HP 9114B Disc Drive
Operator's Manual

HEWLETT PACKARD

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Worldwide Sales Offices

Chapter 1

YOU, THIS MANUAL, AND THE HP 9114B

About This Manual

This manual is divided into three main chapters: "Essentials," Chapter 2, "Things You Might Want to Know," Chapter 3, and "Read This if You Have Problems," Chapter 4. These chapters are constructed to allow you to quickly get into the right section of the manual and find what you need.

Here's what you'll find in this manual.

Essentials − takes you from unpacking the cartons through connecting the disc drive to your system. Turning the system on, verifying proper operation, and inserting a disc into the disc drive are also included.

Things You Might Want to Know − explains the care and handling of the discs and how to use the disc drive.

Read This if You Have Problems − talks more about the selftest and write protect and also explains Media Monitor and errors you can get with your computer. Also included is information on ordering supplies, maintenance, and warranty.

This manual also contains an index and a glossary for your use.

For First Encounters with HP Equipment

If you have just received your HP 9114B Disc Drive and haven't
had any previous experience connecting Hewlett-Packard
equipment together, please see the chapter titled "Essentials."
Then, please read Chapters 3 and 4.

For Experienced HP Users

If you are an experienced HP-IL user, the HP-IL connections are
the same as with any other HP-IL device, so you can skip the
Essentials chapter (Chapter 2). Sometime in the future you may
want to skim through the entire manual.

The HP 9114B Disc Drive

The HP 9114B Disc Drive is a battery operated, electronic storage
device. Data and programs from your computer are stored on a
removable flexible disc used with the disc drive. The HP 9114B
uses a 3 1/2-inch disc providing as much as 710 thousand
characters of storage capacity. Additional features include the
following.

Media Monitor – Continual monitoring of media (flexible disc)
useful life
Battery charge indication – Three light gauge
Low battery indication – Flashing power light (left indicator
light on front panel)
Turn-on selftest – OK TO USE indication
Portability – Can be used away from home or office

The HP 9114B Disc Drive uses a 3 1/2-inch flexible disc. The disc is
similar to a phonograph record that stores programs and data
instead of music. The disc is called a flexible or micro-flexible disc
or media. Data is stored on both sides of the disc, and thus the
name double-sided disc.

Chapter 2

⬤ ESSENTIALS

Unpacking and Checking the Equipment Supplied

The following equipment is supplied with each HP 9114B.

Item	Part Number
One (1 metre) HP-IL cable	82167B
Battery Recharger	Dependent on Location
One Flexible Disc	--
Operator's Manual	09114-90005
Battery Pack	88014B

The HP 9114B contains rechargeable batteries. Please recharge the battery before initial use and keep the battery fully charged to maximize operating time.

If you find any damage, immediately notify your dealer or nearest Hewlett-Packard Sales Office. Also file a claim with the carrier.

A Look at Your Disc Drive

FRONT PANEL

BATTERY POWER INDICATOR
(BLINKS FOR LOW BATTERY)

TEST
INDICATOR

INSERT DISC
HERE

DISC ACCESS
LIGHT

DISC EJECT
BUTTON

REAR PANEL

POWER ON/OFF
SWITCH

BATTERY REMOVAL
LATCH

HP-IL CABLE
CONNECTION

BATTERY CHARGER
CONNECTION
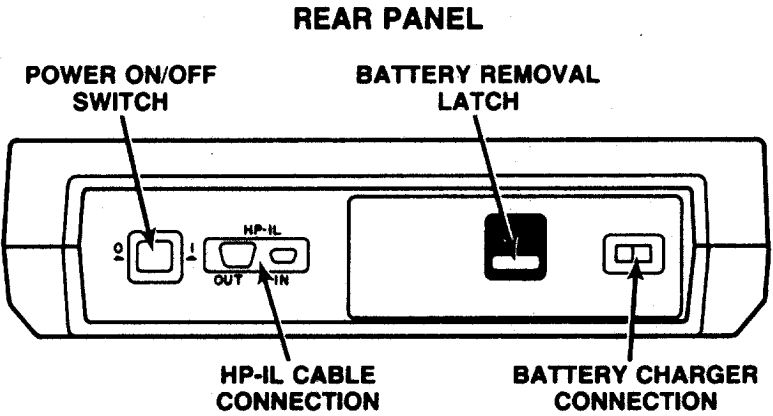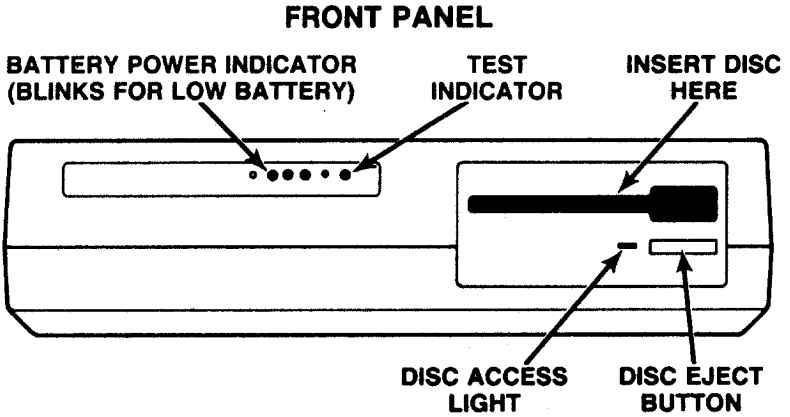
Figure 2-1. Controls and Indicators

Connecting the Disc Drive to Your System

The disc drive is connected to your computer or computing system using the HP 82167 HP-IL cable. Each device must have two cables connected to it, an "In" and an "Out." This is shown next.

DISC DRIVE AND COMPUTER ONLY

Figure 2-2.   Disc Drive Interconnect

DISC DRIVE AND COMPUTER SYSTEM
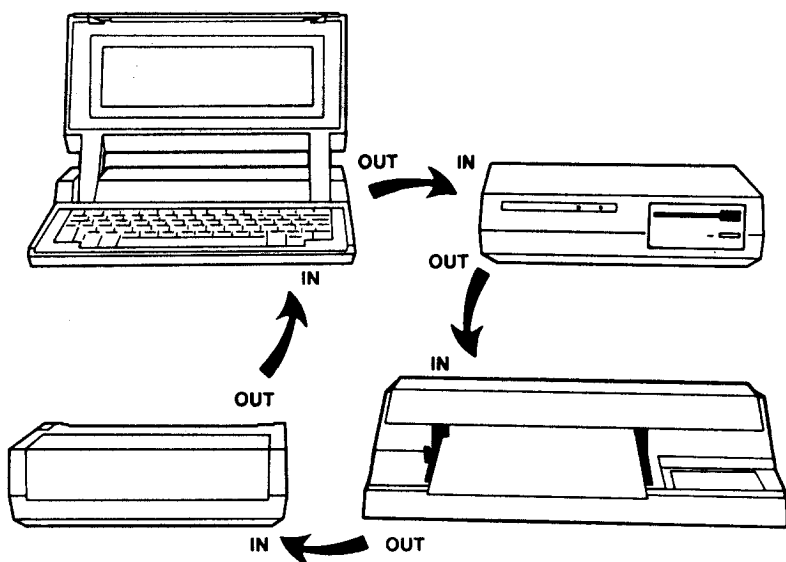
Figure 2-3.   System Interconnects

These devices can be connected in any order. The devices can also be in any location.

What is a Flexible Disc?

A flexible disc is similar to a phonograph record that stores programs and data instead of music. The computer can record data and programs on the disc and can later recall the programs and data from the disc. A box of 10 double-sided flexible discs can be ordered using HP part number 92192A.

A Look at the Flexible Disc

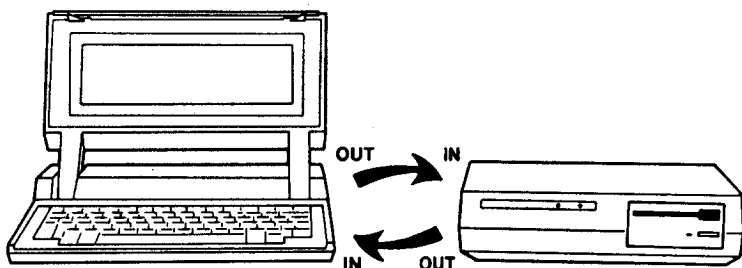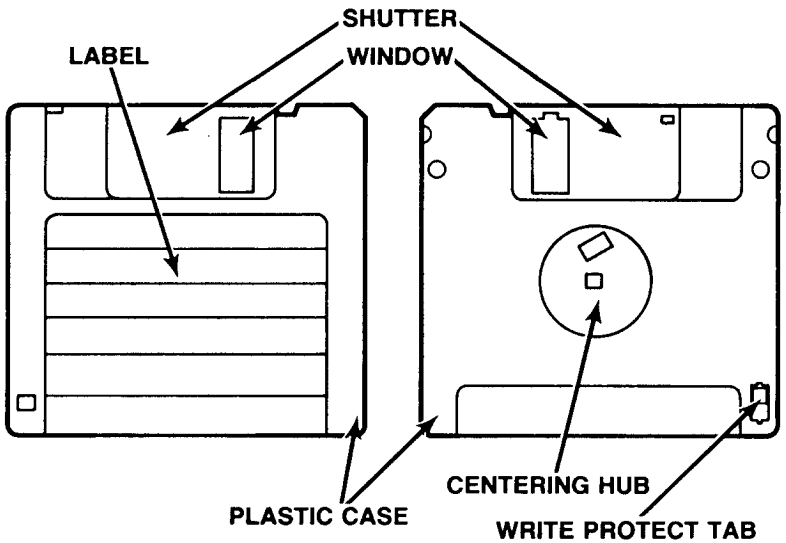Figure 2-4.   Parts of the Flexible Disc

Window and Auto Shutter

The disc drive reads and writes data to and from the disc using a window space which exposes the disc. This window is covered by a metal shutter. The shutter helps protect the disc surface from particles and fingerprints.

The disc drive is equipped with a shutter opener. This means that when the disc is placed in the drive, the shutter is automatically opened, exposing the disc surfaces. You do not need to manually open the shutter before inserting the disc in the drive or close the shutter when removing the disc from the drive.

Centering Hub

On the back of the plastic jacket is a round metal center called the centering hub. The centering hub ensures rapid and accurate positioning when the disc is inserted in the drive.

Using the Write Protect Tab

Write protecting ensures that the disc drive cannot write over or delete information on the disc.

Write protect discs that contain valuable programs and data.

See Figure 2-5.

TO **WRITE PROTECT** THE DISC,
SLIDE THE RED PLASTIC BUTTON DOWN.

TO **WRITE** DATA TO THE DISC,
SLIDE THE RED PLASTIC BUTTON UP.
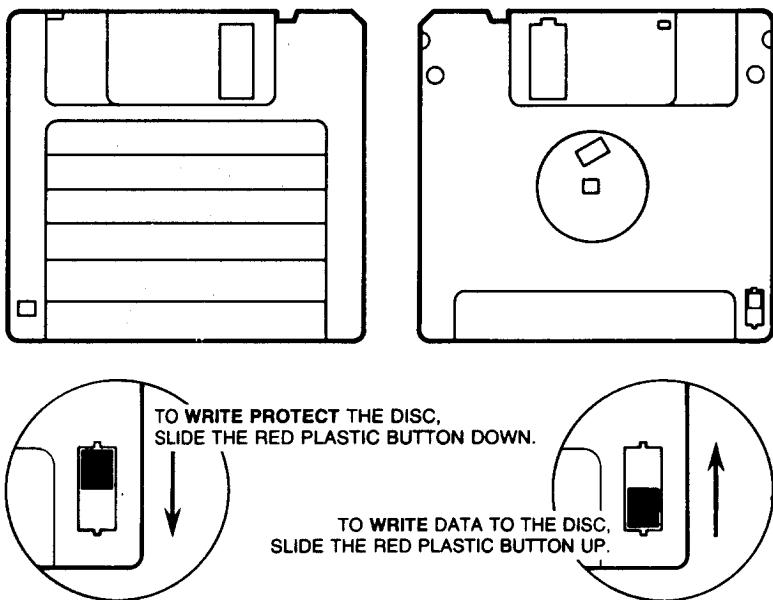
Figure 2-5. Write Protect Tab

Loading the Flexible Disc

To insert and remove flexible discs, perform these steps.

CAUTION
Never turn the disc drive off or remove the disc from the drive
when the disc access light is on; doing so can cause loss of data.

---

1. Remove the plastic yellow disc or cardboard from the drive by
    pressing the disc eject button. (**Save this protective disc and
    insert it in the drive whenever you are transporting the
    9114B.**)

2. Hold the disc with the label up (centering hub down).

3. Slide the disc into the drive (shutter side first) until you feel
    the disc drop into the drive. The disc physically drops about
    1/8 inch. Do not force the disc.
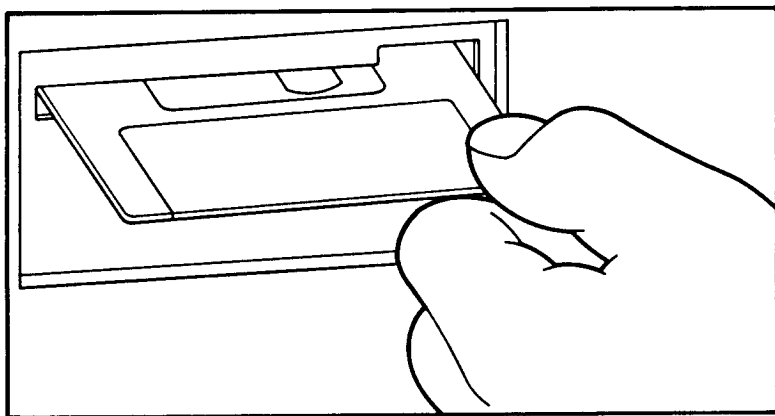
Figure 2-6. Proper loading of the flexible disc

4. Remove the disc by pressing the disc eject button. Pull the
    disc straight out.

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 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.

Warranty and maintenance agreement coverage of repairs not caused by the use of non-HP media is unaffected.

TRY IT!

After connecting your system together, you are ready to turn on your disc drive. Locate the power (on/off) button on the back panel. This is a rocker switch with labeling on each side, "0" and "1". Pressing in the rocker on the "0" side turns the drive off. Pressing in on the side labeled "1" turns the drive on. Now, let's turn it on.

Power-on Selftest

A power-on selftest is performed automatically when you turn on the disc drive. The test light (on the right side of the front panel) is on when selftest is in operation. The selftest takes approximately 6 seconds after which the test light goes out. If you have a disc inserted in the drive, read and write testing (involving the disc) takes an additional 5 seconds or a total of approximately 11 seconds. If the test light stays on after the normal testing time, an error within the disc drive has been detected. If this ever happens, please see Chapter 4. Make sure that the disc used in the selftest is not write protected. If this disc is write protected, only the 6 second test is performed.

Use It

System operation information is included as a supplement to this manual. This supplement (P/N 09114-90013) is to be updated as system operation information becomes available. For further information on system operation see the following manuals.

HP 110 Portable Computer Owner's Manual P/N 00090-90004
HP 110 MS-DOS User's Guide P/N 00090-90006
HP Portable Plus "Getting Started" Manual P/N 45711-90009
HP 82401A HP-IL Owner's Manual P/N 82401-90001
HP 75 Owner's Manual P/N 00075-90001
HP 82160A HP-IL Owner's Manual P/N 82160-90001

Installing the AC Recharger

There are three battery indicator lights on the front panel (see Figure 2-1). The battery is 2/3 to fully charged when all three lights are on. If only the left two lights are on, about 1/3 - 2/3 of the battery's capacity remains. If only the leftmost light is on, about 1/3 or less of the charge remains. When only 10 minutes of disc access time remain in the battery, the leftmost light flashes. If you continue to use this battery, the drive will protect your data by not completing read/write operations. Recharge your bttery at this time. **To preserve your battery, use your recharger whenever possible**.
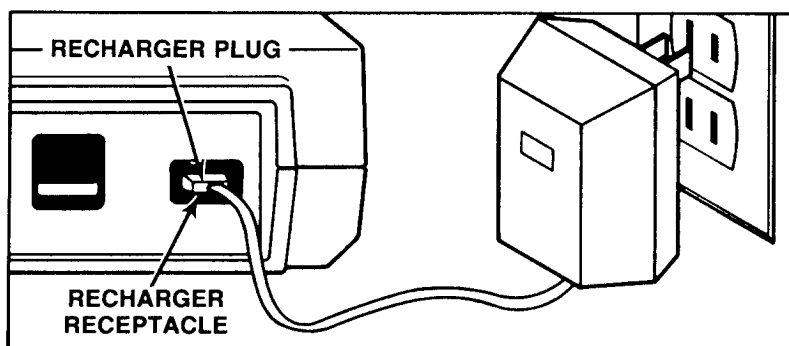

Figure 2-7. Connecting the Recharger

The recharger can be connected to the disc drive at any time. If you connect the recharger during read/write operations (disc access light is on), avoid jarring the drive.

Insert the recharger plug into the recharger receptacle on the back of the disc drive.

Insert the power plug of the recharger into an AC power outlet, after making certain that power is available from the outlet.

You can use the disc drive while the battery pack is charging. **We recommend that you use the recharger whenever possible, even when the battery is fully charged**.

After 5 hours of charging the battery pack will be 80% charged, and after approximately 16 hours the battery pack will be fully charged.

The sealed lead-acid battery operates best on shallow, less than 30% discharge cycles, or constant "trickle" charge with the recharger usually connected.

Replacement batteries are available; order HP 88014B Rechargeable Battery Pack.

To preserve the maximum capacity of your battery pack, charge it fully and operate as much as possible with the recharger connected.

WARNING

Do not short the battery. This will blow a fuse internal to the battery pack and make the pack inoperative.

Do not incinerate. The battery can burst if thrown into a fire.

Do not put within reach of children.

Do not disassemble the battery. The strong acid electrolyte sealed inside can burn your skin and clothes.

If the battery is accidently broken and the electrolyte (gelled sulfuric acid) leaks out, neutralize the acid with some available alkaline substance, such as ammonium solution or baking powder (sodium hydrogen carbonate) and wipe up the spill with a cloth.

In the event electrolyte contacts the skin, immediately flush with water and consult a doctor.

Rechargers

CAUTION

This battery pack is designed specifically to work with an HPrecharger; HP is therefore not responsible for damages caused by using a non HP recharger.

The rechargers listed next are recommended for use with the HP 88014B Rechargeable Battery Pack.

HP 82059B	90 to 120	United States
HP 82066B	210 to 250	Europe
HP 82067B	210 to 250	United Kingdom
HP 82067B Opt 001	210 to 250	Republic of South Africa
HP 82068B	210 to 250	Australia
HP 82069B	90 to 120	Europe

Chapter 3

THINGS YOU MIGHT WANT
TO KNOW

Flexible Disc Usage and Handling

Congratulations on your selection of the HP 9114B 3 1/2-inch disc
drive. The 3 1/2-inch microflexible disc is safer and more reliable
than the larger flexible discs on the market because of its hard case
and automatic shutter. The 3 1/2-inch disc is maintenance free.
Here are some specific DOs and DON'Ts for the handling of your
discs.

Do

Back Up Discs Frequently
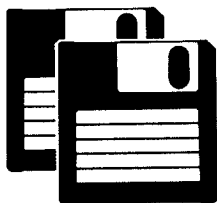
There is always a chance of losing data when
data storage devices are accessed. Causes of
loss of data include programming bugs,
operator errors, power failures, and hardware
failures. Data may also be lost due to flexible
disc contamination or wear. **One protection
against data loss is frequent backup of your
files onto other discs.** Store discs upright in a
dust free container. The box in which the
discs are shipped, or a similar container, is a
good choice.

Operate your system in a relatively clean environment

Airborne contaminants and particles accidently dropped onto the disc will cause your disc to wear 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 disc wear.

Maintain proper temperature and humidity
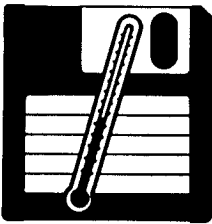
The proper operating range is 10°C (50°F) to 40°C (104°F) and 20% to 80% relative humidity. While temperature can be controlled, it may be necessary to make special provisions to keep the humidity in the proper range. Although the disc will continue to operate outside the normal humidity range, it will wear 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, motors or CRTs (Cathode Ray Tubes).

Don't

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 also collect dust which can cause the disc to wear faster.

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 can 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.

Labeling the Flexible Disc

When you order boxes of flexible discs (HP part number 92192A for a box of 10), you receive a packet of labels with the discs. Note that the labels come in a variety of colors. Position the label on the disc so that the colored portion of the label is folded over the lower edge of the disc. See Figure 3-1.

POSITION THE

LABEL HERE
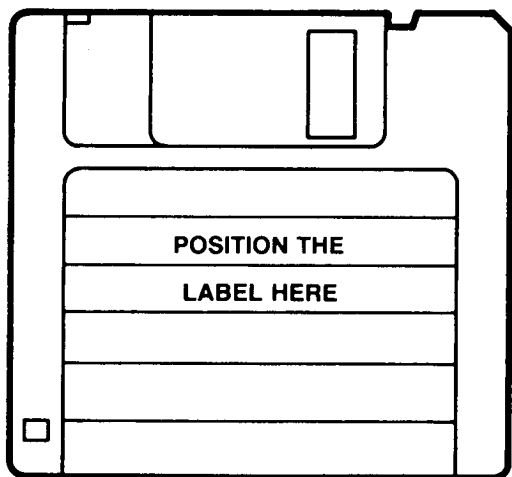
Figure 3-1.   Usual positioning of the label on the disc

You can establish a color-coded system for cataloging your discs. For example, discs containing memos may be labeled in red while discs containing personnel files can have blue labels. Store your discs upright in a container so that the colored edge of the labels are visible. You may use the colors to select the category of discs you desire, and then read the labels to select the specific disc needed.

What is the Life Expectancy of a Flexible Disc?

The read/write heads of the disc drive touch the disc. As a result, the flexible disc media does wear. The Media Monitor indication helps assure reliable operation.

Media Monitor

Through a feature called Media Monitor, your disc drive automatically monitors the cumulative use of each individual disc.

When the usage of a disc is approaching a level at which there is a risk of loss of data through normal disc wear, the disc access light on the front panel blinks and a clicking sound is heard. Once this point has been reached in the life span of a disc, read and write commands are still performed by the computer. However, after a command has been performed, the disc drive immediately resumes the warning indication.

When the Media Monitor warning occurs, immediately copy your disc. If you continue to use this disc, the disc drive will eventually automatically write protect the disc. After that time, you will only be able to read data from the disc or copy the disc.

Write Protect Error on Initialization

A motor speed check is performed when a disc is inserted into the drive. If the motor speed is on either side of the tolerance allowed, a Write Protect Error is generated and the disc cannot be initialized or used. If your drive is operating properly, this indicates a defective disc. Discard the disc.

Chapter 4

READ THIS WHEN YOU
HAVE PROBLEMS

Caring for Your Disc Drive

Guidelings for Transporting the Disc Drive

The 9114B Disc Drive is a portable device, but transportation
requires some care. A drop of more than 5 inches can damage the
read/write heads. Also, do not move the disc drive when the disc
access light is on (when reading or writing to the disc). The
preferred method is to transport the drive in the following manner:

1. Insert the plastic yellow or cardbord disc used in shipping
    the drive to you. (If unavailable, order HP P/N 1150-1787.) A
    discarded or uninitialized disc, while not as effective as a
    plastic or cardboard disc, can also be used to help protect the
    read/write heads. DO NOT use a disc containing valuable
    data.

2. A system carrying case is available for the HP 110, HP Portable
    Plus, and HP 9114B. Order this case using HP part number
    13269V. You should use this case when transporting your
    system.

Caring for the Case

The disc drive case is made from a white plastic material and is not
painted. The rear panel has a durable, non-toxic label. In the event
of damage to the case finish, consult your HP Sales Office for
touchup paints.

CAUTION

Chemical spray-on cleaners used for appliances and other household and industrial applications may damage the case finish. Do not use detergents that contain ammonia, benzenes, chlorides, or abrasives.

Before cleaning the case, disconnect the charger and HP-IL cables. Make sure that any disc is removed from the drive. Dampen a clean, soft, lint-free cloth in a solution of clean water and mild soap. Wipe the soiled areas of the case, making sure that no cleaning solution gets inside the case. For cleaning more heavily soiled areas, use a solution of 80% clean water and 20% isopropyl alcohol. Dry the areas that had cleaning solution applied with another clean, soft, lint-free cloth. Use a non-abrasive eraser to remove pen and pencil marks.

Warranty

The complete warranty statement for the U.S. and Canada follows the title page of this manual. If you have questions concerning the warranty, please contact your dealer or the nearest HP Sales Office. In countries other than the U.S. and Canada, contact your dealer or the nearest HP Sales Office for the warranty statement.

Maintenance

Your disc drive does not require regular maintenance. However, the performance and life of the disc drive and the flexible discs depend on how carefully they are handled. Be sure to follow the disc care and handling guidelines presented in Chapter 3 and the environmental restrictions presented in the Specifications Table in Appendix I.

What If Something Goes Wrong?

1. *What if the disc access light (next to the disc eject button) begins blinking and the disc drive makes a clicking noise?*

    The blinking of the disc access light and the clicking noise are a feature of your disc drive called the Media Monitor. This warning indicates that the disc currently in use in the blinking and clicking drive should be replaced. Immediately copy the worn disc and discard it. For further information about the Media Monitor, please see the "Media Monitor" section of Chapter 3.

2. *What if my disc drive does not pass the selftest?(Selftest information is on page 2-7.)*

    If your disc drive does not pass the selftest, take the following actions:

    A) Turn off your disc drive. Then turn the disc drive back on; this repeats the selftest.

    B) If the test light is still on, contact your dealer or the nearest HP Sales Office.

3. *When I try to initialize my disc, I get an error stating that the disc is write protected. What should I do?*

    First, check to make sure that you are not using a disc that you have write protected or that has been automatically write protected by the Media Monitor.

    When a disc is inserted to be initialized, the disc drive performs a motor speed check. If the motor speed is out of specification, a Write Protect Error is generated and the disc is not initialized. This indicates a defective disc. Discard the disc.

    Please note that if you receive a Write Protect Error on several discs in a row, your disc drive may not be operating properly. Contact your dealer or the nearest HP Sales Office.

4. *When I try to store informationon a disc, I get an error stating that the disc is write protected. What should I do?*

    You are trying to store information on a disc that you have write protected. If you wish to write information on this disc, reverse the write protect tab on the disc (see Chapter 2). If you wish to keep this disc write protected, insert another disc.

    Also, the disc may have been automatically write protected by the Media Monitor. If the Media Monitor warning is on, the disc should be copied and discarded.

5. *What should I do if I get a message that says, "Disc Not Present",
    "No Discs Were Found", "Not Ready Error, Reading Drive --", or
    "Bad Unit Error, Reading Drive --"?*

    A) Be sure the disc drive is turned on and your battery is
        charged.

    B) Check your cables to make sure they are secure.

    C) Be sure that you have a disc in the correct disc drive.

    D) Be sure that the disc has been initialized.

    E) If all this fails, you may have a bad disc. Try another disc.

6. *What if I get an error message saying, "Disc or Data Error, Reading
    Drive ?"*

    Your disc is probably worn or damaged. Try using other discs
    to see if you get the same message. If you receive the message
    on only one disc, copy the disc immediately and discard it.
    (Please note that if the disc is worn or damaged, the copy may
    not work.) If you receive the same message on several discs,
    contact your dealer or HP Sales Office.

7. *What should I do if I get a message that says, "Disc drive is empty,
    off, or undefined"?*

    A) Be sure the disc drive is turned on and your battery is
        charged.

    B) Be sure that you have a disc in your disc drive.

    C) If all this fails, you may have a bad disc. Try another disc.

8. *What if the battery doesn't last long enough for me to do what I want
    to do?*

    A) Always start with a fully charged battery in your HP
        9114B. Fully charging the battery requires connecting the
        recharger for approximately 16 hours (80% charge in 5
        hours).

NOTE

You can operate the HP 9114B with the recharger plugged in. We
recommend plugging in the recharger whenever possible to
extend your battery's life.

    B) Place the HP 9114B as the device as the last device on the
        interface loop. The **Out** cable from the HP 9114B should

be the **In** cable to your computer. And don't forget to connect the other cable from your disc drive to the previous device in the loop. This positioning may keep the disc drive from turning on during printer or plotter commands.

C) If you don't have adequate battery life for your particular application after taking the above precautions, consider purchasing a spare battery pack (P/N 88014B). Remember, these batteries can be charged from a wall outlet while outside the HP 9114B.

D) Also, if you are running your own programs, see the following technical information. You may be able to change your programs to improve the battery life of your disc drive.

The following chart tells you how long the battery will last. The chart is based on the amount of time in seconds between disc accesses (the amount of time the disc access light is off). The following assumptions have been made.

1) You always start with a fully charged battery.
2) Typical access time (disc access light is on) is approximately 5 seconds. If your access times are longer, the hours to discharge will be shorter.

9114B Battery Life vs. Time Between Access

● = with charger   5 second accesses   ■ = without charger
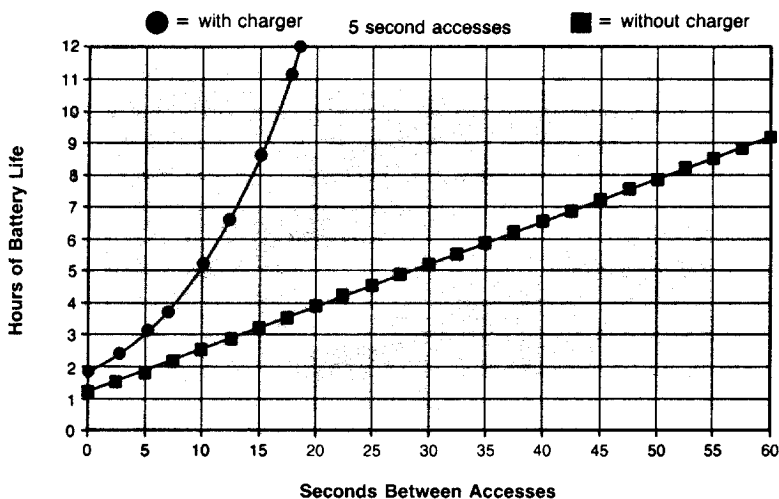
Technical Description of the HP 9114B Battery Life

In order to understand how the battery life of the HP 9114B is affected by the application, you need to understand the way the drive's hardware works. Basically, the HP 9114B's hardware can be in three different states. Each of these states uses different amounts of power. The events that cause the drive to switch from one state to another and the amount of power that is consumed in each state is explained below.

The three different states are sleep, active, and access. The first state, called the sleep state, is a very low power state in which all hardware is shut down except for the CMOS HP-IL integrated circuit and a small wake-up circuit. The second state is the active state in which all of the controller circuitry and all other drive electronics are powered. The third state, the access state, is when the flexible disc is being accessed. This state requires extra power to spin the motor and step the head. The approximate amount of current drawn from the battery in each state is shown next.

> Sleep state   55 milliamps (disc access light off)
> Active state   350 milliamps (disc access light off)
> Access state   1000 milliamps (disc access light on)

The state the HP 9114B is in depends upon the activity on the HP-IL. The HP-IL integrated circuit used in the HP 9114B determines which HP-IL commands cause the disc drive to go from the sleep state to the active state. Certain commands are handled automatically by the chip and some required that the command be proccessed by the CPU on the controller board. This means that power must be applied to the controller board. A detailed list of the HP-IL messages that cause the disc drive to go from the sleep state to the active state follow.

Basically, two operations cause the transition from sleep to active state. The first one configures the loop with the auto addressing command. This requires the CPU to accept a loop address and pass on the next highest address to the next device on the loop. The second operation is addressing the HP 9114B to be a talker or a listener on the loop.

The commands sent over HP-IL depend on your computer and on the type of operations being performed by your computer.

HP-IL Commands Catagorized As To When They
Make the HP 9114B Go From The Sleep State
To The Active State

Always	If Listener or Talker	If Listener or Talker or If Address Equals Device's Address	Never
NOP	Data	LAD (0-31)	IDY
LLO	End	TAD (0-31)	RFC
DCL	GTL		
PPU	SDC		
EAR	PPD		
IFC	GET		
REN	ELN		
NRE	PPE0 (0-7)		
AAU	PPE1 (0-7)		
LPD	DDL (0-31)		
SAD (0-30)	DDT (0-31)		
AAD (0-31)	ETO		
AEP (0-31)	ETE		
AES (0-31)	NRD		
AMP	SDA		
	SST		
	SDI		
	SAI		
	TCT		

HP 110 and HP Portable Plus

The HP 100 Series Portables can be reconfigured quickly.
Therefore, every time the Portable begins talking to any device on
the loop, the Portables send out an auto addressing command.
This always happens if it has been over five seconds since the
Portable last accessed a device on the loop. Auto addressing
always wakes up any HP 9114B on the loop.

HP 71B

The HP 71B can be controlled to a great extent as to when it will
send out auto address commands. It will assign addresses
automatically only when it is turned on, and this can be disabled
by setting an internal flag. The other area of concern with the HP
71B is how it determines which device is on the loop. If absolute
loop addresses or assign codes are not used to specify the device
on the loop, the HP 71B may have to search the loop sequentially
for the proper device to use. This would require each device on the
loop that has a lower address than the device that the HP 71B is
searching for to send its device ID. This requires the HP 9114B to
go to the active mode. For more information on HP-IL operation of
the HP 71B, please refer to the HP-IL Interface Owner's Manual for
the HP 71. The key is to use assign codes or absolute loop
addressing.

HP 75

The HP 75 assigns addresses only with the ASSIGNIO command and the RESTOREIO command. The assignments made with the ASSIGNIO command are always used when addressing the devices. The HP 75 typically will not wake up the HP 9114B when talking to another device such as a printer.

HP Series 40

The HP Series 40 auto addresses the loop on every operation. This causes the HP 9114B to wake up on every operation to the printer or other devices.

Your disc drive can be repaired only by a trained service person. If you suspect that your disc drive is malfunctioning, contact your dealer or the nearest HP Sales Office.

How to Order Supplies

DESCRIPTION	HP PART NUMBER
Gray Double-Sided Micro Flexible Discs . . . . . . (10 discs/box)	92192A for 9114B
Recharger[1]	See footnote
HP-IL Cable	82167A 0.5 metre
	82167B 1.0 metre
	82167D 5.0 metre
HP 9114B Operator's Manual Kit	09114-90099
Rechargeable Battery Pack	88014B

[1] Power connectors are dependent on delivered location. Please consult your dealer or nearest HP Sales Office if you need to order an Recharger.

Order supplies for your disc drive by contacting your dealer or the nearest HP Sales Office. You may also contact the Hewlett-Packard Computer Supplies Operation at the following address:

Direct Marketing Division
1320 Kifer Road
Sunnyvale, California 94086

Telephone: (800) 538-8787 toll free in the United States
(406) 738-4133 (in Canada)

Appendix A

● DATA LOGGING

If your application involves data logging:

1. The HP 9114B continues to operate for 7 seconds after it responds to a command on the loop (auto addressing, a disc read or write operation, etc.). The motor stops spinning after 2 seconds of not receiving a command and after 7 seconds the HP 9114B will shut down. This shut down indicates a very low power condition.

2. Continuous motor-spinning operation will run the battery down in about 80 minutes if the recharger is not connected.

3. The HP 9114B responds to the LPD (Loop Power Down) command by placing itself in a very low power consumption state (shut down).

4. Addressing a data source device (voltmeter) directly by its position number or two letter device code will not cause the disc drive to power up.

5. Store as much data into your host (controller) as possible and write only large amounts of data to the disc drive.

6. Operate the disc drive as much as possible with the recharger connected.

7. Operate the disc drive within its environmental specifications.

Appendix B

● TECHNICAL REFERENCE

Technical Specifications

Listed next are the electrical and physical specifications for the HP 9114B disc drive.

Number of drives	1
Net Weight	2.68 kg (5.9 lbs)
Height	75 mm (3.0 in.)
Depth	200 mm (8.0 in.)
Width	287.5 mm (11.5 in.)
Interface	HP-IL
HP Double Density Format	
Encoding:	MFM
Rotational Speed:	600 RPM
Bit Density @ 600 RPM:	Track 79 (Inside track)
	8717 BPI
Track Density:	135 tracks per inch
Tracks per Surface:	80
Surfaces used per disc:	2

	HP'110, Portable Plus, IBM PC	Series 40 and 70
Capacity		
Bytes Sector:	512	256
Sectors/Track:	9	16
Bytes/Drive (Formatted):	710 Kbytes	630 Kbytes
See note below.		

NOTE

All of HP's computers spare tracks for data reliability. The spared tracks are used as replacements for bad sections of the disc to assure reliable data storage. As a result, the actual usable space on the HP 9114B is 710 Kbytes/drive.

Access Time
- Track-to-Track Seek: 15 ms/track plus 42 ms settling
- Maximum Track-to-Track Seek: 1242 ms (80 tracks)
- Average Track-to-Track: 447 ms
- Maximum Rotational Latency: 100 ms
- Average Rotational Latency: 50 ms
- Spindle Motor on time: 400 ms
- Maximum Data Access Time (Seek plus Latency plus Motor on time): 1742 ms
- Average Data Access Time: 497 ms (motor on)
- Maximum Sustained Transfer Rate: 6 Kbytes/second

Environmental Specs
- Operating Limits
  - Temperature: 10°C to 40°C (50°F to 104°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

Your disc drive is designed for operation in a typical office environment. Use of the equipment in an environment containing dirt, dust, or corrosive substances will drastically reduce the life of the disc drive and of the flexible discs.

Appendix C

GLOSSARY

ADDRESS
: A number that identifies the exact location to which your computer can send data or from which your computer receives data. Just as you have a unique home address, your computer, disc drive, plotter and printer must each have a unique address.

BACKUP
: A backup is a duplicate copy of a disc made in case the original disc is lost or damaged.

BOOTING
: Booting up your computer puts it in a ready-to-run condition. The computer literally "pulls itself up by it's bootstraps" and gets ready to go. (Booting loads the operating system and utilities.)

BYTE
: A byte is used to represent one character, such as a single letter, number, or other symbol.

CABLE
: Cables provide the connection between computers and peripherals (printers, plotters, and disc drives). The cable used in this manual is the HP-IL.

CONFIGURATION
: Configuration is the way you let your computer know which disc drive it is talking to, where the disc drive is on the bus, and which drive you want the computer to access.

CRT
: Acronym for cathode ray tube. The CRT is the video screen of the computer.

DIRECTORY
: The table of contents for the files stored on a disc.

DISC	A circular plate of magnetically coated material used to store computer information. The disc is similar to a phonograph record that stores programs and data instead of music. HP's 3 1/2-inch flexible disc is enclosed in a plastic jacket.
	A disc may be flexible or hard. The flexible disc may also be single-sided or double-sided.
DISC DRIVE	A device that allows a computer to read data that is stored on a disc or write data on a disc.
FORMATTING	The process by which a disc is prepared to receive and store data. Also known as "initializing."
	If you think of your disc as being like a filing cabinet, formatting is equivalent to getting an empty file cabinet and preparing the cabinet for use. First, you check the cabinet for any damage. Similarly, the disc drive checks the disc for any damaged areas in which data cannot be stored. Second, you place hanging folders and dividers in your file cabinet. Likewise, the disc drive sets up storage areas on the disc. Finally, you label your filing cabinet so that you know what is in each drawer. Similarly, the disc drive sets up a directory on your disc.
HARDWARE	The physical parts of the computer system; the computer and the peripheral devices.
HEAD	The part of the disc drive that reads data from your disc and writes data onto your disc.
HP-IL	The HP-IL is a connector that allows the computer and the peripherals to communicate.
INITIALIZING	The process by which a disc is prepared to receive and store data. Also known as "formatting."
INTERFACE	The interface makes communication possible between the computer and its peripherals.
INTERLEAVE	Interleaving a disc is a method of alternately numbering sectors on the disc to improve data acquisition efficiency. See the interleave section of your computer programming manual for additional information.

KBYTES	A unit of measurement for memory storage. One Kbyte is equal to 1,024 bytes (or 1,024 characters). Also called "K" or "kilobyte."
LOAD	To read programs into a computer.
MEMORY	The size of the computer's brain. Memory is the combination of hardware and/or discs on which data is stored.
MFM	Modified frequency modulation (MFM) is a method for storing data on discs.
PERIPHERALS	Devices that are external to and controlled by the computer. Peripherals are so called because they are not part of the computer (e.g. tape drives, disc drives, printers, and plotters).
PROGRAM	A set of instructions or steps telling the computer how to handle a problem or task.
READ/WRITE HEAD	The part of the disc drive that reads data from your disc and writes data onto your disc.
SOFTWARE	A computer program or set of programs.
UTILITY	A utility is a program that performs a task required by most users. For example, most users need to make copies of discs. Therefore, the copy utility is a program that tells the computer how to copy discs.
WRITE PROTECT	A method of protecting disc information from being erased or overwritten.

USING YOUR DISC DRIVE

Supplement to manual P/N 09114-90000 Dated August 1,1984

Introduction

This supplement contains computer system operating information.
"How to Use Your Disc Drive with Your Computer." Information
for the following computers and calculators is presented.

HP Portable
HP Series 70
HP Series 40
IBM PC and PC XT

HP Portable Operations

System Configuration

External disc drives are labeled starting with drive C. As many as eight single disc drives can be connected (drives C, D, E, F, G, H, I, and J). Turn on all the equipment. The first step is system configuration.

1. When the P.A.M. menu appears on the screen, press the following softkey:

   SYSTEM
   CONFIG

   This is softkey f6.

2. The display that appears is shown next. There are three lines that have to do with external disc drives. These lines are the only lines of interest at this time. These lines are "Memory/Edisc:", "External disc drives:", and "Disc write verify:." Please locate these; they are the first three lines.

[System Configuration   *]*

Memory / Edisc: 160K / 112K   *Beep: Long*
External disc drives: 1   *Plotter Interface: HP-IL*
Disc write verify: Off   *Printer: HP Graphics / Alpha*
Power Save mode: On   *Printer Interface: HP-IL*
Display timeout: 5 min   *Print pitch: Normal*
Cursor: Underscore   *Print line spacing: 6 lines/inch*
Console Mode: HP   *Printer skip perf: Yes*
Console Font: HP

The default configuration for "Memory/Edisc:" should be used at this time. This line must be changed only if you run out of room in the HP Portable's memory or its electronic disc. A warning is displayed if this ever happens to you. Space can be taken from either memory or electronic disc and allocated to the other when needed.

The next line of importance is "External disc drives:". The default configuration for an external disc drive is NONE. This must be changed to "1" or the number of HP 9114As you have connected to your system. Press the cursor control keys (arrow keys − top

right) until the "External disc drives:" line is highlighted. Then press the next and previous softkeys until you obtain the proper number.

The other line of interest is the "Disc write verify:". This function can be off or on. When on, everything written to the disc is verified or checked to ensure that it is correct. This takes about twice as long, but ensures correct data on the disc. When, off the data is just written to the disc. Nothing needs to be done at this time, but you should know that verify is available. When the system configuration display is correct, press the "Exit Config" softkey.

The HP Portable automatically assigns each disc drive it sees on the HP-IL (loop). Tracing from the "OUT" HP-IL cable the first disc drive is assigned the letter C, the next disc drive is assigned D, and so on until the maximum of 8 external drives have been assigned. You need to know these letter assignments as they are used whenever you specify commands that store or retrieve data from the external disc.

Disc Formatting

The HP 9114A uses double-sided discs. Data is written on both sides of the disc. Thus the normal formatting procedure is double-sided formatting. Single-sided formatting is allowed for transferring data from older systems. See the next section for single-sided formatting.

Before a flexible disc can be used for the first time, it must be formatted. Formatting establishes the directory and volume label as well as verifying that the media is not damaged. Shown next are two ways to format discs. Insert a blank disc into the disc drive.

From the P.A.M. display, pressing the "File Manager" (f2) softkey gets you to a "Format" softkey. Press the key labeled "Format" (f5) and answer the next questions.

"Enter the disc to format". The first disc drive is assigned the letter C. Type C: and press return.

"Enter a volume label (optional)." The volume label is the name you want to call the disc. This can be up to 11 characters. For example, let's call this disc "First". Type First and press Return.

The information is displayed on the first two lines below the cursor. Press the Start Format key (f1) if these two lines are correct.

"Formatting Disc. Please wait." appears on the display. Formatting a disc takes about 1 1/2 minutes. The interleave used with this formatting method is 8, the optimal for HP Portable/9114A operation.

After formatting is complete, pressing the "Exit Format" (f8) softkey returns you to the main File Manager display. To exit File Manager press the "Exit File Manager" softkey. This ends the format procedure.

The second method of formatting discs is to use the MS DOS Format command. From the initial P.A.M. display, tabbing over to the area called "DOS Commands" and pressing "Return" allows you to use the DOS command called Format. The interleave used in this command is 8 which is optimal for your HP Portable/9114A system.

Type FORMAT C: and press Return.

"Press any key to begin formatting C:" is displayed. Press any key on the keyboard. Formatting takes about 1 1/2 minutes.

After formatting is complete there is another prompt on the display "Volume label (11 characters, Enter for none)?. " Press "Return" if you don't want a label or enter the name and press "Return" if you want to label the volume.

When completed "Format another (Y/N)?" appears on the display. Typing "N" gets you back to entering MS DOS commands. Type "EXIT" to return to P.A.M.

Formatting Single-sided

The HP Portable/9114A system can format double-sided discs in a single-sided format. This is allowed for data compatability with other 3 1/2-inch disc systems. There is a utility called "Format.Com" on the utility disc supplied with your HP Portable computer. You must load the "Format.Com" utility into your HP Portable. Use the following sequence.

Place the Utility disc into your HP 9114A.
Tab over to the DOS Command block and press Start Applic.

From the MS DOS command display type:

COPY C: FORMAT.COM A: and press Return

This loads the utility and allows you to use the extra parameters explained in the following FORMAT command.

● The MS DOS command that allows this compatibility with its parameters is shown next.

Format C:/W -Single-sided
        /X -Double-sided with 256 byte sectors
        /Y -Double-sided with 512 byte sectors
        /Z -Double-sided with 1024 byte sectors

Copying to and from the Electronic Disc

Two MS-DOS commands are used when transferring files (data and programs) between the electronic and external discs. These commands are Copy and Check Disc (CHKDSK). The DIR C: command is used to list the file directory on the external disc.

● Now, from the P.A.M. display, let's tab to the MS DOS Command section and press "(Return or Start Applic)." This puts the HP Portable into MS DOS command mode. Type the next line(s) to display the file directory.

Dir C: and press Return for the external disc

            or

Dir A: and press Return for the electronic disc

When using the Copy command don't forget the space between the filename and the destination address (filename A: and filename C:); this also applies to the space between the * and destination address (* C: and * A:) when copying the entire disc.

Copy C:filename A:
    and pressing Return — copies the file specified from the external disc C to the electronic disc A.

● Copy A:filename C:
    and pressing Return — copies the file specified from the electronic disc A to the external disc C.

Copy A:*.* C:
  and pressing Return copies the entire electronic disc to the external disc.

Copy C:*.* A:
  and pressing Return copies the entire external disc to the electronic disc.

The CHKDSK command is used to check the available disc space. This command can be used to ensure space is available before transferring files. If you get the "Insufficient Disc Space" error when transferring files you can either allocate more space for the electronic disc (if this is the disc that is out of space) or insert another formatted disc into the external drive. To gain more space for the electronic disc, you can either purge some existing file or get the space from the memory space. Memory space is allocated using the first line in the display presented earlier — the System Configuration.

Chkdsk C:
  and pressing Return — displays the usable space remaining on the external disc.

Chkdsk A:
  and pressing Return — displays the usable space remaining on the electronic disc.

Typing EXIT gets you back to the P.A.M. display.

Error Messages

The following error messages can occur with the HP Portable.

"Non — DOS Disc Error Reading Drive __." The disc contains a non recognizable volume label.

"No Disc in Drive — Drive Not Ready — Error Reading Drive __."

These three errors indicate the disc drive does not contain a disc, or the disc drive is not turned on or connected (HP-IL cable), or the disc drive contains a bad disc or a disc formatted by another type of computer. In the case of the bad disc, the problem could be a bad file; try this several times and access different files to determine the extent of disc damage.

6

"Disc Space Unavailable" — The electronic disc or external disc is full.

Series 70 Operation

Operation with the HP 71B

Disc storage for the HP 71B is handled using the following commands: ASSIGN IO, INITIALIZE, COPY, and CAT.

ASSIGN IO is used to assign an address to each device on the loop. A position as well as a two letter code is used to establish this address.

ASSIGN IO ":DD"
> and pressing END LINE — assigns DD to the first or next sequential HP-IL device on the loop. Also assigned is the position or device number. This is the number (1, 2, 3, etc.) of the device on the HP-IL cable. Numbering is obtained sequentially by position on the HP-IL cable as you trace the "OUT" cable from your computer. The DD is used as an example here. Whatever two characters you use can be used in the INITIALIZE, COPY, and CAT commands. After you execute the ASSIGN IO statement you can address a device by the position number or the two letter code. This will be used later in some examples.

INITIALIZE is used to get the disc ready to receive data and to establish a volume label as well as to verify that the media is not damaged.

INITIALIZE "TEST:DD"
> and pressing END LINE — establishes the volume label of TEST on the disc at device location DD. You might want to write the volume name you give the disc on the disc jacket label. This volume name can be used to access the disc using the CAT and COPY commands and is very easy to forget. Initializing takes approximately 1 1/2 minutes. The disc access light on the disc drive goes out when initializing is complete.

COPY allows you to move files and data to and from the disc drive. The next two examples of the COPY command are shown three times. Each time a different form of HP-IL addressing is used.

Example one – Copying a file from the HP 71 to the disc drive.

COPY filename TO :1

COPY filename TO.TEST

COPY filename TO :DD
    and pressing END LINE – writes the file specified to the disc.

Example two – Copying a file from the disc drive to the HP 71.

COPY filename:1

COPY filename.TEST

COPY filename:DD
    and pressing END LINE – reads the file specified from the disc.

CATALOG (CAT) is used to obtain a list of the files that are stored on the disc. The display scrolling keys are used to view the different files (scrolling up and down) and the entire file name and data concerning each file (scrolling to the end of the display).

CAT :1
    and pressing END LINE – displays the filenames on the disc. The "1" represents the position of the disc drive on the HP-IL.

CAT.TEST
    and pressing END LINE – displays the filenames on the disc. TEST is the volume name.

CAT :DD
    and pressing END LINE – displays the filenames on the disc. DD was the assignment made in the previous ASSIGN IO command.

Formatting Singled-sided Discs

The HP 9114A Disc Drive is a double-sided disc drive. When you initialize a disc, the disc is initialized in double-sided format. For single-sided compatibility and data exchange with other computers, the following program allows your HP 71B/9114A system to initialize a double-sided disc in single-sided format.

After keying in and starting the program, you are prompted for the address of the disc drive. The address is the position of the HP 9114A in the HP-IL (loop). The program also asks for the number of directory entries and a volume label. The directory entries are usually set to 200. The volume label is a name you give the disc. This name can be six characters or less. See the HP 71 Owner's manual for more details. As a final question the program asks if you want to initialize another disc. Y for yes and N for no is the required response. After this, the program either repeats or stops.

```
0010   ! SINGLE SIDED FORMAT UTILITY FOR 71B AND THE HP 9114A
0020   INPUT "ADDRESS OF DRIVE? ";A
0030   RESET HPIL
0040   CLEAR :A
0050   SEND UNL MTA LISTEN A SAD 5 DATA CHR$(49)&CHR$(243) END 95
0060   SEND UNL MTA LISTEN A SAD 14
0070   SEND END 4
0080   SEND UNL MLA TALK A SAD 16
0090   ENTER :LOOP USING "# ,b";Q
0100   IF Q=0 THEN GOTO 'NOERR'
0110   DISP "ERROR"
0120   STOP
0130   'NOERR': !
0140   INPUT "NUMBER OF DIRECTORY ENTRIES? ";N
0150   INPUT "VOLUME LABEL? ";V$
0160   INPUT "PRESS END LINE TO START";C$
0170   DISP "INITIALIZING"
0180   INITIALIZE V$&":"&STR$(A),N
0190   INPUT "FORMAT ANOTHER(Y/N)? ";C$
0200   IF C=$"Y" THEN GOTO 140
0210   CLEAR :A
0220   STOP
```

Operation with the HP 75

Disc storage for the HP 75 is handled using the following commands: ASSIGN IO, INITIALIZE, COPY, and CAT.

ASSIGN IO is used to assign a device code to each device on the loop. A device code is generally a two character code representing each device. In our example we use DD to represent Disc Drive.

ASSIGN IO ':DD'
  and pressing Return − assigns DD to the first or next sequential HP-IL device on the loop. The DD is used as an example here. Whatever two characters you use must be used in the INITIALIZE, COPY, and CAT commands. This is used in the examples.

INITIALIZE is used to get the disc ready to receive data.

INITIALIZE ':DD'
>   and pressing Return − prepares the disc at device code DD to
>   receive data. The device code must be used in all the commands
>   to this device. Initializing takes approximately 1 1/2 minutes. The
>   disc access light on the disc drive goes out when initializing is
>   complete.

COPY allows you to move files and data to and from the disc
drive.

COPY 'filename' TO 'filename:DD'
>   and pressing Return − writes the file specified to the disc.

COPY 'filename:DD' TO 'filename'
>   and pressing Return − reads the file specified from the disc.

CATALOG (CAT) is used to obtain a list of the files that are stored
on the disc. The display scrolling keys are used to view the
different files (scrolling up and down) and the entire file name and
data concerning each file (scrolling to the end of the display).

CAT ':DD'
>   and pressing END LINE − displays the filenames on the disc.

Formatting Single-sided Discs

The following utility can be entered into the HP 75 to format 3 1/2-
inch double-sided discs in single-sided format. These discs are
compatible with other HP disc products that use single-sided
drives. This utility requires either the I/O Utilities (00075-13013) or
the I/O ROM (00075-15001) to be resident in your HP 75.

This utility prompts you for the device code. This is the device
code specified using the ASSIGN IO command. The utility then
prompts you for the number of directory entries. A typical number
of directory entries for the single-sided formatted disc is 200. After
RTN is pressed, the HP 75 begins the format operation.

```
10  ! SINGLE SIDED FORMAT UTILITY FOR HP75 AND HP9114A
20  ! THIS PROGRAM REQUIRES EITHER I/O UTILITIES OR THE I/O ROM
30  INPUT "DEVICE CODE OF DRIVE? ";A$
40  SENDIO A$,'UNL,LAD#,SDC',"
50  SENDIO A$,'UNL,LAD#,CD:65,DS:31,DS:F3,EN:5F',"
60  SENDIO A$,'UNL,LAD#,CD:6E,EN:04',"
70  Q= $ENTIO$(A$,'TAD# ,CD:70,SDA')
80  IF Q= $CHR$(0) THEN 110
90  DISP "ERROR IN SETTING FORMAT"
```

```
100  GOTO 160
110  INPUT 'NUMBER OF DIRECTORY ENTRIES? ';N
120  INPUT "PRESS 'RTN' TO START";N$
130  INITIALIZE A$,N
140  INPUT "FORMAT ANOTHER (Y/N)? ";C$
150  IF C = $"Y" THEN 110
160  SENDIO A$,'UNL,LAD# ,SDC',"
170  END
```

Series 40 Operations

Disc storage for the Series 40 is handled using the following commands: NEWM, DIR, WRTP, READP, WRTA, and READA. These commands are explained next. Also for a more complete explanation of these commands see the HP-IL Module Owner's Manual (P/N 82160-90001).

NEWM

The NEWM command is used to initialize the flexible disc. NEWM is automatically directed to the first device on the loop. The first device must be your HP 9114A. Pressing the following keys initiates the NEWM command.

XEQ ALPHA NEWM ALPHA

The calculator then prompts you for the number of directory entries or number of files you plan to store on the the disc. This number can be as high as 447, but generally is around 80. The more directory entries the longer the search times when using the DIR (directory) command.

When you see NEWM , type 080 or the number of directory entries you want. One to two seconds after you type the final number, the disc access light should come on as the 9114A begins the 1 1/2 minute initialize sequence.

DIR

The DIR command is used to read the directory which includes the file names, file types, and file sizes. DIR always accesses the first device on the loop which must be the tape drive. Press the following key sequence.

XEQ ALPHA DIR ALPHA

DIR uses the ALPHA register to display directory information.

WRTP, READP, WRTA, and READA

These four operations require that you place the program name into the ALPHA register before you execute the operation. To execute the operations, press the following keys.

XEQ ALPHA READP ALPHA

Substitute your operation in place of the READP.

WRTP — Write program
READP — Read program
WRTA — Write all (the entire calculator contents and memory modules are written to the mass storage).
READA — Read all (the entire calculator contents and memory modules are read from the mass storage).

ASCII Data Files

The two ASCII data file commands SAVEAS and GETAS were not designed to operate with a disc drive that powers down when not in use. When using these commands an error is generated because the disc drive does not power up fast enough. When programming with these two commands set up the following sequence.

Disable the errors
Send command (SAVEAS or GETAS) — This starts the disc drive.
Enable the errors
Resend the command (SAVEAS or GETAS) — Executes the command.

SAVEAS and GETAS are explained in the section titled "Accessing Mass Storage Files" in the Series 40 Owner's Manual P/N 00041-90492.

Series 40/9114 Utility

The Series 40 calculators can access 130 kbytes of the HP 9114A's 630 kbytes. The following utility, when entered into a Series 40, allows you to access the full 630 kbytes. The utility requires that the 82183A Extended I/O Module be installed in your calculator. Additionally, this utility is available from the User's Library (#41-09114) on 3 1/2-inch media.

There are six operations or functions that are affected by this utility when they are executed: WRTP, WRTPV, WRTS, WRTK, WRTA, AND CREATE. These functions must create new directory entries. All these functions operate the same as before (documented in the HP-IL Module Owner's manual). These functions require correct information be placed in the ALPHA and (in some cases) the X registers.

Following are the 4 most common errors you can get when using this utility.

Error Number	Error Description
18	Uninitialized Media
20	No Media
21	Low Battery
99	Other Errors
	(This includes the write-protect disc error.)

The Utility is listed next.

```
01*LBL "DSC?"
02  ADRON          --
03  16
04  FINDAID        – FIND MASS STORAGE DEVICE
05  X#0?           --
06  GTO "VLL"
07  "NO DRIVE"
08  PROMPT
09  GTO "DONE"
10*LBL "VLL"
11  SELECT
12  0
13  ENTER
14  XEQ "SEEK"     – SEEK TO VOLUME LABEL TRACK 0, RECORD 0
15  RCLSEL
16  TAD
17  2
18  DDT            – READ RECORD
19  XEQ "WAIT"
20  4
21  DDT            – SWAP BUFFERS
22  XEQ "WAIT"
23  1
24  DDT            – SEND BUFFER 1
25  8
26  INAN
27  1
28  ATOXX
29  128
30  X#Y?           – CHECK FOR NON-LIF DISC
```

```
31  GTO "NL"
32  XEQ "B2D"        – READ LOCATION OF 1ST RECORD OF DIRECTORY
33  STO 01
34  4
35  INAN
36  XEQ "B2D"        – DIRECTORY LENGTH
37  1                --
38  –
39  RCL 01
40  +                – CONSTRUCT COUNTER TO SEARCH DIRECTORY
41  STO 02
42  1 E3
43  /
44  ST + 01          --
45  RCL 01
46  INT
47  XEQ "D2B"
48  XEQ "SEEK"       – SEEK TO START OF DIRECTORY
49*LBL 10
50  RCLSEL                .
51  TAD
52  2                – READ RECORD FROM DIRECTORY
53  DDT
54  XEQ "WAIT"
55  RCLSEL
56  LAD
57  9
58  DDL              – COPY BUFFER 0 TO BUFFER 1
59  XEQ "WAIT"
60  3
61  DEVL
62  234              – SET BYTE POINTER TO LAST ENTRY IN RECORD
63  OUTXB
64  RCLSEL
65  TAD
66  1
67  DDT              – SEND BUFFER 1
68  INXB
69  INXB
70  +
71  510              –FOUND A RECORD WITH ROOM
72  X = Y?
73  GTO "RS"
74  XEQ "B2D"        --
75  STO 03           – SAVE LOCATION AND LENGTH OF FILE
76  XEQ "B2D"          IN LAST ENTRY IN RECORD
77  ST + 03
78  ISG 01
79  GTO 10           --
80*LBL "DF"          – DIRECTORY FULL-PACK OR USE NEW MEDIA
81  "DIR FULL"
82  PROMPT
83  GTO "DONE"
84*LBL "NL"          – EXIT IF NOT A LIF DISC
85  "NOT LIF DISC"
86  PROMPT
87  GTO "DONE"
88*LBL "RS"          – START SEARCH OF RECORD FOR LOCATION
89  RCLSEL             TO WRITE DUMMY ENTRY
```

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```
 90  LAD
 91  3
 92  DEVL
 93  CLX
 94  OUTXB          – RESET BYTE POINTER TO 0
 95  RDN
 96  TAD
 97  1
 98  DDT            – SEND BUFFER 1
 99  1.007
100   STO 04
101*LBL 12
102  12
103  INAN
104  ATOXR
105  ATOXR          – READ 2 BYTES OF FILETYPE – IF BOTH 255,
106  +                THEN THIS IS WHERE WE WRITE DUMMY ENTRY
107  510
108  X = Y?
109  GTO "WRT"
110  XEQ "B2D"      --
111  STO 03
112  XEQ "B2D"      – SAVE LOCATION AND LENGTH OF FILE-
113  ST+ 03           NEEDED FOR DUMMY ENTRY
114  12
115  INAN
116  ISG 04
117  GTO 12
118  RCL 01
119  INT
120  RCL 02
121  X = Y?          – IF LAST RECORD – LAST ENTRY OF RECORD, DI-
122  GTO "DF"          RECTORY IS FULL – LAST ENTRY RESERVED BY 41
123*LBL "WRT"
124  RCL 01
125  INT
126  XEQ "D2B"
127  XEQ "SEEK"      – SEEK TO TRACK AND RECORD WHERE DUMMY
128  RCLSEL            ENTRY IS TO BE WRITTEN
129  LAD
130  3               --
131  DDL
132  RCL 04
133  1
134  –               – SET BYTE POINTER
135  32
136  *
137  OUTXB           --
138  RCLSEL
139  LAD
140  6               – PARTIAL WRITE MODE
141  DDL
142  "D"             – DUMMY DIRECTORY ENTRY
143  0
144  XTOAR
145  XTOAR
146  XTOAR
147  XTOAR
148  RCL 03
```

```
149  XEQ "D2B"
150  XTOAR
151  RDN
152  XTOAR
153  0
154  XTOAR
155  XTOAR
156  RCL 05
157  FC? 09
158  GTO 00
159  32
160  /
161  ENTER
162  INT
163  X# Y?
164  ISG X
165  FIX 4
166*LBL 00
167  XEQ "D2B"        – LENGTH OF FILE
168  XTOAR
169  RDN
170  XTOAR
171  20
172  OUTAN            – WRITE TO TAPE
173  ADRON
174  RCLSEL
175  LAD
176  8                – CLOSE RECORD
177  DDL
178  SF 10
179  CLA
180  ARCL 06          --
181  ARCL 07
182  ARCL 08          – RECALL CONTENTS OF ALPHA + X BEFORE
183  ARCL 09            41 FUNCTION WAS ATTEMPTED
184  RCL 05           --
185  GTO IND 00
186*LBL "WRTP"        --
187  CF 10
188  CF 09
189  1                – WRITE PROGRAM
190  STO 00
191  9
192  STO 05
193*LBL 01
194  SF 25
195  WRTP
196  GTO "OP"         --
197*LBL "WRTPV"       --
198  CF 10
199  CF 09
200  2
201  STO 00
202  9                – WRITE PRIVATE PROGRAM
203  STO 05
204*LBL 02
205  SF 25
206  WRTPV
207  GTO "OP"         --
```

```
208*LBL "WRTS"          --
209  CF 10
210  SF 09
211  3
212  STO 00
213  1                  – WRITE STATUS
214  STO 05
215*LBL 03
216  SF 25
217  WRTS
218  GTO "OP"           --
219*LBL "WRTK"          --
220  CF 10
221  CF 09
222  4
223  STO 00
224  1                  – WRITE KEYS
225  STO 05
226*LBL 04
227  SF 25
228  WRTK
229  GTO "OP"           --
230*LBL "WRTA"          --
231  CF 10
232  CF 09
233  5
234  STO 00             – WRITE ALL
235  11
236  STO 05
237*LBL 05
238  SF 25
239  WRTA
240  GTO "OP"           --
241*LBL "CREATE"        --
242  CF 10
243  SF 09
244*LBL 06
245  SF 25              – CREATE
246  CREATE
247  STO 05
248  6
249  STO 00
250  GTO "OP"           --
251*LBL "B2D"           --
252  4
253  INAN
254  ATOXR              – TAKE 4 BYTES FROM LOOP AND RETURN TO X DE-
255  ATOXR                CIMAL # OF LAST 2 BYTES, (16-BIT WORD)
255  ATXOR
256  256
257  *
258  +
259  RTN                --
260*LBL "D2B"           --
261  ENTER
262  ENTER
263  256
264  MOD                – BREAK DECIMAL # IN X INTRO 2 BYTES
265  X<>                  XY MOST SIG. BYTE
```

```
266  LASTX          Y   LEAST SIG. BYTE
267  /
268  INT
269  RTN            --
270*LBL "OP"        – EXECUTED AFTER FUNCTION ATTEMPT
271  FS? 25
272  GTO "WP?"      – IF SUCCESSFUL, GOTO WP?
273  99             IF NOT, WAS IT 2ND TRY?
274  FS? 10         IF 2ND TRY, EXIT
275  GTO "ERROR"    IF 1ST TRY, SAVE ACYNA AND X + TRY AGAIN
276  6.009
277  STO L
278*LBL 07
279  ASTO IND L
280  ASHF
281  ISG L
282  GTO 07
283  GTO "DSC?"
284*LBL "WAIT"      – CHECK STATUS OF DRIVE
285*LBL 11
286  SF 25          – KEEP CHECK IF BUSY
287  INSTAT
288  FC?C 25        – RETURN IF IDLE
289  GTO 11
290  FS? 05         – DISPLAY ERROR # IF ERROR
291  GTO 11
292  FS? 04
293  GTO "ERROR"
294  RTN
295*LBL "WP?"       – IF SUCCESSFUL ON 1ST TRY, EXIT
294  FC? 10
297  GTO "DONE"
298  2              --
299  RCL 00         – IF NOT WRTP OR WRTPV, ENT
300  X>Y?
301  GTO "DONE"     --
302  RCL 01
303  INT
304  XEQ "D2B"      – MUST ALTER DIR ENTRY FOR WRTP AND WRTPB
305  XEQ "SEEK"     TO SHOW CORRECT # OF REGISTERS CONSUMED –
306  RCLSEL         NO WAY TO DETECT THIS WHEN DUMMY
307  LAD            ENTRY IS WRITTEN
308  3
309  DDL
310  RCL 04
311  32
312  *
313  4
314  –
315  OUTXB
316  RCLSEL
317  TAD
318  1
319  DDT
320  INXB
321  INXB           – READ LENGTH OF FILE IN BYTES
322  X>0?
323  ISG Y
324  FIX 4
```

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```
325   RDN
326   STO 05
327   RCLSEL
328   LAD
329   3
330   DDL          --
331   RCL 04
332   32
333   *            – SET BYTE POINTER
334   13
335   –
336   OUTXB        --
337   RCLSEL
338   LAD
339   6            – PARTIAL WRITE MODE
340   DDL
341   RCL 05       – WRITE CORRECT # OF RECORDS
342   OUTXB
343   RCLSEL
344   LAD
345   8
346   DDL          – CLOSE RECORD
347   GTO "DONE"
348*LBL "SEEK"     – SEEK TO TRACK AND RECORD SPECIFIED BY
349   ADROFF          CONTENTS OF X AND Y REGISTERS
350   RCLSEL
351   LAD
352   4
353   DDL
354   RDN
355   RDN
356   OUTXB
357   RDN
358   OUTXB
359   XEQ "WAIT"
360   ADRON
361   RTN
362*LBL "ERROR"    – DISPLAY ERROR #
363   CF 10
364   "ERROR: "
365   ARCL X
366   AVIEW
367   STOP
368*LBL "DONE"     – EXIT
369   CF 10
370   END
```

Using the 9114A with the IBM PC (PC-XT)

Introduction

This section shows you the following two procedures:

Step 1 — How to install the HP-IL routines on the IBM PC so you can use the 3 1/2-inch disc drive with your computer.

Step 2 — How to use your 3 1/2-inch disc with your IBM PC.

Before going any further be sure the HP 82973A HP-IL Interface Card is installed per the HP 82973A manual. The 5 1/4-inch disc that comes with the interface card will be used in the following procedure. This disc is called the HP 82973A HP-IL Interface Disc.

Step 1 — Installing the HP-IL Driver on the IBM PC

This section shows you how to transfer two of the files from the HP 82973A HP-IL Interface disc to your master DOS disc (the disc you use to boot your system). If you have an IBM PC, this master boot disc will be a 5 1/4-inch flexible disc. If you have the IBM PC-XT, this master boot disc would commonly be the Winchester disc at drive C.

First, for you IBM PC users, let's make a copy of your master boot disc. Begin at step 1 of this section. For you IBM PC-XT users, start with step 2 of this section.

1. Use the DISKCOPY command and make a copy of your DOS boot disc. First, boot up your system by placing the boot disc in drive A. Turn the system on and Enter the date and time. Type the next line.

   DISKCOPY A: B:

   Press Enter, and follow the diskcopy instructions.

   Use the new copy of your master DOS disc to make all the following changes. This copy is now in drive B. Remove your master boot disc and put it away for now. Place the copy you have just made in drive A. Continue to step 2.

2. Check to see if you have a file called CONFIG.SYS on your DOS disc by typing the next line and pressing Enter.

DIR CONFIG.SYS

If the file is found the next two lines will appear on your display.

Config Sys
1 File(s)

If CONFIG.SYS is on your DOS disc, perform only **Procedure A** below.

If CONFIG.SYS is NOT on your DOS disc, perform only **Procedure B** below.

PROCEDURE A:

Type in the next line and press Enter.

TYPE CONFIG.SYS

The contents of the CONFIG.SYS file is now displayed. You probably should write these files down as you will have to retype them.

Type the next two lines and add the files you just wrote down beginning at the place indicated. When all the files are added, the Z character is added by holding down the Ctrl key as you press the Z key.

COPY CON CONFIG.SYS
DEVICE = HPIL.SYS
Add the files you wrote down above
Z (Ctrl Z)

Now press the Enter key to store the file to your DOS disc.

PROCEDURE B:

Type the next two lines. The Z character is added by holding down the Ctrl key as you press the Z key.

COPY CON CONFIG.SYS
DEVICE = HPIL.SYS
Z (Ctrl Z)

NOTE

If you set the address on the interface card to an address other than 1700 when you installed the HP-IL interface, you must specify your address when you type DEVICE = HPIL.SYS. For example, if you set the address of the interface card to 2200, enter the following line in CONFIG.SYS:

DEVICE = HPIL.SYS /A 2200

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3. Copy the files **HPIL.SYS** and **HPILFOR.COM** from the HP 82973A HPIL Interface software disc to the DOS disc.

   EXAMPLE: With the DOS disc in drive A (IBM PC), insert the HP-IL interface disc into drive B and type the next commands. If you have the IBM PC-XT insert the HP 82973A disc into the flexible disc drive and type the next two commands. This drive (IBM PC-XT) responds to both A: and B: identifiers.

   After typing each line, press Enter and wait for the file to copy.

      COPY B:HPIL.SYS
      COPY B:HPILFOR.COM

4. At this time connect the HP 9114A to the HP-IL card and turn the disc drive on. Also remove the HP 82973A HPIL Interface disc. This should be done before you reset the computer.

   With the DOS disc in drive A, reset the IBM PC so that the operating system is re-booted. Reset the IBM PC-XT so its operating system re-boots from the Winchester. Reset on both computers is done by pressing the Alt, Ctrl, and Del keys at the same time.

   HPIL.SYS is now installed if the display screen shows HP-IL being present.

NOTE

If you want to run HPLINK, you need to first remove HPIL.SYS from the system. This allows the IBM PC to reside on the HP-IL without being the system controller.

The easiest way to do this on the IBM PC is to boot your computer with the old DOS disc that does not contain the files CONFIG.SYS, HPIL.SYS, or HPILFOR.COM.

On the PC-XT, remove the following line

   DEVICE = HPIL.SYS

from the file CONFIG.SYS and reboot the computer.

Step 2 — Using Your 3 1/2-inch Disc Drive with your IBM PC

The first step in using the 3 1/2-inch disc drive is to format the 3 1/2-inch discs. Formatting 3 1/2-inch discs must always be done using the HPILFOR routine that we installed on the operating system. The commands DISKCOPY and DISKCOMP will not work with the HP 9114A.

Mass storage devices on the loop are assigned disc drive identifiers in a sequence following those already assigned on the IBM. For example, if you have disc drives A:, B:, and C: assigned to the IBM PC-XT and you have two HP-IL mass storage units connected, the HP-IL units will be assigned the identifiers D: and E:. You can then use them as you would any of the disc drives on your IBM PC-XT.

The command to format a disc in the HP 9114A is shown next.

HPILFOR m:

The **m:** is the disc drive identifier of the disc you want to format.

For example, to format a disc using drive D:, type:

HPILFOR D:

Before the computer formats the specified disc drive, it prompts you to press a key to start formatting. This ensures that you do not accidentally format a disc that you do not want erased. **(Remember that formatting a disc erases all information on that disc.)** After pressing the key to confirm that you want a disc formatted, the computer begins the formatting operation.

Once the disc is formatted, you can write data on it. The Copy command is shown next. When using the Copy command don't forget the space between the filename and the destination address (filename A: and filename C:); this also applies to the space between the * and destination address (* C: and * A:) when copying the entire disc.

Copy C:filename A:
   and pressing Enter — copies the file specified from disc C to
   disc A.

Copy A:filename C:
  and pressing Enter – copies the file specified from disc A to disc C.

Copy A:*.* C:
  and pressing Enter copies the entire disc in drive A to the disc in drive C.

Copy C:*.* A:
  and pressing Enter copies the entire disc in drive C to the disc in drive A.

NOTE

When moving data from the IBM PC to the HP 150, the disc must be initialized in single-sided format if you are using any of the following disc drives:

   9121D/S
   9133A/B/V/XV

An HP 150 system with any of the above disc drives can be used to format a disc in single-sided format.

To initialize an HP-IL disc in single-sided format on the IBM PC, use the /w parameter as shown next.

   HPILFOR m:/w

Remember that the m parameter is the identifier of the disc drive containing the disc you want to format.

When using the HP Portable on the loop when the IBM PC is a controller, the HP Portable must be running a program that enables it to be a device on the loop. Otherwise the IBM PC and the HP Portable will both attempt to be the loop controller. The result is that the loop will not operate until either the IBM PC or the HP Portable is disconnected from the loop.