HEWLETT PACKARD

OPERATING AND INSTALLATION MANUAL

7935
DISC DRIVE

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OPTIONS COVERED

This manual covers options 120, 220, 221, 222, 223, 241 and 242 as well as the standard HP 7935 Disc Drive.

DESIGNED FOR HP-IB SYSTEMS

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

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.

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.

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NOTICE

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SAFETY CONSIDERATIONS

KEEP WITH MANUAL

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, practice, or the like, which, if not correctly performed or adhered to, could result in 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, practice, or the like, 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 per the input power configuration instructions provided in this manual.

If this product is to be energized via an autotransformer (for voltage reduction) make sure 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 even when disconnected from its power source.

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

GENERAL INFORMATION

SECTION I

1-1. INTRODUCTION

This section contains a general description of the Hewlett-Packard 7935 Disc Drive (figure 1-1) and 97935A Media Module (figure 1-2), a list of equipment supplied, details of options and accessories available, and specifications.

1-2. GENERAL DESCRIPTION

The disc drive is a high-performance, random-access, microprocessor-controlled data storage device designed for use as a peripheral unit in medium and large Hewlett-Packard computer systems. Data is stored on seven magnetic discs contained in an easily removable HP 97935A Media Module. The media module contains 13 surfaces for data storage and one surface for head positioning and sector timing.

Using the 13 data surfaces, the disc drive provides access to 404.46 million bytes of formatted information in a single package. Each data surface contains three precision head-position-determining bands that supply automatic head alignment information. A separate head is used for each data surface to retrieve existing data or to record new data. Head positioning on any of the 1321 cylinder positions is controlled by a closed loop, track following, servo system that derives cylinder positioning information from the prerecorded data on the servo surface of the media module.

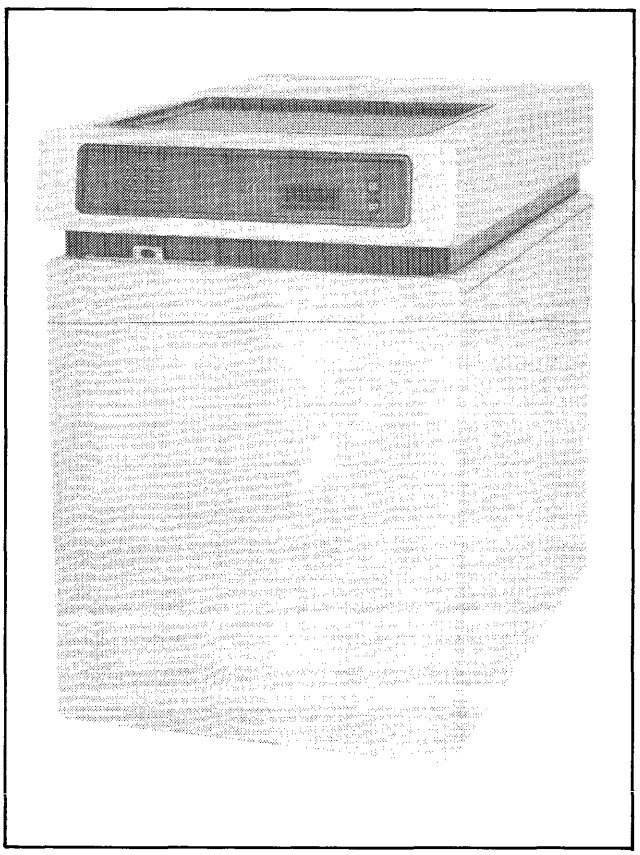


Figure 1-1. HP 7935 Disc Drive

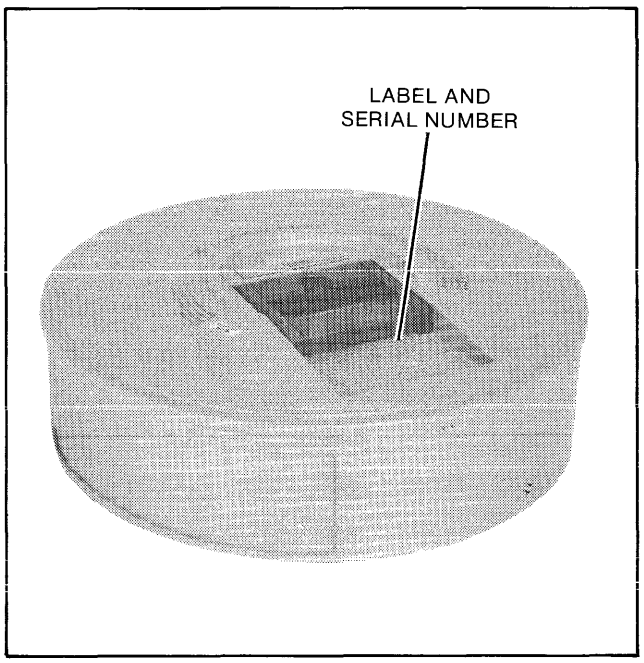


Figure 1-2. HP 97935A Media Module

The disc drive contains sophisticated internal self-check diagnostics and a fault detection system that exercises the complete disc drive and indicates faults through an eight-character alphanumeric display on the operator control panel. The internal diagnostics permit service-trained personnel to perform complete off-line testing of the disc drive and the media module. The self-check diagnostics and the fault detection system furnish a quick and easy means of fault isolation to the printed-circuit assembly level. This quick isolation provides for increased serviceability and minimum downtime.

Each disc drive is interfaced through the Hewlett-Packard Interface Bus (HP-IB)*. The standardization and flexibility afforded by this interface system allows disc drive hardware mobility among a variety of HP computing systems.

* *HP-IB: Not just IEEE-488, but the hardware, documentation and support that delivers the shortest path to a computation system.*

Each disc drive has a microprocessor-based integral controller that provides for translation of high-level command words to command sequences intelligible to the disc drive. The controller supports system protocol designed to minimize the effects of data transfer errors. The controller is capable of managing bidirectional data transfers. This furnishes the user with maximum capabilities in terms of system configuration and data transfer efficiency. Sophisticated error correction code (ECC) algorithms and hardware make it possible to detect and correct virtually all single-burst data errors.

Head positioning information and sector clocking are derived from the servo surface through a read-only servo head. There are 1321 ensured cylinder positions available for data storage. Cylinder addresses range from zero through 1320. Each data cylinder consists of 13 data tracks, one for each data surface. Tracks are addressed when both cylinder and head addresses are specified. Each data track is divided into 93 physical data sectors. Sectors are addressed when both head and sector addresses are specified for a given cylinder. Head addresses range from zero through 12. In addition to the formatted capacity of 404.46 megabytes, a total of 6.25 megabytes of spare media is allocated specifically for track and sector sparing.

All addressing in the disc drive is logical. The controller assigns physical addresses to the logical addresses. When a defective physical track is encountered, a new physical track (spare track) will be assigned to the same logical address. This eliminates dual seeks to obtain the correct data and reduces system overhead in managing the discs and spare tracks. A total of 1321 tracks are guaranteed as logical tracks through the use of the spares, which the controller assigns as required. There are 92 logical sectors (addressed from 0 through 91) for data storage, while the 93rd is reserved as a spare for use in the event that one of the original 92 logical sectors becomes defective. Sectors are spared by the controller. Should more than one sector per track develop unrecoverable errors, the entire logical track will then be assigned a new physical address (one of the spare tracks). This sparing action is transparent to the host CPU.

Each servo surface has 93 index patterns encoded on it. The index pattern consists of a pattern of 8 dibits on the plus odd tracks and a pattern of 8 dibits on the plus even tracks. Sector clock timing is determined by patterns of extra dibits inserted between normal servo code dibits at sector intervals.

The disc drive is housed in a free-standing cabinet. The principal components of the disc drive include disc rotation components, an electromechanical head-positioning actuator assembly, printed-circuit electronic assemblies, a power module, and air circulation and cooling components.

1-3. EQUIPMENT SUPPLIED

The HP 7935 Disc Drive is supplied with one each of the following items:

- HP 97935A Media Module.
- HP-IB Interface Cable Assembly, part no. 8120-3445 (model no. HP 10833A).
- *HP 7935 Disc Drive Operator Instructions,* part no. 07935-90901.
- *HP 7935 Disc Drive Operating and Installation Manual,* part no. 07935-90902.
- *Site Environmental Requirements for Disc/Tape Drives,* part no. 5955-3456.
- *Upgrade Instructions—Procedures for Returning 7925 Disc Drives to Systems Remarketing Operations,* part no. 5957-6423.

1-4. OPTIONS

The standard disc drive is factory configured for operation from a primary power source of 208 Vac and is fitted with a captive power cord suitable for use in the United States. The following options are available for factory configuration of the disc drive for operation on 120, 220, and 240 Vac and fitted with captive power cords suitable for use with the configured voltages. See figure 2-6 for power cord details including HP part number, length, and plug type.

Option	Input Voltage (Vac)	Primary Market Area
120	120	U.S.A., Canada
220	220	Canada
221	220	Continental Europe
222	220	Switzerland
223	220	Denmark
241	240	United Kingdom
242	240	Australia, New Zealnad

1-5. ACCESSORIES

The accessories described in the following paragraphs may be ordered with the disc drive or separately from your local Hewlett-Packard Sales and Support Office. A list of HP Sales and Support Offices is provided at the back of this manual.

1-6. HP 97935A MEDIA MODULE

The HP 97935A Media Module (see figure 1-2) is the storage media used with the HP 7935 Disc Drive. The media module contains seven magnetic discs, each measuring 356.2 mm (14 in.) in diameter. The discs are enclosed in a plastic assembly consisting of a top cover, bottom cover, sliding door, and handle. The plastic assembly remains around the discs at all times.

The sliding door on the assembly is automatically opened to allow head loading when the module is installed in the disc drive.

Hewlett-Packard seeks to provide the best possible total disc performance through extensive testing, selection, and control over all the critical components that make up an HP disc product. Because of the unique interdependence of total disc performance and the head/media interface, disc drive specifications and reliability can only be assured when using HP media products.

Undesirable alteration of the media surface environment can result from improper cleaning. The cleaning of HP media products using a non-approved process is, therefore, not recommended.

Any damage sustained to the heads or media, or any consequential damage resulting from the use of non-HP media or improperly cleaned media, is excluded from warranty or service contract coverage but will be repaired subject to HP's standard time and material charges. Use of non-HP media, however, does not affect the warranty and service contract coverage of other components of the drive not associated with the head/media interface.

Extensive testing of the HP 7935 Disc Drive in conjunction with the HP 97935A Media Module has ensured the best possible disc media error performance and interchangeability of disc packs between HP 7935 Disc Drives (operating within the performance specifications and within environmental limits).

During formatting at Hewlett-Packard, the media module is tested and any defective tracks are flagged. This information is recorded on the media module maintenance tracks.

1-7. HP-IB CABLES

The following cables are available for connecting the disc drive to an HP-IB channel:

- HP 10833A HP-IB Interface Cable Assembly, part no. 8120-3445, length 1 metre (3.3 feet).
- HP 10833B HP-IB Interface Cable Assembly, part no. 8120-3446, length 2 metres (6.6 feet).
- HP 10833C HP-IB Interface Cable Assembly, part no. 8120-3447, length 4 metres (13.1 feet).

1-8. RELATED MANUALS

The following related manuals may be ordered from a Hewlett-Packard Sales and Support Office. Sales and Support Offices are listed at the back of this manual.

- *HP 7933 and 7935 Disc Drive Service Manual,* part no. 07930-90903.
- *CS/80 Instruction Set Programming Manual,* part no. 5955-3442.
- *CS/80 External Exerciser Reference Manual,* part no. 5955-3462.

1-9. CHARACTERISTICS

Characteristics of the HP 7935 Disc Drive and the HP 97935A Media Module are listed in table 1-1. Refer to *Site Environmental Requirements for Disc/Tape Drives,* part no. 5955-3456, for detailed specifications.

Table 1-1. HP 7935 Disc Drive and HP 97935A Media Module Characteristics

SAFETY

CSA certified to CSA 22.2 No. 154.

Meets all applicable safety standards of IEC 380 and IEC 435.

UL recognized UL 114 and UL 478.

PHYSICAL CHARACTERISTICS

HP 7935 Disc Drive

Height:	82.5 cm (32.5 in.)
Width:	55.2 cm (21.7 in.)
Depth:	83.4 cm (32.9 in.)
Net Weight:	154 kg (340 lb)
Shipping Weight:	192 kg (423 lb)

HP 97935A Media Module

Diameter:	388 mm (15.3 in.)
Height:	110 mm (4.3 in.)
Net Weight:	5.7 kg (12.6 lb)
Shipping Weight:	9 kg (20 lb)

POWER REQUIREMENTS

Voltage:	120, 208, 220, 240, ±10%
Frequency:	47.5 to 63 Hz
Power:	1,300 watts (disc drive only)

Current (nominal worst case):

Standard/ Option	Market Area	Voltage (Vac)	Disc Drive (A)	Accessory Outlet (A)	Total (A)
Standard	USA	208	7.6	1.7	9.3
120	USA, Canada	120	13.0	3.0	16.0
220 221 222 223	Canada Continental Europe Switzerland Denmark	220	7.4	1.6	9.0
241 242	United Kingdom Australia, New Zealand	240	6.9	1.5	8.4

Line Drop Out: No effect on performance or operator intervention required for dropout equal to or less than one half cycle of the ac line frequency (10.6 ms, 50 Hz; 8.3 ms, 60 Hz).

COOLING REQUIREMENTS

Allow 50.8 cm (20 in.) in the front and 76.2 cm (30 in.) in the rear of the disc drive for adequate air flow.

INSTALLATION

SECTION II

2-1. INTRODUCTION

WARNING

The disc drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and maintenance procedures to qualified service-trained personnel.

This section contains the necessary information to unpack, install, check out or otherwise prepare the disc drive for use. Included are instructions for unpacking and inspection, installation, and repackaging for shipment.

2-2. UNPACKING AND INSPECTION

The disc drive and the media module 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 a container is damaged or waterstained, request that the carrier's agent be present when the container is unpacked.

If the containers appear to have been received in a satisfactory condition, proceed with unpacking as follows.

2-3. DISC DRIVE UNPACKING INSTRUCTIONS

a. Using a knife or scissors, remove the polystrap banding securing the top of the container to the base and remove the top. (See figure 2-1.)

b. Locate the packing list and compare the list against the purchase order to verify that the shipment is correct.

c. Remove the ramp and the two foam cushions from the disc drive.

d. At the rear of the container base, remove the two bolts securing the retaining member to the container base and remove the retaining member.

e. Secure the ramp on the pins provided at the rear of the container base. Check that the bevelled end of the ramp faces downward.

WARNING

To avoid personal injury when moving the disc drive off the container base, do not position any part of the body in the path of the disc drive.

CAUTION

- To avoid damage to the disc drive from a "runaway" condition when moving the disc drive off the container base, position a handler on each side of the disc drive.

- Do not push or pull on the shroud when moving the disc drive off the container base. (The shroud is the removable assembly surrounding the media module chamber and the control panel. See figure 3-1.)

f. Move the disc drive off the container base and onto the floor using the ramp.

g. Remove the plastic bag from the disc drive.

h. Inspect the disc drive for damage such as dents, surface scratches, and loose components.

i. If visual examination reveals any damage to the disc drive, follow the claims procedure described in paragraph 2-7 of this manual. Retain the shipping container and packaging material for possible future use.

2-4. MEDIA MODULE UNPACKING INSTRUCTIONS

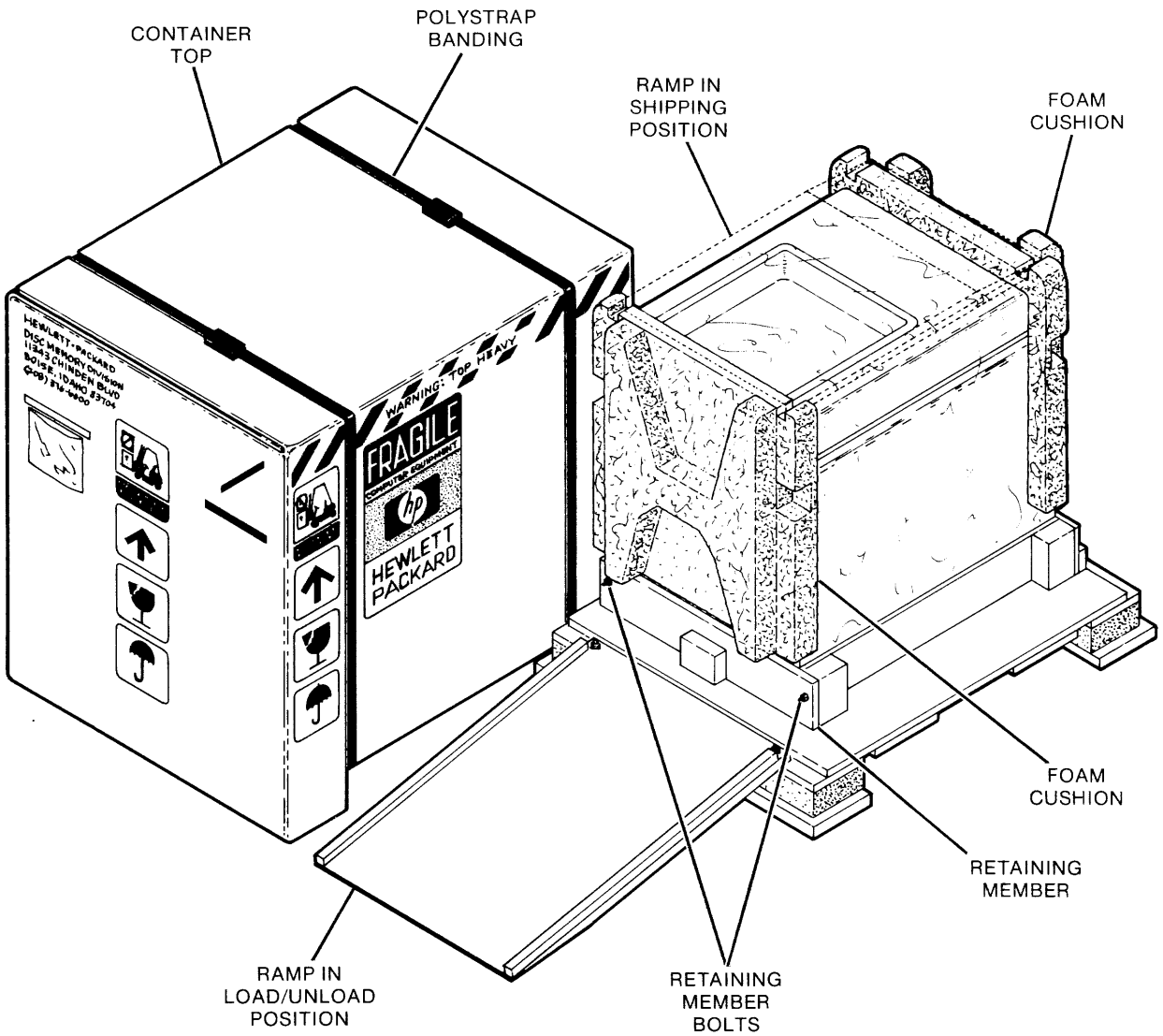
CAUTION

The media module must be kept as clean as possible prior to installation. Do not unpack the media module until the disc drive is installed and ready to receive the module.

a. Using a knife, cut the tape securing the top of the shipping container and remove the media module. (See figure 2-2.)

PART NUMBERS FOR PACKAGING MATERIAL

ITEM	PART NUMBER
CONTAINER TOP	07925-80801
FOAM CUSHION	07920-80805
CONTAINER BASE (INCLUDES RAMP)	07930-80801



REF 7933-202A

Figure 2-1. HP 7935 Disc Drive Packaging Details

PACKAGING MATERIAL PART NUMBERS:

ITEM	PART NUMBER
PACKAGING MATERIAL (INCLUDES CARTON, FOAM PADS, AND PLASTIC BAG)	13356-60002

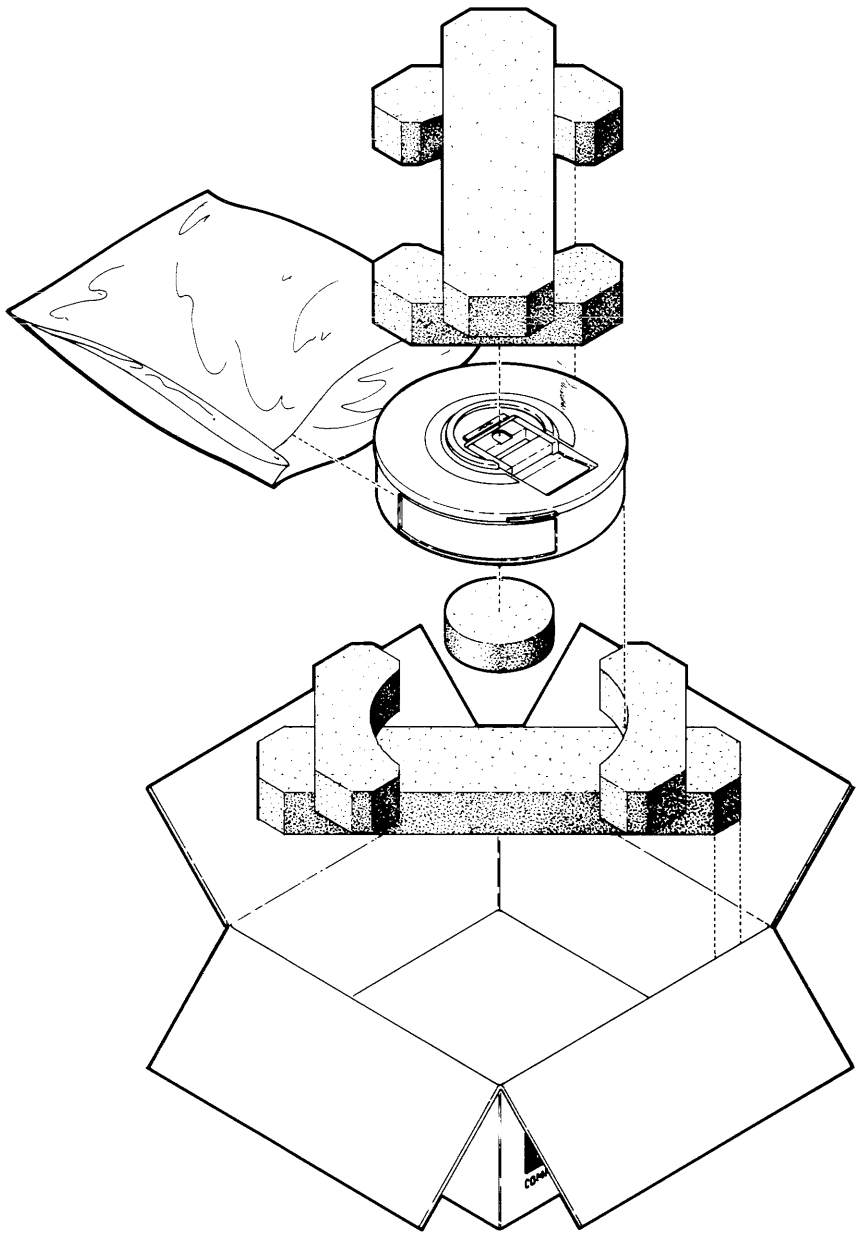


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Figure 2-2. Media Module Packaging Details

b. Remove the plastic bag from the media module.

c. Inspect the media module for physical damage. If damage is observed, follow the claims procedure described in paragraph 2-7. Retain the shipping container and packaging material for possible future use.

d. Install the media module in the disc drive. (Refer to paragraph 3-10.)

2-5. MANUALS

Check to ensure that all of the manuals specified on the packing list have been received.

2-6. EQUIPMENT IDENTIFICATION

The disc drive model number and serial number are stamped on an identification label affixed to the rear panel. (See figure 3-1.) The media module is identified by a 10-digit serial number marked on a label affixed to the cover of the module, adjacent to the top handle. (See figure 1-2.) Record this number for reference. The serial number label has a blank area that may be used to identify the information stored in the module. Use a noncontaminating marker such as a felt-tipped pen to mark on the label. Stick-on labels should only be used on the top of the media module. Be sure to include the model number and the full serial number in any correspondence with Hewlett-Packard concerning the products.

2-7. CLAIMS PROCEDURE

WARNING

To avoid dangerous electrical shock, do not apply power to the disc drive if there are signs of physical damage on any portion of the outer cabinet.

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 and packaging material for inspection.

2-8. SITE PREPARATION

Site preparation information for the disc drive includes environmental, power, cooling, and location requirements. Each of these subjects is discussed in the following paragraphs. For detailed site environmental information, refer to the publication entitled *Site Environmental Requirements for Disc/Tape Drives*, part no. 5955-3456.

2-9. ENVIRONMENTAL REQUIREMENTS

The disc drive is designed to operate with an air inlet temperature range of 10° to 32° C (50° to 90° F) with the rate of temperature change not to exceed 20° C (36° F) per hour. It is assumed that the media modules will be used and stored at the same room temperature at which the disc drive is operating.

Note: The environmental specifications listed herein apply when this device is not connected to a Hewlett-Packard (HP) system. When this device is connected with HP systems, the more stringent environmental and performance specifications listed for any single HP device within the HP system are applicable and supersede these specifications.

2-10. PRIMARY POWER AND EXTERNAL GROUND REQUIREMENTS

The female power outlet to be used to supply ac power to the disc drive must be checked by a certified electrician to ensure that the proper voltage is available for the disc drive. The permitted voltage range is ± 10 percent of the input voltage specified on the disc drive power identification label. Also have the earth or safety ground in the power outlet checked to ensure that there is a good earth ground (properly earthed ac outlet). Bear in mind that the electrical load imposed by the disc drive may reduce the voltage below the non-load value. If the line voltage is not within the correct range, have the electrician check the power outlet to ensure that it is wired correctly with respect to ac high potential (L), ac neutral (N), and earth ground (E). If the outlet is wired improperly, corrections must be made by a qualified electrician. Local electrical codes must be observed.

2-11. COOLING REQUIREMENTS

A blower in the disc drive cabinet provides adequate ventilation when the disc drive is operated in an appropriate environment. Cooling air is drawn into the cabinet through openings at the front of the cabinet and exhausted through vents at the rear. (See figure 2-3.) Air entering the cabinet is directed through a prefilter and an absolute filter that additionally filters the air to the media module.

Note: To obtain maximum cooling efficiency, ensure that the disc drive is positioned so that its front is at least 50.8 centimetres (20 inches) and its rear 76.2 centimetres (30 inches) from any object or barrier.

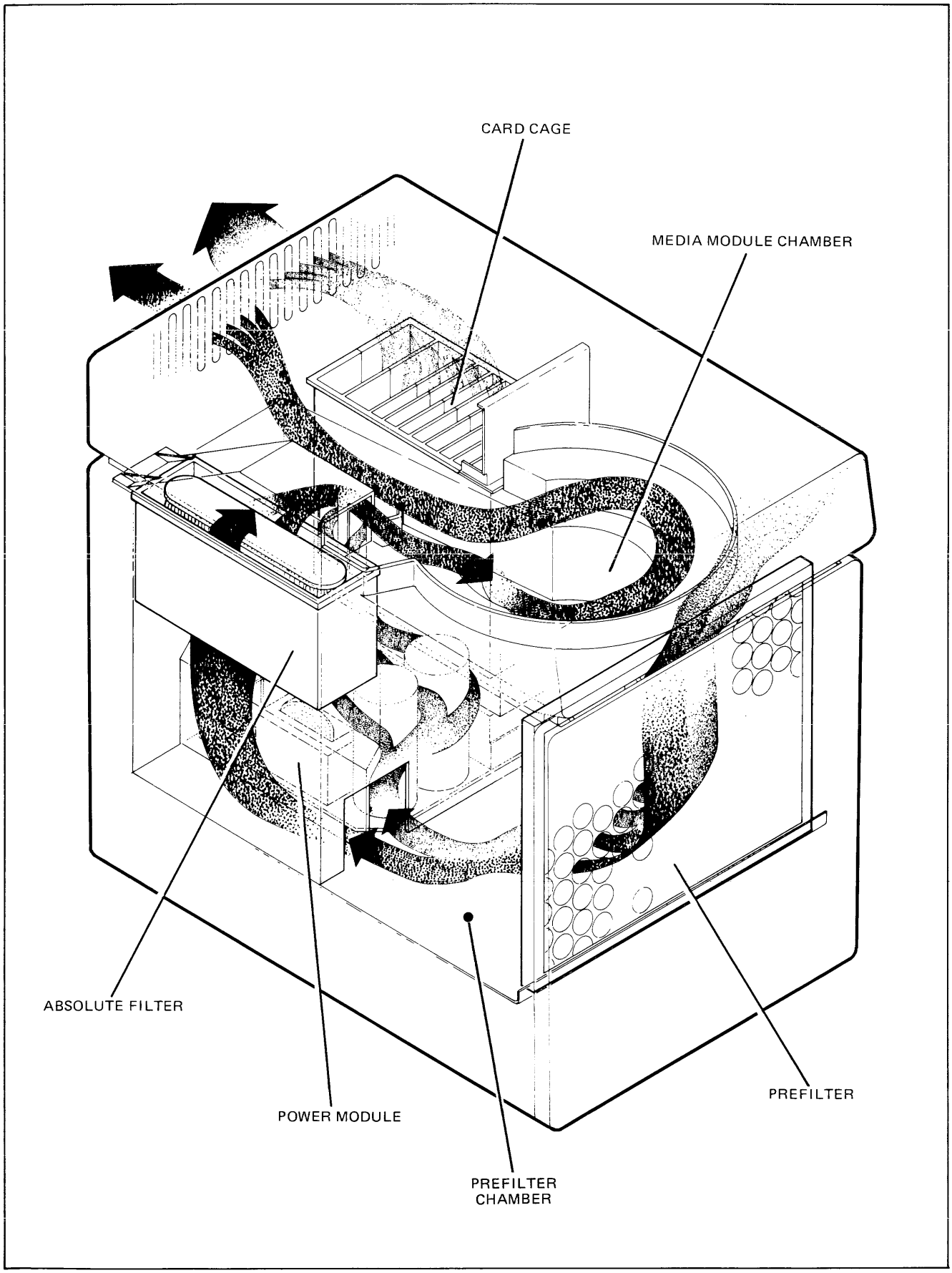
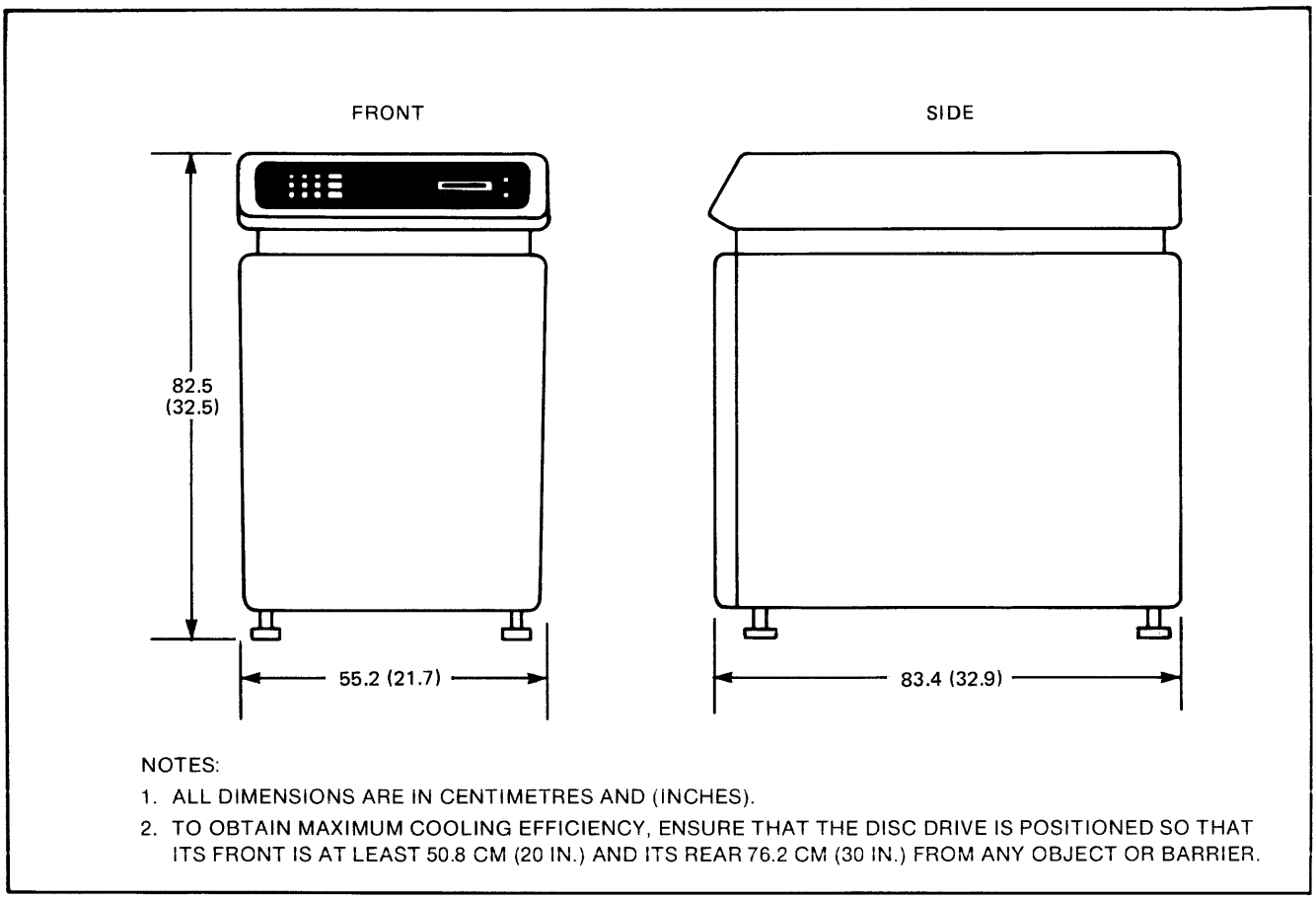


Figure 2-3. Air Circulation and Filtration System



NOTES:
1. ALL DIMENSIONS ARE IN CENTIMETRES AND (INCHES).
2. TO OBTAIN MAXIMUM COOLING EFFICIENCY, ENSURE THAT THE DISC DRIVE IS POSITIONED SO THAT ITS FRONT IS AT LEAST 50.8 CM (20 IN.) AND ITS REAR 76.2 CM (30 IN.) FROM ANY OBJECT OR BARRIER.

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Figure 2-4. HP 7935 Disc Drive Overall Dimensions

2-12. LOCATION REQUIREMENTS

The disc drive is mounted in a free-standing cabinet which requires only that the entire unit be moved to the desired location. Space requirements for the disc drive are specified in figure 2-4.

When positioned, adjust the four levelling feet on the bottom of the unit to relax the "dead-weight" strain from the casters and to provide a more stable foundation than the casters normally provide. Place a level on the top of the disc drive and adjust the feet to ensure that the top of the unit is level.

2-13. INSTALLATION

The following paragraphs provide the information required to install the disc drive. The information given includes manual updating instructions, tools and test equipment required, input power details, power cord description, and HP-IB interconnection instructions.

2-14. MANUAL UPDATING

Before installing the disc drive, read all of the updating supplements for the disc drive manuals and any related publications. Updating supplements, if any, are provided with the manuals.

2-15. TOOLS AND TEST EQUIPMENT

The following paragraphs describe the tools and test equipment required to install the disc drive.

2-16. TOOLS. No installation tools, other than ordinary hand tools, are needed except in cases where power cord or input power changes are required. The following special tools are required for these changes:

Note: TORX® drive screws are used extensively in the disc drive.* These screws are identified in this manual by the letter "T", followed by a number that indicates the drive bit size needed for removal and replacement.

- Driver handle, HP part no. 8710-1413.
- T10 bit, HP part no. 8710-1418.
- T25 bit, HP part no. 8710-1417.

*TORX® is a registered trademark of the Camcar Division of Textron Inc.

2-17. TEST EQUIPMENT. A suitable ac voltmeter (HP 970A Digital Voltmeter, or equivalent battery-operated device suitable for measuring primary ac line voltage) is the only item of test equipment required for installation. The ac voltmeter is used to verify the adequacy of the ac power source to be used to power the disc drive.

2-18. INPUT POWER

The disc drive may be operated continuously from a primary power source of 120, 208, 220, or 240 Vac (± 10%) at a line frequency of 47.5 to 63 Hertz with a power consumption of 1,400 watts maximum. (Refer to table 1-1.)

IMPORTANT NOTICE

The disc drive is configured at the factory for an ac input voltage of 120, 208 (standard), 220, or 240 Vac and fitted with a captive power cord. (Refer to paragraph 1-4.) The input power configuration is specified on the power identification label at the rear of the disc drive cabinet. (See figure 3-1.) However, the disc drive input power requirement can be changed by reconfiguring the strapping in the power module. The captive power cord can also be changed.

If the primary power source is other than that noted on the power identification label, disconnect the power cord from the primary power source and change the strapping on terminal board TB1 in the power module as detailed in paragraph 2-19. Also, if it is desired to change the captive power cord, follow the instructions given in paragraph 2-20.

2-19. POWER MODULE STRAPPING

WARNING

To avoid personal injury, be sure that the disc drive is disconnected from the primary power source before making any change to the disc drive wiring.

If the primary power source to be used is outside the range marked on the disc drive power identification label, it will be necessary to change the strapping on terminal board TB1 located in the power module. To perform this change, proceed as follows:

a. Disconnect the disc drive power cord from the ac power source.

b. Push in on the shroud latch with a slotted-blade screwdriver or similar tool. (The location of the shroud latch is shown in figure 3-1.) When the latch releases, raise the rear of the shroud and then move it forward and away from the disc drive.

c. Slide the front door upward until it unlatches from the bottom of the disc drive cabinet and remove the front door.

d. Loosen the two captive screws which secure the rear cover to the disc drive cabinet and remove the rear cover.

e. Slide the prefilter upward until its lower edge is clear of the disc drive cabinet and remove the prefilter.

f. Disconnect the blower cable and the spindle motor cable from the connectors at the rear of the prefilter chamber.

g. Remove the eleven T25 screws which secure the power module cover to the disc drive cabinet and remove the cover.

h. Disconnect the ribbon cable from connector J1 on spindle driver PCA-A12. (PCA-A12 is the large printed-circuit assembly at the top of the power module.)

i. Disconnect the cable from connector J1 on dc power PCA-A13. (PCA-A13 is the small PCA below PCA-A12.)

j. Carefully extend the power module forward on its slides.

k. **Remove the two T10 screws which secure the cover on the power module strapping chamber and remove the cover. (The strapping chamber is the rectangular enclosure on the left-hand side of the power module.)**

l. Change the wiring on terminal board TB1 for the desired input voltage, as shown in figure 2-5. If it is necessary to change the power cord, follow the instructions given in paragraph 2-20.

m. Replace the cover on the power module strapping chamber with the two T10 screws previously removed. Tighten the screws to 20 inch-pounds. Reconnect the two cables disconnected in steps h and i and slide the power module into the disc drive cabinet.

n. Remove the power identification label from the power module cover. Reverse the label and if the new input power configuration is listed, replace the label on the power module cover.

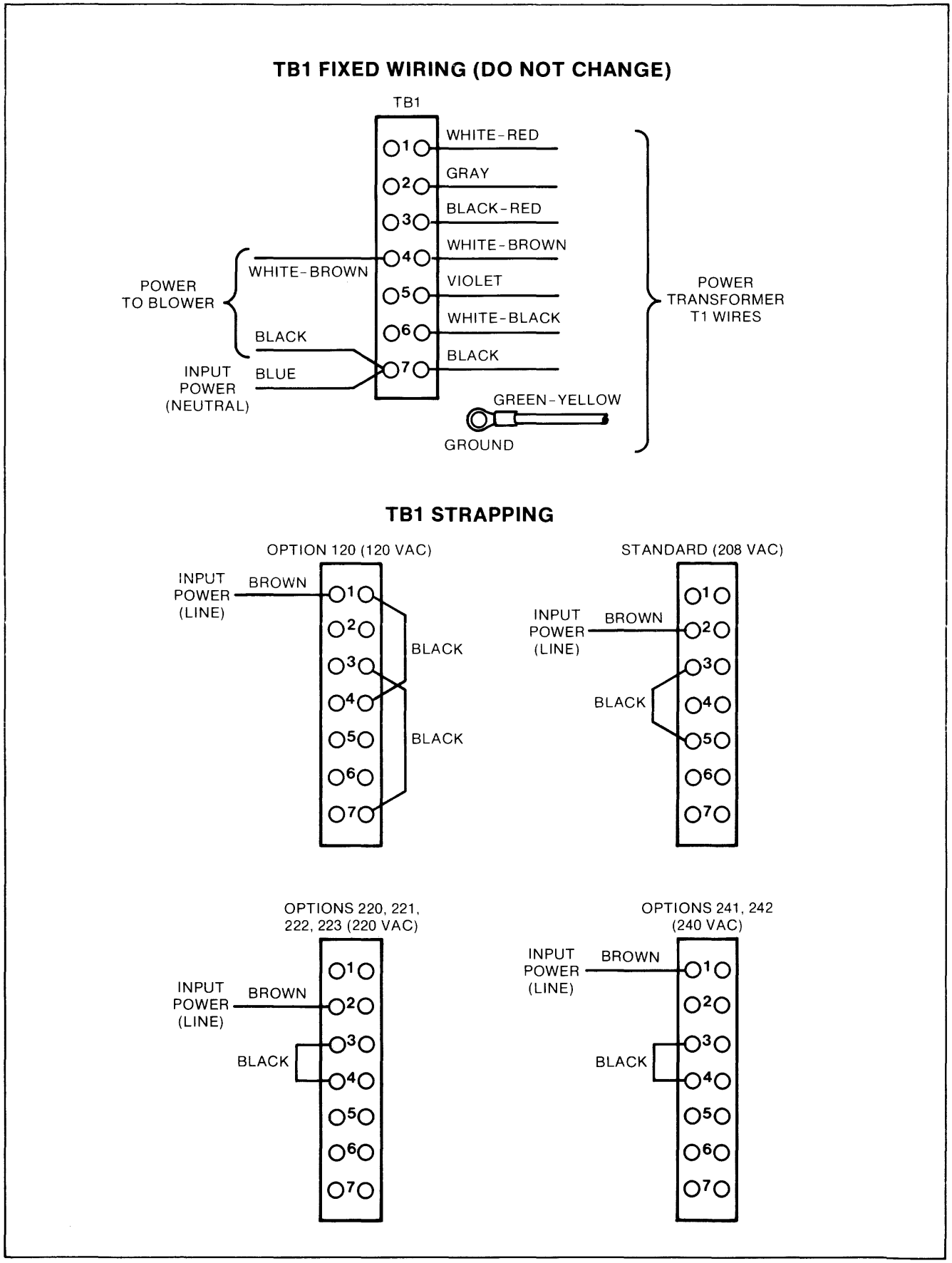

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Figure 2-5. Power Module Strapping

Note: Three power identification labels are available for the disc drive, as listed below. If the reverse side of the label from the disc drive does not specify the new power input configuration, it will be necessary to order the correct label from the nearest Sales and Support Office.

LABEL	PART NO.
120/208V	07935-00002
220/240V	07935-00003

o. Replace the power module cover with the eleven T25 screws previously removed. Tighten the screws to 20 inch-pounds.

p. Reconnect the blower cable and the spindle cable in the prefilter chamber and replace the prefilter.

q. Replace the disc drive front cover, rear panel, and shroud.

2-20. POWER CORD CHANGEOVER

If it is desired to change the captive power cord on the disc drive, proceed as follows. See figure 2-6 for details of the available captive power cords.

a. Disconnect the disc drive power cord from the ac power source.

b. Push in on the shroud latch with a slotted-blade screwdriver or similar tool. (The location of the shroud latch is shown in figure 3-1.) When the latch releases, raise the rear of the shroud and then move it forward and away from the disc drive.

c. Slide the front door upward until it unlatches from the bottom of the disc drive cabinet and then remove the front door.

d. Loosen the two captive screws which secure the rear cover to the disc drive cabinet and remove the rear cover.

e. Slide the prefilter upward until its lower edge is clear of the disc drive cabinet and remove the prefilter.

f. Disconnect the blower cable and the spindle motor cable from the connectors at the rear of the prefilter chamber.

g. Remove the eleven T25 screws which secure the power module cover to the rear of the disc drive cabinet and remove the cover.

h. Disconnect the ribbon cable from connector J1 on spindle driver PCA-A12. (PCA-A12 is the large printed-circuit assembly at the top of the power module.)

i. Disconnect the cable from connector J1 on dc power PCA-A13. (PCA-A13 is the small printed-circuit assembly below PCA-A12.)

j. Carefully extend the power module outward on the slides.

k. Remove the three T10 screws which secure the input power assembly to the power module. (See figure 2-7.)

l. Disconnect the blue wire from J3 (neutral) and the brown wire from J4 (line) terminals on line filter PCA-A21. (See figure 2-7)

m. Disconnect the green/yellow wire from the ground terminal shown in figure 2-7 and remove the input power assembly from the disc drive.

n. Loosen the screw on the bushing which secures the power cord to the panel of the input power assembly.

o. Disconnect the two power cord wires from the ~LINE switch terminals and the single wire from the ground terminal. Remove the power cord.

CAUTION

The power cords shown in figure 2-6 match the power requirements of the disc drive. Do not substitute.

p. Install the new power cord as shown in figure 2-7. Ensure that the correct wires are attached to the ~ LINE switch terminals and the ground terminal, as shown in figure 2-7. Tighten the screw on the panel bushing.

q. Reconnect the three wires disconnected in steps l and m and attach the input power assembly to the power module with the three T10 screws previously removed. Tighten the screws to 20 inch-pounds.

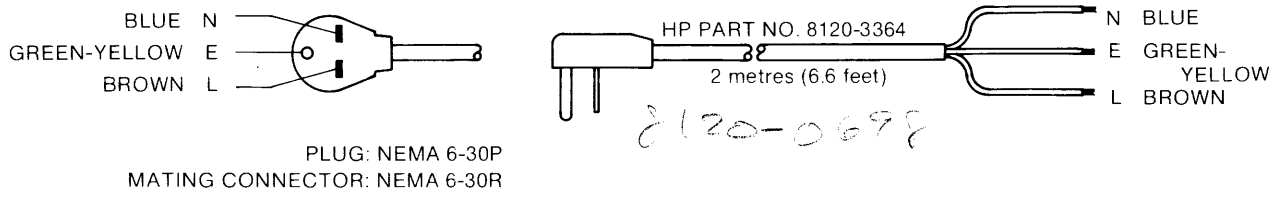
r. Reconnect the two cables to PCA's A12 and A13 and slide the power module back into the disc drive cabinet. Replace the power module cover with the eleven T25 screws previously removed. Tighten the screws to 20 inch-pounds.

s. Reconnect the blower cable and the spindle motor cable in the prefilter chamber and replace the prefilter.

t. Replace the disc drive front cover, rear panel, and shroud.

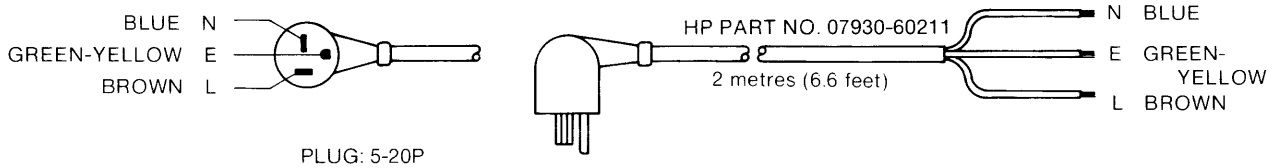
Blue = RT

USA **STANDARD (208 VAC)**



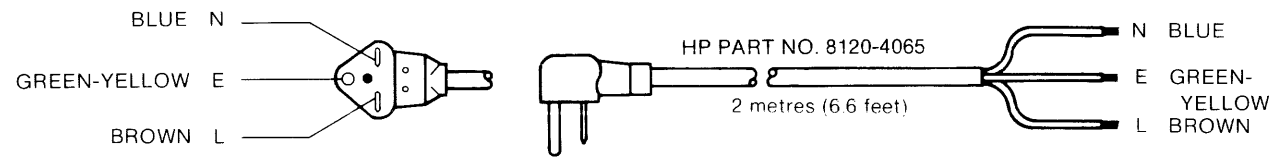
PLUG: NEMA 6-30P
MATING CONNECTOR: NEMA 6-30R

USA, CANADA **OPTION 120 (120 VAC)**



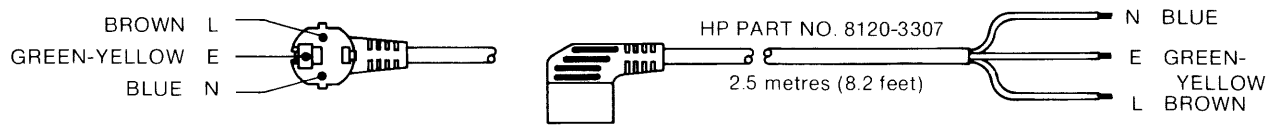
PLUG: 5-20P
MATING CONNECTOR: 5-20R

CANADA **OPTION 220 (220 VAC)**



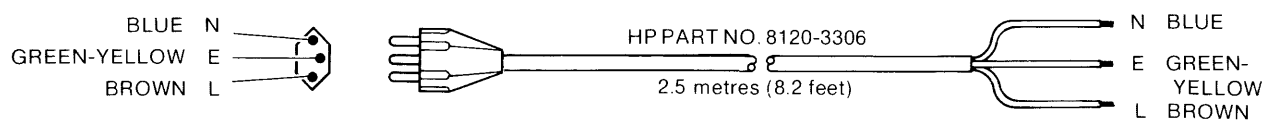
PLUG: 6-15P
MATING CONNECTOR: 6-15R

EAST AND WEST EUROPE **OPTION 221 (220 VAC)**



PLUG: CEE VII
MATING CONNECTOR: TYPE 1050 SCHUKO

SWITZERLAND **OPTION 222 (220 VAC)**



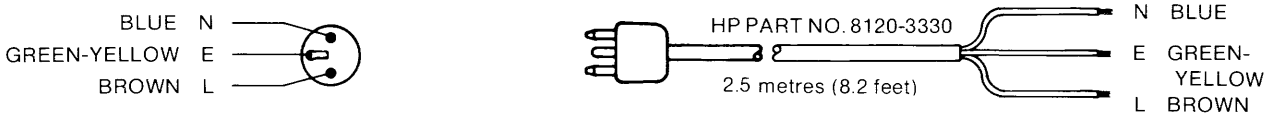
PLUG: SEV 1011 1959-24507
MATING CONNECTOR: 87003

E = EARTH OR SAFETY GROUND
N = NEUTRAL OR IDENTIFIED CONDUCTOR
L = LINE OR ACTIVE CONDUCTOR

7933-205(1)B

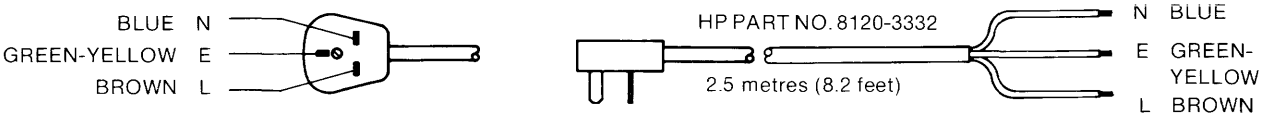
Figure 2-6. Standard and Optional Captive Power Cords

DENMARK **OPTION 223 (220 VAC)**



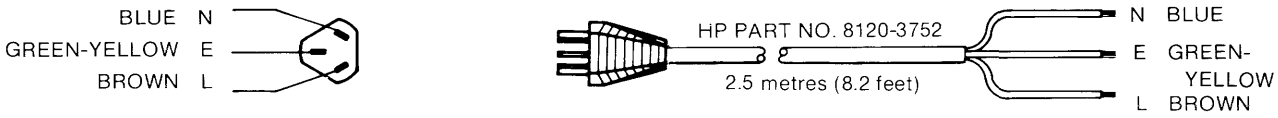
PLUG: DHCR 107

UNITED KINGDOM **OPTION 241 (240 VAC)**



PLUG: BS 1363A
MATING CONNECTOR: PN 755 WHI (unswitched)
PN 2535 WHI (switched)

AUSTRALIA, NEW ZEALAND **OPTION 242 (240 VAC)**

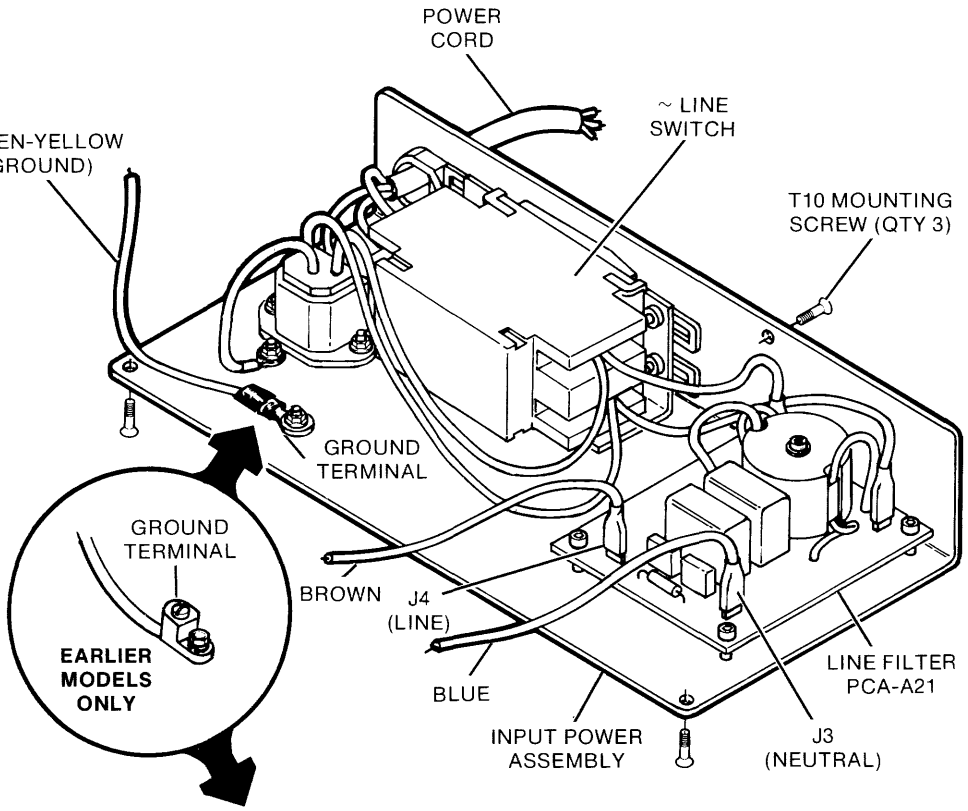


PLUG: NZSS.198/ASC 112
MATING CONNECTOR: NZSS.198/ASC 112

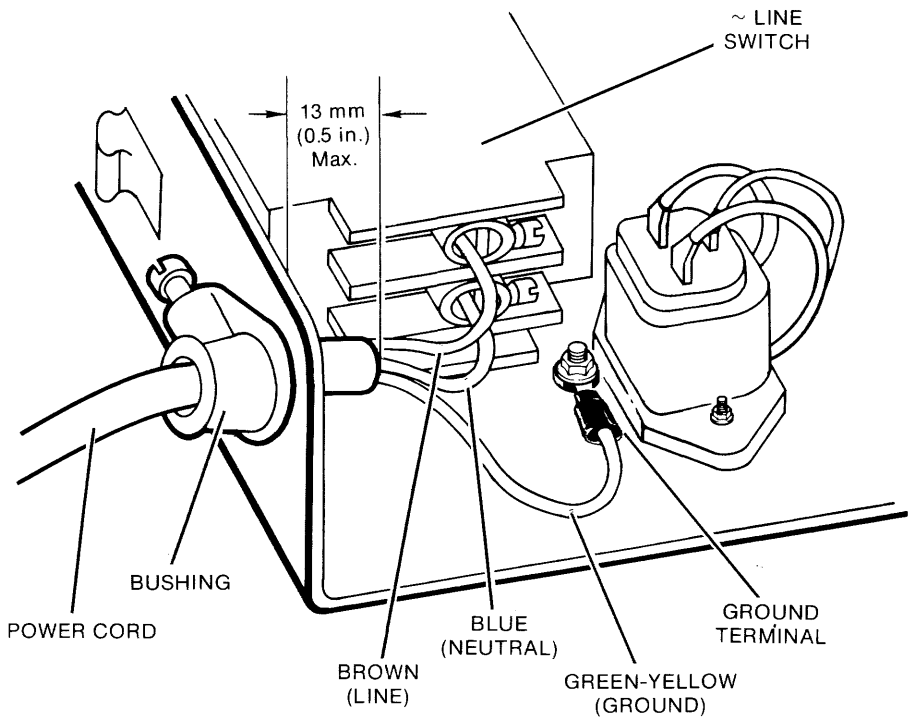
E = EARTH OR SAFETY GROUND
N = NEUTRAL OR IDENTIFIED CONDUCTOR
L = LINE OR ACTIVE CONDUCTOR

7933-205(2)B

Figure 2-6. Standard and Optional Captive Power Cords (continued)



INPUT POWER ASSEMBLY REMOVAL/REPLACEMENT

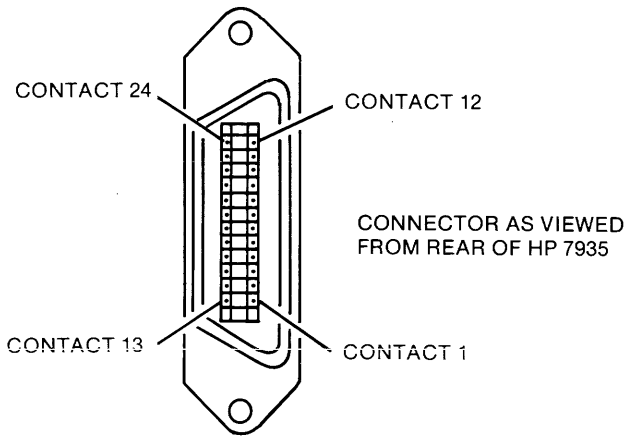


POWER CORD CONNECTIONS

REF 7933-206A

Figure 2-7. Captive Power Cord Removal and Replacement

Table 2-1. HP-IB Connector Pin Assignments



CONTACT	SIGNAL	CONTACT	SIGNAL
1	DIO0-L Data In/Out 1	13	DIO5-L Data In/Out 5
2	DIO1-L Data In/Out 2	14	DIO6-L Data In/Out 6
3	DIO2-L Data In/Out 3	15	DIO7-L Data In/Out 8
4	DIO3-L Data In/Out 4	16	DIO8-L Data In/Out 8
5	EOI-L End or Identify	17	REN-L Remote Enable
6	DAV-L Data Valid	18	GND, (6)
7	WRFD-L Not Ready for Data	19	GND, (7)
8	NDAC-L Not Data Accepted	20	GND, (8)
9	IFC-L Interface Clear	21	GND, (9)
10	SRQ-L Service Request	22	GND, (10)
11	ATN-L Attention	23	GND, (11)
12	SHIELD Shield	24	GND, LOGIC

NOTE: GND (n) refers to the signal ground return of the referenced contact.

2-21. CONNECTION TO HP-IB CHANNEL

The manner in which the disc drive is connected to an HP-IB channel depends on the system configuration, that is, whether a single disc drive or multiple disc drives are to be connected to the HP-IB channel. Connection instructions are as follows:

CAUTION

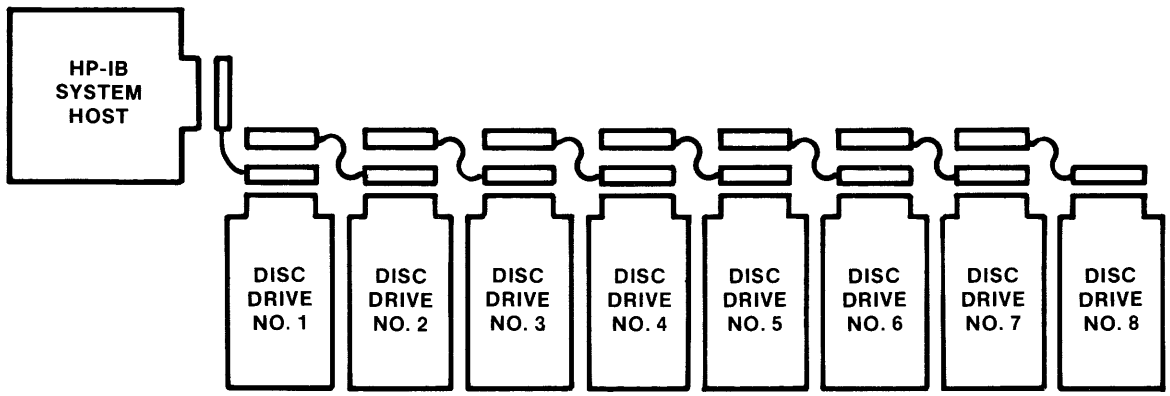
The disc drive uses a short data settling time. To ensure that the disc drive(s) will operate at its specified transfer rate, check the HP-IB length restrictions described in the HP-IB configuration restriction label attached to the rear of the disc drive. This label is illustrated in figure 2-8. The equivalent load of the HP-IB system host must also be considered when calculating the total cable length.

HP-IB CONFIGURATION RESTRICTION

THIS DEVICE USES A SHORT DATA SETTLING TIME. TO ASSURE DATA INTEGRITY, LIMIT TOTAL CABLE LENGTH OF ANY BUS INCLUDING THIS DEVICE TO ONE METRE PER EQUIVALENT LOAD CONNECTED (MAXIMUM 15 METRES). LENGTH (METRES) = SUM EQUIV LOADS THIS DEVICE = 1 EQUIV LOAD

Figure 2-8. HP-IB Configuration Restriction Label

a. Disconnect the disc drive ac power cord(s) from the ac power source.



LINEAR CONFIGURATION

NOTES:

1. All interconnecting cables between disc drives are HP 10833A HP-IB Interface Cables, part no. 8120-3445. The length of this cable is one metre (3.3 feet).
2. Observe the cabling length restrictions detailed in paragraph 2-21 and listed on the HP-IB Configuration Restriction label attached to the equipment.

7935-207

Figure 2-9. Connection to HP-IB

b. If this is a single disc drive installation, connect one end of an HP 10833A HP-IB Interface Cable, part no. 8120-3445, to the HP-IB primary port connector at the rear of the disc drive and the other end of the cable to the primary HP-IB channel. The pin assignments for the HP-IB connector are shown in table 2-1.

c. If this is a multiple unit installation, use HP 10833A HP-IB Interface Cables, part no. 8120-3445, to interconnect the disc drives to the system host. The following details should be observed during installation:

- The disc drives should be connected to the HP-IB system host in a linear configuration. (See figure 2-9.)
- The system host must preload the HP-IB with seven equivalent resistor loads.
- Each disc drive places one equivalent load on each of the HP-IB lines.
- The total cable length is limited to 15 metres (49 feet). No more than one metre of cable should be used for each equivalent load on the HP-IB.
- Refer to the appropriate system configuration manual for additional bus loading information.

d. Check that the HP-IB channel address switches on the rear panel are correctly set. (Refer to paragraph 3-9 for instructions.)

e. Connect the ac power cord from each disc drive to the ac power source.

2-22. INSTALLATION CHECK

After the disc drive(s) has been installed and connected to the HP-IB channel, visually inspect the installation. Ensure that all cabling is properly installed and the correct HP-IB channel address is specified. (Refer to paragraph 3-9.) Refer to section III for a full description of the disc drive operation controls and basic operating procedures.

2-23. REPACKAGING FOR SHIPMENT

WARNING

The disc drive contains magnetic material (spindle assembly and actuator assembly), a potential

hazard during air shipping. The disc drive does not exceed aircraft limitations, 2.0 milligauss at 2.13 metres (7 feet), and can be shipped into or within the United States provided that all applicable regulations of the U.S. Department of Transportation (DOT) are followed before release to the initial carrier. In the United States, refer to DOT Regulations, Title 49, parts 171-177 (hazardous materials).

When the disc drive or the media module requires repackaging for shipment, use the original container and packaging material. If the original container is not available, consult your local Hewlett-Packard Sales and Support Office to obtain a container or instructions on how to fabricate an acceptable substitute. Before shipment, the container (or equipment) should have an attached tag identifying the owner and the service or repair to be performed. Include the equipment model number and full serial number. The approximate shipping weight of the disc drive is 192 kilograms (423 pounds). The Shipping weight of the media module is 9 kilograms (20 pounds).

2-24. DISC DRIVE

To package the disc drive using the original container, proceed as follows:

a. Secure the ramp on the pins provided at the rear of the container base. (See figure 2-1.)

b. Thread the levelling feet fully into the disc drive cabinet to allow freedom of movement of the disc drive.

c. Position the disc drive at the ramp with the front of the disc drive facing toward the container base.

CAUTION

Do not push or pull on the shroud when moving the disc drive.

d. Roll the disc drive up the ramp onto the container base.

e. Attach the retaining member to the container base with the two retaining member bolts.

f. Cover the disc drive with a plastic bag and install the two foam cushions.

g. Remove the ramp and locate it on top of the two foam cushions. (See figure 2-1.)

h. Place the container top on the container base and secure with two polystrap bands. Use banding material having a strength of 500 pounds or greater.

2-25. MEDIA MODULE

To package the media module using the original packaging, proceed as follows:

a. Place the round foam pad on the bottom of the media module and place the module in a plastic bag. Do not seal the bag.

b. Place the media module in the shipping container with the foam packaging arranged as shown in figure 2-2.

c. Close the container and seal it with adhesive tape.

OPERATION

SECTION III

3-1. INTRODUCTION

WARNING

The HP 7935 Disc Drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and maintenance activities to service-trained personnel.

This section contains operating instructions for the disc drive. Included are operating precautions, environmental considerations, instructions for setting the HP-IB device address, media module installation and removal details, and disc drive turn-on and turn-off instructions.

3-2. OPERATING WARNINGS AND PRECAUTIONS

The operator should observe the following warnings and precautions when operating the disc drive:

WARNING

- **Observe all warnings and cautions provided in this manual and affixed to the disc drive.**
- **Do not operate the disc drive with any doors or covers removed. Hazardous voltages are present inside the cabinet.**

CAUTION

- The efficiency of the disc drive prefilter and absolute filter must be maintained. The air flow through the filters is automatically tested at power turn-on and on a continuing basis during operation of the disc drive. Any indication of an abnormal condition must be corrected as soon as possible by service-trained personnel.
- In normal operation the heads "fly" over the disc surfaces on a thin cushion of air. Dust or other contaminants between the head and the disc can cause the head to contact the disc and possibly damage the disc and/or the head. Operate the disc drive in a clean area to minimize the chance of this malfunction occurring.
- Cooling air is drawn into the disc drive through the front of the unit and is exhausted through ports located at the rear. To ensure adequate airflow, ensure that the disc drive is positioned so that its front is at least 50.8 cm (20 in.) and the rear 76.2 cm (30 in.) from any object or barrier.
- Never attempt to force open the top door when it is locked closed; damage to the disc drive may occur. Power must be applied to the disc drive before the door can be opened.
- If the disc drive needs to be moved after it has been installed, it must be moved by qualified service-trained personnel. Damage to the disc drive may result if it is moved by untrained persons.
- Do not operate the disc drive with the power module cover removed. This will reduce the efficiency of the disc drive RFI shielding.
- Do not attempt to operate the disc drive with the power module cover removed, or the power module withdrawn from the enclosure. This will interrupt the flow of cooling air in the enclosure and cause overheating and possible damage to the equipment.
- Do not turn the disc drive ~LINE switch on or off when the system bus is in an active state (Activity indicator illuminated).
- Do not connect or disconnect the HP-IB cable from the disc drive when the system bus is in an active state (Activity indicator illuminated).
- Do not attempt to clean the disc surfaces in the media module.

3-3. ENVIRONMENTAL CONSIDERATIONS

To ensure proper operation of the disc drive, the following precautions should be observed:

- The disc drive must be operated within the environmental limits specified in the *Site Environmental Requirements for Disc/Tape Drives,* part no. 5955-3456.

- If the temperature and relative humidity of the storage area differ from the operating area, the media modules must be allowed two hours for environmental stabilization when brought into the operating area. This is to ensure that the media modules meet the environmental requirements of the disc drive.

- Media modules should always be stored flat and in a clean, dust-free area. It is recommended that media modules not be stacked more than *two* high. Media modules must not be exposed to strong magnetic fields or come in contact with any magnetic material.

3-4. SWITCHES, INDICATORS, AND CONNECTORS

Figure 3-1 shows the location of the switches, indicators, and connectors mounted on the disc drive operator control panel, HP-IB panel, and power panel. The functions of these components are described in paragraphs 3-5 through 3-7. These definitions should be carefully studied before attempting to operate the disc drive.

3-5. OPERATOR CONTROL PANEL

LOAD/UNLOAD Switch: Performs the disc drive load function when set to the LOAD (in) position and the unload function when set to the UNLOAD (out) position. Before either operation is performed, the disc drive will request release from the system host to perform the load or unload. The operation will only be done if either the host request times out or the host grants release. If release is denied, the display will show a BUSY message for about 3 seconds. This cancels the switch action. To try the same operation again, the switch must be pressed again. Only the UNLOAD position can abort the LOAD function when the disc drive is on line.

UNLOCK DOOR Switch: Unlocks the disc drive top door after the unload operation is completed. If the UNLOCK DOOR switch is pressed while the spindle is spinning at speed, the unlock request will be ignored. If the UNLOCK DOOR switch is pressed during a spin down cycle, the unlock request is saved until the spindle is stopped.

Diagnostic Keyboard: Allows entry of commands for running internal diagnostic instructions. The keyboard is not needed for normal operation of the disc drive, and should only be used by qualified service-trained personnel.

Activity Indicator: Signals when the disc drive is busy executing commands.

Alphanumeric Display: An eight-character display that provides messages for the operator and shows internal diagnostic keyboard entries. Operator messages are divided into three groups as follows:

a. The following messages are operator messages indicating normal operations of the disc drive. These messages are included on the reference card located at the front of the disc drive.

AIRPURGE	The disc drive is blowing air through the media module to remove any contamination. This is performed for two reasons: 1) the top door has been opened, or 2) the spindle has stopped after a power failure.
BUSY	The front panel controls are not available because the controller-in-charge is accessing the disc drive.
DRIVE *	The disc drive successfully passed all diagnostics and is ready for operation. (* A single numeral on the right is the primary port channel address. A secondary port channel address numeral will appear to the left of the single numeral if the disc drive is fitted with option 002, dual port.)
SPIN DWN	The spindle is spinning down.
SPIN UP	The spindle is spinning up.
TESTING	The internal diagnostics are running.
UNLOAD	The heads are unloading.

b. The following messages show that operator assistance is required. If the message persists after action is taken, service by service-trained personnel is required.

DOOROPEN	The top door is open. Close the top door.
MOD DOOR	The sliding door on the media module is not fully open. Reinstall the media module.

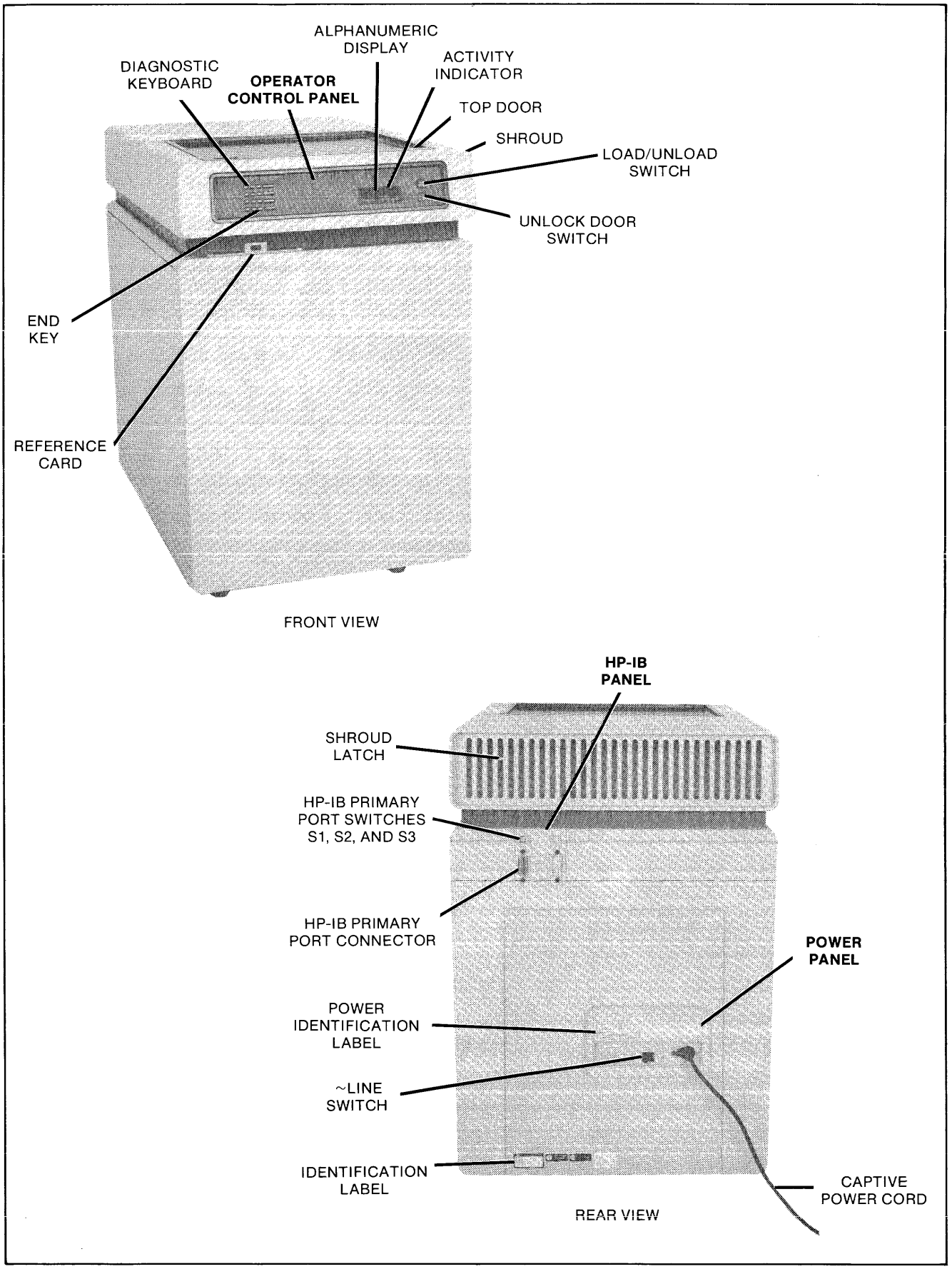


Figure 3-1. Switches, Indicators, and Connectors

NOMODULE A media module is not installed. Install the correct media module.

PART * When power was applied, or after the LOAD/UNLOAD switch was pressed, the disc drive failed part of the diagnostics. Repeat the previous operation several times to verify or to correct the problem. (* A one or two digit number which indicates the failed part; for servicing purposes only.)

RESEAT The media module did not seat correctly before a head load due to contamination on the coupling mechanism between the spindle and the media module. Remove and reinstall the media module. If the message persists, refer to the cleaning procedure in the *HP 7935 Operator Instructions Manual,* part no. 07935-90901.

STEP 0= Under certain conditions, this message may occur after the LOAD/UNLOAD switch is pressed. Press the END key to place the disc drive in operation.

STOPPED The spindle is stopped. The disc drive is waiting for the LOAD/UNLOAD switch or the UNLOCK DOOR switch to be pressed.

TERR * When power was applied, or after the LOAD/UNLOAD switch was pressed, the disc drive failed part of the diagnostics. Repeat the previous operation several times to verify or to correct the problem. (* A one, two, or three digit number which indicates the type of error; for servicing purposes only.)

UNLOCK The UNLOCK DOOR switch on the control panel was pressed, but the top door did not open. Wait for five seconds and press the UNLOCK DOOR switch again.

Note: A reference card, listing the operator messages described above, together with media module installation and removal instructions is located behind the front panel of the disc drive. (See figure 3-1.) To view the card, pull up and forward on the card tab until the card is fully extended from the disc drive. Push the card forward to return it to its storage location.

c. The following messages indicate that service is required by qualified service-trained personnel. Refer the *HP 7933 and 7935 Disc Drive Service Manual,* part no. 07930-90903 for troubleshooting information.

FAULT The disc drive has a drive fault.

FILTER * The disc drive is ready for operation but the prefilter and/or absolute filter requires changing. (*A single numeral on the right is the primary port channel address. A secondary port channel address numeral will appear to the left of the single numeral if the disc drive is fitted with option 002, dual port.)

MEM FAIL The controller memory failed.

TEST ERR The internal diagnostic found an error.

3-6. POWER PANEL

~ LINE Switch: Controls the application of ac power to the disc drive power supplies and blower motor. Power "on" is selected by the 1/ON position of the switch. Power "off" is selected by the 0/OFF position. The 1 and 0 markings correspond to international symbology currently in use.

Note: The ~LINE switch is a 20-ampere circuit breaker. The switch requires resetting to the 1/ON position following an overload condition.

POWER Cord: A three-terminal captive power cord that provides the means to connect the disc drive to an ac power source.

3-7. HP-IB PANEL

HP-IB PRIMARY PORT Switches S1, S2, and S3: Select the primary port HP-IB channel address for the disc drive. The address range is 0 through 7. Coding for the switches is marked on the HP-IB panel.

HP-IB PRIMARY PORT Connector: Permits the disc drive to be connected to an HP-IB channel.

3-8. OPERATING PROCEDURES

The following paragraphs provide basic operating procedures for the disc drive. Procedures are given for setting the HP-IB device address, installing a media module, start-up, changing a media module, and shutdown. The disc drive cannot be started without a media module installed. See figure 3-1 for the location of the controls and display panel referred to in the procedures. Refer also to paragraphs 3-5 through 3-7 for an explanation of the control functions and the display panel messages.

3-9. SETTING HP-IB DEVICE ADDRESS

To select an HP-IB device address for the disc drive, proceed as follows:

a. If the disc drive is in operation, set the LOAD/UNLOAD switch to the UNLOAD (out) position.

b. Set HP-IB PRIMARY PORT switches S1, S2, and S3 to the desired primary port HP-IB channel address number using the coding scheme marked on the HP-IB panel. For example: To select channel 4, set switches S1 to 1 and switches S2 and S3 to 0.

Note: Disregard any markings on the switch assembly; use only the switch markings on the HP-IB panel.

c. If option 002 is fitted (dual port), Set HP-IB SECONDARY PORT switches S1, S2, and S3 to the desired secondary port channel address number.

d. Set the LOAD/UNLOAD switch to the LOAD (in) position.

Note: During normal operation of the disc drive, the HP-IB channel address numbers selected are indicated by the display DRIVE * . (* A single numeral on the right is the primary port channel address. A secondary port channel address numeral will appear on the left of the single numeral if the disc drive is fitted with option 002, dual port.)

3-10. MEDIA MODULE INSTALLATION

To install a media module in the disc drive, proceed as follows:

CAUTION

The disc drive must be at its operating location with the cabinet levelling feet lowered before the media module is installed. Any further movement of the disc drive may require additional data verification.

a. Connect the disc drive power cord to the ac power source.

b. Set the LOAD/UNLOAD switch to the UNLOAD (out) position and the ~LINE switch to 1/ON. (See figure 3-1.)

c. Press the UNLOCK DOOR switch and when a DOOROPEN message appears, open the top door.

CAUTION

The media module is a precision assembly with critical tolerances that are essential to proper operation. Handle it with care to avoid damage.

Always keep the media module in an upright position to avoid contamination and possible damage.

Note: An HP 97935A Media Module must be used with the HP 7935 Disc Drive.

d. If a new media module is being installed for the first time, perform steps e and f. If this is not the first installation of a new media module, skip to step g.

WARNING

All products which utilize the tape head cleaning solution are shipped with a Material Safety Data Sheet. Follow all applicable safety precautions when using the tape head cleaning solution.

e. Using cleaning wipes, part no. 9310-4865, moistened with tape head cleaning solution, part no. 8500-1251, wipe clean the interior of the media module chamber, the inside of the top door, and the top of the spindle-motor assembly, especially the top smooth surface of the spindle motor and the spindle nose.

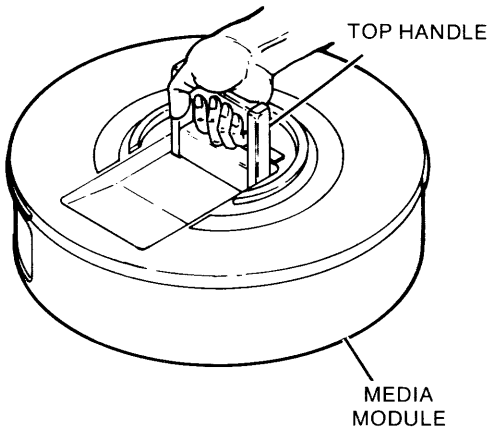
f. Use another cleaning wipe moistened with tape head cleaning solution to clean the outer edge of the flat coupling surface located beneath the removable cover. Be careful not to leave any particles on this surface. Next, clean the side and bottom surfaces of the media module.

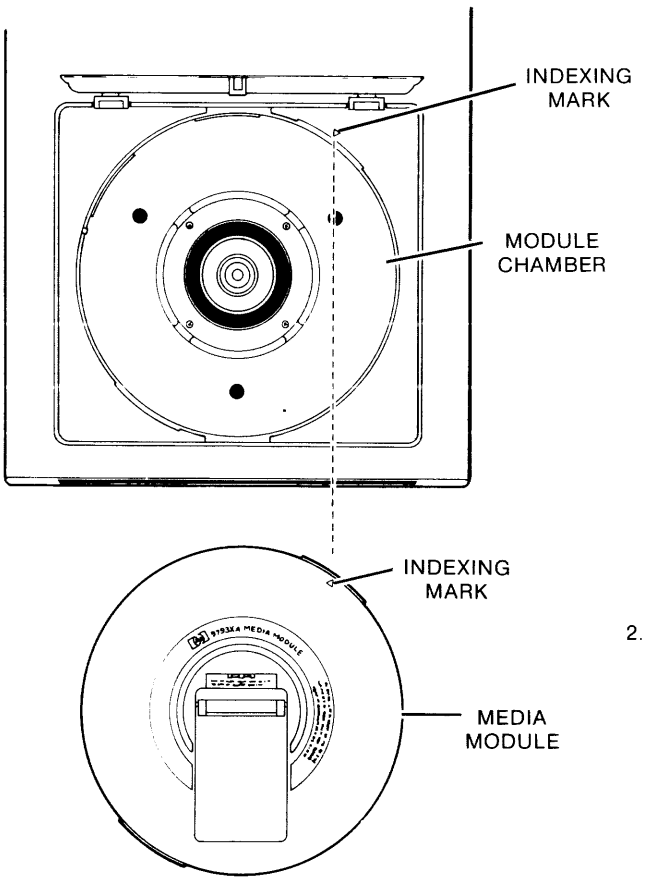
g. Carefully install the media module in the disc drive following the instructions given in figure 3-2.

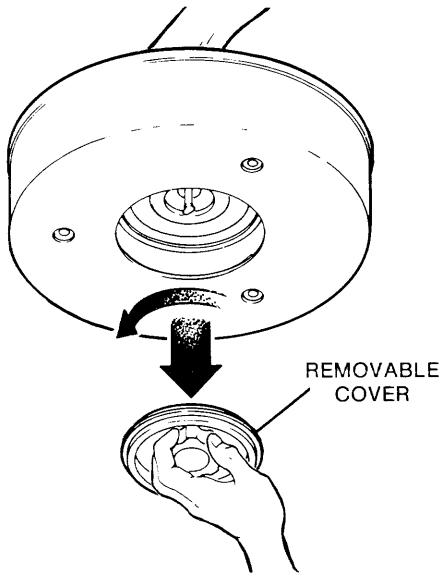
h. Close the top door and set the LOAD/UNLOAD switch to the LOAD (in) position.

i. The disc drive will now begin an internal diagnostic routine. The normal sequence of display messages will be: TESTING , SPIN UP , AIRPURGE, TESTING and DRIVE * . If the routine does not complete, the reason will be indicated by any one of the following messages: DOOROPEN , MOD DOOR , NOMODULE , RESEAT , TEST ERR , MEM FAIL , FAULT , or FILTER * . (* A single numeral on the right indicating the primary port HP-IB channel address number.).

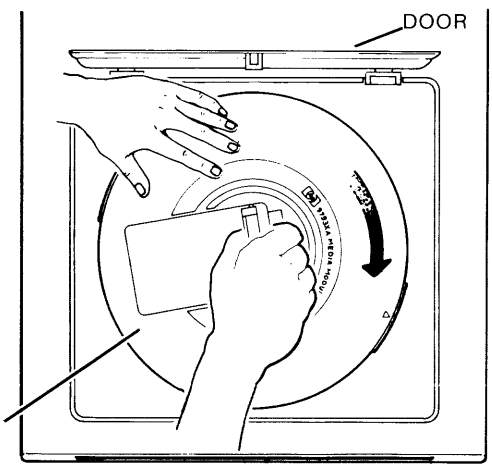
1. ON THE MEDIA MODULE TO BE INSTALLED, RAISE THE TOP HANDLE WITH ONE HAND WHILE HOLDING THE MEDIA MODULE UPRIGHT. THEN WITH THE OTHER HAND, TURN THE REMOVABLE COVER COUNTERCLOCKWISE AND DETACH THE COVER FROM THE MEDIA MODULE.







2. HOLDING THE MEDIA MODULE BY THE RAISED HANDLE, ALIGN THE INDEXING MARK ON THE MEDIA MODULE WITH THE INDEXING MARK ON THE MODULE CHAMBER, AS SHOWN OPPOSITE. WHEN PROPERLY ALIGNED, LOWER THE MEDIA MODULE INTO THE MODULE CHAMBER.



3. USING TWO HANDS, ROTATE THE MEDIA MODULE CLOCKWISE UNTIL IT STOPS.
4. LOWER THE TOP HANDLE EVENLY AND FIRMLY.
5. PLACE THE REMOVABLE COVER ON TOP (CENTER) OF THE MEDIA MODULE.

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Figure 3-2. Media Module Installation

Note: The Airpurge portion of the internal diagnostic routine requires approximately four minutes to complete.

j. If a TEST ERR, MEM FAIL, FAULT, or FILTER * message appears, a message in step f persists, or other message appears, refer to the *HP 7933 and 7935 Disc Drive Service Manual,* part no. 07930-90903, for further information.

k. If a DOOROPEN message appears, repeat the instructions given in step h.

l. If a NOMODULE, RESEAT, or a MOD DOOR message appears, ensure that a media module was properly installed by repeating the procedure described in figure 3-2.

m. If a RESEAT message persists, remove the media module as described in paragraph 3-12, then perform steps e through m; otherwise, skip to step n.

n. Perform the data surface verification test described in table 3-1 (only at initial installation of the disc drive and media module).

o. To interpret the results of the data surface verification test, add the total number of correctable (COR) errors on all heads. If more than 20 correctable errors or ANY uncorrectable errors occur, further diagnostic procedures are necessary before releasing the disc drive for on-line operation. Refer to the *HP 7933 and 7935 Disc Drive Service Manual,* part no. 07930-90903, Section IV, Alignment and Adjustment, for further information.

p. Check the head alignment as indicated in the following list. The display should indicate a head number and a head offset value (YY) of ±40 counts. If the count is outside this range, refer to the *HP 7933 and 7935 Disc Drive Service Manual,* part no. 07930-90903, Section IV, Alignment and Adjustment. Perform the manual head alignment procedure outlined there.

Keystroke	Display	Remarks
CLEAR	STEP0=	Resets the diagnostic program table.
9	STEP0=9	
8	CLEAR	
ENTER	STEP0=	
6	STEP0=6	
8	HD ALIGN	Perform the radial head alignment routine.
ENTER	HEAD=	
RUN	0 YY	YY=head offset value
Rv	1 YY	
Rv	2 YY	
.	.	
.	.	
.	.	
Rv	12 YY	
CLEAR	HD ALIGN	
END	DRIVE *	Returns control of the disc drive to the CPU.

3-11. START-UP PROCEDURE

To start up the disc drive, proceed as follows:

Note: The following procedure assumes that a media module is installed in the disc drive.

a. Set the LOAD/UNLOAD switch to the LOAD (in) position and the ~LINE switch to 1/ON.

b. The disc drive will now begin execution of a diagnostic routine. The activity indicator will illuminate while the disc drive is active. The sequence of display messages for a successful execution of the routine will be TESTING, SPIN UP, AIRPURGE, TESTING, and DRIVE *. (* A single numeral on the right is the primary port channel address. A secondary port channel address numeral will appear to the left of the single numeral if the disc drive is fitted with option 002, dual port.) Refer to paragraph 3-5 for an explanation of these messages.

Note: The Airpurge portion of the internal diagnostic routine requires approximately four minutes to complete.

If the diagnostic routine does not complete, the reason will be indicated by a display message. Refer to paragraph 3-5 for a description of these messages and the action needed to return the disc drive to an operating condition.

3-12. MEDIA MODULE REMOVAL

The following procedure requires that power be applied to the disc drive. To remove the media module from the disc drive, proceed as follows:

a. Set the LOAD/UNLOAD switch to the UNLOAD (out) position.

b. When a STOPPED message appears, press the UNLOCK DOOR switch and open the top door.

Notes: 1. If an UNLOCK message appears and the top door does not unlock, wait for five seconds and again press the UNLOCK DOOR switch.

2. If a BUSY message appears, wait until the controller-in-charge releases the disc drive and then press the UNLOCK DOOR

Table 3-1. Data Surface Verification Test

Keystroke	Display	Remarks
ENTER	[STEP0=]	
7	[STEP0=7]	Clears all logs, including the
7	[CLR LOGS]	error rate test error log.
ENTER	[STEP1=]	
RUN	[CLR LOGS]	
CLEAR	[STEP0=]	
6	[STEP0=6]	Causes the disc drive to seek
0	[RECAL]	to logical cylinder, head,
ENTER	[STEP1=]	and sector 0.
8	[STEP1=8]	
8	[LOOP]	
ENTER	[NUM=]	
2	[NUM=2]	
ENTER	[END=]	
2	[END=2]	
ENTER	[STEP2=]	
9	[STEP2=9]	Performs the read only error
0	[READ ERT]	rate test twice. The test area
ENTER	[AREA=]	is volume (all surfaces). The
4	[VOLUME]	test lasts approximately 16
ENTER	[STEP3=]	minutes. The Activity indicator
8	[STEP3=8]	is lit for the duration of the
4	[ERT LOG]	test.
ENTER	[HEAD=]	
ENTER	[STEP4=]	
RUN	[READ ERT]	Displays the information stored
R↓	[HEAD 0]	in the error rate test error
R↓	[2.43E 5]	log. The number "2.43E 5" is
R↓	[COR n]	the number of sectors
R↓	[UCOR n]	transferred, in scientific
R↓	[HEAD 1]	notation (243,000).
R↓	[2.43E 5]	
R↓	[COR n]	Note the number of correctable
R↓	[UCOR n]	(COR) and uncorrectable (UCOR)
.	.	errors recorded for each head.
.	.	
.	.	
R↓	[HEAD 12]	
R↓	[2.43E 5]	
R↓	[COR n]	
R↓	[UCOR n]	
R↓	[RECAL]	
END	[DRIVE *]	Returns the disc drive to CPU control.

switch. If release is not obtained when the activity indicator extinguishes, the controller-in-charge must be programmed to release the disc drive.

CAUTION

If contact between head and disc (a "crashed" disc) is suspected, do not attempt to retrieve data by placing the potentially damaged media module from the disc drive in another disc drive. It may cause additional damage. Do not attempt to operate the disc drive or use the media module until they have been checked by service-trained personnel.

Always keep the media module in an upright position to avoid damage and possible contamination.

c. Remove the media module from the disc drive following the instructions given in figure 3-3.

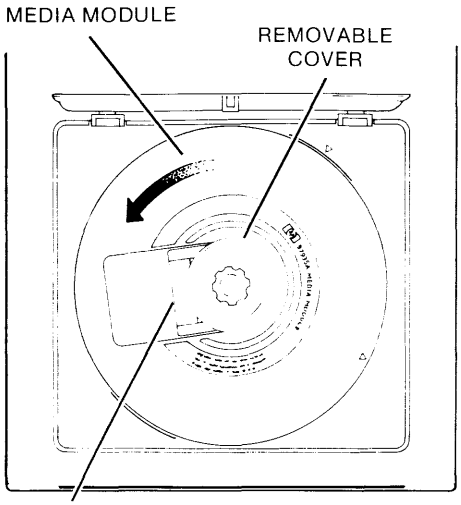
3-13. SHUT-DOWN PROCEDURE

To shut down the disc drive, proceed as follows:

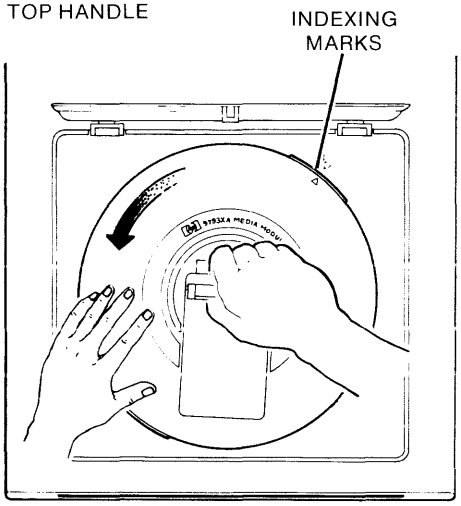
a. Set the LOAD/UNLOAD switch to the UNLOAD (out) position.

b. When a STOPPED message appears, set the ~LINE switch to 0/OFF.

1. REMOVE THE REMOVABLE COVER FROM THE MEDIA MODULE AND RAISE THE TOP HANDLE ON THE MEDIA MODULE.



2. USING BOTH HANDS, ROTATE THE MEDIA MODULE COUNTERCLOCKWISE UNTIL THE INDEXING MARKS ARE ALIGNED AS SHOWN OPPOSITE. WHEN PROPERLY ALIGNED, LIFT THE MEDIA MODULE FROM THE MODULE CHAMBER.



CAUTION

MEDIA MODULES SHOULD BE STORED FLAT IN A CLEAN DUST-FREE AREA. DO NOT STORE MORE THAN TWO HIGH.

3. HOLD THE MEDIA MODULE IN AN UPRIGHT POSITION AND ATTACH THE REMOVABLE COVER TO THE BOTTOM OF THE MODULE. LOCK THE COVER IN PLACE BY ROTATING IT CLOCKWISE.

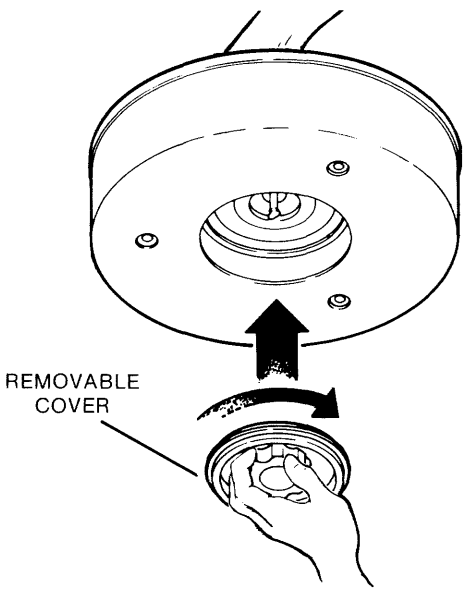


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Figure 3-3. Media Module Removal