HEWLETT-PACKARD

Electronic Disc ROM

OWNER'S MANUAL

HP-86/87

HEWLETT PACKARD

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HP-86/87

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Contents

Section 1

Getting Started

Introduction

The HP-86/87 Electronic Disc ROM allows part of main memory to be designated as a high-speed mass storage device. Mass storage operations to and from main memory can be performed considerably faster than flexible disc operations.

The maximum size of the electronic disc depends on which computer you are using and how much plug-in memory you have. To obtain the largest electronic disc possible, use the configuration shown for your computer in the following table:

If you have an	with:	—then the electronic disc size is:
HP-86A	the Electronic Disc ROM and three 128K memory modules	448K.
HP-86B	four 128K memory modules	640K.
HP-87A	the Electronic Disc ROM and three 128K memory modules	416K.
HP-87XM	the Electronic Disc ROM and three 128K memory modules	512K.

If you copy a number of BASIC programs to the electronic disc, you can load and run any of the programs quickly. For example, you may want to create an electronic disc with two volumes, one volume for an application program (such as WORD/80) and another volume for data files (such as WORD/80 data files).

Don't confuse electronic disc memory with main memory. The electronic disc provides *secondary* memory. Consequently, programs on the electronic disc must first be brought into main memory before they can be executed and are limited in size by main memory.

Unlike flexible discs and hard discs, the electronic disc provides storage *only* while the computer is switched on.

CAUTION

Always maintain backup copies of important files on a permanent mass storage medium. Should a power failure occur, or if power is turned off, the contents of the electronic disc will be lost because the electronic disc resides in volatile RAM.

ROM Installation

To use the Electronic Disc with the HP-86A, the HP-87A, or the HP-87XM; the Electronic Disc ROM must be installed in an HP 82936A ROM Drawer. Up to six different accessory ROMs can be used in a single drawer. The Electronic Disc ROM is built-in to the HP-86B.

The introductory manual for the HP-86 or HP-87, as well as the instruction sheet that accompanies the drawer, explains the installation procedure. Make sure you *switch off the power* of the HP-86/87 whenever you add or remove ROMs and peripherals.

Installing Extra Memory

The electronic disc memory is expandable with HP 82908A 64K Memory Modules and HP 82909A 128K Memory Modules. Memory modules can be installed in any of the four module ports on the rear of the computer. If you are not familiar with the installation procedure, refer to the introductory manual for your computer or to the instruction sheet that accompanies the memory modules.

Syntax Guidelines

The following conventions are used throughout this manual:

DOT MATRIX	Syntactical information shown in dot matrix must be entered as shown (in either uppercase or lowercase letters).
( )	Parentheses enclose the arguments of ROM functions.
[ ]	This type of brackets indicates optional parameters.
italic	Italic type shows the parameters themselves.
...	An ellipsis indicates that you may include a series of like parameters within the brackets.
" "	Quotation marks indicate that the program name or character string must be quoted.
stacked items	When two items are placed one above the other, either one may be chosen.

Notes

Section 2

Creating an Electronic Disc

When your Electronic Disc ROM and additional memory modules are installed in your HP-86/87, you are ready to create an electronic disc. The first command you will need is `CONFIG`.

Executing `CONFIG` is analogous to adding disc drives to your mass storage system. One volume is initially created. This volume can then be divided into two or more distinct volumes. For example, if your application involves chaining among program segments while collecting quantities of data, then you can configure the electronic disc into two volumes, one for the program files and one for the data files. At the end of the session, you can copy just the data files to a permanent storage medium.

`CONFIG` Parameters

The complete syntax for `CONFIG` is:

`CONFIG` ["*new volume label*" [, ":*msus*" | *old volume name* [, *directory size* [, *disc size*]]]]

new volume label

A name up to six characters in length that you use to specify a particular disc. Examples of acceptable volume labels are `"TAX82"`, `"DataCD"`, and `"games"`.

msus or *old volume label*

The mass storage unit specifier of the first electronic disc volume is `":D000"` or `":d000"`. If an electronic disc already exists, the *old volume label* may be used.

directory size

Specifies the number of records to be allocated on the disc for the file directory. Each record holds directory information for eight files. For example, a *directory size* of 4 records allows 32 (4 × 8) files to be stored on the volume. The directory itself occupies 1K (4 × 256 bytes/record) of storage on the volume. May be a numeric variable or expression that rounds to a nonzero positive integer; otherwise, an `INVALID PARAM` error will occur.

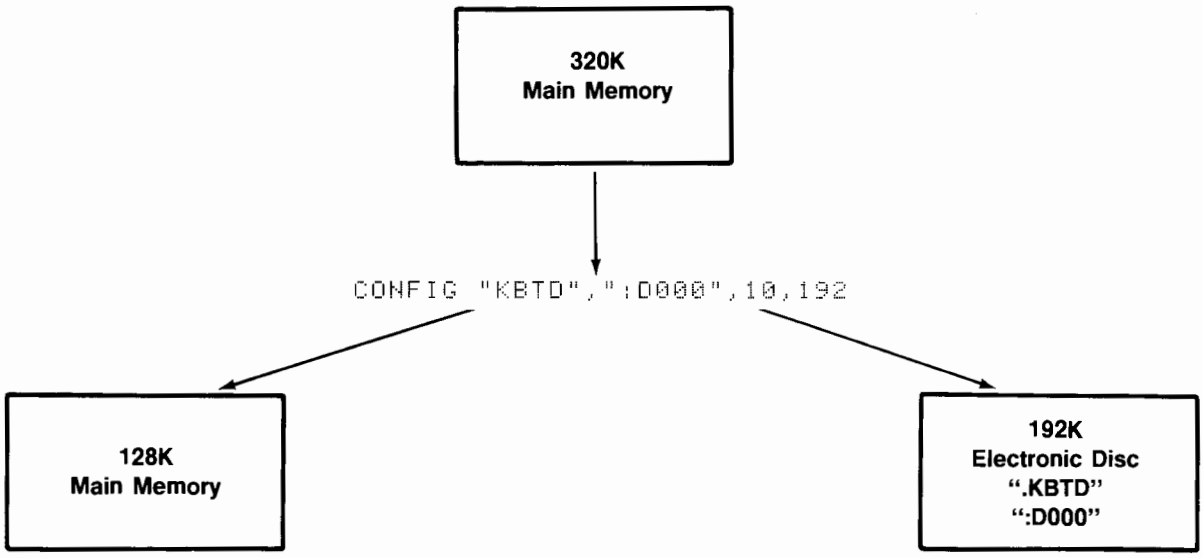
disc size

Sets the size (in kilobytes) of the electronic disc. May be a numeric variable or expression but must round to a nonzero, positive *multiple of 32* (32, 64, 96, 128, ...); otherwise, an `INVALID PARAM` error will occur.

When executing CONFIG for the first time, you must either specify all the parameters in the syntax box (*new volume label, msus, directory size*, and *disc size*) or specify no parameters. If no parameters are specified when you execute CONFIG, your electronic disc will consist of all RAM over 128K. The defaults for *new volume label, msus, directory size*, and *disc size* (when parameters are not specified the first time CONFIG is used) are:

new volume label	"ED "
msus	":D000"
directory size	2 sectors for each 32K RAM specified for the electronic disc
disc size	Available RAM minus 128K RAM (for user programs)

Example: Assuming you have 320K RAM available (an HP-86A with 256K plug-in RAM), configure an electronic disc with a *new volume label* of "KBTD", an *msus* of ":D000", 192K RAM, and a *directory size* of 10 (for storing 8 × 10, or 80 files).



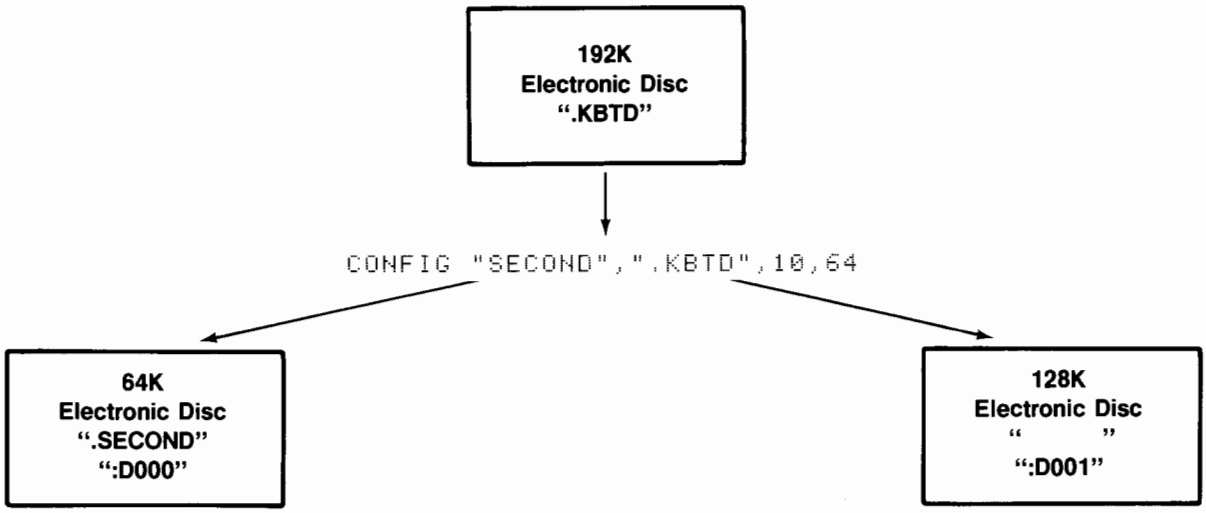
In this example CONFIG creates an electronic disc with a *new volume name* of ".KBTD", an *msus* of ":d000", a *directory size* of 10 (for 8 × 10, or 80 files), and a *disc size* of 192K. After allowing for volume overhead (512 bytes) and directory overhead (10 × 256, or 2560 bytes), there are 756 sectors (with 256 bytes each) remaining on the electronic disc after overhead bytes are subtracted.

Free Electronic Disc Space (756 × 256)	+	Volume Overhead 512	+	Directory Overhead (10 × 256)	=	ED Space 192K

An Electronic Disc With More Than One Volume

Your 192K electronic disc can now be partitioned into two or more distinct disc volumes. Although the storage capacity of the resulting volumes is the same as the original electronic disc, adding volumes is analogous to adding new disc drives to your mass storage system.

Example: With an electronic disc memory of 192K bytes, configure the electronic disc into two volumes of sizes 64K and 128K.



In this example, CONFIG splits the electronic disc ".KBTD" into two volumes. The first volume is 64K bytes (after overhead is subtracted, there are 244 sectors available), has a *new volume label* of ".SECOND", and inherits the msus of the original (":D000"). The second volume is 128K bytes (192K-64K), is named with six blanks, and has an msus *one greater than* the original (":D001"). The second volume will have 502 sectors available after overhead is subtracted.

All volumes must have at least 32K RAM each or an INVALID PARAM error will occur.

If CONFIG is executed without parameters and an electronic disc has previously been configured, a new electronic disc is configured with the default paramters (volume label "ED ", msus ":D000", and directory size of 2 sectors for each 32K RAM of current electronic disc space). Electronic disc memory size does not change.

> **Note:** Additional volumes can be created using the CONFIG command only with an empty electronic disc volume, that is, to a volume with no entries in its directory. Otherwise, a DIRECTORY error will occur and the configuration of the electronic disc will remain unchanged.

Other Considerations

Two sectors (or 512 bytes of memory) are required for each electronic disc volume in your system. This is in addition to the number of records used for the electronic disc directory.

You can configure an electronic disc volume to a size *larger* than its current size if an empty, succeeding volume (or volumes) exists to provide room for it to grow. For example, if volume ":D000" is 32K bytes and volume ":D001" is 128K bytes, then CONFIG "BIGGER",":D000",4,64 causes volume ":D000" to grow to 64K bytes and volume ":D001" to shrink accordingly to 96K bytes. Both volumes must be empty; otherwise, a DIRECTORY error will occur.

If you configure the first of two electronic disc volumes to a size *smaller* than its current size, then the second volume will grow by a corresponding amount.

The commands and functions available for use with an electronic disc are described in section 3.

Section 3

Using the Electronic Disc

Once an electronic disc has been created, it can be treated the same as a physical storage device. For example, mass storage commands (described in Part IV of the *HP-86/87 Operating and BASIC Programming Manual* can be used to COPY, PURGE, LOAD, and STORE programs. Volume names and individual file names can be changed (VOLUME IS and RENAME, respectively).

Command and Function Summary

The following table summarizes the commands and functions that control electronic disc mass storage operations. Note that the INITIALIZE command does not apply to the electronic disc and causes a DISC ONLY error.

Instruction	Description	Prog*	Disc†
ASSIGN#	Opens a data file for reading and writing.	✓	✓
CAT	Displays the datalog entries of a mass storage medium.	✓	✓
CHAIN	Loads a BASIC program from mass storage and begins its execution.	✓	✓
CHECK READ#	Verifies the validity of data printed to a disc file.	✓	✓
CONFIG	Creates an electronic disc space.	✓	
COPY	Copies a source file or storage medium to a destination file or storage medium.	✓	✓
CREATE	Creates a data file.	✓	✓
DISC FREE	Returns the number of unused records on a disc.	✓	✓
GET	Loads and transforms a data file into a BASIC program file.		✓
GLOAD	Loads and displays a graphics file.	✓	✓
GSTORE	Stores a graphics file.	✓	✓
LOAD	Loads a BASIC program file into memory.		✓
LOADBIN	Loads a binary program file into memory.	✓	✓

* Programmable.

† Indicates that the instruction also applies to flexible and Winchester disc drives.

Instruction	Description	Prog*	Disc†
MASS STORAGE IS	Sets the default mass storage location.	✓	✓
MSI	An abbreviation for the MASS STORAGE IS command.	✓	✓
MSUS$	Returns a string specifying the current default mass storage unit specifier.	✓	✓
PACK	Packs disc files together to make more space.	✓	✓
PRINT#	Writes data items to a file on mass storage.	✓	✓
PURGE	Removes files from mass storage.	✓	✓
READ#	Reads data items from mass storage files.	✓	✓
RENAME	Renames mass storage files.	✓	✓
SAVE	Stores a BASIC program as a data file of characters.	✓	✓
SECURE	Secures a mass storage file against listing, editing, overwriting, or access by others.	✓	✓
STORE	Stores a BASIC program as a program (type PROG) file.		✓
STOREBIN	Stores a binary program as a binary program (type BPGM) file.	✓	✓
SWAP	Swaps two BASIC programs, one in main memory and one in electronic memory.	✓	
TYP	Returns an integer indicating the data type of the next item in a data file.	✓	
UNCONFIG	Returns electric disc memory to main memory.	✓	
UNSECURE	Removes the protection from a file that was secured with the SECURE command.		✓
VOL$	Returns the volume label or the specified mass storage medium.	✓	✓
VOLUME IS	Names a specified disc or disc volume.	✓	✓

* Programmable.
† Indicates that the instruction also applies to flexible and Winchester disc drives.

Command and Function Descriptions

Included in this section are electronic disc commands and functions that are not described in the *HP-86/87 Operating and BASIC Programming Manual.*

File names for the electronic disc, as for physical discs, may consist of one to ten characters, excluding periods (.) and commas (,). *File specifiers* for the electronic disc consist of the file name followed by the msus or volume label of the electronic disc, for example, "LinearReg:D000" and "TwoWayAnal.ED".

The CONFIG Command

Allows an electronic disc space to be created.

The syntax is:

```
CONFIG ["new volume label" [, ":msus" / ".old volume name" [, directory size [, disc size]]]]
```

CONFIG must be used with all four parameters or no parameters the first time it is executed. If parameters are not used, an electronic disc will be created with a *new volume label* of "ED ", an *msus* of ":D000", a *directory size* of 2 sectors per 32K bytes, and a *disc size* of total user RAM with 128K reserved for main memory. System overhead uses 4292 bytes of main memory leaving 126780 bytes for the user. CONFIG is described in detail in section 2 of this manual.

The DISC FREE Command

DISC FREE causes the HP-86/87 to search the directory of a specified disc and return two integer values:

- The number of unused records on the disc.
- The size of the largest, contiguous, unused space on the disc.

The syntax is:

```
DISC FREE numeric var1, numeric var2 [, ".volume label" / ":msus" ]
```

The two numeric variables may be either simple variables or array elements. When DISC FREE is executed, *numeric* var_1 is set equal to the total free space on the disc, measured in 256-byte records; *numeric* var_2 is set equal to the largest contiguous single block of space on the disc, in 256-byte records. The two variables will have equal values when there are no "holes" (or NULL files) on the disc.

The ":*msus*" or ".*volume label*" parameter, if supplied, specifies the flexible disc, hard disc volume, or electronic disc that is to be examined. If no disc is specified, the HP-86/87 accesses the current MASS STORAGE IS device.

The computer requires 1 or 2 seconds to access the directories of physical discs using DISC FREE. Afterwards, the values of the two numeric variables can be checked and used from the keyboard or from an executing program. DISC FREE can be used on the same line as a DISP command (for example, DISC FREE A,B @ DISP A).

Examples:

DISC FREE A,B	Reads the total number of free records into A and the size of the largest unused block into B from the current default disc.
DISC FREE S,T,":MYDISC"	Returns available space information from the disc labeled MYDISC, in variables S and T.
DISC FREE X,Y,":D000"	Returns available space information from the electronic disc. An HP-86A with 128K plug-in RAM will show 156 sectors after CONFIG is executed if no parameters are specified.

Note that using the DISC FREE function involves two steps: First, you execute the function; second, you check the values returned in the numeric variables.

The GET Command

Programs stored in the form of data strings (refer to SAVE) are retrieved using the nonprogrammable GET command.

The syntax is:

```
GET "file specifier"
```

When a GET command is executed, the HP-86/87 accesses the specified data file, expecting to find a succession of valid program lines in string form. The stored lines are merged into main memory as program lines without scratching program lines already there. If a retrieved program line has the same line number as a line already in main memory, the retrieved program line overwrites the original line. If GET encounters a string it cannot properly interpret as a Series 80 BASIC program line, the line is printed on the current PRINTER IS device and entered in main memory as a program remark (with the ! symbol).

Although GET is designed to retrieve data files created by the SAVE command, data files originating in other ways (for instance, created by another BASIC program) can be retrieved. The data files must consist of:

- Character strings of up to 160 characters.
- A carriage return character (CHR$(13)) as the last character of each string.
- A valid line number from 1 through 99999 and one or more Series 80 BASIC statements in each string.
- A null string ("") as the last item in the file.

The messages GET IN PROGRESS and DONE will indicate the start and end of the GET operation. The result will be an ordered sequence of lines in main memory, in the form of program statements and remarks.

The MSI Command

MSI is short for the MASS STORAGE IS command. It is listed as MASS STORAGE IS when used in a program.

The syntax is:

```
MSI  " :msus specifier"
     " ,old volume name"
```

The MSUS$ Function

The MSUS$ function returns either a five-character or six-character string that indicates the msus of the current MASS STORAGE IS device.

The syntax is:

```
MSUS$
```

For example, if you have previously typed MSI ":d700" (END LINE), then MSUS$ will return :D700.

The SAVE Command

SAVE enables you to store programs on mass storage as character DATA files (rather than PROG files). (Use GET afterward to bring string data files into main memory as BASIC programs.

The syntax is:

```
SAVE "file specifier"[,beginning line number [,ending line number]]
```

The *file specifier* may refer to a new or existing file on any mass storage medium, including the electronic disc. If the *file specifier* already exists, then the file is replaced. The messages SAVE IN PROGRESS and DONE will indicate the start and end of the SAVE operation. The result will be a DATA file of 256-byte records.

When SAVE is executed, the BASIC program in HP-86/87 main memory is saved in a data file in the form of character strings, one string per program line. When no optional parameters are specified, the entire program is saved. If a beginning line number is included, program lines from that number to the end are saved. If beginning and ending line numbers are specified, the SAVE command begins and ends at the specified lines. SAVE may be used on a program that references a binary program or plug-in ROMs, but the binary program or ROMs must be present during the SAVE operation.

The SWAP Command

SWAP enables you to store the currently executing program on the electronic disc while simultaneously chaining to another program on the electronic disc.

```
SWAP "incoming file specifier", "new ED file name"
```

The *new ED file name* is the name that the currently executing program in main memory will acquire on the electronic disc; it must be an unused file name. The *incoming file specifier* may reference any BASIC program on the electronic disc.

Example:

```
9910 SWAP "IN:D000","OUT"
```

Stores the currently executing program on electronic disc volume ":D000" as OUT while chaining to the IN program from the same volume.

Note that no msus or volume label should be attached to the *new ED file name*. The outgoing BASIC program will be stored on the same electronic disc volume as the incoming program.

As with the CHAIN command:

- SWAP can be applied only to a BASIC file (type PROG).
- SWAP preserves the value of common variables for the use of the incoming program.
- SWAP preserves any resident binary program in main memory.
- SWAP begins execution of the incoming program at the lowest-numbered statement.

Unlike the CHAIN command:

- SWAP applies only to electronic disc files. Trying to swap a program from a physical disc medium will result in an ED ONLY error message.
- SWAP stores the executing program on the electronic disc; CHAIN simply overwrites the program in main memory.
- SWAP can be executed *only* from a running program and not from the keyboard.

SWAP manages the incoming program and outgoing program so that only one copy of each is maintained in the computer—either in main memory or on the electronic disc. When SWAP is executed, the electronic disc space previously copied by the incoming program is given over to the outgoing program. The SIZE MISMATCH error will occur if a program being swapped to the electronic disc is larger than the program being swapped to main memory. For example, a 2K-byte program can be stored on the electronic disc in the space previously occupied by a 12K-byte program; a 12K-byte program in main memory cannot be swapped for a 2K-byte program on the electronic disc.

Note that it is not possible to swap binary program or to swap subprograms created with the Advanced Programming ROM.

The UNCONFIG Command

Returns all electronic disc memory to main memory.

The syntax is:

```
UNCONFIG [numeric value]
```

If the optional parameter is 0, the electronic disc directories will not be checked before electronic disc memory is returned. Otherwise, if a directory has even one entry (including a NULL file), an error (DIRECTORY) is returned and UNCONFIG is not executed.

The VOL$ Function

The VOL$ function accesses a specified disc directory and returns a six-character string that indicates the volume label of the disc.

The syntax is:

```
VOL$(":msus")
```

The ":*msus*" parameter may be any suitable string expression.

Examples:

VOL$(":D000")	Returns the volume label of the electronic disc.
VOL$(MSUS$)	Returns the volume label of the current MASS STORAGE IS device.

The character string from VOL$ will not include the period (.) of the volume label and will be padded with trailing blanks if the volume label has fewer than six characters. Note that the form VOL$(".*volume label*") is legal but redundant.

If an external printer has been declared, the program line

```
10 PRINT VOL$(MSUS$)
```

—will not work. The VOL$ function should instead be assigned to a variable, such as:

```
10 A$=VOL$(MSUS$)
20 PRINT A$
```

Section 4

Error Messages

There are 10 error messages listed below generated by the Electronic Disc ROM. For descriptions of other errors, refer to the *HP-86/87 Operating and BASIC Programming Manual.*

Error Number	Error Message	ERROM Number	Description
112	ED ROM	209	Checksum error. ROM failed power on self-test.
120	NO M.S. DEVICE	208 or 209	There is no external disc drive hooked to the system.
122	NO ED MEMORY	209	Using CONFIG without parameters with 128K or less memory.
123	DISC ONLY	208 or 209	Command executable for external disc only.
124	SIZE MISMATCH	209	Incoming program larger than the one being swapped with.
125	ED ONLY	209	Command executable for electronic disc only.
126	MSUS	208 or 209	Nonexistent msus.
127	SEC>RANG	209	Binary routines asked for nonexistent sector.
128	DIRECTORY	209	CONFIG executed on a volume that was not empty.
129	ILLEGAL AFTER COM	209	CONFIG after a COM statement or in subprogram.

Section 5

Maintenance, Service, and Warranty

Maintenance

The Electronic Disc ROM doesn't require maintenance. However, there are several areas of caution that you should be aware of. They are:

WARNING

Do not place fingers, tools, or other foreign objects into the plug-in ports. Such actions may result in minor electrical shock hazard and interference with some pacemaker devices. Damage to plug-in port contacts and the computer's internal circuitry may also result.

CAUTIONS

Always switch off the HP-86/87 and any peripherals involved when inserting or removing modules. Use only plug-in modules designed by Hewlett-Packard specifically for the HP-86/87. Failure to do so could damage the module, the computer, or the peripherals.

If a module or ROM drawer jams when inserted into a port, it may be upside down or designed for another port. Attempting to force it may damage the computer or the module. Remove the module carefully and reinsert it.

Do not touch the spring-finger connectors in the ROM drawer with your fingers or other foreign objects. Static discharge could damage electrical components.

Handle the plug-in ROMs very carefully while they are out of the ROM drawer. Do not insert any objects in the contact holes on the ROM. Always keep the protective cap in place over the ROM contacts while the ROM is not plugged into the ROM drawer. Failure to observe these cautions may result in damage to the ROM or ROM drawer.

For instructions on how to insert and remove the ROM and ROM drawer, please refer to the instructions accompanying the ROM drawer or to the introductory manual for your computer.

Service

If at any time, you suspect that the Electronic Disc ROM or the ROM drawer may be malfunctioning, do the following:

1. Turn the computer and all the peripherals off. Disconnect all peripherals and remove the ROM drawer from the HP-86/87 port. Turn the computer back on. If it doesn't respond or displays `ERROR 23 : SELF TEST`, the computer requires service.
2. Turn the computer off. Install the ROM drawer, with the Electronic Disc ROM installed, into any port. Turn the computer on again.
   - If `ERROR 112 : ED ROM` is displayed, indicating that the ROM is not operating properly, turn the computer off and try the ROM in another ROM drawer slot. This will help you determine if particular slots in the ROM drawer are malfunctioning, or if the ROM itself is malfunctioning.
   - If the cursor does not appear, the system is not operating properly. To help determine what is causing the improper operation, repeat step 2 with the ROM drawer installed in a different port, both with the Electronic Disc ROM installed in the ROM drawer and with the ROM removed from the ROM drawer.
3. Refer to "Warranty Information" if your unit is malfunctioning.

Warranty Information

The complete warranty statement is included in the information packet shipped with your ROM. Additional copies may be obtained from any authorized Hewlett-Packard dealer, or the HP sales and service office where you purchased your system.

If you have any questions concerning the warranty, and you are unable to contact the authorized HP-86/87 dealer or the HP sales office where you purchased your computer, please contact:

In the United States: One of the six Field Repair Centers listed on the Service Information Sheet packaged with your owner's documentation.

In other countries: Contact your nearest sales and service facility. If you are unable to contact that facility, please contact:

In Europe:
Hewlett-Packard
7, rue du Bois-du-Lan
P.O. Box
CH-1217 Meyrin 2
Geneva
Switzerland
Tel. (022)82 70 00

Other Countries:
Hewlett-Packard Intercontinental
3495 Deer Creek Rd.
Palo Alto, California 94304
U.S.A.
Tel. (415) 857-1501

Not all Hewlett-Packard facilities offer service for your computer. For information on obtaining service in your area, consult the service information included in the Service Information Sheet packaged with your owner's documentation, or contact your authorized HP Series 80 dealer or the nearest Hewlett-Packard sales and service facility.

If your computer requires repair, you can help assure efficient servicing by following these guidelines:

- Leave the configuration of the computer exactly as it was at the time of the malfunction, including ROMs, interfaces, and other peripherals.
- Write a brief description of the malfunction symptoms for service personnel.
- Save printouts or any other materials that illustrate the problem.
- Have on hand a sales slip or other proof of purchase to establish the warranty coverage period.

Serial Number

Each HP-86/87 and peripheral carries an individual serial number. We recommend that you keep a separate record of serial numbers. Should your unit be stolen or lost, you may need them for tracing and recovery, as well as for any insurance claims. Hewlett-Packard doesn't maintain records of individual owner's names and unit serial numbers.

General Shipping Instructions

Should you ever need to ship any portion of your HP-86/87 system, be sure it is packed in a protective package to avoid in-transit damage. Use the original shipping case if possible. Shipping damage is not covered by the warranty. All customs and duties are the customer's responsibility.

Hewlett-Packard recommends that the customer always insure shipments.

Federal Communications Commission Radio Frequency Interference Statement

The HP-86/87 Electronic Disc ROM uses radio frequency energy and may cause interference to radio and television reception. The ROM 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 the FCC Rules. These specifications 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 the ROM does cause interference to radio or television, which can be determined by turning the HP-86/87 on and off with the ROM installed and with the ROM removed, you can try to eliminate the interference problem by doing one or more of the following:

- Reorient the receiving antenna.
- Change the position of the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult an authorized HP dealer or an experienced radio/television technician for additional suggestions. You 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, D.C. 20402, Stock No. 004-000-00345-4.

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