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Introduction to the HP-86B

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HEWLETT PACKARD

Introduction to the HP-86B

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Section 1

Your HP-86 Computing System

Introduction

If you've just purchased your HP-86 or if you've never had the opportunity to operate a Hewlett-Packard Series 80 Personal Computer, you should read all or portions of this manual before you start reading the *HP-86/87 Operating and BASIC Programming Manual.* The *Introduction to the HP-86B* manual provides you with step-by-step instructions for setting up your computer system and presents an overview of the HP-86's powerful features.

Sections 2 and 3 include the information you need to properly set up the computer, install various optional modules, and connect peripheral devices. If you are responsible for setting up or altering the configuration of your system, please read sections 2 and 3, carefully following all instructions. As you perform the set-up procedures, pay particular attention to cautions and warnings; they've been provided to protect you and your new computing system from possible harm.

Once your system has been set up, you'll be ready to start learning about the HP-86 by using it. Section 4, Getting Started, is intended to give you "hands on" experience in performing calculations, entering and running programs, and accessing peripheral devices. You'll also have the opportunity to load and run a program provided on the demonstration disc packaged with the computer. Since the HP-86 cannot be harmed by any keyboard operation, you can become familiar with the computer by doing, rather than by merely reading. In some cases, the computer will be your best teacher, informing you when you've made an error and even providing hints on how to remedy your mistake.

After you've completed section 4, you'll be ready for the more in-depth discussion of the HP-86 presented in the *HP-86/87 Operating and BASIC Programming Manual.* Make sure you read the preface of that manual—it includes valuable hints for using the rest of the manual efficiently.

Appendix A of this manual describes the computer's integrated Hewlett-Packard Interface Bus (HP-IB) interface and monitor interface. Refer to appendix A if you need to know more about using those interfaces than is explained in sections 2 and 3.

Appendix B covers compatibility of the HP-86 with other HP Series 80 products. Read appendix B if you will be using the HP-86 to run programs written for other Series 80 computers, or if you have questions about the compatibility of accessories such as ROMs and plug-in modules.

Owner's Documentation

The following literature has been packaged with your HP-86:

- *Introduction to the HP-86B.*
- *HP-86/87 Operating and BASIC Programming Manual.*
- *HP-86/87 Pocket Guide.*
- *HP-86/87 Electronic Disc ROM Owner's Manual.*
- *Fuse Instruction Card.*
- Warranty and Service Information Sheet.
- User's Library literature.
- Informational brochures.

Please take time to examine the Users' Library literature. As the owner of an HP Series 80 Personal Computer, you have the opportunity to gain access to a large number of programs and programming ideas by purchasing programs from the library.

HP-86 Features: An Overview

Most of your owner's documentation is devoted to discussing the computing and programming capabilities of your HP-86. If you are somewhat experienced in programming, however, you might appreciate this list of some HP-86 features:

- Approximately 124K built-in, usuable bytes of computer memory, expandable in increments of 64K and 128K bytes to a maximum of approximately 636K bytes. Programs can contain up to 99999 lines.
- An integrated monitor interface for connecting an HP 82912A Monitor (9-inch), an HP 82913A Monitor (12-inch), or other compatible monitor.
- An integrated HP-IB interface for connecting devices such as printers, plotters, and disc drive units to the computer.
- Easy-to-use screen editing that includes cursor control and editing keys for replacing, inserting, and deleting characters anywhere on the screen.
- Four variable types: simple numeric, simple string, numeric array, and string array. Arrays can be one- or two-dimensional.
- Three numeric precisions: `INTEGER`, `SHORT`, and `REAL` (full).
- Multicharacter variable names.
- Multicharacter line labels that allow you to reference program lines by name in branching statements.
- Multiparameter user-defined functions.
- Fourteen user-defined keys used to provide program control and typing aids.
- Multiple binary programs: a maximum of five binary programs can be present simultaneously in computer memory.

- Four ports used to add additional interfaces and enhancement features to the system.
- 16K bytes of CRT memory with variable apportionment of memory between the alpha and graphics display. At power-on, CRT memory provides 54 scrollable, 80-character lines and a 400 × 240-dot graphics display.
- Alpha display formatting that includes variable page size (16 or 24 lines per screen), an inverse video character set, and three line drawing characters.
- Powerful program trace operations for debugging, including an immediate execute key for initiating or cancelling a trace operation while a program is running.
- Built-in Electronic Disc ROM, which allows you to designate part of RAM as a high-speed mass storage device. For more information, refer to the HP-86/87 *Electronic Disc ROM Owner's Manual.*

Section 2

Owner's Information

This section covers information you should know about your HP-86 before you begin setting up your computing system. You should become thoroughly familiar with the information in this section before you proceed to operate your HP-86 or connect peripheral devices to the computer.

Section 2 covers:

- Unpacking and inspection.
- Power supply information.
- Description of the computer's rear panel.
- Selecting a workspace.
- Initial set-up instructions.
- Connecting a monitor.
- Installation of plug-in modules.

After you have read the material in this section, you'll be ready to connect your disc drive unit, printer, and other peripheral devices to the computer and to get your system working for you. Section 3, Connecting Peripherals, gives you step-by-step instructions for connecting peripheral devices with the integrated HP-IB interface.

Inspection Procedure

Your HP-86 computer was thoroughly inspected before it was shipped and should be ready to operate as soon as you've completed the set-up procedure. Notify your dealer and file a claim with any carriers involved if you discover any damage to the computer.

Please check to ensure that you have received all of the standard items included with the HP-86:

- Owner's documentation (refer to page 6 for a list of items).
- Demonstration disc.
- Power cord.
- HP-IB Interface cable.
- Video cable.
- Fuses and fuse cap holders.
- Series 80 three-ring binder and dividers.
- One preprinted and one blank keyboard overlay.

If any items are missing, please contact the dealer from whom you purchased the computer. If the computer was purchased directly from Hewlett-Packard, please contact the sales and service facility through which you placed your order.

Physical Specifications

Dimensions

Width	42 cm (16.5 in.).
Depth	46 cm (18 in.).
Height	13 cm (5 in.).

Weight

33 kg (15 lb).

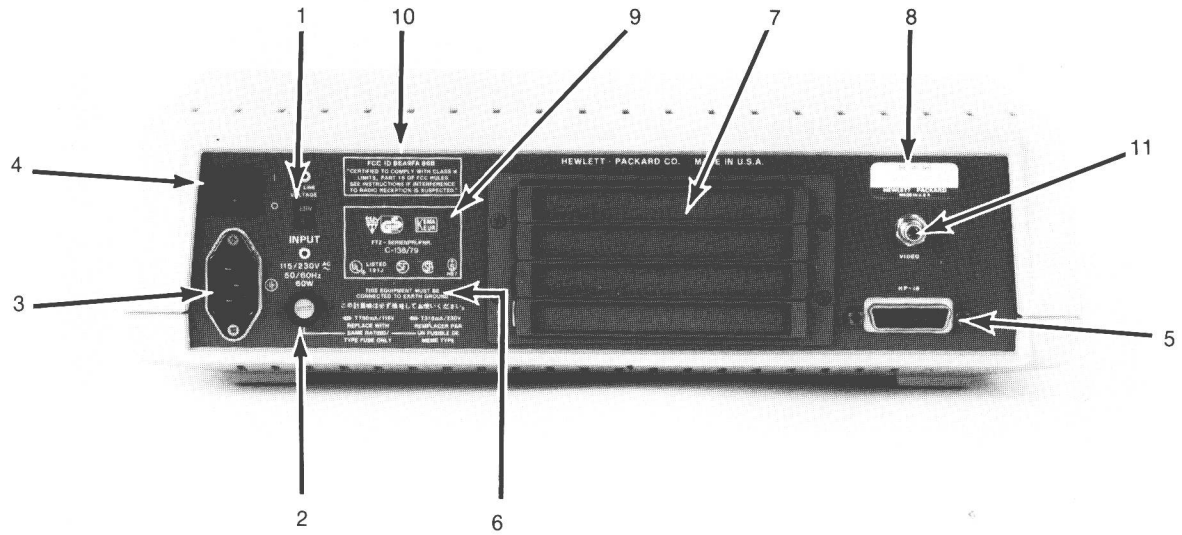
Temperature Ranges

Operating	0° to 55°C (32° to 131°F).
Storage	−40° to 55°C (−40° to 131°F).

Rear Panel

An understanding of the rear panel layout and features of your HP-86 is essential for safe and efficient operation. Use the photograph below to locate the following features:

1. Line Voltage Selector Switch.
2. Fuse Receptacle.
3. Power Cord Receptacle.
4. ON/OFF Switch.
5. HP-IB Cable Receptacle.
6. Ground Information.
7. Module Ports and Covers.
8. Serial Number Plate.
9. Worldwide Safety Approval Nomenclature.
10. RFI (Radio Frequency Interference) Compliance Statement (applicable in U.S.A. only).
11. VIDEO Jack.



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Power Cords, Voltage, and Fuses

The following information relates to the computer's power supply.

Power Requirements

The HP-86 has the following power requirements:

AC Line Voltage

115 Vac Setting	110/117 Vac Nominal
230 Vac Setting	220/240 Vac Nominal

Line Frequency

50 to 60 Hz

Power Consumption

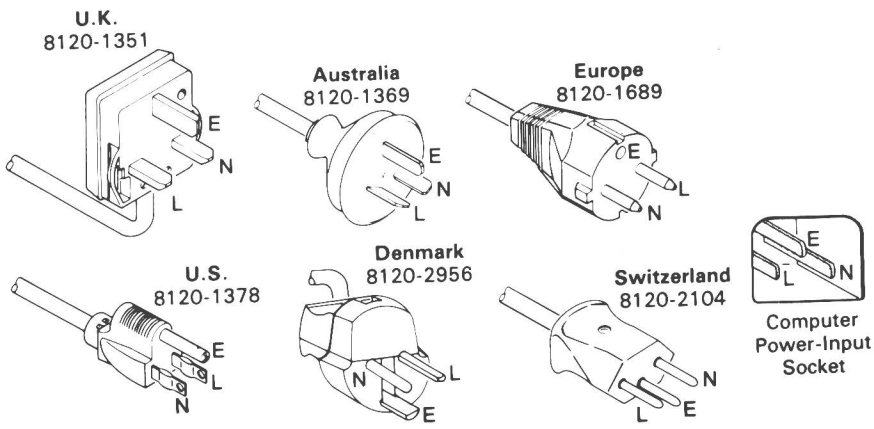
60 Watts Maximum

Power Cords

Power cords supplied by HP have polarities matched to the power cord receptacle on the machine, as shown below.

- L = Line or Active Conductor (also called "line" or "hot").
- N = Neutral or Identified Conductor.
- E = Earth Ground.

Power cords with different plugs are available for the HP-86. The part number of each cord is shown below. Refer to appendix A of the *HP-86/87 Operating and BASIC Programming Manual* for ordering information.



Each plug has a ground connector. The cord packaged with the machine depends upon where the machine was delivered. If your equipment has the wrong power cord for your area, please contact your local authorized HP Series 80 dealer or HP sales and service facility for information on obtaining the proper cord.

Grounding Requirements

To protect operating personnel, the National Electrical Manufacturers' Association (NEMA) recommends that all class 1 equipment be properly grounded. The HP-86 is equipped with a three-conductor power cable which, when connected to an appropriate power receptacle, grounds the machine. To preserve this protection feature, do not operate the machine from a power outlet that has no earth ground connection.

Fuses

For 110/117 Vac Operation:

When the voltage selector switch is set to 115V, use a 750 mA fuse.

For 220/240 Vac Operation:

When the voltage selector switch is set to 230V, use a T315 mA fuse.

Additional Fuses can be ordered from Hewlett-Packard.

750 mA	HP part number 2110-0360
T315 mA	HP part number 2110-0639

Selecting a Workspace

The computer is designed to operate on a flat, hard surface such as a desk or table top. Any workspace you choose should allow the following minimum clearance for adequate air circulation.

Both sides:	15 cm (6 in.).
Rear panel:	15 cm (6 in.).
Overhead:	Allow 15 cm (6 in.) between the monitor and any top enclosure.

To ensure that the air circulation vents in the bottom case are not blocked, avoid placing papers or other items under the computer.

The maximum load that can be placed on the top case is 6.8 kg (15 lb). Equipment placed on top of the computer must not obstruct all the air circulation vents.

CAUTION

To avoid possible damage to equipment, ensure that any item placed on top of the computer provides adequate overhead clearance and does not exceed the top case maximum load or block all the air circulation vents.

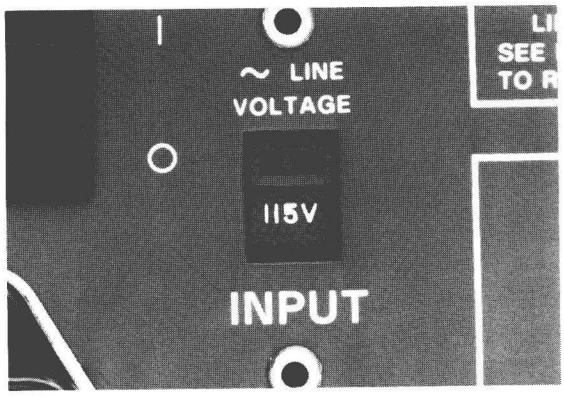
Initial Set-Up Instructions

If you have not already done so, please read the preceding pages of this section before continuing.

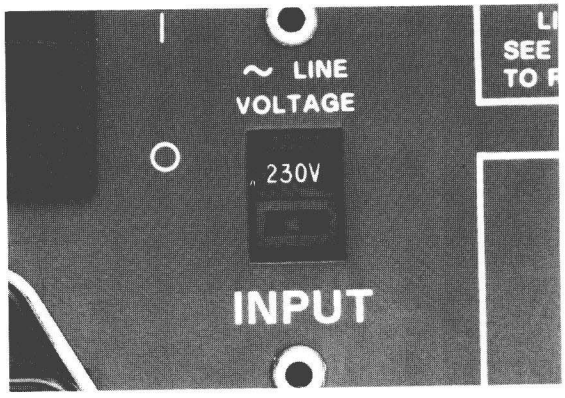
1. Make sure the power cord is disconnected and that the ON/OFF switch is set to OFF (setting **0**; the red "0" on the switch will be visible).

> **WARNING**
>
> Check the voltage selector switch before applying power. Damage to the computer will occur if the selector switch is set to 115 volts ac and 230 volts ac is applied to the power receptacle.
>
> To avoid the possibility of injury, always disconnect the computer from any ac power source before setting the voltage selector switch.

2. Ensure that the voltage selector switch is set for the nominal line voltage in your area. The computer is shipped with the voltage selector switch in the 230V position. If it is necessary to alter the setting of the voltage selector switch, insert the tip of a small screwdriver into the slot on the switch. Slide the switch so that the position of the slot corresponds to the desired voltage as shown below.



Voltage selector switch in 115V position.



Voltage selector switch in 230V position.

> **WARNING**
>
> Before installing or removing a fuse, make sure the computer is disconnected from the ac power source. Otherwise, a chance of electrical shock to personnel exists, and the new fuse might be immediately overloaded.

3. Install the appropriate fuse. A 750 mA fuse is required for 115 Vac operation; a T315 mA fuse is required for 230 Vac operation. To install or replace the fuse, first disconnect the power cord from the machine. Insert the proper fuse in the fuse cap holder; either end of the fuse can be inserted into the cap. Now, install the fuse and fuse cap into the fuse receptacle by pressing the cap inward and then turning it clockwise until it locks in place.

WARNING

Use only the HP-86 power cord specified by Hewlett-Packard for your area. If it is necessary to replace the power cord, the replacement cord must have the same polarity as the original. Otherwise, a safety hazard from electrical shock might exist, and the equipment could be extensively damaged.

4. Connect the power cord to the power cord receptacle on the back of the computer. Plug the other end of the cord into the ac power outlet.
5. Set the computer ON/OFF switch to ON (setting **1**). The amber power light below the keyboard should come on. If the power light is not on, set the ON/OFF switch to OFF and check to see that you've performed steps 2 through 4 correctly. If the power light still fails to come on, the computer requires servicing.

Connecting a Display Monitor

If you've purchased an HP 82912A Monitor or HP 82913A Monitor, you are ready to start the installation procedure. If you will be connecting a different monitor, you should check to be certain the monitor is compatible with the HP-86:

- Compare the monitor's technical specifications with the specifications of the monitor interface on page 53.
- If you intend to stack the monitor on top of the computer, make certain the weight of the monitor does not exceed the weight specification of the computer's top case (6.8 kg, 15 lb) and that the monitor does not block the circulation vents.

The HP-86 allows you to connect multiple monitors. Connecting more than one monitor is discussed in section 3.

To connect a monitor:

1. Set the computer power switch to OFF. Also, turn the monitor power switch to the OFF position.

CAUTION

To prevent possible damage to equipment, set the power switches on both the monitor and the computer to OFF before connecting the monitor to the computer.

2. Place the monitor in its operating position, either on top of or beside the HP-86.
3. Plug the monitor power cord into the power receptacle on the monitor and into an appropriate ac power source.

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4. If the monitor controls include a switch for changing the impedance, set the impedance to 75Ω.
5. Attach one end of the video cable to the monitor VIDEO jack on the back of the HP-86. Attach the other end of the video cable to the VIDEO input jack on the monitor.

Turn on the computer and monitor. Within 12 seconds, a cursor (rectangular block) should appear in the upper left corner of the display. When the cursor appears on the screen, the HP-86 is ready for use. If the cursor fails to appear or if it is too pale or too bright, adjust the monitor brightness and contrast controls.

Each time the power is turned on, the system performs a self-test. Should the cursor not appear, or if the computer displays `Error 23: SELF TEST`, turn the machine off, then on again. If the problem persists, contact your local authorized HP-86 dealer or the nearest HP sales and service facility.

> **Note:** The length of time required by the computer to complete the power-on self-test depends on the amount of user-available memory present. For example, with four HP 82909A 128K Memory Modules installed, the cursor appears approximately 35 seconds after the power is turned on.

If you will be using your HP-86 without any optional plug-in modules, then you are now ready to begin connecting peripheral devices, following the instructions in section 3. However, if your system includes any plug-in modules (e.g., memory modules, ROM drawer, interface modules), read the remaining material in this section.

Installing and Removing Plug-In Modules

The four module ports on the rear of the computer are designed to accept a number of plug-in modules. The ports are numbered 1 through 4 from top to bottom. Before shipping, each port is covered with a removable protective cover. It is recommended that ports not in use be kept covered.

WARNING

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

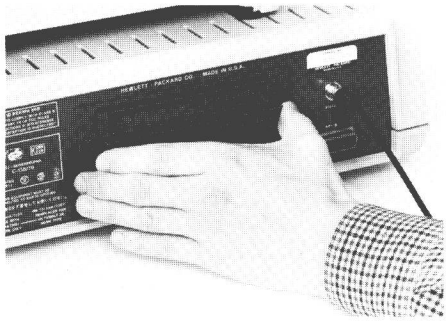
Plug-in modules can be installed or removed as often as you'd like.

It is important that you read all the documentation accompanying each module for instructions, warnings, and any limitations. Each interface module has a factory preset select code in the range 3 through 10. If you will be installing any optional interface modules, make certain each interface module has its own unique select code and that no interface module has a select code of 7, the select code of the integrated HP-IB interface. Instructions for changing the select code of interface modules are provided in the documentation accompanying each interface.

1. Turn off the computer and any connected peripheral devices. However, make sure the computer is plugged into a grounded (three-wire) ac outlet.

> **Note:** Most plug-in modules can be inserted into any of the four ports. However, examine the documentation included with each module for any instructions regarding the use of a specific plug-in port. If it is intended that a module fit into a particular port, it must be inserted into that port.

2. Remove the protective cover from any one of the unused ports, keeping the remaining unused ports covered. You do not need to remove any previously-installed modules.

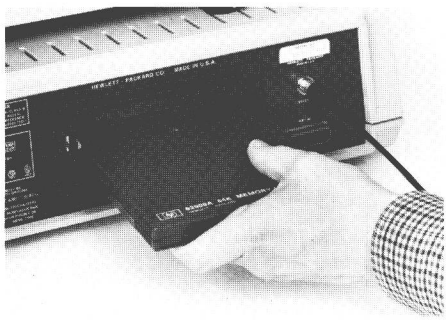


CAUTION

To ensure proper computer operation and to prevent damage to equipment:

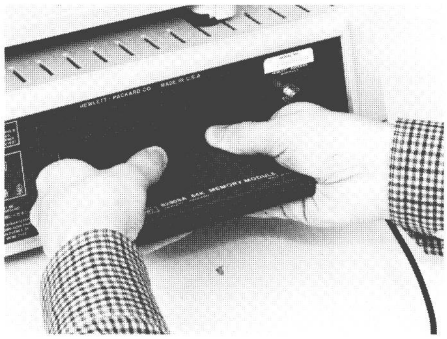
- Always switch off the computer and all peripherals before inserting or removing modules. Use only plug-in modules approved by Hewlett-Packard for the HP-86.
- Do not force a module into a port. The port tracks are keyed to prevent the module from being inserted upside down. Forcing an upside down module into a port could result in damage to the module and/or the computer.

3. Line up the module with the port opening and gently slide the module into the port. When you feel a small amount of resistance, firmly press the module into the port until the module grips meet the side of the port. A slight side-to-side motion may be necessary to seat the module in the port.



To remove a plug-in module:

1. Turn off the computer and any connected peripherals.
2. Firmly grasp the module and pull it from the port. Side-to-side motion may be necessary to dislodge the module. When not in use, modules should be stored in their original container or in a box where they are protected from damage.
3. Replace the port cover.



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