

HEWLETT-PACKARD

User's Documentation Kit



**HP-94
Handheld Industrial
Computer**

HP-94 Handheld Industrial Computer

User's Documentation Kit



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READ THIS FIRST

When you receive your new HP-94, you must take the following four steps, in order, before you can load an application program into the computer:

1. **Carefully remove the tape from the display.** *Do not use a sharp instrument to remove the tape: the display is easily scratched.*
2. **Fully charge the main battery** (refer to the section in this manual on how to charge the main battery).
3. **Install the lithium memory-backup batteries** if they are not already installed (refer to the section in this manual on how to install the memory-backup batteries).
4. **Initialize the memory.** Do the following:

Press the **ON/OFF** key while pressing both the **CLEAR** and **ENTER** keys. When a blinking cursor appears in the display (ignore any error messages), press **I** **SHIFT** **0** **ENTER**. The message **Dir**
0: OK ? will appear in the display. Press **ENTER**.

HOW TO USE THIS MANUAL

This manual was prepared as a stand-alone introduction to the use and care of the HP-94 Handheld Industrial Computer. It can be used in its entirety, or any or all or portions of it can be incorporated in customer-developed documentation prepared for specific applications. (Be aware that some sections refer to information in other sections, however.) The manual was designed primarily for use by the people who actually use the equipment, some of whom may have no prior computer experience. Therefore, wherever possible, computer "jargon" or technical terminology was avoided; where not possible or inconvenient, a definition of the terminology used was included in a glossary. Some of the information covered will be of concern to other than end users; for example, personnel who are responsible for application programming of the HP-94 will need to know how to install a ROM or EPROM card. System administrators will need to know how to connect the HP-94 to external devices. Additional details may often be found in the HP-94 System Development System documentation or the device documentation. The following topics are covered:

- Getting acquainted with your HP-94
- Accessories
- Precautionary measures
- Some basic operations
- How to use the keyboard
- How to remove and install the main battery
- How to charge the main battery
- How to remove and install the memory-backup batteries
- How to install a memory card
- How to install ROM and EPROM ICs in a ROM/EPROM card
- The 128K field service upgrade
- How to install the carrying strap
- How to install the earphone
- How to use a bar-code reader
- How to connect external devices
- What to do if an error message is displayed
- The level converter
- The HP-94 external-device connector
- Equipment specifications
- A glossary
- RFI and air safety notices
- Limited warranty information

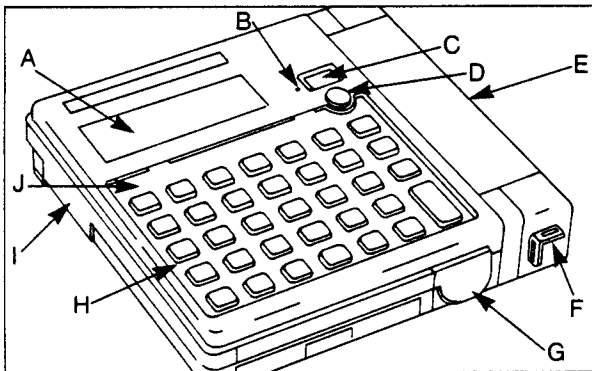
A word of caution... In order to be in compliance in the U.S. with government regulations, you should include the information on the potential for radio interference. You will probably also want to include the precautionary measures information. Otherwise, you are free to choose what you wish to use.

INTRODUCTION

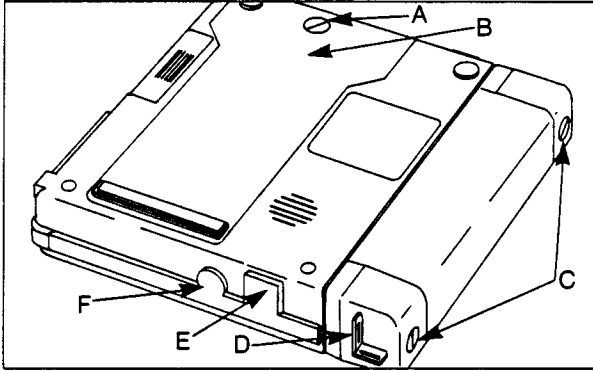
This manual contains the information needed to use and maintain the HP-94 Handheld Industrial Computer. Detailed information concerning the use of optional accessories and external devices is contained in the HP-82520A Software Development System and in the instruction manuals for the particular equipment.

GETTING ACQUAINTED WITH YOUR HP-94

The HP-94 is a small, battery-powered handheld computer designed for fast, accurate data collection and processing. Weighing less than two pounds, it can easily be carried with you wherever you need it. Data can be entered into the HP-94 from the keyboard, by scanning bar-code labels with a bar-code wand, or from another computer. Since it is programmable, the computer can be customized to meet your specific needs. Data can be read and changed if necessary as it is entered, and the computer can be instructed to request you to correct inaccurate entries. The display backlight makes the display easy to read even in dark places. Special batteries enable the computer to retain the data you have entered into it even when the power is turned off or the main battery is removed. Study the pictures below, and familiarize yourself with the location of the controls, connectors, and other features of your HP-94.



- A - Display
- B - Reset button
- C - ON/OFF switch
- D - Display contrast control
- E - Main battery
- F - Carrying strap brackets
- G - Bar-code-wand connector
- H - Keyboard
- I - External device connector
- J - Keyboard overlay



- A - Back-cover retaining screw
- B - Back cover
- C - Main-battery retaining screws
- D - Carrying strap brackets
- E - Recharger connector
- F - Earphone jack

Three models of the HP-94 are available depending upon your need for memory:

- The HP-94D with 64K bytes of built-in memory.
- The HP-94E with 128K bytes of built-in memory.
- The HP-94F with 256K bytes of built-in memory.

The following memory-expansion options are available to you:

Model	Memory Option
HP-94D	EITHER a 40K-byte RAM card, OR a ROM/EPROM card (128K bytes of ROM or EPROM)
HP-94E	EITHER a 40K-byte RAM card, OR a ROM/EPROM card (128K bytes of ROM or EPROM) OR a 128K-byte RAM memory board (must be installed at a service center).
HP-94F	Maximum capacity. No additional memory can be added.

If you are not experienced with computers, you may wish to refer now to the glossary to acquaint yourself with the computer terminology used in this manual.

ACCESSORIES

The following accessories may be used with your HP-94 computer:

- The HP 82431A Recharger (used to recharge the main battery).
- The HP 39961D HP Smart Wand Low Resolution (used to read bar-code labels).
- The HP 39963D HP Smart Wand General Purpose (used to read bar-code labels).
- The HP 39965D HP Smart Wand High Resolution (used to read bar-code labels).
- The HP 82470A RS-232C Level Converter (used to adapt the system-development computer for use with RS-232C devices).
- The HP 82411A 40K RAM Card (used to expand the computer's memory).
- The HP 82412A ROM/EPROM Card (used to expand the computer's memory).
- The HP 82433A Cable (HP-94 to a Modem).
- The HP 82434A Cable (HP-94 to a Printer).
- The HP 82435A Cable (HP-94 to the Level Converter).
- The HP 82436A Cable (HP-94 to the Vectra).
- The HP 24542G Cable (IBM PC/AT to the Level Converter).
- The HP 17255D Cable (IBM PC or PC/XT to the Level Converter-2 meters).
- The HP 82974D Cable (IBM PC or PC/XT to the Level Converter-3 meters).
- The HP 13242H Cable (IBM PC or PC/XT to the Level Converter-5 meters).
- The HP 82430A Battery (spare battery pack).
- The earphone (used to listen to the beeper's audible note when the computer is used in noisy surroundings). *

* Not available from Hewlett-Packard.

For the cable between the level converter and other external devices, you may select other appropriate HP cables, or you may build your own. Refer to the level converter specification in this manual.

Before using your HP 82431A Recharger, you should be aware of the following precautions:

CAUTION Do not charge the battery for more than sixteen hours at a time. The life of the battery may be reduced if you do.

If your battery is low, you can operate your HP-94 by plugging in the recharger. However, do not leave the recharger connected to the HP-94 after you have fully recharged the battery. To do so, may reduce the life of your battery.

Use only the HP 82431A Recharger, or Hewlett-Packard-identified equivalent, with the HP-94.

Do not modify the recharger or use it with any other equipment.

The recharger is non-repairable. If it develops loose power contacts or if it fails to charge batteries, it must be replaced.

PRECAUTIONARY MEASURES

Before using your HP-94 computer, you should be aware of the following precautions:

Your computer contains delicate, high precision electronic parts. It should be handled with care; in particular, it should not be dropped or subjected to excessive shocks or vibration.

It is recommended that you do not expose the HP-94 to temperatures and humidities that exceed the specified limits (refer to the equipment-specification section).

When your computer has been exposed to cold outside temperatures and is then brought into a warm room, water droplets may form inside the display. If this occurs, do not use the computer until the moisture has disappeared.

Never touch any of the contacts in the connectors.

A cloth dampened with a small amount of water should be adequate in most cases to clean your computer. Do not use cleaning fluids.

The HP-94 uses a rechargeable Nickel-Cadmium (NiCd) battery. NiCd batteries are generally designed to be recharged approximately 1000 times. To operate the battery safely, you should be aware of the following information:

- The battery should fully recharge in approximately 7 to 13 hours.
- When a message appears in the HP-94 display indicating that the battery is low, you should recharge the battery as soon as possible. In order to prevent the battery from going dead while being used, you may wish to recharge it periodically, for example, overnight when it's not being used.
- When used in ambient temperatures below 10° C (50° F), the battery will require more frequent charging.

WARNING Do not short circuit the main battery terminals. You may be seriously burned if you do.

CAUTION If you recharged your battery and the low-battery error message is immediately displayed again when you turn the HP-94 on, check that the recharger is working. If it is, discard the battery, and replace it with a new one. If the error message is still displayed, you will need to send the HP-94 in for service.

WARNING Dispose of the battery by placing it in a plastic bag or in a shipping container and depositing it in your trash can. Do not incinerate or mutilate it. It may burst or release toxic materials.

SOME BASIC OPERATIONS

Although in actual use your HP-94 is controlled by the application program you have installed, you should be familiar with several basic operations.

- **Turning the power on and off** - Pressing the **ON/OFF** key turns the power on. Generally, your application program will start running automatically after a brief delay when the power is turned on. Pressing the **ON/OFF** key again will turn the power off unless the key has been disabled by the application program to prevent you from turning the power off at the wrong time. The program can also turn off the power automatically after a specified time delay. If the program has not redefined the time delay and no key has been pressed for two minutes, the computer will turn off automatically.

If the power does not turn on, try plugging in a recharger or replacing the main battery with a fully charged battery. The power will not turn on if you are pressing any of the other keys when you press the **ON/OFF** key. (The power will turn on, however, if the **CLEAR** and **ENTER** keys are both pressed at the same time.)

If the HP-94 turns off in the middle of an operation and turns on again briefly and stops again (or will not turn on again) you probably have a low main battery which must be recharged.


The application program may turn the power off at appropriate times to save the main battery. Either the main battery, or if the main battery is low, the memory-backup batteries will work to save your programs and data.

- **Display contrast** - You can adjust the contrast of the characters in the display by pressing your thumb or finger on the contrast-control knob and turning it.
- **Back light** - You can turn on the display back light by pressing the **SHIFT** key and holding it down for one second. Pressing the key again for one second turns the back light off. The back light will turn off automatically after two minutes. It can also be turned off by the application program. (Be aware that the back light places an extra drain on the main battery. Minimizing the use of the back light will extend its useful life, so you may wish not to use it more than absolutely necessary.)
- **Reset** - You can turn the power off as explained above. In the unlikely event that you should ever not be able to turn your computer off, press the reset switch with a toothpick or a straightened paper clip. Be careful not to press too hard. You can feel the switch click.


HOW TO USE THE KEYBOARD


Installing the keyboard overlay. To install the plastic keyboard overlay, first orient it so that the semi-circular cutout on the inlay coincides with the display contrast control. Engage the tabs along the bottom edge of the overlay in the slots in the lip around the bottom of the keyboard. Bend the overlay into a curve so that you can engage the tabs at the top of the overlay in the slots in the lip around the top of the keyboard, and then press the overlay down so that it lies flat on the keyboard.

Entering data. Turn the HP-94 on. If you have an application program called MAIN installed in the computer it will start running after a short delay. A cursor () or (□) may also appear in the display. If the cursor looks like this (□), the alphabetic characters are active; if the cursor looks like this (), the numeric characters are active.

There are 28 keys marked in orange with the letters of the alphabet, an *, and the word SPACE. Use these keys to type letters, *, and spaces into the computer. Note that when you press the key an audible beep will be heard, and the character may appear in the display if the application program allows it to. If you make a mistake, move the cursor to the left by pressing the  key. The incorrect character will disappear, and you can then type in the correct one. You cannot skip over correct characters to get to an incorrect one. If you do not notice a mistake, you will have to back up to the error in order to correct it.

There are 12 keys containing 10 digits, a # sign, and 00, in addition to orange characters. One key contains only a white minus sign, and another key contains only a white decimal point.

When the computer is turned on, the application program will determine which set of characters is active. If the cursor is a (□), the orange characters are active; if the cursor is a (), the white characters are active. To change from one character set to the other, press . (The white minus sign and the white decimal point are active in both character sets.) The characters remain shifted until you press the shift key again.

The key labeled  operates in both character sets to clear the current line of text, the line in which the cursor appears.

As you type in data, earlier lines of characters move up and out the top of the display. Your application program will tell you how to move the lines of characters down in the display if it is possible to do so.

You should be aware that your application program can redefine some of the keys to represent characters other than those printed on the keys.

You now know how to enter data from the keyboard.

HOW TO REMOVE AND INSTALL THE MAIN BATTERY

To remove the main battery, do the following:

1. Use a coin to unscrew the two battery retaining screws. (Make sure the screws are completely disengaged; they should pull out approximately 5/8 inch.)
2. Pull the battery straight out from the computer. (Do not pull the battery off at an angle to the case. You may damage the screw posts if you do.) In so doing, you will disconnect the battery plug.

To install the main battery, do the following:

1. Align the retaining screw posts on the computer with the holes in the battery case. Make sure the male connector on the computer is aligned with the female connector on the battery.
2. Press the battery straight in firmly until it is seated flush up against the computer (the connectors will mate automatically), then tighten the two retaining screws.

HOW TO CHARGE THE MAIN BATTERY

If the warning Error 200 appears in the display, or the computer turns off during an operation and won't turn on again (or won't stay on), you need to recharge the main battery. To do this, connect the recharger to an ac power source, and then plug the recharger into the recharger connector. The battery will immediately begin to recharge. A dead battery should be fully recharged in about 7 to 13 hours.

(You can use the computer when the main battery is removed or dead if the recharger is connected and plugged in.)

The warning message may appear at any time, either when you turn the HP-94 on, or during whatever operation you are performing.

HOW TO REMOVE AND INSTALL THE MEMORY-BACKUP BATTERIES

Small lithium disc batteries are installed in the computer to make sure the computer does not “forget” your program or stored data when the main battery is removed or discharged. If the main battery is kept charged, the memory-backup batteries should give you several years of continuous service; however, they are not rechargeable, so when they die, they must be replaced. When they begin to die, a warning message in the display will remind you to replace the batteries very soon, or you may lose the data in the memory the next time the main battery is discharged.

If the warning Error 210 appears in the display, you should replace the main-memory-backup battery.

If the warning Error 211 appears in the display, you should replace the RAM-card-backup or the memory-board-backup battery.

NOTE The 210 and 211 warning messages will appear only when you turn on the HP-94.

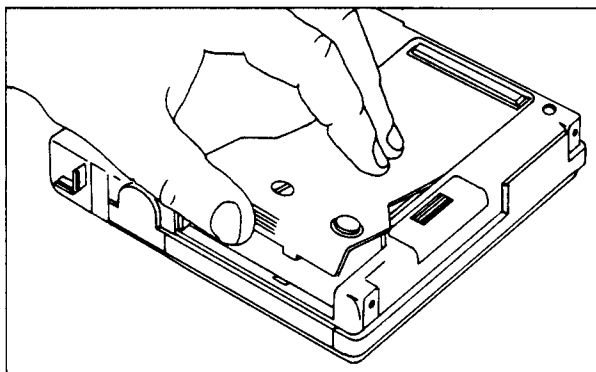
If either of the above warnings appears in the display, you may wish to connect the computer to a recharger as soon as possible; if the main battery goes dead while the backup batteries are in a low condition, you might lose all your programs and stored data. (For this reason, you may wish to replace the backup batteries on a periodic basis, say once a year.)

NOTE The main battery must be charged, or a recharger must be plugged into the HP-94 whenever you change the backup batteries, or you will lose the files and programs you have stored in memory.

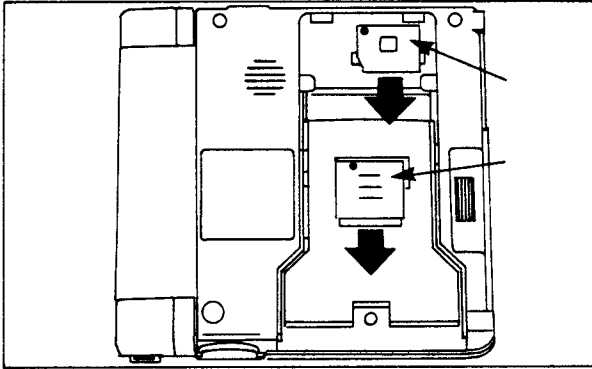
If the 211 warning message is displayed, and you have a RAM card installed, you must leave the RAM card in the HP-94 while you are changing the backup battery. If you remove the RAM card while the backup battery is low, you may lose the contents of the RAM.

To replace the memory backup batteries, do the following:

1. Remove the screw in the back cover on the bottom of the computer, then remove the cover. Do this by placing your thumb on the knurled surface on the front of the cover and your fingers in the middle of the cover. Gently pull up with your thumb; the cover will bend up and snap loose from the case.



2. Remove the small retaining screw in the access cover over the battery you wish to replace. (The picture illustrates the main-memory and the 128-K field-service-upgrade memory-board backup-battery access covers.)

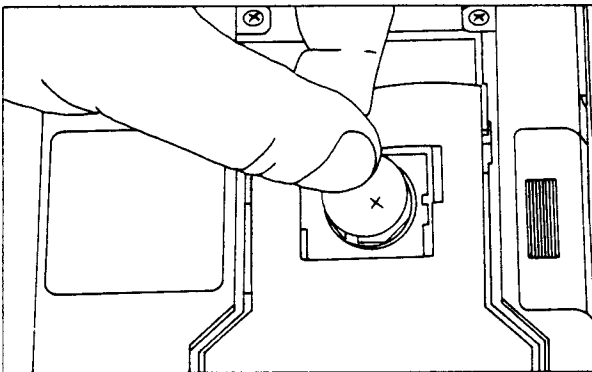


3. Using a finger, slide the battery cover in the direction away from the end with the retaining screw, and lift the cover off.

NOTE

If you are changing the battery in a RAM card, you will have to use a small screwdriver or knife blade to lift up the battery cover from the side that contains the retaining screw. The cover can then be disengaged and lifted off.

4. Remove the disc battery. (You may have to use a small screwdriver to pry it out gently.)
5. Tip the new battery up, and engage one side in the u-shaped spring in the battery cavity; then press the battery down into the battery cavity until it is flush with the surface. Make sure the side of the battery marked with a + is up. Always use a CR 2032, or equivalent, battery.

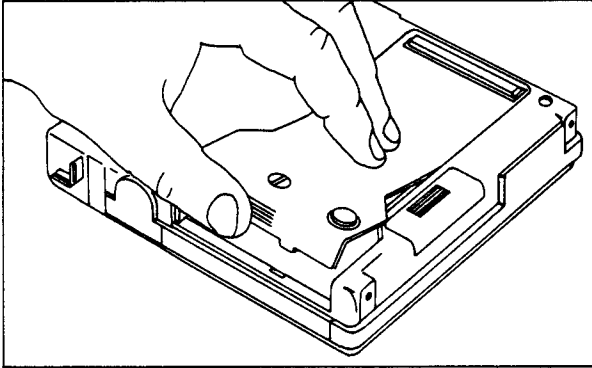


6. Replace the battery access cover. Make sure the cover is engaged properly before screwing it down.
7. Replace the back cover. Do this by engaging the tabs on the narrow end of the cover in the slots in the computer. Then press down along the edges of the cover until it snaps into place, and tighten the cover screw.

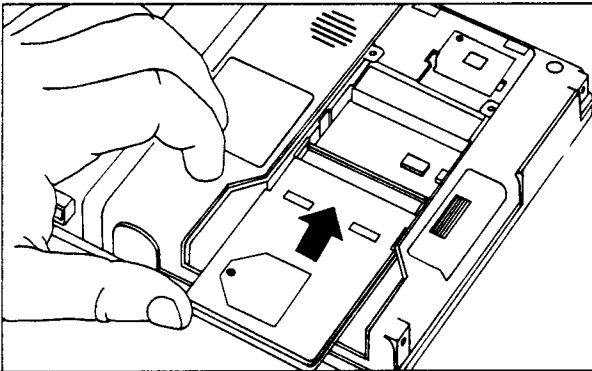
HOW TO INSTALL A MEMORY CARD

If you need to install additional memory, either an HP 82411A RAM card or an HP 82412A ROM/EPROM card, do the following:

1. Make sure the HP-94 is turned off.
2. Remove the screw in the back cover on the bottom of the computer, then remove the cover. Do this by placing your thumb on the knurled surface on the front of the cover and your fingers in the middle of the cover. Gently pull up with your thumb; the cover will bend up and snap loose from the case.



3. Insert the memory card so that the two rails on either side of the opening are engaged in the slots on the sides of card. If the card is a RAM card, make sure the metal battery cover is showing. If the card is a ROM/EPROM card, make sure the side containing the label is showing.

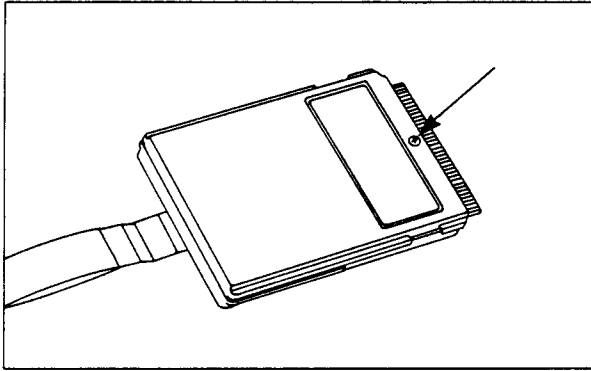


4. Press the card in along the rails until the connector on the card snaps into contact with the connector in the computer.
5. Fold the plastic handle down flat on top of the card making sure it does not interfere with the cover screw.
6. Replace the back cover. Do this by engaging the tabs on the narrow end of the cover in the slots in the computer. Then press down along the edges of the cover until it snaps into place, and tighten the cover screw.

HOW TO INSTALL ROM AND EPROM ICs IN A ROM/EPROM CARD

You can install up to three 256 Kbit (32 Kbyte) ROM or EPROM integrated circuits (ICs) or two 512K-bit (63 Kbyte) ROM or EPROM ICs in a ROM card. You may *not* install 256K-bit *and* 512K-bit ICs at the same time. To install the ICs, do the following:

1. Remove the small retaining screw from the ROM card.



2. Using a small flat-blade screwdriver or a knife blade, pry the two halves of the ROM-card plastic case apart. Do not pry the case too far apart at any one point, but move carefully around the three sides of the case, more than one time if necessary.

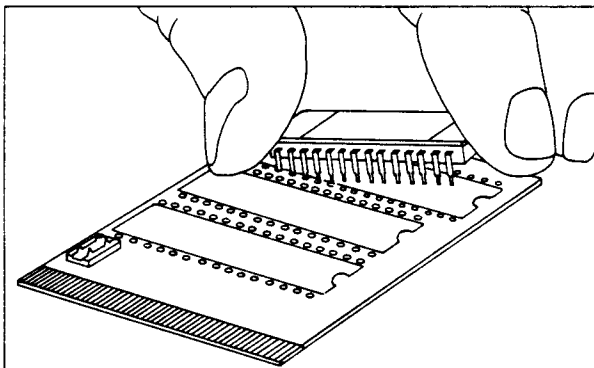
CAUTION To prevent damage from static discharge, be very careful not to touch any of the metal wires coming out of any of the ICs or any of the exposed pins in the card connector. You may destroy the IC if you do.

As an extra precautionary measure, you may wish to use a grounded wrist strap (available at your local electronics store) while you are handling the IC.

You should at least touch an earth ground before opening the case.

3. If you are replacing an IC, remove the original IC by pulling it up off the PCB. (You may need to use a small flat-blade screwdriver or an IC puller to loosen it.)

NOTE The ROMs or EPROMs will be identified as to which sockets they must be installed in on the PCB. If they are not installed in the designated sockets, the programs they contain will not run properly. 256K-bit ROMs or EPROMs may be installed in sockets 1, 2, and/or 3; 512K-bit ROMs or EPROMs may be installed only in sockets 1 and/or 3.



4. With the PCB seated in the bottom of the case, orient the new IC so that the end containing the small half circle is at the same end as in the diagram printed on the PCB. Carefully align the wires coming out of the IC with the holes in the PCB. Gently press down on the IC until it is seated on the PCB as far as it will go.
5. Make sure the jumper is installed on the PCB correctly. To check this, pull the jumper off the PCB. Notice the four white rectangles printed on the PCB between the jumper pin connections. Two of the rectangles are labeled 256, and the other two are labeled 512.
 - If you have installed one, two, or three 256K-bit ROM or EPROM ICs on the PCB, you should install the jumper so that the connections at either end of the labels designated 256 are connected together.
 - If you have installed one or two 512K-bit ROM or EPROM ICs on the PCB, you should install the jumper so that the connections at either end of the labels designated 512 are connected together.
6. Replace the PCA in the bottom of the card case making sure it is seated properly on the two locating pins.
7. Reassemble the card case. Press firmly around the edges until the two halves snap together, then replace the screw.

THE 128K FIELD SERVICE UPGRADE

If you have an HP-94E computer, and you want to increase the built-in memory, you may send your HP-94 to an authorized Hewlett-Packard Service Center to have the 128K field service upgrade installed.

HOW TO INSTALL THE CARRYING STRAP

The strap can be installed across the side of the main battery if you carry the computer in your right hand or underneath the main battery if you carry the computer in your left hand. Just hook the strap onto the appropriate brackets.

HOW TO INSTALL THE EARPHONE

If you are working in a noisy environment, you may wish to use an earphone so you can hear the beeper. Just plug the earphone into the earphone connector; you will then be able to hear the beeper in the earphone. Use a conventional earphone with a 3.5-mm or 1/8-inch plug.

HOW TO USE A BAR-CODE WAND

You can enter data into your computer by using a bar-code wand.

NOTE You must have the proper bar-code-wand application program installed in your HP-94.

Do the following: Plug the bar-code-wand cable into the connector; then follow the instructions in the bar-code-wand user documentation and in the application-program on how to operate the wand.

HOW TO CONNECT EXTERNAL DEVICES

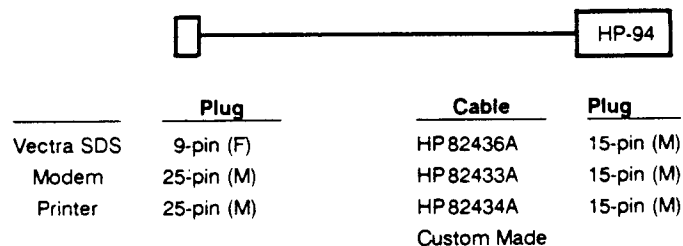
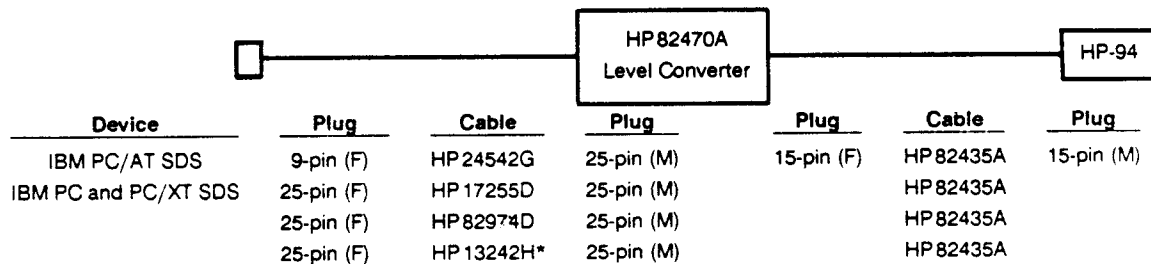
The voltage levels at the external-device connector in the HP-94 are 0 to 5V. These levels may not work with the device you are using. If they do not, you will need to install a level converter between the HP-94 and the device. Refer to the section on level converters for further information.

If you are using a Vectra PC, you will need an HP 82436A cable to connect the computer to the HP-94. Refer to the interconnection diagram below to determine your cable requirements.

Depending upon what computer or external device you are using, you may have to use other cables than those indicated. Refer to the sections on the level converter and the external-device connector to determine your cable requirements. (You may find an existing HP cable to meet your needs, or you can build your own cable.)

If you wish to use the HP-94 for data communications outside the U.S., you will need to use a level converter.

Interconnection Diagram



F - Female

M - Male

* - Use only if 5-meter length is required.

WHAT TO DO IF AN ERROR MESSAGE IS DISPLAYED

If an error message, **Error** *nnn* or *mm* (where *nnn* is a three-digit decimal number and *mm* are two alpha characters), is displayed in the HP-94, consult the following table for the recommended action:

Error Number	Explanation and Action
101	You have an illegal character. Try again.
102	You have an invalid directory number. Try again.
200	Your main battery is low. Recharge it as soon as possible.
210	Your main-memory backup battery is low. Have it replaced as soon as possible.
211	The backup battery for your 128K field-upgrade memory or for your plug-in memory card is low. Have it replaced as soon as possible.
All other errors	Report the number to your supervisor.

For any other errors, refer to appendix A in the utilities reference manual.

NOTE	If the beeper turns on continuously when the HP-94 is turned on, or if Error followed by eight characters is displayed at turn on while the beeper beeps continuously, your HP-94 requires servicing.
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THE LEVEL CONVERTER

The voltage levels on the external-device connector pins of the HP-94 are at 0 and +5V levels. If the device with which you wish to use the HP-94 requires +/-9V levels, you will need to connect an HP 82470A RS-232C Level Converter in the cable between the HP-94 and the device. To aid you in using the level converter, the following table lists the signals on the 25-pin female output connector.

Voltage levels at the output connector are +/- 9V.

Pin	Signal	Meaning)
1	GND	Shield ground
2	TxD	Transmitted data - output
3	RxD	Received data - input
4	RTS	Request to send - output
5	CTS	Clear to send - input
6	DSR	Data set ready - input
7	SG	Signal ground
8	DCD	Data carrier detect - input
20	DTR	Data terminal ready - output

If the device you wish to use has an input resistance greater than 3 kilohms and an input low-to-high transition threshold less than 4.2 volts and a high-to-low transition threshold greater than 0.2 volts, you will probably not need to use a level converter. Consult the device documentation or ask the manufacturer for this information.

The following devices can be used *without* a level converter:

HP 2225D ThinkJet Printer

HP 24540A Vectra Serial/Parallel Interface

HP 24541A Vectra Dual Serial Interface

HP PORTABLE computer

HP Portable PLUS computer

Hayes Smartmodem 1200

Black Box COS-4P and COS-8P Code Operated Switch

Black Box TLSI-4 and TLSI-8 Terminal Line Sharing Interface

The maximum length of cable recommended for reliable use without a level converter is three meters. If your cable is longer than three meters, you must use a level converter even though the device you are using does not require one.

THE EXTERNAL-DEVICE CONNECTOR

To aid you in designing your own interconnection cables, the following table lists shows the signals on the 15-pin external device connector in the HP-94.

Pin	Signal	Meaning)
1	GND	Shield ground
2	TxD	Transmitted data - output
3	RxD	Received data - input
4	RTS	Request to send - output
5	CTS	Clear to send - input
6	DSR	Data set ready - input
7	SG	Signal ground
8	DCD	Data carrier detect - input
9	SWVcc	Switched Vcc
10	Vrch	Recharger input
11	Gnd	Recharger ground
15	DTR	Data terminal ready - output

EQUIPMENT SPECIFICATIONS

Dimensions Power Requirements

- Batteries: Rechargeable nickel-cadmium
- Battery voltage: 4.8 Vdc nominal

Operating Requirements

- Operating temperature: Operating temperature: 0° to 55° C (32° to 131° F)
- Storage temperature: -40° to 65° C (-40° to 149° F)
- Humidity: Humidity: 0 to 95 relative.

Display (Liquid-crystal)

- Character font: Character font: 5X8 dot matrix.
- Capacity: Capacity: 4 lines.
- Window size: Window size: 20 characters per line.
- Character set: Character set: Roman 8, 256 characters.

Character Range A-Z, a-z, 0-9, European characters, and punctuation, plus 16 user-defined characters.

Dynamic Range

1. Real precision: 1.0E-64 to 1.0E63
2. Significant digits: 14
3. Integer precision: -32,768 to 32,767
4. Variable types: Integer, real, string, numeric and string arrays (up to 255 dimensions with a maximum of 64K bytes per array)

Clocks and Timers Perpetual real-time clock calendar.

Beeper Programmable with parameters for high or low tones and varying durations (0.1 to 25.5 seconds).

Redefinable Keys 16

Multiple File Structure

- Maximum number of files: 63 to 189 depending on the memory configuration
- File types: BASIC, data, device driver, keyword extension *ROM/RAM*
- Built-in operating system ROM: 32K bytes.
- Built-in user RAM: 64K, 128K, or 256K bytes.
- User-installed options with 64K or 128K bytes built in: A 40K-byte RAM card or a maximum of 128K bytes of ROM or EPROM.
- Service upgrade with 128K bytes of RAM built in: One additional 128K-byte memory board can be installed.

- Maximum system RAM: 256K bytes
- Maximum capacity (RAM plus ROM or EPROM): 256K bytes

Built-In Interfaces

- RS-232C: Asynchronous up to 9600 baud, 0 to Vcc 15-pin D-type female connector
- Bar code: 0 to Vcc signal levels, 5-pin DIN female connector

Communication Capability With RS-232C Devices Having The Following Characteristics:

- Transmission mode: serial, asynchronous, full duplex
Handshake: XON/XOFF or none
- Baud rate: 150 to 9600
- Data bits: 7 or 8
- Stop bits: 1 or 2
Parity: Even, odd, or none
- Start bits: 1

GLOSSARY

Application Program. The application program contains the instructions that tell the computer and the user what to do. It may be contained in a memory card that you install in the HP-94, or you may download it from an external computer into the HP-94.

Bar-Code Wand. The bar-code wand is a device resembling a thick marking pen that you use to “read” the black-and-white stripes of a bar-code label.

Cursor. The cursor is the blinking () or (□) in the HP-94 display that shows you where the next character will appear when you type it in.

Data. Data is information, such as an application program or inventory quantities, that you type into the computer or read from the computer.

EPROM. See Memory Cards.

Level Converter. A device installed in the cable between the HP-94 and an external device to enable them to work together.

Memory Batteries. The memory batteries are special very-long-life batteries that permit the computer to retain the data you have put into its memory even when the main battery is discharged or removed.

Memory Cards. Memory cards are of two types: ROM (read-only memory) provides memory storage space for instructions for a specific purpose. For example, an application program and the operational control system for your computer could each be designed and built into ROM cards at the factory. An EPROM (erasable-programable read-only memory) enables a software developer to install a program or data into a ROM card.

RAM (Random-access memory) provides storage space for your use when you enter data into your computer. The more RAM you have installed in your computer, the more data you can store.

Printed-Circuit Assembly. The printed-circuit board and the electrical parts mounted on it.

Printed-Circuit Board. The epoxy-glass board on which the electrical parts are mounted.

ROM. See Memory Cards.

System Administrator. The person responsible for supervising the use of the HP-94 and associated equipment by the end users.

POTENTIAL FOR RADIO FREQUENCY INTERFERENCE

(for U.S.A. only)

Your HP-94 generates and uses radio-frequency energy and may cause interference to radio and television reception. Although the HP-94 has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation, there is no guarantee that interference will not occur in a particular installation or configuration. In the unlikely event that there is interference to radio or television reception (which can be determined by turning the HP-94 off and on), you are encouraged to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the product with respect to the receiver.

If the interference is experienced when the HP-94 is operated with a recharger plugged in, plug the recharger into another ac outlet so that the recharger and the receiver are on different branch circuits.

NOTE

Hewlett-Packard is not responsible for any radio or television interference caused by unauthorized modifications to this equipment. It is the user's responsibility to correct such interference.

If necessary, you should consult your field representative 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 Number 004-000-00345-4. At the first printing of this manual, the telephone number was (202) 783-3238.

AIR SAFETY NOTICE

This product has been tested and qualified to the requirements of RTCA (Radio Technical Commission for Aeronautics) Docket 160B, Section 21 and has been found to comply with those requirements. Many airlines permit the use of portable computers in flight based on such a qualification. However, before boarding a flight, check with an airline representative on the carrier's policy regarding use of portable computers in flight.

Limited One-Year Warranty

What We Will Do

The HP-94 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 otherwise transfer ownership of it, 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.

For More Information

If you have questions about this warranty, please contact Hewlett-Packard at one of the following locations.

In the United States.

Call (503) 757-2002 or write to:

Hewlett-Packard Co.
Calculator Service Center
1030 N.E. Circle Blvd.
Corvallis, OR 97330

In Europe.

Call (022) 83 81 11 or write to:

Hewlett-Packard S.A.
150, route du Nant-d'Avril
P.O. Box 1217 Meyrin 2
Geneva
Switzerland

NOTE Do *not* send units to this address for repair.

In Other Countries.

Call (415) 857-1501 in the U.S.A. or write to

Hewlett-Packard Intercontinental
3495 Deer Creek Rd.
Palo Alto, California 94304
U.S.A.

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 serviced 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.

NOTE Before sending in your unit for service, be sure to save any data you have in memory that you do not wish to lose; all memory is lost during the repair procedures.
(Transfer the data to your system computer or to another HP-94.)

Obtaining Repair Service in the United States

For service in the United States, ship your unit to:

Hewlett-Packard Company
Calculator Service Center
1030 N.E. Circle Blvd.
Corvallis, Oregon 97330, U.S.A.

or mail it to:

Hewlett-Packard Company
Calculator Service Center
P.O. Box 999
Corvallis, Oregon 97339, U.S.A.

The telephone number for the Calculator Service Center is (503) 757-2002

Obtaining Repair Service in Europe

Service centers are maintained at the following locations. For information on service in these countries, contact the service center. In countries not listed, contact the sales representative from whom 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 Birkerød (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

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 Charge There is a standard service charge for out-of-warranty service. The charge includes 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.

HP-94s damaged by accident or misuse are not covered by the fixed service charges. In these situations, service charges will be individually determined based on time and materials.

Service Warranty

Any out-of-warranty service is 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 description of the problem.
- A sales receipt or other proof of purchase date if the one-year warranty has not expired.

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

Further Information

Service contracts for many Hewlett Packard calculator and computer products are available. For information about service contracts, please contact the Calculator Service Center in Corvallis, Oregon, USA.

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.



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