

9121D/S Disc Memory Operator's Manual

 HEWLETT
PACKARD



Federal Communications Commission
Radio Frequency Interference Statement
U.S.A. Only

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:

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV
Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Warranty Statement

Hewlett-Packard products are warranted against defects in materials and workmanship. For Hewlett-Packard Desktop Computer Division products sold in the U.S.A. and Canada, this warranty applies for ninety (90) days from date of delivery. * Hewlett-Packard will, at its option, repair or replace equipment which proves to be defective during the warranty period.

ALL REPAIRS TO BE DONE UNDER WARRANTY MUST BE RETURNED TO HP.

Buyer shall prepay shipping charges for products returned to HP for warranty service and HP shall pay for return of the products to Buyer. However, Buyer shall pay for all shipping charges, duties and taxes for products returned to HP from another country.

Repairs necessitated by misused of the equipment, or by hardware, software, or interfacing not provided by Hewlett-Packard are not covered by this warranty.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HEWLETT-PACKARD SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES.

*For other countries, contact your local Sales and Service Office to determine warranty terms.

9121D/S Disc Memory Operator's Manual

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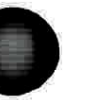
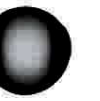
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Chapter 1

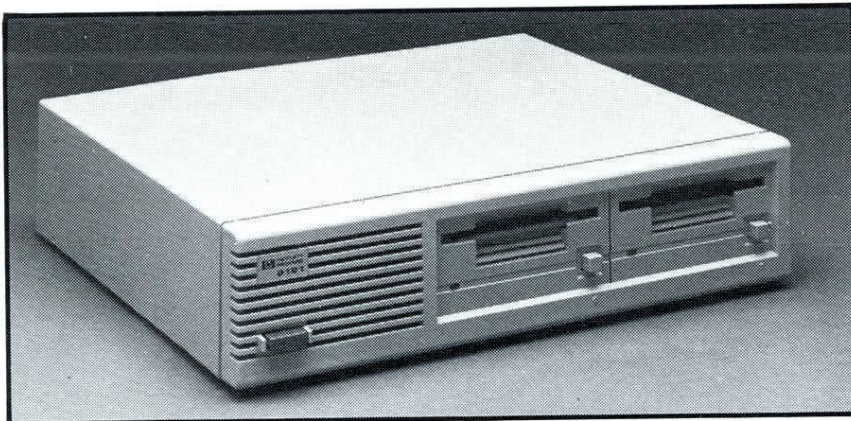
General Description

- Introduction
- Technical Specifications

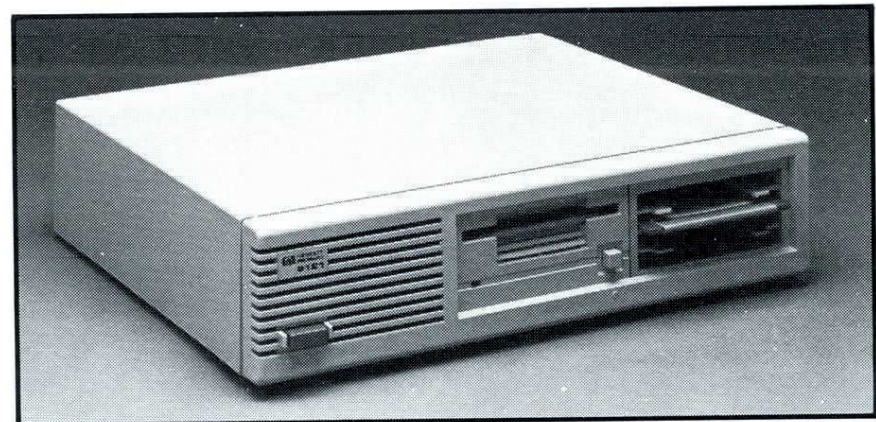
Introduction

The HP 9121D/S Disc Memories (Figures 1-1) are random access data storage devices. The HP 9121S contains a single 3 1/2-inch disc drive providing 286.72 Kbytes of storage capacity. The HP 9121D contains two 3 1/2-inch disc drives providing a total storage capacity of 573.44 Kbytes.

The 9121D/S Drives have been designed to emulate the HP 82900 Series Disc Drives. The 82900s are HP's 5 1/4-inch Flexible Disc Drives. Thus, HP computers that support the 82900 Flexible Disc Drives will support the 9121D/S. Refer to the Mass Storage Manual of your computer for programming information for the HP 82900 5 1/4-inch Flexible Disc Drive.



HP 9121D



HP 9121S

Figure 1-1. HP 9121D/S Flexible Disc Memories

Technical Specifications

Listed next are the electrical and physical specifications for the HP 9121D/S disc memories.

| | HP 9121S | HP 9121D |
|------------------|-------------------|-----------------|
| Number of drives | 1 | 2 |
| Net Weight | 3.6kg (8.5 lbs) | 4.5 kg (10 lbs) |
| Height | 76 mm (2.99 in.) | |
| Depth | 285 mm (11.2 in.) | |
| Width | 325 mm (12.8 in.) | |

Interface HP-IB

HP Double Density Format

| | |
|-------------------------|----------------------------------|
| Encoding: | MFM |
| Rotational Speed: | 600 RPM |
| Bit Density @ 600 RPM: | Track 69 (Inside track) 7610 BPI |
| Track Density: | 135 tracks per inch |
| Tracks per Surface: | 70 |
| Surfaces used per disc: | 1 |

Capacity

| | |
|--------------------------|---------------|
| Bytes/Sector: | 256 |
| Sectors/Track: | 16 |
| Tracks: | 70 |
| Bytes/Drive (Formatted): | 286.72 Kbytes |

NOTE

All of HP's computers spare 4 complete tracks. This reduces the useable user space to $256 \times 16 \times 66$ (bytes/sector times sector/track times unspared tracks). This total equals 270.34 Kbytes. Additionally, directories further reduce useable user space. This, as implemented by HP, generally takes track 0. Actual useable space then is somewhere less than 270.34 Kbytes.

Access Time

| | |
|--|----------------------------------|
| Track-to-Track Seek: | 15 ms/track, plus 20 ms settling |
| Maximum Track-to-Track Seek (70 tracks): | 1070 ms |
| Average Track-to-Track: | 370 ms |
| Maximum Rotational Latency: | 100 ms |
| Average Rotational Latency: | 50 ms |
| Spindle Motor on time: | 1 s |
| Maximum Data Access Time (Seek plus Latency plus Motor on time): | 2.175 s |
| Average Data Access Time: | 420 ms |

Data Transfer Rates:

| Interleave | Burst Rate (1) (bytes/sec) | Avg. Transfer Rate (2) (bytes/sec) |
|------------|----------------------------------|--|
| 1 | 3.2K | 2.6K |
| 2 | 76.9K | 17.1K |
| 3 | 40.8K | 12.1K |
| 4 | 20.6K | 9.3K |
| 5 | 14.8K | 7.6K |
| 6 | 11.6K | 6.4K |
| 7 | 9.5K | 5.5K |
| 8 | 7.0K | 4.8K |
| 9 | 6.2K | 4.3K |
| 10 | 5.5K | 3.9K |
| 11 | 5.0K | 3.5K |
| 12 | 4.2K | 3.2K |
| 13 | 3.9K | 3.0K |
| 14 | 3.6K | 2.8K |
| 15 | 3.4K | 2.6K |

Maximum burst transfer rate of the 9121D/S is 64.5 Kbytes/s for writing and 67 Kbytes/s for reading. This is the capability of the 9121D/S. Your system transfer may vary due to your controller.

- (1) Minimum average burst rate required to utilize this interleave efficiently without introducing extra disc rotational latencies.
- (2) Average data rate for a multiple-track read or write.

Power Requirements

86-125 volts or 195-250 volts @ 67 watts RMS (94 voltamps)

50-60 Hertz

Fuse 1A, 250 for 115V setting

.5A 250 for 230V setting

Environmental Specs**Operating Limits**

| | |
|--------------|--|
| Temperature: | 10° C to 45° C (50° F to 115° F) |
| Humidity: | 20 to 80% with maximum wet bulb temperature (non-condensing) not to exceed 29° C (85 F). |
| Altitude: | 0 to 4572 m (0 to 15 000 ft) |

**Non-operating Limits
(Storage and Transit)**

| | |
|--------------|--------------------------------------|
| Temperature: | -40° C to 60° C (-40° F to 140° F) |
| Altitude: | -304 to 15240 m (-1000 to 50 000 ft) |

NOTE

The flexible disc in the HP 9121D/S Disc Memory is designed for operation in a typical office environment. Use of the equipment in an environment containing dirt, dust, or corrosive substances will cause the flexible disc drives and media life to be drastically reduced.

Chapter 2

Installation

- Equipment Supplied
- Unpacking Your HP 9121D/S Disc Memory
- Configuring Power
- Interfacing to Your System

Equipment Supplied

The following equipment is supplied with each HP 9121D/S disc memory.

Table 2-1. Equipment Supplied

| Description | Quantity | HP Part Number |
|---------------------|--|--|
| Power Cable | 1 | Dependent on location (see Chapter 2) |
| * Operator's Manual | 1 | 09121-90000 |
| Fuse | 1 96 to 125VAC 1.0 Amp or 1 195 to 250VAC .5 Amp | 2110-0001 2110-0012 |
| | Dependent on Location | |

*This manual is available in the following languages:

German – 09121-90006 Spanish – 09121-90008
French – 09121-90007 Italian – 09121-90009

A package of ten discs has been set up as a product. This product is orderable using the 92191A product number.

Unpacking Your HP 9121D/S Disc Memory

Your disc memory was carefully inspected before shipment. Remove the unit from the shipping carton and carefully inspect the unit for any physical damage that may have occurred during shipment. If you find any damage, you should immediately notify your dealer and file a claim with any carriers involved.

CAUTION

THE DISC MEMORY IS A PRECISION INSTRUMENT. MECHANICAL SHOCK CAN MISALIGN THE READ/WRITE HEAD, RESULTING IN READ ERRORS AND/OR DAMAGED DISCS WHETHER THE DISC IS OPERATING OR NOT.

If the disc memory is moved, be careful when picking it up and setting it down.

Carefully repack the disc memory in a shipping carton before transporting it to another site.

NOTE

Evidence of excessive shock will void the warranty.

Please check to insure that you have received all of the standard equipment. If any items are incorrect or missing, please contact the dealer from whom you purchased the unit.

Configuring Power

Setting the Line Voltage Select Switch

The voltage select switch on the rear panel must be set to the nominal line voltage for the area in which it is operating, Figure 2-1 shows the setting for the voltage select switch for the various line voltages.

CAUTION

ALWAYS TURN THE AC POWER SWITCH OFF OR DISCONNECT THE AC LINE CORD BEFORE CHANGING THE LINE VOLTAGE SELECT SWITCH POSITION. CHANGING THE LINE VOLTAGE SELECT SWITCH SETTING WHILE AC POWER IS ON COULD DAMAGE THE DISC MEMORY.

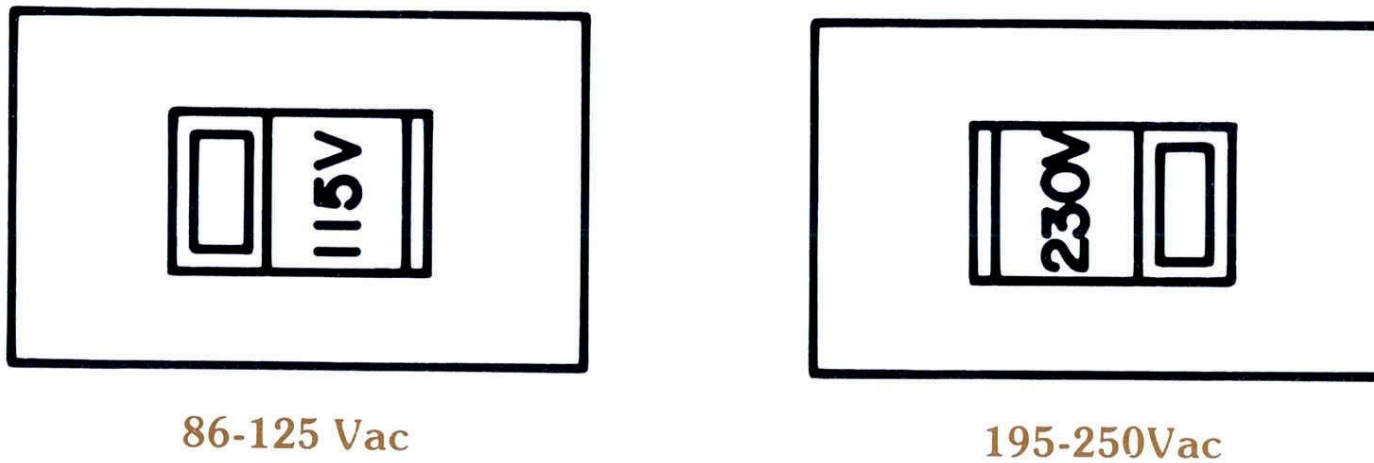


Figure 2-1. Line Voltage Select Switch

Fuses

A different fuse is required for each of the two voltage ranges of 86-125 and 195-250 VAC. Table 2-2 gives the correct fuse ratings and part numbers.

Table 2-2. Fuses

| | Voltage Range | Fuse Rating | HP P/N |
|------------|---------------|-------------------------|-----------|
| HP 9121D/S | 86-125VAC | 1.A 250 VAC-Normal Blow | 2110-0001 |
| HP 9121D/S | 195-250VAC | .5A 250 VAC-Normal Blow | 2110-0012 |

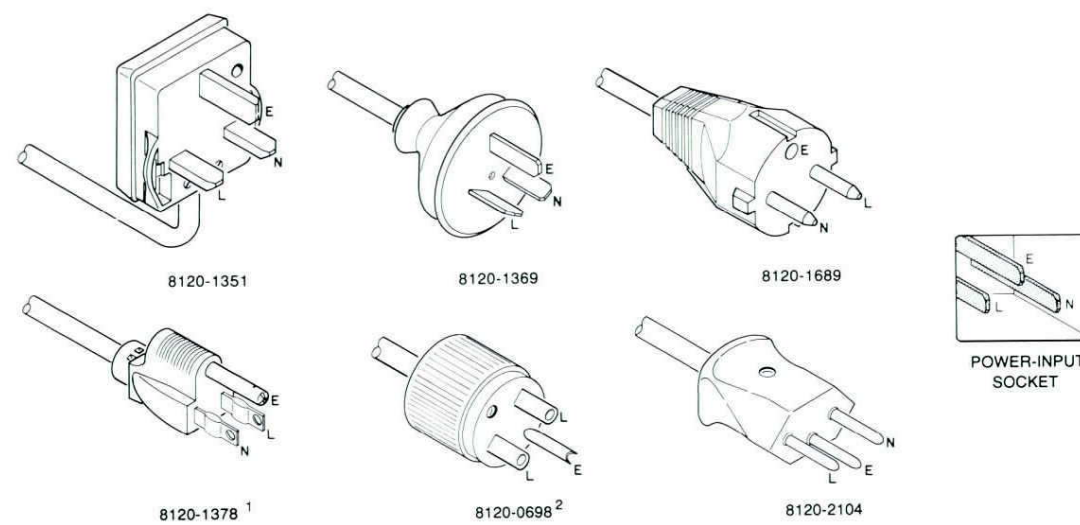
WARNING

ALWAYS DISCONNECT THE DISC MEMORY FROM ANY AC LINE BEFORE CHANGING FUSES.

Power Cords

Power cords supplied by HP have polarities matched to the power input socket on the equipment (Figure 2-2).

- L = Line or active conductor (also called “live” or “hot”)
- N = Neutral or identified conductor
- E = Earth or safety ground



¹UL and CSA approved for use in the United States of America and Canada with equipment set for either 100 or 120 Vac operation.

²UL and CSA approved for use in the United States of America and Canada with equipment set for either 200 or 240 Vac operation.

Figure 2-2. Available Power Cords

WARNING

IF IT IS NECESSARY TO REPLACE THE POWER CORD, THE REPLACEMENT CORD MUST HAVE THE SAME POLARITY AS THE ORIGINAL AS WELL AS THE EARTH OR SAFETY GROUND CONDUCTOR. OTHERWISE, A SAFETY HAZARD MIGHT EXIST IF AN INTERNAL FAILURE OCCURS.

The cord packaged with the equipment depends upon where the equipment is to be delivered.

Interfacing to Your System

The HP-IB Interface

The HP 9121D/S are connected to the computer via the Hewlett-Packard Interface Bus (HP-IB). Refer to the figure below for a list of the HP-IB interface cables used with HP computers.

| <u>Length</u> | <u>Accessory Number</u> |
|---------------|-------------------------|
| 1 metre | 10833A |
| 2 metres | 10833B |
| 4 metres | 10833C |
| .5 metres | 10833D |



Figure 2-3. HP-IB Interface Cables

HP-IB Interface Restrictions:

1. All the AC line switches must be turned "OFF" when connecting (and disconnecting) devices to your system.
2. The total length of cable permitted in one bus system must be less than or equal to two metres times the number of devices connected together (the interface card is counted as one device).
3. The total length of the cable must not exceed 20 metres. For example, a system containing six devices can be connected together with cables that have a total length less than or equal to 12 metres (six devices x 2m/device = 12 metres). The individual lengths of cable may be distributed in any manner desired as long as the total length does not exceed the allowed maximum. If more than 10 devices are to be connected together, cables shorter than two metres must be used between some of the devices to keep the total cable length less than 20 metres.
4. The maximum number of devices that can be connected together in one bus system is 15.
There are no restrictions to the way cables may be connected together; however, it is recommended that no more than four piggyback connectors be stacked together on one device. The resulting structure could exert enough force on the connector mounting to damage it.

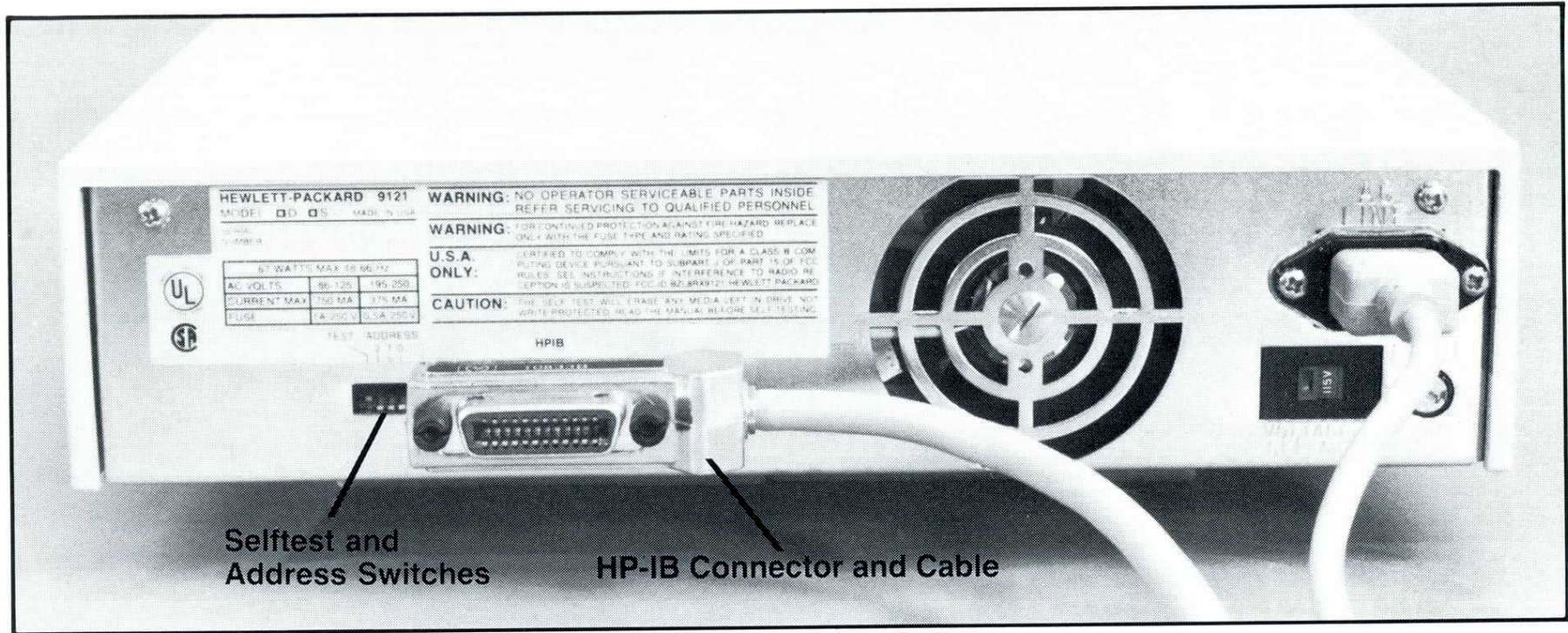


Figure 2-4. Interface Connection

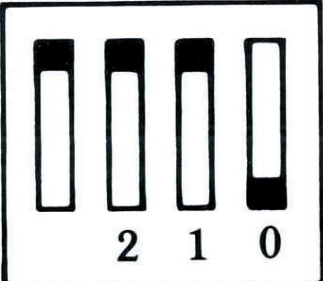
Selecting the Device Address

Each device in an HP-IB system must be set to a unique device address. The 9121D contains two separate drives, but is one device and requires one address. See the mass storage information of your controller for addressing information concerning drive 0 and drive 1. See Figure 2-5 for switch locations.

Prior to setting the device address switches, turn the disc memory AC line switches OFF.

The switches can be set to any one of eight device addresses, ranging from decimal 0 through 7. Refer to Figure 2-5 to set these switches to the desired device address.

| Address | Switch Segments | | | |
|---------|-----------------|------|------|------|
| | 2 | 1 | 0 | |
| 0 | ** | DOWN | DOWN | DOWN |
| 1 | ** | DOWN | DOWN | UP |
| 2 | ** | DOWN | UP | DOWN |
| 3 | ** | DOWN | UP | UP |
| 4 | ** | UP | DOWN | DOWN |
| 5 | ** | UP | DOWN | UP |
| 6 | ** | UP | UP | DOWN |
| 7 | ** | UP | UP | UP |



UP

DOWN

** = Selftest - Refer to Chapter 3 for selftest information.

Figure 2-5 . Device Address Switch Setting



Chapter 3

System Operation

- Flexible Disc Usage and Handling
- Media Monitor
- Controls and Indicators
- Applying Power
- Loading the Flexible Disc
- Flexible Disc Structure
- Basic System Operation
- Data Errors
- Selftest
- Helpful Hints

Flexible Disc Usage and Handling

Flexible Disc Media

The removable storage medium used in the HP 9121D/S is a flexible mylar disc coated with a thin layer of magnetic oxide. The disc is enclosed in a protective plastic jacket with a slot for head access to the recording surface. Only the lower side of the flexible disc is used for data storage. The lower side refers to the lower side of the disc as the disc resides in the drive.

Each disc may contain 286 Kbytes of formatted data. Since some storage is used for a directory, the exact amount available for user storage depends upon the controller and the number of files stored. Refer to the appropriate computer mass storage programming or reference manual for details.

Each flexible disc must be initialized before it can be used for data storage. The initialization procedure marks each disc sector, checks for defective tracks, and establishes file directories.

Refer to the mainframe programming or reference manual for the correct initialization procedure.

Write Protect Error on Initialization

A motor speed check is performed when a disc is inserted to be initialized. If the motor speed is on either side of the tolerance allowed, a Write Protect Error is generated and the disc is not initialized. If your drive is operating properly, this indication is one of a defective disc. Discard the disc.

CAUTION

DISC DRIVE PERFORMANCE AND RELIABILITY ARE DEPENDENT ON THE TYPE OF MEDIA 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 THE 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 IS THE CUSTOMER'S RESPONSIBILITY. HP RESERVED 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.

WARRANTY AND MAINTENANCE AGREEMENT COVERAGE OF REPAIRS NOT CAUSED BY THE USE OF NON-HP MEDIA IS UNAFFECTED.

Operating Cleanliness

The critical elements involved in the read/write process are shown in Figure 3-1. The read/write head must maintain contact with the disc during read and write operations. Also shown are various types of contaminants and their size relationships. A contaminant particle hard enough and of the right size may scratch the media oxide coating or the head surface. Even if not hard enough to scratch, it may be large enough to lift the head from the surface, causing data errors or damage to the media.

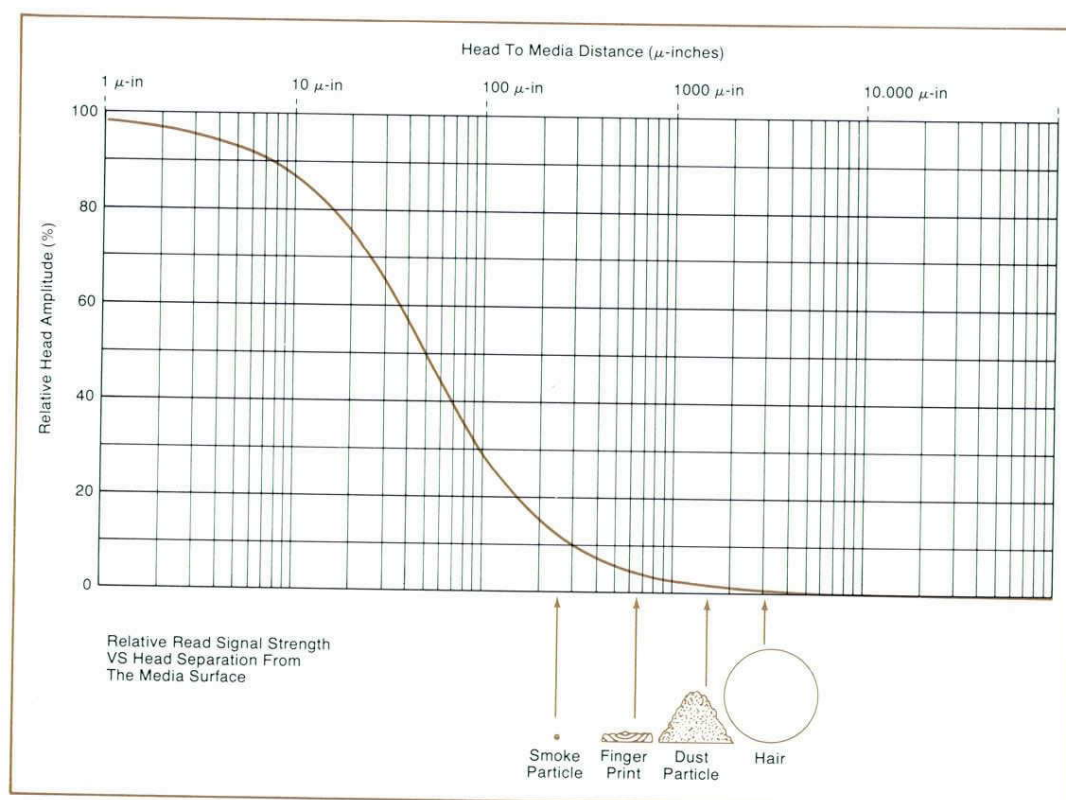


Figure 3-1. Head/Media Critical Requirements

Handling Flexible Disc Media

The flexible disc is basically maintenance free, but it is delicate and **MUST BE HANDLED CAREFULLY**. Remember, the disc contains your valuable data and programs, and should be treated accordingly. A good rule of thumb is to treat your disc as you would a valuable record album. Here are some specific Do's and Don'ts to avoid loss of data or damage to your discs.

EVEN A LITTLE CARELESSNESS IN DISC HANDLING CAN DRAMATICALLY REDUCE THE LIFE OF THE DISC.

Do's

Back Up Discs Frequently

There is always a chance of losing data when mass storage devices are accessed. There are many causes in any computer system - a programming bug, operator error, power failure, or hardware failure. In the case of flexible discs, additional conditions must be considered - media failure from contamination or wearout. **ONE SURE PROTECTION AGAINST DATA LOSS IS FREQUENT BACKUP OF YOUR FILES.**

Slide the Disc Guard Over The Head Window When Not In Use



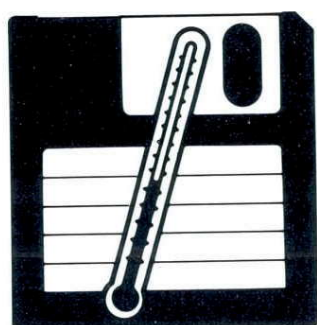
This is the single most important thing to remember about handling your disc because it prolongs disc life by protecting it from dust, finger prints, and scratches. **NEVER ATTEMPT TO BLOW DUST FROM THE DISC.** Between uses discs should be stored upright in a dust free container. The box in which the discs are shipped in, or a similar container, is a good choice.

Operate Your System In A Clean Environment



Airborne contaminants and particles accidentally dropped onto the disc will cause your disc to wear out prematurely and may cause unreliable data storage and retrieval operations. Some of the most common contaminants are **DUST, SMOKE, ASHES, ERASER CRUMBS, and BREADCRUMBS.** **NEVER ATTEMPT TO BLOW SMALL PARTICLES FROM THE DISC.** Chemical vapors may also cause premature wearout.

Maintain Proper Temperature And Humidity



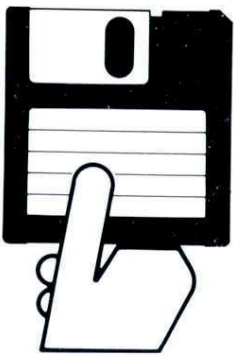
The proper operating range is **10° C (45° F) to 45° C (115° F)** and **20% to 80% relative humidity**. While temperature is usually easy to control, it may be necessary to make special provisions to keep the humidity in the proper range. Although the disc will continue to operate outside the normal humidity range, it will wear continue to operate outside the normal humidity range, it will wear out more quickly and will have a higher error rate.

Avoid Magnetic Fields



The data is stored on the disc magnetically, and can be erased by an external magnetic field. Avoid placing a disc near power transformers, magnets, large disc memories or motors.

Remove Disc From Drive When Not In Use



Remove the disc completely from the drive when access is not needed for an extended period of time.

Use A Felt Tip Pen To Label Your Disc



Use a soft felt tip pen to label your disc, and be careful to write only in the label area.

Replace Discs Frequently

Although discs are designed to provide many hours of useful life, they will eventually wear out. The life of a disc is VERY dependent on how carefully it is handled and how much it is used.

The following guidelines refer to head/media contact time or the time the front panel LED is on. The terms used here (normally and heavily) also refer to load pad replacement in the maintenance section. A disc used normally (less than 20 minutes a day) should last half a year. A disc that is used heavily (more than 2 hours a day) should not be expected to last more than 2 months. Discs should be replaced whenever they begin to show signs of circular marring. See the following section titled "Media Wear Indication".

Don't**Do Not Touch The Surface Of The Disc**

The thickness of a fingerprint is enough to lift the head off the disc and cause errors. The oils in a fingerprint will also collect dust which can cause a disc to wear out sooner than it normally would.

Do Not Bend Or Fold The Disc

The disc is flexible but will not operate if it is creased. Using ball point pens, rubber bands, paper clips, etc. can crease the disc.

Do Not Try To Clean A Disc

The inside surface of the disc jacket is covered with a special material that cleans the disc as it rotates. Any other method of cleaning may cause solvent damage to the media or scratch the disc, causing loss of data. If a disc becomes dirty or scratched, immediately transfer the data to a new disc and dispose of the old disc.

Disc Description and Write Protect

The micro-flexible disc is enclosed in a rigid plastic shell for extra protection and reduced disc-to-case friction (see Figure 3-2). A metal centering hub ensures rapid and accurate positioning when the disc is inserted in the drive. The disc guard which slides back and forth across the front of the disc protects the recording surface from foreign object contamination.

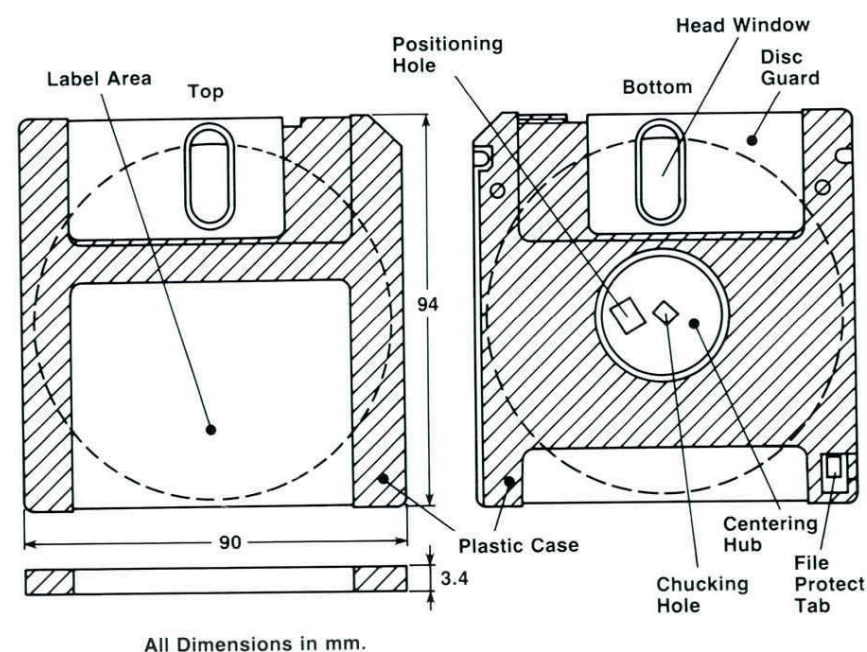


Figure 3-2. The Micro-Flexible Disc

The micro-flexible disc is write unprotected when you receive it. To prepare the disc for write protected operation do the following (see Figure 3-3):

1. Weaken or score the attach point so as not to break the tab
2. Break off the write protect tab
3. Align the protrusion on the tab with the groove in the disc
4. Depress the tab into the groove – tab should fit snugly

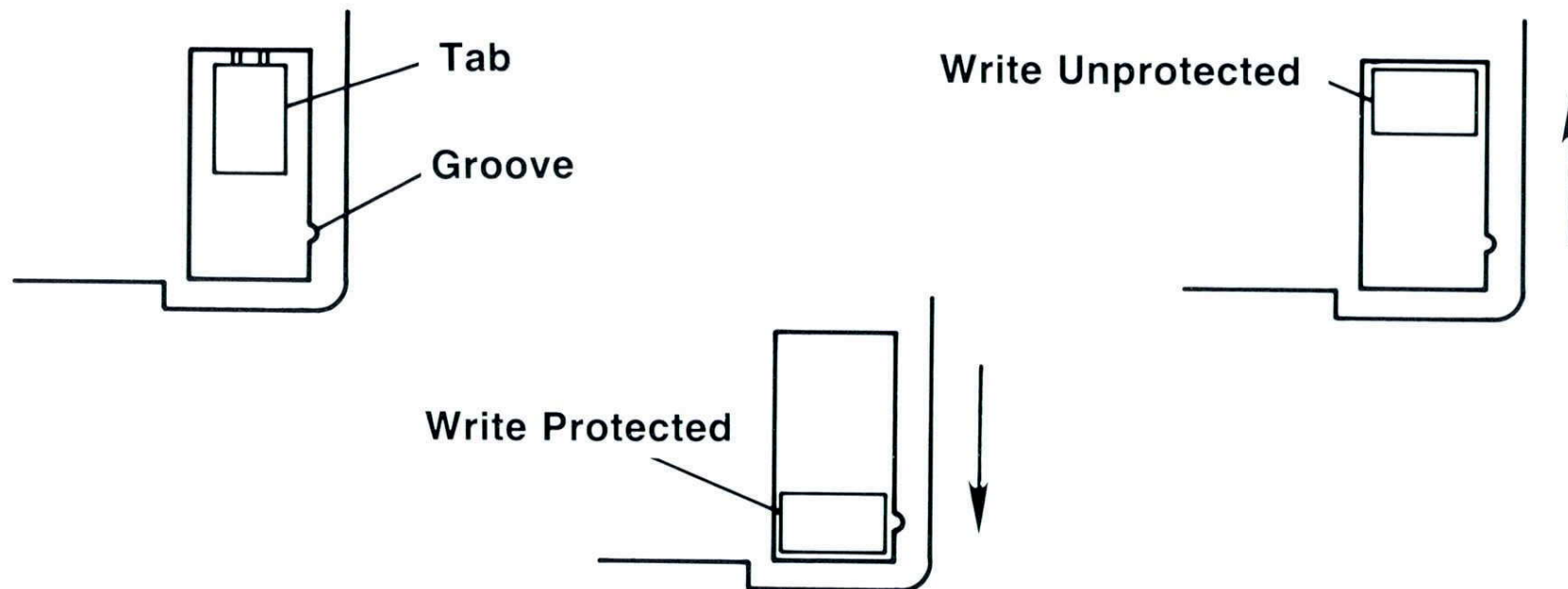


Figure 3-3. Disc Write Protect Tab

Write protection is accomplished by sliding the tab away from the center of the disc.

Write Protect Error on Initialization

A motor speed check is performed when a disc is inserted to be initialized. If the motor speed is on either side of the tolerance allowed, a Write Protect Error is generated and the disc is not initialized. If your drive is operating properly, this indication is one of a defective disc. Discard the disc.

Media Monitor

As the flexible disc becomes worn, the friction between the disc and the read/write head increases. Because the same read/write head accesses the data from all your discs, it is very important that this friction be kept to a minimum level. To insure the long wear life of the read/write head, you should make the following media check each time you insert a disc into your drive.

Checking for disc wear is a simple visual inspection of the disc surface before you insert the disc into the drive. When viewing the disc surface you should look for any signs of circular marring. This is done by sliding open the disc guard revealing the disc surface. If you see any sign of circular marring on either side of the exposed surface, the disc should be immediately copied and discarded. Circular marring generally occurs first on the upper (label side) surface of the disc.

A good disc should always reflect a hatchmark type of pattern. Compare a new (never used) disc to a disc you have used for a few hours. There should be no visible difference.

An internal test has been implemented to provide you with an upper limit indication for disc use. When a disc reaches a finite limit, the head loaded indicator (front panel LED) blinks on and off. This indication is continued until you remove the disc or until the host sends a command to the drive. The drive accepts and performs the command from the host after which it resumes the disc "worn out" indication. When you get the "worn out" indication, copy your disc and discard the original.

Viewing the disc in the previously described manner prior to inserting it into the drive and taking the appropriate action when you receive the "worn out" indication will insure the long life of the read/write head.

Controls and Indicators

The indicators are located on the front panel. The indicators, as shown in Figure 3-4, are the following: one disc access light for each drive unit, (the disc access lights are illuminated whenever the disc is accessed for data storage or retrieval and momentarily when the drive is powered up) one power ON/OFF switch, and the selftest LED (seen through the air inlet).

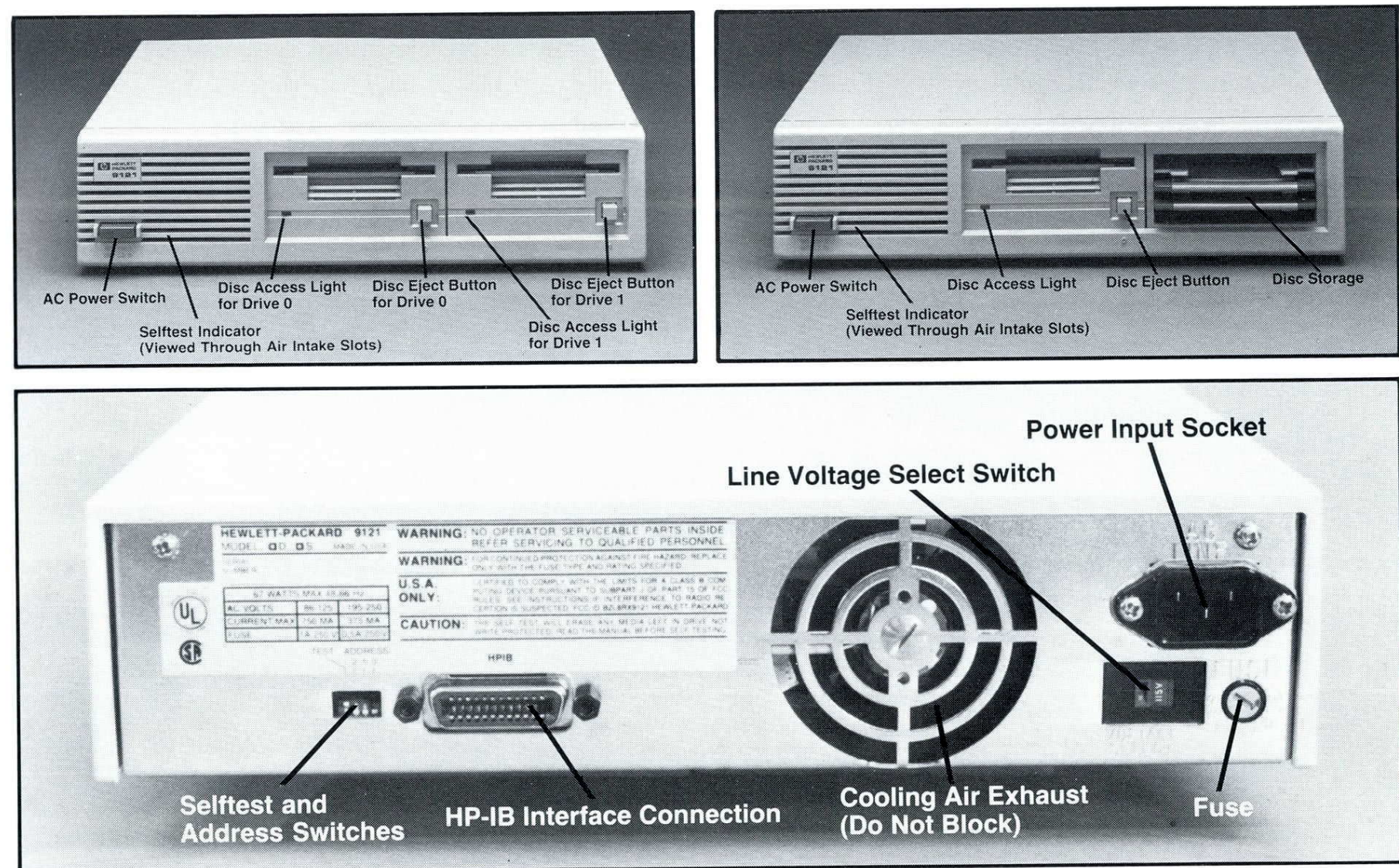


Figure 3-4. Front and Rear Panels

CAUTION

THE ACTIVITY LIGHT ON THE FRONT OF EACH DRIVE INDICATES USAGE OF THAT DRIVE. DO NOT DEPRESS THE DISC EJECT BUTTON WHEN THE ACTIVITY LIGHT IS ON.

Applying Power

Before turning the disc memory on, be sure to perform all the procedures in Chapter 2.

Locate the AC line switch on the front panel and set it to the "ON" or "1" position. The disc drive requires about 10 seconds after the application of power before it is ready for operation or before you insert your disc. See the section titled "Selftest" for the power-on selftest indication.

Loading the Flexible Disc

To install and remove flexible discs, perform these steps.

1. Do not attempt to insert the disc into the drive without power applied.
2. Slide the disc guard away from the head window exposing the disc surface. Insert the exposed head window first with the metal centering hub down. Carefully slide the disc into the drive until you feel it contact the rear of the drive. Do not force the disc.
3. Remove the disc by depressing the disc eject button and pulling the disc straight out. Always slide the disc guard over the head window immediately after removing the disc from the drive.

Refer to Figure 3-5 for proper loading of the flexible disc.



Figure 3-5. Disc Loading

Flexible Disc Structure

The surface of the flexible disc is coated with ferromagnetic iron oxide. Data is stored in the form of binary digits represented by magnetic flux reversals on the disc. Information is stored and retrieved by the disc unit's read/write head which comes in contact with the disc's lower surface.

Information is stored in 70 concentric tracks on the lower side of the disc. The tracks are numbered 0 through 69. Each track is divided into 16 physical records (sectors), numbered 0 through 15. Each record contains 256 bytes (characters) of information. There is an important difference between a physical record and a logical record. A physical record is the smallest accessible unit of data on the disc. It is always the same size (256 bytes). A logical record is one that you define when you create a data file. Data files are variable and depend on the type and quantity of data you are storing.

Some of the space on each disc is reserved for the directory. The space reserved depends on the controlling computer and the number of records in the file directory.

Basic System Operation

Before using a blank flexible disc, it must be formatted or initialized for use with your computer. This process checks the disc for defects (areas where information cannot be stored), reserves spare tracks, and creates a file directory. The directory holds the name and location of each file on the disc. When a disc is first initialized, the directory is empty, so no files are listed when you catalog the disc.

The 9121D/S drive emulates the 82901 drive. Thus, you program it using mass storage ROM or driver statements that your computer manuals describe for the 82901 disc drive.

Data Errors

Two error conditions cause the selftest LED to come on and stay on until the condition disappears. These conditions are a command sequence-error over the HP-IB (from the host controller) and a data error from the disc. Whenever these conditions occur it is best to retry the last operation. If a retry is successful, the error and error indication are cleared. If the condition remains after several retries contact your dealer or sales office for assistance.

Selftest

There are four selftest modes on the 9121D/S: power-on, user confidence, remote, and service. The service selftests are not included in this document.

The user confidence test LED is visible through the air intake slots in the front of the 9121D/S. See Figure 3-1 for the location of this LED.

The power-on selftest is a subset of the user confidence selftest. The power-on test exercises the RAM, and the flexible disc controller chip (FDC). Power-on also calculates a checksum for the ROM. If the RAM or ROM tests fail, the processor goes no farther, waiting for service. If the 9121D/S passes the RAM and ROM tests, but fails the FDC test, the 9121D/S's processor continues to initialize the system and allows the host to talk to it, if possible. If all the power-on selftests are passed, the confidence test LED flashes five times to indicate a successful power-on condition.

NOTE

Disconnect the HP-IB cable before initiating the user confidence selftest.

The user confidence selftest is initiated by toggling the selftest switch on the back panel from up to down to up. **DO NOT LEAVE THIS SWITCH IN THE DOWN POSITION.** If each drive contains discs that are not write protected, a complete selftest is performed: a RAM, ROM, HP-IB, FDC, seek, motor speed, format, and read verify test is executed. The RAM test reads and writes checkerboard patterns into the RAM. The ROM test calculates a checksum for the ROM and compares that to a precalculated value. The HP-IB test reads and writes to selected registers on the HP-IB chip and then sets the chip up to talk to itself and echo data back to the processor. No testing of the interface to the host occurs. The FDC test reads and writes to selected registers on the chip. The seek test steps the head to track 69 and then back to track 0, testing for movement on each drive. The motor speed test measures the index period and compares it to the drive specification. The format test formats the discs in each drive.

WARNING

ALWAYS USE A BLANK INITIALIZED DISC OR A DISC CONTAINING UNWANTED DATA WHEN PERFORMING THE USER CONFIDENCE SELFTEST. THIS TEST READS AND WRITES DATA ONTO THE DISC AS PART OF THE SELFTEST. ALL DATA PREVIOUSLY STORED ON THE DISCS USED DURING THE USER CONFIDENCE TEST IS DESTROYED AND IS UNRECOVERABLE.

The read test verifies the written data and the error checking of this data on the discs. If all these tests are passed successfully, the user confidence test LED flashes ten times. If any test fails, no flashing occurs.

If the disc inserted in drive 0 is write protected, the format test is skipped. If all the other tests are passed successfully, the user confidence test LED flashes ten times. If no disc is inserted in drive 0, then the seek, motor speed, format, and read tests are skipped. If the other tests are passed the confidence test LED flashes ten times.

After this user confidence test, the drives are reset and the 9121D/S appears, to the host, to have just been powered on.

The remote selftest is initiated by the host with the proper HP-IB command. It is basically the same as the full user confidence test without the HP-IB test. Results of the test are available over the HP-IB to the host. See the INITIATE SELFTEST command description in the Service Manual for more details.

Helpful Hints

The following information may help you avoid possible problems when operating the 9121D/S with Series 80, 100, and 200 mainframes. Refer to your mass storage programming or reference manual for more information on the use of the disc memory with your mainframe.

Series 80 –

Do not place the HP 86's CRT on top of early versions of the 9121D/S (Serial Numbers below 2229A03802 for the 9121D and 2244A00341 for the 9121S). It is possible to erase data from the discs if operated in this manner. A new top cover, containing an additional shield, is available through your Sales and Service Office. Specify HP part number 09121-88865. This cover allows you to operate the 9121D/S with the CRT on top of the disc drive.

When initializing a disc ALWAYS specify the volume label or use the Mass Storage Unit Specifier to direct the location of the Initialize command. If you fail to specify the volume label, the next section of the command which is the location (Mass Storage Unit Specifier) is interrupted as the volume label. The problem arises that the location is left undefined. With the location undefined, the Series 80 defaults to the previous location specified using the Mass Storage Unit Specifier command. If a previous location has not been specified an error condition results.

Series 100 –

In the event that the error "CANNOT IDENTIFY ADDRESS 0" should appear on your Series 100 display, press the "LOAD OPS SYS" softkey (F6) to clear the error. This error will most likely occur on the power-up cycle of the system.

Series 200 – (With Basic 2.0 Extensions)

When entering the MSUS (Mass Storage Unit Specifier) on your Series 200 mainframe, specify HP 9121 rather than HP 82901 for optimum performance of the 3 1/2-inch flexible disc. When the MSUS is entered, the interleave is automatically set to 4 for the HP 82901, set to 2 for the HP 9121.

Basic Operating Systems (without 2.0 Extensions) previously supplied with the 9826 and 9836 mainframes, when used with the Series 200 mainframe, may not allow you to access the 3 1/2-inch flexible disc drive using the HP 9121 MSUS. The MSUS "HP 82901" will have to be used in these instances. Specifying an interleave of 3 may improve the 9121's performance in some circumstances.



Chapter 4

Maintenance and Service

- Maintenance
- Service
- Warranty
- Cleaning the Case

Maintenance

The HP 9121D/S Disc Drives do not require regular maintenance. However, the load pad will wear out over a period of time and must be replaced. This is a complicated process and should only be attempted by a trained service person. The maintenance schedule for the load pad depends upon the use of the drive. A normally used drive requires head load pad replacement of every 5 years; whereas, a heavily used drive requires the replacement every 1 to 2 years. Refer to the section titled "Replace Discs Frequently" for determining your drive usage.

The performance and life of the flexible disc heads and the flexible disc media depend directly on how carefully they are handled.

There are several other areas of caution; they are as follows:

CAUTION

ALWAYS SET THE AC LINE SWITCHES TO "OFF" (0) FOR THE COMPUTER AND THE DISC DRIVES WHEN INSERTING OR REMOVING THE INTERFACE CABLES. USE ONLY CABLES DESIGNED BY HEWLETT-PACKARD SPECIFICALLY FOR THE HP 9121D/S DISC DRIVES. FAILURE TO DO SO COULD DAMAGE THE DISC DRIVE, OR THE CONTROLLING COMPUTER.

CAUTION

KEEP THE FRONT AND BACK OF THE DISC DRIVE FREE FROM OBSTRUCTIONS TO AVOID RESTRICTING THE AIR FLOW. FAILURE TO DO SO COULD CAUSE THE UNIT TO OVERHEAT AND RESULT IN DAMAGE TO THE UNIT.

Service

There are no operator serviceable parts within your HP 9121D/S. If at any time you suspect that your disc memory is malfunctioning, call the HP sales office or dealer from which you purchased your disc memory.

Warranty

The complete warranty statement for the U.S. and Canada is included inside the front cover of this manual. For other countries, contact your local HP Sales Office or dealer from which you purchased your disc memory to determine warranty terms.

If you have questions concerning the warranty, please contact an authorized dealer or the HP sales and service office (see the list in the back of this manual for the nearest office) where you purchased your disc drive.

Cleaning the Case

The disc memory case consists of a pearl grey plastic material and is not painted. The rear panel has been painted with a durable, long lasting, non-toxic paint. This design will preserve the appearance of your disc memory for many years. When you want to clean the case, following the next instructions will sustain the quality finish. If the case finish should become damaged, consult your local Hewlett-Packard sales and service office for touchup paints that are available.



CAUTION

CHEMICAL SPRAY-ON CLEANERS USED FOR APPLIANCES AND OTHER HOUSEHOLD AND INDUSTRIAL APPLICATIONS MAY DAMAGE THE CASE FINISH. THESE OR OTHER CHEMICAL CLEANERS SHOULD NOT BE USED.



Before cleaning the disc memory case, disconnect the power cord and any interconnecting cables. Dampen a clean, soft, lint-free cloth in a solution of clean water and mild soap. Wipe the soiled areas of the case, ensuring that no cleaning solution gets inside the unit. For cleaning more heavily soiled areas, a 50%-50% solution of clean water and isopropyl alcohol may be used. Wipe the case areas that had cleaning solution applied with a clean, soft, lint free cloth dampened in clean water, then dry the case with a dry, soft, clean cloth. A non-abrasive eraser may be used to remove pen and pencil marks.

CAUTION

DO NOT USE DETERGENTS THAT CONTAIN AMMONIA, BENZENES, CHLORIDES, OR ABRASIVES.



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