

HEWLETT  PACKARD

INSTALLATION MANUAL

7906 DISC DRIVE



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MODELS COVERED

The main part of this manual covers the HP 7906M, S, MR, and SR Disc Drives. Appendix A covers the HP 7906H and HR Disc Drives.

OPTIONS COVERED

This manual covers option 015 as well as the standard HP 7906 Disc Drive.

NOTICE

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LIST OF EFFECTIVE PAGES

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All pages in this edition are original.

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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 (sometimes used in manual to indicate circuit common connected to grounded chassis).

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 auto-transformer (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.

1. INTRODUCTION

This manual contains the necessary information to unpack, inspect, install, check out, or otherwise prepare the HP 7906 Disc Drive for use. Included are site preparation data; unpacking, inspection, and installation information; and recommended packing and shipping methods.

The HP 7906 Disc Drive may be ordered as 7906M, 7906S, 7906MR, or 7906SR. The 7906M (Master) includes an HP 13037 Disc Controller and is used as the first disc drive in a system. The 7906S (Add-On) is configured as the second through eighth drives. Both the 7906M and 7906S include an HP 29425 Low Profile Cabinet. The 7906MR and 7906SR are similar to the 7906M and 7906S, respectively, except they are intended for mounting in a conventional cabinet. Therefore, they do not include the HP 29425 Cabinet but do include an HP 12904A-001 Slide Mounting Kit. Older versions of the disc drive (7906A) have the POWER switch and ac power fuse on the operator control panel at the front of the drive behind the control panel access door. On newer versions (7906B), the POWER switch and fuse are located on the power panel assembly of the HP 29425B Cabinet or on the HP 40019B Prefilter Assembly. The information in this manual applies to all configurations unless otherwise indicated.

To unpack, inspect, install, check out, or otherwise prepare the HP 13037 Disc Controller for use, refer to the *HP 13037 Disc Controller Installation and Service Manual*, part no. 13037-90006.

2. SITE PREPARATION

Site preparation information for the disc drive includes environmental, power, cooling, and mounting requirements. Each of these requirements is discussed in detail in the following paragraphs. If the disc drive is purchased as part of an HP computer system, Hewlett-Packard will have already taken into account the importance of these requirements.

3. ENVIRONMENTAL REQUIREMENTS

The disc drive has been designed to operate with an air inlet temperature in the range of 10°C to 40°C (50°F to 104°F) with the rate of temperature change not to exceed 20 Celsius degrees (36 Fahrenheit degrees) per hour. It is expected that the disc cartridges to be used will be stored in the same room in which the disc drive is operating. To ensure interchangeability, it is further required that the air inlet temperature of the disc drive be within 2 Celsius degrees (4 Fahrenheit degrees) of room ambient.

4. POWER REQUIREMENTS

The disc drive may be operated continuously from a single-phase, primary power source of 100, 120, 220, or 240 Vac +5 or -10 percent at a line frequency of 47.5 to 66 Hz with a typical power consumption of 500 watts.

Prior to installing the disc drive, determine the primary power source to be used. Also, various safety codes require that the disc drive be grounded to protect operating and service personnel. A grounded three-conductor female power outlet must be made available to satisfy this requirement. Refer to paragraph 17.

If the primary power source to be used is other than 120 Vac (standard) or 240 Vac (option 015), change the strapping configuration of TB1 on the transformer assembly to correspond to the voltage of the primary power source, as follows:

WARNING

This manual does not contain operator-serviceable parts. To prevent electrical shock, refer all installation activities to service-trained personnel. HAZARDOUS VOLTAGES will be present inside the mainframe whenever the ac power cord is connected to the input power receptacle on the rear frame of the disc drive.

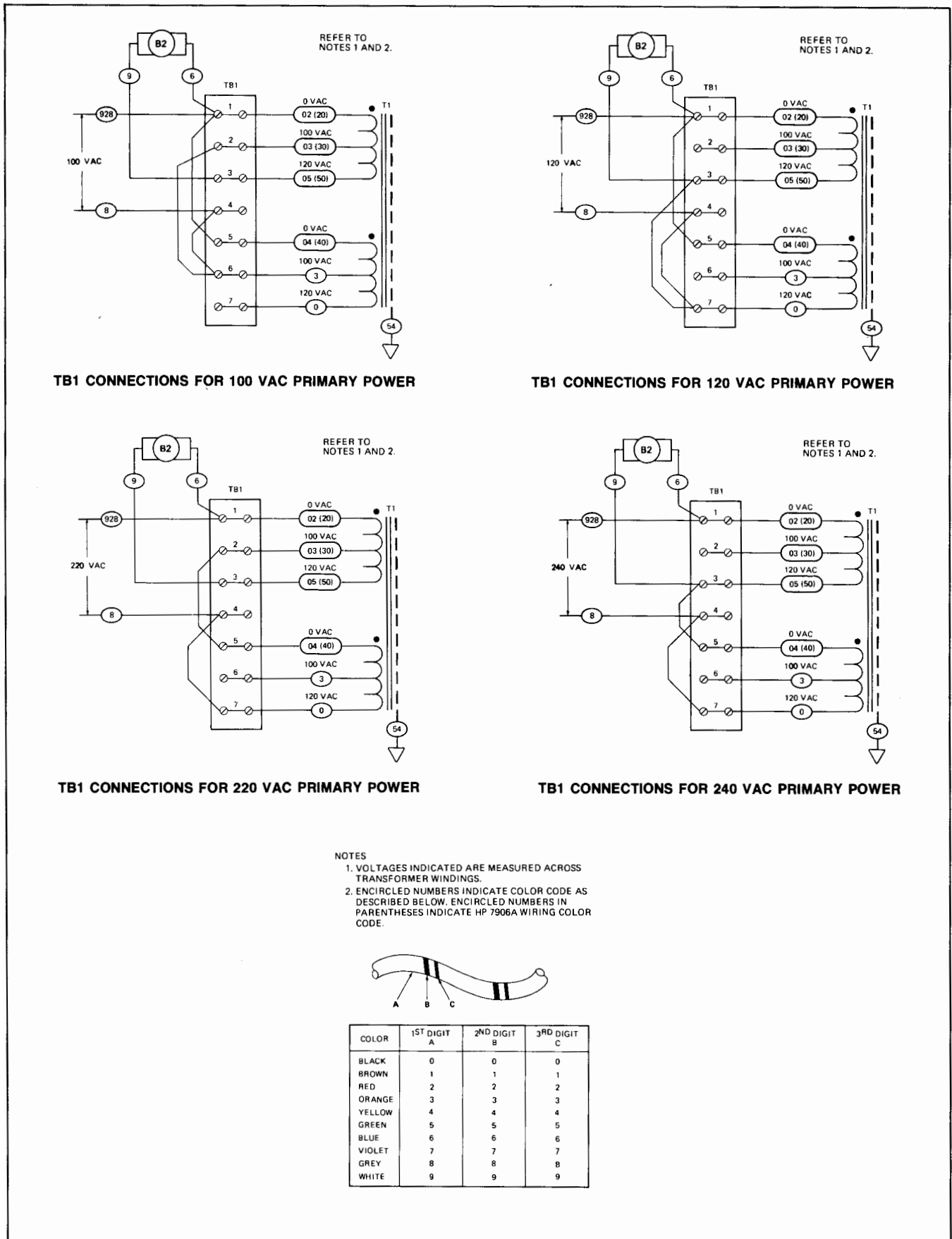
- a. Disconnect the power cord from the input power receptacle on the rear frame of the disc drive.
- b. Remove the top cover from the disc drive as follows:
 - (1) Remove the four screws and flat washers from the top rear edge of the top cover.
 - (2) Remove the two screws from the top front edge of the top cover.
 - (3) Carefully lift the top cover up and away from the disc drive mainframe.
- c. Consult figure 1. Change the strapping configuration of TB1 on the power supply assembly to correspond to the primary power voltage being used.

5. COOLING REQUIREMENTS

A single blower motor provides adequate ventilation when the disc drive is operated within the environmental limitations specified in table 1. Cooling air is drawn into the disc drive through a prefilter duct assembly (refer to paragraph 23) and is primarily exhausted through the right rear at the bottom of the drive. The air flow developed provides cooling air to the heat sink on the power and motor control printed-circuit assembly (PCA) A8 and filtered air to both the removable and fixed discs. The air filtration system purges the cooling air supply to the disc area of 99-percent of contaminants 0.3 micron or larger.

6. MOUNTING REQUIREMENTS

For most installations, the disc drive will be rack mounted in an HP equipment cabinet. Rack mounting specifications for the disc drive are as follows:



7300-7B

Figure 1. Power Supply Assembly Strapping Configurations

Table 1. HP 7906 Disc Drive Environmental Specifications

Ambient Temperature	
Operating	10°C to 40°C (50°F to 104°F) rate of temperature change not to exceed 20°C (36°F)/hr
Non-operating	-40°C to 65°C (-40°F to 149°F) rate of temperature change not to exceed 20°C (36°F)/hr
Relative Humidity	
Operating	8% to 80% with maximum wet bulb temperature not to exceed 25.6°C (78°F)
Non-operating	5% to 95% with maximum wet bulb temperature not to exceed 25.6°C (78°F)
Heat Dissipation	
430 kilogram-calories (1700 Btu)/hr (maximum)	
Air Flow	
100 cfm @ 60 Hz; 85 cfm @ 50 Hz	
Air Filtration	
Prefilter *	Extended area, unwoven cotton
Absolute Filter	Retains 99% of all particles 0.3 micron or larger
Altitude	
Operating	0 to 3 048 m (0 to 10,000 ft)
Non-operating	-304.8 to 15 240 m (-1,000 to 50,000 ft)
* The prefilter is contained in a prefilter duct assembly, attached to the bottom of the disc drive when it is mounted in an HP 29400B-Series/29425 Cabinet. For details, refer to the <i>HP 40019 Prefilter Assembly Installation and Service Manual</i> , part no. 40019-90901.	

- Height 26.52 cm (10.44 in.)
- Width (ahead of mounting flange) 48.03 cm (18.91 in.)
- Width (behind mounting flange) 44.15 cm (17.38 in.)
- Depth (from mounting flange) 68.10 cm (26.81 in.)
- Depth (overall) 71.12 cm (28.00 in.)
- Weight 73.55 kg (162 lb)

In addition, cabinet rack space below the disc drive is required to house the prefilter duct assembly. The space needed is as follows:

- HP 29400B-Series Cabinet 13.3 cm (5.25 in.)
- HP 29425 Cabinet 8.9 cm (3.5 in.)

Whenever a disc drive is to be mounted on rack slides in an equipment cabinet, the cabinet must be equipped with an extended base or a base with extendable legs. If one or more disc drives are to be mounted in a single-bay cabinet, an HP equipment cabinet with extendable legs is recommended. This cabinet must also be equipped with an HP 40017A Cabinet Stabilizer Assembly (29.5 kilograms/65 pounds). When extendable legs are employed, they must be fully extended and locked in place prior to extending a disc drive on its rack slides. Do not extend more than one disc drive on its rack slides at any one time.

7. UNPACKING AND INSPECTION

The disc drive and accessories may be shipped in more than one container. When the shipment arrives, check to ensure receipt of all containers as specified by the carrier's papers. Inspect each shipping container immediately upon receipt for evidence of mishandling during transit. If any

container is damaged in any way, or if any container is water-stained, request that the carrier's agent be present when the container is unpacked.

CAUTION

There is a recommended procedure for opening and unpacking the shipping container housing a disc drive mounted in the HP 29425 Cabinet. Refer to section II of the *HP 29425 Installation and Service Manual*, part no. 29425-90001 for this procedure. Failure to follow the recommended procedure may result in damage to the equipment.

Open the shipping container(s) and locate the packing list. Compare this list against the purchase order to verify that the shipment is correct. Unpack the shipping container(s) and inspect each item for external damage. Look for damage such as broken controls or fuseholders, dented corners, bent covers, surface scratches, and loose components. Also, check the rigid foam-plastic cushioning (if used) for any signs of deformation which could be indicative of rough handling during transit.

WARNING

To avoid dangerous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the enclosure.

If visual examination reveals any damage to the disc drive or accessories, follow the damage-claim procedure described in paragraph 10. Retain the shipping container(s) and packing material for examination during the settlement of any claims or for future use.

8. MANUALS

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

9. EQUIPMENT

The disc drive model number and full serial number are stamped on an identification label affixed to the rear panel. Ensure that both the model number and full serial number are identical with those specified on the packing list. A typical identification label is illustrated in figure 2.

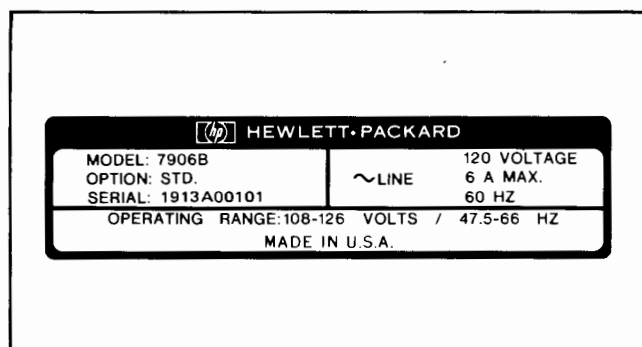


Figure 2. Typical Identification Label

10. CLAIMS PROCEDURE

If the shipment is incomplete or if the equipment is damaged or fails to meet specifications, notify the nearest Hewlett-Packard Sales and Service 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.

WARNING

To avoid dangerous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the enclosure.

11. INSTALLATION INFORMATION

The following paragraphs provide the necessary information to install the disc drive. Included are details of documentation supplied and available, a list of the tools and test equipment required for installation, ac power outlet and external ground requirements, a fuse rating check, and mounting and interconnection instructions.

12. DOCUMENTATION

The following documentation is supplied with the disc drive:

- *HP 7906 Disc Drive Installation Manual*, part no. 07906-90902.
- *HP 7906 User's Manual*, part no. 07906-90901.
- *HP 13037 Disc Controller Installation and Service Manual*, part no. 13037-90006. (Supplied only with HP 7906M Disc Drive.)
- *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901.
- *HP 29425 Cabinet Installation and Service Manual*, part no. 29425-90001. (Supplied only with HP 7906M Disc Drive.)
- *HP 12904A Slide Mounting Kits Installation Instructions*, part no. 12904-90003. (Supplied only with HP 7906MR/7906SR Disc Drive.)

In addition, the following supporting documentation may be ordered from a Hewlett-Packard Sales and Service Office. Sales and Service Offices are listed at the back of this manual.

- *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

13. MANUAL UPDATING

Before installing the disc drive, perform any updating that may be required for the disc drive documentation. Updating instructions (if any) are provided with the appropriate document.

14. TOOLS AND TEST EQUIPMENT REQUIRED

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

15. TOOLS. No installation tools other than ordinary hand tools are required.

16. TEST EQUIPMENT. A suitable voltmeter (HP 970A Digital Voltmeter, or equivalent battery-operated device suitable for measuring dc voltage and primary ac line voltage) and an HP 19904A Customer Service Kit are the only pieces of test equipment required for installation. The voltmeter is used to verify the adequacy of the ac power outlet to be used and the +5 volt dc supply; the components of the product support package are used to verify the alignment of all adjustable parameters.

17. AC POWER SOURCE AND EXTERNAL GROUND

The female power outlet that will be used to supply ac power for the equipment must be checked by a qualified electrician to ensure that it furnishes the proper voltage for which the disc drive is configured (refer to paragraph

4). The outlet and its associated wiring and circuit breakers must be capable of meeting the following electrical requirements for the disc drive:

- **Input Power Requirements**
 100 Vac +5% -10%, 5.8A, 1 phase, 580 VA, 475W
 120 Vac +5% -10%, 5.2A, 1 phase, 624 VA, 460W
 220 Vac +5% -10%, 2.9A, 1 phase, 638 VA, 475W
 240 Vac +5% -10%, 2.7A, 1 phase, 648 VA, 480W
- **Line Frequency** 47.5 to 66 Hz

Have a qualified electrician check the power outlet with an ac voltmeter to ensure that the required single-phase voltage is present. If the disc drive is configured for 100-volt operation, the line voltage must be in the range of 90 to 105 volts ac (rms); for 120-volt operation, the line voltage must be in the range of 108 to 126 volts ac (rms); for 220-volt operation, the line voltage must be in the range of 198 to 231 volts ac (rms); and for 240-volt operation, the line voltage must be in the range of 216 to 252 volts ac (rms). Bear in mind that the electrical load imposed by the disc drive may reduce the line voltage below the non-load value.

If the line voltage is in 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 if the installation is inside a building.

18. AC INPUT POWER

WARNING

To avoid dangerous electrical shock, do not operate the disc drive directly from an ac power outlet. AC power for the disc drive must be obtained from the power panel assembly associated with the disc drive.

AC power to the HP 7906B Disc Drive power input receptacle is supplied by cable from a power panel assembly (not part of the disc drive) in the HP 29425B Cabinet (HP 7906M/S Disc Drive) or on the prefilter duct assembly (HP 7906MR/SR Disc Drive). The power panel assemblies include a line filter, line fuse, and power on/off switch. Detailed descriptions of the power panel assemblies are provided in the following publications:

- *HP 29425 Cabinet Installation and Service Manual*, part no. 29425-90001.
- *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901.

The ac power cord configurations available to connect ac power to the ~ LINE receptacle on the power panel assemblies are illustrated in figure 3. If the equipment is

installed in a building, ensure that the local electrical codes permit the use of the type of power cord selected.

Connection between the power output receptacle on the HP 29425B Cabinet power panel assembly and the receptacle on the rear frame of the disc drive is via cable assembly, part no. 8120-1575 (see figure 3). Connection between the output of the power panel on the prefilter duct assembly and the disc drive receptacle is via a cable on the power panel.

The HP 7906A Disc Drive includes a line filter, line fuse, and power on/off switch. Figure 4 illustrates and provides the necessary details of the various ac power cord configurations available to connect primary power to an HP 7906A Disc Drive installed in an HP 29425A Cabinet (HP 7906M(S) or a conventional cabinet (HP 7906MR/SR). Ensure that the local electrical codes permit the use of the type of power cord selected.

19. AC POWER FUSE RATING CHECK

WARNING

To avoid dangerous electrical shock, read the WARNING label attached to the power panel assembly before checking or replacing the primary power fuse.

Primary power fuse F1 for the HP 7906B Disc Drive is located on the power panel assembly adjacent to the POWER switch. Check that the fuse rating conforms to the specifications given in table 2.

The primary power fuse for the HP 7906A Disc Drive is located on the operator control panel just behind the control panel access door.

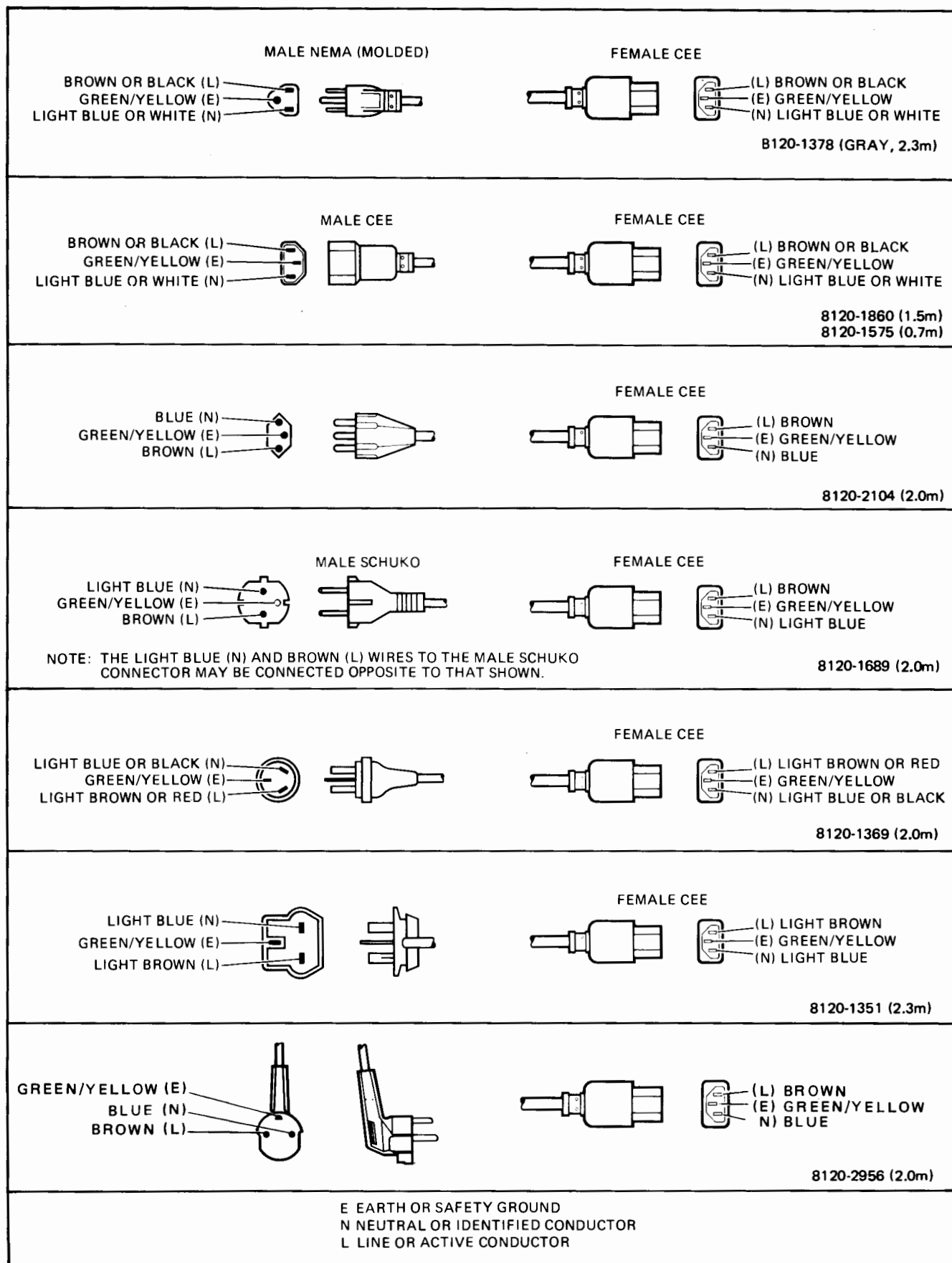
WARNING

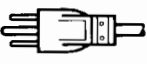

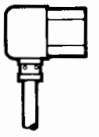
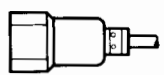
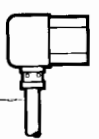
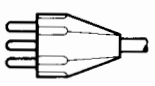
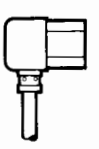
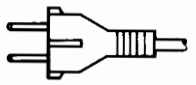
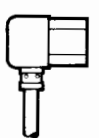
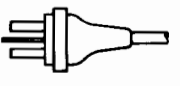
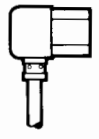

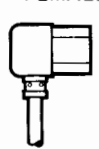
To avoid dangerous electrical shock, read the WARNING label attached to the operator control panel before checking or replacing the primary power fuse.

To reach the fuse, push in on the bottom edge of the control panel access door to open it. Check that the fuse rating conforms to the specifications given in table 2.

20. SECONDARY FUSE RATING CHECK

The disc drive is equipped with six secondary fuses: F2 through F6 and A8F1. Five of the secondary fuses (F2 through F6) are located at the rear of the power supply assembly and the sixth fuse is located on power and motor control PCA-A8. Check to ensure that the rating of each fuse is as specified in table 3.



<p>STANDARD</p> <p>MALE NEMA (MOLDED)</p> <p>BROWN OR BLACK (L) GREEN/YELLOW (E) LIGHT BLUE OR WHITE (N)</p>  	<p>FEMALE CEE</p> <p>(L) BROWN OR BLACK (E) GREEN/YELLOW (N) LIGHT BLUE OR WHITE</p>  <p>8120-1521 (2.2m)</p>
<p>OPTION 015</p> <p>MALE CEE</p> <p>BROWN OR BLACK (L) GREEN/YELLOW (E) LIGHT BLUE OR WHITE (N)</p> 	<p>FEMALE CEE</p> <p>(L) BROWN OR BLACK (E) GREEN/YELLOW (N) LIGHT BLUE OR WHITE</p>  <p>8120-2191 (1.5m)</p>
<p>NOTE: OTHER COUNTRIES SUCH AS CANADA, JAPAN (100 OR 200 VOLTS), MEXICO, PHILIPPINES, AND TAIWAN MAY USE SOME OF THE ABOVE SETS. CONSULT YOUR NEAREST HP SALES OFFICE.</p>	
<p>SWITZERLAND</p> <p>BLUE (N) GREEN/YELLOW (E) BROWN (L)</p> 	<p>FEMALE CEE</p> <p>(L) BROWN (E) GREEN/YELLOW (N) BLUE</p>  <p>8120-2296 (2.0m)</p>
<p>EAST AND WEST EUROPE, SAUDI ARABIA, UNITED REPUBLIC OF EGYPT</p> <p>LIGHT BLUE (N) GREEN/YELLOW (E) BROWN (L)</p>  <p>MALE SCHUKO</p>	<p>FEMALE CEE</p> <p>(L) BROWN (E) GREEN/YELLOW (N) LIGHT BLUE</p>  <p>8120-1692 (2.0m)</p>
<p>AUSTRALIA, NEW ZEALAND</p> <p>LIGHT BLUE OR BLACK (N) GREEN/YELLOW (E) LIGHT BROWN OR RED (L)</p> 	<p>FEMALE CEE</p> <p>(L) LIGHT BROWN OR RED (E) GREEN/YELLOW (N) LIGHT BLUE OR BLACK</p>  <p>8120-0696 (2.2m)</p>
<p>GREAT BRITAIN, CYPRUS, NIGERIA, RHODESIA, SINGAPORE</p> <p>LIGHT BLUE (N) GREEN/YELLOW (E) LIGHT BROWN (L)</p> 	<p>FEMALE CEE</p> <p>(L) LIGHT BROWN (E) GREEN/YELLOW (N) LIGHT BLUE</p>  <p>8120-1703 (2.2m)</p>
<p>NOTE: OTHER COUNTRIES USE MORE THAN ONE OF THE ABOVE POWER CORD CONFIGURATIONS. FOR CORRECT POWER CORD SET IN YOUR AREA, CONSULT YOUR NEAREST HP SALES OFFICE.</p>	<p>E EARTH OR SAFETY GROUND N NEUTRAL OR IDENTIFIED CONDUCTOR L LINE OR ACTIVE CONDUCTOR</p>

7087-5A

Figure 4. AC Power Cord Sets, HP 7906A Disc Drive

Table 2. Primary Power Fuse Rating

SOURCE VOLTAGE	REQUIRED RATING	HP PART NO.
100 Vac	8AT*, 250V	2110-0383
120 Vac	8AT*, 250V	2110-0383
220 Vac	4AT*, 250V	2110-0365
240 Vac	4AT*, 250V	2110-0365

* The T indicates that a time delay or slo-blo fuse must be used.

Table 3. Secondary Fuse Ratings

SECONDARY FUSE	SUPPLY VOLTAGE		REQUIRED RATING	HP PART NO.
	UNREGULATED	REGULATED		
F2	-36 Vdc	— —	8AT*, 250V	2110-0383
F3	+36 Vdc	— —	8AT*, 250V	2110-0383
F4	+10 Vdc	+5 Vdc	8A, 250V	2110-0342
F5	+20 Vdc	+12 Vdc	1.5A, 250V	2110-0043
F6	-20 Vdc	-12 Vdc	1.5A, 250V	2110-0043
A8F1	25 Vac	— —	1A, 125V	2110-0099

* The T indicates that a time delay or slo-blo fuse must be used.

21. MOUNTING INSTRUCTIONS

The following paragraphs provide information regarding rack mounting of the disc drive and installation of the prefilter duct assembly.

WARNING

The disc drive weighs approximately 73.55 kg (162 lb); two or more persons are required to lift it.

WARNING

Ensure that the cabinet is equipped with an extender base or that the extendable legs are fully extended and locked in place before attempting to extend the disc drive. Do not extend more than one disc drive on its rack slides at any one time.

CAUTION

Do not attempt to mount an HP 7906B Disc Drive in a cabinet having a power panel assembly without an ac POWER on/off switch and ac line fuse.

22. RACK MOUNTING. As previously mentioned, the disc drive will typically be rack mounted in an HP equipment cabinet. The HP 12904A Slide Mounting Kit is provided with the HP 7906MR/7906SR for rack mounting the disc drive. Mount the kit parts to the inside of the cabinet and to the sides of the disc drive. Refer to the Installation Instructions for the HP 12904A Slide Mounting Kit, part no. 12904-90003, furnished with the kit.

23. PREFILTER DUCT ASSEMBLY A prefilter duct assembly is fitted in place of the bottom cover of the disc drive when it is mounted in an HP 29400B-Series/29425 Cabinet. Refer to the *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901 for installation instructions and replaceable parts.

24. HP 7906B INTERCONNECTION INSTRUCTIONS

The interconnecting procedure for the HP 7906B Disc Drive depends upon the system configuration, that is, whether a single disc drive, multiple disc drives, or add-on disc drives are to be interconnected. The interconnecting procedure in each case is as follows:

Note: Interconnecting procedures for the HP 7906A Disc Drive are different due to component dissimilarities — instructions for HP 7906A interconnection are given in paragraph 25.

- a. Disconnect the disc controller and disc drive(s) from the primary power panel(s).
- b. If this is a single unit installation, connect Interconnecting Cable, part no. 07906-60041 to Terminator PCA, part no. 07906-60039, as shown in figure 8. Ensure that the terminator PCA and the cable connector are oriented as shown in view C.

If this is a multiple unit installation, connect the interconnecting cable(s) to Cable-to-Cable Adapter(s), part no. 07905-80010, as shown in figure 8. On the last disc drive in the series, use the terminator PCA instead of the cable-to-cable adapter.

If this is an add-on unit installation, remove the terminator PCA from the last drive in the existing series and replace it with a cable-to-cable adapter. Use the terminator PCA on the last disc drive in the new series.

Note: Retain each spare terminator PCA with the disc drive for future use in multiple and add-on unit installations.

- c. Insert the cable-to-cable adapter(s) or terminator PCA into the 50-pin connector on each Terminator Bracket Assembly, part no. 07906-60039, used. The terminator PCA should be oriented as shown in figure 8.
- d. Connect one end of an HP 13013B Multi-Unit Cable to each terminator bracket assembly used, as shown in figure 8. Secure the cable connector to the T-connector bracket with the attached spring-loaded captive screw.
- e. Connect the free end of each multi-unit cable used to the terminator bracket assembly associated with the preceding disc drive. That is, the multi-unit cable from the second disc drive connects to the terminator bracket assembly associated with the first disc drive, etc. See figure 8. Ensure that each cable connector is secured to the T-connector bracket by the captive screw.
- f. Mount each terminator bracket assembly to the inside of the equipment cabinet behind the disc drive on the left side (as viewed from the rear).

Note: To facilitate installation at different locations, the angle-bracket on the T-connector bracket can be attached at various positions on the assembly.

- g. Connect the end of an HP 13213B Data Cable having an angle-bracket to each disc drive motherboard PCA-A7 at connector A7P4. See figure 8, view B. Access is provided through the opening in the rear cover of the disc drive. Secure the angle-bracket to the standoff on the card cage chassis with the hardware supplied.

- h. Remove the top cover and front panel from the disc controller.
- i. Pass the free end of the multi-unit cable from the first disc drive in the series through the opening provided at the rear of the disc controller. Connect the cable connector to the device controller PCA at connector DRV J3. The cable should be positioned in the channel provided and should lie to the right of the side fan.
- j. Pass the free end of each data cable through the opening provided at the rear of the disc controller. Connect each cable to the device controller PCA at connectors J4 through J11. It makes no difference which data cable is connected to which connector. Secure each cable to the data cable retainer assembly on the PCA with the attached spring-loaded captive screws. See figure 8, view A. The cables should be positioned in the channel provided and lie to the right of the side fan.
- k. Ensure that Jumper Cable, part no. 13037-60021, is connected between connector J2 on the error correct PCA and connector J2 on the microprocessor PCA.
- l. Ensure that the cable from the computer interface is connected to the device controller PCA at connector IF-J1.
- m. Replace the disc controller top cover and front panel.
- n. Connect the ac power cord from the disc controller and each disc drive installed to the appropriate power panel assemblies. Refer to paragraphs 4 and 17.
- o. Whenever one or more disc drives is installed, the logical unit address of each must be specified to the disc controller. The setting of the UNIT SELECT switch on the disc drive determines its logical unit address. Ensure that no two logical unit addresses are alike.

25. HP 7906A INTERCONNECTION INSTRUCTIONS

Interconnecting the HP 7906A Disc Drive depends upon the system configuration, that is, whether a single disc drive, multiple disc drives, or add-on disc drives are to be interconnected. The interconnection procedure in each case is as follows:

- a. Disconnect the disc controller and the disc drive(s) from the primary power source.
- b. If this is a single unit installation, connect one end of Interconnecting Cable, part no. 07905-60038, to Terminator PCA, part no. 07905-60039, as shown in figure 9. The cable connector and the terminator PCA should be oriented as shown in view A.

If this is a multiple unit installation, connect one end of the interconnecting cable(s) to Cable-to-Cable Adapter(s), part no. 07905-80010, as shown in figure 9. On the last disc drive in the series, use the terminator PCA instead of the cable-to-cable adapter.

If this is an add-on unit installation, remove the terminator PCA from the last disc drive in the existing series and replace it with a cable-to-cable adapter. Use the terminator PCA on the last disc drive in the new series.

Note: Retain each extra terminator PCA with its disc drive for future use in multiple and add-on unit installations.

- c. Insert the cable-to-cable adapter(s) or terminator PCA into the respective connector on each T-Connector, part no. 07905-60040, used. The T-connector and cable-to-cable adapter or terminator PCA should be oriented as shown in figure 9.
- d. Connect one end of an HP 13013A/B Multi-Unit Cable to the right edge (as viewed from the rear) of each T-connector used as shown in figure 9.
- e. Connect the free end of each multi-unit cable used to the left edge (as viewed from the rear) of the T-connector associated with the preceding disc drive, i.e., the multi-unit cable from the second disc drive connects to the T-connector associated with the first disc drive, etc. See figure 9.
- f. Mount Terminator Bracket(s), part no. 07905-00050, to the inside of the equipment cabinet behind the disc drive on the left side (as viewed from the rear).
- g. Connect the end of an HP 13213A/B Data Cable with the cable clamp to each motherboard PCA-A7 at connector A7P4. Access is provided through the opening in the rear cover. Secure each cable clamp to the standoff on the card cage chassis using the hardware supplied. See figure 9, view B.
- h. Remove the top cover and front panel from the disc controller.
- i. Pass the free end of the multi-unit cable from the first disc drive in the series through the opening provided at the rear of the disc controller. Connect it to the device controller PCA at connector DRV J3. The cable should be positioned in the channel provided and should lie to the right of the side fan.
- j. Remove the data cable retainer from the device controller PCA.
- k. Pass the free end of each data cable through the opening provided at the rear of the disc controller. Connect each cable to the device controller PCA at connectors J4 through J11. It makes no difference which data

cable is connected to which connector. See figure 9, view C. The cables should be positioned in the channel provided and should lie to the right of the side fan.

- l. Replace the data cable retainer removed in step j.
- m. Ensure that Jumper Cable, part no. 13037-60021, is connected between connector J2 on the error correct PCA and connector J2 on the microprocessor PCA.
- n. Ensure that the cable from the computer interface is connected to the device controller PCA at connector IF-J1.
- o. Replace the disc controller top cover and front panel.
- p. Connect the ac power cord from the disc controller and each disc drive installed to an appropriate primary power source. Refer to paragraphs 4 and 17.
- q. Whenever one or more disc drives is installed, the logical unit address of each must be specified to the controller. The position of the UNIT SELECT switch on the disc drive determines its logical unit address. Ensure that no two logical unit addresses are alike.

26. INSTALLATION CHECKOUT

The following paragraphs provide an installation checkout procedure for the disc drive. Included are visual inspection instructions, an air circulation check, head cleaning details, disc service unit installation instructions, and checks for seek time, actuator assembly radial alignment, index transducer alignment, and head alignment. The installation checkout procedure should be performed by service-trained personnel in the order given and must be completed before the disc drive is placed in service.

27. INITIAL INSPECTION

After the disc drive(s) has been installed and interconnected, visually inspect the installation. Ensure that the interconnecting and data cables are properly routed and anchored, the last disc drive in the series is properly terminated, and the correct logical unit addresses are specified.

28. OPERATOR PANEL

Refer to the *HP 7906 Disc Drive User's Manual*, part no. 07906-90901 for a full description of each operating control and indicator in the disc drive and for basic operating instructions.

29. AIR CIRCULATION CHECK

The overall effectiveness of the air circulation system must be checked before the disc drive is placed in service.

The following paragraphs provide procedures for checking the prefilter for contamination and for measuring the air pressure at the output of the absolute filter.

Note: The prefilter element is contained in a prefilter duct assembly that replaces the bottom cover of the disc drive when the drive is installed in an HP 29400B-Series/29425 Cabinet.

30. CHECKING PREFILTER. To inspect the prefilter for contamination, proceed as follows:

- a. Remove power from the disc drive. Ensure that the ac power cord is disconnected from the rear frame of the disc drive.
- b. Remove the prefilter grill assembly, if applicable.

Note: In an HP 29400B-Series Cabinet, the prefilter grill is attached by magnets to the front of the cabinet below the disc drive; the prefilter grill is not fitted on an HP 29425 Cabinet.

- c. Pull the filter element out of the prefilter duct and check the filter for contamination. Replace if necessary. Refer to the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903, for replacement details.

31. MEASURING ABSOLUTE FILTER AIR PRESSURE. A hole, located on the left side of the top cover and the main casting, as viewed from the front, is provided so that the air pressure at the output of the absolute filter can be measured. Air Pressure Measuring Gauge, part no. 0101-0374, and Air Pressure Probe Assembly, part no. 12995-60013, are used to make this measurement.

Measure the absolute filter air pressure as follows:

- a. Ensure that the controller panel access door is closed and the lower front cover and the prefilter duct assembly are properly installed.
- b. Reconnect the ac power cord and restore power to the disc drive.
- c. Carefully insert a disc cartridge, access door end first, into the disc drive. Use only an HP 12940A Formatted Disc Cartridge.
- d. Set the RUN/STOP switch to RUN.
- e. Place the air pressure probe assembly through the top cover hole and over the hole in the main casting. See figure 5. Check that the meter reading is close to the value given for normal operation in table 4. If the reading is closer to the minimum acceptable value (0.35), note that the absolute filter may require re-

placement before the first six-month preventive maintenance inspection is due to be performed on the disc drive. If the reading is below the minimum acceptable value, replace the absolute filter. Refer to the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903, for replacement instructions.

32. HEAD CLEANING

If there is any evidence of condensation in or on the disc drive, data and servo head cleaning is prescribed. An Inspection Mirror, part no. 8830-0005; Textsleeves (including cleaning wand), part no. 9310-4406; and 91-percent Isopropyl Alcohol, part no. 8500-0559, are required for head cleaning.

~~8500-0559 is required for head cleaning.~~

To clean data or servo heads, proceed as follows:

- a. Remove the top cover from the disc drive, following the instructions included in paragraph 4.

CAUTION

Use only the cleaning materials listed above. Many other brands of material contain contaminating oils and/or lint which may leave a residue that could cause damage.

- b. Place a Textsleeve on the end of the cleaning wand. See figure 6.

~~8500-0559 is required for head cleaning.~~

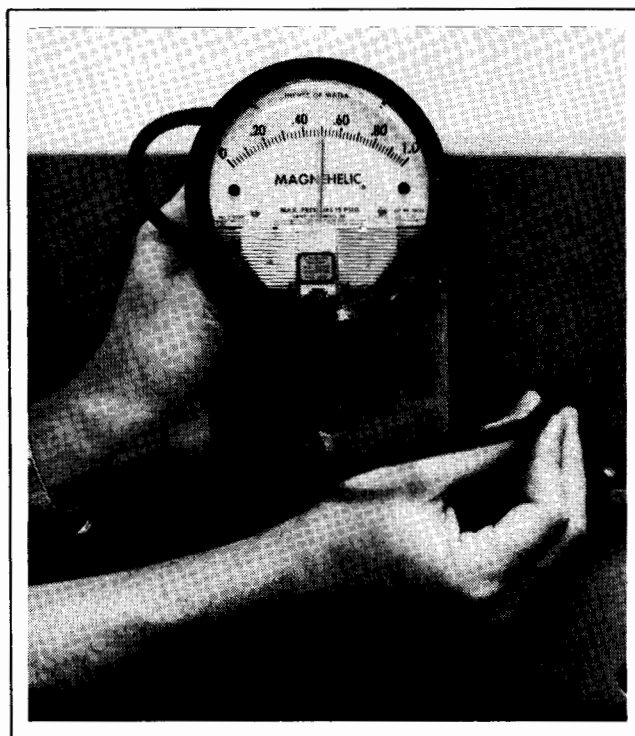
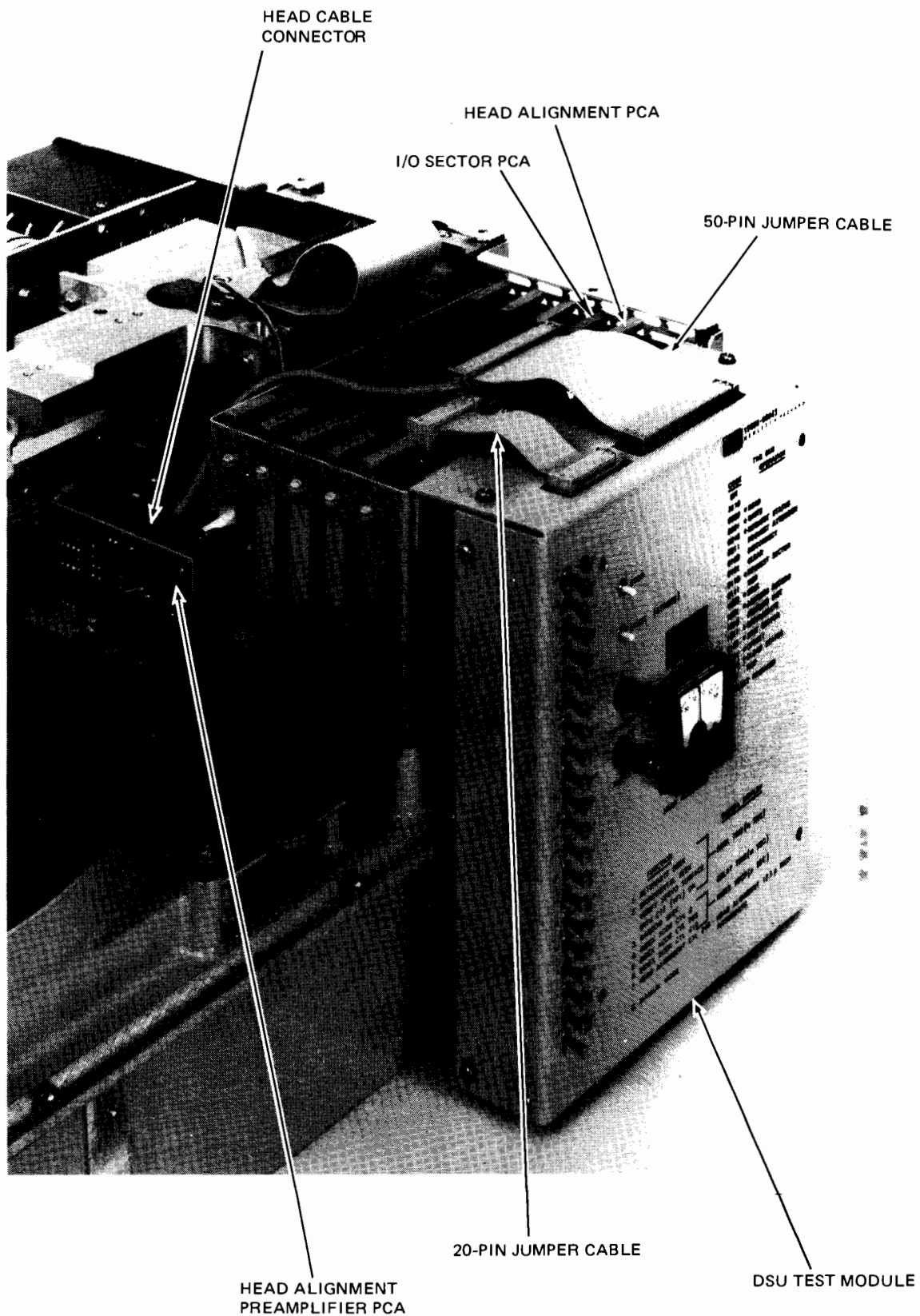


Figure 5. Measuring Absolute Filter Air Pressure



7300-15A

Figure 7. Disc Service Unit Installed

- (4) Disconnect each of the three read/write head connectors and the servo head connector from the PCA.

CAUTION

Use care when removing the PCA to avoid catching it on the wiring in the surrounding area.

- (5) Carefully grasp the upper edge of the PCA and pull it free from the connector on the motherboard PCA-A7, then remove it from the disc drive.

CAUTION

The head alignment preamplifier PCA must be installed whenever a CE head alignment cartridge or CE servo reference cartridge is to be used. This will prevent any accidental damage to the prerecorded surfaces and provide more accurate head alignment readings.

- i. Insert Head Alignment Preamplifier PCA, part no. 12995-60040, into the A6 connector as shown in figure 7. Ensure that it is correctly oriented, then push it firmly into the connector until it is fully seated. The component side of the PCA must face toward the rear of the disc drive. Also, ensure that all four head connectors are correctly installed.
- j. Connect the head cable connector from the head alignment PCA to the head connector located on the head alignment preamplifier PCA at the top edge in the center. See figure 7.

35. EXERCISING THE DISC DRIVE

Once the DSU has been installed, the disc drive should be exercised to relax any mechanical stresses.

To exercise the disc drive, proceed as follows:

- a. Reconnect the ac power cord and apply power to the disc drive.
- b. Carefully insert an HP 12940A Formatted Disc Cartridge, access-door end first.
- c. Set the RUN/STOP switch to RUN.
- d. Set the FUNCTION switch on the DSU test module to position 3 (RANDOM SEEK).
- e. Rotate the DELAY potentiometer on the DSU test module fully clockwise to MAX.

Note: With the DELAY potentiometer set to MAX, a maximum delay between seek operations is introduced.

- f. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to perform a series of random seek operations.
- g. After several seek operations have been performed, rotate the DELAY potentiometer on the DSU test module fully counterclockwise to MIN.

Note: With the DELAY potentiometer set to MIN, a minimum delay between seek operations is introduced.

- h. Allow the disc drive to run for at least 1 minute.
- i. Press the STOP pushbutton on the DSU test module and proceed to paragraph 36.

36. SEEK TIME CHECK

The seek time of the disc drive is adjusted to specified tolerances. To verify the seek time adjustment, proceed as follows:

- a. Set the FUNCTION switch on the DSU test module to position 1 (ALTERNATE SEEK).
- b. Select cylinder address 0 on the upper bank of DSU test module switches (all 10 switches set to the left).
- c. Select cylinder address 410 on the lower bank of DSU test module switches (switches 2, 8, 16, 128, and 256 set to the right).
- d. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to alternately seek between cylinders 0 and 410.
- e. Rotate the DELAY potentiometer on the DSU test module until the seek time from cylinder 0 to 410 (forward seek operation) can be differentiated from the seek time from cylinder 410 to 0 (reverse seek operation).

Note: The two seek times displayed will most probably be different.

- f. In both cases, observe that the seek time displayed is between 42 and 45 milliseconds. If either seek time is out of tolerance, perform the seek time adjustment procedure described in the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.
- g. Press the STOP pushbutton on the DSU test module and proceed to paragraph 37.

37. ACTUATOR ASSEMBLY RADIAL ALIGNMENT CHECK

The actuator assembly must be aligned so that the carriage rails are positioned on a radius with the center of

the spindle assembly. This alignment is accomplished by monitoring the time difference between an index gap passing beneath data head 1 at tracks 0 and 410 and the index pulse generated by the index transducer.

To verify actuator assembly radial alignment, proceed as follows:

- a. Set the RUN/STOP switch to STOP and remove any previously installed cartridge.
- b. Carefully insert CE Head Alignment Cartridge, part no. 12995-60030, access-door end first, into the disc drive.
- c. Set the RUN/STOP switch to RUN.
- d. Select head 1 on the lower bank of DSU test module switches (switch 256/H1 set to the right).
- e. Set the FUNCTION switch on the DSU test module to position 4 (INDEX XDCR CYL 0).
- f. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to seek to cylinder 0.

Note: The indication on the HEAD ALIGNMENT meter will be fully deflected.

- g. Observe the digital display and note the corrected value (time difference displayed in microseconds).

Notes: 1. Negative numbers are displayed as positive numbers subtracted from 100.

For example:

2.6 would be displayed as 02.6
-2.6 would be displayed as 97.4

2. The index time plus/minus number for head 1 marked on the CE alignment cartridge represents the number of microseconds that the digital display is offset from zero when the actuator assembly radial alignment is being verified. For example, if the cartridge is marked -0.3, the corrected readings for the two examples given in note 1 (2.6 and -2.6) are +2.9 and -2.3, respectively. In each case, the index number is algebraically subtracted from the display reading. The index time number marked on the CE alignment cartridge must be used when verifying the actuator assembly radial alignment.
3. The two left-hand decimal points of the digital display may be lit. This

indicates that index transducer alignment is outside the measurement range of the DSU. When this occurs, perform the index transducer alignment as outlined in paragraph 38, then verify actuator assembly radial alignment as outlined in paragraph 37.

- h. Set the FUNCTION switch on the DSU test module to position 6 (INDEX XDCR CYL 410).
- i. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to seek to cylinder 410.

Note: The indication on the HEAD ALIGNMENT meter will be fully deflected.

- j. Observe that the corrected value does not differ by more than ± 1.0 microsecond from the corrected value noted in step g.

If the corrected value is within the specified tolerance, proceed to paragraph 38.

If the corrected value is out of tolerance, perform the actuator assembly radial alignment procedure described in the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

38. INDEX TRANSDUCER ALIGNMENT CHECK

The index transducer is aligned to compensate for allowable mechanical tolerances between disc drives, thereby ensuring data compatibility. The alignment of the index transducer is verified by monitoring the time difference between an index gap passing beneath data heads 0 and 1 at track 205, and the index pulse generated by the index transducer.

To verify index transducer alignment, proceed as follows:

- a. Set RUN/STOP switch to STOP. Remove any previously installed cartridge, then carefully insert CE Head Alignment Cartridge, part no. 12995-60030, access-door end first.
- b. Set the RUN/STOP switch to RUN.
- c. Select head 0 on the lower bank of DSU test module switches (all 10 switches set to the left).
- d. Set the FUNCTION switch on the DSU test module to position 5 (INDEX XDCR CYL 205).
- e. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to seek to cylinder 205.

Note: The indication on the HEAD ALIGNMENT meter will be fully deflected.

- f. Observe the digital display and note the corrected value (time difference displayed in microseconds).

Notes: 1. Negative numbers are displayed as positive numbers subtracted from 100.

For example:

1.6 would be displayed as 01.6
-1.6 would be displayed as 98.4

2. The index time plus/minus numbers marked on the CE alignment cartridge represent the number of microinches that the digital display is offset from zero when the index transducer is correctly aligned. For example, if the cartridge is marked -0.3, the corrected readings for the two examples given in note 1 (1.6 and -1.6) are 1.9 and -1.3, respectively. The index time numbers marked on the CE alignment cartridge must be used when verifying index transducer alignment. Use the index time number given for head 0 at cylinder 205 when calculating the corrected value in step f.
3. Index transducer alignment is outside the measurement range of the DSU when the two left-hand decimal points of the digital display are lit.

- g. Select head 1 on the lower bank of DSU test module switches (switch 256/H1 set to the right).
- h. Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to seek to cylinder 205.

Note: The indication on the HEAD ALIGNMENT meter will be fully deflected.

- i. Observe the digital display and note the corrected value (time difference displayed in microseconds).

Note: Use the index time number for head 1 at cylinder 205 when calculating the corrected digital display value.

If the corrected values noted in steps f and i are within ± 2.0 microseconds of zero and their sum is equal to 0.0 ± 0.4 microsecond, proceed to paragraph 39.

If the corrected values noted in steps f and i are out of tolerance, perform the index transducer alignment procedure described in the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

39. HEAD ALIGNMENT CHECK

Data heads 0 and 1 are the only heads that must be in alignment to ensure data compatibility. This is accomplished by monitoring radial alignment.

To verify head alignment, proceed as follows:

CAUTION

Ensure that the temperature compensation cable connector is disconnected from track follower PCA-A5 when verifying head alignment.

- Set the FUNCTION switch on the DSU test module to position 3 (RANDOM SEEK).
- Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to perform a series of random seek operations.
- Rotate the DELAY potentiometer on the DSU test module, as required, until the digital display indicates approximately 50.0 milliseconds.
- From room ambient, allow at least 20 minutes for the disc drive and cartridge temperature to warm up and stabilize.
- Press the STOP pushbutton on the DSU test module.
- Select head 0 on the lower bank of DSU test module switches (all 10 switches set to the left).
- Set the FUNCTION switch on the DSU test module to position 7 (HEAD ALIGNMENT CYL 245).
- Press the START (STROBE) pushbutton on the DSU test module and allow the disc drive to seek to cylinder 245.
- Observe that the indication on the HEAD ALIGNMENT meter first fully deflects to one side, then fully deflects to the other side, and finally returns to near center scale (takes approximately 1.5 seconds).
- Observe the HEAD ALIGNMENT meter and the digital display.

Notes: 1. During head alignment, the HEAD ALIGNMENT meter is calibrated in 12.5-microinch increments. Each major division equals 125 microinches and each minor division equals 25 microinches.

2. The plus/minus number marked on the CE head alignment cartridge represents the number of minor meter divisions (1 division = 12.5 microinches) that the HEAD



ALIGNMENT meter is offset from zero when the heads are correctly aligned. For example, if the cartridge is marked -3, the heads are correctly aligned when the meter reads -3. The correction marked on the cartridge must be observed when verifying head alignment.

3. The HEAD ALIGNMENT meter and the digital display should provide the same indication ± 25 percent.
4. The most accurate indications are obtained from the HEAD ALIGNMENT meter.
5. Negative numbers are displayed as positive numbers subtracted from 1000.

For example:

10 would be displayed as 010

-10 would be displayed as 990

6. Head alignment is outside the measurement range of the DSU when the two left-hand decimal points of the digital display are lit.

If the indication for head 0 is less than or equal to ± 6 increments (± 75 microinches of track center) on the HEAD ALIGNMENT meter, select head 1 on the lower bank of DSU test module switches (switch 256/H1 set to the right) and repeat steps h through j.

If the indication for head 1 is less than or equal to ± 6 increments (± 75 microinches of track center) on the HEAD ALIGNMENT meter, set the RUN/STOP switch to STOP and proceed to paragraph 40.

If either or both indications observed in step j are greater than ± 6 increments (± 75 microinches of track center), perform the head alignment procedure described in the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

40. ON-LINE CHECKOUT

Once all of the preceding parameters have been verified, remove power, remove the DSU test module and head alignment PCA, replace the read/write preamplifier PCA-A6, reconnect the temperature compensation cable connector to track follower PCA-A5, replace the top cover, then restore the disc drive to its normal operating position in the equipment cabinet. If the disc drive is installed in an HP system, run the system diagnostic tests in accordance with the instructions provided in the diagnostic manual. If the disc drive is installed in some

other computer system, an off-line checkout may be performed in accordance with the instructions provided in section IV of the *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

41. REPACKAGING FOR SHIPMENT

The following paragraphs provide instructions for repackaging the disc drive for shipment. Included are instructions for shipping the disc drive using the original packaging or for shipping the disc drive using new packaging.

Note: The instructions given are for a disc drive only; for information regarding repackaging and shipment of a disc drive and disc controller (for 7906M) mounted in an HP 29425 Cabinet, refer to section II of the *HP 29425 Cabinet Installation and Service Manual*, part no. 29425-90001. For information regarding individual repackaging and shipment of a disc controller, refer to the *HP 13037 Disc Controller Installation and Service Manual*, part no. 13037-90006.

42. SHIPMENT USING ORIGINAL PACKAGING

The same Wooden Container, part no. 9211-2196, and Corrugated Carton, part no. 9211-3125, used in factory packaging can be used for reshipment of the disc drive. Alternatively, the correct container and carton may be ordered from Hewlett-Packard Sales and Service Offices. Use the following instructions as a guide when packaging the disc drive with the original factory packaging materials:

- a. Remove the prefilter duct assembly from the disc drive and replace the bottom cover on the disc drive. Refer to the *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901 for removal instructions.
- b. If the disc drive is being sent to the factory for servicing, attach a tag specifying the return address, type of service or repair required, model number, and full serial number.
- c. Close the shipping container and mark it "FRAGILE" to ensure careful handling.

WARNING

The disc drive contains magnetic material (spindle assembly and actuator assembly), a potential hazard to personnel during shipping. Special packaging and markings are required by the United States govern-

ment for shipping. The disc drive does not exceed aircraft limitations, 5.25 milligauss at 4.6 meters (15 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 U.S. Refer to DOT Regulations, Title 49, parts 171-177 (Hazardous Materials).

- d. In any subsequent correspondence with the factory, refer to the disc drive by model number and full serial number.

43. SHIPMENT USING NEW PACKAGING

The following instructions should be used as a guide when packaging the disc drive with commercially available materials:

- a. Remove the prefilter duct assembly from the disc drive and replace the bottom cover on the disc drive. Refer to the *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901 for removal instructions.
- b. Wrap the disc drive in heavy paper or sheet plastic. If the disc drive is being sent to the factory for servicing, attach a tag specifying the return address, type of servicing or repair required, model number, and full serial number.

- c. Use a strong shipping container. A double-wall carton constructed of 158.9-kg (350-lb) test material is adequate.
- d. Use sufficient shock-absorbing material, 7.62- to 10.16-cm (3- to 4-in.) layer, on all sides of the disc drive to provide a firm cushion and to prevent movement inside the container. Use particular care to protect the disc drive corners and cabinet.
- e. Close the shipping container and mark it "FRAGILE" to ensure careful handling.

WARNING

The disc drive contains magnetic material (spindle assembly and actuator assembly), a potential hazard to personnel during shipping. Special packaging and markings are required by the United States government for shipping. The disc drive does not exceed aircraft limitations, 5.25 milligauss at 4.6 meters (15 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 U.S. Refer to DOT Regulations, Title 49, parts 171-177 (Hazardous Materials).

- f. In any subsequent correspondence with the factory, refer to the disc drive by model number and full serial number.

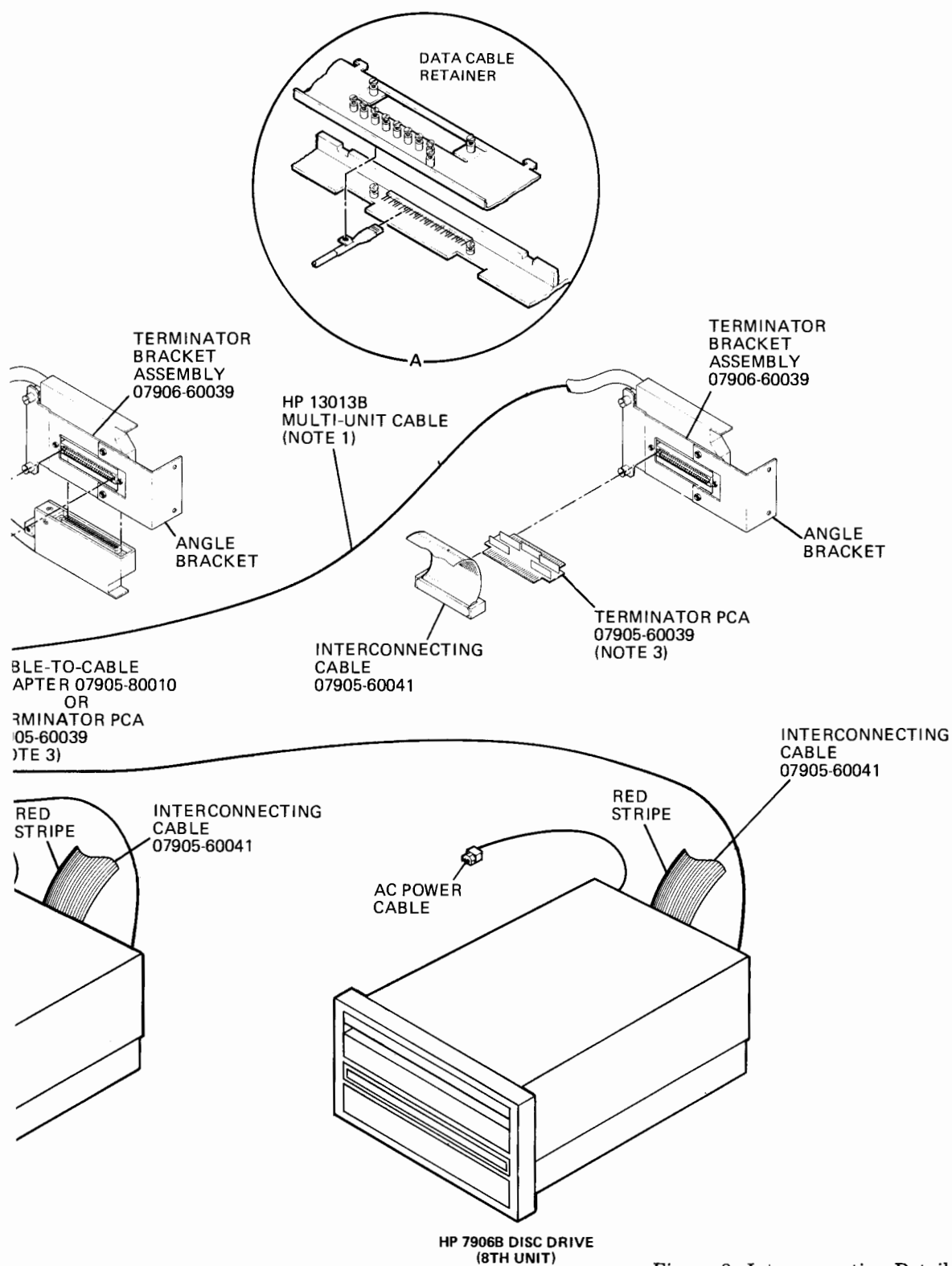
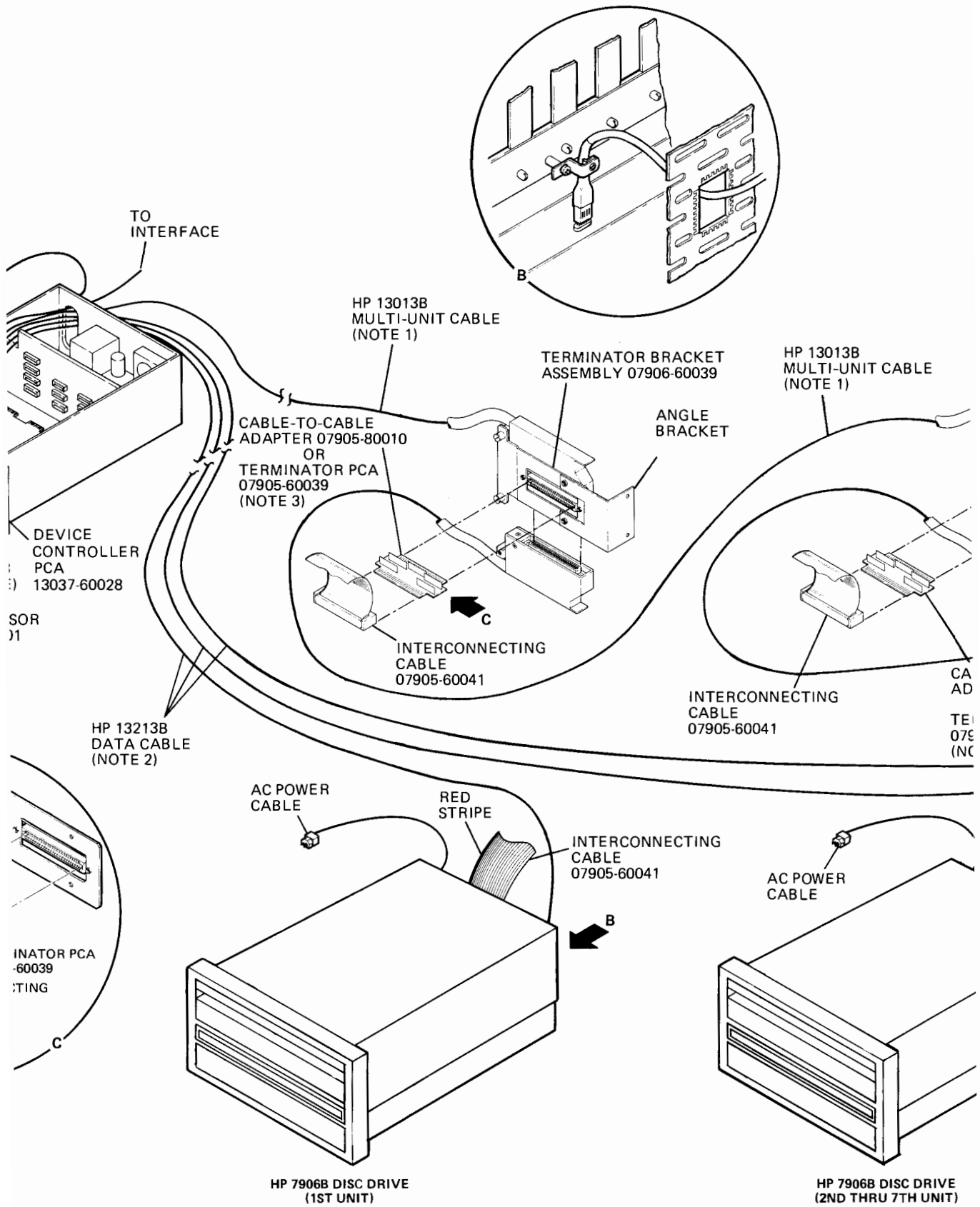
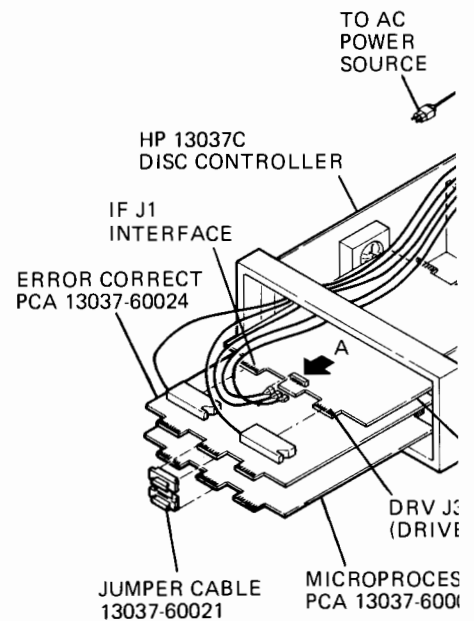


Figure 8. Interconnection Details,
HP 7906B Disc Drive





NOTES:

1. THE HP 13013B MULTI-UNIT CABLE IS AVAILABLE IN FOUR LENGTHS AS FOLLOWS. MAXIMUM CUMULATIVE CABLE LENGTH, CONTROLLER TO LAST DISC DRIVE, IS 25.55M (74 FT).

CABLE	PART NO.	LENGTH
13013B-001	13013-60011	1.83M (6 FT)
13013B-003	13013-60012	2.44M (8 FT)
13013B	13013-60013	3.66M (12 FT)
13013B-002	13013-60014	5.49M (18 FT)

2. THE HP 13213B DATA CABLE IS AVAILABLE IN FIVE LENGTHS AS FOLLOWS:

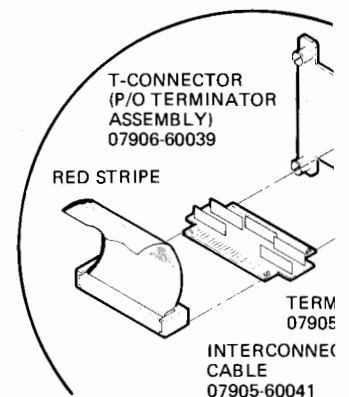
CABLE	PART NO.	LENGTH
13213B-004	13213-60006	1.83M (6 FT)
13213B	13213-60007	3.05M (10 FT)
13213B-001	13213-60008	7.62M (25 FT)
13213B-002	13213-60009	15.24M (50 FT)
13213B-003	13213-60010	22.86M (75 FT)

3. TERMINATOR PCA, PART NO. 07905-60039, IS ONLY USED ON THE LAST DISC DRIVE IN THE SERIES.

FOR SINGLE UNIT INSTALLATION, THE TERMINATOR PCA IS USED.

FOR MULTIPLE UNIT INSTALLATIONS, THE TERMINATOR PCA IS USED ON THE LAST DISC DRIVE IN THE SERIES AND CABLE-TO-CABLE ADAPTERS, PART NO. 07905-80010, ARE USED FOR EACH OF THE REMAINING DISC DRIVES.

FOR ADD-ON INSTALLATIONS, THE TERMINATOR PCA MUST BE REMOVED FROM THE LAST DISC DRIVE IN THE EXISTING SERIES AND REPLACED WITH A CABLE-TO-CABLE ADAPTER. THE TERMINATOR PCA IS USED ON THE LAST DISC DRIVE IN THE NEW SERIES.



NOTE:
RIBBON CABLE CONNECTOR AND PCA MUST BE ORIENTED AS SHOWN.

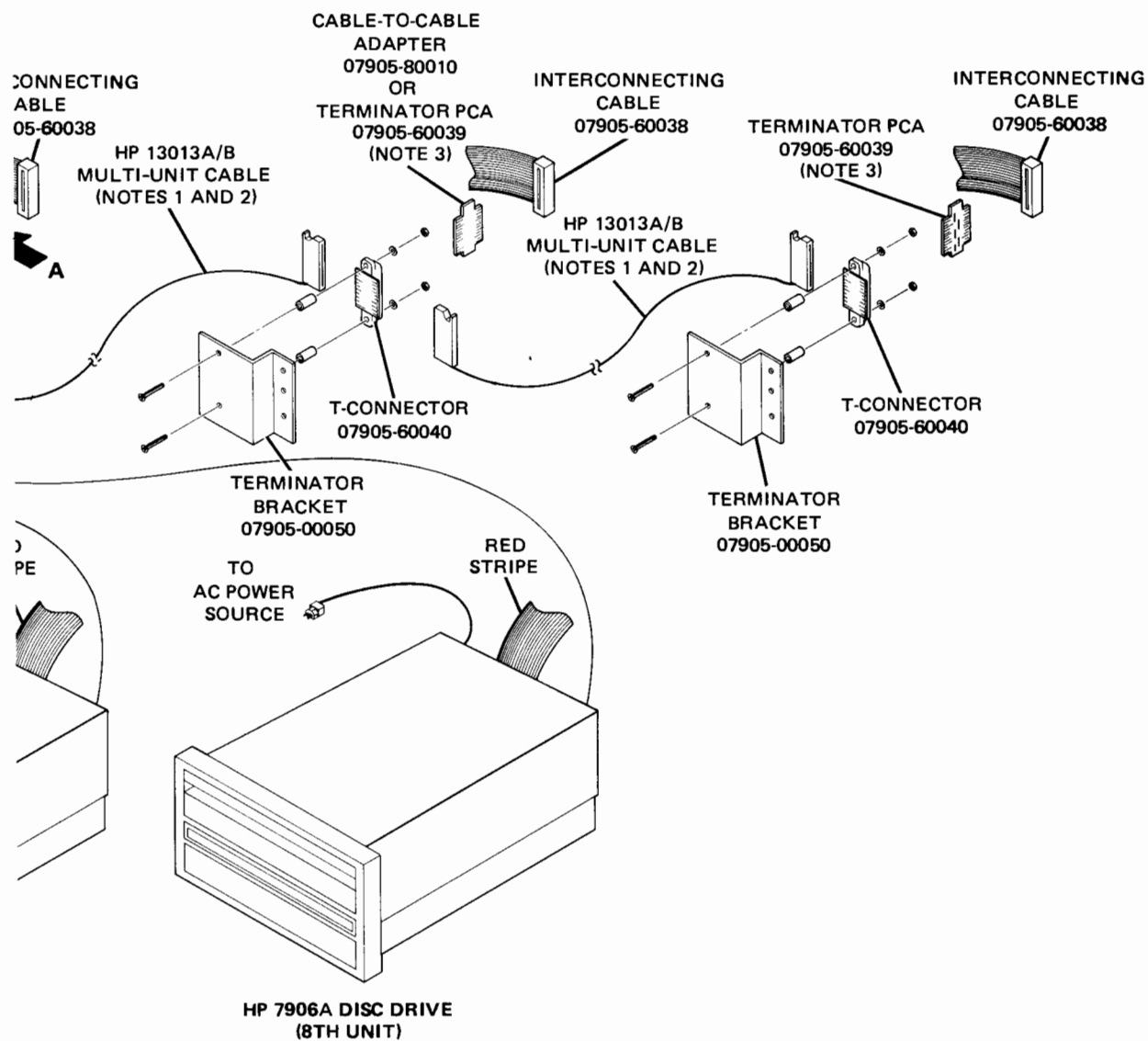


Figure 9. Interconnection Details,
HP 7906A Disc Drive

TERMIN
07905-6

NOTE:
CONNECTO
AND PCA
MUST BE
ORIENTED
AS SHOWN.

NOTES: 1. EARLY VERSIONS OF THE MULTI-UNIT CABLE (13013A) AND THE DATA CABLE (13213A) ARE SUITABLE FOR USE WITH THE 7906A AND 13037B ONLY. LATE VERSIONS OF THE CABLES (13013B AND 13213B), DESIGNED FOR USE WITH 7906B AND 13037C, CAN ALSO BE USED WITH THE 7906A AND 13037B.

2. THE HP 13013A/B MULTI-UNIT CABLE IS AVAILABLE IN FOUR LENGTHS AS FOLLOWS:

CABLE	PART NO.	LENGTH
13013A-001	13013-60002	1.52m (5 ft)
13013B-001	13013-60011	
13013A-003	13013-60004	2.44m (8 ft)
13013B-003	13013-60012	
13013A	13013-60001	3.66m (12 ft)
13013B	13013-60013	
13013A-002	13013-60003	5.49m (18 ft)
13013B-002	13013-60014	

3. THE HP 13213A/B DATA CABLE IS AVAILABLE IN FIVE LENGTHS AS FOLLOWS:

CABLE	PART NO.	LENGTH
13213B-004	13213-60006	1.82m (6 ft)
13213A	13213-60002	3.05m (10 ft)
13213B	13213-60007	
13213A-001	13213-60001	7.62m (25 ft)
13213B-001	13213-60008	
13213A-002	13213-60003	15.24m (50 ft)
13213B-002	13213-60009	
13213A-003	13213-60004	22.86m (75 ft)
13213B-003	13213-60010	

4. TERMINATOR PCA, PART NO. 07905-60039, IS ONLY USED ON THE LAST DISC IN THE SERIES.

FOR SINGLE UNIT INSTALLATIONS, THE TERMINATOR PCA IS USED.

FOR MULTIPLE UNIT INSTALLATIONS, THE TERMINATOR PCA IS USED ON THE FIRST DISC DRIVE IN THE SERIES AND CABLE-TO-CABLE ADAPTERS, PART NO. 07905-60039, ARE USED FOR EACH OF THE REMAINING DISC DRIVES.

FOR ADD-ON INSTALLATIONS, THE TERMINATOR PCA MUST BE REMOVED FROM THE FIRST DISC DRIVE IN THE EXISTING SERIES AND REPLACED WITH A CABLE-TO-CABLE ADAPTER. THE TERMINATOR PCA IS USED ON THE LAST DISC DRIVE IN THE SERIES.

APPENDIX A

HP 7906H DISC DRIVE INSTALLATION

PREFACE

This appendix adds installation information for the HP 7906H Disc Drive. In general, the information given in the main manual is applicable to the HP 7906H, with the following exceptions:

- Introduction (paragraph 1)
- Power Requirements (paragraph 4)
- Mounting Requirements (paragraph 6)
- Documentation (paragraph 12)
- Test Equipment (paragraph 16)
- Rack Mounting (paragraph 22)
- Interconnection Instructions (paragraphs 24 and 25)
- Operator Panel (paragraph 28)
- Disc Service Unit Installation (paragraph 34)
- On-Line Checkout (paragraph 40)
- Repackaging for Shipment (paragraph 41)

These exceptions are discussed in the following paragraphs.

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Mounting Requirements	A-1	On-Line Checkout	A-5
Documentation	A-1	Preparation for Service	A-5
Test Equipment	A-2	Self Test	A-5
Rack Mounting	A-2	Diagnostic Testing	A-7
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ILLUSTRATIONS

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HP 7906H HP-IB Configuration		Programming Jumpers	A-6
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Interconnection Details	A-3	and Indicators	A-7

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A-1. INTRODUCTION

WARNING

The equipment described in this appendix does not contain operator-serviceable parts. To avoid electrical shock, refer the following installation to service-trained personnel.

The HP 7906 Disc Drive may be ordered as the HP 7906H. The HP 7906H includes integrated disc controller circuitry that provides a simple interface between the Hewlett-Packard Interface Bus (HP-IB) and an HP 7906 Disc Drive. Upon receipt of command sequences via the HP-IB, this integrated controller (hereafter referred to as the controller) decodes the commands and generates the necessary timing and control signals for the disc drive. In addition, the controller handles all of the input/output communications with the HP-IB. Up to four HP 7906H Disc Drives may be interfaced to a single HP-IB channel. The HP 7906H includes an HP 29425B Low Profile Cabinet. The HP 7906HR is similar to the HP 7906H except that it is intended for mounting in a conventional cabinet. Therefore, the HP 7906HR does not include the HP 29425B Cabinet but does include the HP 12904A-001 Slide Mounting Kit.

A-2. POWER REQUIREMENTS

The disc drive power requirements and power supply assembly strapping instructions contained in the main manual are fully applicable to the HP 7906H. However, figure 1 requires to be changed, as shown in figure A-1, to indicate connection of the rear cover fan to terminals 5 and 7 of terminal board TB1 in the power supply assembly. The fan connections remain unchanged for all levels of ac input voltage.

A-3. MOUNTING REQUIREMENTS

The disc drive rack mounting specifications given in the main manual are applicable to the HP 7906H, with the exception of the depth and weight figures. Revised measurements for these specifications are as follows:

- Depth (from mounting flange) 70.95 cm (27.935 in.)
- Depth (overall) 73.98 cm (29.125 in.)
- Weight 74.4 kg (164 lbs)

The increased depth requirements are caused by the addition of the self-test panel to the rear cover of the disc drive.

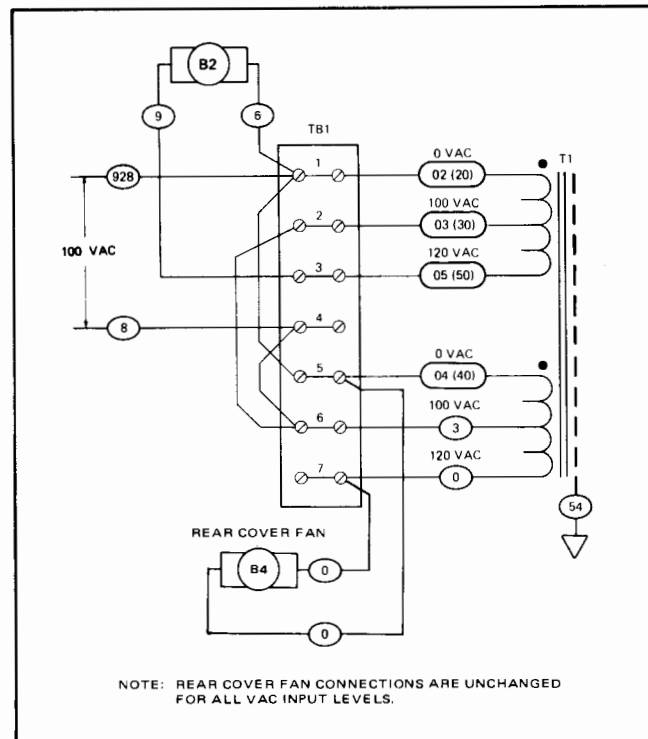


Figure A-1. Figure 1 Wiring Changes

A-4. DOCUMENTATION

The following documentation is supplied with the HP 7906H:

- *HP 7906 Disc Drive Installation Manual*, part no. 07906-90902.
- *HP 7906 Disc Drive User's Manual*, part no. 07906-90901.
- *HP 40019 Prefilter Assembly Installation and Service Manual*, part no. 40019-90901.
- *HP 29425 Cabinet Installation and Service Manual*, part no. 29425-90001. (Supplied only with the HP 7906H Disc Drive.)
- *HP 12904A Slide Mounting Kit Installation Instructions*, part no. 12904-90003. (Supplied only with the HP 7906HR Disc Drive.)

In addition, the following documentation may be ordered from a Hewlett-Packard Sales and Service Office. Sales and Service Offices are listed at the back of this manual.

- *HP 7906 Disc Drive Service Manual*, part no. 07906-90903.

A-5. TEST EQUIPMENT

For HP 7906H installation, the HP 19904A Customer Service Kit described in the main manual must include option 035 (I/O sector PCA, for use with the disc service unit).

A-6. RACK MOUNTING

As previously mentioned, the disc drive will typically be rack mounted in an HP equipment cabinet. The HP 12904A Slide Mounting Kit is provided with the HP 7906HR for rack mounting the disc drive. The kit parts are mounted on the inside of the cabinet and to the side of the disc drive. For installation details, refer to the Installation Instructions for the HP 12904A Slide Mounting Kit, part no. 12904-90003 furnished with the kit.

A-7. INTERCONNECTION INSTRUCTIONS

Interconnecting the disc drive depends on the system configuration, that is, whether a single disc drive or multiple disc drives are to be connected to an HP-IB channel. Interconnection in each case is as follows.

CAUTION

The HP 7906H uses a short data settling time. To ensure that the disc drive(s) will operate at its specified transfer rate, check that the HP-IB cabling meets the length restrictions described in the "HP-IB Configuration Restriction" label attached to the rear of the disc drive. This label is illustrated in figure A-2. The equivalent load of the HP-IB controller-in-charge (CIC) 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).
 $\text{LENGTH (METRES)} = \text{SUM EQUIV LOADS}$
 $\text{THIS DEVICE} = 2 \text{ EQUIV LOADS}$

Figure A-2. HP 7906H HP-IB Configuration Restriction Label

- a. Remove ac power from the disc drive(s). Ensure that the ac power cord is disconnected from the rear frame of the disc drive(s).
- b. If this is a single disc drive installation, connect one end of an HP-IB interface cable assembly, part no.

8120-2718, to the HP-IB connector at the rear of the disc drive and the other end of the cable to the HP-IB channel. The pin assignments for the HP-IB connector are shown in table A-1.

- c. If this is a multiple unit installation, use HP-IB interface cable assemblies, part no. 8120-2718, to interconnect the disc drives to the HP-IB controller-in-charge (CIC). The following details should be observed during installation:
 - The disc drive can be connected to the HP-IB controller-in-charge in a linear or star configuration. See figure A-3. A combination of the two methods can also be used. The linear configuration is the preferred method.
 - The CIC must preload the HP-IB with six equivalent resistor loads. (The CIC is one load.)
 - Each disc drive places two equivalent loads on each of the HP-IB lines.
 - Four disc drives (maximum) are allowed on each HP-IB channel.
 - The total cable length is limited to 15 metres. No more than one metre of cable should be used for each equivalent load on the HP-IB.
 - Only one disc drive on each HP-IB channel can be powered down without affecting the overall performance of the remaining disc drives on the channel.
- d. Connect the ac power cord from each disc drive installed to the associated power panel assembly.

A-8. OPERATOR PANEL

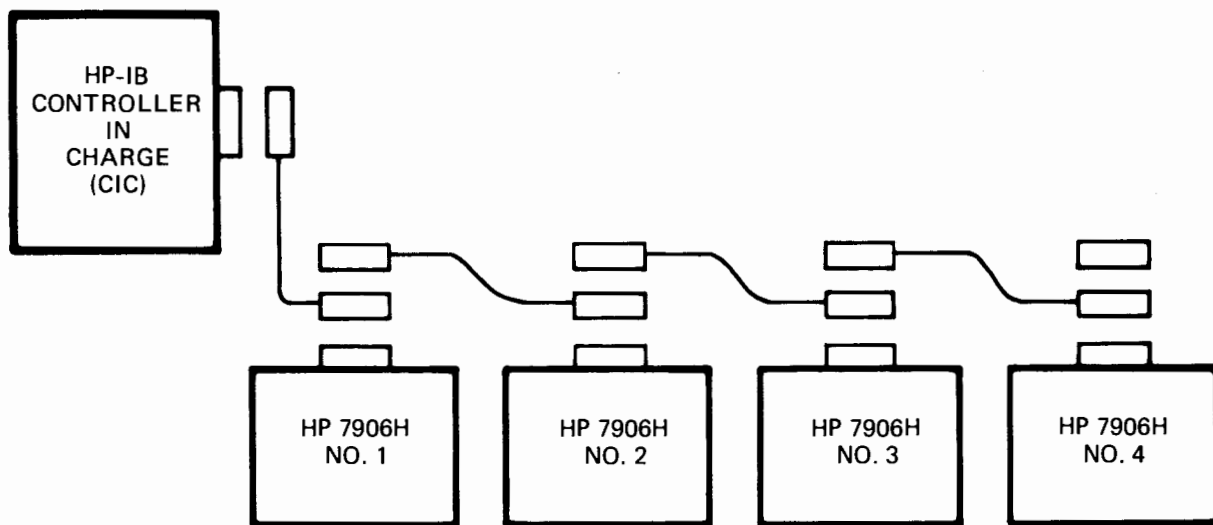
Refer to the *HP 7906 Disc Drive User's Manual*, part no. 07906-90901, for a full description of each operating control and indicator in the disc drive and for basic operating instructions.

A-9. DISC SERVICE UNIT INSTALLATION

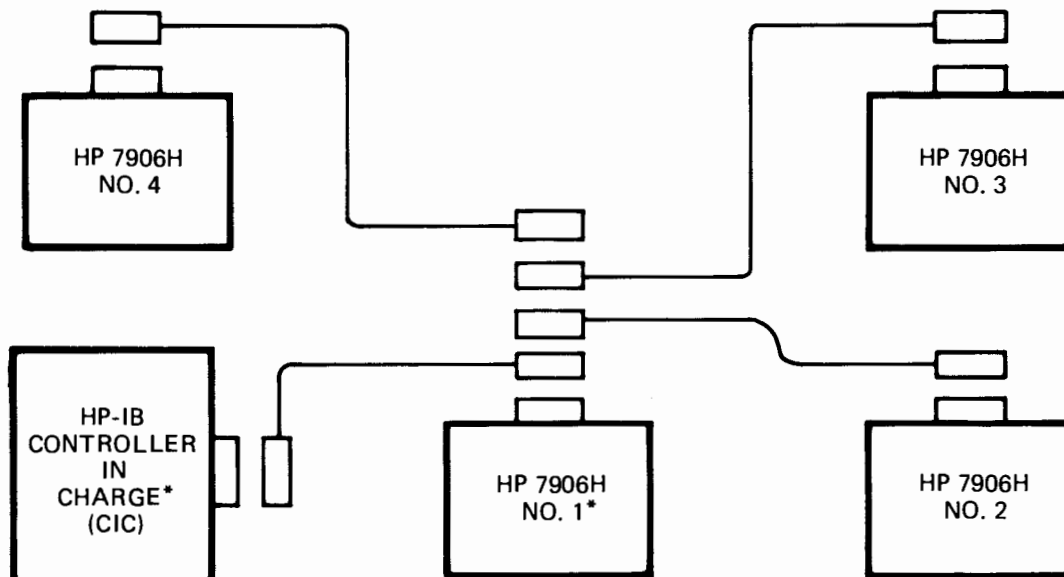
The disc service unit (DSU) is required to exercise the disc drive and to perform the seek time, actuator assembly radial alignment, index transducer alignment, and head alignment checks described in the main manual.

WARNING

The equipment described in these instructions does not contain operator-serviceable parts. To avoid electrical shock, refer the following installation to service-trained personnel.



a. Linear Configuration



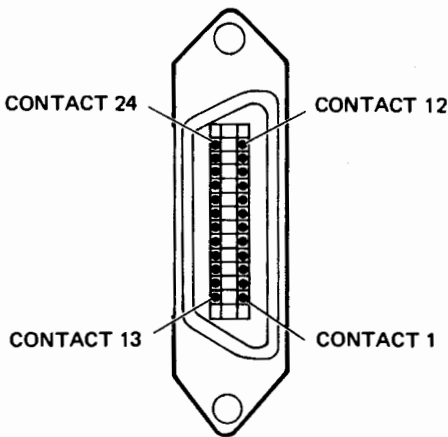
* Can be interchanged

b. "Star" Configuration

NOTES:

1. All interconnecting cables are HP-IB interface cable assemblies, part no. 8120-2718. The length of this cable is 2 metres (6.55 feet).
2. Observe the cabling length restrictions detailed in paragraph A-7 and listed on the "HP-IB Configuration Restriction" labels attached to the equipment.
3. Four HP 7906H's (maximum) are allowed on one HP-IB channel.

Table A-1. HP-IB Connector Pin Assignments

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

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

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To install the DSU, proceed as follows.

Note: When the DSU is installed in the disc drive, the controller circuitry is disconnected — control for the disc drive is furnished solely by the DSU.

- Remove power from the disc drive. Ensure that the ac power cord is disconnected from the rear frame of the disc drive.
- Loosen the screw used to secure the PCA retainer to the card cage chassis and remove the PCA retainer.
- Remove Jumper Cable, part no. 13365-60006, connected between data PCA-A1 and microprocessor PCA-A2.
- Disconnect the ribbon cable connector attached to data PCA-A1.
- Remove data PCA-A1 and microprocessor PCA-A2 from the card cage chassis.
- Remove read/write preamplifier PCA-A6 as follows:
 - Remove the PCA retaining screw and lock washer.
 - Loosen the screw securing the head connector retaining strap to the PCA.
 - Remove the head connector retaining strap.
 - Disconnect the three read/write head connectors and the servo head connector from the PCA.

CAUTION

Use care when removing the PCA to avoid catching it on the wiring in the surrounding area.

- (5) Carefully grasp the upper edge of the PCA and pull it free from the connector on motherboard PCA-A7, then remove the PCA from the disc drive.
- g. Insert Head Alignment PCA, part no. 12995-60003 or 13354-60010, into the card guides for A1. See figure 7 in the main manual. Ensure that the component side of the PCA is facing toward the right-hand side of the card cage chassis, as viewed from the front of the disc drive. Push the PCA firmly into the connectors on motherboard A7 until the PCA is fully seated.
- h. Insert I/O sector PCA, part no. 07906-60001, into the card guides for A2. See figure 7. Ensure that the component side of the PCA is facing in the same direction as the component side of the head alignment PCA. Push the PCA firmly into the connectors on motherboard A7.
- i. Hang the DSU Test Module, part no. 12995-60045 or 13354-60005, on the top right-hand edge of the card cage chassis as shown in figure 7.
- j. Connect 50-pin Jumper Cable, part no. 12995-60011 or 13354-60012, between the 50-pin connector on the DSU test module and J1 on the I/O sector PCA. See figure 7.
- k. Connect 20-pin Jumper Cable, part no. 12995-60009 or 13354-60013, between the 20-pin connector on the DSU test module and J1 on the head alignment PCA. See figure 7.

CAUTION

The head alignment preamplifier PCA must be installed whenever a CE head alignment cartridge or a CE servo reference cartridge is to be used. This will prevent any accidental damage to the prerecorded surfaces.

- l. Insert Head Alignment Preamplifier PCA, part no. 12995-60040, into the A6 connector as shown in figure 7. Ensure that the PCA is correctly oriented, then push it firmly into the connector until it is firmly seated. The component side of the PCA must face toward the rear of the disc drive. Reconnect the four head connectors disconnected in substep f (4).
- m. Connect the head cable connector from the head alignment PCA to the head connector on the head alignment preamplifier PCA. This connector is located at the center of the top edge of the PCA. See figure 7.

A-10. ON-LINE CHECKOUT

A-11. PREPARATION FOR SERVICE

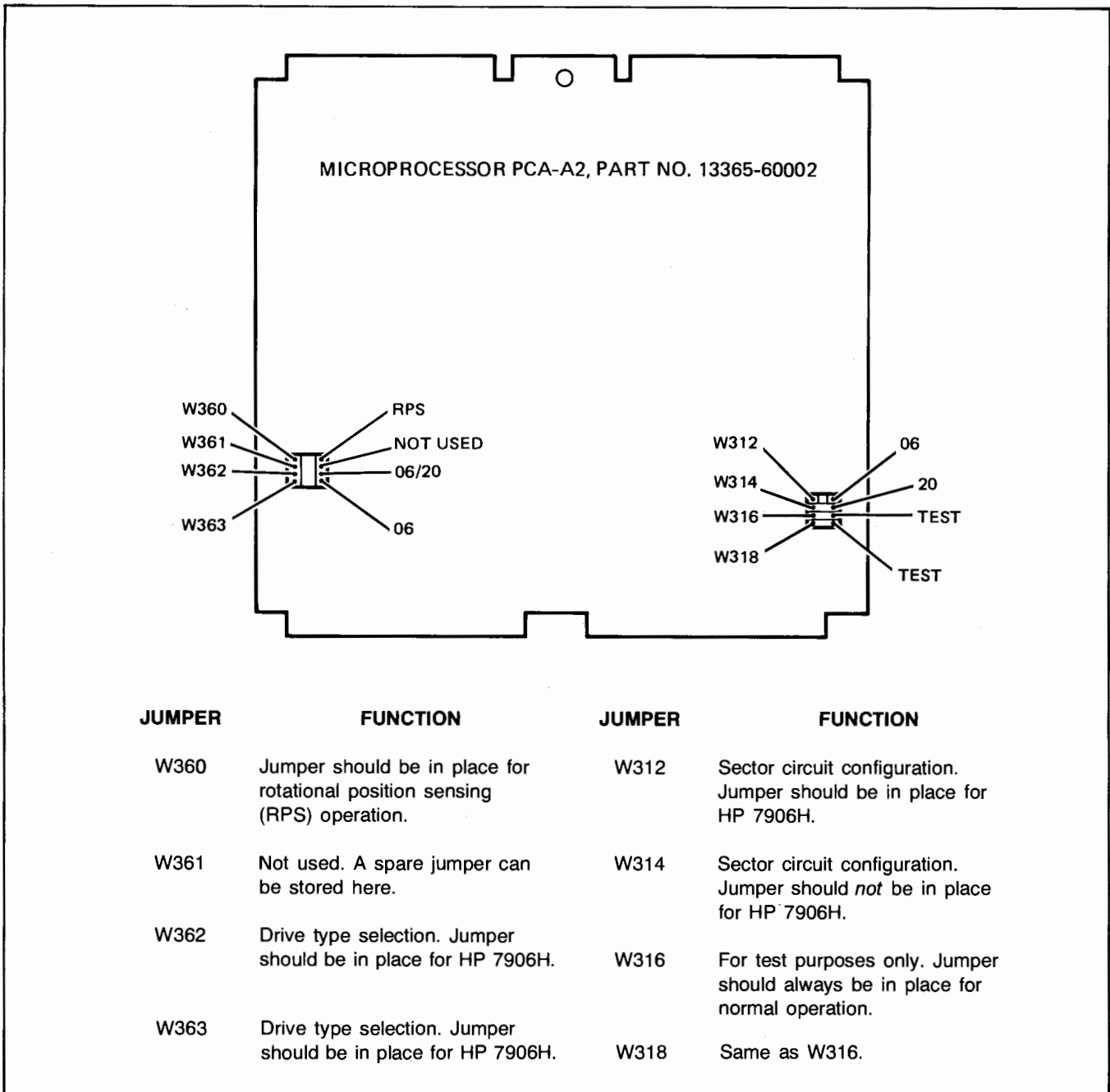
Once all of the installation checkout tests described in the main manual have been verified, return the disc drive to a normal operating state as follows:

- a. Remove ac power from the disc drive. Ensure that the ac power cord is disconnected from the rear frame of the disc drive.
- b. Remove the DSU from the disc drive. DSU components include the following:
 - DSU Test Module
 - Head Alignment Preamplifier PCA
 - Head Alignment PCA
 - I/O Sector PCA
 - 20-pin Jumper Cable
 - 50-pin Jumper Cable
- c. Check that the programming jumpers on microprocessor PCA-A2 are correctly configured. See figure A-4.
- d. Replace the following items in the disc drive by performing, in reverse order, the instructions given in steps a through f of paragraph A-9.
 - Data PCA-A1
 - Microprocessor PCA-A2
 - Read/Write Preamplifier PCA-A6
 - Cable, part no. 13365-60006
- e. Reconnect the temperature compensation cable connector to track follower PCA-A5.
- f. Replace the top cover and restore the disc drive to its normal operating position in its equipment cabinet.



A-12. SELF TEST

The HP 7906H contains a self-test feature that provides a go/no-go check of the controller hardware and certain functions of the disc drive. The self-test control panel on the rear cover of the disc drive is shown in figure A-5. Ensure that the OP/SERVICE switch is in the OP (operating) position before applying power to the disc drive. (The SERVICE position is used for maintenance purposes and does not allow the disc drive to respond to HP-IB commands following successful completion of self test.) Self test can be invoked in the following three ways:



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Figure A-4. Microprocessor PCA-A2 Programming Jumpers

- Automatically via a power-on or by setting the disc drive RUN/STOP switch to RUN.
- Using the secondary INITIATE SELF-TEST command.
- Manually by activating the START switch on the self-test panel located at the rear of the disc drive (assuming that the controller is in Idle State 2 or 3).

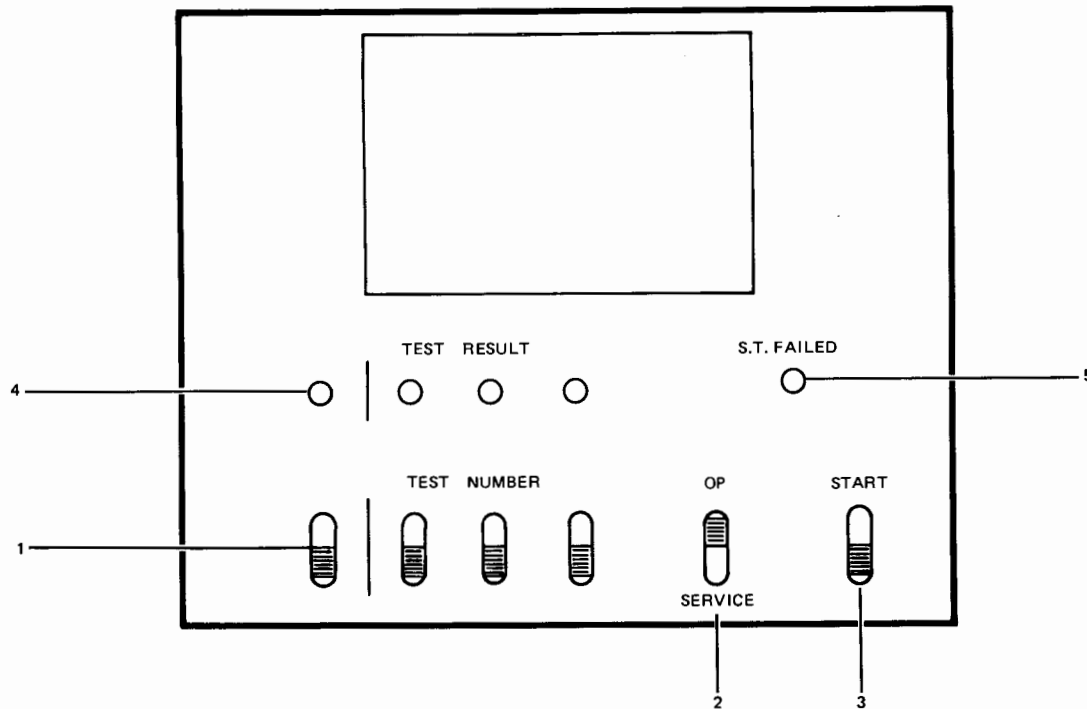
Note: The LED in the upper left-hand corner of the disc drive Unit Select Indicator is unlighted when the controller is in Idle

State 2, Idle State 3, and when self test is running. When the LED is lighted, the controller will not respond to the self-test START switch. In the event that the controller is not in Idle State 2 or 3, Idle State 2 can be entered via the END command.

The self test will start with "power on" and/or "run" but will not complete until "drive ready". In the interim, an octal ten will flash on the TEST RESULT LED's. At "drive ready", self test will complete in about two seconds. When the self-test routine is executing, the TEST RESULT

A-6

Note: If the RUN/STOP switch is not in the RUN position or the disc pack is not in place, the resulting absence of "drive ready" will cause the S.T. FAILED indicator to come on approximately 92 seconds after power on is initiated. If this occurs, proper preparation of the disc drive for operation (disc pack installed and RUN/STOP switch set to RUN) will allow the self-test routine to start again.



- | | | |
|-------------------------|---|--|
| 1. TEST NUMBER switches | — | Select desired self-test number in octal when OP/SERVICE switch (2) is in SERVICE position. |
| 2. OP/SERVICE switch | — | Selects self-test mode of operation. When OP position is selected, controller executes self-test routine at power turn-on, on HP-IB command, or when START switch (3) is activated. Switch must be in OP position for disc drive to operate normally. When SERVICE position is selected, controller will loop continuously in self test until a fault is detected. |
| 3. START switch | — | Initiates self-test operation. Switch is spring-loaded in off position. |
| 4. TEST RESULT LED's | — | Provide a readout of self-test operation. At beginning of self-test routine, LED's will flash briefly, indicating controller activity and testing of LED's. If a test fails, the LED's indicate the number of the failed test in octal. If self test passes, LED's remain unlit. |
| 5. S.T. FAILED LED | — | Indicates a self-test (S.T.) failure. Result is duplicated by SELF TEST FAILED indicator on disc drive operator panel. |

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Figure A-5. Rear Panel Self-Test Controls and Indicators

LED's and the S.T. FAILED LED on the panel will flash briefly indicating controller activity and testing of the LED's. The SELF TEST FAILED indicator on the disc drive operator panel will also flash at this time. If no failures are detected, all of the LED's will remain off at the end of self test. If a test fails, the test number (octal) is displayed continuously on the TEST RESULT LED's. The S.T. FAILED LED and the SELF TEST FAILED indicator will also remain lit. In the event that a self-test error is indicated, refer to the *HP 7906 Disc Drive Service Manual*,

part no. 07906-90903, for information regarding interpretation of the error readout and for repair instructions.

A-13. DIAGNOSTIC TESTING

If the disc drive is installed in an HP system, run the system diagnostic tests in accordance with the instructions provided in the Diagnostic Reference Manual. If the disc drive is installed in some other computer system,

perform the diagnostic tests in accordance with the instructions provided for that system.

A-14. REPACKAGING FOR SHIPMENT

The repackaging for shipment instructions given in the

main manual are applicable to the HP 7906HR Disc Drive. Note that these instructions are for a disc drive only. For information regarding repackaging and shipment of an HP 29425B Cabinet containing an HP 7906H, refer to section II of the *HP 29425 Cabinet Installation and Service Manual*, part no. 29425-90001.