HEWLETT PACKARD

HP 82725A
Bar Code Reader Module

Owner's Manual

for use with the HP-75D

February 1984

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Introduction

This owner's manual describes how to install and operate the HP 82725A Bar Code Reader Module with the HP-75D Portable Computer and a compatible bar-code reading wand. This information is written for the knowledgeable user who knows how to use bar-code data and what to use it for.

> **Note:** This Bar Code Reader Module operates only with the HP-75D. It will not function with the HP-75C.

The HP 82725A Bar Code Reader Module is a software ROM module that can decode the following seven kinds of bar code.

- Code 11 (USD-8)
- 3-of-9 Code (USD-3)
- Interleaved 2-of-5 Code (USD-1)
- Industrial 2-of-5 Code
- 2-of-7 Code (Codabar) (USD-4)
- Universal Product Code (UPC A or E)
- European Article Number (EAN 8 or 13)

Each type of bar code is decoded by its own string function. This string value can be sent to a text file, a video monitor, or to a host computer via modem and phone line. If you use a text file for your data, the file itself can subsequently be sent to a host computer or stored on a digital cassette.

Bar Code Wands

This Bar Code Reader Module is made to use with the HP 92267A or the HP 92267B Bar Code Reader wand. However, it can be used with any wand that has all of the following:

- A three-pin Hypertronics D01 connector.
- A single, 5-volt supply operation.
- Digital output compatible with TTL and CMOS.
- Polarity of signal:
  - high on non-reflective
  - low on reflective
- A maximum current of 50 mA.

Switched wands are recommended for use with the HP-75D in order to conserve battery life.

Bar Code Specifications

The Bar Code Reader Module will reliably decode bar code that:

- Has a minimum element width of 0.0075 inch.

- Has a ratio of wide to narrow elements between 2:1 and 3:1.

- Is read with a minimum scan speed of 3 inches/second and a maximum scan speed of 30 inches/second.

The functions in the module can decode a maximum string length of 42 characters, including any check digit, for each bar-code label.

A bar code scan must begin within about 2½ minutes of the execution of the string function (given below) that activates the decoding. (This is to preserve battery power.) There is no time limit once the scan has started, as long as bar code is continuously being read.

After each completed scan of a label, the HP-75D will respond with a short scan tone. If the bar code is *successfully* read, you will hear a *high tone*. If the bar code is *not successfully* read, you will hear a *low tone*. A time-out also gives a low tone.

The Bar Code Reader Module includes a check-digit option (CDIGIT) to calculate and verify check digits present in the bar code. CDIGIT and the BASIC function LEN (*field length*) can eliminate substitution errors and truncation in the decoding of bar code. These functions are described under the topic, "Calculating and Verifying a Check Digit".

Installation Procedures

Connecting and Disconnecting the Wand

Insert the wand's plug into the outlet on the back edge of the HP-75D, as shown in the photo at right.

To remove the wand, push down on the button on top of the plug while pulling the plug out.
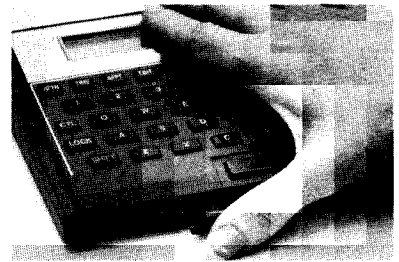
Installing the ROM Module

The ROM module fits into one of the three ports on the front edge of the computer.

CAUTION

- Be sure to turn off the HP-75 before installing or removing any module. If there are any pending appointments, type ᴀlᴀᴦᴍ ᴏff [RTN] in EDIT mode to prevent the arrival of future appointments (which would cause the computer to turn on). If the computer is on or if it turns itself on while a module is being installed or removed, it might reset itself, causing all stored information to be lost.

- Do not place fingers, tools, or other foreign objects into any of the ports. Such actions could result in minor electrical shock hazard and interference with pacemaker devices worn by some persons. Damage to port contacts and internal circuitry could also result.

To insert the Bar Code Reader Module, orient it so that its label is right-side up, hold the computer with the keyboard facing up, and push in the module until it snaps into place. During this operation be sure to observe the precautions described above.

To remove the ROM module, use your fingernails to grasp the lip on the bottom of the front edge of the module and pull the module straight out of the port. Install a blank module in the port to protect the contacts inside.

Operation Instructions

Decoding Bar Code

The Bar Code Reader Module can decode seven types of bar code. Each one of these bar codes is decoded by its own string function, which is *specific to the particular bar code* that will be read.

String Functions

Function	Action
CODE11$	Decodes Code 11.
CODE39$	Decodes 3-of-9 Code.
INT25$	Decodes Interleaved 2-of-5 Code.
IND25$	Decodes Industrial 2-of-5 Code.
CODABAR$	Decodes 2-of-7 Codabar.
UPCOD$	Decodes Universal Product Code (UPC). (Automatically discriminates between UPC A and UPC E.)
EANCOD$	Decodes European Article Number (EAN). (Automatically discriminates between EAN 8 and EAN 13.)

Any one of these string functions prepares the decoder to read and decode *one* bar-code label.

Each bar-code label is decoded into a character string, which can be assigned to a variable for storage (e.g., A$=CODE39$). If the wand scan of the label is not successful, however, the bar-code string returned will be the null string (A$=' ').

Operator Feedback

You can program the BEEP and DISP instructions (explained in the *HP-75 Owner's Manual*) to provide auditory and visual prompting and feedback for bar-code reading. The module automatically provides beeps to register good and bad scans.

Beeps for Good/Bad Scans. After each completed scan of a label, the HP-75D responds with a short scan tone or beep. If the bar code is *successfully* read, there is a *high tone*. If the bar code is *not successfully* read, there is a *low tone*.

Time-Out. To save battery power, the computer will not wait more than approximately 2½ minutes for a scan to begin. If the user takes more than about 2½ minutes to start a bar-code scan following the execution of the string-decoding function, a *time-out* will occur, resulting in a *bad scan* and a *low tone*.

There is no time-out once a scan has started, assuming the scan is not interrupted.

If you execute one of these keywords unintentionally, you can cancel the 2½-minute waiting period (during which time the computer will not allow any operation except wand-scanning) *by creating a "bad scan"*. To do so, simply hold the wand in the air and press the switch.

Example with Feedback: If you executed A$=CODE39$ and then scanned the bar-code label

1000011289

(representing 1000011289 in 3-of-9 Code), the possible results would be:

Status	A$ Value	Tone
Good Scan	1000011289	High
Bad Scan	Null	Low
Time-Out	Null	Low

Delay Setting. When writing programs, note that the DELAY setting (explained in the *HP-75 Owner's Manual*) affects the lag between a DISP statement and a following BEEP statement. A delay of about 0.5 second works well (DELAY .5). A longer delay could give the user the mistaken impression of a malfunction, owing to the delay between the visual and auditory cues.

You can eliminate any lag between a display and a beep with a DELAY 0 setting. In this case, the display would be so brief it would not be legible.

User Prompts. There are no other built-in prompts or responses in the Bar Code Reader Module. Visual and additional auditory cues can be supplied by the applications programmer.

For example, the five program lines below would issue a visual prompt (Scan Package Label) and a high-frequency auditory prompt to read and decode a 3-of-9 bar-code label, ending with a display of the decoded value (DISP A$):

```
10 DELAY .5                    Sets delay to 0.5 second.
20 DISP 'Scan Package Label'   Displays prompt.
30 BEEP 1800,.5                Beeps at frequency 1800 Hz; duration 0.5 s.
40 A$=CODE39$                  Decodes 3-of-9 label.
50 DISP A$                     Visual feedback of the decoded label.
```

Keyboard Entry versus Wand Entry

Occasionally you might find a particular bar-code label unreadable with the wand, perhaps because the label is defective or worn out. In this case, you need to enter the label's decoded string (printed on the label with the bar code) by hand using the keyboard. This is called *keyboard entry* of the bar code.

If you are using a *program* to decode and allocate bar-code values, you should include an *error trap* that specifically tests for bad scans and provides for keyboard entry of values in those cases where wand entry is not working. Without such a contingency in your program, it could be very difficult to stop a program for a keyboard entry and re-start it at the proper place.

The program example given below includes a contingency for keyboard entry (lines 100, 150–180) if wand entry of a label fails three times in a row.

Example Using CODE39$

As an example, the following program will decode a 3-of-9 bar-code label, place the decoded ASCII character string into the string variable A$, and subsequently record that value as data in the text file BARDATA.

The program will continue to collect bar-code data until the given number of labels (N) has been read. Lines 60, 100, and 150–170 keep track of the consecutive bad scans (C). If C gets up to three, the program asks the user to enter the value of the bar-code label via the keyboard—that is, without the wand.

The prompts in lines 70–80 precede the actual execution of the decoder function CODE39$ in line 90.* Depending on whether the bar-code scan is good or bad, A$ is assigned a value or the null string. Line 100 traps out any null values so they will not be recorded in BARDATA in line 110.

Code	Description
10 DELAY .5	
20 ASSIGN #1 TO 'BARDATA',TEXT	Sets up text file for data.
30 DIM A$[42]	Dimensions string variable.
40 INPUT 'Number of Readings';N	Gets the number of labels.
50 FOR I=1 TO N	Loop.
60 C=0	Initializes the number of consecutive bad scans.
70 DISP 'Scan Label'	Displays prompt to read bar code.
80 BEEP 1800,.5	Auditory prompt to start scanning.
90 A$=CODE39$	Scans and decodes bar-code label.
100 IF A$='' THEN 150	Traps bad scans.
110 PRINT #1;A$	Writes decoded value to BARDATA.
120 NEXT I	End of loop.
130 ASSIGN #1 TO *	Closes the file BARDATA to any more data.

---

* The HP-75 DELAY setting will affect the lag between lines 70 and 80.

140 END	
150 C = C + 1	Increments count for bad scans.
160 IF C < 3 THEN 70	Allows new scan attempt if fewer than three consecutive bad scans.
170 INPUT 'Key in Label Code: ';A$	Prompts for manual (keyboard) entry of label value if there have been three consecutive bad scans.
180 GOTO 110	Writes that value to BARDATA.

Calculating and Verifying a Check Digit

The Bar Code Reader Module has a *check-digit option* (CDIGIT) that you can set to further test the success of your wand scans. It does this by calculating and verifying any check digit present in the coded label. To verify values entered from the keyboard, use the various CDW functions (next page), each of which is specific to a bar-code type.

Note that, regardless of the setting of the check-digit option, UPC and EAN codes are *always* checked. (They have mandatory check-digit verification.) Codabar code, on the other hand, never provides a check digit, so it *cannot* be check-digit verified.

Check-Digit Verification in Bar Codes

Mandatory	Optional	Not Applicable
UPC	Code 11	Codabar
EAN	3-of-9 Code	
	Interleaved 2-of-5	
	Industrial 2-of-5	
	2-of-7 Code	

An additional method of data verification is by checking the field length of decoded bar code using LEN (page 13).

Checking Wand Entries (CDIGIT)

```
CDIGIT ON
       OFF
```

When you execute CDIGIT ON, you set the Bar Code Reader Module's *check-digit* option, which calculates and verifies check digits in the process of decoding bar-code scans. If the check digit *is* verified, the scan is good. If the check digit is *not* verified, the scan is bad, and the bar-code string is returned as the null string. If there is *no* check digit present, a *bad scan* results.

To turn off this option, execute CDIGIT OFF.

The default condition for the HP-75 is CDIGIT OFF.

It is advisable to execute CDIGIT ON/OFF in a program (rather than from the keyboard) so that the state of the CDIGIT option will be known.

> **Note:** If the current condition of the computer is CDIGIT ON, then reading bar code that has no check digits will result in bad scans. It is therefore very important that CDIGIT be set only when reading bar code with check digits. (This setting does not affect reading Codabar, UPC, or EAN.)

Checking a Keyboard Entry

The CDIGIT option does not check keyboard entries, but the following four CDV (*check-digit verification*) functions will, by providing access to the CDIGIT coding. (Note that Codabar, UPC, and EAN are not represented.)

Function	Action
CDV11 (*string*)	Use with a Code 11 character string.
CDV39 (*string*)	Use with a 3-of-9 Code character string.
CDV25I (*string*)	Use with an Interleaved 2-of-5 Code character string.
CDV25D (*string*)	Use with an Industrial 2-of-5 Code character string.

These Boolean functions calculate the check digit for the given bar-code character string, then attempt to verify it. The functions return a 1 if the check digit is verified, and a zero if it is not. (If the given string has *no* check digit, the function returns a zero.)

The following three program lines illustrate the use of CDV39 to verify 3-of-9 bar code entered from the keyboard.

```
100 INPUT 'Label: ';A$
110 IF CDV39(A$) THEN 120 ELSE 100
120 DISP 'Check Digit Verified'
```

Prompts for keyboard entry and assigns to A$.

Calculates and tests check digit. If CDV39(A$) returns 1, then the check digit is verified; if CDV39(A$) returns zero, then repeat the input.

Checking the Field Length (LEN)

If you know what the field length of the decoded character string should be, then you can also verify the value of the decoded string by checking its field length using the BASIC function LEN (*string length*).

```
LEN (string)
```

Use the decoded bar-code string for *string*. The following program lines illustrate the use of LEN in a program to check the field length.

```
100 A$=CODE39$
110 IF LEN(A$)=L THEN 200
120 DISP 'Truncation Error'
130 DISP 'Scan Again'
140 BEEP 1800,.5
150 GOTO 100
        ⋮
200 DISP 'Good Read'
```

Scans and decodes bar-code label.

Compares its length to L, the known field length.

Displays error message if lengths aren't equal.

Displays confirmation if lengths are equal.

Example for Taking Inventory

The following program is an example of how the Bar Code Reader Module with a wand could be used to do an inventory of n different products. It is written to be used on 3-of-9 bar code with check digits. The user reads each different product's bar-code label, and then types in the current number of items of each product. The program includes check-digit calculation/verification and a field-length check of each decoded label.

```
10 DELAY .5
20 ASSIGN #1 TO 'INVEN',TEXT
30 DIM A$[42]
40 CDIGIT ON
50 INPUT 'Length of Label: ';L
60 INPUT 'Number of Different Products: ';N
70 FOR I=1 TO N
80 C=0
90 DISP 'Scan Label'
100 BEEP 1800,.5
110 A$=CODE39$
120 IF A$='' THEN 500
130 IF LEN(A$)<>L THEN 500
140 INPUT 'Quantity: ';Q$
150 PRINT #1;' ',A$,' ',DATE$,' ',Q$
160 NEXT I
170 CDIGIT OFF
180 ASSIGN #1 TO *
190 END
```

Creates text file INVEN for data.

Dimensions maximum size of string.

Sets check-digit option.

Asks for length of label.

Asks for number of different readings to be taken.

Starts loop for n number of readings.

Initializes count of bad scans.

Visual prompt for scan.

Auditory prompt.

Decodes label.

Trap for bad scan.

Trap for incorrectly read field length.

Asks for the number of items of that product.

Writes the label's value, the date, and the quantity to INVEN.

Ends check-digit option.

Closes file INVEN.

500 DISP 'Incorrect Scan'	Subroutine to handle bad scans.
510 C = C + 1	Increments count of bad scans.
520 IF C < 3 THEN DISP 'Re-scan Label' @ GOTO 100	
530 INPUT 'Key in Label Code: ';A$	Asks for keyboard input of label's character string.
540 IF CDV39(A$) THEN 550 ELSE DISP 'Incorrect Label' @ GOTO 530	Check-digit verification of keyboard entry.
550 GOTO 130	

For more efficient data storage, I N V E N is a text file instead of a BASIC file (line 20). HP-75 BASIC files have overhead requirements that text files do not. The main loop, lines 70 to 160, collects data (label string and item quantity), and then writes the data and the current date to I N V E N. The spaces included in the P R I N T # statement divide the data into records in the file. The check-digit option is set in line 40 and turned off at the end of the program in line 170. Line 130 verifies the field length of the decoded label. Line 530 accepts keyboard input and line 540 verifies its check digit.

Warranty and Service Information

Maintenance

The Bar Code Reader Module does not require maintenance. However, there are several precautions, listed below, that you should observe.

CAUTIONS

- Do not place fingers, tools, or other foreign objects into any of the ports. Damage to plug-in module contacts and the computer's internal circuitry may result.

- Turn off the computer (press [SHIFT][ATTN]) before installing or removing a plug-in module.

- If a module jams when inserted into a port, it may be upside down. Attempting to force it further may result in damage to the computer or the module.

- Handle the plug-in modules very carefully while they are out of the computer. Do not insert any objects into the module connecter socket. Always keep a blank module in the computer's port when a module is not installed. Failure to observe these cautions may result in damage to the module or the computer.

Limited One-Year Warranty

What We Will Do

The HP 82725A Bar Code Reader Module is warranted by Hewlett-Packard against defects in materials and workmanship affecting electronic and mechanical performance, but not software content, for one year from the date of original purchase. If you sell your unit or give it as a gift, the warranty is transferred to the new owner and remains in effect for the original one-year period. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you return the product, shipping prepaid, to a Hewlett-Packard service center.

What Is Not Covered

This warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification by other than an authorized Hewlett-Packard service center.

No other express warranty is given. The repair or replacement of a product is your exclusive remedy. **ANY OTHER IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS IS LIMITED TO THE ONE-YEAR DURATION OF THIS WRITTEN WARRANTY**. Some states, provinces, or countries do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. **IN NO EVENT SHALL HEWLETT-PACKARD COMPANY BE LIABLE FOR CONSEQUENTIAL DAMAGES**. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state, province to province, or country to country.

Warranty for Consumer Transactions in the United Kingdom

This warranty shall not apply to consumer transactions and shall not affect the statutory rights of a consumer. In relation to such transactions, the rights and obligations of Seller and Buyer shall be determined by statute.

Obligation to Make Changes

Products are sold on the basis of specifications applicable at the time of manufacture. Hewlett-Packard shall have no obligation to modify or update products once sold.

Warranty Information

If you have any questions concerning this warranty, please contact an authorized Hewlett-Packard dealer or a Hewlett-Packard sales and service office. Should you be unable to contact them, please contact:

- In the United States:

<div align="center">

Hewlett-Packard

Personal Computer Group

Customer Support

11000 Wolfe Road

Cupertino, CA 95014

Toll-Free Number: (800) FOR-HPPC (800 367-4772)

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- In Europe:

Hewlett-Packard S.A.
150, route du Nant-d'Avril
P.O. Box CH-1217 Meyrin 2
Geneva
Switzerland
Telephone: (022) 83 81 11

Note: Do *not* send units to this address for repair.

- In other countries:

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

Note: Do not send units to this address for repair.

Service

Hewlett-Packard maintains service centers in most major countries throughout the world. You may have your unit repaired at a Hewlett-Packard service center any time it needs service, whether the unit is under warranty or not. There is a charge for repairs after the one-year warranty period.

Hewlett-Packard products are normally repaired and reshipped within five (5) working days of receipt at any service center. This is an average time and could vary depending upon the time of year and the work load at the service center. The total time you are without your unit will depend largely on the shipping time.

Obtaining Repair Service in the United States

The Hewlett-Packard United States Service Center for battery-powered computational products is located in Corvallis, Oregon:

Hewlett-Packard Company
Service Department

P.O. Box 999
Corvallis, Oregon 97339, U.S.A.
or
1030 N.E. Circle Blvd.
Corvallis, Oregon 97330, U.S.A.

Telephone: (503) 757-2000

Obtaining Repair Service in Europe

Service centers are maintained at the following locations. For countries not listed, contact the dealer where you purchased your unit.

AUSTRIA
HEWLETT-PACKARD Ges.m.b.H.
Kleinrechner-Service
Wagramerstrasse-Lieblgasse 1
A-1220 Wien (Vienna)
Telephone: (0222) 23 65 11

BELGIUM
HEWLETT-PACKARD BELGIUM SA/NV
Woluwedal 100
B-1200 Brussels
Telephone: (02) 762 32 00

DENMARK
HEWLETT-PACKARD A/S
Datavej 52
DK-3460 Birkerod (Copenhagen)
Telephone: (02) 81 66 40

EASTERN EUROPE
Refer to the address listed under Austria.

FINLAND
HEWLETT-PACKARD OY
Revontulentie 7
SF-02100 Espoo 10 (Helsinki)
Telephone: (90) 455 02 11

FRANCE
HEWLETT-PACKARD FRANCE
Division Informatique Personnelle
S.A.V. Calculateurs de Poche
F-91947 Les Ulis Cedex
Telephone: (6) 907 78 25

GERMANY
HEWLETT-PACKARD GmbH
Kleinrechner-Service
Vertriebszentrale
Berner Strasse 117
Postfach 560 140
D-6000 Frankfurt 56
Telephone: (611) 50041

ITALY
HEWLETT-PACKARD ITALIANA S.P.A.
Casella postale 3645 (Milano)
Via G. Di Vittorio, 9
I-20063 Cernusco Sul Naviglio (Milan)
Telephone: (2) 90 36 91

NETHERLANDS
HEWLETT-PACKARD NEDERLAND B.V.
Van Heuven Goedhartlaan 121
NL-1181 KK Amstelveen (Amsterdam)
P.O. Box 667
Telephone: (020) 472021

NORWAY
HEWLETT-PACKARD NORGE A/S
P.O. Box 34
Oesterndalen 18
N-1345 Oesteraas (Oslo)
Telephone: (2) 17 11 80

SPAIN
HEWLETT-PACKARD ESPANOLA S.A.
Calle Jerez 3
E-Madrid 16
Telephone: (1) 458 2600

SWEDEN
HEWLETT-PACKARD SVERIGE AB
Skalholtsgatan 9, Kista
Box 19
S-163 93 Spanga (Stockholm)
Telephone: (08) 750 2000

SWITZERLAND
HEWLETT-PACKARD (SCHWEIZ) AG
Kleinrechner-Service
Allmend 2
CH-8967 Widen
Telephone: (057) 31 21 11

UNITED KINGDOM
HEWLETT-PACKARD Ltd
King Street Lane
GB-Winnersh, Wokingham
Berkshire RG11 5AR
Telephone: (0734) 784 774

International Service Information

Not all Hewlett-Packard service centers offer service for all models of HP products. However, if you bought your product from an authorized Hewlett-Packard dealer, you can be sure that service is available in the country where you bought it.

If you happen to be outside of the country where you bought your unit, you can contact the local Hewlett-Packard service center to see if service is available for it. If service is unavailable, please ship the unit to the address listed above under Obtaining Repair Service in the United States. A list of service centers for other countries can be obtained by writing to that address.

All shipping, reimportation arrangements, and customs costs are your responsibility.

Service Repair Charge

There is a standard repair charge for out-of-warranty repairs. The repair charges include all labor and materials. In the United States, the full charge is subject to the customer's local sales tax. In European countries, the full charge is subject to Value Added Tax (VAT) and similar taxes wherever applicable. All such taxes will appear as separate items on invoiced amounts.

Computer products damaged by accident or misuse are not covered by the fixed repair charges. In these situations, repair charges will be individually determined based on time and materials.

Service Warranty

Any out-of-warranty repairs are warranted against defects in materials and workmanship for a period of 90 days from date of service.

Shipping Instructions

Should your unit require service, return it with the following items:

- A completed Service Card, including a description of the problem.
- A sales receipt or other proof of purchase date if the one-year warranty has not expired.

The product, the Service Card, a brief description of the problem, and (if required) the proof of purchase date should be packaged in adequate protective packaging to prevent in-transit damage. Such damage is not covered by the one-year limited warranty; Hewlett-Packard suggests that you insure the shipment to the service center. The packaged unit should be shipped to the nearest Hewlett-Packard designated collection point or service center. Contact your dealer for assistance. (If you are not in the country where you originally purchased the unit, refer to "International Service Information" above.)

Whether the unit is under warranty or not, it is your responsibility to pay shipping charges for delivery to the Hewlett-Packard service center.

After warranty repairs are completed, the service center returns the unit with postage prepaid. On out-of-warranty repairs in the United States and some other countries, the unit is returned C.O.D. (covering shipping costs and the service charge).

Further Information

Circuitry and designs are proprietary to Hewlett-Packard, and service manuals are not available to customers. Should other problems or questions arise regarding repairs, please call your nearest Hewlett-Packard service center.

When You Need Help

Hewlett-Packard is committed to providing after-sale support to its customers. To find out where to get help for this product, call toll-free:

(800) FOR-HPPC
(800 367-4772)

or write to:

Hewlett-Packard
Personal Computer Group
Customer Support
11000 Wolfe Road
Cupertino, CA 95014