HEWLETT PACKARD

This package contains a section of the

CE SERVICE HANDBOOK
FOR
91XX SERIES DISC DRIVES

and consists of the following document:

9153C, 9153M
DISC DRIVES
Part no. 09153-90905

Insert this section into the handbook binder P/N 9282-0683 along with cover and tabset P/N 5957-4228.

P.O. Box 39, Boise, Idaho 83707-0039

Notice

FOR U.S.A. ONLY

The Federal Communications Commission (in 47 CFR 15.838) has specified that
the following notice be brought to the attention of the users of this product.

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

Warning: This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: re-orient the receiving antenna; relocate the computer with respect to the receiver; move the computer away from the receiver; plug the computer into a different branch circuit. If necessary, the user should consult the dealer or authorized field service representative for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "Interference Handbook." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00450-7.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Funkentstorung Deutschland

Dieses Gerät wurde in einer typischen Systemkonfiguration geprüft und entspricht den Bestimmungen der Allgemeinen Genehmigung FTZ 1046/84. Als Nachweis ist das Gerät mit dem VDE-Funkschutzzeichen mit Index 0871-B/P für Peripheriegeräte gekennzeichnet.

Wird das Gerät innerhalb einer Anlage betrieben,

- so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der oben genannten Genehmigung entsprechen.
- die mit einer FTZ-Serienprüfnummer gekennziechnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

Electromagnetic Interference Regulations Germany

This device was tested in a typical system configuration and meets the General License require-ments in Germany (FTZ 1046/84). As a proof of compliance it carries the VDE Radio Protection Mark with the index 0871-B/P for peripherals.

If this device is to be operated with a system,

- and if the General License is being claimed, the complete system has to comply with the General Licensing requirements.
- which has its own FTZ-Serial-License, and for which an operating license has been granted or requested, usually no further steps are necessary.

For Japan Only

この装置は，第二種情報装置（住宅地域又はその隣接した地域において使用
されるべき情報装置）で住宅地域での電波障害防止を目的とした情報処理装置
等電波障害自主規制協議会（VCCI）基準に適合しております。

しかし，本装置をラジオ，テレビジョン受信機に近接してご使用になると，

受信障害の原因となることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

This apparatus is a class 2 ITE (information apparatus which may be used in residential and ad-jacent areas) which meets the VCCI standards to prevent radio interference in residential and ad-jacent areas. However, this apparatus may become a source of radio interference if used within close range of radio or television receivers. To ensure compliance, this apparatus must be operated according to instructions included with the product.

Printing History

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

A software code may be printed before the date; this indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

Safety Considerations

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

SAFETY SYMBOLS

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

Indicates hazardous voltages.

Indicates earth (ground) terminal.

WARNING

The WARNING sign denotes a hazard.
It calls attention to a procedure or prac-
tice that, if not correctly performed or
adhered to, could result in personal in-
jury. 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 proce-
dure or practice that, 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 1 product and is provided with a protective
earthing terminal. An uninterruptible safety

earth ground must be provided from the main
power source to the product input wiring
terminals, power cord, or supplied power cord set.
Whenever it is likely that the protection has been
impaired, the product must be made inoperative
and be secured against any unintended operation.

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

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

SERVICING

WARNING

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

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

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

To avoid a fire hazard, fuses with the proper
current rating and of the specified type
(normal blow, time delay, etc.) must be used
for replacement. To install or remove a
fuse, first disconnect the power cord from
the device. Then, using a small flat-bladed
screw driver, turn the fuseholder cap coun-
terclockwise until the cap releases. Install
either end of a properly rated fuse into the
cap. Next, insert the fuse and fuseholder
cap into the fuseholder by pressing the cap
inward and then turning it clockwise until it
locks in place.

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Figures and Tables

Product Information

1-1. Product Description

FEATURES:

- 10-megabyte hard disc storage - HP 9153C, Options 010, 011
- 20-megabyte hard disc storage - HP 9153C, Options 020, 021
- 40-megabyte hard disc storage - HP 9153C, Options 040, 041
- 20-megabyte hard disc add-on for Option 010 and 020 - HP 9153M
- 2-megabyte double-sided flexible disc storage - HP 9153C, Options 010, 020, 040
- 3.5-inch hard and flexible disc media
- 75 ms average access time (hard disc)
- 200 ms average access time (flexible disc)
- Integrated controller and power supply
- Built-in diagnostic capability
- HP-IB interface

PHYSICAL CHARACTERISTICS:

Refer to "Physical Characteristics" on page 1-3.

1-2. Options and Accessories

The following items are included with the standard drive:

- *Getting Started with Your HP 9153C Disc Drive*, reorder no. 09153-90199
- Power cord (part number depends on location and power source)
- Fuse, 3A, 250V (115V setting), part no. 2110-0003
- Fuse, 1.6A, 250V (230V setting), part no. 2110-0787
- Gray fuse holder (115V setting), part no. 2110-0565
- Black fuse holder (230V setting), part no. 2110-0567
- 2-megabyte double-sided flexible disc, part no. 92192X (deleted on options 011, 021, 041)

The following options are available:

- Option 010 - 10-megabyte hard disc with a 3.5-inch, double-sided, 2-megabyte, flexible disc drive.
- Option 011 - 10-megabyte hard disc only
- Option 020 - 20-megabyte hard disc with a 3.5-inch, double-sided, 2-megabyte, flexible disc drive.
- Option 021 - 20-megabyte hard disc only
- Option 040 - 40-megabyte hard disc with a 3.5-inch, double-sided, 2-megabyte, flexible disc drive.
- Option 041 - 40-megabyte hard disc only

The following packaging items are required when repackaging the drive for shipment:

- Shipping Carton, part no. 09153-84404
- Plastic Shipping Disc, part no. 1150-1787

1-3. Service Kits

Table 1-1 lists the contents of the recommended Product Support Package for the disc drive.

| NOTE |

Hewlett-Packard does not supply this package.

Table 1-1. Recommended Product Support Package

PART NO.	QTY.	DESCRIPTION
09153-69201	1	3.5-inch Flexible Disc Drive (exchange)
09153-69511	1	Controller PCA (exchange)
45816-69111	1	3.5-inch Winchester Disc Drive (exchange)
09153-67110	1	Power Supply (nonexchange)
09153-61603	1	Flexible Disc Drive Controller Cable (nonexchange)
09153-60605	1	Power Cable (nonexchange)
09153-61606	1	Winchester Disc Drive Controller Cable (nonexchange)
2100-0003	5	Fuse, 3.0 AF, 250 Vac, (115V Setting)
2110-0787	5	Fuse, 1.6 AF, 250 Vac, (230V Setting)
9300-0794	1	Anti-static Workstation
8710-1426	1	TORX* Field Kit
09122-89415	1	Head Cleaning Disc

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

1-4. Operating Specs and Characteristics

Operating specifications and characteristics are listed in table 1-2.

Table 1-2. Operating Specifications and Characteristics

OPERATING SPECIFICATIONS

	Hard Disc	Flexible Disc
Average access time:	75 ms	200 ms
Average rotational delay:	10 ms	100 ms
Average time to transfer 1 kbyte:	5. 4 ms	33. 3 ms
Data transfer rate (maximum sustained):	185 kbytes/s	30 kbytes/s
Rotational speed:	3000 rpm	300 rpm

DATA CAPACITY (formatted)

See tables 1-3 through 1-6 for hard disc mechanism capacity specifications and table 1-7 for flexible disc mechanism capacity specifications.

PHYSICAL CHARACTERISTICS

DIMENSIONS

Height:	106 mm (4. 2 in.)
Width:	325 mm (12. 8 in.)
Depth:	285 mm (11. 2 in)

WEIGHT

	Net	Shipping
Options 010, 020	7. 7 kg (17 lb)	9. 7 kg (21 lb)
Options 011, 021	7. 1 kg (16 lb)	9. 1 kg (20 lb)
Option 040	8. 6 kg (19 lb)	10. 7 kg (24 lb)
Option 041	8. 0 kg (18 lb)	10. 1 kg (22 lb)

Table 1-2. Operating Specifications and Characteristics (continued)

OPERATING CHARACTERISTICS

HEAT DISSIPATION

Maximum: 50 Watts (170 Btu/hr; 43 kcals/hr)

ELECTROMAGNETIC EMISSIONS

Radiated and conducted interference:

- HP 9153C -- For U.S.A., designed to meet FCC docket 20780 for Class B computing peripheral devices. These products comply with the limits for a Class B computing device persuant to Subpart J of part 15 of the FCC Rules. See instructions if interference to radio reception is suspected.

- HP 9153C -- for Europe, designed to meet EMI level FTZ 1046/84 and provides a Manufacturer's Declaration. Refer to your local sales representative for more information.

Magnetic nonoperating: <5.25 milligauss at 4.6m (15 ft) on all surfaces
Magnetic operating: <1 gauss on all surfaces

POWER CHARACTERISTICS

Voltages (true RMS):

115V Setting;   100V, 115V, 120V, single phase (inclusive tolerance range is 86V to 127V)
230V setting;   220V, 240V, single phase (inclusive tolerance range is 195V to 253V)

Frequency: 48-66 Hz

Maximum Power: 50 Watts

Maximum Current (occurs during spin up):   115V setting; 3.0A (true RMS at 90V, 60 Hz)
                                                 230V setting; 1.6A (true RMS at 180V, 50Hz)

Line Dropout: No effect on performance; no operator intervention required for dropout equal to or less than one cycle of the ac line frequency (20.0 ms, 50 Hz; 16.7 ms, 60 Hz).

ACOUSTIC EMISSIONS

Average sound pressure level ($\overline{L}_{pA}$):   43 dB(A)
Sound power level (L_{wA}):   49 dB(A)

SAFETY

- CSA certified to CSA 22.2 No. 154.
- Meets all applicable safety standards of IEC 380 and IEC 435.
- UL listed to UL 478, Fifth Edition

Table 1-3. Hard Disc Specification (10-Megabyte)

Setting	Number of Volumes		Sectors/ Track	Tracks/ Volume	Disc Surfaces	Sectors / Volume	Sector Size	Capacity/ Volume
0	Initialize Enable							
1	1		28	698	2	39088	256	10006528
2	2		28	349	2	19544	256	5003264
3	3		28	232	2	12992	256	3325952
4	4		28	174	2	9744	256	2494464
5	5		28	140	2	7840	256	2007040
6	6		28	116	2	6496	256	1662976
7	2	Vol 0	28	210	2	11760	256	3010560
		Vol 1	28	490	2	27440	256	7024640
8	Write Protect first volume, Initialize Protect all volumes							
9	Initialize Protect							

Table 1-4. Hard Disc Specification (20-Megabyte)

Setting	Number of Volumes		Sectors/ Track	Tracks/ Volume	Disc Surfaces	Sectors / Volume	Sector Size	Capacity/ Volume
0	Initialize Enable							
1	1		28	1404	2	78624	256	20127744
2	2		28	702	2	39312	256	10063872
3	3	Vol 0	28	210	2	11760	256	3010560
		Vol 1	28	210	2	11760	256	3010560
		Vol 2	28	984	2	55104	256	14106624
4	4		28	351	2	19656	256	5031936
5	2	Vol 0	28	351	2	19656	256	5031936
		Vol 1	28	1053	2	58968	256	15095808
6	6		28	234	2	13104	256	3354624
7	2	Vol 0	28	210	2	11760	256	3010560
		Vol 1	28	1194	2	66864	256	17117184
8	Write Protect first volume, Initialize Protect all volumes							
9	Initialize Protect							

Table 1-5. Hard Disc Specification (30-Megabyte)

Setting	Number of Volumes		Sectors/ Track	Tracks/ Volume	Disc Surfaces	Sectors / Volume	Sector Size	Capacity/ Volume
0	Initialize Enable							
1	1		28	2102	4	117712	256	30162944
2	2		28	1051	4	58856	256	15081472
3	3	Vol 0,1	28	349	4	19544	256	5017600
		Vol 2	28	1404	4	78624	256	20127744
4	4		28	525	4	29400	256	7540736
5	2	Vol 0	28	698	4	39088	256	10035200
		Vol 1	28	1404	4	78624	256	20127744
6	6	Vol 0,1	28	349	4	19544	256	5017600
		Vol 2,3, 4,5	28	351	4	19656	256	5031936
7	2	Vol 0	28	349	4	19544	256	5031936
		Vol 1	28	1753	4	98168	256	25131008
8	Write Protect first volume, Initialize Protect all volumes							
9	Initialize Protect							

Table 1-6. Hard Disc Specification (40-Megabyte)

Setting	Number of Volumes		Sectors/ Track	Tracks/ Volume	Disc Surfaces	Sectors / Volume	Sector Size	Capacity/ Volume
0	Initialize Enable							
1	1		28	2808	4	157248	256	40255488
2	2	Vol 0	28	1404	4	78624	256	20127744
		Vol 1	28	1404	4	78624	256	20127744
3	3	Vol 0	28	420	4	23520	256	6021120
		Vol 1	28	420	4	23520	256	6021120
		Vol 2	28	1968	4	110208	256	28213248
4	4		28	702	4	39312	256	10063872
5	2	Vol 0	28	702	4	39312	256	10063872
		Vol 1	28	2106	4	117936	256	30191616
6	6		28	468	4	26208	256	6709248
7	2	Vol 0	28	420	4	23520	256	6021120
		Vol 1	28	2388	4	133728	256	34234368
8	Write Protect first volume, Initialize Protect all volumes							
9	Initialize Protect							

Table 1-7. Flexible Disc Specification

Media	Format Option	Sectors/ Track	Tracks/ Surface	Surfaces/ Disc	Number of Sectors	Sector Size	Capacity (Bytes)
0.5-Mbyte (Blue Discs)	4	16	66	1	1056	256	270336
1-Mbyte (Gray Discs)	0,1 Default	16	77	2	2464	256	630784
	2	9	77	2	1386	512	709632
	3	5	77	2	770	1024	788480
	4	16	66	1	1056	256	270336
	16	9	80	2	1440	512	737280
2-Mbyte (Black Discs)	0,1,4 Default	32	77	2	4928	256	1261568
	2	18	77	2	2772	512	1419264
	3	10	77	2	1540	1024	1576960
	16	18	80	2	2880	512	1474560

1-5.   Rack Mounting Kit

The HP 19500B Rack Mounting Kit is available to install the HP 9153C Disc Drive into an EIA 19-inch equiment rack.

2-1.   Environmental Requirements

Table 2-1 contains environmental information pertinent to the operation of the disc drive.

2-2.   Installation

First-time installation of the drive requires use of the following manual.

- *Getting Started with Your HP 9153C Disc Drive*, reorder no. 09153-90199
- *19500B Rackmount Kit Installation Instructions*, part no. 19500-90902

2-3.   Installation Checklist

1) Verify input ac voltage, fuse rating, and ~LINE SELECT switch setting.

2) Set the CONFIGURATION switch for the desired volumes.

3) Set ADDRESS switch for HP-IB device address.

4) Connect interface cable (or cables). Not more than four cables.

5) Apply power and perform self-test (refer to chapter 5).

6) Format (or initialize) the disc drive.

2-4.   Handling

While the disc drive has been designed to withstand a certain shock level it is still a delicate device. Care should be taken when handling or transporting the product. The following precautions should be obser-ved when handling or transporting the disc drive. Failure to observe these handling precautions could result in loss of data or damage to the product.

Handling Precautions

- Avoid sharp shocks to the disc drive.

- Always repackage the disc drive in approved packaging (see figure 2-1) when transporting the product from one area to another.

Table 2-1. Environmental Requirements

ENVIRONMENTAL REQUIREMENTS

Note: The environmental specifications listed herein apply when this subsystem is not connected to a Hewlett-Packard (HP) system. When this subsystem 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.

The following specifications were type-tested under controlled conditions. Hewlett-Packard maintains an active program of auditing production products to ensure these specifications remain true when products are again tested under the same conditions. The limits of these specifications do not represent the optimum for long, trouble-free operation and are specifically not recommended for maximum customer satisification. The recommended conditions are stated separately where appropriate.

TEMPERATURE

Recommended operating range:	20°C to 25.5°C (68°F to 78°F)
Operating range:*	10°C to 40°C (50°F to 104°F)
Nonoperating range:	-40°C to 60°C (-40°F to 140°F)

Maximum rate of change: 10°C (18°F) per hour

With no flexible disc inserted, the HP 9153C has been operated at 50 degrees C and ambient humidity (roughly 30% at 23 degrees C) with no errors or performance degradation.

HUMIDITY

Operating: 20% to 80% relative humidity, noncondensing, wet bulb temperature not to exceed 29°C (84°F).

Nonoperating: 5% to 90% relative humidity, noncondensing and wet bulb temperature not to exceed 29°C (84°F).

VIBRATION

Operating: Random vibration with power spectral density (PSD) of 0.0002 g^2/Hz from 5 to 350 Hz; -6 dB/octave from 350 to 500 Hz.

Nonoperating: Random vibration with power spectral density (PSD) of 0.02 g^2/Hz from 5 to 100 Hz; -6 dB/octave from 100 to 137 Hz; PSD of 0.0107 g^2/Hz from 137 to 350 Hz; -6 dB/ octave from 350 to 500 Hz.

SHOCK

Nonoperating: 292 in./s, 29.7 ms duration, 30 g, trapezoidal waveform
50 in./s, 2.95 ms duration, 87 g, half sine waveform

Table 2-1. Environmental Requirements (continued)

ALTITUDE

Operating: maximum 4 572m (15,000 ft.)
Nonoperating: maximum 15 240m (50,000 ft)

ELECTROMAGNETIC SUSCEPTIBILITY OPERATING RANGE

Radiated Electric Field: 14 kHz to 1 GHz, up to 5 V/m
Electrostatic Discharge: <25.0 kV
Recommended limit: <10 kV
Magnetic Field: <4 gauss peak-to-peak, 47.5 to 198 Hz
Power line spike transients: 1.0 kV, repetitive with 1 ns
                                                    rise time and 800 ns pulse width

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COOLING REQUIREMENTS

Ensure that the fan exhaust opening is not blocked or restricted

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POWER REQUIREMENTS

Voltages (true RMS):

   115V Setting;   100V, 115V, 120V, single phase (inclusive tolerance range is 87V to 127V)
   230V setting;   220V, 240V, single phase (inclusive tolerance range is 195V to 253V)

Frequency: 48-66 Hz

Maximum Power: 115V setting; 0.43 V-A
                                                     230V setting; 0.22 V-A

Maximum Current (occurs during spin up):   115V setting; 3.0A (true RMS at 90V, 60Hz)
                                              230V setting; 1.6A (true RMS at 180V, 50Hz)

Distortion: <5% peak and flat harmonic distortion
Line Surge and Sag: 70% and 130% typical line voltage for 0.5 sec.
                                      85% and 130% typical line voltage for 0.5 sec.

ACCESSORIES KIT
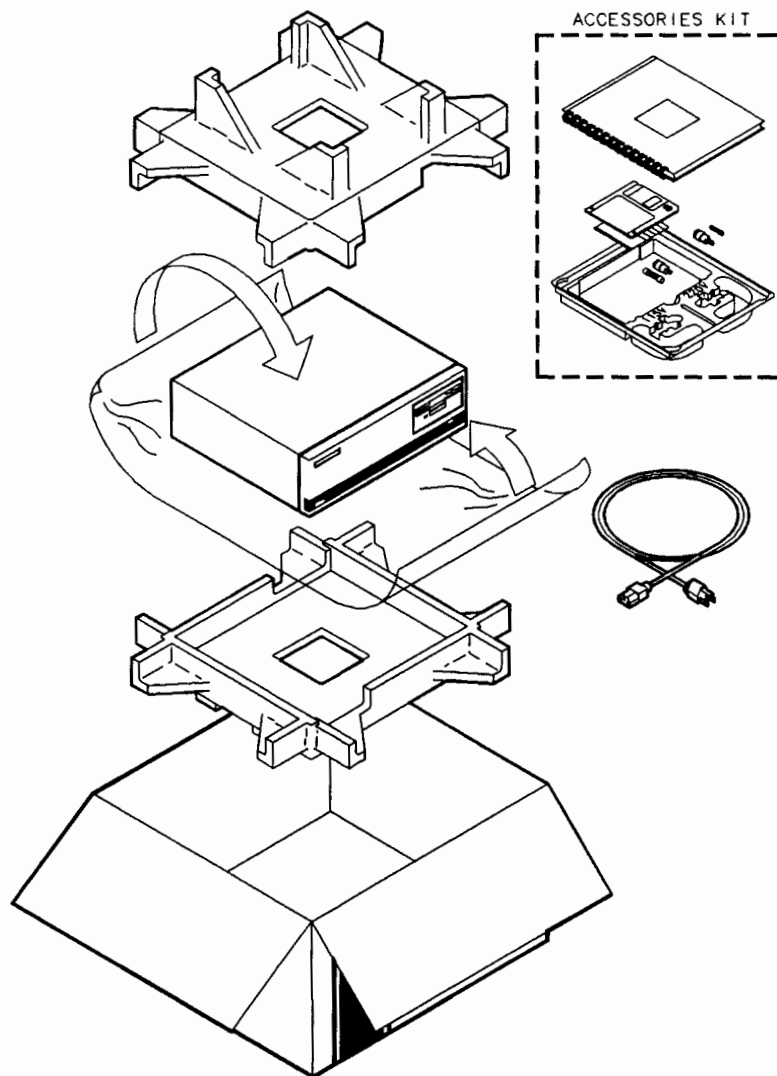
Figure 2-1. HP 9153C Packaging

2-5. Controls and Connectors

Figure 2-2 shows the location of the disc drive controls and indicators.
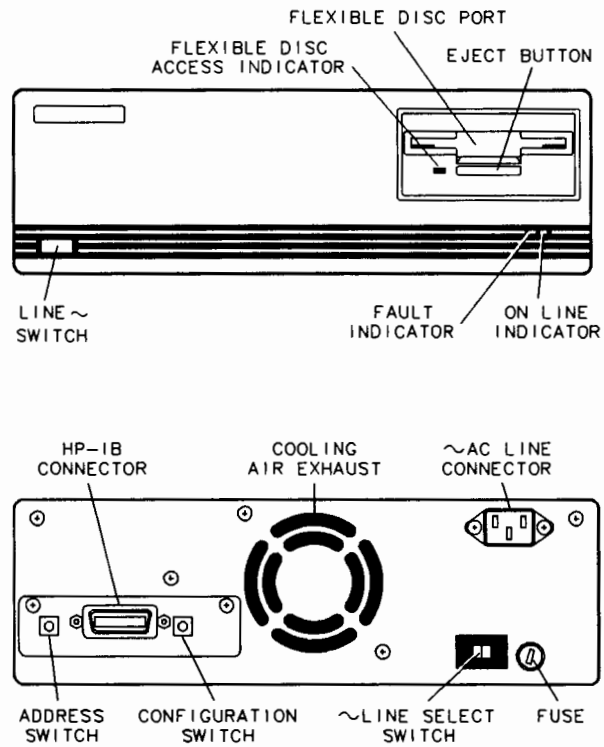
Figure 2-2. HP 9153C Controls and Indicators

2-6. AC Power: Voltage Selection/Fuses/Cords

2-7. Voltage Selection

| CAUTION |

Disconnect the power cord from the disc drive ~AC LINE connector before changing the ~LINE SELECT switch.

Slide the ~LINE SELECT switch to the proper position (115V or 230V) for the voltage available.

2-8. Fuse and Fuse Holder

WARNING

Remove the power cord from the disc drive before installing or replacing the fuse.

Replace the fuse with one of the same type and rating.

The following fuses and fuse holders are used:

- Fuse, 3A, 250V, medium time delay (115V setting), part no. 2110-0003
- Fuse, 1.6A, 250V, medium time delay (230V setting), part no. 2110-0787
- Gray fuse holder (used with 115V setting), part no. 2110-0565
- Black fuse holder (used with 230V setting), part no. 2110-0567

2-9. Power Cords

See figure 2-3 for power cord information.

OPTION 903   120V STANDARD

MALE NEMA (MOLDED)   FEMALE CEE

BLACK (L)
GREEN (E)
WHITE (N)

(L) BLACK
(E) GREEN
(N) WHITE

(8120-2371 [BLACK, 2.3m])

OPTION 904   220V STANDARD

MALE NEMA (MOLDED)   FEMALE CEE (MOLDED)

BROWN OR BLACK (L)
GREEN/YELLOW (E)
BLUE (N)

(L) BROWN OR BLACK
(E) GREEN/YELLOW
(N) BLUE

(8120-0698 [BLACK, 2.3m])

OPTION 905   240V

BROWN OR BLACK (L)   MALE CEE   FEMALE CEE   (L) BROWN OR BLACK
GREEN/YELLOW (E)   (E) GREEN/YELLOW
LIGHT BLUE OR WHITE (N)   (N) LIGHT BLUE OR WHITE

8120-1575 (0.7m)   8120-1860 (1.5m)

OPTION 906   240V

MALE SEV   FEMALE CEE
BLUE (N)   (L) BROWN
GREEN/YELLOW (E)   (E) GREEN/YELLOW
BROWN (L)   (N) LIGHT BLUE

8120-2104 (2.0m)

OPTION 902   240V

LIGHT BLUE (N)   MALE SCHUKO   FEMALE CEE   (L) BROWN
GREEN/YELLOW (E)   (E) GREEN/YELLOW
BROWN (L)   (N) BLUE

NOTE: THE LIGHT BLUE (N) AND BROWN (L) WIRES TO THE MALE SCHUKO
         CONNECTOR MAY BE CONNECTED OPPOSITE TO THAT SHOWN   8120-1689 (2.0m)

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

Figure 2-3. Power Cords

OPTION 918   120V

MALE NEMA (MOLDED)   FEMALE CEE

BROWN (L)
GREEN/YELLOW (E)
BLUE (N)

(L) BROWN
(E) GREEN/YELLOW
(N) BLUE

(8120-4753 [GRAY, 2.3m])

OPTION 917   240V

MALE SABS 164   FEMALE CEE

GREEN/YELLOW (E)
LIGHT BLUE (N)
BROWN (L)

(L) BROWN
(E) GREEN/YELLOW
(N) BLUE

8120-4211 (2.0m)

OPTION 901   240V

MALE ASC-112   FEMALE CEE

LIGHT BLUE OR BLACK (N)
GREEN/YELLOW (E)
LIGHT BROWN OR RED (L)

(L) LIGHT BROWN OR RED
(E) GREEN/YELLOW
(N) LIGHT BLUE OR BLACK

8120-1369 (2.0m)

OPTION 900   240V

MALE BS 1363   FEMALE CEE

LIGHT BLUE (N)
GREEN/YELLOW (E)
LIGHT BROWN (L)

(L) LIGHT BROWN
(E) GREEN/YELLOW
(N) LIGHT BLUE

8120-1351 (2.3m)

OPTION 912   220V

MALE DANISH 90 DEG MDPP   FEMALE CEE

GREEN/YELLOW (N)
BLUE (E)
BROWN (L)

(L) BROWN
(E) GREEN/YELLOW
(N) BLUE

8120-2956 (2.0m)

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

Figure 2-3. Power Cords (continued)

2-10. HP-IB Interconnections

CAUTION

Do not connect or disconnect the HP-IB cable to the disc drive if the system is in an active state.

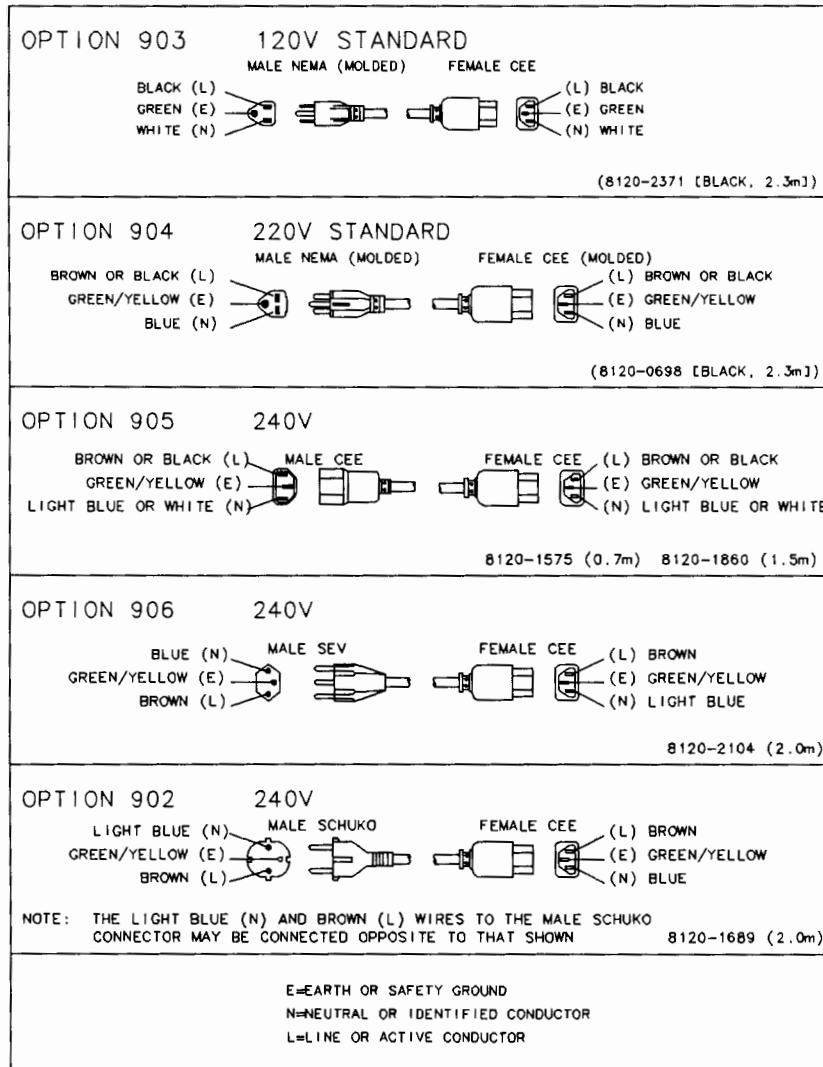Do not remove power from the disc drive if the system bus is in an active state.

HP-IB cables available from the Corporate Parts Center are listed below (lengths must be within load limits specified in next paragraph).

- HP-IB cable, 0.3 metre, right-angle connector, product no. 92220R
- HP-IB cable, 0.5 metre, product no. 10833D
- HP-IB cable, 1.0 metre, product no. 10833A
- HP-IB cable, 1.0 metre, right-angle connector, product no. 82977A
- HP-IB cable, 2.0 metre, product no. 10833B
- HP-IB cable, 2.0 metre, right-angle connector, product no. 82977B
- HP-IB cable, 4.0 metre, product no. 10833C

Cabling is limited to one metre per HP-IB load. Typically, the host system is seven equivalent loads and the disc drive is one equivalent load. In multi-drive systems, the HP standard allows seven metres of cable between the host and the nearest device, and one metre between each additional device. The maximum configuration is eight devices (not including the CPU) per HP-IB channel or a maximum of 15 metres or 15 equivalent loads (see figure 2-4). Refer to host configuration guides for any additional system limitations.
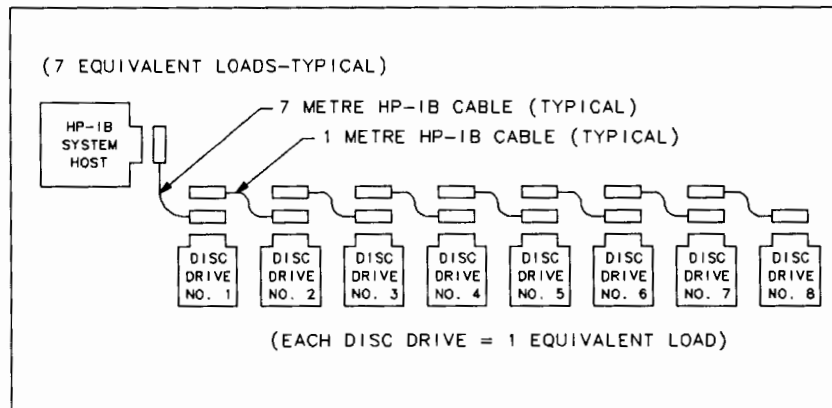
Figure 2-4. Connection to HP-IB

2-11. Preventive Maintenance

No regularly scheduled preventive maintenance is required.

2-12. Installation Considerations

Refer to the configuration section for information on HP-IB address settings and internal disc drive configuration.

Configuration 3

3-1. Introduction

This chapter contains information on setting both internal and external switches on the disc drive to determine disc drive configuration.

3-2. Host Systems Support

Table 3-1 lists the host systems that support the disc drive.

Table 3-1. Host System Support Matrix

HOST SYSTEM	VERSION SUPPORTED	COMMENTS
HP 9000 Series 200/300	BASIC 3.0 or later (see comments) Pascal 3.2 or later	BASIC 5.0 using HFS and con-figured as a single 40-Mbyte volume does not work. BASIC 5.1 corrects problem.
HP 9000 Series 300	HP-UX 5.5 or later	
HP Touchscreen II PC (HP 150C or HP 150 II)	MS-DOS 3.2, Rev E.01.02 or later	
HP 260	B.09 or later	
HP 1000 A-Series	RTE-A 5.0 or later	
HP 64100A / 64110A	Rev 2.09 or later	HP 9153C Options 010, 020, and 040 not supported. Must have Options 011, 021, or 041.
IBM Compatibles		

3-3. Disc Drive Configuration

3-4. ADDRESS Switch

The ADDRESS switch is a rotary switch with decimal numbers located on the rear panel of the disc drive (see figure 3-1). Configure the unit for the desired address as stated below.

ADDRESS switch = 0 through 7   HP-IB address of drive is the same as the switch setting.

                                      Hard disc= unit 0
                                      Floppy = unit 1

ADDRESS switch = 8 or 9   HP-IB address of the drive is 0.

                                      Hard disc = unit 1
                                      Floppy = unit 0

The ADDRESS switch is being used for more than just the HP-IB address of the device. It is being used to designate whether the flexible disc drive is unit 0 or unit 1. This was necessary for the HP 150 since certain versions could only boot from HP-IB address 0 and unit 0. Note that the actual HP-IB addresses are still numbers from 0 through 7. Addresses 8 and 9 are the same as address 0.
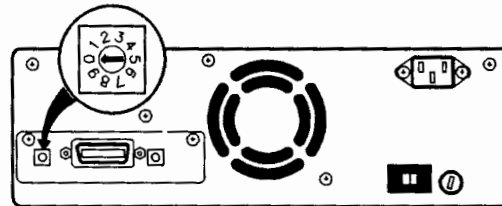

Figure 3-1. ADDRESS Switch

3-5. CONFIGURATION Switch

The CONFIGURATION switch is a rotary switch with decimal numbers located on the rear panel of the disc drive (see figure 3-2). This switch allows the user to divide the hard disc into multiple volumes. These volumes are physical volumes which can be formatted independently with different interleaves and can have different file systems on them. To use this feature, the host must support multiple volumes. If the host supports only a single volume, volume 0, then this feature is of no use and should be set to the one volume setting. The settings on the CONFIGURATION switch depend on the disc drive capacity. Tables 3-2 through 3-5 define the volumes settings. To set the CONFIGURATION switch, proceed as follows:

CAUTION

Existing data will be lost if you reformat or reinitialize the disc drive. Backup data before changing the CONFIGURATION switch.

a. Set the LINE~ switch to OFF (0) and disconnect the HP-IB cable.

b. Rotate the CONFIGURATION switch to the desired setting (see tables 3-2 through 3-5).

c. Connect the HP-IB cable and set the LINE~ switch to ON (1).

NOTE

When power is applied, the disc drive will perform a self-test for about 55 seconds. Upon completion of self-test, the disc drive waits until an attempt is made to access the disc. The disc drive will then illuminate the FAULT indicator and inform the host system that the media is not initialized and that a re-format is required. You must now format (initialize) the hard disc.

d. The FAULT indicator remains illuminated when a new hard disc mechanism is installed until the disc drive is re-formatted. After re-formatting, remove power from the disc drive, then apply power again to extinguish the FAULT indicator.
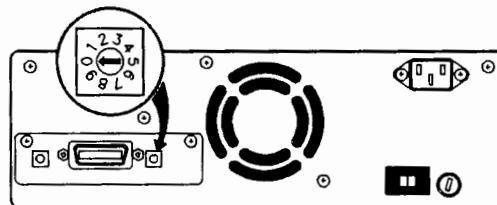
Figure 3-2. CONFIGURATION Switch

Table 3-2. Volume Configuration (10-Megabyte)

Setting	Number of Volumes	Volume Size (Mbytes/Vol)					
0	Allows re-initializing of existing volumes. At first, if you leave the switch at the factory setting of 0, the hard disc is initialized as one volume (it defaults to setting 1).						
1	One	10.0					
2	Two	5.0			5.0		
3	Three	3.32		3.32		3.32	
4	Four	2.49		2.49	2.49		2.49
5	Five	2.0	2.0	2.0	2.0		2.0
6	Six	1.66	1.66	1.66	1.66	1.66	1.66
7	Two	3.01		7.02			
8	Prevents writing to the *first* volume of the hard disc. Prevents accidental re-initializing of the hard disc.						
9	Prevents accidental re-initializing of the hard disc.						

Table 3-3. Volume Configuration (20-Megabyte)

Setting	Number of Volumes	Volume Size (Mbytes/Vol)					
0	Allows re-initializing of existing volumes. At first, if you leave the switch at the factory setting of 0, the hard disc is initialized as one volume (it defaults to setting 1).						
1	One	20.0					
2	Two	10.06			10.06		
3	Three	3.01	3.01	14.1			
4	Four	5.03		5.03	5.03		5.03
5	Two	5.03		15.09			
6	Six	3.35	3.35	3.35	3.35	3.35	3.35
7	Two	3.01		17.11			
8	Prevents writing to the *first* volume of the hard disc. Prevents accidental re-initializing of the hard disc.						
9	Prevents accidental re-initializing of the hard disc.						

Table 3-4. Volume Configuration (30-Megabyte)

Setting	Number of Volumes	Volume Size (Mbytes/Vol)					
0	Allows re-initializing of existing volumes. At first, if you leave the switch at the factory setting of 0, the hard disc is initialized as one volume (it defaults to setting 1).						
1	One	30.0					
2	Two	15.0			15.0		
3	Three	5.0	5.0	20.0			
4	Four	7.5		7.5	7.5		7.5
5	Two	10.0		20.0			
6	Six	5.0	5.0	5.0	5.0	5.0	5.0
7	Two	5.0	25.0				
8	Prevents writing to the *first* volume of the hard disc. Prevents accidental re-initializing of the hard disc.						
9	Prevents accidental re-initializing of the hard disc.						

Table 3-5. Volume Configuration (40-Megabyte)

Setting	Number of Volumes	Volume Size (Mbytes/Vol)					
0	Allows re-initializing of existing volumes. At first, if you leave the switch at the factory setting of 0, the hard disc is initialized as one volume (it defaults to setting 1).						
1	One	40.0					
2	Two	20.0			20.0		
3	Three	6.0	6.0	28.0			
4	Four	10.0		10.0	10.0		10.0
5	Two	10.0		30.0			
6	Six	6.6	6.6	6.6	6.6	6.6	6.6
7	Two	6.0	34.0				
8	Prevents writing to the *first* volume of the hard disc. Prevents accidental re-initializing of the hard disc.						
9	Prevents accidental re-initializing of the hard disc.						

3-6. Unit Select Switch Configuration

Each hard disc mechanism has a unit select switch which changes the drive unit number. The drive unit numbers should always be set for the position in which the disc mechanism is physically located. Drive 0 is always located at the front of the disc drive, drive 1 is always located toward the rear of the disc drive. See figure 3-3 for location and settings of the unit select switch.

DRIVE 0 POSITION   DRIVE 1 POSITION
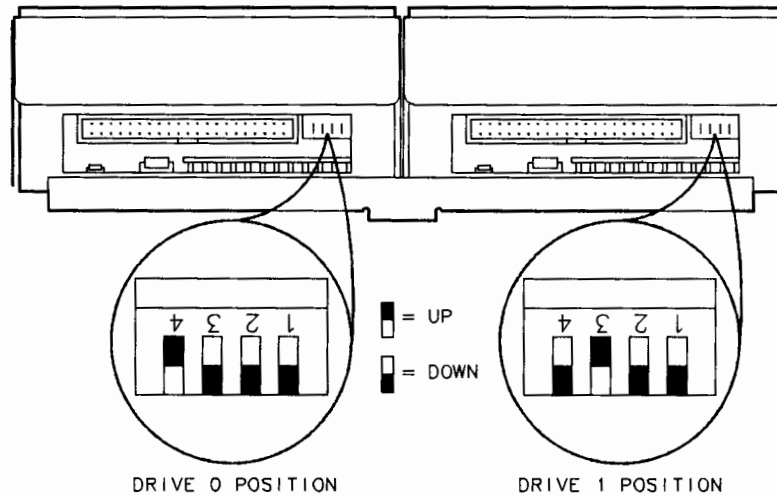
Figure 3-3. Unit Select Switch Settings

3-7. Disc Drive Configuration Jumpers

Jumper switch bank SW3 located inside the disc drive on the controller PCA (see figure 3-4) is used to set the disc drive configuration. These switches normally are changed only when adding an HP 9153M upgrade kit. At power up the firmware reads these switches to determine how many hard disc mechanisms and/or flexible disc mechanisms it should expect. The switch setting is active when pressed down. The different selections are as follows:

a. Switch 1 - Set to **FLOPPY** if you have a flexible disc mechanism in your disc drive (options 010, 020 or 040); set to **NO FLOPPY** if no flexible disc mechanism is installed (options 011, 021 or 041).

b. Switch 2 - Set for the TOTAL hard disc capacity of your disc drive. (EXAMPLE: You are adding 20-megabytes of hard disc storage to 10-megabytes of existing storage. Since total hard disc capacity after the upgrade is 30-megabytes, set switch 2 to the **10/30** position.)

c. Switch 3 - Also set this switch for the TOTAL hard disc capacity of your disc drive.

3-6

d. **Switch 4** - Should always be in the C position.

e. **Switch 5** - Should always be set in the **NORM** position except when executing built-in self-tests. Refer to chapter 5.
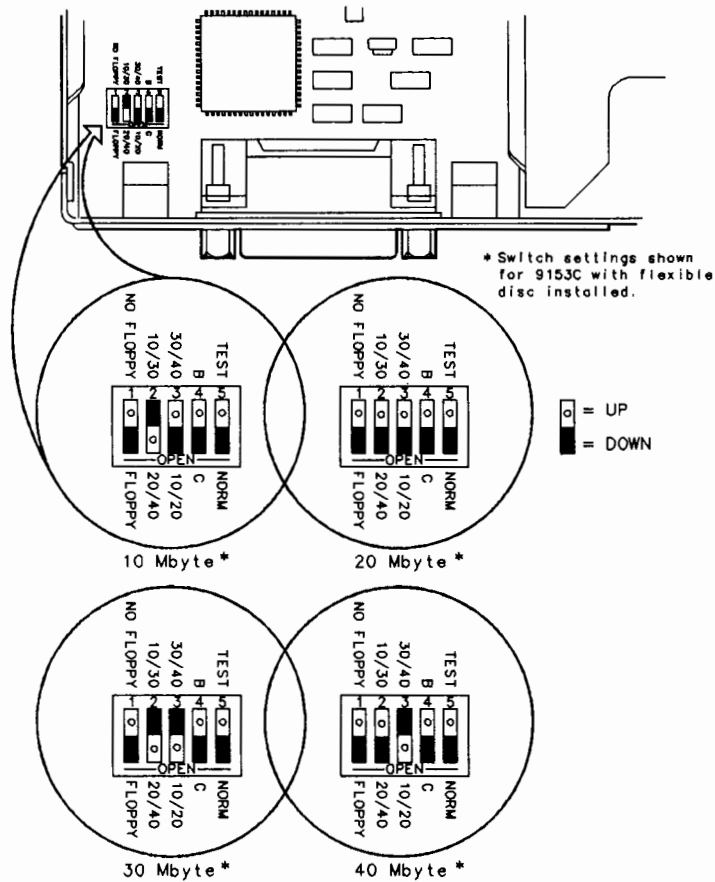
Figure 3-4. Jumper Switch Settings

3-8. Flexible Disc Mechanism Address Switch

The flexible disc mechanism has an address switch which is located on the right-hand side of the disc drive (see figure 3-5). This slide switch is set to position 0 at the factory, but can be in any position in the HP 9153C.

SWITCH WILL BE
TO THE RIGHT
(POSITION 0)
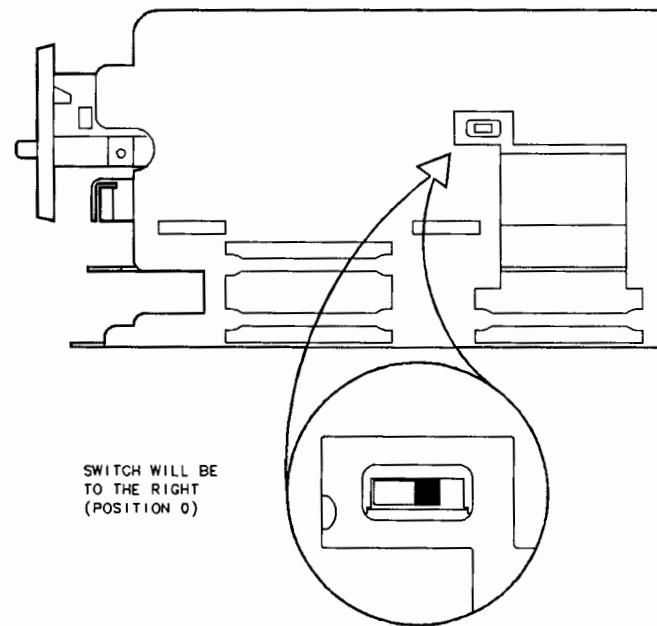
Figure 3-5. Flexible Disc Mechanism Address Switch

Troubleshooting 4

4-1. Assembly Location and Layout

| CAUTION |

Controller PCA-A2 in the disc drive is an electrostatic sensitive device. Take ap-
propriate precautions when removing this PCA from the disc drive. Use of an anti-
static pad and wrist strap is recommended. (These components are contained in the
anti-static work station, part no. 9300-0749.) Immediately after removal, store the
PCA in an anti-static, conductive plastic bags.

Location of assemblies and connectors is given in Chapter 9, Diagrams. Connector pin information for in-
ternal cabling of the disc drive is also included.

4-2. Power Supply Voltage

WARNING

With ac power applied, hazardous voltages are present on the power supply PCA.

Power supply voltages should be checked before any troubleshooting procedures are started. Figure 4-1
shows the location of power supply voltage test points. This will aid you in isolating the failure to a
replaceable assembly. The power supply is a non-exchange assembly.

| NOTE |

Electrical contact with the test points is not provided to both sides of the power sup-
ply PCA. Use the bottom side to assure good electrical contact.
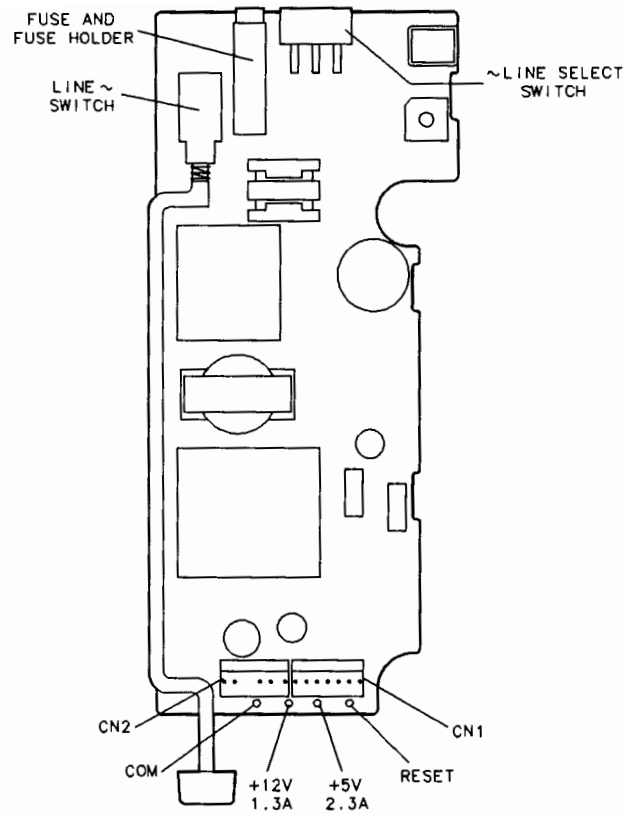
Figure 4-1. Power Supply PCA

4-3. General Troubleshooting

4-4. Power-on Self-test

Refer to chapter 5 for detailed information on diagnostics and selectable self tests.

Three indicators (see figure 4-2) show the status of the power-on self-test: the FAULT indicator, the ON LINE indicator, and the flexible disc access indicator. Operation of the indicators is described in the following paragraphs.
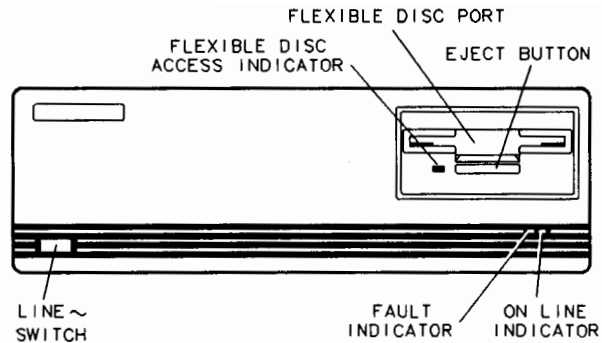
Figure 4-2. Front Panel Controls and Indicators

4-5. Self-test Passes

When power is applied to the disc drive, the FAULT indicator will illuminate during the entire self-test.

The ON LINE and flexible disc access indicators both blink on, then extinguish when power is applied. The ON LINE indicator illuminates during the hard disc portion of the self-test. The flexible disc access indicator illuminates during the flexible disc portion of the self-test.

When self-test is successful, all three indicators extinguish.

4-6. Self-test Fails

If self-test fails, one of four possible indications are displayed:

- Indicators never illuminate

- FAULT and ON LINE never extinguish (mechanisms do not spin up)

- FAULT blinks

- FAULT never extinguishes (mechanisms spin up)

The following paragraphs describe each situation.

4-7. Indicators Never Illuminate

If neither the FAULT or ON LINE indicators ever illuminate, the power supply PCA is most likely the problem. Also check the power cable to the controller PCA; replace the power supply PCA if there is no apparent problem with the cable. If this does not fix the problem, replace the controller PCA.

4-8. FAULT and ON LINE Never Extinguish

If the FAULT and ON LINE indicators (and possibly the flexible disc access indicator) immediately illuminate and never extinguish, the controller PCA is most likely the problem.

4-9. FAULT Blinks

If the FAULT indicator blinks, the blink sequence indicates the possible problem. The blink sequences are described in the following list:

- FAULT indicator illuminates 6 seconds, blinks off once, repeats - ROM checksum is wrong. Replace the ROMs.

- FAULT indicator illuminates 6 seconds, blinks off 2 times, repeats - Processor RAM is bad. Replace the controller PCA.

- FAULT indicator illuminates 6 seconds, blinks off 3 times, repeats - Buffer RAM is bad. Replace the controller PCA.

- FAULT indicator illuminates 6 seconds, blinks off 4 times, repeats - The configuration jumper switch settings (SW3) are set to an illegal configuration. Refer to chapter 3 for proper settings. The switches are located on the controller PCA and can be accessed by loosening the HP-IB panel on the rear of the disc drive.

- FAULT indicator illuminates 6 seconds, blinks off 5 times, repeats - The HP-IB chip is bad. Replace the controller PCA.

- FAULT indicator illuminates 6 seconds, blinks off 6 times, repeats - The processor may have failed; probably the TEST/NORM configuration jumper switch is set to TEST and performed a service test which passed.

- FAULT indicator illuminates 6 seconds, blinks off 7 times, repeats - The disc controller chip is bad. Replace the controller PCA.

4-10. FAULT Never Extinguishes

If self-test appears to complete but the FAULT indicator remains illuminated, the ON LINE and flexible disc access indicators provide information on which unit in the disc drive failed. This self-test failure occurs when one of the disc mechanisms in the disc drive fails.

The ON LINE and flexible disc access indicators display the following:

- Both indicators extinguished - hard disc failed (drive 0, front of disc drive)

- ON LINE indicator illuminated - hard disc failed (drive 1, rear of of disc drive)

- Flexible disc access indicator illuminated - flexible disc failed

After failing self-test, if the disc drive can come on-line it will allow the host to execute a "REQUEST STATUS" command to the disc drive. This command allows the disc drive to return failure information to the host. For information on selectable self tests, refer to chapter 5.

4-11. Flexible Disc

Defective flexible discs should be replaced immediately. Some problems associated with flexible discs are:

- Use of flexible discs (media) other than HP double-sided media, including HP single-sided media. Media from other vendors is NOT recommended. HP single-sided media should be used ONLY to exchange data with single-sided disc drives, do not use single-sided media consistently. Symptoms include visible wear of the flexible disc and a high-pitched sound from the flexible disc mechanism while the flexible disc is being accessed.

- Failure to initialize media or intermittent failures. May be caused by media residue accumulating on the flexible disc mechanism read/write heads. Clean the heads with a cleaning disc (HP part no. 09122-89415) and the HD_CLN routine in the SS/80 Exerciser SERVC module to exercise the flexible disc mechanism during the cleaning.

4-12. Flexible 3.5-Inch Mechanism

Field repair of the flexible disc mechanism is limited to head cleaning or replacement of the mechanism. The troubleshooting procedure is as follows:

a. When READ/WRITE problems occur with a particular flexible disc mechanism, clean the heads with the cleaning disc.

b. It is possible for a drive to pass all READ/WRITE tests, yet fail when reading a disc which has been initialized or written on by another drive. This type of failure can be caused by misalignment of the drive mechanism or of the PLL frequency.

   To determine which drive is misaligned, test with a disc that has been initialized and written on by a known-good drive.

c. When SEEK or HEAD-POSITION problems occur on a particular flexible disc mechanism, replace the mechanism.

d. If a flexible disc is damaged by the flexible disc mechanism, replace the mechanism.

4-13. Winchester 3.5-Inch Mechanism

Field repair of the hard disc mechanism is limited to replacement of the mechanism. If there is doubt whether the controller PCA or the hard disc mechanism is defective, substitute another controller PCA and, if not defective, replace it with the original controller PCA before replacing the hard disc mechanism.

CAUTION

The hard disc mechanism, HP part no. 45816-67111 (new) or 45816-69111 (exchange), is also used to repair the HP 45816A (internal disc mechanism in Vectra PC)

with serial number prefix 2552A or higher. However, if the drive is formatted in the HP 9153C Disc Drive it cannot then be used in an HP 45816A. The formatting process overwrites information on the hard disc required for use in the HP 45816A.

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 NOTE 
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If the hard disc mechanism is replaced, self-test will fail when power is applied to the disc drive. The disc drive must be initialized (or formatted) and have power cycled on and off before the disc drive will pass self-test.

4-14. Fan

If the fan is not operating, check primary power to the disc drive. Ensure that the ¯LINE SELECT switch on the rear panel is set correctly and the fuse on the rear panel is good. Check the power supply PCA voltages (see figure 4-1).

4-15. Detailed Troubleshooting Procedure

When troubleshooting the disc drive, the first thing to do is to determine if the fault is repeatable or intermittent. A repeatable fault usually causes the same failure each time self-test or a diagnostic test is performed. An intermittent fault, on the other hand, occurs at random intervals, and may not always cause a test failure.

In the case of a repeatable fault, the test will identify the failing assembly with a 95 percent certainty. In the event that more than one assembly is a possible cause of the failure, replace the assemblies one at a time, in the order indicated by the diagnostic error bytes.

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 NOTE 
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Cable faults (an open cable conductor, loose cable connector, etc.) may present a variety of failure indications. The failure shown will be an assembly at either end of the defective cable. All cables should therefore be checked before replacing any assembly.

Attempt to isolate the fault to a specific assembly by running self-test following the replacement of each assembly.

The following procedures refer to the troubleshooting flowchart shown in figure 4-3.

4-16. Procedure P1

Indicators never illuminate when power is applied.
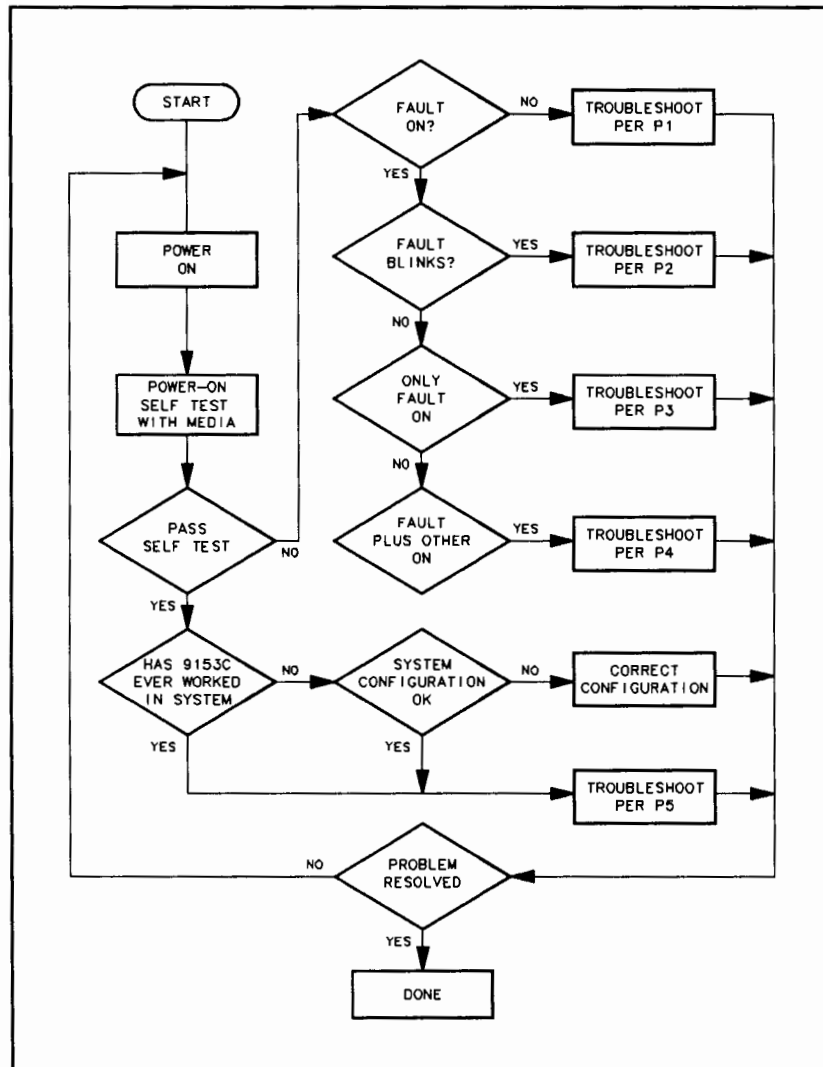
Figure 4-3. Troubleshooting Flowchart

a. Check ~LINE SELECT switch setting on rear panel.

b. Check fuse on rear panel.

c. Check cables and connections between power supply and mechanisms.

d. Check supply voltages on the power supply PCA (see figure 4-1).

e. Replace controller PCA if above steps do not correct problem.

4-17. Procedure P2

FAULT indicator blinks when power is applied.

INDICATION	PROBLEM
FAULT indicator on 6 seconds, blinks off 1 time, repeats.	ROM checksum wrong. Replace ROM or controller PCA.
FAULT indicator on 6 seconds, blinks off 4 times, repeats.	Configuration jumper switches set to illegal configuration. Set switches for correct configuration (refer to chapter 3).
All other FAULT indicator blink displays.	Controller fault. Replace controller PCA.

4-18. Procedure P3

Only FAULT indicator illuminated after self-test should be complete. Use this portion of the procedure if, during self-test, none of the disc mechanisms are accessed, the flexible disc mechanism is not accessed, or one of the two hard disc mechanisms is not accessed.

a. Ensure that a flexible disc is installed (options 010, 020, and 040 only).

b. Check supply voltages on the power supply PCA (see figure 4-1).

c. Ensure all cables are connected properly.

d. Ensure that the configuration jumper switch on the controller PCA is set correctly (refer to chapter 3).

e. Ensure that the configuration switches on each disc mechanism is set correctly (refer to chapter 3).

f. Replace the controller PCA.

g. If the problem persists, put the original controller PCA in the disc drive then replace the hard disc mechanism (drive 0).

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

If the hard disc mechanism is replaced, self-test will fail when power is applied to the disc drive. The disc drive must be initialized (or formatted) and have power cycled on and off before the disc drive will pass self-test.

Use this portion of the procedure if ALL drives are accessed during the self-test.

It is possible that either the controller PCA or hard disc mechanism can cause this problem. The hard disc and flexible disc mechanisms use some different circuits on the controller PCA, and it is not always clear whether the controller or the drive is causing a problem related to apparent failure of a mechanism.

a. Set the configuration jumper switch on the controller PCA to the FLOPPY position and repeat the power-on self-test. If self-test passes, replace the flexible disc mechanism and return the FLOPPY/NO FLOPPY switch to its original position.

b. If the problem persists, return the FLOPPY/NO FLOPPY switch to its original position and replace the controller PCA.

c. If the problem persists, put the original controller PCA in the disc drive then replace the hard disc mechanism (drive 0).

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

If the hard disc mechanism is replaced, self-test will fail when power is applied to the disc drive. The disc drive must be initialized (or formatted) and have power cycled on and off before the disc drive will pass self-test.

4-19. Procedure P4

FAULT indicator and either ON LINE or flexible disc access indicator illuminates.

The controller PCA is the most probable defective assembly. Replace the controller and perform self-test again. If problem persists, replace the hard disc mechanism (drive 1) if the ON LINE indicator is illuminated, or replace the flexible disc mechanism if the flexible disc access indicator is illuminated.

4-20. Procedure P5

Passes power-on self-test, but failure in system.

If the flexible disc mechanism fails:

a. Determine if HP double-sided media is being used. Media from from other vendors is NOT recommended. Some media, including HP single-sided media, will not perform properly if used consistently in the HP 9153C. Symptoms include visible wear of the flexible disc and a high-pitched sound from the flexible disc mechanism while the flexible disc is being accessed. The heads in the flexible disc mechanism may require cleaning before HP double-sided media will perform properly. Clean the heads with a cleaning disc (HP part no. 09122-89415) and the HD__CLN routine in the SS/80 Exerciser SERVC module to exercise the flexible disc mechanism during the cleaning.

b. Failure to initialize media or intermittent failures. May be caused by media residue accumulating on the flexible disc mechanism read/write heads. Clean the heads with a cleaning disc (HP part no. 09122-89415) and the HD_CLN routine in the SS/80 Exerciser SERVC module to exercise the flexible disc mechanism during the cleaning.

c. Verify the problem by using service self-test #4 (refer to chapter 5) on a customer data disc if read problems are occurring. This test will verify but does not change data.

d. Format a scratch disc using service self-test #5 (refer to chapter 5), then check read/write performance using service self-test #3.

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 ┌──────────┐
 │   NOTE   │
 └──────────┘
```

Service self tests #4 and #5 will continue to loop until an error is detected, the test will then end and the FAULT indicator will remain illuminated.

e. Replace the flexible disc mechanism if a problem is indicated.

f. If problem persists, replace the original flexible disc mechanism in the disc drive then replace the controller PCA.

If the hard disc mechanism(s) fails:

a. Attempt to verify that the problem is the hard disc mechanism using service self-test #7 (refer to chapter 5).

b. If service self-test #7 does not indicate a problem, replace the controller PCA.

c. If the problem persists, put the original controller PCA in the disc drive then replace the hard disc mechanism. If the disc drive contains two hard disc mechanisms, replace one mechanism; if the problem persists, put the original mechanism in the disc drive and replace the other mechanism.

```
 ┌──────────┐
 │   NOTE   │
 └──────────┘
```

If the hard disc mechanism is replaced, self-test will fail when power is applied to the disc drive. The disc drive must be initialized (or formatted) and have power cycled on and off before the disc drive will pass self-test.

If none of the disc mechanisms can be accessed:

Replace the controller PCA.

4-21. Repair Verification

After repair of the product, verify proper operation of the disc drive. If the test is on the flexible disc mechanism, format a disc using either a host computer which supports the disc drive, the SS/80 Exerciser, or service self-test #5 (refer to chapter 5). If the SS/80 Exerciser is available, the R/W_TEST module can be used to loop on a write/read test. Service self-test #5 formats a flexible disc, and will continue to

loop on that test until the test fails. This provides a way to exercise the disc drive without operator intervention.

If the repair is on the hard disc mechanism and no customer data is on the disc, the repair can be verified by formatting the disc. If the disc has been divided into volumes, each volume must be formatted. If customer data must be saved on the disc, the R/W__TEST module in the SS/80 Exerciser provides a read-only test which will not affect customer data. Service self-test #7 (refer to chapter 5) also provides a verify test which will not affect customer data, and allows the test to execute continuously until an error is detected.

If the repair is on the controller, repair can be verified by performing write and read operations on all mechanisms in the disc drive.

Diagnostics 5

5-1. Diagnostic Tools

The following diagnostics are available for detecting problems:

- Power-on self-test

- Selectable self-tests

- SS/80 Exerciser

5-2. Power-on Self-test

A series of tests are performed each time power is applied to the disc drive. Refer to chapter 4 for a description of the power-on self-test and indicator displays.

5-3. Selectable Self-tests

There are nine selectable self-tests available. Refer to table 5-1 for a description of the self-tests. Perform the tests as follows:

5-4. Performing Selectable Self-tests

To perform the tests, set the ADDRESS switch on the rear panel to the desired test number, and set the TEST/NORM configuration jumper switch located on the controller PCA to the TEST position (switch down). This will run the test continuously. To run the test once, simply set the TEST/NORM switch to the NORM position. When the current test completes, the selected self-test will halt.

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NOTE
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> Because the RAM test clears all parameters, some of which are needed for other tests, do not switch arbitrarily from test to test. The RAM test should be run either first or last. After each RAM test the unit goes through its power-on sequence.

The following is an example of running the RAM test as the first test performed.

a. Set the LINE‾ switch to OFF (0).

b. Select the RAM test (0 on the ADDRESS switch) and set the TEST/NORM configuration jumper switch to the TEST position.

Table 5-1. Selectable Self Tests

ADDRESS SWITCH SETTING	TEST TIME*	TEST DESCRIPTION
0 (RAM)	2 s	All possible patterns are written in all locations of the micro-processor RAM.
1 (ROM)	3 s	A checksum calculation is performed.
2 (Controller)	3 s	Tests HP-IB chip, controller chip, and buffer RAM.
**3 (Floppy test)	3 s	Flexible disc mechanism seek test, speed test, and read/write/compare on the system cylinder.
**4 (Floppy verify)	40 s	All sectors in the data area of the disc are checked for CRC errors. No user data is affected.
**5 (Floppy format)	Up to 3.5 min.	Formats the flexible disc (double-sided, 256 byte sectors). Will fail if disc is write-protected or too many bad sectors.
6 (Hard disc test)	˜5 to 10 min.	Performs two different seek tests, hard disc mechanism read/write/compare.
7 (Hard disc verify)	Up to 4 min.	All sectors in the data area of volume 0 are checked for CRC errors. No user data is affected. Execution time depends on capacity.
8 (Connect)	3 s	Checks to determine if the hard disc mechanism is connected.
9 (ECC)	3 s	Checks that the error correction code circuitry is working properly.

*If selected test is performed from power-on, allow additional time for self test to complete.
** If a "floppy" test is selected on an Option 011, 021, or 041 disc drive, the test will fail.

c. Set the LINE˜ switch to ON (1). The disc drive will perform the power-on self-test, then begin executing the RAM test. The FAULT indicator remains illuminated during the test. When the test is completed, the FAULT indicator should blink 5 times. If the FAULT indicator remains illuminated continously, the test failed and will halt. Remove power to exit this state.

d. Set the LINE˜ switch to OFF (0). Select the next test using the ADDRESS switch. Do NOT select the RAM test (test 0).

e. Set the LINE˜ switch to ON (1). The disc drive will perform all or part of the power-on self-test, then begin the specified test. Again, when the test completes, the FAULT indicator should blink 5 times. If it does not, the test failed and power must be removed to exit this state. The disc drive automatically repeats the test until another test selection is made or until power is removed from the disc drive.

More tests may be selected, as needed (except Test 0 - RAM test, and Test 3 - floppy test) without removing power. There is a delay after the selection of a test until execution of the test is begun.

5-5. FAULT Indicator Operation

The FAULT indicator will go on for one second (to show that it works) at the beginning of each test. The indicator will then illuminate during the length of the test. A pass indication is displayed by the FAULT indicator blinking 5 times. A failure is displayed by the FAULT indicator remaining illuminated.

$$\boxed{\textbf{CAUTION}}$$

A flexible disc must be inserted in the drive to perform tests 3, 4, and 5. Ensure that the disc is an initialized scratch disc and that it is not write protected.

5-6. SS/80 Exerciser

The Subset 80 (SS/80) Exerciser provides the capability to transfer data and commands between a host computer and the disc drive, and to perform tests which cannot be implemented in other ways.

The exerciser consists of the SS/80 Diagnostic Tape, part no. 5010-0310 and the *SS/80 Exerciser Manual*, part no. 5958-4142. Error codes returned by the exerciser are listed in table 5-2.

5-7. Exerciser Tests

Some general testing solutions which can be implemented using the Exerciser are as follows:

HP-IB channel test	The LOOPBAK module in the SERVC program tests the capability to communicate with the product across the HP-IB.
Testing for R/W errors	The R/W__TEST module allows either a Read Only, or a Write Then Read test to be performed on a single unit. This test can be set to loop up to 32,000 times and allows extensive testing to identify a problem or verify a repair.
General product evaluation	The R/W__TEST module provides capability to perform general product testing and is recommended for this use.
Flexible disc tests	The SERVC module contains special flexible disc mechanism tests, including motor speed, Track 0, head cleaning routine, and others. Refer to paragraph 5-8 for more information.
Complete product evaluation	The OPER program provides the capability to test all units and volumes of a disc drive without manually selecting each one. An OPER program can be defined which will select each unit and volume, then perform a locate and verify, locate and read, locate and write, etc. The program will allow looping to perform extensive testing.

5-8. SERVC Program

This program identifies all active SS/80 devices on the HP-IB and indicates all device addresses at which an SS/80 device is present. If more than one device is on the bus, the user must select which device to test.

The user is requested to select an output device, either display or printer. It is recommended that the printer be used to assure that all data is available for analysis.

The program displays the following three sets of softkeys:

- **SET 1**

MORE   Display SET 2 of softkeys.

UNIT   Set "Unit" number. The user is requested to enter the desired unit number.

VOLUME   Set "Volume" number. The user is requested to enter the desired volume number.

EXIT   Exit from the program.

DESCRIB   Execute the Describe command on the current unit and volume. (This can be executed on Unit 15, the controller, but will be more useful if executed on a flexible or fixed disc unit and volume.)

LOOPBAK Execute an HP-IB test.

DIAG   Execute the power-on self-test routine.

REQSTAT   Read status from the disc drive.

- **SET 2**

MORE   Display SET 3 of softkeys.

INIT   Initialize media.

MTR__SPD Check the speed of the motor on a flexible disc. The time required for one revolution of the disc is output. (You must use the UNIT command to select the flexible disc for this command to be displayed on soft keys.)

TRK__0   The Track 0 detector of a flexible disc is checked. (You must use the UNIT command to select the flexible disc for this command to be displayed on soft keys.)

WEAR__CT The log of head-loaded revolutions of a 3.5-inch flexible disc is read. The log of both single-sided and double-sided media can be read. (You must use the UNIT command to select the flexible disc for this command to be displayed on soft keys.)

HD__CLN   The head is loaded and moved across the surface of a cleaning disc for approximately 20 seconds. (You must use the UNIT command to select the flexible disc for this command to be displayed on soft keys.)

- **SET 3**

MORE   Display SET 1 of softkeys.

AMCLEAR   Execute Amigo Clear command.

CICLEAR   Execute Channel Independent Clear command.

EXIT   Exit from the program.

RW__TEST Load the RW__TEST program.

OPER   Load the OPER program.

HELP   Display HELP information for the SERVC program.

5-9. Status Error Information

The *SS/80 Exerciser Manual* specifies the meaning of each bit in the status byte. Bytes P7 through P10 are always reserved for device specific information. Except for an Initiate Diagnostic command or following power-on, the flexible disc mechansism uses P7 through P10 to store the error codes listed in table 5-2. The error codes are stacked, with byte P7 being the most recent error.

Table 5-2. Error Codes

HEX CODE	DESCRIPTION
01	Division by zero
02	No sector pulse was seen
03	Could not find target track
04	Servo samples vary too much
05	Cannot locate a track center
06	FAULT pulled high on cable
07	Only one recalibrate per seek
08	Error in seeking during format
09	Recalibrate failed in seek
0A	27000 microsteps done to inside diameter
0B	Probably at outside diameter
0C	Cannot reach 2000 revolutions per minute
0D	After 2000 revolutions per minute reached
0E	PERFORM__HEROICS routine failed
0F	Greater than 3000 revolutions per minute
10	FIND__INSIDE__TRACK routine failed twice
11	27000 microsteps done to outside diameter
12	Head not correct in verify
13	Microsteps exceeded in restore
14	Bounds error while seeking
15	Cannot pass NEW__RECAL in five tries
16	Fine servo failed in SEEK INIT
17	Fine servo failed in NRECAL
18	There were too many moves in N__STEP__CYL
19	Failure to build the seek table properly
1A	Did not find head skew track to take measurement
20	Fault detected in CHECK__FAULT
21	Did RECAL during seek
22	First try to find first track failed
23	In CONTROL__SPEED routine
24	In PERFORM__HEROICS routine
25	In LOOK4__SPEED routine
26	In FIND__GBAND routine
27	In FIND__DBAND routine
28	In FIND__INSIDE__TRACK routine
29	PERFORM__HEROICS routine called
2A	Seek tables were rebuilt
2B	Did RECAL or RESTORE to get back 0
2C	Could not get a header off the disc
2D	Non-clearable fault occurred
2E	Did not hit target track
2F	Started stepping by one microstep

Table 5-2. Error Codes (continued)

HEX CODE	DESCRIPTION
30	Started nanostepping inside fine servo
31	Did a RECAL because restore failed
32	Did a retry on N_RECAL in N_PUNIT_DIAG
40	Failed the seek to the start of the volume to be formatted
41	Failed the FORMAT TRACK routine
42	Failed the NEXT CYLINDER routine
43	Failed the RESTORE routine before starting the format
44	Failed the SEEK routine
45	Failed to write the INFO table during format
46	Failed to write the SPARE table during format
47	Got too many MISSED SEEKS CHECKING CYLS after format
48	Rebuilding the SEEK table failed after format
49	Required RESERVO during the INIT TRACK routine
4A	RESERVO failed during the INIT TRACK routine
4B	Timeout waiting for the next bit to go active
4C	Timeout waiting for the next bit to go away
4D	Timeout waiting for the busy bit to go away
4E	Read address on RECAL TRACK failed; unformatted disc assumed
4F	Timed out waiting for a header match; background read
50	Seek to the self test cylinder failed
51	The data written did not compare with the data read
52	There were more than five bad sectors on the self test cylinder
53	Miscompare of data in buffer RAM
54	The ECC was not written correctly
55	The sector with an error introduced read O.K.
56	Too many bad sectors; the ECC test could not complete
57	Read address failed in background read
58	Read address failed; reinitialize the disc
59	Some Flintlock Disc Controller (FDC) status error bit set; fast loop of BG_READ
5A	Time out waiting for FDC to become Not Busy
5B	Some FDC error bit set; last sector on track, BG_READ
5C	Spare table has been corrupted; cleared table
5D	Write to INFO table at start of format failed
5E	Initialize options 1 and 2 not allowed; multi-volume drive
5F	Factory Spare table sector is bad; ECC errors
60	Controller chip never became Not Busy
61	Good read during correction, so no correction done
62	Bad long reads or syndromes do not compare
63	Abort command because of inbound CLEAR or CMD PHASE SEC
64	Got next bit, but timed out while waiting for Busy
65	Retry count expired while waiting for header match
66	WRITE KEY routine failed during format
67	Error too long to correct
68	Error correction was used and was successful

Table 5-2. Error Codes (continued)

HEX CODE	DESCRIPTION
69	Data in INFO sectors is not ours
6A	Seek to system cylinder failed
6B*	Number of good sectors is too small; parameter byte P1=number
6C	Non-secondary inbound byte caused host interrupt
6D	AMIGO CLEAR secondary was received (look for error code F3)
6E	Bad servo sample, measurements taken in WAIT__FDC
6F*	Verify error; byte P1 lists sector attempting to verify
70	The next location is greater than 64, which is impossible
71	Algorithm error
72	Time out error
73	The FDC went Not Busy
74	The disc drive went Not Ready
75	More than six spares on one track; set unit fault
76	First two bytes of factory spare sector were not correct
77	10/20 disc drive capacity identifier was not 10 or 20
78	More than 84 entries in Factory Spare table
79	Failed to add factory spare to RAM Spare table
7A	Tried to set an error bit greater than 59; outside range
7B	Never saw the next bit during a write
7C*	Bad servo sample found while waiting for header
7D*	Bad servo sample found in the module listed in byte P1
7E	This is not an INFO table written by the factory
7F	Data recovered after track center moved to 22H
80	Write/Read test was not performed; no system cylinder
81	Did a retry on the write
82	The read was successful, a compare will be done
83	Did a retry on the read
84	Data recovered after track center was moved to 5EH
85	Sector autospared successfully
86	Autosparing failed, data not spared, bad spare removed
87	After reading a spare, seek back to track failed
88	Retry count expired waiting for header match
89	Two sectors read from system cylinder, but data did not match
8A	Missed next bit, chip became NOT__BUSY, no error
8B	Could not do a write, sector needs sparing
90	DMA module outputted fail during a write
91	Retry count expired while waiting for header match
92	The Spare table is full
93	Large Spare table has too many spares on one track
94	Large Spare table is full
95	Seek to cylinder failed; could not do writes
	*Note: These error codes have a specific parameter byte (P1) added to the error message.

Table 5-2. Error Codes (continued)

HEX CODE	DESCRIPTION
96*	Servo problems while verifying sector, byte P1=servo sample
97	Failed stepping in or out
98	Writing Spare table to system cylinder failed
99	Attempting to add an entry to the Spare table failed
9A	The Spare table is full
9B	Seek to system cylinder failed
9C*	Trouble writing Spare table to system cylinder
9D	Writing a sector on self test or system cylinder failed
9E	Seek to system cylinder failed
9F	Could not find two sectors which matched on system cylinder
A0	Read on system cylinder failed
A1	Unable to find two matching sectors on system cylinder cleared
A2	Unable to find two matching sectors on system cylinder cleared
A3	Sector which needed sparing was spared during write
A4*	Busy bit did not go away after abort command; byte P1=FDC
A5*	Timed out while waiting for BUSY bit; byte P1=FDC status
A6*	CRC bit was set; byte P1=FDC status
A7	Went to NOT_BUSY without going to 1
A8*	Abort bit was set in FDC chip; byte P1=FDC status
A9	The disc drive became Not Ready
AA	Retry count expired with no header match found
AB	The disc drive became Not Ready during a write
AC	Sector to put into table was too big
AD	Retries done during write; write is O.K.
AE	Some FDC error set; the drive is in the fast loop
AF	Seek Verify failed in doing a write
B0	Location code for new spare was too large
B1	Could not find the track in Seek Verify module
B2	Read address failed in Seek Verify
B3	Seek failed in Seek Verify
B4	Restore failed in Seek Verify
B7	All pulses issued, still not at track 0
B8	Timed out without drive being Ready
B9*	Byte P1 has the number of spare tracks available; 4 = all available
BC	Tried to clean up more buffers than asked for
BE	Out of buffer space
BF	Timed out while waiting for SEEK COMPLETE
C0	Going to read a spared sector
C1	Retry count expired and still no header match
C2	Drive became Not Ready
C3	Nighthawk Integrated Controller (NIC) fault occurred while writing
	*Note: These error codes have a specific parameter byte (P1) added to the error message.

Table 5-2. Error Codes (continued)

HEX CODE	DESCRIPTION
C4	Clear or processor handshake abort was set
C5	Too many bytes passed for partial sector
C6	Early EOI
C7	Input to this module is not an allowed choice
C8	Module addressing error
C9	Terminated early with a byte not an EOI or secondary
CA	Length + target > MAX_ADDRESS; length wrong
CB	Terminated early with a secondary
CC	No EOI on last byte; expect to see C9 next
CD	DMA is busy but all bytes are in for last full sector
CE	A write fault was detected in WRITE_SECTOR module
CF	The volume switch is broken; number is greater than 9
D0	Exceeded length of partial sector after disabling DMA
D1	Failure reported by NEXT_TRACK or PREVIOUS_TRACK
D2	STP_HD_OUT routine failed; physical head was 0
D4	Protected code; not available to service personnel
D5	Protected code; not available to service personnel
D6	Protected code; not available to service personnel
D7	Protected code; not available to service personnel
D8	Protected code; not available to service personnel
D9	Read address to synchronize to physical sectors failed
DB	Got the next bit, but timed out while waiting for NOT BUSY
DC	Status error bit set on controller chip after EAD
DD	Retry count exceeded the waiting for header match
DE	Reached the end of the volume; no error
DF	Got the next bit but timed out waiting for NOT BUSY
E0	Failed seek back to original track
E1	The Seek Verify failed in this module
E2	Problems servoing
E3	Data recovered in first set of retries
E4	Data recovered after stepping head in, then back out
E5	Data recovered after stepping head out, then back in
E6	Data was recovered after microstepping
E7	Data was recovered after error correction
E8	No autosparing needed, data recovered easily
E9	Autosparing module called, data recovered with difficulty
EA	Seek or read address failed
EB*	Servo problems in LOC_VERIFY; byte P1=adjusted sample
EC	Retry count expired while waiting for a header match
ED	Got the next bit, but timed out while waiting for NOT_BUSY
EE	Did a seek for an off track spare; verify failed
EF	Firmware problem; must be corrected

*Note: These error codes have a specific parameter byte (P1) added to the error message.

Table 5-2. Error Codes (continued)

HEX CODE	DESCRIPTION
F0	The microprocessor RAM failed
F1	Did not get correct secondary
F3	Had to sink bytes at the top
F5	Got processor HANDSHAKE ABORT bit set
F6	Got processor HANDSHAKE ABORT bit set
F7	Got processor HANDSHAKE ABORT bit set
F8	Got processor HANDSHAKE ABORT bit set
F9	Got processor HANDSHAKE ABORT bit set
FA	Got processor HANDSHAKE ABORT bit set
FB	Got processor HANDSHAKE ABORT bit set

Adjustments 6

No operating or maintenance adjustments are required.

Peripherals 7

This chapter is not applicable to these products.

Replaceable Parts 8

8-1. Introduction

This chapter provides listings of all field-replaceable parts and an illustrated parts breakdown for the disc drive. Replaceable parts ordering information for the disc drive is also provided in this section.

8-2. Major Replaceable Assemblies

Table 8-1 lists recommended spare parts for normal repair.

Table 8-1. Recommended Product Support Package

PART NO.	QTY.	DESCRIPTION
09153-69201	1	3. 5-inch Flexible Disc Drive (exchange)
09153-69511	1	Controller PCA (exchange)
45816-69111	1	3. 5-inch Winchester Disc Drive (exchange)
09153-67110	1	Power Supply (nonexchange)
09153-61603	1	Flexible Disc Drive Controller Cable (nonexchange)
09153-60605	1	Power Cable (nonexchange)
09153-61606	1	Winchester Disc Drive Controller Cable (nonexchange)
2100-0003	5	Fuse, 3. 0 AF, 250 Vac, (115V Setting)
2110-0787	5	Fuse, 1. 6 AF, 250 Vac, (230V Setting)
9300-0794	1	Anti-static Workstation
8710-1426	1	TORX* Field Kit
09122-89415	1	Head Cleaning Disc

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

8-3. Hard Disc Mechanism Return

A defective hard disc mechanism being returned to the factory must be packaged and shipped in Hewlett-Packard shipping material or the warranty will be void.

8-4. Removal and Replacement Notes

8-5. ROM Replacement

If an upgrade or replacement of the ROM (11, figure 8-1) is ever necessary, ensure that you observe all electrostatic discharge precautions while removing and handling the controller PCA.

8-6. Torque Specifications

To ensure that the disc drive adheres to radio frequency interference (RFI) specifications, tighten all screws as specified in table 8-2.

Table 8-2. Screw Torque Specifications

LOCATION	INDEX NO. (Figure 8-1)	SIZE	TORQUE (in./lbs)
Power supply PCA to chassis	26	T20	18
Power cord receptacle to rear panel	34	T20	13.5
Power cord receptacle ground wire to chassis	34	T20	18
Chassis support bracket to chassis	36	T20	18
Fan to chassis	13	T20	13.5
HP-IB panel to controller PCA	9	9/32	7
HP-IB panel to chassis	7	T20	18
Hard disc plate to hard disc	18	T10	7.5
Drive plate to flexible disc	24	T10	7.5
Hard disc plate to chassis support bracket	17	T20	18
Drive plate to chassis support bracket	22	T20	18
Top cover and front panel to chassis	2 and 3	T20	16

8-7. Removal and Replacement

Removal and replacement instructions for field-replaceable assemblies (FRA's) and parts in the disc drive are provided in the following paragraphs. Unless otherwise specified, replacement is a reversal of the removal instructions.

8-8. Top Cover

To remove the top cover (1, figure 8-1), proceed as follows:

a. Set the LINE~ switch to OFF (0) and disconnect the power cord.

b. Disconnect the HP-IB cable(s) and power cord.

c. Remove the two T20 screws (2, figure 8-1) from the top corners on the rear panel of the disc drive.

d. Place the disc drive on one side, then remove the three T20 screws (3) at the bottom of the front panel.

e. Place the disc drive upright, then push the top cover toward the front of the disc drive until the top cover can be removed.

f. Ground the chassis (38) of the disc drive to the anti-static workstation. Observe all electrostatic discharge (ESD) precautions.

Torque Specification: Tighten the two T20 screws (2) removed in step c and the three T20 screws (3) removed in step d to 16 in./lbs.

Installation is the reversal of this procedure. Check that the LINE~ switch operates freely before install-ing any screws.

8-9. Front Panel

To remove the front panel (4, figure 8-1), proceed as follows:

a. Remove the top cover (refer to paragraph 8-6).

b. Use a flat blade screwdriver to CAREFULLY pry the tabs on the top cover just enough to free the front panel. Free both sides of the front panel first, then the top.

c. Pull the front panel away from the top cover.

To install the front panel, align the panel to the top cover, then push the front panel until the tabs lock in place.

8-10. Controller PCA-A1

To remove controller PCA-A1 (6, figure 8-1) from the disc drive, proceed as follows:

a. Remove the top cover (refer to paragraph 8-6).

| CAUTION |

Ground the chassis (38) of the disc drive to the anti-static pad. Observe all electros-tatic discharge (ESD) precautions while handling the controller PCA. Damage to the controller PCA may result if the PCA is not handled properly.

b. Remove the two T20 screws (7) which secure the HP-IB panel to the rear panel.

c. Disconnect the hard disc mechanism ribbon cable (19) from the controller PCA (6).

d. Disconnect the power supply cable (32) from the controller PCA.

e. Disconnect the flexible disc mechanism ribbon cable (20) from the controller PCA.

f. Slide the controller PCA out the rear of the disc drive.

Torque Specification: Tighten the two T20 screws (7) removed in step b to 18 in./lbs.

Reinstallation is a reversal of the removal procedure. Ensure that the cable connectors disconnected in steps c through e are firmly seated in their mating connectors.

8-11. Fan

To remove the fan (12, figure 8-1) from the disc drive, proceed as follows:

a. Remove the top cover (refer to paragraph 8-6).

b. Disconnect the fan power cable from its connector on the power supply PCA (25). It may be necessary to carefully pry loose the cable connector using a flat-blade screwdriver.

c. Remove the two T20 self-tapping screws (13) which secure the fan to the rear panel.

d. Remove the fan from the disc drive. Ensure that the fan power cable does not catch inside the disc drive chassis.

Torque Specification: Tighten the two T20 screws (13) removed in step c to 13.5 in./lbs.

Installation is the reversal of this procedure. Position the fan with the manufacturer's label toward the rear and the fan power cable channelled toward the bottom and near the power supply PCA. Also, ensure that the fan power cable is firmly seated in its connector on the power supply PCA. Before returning the disc drive to use, check that the fan is operating correctly (air flow is out the rear of the disc drive).

8-12. Hard Disc Mechanism

CAUTION

A defective hard disc mechanism being returned to the factory must be packaged and shipped in the proper Hewlett-Packard shipping container. Failure to use the proper container will void the warranty.

To remove a hard disc mechanism (14, 15, figure 8-1) from the disc drive, proceed as follows.

a. Remove the top cover (refer to paragraph 8-6).

b. Disconnect the hard disc mechanism ribbon cable (19) from the controller PCA (6).

c. Remove the T20 screw (17) which secures the hard disc plate (16) to the chassis support bracket (35).

d. Slide the hard disc plate toward the power supply until it stops, then lift the side with the mounting tab upward and away from the chassis to remove the mechanism.

e. If you desire to further remove a hard disc mechanism from the hard disc plate, disconnect the ribbon cable (19) from the mechanism, then remove the four T10 screws (18) which secure the disc mechanism to the hard disc plate.

Torque Specification: Tighten the two T20 screws (17) removed in step e to 18 in./lbs and the four T10 screws (18) removed in step e to 7.5 in./lbs.

Reinstallation is a reversal of the removal process. Ensure that the cable connector disconnected in step b is firmly seated in its mating connector.

8-13. Flexible Disc Mechanism

CAUTION

A defective flexible disc mechanism being returned to the factory must be packaged and shipped in the proper Hewlett-Packard shipping container. Failure to use the proper container will void the warranty.

To remove the flexible disc mechanism (21, figure 8-1) from the disc drive, proceed as follows.

a. Remove the top cover (refer to paragraph 8-6).

b. Disconnect the hard disc mechanism ribbon cable (19) from the controller PCA (6).

c. Disconnect the flexible disc mechanism ribbon cable (20) from the controller PCA.

d. Remove the T20 screw (22) which secures the flexible disc drive plate (23) to the chassis support bracket (35).

e. Slide the flexible disc mechanism toward the rear panel until it can be lifted from the disc drive.

f. If you desire to further remove a flexible disc mechanism from the drive plate, disconnect the ribbon cable (20) from the flexible disc mechanism, then remove the four T10 screws (24) which secure the disc mechanism to the drive plate.

Torque Specification: Tighten the T20 screw (22) removed in step d to 18 in./lbs and the four T10 screws (24) removed in step f to 7.5 in./lbs.

CAUTION

Before tightening the screw removed in step d, fit the top cover to the disc drive to ensure proper forward and backward positioning of the flexible disc mechanism. With the flexible disc mechanism properly positioned, the top cover must fit flush against the rear panel before tightening screws. If this alignment is not achieved, eject problems with flexible discs may occur.

Reinstallation is a reversal of the removal process. Ensure that the cable connectors disconnected in steps b and c are firmly seated in their mating connectors.

8-14. Power Supply PCA-A2

To remove power supply PCA-A2 (25, figure 8-1) from the disc drive, proceed as follows:

a. Remove the top cover (refer to paragraph 8-6).

b. Remove the hard disc mechanism (refer to paragraph 8-10).

c. Use a flat-blade screwdriver to carefully pry the tabs on the power supply access cover (30) loose, then remove the access cover.

d. Remove the three T20 screws (34) which secure the power cord receptacle (33) and its ground wire to the chassis. Push the receptacle down into the power supply access opening.

e. Remove the three T20 screws (26) which secure the power supply PCA to the chassis.

f. Slide the power supply PCA out of the disc drive just enough to access the connectors at the front of the PCA. It is necessary to lift the rear of the PCA as it is pulled from the disc drive.

g. Disconnect the fan (12) power cable from connector CN2 on the power supply PCA. Use a flat-blade screwdriver to carefully pry the connector loose.

h. Disconnect the power supply cable (32) from connector CN1 on the power supply PCA. Use a flat-blade screwdriver to carefully pry the connector loose.

i. Gently remove the power supply PCA from the disc drive. It is necessary to lift the rear of the PCA as it is pulled from the disc drive.

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┌─────────────┐
│   **NOTE**   │
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The power cord receptacle is not supplied with a new power supply PCA. Remove the receptacle from the power supply PCA to be used with the replacement PCA.

To install power supply PCA-A2, proceed as follows:

a. Ensure that the bottom shield (31) is in place.

b. Slide the power supply PCA (25) partially into the disc drive. Connect the fan power cable to connector CN2 and connect the power supply cable to connector CN1.

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┌─────────────┐
│   **NOTE**   │
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The power supply PCA does not slide smoothly into the disc drive. It is necessary to lift the rear of the PCA as it is eased into position.

c. Slide the power supply PCA fully into the disc drive.

d. Lift the power cord receptacle (33) through the power supply access opening. Install the three T20 screws (34) which secure the power cord receptacle and its ground wire to the chassis (37). Tighten the two screws for the power cord receptacle to 13.5 in./lbs and tighten the screw for the ground wire to 18 in./lbs.

e. Use long-nosed pliers to position the three T20 screws (26) which secure the power supply PCA to the chassis. Tighten these screws to 18 in./lbs. These screws are required to properly ground the power supply PCA to the chassis. Ensure that the shaft guide (27) for the LINE~ switch shaft (28) is in position when the T20 screw (26) is installed.

f. Install the power supply access cover (30). Ensure that the tabs engage the metal of the chassis support bracket (35).

WARNING

Power supply access cover (30) must be in place and the three T20 screws (26) which secure the power supply PCA to the chassis must be tightened before power is applied to the disc drive.

g. Install the hard disc mechanism (refer to paragraph 8-10).

h. Install the top cover (refer to paragraph 8-6).

8-15. Replaceable Parts

Replaceable parts for the disc drive are listed in order of disassembly in table 8-3 and illustrated in figure 8-1. In each listing, attaching parts are listed immediately after the item they attach. Items in the DESCRIPTION column are identified with asterisks to indicate their relationship to the next higher assembly. In addition, the symbol "- - - X - - - " follows the last attaching part for the item. Identification of the items and the labels is as follows:

Major Assembly

*Replaceable Assembly

*Attaching Part for Replacement Assembly

**Subassembly or component Part

**Attaching Part for Subassembly or Replacement Part

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

a. FIGURE AND INDEX NO. The figure and index numbers which indicate where the replaceable part is illustrated.

b. HP PART NO. The Hewlett-Packard number for the replaceable part.

c. DESCRIPTION. The description of the replaceable part. Refer to table 8-4 for an explanation of the abbreviations used in the DESCRIPTION column.

d. MFG. CODE. The 5-digit code that denotes a typical manufacturer of a part. Refer to table 8-5 for a listing of manufacturers that corresponds to the codes.

e. MFG. PART NO. The manufacturer's part number for each replaceable part.

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

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

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| NOTE |
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TORX* hardware is used in the disc drive. This hardware requires the use of special drivers. In this manual, any reference to this type of hardware will be accompanied by the required driver size (for example, "T15").

8-16. Ordering Information

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

a. Model and full serial number.

b. Hewlett-Packard part number.

c. Complete description of each part as provided in the replaceable parts listing.

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

Table 8-3. Disc Drive Replaceable Parts

FIG.& INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	UNITS PER ASSY
8-1-	9153C	DISC DRIVE	28480		REF
1	09153-04100	* Top cover	28480	09153-04100	1
		(Attaching Parts)			
2	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	2
3	0515-1578	* SCREW, M4 by 0.7, T20, 5mm long	00000	OBD	3
		- - - X - - -			
4	09153-40200	* PANEL, front	28480	09153-40200	1
		(Options 010, 020, 040 only)			
	09154-40200	* PANEL, front	28480	09154-40200	REF
		(Options 011, 021, 041 only)			
5	09153-43701	** LIGHT PIPE	28480	09153-43701	1
6	09153-67511	* PCA, controller (new)	28480	09153-67511	1
	09153-69511	* PCA, controller (exchange)	28480	09153-69511	REF
		(Attaching Parts)			
7	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	2
		- - - X - - -			
8	09153-04115	** PLATE, HP-IB	28480	09153-04115	1
		(Attaching Parts)			
9	0380-1717	** STANDOFF, hex, 6-32, 0.255-in. long	00000	OBD	2
10	2190-0843	** WASHER, lock,. intl-tooth, no. 8	00000	OBD	2
		- - - X - - -			
11	09153-89301	** READ ONLY MEMORY, coded	28480	09153-89301	1
12	09153-68510	* FAN ASSEMBLY	28480	09153-68510	1
		(Attaching Parts)			
13	0624-0661	* SCREW, tapping, pnh, T20, 10-14, 0.625 in. long	00000	OBD	2
		- - - X - - -			
14	45816-67111	* MECHANISM, hard disc (new)	28480	45816-67111	1
		(20-Mbyte, Options 040, 041 only)			
	45816-69111	* MECHANISM, hard disc (exchange)	28480	45816-69111	REF
15	45816-67111	* MECHANISM, hard disc (new)	28480	45816-67111	1
		(20- or 10-Mbyte, Options - all)			
	45816-69111	* MECHANISM, hard disc (exchange)	28480	45816-69111	REF
16	09153-04111	* PLATE, hard disc	28480	09153-04111	1
		(Attaching Parts)			
17	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	1
18	0515-1251	* SCREW, M3 by 0.5, T10, 10mm long	00000	OBD	4
		- - - X - - -			
19	09153-61606	* CABLE, hard disc ribbon	28480	09153-61606	1
20	09153-61603	* CABLE, flexible disc ribbon	28480	09153-61603	1
		(Options 010, 020, 040 only)			
21	09153-67201	* MECHANISM, flexible disc, 2-Mbyte, 3.5-in., (new)	2K658	MP-S73W-50	1
		(Options 010, 020, 040 only)			
	09153-69201	* MECHANISM, flexible disc, 2-Mbyte, 3.5-in., (exchange)	28480	09153-69201	REF
		(Attaching Parts)			
22	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OB0	1
		- - - X - - -			

Table 8-3. Disc Drive Replaceable Parts (continued)

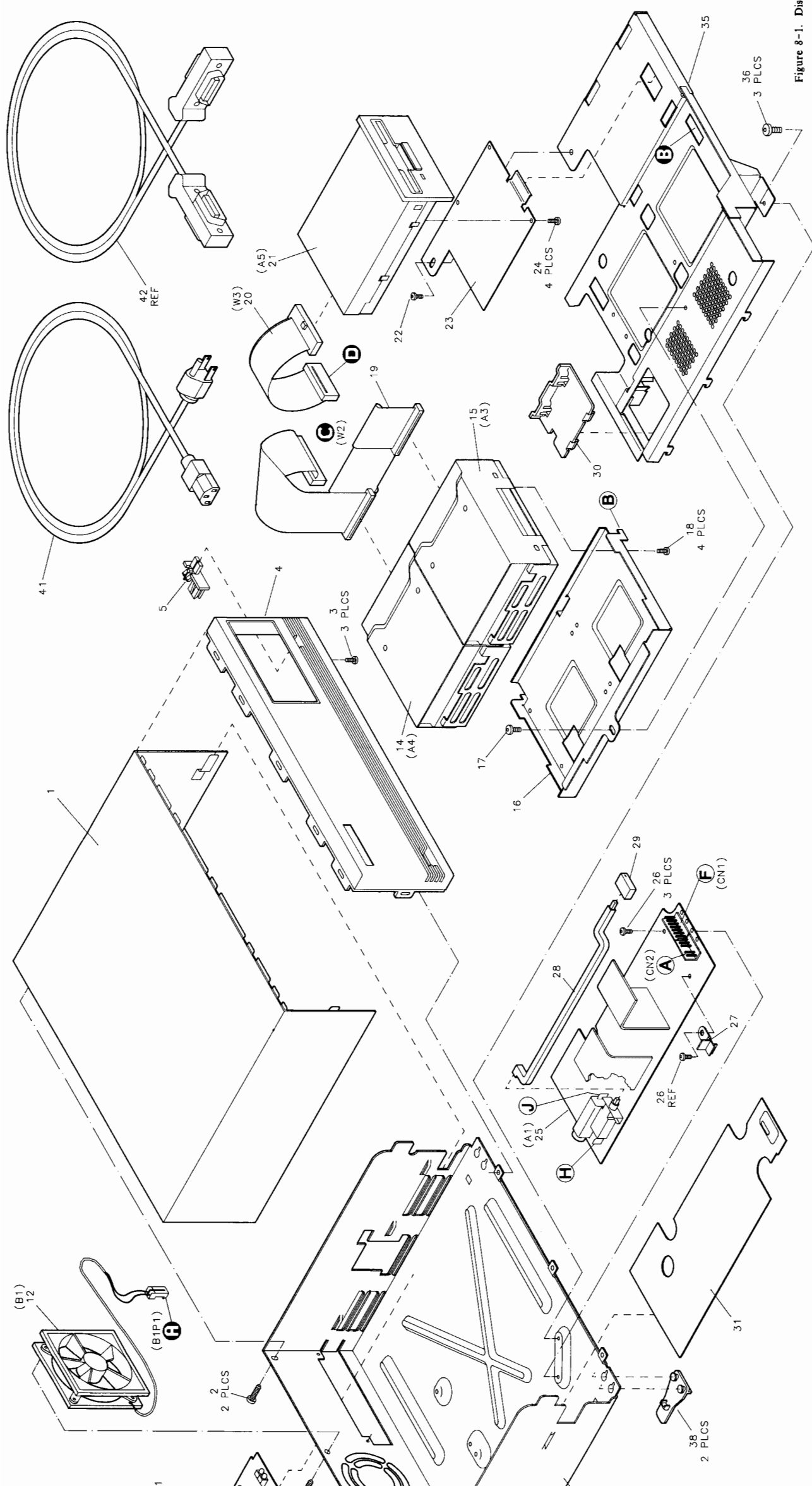| FIG.& INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	UNITS PER ASSY
8-1-					
23	09153-04704	** PLATE, drive	28480	09153-04704	1
		(Attaching Parts)			
24	0515-1251	** SCREW, M3 by 0.5, T10, 10mm long	00000	OBD	3
		- - - X - - -			
25	09153-67110	* PCA, power supply	61058	ETX-533B3M	1
		(Attaching Parts)			
26	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	3
		- - - X - - -			
27	09153-43703	** SHAFT GUIDE	28480	09153-43703	1
28	09153-43702	** PUSH ROD	28480	09153-43702	1
29	5041-1203	** CAP, switch	28480	5041-1203	1
30	09153-44100	* COVER, power supply access	28480	09153-44100	1
31	09153-40601	* SHIELD, bottom	28480	09153-40601	1
32	09153-61605	* CABLE, power supply	28480	09153-61605	1
33	09153-68802	* RECEPTACLE, power cord	28480	09153-68802	1
		(Attaching Parts)			
34	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	3
		- - - X - - -			
35	09153-01200	* BRACKET, chassis support	28480	09153-01200	1
		(Attaching Parts)			
36	0515-1899	* SCREW, M4 by 0.7, T20, 8mm long	00000	OBD	3
		- - - X - - -			
37	09153-00101	* CHASSIS, disc drive	28480	09153-00101	1
38	09121-48303	* FOOT, plastic, molded	0BJK9	No number	2
39	2110-0003	* FUSE, 3A, 250V, ntd, 1.25 by 0.25 in.	75915	312 003	1
		(Used with 115V setting)			
	2110-0787	* FUSE, 1.6A, 250V	75915	23501.6	REF
		(Used with 230V setting)			
40	2110-0565	* CAP, fuseholder	28480	2110-0565	1
		(Used with 115V setting)			
	2110-0567	* CAP, fuseholder	28480	2110-0567	REF
		(Used with 230V setting)			
41	8120-2371	* POWER CORD, NEMA10A/CEE (option 903)	28480	8120-2371	1
	8120-0698	* POWER CORD, NEMA15A/CEE (option 904)	28480	8120-0698	REF
	8120-1860	* POWER CORD, CEE/CEE, 1.5 m, (option 905)	28480	8120-1860	REF
	8120-2104	* POWER CORD, SEV/CEE (option 906)	28480	8120-2104	REF
	8120-1689	* POWER CORD, GMBH/CEE (option 902)	28480	8120-1689	REF
	8120-4753	* POWER CORD, NEMA12A/CEE (option 918)	28480	8120-4753	REF
	8120-4211	* POWER CORD, SABS/CEE (option 917)	28480	8120-4211	REF
	8120-1369	* POWER CORD, ASC 112/CEE (option 901)	28480	8120-1369	REF
	8120-1351	* POWER CORD, BS 1363/CEE (option 900)	28480	8120-1351	REF
	8120-2956	* POWER CORD, MDPP/CEE (option 912)	28480	8120-2956	REF

Figure 8-1. Disc Drive, Exploded View

8-11

Table 8-3. Disc Drive Replaceable Parts (continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	UNITS PER ASSY
8-1-					
42	10833A	* HP-IB CABLE ASSEMBLY, 1m	28480	10833A	1
	10833B	* HP-IB CABLE ASSEMBLY, 2m	28480	10833B	REF
	10833C	* HP-IB CABLE ASSEMBLY, 4m	28480	10833C	REF
	10833D	* HP-IB CABLE ASSEMBLY, 0.5m	28480	10833D	REF
	82977A	* HP-IB CABLE ASSEMBLY, 1m, right angle	28480	82977A	REF
	82977B	* HP-IB CABLE ASSEMBLY, 2m, right angle	28480	82977B	REF
	92220R	* HP-IB CABLE ASSEMBLY, 0.3m, right angle	28480	92220R	REF
43	0403-0427	* FOOT, rear	94959	SJ-5008	2
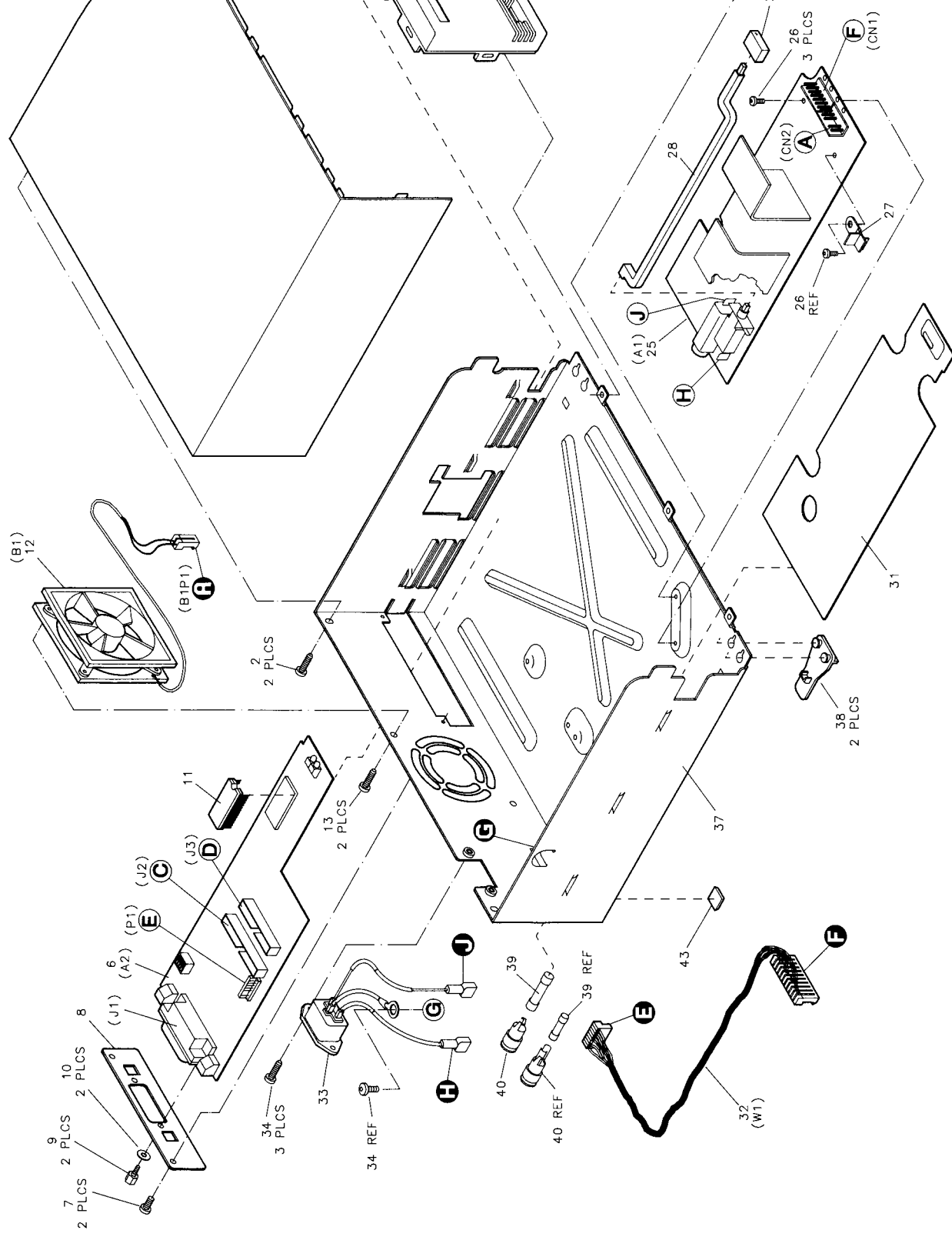
Table 8-4. Abbreviations

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

TORX(R) is a registered trademark of the Camcar Division of Textron, Inc.   (abbrev-8/83)

Table 8-5. Code List of Manufacturers

CODE NO.	MANUFACTURER	ADDRESS
OBJK9	Plastech	Monrovia, CA
28480	Hewlett-Packard Co.	Palo Alto, CA
2K658	Sony Corp.	Dallas, TX
61058	Panasonic Industrial Co.	Secaucus, NJ
75915	Littelfuse Tracor Inc.	Des Plaines, IL
94959	3M Co., Adhesives, Coating, and Sealers Div.	St. Paul, MN

Diagrams 9

9-1. Introduction

This chapter contains diagrams of the disc drive printed circuit assemblies, connector information, and block diagrams.

Figure 9-1 shows the location of assemblies. Figure 9-2 is an overall cabling diagram of the disc drives. Figures 9-3 and 9-4 show the layout and cable connections for each assembly. Tables 9-1 through 9-4 list the pin connections for the internal cabling of the disc drive.

Table 9-1. HP-IB Connector (J1) Pin Connections

PIN	FUNCTION	PIN	FUNCTION
1	Data Bus 1	13	Data Bus 5
2	Data Bus 2	14	Data Bus 6
3	Data Bus 3	15	Data Bus 7
4	Data Bus 4	16	Data Bus 8
5	EOI	17	Remote Enable
6	Data Valid	18	Ground
7	Not Ready For Data	19	Ground
8	Not Data Accepted	20	Ground
9	Interface Clear	21	Ground
10	Service Request	22	Ground
11	Attention	23	Ground
12	Chassis Ground	24	Ground

Table 9-2. Power Cable (W1) Pin Connections

PIN	FUNCTION	PIN	FUNCTION
1	+12V Miscellaneous	5	PVAL signal
2	+12V to hard disc	6	Keyed slot
3	Ground to hard disc	7	Ground for +5V
4	Ground for +12V Misc.	8	+5V

Table 9-3. Hard Disc Cable (W2) Pin Connections

PIN	FUNCTION	PIN	FUNCTION
1	Read Data	21	Drive Select 2
2	Ground	22	Drive Select 3
3	Write Data	23	Write D/A Converter
4	Ground	24	NA/B
5	Write Gate	25	Sector Pulse
6	Ground	26	Index Pulse
7	4 MHz Clock	27	Write NIC chip
B	Ground	2B	Reset
9	Read A/D Converter	29	+12V (Motor)
10	Ground	30	+12V (Motor)
11	+5V	31	Fault
12	Ground	32	+12V
13	+5V	33	Data Bus 7
14	Ground	34	Data Bus 0
15	+12V (Motor)	35	Data Bus 6
16	Ground (Motor)	36	Data Bus 1
17	+12V (Motor)	37	Data Bus 5
18	Ground (Motor)	38	Data Bus 2
19	Drive Select 0	39	Data Bus 4
20	Drive Select 1	40	Data Bus 3

Table 9-4. Flexible Disc Cable (W3) Pin Connections

PIN	FUNCTION	PIN	FUNCTION
1	Disc Change Reset	18	Direction Select
2	Disc Change Indicator	19	Ground
3	+5V	20	Step
4	Density Bit	21	Ground
5	+5V	22	Write Data
6	Drive Select	23	Ground
7	+5V	24	Write Gate
8	Index Pulse	25	Ground
9	+5V	26	Track 0 Indicator
10	Drive Select 0	27	Ground
11	+5V	28	Write Protect Indicator
12	Drive Select 1	29	+12V
13	Ground	30	Read Data
14	Drive Select 2	31	+12V
15	Ground	32	Head Select
16	Motor On	33	+12V
17	Ground	34	Ready
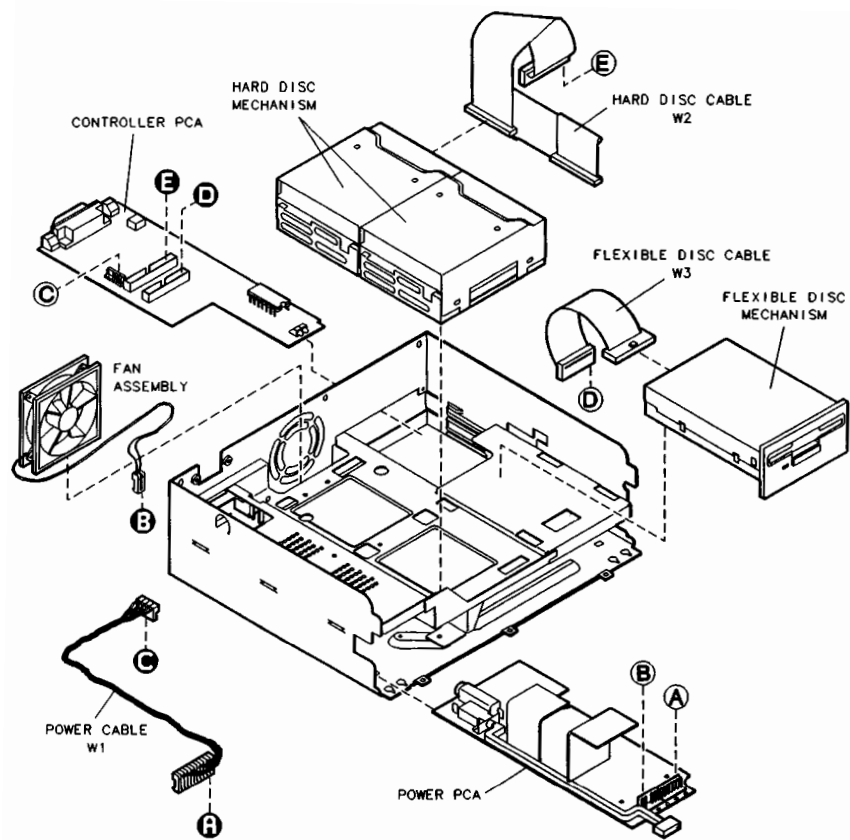
Figure 9-1. Major Assemblies Location

Figure 9-2. Cabling Diagram

FUSE AND
FUSE HOLDER

LINE ~
SWITCH
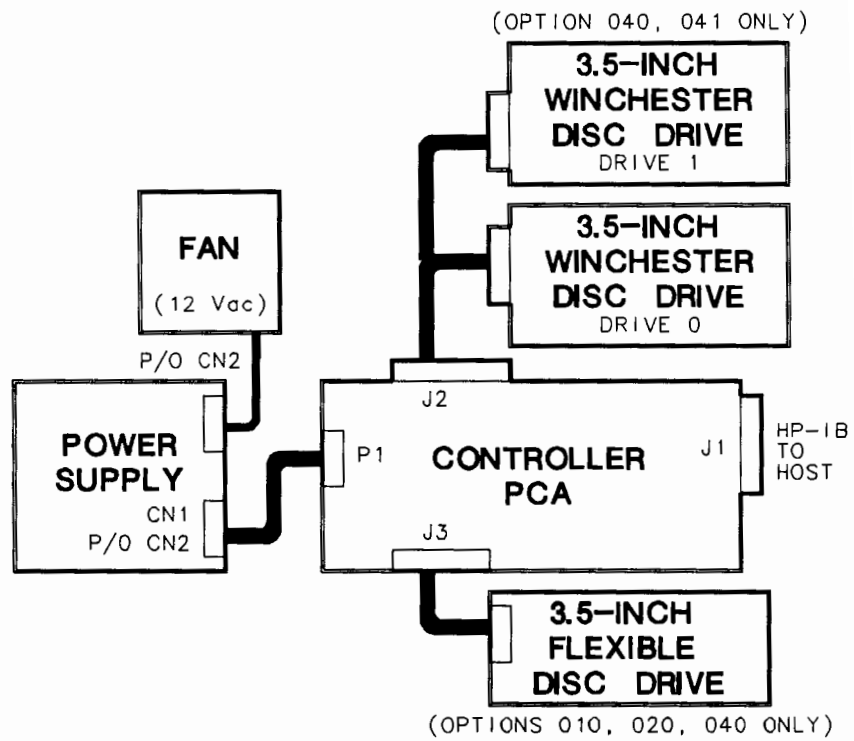
~LINE SELECT
SWITCH

CN2

CN1

COM

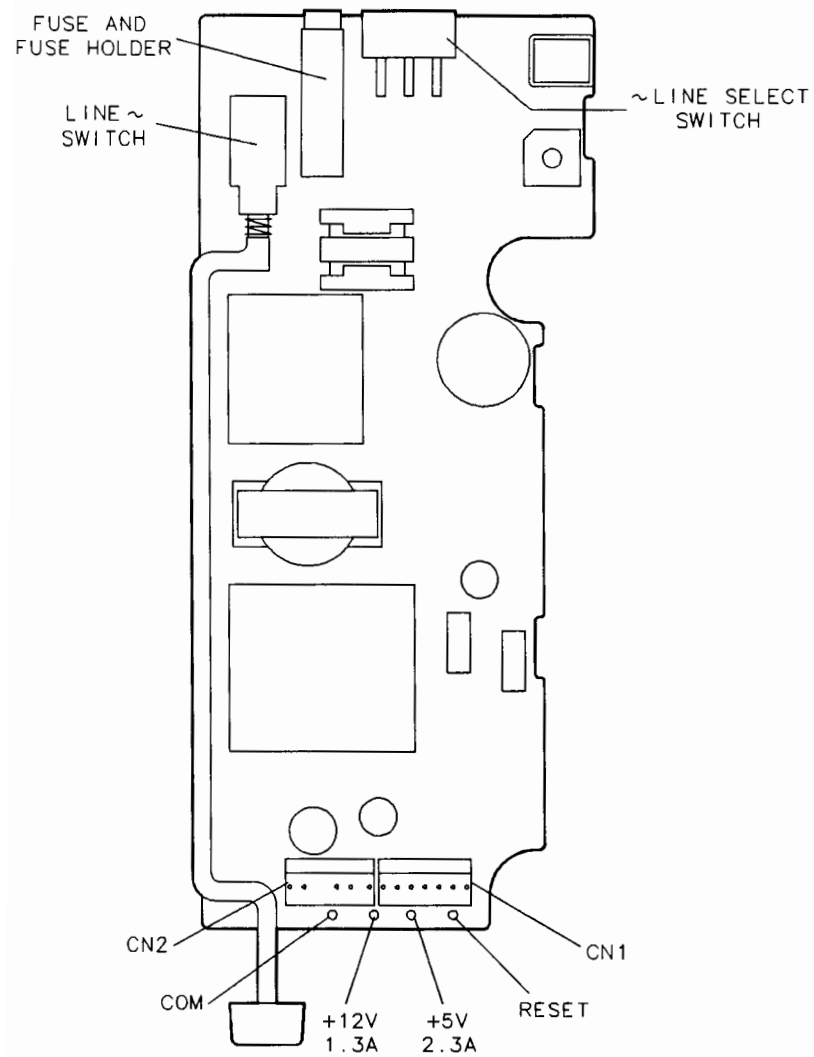+12V
1.3A

+5V
2.3A

RESET

Figure 9-3. Power Supply PCA

Figure 9-4. Controller PCA

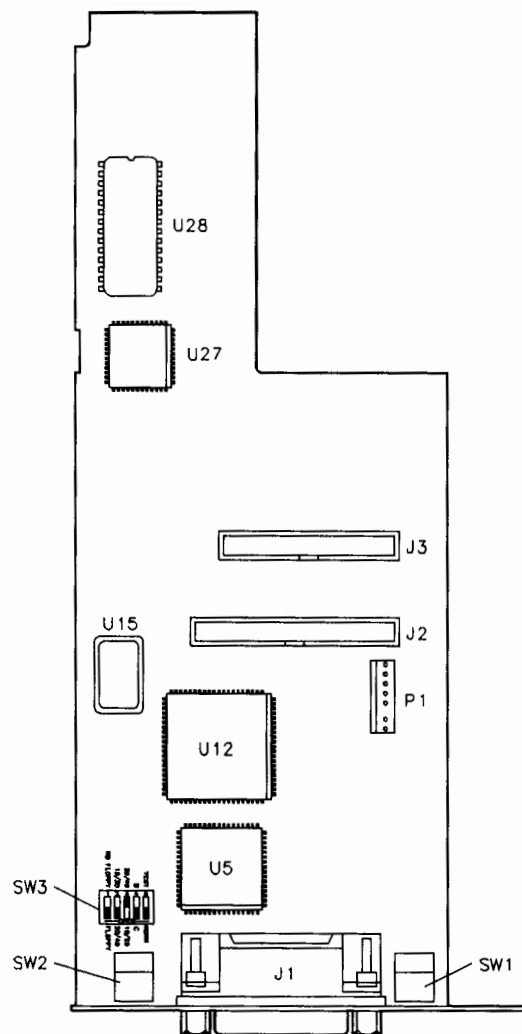# Reference

Introduction

This chapter provides information on other manuals for this product and on media compatibility.

Related Manuals

- *Getting Started with Your HP 9153C Disc Drive*, reorder no. 09153-90199

- *19500B Rack Mounting Kit Installation Instructions*, part no. 19500-90902

- *SS/80 Exerciser Manual*, part no. 5958-4142

Media Compatibility

The HP 9153C uses 2-megabyte, double-sided, flexible discs. Table 10-1 lists recommendations when using other types of media.

| CAUTION |

Disc drive performance and reliability are dependent on the type of media (flexible discs) used. Disc drive specifications can be assured only when using HP media. The use of improper media can result in premature disc failure or damage to your disc drive.

On some disc products, HP may qualify other non-HP media. When tested, this media met HP specifications. However, HP does not warrant or support this media and cannot control changes in its specifications or quality. The selection and use of such products are the customer's responsibility. HP reserves the right to exclude from warranty and maintenance agreement coverage any repairs which HP reasonably determines or believes were caused by the use of media not provided by HP. HP will, upon request, provide such repairs on a time and material basis.

Table 10-1. Recommended Use of Media

MEDIA	RECOMMENDATIONS
Single-sided, 0.5-megabyte HP discs	USE FOR DATA EXCHANGE ONLY. Do not use on a daily basis. Repeated use can cause wear and eventual eventual failure of discs or heads. NEVER use a single-sided disc with a manual shutter in the HP 9153C (manual shutters lock open when moved to the open position). Single-sided discs operate at half speed and should be used with format option 4. Can be identified by gray case.
Double-sided, 1-megabyte HP discs	COMPATIBLE. May be used on a daily basis. Operates at half speed in the HP 9153C. Can be identified by blue case.
Double-sided, 2-megabyte HP discs	COMPATIBLE. Recommended for daily use. Provides best performance for the HP 9153C. Can be identified by "HD" symbol and black case. DO NOT USE IN EARLIER MODEL DISC DRIVES, loss of data may result.

Service Notes

No service notes existed at the time of this printing.

HEADQUARTER OFFICES
If there is no HP Sales Office in your area,
contact one of these headquarter offices.

UNITED STATES:
Hewlett-Packard Company
4 Choke Cherry Road
Rockville, MD 20850
Telephone: (301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
Telephone: (312) 255-9800

Hewlett-Packard Company
5161 Lankershim Blvd.
North Hollywood, CA 91601
Telephone: (818) 505-5600

Hewlett-Packard Company
200 South Park Place
Atlanta, GA 30339
Telephone: (404) 955-1500

CANADA:
Hewlett-Packard Ltd.
6877 Goreway Drive
Mississauga, Ontario L4V1M8
Telephone: (416) 678-9430

AUSTRALIA/NEW ZEALAND:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street,
Blackburn, Victoria 3130
Melbourne, Australia
Telephone: (03) 895-2895

EUROPE/AFRICA/MIDDLE EAST:
Hewlett-Packard Company
Central Mailing Department
P.O. Box 999
1180 AZ Amstelveens
The Netherlands
Telephone: (31) 20/5479999

FAR EAST:
Hewlett-Packard Asia Ltd.
47/F China Resources Building
26 Harbour Road, Hong Kong
Telephone: (5) 833-0833

JAPAN:
Yokagawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi 3-chrome
Suginami-ku, Tokyo 168
Telephone: (03)331-6111

LATIN AMERICA:
Hewlett-Packard de Mexico,
Sp.A. de C.V.
Monte Pelvux No. 111
Lomas de Chapultepec
11000 Mexico D.F., Mexico
Telephone: (905) 596-7933

UNITED KINGDOM:
Hewlett-Packard Ltd.
Miller House -- The Ring
Bracknell
Berkshire RG12 1XN, England
Telephone: (4) 344/424898

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