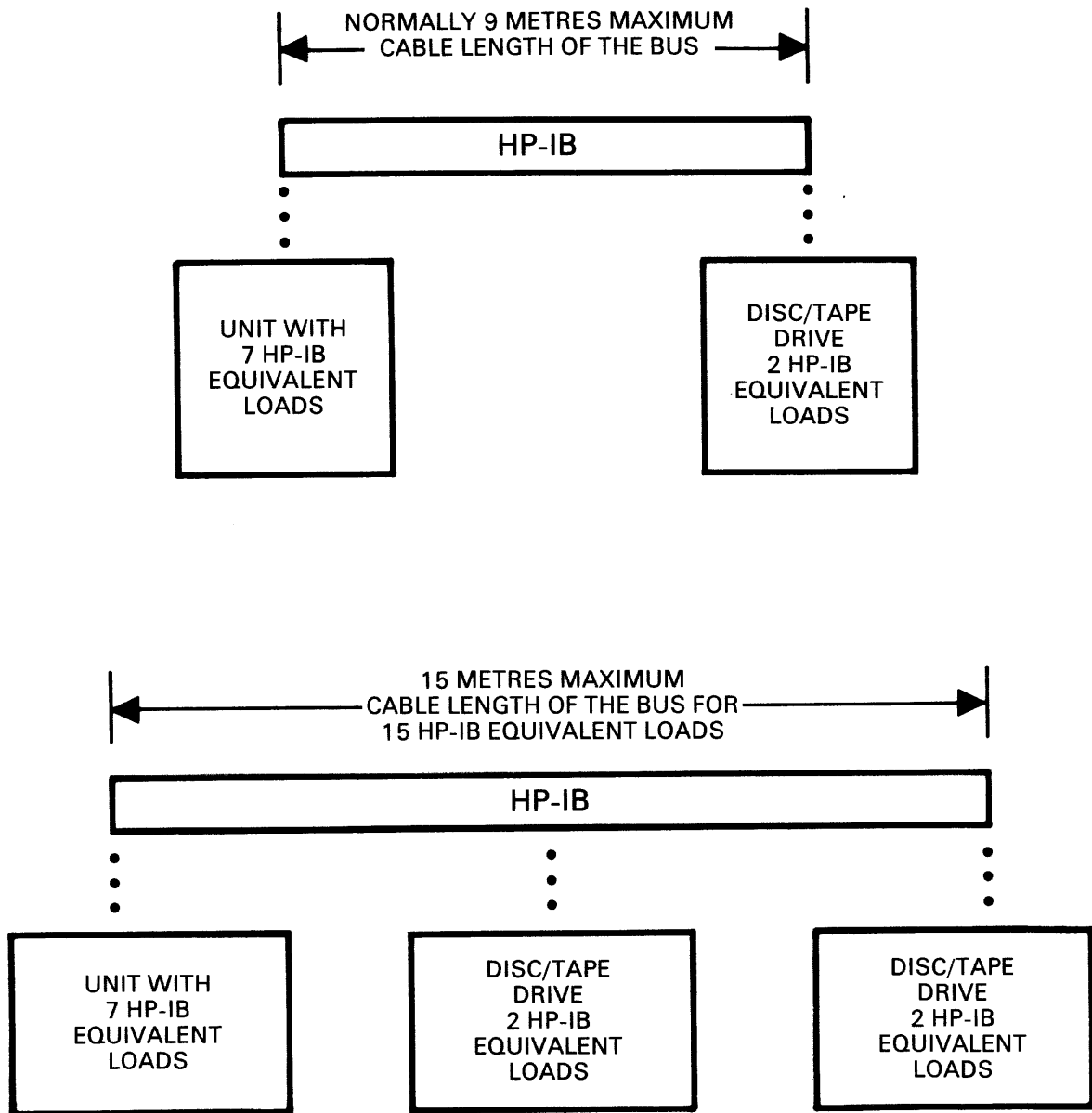


Figure 2-3. Front and Rear Panels



1 METRE X N LOADS = MAX CABLE LENGTH IN METRES (UP TO 15 METRES MAXIMUM)

NOTES:

1. THE HP7914CT IS SUPPLIED WITH TWO 1 METRE HP-IB CABLES.
2. THE MAXIMUM NUMBER OF DRIVES THAT CAN BE CONNECTED TO A SINGLE HP-IB CHANNEL IS HOST DEPENDENT. THIS INFORMATION IS CONTAINED IN THE APPROPRIATE HOST CONFIGURATION GUIDE.

Figure 2-4. Maximum Cable Length for HP-IB Channels

2-24. DISC DRIVE INSTALLATION INFORMATION

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

The following paragraphs provide the necessary information to install the drive. The information includes instructions on updating manuals, tools and test equipment required for installation, preparation procedures, spindle and actuator locks, ac outlet and external ground requirements and power cord information. Interconnection details are given in paragraph 2-21.

2-25. UPDATING MANUALS

Before installing the drive, read all updating supplements for the drive manuals and any related manuals. Updating supplements (if any) are provided with the appropriate manual.

2-26. TOOLS

Table 2-2. lists the special tools which, in addition to ordinary tools, are required to install/service the drive.

NOTE

TORX^R hardware is used extensively throughout the drive. Removal and installation of this hardware requires the use of special drivers (refer to table 2-2). Any reference to the type of hardware will be accompanied by the appropriate driver size (e. g., T15).

Table 2-2. Special Tools

TOOL	HP PART NO.
Variable Torque Driver	1535-2653
Torque Wrench	8710-1007
Coupler	8710-1457
TORX ^R Driver Kit	8710-1426

(includes the following items)

Bit, T6	8710-1424
Bit, T7	8710-1423
Bit, T8	8710-1422
Bit, T9	8710-1421
Bit, T10	8710-1418
Bit, T10, 3.5 in. long	8710-1465
Bit, T15	8710-1415
Bit, T20	8710-1416
Bit, T25	8710-1417
Bit, T27	8710-1420
Bit, T30	8710-1419
Extension	8710-1425
Driver Handle	8710-1413
Pouch	8710-1412

TORX^R is a registered trademark of the Camcar Division of Textron, Inc.

2-27. TEST EQUIPMENT

Test equipment capable of measuring the environmental and power specification limits should be used to check the installation site.

2-28. UNPACKING THE DISC DRIVE

CAUTION

To avoid damage to the disc drive do not apply any sudden mechanical shocks to it.

CAUTION

The disc drive is shipped with the spindle and actuator locked. To avoid damage to the disc mechanism, do not unlock the spindle and actuator until the disc drive has been moved to its installation site.

To unpack the disc drive proceed as follows:

- a. Locate the packing list and compare this list against the purchase order to verify that the shipment is correct.
- b. Cut the container polystrap bands (see figure 2-5).
- c. Lift the container top from the pallet base.

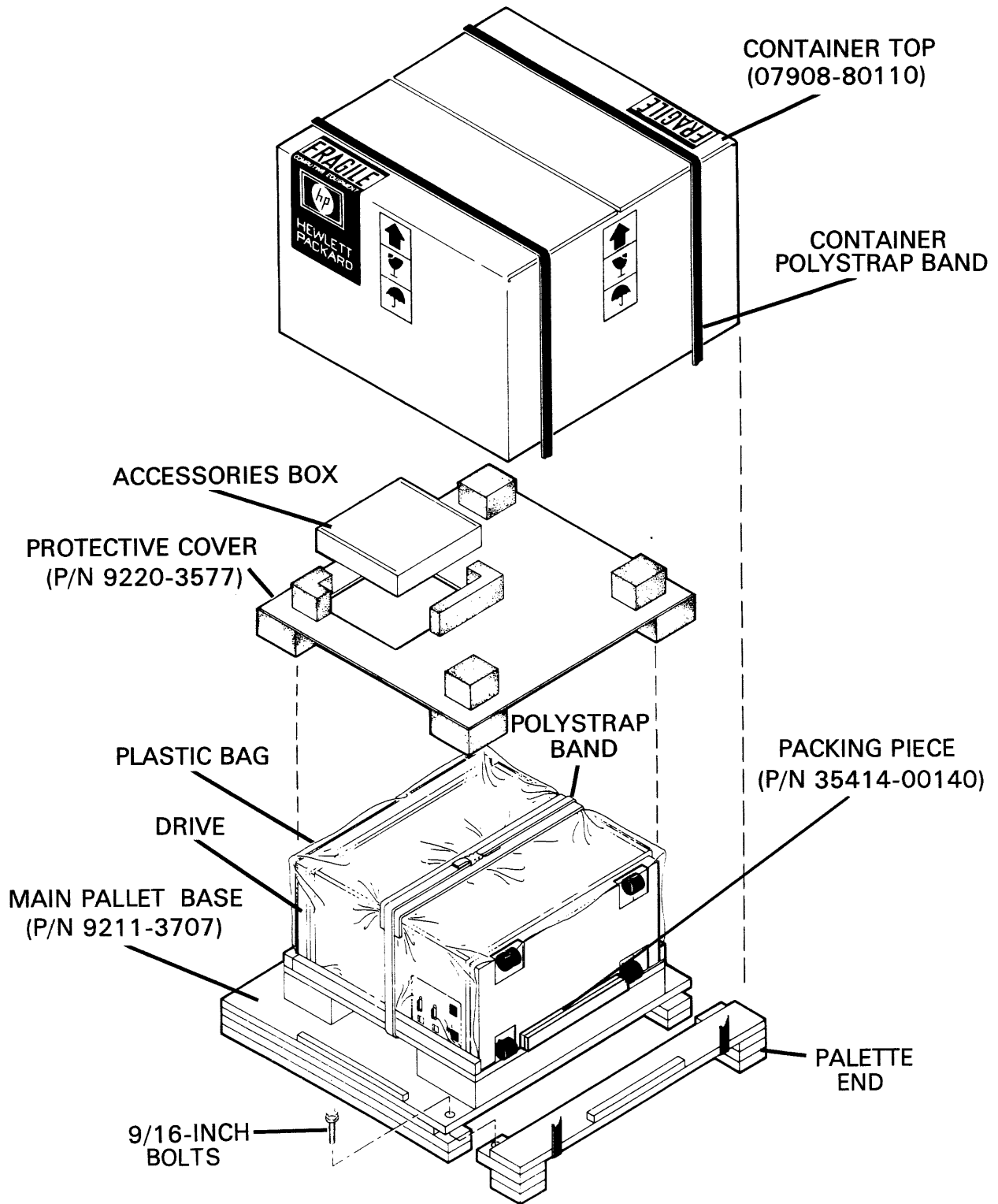


Figure 2-5. HP 7914CT Disc Drive Shipping Package

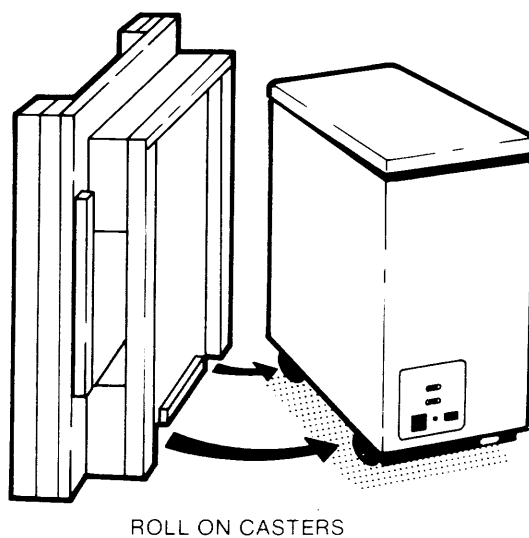
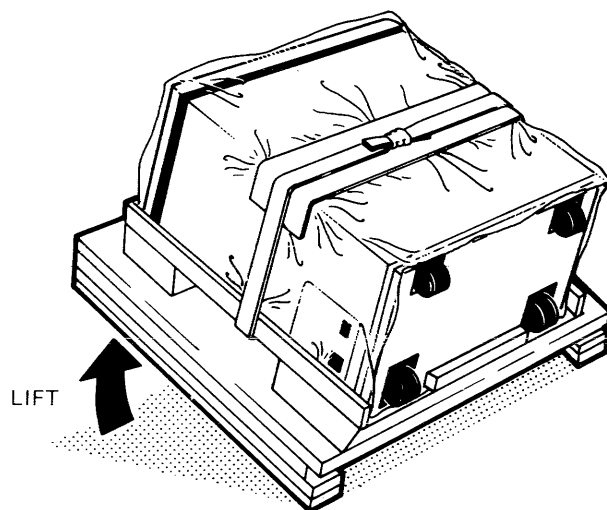
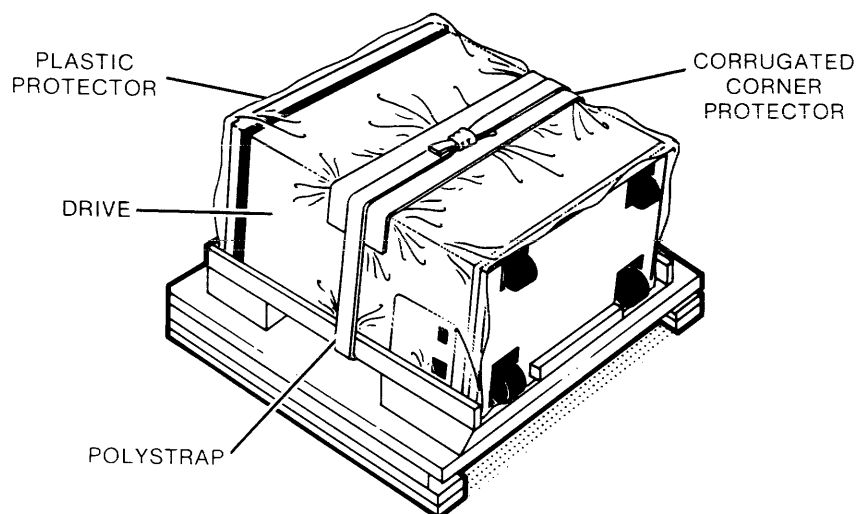


Figure 2-6. HP 7914CT Disc Drive Unpacking

Installation

- d. Remove the accessories box.
- e. Lift the protective cover from the disc drive.
- f. Using a 9/16-inch wrench, remove the two bolts that hold the pallet end to the main pallet base.
- g. Pull the pallet end from the main pallet base.
- h. Lift the other end of the main pallet base up until the casters on the disc drive rest firmly on the floor (see figure 2-6).
- i. Cut the polystrap band holding the disc drive to the main pallet base
- j. Separate the disc drive from the pallet base.
- k. Cut the plastic bag and peel it off the disc drive. Do not pull the bag off the disc drive.
- l. Visually inspect the drive for damage.
- m. If a visual examination reveals any damage to the disc drive, follow the claims procedure described in paragraph 2-4.

NOTE

Retain the shipping containers and packing materials for future use.

2-29. PREPARATION PROCEDURES

WARNING

To avoid dangerous electrical shock, do not perform any installation/removal/replacement operation until the ac mains power is removed from the disc drive.

Installation of the subsystem requires that the disc drive power cord be disconnected. To remove the power cord, proceed as follows:

- a. Set the disc drive power switch on the rear panel to the 0 (off) position.

- b. Set the power switch on the front of the HP 9144A to the 0 (off) position.

- c. Disconnect the ac power cord from the wall outlet and from the receptacle on the rear of the disc drive.

Installation of the subsystem requires that the HP-IB cable(s) be disconnected. Disconnect the HP-IB cable(s) as follows:

CAUTION

Do not connect or disconnect the HP-IB cable(s) from the drive while the system bus is in an active state.

- a. Loosen the two thumb screws which hold the HP-IB connector in place.

- b. Disconnect the HP-IB cable(s).

To reconnect the HP-IB cable(s), first ensure that the system bus is not in an active state, then reverse the procedure.

2-30. PANEL REMOVAL AND REPLACEMENT

NOTE

Do not attempt to force any panel away from the subsystem. Always follow the logical sequence given and refer to figure 2-2 if necessary.

2-31. TOP COVER. To remove the top cover, proceed as follows:

- a. Unlock the rear panel with the key supplied.

- b. While holding the front of the top cover down, pull up on its rear edge, as shown in figure 2-2, until it is clear of its locating studs.

- c. Lift the top cover clear of its front edge locating lugs with a forward movement as shown in figure 2-2.

2-32. LOWER FRONT PANEL. To remove the lower front panel, proceed as follows:

- a. Remove the top cover (refer to paragraph 2-31).
- b. Loosen the two retractable captive screws from the top of the front panel. These were previously hidden by the top panel and should be finger-tight.
- c. Lower the top of the panel away from the framework and then lift it away from the lower edge locating lugs, refer to figure 2-4(d).

2-33. UPPER FRONT PANEL FILLER STRIPS. To remove the upper front panel filler strips, proceed as follows:

- a. Remove the lower front panel (refer to paragraph 2-32).
- b. Remove each of the five plastic filler strips by pressing the ends inward and pulling them clear of the framework, one at a time.

2-34. REAR PANEL To remove the rear panel, proceed as follows:

- a. Remove the top cover (refer to paragraph 2-31).
- b. Loosen the two retained screws at the top of the rear panel. These were previously hidden by the top panel.
- c. Lower the top of the panel away from the framework and then lift it away from the lower edge locating lugs.

2-35 SIDE PANELS. To remove either of the cabinet side panels proceed as follows:

- a. Remove the top cover (refer to paragraph 2-31).
- b. Loosen the two retractable captive screws from the top edge of the panel. These were

previously hidden by the top panel and should be finger-tight.

- c. Lower the top of the panel away from the framework then lift it away from its lower edge locating lugs.

Replacement is a reversal of the above procedures.

2-36. INTERNAL SHIELDING

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

The disc drive mechanism is protected by an internal shield (see figure 2-7.). Before any maintenance can be carried out or parts replaced, other than operating the shipping locks, this shielding must be removed. To remove the shielding proceed as follows:

CAUTION

When removing any of the internal shields, take care not to damage either the acoustic foam or the RFI strips fitted to the inner faces of each shield and the vertical sides of the disc drive PDU..

- a. Remove the cabinet top, rear and side panels (refer to paragraph 2-31 through 2-35).
- b. Remove the tape drive, if fitted (refer to paragraph 2-10).
- c. Remove the top shield by unscrewing the four screws then slide the shield out from the rear of the framework.
- d. To remove either of the side shields, unscrew the appropriate two upper edge fixing screws, lift the shield and slide it out from the rear of the framework.

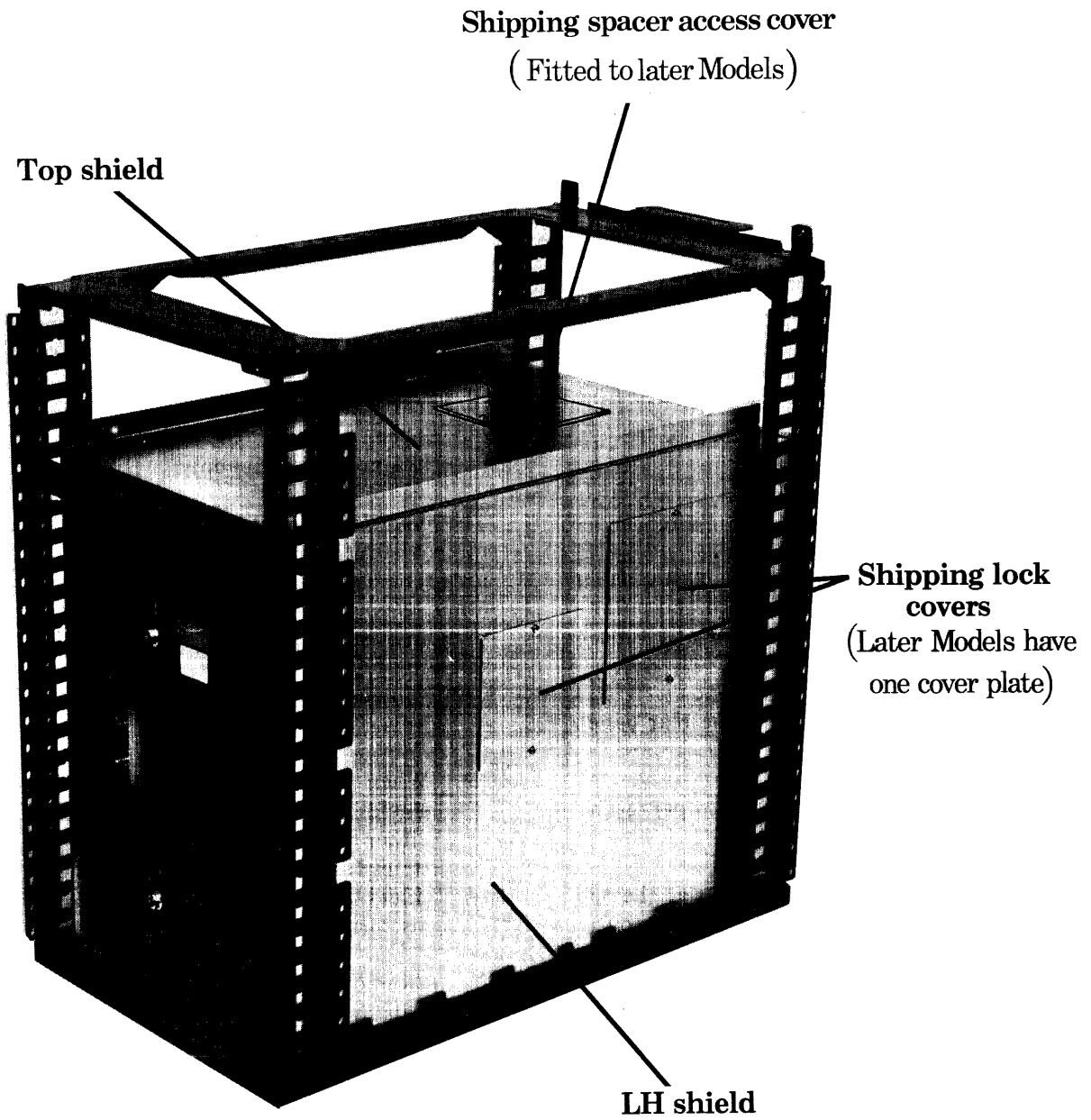


Figure 2-7. Internal Shielding

2-37. SHIPPING SPACER REMOVAL**WARNING**

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

An internal shipping block (spacer) is fitted between the rear of the Head Disc Assembly (HDA) and the Power Distribution Unit (PDU). Before operating the drive this must be removed as follows:

- a. Remove the top cover (refer to paragraph 2-31).
- b. Access the shipping block by either removing the top internal shield (refer to paragraph 2-36), or moving aside the access plate which is fitted to later models.
- c. Pull the shipping block from between the HDA and PDU.

2-38. REAR PANEL SOUND BAFFLE INSTALLATION**WARNING**

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

WARNING

Do not operate the HP 7914CT until the rear panel sound baffle is fitted.

The rear panel sound baffle is shipped in the accessory box which accompanies the disc drive. This baffle must be fitted to reduce the sound output from the cooling air outlets. To install the baffle proceed as follows:

- a. Remove the top cover and rear panel (refer to paragraphs 2-31 and 2-34).

b. Position the four screw holes on the rear panel over the corresponding holes on the baffle.

c. Attach the baffle to the rear panel using the four screws provided (these should be in the baffle).

2-39. SHIPPING LOCKS**WARNING**

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

CAUTION

Do not attempt to operate the drive if the spindle and actuator have not been unlocked. Do not connect the ac power cord to the subsystem until the spindle and actuator have been unlocked.

The drives are equipped with locks (see figures 2-7 and 2-8) for the disc spindle and actuator. These locks are designed to protect the disc mechanism during shipment of the drive. Before operating the drive, the shipping locks must be set to the OPERATE position. The spindle and actuator should not be unlocked until the drive has been moved to its installation site.

2-40. UNLOCKING THE SHIPPING LOCKS**WARNING**

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

To unlock the spindle and actuator, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-29).

Installation

b. Remove the subsystem's top cover and left-hand side panel (refer to paragraphs 2-31 and 2-35).

c. Access the actuator and spindle locks by moving the plate(s) on the side of the internal shield. This is best done by removing one fixing screw, slackening the other screw and then swinging the plate(s) aside (see figure 2-8).

d. Unlock the actuator by moving the actuator lock to the OPERATE position (see figures 2-7 and 2-8).

e. Loosen the T15 spindle lock screw.

f. Using a flat blade screwdriver for increased leverage, move the spindle lock to the OPERATE position.

g. Tighten the T15 spindle lock screw to 20 in.-lb.

To reassemble, install the items removed in steps d and c.

To lock the disc mechanism prior to shipment, perform the above procedure but move the locks to the SHIP position.

NOTE

When locking the spindle, ensure that the spindle lock screw is tight.

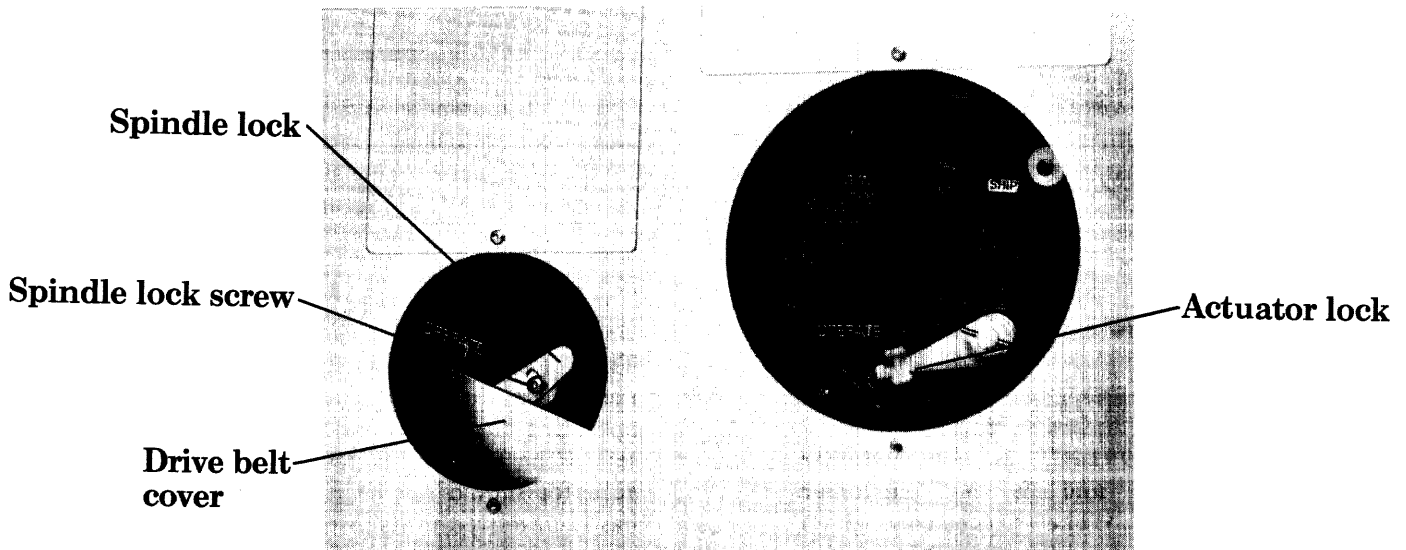


Figure 2-8. Shipping Locks

2-41. RESEATING CARD CAGE PCA'S

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

During shipment, the card cage PCA's may become unseated. Before operating the disc drive,

all the card cage PCA's must be resealed. To reseat the PCA's proceed as follows:

a. Perform preparation procedures (refer to paragraph 2-29).

b. Disconnect the ac power cord from the ac mains power.

c. To access the card cage, remove the top cover and lower front panel (refer to paragraphs 2-31 and 2-32).

d. Remove the air filter foam and loosen the

two captive screws that hold the card cage shield in place.

e. Remove the shield from the front of the card cage.

f. Using the ESD grounding kit supplied with the CE Tool Kit, ground the HP 7914CT to mains safety earth. Wearing a grounding wrist strap connected to the HP 7914CT chassis, reseal all card cage PCA's.

WARNING

When installing the card cage shield, the two captive screws must be tightened to 15 inch-pounds to prevent operator access into the card cage.

To reassemble, reverse steps a through e of the above procedure.

2-42. POWER REQUIREMENTS

CAUTION

Do not attempt to operate a drive configured for 100 or 120 Vac on 220 or 240 Vac or vice versa. Damage to the drive will result.

The disc drive has been preset for the ordered operating voltage before being shipped. The standard model is set for 120 Vac, 60 Hz operation and option 015 is set for 220 Vac, 50 Hz operation (240Vac for UK delivery).

2-43. AC POWER OUTLET AND EXTERNAL GROUND

Have a qualified electrician check the power outlet with an ac voltmeter to ensure that the required voltage is present (refer to paragraph 1-6). Also, check the earth or safety ground in the power outlet to ensure that there is a good earth ground (properly earthed ac outlet).

2-44. FUSE RATING CHECK

The disc drive is equipped with one primary power fuse (F1). Figure 2-3 indicates the location of the primary power fuse on the rear panel. The fuse value is dependent on the operating voltage; therefore, it should be checked to ensure it is the value shown in table 2-3.

Table 2-3. Disc Drive Fuse Ratings

Nominal Operating Voltage	Fuse Description	HP Part No.
100/120 Vac	10A, 250V, med-blo	2110-0051
220/240 Vac	5A, 250V, slow-blo	2110-0367

2-45. VOLTAGE SELECTION

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

The disc drive operating voltage is preset at the factory prior to shipment. The standard model is strapped for 120 Vac, 60 Hz operation and option 015 is strapped for 220 Vac, 50 Hz operation; 100 Vac and 240 Vac operation may also be selected. Voltage selection is accomplished by configuring terminal board TB1 in the power supply (see figure 2-9). Table 2-4 lists the four operating voltages for which the drive can be configured.

Table 2-4. Disc Drive Voltage Ranges

Disc Drive Voltage Operation	Input AC Voltage Range
100V	90 to 105 Vac
120V	108 to 126 Vac
220V	198 to 231 Vac
240V	216 to 252 Vac

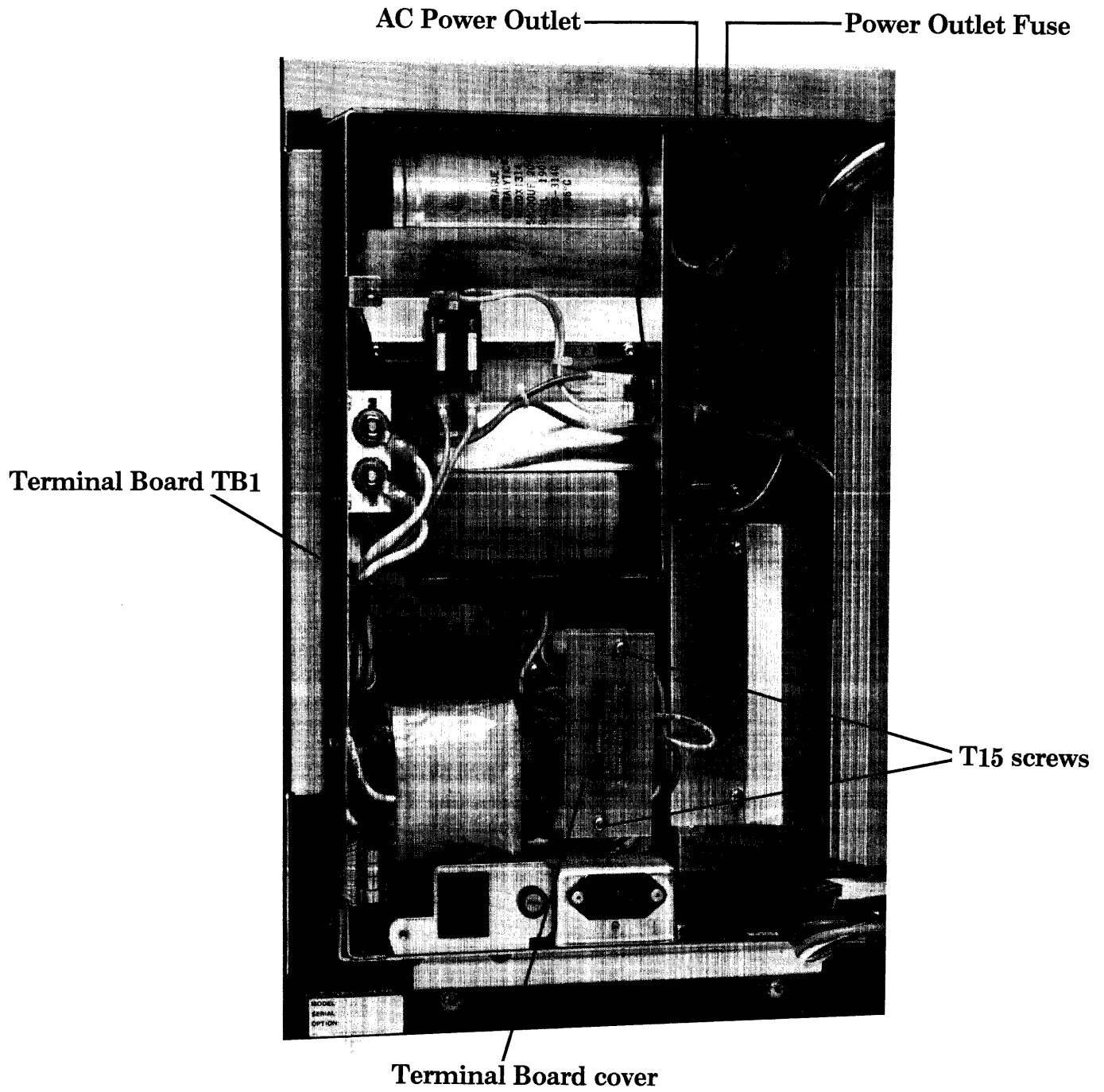


Figure 2-9. Terminal Board TB1 Identification

2-46. VOLTAGE STRAPPING

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

To change or check the drive voltage strapping, proceed as follows:

WARNING

To avoid dangerous electrical shock, do not perform the voltage strapping procedure until the AC mains power is removed from the drive.

- a. Perform preparation procedures (refer to paragraph 2-29).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the top cover and rear panel (refer to paragraphs 2-31 and 2-34).
- d. Remove the two T15 door closure screws that hold the power supply cover panel in place (see figure 2-11).
- e. Disconnect the HP-IB ribbon cable from the HP-IB PCA-A14.
- f. Swing the hinged cover panel to the right, exposing terminal board TB1 (see figure 2-9).
- g. Remove the two T15 screws that mount the terminal board cover.
- h. Change the strapping configuration on TB1 of the power supply to correspond to the primary voltage being used (see figure 2-10).
- i. If necessary, change the primary power fuse (F1) to the correct value.
- j. Install the terminal board cover, tightening the two T15 mounting screws to 20 in. -lb.

k. Close the power supply cover panel and install the two T15 attaching screws. Tighten the screws to 25 in. -lb.

l. Change the power specification label located on the rear panel to reflect the current strapping configuration.

2-47. FREQUENCY CONVERSION

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

The disc drive-spindle is driven by an induction motor through a pulley and drive belt. To maintain the proper spindle rotation speed, different pulley/drive belt combinations are required for 50 Hz and 60 Hz operation. The power specification label indicates the frequency for which the drive is currently configured.

If it is necessary to convert the drive from 50 Hz to 60 Hz, or vice-versa, the pulley and drive belt must be changed. To access the pulley and drive belt, the drive belt cover must be removed.

2-48. DRIVE BELT COVER REMOVAL AND REPLACEMENT

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

To remove the drive belt cover, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-29).
- b. Disconnect the ac power cord from the ac mains power.

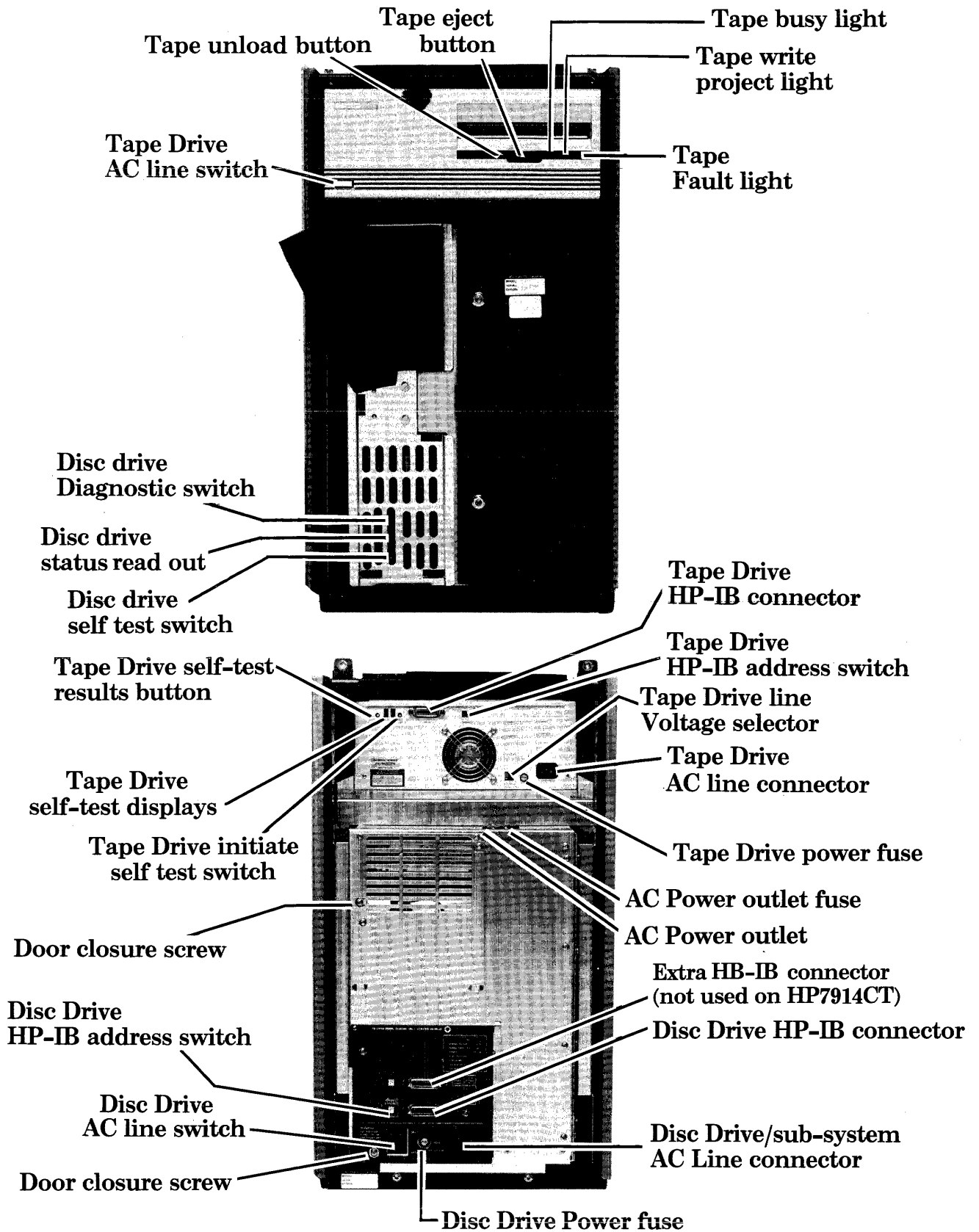


Figure 2-11. Service Engineer Accessible Controls

Installation

- c. Remove the subsystem's panels (refer to paragraphs 2-31 through 2-35).
- d. Remove the HP 9144A if fitted (refer to paragraph 2-10).
- e. Remove the top and left-hand side internal shields (refer to paragraph 2-36).
- f. Remove the four T15 screws that mount the drive belt cover (see figure 2-8) to the disc mechanism.

To replace the drive belt cover, proceed as follows:

- a. Ensure that the grounding strap is rotated so the hole in the strap is aligned with the nearest hole in the drive belt cover. This ensures a good ground to the spindle shaft.
- b. Place the drive belt cover on the disc mechanism and install a T15 screw in the hole aligned with the grounding strap. Tighten this screw finger tight.
- c. Replace the other three T15 screws and tighten all four screws to 20 in.-lb.
- d. Replace the internal shields, HP 9144A (if fitted) and cabinet panels.

2-49. FREQUENCY CONVERSION PROCEDURE

WARNING

The HP 7914CT is not customer installable and is not customer serviceable. The procedures given here are for the use of service trained personnel only.

The frequency conversion procedure involves changing the pulley and drive belt (see figure 2-12). To perform the frequency conversion, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-29).

- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the drive belt cover (refer to paragraph 2-48).
- d. Remove the spindle lock by removing the two T15 screws that mount the lock to the disc mechanism.
- e. Loosen the motor mounting screw directly opposite the tension stud 3/4 turn.
- f. Loosen the other two motor mounting screws two turns.
- g. Loosen the 8 mm nut on the tension stud.
- h. Using the motor pulley, move the motor toward the spindle and, while holding the motor in this position, tighten the 8 mm nut on the tension stud.
- i. Remove the drive belt.
- j. Using a 3/4-inch open-end wrench to hold the motor pulley across the flats, remove the 1/2-inch nut on the motor shaft.

CAUTION

When the motor pulley is removed from the motor shaft, the woodruff key will fall free. Do not allow the key to fall into the spindle motor area.

- k. Slide the motor pulley off the motor shaft being careful not to lose the woodruff key.
- l. Verify that the motor pulley/drive belt combination to be installed is correct for the power line frequency available.

NOTE

The outside diameter of the 50 Hz motor pulley is 71.2 mm (2.8 in.). The outside diameter of the 60 Hz motor pulley is 59.3 mm (2.3 in.).

- m. Position the key in the slotted motor shaft.
- n. Seat the pulley to the rear of the shaft.

o. Install the 1/2-inch nut on the motor shaft and, while holding the pulley across the flats with a 3/4-inch open-end wrench, tighten the nut to 120 in.-lb.

p. Place the new belt around the spindle pulley and around the motor pulley ensuring that the side of the belt with the part number stamped on it is to the outside.

q. Loosen the 8 mm nut on the tension stud.

CAUTION

Do not turn the spindle in a clockwise direction.

r. Manually rotate the motor pulley counterclockwise until the drive belt is centered on the motor pulley. Also ensure that the full width of the drive belt lies on the spindle pulley.

s. Using the tension stud, push the motor toward the rear of the drive and then release. This removes any friction in the motor mounting and allows the spring tension assembly to establish the proper drive belt tension.

t. Tighten the 8 mm nut on the tension stud to 30 in.-lb.

u. Tighten the three motor mounting screws to 30 in.-lb.

v. Install the spindle lock in the OPERATE position using the two T15 lock mounting screws. Tighten the screws to 20 in.-lb.

w. Change the power specification label located on the rear panel to reflect the frequency for which the drive is currently configured.

x. Install the drive belt cover (refer to paragraph 2-47).

2-50. DISC DRIVE POWER CORD INSTALLATION

WARNING

For USA and Canada operation, use only a UL listed and CSA Certified, detachable power cord with type SJT flexible cord, suitable for rated voltage and current. Check the input ac voltage, main fuse rating, and voltage strapping before connecting the power cord. The drive is shipped with an appropriate power cord.

CAUTION

Do not attempt to operate a drive configured for 100 or 120Vac on 220 or 240Vac or vice versa. Damage to the drive will result.

CAUTION

Do not connect the ac power cord to the disc drive until the spindle and actuator have been unlocked.

Check the input ac voltage and fuse rating of both the disc drive and tape drive before proceeding with the power cord installation. The various power cords available are shown in figure 2-13.

To attach a power cord, proceed as follows:

a. Set the power switches (see figure 2-3) one on the disc drive rear panel and one on the tape drive front panel (if fitted) to the 0 (off) position.

b. Plug the female end of the power cord into the connector on the rear panel of the disc drive

Installation

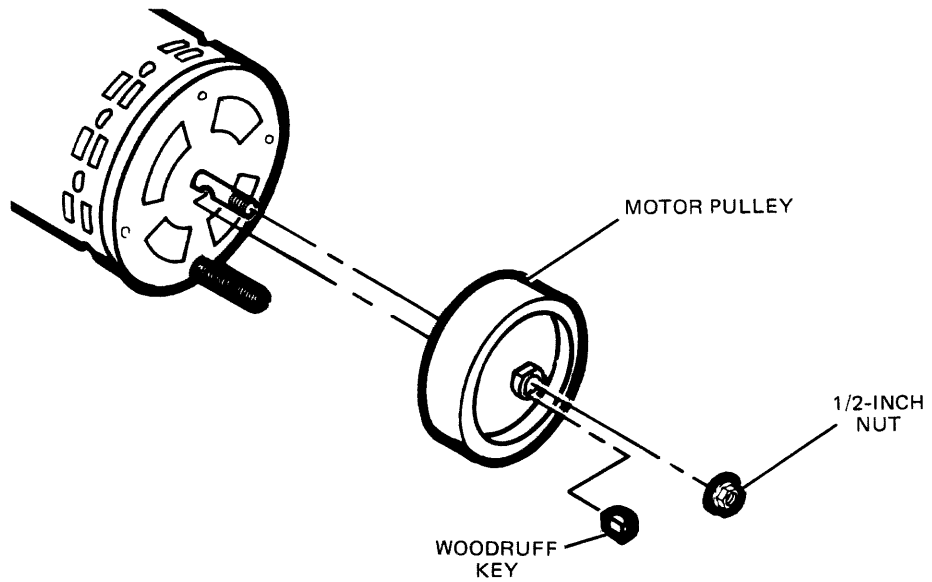
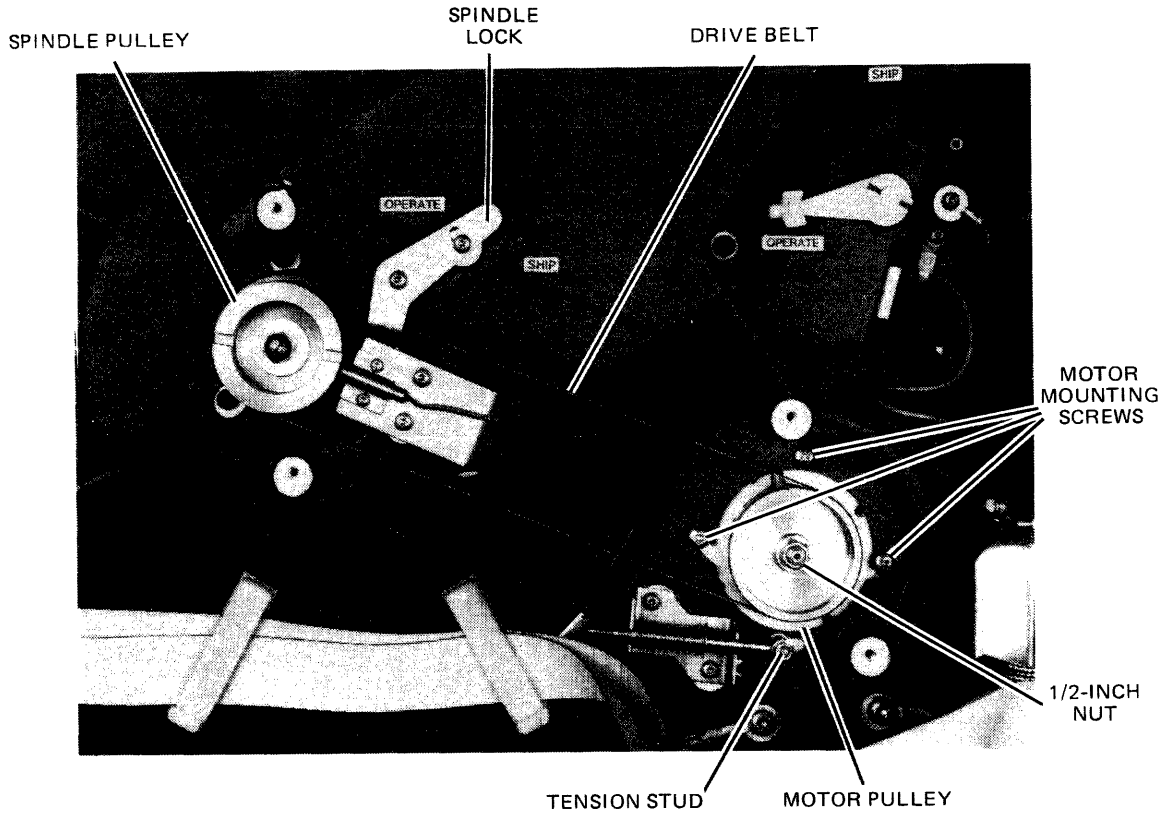


Figure 2-12. Frequency Conversion

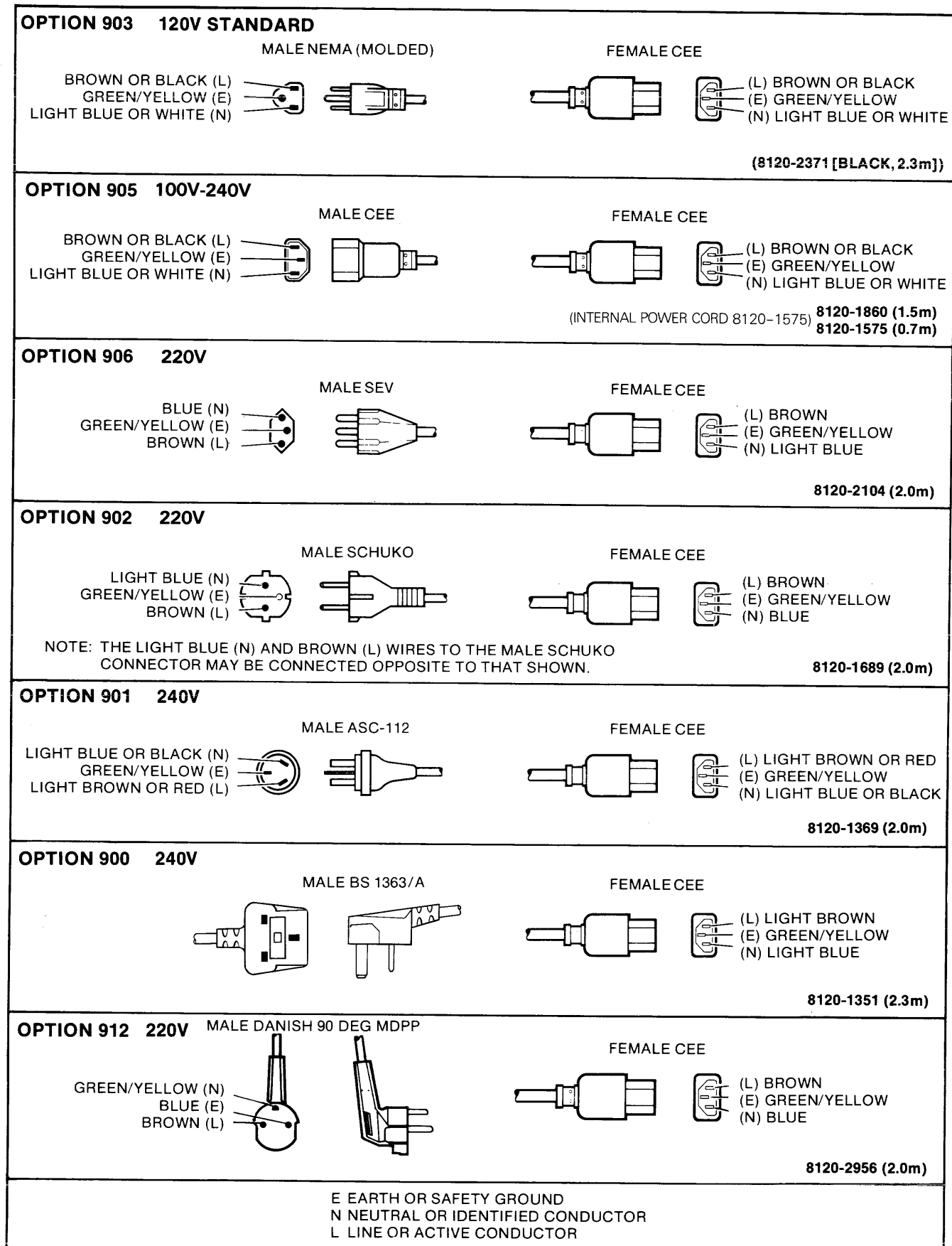


Figure 2-13. AC Power Cord Sets

2-51. INSTALLATION CHECKS

After the subsystem has been installed and the power connections made, visually inspect the installation. If the inspection verifies that everything is in order and correct, proceed to the power-on sequence and installation checks.

2-52. POWER-ON SEQUENCE

CAUTION

Do not attempt to operate the subsystem if the disc drive spindle and actuator have not been unlocked.

Do not turn the subsystem power on or off while the system bus is in an active state.

Do not operate the subsystem if condensation is evident anywhere on it. Wait until all condensation has evaporated before operating the drive.

Do not operate the subsystem until the leveling feet have been lowered.

Do not operate the subsystem until the rear panel sound baffle is installed.

Set both the disc drive rear panel power switch and the tape drive front panel power switch to the 1 (on) position. When power is applied to the subsystem, both component drives perform internal self test routines. The self tests are initiated for approximately 30 seconds and 7 seconds for the disc and tape drives respectively. Sound will be heard at power on as the fans come up to speed and continue moving cooling air through the drives. At the completion of the disc drive's self test, the letter **P** and a period (.) will be displayed on its status readout which is located behind the front panel and behind the foam air filter on the card cage cover. The period indicates completion of the self test and the letter **P** indicates that the drive has passed the self test. Successful completion of the tape drive's self test routine is indicated by its Fault light being extinguished and a **P** being displayed in its rear panel status display.

Any indication other than **P**. indicates that the disc drive has failed one of the internal tests and requires further testing to isolate the trouble to a unique assembly. The testing is activated by the Self-Test or Diagnostic switches which are located behind the front panel and behind the foam air filter on the card cage cover. Similarly, if the tape drive's Fault light does not go out, this indicates that it has failed one or more of its selftests and further testing should be carried out.

The disc drive is capable of locally executing three troubleshooting routines which have been programmed into the microprocessor ROM. All routines execute thorough hardware checks. The power-on routine performs a full reset, delays certain tests until the spindle is up to speed, and tests all PCA's. The self-test routine performs the same tests as the power-on routine except that the microprocessor PCA is not reset and no delays are induced.

When the disc drive is first powered on, it is in the normal mode (see figures 2-14 and 2-15). In the normal mode, momentarily pressing the Self-Test switch will activate the self test, and momentarily pressing the Diagnostic switch will activate the diagnostics. Simultaneously pressing the Self-Test and Diagnostic switches causes a power-on to occur and is equivalent to turning the drive power switch to 0 (off) and then to 1 (on) again.

When in the normal mode, holding either the Self-Test or Diagnostic switches depressed until the display flashes causes the disc drive to enter the supplemental mode. The supplemental mode should only be used for troubleshooting the drive. Once in supplemental mode, a number or the letter **P**. appears on the Status Readout. A **P**. means that the drive passed all tests which were run. If a number appears, this indicates an error condition (see figure 2-15). Press the Self-Test switch momentarily to see a two-digit error code associated with the suspect error condition which was displayed. The two digits represent an error code as shown in figure 2-15. Pressing the Diagnostic switch momentarily will show the next suspect condition, if any. Any time "-." appears on the Status Readout, the last error condition or last error code has been displayed for that assembly. For a detailed list of the disc

drive's error codes, refer to the *HP 7911, HP 7912 and HP 7914 Service Manual*, part no. 07912-90903.

At any time, the Self-Test or Diagnostic switches can be held until the Status Readout flashes, and the results of the test run can be displayed again. To exit supplemental mode, simultaneously press both the Self-Test and Diagnostic switches.

Once the first CS/80 instruction is received by the drive, background diagnostics are enabled. This permits the disc drive, when idle, to continually check itself. Background diagnostics monitor the controller system and the fault latch for vital information during idle states. An idle state occurs when the host CPU has not conversed with the drive for one second or more. Each time background diagnostics are completed, a **P**. is displayed on the status readout; therefore, during idle states the status readout will display a **P**. flashing at one second intervals.

The HP 9144A Tape Drive's selftest can be initiated in three ways; by cycling the power off and then on, by pressing the tape drive rear panel selftest switch, and by initiating a selftest from the host controller. The first two methods initiate the same set of tests, but the third method allows the operator to select individual tests within the routine or the whole routine. For detail on host initiated selftests, see the *CS/80 Instruction Set Manual*, part no. 5955-3442.

Once initiated, the tape drive selftest routine assures that the major assemblies within the unit are operable and displays the selected HP-IB address using the seven segment displays on the rear panel. If the tape drive is not operable for any reason, the front panel fault light is turned on and it remains on until another selftest is initiated or the tape drive is switched off. The seven segment displays show the following sequence when power is applied:

- a. Both seven segment displays are off.
- b. All segments are turned on - both displays show an **8** with a decimal point. This shows that all displays are working.

- c. All segments are turned off except for the decimal points. This indicates that the power supply is operating correctly.

- d. A pass or fail indication (**P** or **F**) appears in the seven-segment display furthest from the fan outlet, while the current HP-IB address is displayed in the other.

This sequence (power-on selftest) takes approximately 7 seconds. After a pass indication and if a tape cartridge is fitted in the drive, the load sequence begins. If the power-on selftests were performed without a cartridge tape fitted and a pass indication is given, the tape cartridge should be inserted so that the load sequence can begin. Embedded in the load sequence is the read and write portion of the selftest. The read test takes place at the start of the load sequence while the write test takes place at the end. If the cartridge fitted is write-protected, only the read portion of the tests is executed. Write tests are performed on a portion of tape at BOT (Beginning Of Tape) reserved for testing. The time for the load and unload sequences are as follows:

150-ft Tape Cartridge

Load = 1 minute, 15 seconds

Unload = 35 seconds

600-ft Tape Cartridge

Load = 2 minutes, 15 seconds

Unload = 1 minute, 35 seconds

If a failure is detected, the front panel fault light will be turned on The failing assembly and the number of the test that failed are recorded and can be displayed on the seven-segment displays. The error codes are given in Figure 2-16. For details of the tape drive error codes, refer to the *HP 9144A Tape Drive Service Manual*, part no. 09144-90030.

2-53. CONTROLLER INSTRUCTION SET

The drives contain controllers that respond to the Hewlett-Packard CS/80 Instruction Set. This instruction set has been written to increase the efficiency and speed of channel operations between mass storage devices and their associated computers. This instruction set is detailed in the *CS/80 Instruction Set Programming Manual*, part no. 5955-3442.

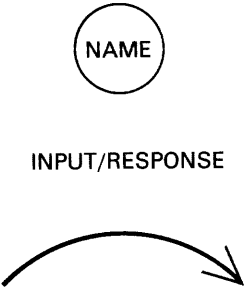
SYMBOL	DESCRIPTION
 <p>A circle containing the word "NAME".</p> <p>INPUT/RESPONSE</p> <p>A curved arrow pointing to the right.</p>	<p>STATE SYMBOL. This symbol indicates the current condition a device is in. The symbol contains the name of the state.</p> <p>INPUT. Information read from an external source (such as a switch) which causes a response.</p> <p>RESPONSE. The output caused by a certain input while in a certain state.</p> <p>TRANSITION. The path from one state to another or from one state to itself.</p>

Figure 2-14. State Diagram Symbols

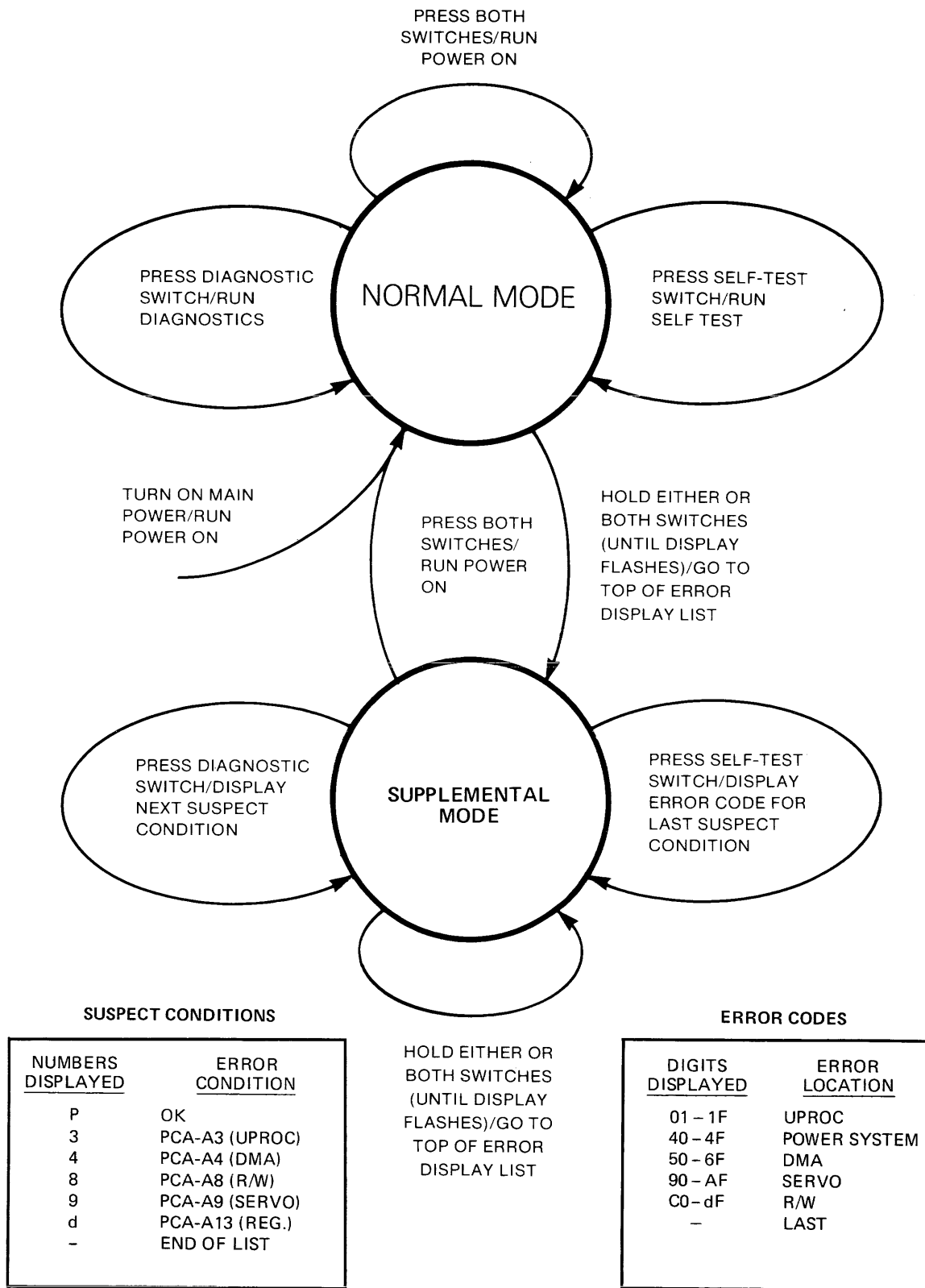
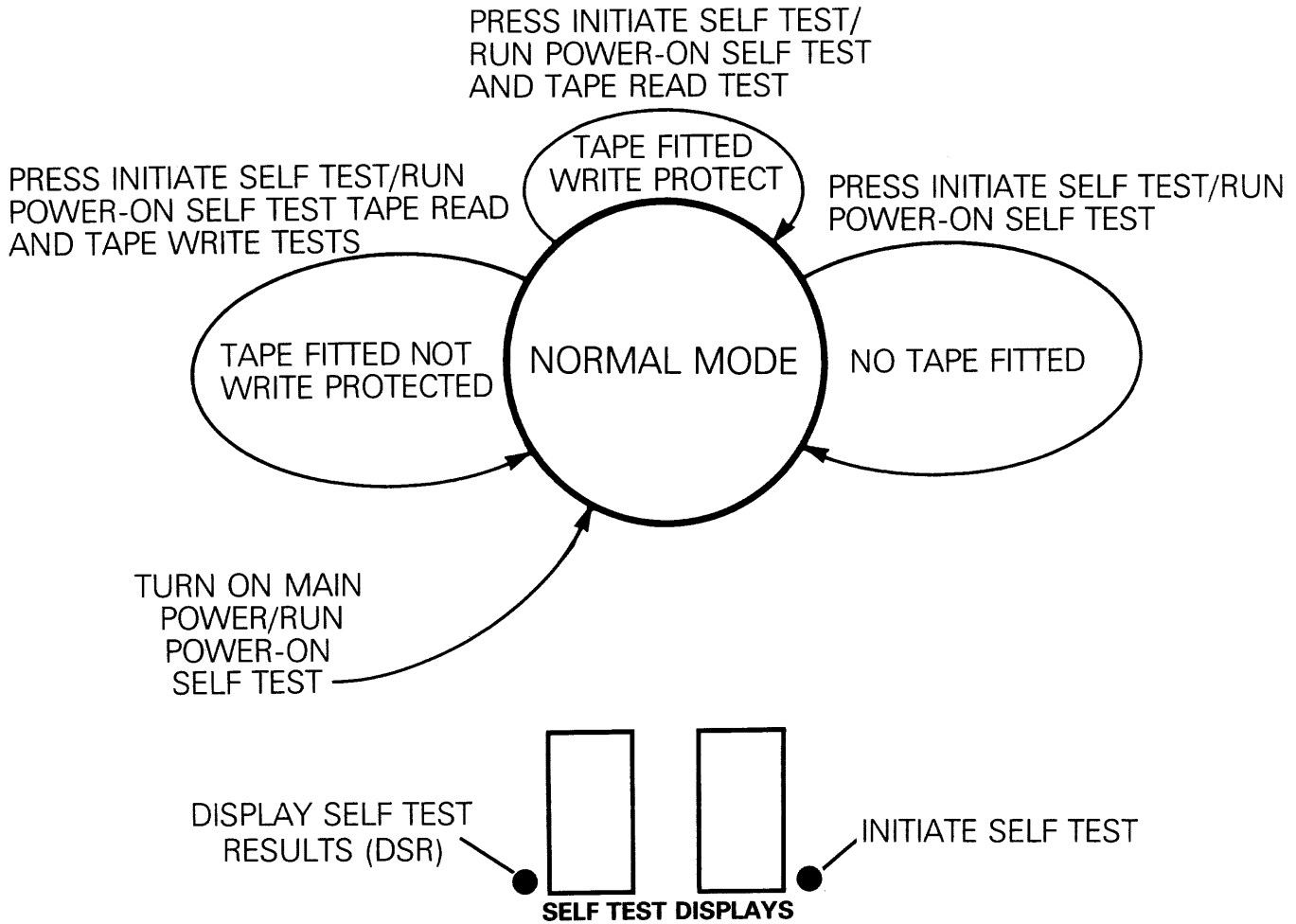


Figure 2-15. Disc Drive Internal Diagnostic States



HP9144A SELF TEST DISPLAYS

<input type="checkbox"/> P	<input type="checkbox"/> 4	=	PRODUCT HAS PASSED SELFTEST, HPIB ADDRESS = 4
<input type="checkbox"/> -	<input type="checkbox"/> -	=	POWER SUPPLY FAILED
<input type="checkbox"/> -	<input type="checkbox"/> -	=	POWER SUPPLY FAILED
<input type="checkbox"/> -	<input type="checkbox"/> -	=	POWER SUPPLY FAILED
<input type="checkbox"/> F	<input type="checkbox"/> 4	=	PRODUCT HAS FAILED SELFTEST, HPIB ADDRESS = 4
<input type="checkbox"/> U	<input type="checkbox"/> 2	=	UNIT 2 FAILED, HDC (CONTROLLER)
<input type="checkbox"/> U	<input type="checkbox"/> 1	=	NOT ASSIGNED FOR HP7914CT
<input type="checkbox"/> U	<input type="checkbox"/> 0	=	DDC OR SERVO OR R/W OR MECHANISM FAILED
<input type="checkbox"/> A	<input type="checkbox"/> 0	=	FAILURE BUT ASSEMBLY FAILED NOT IDENTIFIED
<input type="checkbox"/> A	<input type="checkbox"/> 1	=	DRIVE MECHANISM
<input type="checkbox"/> A	<input type="checkbox"/> 2	=	DDC ASSY
<input type="checkbox"/> A	<input type="checkbox"/> 3	=	R/W ASSY
<input type="checkbox"/> A	<input type="checkbox"/> 4	=	DIRTY HEAD
<input type="checkbox"/> A	<input type="checkbox"/> 5	=	HDC ASSY
<input type="checkbox"/> A	<input type="checkbox"/> 6	=	NOT USED
<input type="checkbox"/> A	<input type="checkbox"/> 7	=	SERVO ASSY
<input type="checkbox"/> A	<input type="checkbox"/> 8	=	STEPPER MOTOR
<input type="checkbox"/> A	<input type="checkbox"/> 9	=	CAPSTAN MOTOR OR TACHO

FOR ALL OTHER DISPLAYS SEE THE HP9144A SERVICE MANUAL SECTION 3

Figure 2-16. Tape Drive Internal Diagnostic States

2-54. REPACKAGING FOR SHIPMENT

CAUTION

The subsystem should not be shipped with the tape drive installed. The tape drive must be removed and packaged in its own shipping carton. Failure to do this may result in damage to the tape drive and over-stressing of both the disc drive's framework and its shipping carton. This may cause damage to the mechanical assembly.

When the subsystem requires repackaging for shipment, use the original container and packing material. If the container is not available, consult your local Hewlett-Packard Sales and Support Office regarding shipment. Sales and Support Offices are listed at the back of this manual. Before shipment, the container (or equipment) should have a tag identifying the owner and the service or repair to be performed. Include the equipment model number and full serial number.

2-55. DISC DRIVE REPACKAGING

To repackage the disc drive, proceed as follows:

CAUTION

Before repackaging the disc drive, the tape drive and the rear panel sound baffle must be removed from the cabinet (refer to paragraphs 2-10 and 2-38). The tape drive must be repackaged and shipped in its own container while the sound baffle should be shipped in the disc drive accessory box.

CAUTION

To avoid damage to the disc drive, the

spindle and actuator must be locked and the internal packing piece (where originally supplied) must be fitted before the disc drive is repackaged for shipment (refer to paragraphs 2-37, 2-39 and 2-40).

- a. Place the main pallet base on edge (see figure 2-6).
- b. Cover the disc drive with a plastic bag.
- c. Position the disc drive so the side is flush with the inside of the main pallet base.
- d. Secure the disc drive to the pallet base using the corrugated corner protector and 1/2-inch polystrap binding.
- e. Lay the main pallet base flat on the floor (see figure 2-5).
- f. Move the pallet end flush to the end of the main pallet base (see figure 2-5).
- g. Replace and tighten the two 9/16-inch bolts.
- h. Place the protective cover over the disc drive.
- i. Place the container top over the disc drive and secure it to the pallet base using 1/2-inch polystrap binding.

2-56. TAPE DRIVE REPACKAGING

To repackage the tape drive, proceed as follows:

- a. Place the tape drive into its the lower foam piece in its shipping carton.
- b. Place the upper foam piece over the tape drive.
- c. Secure the carton with adhesive tape.

3-1. OPERATING PRECAUTIONS

The operator should observe the following precautions when operating the HP 7914CT.

WARNING

The subsystem does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and service activities to service trained personnel.

CAUTION

Do not touch the tape. Do not attempt to clean the tape or tape guides within the cartridge.

Do not attempt to remove a tape cartridge until the tape cartridge unloading sequence has completed.

Do not use excessive force on the tape Eject button. It will operate only if the tape unloading sequence has successfully completed.

Do not start up or shut down the subsystem when the system bus is in an active state.

Do not connect or disconnect the HP-IB cable(s) when the system bus is in an active state.

Before an uncertified tape can be used in any host-initiated data operations, it must be certified by the host computer.

Heed all WARNING and CAUTION labels affixed to the subsystem.

Avoid cycling the subsystem power on and off unnecessarily.

Only service trained personnel are qualified to unpack and install the subsystem.

Do not clean the tape unit capstan or head with a cleaning swab other than the one listed in the cleaning procedures.

When not in use, all tape cartridges should be removed from the tape unit and stored in the protective plastic case. If tape cartridges are left in the tape unit, they may deform the rubber capstan and may collect excessive amounts of dust and dirt.

Tape cartridges should not be left in excessively warm, dry, or humid areas, direct sunlight, or areas where magnetic fields are present (e.g., motors, transformers, etc.).

Tape cartridges should not be operated at temperatures below 5°C (41°F) or above 40°C (104°F) or stored at temperatures below -40°C (-45°F) or above 40°C (113°F). Nor should they be operated in humidity levels exceeding 20% to 80% with a maximum wet bulb temperature (non-condensing) not to exceed 26°C (79°F).

Do not drop tape cartridges or subject them to rough handling.

To protect data stored on the tape cartridge, turn the safe arrow in the corner of the tape cartridge to SAFE.

3-2. CONTROLS CONNECTORS AND INDICATORS

Figure 3-1 identifies the drive controls, connectors, and indicators.

3-3. BUSY LIGHT

The BUSY light, when lit, indicates that a tape operation is in progress.

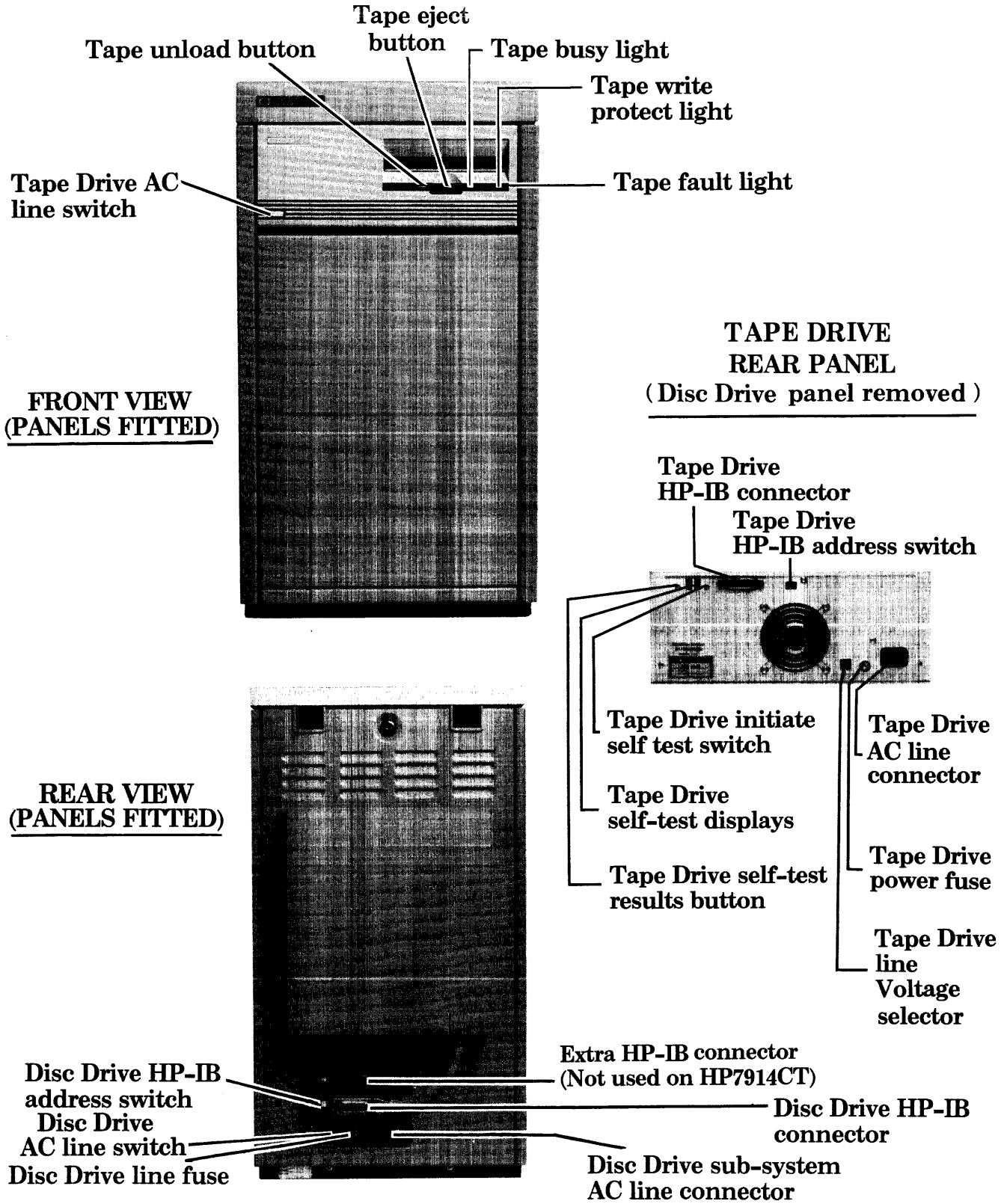


Figure 3-1. Controls, Connectors, and Indicators

3-4. PROTECT LIGHT

CAUTION

A power loss during a tape read operation could cause an unwanted write to occur. A tape should be "write-protected" by turning the screw on the cartridge to the "SAFE" position when the tape is not to be written to.

The WRITE PROTECT light illuminates when the cartridge presently in the tape unit has been set to SAFE. This is done by turning the screw on the cartridge so that the arrow points toward the area marked SAFE.

3-5. EJECT BUTTON

CAUTION

Do not force the Eject Button.

The EJECT BUTTON ejects the cartridge out of the tape unit. An interlock prevents the cartridge eject from working unless the cartridge has been unloaded as described in paragraph 3-20.

3-6. UNLOAD BUTTON

NOTE

When used in the context of the following paragraphs, the term "unload" implies a *logical* operation that is performed by the drive. Once the tape has been unloaded, the Eject lever is used to *physically* remove the tape cartridge from the tape mechanism.

When the UNLOAD switch is pressed, the controller will request release from the host. Once release is granted, the controller updates the error logs near the front of tape (if necessary), rewinds the tape to "End of Tape" (EOT), updates the Use log, and unlocks the cartridge. The switch, if pressed during an autoloader, will stop the autoloader and perform an unload operation. Pressing the UNLOAD switch

during any other active operation initiates a request release sequence with the host before unloading the tape. The unload sequence can also be executed from the system via an UNLOAD command.

3-7. HP-IB CONNECTORS

The lower HP-IB DISC connector provides the cable interface between the disc drive and CPU. The tape drive HP-IB connector provides a similar interface for the tape drive.

NOTE

The Self-Test switches, the Status Readouts, and the Diagnostic switches are all located inside the cabinet panels.

3-8. SELF-TEST SWITCHES

Pressing the Self-Test switches initiates internal self tests. These tests verify the operational condition of the drives. The results of these self tests are indicated by the Status Readouts. The disc and tape drives have their own self test routines.

3-9. STATUS READOUTS

The Status Readouts are used to indicate operational status and the results of the self test internal diagnostics during troubleshooting. The tape drive's status readout is located on the rear panel of the HP 9144A. To access this readout the HP 7914CT's top panel must be removed. To access the disc drive's status readout the lower front panel and foam air filter must be removed. The tape drive status readouts can be interrogated by pressing the **DISPLAY SELFTEST RESULTS BUTTON**.

3-10. DIAGNOSTIC SWITCH

Pressing the Diagnostic switch initiates an internal disc drive diagnostic test. This test verifies the overall operation of the drive by performing an extensive seek and verify test.

Operation

The results of this test are indicated on the disc drive's status readout.

3-11. HP-IB ADDRESS SWITCHES

The HP-IB DISC address switch is accessible through the rear panel (see figure 3-1). The tape drive HP-IB address switch can only be accessed by removing the HP 7914CT's top cover. The HP-IB Address Switches permit the setting of one of eight unique addresses. The address switches can be set with any pointed tool. Before setting the HP-IB address for each drive refer to paragraph 2-23 of this manual. A new address is not valid until the power has been cycled or a self test initiated.

3-12. DISC DRIVE FUSE

This fuse provides the disc drive with protection from an ac power overload. The current and voltage ratings and the HP part numbers of the required fuses are listed in table 3-1.

Table 3-1. Disc Drive Fuse Ratings

Noninal Operating Voltage	Fuse Description	HP Part No.
100/120 Vac	10A, 250V, med-blo	2110-0051
220/240 Vac	5A, 250V, slow-blo	2110-0367

3-13. POWER OUTLET FUSE

This fuse provides protection to the power outlet located on the top of the disc drive's power distribution unit. The current and voltage rating for this fuse is 3.0 AT slow-blo 250V, HP part number 2110-0029.

3-14. TAPE DRIVE FUSE

The tape drive power supply fuse gives the drive protection from an ac power overload. The current and voltage ratings for this fuse are

detailed in the HP 9144A Operator's Manual, part no. 09144-90000.

3-15. LINE CONNECTOR

WARNING

Only one power supply cable should be used to supply power to the HP 7914CT. The HP 9144A tape drive must be supplied via the internal cable.

The three terminal power line connector provides the means to connect ac power to the HP 7914CT. Power for both the disc and tape drives is supplied via this connector. Power to the tape drive is distributed from the disc drive's power distribution unit.

3-16. POWER SWITCHES

WARNING

The rear panel power switch on the disc drive DOES NOT interrupt the tape drive's power supply. This is controlled via the tape drive's front panel power switch. To ensure that power has been removed from both drives prior to maintenance, disconnect the power supply cord from the wall outlet. Refer to paragraph 2-29.

The rear panel power switch controls application of ac power to the disc drive power supply and blower motor, but not to the tape drive's power cord. The tape drive's power is switched via its own front panel control. In both cases the power "on" condition is with the respective switch in the 1 (on) position. The 1 and 0 correspond to international symbology in use.

3-17. DISC DRIVE POWER INDICATOR

This indicator, a small, red, light-emitting diode (LED) located on the rear of the disc drive to the right of the lower HP-IB connector, indicates the

operating status of the power supply. The Power indicator will be illuminated if all dc operating voltages are present. The loss of any dc operating voltage will cause the LED to extinguish.

3-18. TAPE CARTRIDGE INFORMATION

3-19. TAPE CARTRIDGE DESCRIPTION

The cartridge is a DC 600 type preformatted data cartridge. Two sizes are available: the 67.1 Mbyte cartridge with 600 feet of tape, and the 16.7 Mbyte cartridge with 150 feet of tape. Each formatted block includes space for 1 kbyte of data with error correction, block addresses, and error detection. Figure 3-2 illustrates the tape cartridge formats. A mechanical write protect key is built into the cartridge also.

Before a tape cartridge can be used in host-initiated data operations, it must be certified. The certification routine, which is initiated by the host, takes approximately 17

minutes for a 150-foot tape and approximately 67 minutes for a 600-foot tape. Tapes are available that have already been certified; these tapes are ready for immediate use.

3-20. TAPE CARTRIDGE LOADING

To load the tape cartridge into the tape unit, proceed as follows (see figure 3-1 for tape unit controls):

- a. Remove the tape cartridge from the plastic case.
- b. Set the tape cartridge safe screw (see figure 3-3) to the desired position. This screw is used to protect the data stored on the cartridge. When the arrow points to SAFE, information cannot be written on to the tape cartridge. When the arrow is in the opposite direction from SAFE, the tape can be written on with the possible loss of previously stored data. If a tape cartridge set to SAFE is installed in the tape drive, the WRITE PROTECT LIGHT will illuminate.

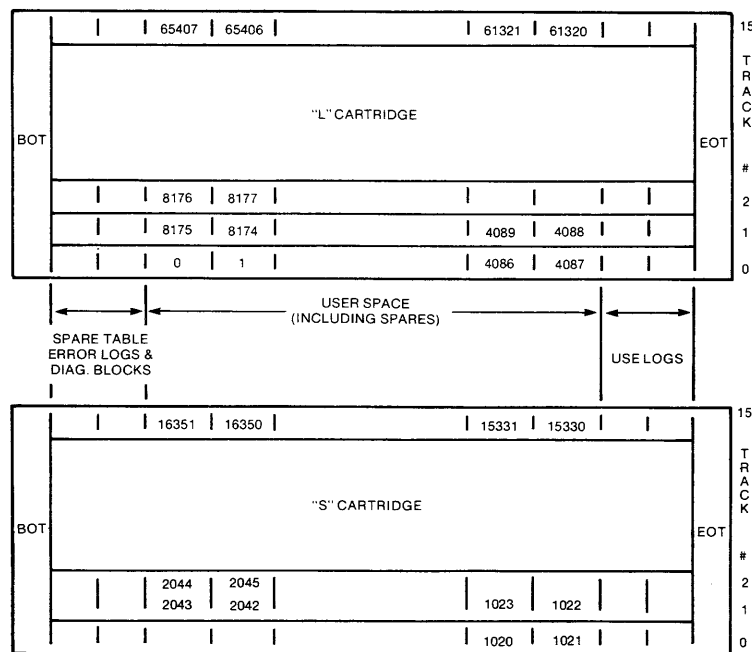


Figure 3-2. Tape Cartridge Formats

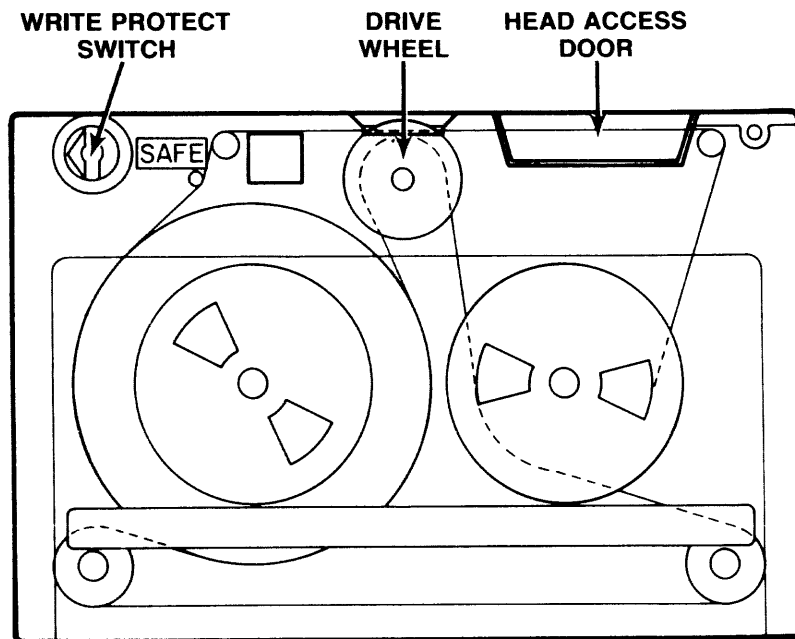
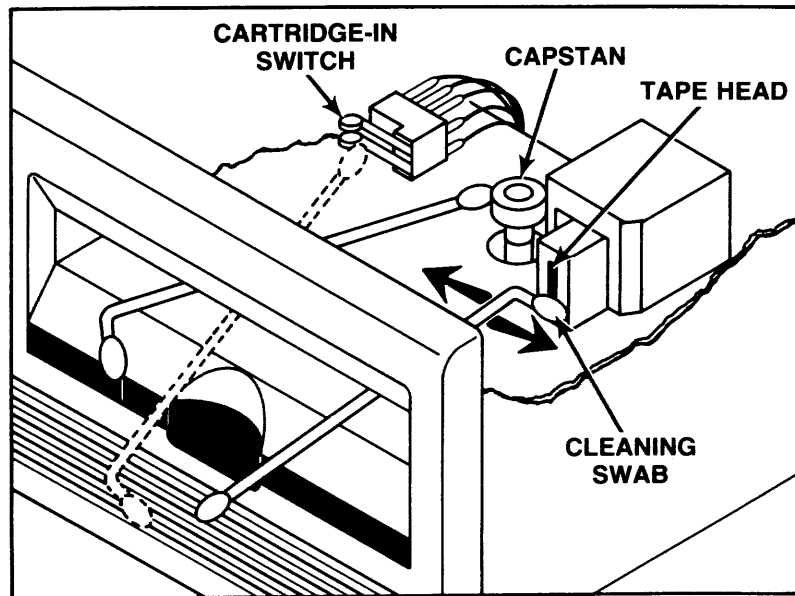


Figure 3-3. Tape Unit Cleaning and Tape Cartridge Identification

c. Place the tape cartridge at the tape unit door. The SAFE label on the tape cartridge should be toward the upper left-hand corner. Insert the tape cartridge into the door and push until a click is heard. This indicates that the tape is installed properly.

d. The drive will immediately start a tape cartridge conditioning sequence where the tape is position to the end of the tape and back to the beginning of the tape. During this period of time, the BUSY indicator will be illuminated. This indicator is illuminated any time the tape unit is in motion. This conditioning technique prevents loss of data or poor operation due to low tape tension. Tape conditioning will take from 1 to 2 minutes depending on the model of the tape cartridge installed.

e. At the completion of tape cartridge conditioning, the drive will immediately run an internal self test. The BUSY light will light and go out several times during this test as the tape motion is started and stopped. At the completion of tape unit self test (approximately 7 seconds), the BUSY light will go out. Any indication other than this means that the drive requires the attention of service-trained personnel (refer to paragraph 2-51).

3-21. TAPE CARTRIDGE UNLOADING

To unload the tape cartridge, proceed as follows:

CAUTION

Do not attempt to remove a tape cartridge until the tape cartridge unloading sequence has completed.

- a. Press the UNLOAD button.
- b. Wait for the tape cartridge to rewind. The BUSY indicator will be illuminated while the tape is rewinding and extinguished when the rewind operation is complete.

CAUTION

Do not use excessive force on the tape Eject Button.

c. To remove the tape cartridge, push the Eject Button. The tape cartridge will eject from the tape unit.

CAUTION

If a power fail occurs while a cartridge is loaded, the cartridge will not be released. Force should not be used to remove the cartridge.

d. Ensure that the tape cartridge SAFE screw is in the desired position. Place the tape cartridge in the protective plastic case.

3-22. TAPE DRIVE MAINTENANCE

WARNING

All products which utilize tape head cleaner are shipped with a Material Safety Data Sheet (MSDS). Follow all applicable safety precautions when using the tape head cleaner.

CAUTION

Do not touch the tape. Do not attempt to clean the tape or tape guides within the cartridge.

The maintenance required to keep the tape unit working properly is minimal. Once a week the capstan and head should be cleaned. Each drive is shipped with cleaning materials including both swabs and head cleaner. The swabs have two cleaning ends. The straight end is used to clean the capstan and the right-angle end is used to clean the head. Figure 3-3 illustrates the tape unit cleaning procedure.

3-23. TAPE CAPSTAN CLEANING

CAUTION

When initiating the tape mechanism cleaning procedure, do not press the cartridge-in-place switch more than once or hold it down for more than 1 second. If either of these conditions

Operation

occur, a unit fault will be logged and reported to the host computer; it will also be necessary to restart the cleaning operation.

Slightly dampen the straight end of the cleaning swab with head cleaner. Hold the tape drive door open and insert the cleaning swab. (The tape interior is shown for clarity in figure 3-3.) Use the swab to momentarily press and release the cartridge-in-place switch; after a 2-second delay, the tape head is raised and the capstan rotates. To clean the rotating capstan, hold the swab against its left side.

3-24. TAPE HEAD CLEANING

Slightly dampen the right-angle end of the cleaning swab with head cleaner. Hold the tape unit door open and insert the cleaning swab. (The tape unit interior is shown for clarity in figure 3-3.) Wipe the ceramic head surface with an up and down motion. Use the swab to press and release the cartridge-in-place switch to stop

capstan rotation and to return the tape head to its starting position.

NOTE

The tape stepping motor will make a "buzzing" sound as the head is stepped down; this is normal.

NOTE

Do not reuse cleaning swabs; discard after use.

3-25. POWER-DOWN SEQUENCE

To power-down the drive, proceed as follows:

- a. Unload and remove any tape cartridge, using the instructions given in paragraph 3-21.
- b. Set the front panel power switch on the tape drive and the rear panel power switch on the tape drive to 0 (off).

4-1. INTRODUCTION

This section provides information for servicing the subsystem. Included is general maintenance information and instructions for removing and installing the major subsystem assemblies.

4-2. SERVICE PREPARATION

WARNING

To avoid dangerous electrical shock, do not perform any service operations until the ac line supply has been removed from the subsystem.

Before servicing, power must be disconnected from the subsystem. To disconnect power, proceed as follows:

CAUTION

Do not turn the subsystem power off (or on) while the system bus is in an active state.

- a. Switch the line supply switch on the disc drive rear panel to OFF (0).
- b. Switch the line supply switch on the HP 9144A front panel to OFF (out).
- c. Disconnect the ac power cord to the subsystem from the wall outlet. The power supply to the HP 9144A is distributed from the disc drive power distribution unit via an internal supply cord.

All service procedures require the HP-IB cables to be disconnected. The HP-IB cables are disconnected as follows:

CAUTION

Do not connect or disconnect the HP-IB cable(s) from the subsystem

while the system bus is in an active state.

CAUTION

Always ensure that power has been removed before disconnecting the HP-IB cable.

NOTE

To access the HP 9144A's HP-IB connector and cable, first gain access to the rear of the tape drive by following the procedure given in paragraph 2-16 or 2-31.

- a. Remove the two thumb screws which hold the HP-IB connector in place.
- b. Disconnect the HP-IB cable.

To reconnect the HP-IB cable, first ensure that power is removed from the subsystem, then reverse the above procedure.

4-3. MAINTENANCE

The subsystem requires minimal maintenance. The HP 9144A's tape path must be kept clean. For cleaning instructions refer to paragraph 3-22 or the *HP 9144A Operator's Manual*, part no. 09144-90000.

4-4. REMOVAL/REPLACEMENT

WARNING

The subsystem does not contain any operator-serviceable parts. To prevent electrical shock, refer all service activities to service trained personnel.

The following paragraphs contain removal and replacement procedures for the major subsystem components and cabinet panels.

4-5. CABINET PANELS AND INTERNAL SHIELDS

To remove the necessary cabinet panels and internal shields for access, refer to paragraph 2-30.

The disc drive mechanism is protected by an internal shield. Before any maintenance can be carried out or parts replaced, this shielding must be removed. To remove the shielding refer to paragraph 2-36.

4-6. HP 9144A TAPE DRIVE

To remove the HP 9144A for service refer to the installation procedure given in paragraph 2-10. For details of servicing the tape drive refer to the *HP 9144A Tape Drive Service Manual*, part no. 09144-90030.

4-7. HP 7914 DISC DRIVE REPLACEABLE PARTS

To remove any of the disc drive replaceable parts, refer to the procedures detailed in Section V 'Removal and Replacement' of the HP 7911, 7912 and 7914 Disc/Tape Drives Service Manual, Part no. 07912-90903, ignoring all references to the built-in tape drive.

NOTE

When replacing an HP 7914 Head Disc Assembly (HDA), ensure that the two front shock mounts are positioned to give a minimum clearance of 10 mm (1/2-in.) between the bottom of the HDA and the cabinet bottom, see figure 4-1. When replacing an HDA, it is recommended that the two front shock mounts are also replaced.

Clearance required: 10mm

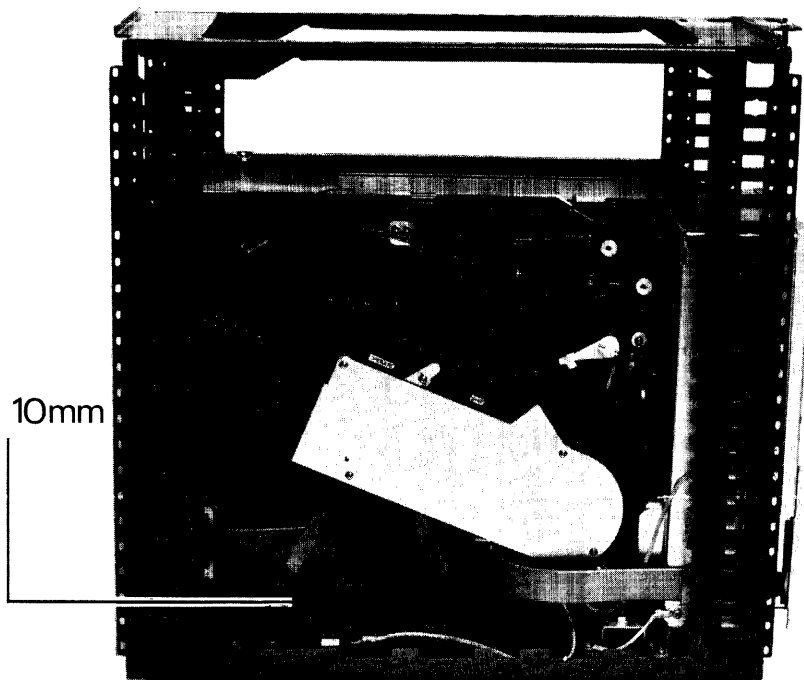


Figure 4-1 HDA Fitting Clearance

5-1. INTRODUCTION

This section provides listings of all field-replaceable parts and an illustrated parts breakdown for the subsystem, as well as replaceable parts ordering information.

Replaceable parts for the subsystem are listed in disassembly order in table 5-1 and illustrated in figure 5-1. In the table, attaching parts are listed immediately after the item they attach. Items in the DESCRIPTION column are indented to indicate relationship to the next higher assembly. In addition, the symbol "---X---" follows the last attaching part for that item. Indentation of the items in the tables is as follows:

- Major Assembly
- *Replaceable Assembly
- *Attaching Parts for Replaceable Assembly
- **Subassembly or Component Part
- **Attaching parts for Subassembly or Component Part

The replaceable parts listings provide the following information for each part:

- a. FIG. & INDEX NO. The figure and index number which indicates where the replaceable part is illustrated.
- b. HP PART NO. The Hewlett-Packard part number for each replaceable part.
- c. DESCRIPTION. A description of each replaceable part. Refer to table 5-2 for an

explanation of abbreviations used in the description column.

d. MFR CODE. The 5-digit code that denotes a typical manufacturer of a part. Refer to table 5-3 for a list of manufacturers who correspond to the codes.

e. MFR PART NO. The manufacturer's part number of each replaceable part.

f. UNITS PER ASSY. The total quantity of each part used in the major assembly.

The MFR CODE and MFR PART NO. for common hardware items are listed as 00000 and OBD (order by description), respectively, because these items can usually be purchased locally.

5-2. ORDERING INFORMATION

To order replaceable parts for the subsystem, address the order to your local Hewlett-Packard Sales and Support Office. Sales and Support Offices are listed at the back of this manual. Specify the following information for each part ordered:

- a. Model and full serial number.
- b. Hewlett-Packard part number.
- c. Complete description for each part as provided in the replaceable parts listings.

Replaceable Parts

Table 5-1. Replaceable Parts

INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO	UNIT PER ASSY
1	7914CT	DISC/TAPE DRIVE ---X---	28480	7914CT	REF
2	9144A	TAPE DRIVE REPLACEABLE PARTS FOR THE 9144A ARE NOT LISTED HERE. REFER TO THE 9144A SERVICE MANUAL, PART NO. 09144-90030. ---X---	28480	9144A	1
3	35414CT	DISC DRIVE ONLY PARTS WHICH ARE UNIQUE TO THE 7914CT(35414CT) DISC DRIVE ARE LISTED HERE. PARTS WHICH ARE COMMON TO ALL HP 7914 DISC DRIVES ARE LISTED IN THE 7911, 7912 AND 7914 SERVICE MANUAL, PART NO. 07912-90903. ---X---	28480	35414	1
4	92211-60002	PANEL ASSEMBLY TOP ---X---	28480	92211-60002	1
5	35414-60302	PANEL ASSEMBLY SIDE ---X---	28480	92211-60004	2
6	35414-60308	PANEL ASSEMBLY FRONT ---X---	28480	35414-60308	1
7	35414-60301	PANEL ASSEMBLY REAR (Attaching Parts)	28480	35414-60301	1
8	92211-40008	*LINER CABLE	28480	92211-40008	2
9	0400-0283	*GROMMET	28480	0400-0283	1
10	35414-60311	*BAFFLE ASSEMBLY	28480	35414-60311	1
11	8160-0397	*RFI BRAID (CUT TO FIT) ---X---	28480	8160-0397	3ft
12	35414-60302	FRAME ASSEMBLY (Attaching Parts)	28480	35414-60302	1
13	0403-0484	*LEVELLING PAD (FOOT)	28480	0403-0484	4
14	1492-0083	*CASTER	28480	1492-0083	4
15	35414-00101	*POWER SUPPLY BRACKET	28480	35414-00101	1
16	8160-0517	*ESD GASKET (CUT TO FIT) ---X---	28480	8160-0517	2ft
17	35414-00103	INTERNAL SHIELD TOP	28480	35414-00103	1
17a	35414-00142	*COVER SHIPPING SPACER ---X---	28480	35314-00142	1
18	35414-60309	INTERNAL SHIELD ASSEMBLY RH (Attaching Parts)	28480	35414-60309	1
19	35414-00106	*INTERNAL SHIELD RH	28480	35414-00106	1
20	8160-0414	**RFI SHIELDING (CUT TO FIT) ---X---	28480	8160-0414	2ft
21	35414-60305	INTERNAL SHIELD ASSEMBLY LH (Attaching Parts)	28480	35414-60305	1
22	35414-00102	*INTERNAL SHIELD LH	28480	35414-00102	1
23	35414-00104	**COVER SHIPPING LOCK REAR	28480	35414-00104	1
24		NOT USED			
25	8160-0414	**RFI SHIELDING (CUT TO FIT)	28480	8160-0414	2ft

Table 5-1 (continued). Replaceable parts

INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO	UNIT PER ASSY
26	35414-60307	BOX ASSEMBLY AC POWER (Attaching Parts)	28480	35414-60307	1
27	35414-00118	*CHASSIS POWER BOX	28480	35414-00118	1
28	2110-0565	**FUSEHOLDER CAP	28480	2110-0565	2
29	2110-0566	**FUSEHOLDER-EXTR POST	28480	2110-0566	2
30	2110-0569	**NUT FUSEHOLDER	28480	2110-0569	2
31	2110-0029	**FUSE 3AT 250V	28480	2110-0029	1
32	35414-80004	**CONNECTOR AC FEMALE ASSEMBLY	28480	35414-80004	1
33	1400-1209	**CLIP-CABLE	28480	1400-1209	1
34	1251-7769	**COVER-HPIB	28480	1259-7769	1
35	8160-0280	**RFI "D" STRIP (CUT TO FIT) ---X---	28480	8160-0280	2ft
36	92211-40003	PANEL FILLER ---X---	28480	92211-40003	5
37	92211-40002	LOCK MODULE ---X---	28480	92211-40002	2
38	35414-00113	PLATE-LABEL HPIB ---X---	28480	35414-00113	1
39	35414-00130	LABEL, MAXIMUM CURRENT ---X---	28480	35414-00130	1
40	35414-00131	LABEL, POWER SPECIFICATION ---X---	28480	35414-00131	1
41	35414-00132	LABEL, NAME ---X---	28480	35414-00132	1
42	07914-80014	LABEL, WARNING ---X---	28480	07914-80014	1
43	35414-00135	LABEL, LEVELING FEET ---X---	28480	35414-00135	2
44	9320-0125	TAG, INSPECTION ---X---	28480	9320-0125	1
45	5081-0526	LABEL, SPACER REMOVAL ---X---	28480	5081-0526	1
46	5041-1305	SHIPPING BLOCK (SPACER) ---X---	28480	5041-1305	1
47	8120-1575	POWER CORD 9144A ---X---	28480	8120-1575	1
48	35414-90000	INSTALLATION/OPERATING/SERVICE MANUAL ---X---	28480	35414-90000	REF
49	35414-90001	OPERATOR CONTROLS CARD	28480	35414-90001	REF

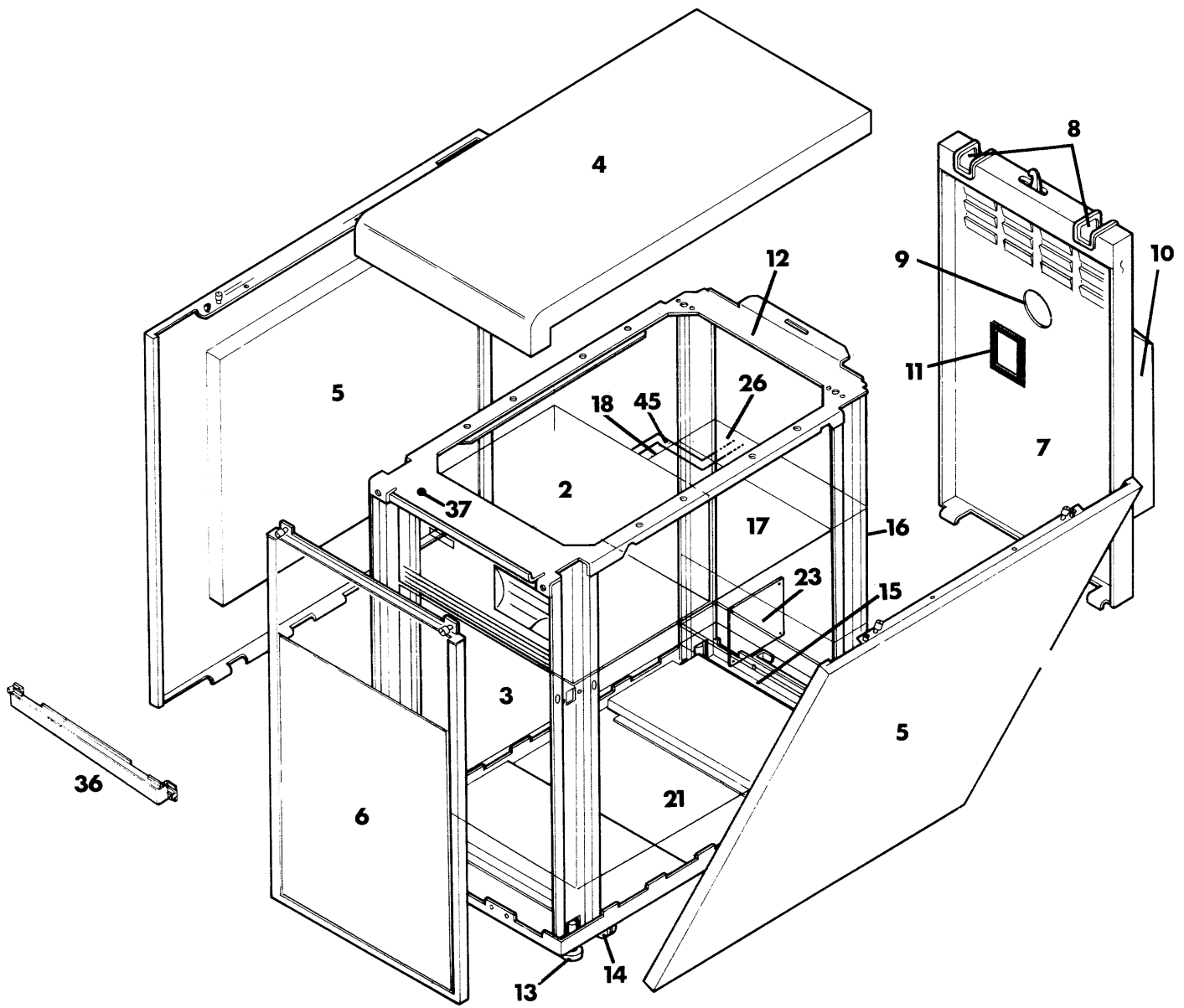


Figure 5-1. HP 7914CT Exploded View

Table 5-2. Abbreviations

A	= ampere(s)	ID	= inside diameter	qty	= quantity
ac	= alternating current	in.	= inch, inches	rdh	= round head
AR	= as required	incand	= incandescent	rect	= rectifier
assy	= assembly	incl	= include(s)	ref	= reference
brkt	= bracket	intl	= internal	rf	= radio frequency
c	= centi (10^{-2})	I/O	= input/output	rfi	= radio frequency interference
C	= Celsius, centigrade	k	= kilo (10^3) kilohm	rh	= right hand
cer	= ceramic	kg	= kilogram	rpm	= revolutions per minute
cm	= centimetre	lb	= pound	rwv	= reverse working voltage
comp	= composition	LED	= light-emitting diode	sb	= slow blow
conn	= connector	ih	= left hand	SCR	= semiconductor-controlled rectifier
d	= deci (10^{-1})	M	= mega (10^6) megohm	scw	= square cone washer
dc	= direct current	m	= milli (10^{-3})	Se	= selenium
deg	= degree(s)	mach	= machine	Si	= silicon
dia	= diameter	mb	= medium blow	slftpg	= self-tapping
dpdt	= double-pole, double-throw	met oxd	= metal oxide	spdt	= single-pole, double throw
dpst	= double-pole, single-throw	mfr	= manufacturer	sst	= stainless steel
elctlt	= electrolytic	misc	= miscellaneous	stl	= steel
encap	= encapsulated	mm	= millimetre	sw	= switch
ext	= external	mtg	= mounting	T	= TORX(R) screw
F	= Fahrenheit, farad	My	= Mylar	Ta	= tantalum
fb	= fast blow	n	= nano (10^{-9})	tgl	= toggle
fh	= flat head	n.c.	= normally closed	thd	= thread
fig.	= figure	no.	= number	Ti	= titanium
filh	= fillister head	NSR	= not separately replaceable	tol	= tolerance
flm	= film	ntd	= no time delay	u (u)	= micro (10^{-6})
fw	= full wave	OBD	= order by description	V	= volt(s)
fxd	= fixed	OD	= outside diameter	var	= variable
G	= giga (10^9)	ovh	= oval head	Vdcw	= direct current working volts
Ge	= germanium	oxd	= oxide	W	= watt(s)
H	= Henry, Henries	p	= pico (10^{-12})	w/	= with
hd	= head	PCA	= printed-circuit assembly	WIV	= inverse working volts
hex	= hexagon, hexagonal	phh	= phillips head	ww	= wire wound
hlcl	= helical	pnh	= pan head		
Hz	= Hertz	P/O	= part of		
		pot	= potentiometer		
		pozi	= pozidriv		

TORX(R) is a registered trademark of the Camcar Division of Textron, Inc.

Table 5-3. Code List of Manufacturers

Code No.	Manufacturer	Address
28480	Hewlett-Packard Co.	Palo Alto, CA

These code numbers are taken from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

Part Number 35414—90000
Printed in U.K. 12/84
E1284

