



This package contains a section of the

**CE SERVICE HANDBOOK
FOR
79XX SERIES DISC DRIVES**

and consists of the following document:

**79576, 79596 and 79593
DISC DRIVES**

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This is to certify that the product(s) HP 7957S, 7958S and 7959S is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation; the right to check the series for compliance with the requirements was granted.

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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.

Edition 1 AUGUST 1988

Safety Considerations

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

SAFETY SYMBOLS



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



Indicates hazardous voltages.



Indicates earth (ground) terminal.

WARNING

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

CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure or practice 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 I product and is provided with a protective earthing terminal. An uninterruptible safety earth ground must be provided from the main power

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

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

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

SERVICING

WARNING

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

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

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

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



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1-1. Product Description

Features

- 107-megabyte capacity (formatted) - HP 7957S
- 161-megabyte capacity (formatted) - HP 7958S
- 323-megabyte capacity (formatted) - HP 7959S
- Rugged, sealed head-media design
- 130-millimetre (5.12-inch) thin-film media
- Thin-film heads
- 18.0 ms average seek time
- Includes Small Computer System Interface (SCSI) controller and power supply
- Built-in diagnostic capability

Unless otherwise specified, "disc drive" in this publication refers to all three models of the drive.

Physical Characteristics

Refer to the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456. This publication is contained in a section of this handbook.

1-2. Options and Accessories

The following items are included with the standard drive:

2110-0003	Fuse (2 each)
5955-3456	Site Environmental Requirements for Disc/Tape Drives Manual
8120-1378	Power Cord
07959-90911	HP 7957S, 7958S and 7959S Owner's Manual

The following options are available:

OPTION 015	Set for 230 Vac operation
------------	---------------------------

The following accessories are available:

1252-2297	SCSI Terminator
19500B	Rack mount kit for EIA 19-inch equipment rack
92211A	Desk-height stand-alone cabinet
92222A	0.5-metre SCSI Peripheral Interface Cable
92222B	1-metre SCSI Peripheral Interface Cable
92222C	2-metre SCSI Peripheral Interface Cable
92222D	1-metre SCSI Extender Cable

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

9211-4692	Shipping Carton
9222-1177	Plastic Bag
07941-80001	Foam Cushion (2)

1-3. Operating Specifications & Characteristics

Operating specifications and characteristics for the drive are given in the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456. This publication is contained in a section of this handbook.

1-4. Service Kit

The following items are recommended as a Product Support Package for the drive.

NOTE

Disc Memory Division does not supply this package.

82441A	AC Adapter (for U.S.A. and Canada)
82441AB	AC Adapter (for West Germany, Finland, Sweden, Norway, Denmark and Switzerland)
82441AG	AC Adapter (for Australia)
82441AJ	AC Adapter (for Japan)
82441AU	AC Adapter (for UK)
5010-0568	SCSIDISC Diagnostic Program
5959-3935	SCSIDISC Diagnostic Reference Manual
5061-3156	SCSI/HP-IL Interface Module (includes field service SCSI cable, 5061-3158)
8710-1426	TORX* Field Kit
9300-0794	Anti-static Work Station
07959-90915	7957S, 7958S and 7959S Disc Drives (insert for CE Handbook)

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



Environmental/Installation/PM

2

2-1. Environmental Requirements

Environmental specifications for the disc drive are given in the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456.

2-2. Installation

First-time installation of the disc drive requires the use of the following manuals:

- *Site Environmental Requirements for Disc/Tape Drives Manual*, part number 5955-3456.
- *HP 7957S, 7958S and 7959S Owner's Manual*, part number 07957-90911

2-3. Installation Checklist

- 1) Verify input ac voltage, fuse rating, and VOLTAGE SELECTOR switch setting.
- 2) Connect SCSI cable(s) and set ADDRESS switch.

NOTE

The last disc drive on the bus must have a terminator (part no. 1252-2297) fitted on the unused SCSI connector to properly terminate the bus.

- 3) Power up and observe the power-on diagnostic display on the front panel FAULT/ON LINE indicator. Refer to chapter 4 for details.

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 observed 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.

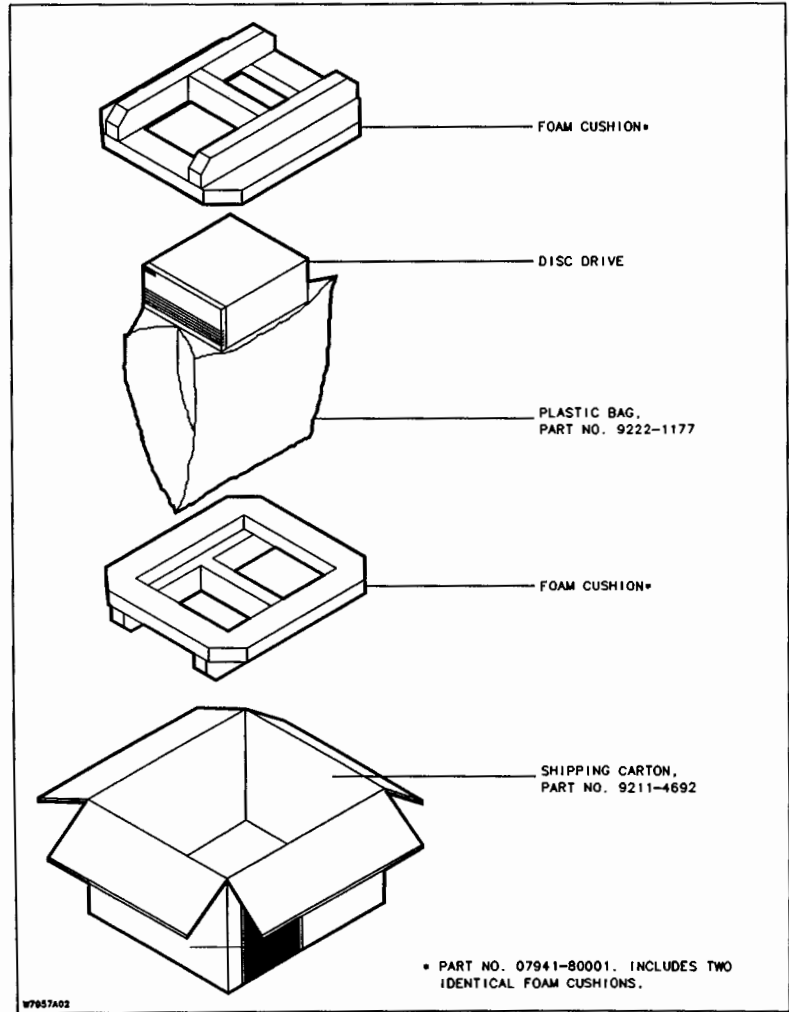


Figure 2-1. Packaging Details

2-5. Static Control

To ensure continuously successful operation of the disc drive in a carpeted office environment, the use of anti-static mats and/or carpets is recommended.

2-6. Controls and Connectors

Figure 2-2 shows the location of the disc drive controls and indicators.

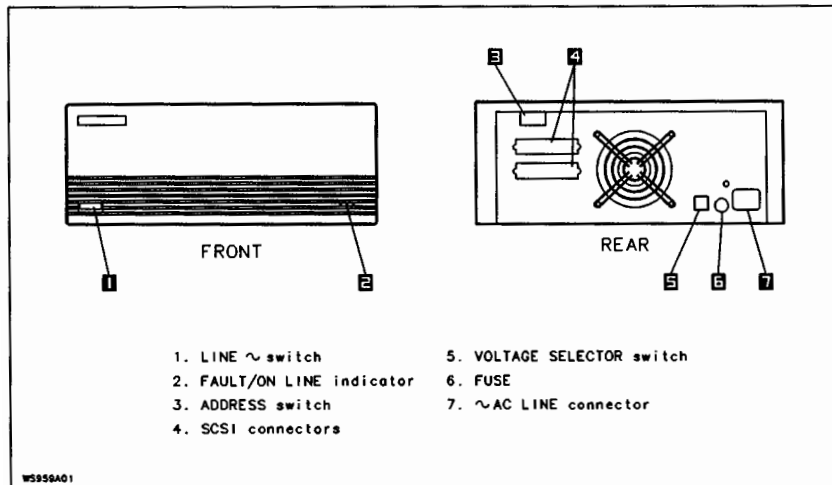


Figure 2-2. Controls and Connectors

2-7. AC Power: Voltage Selection/Fuses/Cords

Voltage Selection

CAUTION

Disconnect the power cord from the disc drive ~AC LINE connector before changing the VOLTAGE SELECTOR.

Slide the VOLTAGE SELECTOR switch to the proper position (115V or 230V) for the voltage available.

Fuse

WARNING

Remove the power cord from the disc drive before installing or replacing the fuse. Failure to do so may result in electrical shock hazard. Replace the fuse with one of the same type and rating.

The same fuse is used for 115V and 230V operation:

HP part no. 2110-0003 DESCRIPTION: 3A, 250V, non time-delay

Power Cord

If necessary, refer to Appendix D in the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456 for power cord information.

2-8. Connection to SCSI Bus

CAUTION

- Ensure that power is removed from all units of the system before connecting (or disconnecting) the disc drive.
- A Hewlett-Packard Series 92222 SCSI Peripheral Interface Cable must be used to connect the disc drive to the SCSI bus. Failure to use this shielded cable may result in failure of the drive to meet its radio frequency interference (RFI) specifications.
- When power is returned to the system after the drive is connected, apply power to the disc drive before turning on the power to the computer.

The disc drive is connected to the computer via a SCSI interface cable plugged into the SCSI connector on the rear panel of the drive. This interface cable is supplied with the SCSI interface card installed in the computer. The length of the cable depends on the system configuration. All series 300 Workstations have 1-metre cables except the Model 319 Workstation which has a 0.5-metre cable. Additional SCSI interface cables are available from the Corporate Parts Center. These cables are listed below. In addition, a 92222D 1-metre SCSI cable extender is available. It should be noted that the total length of SCSI bus cabling must not exceed the limits specified in Figure 2-3, SCSI Bus Cabling Standards.

CABLE LENGTH	PRODUCT NO.
0.5 metre	92222A
1 metre	92222B
2 metre	92222C

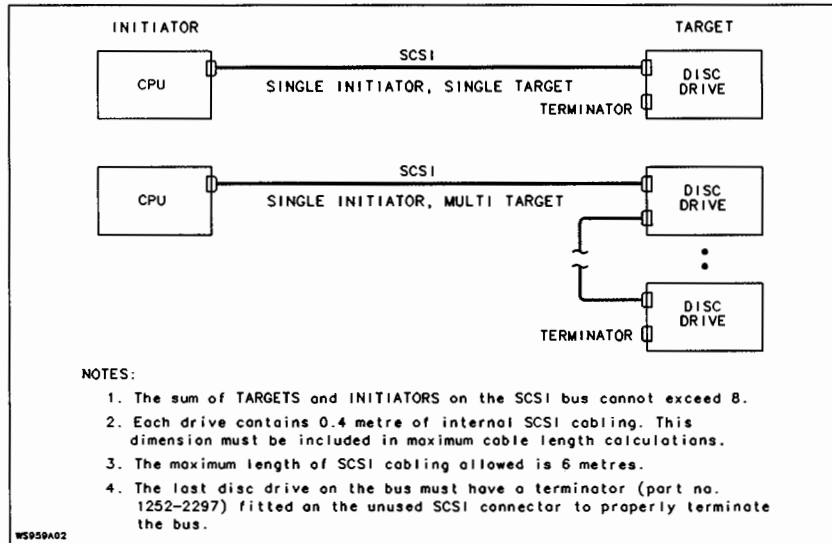


Figure 2-3. SCSI Bus Cabling Standards

2-9. SCSI Device Address

Set the rear panel ADDRESS switch to program the desired SCSI address for the disc drive.

NOTE

ADDRESS switch positions 8 and 9 select addresses 0 and 1, respectively.

2-10. Parity

The disc drive is configured with parity detection enabled, and generates valid parity.

2-11. Preventive Maintenance

No regularly scheduled PM is required.

The disc drive requires no configuration other than voltage selection and SCSI address switch programming. These operations are described in the installation instructions in chapter 2.

For system configuration information, refer to the appropriate configuration section of the system manual.



Troubleshooting

4

4-1. Troubleshooting

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 self-test fail result to be presented each time self-test is performed. An intermittent fault, on the other hand, occurs at random intervals, and may not always cause a self-test failure.

The SCSI/DISK Diagnostic Program is recommended as an offline troubleshooting aid for the disc drive. Refer to chapter 5 for a description of the SCSI/DISK Diagnostic, how to connect it to the drive, and a description of the commands available for troubleshooting. These commands allow access to various drive logs and media tests. The logs contain access, data error, and hardware fault information. The MEDIA TEST command will direct the drive to perform a number of different combinations of read-only and write-then-read tests. Note that although the drive does not feature autosparing, defective media can be eliminated using the SCSI/DISK Diagnostic REASSIGN BLOCK command.

4-2. Self-Test Display

Results of the power-on self-test routines are presented on the amber FAULT/ON LINE indicator on the front panel of the disc drive. See figure 4-1. Details of how to interpret this display are presented in the following paragraphs.

The FAULT/ON LINE indicator is a front panel amber LED display that signals to the operator a) the status of the power-on diagnostics and b) drive activity.

When primary power is applied to the disc drive, the power-on reset signal from the drive hardware illuminates the indicator. The indicator remains lit until extinguished by the microprocessor on the drive electronics/controller board. If the indicator remains lit, a catastrophic failure has occurred. The most probable cause of the failure is the drive electronics/controller board.

Once the servo processor has tested itself and its internal RAM, the indicator is extinguished. The indicator remains unlit for approximately one second while the processor performs additional hardware tests and establishes various operating parameters.

After this the indicator is lit to signal that power is being applied to the spindle motor. The indicator remains lit until the spindle is up to speed.

Next the indicator flashes for a short time to indicate that the controller is performing a number of internal diagnostic tests. Due to the short duration of these tests the flashing pattern may not be visible. If the indicator starts to flash continuously once per second, the controller has failed some portion of these tests.

Following successful completion of the power-on diagnostic sequence described above, the FAULT/ON LINE indicator functions as an activity light. When the indicator is illuminated the disc drive is reading, writing or executing a command. When the indicator is extinguished the drive is idle. If the indicator begins to flash continuously once per second, a drive failure has occurred.

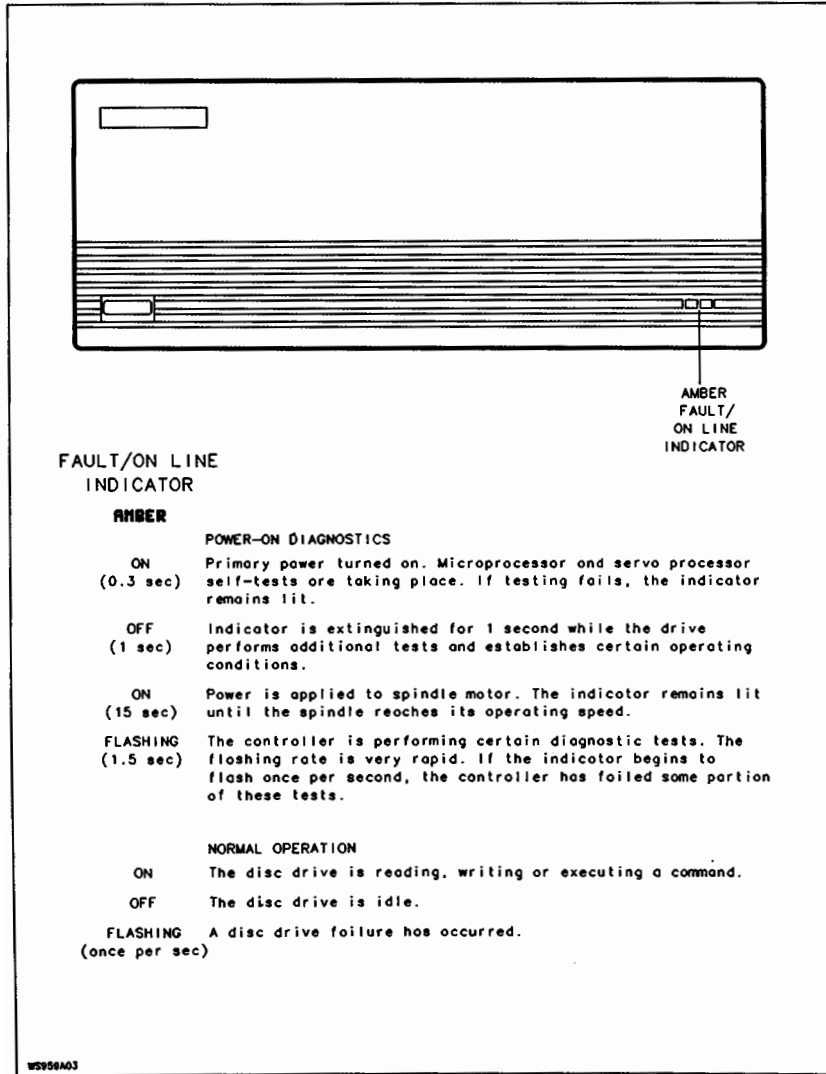


Figure 4-1. FAULT/ON LINE Indicator

4-3. FRA Location and Layout

CAUTION

The field-replaceable assemblies (FRAs) in the disc drive are electrostatic sensitive devices. Take appropriate precautions when removing an FRA from the disc drive. Use of an anti-static pad and wrist strap is recommended. (These components are contained in the anti-static workstation, part no. 9300-0749.) Immediately after removal, store the FRA in an anti-static, conductive plastic bag.

Figure 4-2 shows the location of the FRAs in the drive mainframe. Figures 4-3 and 4-4 show the layout and cable connections for the FRAs.

4-4. Power Supply Voltage

WARNING

With ac power applied, hazardous voltages are present on power supply PCA-A2.

All power supply voltages can be measured at test points on power supply PCA-A2. Figure 4-5 shows the locations of these test points and the values that should be measured at each one. All voltage and ripple values given in figure 4-5 are "on load" readings. FRAs. Figure 4-6 is an overall cabling diagram of the disc drive.

4-5. Sparing

The SCSI controller in the drive implements sparing as follows:

- Track sparing using one pool of spare tracks allocated prior to the start of the user cylinders.
- Cross head sparing to allow for one or more surfaces with an excessive number of defects.
- Spare mapping information kept on the media in the headers to remove the requirement to keep a spare list in the maintenance track.
- A spare track table kept in RAM and consulted during logical to physical track address mapping. This allows spared track access without having to seek to the original defective track.
- Thirty spare tracks are allocated per head. This is a total of 359 spare tracks on a 12-head drive (one track reserved for the log) and 1952 bytes of RAM usage to support the spare table and pre-table. The media layout, including spare track allocation, is shown in figure 9-2.
- There is no autosparing; the host is required to issue a Reassign Block command.

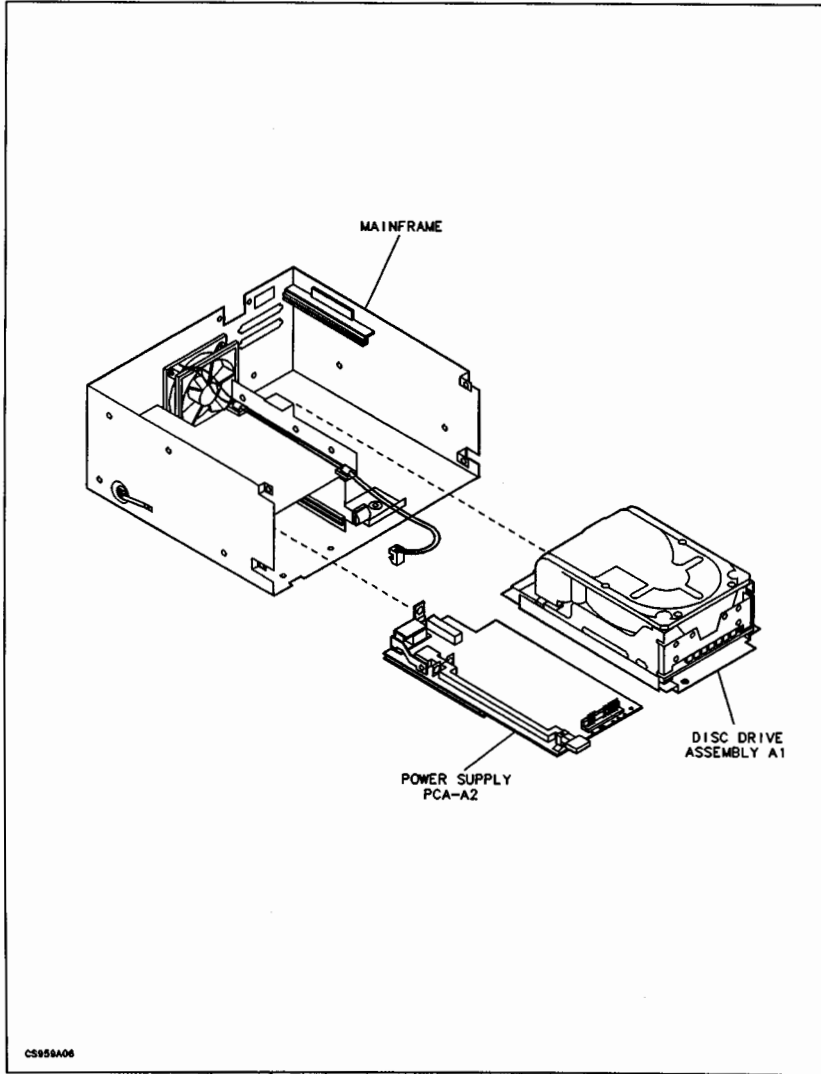


Figure 4-2. Field Replaceable Assembly (FRA) Locations

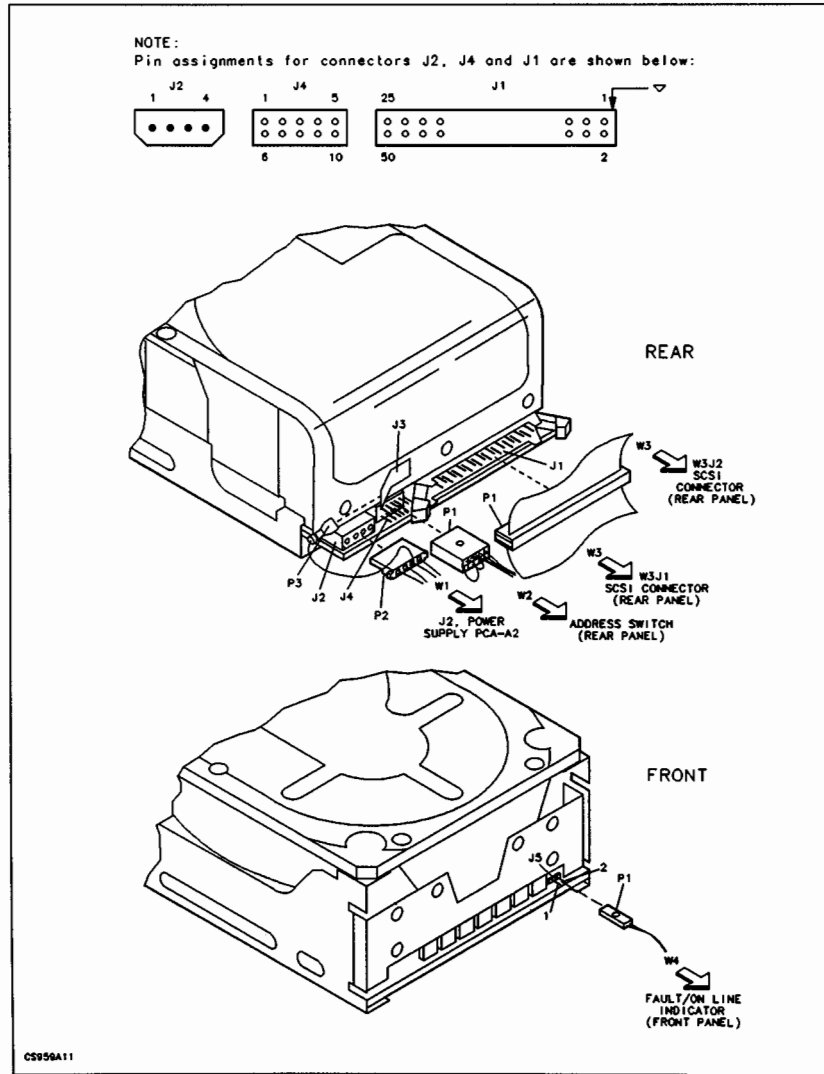


Figure 4-3. Disc Drive Assembly A1, Layout and Cable Connections

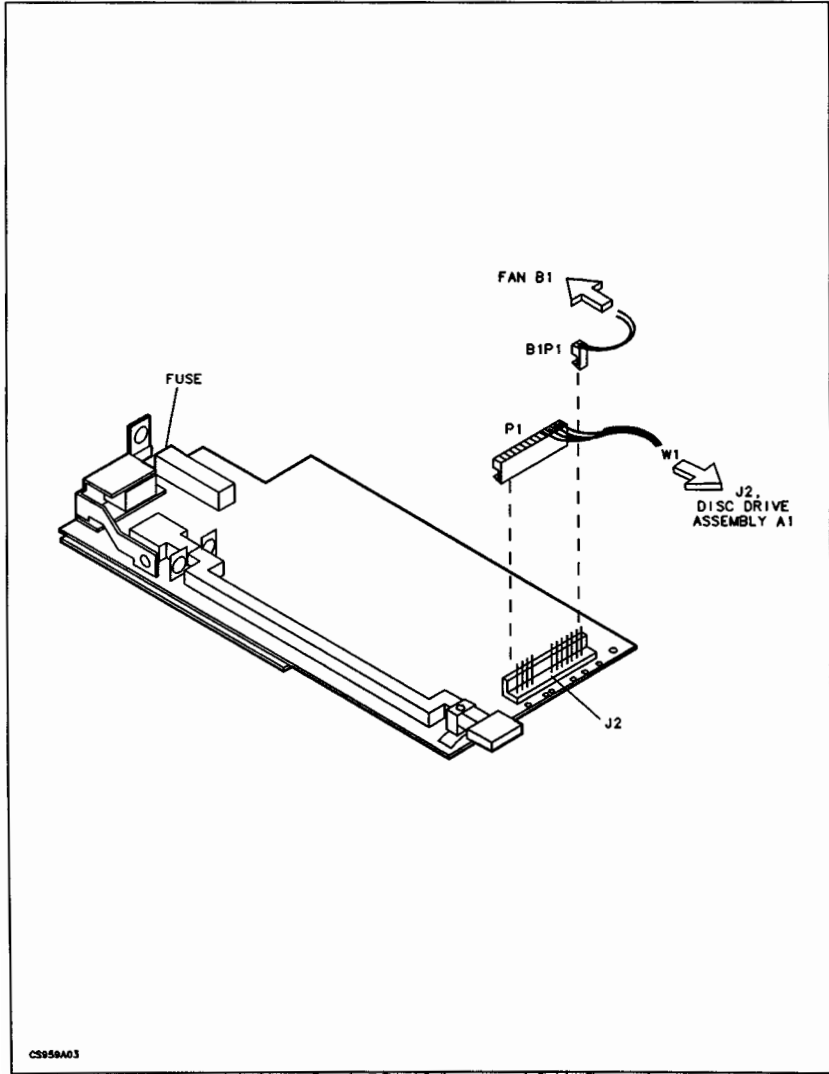


Figure 4-4. Power Supply PCA-A2, Layout and Cable Connections

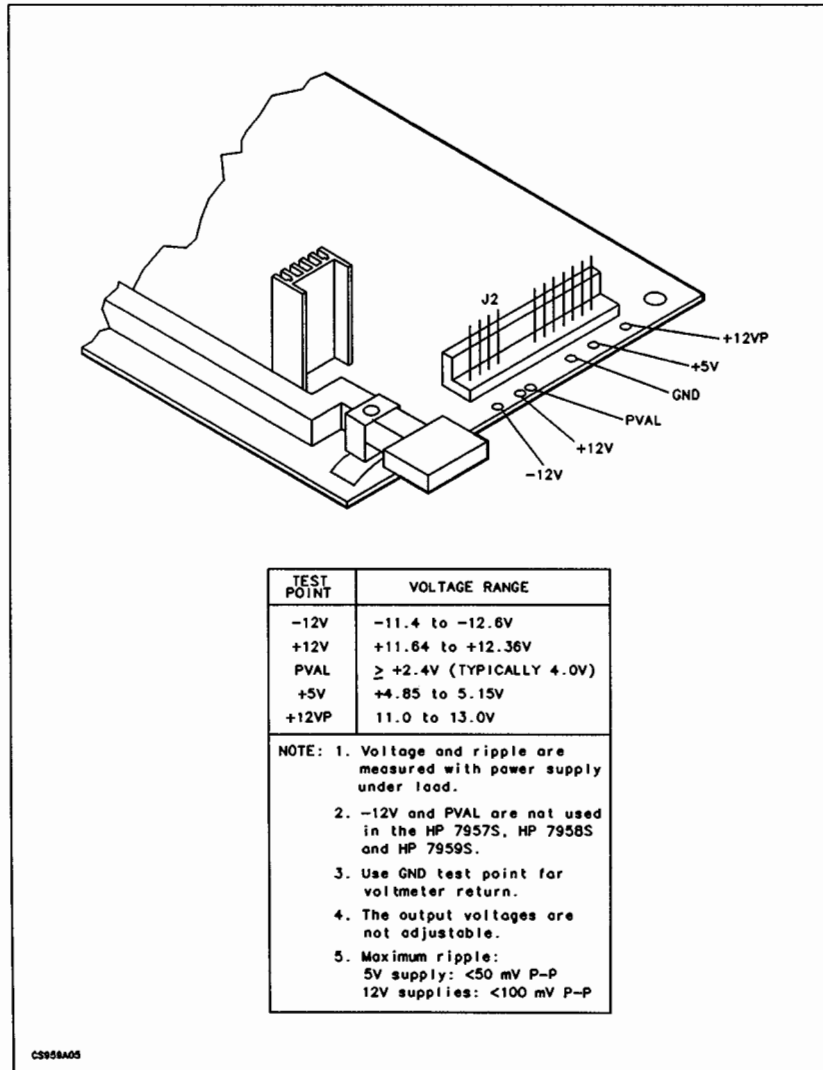


Figure 4-5. Power Supply PCA-A2 Test Points and Voltages

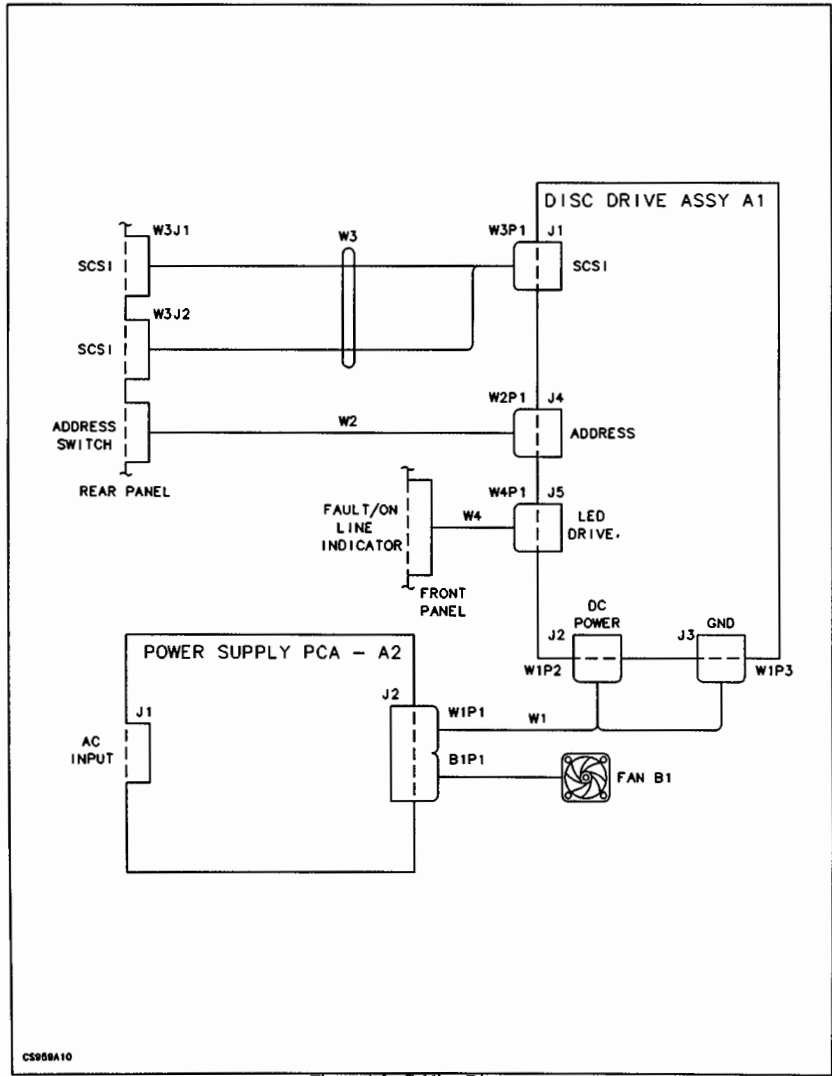


Figure 4-6. Cabling Diagram



Diagnostics

5

5-1. SCSIDISC Diagnostic Program

The following paragraphs describe the basics of the off-line SCSIDISC Diagnostic Program and how it is used to troubleshoot the disc drive. This program has been designed and tested on the HP 150 Personal Computer and the HP 110 Portable PLUS Computer.

5-2. Related Documentation

In addition to the information in this chapter, the following publications will provide additional information regarding use of the SCSIDISC Diagnostic Program and operation of the SCSI bus. Tables 5-1 through 5-5 will be helpful when interpreting SCSIDISC Diagnostic information.

- *SCSIDISC Diagnostic Reference Manual*, part no. 5959-3935
- *HP Common SCSI Interface Specification*, part no. 5959-3911
- *Small Computer System Interface: ANSI X3T9.2/82-2 (Rev 17B) and ANSI X3.131.86*
- *Common Command Set (CCS) of the Small Computer System Interface (SCSI): ANSI X3T9.2/85-52 (REV 4.3)*

5-3. Connecting the Diagnostic to the Disc Drive

To connect the SCSIDISC Diagnostic hardware to the disc drive, proceed as follows:

- a. Remove ac power from the computer system.
- b. Set the LINE- switch on the disc drive to the 0 (out) position.
- c. Disconnect the SCSI bus cable(s) from the disc drive.
- d. Connect the field service SCSI cable (part no. 5061-3158) to the SCSI/HP-IL interface module (part no. 5061-3156). Check that the connector on the cable is properly oriented before plugging it into the module. See figure 5-1.
- e. Connect the other end of the field service SCSI cable to a SCSI connector on the rear panel of the disc drive.
- f. Connect the SCSI terminator (part no. 1252-2297) to the other SCSI connector on the drive.
- g. Connect the computer and the printer to the SCSI/HP-IL interface module using HP-IL cables. See figure 5-1. If the printer is not available, connect the computer to the module as shown in figure 5-2.

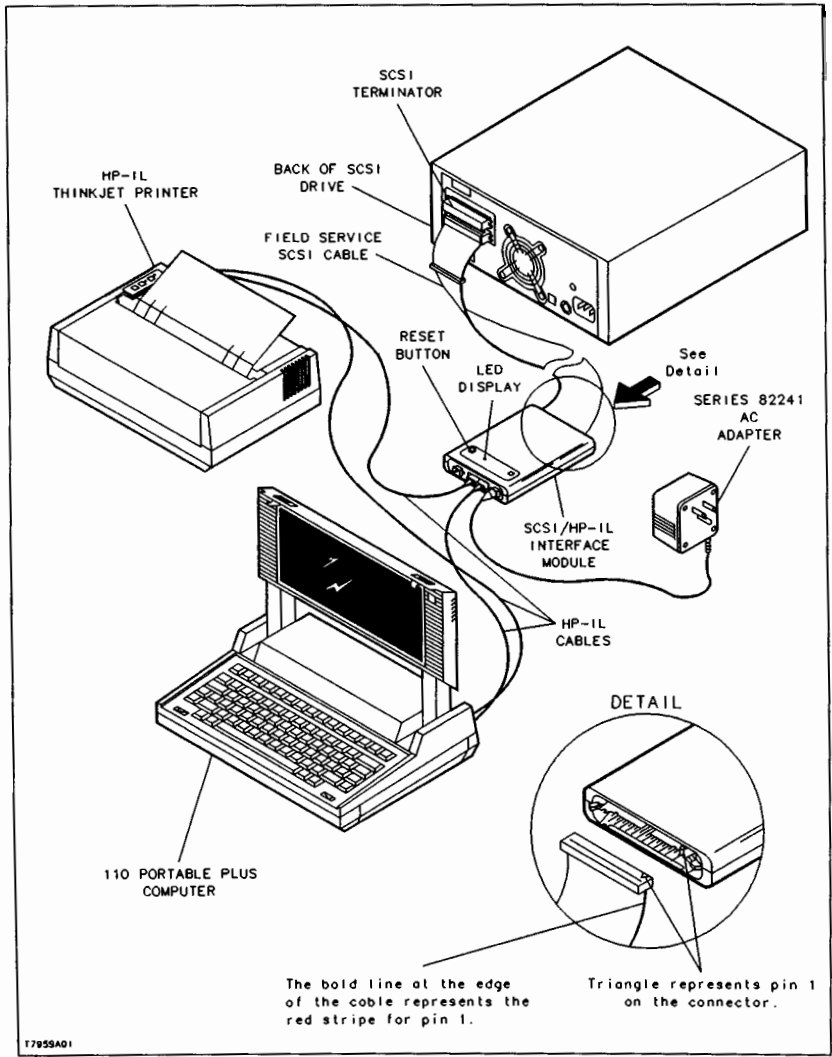


Figure 5-1. SCSI/HP-1L Diagnostic, Connection Details

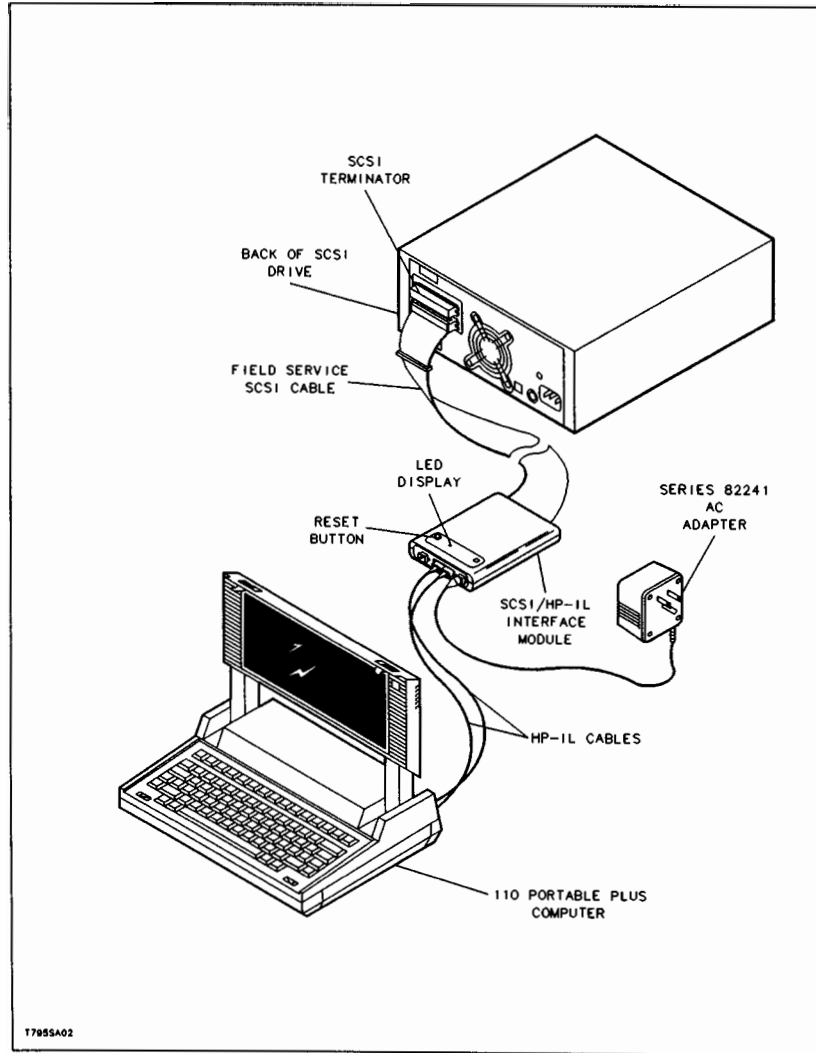


Figure 5-2. SCSIDISC Diagnostic Connection Details, Computer Only

CAUTION

Use only a Hewlett-Packard Series 82241 AC Adapter to power the SCSIDISC Diagnostic Program. The following units have been approved for use with the SCSIDISC Diagnostic Program:

REGULATORY AGENCY	COUNTRY	MODEL	INPUT	OUTPUT
UL	U.S.A.	82241A	120V 20VA	9 VAC 13.5 VA
CSA	CANADA	82241A	120V 20VA	9 VAC 13.5 VA
TUV/GS	W. GERMANY	82241AB	220V 20VA	9 VAC 13.5 VA
FEI	FINLAND	82241AB	220V 20VA	9 VAC 13.5 VA
SEMKO	SWEDEN	82241AB	220V 20VA	9 VAC 13.5 VA
NEMKO	NORWAY	82241AB	220V 20VA	9 VAC 13.5 VA
DEMKO	DENMARK	82241AB	220V 20VA	9 VAC 13.5 VA
SEV	SWITZERLAND	82241AB	220V 20VA	9 VAC 13.5 VA
SEC	AUSTRALIA	82241AG	240V 20VA	9 VAC 13.5 VA
MITI	JAPAN	82241AJ	100V 20VA	9 VAC 13.5 VA

- h. Connect the cable from the Series 82241 AC Adapter to an input power connector on the interface module. (Either of the two similar connectors on the module can be used).

5-4. Error Rate Information

The SCSIDISC Diagnostic Program may return Error Rate Test information. The maintenance log information is maintained in two places: on the disc media, and in controller RAM. The RAM table is initialized from the disc log at power-on or following a reset. During drive operation the RAM log is continually updated. The contents of the RAM log is only posted to the disc when an error entry is added. The ACCESS LOG command always returns the contents of the RAM log; there is no disc access.

The Data Error log product-specific fields are defined as follows:

Error type:

REC-E = Recovered data with ECC
REC-R = Recovered data with retrys
UNR = unrecoverable error

Error byte:

1XXXXXXX = Unclassifiable error
X1XXXXXX = Error occurred in header field
XX1XXXXX = Error occurred in data field
XXX1XXXX = Unrecoverable data
XXXX1XXX = Data recovered with ECC
XXXXX1XX = Data recovered with retries
XXXXXXX1X = Write fault
XXXXXXX1 = Reserved



Table 5-1. Access Count Range Values

VALUE (HEX)	MINIMUM OF ACCESS RANGE	MAXIMUM OF ACCESS RANGE
0	No Accesses	No Accesses
1	1	1
2	2	10
3	11	100
4	101	1,000
5	1,001	10,000
6	10,001	100,000
7	100,001	500,000
8	500,001	1,000,000
9	1,000,001	5,000,000
A	5,000,001	10,000,000
B	10,000,001	50,000,000
C	50,000,001	100,000,000
D	100,000,001	500,000,000
E	500,000,001	1,000,000,000
F	1,000,000,001	>1,000,000,001

Table 5-2. Extended Sense Data Format

BYTE	BIT							
	7	6	5	4	3	2	1	0
00	VALID	ERROR CLASS = 7			ERROR CODE = 0			
01	SEGMENT NUMBER = 0							
02	FM=0	EOM=0	ILI=0	RESERVD	SENSE KEY			
03	INFORMATION BYTES (MSB)							
04	INFORMATION BYTES							
05	INFORMATION BYTES							
06	INFORMATION BYTES (LSB)							
07	ADDITIONAL SENSE LENGTH = 14							
08-11	COPY/SEARCH INFORMATION = 0							
12	ADDITIONAL SENSE CODE							
13	RESERVED							
14	FAILED FIELD REPLACEABLE UNIT (FRU) = 0							
15	FPV=0	C/D=0	VEND UNQ = 0		BPV=0	BIT POINTER = 0		
16	FIELD POINTER (MSB) = 00							
17	FIELD POINTER (LSB) = 00							
18	DEVICE ERROR (FIRST)							
19	DEVICE ERROR							
20	DEVICE ERROR							
21	DEVICE ERROR (LAST)							

Table 5-3. Sense Key Codes

VALUE (HEX)	DESCRIPTION
0	NO SENSE. Indicates that there is no specific sense key information to be reported for the designated logical unit.
1	RECOVERED ERROR. Indicates that the last command completed successfully with some recovery action performed by the Target. Details may be determinable by examining the additional sense bytes and the information bytes.
2	NOT READY. Indicates that the logical unit addressed cannot be accessed.
3	MEDIUM ERROR. Indicates that the command terminated with a non-recovered error condition that was probably caused by a flaw in the medium or an error in the recorded data.
4	HARDWARE ERROR. Indicates that the Target detected a nonrecoverable hardware failure (for example, controller failure, device failure, parity error, etc.) while performing the command or during a self test.
5	ILLEGAL REQUEST. Indicates that there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands.
6	UNIT ATTENTION. Indicates that the Target has been reset or there has been a power on.
B	ABORTED COMMAND. Indicates that the Target aborted the command due to Initiator request/action.
E	MISCOMPARE. Indicates data in buffer may have been corrupted between READ BUFFER and WRITE BUFFER commands.

Table 5-4. Additional Sense Codes

<u>VALUE</u> <u>(HEX)</u>	<u>DESCRIPTION</u>
00	No Additional Sense Information
01	No Index/Sector signal
02	No Seek Complete
03	Write Fault
04	Drive Not Ready
08	Logical Unit Communication Failure
10	ID CRC or ECC error
11	Unrecovered Read error of data blocks
14	No record found
15	Seek Positioning error
17	Recovered Read data with Target's Read retries (not with ECC)
18	Recovered Read data with Target's ECC correction (not with retries)
19	Defect List error
1A	Parameter Overrun
1B	Synchronous Transfer error
1D	Compare error
20	Invalid Command Operation Code
21	Illegal Logical Block Address. Address greater than the maximum LBA returned by the READ CAPACITY data with PMI not set.
24	Illegal field in CDB
25	Invalid LUN
26	Invalid field in Parameter List
27	Write Protected
29	Power On or Reset or Bus Device Reset occurred
2A	Mode Select Parameters changed.
31	Medium Format Corrupted
32	No Defect Spare Location Available
33	Spare Operation Failed
40	RAM failure
41	Data Path Diagnostic failure
42	Power-On Diagnostic Failure
43	Message Reject Error
44	Internal Controller Error
45	Select/Reselect failed
46	Unsuccessful Soft Reset
47	SCSI Interface Parity Error
48	Initiator Detected Error
49	Inappropriate/Illegal Message



Table 5-5. Device Error Bytes (1 of 3)

If the first Device Error byte (byte 18) is in the range 00H through 3FH then the device error bytes contain HDA status information. This information may be returned with either RECOVERED ERROR or HARDWARE ERROR sense keys and is defined as follows:

Byte 18 Bit 1 - Spindle motor stopped
Byte 18 Bit 0 - Reset condition exists

Byte 19 Bit 7 - Command data parity fault
Byte 19 Bit 6 - Interface fault
Byte 19 Bit 5 - Invalid command fault
Byte 19 Bit 4 - Seek fault
Byte 19 Bit 3 - Write gate with track offset fault
Byte 19 Bit 2 - Extended status available (byte 21)
Byte 19 Bit 1 - Write fault
Byte 19 Bit 0 - zero

Byte 20 zero

Byte 21 (Zero unless byte 19 bit 2 set)
01H = Spindle won't start
02H = Spindle spinning but not at speed
03H = Spindle at speed but no lock
04H = Command interface timeout
05H = Not used
06H = Write while offtrack
07H = Write while offspeed
08H = Write when 2 STP's missing
09H = Not used
0AH = Not used
0BH = Command parity error
0CH = Illegal command
0DH = Write while illegal head selected
0EH = Not used
0FH = Not used
10H = Status Timeout
11H = Target Cylinder exceeds maximum
12H = Wrong mode fault
13H = Consecutive sectors skipped
14H = Servo timeout for Gray code validation
15H = Servo fine settle fault
16H = Servo gross settle fault
17H = Servo interrupt timeout
18H = Seek while servo shut down
19H = Aggressive seek write fault
1AH = Write while protected
1BH = Possible stuck latch (on power on)
1CH = Aggressive write while offtrack (aggressive seeks enabled)
1DH = Write while offtrack (not seek related)

Table 5-5. Device Error Bytes (2 of 3)

If the first Device Error byte (byte 18) is in the range of 40H through 5FH then the device error bytes contain diagnostic failure result information. These codes will normally be returned with a HARDWARE ERROR sense key after power on or a Send Diagnostic command. The device error information is defined as follows:

- Byte 18: 41H = Microprocessor failure
 - Byte 19: 11H = Data register failure
 - 12H = Data register fade failure
 - 21H = Address register failure
 - 22H = Address register fade failure
 - 31H = Condition code failure
 - 32H = Addressing mode failure
- Byte 18: 42H = Microprocessor RAM failure
 - Byte 19: 11H = RAM failed walking 0's test
 - 12H = RAM failed walking 1's test
 - 20H = RAM failed marching test
 - 30H = RAM failed compliment test
 - 40H = RAM failed address test
- Byte 18: 43H = ROM checksum failure
 - Byte 19: zero
- Byte 18: 44H = SCSI interface chip failure
 - Byte 19: 30H = SCIPi failed RAM test
 - 50H = SCIPi failed register test
 - 51H = SCIPi failed command test
 - 52H = SCIPi failed message out test
 - 53H = SCIPi failed message in test
 - 54H = SCIPi functional failure
 - 55H = SCIPi failed status test
 - 56H = SCIPi failed data path test
- Byte 18: 45H = Buffer RAM failure
 - Byte 19: 11H = RAM failed walking 0's test
 - 12H = RAM failed walking 1's test
 - 20H = RAM failed marching test
 - 30H = RAM failed compliment test
 - 40H = RAM failed address test
- Byte 18: 46H = HDC chip failure
 - Byte 19: 60H = HDC failed register test
- Byte 18: 47H = Write/Read failure
 - Byte 19: 00H-7FH = defined as same as additional sense code
 - 81H = Buffer compare error
- Bytes 20-21: zero

Table 5-5. Device Error Bytes (3 of 3)

If the first Device Error byte (byte 18) is in the range of 80H through FFH then the error information returned is from the Hard Disc Controller (HDC) chip. This information will normally be returned for RECOVERED ERROR or MEDIUM ERROR sense keys. The device error bytes contain the following information:

Byte 18	Bit 7 - Error detected
Byte 18	Bit 6 - Correction cycle active
Byte 18	Bit 5 - Local command busy
Byte 18	Bit 4 - Remote command busy
Byte 18	Bit 3 - Local request
Byte 18	Bit 2 - Header match complete
Byte 18	Bit 1 - Next disc command
Byte 18	Bit 0 - ignore
Byte 19	Bit 7 - Late interlock
Byte 19	Bit 6 - Correction failed
Byte 19	Bit 5 - FIFO data lost
Byte 19	Bit 4 - No data synch
Byte 19	Bit 3 - Sector overrun
Byte 19	Bit 2 - Sector not found
Byte 19	Bit 1 - Data field error
Byte 19	Bit 0 - Header failed although sector matched
Byte 20	zero
Byte 21	number of retries attempted

No operating or maintenance adjustments are required for these products.



Peripherals

7

This chapter is not applicable to these products.

8-1. Replaceable Parts

Field replaceable assemblies and parts for the disc drive are listed in table 8-1. Figure 9-6 illustrates all the parts for the disc drive (see Diagrams chapter). In each listing, attaching parts are listed immediately after the item they attach. Items in the DESCRIPTION column are indented 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 8-2 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 8-3 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.

NOTE

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").

8-2. 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:

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

8-3. Disc Drive Assembly A1 Return

A defective disc drive assembly A1 being returned to the factory must be packaged and shipped in Hewlett-Packard shipping material or the warranty will be void.

8-4. Field Stocking Inventory

The following assemblies and parts comprise a recommended field stocking inventory for the drive.

PART NO.	QTY	DESCRIPTION
2110-0003	1	FUSE, 3A, 250V
3160-0528	1	FAN
07957-60031	1	DATA CABLE (W3)
07957-60032	1	LED CABLE (W4)
07957-60034	1	ADDRESS CABLE (W2)
07957-60033	1	POWER CABLE (W1)
07961-60061	1	DISC DRIVE ASSY A1 (107 Mbyte)
07962-60061	1	DISC DRIVE ASSY A1 (161 Mbyte)
07963-60061	1	DISC DRIVE ASSY A1 (323 Mbyte)
09133-67120	1	POWER ASSEMBLY PCA-A2

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



8-5. Removal and Replacement

CAUTION

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

CAUTION

The field-replaceable assemblies (FRAs) in the disc drive are electrostatic sensitive devices. Take appropriate precautions when removing an FRA from the disc drive. Use of an anti-static pad and wrist strap is recommended. (These components are contained in the anti-static workstation, part no. 9300-0749.) Immediately after removal, store the FRA in an anti-static, conductive plastic bag.

WARNING

Remove the power cord from the disc drive before removing or replacing any assemblies or parts. Failure to do so may result in electrical shock hazard.

Removal and replacement procedures for the field-replaceable assemblies and parts in the disc drive are given in the following paragraphs. To assist in the identification of parts, references are made to the index numbers in table 8-1 and figure 9-6.

NOTE

All attaching hardware must be in place and the torque specifications given adhered to in order for the drive to meet its RFI specifications.

8-6. Top Shroud

To remove the top shroud (1):

- a. Remove the three T10 screws (2) that secure the top shroud to the disc drive.
- b. Slide the top shroud towards the rear of the drive and then remove the shroud from the drive.
- c. Ground the frame of the disc drive to an anti-static pad.

Reinstallation is a reversal of the removal procedure.

8-7. Front Panel

To remove the front panel (4):

- a. Remove the top shroud.
- b. Remove the four T10 screws (3) that secure the front panel shield (6), with front panel (4) and LED cable assembly W4 (7) attached, to the disc drive. Move the front panel forward away from the disc drive.
- c. Disconnect cable assembly W4 from connector J5 on disc drive assembly A1 (28).

Reinstallation is a reversal of the removal procedure. Check that the connector disconnected in step c is properly oriented with the white dot on the connector facing upward (visible to the installer). See figure 4-3. Ensure also that the LINE~ switch operates freely before tightening the four T10 screws that secure the front panel to the mainframe.

Torque Specification: Tighten the four T10 screws removed in step b to 14 in.-lbs.

8-8. Fan

To remove the fan (12), proceed as follows:

- a. Remove the top shroud and front panel.
- b. Remove the four T20 screws (13) and grille (14) that secure the fan (12) to the rear panel of the mainframe assembly (30).
- c. Disconnect the fan power cable from connector J2 on power supply PCA-A2 (19).
- d. Disengage the fan cable assembly from the two cable clamps (15) and remove the fan from the disc drive.

Reinstallation is a reversal of the removal procedure. Ensure that the fan is positioned with its power cable assembly in line with the cable clamps (15). Ensure also that the fan cable connector is firmly seated in its mating connector on power supply PCA-A2. Before returning the disc drive to service, check that the fan is operating correctly.

8-9. LED Cable W4

To remove LED cable assembly W4 (7):

- a. Remove the top shroud and front panel.
- b. Remove the four T25 screws (5) that hold the front panel shield (6) to the front panel (4).
- c. Separate the front panel shield (6) from the front panel (4) and remove LED cable assembly W4 from the front panel.

8-10. Address Cable W2

To remove address cable assembly W2 (11):

- a. Remove the top shroud.
- b. Disconnect cable assembly W2 from connector J4 on disc drive assembly A1.
- c. Press down on the four retaining clips on the sides of the ADDRESS switch and remove cable assembly W2 from the drive.

Reinstallation is a reversal of the removal procedure. Ensure that the connector removed in step b is properly oriented with the white dot on the connector facing upward (visible to the installer). See figure 4-3.

8-11. Power Supply PCA-A2

To remove power supply PCA-A2 (19):

- a. Remove the top shroud and front panel.
- b. Disconnect power cable assembly W1 (8) and the fan cable from connector J2 on power supply PCA-A2.
- c. Remove the T10 screw (16) and spacer (17) that secure PCA-A2 to the mainframe assembly.
- d. Remove the two T15 screws (18) that secure PCA-A2 to the mainframe assembly.
- e. Slide PCA-A2 forward and out of the disc drive.

WARNING

The power supply shield (22) must be in place and the captive T15 screw (18) on the left-hand side of the mainframe assembly (30) tightened before power is applied to the disc drive.

WARNING

The T10 screw (16) and spacer (17) must be in place for the disc drive to meet safety and RFI specifications. The T10 screw (16) should be replaced each time it is removed from the disc drive.

Reinstallation is a reversal of the removal procedure. Ensure that the T10 screw (16) and spacer (17) are properly installed. Ensure also that the two T15 screws (18) are properly replaced. This attaching hardware is required to properly ground the power supply to the mainframe.

Torque Specification: Tighten the T10 (16) screw removed in step c to 10 in.-lbs.

8-12. Disc Drive Assembly A1

CAUTION

Disc drive assembly A1 is an electrostatic sensitive device. Observe all anti-static precautions noted in paragraph 8-5 when removing or replacing the drive.

CAUTION

A defective disc drive assembly A1 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 disc drive assembly A1 (28);

- a. Remove the top shroud and front panel.
- b. Remove the four T15 screws (26) which secure tray (29), with A1 attached, to the mainframe assembly and partially withdraw A1 from the mainframe.
- c. Disconnect SCSI cable assembly W3 (9), power cable assembly W1 (8) and address cable assembly W2 (11) from connectors J1, J2, J3 and J4 on disc drive assembly A1.
- d. Carefully remove A1 from the mainframe assembly.
- e. Remove the four T15 screws (27) which secure A1 to the tray (29).

Reinstallation is a reversal of the removal procedure.

Torque Specification: Tighten the T15 screws removed in step b 10 in.-lbs and the T15 screws removed in step e to 15 in.-lbs.



Table 8-1. Disc Drive Replaceable Parts

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	UNITS PER ASSY	
P-6-	7957S	DISC DRIVE	28480	7957S	REF	
	7958S	DISC DRIVE	28480	7958S	REF	
	7959S	DISC DRIVE	28480	7959S	REF	
	1	07957-60024	* TOP SHROUD ASSEMBLY (Attaching Parts)	28480	07957-60024	1
	2	0515-0374	* SCREW, pnh, T10, M3.0 X 0.50, 10 mm long w/scw - - - X - - -	00000	0BD	3
	3	0515-0374	* SCREW, pnh, T10, M3.0 X 0.50, 10 mm long w/scw	00000	0BD	4
	4	07957-60018	* FRONT PANEL ASSEMBLY, 7957S	28480	07957-60018	1
		07958-60018	* FRONT PANEL ASSEMBLY, 7958S	28480	07958-60018	REF
		07959-60018	* FRONT PANEL ASSEMBLY, 7959S	28480	07959-60018	REF
	5	0624-0590	** SCREW, tapping, pnh, T25, 8-16, 0.312	00000	0BD	4
	6	5001-3344	** FRONT SHIELD	28480	5001-3344	1
	7	07957-60032	** LED CABLE ASSEMBLY (W4)	28482	07957-60032	1
	8	07957-60033	* POWER CABLE ASSEMBLY (W1)	28480	07957-60033	1
	9	07957-60031	* DATA CABLE ASSEMBLY (W3) (Attaching Parts)	28480	07957-60031	1
	10	0515-0374	* SCREW, pnh, T10, M3.0 X 0.50, 10 mm long w/scw - - - X - - -	00000	0BD	3
	11	07957-60034	* ADDRESS CABLE ASSEMBLY (W2)	28480	07957-60034	1
	12	3160-0528	* FAN (Attaching Parts)	28480	3160-0528	1
	13	0624-0661	* SCREW, tapping, pnh, T20, 10-14, 0.625 in. long	00000	0BD	4
	14	07941-00026	* GRILLE, fan	28480	07941-00026	1
	15	1400-0510	* CLAMP, cable - - - X - - -	02768	8511-28-00-99	2
	16	0515-0665	* SCREW, machine, pnh, T10, M3.0 by 0.5, 14 mm long, w/scw	00000	0BD	1
	17	5021-1534	* SPACER	28480	5021-1534	1
	18	0515-0433	* SCREW, machine, pnh, T15, M4.0 by 0.7, 8 mm long, w/scw	00000	0BD	2
	19	09133-67120	* POWER SUPPLY ASSEMBLY	28480	09133-67120	1
	20	2110-0565	** CAP, fuseholder	28480	2110-0565	1
	21	2110-0003	** FUSE, 3A, 250V, ntd, 1.25 by 0.25 in.	75915	312 003	1
	22	09144-45404	** SHIELD, power supply	28480	09144-45404	1
	23	09133-40202	** SHAFT, switch	28480	09133-40202	1
24	0380-1655	** HOLDER, shaft	28480	0380-1655	1	
25	5041-1203	** CAP, LINE- switch	28480	5041-1203	1	
26	0515-0433	* SCREW, machine, pnh, T15, M4.0 by 0.7, 8 mm long, w/scw	00000	0BD	4	
27	2360-0464	* SCREW, pnh, T15, 0.375 in. long, 6-32 w/scw	00000	0BD	4	
28	07961-60061	* DISC MECHANISM, 107 MEGABYTE	28480	07961-60061	1	

Table 8-1. Disc Drive Replaceable Parts (continued)

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	UNITS PER ASSY
	07962-60061	* DISC MECHANISM, 161 MEGABYTE	28480	07962-60061	REF
	07963-60061	* DRIVE MECHANISM, 323 MEGABYTE	28480	07963-60061	REF
29	07957-00022	* UNIVERSAL DISC TRAY	28480	07957-00022	1
30	5061-3155	* MAINFRAME ASSEMBLY	28480	5061-3155	1
31	09121-48303	** FOOT, plastic, molded	28480	09121-48303	2
32	0403-0427	** FOOT, rear	94959	SJ-5008	2
33	0403-0406	** GUIDE, PCA, 4.5 in. long	28480	0403-0406	2
34	0403-0379	** GUIDE, PCA, 9.9 in. long	28480	0403-0379	1
35	0403-0302	** GUIDE, PCA, 8 in. long	28480	0403-0302	1
36	8120-0698	* POWER CORD, NEMA15A/CEE (option 904)	28480	8120-0698	1
	8120-1351	* POWER CORD, BS 1363/CEE (option 900)	28480	8120-1351	REF
	8120-1369	* POWER CORD, ASC 112/CEE (option 901)	28480	8120-1369	REF
	8120-2371	* POWER CORD, NEMA10A/CEE (option 903)	28480	8120-2371	REF
	8120-1689	* POWER CORD, GMBH/CEE (option 902)	28480	8120-1689	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
	8120-2956	* POWER CORD, MDPP/CEE (option 912)	28480	8120-2956	REF
	8120-4211	* POWER CORD, SABS/CEE (option 917)	28480	8120-4211	REF
	8120-4753	* POWER CORD, NEMA12A/CEE (option 918)	28480	8120-4753	REF

Table 8-2. Abbreviations

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

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

Table 8-3. Code List of Manufacturers

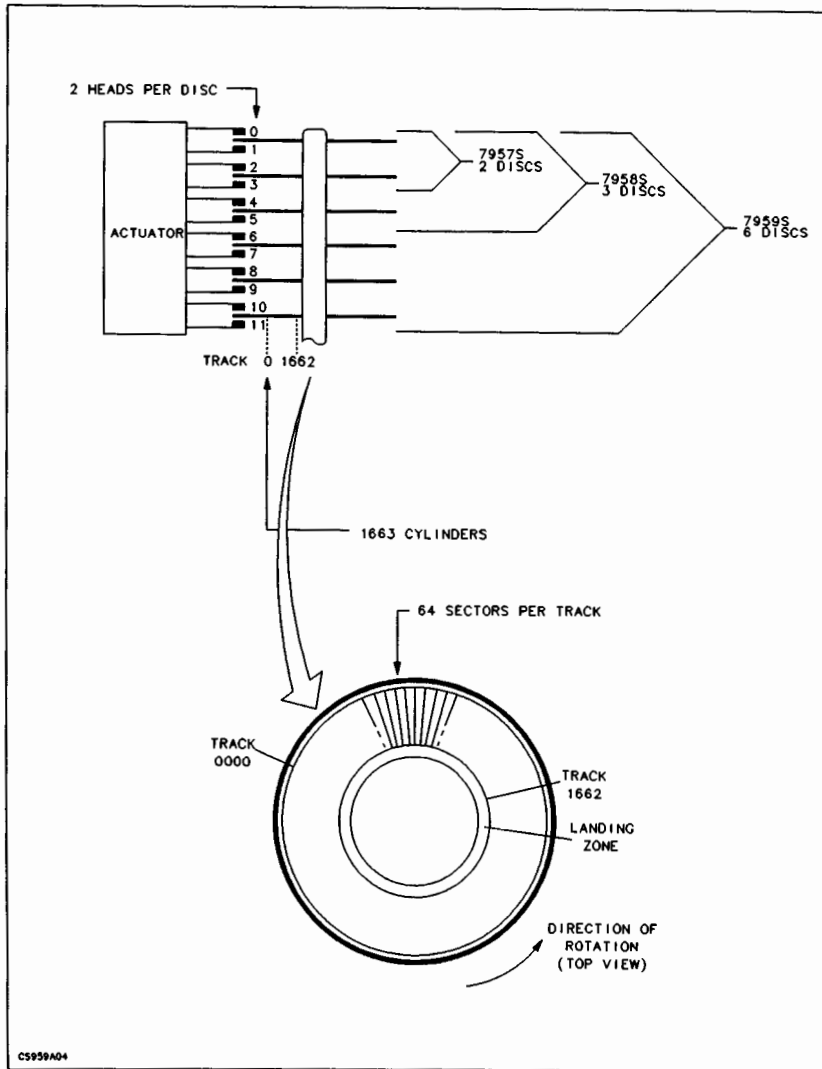
CODE NO.	MANUFACTURER	ADDRESS
02768	Illinois Tool Works, Inc.	Des Plaines, IL
28480	Hewlett-Packard Co.	Palo Alto, CA
75915	Littelfuse Tracor Inc.	Des Plaines, IL
94959	3M Co., Adhesives, Coating, and Sealers Div.	St. Paul, MN



Diagrams

9

This chapter contains illustrations of the disc drive addressing structure, track allocation, sector format, functional blocks, cabling, signal distribution, and parts location.



CS959A04

Figure 9-1. Disc Mechanism Addressing Structure

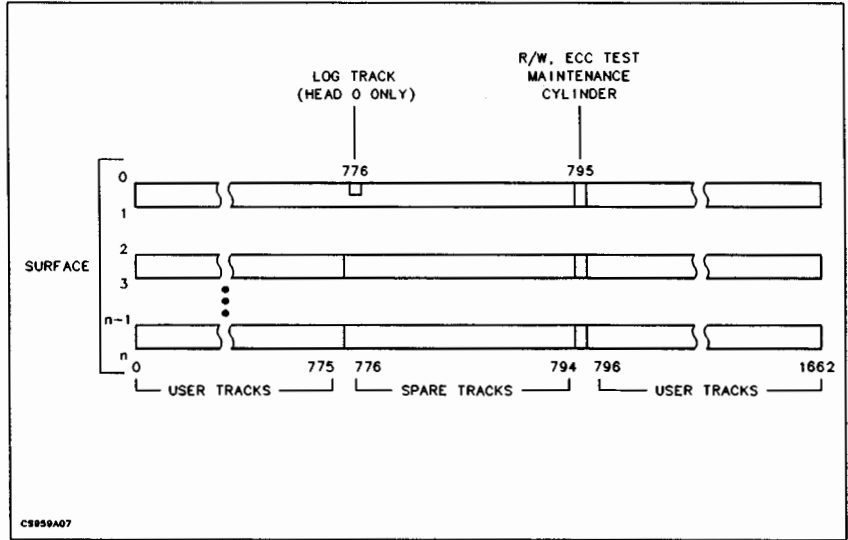


Figure 9-2. Track Allocation

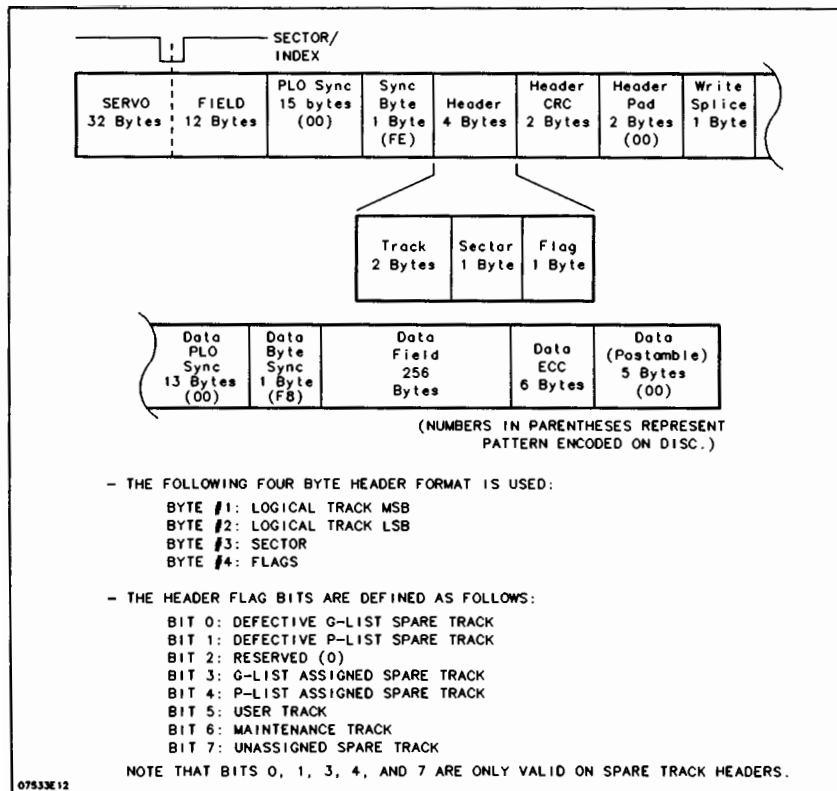


Figure 9-3. Physical Sector Format

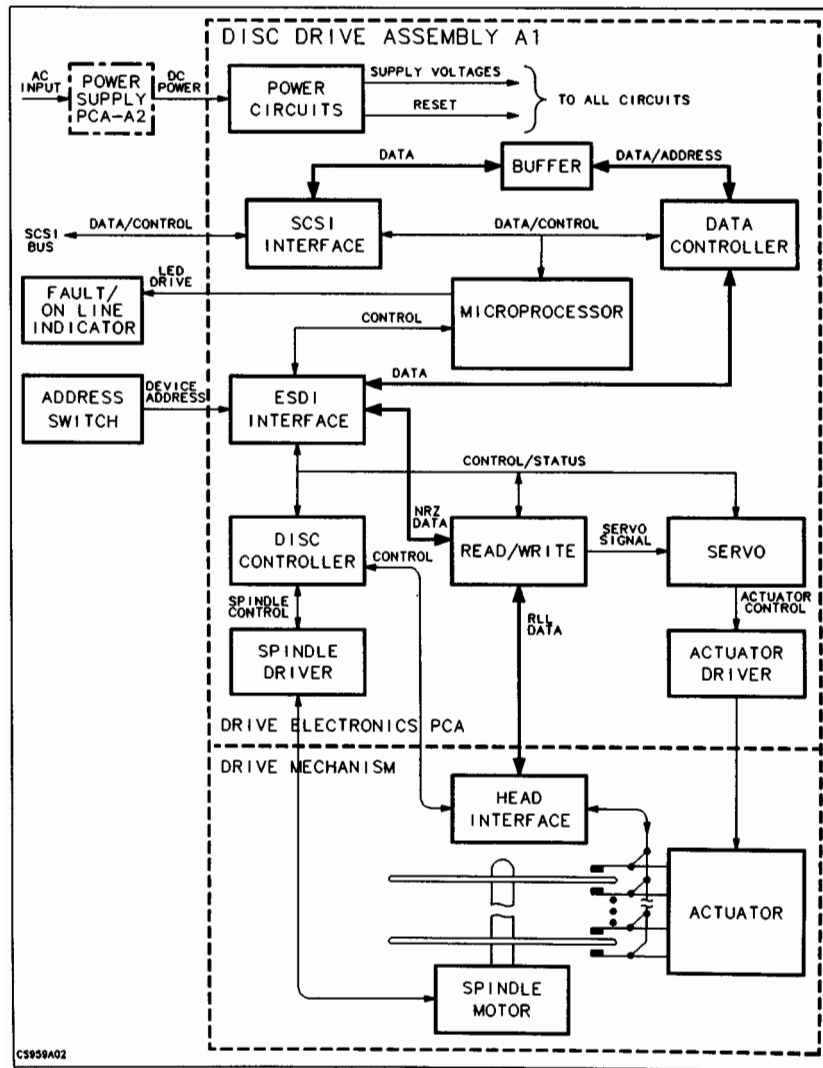
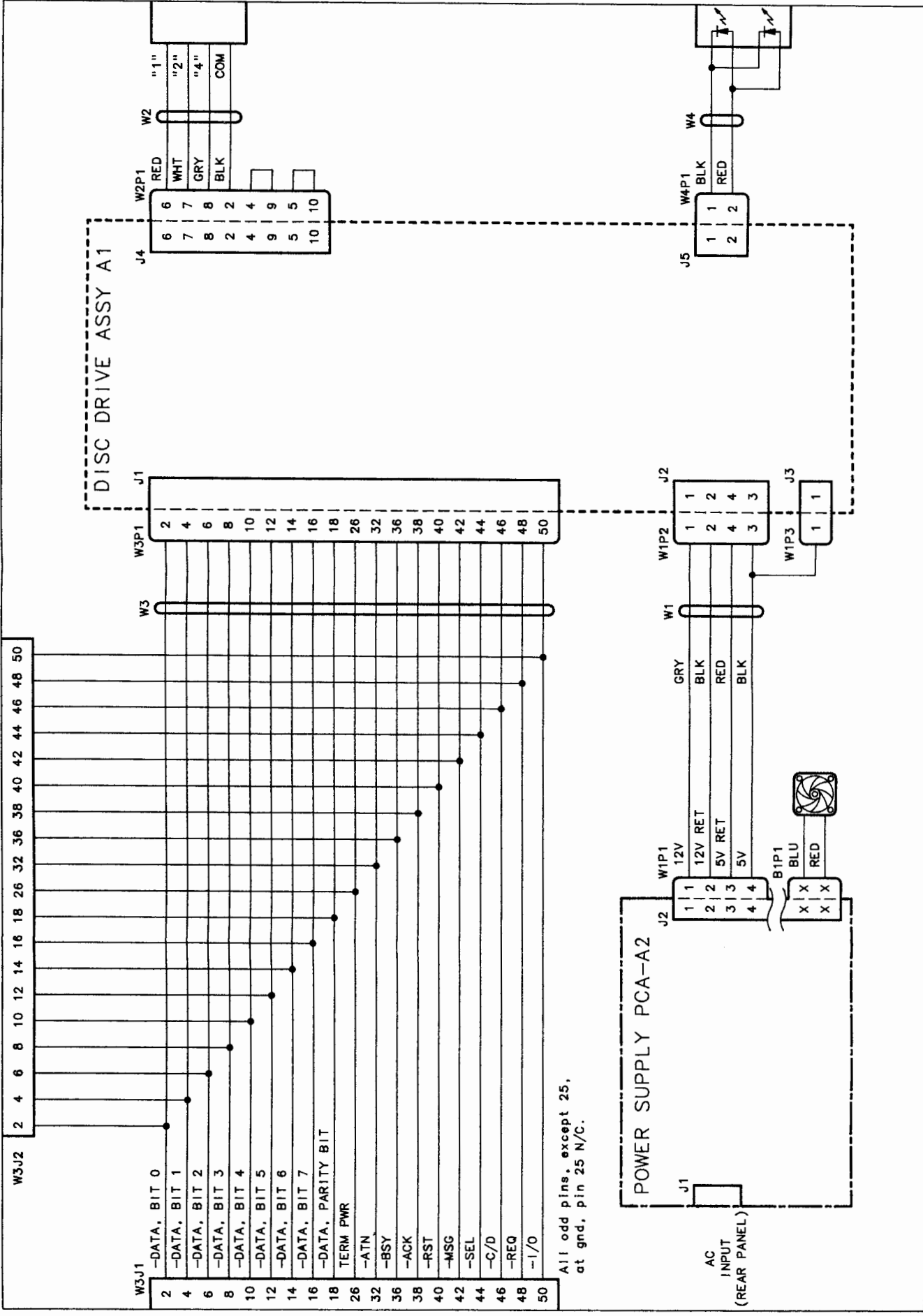


Figure 9-4. Disc Drive Block Diagram



ADDRESS SWITCH (REAR PANEL)

FAULT/ON LINE INDICATOR (FRONT PANEL)

Figure 9-5. Signal Distribution

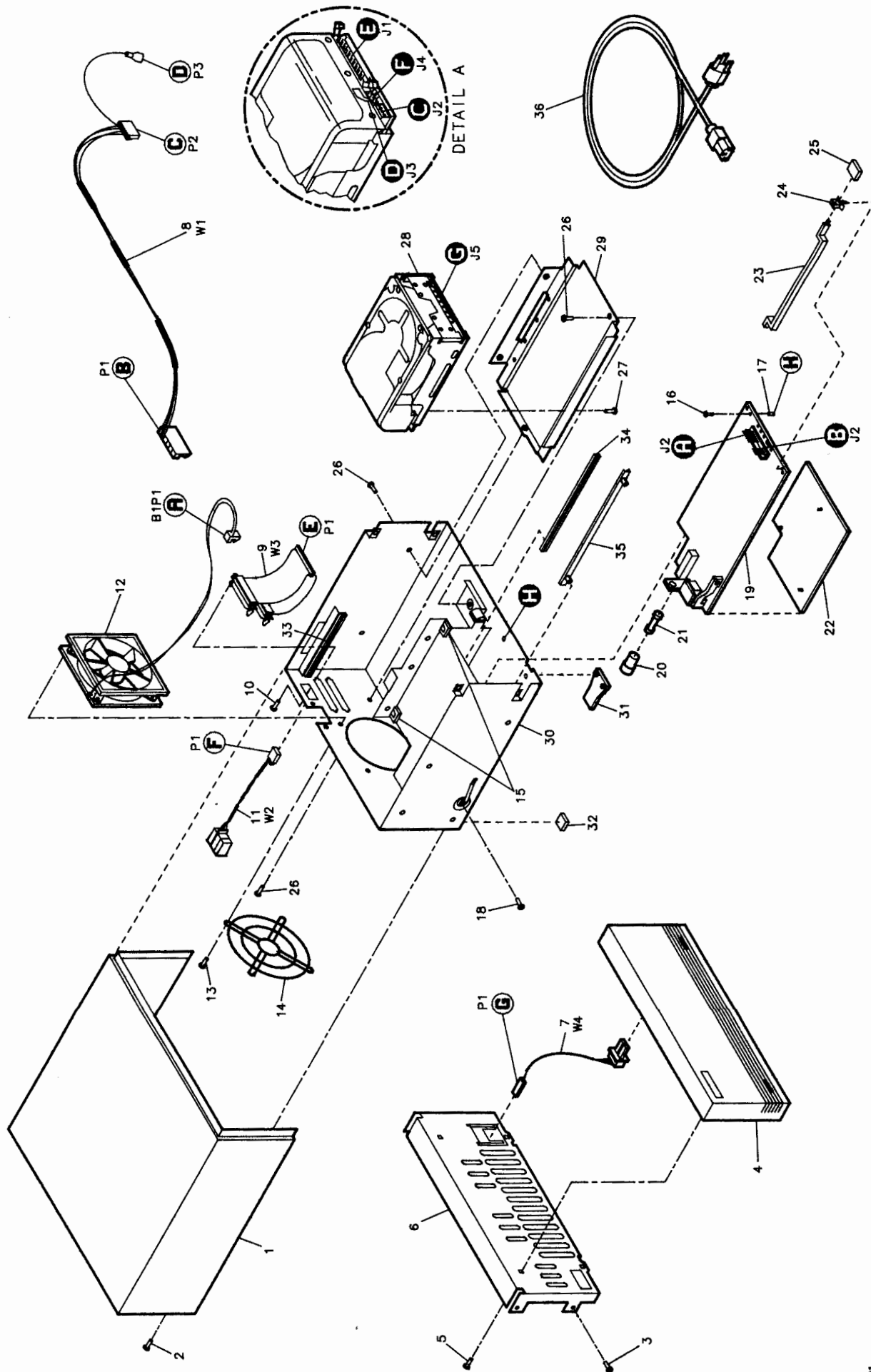


Figure 9-6. Disc Drive, Exploded View
9-9/9-10



Reference

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For more information regarding the product, refer to the publications listed below:

Site Environmental Requirements for Disc/Tape Drives Manual, part no. 5955-3456

HP 7957S, 7958S and 7959S Owner's Manual, part no. 07959-90911

This chapter provides a listing of all released service notes for these products. No service notes have been issued at the time of this printing.

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