

# Series 80 Personal Computers

**hp** HEWLETT  
PACKARD





# **Hewlett-Packard Series 80 Personal Computers**

## **Introduction**

When technical professionals look for a personal computer, they look for a computer that is adaptable to their style of work. They also look for a computer that is expandable. The HP Series 80 is their solution.

Perhaps one of the most attractive features of HP Series 80 personal computers is their ability to be used as instrument controllers or data acquisition devices. With powerful and complete I/O solutions, the HP Series 80 personal computers are adaptable to almost any occupation or workstyle.

Professionals also look for a computer from a company that stands behind their product, and a company that will still be standing behind their product years after the sale. For over forty years, Hewlett-Packard has stood for excellence.

All the assistance you'll ever need is available through HP. Toll-free telephone numbers, training courses, maintenance services, software support, and many other support functions are available when you invest in a Hewlett-Packard personal computer. With HP dealers and offices located around the world, you're never far from help.





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# Hewlett-Packard

## Series 80 Personal Computers

### Powertools For Your Mind

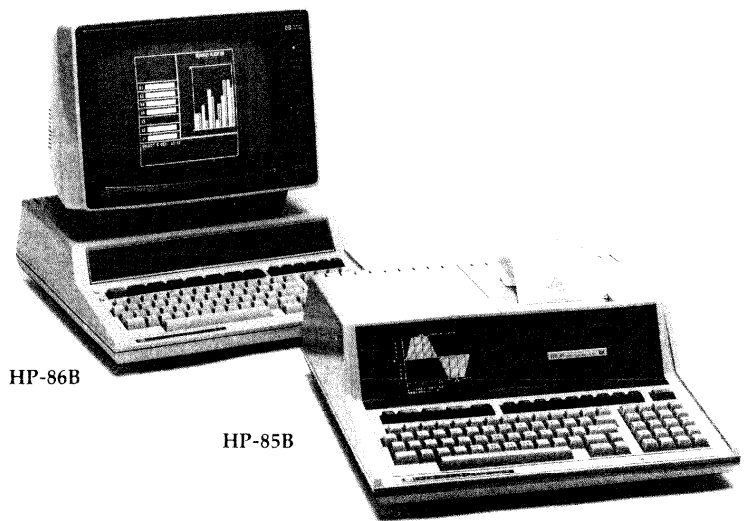
The Series 80 personal computers from Hewlett-Packard come in two models, the HP-85B, and the HP-86B. Both are designed to be used as analytical computing tools, system controllers, and office partners. Both utilize a ROM-based operating system and enhanced HP-BASIC (a superset of ANSI BASIC) with up to 350 commands and statements. With a built-in monitor, tape-drive, and printer, the HP-85B offers an integrated answer to today's technical professional's needs. A more modular system is available in the HP-86B so that you can design the system to best meet your needs.

For the technical professional who needs an integrated system to do analysis, testing or instrument control, the HP-85B is the logical choice. The HP-85B features an integral thermal printer, custom CPU, 32K bytes of built-in RAM, tape-drive mass storage, and Electronic Disc high-speed mass storage. Additional built-in features include an I/O ROM that gives you a universal set of 45 input/output commands and functions, as well as Mass Storage ROMs that let you use flexible and Winchester disc drives.

The other member of the Series 80 family, the HP-86B, was designed for the professional who needs a modular system that can be tailored to fit spacial, financial, and performance requirements. The HP-86B offers lots of memory, a choice of display screens, multiple operating systems, and a broad range of software. You can choose from a selection of components, including two monitors, eight disc drives, eleven printers, six plotters and five data communications pacs. CP/M and UCSD p-System are available in addition to the standard Enhanced HP-BASIC. A choice of local language keyboards is also available for the HP-86B.

Software solutions abound for the Series 80 personal computer user. You can choose from the general-purpose business software selection offering electronic spreadsheets, graphics, word-processing, and data base management, or you can select some of the vertical solutions tailored to your industry from real estate to chemical engineering to surveying. Whatever your needs, Series 80 has the software solution for you.

Whether as an office partner, system controller or analytical computing tool, the HP Series 80 Personal Computers offer just about everything a technical professional might need from a computer.



HP-86B

HP-85B

### Hewlett-Packard Personal Computer Comparison Chart

COMPUTER	HP-85B	HP-86B	HP 150	HP 216
Orientation	Technical professionals who want control applications and measuring capabilities in an integrated system.	Technical professionals who want to program their own applications, and need the productivity software.	Business professionals who want industry standard software and an easy-to-use, friendly system.	Technical professionals who want a high-powered computer, for complex operations.
Features	Integrated system, transportable	Modular system, local language keyboards.	Touchscreen, battery back-up for system configuration and real time clock	Rotary control knob, high-speed, high-powered microprocessor
Operating System	Enhanced HP BASIC	Enhanced HP BASIC	MS-DOS 2.0	Enhanced HP BASIC HP Pascal
CPU	HP Custom (8 bit)	HP Custom (8 bit)	Intel 8088 (16 bit)	Motorola MC68000 (16/32 bit)
User Memory standard maximum	32K bytes 32K bytes	128K bytes 640K bytes	256K bytes 640K bytes	512K bytes 768K bytes
Electronic Disc	32K bytes, expandable to 544K bytes	96K bytes, expandable to 608K bytes	Not Available	Not Available
Display	5" Diagonal, 32x16 lines, 192x256 dots	9" or 12" Diagonal, 80x16 or 24 lines, 400 or 544x240 dots	9" Diagonal, 80x27 lines, 512x390 dots	9" Diagonal, 80x25 lines, 400x300 dots
Built-in Interfaces	None	HP-IB, video	HP-IB, 2 RS-232	HP-IB, RS-232
Data Communications w/Timeshare services	Optional	Optional	Built-in	Optional
w/Terminal Emulation	Not Available	Optional	Built-in	Optional
w/IBM Terminal Emulation	Not Available	Available through third party	Optional	Optional
Keyboard	Attached, typewriter style	Attached, typewriter style	Detached, typewriter style	Detached, typewriter style
Disc Drives Supported	9121S/D, 82901M, 82902M, 9133V*, 9133V Opt. 004, 9133XV**, 9134XV**	9121S/D, 82901M, 82902M, 9133V*, 9133V Opt. 004, 9133XV**, 9134XV**	9121D, 82901M, 9133V, 9133XV†, 9134XV†	9121S/D, 82901M, 82902M, 9133V, 9133XV†, 9134XV†
Programming Languages Available	HP BASIC Assembly	HP BASIC Assembly Pascal FORTRAN-77	HP BASIC FORTRAN-77	HP BASIC Assembly Pascal FORTRAN-77 Multi-FORTH C

\* Does not support CP/M

\*\* Available only in 10Mb capacity (Option 010) for Series 80. Does not support CP/M or p-System.

† 15Mb Winchester and 15Mb Combination Winchester disc drives with 3½" microfloppy disc drives.

# Hewlett-Packard Series 80 HP-85B Personal Computer



HP-85B

If you need an instrument controller, then Hewlett-Packard's HP-85B is for you. It's an ideal low-cost computer for data acquisition, computer-aided testing, and technical analysis.

Designed with the needs of the technical professional in mind, the HP-85B integrates a sculpted keyboard and numeric keypad, CRT screen, thermal printer, and tape-drive unit into one rugged 20-pound package. Use it anywhere from the lab to the field, and every place in between.

## Easy Interfaces

To best serve your needs, the HP-85B comes with a wide selection of interfaces designed as plug-in expansion modules. Simply insert them into the back of your HP-85B. There is no need to open the top case or add confusing cables. The I/O command set allows the user to run most of the interfaces without using different commands and functions for each one. There is no better selection offered by any other single vendor.

## Expandable Memory

The HP-85B has 32K bytes of directly-addressable user read/write memory. Another 32K bytes, called Electronic Disc memory, are indirectly addressable through mass storage commands. The Electronic Disc memory is dramatically expandable to 544K bytes by using any combination of 64K or 128K plug-in memory modules.

## Electronic Disc

In theory, Electronic Disc acts as a high-speed disc drive. Execution speeds of software such as Graphics Presentations, General Statistics and Regression Analysis are greatly increased using Electronic Disc. The speeds of data transfer or program loading and chaining in Electronic Disc are up to 150 times faster than tape, and up to 15 times faster than flexible disc. However, because data resides in volatile RAM, it will be lost when the power is turned

Features	Benefits
<ul style="list-style-type: none"> <li>• System Integration</li> </ul>	<p><i>Saves space</i>—Includes keyboard, mass storage, Electronic Disc, printer, and CRT for alpha and graphics needs, in one 20-lb. package—a total low-cost hardware solution for both technical analysis and instrument control.</p>
<ul style="list-style-type: none"> <li>• Powerful HP BASIC Programming Language</li> <li>• Integrated Graphics Capability</li> </ul>	<p><i>Saves time</i>—Lets you write programs quickly by using fewer statements.</p> <p><i>Makes graphics programming easier</i>—Graphics commands are built right into the computer's BASIC language.</p>
<ul style="list-style-type: none"> <li>• Built-in I/O ROM</li> </ul>	<p><i>Enhances operating system</i>—Provides universal set of 45 input/output commands and functions.</p>
<ul style="list-style-type: none"> <li>• Built-in Electronic Disc</li> <li>• Built-in Mass Storage and Electronic Disc ROM Set</li> </ul>	<p><i>Enhances operating system</i>—Lets you use Electronic Disc memory, as well as flexible, 5M byte and 10M byte Winchester disc drives.</p>
<ul style="list-style-type: none"> <li>• Four Expansion Ports</li> </ul>	<p><i>Saves money</i>—You don't need to purchase the Series 80 ROM Drawer, Mass Storage ROM, or Electronic Disc ROM.</p>
<ul style="list-style-type: none"> <li>• Eight User-definable Softkeys</li> </ul>	<p><i>Provide expandability</i>—Let you add on instruments, additional printers, plotters, mass storage units, ROM's, Electronic Disc memory, or even a modem.</p>
<ul style="list-style-type: none"> <li>• Hard-copy Printer</li> </ul>	<p><i>Make it easy to write and understand programs</i>—Give you more control by letting you define subroutines within program execution.</p> <p><i>Saves money and space</i>—No extra printer is needed for many applications.</p> <p><i>Gives you on-the-spot hard copies</i>—Provides hard copy of reports, program listings, data, and graphics.</p>

off, so you'll need to back up the contents of Electronic Disc to tape or disc before turning the computer off.

## ROM-Based Operating System

The HP-85B runs the powerful and friendly HP-BASIC operating system, which consists of 220 built-in command

statements expandable to 350 statements with enhancement ROMs. Even better performance is possible using the built-in Mass Storage/Electronic Disc ROM set. This ROM set adds features such as "GET" and "SAVE" commands, which are designed to improve program



transportability, and commands which let you address mass storage devices and the Electronic Disc.

With all of its hardware and software capabilities, the HP-85B is the perfect tool for the technical professional.

## Specifications

### Unique to the HP-85B

(See Tables A and B on pp. 10-12 for programming specifications.)

#### CRT DISPLAY

Size	12.7 cm (5 in.) diagonal
Capacity:	
Alphanumeric	16 lines × 32 characters
Graphics	192 × 256 dots
Scrolling capacity	64 lines
Character set	256 characters; set of 128 + same set underscored
Character font	5- × 7-dot matrix
Intensity	adjustable
Cursor	underline

#### BASIC LANGUAGE AND OPERATING SYSTEM

Standard ROM	56K bytes
Maximum add-on ROM	48K bytes
CRT memory RAM	8K bytes
Optional built-in I/O ROM	8K bytes

#### USER READ/WRITE MEMORY

Standard/Maximum	32K bytes
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#### ELECTRONIC DISC MEMORY

Standard	32K bytes
Maximum	544K bytes
Transfer rate:	
Program LOAD (allocated)	46,000 bytes/sec
Program LOAD (deallocated)	17,000 bytes/sec
Data file (maximum)	13,000 bytes/sec
Data file (minimum)	540 bytes/sec

#### TOTAL MEMORY

Standard	120K bytes
Maximum	640K bytes

#### TAPE CARTRIDGE

Capacity:	
Data	210K bytes
Programs	195K bytes
File management	by name, up to 42 files
Read/write speed	254 mm/sec (10 in./sec)
Search speed	7,800 bytes/sec (1,524 mm/sec or 60 in./sec)
Transfer rate:	
Program LOAD	610 bytes/sec
Data file	80 bytes/sec
Average access time	9.3 sec

Rewind time	29 sec (end to end)
Tape length	43 m (140 ft)
Cartridge size	61.2 × 80.9 × 11.9 mm (2.41 × 3.18 × 0.47 in.)
Security	programmable and mechanical

**NOTE:** Tape cartridges are intended for nominal program or data storage; the typical life cycle is 50 to 100 hours of use, depending on the application. Environmental conditions of 25°C (77°F) and 20% to 50% relative humidity are most favorable for a long tape life. Tape life is decreased by a high-duty cycle (percent of time the tape is accessed during the total time the HP-85B is in use) and continuous use for long periods of time (longer than one-half hour). It is suggested that tape transports be regularly cleaned and cartridges removed from drives after use.

#### PRINTER

Imprinting method	moving head, thermal
Paper width	108 mm (4.3 in.)
Speed	120 lines/min
Character font	5- × 7-dot matrix; 32 characters/line

Graphics resolution	2.63 dots/mm (67 dots/in.)
Intensity	adjustable

#### OPERATING REQUIREMENTS

Line voltage	115 Vac nominal (90-127 Vac), 230 Vac nominal (200-254 Vac), switch selectable
Frequency	50-60 Hz
Power consumption	40 watts nominal
Operating temperature	5° to 40°C (40° to 105°F)
Storage temperature	-40° to 65°C (-40° to 150°F)
Humidity	5% to 80% at 40°C

#### SIZE AND WEIGHT

Height	15.9 cm (6.3 in.)
Width	41.9 cm (16.5 in.)
Depth	45.2 cm (17.8 in.)
Weight:	
Net	9.1 kg (20 lbs)
Shipping	16.8 kg (37 lbs)

## BASIC FUNCTIONS AND STATEMENTS

### Mass Storage/Electronic Disc Statements

The built-in Mass Storage/Electronic Disc ROM set provides the statements required to control the tape cartridge, Electronic Disc memory, and external flexible and Winchester disc drives.

(See Table A)

### I/O ROM STATEMENTS

The I/O ROM, built into the HP-85B, provides basic input/output capabilities including ENTER/OUTPUT with format control, status testing, and base conversion. The I/O ROM also provides advanced input/output capabilities, including interface control, vectored interrupt, buffered I/O, fast handshake transfer, data conversion and formatting, and keyboard masking. See page 41 for a list of I/O ROM BASIC statements.

## Ordering Information

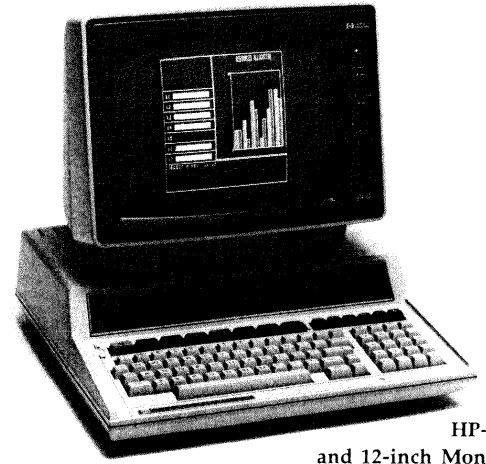
HP Part Numbers:

- HP-85B

Product Includes:

- Owner's Manual and Programming Guide
- Pocket Guide
- Standard Pac, including:
  - Instruction Manual
  - Preprogrammed Tape Cartridge
- Registration Card
- Service Card
- Accessory Data Sheet
- Users' Library Flyer
- Roll of Thermal Printer Paper
- Power Cord
- Fuses and Fuse Cap Holders
- Three-Ring Binder and Dividers

# Hewlett-Packard HP-86B Personal Computer



HP-86B  
and 12-inch Monitor

If you want the friendliness, programming, and interfacing power of the HP-85B, but need a more expandable system, then the HP-86B is the computer you've been looking for. The HP-86B is the perfect office-mate for the technical professional who needs an adaptable system. The HP-86B offers you a choice of three operating systems, HP-BASIC, CP/M and UCSD p-System, that can open personal productivity and vertical solutions software doors to meet your every need, from accounting to waveform analysis. An HP-IB Interface is built right into the HP-86B. Thus you can hook up to as many as 14 HP-IB-compatible peripherals and instruments per interface.

## Electronic Disc

To increase the speed of data or program transfer on the HP-86B, Electronic Disc has been incorporated. Electronic Disc on the HP-86B can address up to 96K bytes of built-in RAM, and up to 512K bytes of add-on RAM.

## Enhanced Programmability

The programmability of the HP-86B includes several enhancements over the HP-85B. Multi-character variable names, indented program lines, line labels, and multi-parameter defined functions improve the programmability of the HP-86B. Additionally, up to five binary programs resident in memory simultaneously, redefinable typing-aid keys, true string arrays, and a built-in, full graphics command set make the HP-86B a powerful programming computer.

### Features

- Powerful HP BASIC Programming Language
- Integrated Graphics Capability
- Modular System
- Expandable Memory
- 14 Built-in Softkeys
- Built-in HP-IB Interface
- Built-in Electronic Disc ROM
- Optional Local Language Keyboards

### Benefits

- Saves time*—Lets you write programs quickly by using fewer statements.
- Makes graphics programming easier*—Graphics commands are built right into the computer's BASIC language.
- Increases your flexibility*—Build the system that meets your needs now. Then, modify it if your needs change later.
- Gives you extensive computing power*—Provides 128K bytes that's expandable to 640K bytes to handle complex analyses, reports, and problems.
- Make it easy to write programs*—Let you define subroutines within program execution.
- Saves money*—Eliminates the need to purchase a separate HP-IB Interface.
- Enhances system expandability*—Lets you connect your computer to as many as 14 peripherals or instruments without using an expansion port.
- Saves time*—Provides high-speed mass storage performance.
- Let you communicate in your own language*—Optional keyboards are laid out in standard typewriter style for each language.

## Local-Language Keyboards

Ten local-language keyboards are available with the HP-86B. The keyboard layouts match local typewriter keyboards so you'll feel right at home. Characters appear on the screen and on

the printer in the local language, right down to the umlaut, grave or other accent marks. All current HP printers support local-character printing with the HP-86B. In addition, some software has been translated for use with local-language keyboards.

## Specifications

### Unique to the HP-86B

(Also see Tables A and C on pp. 10-13 for programming specifications.)

### SYSTEM REQUIREMENTS

- Peripherals
  - HP 82912A 9-inch Monitor, or
  - HP 82913A 12-inch Monitor
  - HP Disc Drive
  - Printer for hard-copy output

### CRT DISPLAY

NOTE: Monitor must be purchased separately.

#### Capacity:

Alphanumeric ..... 16 or 24 lines (variable) × 80 characters  
 Graphics ..... 400 or 544 (variable) × 240 dots

#### Scrolling capacity:

Mixed mode ..... 54 lines  
 All alpha mode ..... 204 lines  
 Character set ..... 256 characters; set of 128 with or without inverse video

Character font ..... 5- × 7-dot matrix  
 Intensity ..... adjustable  
 Cursor ..... inverse video

### BASIC LANGUAGE AND OPERATING SYSTEM (bytes)

Standard ROM	56K
Maximum add-on ROM	48K
CRT memory RAM	16K
Optional Local Language ROM	8K

### USER READ/WRITE MEMORY (bytes)

Standard	128K
Maximum	640K

### TOTAL MEMORY (bytes)

Standard	200K*
Maximum	712K*

### ELECTRONIC DISC MEMORY (bytes)

Maximum user memory that can be allocated as Electronic Disc memory	96K
Maximum add-on	512K
Maximum total	608K

### ELECTRONIC DISC TRANSFER RATES (bytes/sec)

Program LOAD (allocated)	46,000
Program LOAD (deallocated)	17,000
Data file (maximum)	13,000
Data file (minimum)	540

### BUILT-IN INTERFACES

Monitor  
 HP-IB

### ELECTRONIC DISC ROM

Provides statements that control Electronic Disc memory plus external flexible and Winchester (including 10M byte) disc drives.

### OPERATING REQUIREMENTS

Line voltage	115 Vac nominal (90-127 Vac), 230 Vac nominal (200-254 Vac), switch selectable
Frequency	50-60 Hz
Power consumption	18 watts nominal

Operating temperature	0° to 55°C (32° to 131°F)
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Storage temperature	-40° to 55°C (-40° to 131°F)
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Humidity	5% to 80% at 40°C
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### SIZE AND WEIGHT

Height	13 cm (5 in.)
Width	42 cm (16.5 in.)
Depth	46 cm (17.8 in.)
Weight:	
Net	6.8 kg (15 lbs)
Shipping	14.1 kg (31 lbs)

## Ordering Information

### HP Part Numbers:

- HP-86B (U.S./U.K. keyboard is standard), or HP-86B with Local Keyboard Option:
 

Opt. 001-Swedish**	Opt. 010-Dutch
Opt. 002-Danish/Norwegian	Opt. 011-Finnish**
Opt. 004-German	Opt. 020-Swiss German
Opt. 006-Spanish	Opt. 021-Swiss French
Opt. 008-French	
Opt. 009-Italian	

### Product Includes:

- HP-86B
- HP-86B Owner's Manual
- Pocket Guide
- HP-IB Cable
- Video Cable
- 2 Fuses and Fuse Instruction Card
- Keyboard Overlays
- Demonstration Disc (5¼" and 3½")
- Service Card
- Users' Library Flyer

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

\*Does not include Local Language ROM.

\*\*Hardware is identical for options 001 and 011.

**TABLE A**  
**Programming Features, Functions**  
**and Statements for All Series 80**  
**Personal Computers**

The following functions and commands are built into the ROM-based operating systems of the HP-85B and HP-86B Personal Computers. For more commands available through optional ROMs, see the ROM section, page 41.

#### DYNAMIC RANGE

Real precision: -9.999999999999E499 to  
-1E-499, 0, 1E-499 to  
9.999999999999E499

Short precision: -9.9999E99 to -1E-99,  
0, 1E-99 to 9.9999E99

Integer precision: -99999 to 99999

Variable types: numeric, string, numeric  
array

#### BUILT-IN FUNCTIONS

Mathematical and trigonometric functions are included in the following table with average execution times in msec.

Absolute (ABS)	0.36
Fractional part (FP)	1.15
Integer part (IP)	2.21
Maximum (MAX)	1.62
Minimum (MIN)	1.72
Modulo (MOD)	2.80
ln (LOG)	20.65
log (LGT)	25.57
e <sup>x</sup> (EXP)	25.97
Raise to power (Y ↑ X)	41.29
Random number (RND)	3.55
Sign (SGN)	0.44
Square root (SQR)	6.93
Sine (SIN)	43.74
Cosine (COS)	43.48
Tangent (TAN)	25.75
Arc sine (ASN)	39.40
Arc cosine (ACS)	39.54
Arc tangent (ATN)	22.81
Cosecant (CSC)	49.43
Secant (SEC)	48.94
Cotangent (COT)	25.72
+	1.32
-	1.37
÷	4.75
*	2.24
Ceiling (CEIL)	2.91
Floor (FLOOR)	3.33

Built-in Operators

Logic: AND, OR, NOT, EXOR

Relational: =, >, <, <=, >=, <> (or #)

#### CLOCK AND TIMERS

Time is maintained as seconds since midnight, along with year and day in year. Three timers can be programmed to generate individual interrupts periodically, at intervals from 0.5 msec to 99,999,999 msec (1.16 days).

#### BEEPER

The beeper is programmable with parameters for duration and tone. The frequency range is approximately 0 to 4,575 Hz.

#### BASIC FUNCTIONS AND STATEMENTS

##### System Functions

ABS—Absolute value of the numeric expression.

ACS—Principal value (1st or 2nd quadrant) of the arc cosine of the numeric expression in the current angular units.

ASN—Principal value (1st or 4th quadrant) of the arc sine of the numeric expression in the current angular units.

ATN—Principal value (1st or 4th quadrant) of the arc tangent of the numeric expression in the current angular units.

ATN2—Arc tangent of Y/X in proper quadrant.

CEIL—Smallest integer greater than or equal to the numeric expression.

COS—Cosine.

COT—Cotangent.

CSC—Cosecant.

DATE—Julian date in the format YYDDD, assuming system timer was set.

DTR—Converts the value of the numeric expression from degrees to radians.

EPS—A constant equal to the smallest positive real precision number, 1E-499.

ERRL—Line number of latest error.

ERRN—Error number of latest error.

EXP—Value of Napierian e raised to the power of the computed expression.

FLOOR—Largest integer less than or equal to the evaluated expression.

FP—Fractional part of the evaluated expression.

INF—A constant equal to the largest real number possible, 9.999999999999E499.

INT—Largest integer less than or equal to the expression (equivalent to FLOOR).

IP—Integer part of the numeric expression.

LGT—Common logarithm (base 10) of a positive numeric expression.

LOG—Natural logarithm (base e) of a positive numeric expression.

MAX—Larger of two values.

MIN—Smaller of two values.

PI—Numerical value of pi.

RMD—Remainder resulting from a division operating according to  $X - (Y * IP(X/Y))$ .

RND—Generates a number that is greater than or equal to zero and less than one, using a predetermined, pseudo-random sequence.

RTD—Converts the value of the numeric expression from radians to degrees.

SEC—Secant.

SGN—Returns a 1 if the expression is positive, -1 if negative, and 0 if exactly 0.

SIN—Sine.

SQR—Square root of a positive numeric expression.

TAN—Tangent.

TIME—Returns the time in seconds since midnight if the timer is set, or since machine turn-on otherwise, resetting automatically after 24 hours.

#### String Functions

CHR5—Converts a numeric value between 0 and 255 into a character corresponding to that value.

LEN—Returns number of characters in a string.

NUM—Returns decimal value corresponding to first character of string expression.

POS—Returns the position of the first character of a substring within another string or 0 if the substring is not found.

UPCS—Converts all lowercase letters in a string to uppercase letters.

VAL—Returns as a numeric value, including exponent, a string of digits so that the value may be used in calculations.

VAL5—Returns the value of a numeric expression as a string of digits.

#### General Statements and Programmable Commands

BEEP—Outputs a tone of specified frequency for a specified duration.

CLEAR—Clears the CRT.

COM—Dimensions and reserves memory so chained programs can access the same data.

CRT IS—Allows the definition of either a printer or the actual CRT as the current CRT.

DATA—Provides constants and text characters for use with READ statements.

DEFAULT ON—Makes numeric overflows, underflows, and the user of uninitialized variables non-fatal by substituting an appropriate approximate value.

DEFAULT OFF—Makes numeric overflows, underflows, and the use of uninitialized variables fatal.

DEF FN—Defines a single- or multiple-line function.

(Table A continued)



DEG—Sets degree mode for evaluation and output of the arguments and results of trigonometric functions.	OFF TIMER#—Cancels any interrupts from a timer set up by an ON TIMER# statement.	CAT—Displays file directory on CRT screen.
DIM—Declares the size and dimensions of array and string variables.	OPTION BASE—Allows specifying lower bound of an array as 1 rather than the default of 0.	CHAIN—Loads a new program from the mass storage device and continues executing while retaining any data in common.
DISP—Outputs values or text on current CRT.	PAUSE—Suspends program execution.	CHECK READ—Performs record-by-record data verification during file read/write operations.
DISP USING—Displays values and text according to format specified by IMAGE statement or literal IMAGE.	PLIST—Lists the program on the PRINTER IS device.	COPY—Copies files or entire storage media.
END—Terminates program execution (same as STOP).	PRINT—Prints values or text on the current PRINTER IS device.	CREATE—Establishes a data file of specified length and record length on mass storage devices.
FLIP—Changes the keyboard from BASIC mode to typewriter mode or vice versa.	PRINT ALL—Sets a mode such that all inputs, messages, and results are printed on the PRINTER IS device.	ERROM—Returns the number of the ROM that issued an error message.
FN END—Terminates a multiple-line function.	PRINT USING—Prints values and text according to format specified by an IMAGE statement or literal IMAGE.	ERRSC—Returns select code of interface module that received an illegal operation.
FOR/NEXT—Defines a program loop and the number of iterations.	PRINTER IS—Defines device for printer output.	GLOAD—Loads the contents of a special extended-type file into the graphics display.
GOSUB—Transfers program control to a subroutine and allows subsequent return of control.	RAD—Sets radian mode for evaluation and output of the arguments and results of trigonometric functions.	GSTORE—Stores the contents of the graphics display onto the mass storage system.
GOTO—Transfers program execution to the specified line.	RANDOMIZE—Re-evaluates random number seed.	INITIALIZE—Clears, tests, and prepares a flexible disc medium for use in the mass storage system.
GRAD—Sets grad mode for evaluation and output of the arguments and results of trigonometric functions.	READ—Assigns values from a DATA statement to the variables specified.	LOAD—Brings into memory a program previously stored on a mass storage device. (Not programmable.)
IF...THEN...ELSE—Allows statements to be either executed or bypassed depending on the outcome of a logical expression.	REAL—Declares full-precision variables as well as the size and dimensions of full-precision arrays.	LOADBIN—Brings binary program into memory.
IMAGE—Specifies the format used with PRINT USING or DISP USING statements.	REM—Declares the subsequent characters as remarks for documentation only.	MASS STORAGE IS—Defines the default mass storage device. Allows use of mass storage ROM commands without specification of a device.
INPUT—Allows entry of values or text from the keyboard during program execution.	RESTORE—Resets data pointer to the start of the specified DATA statement, or the first DATA statement if none is specified.	PACK—Removes null files from the disc system.
INTEGER—Declares variables as integer; gives size and dimensions of integer arrays.	RETURN—Transfers program control back to the statement following a GOSUB.	PRINT#—Records data onto referenced file.
KEY LABEL—Displays, in the lower portion of the CRT, an eight-character prompt for each Special Function Key (softkey) defined by an ON KEY statement. Also returns cursor to upper left corner of the CRT.	SETTIME—Sets the system clock with the parameters of seconds since midnight and Julian day in form YYDDD.	PURGE—Erases the specified file from the file directory, rendering it inaccessible.
LET—Assigns a value to a variable or array element.	SHORT—Declares variables as being short-precision as well as the size and dimensions of short-precision arrays.	READ#—Retrieves data from a specified file.
LIST—Lists the program on the CRT IS device. Also outputs bytes remaining at the end of a program.	STOP—Suspends program execution (same as END).	RENAME—Changes name of an existing file.
NORMAL—Cancels the effect of the PRINT ALL, AUTO, or TRACE statements.	TAB—Used in a DISP or PRINT statement to allow information to be placed at a specified character position.	SECURE—Disallows unauthorized listing, editing, duplicating, or cataloguing of a program.
ON ERROR—Sets up a branch to the specified line or subroutine anytime an error occurs.	TRACE—Traces program logic flow in all or part of a program as specified and prints this information.	STORE—Records a program onto the mass storage device. (Not programmable.)
OFF ERROR—Cancels any ON ERROR statement previously executed.	TRACE ALL—Traces all program logic flow and variable assignments in all or part of a program and prints this information.	STORE BIN—Records a binary program onto the mass storage device.
ON KEY#—Sets up a branch to the specified line or subroutine each time the Special Function Key (softkey) is pressed.	TRACE VAR—Traces all value changes of specified variables and prints information.	TYP—Returns the type of the next datum of a data file.
OFF KEY#—Cancels the branch set up by an ON KEY# statement.	WAIT—Holds program execution for the specified number of milliseconds.	UNSECURE—Allows files previously secured to be listed, edited, duplicated, and catalogued. (Not programmable.)
ON TIMER#—Sets up a branch to the specified line or subroutine on a time-dependent interrupt basis.		

#### Mass Storage Statements

ASSIGN#—Opens a data file by assigning a buffer number to it.

(Table A continued)

VOLUME IS—Established a volume label for a disc medium. Volume labels let you refer to a disc medium by a name that you specify.

#### Electronic Disc Statements

CONFIG—Enables you to reset or define Electronic Disc space and to specify the volume label, directory length, mass storage unit specifier, and the amount of RAM dedicated to Electronic Disc space.  
DISC FREE—Returns the amount of free disc space available and the size of the largest contiguous block available.  
GET—Merges into memory a program that has been saved as an ASCII data file.  
MSI—Short for the MASS STORAGE IS command. When listed, it will appear as MASS STORAGE IS.  
MSUS\$—This string function returns the current mass storage unit specifier.  
SAVE—Converts the program currently in memory into strings and stores them out to a data file.  
SWAP—Chains in the specified file while the program currently in memory is stored out.  
UNCONFIG—Returns to system memory all memory stolen by the Electronic Disc.  
VOL\$—This string function returns the volume label of the specified mass storage unit specifier.

#### Graphics Statements

ALPHA—Puts the CRT into alphanumeric mode.  
BPLOT—Allows plotting any series of dots on the CRT by conversion to an alphanumeric string.

DRAW—Lowers the pen and draws a line from current pen position to a specified destination position.

GCLEAR—Clears all or a specified lower section of the graphics display.  
GRAPH—Sets display to graphics mode.  
IDRAW—Lowers the pen and draws a line of specified incremental length from the present position.

IMOVE—Lifts the pen and moves it an incremental distance from the present position.

LABEL—Allows printing of text in graphics mode.

LDIR—Specifies horizontal or vertical direction of a label.

MOVE—Lifts the pen and moves the cursor to a specified absolute location.

PEN—Sets pen color.

PEN UP—Raises the pen so that plotting is possible without drawing lines between points.

PLOT—Moves to a specific point if pen is up; draws a line to the point if pen is down.

SCALE—Defines the incremental units and range of x and y on the CRT.

XAXIS—Draws a horizontal line of specified length, with or without tic marks, at a specified y-intercept.

YAXIS—Draws a vertical line of specified length, with or without tic marks, at a specified x-intercept.

#### Non-Programmable Commands

AUTO—Allows automatic generation of line numbers during program entry.  
CONT—Allows continuation of a program which has been paused.

DELETE—Deletes program lines specified.  
INIT—Initializes a program by allocating memory for the variables required, and performs a check for certain errors.

REN—Renumbers program lines with specified increments.

RUN—Initializes a program and begins its execution.

SCRATCH—Clears memory of all programs and data.

## TABLE B

### Additional Programming Specifications for HP-85B Personal Computers

#### BASIC FUNCTIONS AND STATEMENTS

##### Mass Storage/Electronic Disc Statements

CTAPE—Conditions the tape by running it to end, then rewinding it to assure smooth operation of the tape.  
ERASETAPE—Initializes a tape by creating a blank directory.  
REWIND—rewinds tape to its beginning point.

#### I/O ROM STATEMENTS

See page 41 for I/O ROM statements built into the HP-85B.

## TABLE C

### Additional Programming Specifications for HP-86B

#### Personal Computers

##### BASIC FUNCTIONS AND STATEMENTS

**FRE**—Returns the amount of available memory; allows a program to adapt itself to memory size.

##### Graphics Statements

**AXES**—Draws a pair of axes with optional tic marks.

**BREAD**—Byte read. Reads the contents of the graphics display into the specified string variable, enabling you to read and store the entire graphics display in one variable.

**CLIP**—Defines plotting boundaries (soft-clips) in current units mode, enabling you to highlight or make windows around specified areas of your graph.

**CSIZE**—Character size. Specifies the height, width-height aspect ratio, and slant of characters used in labels.

**CURSOR**—Stores the values of the current cursor coordinates in the specified variable names.

**DRAW**—Drops the pen and draws to the specified coordinate position.

**FXD**—Establishes the label format for automatic axes labeling with the **LAXES** and **LGRID** statements.

**FRAME**—Draws a box around current plotting area.

**GRAPHICS**—Switches the CRT to graphics mode if it is not already there.

**GRID**—Draws a full-scale grid with optional tic marks on the grid lines.

**IPLOT**—Provides incremental plotting with pen control from the last plotted point.

**LABEL USING**—Used like the **PRINT USING** statement to draw formatted labels on the plotting device. The image format string determines the exact form of the labels.

**LAXES**—Label axes. Draws and labels a pair of axes. Labels are placed outside the plotting area, within the graphic limits, at each major tic mark.

**LGRID**—Label grid. Draws and labels a grid. Labels are placed outside the plotting boundaries, within the graphic limits, on each grid line.

**LIMIT**—Defines the graphic limits beyond which the pen is not allowed to move. When the optional parameters are not included, two corner points of the plotting area can be digitized to define the graphic limits.

**LINEYPE**—Selects one of eight solid or dashed line types.

**LOCATE**—Specifies the plotting boundaries upon which **SCALE** or **SHOW** will map. Lines drawn or plotted in user units will not be allowed to cross the plotting boundaries specified by **LOCATE**. Useful for creating a window for your plot, saving space outside the window for labels.

**LORG**—Label origin. Determines where subsequent labels are drawn relative to the current pen location. Useful for positioning or centering labels.

**MSCALE**—Scales the current plotting area in millimeters.

**PDIR**—Plot direction. Sets the angle of rotation for relative and incremental plotting.

**PLOTTER IS**—Specifies the target of all plotter statements and operations.

**RATIO**—Returns a value equal to the ratio of the physical dimensions of the graphic limits, i.e., the x dimension divided by the y dimension.

**RPLOT**—Relative plot. Enables relative plotting and pen control from the last pen position determined by a statement other than **RPLOT**. The direction may be rotated with the **PDIR** statement.

**SETGU**—Sets graphics units as the current units mode.

**SET I/O**—Enables you to write information directly to the registers in an interface module.

**SETUU**—Sets user units as the current units mode.

**SHOW**—Defines an isotropic scale (one unit of x equals one unit of y) in user units within the plotting boundaries.

**TRANSLATE**—Translates tape-based programs to disc-based programs to allow them to automatically take advantage of the mass storage system.

**UNCLIP**—Sets the plotting boundaries (which are set by **LOCATE** or **CLIP**) equal to the graphic limits.

**WHERE**—Assigns the coordinate values of the last plotted or moved-to point and the pen's up or down status to the specified variables.

##### OTHER ENHANCEMENTS

Indented program lines

Line labels and **GOSUB/GOTO** line labels

Multi-character variable names

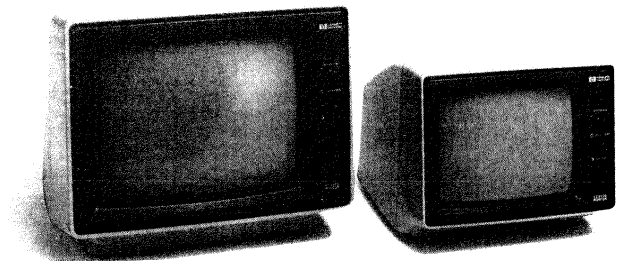
Multi-parameter defined functions

Multiple binary programs (up to five)

Redefinable typing aid keys

String arrays

# Hewlett-Packard Video Monitors



HP 82913A

HP 82912A

## Picture Perfect

When you need a clear, crisp, bright picture of what's important, you have a choice of two monitors from Hewlett-Packard for your HP-86B. Both feature high-resolution video monitors with glare-reducing, etched-surfaced screens, in 9- or 12-inch CRT versions.

A video bandwidth wide enough to display 24 lines of 80 characters without distortion allows you to work on large screen area without losing any crispness of characters. There is also a 1-watt audio amplifier built into the monitor. All this connects to your HP-86B via the built-in interface and video cable that come with your HP-86B.

## Ordering Information

HP Part Numbers:

- HP 82913A 12-inch Monitor (120 Vac standard; 230 Vac Opt. 001) or
- HP 82912A 9-inch Monitor (120 Vac standard; 230 Vac Opt. 001)

Product Includes:

- Monitor
- Instruction Sheet
- Power Cord
- Warranty and Service Sheet

### Specifications

#### HP 82913A 12-inch Monitor

DISPLAY AREA ... 23 × 15 cm  
(9 × 5.8 in.)

#### OPERATING REQUIREMENTS

Line voltage ..... 120 Vac nominal  
(108-132 Vac)

Frequency ..... 60 Hz

Opt. 001 line

voltage ..... 230 Vac nominal  
(207-264 Vac)

Opt. 001

frequency ..... 50-60 Hz

Power

consumption ..... 28 watts nominal

Operating

temperature ..... 0° to 45°C  
(32° to 113°F)

Storage

temperature ..... -40° to 65°C  
(-40° to 149°F)

#### SIZE AND WEIGHT

Height ..... 29.6 cm (11.5 in.)

Width ..... 36 cm (14 in.)

Depth ..... 33 cm (12.8 in.)

Weight:

Net ..... 6.7 kg (14.7 lbs)

Shipping ..... 8.5 kg (18.7 lbs)

### Specifications

#### HP 82912A 9-inch Monitor

DISPLAY AREA ... 16.5 × 11 cm  
(6.4 × 4.3 in.)

#### OPERATING REQUIREMENTS

Line voltage ..... 120 Vac nominal  
(108-132 Vac)

Frequency ..... 60 Hz

Opt. 001 line

voltage ..... 230 Vac nominal  
(207-265 Vac)

Opt. 001

frequency ..... 50-60 Hz

Power

consumption ..... 28 watts nominal

Operating

temperature ..... 0° to 55°C  
(32° to 131°F)

Storage

temperature ..... -40° to 75°C  
(-40° to 167°F)

Humidity ..... 5% to 80% at 40°C

#### SIZE AND WEIGHT

Height ..... 21.8 cm (8.5 in.)

Width ..... 27.0 cm (10.5 in.)

Depth ..... 26.1 cm (10.2 in.)

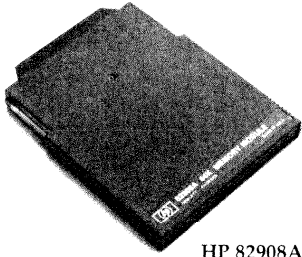
Weight:

Net ..... 4.8 kg (10.6 lbs)

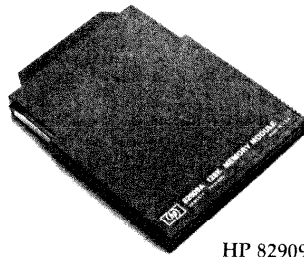
Shipping ..... 6.5 kg (14.3 lbs)



# Hewlett-Packard Memory Modules



HP 82908A



HP 82909A

## Expand Your Hardware's Horizons

Broaden the programming capabilities of your Series 80 personal computer with either a 64K-byte or 128K-byte memory module. Once installed, all operations can immediately and automatically access the added memory. You will find memory modules useful for handling large data requirements or for writing and running long programs needing up to 640K bytes of memory.

The modules are easy to install. Just plug one or more of the 64K or 128K memory modules into the expansion ports in the back of the computer. They can also be designated to serve as Electronic Disc, and can increase the speed and versatility of your Series 80 Personal Computer.

## Ordering Information

HP Part Numbers:

- HP 82908A 64K
- HP 82909A 128K

Product Includes:

- Memory Module
- Instruction Sheet

### Configuration Guidelines

#### MODULES USED AS ADD-ON USER MEMORY

Computer	Compatible Memory Module
HP-85B	—
HP-86B	64K or 128K

**NOTE:** Up to four modules, in any combination of 64K or 128K, can be plugged into the four expansion slots on an HP-86B.

#### MODULES USED AS ELECTRONIC DISC MEMORY

Computer	Compatible Memory Module
HP-85B	64K or 128K
HP-86B	64K or 128K

**NOTE:** Up to four modules, in any combination of 64K or 128K, can be plugged into the four expansion slots on an HP-85B or HP-86B.

# Hewlett-Packard

## Mass Storage

### Save that Thought

Most software available for the HP Series 80 Personal Computers requires a disc drive to load the program and Hewlett-Packard offers you a complete family of disc systems with a wide variety of capacities and configurations to fit your individual needs. For applications demanding quick access to data, you'll appreciate the random-access speed of disc-based storage. You can pinpoint critical disc information quickly whether you select a 3½" flexible disc drive or a high-powered Winchester system. Ranging from 270K bytes to 9.6 M-bytes, the capacities of the Series 80 disc systems are ideal for use with Series 80 software.

### Flexible Discs

Flexible disc systems combine the speed of random access with low-cost and removable media. They are available in either dual (540K bytes) or single (270K bytes) disc versions and come in either 3½" or 5¼" disc versions.

- HP 9121D (dual), 3½"
- HP 9121S (single), 3½"
- HP 82901M (dual), 5¼"
- HP 82902M (single), 5¼"

### Winchester Drives

Winchester disc systems and combination (3½" plus hard disc) Winchester disc drives are for those who run data-intensive applications. HP Winchester mass storage offers high-speed transfer rates, fast random access and large capacities. The combination Winchesters blend the speed and power of a Winchester along with the flexibility of removable media. Besides the Winchester capacity, each combination unit also has 270K bytes in flexible disc. This allows you to back up your Winchester to flexible disc, as well as load new programs, data, and software to your hard disc drive.

- HP 9133V (4.8Mb in one volume plus single 3½" flexible disc drive)
- HP 9133V Option 004 (4.6Mb in four 1.15Mb volumes plus single 3½" flexible disc drive)
- HP 9133XV Option 010 (9.6Mb in one volume plus single 3½" flexible disc drive)
- HP 9134XV Option 010 (9.6Mb in one volume, no flexible disc drive)

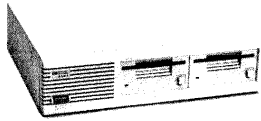
#### Note:

Only the HP 9133V Option 004 combination Winchester disc drive supports CP/M. The other Winchester disc drives do not support CP/M, and the 9.6M Winchesters do not support p-System or CP/M.

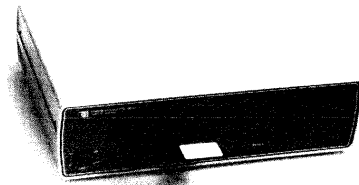
### Microfloppy Advantages

The Hewlett-Packard 3½" flexible disc employs a number of features designed to guard against media damage and contamination. By enclosing the disc in a hard polymer case with an automatic metal shutter, dirt, fingerprints and other contaminants are permanently locked out. A write-protect tab guards against accidental erasure, and the polymer jacket allows users to write directly on the label without damaging the media.

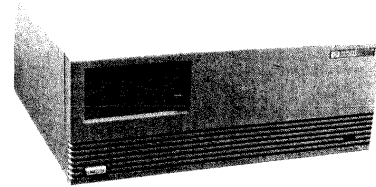
In addition, because the read/write head of all floppy discs come in direct contact with the media, discs eventually wear out. HP has included on all of its 3½" discs a "media monitor" that tracks the life of the media. When the disc has reached the end of its useful life, a light on the disc drive flashes to alert you to replace the microfloppy disc media. This allows you to use the disc to its fullest without worrying about data loss due to wear on the disc.



HP 9121D



HP 82901M



HP 9133XV

### Series 80 Mass Storage Choices

MEDIA SIZE	3 1/2" Flexible Discs	5 1/4" Flexible Discs	5Mbyte Winchester discs	10Mbyte Winchester discs
Disc Drive	9121D, 9121S, 9133V, 9133V Opt. 004, 9133XV Opt. 010	82901M, 82902M	9133V, 9133V Opt. 004	9133XV Opt. 010, 9134XV Opt. 010
Formatted Capacity (bytes per unit)	540K (dual) 270K (single)	540K (dual) 270K (single)	4.6M (Opt. 004) 4.8M	9.6M
Transfer Rates (bytes/second)				
Data File				
HP-85B	410	370	500	500
HP-86B	950	620	1400	1400
Program LOAD				
HP-85B	3250	2700	5700	5700
HP-86B	3500	2900	6200	6200
Average Access Time (milliseconds per unit)	415 (motor on) 1415 (motor off)	187 (motor on) 435 (motor off)	60 (motor on. Opt. 004) 85 (motor on)	85 (motor on)
Protected Media	Yes	No	Yes	HP 9133XV Opt. 010 only
Media Monitor	Yes	No	Yes	HP 9133XV Opt. 010 only
Product Includes	Power cord Owner's Manual	Power cord Owner's Manual	Power cord Owner's Manual	Power cord Owner's Manual

# Hewlett-Packard Printers

## Get the Word Out

When you need to put your thoughts down on paper, you should turn to Hewlett-Packard printers. Hewlett-Packard has a selection of word-processing, graphics and general-purpose printers to meet a variety of different price and performance requirements. Each printer offers a unique combination of size, print quality, speed, flexibility and durability. Why put your thoughts down anywhere else.

### Printers for All Reasons

For the professional who doesn't need letter-quality printing, Hewlett-Packard offers a number of impact and non-impact printers. Non-impact printers offer you quiet, fast copy via ink-jet or thermal printing technology.

### A Printer for Your Thoughts

Think-Jet, the personal printer from Hewlett-Packard gives you 150 characters per second (cps) at less than 50 dB. That's quieter than the inside of a Rolls Royce. It comes in a package smaller than a notebook (93.2 square inches or 0.65 square feet) and weighs only 6½ pounds.

### The Heat Is On

Also in the non-impact category, HP offers three thermal printers to choose from, starting with the entry level, alphanumeric HP 2671A. Add graphics to the HP 2671A and you have the HP 2671G. And, if you want even more sophisticated graphics, you'll want to look at the HP 2673A. The HP 2673A also has additional formatting capabilities and a printer memory that lets you store margins, tabs, and page formats. All three operate at 120 cps to give you fast, clean hard copy.

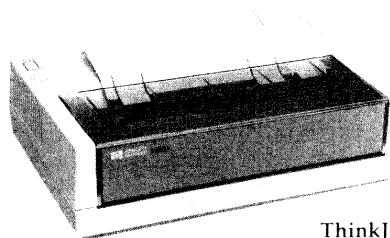
### When You Want Impact

If you need multi-part forms or letter-quality copies, HP offers impact printers in two varieties, dot-matrix and letter-quality. Dot-matrix offers the advantages of high speed and varying character sizes. At the low end, the HP 82905B and the HP 82906A offer data-processing quality type and graphics capabilities at 80 and 160 cps, respectively. As you move higher up the range, you meet the HP 2930 Series printers. The HP 2930 Series printers offer higher speeds (200 cps), and higher quality type ranging from factory data printing to letter-quality office printing.

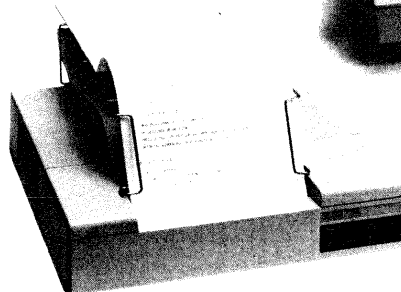
### When Appearance Counts

If your thoughts take the form of letters, then you're going to need a printer that produces full-font characters that look like they have been typed. The HP 2602A and 2601A word-processing printers give you the look of a sophisticated typewriter, and the speed of 25 and 40 characters per second (that's approximately 300 and 480 words per minute), using daisy wheel technology.





ThinkJet



HP 2673A



HP 2602A

## Series 80 Printer Choices

PRINTER	ThinkJet	HP 82905B	HP 82906A	HP 2670 Series	HP 2930 Series	HP 2602A	HP 2601A
Print Method	Dot-matrix Ink-jet	Dot-matrix Impact	Dot-matrix Impact	Dot-matrix Thermal	Dot-matrix Impact	Full-font Impact (Daisy Wheel)	Full-font Impact (Daisy Wheel)
Peak Speed (Characters per second)	150	80	160	120	200	25	40
Characters Per Inch	12, 6 21.3, 10.7 Adjustable	10 Adjustable	10 Adjustable	10	16, 12, 10, 5	10	16, 12, 10, 5
Columns at Default	80	80	80	80	136	132	132
Print Quality	Data processing and memo	Data processing and memo	Data processing and memo	Memo	Data processing, memo, letter	Letter	Letter
Paper Type	Ink jet single or fan-fold	Plain fan-fold	Plain: single sheets or fan-fold	Thermal: roll or fan-fold	Plain: single sheets or fan-fold	Plain: single sheets or fan-fold	Plain: single sheets or fan-fold
Graphics Capability	Yes	Yes	Yes	Yes, 2671G and 2673 only	Yes	No	No
Interface Model Option Numbers							
HP-IB	A	001, 002, 003, 004**	Standard	Standard	046, cable extra	046†	Not Available
HP-IL	B	148, 248, 348, 448**	Not Available	048 for 2671A and 2671G only	Not Available	Not Available	Not Available
RS-232C (Serial)	Not Available	240, 340, 440**	Not Available	040	Standard	Standard	Standard
CENTRONICS (Parallel)	C	142, 242, 342, 442**	Not Available	042	042, cable extra	Not Available	Not Available
Line Voltage Option Numbers							
100 Vac	B (Battery-powered)* A (user-configurable)*	001, 142, 148††	001	Required voltage set at factory	User-configurable	Not Available	016
120 Vac	A (user-configurable), C*	002, 240, 242, 248††	002	Standard	User-configurable	Standard	Standard
220 Vac	A (user-configurable)*	003, 340, 342, 348††	003	Set at factory	User-configurable	015 (must specify option)†	015
240 Vac	A (user-configurable)*	004, 440, 442, 448††	004	Set at factory	User-configurable	017 (must specify option)†	017
Ordering Information							
HP Product Numbers (include option numbers if necessary)	HP 2225A HP 2225B HP 2225C	HP 82905B	HP 82906A	HP 2671A HP 2671G HP 2673A	HP 2932A HP 2933A HP 2934A	HP 2602A	HP 2601A
Product includes power cord, Owner's Manual, plus:	50 sheets ink-jet fan-fold paper, 1 HP Ink-jet print cartridge, battery pack (B only), battery recharger (B only)			HP-IB Interface, Paper rack, One pack fan-fold paper	RS-232C Interface, ribbon, all supported character sets, Courier character style cartridge	10-pitch Daisy Wheel, Multi-strike ribbon cartridge	10-pitch Daisy Wheel, Multi-strike ribbon cartridge, I/O cable

\* HP 2225A is user-configurable, HP 2225B is battery-powered, HP 2225C is 120 Vac only (U.S. version), or user-configurable (international version)

\*\* See Line Voltage Options

† If ordering either the 220 Vac (Opt. 015) or 240 Vac (Opt. 017) for an HP 2602A with the HP-IB interface (Opt. 046), specify both voltage and HP-IB options.

†† See Interface Model Option Numbers

# Hewlett-Packard Plotters

## Say It with Pictures

Have you ever noticed how even the most complicated data is easier to understand in graphic form? Color graphics can help clarify such things as market shares, forecasts, distributions, trends, performance, comparisons, flows, relationships, and production curves. Computer graphics can do all this with crisp, clean, colorful charts, schematics, and illustrations. Today's professionals need professional-looking graphics, and that's why Hewlett-Packard has developed quality plotters.

### Affordable Artistry

To reflect the quality of your work you want to present quality graphics. Hewlett-Packard's HP 7470A and HP 7475A 2- and 6-pen color plotters (respectively) can give you quality commensurate with your work at a price you can afford. Both feature Hewlett-Packard's simple, yet powerful HP-GL (Hewlett-Packard Graphic Language), friendly controls, and automatic pen capping and damping. The HP 7470A offers five character sets including French, German, Scandinavian and Spanish. The HP 7475A offers an extra fourteen character sets, and accepts two paper sizes.

### Performance Pictures

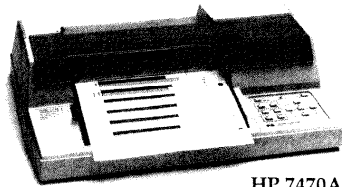
For those who demand high throughput and unattended operation, Hewlett-Packard offers the HP 7550A. This high-performance vector plotter features 8 pens and an integral automatic sheet feeder.

The throughput and output quality of the HP 7550A is noticeably superior to that of any other graphics plotter on the market. It has been designed to serve an entire department or group of users with little attention. The HP 7550A is well suited to applications that require multipage graphic reports or multiple copies of original graphs. Because it offers liquid pens on mylar or vellum, the HP 7550A also has design graphics applications for CAE/CAD.

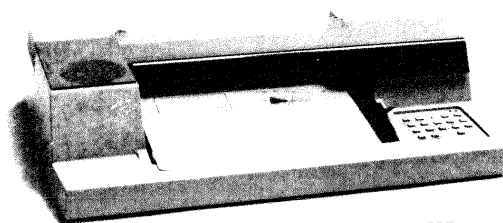
### For the Big Picture

For large format plotting, the HP 7580B, HP 7585B, and HP 7586B drafting plotters are the most cost-effective additions to your system that you are likely to find. With low-inertia drive technology, the three plotters deliver high-speed, high-quality plots with excellent resolution. Productivity is increased because only minimal operator interaction is required.

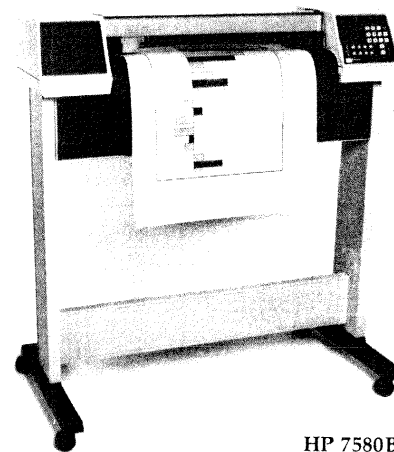
When words alone are not enough, turn to the HP plotters for the right tool for the job. Professional-looking graphics for the professional.



HP 7470A



HP 7475



HP 7580B

### Series 80 Plotter Choices

	HP 7470A	HP 7475A	HP 7550A	HP 7580B HP 7585B	HP 7586B
Number of Pens	2 in individual pen stalls	6 in carousel	8 in carousel	8 in carousel	8 in carousel
Pen Types	Paper, transparency	Paper, transparency	Paper, transparency, liquid-ink, roller-ball	Paper, liquid-ink, roller-ball	Paper, liquid-ink, roller-ball
Media Sizes	A4/A	A4/A, A3/B	A4/A, A3/B	A4/A, A3/B, A2/C, A1/D (A0/E—HP 7585B only)	A4/A, A3/B, A2/C, A1/D, A0/E
Media Types	Paper, transparency film	Paper, transparency film	Paper, transparency film, vellum, polyester film	Paper, vellum, tracing bond, polyester film	Paper, vellum, tracing bond, polyester film
Media Load Methods	Manual sheet loading for above media types	Manual sheet loading for above media types	Automatic sheet feed for paper Manual sheet loading for above media types	Manual sheet loading for above media types	Automatic roll feed for above media types except tracing bond Manual sheet loading for above media types
Resolution					
Addressable	0.025 mm (0.001 in.)	0.025 mm (0.001 in.)	0.025 mm (0.000985 in.)	0.025 mm (0.000984 in.)	0.025 mm (0.000984 in.)
Mechanical	0.025 mm (0.001 in.)	0.025 mm (0.001 in.)	0.006 mm (0.000246 in.)	0.003 mm (0.00012 in.)	0.003 mm (0.00012 in.)
Repeatability (on paper, 10°-30°C)	0.1 mm (0.0004 in.)	0.1 mm (0.0004 in.)	0.1 mm (0.0004 in.)	0.1 mm (0.0004 in.)	0.1 mm (0.0004 in.)
Maximum Velocity (Speed)	38.1 cm/s (15 in./s)	38.1 cm/s (15 in./s)	80 cm/s (31.5 in./s)	60 cm/s (24 in./s)	60 cm/s (24 in./s)
Acceleration	2 g	2 g	6 g	4 g	4 g
Labeling Speed	2-3 cps	2-3 cps	8-10 cps	6-8 cps	6-8 cps
Interfaces	RS-232C (Opt. 001)* HP-IB (Opt. 002) HP-IL (Opt. 003)*	RS-232C (Opt. 001)* HP-IB (Opt. 002)††	RS-232* and HP-IB†	RS-232C* and HP-IB	RS-232C* and HP-IB†
Ordering Information (Option shown recommended for use with Series 80)	HP 7470A, Opt. 002	HP 7475A Opt. 002	HP 7550A	HP 7580B Opt. 058 HP 7585B Opt. 058	HP 7586B Opt. 058
HP-GL Instructions**	40+	50+	80+	75+	75+
Character Sets	5	19	20	21	21
Fonts	"Stick" characters, fixed spacing	"Stick" characters, fixed spacing	"Stick" characters, fixed spacing "Arc" characters, proportional spacing	"Stick" characters, fixed spacing "Arc" characters, proportional spacing "Arc" characters, fixed spacing	"Stick" characters, fixed spacing "Arc" characters, proportional spacing "Arc" characters, fixed spacing
I/O Buffer Size (Bytes)	255	1024	1024 (default) 12,800 (available)	1024 (default) 18,432 (available)	1024 (default) 18,432 (available)

\* Graphics Presentation Pac and other Series 80 applications pacs are NOT supported by RS-232C or HP-IL interfaces with HP 7470A, HP 7475A, HP 7550A, HP 7580B, HP 7585B, and HP 7586B.

\*\* Although the HP 7550A is language compatible with other HP Plotters, it is not plug compatible.

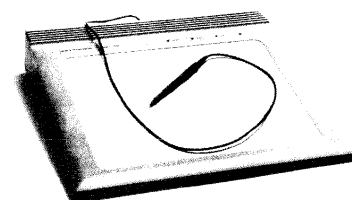
† Graphics Presentation Pac and other Series 80 applications pacs are NOT supported by the HP-IB interface with HP 7550A and HP 7586B.

†† Graphics Presentation Pac (HP-85B version) and other HP-85B applications pacs are NOT supported by the HP 7475A Opt. 002 (HP-IB interface).

# Hewlett-Packard

## Series 80

### Graphics Tablet



HP 9111A

The HP 9111A Graphics Tablet lets your Series 80 personal computer electronically create, display, and interact with pictorial information. As you move a pen-like stylus on the tablet's surface, the tablet translates your movements into X,Y coordinate points and transmits these points to the computer. Points are entered either each time the stylus is pressed or continuously as you draw.

### Operation

Software containing sample programs for the tablet and your computer is provided at no extra cost when you order HP 9111A Opt. 085. These programs show tablet capabilities and serve as programming aids. They include designing graphics on a display screen, converting graphics into data files, and measurement.

### Customer Support

Services Available:

- HP Dealer Repair Center (check with dealer for availability)
- On-site service at your location
- HP Field Repair Center
- Phone-in support
- User newsletter

### Ordering Information

HP Part Numbers:

For HP-85B

HP 9111A Opt. 085

For HP-86B

HP 9111A Opt. 086

Product Includes:

- Graphics Tablet
- One Overlay
- Package of 20 Menu Blanks
- Package of Stylus Refills: 2 inkless, 3 ink
- Two Spare Fuses
- User's Manual
- Power Cord

### Features

Hard, Durable Ceramic Platen

User-definable Special Function Keys

Slim, Lightweight Stylus

Transparent Overlay

Audible Feedback

Self-tests

### Benefits

*Ensures consistent tablet accuracy*—Resists scratches, expansion, and contraction.

*Make program control easier*—You can send a unique code to your computer program with the sixteen softkeys that are conveniently located across the top of the tablet.

*Is easy to use*—Fits comfortably in your hand and gives tactile feedback as you enter data.

*Protects source documents from wear and tear*—Relieves you of concern by holding source documents on the platen and protecting them.

*Gives you confidence*—A beeper which is programmable in pitch, volume, and duration can let you know if you're using the tablet correctly.

*Give you confidence*—Assure you that the tablet is operating properly.

### Specifications

#### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B
- Enhancements:
  - HP 82937A HP-IB Interface (for HP-85B only)
  - HP 10833A, B, C, or D HP-IB cable (for HP-86B only)
  - HP 82936A ROM Drawer
  - I/O ROM (built into HP-85B) or 00085-15002 Plotter/Printer ROM (for HP-85B; I/O ROM is preferred)
  - 00087-15003 I/O ROM or 00087-15002 Plotter ROM (for HP-86B; I/O ROM is preferred)

**RESOLUTION** ..... 0.100 mm (0.004 in.)

**ACCURACY** .....  $\pm 0.600$  mm (0.0236 in.) at 20°C for each measuring point; change of 0.004 mm for each °C deviation from 20°C

**REPEATABILITY** ..  $\pm$  resolution unit

**DATA RATE** ..... programmable from 1 to 60 coordinate pairs/sec; actual rate  $\pm 0.2$  Hz from programmed rate

**DATA FORMAT** ... ASCII or binary X,Y coordinate data

#### ACTIVE DIGITIZING AREA

..... 21.9 × 30.1 cm (8.6 × 11.8 in.); can be extended to include the area occupied by the 16 softkeys

#### DOCUMENT MATERIAL

..... single sheet, electrically nonconductive, homogenous, less than 0.5 mm thick

#### INTERFACE

..... HP-IB

#### OPERATING REQUIREMENTS

Line voltage ..... 100, 120, 220, 240

Vac, switch selectable

Frequency ..... 48-66 Hz

Power consumption ..... 25 watts maximum

Operating temperature ..... 0° to 55°C

(32° to 131°F)

Humidity ..... 5% to 90% at 40°C, noncondensing

#### SIZE AND WEIGHT

Height ..... 8.5 cm (3.35 in.)

Width ..... 44.0 cm (17.3 in.)

Depth ..... 44.0 cm (17.3 in.)

Weight:

Net ..... 5.8 kg (12.8 lbs)

Shipping ..... 10.8 kg (23.8 lbs)

# Hewlett-Packard

## Series 80

### Interfaces



HP 82938A HP-IL Interface

Hewlett-Packard interfaces are used to link external peripherals to a Series 80 personal computer or to form I/O (input/output) control systems suited to many applications. Once installed, these devices relieve you of complex interfacing tasks so you can concentrate on using your system. Up to four interfaces can be inserted into any of the four computer ports at a time.

Some interfaces, or their capability, are built into specific Series 80 computers.

#### HP-IL Interface

The HP 82938A Hewlett-Packard Interface Loop gives you a bit-serial interface that combines low power, small size, and low cost. Using HP-IL, you can link as many as 30 devices with up to 10 meters of cable between each one. The small two-wire cables are easy to use and connect. Three unique features of this loop structure are auto address assignment, device identification, and power ON/OFF control. The dynamic addressing abilities allow immediate reconfiguration of your system. And, this loop structure is so versatile that you can even link a Series 40 handheld or Series 70 portable computer to your HP Series 80 personal computer system.

#### Specifications

##### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR ENTER & OUTPUT	400	400
TRANSFER FHS	1K	1K
	3K	5K

#### ADDRESSING

There are 32 valid addresses, 0 through 31. The controller assumes address 0 and assigns addresses to devices in the loop.

#### INTERRUPT CAPABILITY (with I/O ROM)

Active controller  
Active talker  
Active listener  
Service request (SRQ)  
Interface clear (IFC)  
Device clear (DCL, SDC)  
Device trigger (GET)  
Device dependent command (DDC)

#### SWITCH CONFIGURATION

The following switches can be configured by opening the interface:  
Select code  
System controller

#### HP-IL INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities determined by the interface being used. The following describes how the HP-IL Interface interprets these statements.

ABORTIO—Sends Interface Clear if active controller, else stops handshaking data.  
ASSERT—Provides direct access to loop.  
CLEAR—Sends Selective Device Clear or Device Clear.  
HALT—Stops a loop data transfer.  
LOCAL—Sends Go To Local or Not Remote Enable.  
LOCAL LOCKOUT—Sends Local Lockout message.  
PASS CONTROL—Passes active control.  
PPOLL—Returns the value of a parallel poll.  
REMOTE—Sends Remote Enable.  
REQUEST—Allows the programmer to set service request line and the serial poll response byte.  
RESUME—Sends the Send Data (SDA) message.  
SEND—Allows sending of arbitrary data/command sequences.  
SPOLL—Returns the value of a serial poll.  
TRIGGER—Sends Group Execute Trigger.

#### FRAMES SENT

Data or End—Sends or transfers data messages.  
Commands—Perform interface functions such as Device Clear or Trigger.  
Ready frames—Perform interface management such as starting and ending data transfers.  
Identify—Aids parallel polling and helps to detect service request.

#### STATUS REGISTERS

One each for interrupt cause register,\* received frame control bits, received frame data bits, loop address, interface state, received device dependent command, device count register, and interface identification.\*

#### CONTROL REGISTERS

One each for interrupt mask,\* control bits, data bits, loop address, asynchronous request enable, end-of-line count,\* and seven registers for end-of-line characters (end-of-line sequence is sent at end of each OUTPUT or TRANSFER).

\*Common to all Series 80 I/O interfaces.



HP 82937A HP-IB Interface

## HP-IB Interface

You get an easy-to-use, industry-standard interface with the HP 82937A HP-IB. This Hewlett-Packard Interface Bus permits bidirectional, asynchronous communication among a wide variety of instruments and peripherals. It implements the IEEE 488-1978 Standard Digital Interface for Programmable Instrumentation and allows your computer to communicate with as many as 14 HP-IB compatible instruments per interface, with a total of up to 20 meters of cable. A unique three-wire handshake allows the bus to communicate at a speed that all listening devices can maintain. (If a slow device is not addressed, it will not hamper the speed of the remaining devices.) The HP-IB uses an interface processor for efficient management of the interface bus protocol. The HP-86B has a built-in HP-IB interface.

### Specifications

**DATA INPUT/OUTPUT** ..... eight bidirectional data lines

**CONTROL LINES** ..... three-line handshake (DAV, NRFD, NDAC)

**INTERFACE MANAGEMENT** ... five lines (IFC, ATN, SRQ, REN, EOI)

### INTERFACE FUNCTIONS

Level of implementation in terms of IEEE 488-1978 mnemonics follows. The Device Trigger, Device Clear, and Remote/Local state responses are achieved by programming the mainframe for end-of-line interrupts on those conditions.

Source handshake	SH1
Acceptor handshake	AH1
Talker	T6
Listener	L4
Service request	SR1
Remote/Local	RL1
Parallel poll	PP2

Device clear	DC1
Device trigger	DT1

Controller:

System control	C1
IFC & Take control	C2
REN	C3
Respond SRQ	C4
Miscellaneous control	C5
Extended talker	TE0†
Extended listener	LE0†

### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR	400	400
ENTER & OUTPUT	1.4K	3K
TRANSFER FHS	26.2K	25.5K

### ADDRESSING

There are 32 valid addresses, 0 through 31. (Electrically, IEEE 488 systems can support only 15 devices including the controller.)

### INTERRUPT CAPABILITY (with I/O ROM)

Active controller  
Active talker  
Active listener  
Service request (SRQ)  
Interface clear (IFC)  
Device clear (DCL, SDC)  
Device trigger (GET)  
Secondary command (SCG)

### SWITCH CONFIGURATION

The following switches can be configured by opening the interface:

- Select code
- Interface bus address
- System controller

### JUMPER CONFIGURATION

The HP 82937A can be configured by a jumper wire to respond to a parallel poll. The designated bit is then asserted in response to a parallel poll when the interface is asserting SRQ. The card is configured with a parallel poll response on bit 0 of the data lines.

### HP-IB INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities deter-

mined by the interface being used. The following describes how the HP-IB Interface interprets these statements.

ABORTIO—Sends Interface Clear if system controller, else sends My Talk Address if active controller, else stops handshaking data.

ASSERT—Provides access to bus management lines.

CLEAR—Sends Selective Device Clear or Device Clear.

HALT—Stops an interrupt type TRANSFER.

LOCAL—Go To Local or Remote Disable.

LOCAL LOCKOUT—Sends Local Lockout message.

PASS CONTROL—Passes active control.

PPOLL—Returns the value of a parallel poll.

REMOTE—Remote Enable.

REQUEST—Allows the programmer to set service request line and the serial poll response byte.

RESUME—Drops the attention line (ATN).

SEND—Allows sending of arbitrary data/command sequences.

SPOLL—Returns the value of a serial poll.

TRIGGER—Sends Group Execute Trigger.

### STATUS REGISTERS

One each for bus address, system controller setting, card state (talker, listener, etc.), received secondary command, state of data and control lines, card identification number\* (1 for HP-IB), and interrupt cause register.\*

### CONTROL REGISTERS

One each for parity, HP-IB data lines, control lines, interrupt mask,\* end-of-line character count,\* and seven registers for the end-of-line characters\* (end-of-line sequence is sent at end of each OUTPUT or TRANSFER).

**NOTE:** An HP-IB Interface with all of the above-mentioned capabilities is built into the HP-86B Personal Computer. An HP-IB cable is included with the HP-86B.

†The HP-IB allows for interrupts on secondary commands. This lets a user program the computer to respond to TE4 and LE2 extended talker and listener.

\*Common to all Series 80 I/O interfaces.



HP 82169A HP-IL/HP-IB Interface

## HP-IL/HP-IB Interface

The HP 82169A HP-IL/HP-IB Interface lets you link HP-IL systems with HP-IB computers and lab equipment. Its key feature is its friendly, flexible two-mode operation. In translator mode, a controller exists on either the HP-IL or HP-IB side of the interface, and the devices to be controlled can exist on both sides. Control can be passed between HP-IL and HP-IB controllers as long as only one is active at a time. In mailbox mode, controller systems exist on both sides of the interface, and information can be passed bidirectionally between the two systems through the two resident 110-byte buffers. The interface responds to most HP-IL and HP-IB commands, and is powered by an AC adapter which is supplied.

## Specifications

### EQUIPMENT REQUIRED

- HP 82938A HP-IL Interface—to translate from HP-IL to HP-IB.
- HP 82937A HP-IB Interface—to translate from HP-IB to HP-IL (HP-85B only).
- HP 10833A, B, C, or D HP-IB cable—one per system.

### HP-IL INTERFACE FUNCTIONS

The level of implementation is in terms of the HP-IL Interface Standard.

	Implementation	
	Translator Mode	Mailbox Mode
Receiver	Complete (both modes)	
Driver	Complete (both modes)	
Acceptor handshake	Complete (both modes)	
Source handshake	Complete (both modes)	
Talker:		
Send data	T1	T1
Send status	T2	T2

Send device ID	T3	T3
Send accessory ID	T4	T4
Extended talker	T6†	—
Listener:		
Basic capability	L1	L1
Extended listener	L3†	—
Service request:		
Basic capability	SR1	SR1
Asynchronous request	—	SR2
Remote/Local	RL2†	RL0
Parallel poll	PP1	PP1
Device clear	DC2	DC2
Device trigger	DT4	DT0
Device dependent	DD1††	DD0
Power down	PD0	PD0
Not ready	NR1	NR1
Auto address	AA1	AA1
Controller:	—	C0
Basic capability	C1	—
System controller	C2	—
Respond to SRQ	C3	—
Pass/Receive control	C4	—
Parallel poll	C5	—
Assign auto address	C7	—

### HP-IB INTERFACE FUNCTIONS

The level of implementation is stated in terms of IEEE 488-1978 mnemonics.

	Implementation	
	Translator Mode	Mailbox Mode
Source handshake	SH1	SH1
Acceptor handshake	AH1	AH1
Talker	T6	T6
Listener	L4	L4
Service request	SR1	SR1
Remote/Local	RL1†††	RL0
Parallel poll	PP1	PP1
Device clear	DC1†††	DC1
Device trigger	DT1†††	DT1
Controller:	—	—
System control	C1	—
IFC & Take control	C2	—

Remote enable	C3	—
Respond SRQ	C4	—
Miscellaneous control	C5	—
Extended talker	TE0†††	TE0
Extended listener	LE0†††	LE0

### HP-IL TRANSLATOR MODE OPTIONS

The interface provides the ability to terminate HP-IB transmissions after a line feed is transferred from the HP-IB device, to translate HP-IL DDT/DDI messages to HP-IB secondary command messages, and to override most of the interface's automatic (friendly) functions.

### HP-IB TRANSLATOR MODE OPTIONS

The interface provides the ability to translate HP-IB secondary commands to HP-IL DDI/DDT messages and to obtain the device and accessory ID's of HP-IL devices from HP-IB.

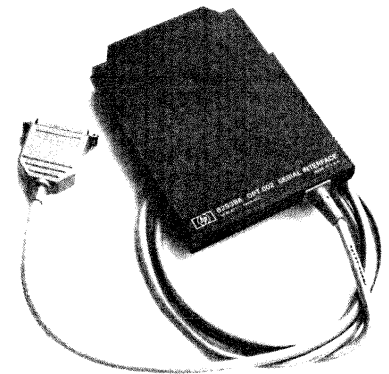
### TRANSFER RATES (maximum)

Type	Translator Mode	Mailbox Mode
	Input (bytes/sec)	Output (bytes/sec)
HP-IL → HP-IB	1.8K	1.9K
HP-IB → HP-IL	3.0K	1.7K
HP-IB BUFFER LOAD		6.0K

† Commands associated with these functions cause no effect on the state of the interface but are transferred to HP-IB.

†† Commands associated with these functions cause no effect on the state of the interface but are transferred to HP-IB on option, after conversion to secondary command messages.

††† Commands associated with these functions have no effect on the state of the interface, but are transferred to HP-IL.



HP 82939A Serial Interface

## Serial (RS-232C) Interface

This RS-232C compatible interface provides bit-serial asynchronous data communication capability. Such an interface is a common means of communicating between a computer and peripherals like terminals and printers. It's also common in applications that involve communications between two computers, such as remote data acquisition. This HP 82939A Serial Interface supports operation with a Series 80 mainframe acting as the computer or as the peripheral. It also supports current-loop operation—a mode of serial operation used by such devices as mechanical teletypes. Information can be sent and received (in true full-duplex mode) in EIA RS-232C compatible voltage levels or with 20-mA current loop configurations. Two 20-mA current sources in the interface allow connection to virtually any current-loop device. Terminal emulation using the Serial Interface is available with HP Series 80 TERM/80 Terminal Emulation System and Data Communications software (see descriptions on pp. 32 and 34). The HP 82939A uses an interface processor to provide efficient management of the Serial Interface.

## Specifications

### DATA RATES AND FORMATS

All signals present at the connector conform electrically to EIA RS-232C and CCITT V.24 specifications. The interface operates in an asynchronous mode providing 5-, 6-, 7- or 8-bit data formats with 1 or 2 stop bits and odd, even, zero, one, and no parity modes.

Standard data rates available are:

50	75	110	134.5
150	200	300	600
1200	1800	2000	2400
3600	4800	7200	9600

In addition to these standard baud rates, the user can select one from a set of 65,533 dif-

ferent baud rates ranging from 1.76 baud to 38,400 baud. The standard baud rates are either switch selectable or programmable. The optional 65,533 baud rates are only programmable.

### MODEM CONTROL LINES

RTS —Request To Send  
CTS —Clear To Send  
DSR —Data Set Ready  
DTR —Data Terminal Ready  
DCD —Data Carrier Detect  
DRS —Data Rate Select

### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR ENTER & OUTPUT	1K	400
TRANSFER FHS	1.4K	1.5K
	none	none

These data rates mean that the Serial Interface can support incoming data rates of 9,600 baud (with interrupt mode transfers) and 15,000 baud with ENTER (into a string variable).

### ADDRESSING

The I/O ROM allows address information to be sent to all interfaces. The HP 82939A Serial Interface does not use this addressing information and will generate an error if used.

### INTERRUPT CAPABILITY (with I/O ROM)

BREAK received  
Framing error  
Parity error  
Received data available  
Auto disconnect  
Change of modem line DCD or RTS:  
Data Carrier Detect (on Opt. 001 interface)  
Request To Send (on standard interface)  
Change of modem line DSR or DRS:  
Data Set Ready (on Opt. 001 interface)  
Data Rate Select (on standard interface)  
Change of modem line CTS or DTR:  
Clear To Send (on Opt. 001 interface)  
Data Terminal Ready (on standard interface)

### SWITCH CONFIGURATION

The following switches can be configured by opening the interface:

Select code  
Baud rate  
Line characteristics  
Parity  
Auto handshake

### SERIAL INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities determined by the interface being used. The following describes how the Serial Interface interprets these statements.

ABORTIO—Aborts all TRANSFER's in progress (to the specified card) and drops all modem lines.

ASSERT—Writes into modem control register.

HALT—Aborts all TRANSFER's in progress (to the specified card) but leaves all modem lines unchanged.

REQUEST—Sends a BREAK using the parameter to determine the length of the BREAK.

RESUME—Enables the transmitter.

SEND—Sends arbitrary data sequences.

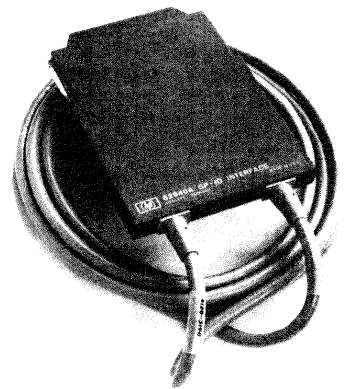
### CONTROL AND STATUS REGISTERS

The HP 82939A Serial Interface has 12 status registers and 22 control registers implemented. The status registers include direct state of the modem control lines, cable type, line characteristics (parity, number of bits/character, number of stop bits), current 16-bit baud rate divisor, reason for termination of ENTER or TRANSFER, card identification number\* (2 for serial) and the interrupt cause register.\*

The 22 control registers consist of standard baud rate selection, line characteristics selection, 16-bit baud rate divisor selection (for non-standard baud rates), direct control over the modem lines, termination character selection for up to four different characters, interrupt mask,\* seven end-of-line characters,\* and the end-of-line character count.\* (The end-of-line sequence is sent at the end of each OUTPUT or TRANSFER.) One of the registers allows for a replacement character to be sent to the computer when an incoming character has a parity or framing error.

\*Common to all Series 80 I/O interfaces.





HP 82940A GPIO Interface

## GPIO (Parallel) Interface

The HP 82940A GPIO Interface is a general purpose byte (8-bit) or word (16-bit) oriented interface. It has two output-only 8-bit ports and two bidirectional 8-bit ports. They can be used as separate 8-bit ports or as 16-bit ports. This parallel interface is commonly used with printers, paper tape readers, paper tape punches, card readers, and special instrumentation.

The HP 82940A provides the computer with 16 bits of latched output data and 16 bits of bidirectional data (latched output, non-latched input). The HP 82940A uses an interface processor for efficient management of the interface.

## Specifications

### DATA INPUT/OUTPUT

There are 16 bidirectional data lines and 16 output-only data lines. The output-only lines provide high current capability, using open-collector transistors.

### ELECTRICAL CHARACTERISTICS

#### Electrical Characteristics for Bidirectional Lines

(Input characteristics also apply to FLG and ST lines)

Parameter	Min.	Max.	Units
Input Low Voltage	0.0	0.8	V
Input High Voltage	2.0	5.0	V
Input Low Current		0.6	mA
Output Low Voltage @ 4.5 mA		0.45	V
Output High Voltage @ -450 $\mu$ A	2.4		V
Output Low Current		4.5	mA
Output High Current		-450	$\mu$ A

#### Electrical Characteristics for Output-Only, CTL, OUT, and RES Lines

Parameter	Min.	Max.	Units
Output Low Voltage @ 20 mA		0.5	V
Output High Voltage (open collector)		5.0	V
Output Low Current		20	mA
Output Leakage Current		40	$\mu$ A

### CONTROL LINES

Twelve lines provide control information between the peripheral and the computer. The outgoing lines are electrically equivalent to the open-collector, output-only data lines. The incoming lines are electrically equivalent to the bidirectional data lines. The control lines and their meanings are:

OUTA, OUTB—Indicates the direction of the data transfer on ports A and B.  
 CTLA, CTLB, CTL0, CTL1—Indicates that the computer is ready for input or that data is ready for output.  
 FLGA, FLGB—Indicates that the peripheral has completed its operation.  
 ST0, ST1—Indicates that the peripheral has completed its operation.  
 RESA, RESB—Used to reset peripherals under program control.

### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR ENTER & OUTPUT	400	400
TRANSFER FHS	1.4K	3K
	18K	19K

### ADDRESSING

The I/O ROM allows address information to be sent to all interfaces. The HP 82940A GPIO Interface uses this addressing information to select which port is being used for the data transfer, the width of the data path (8 or 16 bits), and which handshake lines are to be used. There are a total of 16 valid addresses—0 through 15.

### INTERRUPT CAPABILITY (with I/O ROM)

FLGA	ST1
FLGB	Received parity error
ST0	

### SWITCH CONFIGURATION

The following switches can be configured by opening the interface:

Select code	Handshake mode
Data line sense	Output enable
Flag line sense	Address
Control line sense	

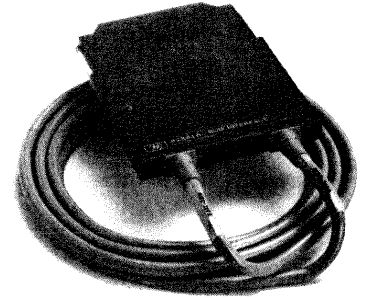
### GPIO INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities determined by the interface being used. The following describes how the GPIO Interface interprets these statements.

ABORTIO—Aborts current TRANSFER; returns handshake lines to their idle state.  
 ASSERT—Allows access to control lines.  
 CLEAR—Sets RESET-A or RESET-B line.  
 HALT—Stops an interrupt TRANSFER leaving handshake and data lines undefined.  
 SEND—Sends arbitrary data sequences.

### CONTROL AND STATUS REGISTERS

The HP 82940A GPIO Interface has ten status registers and 18 control registers implemented. The status registers allow for reading back the value of control registers. The interface identification number (4 for parallel) and the interrupt cause register complete the set. The control registers allow direct access to CTL and RESET lines, logic sense (for FLG, CTL, data lines) and handshake mode. Control registers also allow skipping incoming characters until a character meets a relation (<, =, > or some combination of conditions) with a trigger character. Also included are the registers for interrupt mask, seven end-of-line characters, and the end-of-line character count. (The end-of-line sequence is sent at the end of each OUTPUT or TRANSFER.)



HP 82941A BCD Interface

## BCD (Binary Coded Decimal) Interface

The HP 82941A BCD Interface lets you link BCD instruments to a Series 80 personal computer. A BCD instrument presents digits on a set of parallel lines. Common instruments with BCD interfaces are voltmeters, multimeters, medical equipment, and weighing systems. The HP 82941A provides the computer with 11 digits of 4-bit BCD input or output data plus four sign bits for one or two channels. It uses an interface processor to provide efficient management of the interface and can achieve data transfer rates of up to 1.4K readings/sec.

### Specifications

#### DATA INPUT/OUTPUT

Twelve bidirectional ports, of four lines each, provide data input and output.

#### Electrical Characteristics for Data Lines

Parameter	Min.	Max.	Units
Input Low Voltage	0.0	0.8	V
Input High Voltage	2.0	5.0	V
Input Low Current		0.6	mA
Output Low Voltage @ 4.5 mA		0.45	V
Output High Voltage @ -450 $\mu$ A	2.4		V
Output Low Current		4.5	mA
Output High Current		-450	$\mu$ A

#### CONTROL LINES

Six lines allow for control information to be passed between the peripherals and the computer. The output control lines are implemented with standard TTL gate 7405 open-collector drivers.

I/OA, I/OB—Indicates the direction of the data transfer on channels A and B.

CTLA, CTLB—Ready for input or output.

FLGA, FLGB—Peripheral has completed its operation.

### ELECTRICAL CHARACTERISTICS

#### Electrical Characteristics for CTL and I/O Direction Lines

Parameter	Min.	Max.	Units
Output Low Voltage @ 13 mA		0.4	V
Output High Voltage @ -1.0 mA	2.4		V
Output Low Current		13	mA
Output High Current		-1.0	mA

#### Electrical Characteristics for FLG Lines

Parameter	Min.	Max.	Units
Input Low Voltage	0.0	0.8	V
Input High Voltage	2.0	5.0	V
Input Low Current		4.0	mA

### DATA FORMATS

The HP 82941A supports a wide variety of user-configurable data formats and two predefined data formats:

Single channel . . . . . 8-digit signed mantissa with 1-digit signed exponent and a 1-digit function code

Dual channel . . . . . each channel consists of a 4-digit signed mantissa and a 1-digit function code

### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR ENTER & OUTPUT	400	400
TRANSFER FHS	1.4K	3K
	20K	22K

### ADDRESSING

The I/O ROM allows address information to be sent to all interfaces. The HP 82941A BCD Interface uses this addressing information to select which channel is being used for the data transfer and which of the fields are being read—numeric data (mantissa, exponent, and sign information) or function code. There are a total of seven valid addresses—0 through 6.

### INTERRUPT CAPABILITY (with I/O ROM)

For each channel used, you can select an interrupt mask for the high order function digit from 16 possible masks. The event type interrupts on the BCD card are detected upon entering the function digits. These digits may be entered alone with partial field specifiers 305 or 306, or with mantissa, exponent, and function digits with partial field specifiers

301 or 302. Exponent and function digits may also be entered through the default 300.

### DEVICE CONTROL

The HP 82941A Interface allows you to control a BCD device via one of the BCD digits. To OUTPUT control information to the device would require opening the module and reconfiguring it by setting a switch. To avoid this, Port 10, accessed via ASSERT, allows you to control the device without this reconfiguration.

### SWITCH CONFIGURATION

The following switches can be set by opening the interface:

Select code	Sign bits sense
Format	Control line sense
Handshake	Flag line sense
Data line sense	Output enable

### BCD INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities determined by the interface being used. The following describes how the BCD Interface interprets these statements.

ABORTIO—Aborts the current TRANSFER and returns the interface lines to a tri-state high impedance state.

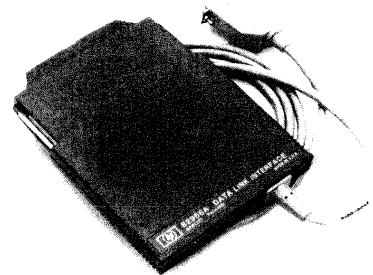
ASSERT—Allows access to control lines and Port 10.

HALT—Stops any TRANSFER; leaves the handshake and data lines unchanged.

SEND—Sends arbitrary data sequences.

### CONTROL AND STATUS REGISTERS

The HP 82941A BCD Interface has 11 status registers and ten control registers implemented. The status and control registers allow a user to set and examine the logic sense for the handshake, data digit, function digit, and sign bit lines. The registers also allow access to the number of digits allocated to channels A and B for the mantissa, exponent, and function. There are two status registers common to all cards that contain the card identification number (3 for BCD) and the interrupt cause register. The common end-of-line count and character registers, and the interrupt mask register are not implemented on the BCD Interface.



HP 82966A Data Link Interface

## Data Link Interface

HP offers you the ability to configure Series 80 personal computers with most other HP computer products on a common network. By implementing the Data Link protocol, the HP 82966A Data Link Interface enables Series 80 personal computers to connect to an HP 3074A adapter and use I/O ROM functions to communicate over Hewlett-Packard's multidrop data communications network.

The network consists of a group of terminals and/or computers connected to a common data link where a single HP 1000 or HP 3000 host computer is the master of all communication activity.

## Specifications

### EQUIPMENT REQUIRED

- 00087-15003 I/O ROM (HP-86B only)
- HP 82936A ROM Drawer (HP-86B only)
- HP 92901A Data Link Multidrop Junction Box
- HP 92905A Interconnecting Cable
- HP 92902A Data Link Cable
- HP 3074A Data Link Adapter

### DATA RATES AND FORMATS

All signals at the connector conform electrically to EIA RS-232C specifications. The interface operates in asynchronous mode providing 8- and 9-bit data formats with odd, even, one, zero, or no parity. It can be run at the following baud rates:

2400	9600
4800	19200

### SWITCH CONFIGURATION

The following switches can be configured by opening the interface:

- Select code
- Default baud rate
- Default device identification
- Default group identification
- Enable daisy chain operation

### INTERRUPT CAPABILITY (with I/O ROM)

- Timed out by master controller
- Exceed retransmission count
- No activity timeout
- Received data available
- Transmit data buffer empty

### DAISY CHAINING

In the Owner's Manual you will find instructions which provide you with an inexpensive method for connecting multiple Series 80 personal computers via HP 82966A Data Link Interfaces to a single HP 3074A Data Link Adapter.

### CONTROL AND STATUS REGISTERS

The HP 82966A Data Link Interface has 11 status registers and 19 control registers. The status registers include: state of the data link, state of the data buffer, group and device identification, line characteristics, reason for termination of ENTER or TRANSFER, card identification number\* (8 for Data Link), and the interrupt cause register.\*

The 19 control registers consist of: timeout and retransmission limits, line characteristics selection, data link control, data buffer control, setting group and device identification, termination character selection for up to four

characters, interrupt mask,\* seven end-of-line characters,\* and the end-of-line character count.\*

### DATA LINK INTERFACE STATEMENTS

The I/O ROM adds a set of statements to the computer that accesses capabilities determined by the interface being used. The following describes how the Data Link Interface interprets these statements.

**ABORTIO**—Aborts all transfers in progress and stops responding to requests on the link.

**HALT**—Aborts all transfers in progress but still responds to requests on the link.

**RESUME**—Begins responding to requests on the link.

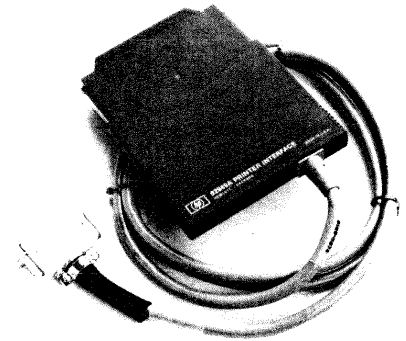
**SEND**—Sends arbitrary data sequences.

### TRANSFER RATES (maximum)

Type	Input (bytes/sec)	Output (bytes/sec)
TRANSFER INTR	1.0K	1.0K
ENTER & OUTPUT	1.4K	1.5K
TRANSFER FHS	none	none

The data rates listed above relate to data transfer between the card and the Series 80 CPU. Because the interface has facilities for buffering data, however, the card can support data transfer at 19,200 baud.

\*Common to all Series 80 I/O interfaces.



HP 82949A Printer Interface

## Printer Interface

With the HP 82949A Printer Interface your Series 80 computer can drive printers having a standard parallel Centronics-type interface. This output-only interface consists of a plug-in module which is inserted into any of the rear ports of a Series 80 personal computer and a captive cable which is terminated by a standard Amphenol-type, 36-pin connector.

## Specifications

### EQUIPMENT REQUIRED

- With HP-85B, 00085-15002 Plotter/Printer ROM or I/O ROM (built-in)
- With HP-86B, 00087-15003 I/O ROM optional

### CONTROL AND STATUS REGISTERS

The HP 82949A has ten control registers, three status registers, and one combined control/status register (register 3). Addressable control registers include enable and disable for printer fault interrupt, out-of-paper indica-

tor, and select state interrupt, plus printer reset and handshake normalization. The status registers include interface identification, interrupt cause, and printer status registers.

### ADDRESSING

With the HP-85B, the Plotter/Printer ROM provides the ability to specify the peripheral printer as the destination device for all PRINT output and also allows certain formatting instructions to be programmed into the Printer Interface.

The SET I/O statement enables the user to write to any of the ten control registers, registers 1, 2, and 16 through 23, and also to control/status register 3.

With the HP-86B, these capabilities are built in, so a ROM is not required for printing applications.

The CONTROL, ASSERT, and ENABLE INTR statements provided by the I/O ROM allow access to the interface control registers. The STATUS statement accesses status registers 1 and 2 (and control/status register 3). With the I/O ROM, the interface is capable of implementing a number of I/O operations consistent with its output-only, full handshake function. The I/O ROM cannot control the page width of the printer.

## ELECTRICAL CHARACTERISTICS

### Electrical Characteristics for Acknowledge, Out of Paper, Select, Fault Lines

Parameter	Min.	Max.	Units
Input Low Voltage	0.0	0.8	V
Input High Voltage	2.0	5.0	V
Input Low Current		0.4	mA

### Electrical Characteristics for Strobe, Input Prime Lines

Parameter	Min.	Max.	Units
Output Low Voltage @ 16 mA		0.4	V
Output High Voltage @ -400 $\mu$ A	2.4		V
Output Low Current		16	mA
Output High Current		-400	$\mu$ A

### Electrical Characteristics for Data 1-8 Lines

Parameter	Min.	Max.	Units
Output Low Voltage @ 24 mA		0.5	V
Output High Voltage @ -15 $\mu$ A	2.0		V
Output Low Current		24	mA
Output High Current		-15	mA

## Ordering Information

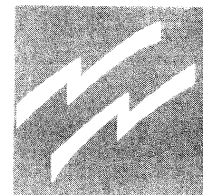
HP part numbers are given below. Each interface comes with an Owner's Manual and the interface itself, as well as the items listed.

- HP 82938A HP-IL Interface
  - Interface connected to a 1-m (3.3-ft) cable (additional cables to link multiple peripherals can be purchased separately)
- HP 82937A HP-IB Interface
  - Interface connected to a 2-m (6.6-ft) cable (additional cables to link multiple peripherals can be purchased separately)
- HP 82169A HP-IL/HP-IB Interface
  - HP 82059B AC Adapter
  - HP 82167A HP-IL Cable
- HP 82939A Serial (RS-232C) Interface
  - 2-m (6.6-ft) interface cable terminated with the standard RS-232C female (DCE) connector
- HP 82939A Opt. 001 Serial (RS-232C Interface)
  - 2-m (6.6-ft) interface cable terminated with an RS-232C male (DTE) connector
- HP 829239A Opt. 002 Serial (RS-232C) Interface
  - 4-m (13.1-ft) unterminated interface cable for current loop operation
- HP 82940A GPIO (Parallel) Interface
- HP 82941A BCD (Binary Coded Decimal) Interface
- HP 82966A Data Link Interface
- HP 82949A Printer Interface

# Hewlett-Packard

## Series 80

### Communications



Hewlett-Packard offers an exceptionally broad set of communications solutions. These communications products can bridge the gap between Series 80 and other computers. Depending on the outside device to be communicated with, one or more of the communications products is best suited to the job.

You can turn your HP-86B into an intelligent terminal that communicates with large HP mainframe computers in multiple operating modes, including block and format. It's easy, using Hewlett-Packard's new HP 82900A Opt. 001 TERM/80 Terminal Emulation System. TERM/80 lets your HP-86B emulate the popular HP 2622A Terminal. If tied to an HP 3000, for example, you could use VIEW/3000 to access data bases.

Also, full editing capabilities are provided through the use of eight special function keys. With an HP 82839A RS-232C Serial Interface and an HP-86B you can use the TERM/80 Terminal Emulation System to communicate with the host computer at speeds up to 9,600 baud.

If you need a data communications system that lets you transmit large amounts of data at higher speeds,

consider Hewlett-Packard's Data Communications software pac. You can use this flexible pac with your Series 80 personal computer and an HP 82939A RS-232C Serial Interface to communicate with host computers at speeds of up to 9,600 baud. It supports hard-wired links and external modems with two hand-shaking options. If you want to change the configuration of your Series 80 system—including baud rate, parity, and printer output—you can do that while the pac is running.

The HP 82950A Series 80 Modem is the easy-to-use solution. It offers automatic dialing and logging-on from data files; redialing; auto answer; and five sets of special function keys. All these features mean less dialing for you and efficient, easy communication.

Professional Communications is an advanced software package for those individuals who need to communicate with other personal computer users. You can also communicate with remote data services like THE SOURCE<sup>SM</sup> or Dow Jones News/Retrieval<sup>®</sup>, or mainframes which support dial-up connection to character mode terminals. Professional Communications offers text

editing, file management, 1200-baud modem support, and unattended operation. All this means time and money savings to you.

Your Series 80 Personal Computer can become an applications oriented intelligent terminal with the COM-80 Communications Interface. The COM-80 is a communications interface module that allows Series 80 computers to become multi-purpose workstations. COM-80 allows multiple devices and computers to be attached to a Series 80 computer at the same time. COM-80 also allows Series 80 computers to send and receive data over long distances, connecting several business sites into a unified network.

In addition to data communications, Hewlett-Packard offers a voice communications option. The HP 82967A Speech Synthesis Module allows you to create high-quality *human-sounding* speech quickly and easily. You can use it with any Series 80 personal computer which is configured with at least one disc drive. The Module comes with two flexible discs, one 3½" and one 5¼", containing vocabulary and necessary speech programs.

**Data Communications Choices** (see page 53 for configuration requirements)

	TERM/80	Data Communications Pac	Series 80 Modem	Professional Communications Pac	COM-80
Computer	HP-86B	HP-85B & HP-86B	HP-85B & HP-86B	HP-85B & HP-86B	HP-85B & HP-86B
Baud rate (bits per second)	110 to 9,600	50 to 9,600*	110 to 300	300 to 1,200	110 to 9,600
Terminal support level	Block/format modes	Character modes	Character mode	Character mode	Character mode
User features:					
Stored log-on files	No	No	Yes	Yes	Yes
Stored configuration files	Yes	Yes	Yes	Yes	Yes
Auto dialing	No	No	Yes	Yes	No
Auto answer	No	No	Yes	Yes	No
File transfer	No	Yes	No	Yes	Yes
Method of connection to computer	Hard-wired or acoustic coupler	Hard-wired or acoustic coupler	Modular phone plug	Modular phone plug, Series 80 modem or RS-232C to external modem	Hard-wired, acoustic coupler or modem

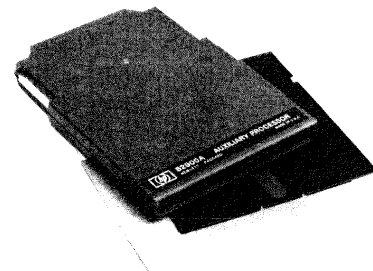
\*Net file transfer throughput is less than set baud rates.

THE SOURCE<sup>SM</sup> is a service/mark of Source Telecomputing Corp., a subsidiary of Reader's Digest Association.

# Hewlett-Packard

## Series 80

### TERM/80



HP 82900A Opt. 001 TERM/80  
Terminal Emulation System

Do you need the power of an HP mainframe computer plus the convenience of personal computing at your desk? If so, Hewlett-Packard has the answer. Turn your HP-86B into an intelligent terminal! It will communicate with the mainframe in multiple operating modes—including block and format—by using the TERM/80 Terminal Emulation System.

Mainframe computer power is at your fingertips with this simple tool. TERM/80 lets your computer emulate an HP 2622A terminal, a potential gateway to increased power and information. For example, if you're tied to an HP 3000, you can use VIEW/3000 to access data bases, enter information, and retrieve it. In addition, you can borrow mainframe computer power that may be needed for complex operations and calculations.

And you can do it at speeds of from 100 to 9,600 baud. Such flexibility helps maximize your productivity. On your own HP-86B. At your desk.

#### Features

- Block Mode Operation
- Format Mode Support
- Memory Lock
- Softkey-driven Software
- Configuration Flexibility
- Display Memory

#### Benefits

*Provides efficient use of the host computer's resources—*Gives you quick response by sending and receiving blocks of information a page at a time.

*Provides you with the tools available on the host computer—*You can take advantage of features like tabbing between fields, screen editing, cursor control from host, forms fillout, and calling attention to fields.

*Provides continuity of work flow—*Lets you hold the position of the lines you are working on while scrolling through others.

*Makes computer communication easy—*Terminal capabilities are yours at the touch of a key.

*Provides HP mainframe computer compatibility—*You get the use of host computer menu items on HP-86B softkeys.

*Makes you more productive with less work—*You can vary such things as handshaking, parity, and baud rates, and store that status on disc. Next time, your TERM/80 Terminal Emulation System wakes up to the status you have stored.

*Permits reference to other pages—*Gives you two pages of scrollable memory.

#### TERMINAL CONFIGURATION

```

ReturnDef ☒
LocalEcho ☒ OFF
XmitFncn(A) ☒ NO
InhHndShk(G) ☒ NO
SPDWB(B) ☒ NO
Inh DC2(H) ☒ NO
Start Col ☒ 01
InhEolWrp(C) ☒ NO
Line/Page(D) ☒ LINE
FldSeparator ☒ BlkTerminator ☒

```

SAVE  
CONFIG

NEXT  
CHOICE

PREVIOUS  
CHOICE

DEFAULT  
VALUES

1 1

DISPLAY  
FUNCTNS

exit/  
setup

## Operation

The TERM/80 Terminal Emulation System lets you:

- Operate in multiple modes—your choices are remote, local, character, line, block, format (forms), page, or line modify modes.
- Use the tools available on the host computer—tools like memory lock, tabbing between fields, screen editing, cursor control from the host, forms fillout, and calling attention to fields.
- Edit information—you get full editing capabilities, so you can insert, delete, or clear lines; and insert or delete characters.

TERM/80 provides you with eight user-definable function keys with labels of up to 16 characters each, which can be displayed in a row across the bottom of the screen. When the function keys are pressed, up to 80-character strings can be returned to the host computer. In addition, there's a two-character user-definable return key. You can select operating modes and perform other terminal control functions with the screen-labeled system function keys.

It's easy to set up parameters such as baud rate, parity, handshakes, or end-of-line wrapping too. All you do is perform keyboard entries into formatted

menus which are displayed on the screen. And after you're finished, you can save the configuration you've created by pressing a softkey to store it on disc.

Of course, typical HP terminal features like memory lock, and adjustable margins and tab stops are features of your TERM/80 Terminal Emulation System.

### Software Specifications

#### SYSTEM REQUIREMENTS

- Computer:
  - HP-86B
- Peripherals:
  - HP Disc Drive (dual recommended, for backing up discs)
- Enhancements:
  - HP 82900A Auxiliary Processor Module (see Ordering Information)
  - HP 82939A Serial Interface (RS-232C)

#### TRANSMISSION

MODE ..... serial, asynchronous, full-duplex

HANDSHAKE ..... ENQ/ACK

#### TRANSMIT

PACING ..... DC1/DC3 (XON/XOFF)

#### RECEIVE

PACING ..... DC1/DC3 (XON/XOFF)

#### BAUD

RATE ..... 110 to 9,600 bits/sec (default is 2,400)

#### DATA

BITS ..... 7 (8 if none parity selected; default is 7)

#### START

BITS ..... 1

#### STOP

BITS ..... 1 (2 if 110 baud selected)

#### PARITY

..... odd, even, always one, always zero, or none (default is zero)

#### OPERATING

MODES ..... remote, local, character, line, block, page and line modify, format (forms), auto linefeed

### Auxiliary Processor Specifications

PROCESSOR ..... Z-80A

#### CLOCK

RATE ..... 4 MHz

#### MODE

You can switch between Z-80A and HP-86B Enhanced BASIC mode. TERM/80 loads automatically from disc. Reset returns to HP-86B mode.

## Ordering Information

HP Part Numbers:

- HP 82900A Opt. 001—3½" and 5¼" Disc Media (includes Auxiliary Processor Module)
- HP 82849A Opt. 630—3½" Disc Media Only (see NOTE)
- HP 82849A Opt. 650—5¼" Disc Media Only (see NOTE)

Product Includes:

- Software Media
- Keyboard Reference Card
- Owner's Manual

- Auxiliary Processor Module (included only with HP 82900A Opt. 001)

#### Note:

If you have already purchased an HP 82900A CP/M System, you already own the Auxiliary Processor Module. To acquire full TERM/80 capability, you need only order one of the HP 82849A options.

# Hewlett-Packard

## Series 80

### Data Communications Software Pac

For hard-wired (RS-232C) data communications or modem communications using an acoustic coupler, the Series 80 Data Communications software and HP 82939A Serial Interface combine to provide a variety of data communications configurations. You can use the Data Communications Pac when you need to send or receive information to or from another system at rates from 50 to 9,600 baud (bits per second). Actual net file transfer throughput is less than set baud rates. The pac supports two handshaking options that let you turn your Series 80 personal computer into a remote character-mode terminal emulator.

### Customer Support

Services Available:

- Phone-in support
- User newsletter

### Ordering Information

HP Part Numbers:

For HP-85B:

- HP 82821A Opt. 610—Tape Cartridge

For HP-85B/86B:

- HP 82821A Opt. 630—3½" Disc Media
- HP 82821A Opt. 650—5¼" Disc Media

Product Includes:

- Software Media
- Owner's Manual

### Features

- 50-9,600 Baud Operation
- Two Handshakes
- Configuration Files
- Softkey-driven Software
- Remote Console Mode
- Uploading/Downloading

### Benefits

*Adds flexibility*—Lets you match the system to the speed of the host computer.

*Increase versatility*—Provide compatibility with more systems.

*Easy to use*—Let you store system configurations to fit each application on tape or disc, and retrieve them later with the touch of a key.

*Makes computer communication easy*—Terminal capabilities are yours at the touch of a key.

*Turns your Series 80 personal computer into a remote terminal emulator*—Allows the host computer or another terminal to control your HP-85B or HP-86B.

*Saves time and money*—Lets your computer transfer large amounts of data at optimal speed.

### Specifications

#### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B.
- Peripherals:
  - HP Disc Drive (if using discs)
- Enhancements:
  - HP 82939A Serial Interface (RS-232C)
  - 00087-15003 I/O ROM (for HP-86B)
  - HP 82936A ROM Drawer (for HP-86B)
- Other:
  - Acoustic modem or direct serial port to a host computer

#### TRANSMISSION

MODE ..... serial, asynchronous,  
full-duplex

TERMINAL  
CONNECTION ..... hard-wired or modem  
HANDSHAKE

DC1/DC3 (XON/XOFF) or ENQ/ACK  
(default is DC1/DC3); ENQ/ACK is designed  
to operate with the HP 1000E/F Series  
Computer using driver :DVA05 Rev. 2013 or

with the HP 12966A Buffered Asynchronous Communications Interface.

BAUD RATE ..... 50 to 9,600 bits/sec  
(default is 300)

DATA BITS ..... 5 through 8 (default is  
7)

START BITS ..... 1

STOP BITS ..... 1 or 2

PARITY ..... odd, even, always 1,  
always 0, or none  
(default is odd)

**NOTE:** The Data Communications Pac runs only with full-duplex, asynchronous modems or hard-wired RS-232C lines. Half-duplex modems cannot be used. The HP 82950A Series 80 Modem is not compatible with the HP Data Communications Pac.



# Hewlett-Packard

## Series 80

### Modem



HP 82950A Modem

Become part of nationwide computer networks with your Series 80 personal computer and the HP 82950A Modem. The Modem is a serial, asynchronous, full-duplex module. Use it and your Series 80 computer to communicate with industrial data bases or commercial time-sharing systems such as Dow Jones News/Retrieval® service, THE SOURCE<sup>SM</sup>, and CompuServe. You can get timely production reports, send electronic mail to other computer users, or conduct literature research.

#### Operation

The Modem is easy to use. Simply plug it into one of the expansion slots in the back of a Series 80 computer and connect it directly to your telephone. This telephone link is easier to connect and use than acoustic coupler connections on other modems.

Menu-driven modem communications software that utilizes Series 80 softkeys is included with the Modem to put special functions at your fingertips. The HP 82950A Modem is compatible with Bell 103/113 modems and lets you communicate with the majority of time-sharing computers in the United States. It operates at speeds of 110 to 300 baud. Together, these features make the HP 82950A Modem an excellent choice for communications over the telephone lines.

#### Features

- Softkey-driven Software
- Direct Connection
- Bell 103/113 Compatibility
- Auto-dialing, Auto-answer, and Log-on
- Integrated Package
- Directory Storage
- Self-test of Modem Performance

#### Benefits

*Makes computer communication easy*—Terminal capabilities are yours at the touch of a key.

*Increases accuracy*—Gives you fewer errors than you'd get with an acoustic coupler, because there's less interference.

*Increases scope*—Lets you communicate with the majority of time-sharing computers throughout the United States.

*Provide easy, efficient communication*—Establish communications in the simplest possible manner.

*Saves money*—Gives you everything you need in one compact, functional module that plugs into the back of your computer.

*Saves time*—Lets you store phone numbers and log-on sequences for easy recall.

*Gives you confidence*—Lets you do a simple verification of the system.

## Specifications

### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B
- Peripherals:
  - HP Disc Drive (if using discs)
- Enhancements:
  - 00087-15003 I/O ROM (for HP-86B)
  - HP 82936A ROM Drawer (for HP-86B)
- Other:
  - Telephone line with modular plug

### TRANSMISSION

**MODE** ..... serial, asynchronous,  
full duplex

**HANDSHAKE** ..... DC1/DC3 (XON/  
XOFF)

**MODULATION** ..... binary phase coherent  
FSK

**BAUD RATE** ..... up to 300 bits/sec

**DATA BITS** ..... 7 or 8 (default is 7)

**START BITS** ..... 1

**STOP BITS** ..... 1

**PARITY** ..... odd, even, always 1,  
always 0, or none  
(default is odd)

**MODES** ..... originate and answer

### MODEM

**COMPATIBILITY** ... Bell 103/113

### CONNECTORS

Two miniature six-position jacks with four conductors; one four-conductor cable with two miniature six-position plugs.

**DIALING** ..... automatic or manual

### SIZE

Dimensions ..... 16.5 × 12.7 × 3.2 cm

Cable length ..... 210 cm (7 ft)

### OPERATING REQUIREMENTS

Operating  
temperature ..... 0° to 55°C  
(32° to 131°F)

Storage  
temperature ..... –40° to 65°C  
(–40° to 150°F)

### RINGER

**EQUIVALENCE** ..... 1.0 B

### JACKS

The following jacks may be used:

RJ11C and RJ11W                      RJ13C and RJ13W  
RJ12C and RJ12W

## Ordering Information

HP Part Numbers:

*For HP-85B:*

- HP 82950A—Tape Cartridge

*For HP-85B/86B:*

- HP 82950A Opt. 630—3½" Disc Media
- HP 82950A Opt. 650—5¼" Disc Media

Product Includes:

- Modem connected to a 2.1-m (7-ft) cable
- Phone Cord
- Software Media
- Owner's Manual

Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

THE SOURCE is a service mark of Source Telecomputing Corp., a subsidiary of the Reader's Digest Association.

# Hewlett-Packard

## Series 80

### Professional Communications Software Pac

Professional Communications (PC) is an advanced software package for communicating via telephone lines using either the Series 80 Modem or an external modem.

Professional Communications is intended for users who need to communicate with any of the following:

- Other personal computer users
- Remote data services: THE SOURCE<sup>SM</sup>, Dow Jones News/Retrieval<sup>®</sup>, etc.
- Mainframes which support dial-up connection to character mode terminals.

Although the Series 80 Modem includes software (ModCom) which can access either remote data services or mainframes, PC offers several additional capabilities including text editing, file management, 1200 baud modem support, and unattended operation. For the heavy user of communications, PC will save money in connect time (higher speed and use of non-prime time) and in long-distance phone charges.

#### Features

- Built-in text editor
- Integrated file management and retrieval system
- Manual or automated transmissions
- "Bulletin board" mode for incoming calls
- Automatic record-keeping
- Print files on external printer or internal HP-85B printer
- Secure or encrypt files and communications

#### Benefits

*Simplifies operation*—Create and edit text files for later printing or transmission to other computers. Includes the ability to merge existing files into the file being edited.

*Saves time*—avoid unnecessary duplication of inputs by re-using existing files.

*More flexibility*—take advantage of "off-peak" connect rates or periods of low system congestion.

*Unique capability*—any computer (including non-HP computers) can call in, browse through the posted files, and leave messages. All incoming text is stored into files for later reference or posting on the bulletin board.

*Convenient operation*—keeps a copy of all past communications activity for later reference.

*Saves time*—get hard copy of messages or data without extra steps.

*Insures privacy*—confidential files can require passwords and be transmitted in encrypted form.

## Specifications

### SYSTEM REQUIREMENTS

	HP-85B	HP-86B
Software	82850A	82851A
Disc Drive	yes	yes
Modem or RS-232*	yes	yes
ROM drawer	yes	yes
I/O ROM	built-in	yes
A/P ROM	yes	—

\*82939A option 001 RS-232 interface is used to connect to an external modem, such as a 1200 baud modem for users who prefer 1200 baud. External modems or acoustic couplers without auto-answer/auto-dial features may be used, but unattended dialing or bulletin board mode will not be available.

### TRANSMISSION

**MODE** ..... serial, asynchronous,  
full duplex

### TRANSMISSION

**SPEED** ..... 300 bits per second  
(or 1200 bits per second with compatible external modem)

**HANDSHAKE** ..... DC1/DC3 (XON/  
XOFF)

**DATA BITS** ..... 7 or 8

**PARITY** ..... odd, even, always 1,  
always 0, or more

### LINE

**TERMINATOR** ..... carriage return only

## Ordering Information

Professional Communications is available in two versions, with two media size options for each, as follows:  
*PC-85 (for HP-85B)*

- HP 82850A Opt. 630—with 3½" media
- HP 82850A Opt. 650—with 5¼" media

*PC-86 (for HP-86B)*

- HP 82851A Opt. 630—with 3½" media
- HP 82851A Opt. 650—with 5¼" media

Product includes program disc, data disc, and manual.

# Hewlett-Packard

## Series 80

### COM-80

Turn your HP Series 80 computer into an applications-oriented intelligent terminal via the COM-80 Communications Interface.

The COM-80 is a communications interface module that allows Hewlett-Packard Series 80 computers to become multi-purpose workstations. These Series 80 stations may be configured to communicate with a variety of computers or peripheral devices configured for either bisynchronous (bisync), or asynchronous (async) communications. The devices communicated to may range from printers, terminals, and data logging devices to large mainframe or central computers.

The COM-80 module allows multiple devices and computers to be attached to a Series 80 computer at the same time, since three (3) communications ports are available. Two of these ports are software configurable to allow the transmitting and receiving of async or bisync data at baud rates to 9600 baud. The third port allows output only in an asynchronous manner to 4800 baud. Some additional capabilities:

- Flexible data collection and storage from local or remote async or bisync devices.
- Collect data in an async manner on one port and transmit bisync data out to a central computer on another port with no recabling.
- File transfer from one Series 80 computer to another Series 80 computer.
- File transfer from Series 80 computers to other computers in Bisync or Async mode.
- Emulation of an asynchronous character-oriented ASCII terminal.
- Emulation of IBM, HASP/RJE workstation communicating in a 2780/3780 mode.

#### Specifications

##### BISYNCHRONOUS COMMUNICATION 2770/2780/3780 RJE BSC ROUTINE

- Bisynchronous to 9600 baud
- Remote via modems
- Direct connect
- Settable parameters
  - Transmit block size (up to 1024 characters)
  - Receive block size (up to 1024 characters)
  - Receive delimiter
  - Receive record size (up to 1024 characters)
  - Transmit record size (up to 1024 characters)
- Terminal identifier
- Logon file
- Logoff file
- File transfer
  - Send
  - Receive
  - Concatenated files
  - No size limitation
- Automatic ASCII to EBCDIC conversion
- Point-to-point based on switched line capability
- Conversational mode
- CRC generation and verification
- Auto retry on read and write
- Provides BASIC statements allowing the development of BSC programs
- Transparent mode

The COM-80 module allows the Series 80 computer to send and receive data over long distances, connecting several business sites into a unified network.

This allows the Series 80 computer to not only collect and display data, but to send it to another computer as well. An organization may now collect and control data at any number of locations and process the collected data at a central location on a sophisticated central computer. It also gives the Series 80 user the ability to use applications software packages on a timesharing basis while still retaining local control of his data.

##### ASYNCHRONOUS TERMINAL EMULATION

- Transmission mode:
  - Serial
  - Asynchronous
  - Full/half duplex
- Handshake:
  - DC1/DC3 (XON/XOFF)
  - DTR/CTS
- Baud rates: 110, 150, 300, 1200, 2400, 9600
- Data bits: 5-8
- Stop bits: 1, 1½, 2
- Parity: odd, even, none
- File transfer
  - Send
  - Receive
  - Concatenated files
  - No size limitation

##### HARDWARE SPECIFICATIONS

- Two (2) fully configurable RS-232C I/O ports
  - Asynchronous/Bisynchronous
  - Baud rates to 9600 baud
- One (1) Output only RS-232C I/O port
  - Asynchronous only
  - Baud rates to 4800 baud

##### REQUIRED EQUIPMENT

- HP-85B or
- HP-86B
- HP 82936A ROM Drawer (HP-86B only)
- HP 00087-15003 I/O ROM (HP-86B only)
- **Note:** 82900A is not required

#### Ordering Information

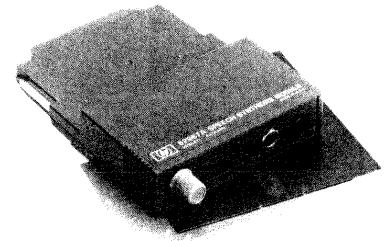
- 92204A COM-80 Interface Module  
Product Includes:
  - COM-80 Module
  - 2m datacomm cable (92221C)
- 92239A Remote Job Entry (RJE) Software\* (2770/2780/3780)
- 92239B Asynchronous Terminal Emulation Software\*
- 92221C Communications Cable
- 92221T Printer Cable

\* Either 92239A or 92239B must be ordered with 92204A.

# Hewlett-Packard

## Series 80

### Speech Synthesis Module



HP 82967A Speech Synthesis Module

At last there is a voice product that features high-quality *human-sounding* speech output at low cost! The HP 82967A Speech Synthesis Module will pleasantly surprise you with its voice quality, plug-in module package, and large vocabulary consisting of over 1,500 words, phrases, and sounds.

#### Operation

It's easy to create, store, and invoke speech with any Series 80 personal computer. The Speech Synthesis Module has two types of output jacks for configuration flexibility, and speaks through any standard 8-ohm speaker or headphone set. It even has a volume control knob.

You can create speech simply by slipping the module directly into a backplane slot of an HP-86B when used with either an HP 82913A or HP 82912A monitor, because the monitor includes a built-in speaker.

Custom or foreign vocabularies can be obtained at additional cost (see ordering information in the Owner's Manual Supplement which is included with the module).

#### Ordering Information

HP Part Number:

- HP 82967A

Product Includes:

- Speech Synthesis Module
- Owner's Manual
- Owner's Manual Supplement
- 3½" and 5¼" Disc Media

#### Features

- High-quality Speech Output
- Plug-in Module Package
- Speech Software
- Two Types of Output Jacks

#### Benefits

*Is easy to understand*—Gives you clear, *human-sounding* speech output.

*Saves money*—Eliminates the need for an external power supply, interfaces, and cables.

*Helps you create the speech you need*—Makes it easy to add speech output to your applications, because Binaries and a Speech Editor utility are provided.

*Add configuration flexibility*—Let you use either external headphones or speakers, or the internal speaker in an HP 82912A or HP 82913A monitor for speech output.

#### Specifications

##### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B
- Peripherals:
  - HP Disc Drive
- Enhancements:
  - HP 82937A HP-IB Interface (for HP-85B)
- Other:
  - Audio connector with RCA phono plug on each end (for HP-86B when using HP 82912A or HP 82913A speaker for output; HP part number 8120-3760 suggested)
  - Output speaker or headphones (eight ohms) equipped with either a ¼" or RCA phono plug (for HP-85B and for HP-86B if *not* using HP 82912A or HP 82913A speaker for output)

##### SPEECH

High-quality LPC (Linear Predictive Coding) speech output  
Sampling rate 8 kHz  
Bit rate 1,200 to 2,000 bits/sec

##### VOCABULARY

Approximately 1,500 words, phrases, and sounds  
Disc based

##### SPEECH EDITOR

Allows custom phrase construction from existing vocabulary elements.

##### VOLUME

16-level program or keyboard controlled volume  
Manual volume control knob

##### AUDIO OUTPUT

0.22 watts to 8 ohms  
Compatible with HP-86B monitor audio speaker

**DIMENSIONS** . . . . . 16.5 × 12.7 × 3.2 cm  
(6.6 × 5.0 × 1.3 in.)

##### OPERATING REQUIREMENTS

Operating temperature . . . . . 0° to 55°C  
(32° to 131°F)

Storage temperature . . . . . –40° to 65°C  
(–40° to 150°F)

##### JACKS

The following jacks may be used:  
RCA  
¼" phono

##### STATEMENTS AND FUNCTIONS

###### Binary Commands

SVOL—Allows volume to be set from the keyboard.

SPEAK—Outputs speech through the HP 82967A Speech Synthesis Module.

DLOAD#—Loads dictionary files from mass storage.

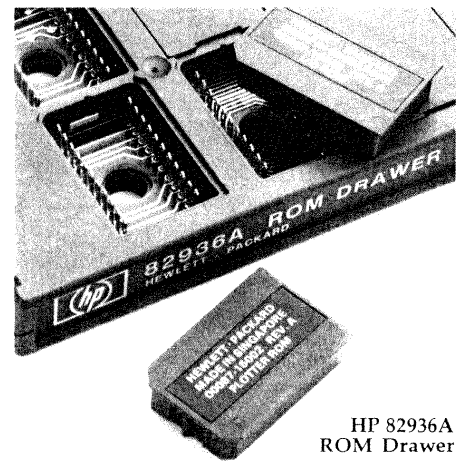
PAR#—Returns speech parameters for a given word.

LOC—Locates record number of word from mass storage.

# Hewlett-Packard

## Series 80

### ROM's



HP 82936A  
ROM Drawer  
and ROM's

Hewlett-Packard ROMs (read-only memories) are typically used to integrate peripherals into a Series 80 computer system or to enhance the capabilities of the Series 80 BASIC language. Once a ROM is installed, its capabilities are *instantly accessible* when you turn the computer on. Up to six ROMs can be placed into the HP

82936A ROM Drawer which is then inserted into any of the four computer ports. A Series 80 personal computer will accept only one ROM Drawer at a time.

In the descriptions that follow, ROMs with a numerical prefix of 00085 are for the HP-85B Personal Computer only, while ROMs with a 00087 prefix operate

only with the HP-86B Personal Computer. Some ROMs, or their capability, are built into specific Series 80 computers. See the Series 80 Programming Development Aids section for a description of the Assembler ROM.

## I/O ROM

HP's BASIC language capability in Series 80 personal computers is enhanced with straightforward I/O commands by the 00087-15003 I/O ROM. It provides all the commands necessary to access the features of each of the Series 80 interaces. The I/O ROM adds 8,192 bytes of read-only memory to the operating system. It uses 416 bytes of read/write memory on the HP-85B and 818 bytes on the HP-86B.

**NOTE:** The I/O ROM is built into the HP-85B.

## Specifications

### GENERAL STATEMENTS

The I/O ROM adds bit manipulation, base conversion, keyboard masking, and error determination capabilities to Series 80 personal computers.

**BINAND**—Logical AND of two 16-bit values.  
**BINCMP**—Binary complement of a 16-bit value.  
**BINEOR**—EXCLUSIVE OR of two 16-bit values.  
**BINIOR**—INCLUSIVE OR of two 16-bit values.  
**BIT**—Value of a specified bit.  
**BTD**—Decimal value of a binary string.  
**DTB\$**—Returns a string with a binary representation of a decimal number.  
**DTH\$**—Returns a string with a hexadecimal representation of a decimal number.  
**DTOS\$**—Returns a string with an octal representation of a decimal number.  
**ENABLE KBD**—Disable/enable sections of the keyboard.  
**ERROM**—Returns number of last optional ROM that caused an error.  
**ERRSC**—Returns the select code of the last card that caused an error.

**HTD**—Returns the decimal value of a hexadecimal string.  
**OTD**—Returns the decimal value of an octal string.

### UNIVERSAL I/O STATEMENTS

The I/O ROM adds a set of interfacing capabilities to a Series 80 computer which are common to all interfaces. These capabilities provide for data transfers, data conversions, interface control, interrupts, and end-of-line branching. Statements specific to interfaces are listed in the Series 80 Interfaces section.

**CONTROL**—Accesses I/O card control registers or I/O buffer control registers.  
**CONVERT**—Sets up conversion tables for ENTER or OUTPUT on a specified select code or an I/O buffer. The conversion can be an indexed table or a pairs lookup table.  
**ENABLE INTR**—Interrupt on a specified condition.  
**ENTER**—Formatted or free-field data from an I/O card or I/O buffer.  
**IOBUFFER**—Turns a string variable into an I/O buffer.  
**OFF EOT**—Turns off the end of transfer end-of-line branch.  
**OFF INTR**—Turns off the ENABLE INTR end-of-line branch.  
**OFF TIMEOUT**—Turns off the SET TIMEOUT end-of-line branch.  
**ON EOT**—Specifies destination on end of transfer.  
**ON INTR**—Specifies destination on interrupt.  
**ON TIMEOUT**—Specifies destination on handshake timeout.  
**OUTPUT**—Formatted or free-field output to I/O card or buffer.  
**RESET**—Hardware reset of the I/O card.  
**SET TIMEOUT**—Causes handshakes to an I/O card to be timed; if timeout occurs, then branch is taken to service routine.  
**STATUS**—Access to I/O card or buffer.  
**TRANSFER**—Allows for fast handshake (FHS) or interrupt data transfers between an I/O buffer and an I/O card.

**IMAGE**—Specifies format used with ENTER...USING, and OUTPUT...USING statements.

### GP-IO Interface Statements

**ABORTIO**—Aborts the current TRANSFER and returns the handshake lines to their idle state.  
**ASSERT**—Allows access to control lines.  
**CLEAR**—Sets RESET-A or RESET-B line depending on whether the device address was odd or even.  
**HALT**—Stops and interrupts type TRANSFER and leaves the handshake and data lines in an undefined state.  
**SEND**—Allows sending of arbitrary data sequences over the parallel interface.

### Serial Interface Statements

**ABORTIO**—Abort all TRANSFERS in progress (to the specified card) and drop all modem lines.  
**ASSERT**—Write to modem control register.  
**HALT**—Abort all TRANSFERS in progress (to the specified card) but leave all modem lines unchanged.  
**REQUEST**—Send a BREAK; use the parameter to determine the length of the BREAK.  
**RESUME**—Enable the transmitter.  
**SEND**—Allows sending of arbitrary data sequences over the serial interface.

### HP-IB Interface Statements

**ABORTIO**—Sends Interface Clear if system controller, or sends My Talk Address if active controller, or else stop handshaking data.  
**ASSERT**—Provides access to bus management lines.  
**CLEAR**—Sends Selective Device Clear or Device Clear.  
**HALT**—Stop an interrupt type TRANSFER.  
**HP-IB Interface Statements**  
**LOCAL**—Sends Go to Local or Remote disable.

(I/O ROM continued)

LOCAL LOCKOUT—Sends Local Lockout message.  
 PASS CONTROL—Passes active control.  
 PPOLL—Returns the value of a parallel poll.  
 REMOTE—Remote enable.  
 REQUEST—Allows the programmer to set service request line and the serial poll response byte.  
 RESUME—Drops the attention line (ATN).  
 SEND—Allows sending of arbitrary data/command sequences.  
 SPOLL—Returns the value of a serial poll conducted on a specified HP-IB device.

TRIGGER—Sends the Group Execute Trigger message.

#### *BCD Interface Statements*

ABORTIO—Aborts the current TRANSFER and returns the interface lines to a "tri-state" high impedance state.  
 ASSERT—Allows access to control lines and Port 10 digit lines.  
 HALT—Stops any TRANSFER (on the specified card) and leaves the handshake and data lines unchanged.  
 SEND—Allows sending of arbitrary data sequences over the BCD interface.

## **Plotter ROM**

Although the HP-86B Personal Computer includes built-in print and graphics commands that allow you to transfer data to an HP printer, you will need the HP Plotter ROM to transfer data from your computer to an HP plotter. The 00087-15002 Plotter ROM allows you to use the system graphics commands to control an external plotter. It also provides single commands to dump CRT graphics and alpha screens to any HP dot-matrix printer not used with an RS-232C Interface. The ROM consumes 1,392 bytes of available user memory.

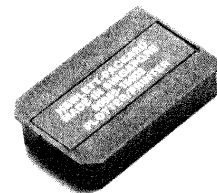
## **Specifications**

### **STATEMENTS AND FUNCTIONS**

DUMP GRAPHICS—Dumps graphics portion of the CRT screen to the printer located at the PRINTER IS address.

DUMP ALPHA—Dumps one page of alpha memory. This page is rotated 90° counterclockwise.





00085-15002 Plotter/Printer ROM

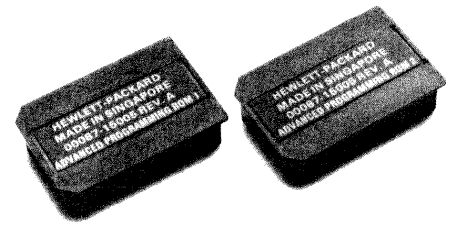
## Plotter/Printer ROM

The 00085-15002 Plotter/Printer ROM lets you interface your HP-85B Personal Computer with HP's high-resolution graphics plotters and full-width line printers. It also adds several graphics enhancements to the standard Series 80 CRT graphics. Consumes only 373 bytes of available user memory.

### Specifications

#### STATEMENTS AND FUNCTIONS

- AXES**—Draws a pair of axes with optional tic marks.
- BLINK**—Turns off the CRT while BPLOT statements write information to the graphics display.
- BPLOT**—Byte plot. Allows plotting any series of dots on the graphics display by conversion to an alphanumeric string.
- BREAD**—Byte read. Reads the contents of the graphics display into the specified string variable, enabling you to read and store the entire graphics display in one variable.
- CLIP**—Defines plotting boundaries (soft-clips) in current units mode, enabling you to highlight or make windows around specified areas of your graph.
- CRT IS**—Defines default display device, directing all output that defaults to the CRT to the specified device. An optional line length parameter can be used to select line length formatting for the device.
- CSIZE**—Character size. Specifies the height, width-height aspect ratio, and slant of characters used in labels.
- CURSOR**—Stores the values of the current cursor coordinates in the specified variable names.
- DIGITIZE**—Enables point digitizing from an external plotter.
- DRAW**—Drops the pen and draws to the specified coordinate position.
- ERROM**—Returns the number of the ROM that issued an error message.
- ERRSC**—Returns the select code of the interface module that received an illegal operation.
- FXD**—Establishes the label format for automatic axes labeling with the LAXES and LGRID statements.
- FRAME**—Draws a box around current plotting area.
- GCLEAR**—Clears the graphics display.
- GRAPHICS**—Switches the CRT to graphics mode if it is not already there.
- GRID**—Draws a full-scale grid with optional tic marks on the grid lines.
- IDRAW**—Lowers the pen and draws a line of specified incremental length from the current pen position.
- IMOVE**—Lifts the pen and moves it an incremental distance from the current pen position.
- IPLOT**—Provides incremental plotting with pen control from the last plotted point.
- LABEL**—Used like the PRINT statement to draw labels on an external plotter or the graphics display.
- LABEL USING**—Used like the PRINT USING statement to draw formatted labels on the plotting device. The image format string determines the exact form of the labels.
- LAXES**—Label axes. Draws and labels a pair of axes. Labels are placed outside the plotting area, within the graphic limits, at each major tic mark.
- LDIR**—Label direction. Specifies the angle at which subsequent labels will be drawn.
- LGRID**—Label grid. Draws and labels a grid. Labels are placed outside the plotting boundaries, within the graphic limits, on each grid line.
- LIMIT**—Defines the graphic limits beyond which the pen is not allowed to move. When the optional parameters are not included, two corner points of the plotting area can be digitized to define the graphic limits.
- LINETYPE**—Selects one of eight solid or dashed line types.
- LOCATE**—Specifies the plotting boundaries upon which SCALE or SHOW will map. Lines drawn or plotted in user units will not be allowed to cross the plotting boundaries specified by LOCATE. Useful for creating a window for your plot, saving space outside the window for labels.
- LORG**—Label origin. Determines where subsequent labels are drawn relative to the current pen location. Useful for positioning or centering labels.
- MOVE**—Lifts the pen and moves it to the specified coordinate position.
- MSCALE**—Scales the current plotting area in millimeters.
- NOBLINK**—Places the computer in a mode such that BPLOT statements write their information to the CRT with the CRT remaining on.
- PDIR**—Plot direction. Sets the angle of rotation for relative and incremental plotting.
- PEN**—Specifies the number or color (1 through 4) of the pen to be used.
- PENUP**—Lifts the pen.
- PLOT**—Provides absolute data plotting and pen control.
- PLOTTER IS**—Specifies the target of all plotter statements and operations.
- PRINTER IS**—Defines the default printer, directing all output that initially defaults to the internal printer to the specified device. An optional line length parameter can be used to select the line width formatting for the device.
- RATIO**—Returns a value equal to the ratio of the physical dimensions of the graphic limits, i.e., the x dimension divided by the y dimension.
- RPLOT**—Relative plot. Enables relative plotting and pen control from the last pen position determined by a statement other than RPLOT. The direction may be rotated with the PDIR statement.
- SCALE**—Defines the user units that are mapped onto the plotting area or LOCATE rectangle.
- SETGU**—Sets graphic units as the current units mode.
- SET I/O**—Enables you to write information directly to the registers in an interface module.
- SETUU**—Sets user units as the current units mode.
- SHOW**—Defines an isotropic scale (one unit of x equals one unit of y) in user units within the plotting boundaries.
- TRANSLATE**—Provides an easy means of translating CRT-directed graphics programs into programs that use the Plotter/Printer ROM routines for plotting to an external device.
- UNCLIP**—Sets the plotting boundaries (which are set by LOCATE or CLIP) equal to the graphic limits.
- WHERE**—Assigns the coordinate values of the last plotted or moved-to point and the pen's up or down status to the specified variables.
- XAXIS**—Draws a horizontal axis at the specified y-intercept.
- YAXIS**—Draws a vertical axis at the specified x-intercept.



00087-15005  
Advanced Programming ROM's

## Advanced Programming ROM

The functions, statements, and commands of this ROM set give you extended control over data, programs, and your Series 80 system operations. With the 00085-15005 or 00087-15005 Advanced Programming ROM's you can execute subprograms; create string arrays; use the entire keyboard for branching operations; position the cursor during program execution; read string information directly from the display; find and replace program variables; cross-reference both program statements and program variables; merge programs; and set, clear, and test 64 program flags. Consumes only 132 bytes of available user memory on the HP-85B, and 159 bytes on the HP-86B (Not compatible with the HP 98151B Program Development ROM.)

## Specifications

### STATEMENTS AND FUNCTIONS

ALPHA—Moves cursor to a specified row/column on the ALPHA screen.  
AREAD—Fills string variable or substring with screen contents.  
AWRIT—Displays contents of string.  
CALL—Transfers program execution to specified subprogram.  
CFLAG—Clears specified flag to 0.  
CRT OFF—Turns display screen off. Speeds up PRINT#ing and READ#ing data during mass storage operations.  
CRT ON—Turns display screen on.  
CURSCOL—Returns number of cursor's column location.  
CURSROW—Returns number of cursor's row location.  
DATES\$—Returns system clock reading as year/month/day.  
DIRECTORY—Displays length of main program, names and sizes of subprograms

in memory, and relative positions in memory.  
ERRM—Displays most recent error message.  
ERROR—Returns number of last plug-in ROM that generated an error message.  
FINDPROG—Locates specified subprogram.  
FLAG—Returns 1 if specified flag (1 through 64) is set, a 0 if not.  
FLAG\$—Returns 8-character string whose binary representation shows all 64 flag settings.  
GET—Allows you to retrieve a program as an ASCII data file (on the HP-86B only).  
GET\$—Returns string array element specified (on the HP-85B only).  
HGL\$—Underlines characters in given string.  
HMS—Converts hours/minutes/seconds string to equivalent number of seconds.  
HMS\$—Converts specified number of seconds to hours/minutes/seconds format.  
KEYLAG—Sets time delay before key output starts repeating. Sets rate of repetition.  
LINPUT—Assigns input from keyboard to a string or substring.  
LWC\$—Converts uppercase letters of a string to lowercase.  
MDY—Converts month/day/year string to equivalent Julian day number.  
MDY\$—Converts specified Julian day number to month/day/year format.  
MERGE—Retrieves specified program from mass storage, renames it, and merges it with current main program.  
NPAR—Returns number of parameters passed in CALL statement to the subprogram.  
OFF CURSOR—Suppresses cursor while program is running.  
OFF KYBD—Deactivates keys in string so they no longer cause immediate branching.  
ON KYBD—Declares keys active for branching during a running program.  
PAGE—Sets number of lines per page for a PLIST operation.  
READTIM—Number of seconds counted by a

system timer after timer has been set in a program.  
REPLACEVAR—Replaces variable name with another.  
RENUM—Renames program or subprogram.  
REV\$—Reverses order of character string.  
ROTATES—Wraps string around on itself, shifting characters in a specified direction.  
RPT\$—Concatenates string with itself a specified number of times.  
SARRAY—Declares string variables to be string arrays (on the HP-85B only).  
SAVE—Allows you to save a program as an ASCII data file (on the HP-86B only).  
SCAN—Locates and displays next line containing a specified string or variable.  
SCRATCHBIN—Clears binary program in memory.  
SCRATCHSUB—Deletes specified subprogram.  
SFLAG—Sets specified flag (1 through 64) to 1.  
SLET—Puts string expression into string array at specified location (on the HP-85B only).  
SMAX—Returns highest subscript number of specified string array (on the HP-85B only).  
SUB—First line of specified subprogram. Designates parameters whose values are received from calling program.  
SUBEND—Last line of subprogram. Returns execution to calling program.  
SUBEXIT—Returns execution to calling program from anywhere within a subprogram.  
TIMES\$—System clock reading in hours/minutes/seconds format.  
TRIM\$—Removes leading and trailing blanks from string expressions.  
XREF L—Generates table of line numbers referenced by other program statements.  
XREF V—Generates table of program variables, showing line numbers of statements that reference them.



00087-15011 MIKSAM ROM

## MIKSAM ROM

Create and maintain a customized file management system with HP's 00087-15011 MIKSAM ROM (Multiple Indexed Keyed Sequential Access Method). This capability is provided in the form of 13 additional BASIC commands which give you the tools necessary to efficiently retrieve, add, and delete information from data base files. Each file system supports a variable number of data fields determined by your design. These data fields can be either sort items—called keys—or informational items. Up to 12 sort fields can be defined. The number of informational fields is unlimited.

Use MIKSAM with your HP-86B and a minimum of one disc drive. Maximum key length is 60 bytes with up to 64K

keys per key file. Up to 12 MIKSAM key files can be open simultaneously, allowing you to search for more than one category of data at once.

MIKSAM is a powerful software development tool for applications programmers and serves as a core around which custom file management can be designed to fill your special needs. Consumes 4K bytes of available user memory.

### Specifications

#### STATEMENTS AND FUNCTIONS

MAKE\_KEY\_FILE—Key file creation.

KILL\_KEY\_FILE—Delete an existing key file and remove from directory.

OPEN\_KEY\_FILE—Begin access to data base.

CLOSE\_KEY\_FILE—Terminate access to data base.

CREATE\_KEY—Add a new record to data base.

DELETE\_KEY—Delete an existing record from data base.

SEEK\_FIRST—Point to first record (in key order).

SEEK\_END—Point to last record (in key order).

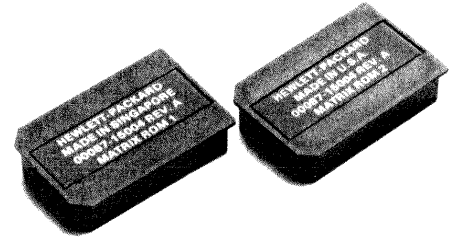
SEEK\_NEXT\_KEY—Get next record in forward direction.

SEEK\_PRIOR\_KEY—Get next record in backward direction.

SEEK\_KEY—Get a record with known key value.

SET\_UP—Initialize key file buffer.

M\_STATUS—Return status about a particular key file.



00087-15004 Matrix ROM's

## Matrix ROM

The 00085-15004 or 00087-15004 Matrix ROM set gives you a powerful set of statements and functions for working with arrays—both matrices (two-dimensional arrays) and vectors (one-dimensional arrays). It lets you perform calculations with more convenience, speed, and accuracy than would be possible using your Series 80 personal computer alone. Consumes only 69 bytes of available user memory on the HP-85B, and 73 bytes on the HP-86B.

## Specifications

### STATEMENTS AND FUNCTIONS

**ABSUM**—Sum of absolute values of elements in array.  
**AMAX**—Value of largest element in array.  
**AMAXCOL**—Column number of largest element in array most recently specified in AMAX function.  
**AMAXROW**—Row number of largest element in array most recently specified in AMAX function.  
**AMIN**—Value of smallest element in array.  
**AMINCOL**—Column number of smallest element in array most recently specified in AMIN function.  
**AMINROW**—Row number of smallest element in array most recently specified in AMIN function.  
**CNORM**—Largest sum of absolute values of elements in each column of array (column norm).  
**CNORMCOL**—Column number with largest sum of absolute values in array most recently specified in CNORM function.  
**DET**—Determinant of matrix.  
**DETL**—Determinant of last matrix inverted in MAT INV statement or specified as first argument in MAT SYS statement.  
**DOT**—Sum of products of corresponding elements of vectors (dot product or scalar product).  
**ERROM**—Number designating last plug-in ROM to generate error message.  
**FNORM**—Square root of sum of squares of elements in array (Frobenius norm or Euclidean norm).  
**LBND**—Lower bound of array subscript.  
**MAT** —Assigns value of numeric expression or values of all elements of operand array to elements of result array. Alternatively, assigns specified elements of operand array to specified elements of result array.  
**MAT (+, -, \*, /, or \*)**—Performs specified arithmetic operation between array and scalar (number, numeric variable, or numeric expression) or between two arrays. Alternatively, performs matrix multiplication.  
**MAT = \* + \***—Adds two products of a scalar and an array.  
**MAT CON**—Assigns value 1 to all elements of array.  
**MAT CROSS**—Finds cross product (vector product) of two 3-element vectors.  
**MAT CSUM**—Adds values of elements in each column of array.  
**MAT DISP**—Displays elements of array(s).  
**MAT DISP USING**—Displays elements of array(s) according to format string specified in this statement or in IMAGE statement whose statement number (or label, on HP-86B only) is specified.  
**MAT IDN**—Assigns value 1 to all diagonal elements of matrix, and assigns value 0 to all other elements.  
**MAT INPUT**—Assigns values input from keyboard to elements of array(s).

**MAT INV**—Finds inverse of matrix.  
**MAT INV \***—Multiplies inverse of matrix by another array.  
**MAT PRINT**—Prints elements of array(s).  
**MAT PRINT USING**—Prints elements of array(s) according to format string specified in this statement or in IMAGE statement whose statement number (or label, on HP-86B only) is specified.  
**MAT READ**—Assigns values listed in DATA statement(s) to elements of array(s).  
**MAT RSUM**—Adds values of elements in each row of array.  
**MAT SYS**—Solves matrix equation  $Ax = B$  for unknown array  $x$ , given any square matrix  $A$  and any other array  $B$ .  
**MAT TRN**—Finds transpose of array.  
**MAT TRN \***—Multiplies transpose of array by another array.  
**MAT = \* TRN**—Multiplies array by transpose of another array.  
**MAT ZER**—Assigns value 0 to all elements of array.  
**MAXAB**—Largest absolute value of any element in array.  
**MAXABCOL**—Column number of element with largest absolute value in array most recently specified in MAXAB function.  
**MAXABROW**—Row number of element with largest absolute value in array most recently specified in MAXAB function.  
**REDIM**—Changes working size of array(s) to size specified.  
**RNORM**—Largest sum of absolute values of elements in each row of array (row norm).  
**RNORMROW**—Row number with largest sum of absolute values in array most recently specified in RNORM function.  
**SUM**—Sum of elements in array.  
**UBND**—Upper bound of array subscript.

## Hewlett-Packard Enhancement ROMs Ordering Information

ROM	HP Part Numbers	
Computer	HP-85B	HP-86B
Printer/Plotter	00085-15002	Not Available
Plotter	Not Available	00087-15002
I/O	Built-in	00087-15003

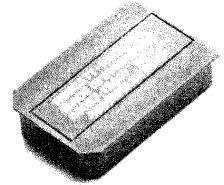
ROM	HP Part Numbers	
Matrix	00085-15004	00087-15004
Advanced Programming	00085-15005	00087-15005
MIKSAM	Not Available	00087-15011

Each product includes ROM, Owner's Manual, and a Pocket Guide.

# Hewlett-Packard

## Series 80

### Programming Development Aids



00087-15007 Assembler ROM

You can enhance the power of a Series 80 personal computer by adding to it your own programming in the form of EPROM's (erasable, programmable ROM's).

Create new system commands, new BASIC keyboards, new statements, and new functions in *Assembly language* using any Series 80 computer, an HP Assembler ROM (00085-15007 or 00087-15007), and the HP 82928A System Monitor. Or make EPROM's that store *BASIC and Assembly language* programming with the HP 82929A Opt. 001 Hybrid ROM Development System and an HP-85B.

By using programmable firmware instead of memory-resident binary routines, you can take advantage of safeguards that protect your program from being edited, overwritten, copied, or destroyed. And, unlike flexible disc drives, EPROM's do not require a separate power supply, so your programs are less affected by environmental conditions.

Programs in EPROM are user friendly, too. For example, you can auto start BASIC programs in EPROM, allowing your computer to *wake up* under program control. Lastly, programmable firmware requires no user memory, leaving you with plenty of problem-solving power.

To convert programs to firmware, you burn them into an EPROM. EPROM's can then be placed in the HP 82929A Programmable ROM Module, which will plug into any of the four ports on your Series 80 personal computer.

Specifications follow for the Assembler ROM, System Monitor, Programmable ROM Module, and Hybrid ROM Development System. Whether creating hybrid ROM's or Assembly language EPROM's, you will need:

1. 00087-15003 I/O ROM and HP 82936A ROM Drawer (HP-86B only).
2. HP 82939A Serial Interface (RS-232C).
3. EPROM (erasable, programmable ROM) Model 2732 (4K bytes) or 2764 (8K bytes). Must be purchased outside HP.
4. Data I/O System 19 PROM Burner (or other compatible unit). Must be purchased outside HP.

#### Assembler ROM

The 00085-15007 or 00087-15007 Assembler ROM provides you with the capability to write customized Assembly language programs that can be executed from RAM memory or burned into EPROM's. You can write programs that allow you to: create customized BASIC keywords; redefine existing BASIC commands and functions; expand input/output control; increase speed in various applications; and store both source code and object code on either tape cartridges or discs. Consumes only 124 bytes of available user memory on the HP-85B and 220 bytes on the HP-86B.

#### Specifications

##### STATEMENTS AND FUNCTIONS

ALOAD—Loads Assembly language source code.

ASSEMBLE—Assembles source code and stores object code.

ASSEMBLER—Enters Assembler mode.

ASTORE—Stores Assembly language source code.

BASIC—Returns to BASIC mode.

BKP—Sets breakpoint.

CLR—Clears breakpoint.

DEC—Decimal value of octal number.

FLABEL—Finds label.

FREFS—Finds label references.

MEM or MEMD—Dumps contents of computer RAM or ROM memory to CRT.

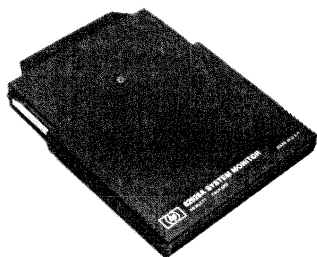
Optional parameters allow you to address ROM's, to specify number of bytes to dump (default is 64), and to change contents to other values.

OCT—Octal value of decimal number.

REL—Returns absolute address of relative address in a binary program.

SCRATCHBIN—Scratches binary program.

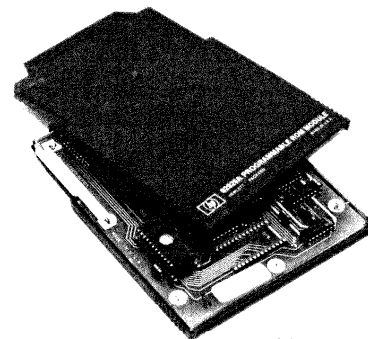
TREM—Toggles remark output on listings (on the HP-85B only).



HP 82928A System Monitor



HP 82929A Opt. 001  
Hybrid ROM Development System



HP 82929A  
Programmable ROM Module

### System Monitor

The HP 82928A System Monitor will help you develop and debug the Assembly language programs you create for your Series 80 personal computer. This programming aid lets you monitor program flow by providing two break points to be set in any portion of memory. Interrupts generated by these break points will allow examination of memory contents, CPU status indicators, and CPU registers.

### Specifications

#### MEMORY CONTENTS

Octal and ASCII representation of a user-specified number of ROM or RAM memory locations.

#### CPU STATUS INDICATORS

Program counter  
Address register pointer  
Data register pointer  
Break point addresses  
Overflow flag  
Carry flag  
Status of most significant bit  
Left-digit zero flag  
Zero flag  
Right-digit zero flag  
Status of least significant bit  
Decimal flag  
Extend register

#### CPU REGISTERS

Octal contents of all CPU registers are displayed. With the HP 82928A System Monitor, you can single step and trace through the operation of code at any point in memory and alter any register, status bit, or memory location. Together, the Assembler ROM, System Monitor, and Programmable ROM Module provide you with an Assembly language software development package.

### Hybrid ROM Development System

With the HP 82929A Opt. 001 Hybrid ROM Development System, you and your HP-85B Personal Computer can produce customized hybrid ROM's. Hybrid ROM's are EPROM's (erasable, programmable read-only memories) that store your Assembly language and BASIC language programs. The development system provides the BASIC programs, binary programs, and documentation necessary to incorporate such programming into hybrid ROM's. To plug hybrid ROM's into the HP-85B, use the HP 82929A Programmable ROM Module that's included with the system.

Programs stored in a hybrid ROM can be up to 8,083 bytes in length, either allocated or deallocated. The keywords RLOAD, RCHAIN, RSEARCH and RCAT, are defined within the Hybrid ROM Development System by Assembly language routines. These keywords provide the ability to download (into RAM), chain, and catalog BASIC programs stored in the ROM. These routines can be contained in the Hybrid ROM Development System, in other non-hybrid ROM's, or in binary programs present in RAM.

Up to six hybrid ROM's using three Programmable ROM Modules can be present in the system at once. One hybrid ROM in the system must be designated the main hybrid ROM; all others are auxiliary ROM's.

### Specifications

#### STATEMENTS AND FUNCTIONS

RCAT—Catalog programs in EPROM.  
RCHAIN—Chain a program from EPROM.  
RLOAD—Load program from EPROM.  
RLODGO—Load and execute program from EPROM.

RSEARCH—Search directory in EPROM.

#### DEVELOPMENT SOFTWARE MEDIA

Includes tape cartridge and both 3½" and 5¼" flexible discs for use with the HP-85B.

### Programmable ROM Module

The HP 82929A Programmable ROM Module carries the EPROM's you create, incorporating your programming into a Series 80 personal computer. It contains two sockets that accommodate either one or two 4K byte Model 2732 EPROM's or one or two 8K byte Model 2764 EPROM's. A single Programmable ROM Module supports 8K bytes to 16K bytes of memory. Up to three Programmable ROM Modules may be installed at one time, allowing a maximum of 24K bytes (with all 2732 EPROM's) to 48K bytes (with all 2764 EPROM's) of storage.

### Ordering Information

HP part numbers are given below. Each product includes an Owner's Manual and the items listed.

- 00085-15007 or 00087-15007 Assembler ROM
  - ROM
  - Pocket Guide
  - 3½" and 5¼" Sample Assembly Language Program Discs
  - Sample Assembly Language Program Tape Cartridge (included with 00085-15007 only)
- HP 82929A Programmable ROM Module
  - Installation Guide
  - Programmable ROM Module
- HP 82929A Opt. 001 Hybrid ROM Development System
  - Instruction Sheet
  - Programmable ROM Module
  - Tape Cartridge; 3½" and 5¼" Disc Media
- HP 82928A System Monitor
  - System Monitor Module

# Hewlett-Packard

## Series 80

### Optional Operating Systems

The versatility of your HP-86B Personal Computer can be enhanced by adding an alternate operating system, either UCSD p-System or CP/M®.

The UCSD p-System is a complete software development system available in configurations that support UCSD Pascal, FORTRAN-77, or both. You get all of the tools necessary to develop Assembly, Pascal, or FORTRAN applications. Or you have the option of an

additional configuration that supports runtime execution of application software only. Take advantage of the growing list of p-System software being developed by third-party suppliers.

The CP/M System accepts the vast library of HP disc-formatted software written under the CP/M operating system.

With either system, you and your Series

80 personal computer can work as partners to accomplish a large variety of tasks.

Both CP/M and the UCSD p-System replace the native operating system of Series 80 personal computers. As a result, some of the peripherals, memory, interfaces, and other enhancements that work with the native operating system are not supported. See table below.

#### Operating Systems and Enhancements Compatibility

	OPERATING SYSTEMS		
	NATIVE MODE	CP/M	p-SYSTEM
<b>Interfaces</b>			
HP 82937A HP-IB Interface	Yes	Disc drive & printer only*	Disc drive & printer only
HP 82938A HP-IL Interface	Yes	Printer only	Printer only
HP 82169A HP-IL/HP-IB Interface	Yes	Printer only	Printer only
HP 82939A Serial Interface (RS-232C)	Yes	Printer only	Yes
HP 82940A GPIO Interface	Yes	No	No
HP 82941A BCD Interface	Yes	No	No
HP 82949A Printer Interface	Yes	Yes	No
HP 82966A Data Link Interface	Yes	No	No
<b>Series 80 Data Communications</b>			
HP 82900A Opt. 001 TERM/80 Terminal Emulation System (for HP-86B only)	Yes	No	No
HP 82950A Modem	Yes	No	Yes
HP Data Communications Software Pac	Yes	No	No
Professional Communications	Yes	No	No
COM-80	Yes	No	No
<b>Series 80 Voice Communications</b>			
HP 82967A Speech Synthesis Module	Yes	No	No
<b>ROM's</b>			
HP Plotter ROM (for HP-86B only)	Yes	No	No
HP Plotter/Printer ROM (for HP-85B only)	Yes	No	No
HP I/O ROM	Yes	No	No
HP Matrix ROM	Yes	No	No
HP MIKSAM ROM (for HP-86B only)	Yes	No	No
HP Advanced Programming ROM	Yes	No	No
<b>Series 80 Programming Development Aids</b>			
HP Assembler ROM	Yes	No	No
HP 82929A Programmable ROM Module	Yes	No	No
HP 82929A Opt. 001 Hybrid ROM Development System (for HP-85B only)	Yes	No	No
HP 82928A System Monitor	Yes	No	No

\*For example, in CP/M the HP-IB Interface would support a disc drive and/or printer.

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.  
CP/M® is a trademark of Digital Research, Inc.

# Hewlett-Packard

## Series 80

### UCSD p-System



UCSD p-System

The UCSD p-System is a complete software development system supporting UCSD Pascal, FORTRAN-77, and HP-86B Assembly language. The product is offered in various configurations supporting Pascal development, FORTRAN-77 development, or both. A separate configuration is also provided for application execute-only environments. Each configuration is offered in both 5¼" and 3½" disc media for use on an HP-86B.

### Operation

The p-System offers an integrated operating system including compilers and Assembler, editor, linker and file handler. This system lets you develop highly-portable application software as well as take advantage of the growing library of third-party software developed for the p-System.

The interactive operating system supports program chaining, input/output redirection, dynamic overlay, dynamic memory allocation, disc file handling capabilities, and support for asynchronous processes and concurrency primitives in Pascal.

Software development support includes a powerful screen-oriented editor, a symbolic debugger, and for high-resolution graphics, machine-independent adaptable library subroutines (Turtlegraphics).

UCSD Pascal is the industry standard Pascal for microcomputers. It is a fully developed and supported Pascal with extension for system development and commercial applications programming. It is the preferred language for the user who demands support for complex data structures and a structured programming orientation.

FORTRAN-77 is the most up-to-date FORTRAN for microcomputers and supports structured programming, IF-THEN-ELSE constructs, program overlays, interactive input/output, and standardized random access files to facilitate portability.

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

### Features

- Fully featured, integrated software development tools (editor, filer, linker, Macro-Assembler, compilers, debugger)
- Supports UCSD Pascal, the industry standard Pascal for microcomputers
- Supports FORTRAN-77, the most up-to-date ANSI-77 FORTRAN subset available for microcomputers
- Supports Electronic Disc capabilities for rapid RAM-resident file operations
- Requires no external plug-ins, and utilizes the power and flexibility of the processor, memory, I/O, and graphics capabilities of the HP-86B
- UCSD p-System is the fastest growing operating system for microcomputers

### Benefits

*Optimize software development time and effort*—You get common user interface and compatible format.

*Are economical*—You don't need to purchase additional software development tools.

*Provides an efficient programming language*—You can use the structured, modular approach of Pascal to develop and maintain software.

*Eliminates rewriting or translating of FORTRAN programs*—Earlier FORTRAN versions can be run directly with little or no modification.

*Speeds up file operations*—Lets you install frequently-used files or utilities in Electronic Disc. Excess RAM memory is automatically configured as an extra "disc" at boot time and supports all of the features of disc with the speed of RAM.

*Permits quicker and easier program development*—You can utilize the maximum memory of the HP-86B—either directly as user memory, or as an Electronic Disc that optimizes disc transfer operations, and lets you write large programs. Serial I/O operations are directly supported from both FORTRAN-77 and Pascal. All of the flexibility of native mode I/O support is provided via the Macro-Assembler.

*Gives you confidence*—Use an industry-standard operating system, with more than 100 companies supporting over 300 application programs, implemented on nearly every major personal computer.



## Specifications

### SYSTEM REQUIREMENTS

- Computer:
  - HP-86B
- Memory:
  - 96K Total RAM; extended memory mode supported with minimum of 160K bytes of total RAM; built-in Electronic Disc supported with excess of 160K bytes of RAM
- Enhancements:
  - No ROM's or external plug-ins required or supported
- Peripherals:
  - HP Disc Drive (single required; dual recommended)

**NOTE:** The p-System may be expanded with additional disc drives (up to 16 on-line volumes), a printer, and an HP 82939A Serial Interface (RS-232C).

### UTILITY FEATURES

File Manager  
Screen-oriented Editor

Pascal/FORTRAN-77 Compilers  
Turtlegraphics  
Macro-Assembler  
Linker Utility  
Symbolic Debugger

### I/O SUPPORT

Serial I/O capabilities are directly supported from Pascal and FORTRAN-77. (HP-IB for other than discs and printers is not directly supported.)

UCSD Pascal and FORTRAN-77 do not directly support certain Series 80 interfaces, including HP 82938A HP-IL, HP 82940A GPIO, HP 82941A BCD, and HP 82949A Parallel Printer Interface.

Full I/O support from Assembly language (does not require Assembler ROM and System Monitor).

### ELECTRONIC RAM DISC

Requires no additional plug-in other than RAM.

Automatically configurable  
Maximum capacity:  
416K for HP-86A  
480K for HP-86B  
480K for HP-87XM

### FILE FORMAT

Unique p-System format

### EXECUTION SPEED

Pascal and FORTRAN:  
Comparable to native mode BASIC

Assembly language:

Comparable under both operating environments (native and p-System)

### GRAPHICS SUPPORT

Turtlegraphics, a line-oriented graphics library, is directly supported by Pascal and FORTRAN.

### KEYBOARD INTERFACE

Softkeys are supported  
Buffered keyboard input (80 characters)

## Ordering Information

HP Part Numbers:

CONFIGURATION	DESCRIPTION	PART NUMBERS	
		3½" Disc Media	5¼" Disc Media
UCSD p-System/ FORTRAN-77	Complete p-System software development system with FORTRAN-77 compiler	HP 82825A Opt. 630	HP 82825A Opt. 650
UCSD p-System Pascal	Complete p-System software development system with Pascal compiler	HP 82826A Opt. 630	HP 82826A Opt. 650
UCSD Pascal	Add-on Pascal compiler to be used with HP 82825A	HP 82827A Opt. 630	HP 82827A Opt. 650
FORTTRAN-77	Add-on FORTRAN-77 compiler to be used with HP 82826A	HP 82828A Opt. 630	HP 82828A Opt. 650
UCSD p-System Runtime Module	Lets you run software developed for the p-System. A subset of the configurations above. No software development utilities. <b>NOTE:</b> Some application software available for purchase is provided with a runtime module in the software disc and does not require this configuration for execution.	HP 82829A Opt. 630	HP 82829A Opt. 650

Product Includes:

- Software Media
- Operating System, and where appropriate, Language Documentation
- Pocket Guide

**Note:**

Contents differ for each configuration.

# Hewlett-Packard

## Series 80

### CP/M® System



HP 82900A CP/M® System

A new world of software is opened to you with the CP/M® System. The Auxiliary Processor module that's included contains all necessary hardware to implement the CP/M operating system. It extends your HP-86B system by adding a new CPU (Z-80A) and 64K bytes of RAM. Your HP-86B will accept software written under the CP/M Version 2.2 operating system that's compatible with HP disc format when loaded from disc.

### Operation

CP/M controls and directs a variety of tasks performed by your Series 80 personal computer. Tasks like accessing files, loading and executing programs, controlling the CRT display, interpreting keyboard input, and operating a peripheral printer.

The CP/M operating system comprises several subprograms or sequences of

### Features

- Print Spooling Buffer
- Supports Two Terminal Protocols
- Supports All Printer Interfaces
- Uses HP 120/125 Disc Format
- Provides Standard CP/M Operating Environment

### Benefits

*Increases efficiency and saves time*—Allows you to print and perform other operations simultaneously.

*Adds flexibility*—Facilitates easy configuration of programs.

*Adds versatility*—Allows interfacing to a wide variety of printers and other output-only devices.

*Provides common interchange format*—Gives access to a vast library of software (except special screen enhancements) available for HP 120/125.

*Is easy to use*—Lets you use software without modifications other than terminal configuration.

instructions with which you can produce application programs or software.

### System Specifications

#### SYSTEM REQUIREMENTS

- Computer:
  - HP-86B
- Peripherals:
  - HP Disc Drive (dual recommended)
  - Printer for hard-copy output
- Enhancements:
  - HP 82900A Auxiliary Processor module (see Ordering Information)

#### COMPATIBILITY

CP/M System supports serial printers, parallel printers, HP-IB disc and printers.

#### I/O HANDLING

HP-86B microprocessors handle I/O in Z-80A mode.

#### MEMORY REQUIREMENTS

Consumes 7K of built-in CP/M RAM.

#### CP/M PROGRAMS

CP/M System will run standard CP/M programs that are supplied on or converted to HP disc format.

#### SYSTEM UTILITIES

PIP—General purpose file transfer.  
 STAT—Program for tracking important system information.  
 SUBMIT and XSUB—Allow execution of batch processing jobs.  
 ED—Text editor.  
 ASM—Assembler.

#### FORMAT UTILITY

Formats CP/M discs and copies CP/M system software.

### Auxiliary Processor Specifications

PROCESSOR ..... Z-80A

CLOCK RATE ..... 4M Hz

#### MODE

You can switch between Z-80A and HP-86B mode. CP/M operating system loads automatically from disc. Reset the computer to return to HP native mode.

### Ordering Information

HP Part Numbers:

- HP 82900A—3½" and 5¼" Disc Media (includes Auxiliary Processor module)
- HP 82848A Opt. 630—3½" Disc Media Only
- HP 82848A Opt. 650—5¼" Disc Media Only

Product Includes:

- Software Disc Media
- Owner's Manual
- Introduction to CP/M Manual
- Pocket Guide
- Auxiliary Processor module (included only with HP 82900A)

### Note:

If you have an 82900A Opt. 001 TERM/80 Terminal Emulation System, you own the Auxiliary Processor module and need only order an HP 82848A option.

## Requirements for Configuration of Communications Options and Optional Operating Systems

OPTION	HP-85B	HP-86B
Communications TERM/80	N/A	HP Disc Drive (dual recommended) HP 82939A Serial Interface HP 82900A Auxiliary Processor Module
Modem	HP Disc Drive (required if using disc media) Telephone line terminated with modular plug	HP Disc Drive HP 82936A ROM Drawer 00087-15003 I/O ROM Telephone line terminated with modular plug
Data Communications Pac	HP Disc Drive (required if using disc media) HP 82939A Serial Interface Acoustic modem or direct serial port to a host computer	HP Disc Drive HP 82939A Serial Interface HP 82936A ROM Drawer 00087-15003 I/O ROM Acoustic modem or direct serial port to a host computer
Professional Communications	HP Disc Drive (dual recommended) HP 82936A ROM Drawer 00085-15005 Advanced Programming ROM Modem or RS-232C Interface (RS-232C is recommended for users outside the U.S., or for those who prefer to operate at 1200 baud-rate)	HP Disc Drive (dual recommended) HP 82936A ROM Drawer 00087-15003 I/O ROM Modem or RS-232C Interface (RS-232C is recommended for users outside the U.S., or for those who prefer to operate at 1200 baud-rate)
COM-80	N/A	HP Disc Drive HP 82936A ROM Drawer 00087-15003 I/O ROM
Speech Synthesis	HP Disc Drive An output speaker or headphones (eight ohms) equipped with either a 1/4" or RCA phono plug (if <b>not</b> using an HP 82912A or HP 82913A speaker for output)	HP Disc Drive Audio connector with RCA phone plug on each end; part number B120-3760 suggested (if using an HP 82912A or HP 82913A speaker for output) An output speaker or headphones (eight ohms) equipped with either a 1/4" or RCA phono plug (if <b>not</b> using an HP 82912A or HP 82913A speaker for output)
Optional Operating Systems UCSD p-System*	N/A	HP Disc Drive (dual recommended) Requires 96K total RAM. More memory (up to 160K) provides extended memory support for program execution. Memory in excess of 160K bytes can be used as Electronic Disc
CP/M	N/A	HP Disc Drive (dual recommended) Printer (recommended) HP 82900A Auxiliary Processor Module

\* The UCSD p-System may be expanded with additional disc drives (up to 16 on-line volumes), a printer, and an HP 82939A Serial Interface (RS-232C).

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

# Hewlett-Packard

## Series 80

### Software

Series 80 software gives you solutions for a variety of tasks—from general-purpose programs that let you do graphics or spreadsheets to software that's designed for specific professions.

This range of solutions means that you can purchase a Series 80 system for one task, and then find other ways for it to help you improve your on-the-job effectiveness.

Computer-aided work software is designed to help professionals in virtually any field with their fundamental tasks, including:

- Doing business planning on electronic spreadsheets.
- Producing professional-quality charts and graphs.
- Writing and editing printed reports and memos.
- Managing and retrieving information from on-line files.

Computer-aided work software also lets you take advantage of some Series 80 key features—for example, softkeys for maximum ease of use, and large memory for extensive problem-solving. And it's backed by HP's extensive post-sale support capabilities.

In addition, there are several software offerings to help you solve problems unique to your responsibilities—in such fields as

- Engineering and science
- Accounting and finance
- Real estate finance
- Project management
- Computation and statistical analysis

Many of these solutions are available from third-party suppliers through the HP PLUS program (rather than from Hewlett-Packard). These suppliers also provide post-sale support for their products. For more information on third-party packages, contact the

supplier at the address that appears below the descriptions beginning on the next page, or consult the *Series 80 Software Catalog*. This catalog also shows the geographic areas within which the software packages are supported and distributed.

To find the solutions that fit your needs, look in the pages that follow, according to the types of software that appear below.



**Spreadsheet Analysis**



**Graphics**



**Word Processing**



**Data Management**



**Time and Project Management**



**Real Estate**



**Accounting**



**Finance**



**Computation and Analysis**



**Engineering and Science**



**Education**



**Recreational (Games)**

**Note:** Starting on page 66, you'll also find more detailed information on Series 80 computer-aided work software (VisiCalc® PLUS, Graphics Presentations, WORD/80, and FILE/80).

# Hewlett-Packard

## Series 80

### Software at a Glance

Once you've identified the software categories that interest you, choose the software that provides the solutions you need. Information below each description tells you what computer the software runs on, media types and sizes, HP part numbers, and any optional operating system you might need (CP/M or UCSD p-System).

*CP/M®* indicates software that runs with the optional Series 80 CP/M system (available on the HP-86B).

*p-System* indicates software that runs with the optional UCSD p-System (available on the HP-86B).

*Cart.* indicates software available on a tape cartridge (HP-85B only).

*3½"* indicates software available on a 3½" flexible disc.

*5¼"* indicates software available on a 5¼" flexible disc.

#### Personal Productivity Pac

The Personal Productivity Pac for the HP-86B combines the power of the VisiCalc PLUS electronic spreadsheet with the easy-to-use WORD/80 word processor and FILE/80 file management system. The combination provides you with a powerful office productivity tool to handle even your most difficult problems.

HP-86B	3½"	82846A Opt. 630
HP-86B	5¼"	82846A Opt. 650

#### Perfect Pac

Perfect Pac provides the HP-86B user with a highly capable CP/M software product. The package includes Perfect Writer and Perfect Speller word processing packages, Perfect Filer information manager, and Perfect Calc, a powerful electronic spreadsheet. All four have a common command structure and can share data files.

HP-86B	3½"	98592JA Opt. 630
HP-86B	5¼"	98592JA Opt. 650



#### Spreadsheet Analysis

##### VisiCalc® PLUS

One of the most powerful and widely-used analytical tools available for personal computers. With an HP-86B Personal Computer expanded to maximum memory, VisiCalc PLUS can handle a five-year forecast with over 200 line items—on a worksheet with 63 columns and 254 rows.

And, there's the Series 80 PLUS: graphics and financial analysis capabilities built into VisiCalc. You can use the information contained in a VisiCalc worksheet to create line graphs, bar charts, and pie charts. Calculate net present value and internal rate of return. Or do curve fitting.

HP-85B	Cart.	82800A Opt. 610
HP-85B	3½"	82800A Opt. 630
HP-85B	5¼"	82800A Opt. 650
HP-86B	3½"	82830A Opt. 630
HP-86B	5¼"	82830A Opt. 650

##### SuperCalc™ SuperCalc2

Offer a CP/M-based electronic worksheet for quick and easy data manipulation. In addition to standard VisiCalc capabilities, SuperCalc gives you a variety of formatting options. You can enter lengthy headings more easily because SuperCalc lets you vary the width of your columns. You can also format whole rows and columns of cells (as well as the normal individual and "global" formatting), and print out formulas used in your worksheet. And it's much easier to move and copy groups of cells within the worksheet.

SuperCalc 2 uses commands that are similar to other Sorcim SuperWare, and offers such advanced features as multiple worksheet consolidation, sorting, calendar/clock to allow automatic calculations of dates and time periods, protected areas, independently variable column widths, and split-screen viewing.

HP-86B	CP/M
Supplier:	
Sorcim Inc.	
2310 Lundy Ave.	
San Jose, CA 95131	
(404) 942-1727	

#### MULTIPLAN

For HP-86B owners, the MULTIPLAN high-performance electronic spreadsheet gives you the familiarity of a calculator and the power of a microcomputer. MULTIPLAN has many advanced features including multiple windows, flexible column widths, multiple sheet editing, and flexible report generation. Because MULTIPLAN is a standard ASCII text file, it is compatible with other CP/M productivity software such as WordStar.

HP-86B	3½"	82855A Opt. 630
HP-86B	5¼"	82855A Opt. 650

#### MicroPlan

MicroPlan is the financial-planning package designed for the serious business user. Formulas are built-in, and no replication is required. On-screen commands are referenced by numbers, so typing skills are not needed. As you develop a spreadsheet with MicroPlan, the commands used are automatically documented so that continuity is assured. To find out how a worksheet was developed, you press the command for "show rows", and the sequence of commands will be shown with their prompted values. MicroPlan's powerful commands and built-in formulas are a real benefit for serious business users.

HP-86B	3½"	45502A Opt. 630
HP-86B	5¼"	45502A Opt. 650

#### MicroPlan Consolidation Option

The Consolidation Module is an add-on to MicroPlan for consolidation of different reports, and for drawing data into MicroPlan from outside sources. Such sources include mainframe and minicomputers, outside timesharing services, and other spreadsheet, general ledger, data base, or accounts receivable packages. The Consolidation Module must be used with MicroPlan. It is not a stand-alone product.

HP-86B	3½"	45503A Opt. 630
HP-86B	5¼"	45503A Opt. 650



## Graphics

### Graphics Presentations

Easy-to-use software for creating professional-quality charts and graphs. This pac lets you create graphics on paper for reports and analysis, or on transparencies for overhead presentations. The software is user-friendly, too. A few examples get you started. Then, instructions in the program itself help you easily produce pie charts, bar charts, text slides, and line charts.

With the HP-86B Graphics Presentations Pac you can also do line and arc drawing for applications like forms and organization charts.

HP-85B	3 1/2"	82801A Opt. 630
HP-85B	5 1/4"	82801A Opt. 650
HP-86B	3 1/2"	82831A Opt. 630
HP-86B	5 1/4"	82831A Opt. 650



## Word Processing

### WORD/80

A versatile, HP-easy package for preparing reports, letters, and other "typewritten" documents. WORD/80 lets you take advantage of the HP-86B's softkeys, so you can edit, format, print, or store your document by pressing a few keys. And, with full on-screen editing, you can cut, paste, or copy both rows and columns of text—and see the results right on the screen. Among WORD/80's extensive formatting capabilities for presentation documents are: indentation, variable line spacing, numbering pages, character underlining, boldface, and headers and footers.

HP-86B	3 1/2"	82823A Opt. 630
HP-86B	5 1/4"	82823A Opt. 650

### WordStar®

One of the most popular word processing programs available for today's microcomputers, WordStar is a screen-oriented word processing system that

makes it easy to edit, reorganize, and format printed documents—without retyping each draft. WordStar features a series of menus that let you choose from several levels of on-screen help, depending on your level of experience with the product. The software also includes a training guide.

HP-86B	3 1/2"	45584A Opt. 630 CP/M
HP-86B	5 1/4"	45584A Opt. 650 CP/M

### SpellStar®

Checks your WordStar documents to eliminate spelling and typographical errors. SpellStar consists of a dictionary of approximately 20,000 words that you can augment to include words you use frequently, like technical words or foreign phrases.

HP-86B	3 1/2"	45588A Opt. 630 CP/M
HP-86B	5 1/4"	45588A Opt. 650 CP/M

### MailMerge®

Adds to the printing capabilities of WordStar. By merging files or a mailing list into a form letter file, MailMerge lets you produce personalized form letters, insert data into printouts, print multiple copies, or combine portions of several documents.

HP-86B	3 1/2"	45587A Opt. 630 CP/M
HP-86B	5 1/4"	45587A Opt. 650 CP/M

### Write/Idea™

A sophisticated, flexible, easily-mastered word processing program for the HP-85B. Write/Idea lets you write and edit reports, articles, letters, manuscripts and other kinds of documents. You can print them on any Series 80-compatible printer or make slide transparencies of tables and outlines with an HP graphics plotter.

HP-85B  
Also available for the HP-86B

Supplier:  
ECOM West  
1749 Write St.  
Sacramento, CA 95825  
(916) 971-1046

### DOCUMATE™

Makes your HP-85B an easy-to-use, portable writing and editing system. You can use it to write and revise documents containing up to 15,000 characters. Full on-screen editing means you see your editing entered immediately. And, you delete, insert, add, and change copy—or even move blocks of text—by pressing one key. You can print documents on the HP-85B's built-in printer or on peripheral letter-quality or dot-matrix printers.

HP-85B

Supplier:  
Applied Microcomputer Systems  
Page Hill Road  
Chocorua, NH 03817

### TEXT85

A screen-oriented, easy-to-use word processing package for the HP-85B. TEXT 85 lets you choose either softkey commands or typed-in commands, so you can create documents the way you find easiest. Because the software's screen oriented, what you see is what you get when the document is printed. And there's plenty of versatility in the items you can print—form output, equations, even embedded graphics.

HP-85B

Supplier:  
Applied Research and Consulting  
2938 Madison Ave.  
Loveland, CO 80537  
(303) 667-7936

### Text Editing

With HP-85B Text Editing you can write memos, outlines, and reports on your display screen, and edit copy by changing words or moving groups of lines. And, you can save what you've written on tape or disc to call it up later for more editing or hard-copy printing.

HP-85B Cart.	82816A Opt. 610
HP-85B 3 1/2"	82816A Opt. 630
HP-85B 5 1/4"	82816A Opt. 650

## Perfect Writer/Perfect Speller

Perfect Writer/Perfect Speller is a powerful word-processing package available for the HP-86B Personal Computer. The package consists of two products that allow you to create sophisticated documents and automatically check for and correct spelling errors. The package offers internal safeguards to protect against loss of material and irretrievable mistakes. The Document design features permit automatic indexing, automatic footnote placement, and in-text referencing. They also allow a table of contents to be created automatically. A large and flexible language, virtual memory architecture, multiple file buffers, and multiple file displays combine to make Perfect Writer/Perfect Speller more user friendly.

HP-86B 3½" 98593J Opt. 630  
HP-86B 5¼" 98593J Opt. 650



## Data Management

### FILE/80

A user-friendly file management system that makes it easy to create files and generate reports from them. FILE/80 smoothly guides you through the process of file creation. Then, a convenient on-screen form lets you prepare labels, reports in a variety of formats, and form letters with names or other information inserted from your files. FILE/80 also offers extensive search capabilities for finding specific information in your file (for example, names in a zip area). FILE/80 will manage up to 65,000 separate records (with up to 100 items of information per record) with the actual number dependent on your system's memory capacity.

HP-86B 3½" 82824A Opt. 630  
HP-86B 5¼" 82824A Opt. 650

### dBASE II™

A relational data base management system that extends the power of Series 80 to tasks that previously required large mainframe computers. dBASE II lets you create interrelated files and easily enter and retrieve information. You can design

your data base to work interactively or under the control of programs that you write using English-like commands. Data bases can range from simple files to complete personnel or accounting records.

HP-86B 3½" 45583A Opt. 630 CP/M  
HP-86B 5¼" 45583A Opt. 650 CP/M

### File/Idea

File/Idea is a file management system designed to provide quick and easy creation, entry, and printing of user created files. File/Idea fits into the mid-range of "data base" programs. It is suitable for a variety of applications which require keeping track of information of the sort one might keep on file cards, or as forms in a file drawer, or as a list. File/Idea offers a flexible print format and a program which will allow users to create "form letters" using File/Idea files and Write/Idea text files. Users may also translate numeric data from File/Idea files into a format compatible with HP's General Statistics Pac and the VisiCalc PLUS VZWRITE utility.

HP-86B  
Supplier:  
ECOM West  
1749 Write St.  
Sacramento, CA 95825  
(916) 971-1046

### File Manager

Helps you get the specifics you need from your information. You can search the files—up to 1,000 records—using up to 10 conditions. File Manager lets you organize the output using its five-level nested sort capability. Built-in report and graphics capabilities let you turn your information into printed reports, mailing labels, and color graphics. And, you can convert your File Manager records into VisiCalc files, so you can do *what-if* analyses on your data.

HP-85B 3½" 88103A Opt. 630  
HP-85B 5¼" 88103A Opt. 650  
HP-86B 3½" 88104A Opt. 630  
HP-86B 5¼" 88104A Opt. 650

### Information Management Pac (IMPac)

Lets your HP-85B handle list management. You can create data files for

approximately 1,000 records. Search through the records using up to 15 conditions. And generate lists and reports. Or, use IMPac's graphics capabilities to plot data in graphs and charts.

HP-85B 3½" 82817A Opt. 630  
HP-85B 5¼" 82817A Opt. 650



## Time and Project Management

### Milestone®

For project management and time scheduling. Milestone lets you do instant *what-if* analyses to update schedules, observe the impact of scheduling changes, and analyze your costs to show the tradeoffs between labor, expenses, and time. PERT (Performance Evaluation and Review Technique) gives you a program for tracking projects, while CPM (Critical Path Method) lets you plan projects as a series of activities and determine the most critical time line.

HP-86B 3½" 45580A Opt. 630 CP/M  
HP-86B 5¼" 45580A Opt. 650 CP/M

### Datebook II™

An appointment-scheduling program for doctors, attorneys, and other professionals. You can use Datebook to store a permanent record of each day's activities and print out schedules as needed. Datebook maintains up to 40 appointments per day for as many as 27 people.

HP-86B 3½" 45581A Opt. 630 CP/M  
HP-86B 5¼" 45581A Opt. 650 CP/M

### Personal Datebook™

Applies the speed and efficiency of Datebook II™ to your individual time scheduling problems. Personal Datebook provides you with a printout of your daily appointments, and lets you track appointments for as many as 9 people. It will manage the appointments in blocks of 28 days and keep a special future appointment list beyond 28 days.

HP-86B 3½" 45582A Opt. 630 CP/M  
HP-86B 5¼" 45582A Opt. 650 CP/M



## Real Estate

### Residential Property Analysis (RPA)

Residential Property Analysis (RPA) is an integrated CCIM level package designed for analyzing and marketing large apartment complexes. It can be used for commercial properties with certain restrictions on the tax handling. Programs included in RPA are 1) Investment Analysis, 2) Loan Broker, 3) Amortization Schedule, 4) Depreciation Schedule, and 5) Installment Sale. All five of the programs can be used separately or together. None of the programs require the use of worksheets.

HP-86B

CP/M

Supplier:

L and S Enterprises  
18558 Santa Ynez Street  
Fountain Valley, CA 92708



## Accounting

### Peachtree Accounting Series 8

Manages your books so you can spend more time on analysis and less on book-keeping. You can use these five accounting modules individually or together to form an integrated accounting system that can combine the entries in all modules for trial balancing and end-of-period reporting. These modules have been customized to take advantage of the unique features of Series 80 personal computers—to maximize their ease of use.

**General Ledger** helps you track a company with up to 100 departments. This module provides a complete set of management reports and can automatically post transactions you've recorded in other Peachtree modules. General Ledger provides flexible chart of account set-up and built-in depreciation/amortization calculations. You can generate comparative balance sheet and income statements with prior year information or budgeted amounts.

HP-86B 3 1/2" 82883A Opt. 630

HP-86B 5 1/4" 82883A Opt. 650

**Accounts Receivable** is designed to help you prepare bills and obtain timely collections from your customers. You can use it to print invoices, statements, and aging reports, as well as maintain information on sales taxes, customer accounts, and details for posting to the General Ledger. At the end of a billing period, you can generate either a balance forward or a more detailed open-item customer account.

HP-86B 3 1/2" 82884A Opt. 630

HP-86B 5 1/4" 82884A Opt. 650

**Accounts Payable** maintains a complete master file for each of your vendors. Plus, the module can show you which invoices to pay—by due date, discount date, or according to your cash flow requirements. Includes detailed aging reports, automatic posting for recurring invoices and the ability to apply credits to a specific invoice or as an open credit against a vendor record.

HP-86B 3 1/2" 82885A Opt. 630

HP-86B 5 1/4" 82885A Opt. 650

**Inventory Control** helps you exercise control over all facets of your inventory operations. It features three price levels for each item, standard cost or average cost options, and an inventory master file with sales, costs, and reorder information.

HP-86B 3 1/2" 82886A Opt. 630

HP-86B 5 1/4" 82886A Opt. 650

**PeachPay™ Payroll System** is a complete employee payroll system that you can use by itself or with General Ledger. It maintains employees' payroll history and supports weekly, biweekly, semimonthly, and monthly pay periods. PeachPay provides 12 deduction categories and 8 earnings categories. Also tracks sick and vacation days. An annual subscription provides you with tax record maintenance service to keep your payroll accounting abreast of federal, state, and local tax changes.

HP-86B 3 1/2" 82887A Opt. 630

HP-86B 5 1/4" 82887A Opt. 650

### TAJ™ I-85 The Accounts Journal™

Fully integrates the journals you need in small business accounting: general ledger, accounts receivable, accounts payable, and payroll. On the HP-85B TAJ can handle up to 400 general ledger accounts, 300 customers, 300 vendors, and 50 employees. Complete integration means that all journals are updated with one posting. Designed for use with hard disc or flexible disc mass storage.

HP-85B 5 1/4" 82854A Opt. 650

### TAJ™ I-87 The Accounts Journal™

Offers similar capabilities as TAJ I-85, but can handle up to 6,400 general ledger accounts, 4,800 customers, 4,800 vendors, and 800 employees on an HP-86B expanded to 512K of user memory. TAJ I-87 also interacts with TAJ Forms Pac, TAJ Financial Graphics Pac, and TAJ Job Costing Pac available from the supplier.

HP-86B

Supplier:

Production Data Systems  
2386 Fair Oaks Blvd., Suite 210  
Sacramento, CA 95825  
(916) 484-0155

### Data-Flex™ Accounting

Three independent accounting software modules—general ledger, accounts receivable, and payroll.

The general ledger module can handle up to 400 accounts and 4,300 transactions per month. Accounts receivable will handle up to 500 customers and 4,300 transactions per month per data disc. The payroll module will process up to 200 employee records.

HP-85B

Supplier:

Champ Systems, Inc.  
6355 Riverside Blvd., Bldg. 3, Suite R  
Sacramento, CA 95831  
(916) 424-4066



## ADS Business Software

Five integrated, easy-to-use accounting modules. You can handle up to 400 records on General Ledger, 1,100 on Accounts Receivable, and 550 on Accounts Payable. With Inventory you can keep track of up to 2,200 records, while Payroll can handle up to 500 employees. In addition, some of these modules have been tailored for the needs of specific businesses, including small bookkeeping services, private membership clubs, retail jewelry stores, retail florists, restaurants, small contractors, veterinarians, tire dealers, and churches.

HP-86B

Supplier:

ADS Business Software  
3016 Franklin Rd. S.W.  
Roanoke, VA 24014  
(703) 344-6818

## FIN-87™ Accounting System FIN-87™ PLUS

Takes full advantage of the computing capability of the HP-86B including controlling the software with softkeys. FIN-87 offers fully integrated programs for General Ledger, Accounts Receivable, Accounts Payable, and Payroll. Your system can handle 2,000 transactions before updating the general ledger, 400 customer accounts, 400 vendor accounts, 1,000 open invoices, and 100 employees. FIN-87 PLUS includes an additional inventory package with the above modules, and lets you use the HP-41 Handheld Computers for remote data capture when you take inventory.

HP-86B

Supplier:

Profit Management Systems, Inc.  
3637 4th St., Suite 350  
St. Petersburg, FL 33704  
(813) 822-1793

## CMS STEP1 Distributor's System

A fully-integrated accounting system. STEP1 includes general ledger, accounts receivable, accounts payable, inventory control, and payroll modules. Designed to solve inventory and billing problems, STEP1 lets you choose versions that use either flexible or hard (Winchester) disc storage; you can later upgrade the flexible disc version to hard disc. Includes step-by-step instructions that assume no prior computer experience.

HP-86B

CP/M

Supplier:

Commercial Micro-Systems, Inc.  
Box 2575  
Newbury Park, CA 91320  
1-800-321-1103

## COSAC Plus

COSAC Plus, cost accounting/predicting with work-in-progress and accounts receivable management, takes powerful job costing and predicting features and combines them with other-invoice accounting. Costs can be followed on a job-by-job basis through concise reports, a work-in-progress/accounts receivable journal, and printed invoices. Overview reports, productivity reports and cost detail sheets may be generated with COSAC Plus. The program will also print invoices, job lists, cost category lists, and employee lists.

HP-86B

Supplier:

Threshold Software  
1832 Tribute Road, Suite E  
Sacramento, CA 95815



## Finance

### Aardvark Tax Planning

Includes programs, all fully tested by a major public accounting firm. All three programs include the provisions of the Tax Equity and Fiscal Responsibility Act of 1982.

**Personal Tax Plan** lets individual users do year-end planning using *what-if* calculations to minimize federal tax liabilities. With it you can do multiple-year projections (1982 to 1985) or multiple alternatives for a single year.

HP-86B	3½"	45586A	Opt. 630	CP/M
HP-86B	5¼"	45586A	Opt. 650	CP/M
HP-86B	3½"	82877A	Opt. 630	p-System
HP-86B	5¼"	82877A	Opt. 650	p-System

**Professional Tax Plan**, for professionals who provide tax consulting to clients, includes the capabilities of Personal Tax Plan, plus indexing for tax years 1985 and thereafter, and ten-year averaging for lump sum distributions.

HP-86B	3½"	45585A	Opt. 630	CP/M
HP-86B	5¼"	45585A	Opt. 650	CP/M
HP-86B	3½"	82876A	Opt. 630	p-System
HP-86B	5¼"	82876A	Opt. 650	p-System

**ESTATE TAX PLAN\*\***, for trust officers and professionals who manage estates, helps you determine various planning factors that affect death tax liabilities and payment schedules. It lets you examine: various valuations of clients' assets, selected marital deduction formula clauses in clients' wills, and present value analysis as it relates to impending death tax liabilities.

HP-86B	3½"	82878A	Opt. 630	p-System
HP-86B	5¼"	82878A	Opt. 650	p-System

## Portfolio Management

Helps individual investors and professional investment advisors monitor their portfolios. Softkey and prompt-driven commands make it easy to use. A connection to Dow Jones News/Retrieval® lets you automatically determine the current market value of your portfolio's stocks, bonds, warrants, treasury bills, and mutual funds. Other types of investments you can include in your analysis are: real estate, cash, liabilities, money market funds, and other assets. You can also group your investments into subclasses (airlines, oil, or categories you define). Portfolio Management can handle 35 portfolios per tape or disc with as many as 100 investment items per portfolio.

HP-85B	Cart. & 3½"	82814A	Opt. 630
HP-85B	Cart. & 5¼"	82814A	Opt. 650
HP-86B	3½"	82844A	Opt. 630
HP-86B	5¼"	82844A	Opt. 650

## Financial Decisions

Lets you perform a variety of financial analyses—including loan amortization schedules, internal rate of return, net present value, financial management rate of return, break-even analysis, price and yield of notes and bonds, depreciation schedules (straight line, declining balance, sum of the years' digits), and odd-days' interest.

HP-85B	Cart.	82803A	Opt. 610
HP-85B	3½"	82803A	Opt. 630
HP-85B	5¼"	82803A	Opt. 650
HP-86B	3½"	82833A	Opt. 630
HP-86B	5¼"	82833A	Opt. 650

## Home Budget Manager

Monitor and manage your household budget with Home Budget Manager for your HP-86B. Just enter expense and budget information in detailed categories, then compare and analyze the data with reports and graphics. Keep track of where your money is going. Record income and expenses, create budgets, enter checks by check number, record autoteller entries, flag tax-exempt income and expenditures, and create reports and graphs to show how and where your money is going.

HP-86B	3½"	92248EA	Opt. 630
HP-86B	5¼"	92248EA	Opt. 650



## Computation and Analysis

### General Statistics

Offers widely-used statistical tools. You can run: one-sample analysis, paired-sample analysis, chi-square, one- and two-way analysis of variance, t-test, and multiple linear regression. Also provides functions that replace reference tables for right-tail probabilities for eight common continuous and discrete distributions.

HP-85B	Cart.	82804A	Opt. 610
HP-85B	3½"	82804A	Opt. 630
HP-85B	5¼"	82804A	Opt. 650
HP-86B	3½"	82834A	Opt. 630
HP-86B	5¼"	82834A	Opt. 650

### Basic Statistics and Data Manipulation

Lets you develop a flexible data base for statistical analysis—or for use with the Regression Analysis Pac. This software prepares your data for analysis and lets you calculate such summary statistics as mean, standard deviation, number of observations, median, confidence interval, and quartiles.

HP-85B	Cart.	82805A	Opt. 610
HP-85B	3½"	82805A	Opt. 630
HP-85B	5¼"	82805A	Opt. 650
HP-86B	3½"	82835A	Opt. 630
HP-86B	5¼"	82835A	Opt. 650

## Regression Analysis

Analyzes relationships between a dependent variable and one or more independent variables. This software lets you use the least squares method to fit your data to a polynomial regression or to a multiple linear regression. Requires use of Basic Statistics and Data Manipulation Pac.

HP-85B	Cart.	82806A	Opt. 610
HP-85B	3½"	82806A	Opt. 630
HP-85B	5¼"	82806A	Opt. 650
HP-86B	3½"	82836A	Opt. 630
HP-86B	5¼"	82836A	Opt. 650

## Statistical Analysis Multi Pac

Gives you a complete, integrated software package for performing statistical analysis. Combines the General Statistics, Basic Statistics and Data Manipulation, and Regression Analysis pacs for a total solution to your statistical requirements—at a lower cost than you'd pay for the three pacs if purchased individually.

HP-85B	Cart.	82807A	Opt. 610
HP-85B	3½"	82807A	Opt. 630
HP-85B	5¼"	82807A	Opt. 650
HP-86B	3½"	82837A	Opt. 630
HP-86B	5¼"	82837A	Opt. 650

## Linear Programming

Gives you a simple and convenient means of optimizing linear programming models. This software will fit a variety of applications, including production scheduling, pharmaceuticals, food processing, feed lot blending, media selection, and others. With an HP-86B Personal Computer expanded to 256K of user memory, this software can handle up to 200 variables with 80 constraints.

HP-85B	Cart.	82808A	Opt. 610
HP-85B	3½"	82808A	Opt. 630
HP-85B	5¼"	82808A	Opt. 650
HP-86B	3½"	82838A	Opt. 630
HP-86B	5¼"	82838A	Opt. 650

### Data Evaluation System

A general purpose Data Evaluation System written especially for the HP-86B Personal Computers and an HP plotter such as the HP 7470A. The program offers two modes of operation, a CRT graphics mode and a plotter graphics mode. The program will both plot and fit experimental data to a variety of mathematical functions by non-linear least-squares. Customized versions of the program which incorporate user supplied functions are available. Graphs can be plotted on an external plotter and labeled along the axes or at any position specified by the user.

HP-86B  
Supplier:  
R & L Software  
1299 Beacon Street  
Newton, MA 02168



## Engineering and Science

### Waveform Analysis

Offers a wide range of applications in digital signal processing—in such areas as electrical engineering, acoustics, oil exploration, engine vibration analysis, signal noise detection, and image processing. You can input a single function and analyze up to 1,024 data points on an HP-86B Personal Computer. Or use double data input to enter information on two separate functions. The software also gives you routines for finding Fourier series coefficients.

HP-85B	Cart.	82809A	Opt. 610
HP-85B	3½"	82809A	Opt. 630
HP-85B	5¼"	82809A	Opt. 650
HP-86B	3½"	82839A	Opt. 630
HP-86B	5¼"	82839A	Opt. 650

### AC Circuit Analysis

Lets you quickly and easily simulate AC circuits and analyze their performance, so you can recognize design problems early in the development process. An interactive mode of operation lets you design optimal solutions for amplifiers, power and transmission systems, control systems, instrumentation, filters, spectral analysis, or environmental components.

HP-85B	Cart.	82810A	Opt. 610
HP-85B	3½"	82810A	Opt. 630
HP-85B	5¼"	82810A	Opt. 650
HP-86B	3½"	82840A	Opt. 630
HP-86B	5¼"	82840A	Opt. 650

### Math

Provides quick access to mathematical routines commonly employed in calculus, numerical analysis, linear systems, geometry, and special functions. Calculations you can perform include: simultaneous equations, solution to  $f(x)=0$  on an interval, integration, ordinary differential equations, Chebyshev polynomials, Fourier series, fast Fourier transform, complex number operations, and triangle solutions.

HP-85B	Cart.	82811A	Opt. 610
HP-85B	3½"	82811A	Opt. 630
HP-85B	5¼"	82811A	Opt. 650
HP-86B	3½"	82841A	Opt. 630
HP-86B	5¼"	82841A	Opt. 650

### Electronics Engineering Multi Pac

Offers a broad solution to your analytical problems by combining the AC Circuit, Waveform Analysis, and Math software packages. You can use this package to solve a range of electronics engineering problems—and at a lower price than you'd pay for the three pacs individually.

HP-85B	Cart.	82812A	Opt. 610
HP-85B	3½"	82812A	Opt. 630
HP-85B	5¼"	82812A	Opt. 650
HP-86B	3½"	82842A	Opt. 630
HP-86B	5¼"	82842A	Opt. 650

### 3D Plotting

Lets you draw perspective, isometric, or plan drawings of objects, designs, buildings, and other structures—on either a CRT screen or an external plotter. You can input the X,Y,Z coordinate data from the keyboard, from a graphics tablet, or from data files that interface with other Land Innovation software. You can also rotate, transform, mirror, and replicate the drawings—as well as view them from alternate points.

HP-86B  
Supplier:  
Land Innovation  
7359 Berkshire Ct.  
Maple Plains, MN 55369  
(612) 420-6811

### Land Innovation Site Computation and Design

A general surveying and site design program that includes all the basic COGO-type (coordinate geometry) operations—in a form that's easier to use than standard COGO. The package includes a vertical design section, a complete radial surveying program, and a legal description program. In addition, your field personnel can use the HP-41C Handheld Computer as a low-cost, portable terminal that they can plug into an HP-86B to transfer coordinates.

HP-86B  
Supplier:  
Land Innovation  
7359 Berkshire Ct.  
Maple Plains, MN 55369  
(612) 420-6811

### Surveying

For your most frequently-encountered surveying computations—to calculate and reduce field data in field traversing, coordinates, azimuths, sectors and fill areas, and station and elevation for vertical curves and grades.

HP-85B	Cart.	82813A	Opt. 610
HP-85B	3½"	82813A	Opt. 630
HP-85B	5¼"	82813A	Opt. 650
HP-86B	3½"	82843A	Opt. 630
HP-86B	5¼"	82843A	Opt. 650

### **OSLO-85**

A design and analysis program for a variety of optical systems. With OSLO you can perform such evaluations as paraxial ray tracing, exact ray tracing, spot diagram analysis, and computation of aberration coefficients. OSLO also lets you pre-program sequences of commands, and take advantage of HP-85B on-screen and hard-copy graphics capabilities.

HP-85B

Supplier:  
Sinclair Optics, Inc.  
6780 Pittsford-Palmyra Rd.  
Fairport, NY 14450  
(716) 425-4380

### **Topography: Digital Terrain Modeling**

Makes sophisticated terrain modeling techniques available to you on a Series 80 personal computer. With Topography you can perform a variety of mapping functions and computations. The program can produce finished contour maps, 3-dimensional projections, profiles, and cross sections. An earthwork program lets you compute volumes for site preparation, surface mining, reservoirs, and dredging.

HP-85B/86B

Supplier:  
PacSoft  
733 7th Ave.  
Kirkland, WA 98033  
(206) 827-0551

### **Chemical Engineering Pac I**

Eight programs to help you solve many of the time-consuming problems that arise in designing or troubleshooting a chemical plant. The programs, which you can also purchase individually, include: flow analysis, dew point and bubble point calculations, equations of state, isothermal flash calculation, adiabatic flash calculation, packed column analysis, McCabe-Thiele Analysis, and simultaneous non-linear equations.

HP-85B

Supplier:  
Kelix Software Systems  
425 Daventry Dr.  
Baton Rouge, LA 70808  
(504) 769-6785

### **Flow Network Analysis**

State-of-the-art software for the analysis of fluid piping networks. This user-friendly program lets you easily describe your flow network to the computer, and provides menus for selecting fittings, valves, and pipe surface roughness.

HP-86B

Supplier:  
Kelix Software Systems  
425 Daventry Dr.  
Baton Rouge, LA 70808  
(504) 769-6785

### **HYDRO PLUS III**

The HYDRO PLUS III Software Package was developed by civil engineers to be used by civil engineers as a storm water detention design tool. The programs and methods are oriented in a fashion to produce final-copy documents to be included in or stand alone as storm water detention reports. They allow a refined solution to storm detention design; and using these capabilities, a complex drainage system can be analyzed in a fraction of the time required than if the calculations were performed longhand. Programs available include Bowstring, Bowstring with Bypass, Universal Rational, Dekalb Rational and Soil Conservation Service Unit Hydrographs.

HP-86B

Supplier:  
PLUS III Software, Inc.  
1851 Peeler Road, Suite B  
Atlanta, GA 30338

### **COGO PLUS III**

The COGO PLUS III Program Package was developed for land surveyors and civil engineers involved in residential and commercial development. The package includes field data traverse, bearing traverse, coordinate geometry, coordinate rotation, executive, vertical curve, company data input, and system configuration programs. The COGO PLUS III Package can be used to upload and download data files as ASCII files for transmission by phone modem or direct disc loading of coordinates generated by other cogo systems.

HP-86B

Supplier:  
PLUS III Software, Inc.  
1851 Peeler Road, Suite B  
Atlanta, GA 30338

### **Linear System Response**

Linear System Response will analyze the time response and frequency response of a transfer function. The program features simplified data entry and extensive graphics capability with easy-to-read plots and superposition of response curves. Users can determine transfer function response for each of the following inputs: step, impulse, ramp, and sawtooth. Magnitude vs. frequency, phase vs. frequency, and logarithmic or linear frequency plots may be determined. The software is available on tape cartridge or 5¼" flexible disc.

HP-85B, HP-86B

Supplier:

Priority Software  
20993 Foothill Blvd., Suite 101  
Hayward, CA 94541

### **Op Amp Circuit Design**

The Op Amp Circuit Design Pac consists of a series of programs developed to aid the designer with his most often encountered op amp circuit tasks. Extensive use of circuit models permits simplified data entry and rapid computations.

HP-85B, HP-86B

Supplier:

Priority Software  
20993 Foothill Blvd., Suite 101  
Hayward, CA 94541

### **Active Filter Design**

Using basic filter requirements, the Active Filter Design program will determine component values, frequency response and time domain response, all in a matter of minutes. Filter selections offered are: Filter Type, Circuit Type and Filter Response. Active Filter Design will display insertion loss, determine component sensitivity, plot magnitude vs. frequency, automatically select standard resistor and capacitor values, compute the time response for step and user defined inputs, and draw circuit schematics.

HP-85B, HP-86B

Supplier:

Priority Software  
20993 Foothill Blvd., Suite 101  
Hayward, CA 94541

### **CADD/86-87**

#### **Computer-Aided-Drafting**

CADD/86-87 provides rapid access to hundreds of high-level functions by using both special function keys and global-mode-direct-execute keys. Users may work in either metric or inch units and any scale. CADD/86-87 provides an accurate, time-efficient, and cost-effective solution to a broad spectrum of design and drafting applications.

HP-86B

Supplier:

Tensegrity, Inc.  
2424 Addison  
Chicago, IL 60618

#### **Concrete Beam Design**

Concrete Beam Design (CD-1) designs reinforced concrete beams by either the ultimate strength or working stress method of ACI 318-77. Flexural reinforcement requirements are given for rectangular, tee, or ledger beam sections. Cutoff locations are given for the various bar sizes that the designer may choose to use. The end sections and midspan section may be of different size.

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223

#### **Flat Slab Analysis and Design**

This program analyzes and designs flat slab or waffle slab floors in accordance with ACI 318-77. Flat slabs may have drop panels at columns. Columns may have capitals. Either the ultimate strength or the working stress method may be used. Design is for a one-bay wide strip using the equivalent frame analysis method, and may be up to 10 spans. The strip may have cantilevers. No beams parallel to the direction of moments are permitted.

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223

### **Steel Beam Design**

Steel Beam Design (SD-1) designs or checks steel W, S and C sections subjected to loads and end moments. The program selects the lightest sections for each of several section depths. A check routine allows the designer an opportunity to check a section. The ratio of the actual is calculated. Solutions do not include biaxial bending problems. The program includes data files for W6 through W36 sections as listed in the AISC Steel Construction Manual.

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223

### **Steel Column Design**

Steel Column Design (SD-2) designs or checks wide flange, tube or pipe steel sections subjected axial loads with or without bending moments applied about axes of the column. The moments can be applied to either or both ends of the column. The program selects the lightest section for a specified depth. "Pin-ended column" base plates can also be designed. Base plate dimensions can be established for special "built-up" column shapes. The program includes data files for W6 through W36 sections as listed in the AISC Steel Construction Manual.

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223

## Plane Frame & Truss Analysis

Plane Frame & Truss Analysis (FA-3) determines critical moments, axial loads, and the displacements at all joints for a plane frame of any configuration. Initial axial displacements are allowed in order to evaluate the effects of settlements, member shrinkage, or member temperature change. Members may have variable section. Members may have uniform (full or partial) length, or concentrated.

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223

## Reinforced Concrete Column Design

Reinforced Concrete Column Design (CD-2) designs or checks the capacity of a reinforced concrete column in accordance with ACI 318-77 with bending in either or both directions. Slenderness effects are evaluated according to the moment magnification method in accordance with Section 10.11 of the ACI Code. Slenderness ratio limited to 100 or less. Cross-sections include rectangular (tied), round (spiral or tied), and square with circular bar arrangement (spiral or tied).

HP-85B, HP-86B

Supplier:

ECOM Associates, Inc.  
8634 W. Brown Deer Road  
Milwaukee, WI 53223



## Education

### BASIC Training

Whether you're new to personal computing or have BASIC programming experience, you can use this interactive training pac to suit your requirements. BASIC Training provides a self-teaching, tutorial course on the operation and HP BASIC language programming of Series 80 personal computers. You can start from the beginning or at any other level, and proceed at your own pace. A tutorial workbook-style manual includes tests and reviews; a supplemental reference booklet contains step-by-step problem solutions, flow charts, and an abridged BASIC dictionary.

HP-85B	Cart.	82802A	Opt. 610
HP-85B	3 1/2"	82802A	Opt. 630
HP-85B	5 1/4"	82802A	Opt. 650
HP-86B	3 1/2"	82832A	Opt. 630
HP-86B	5 1/4"	82832A	Opt. 650

### Graphics Instruction Device

Graphics Instruction Device (GRID) is specifically tailored to the classroom. It comes with a teaching text, is operated by single keystrokes, produces industry quality drawings and does not require the user to know how to program a computer. GRID was designed by classroom instructors and allows students to make simple drawings at their first session. GRID stores drawing data as familiar English words, not abbreviations or control characters. A complete and readable list of the drawing data is always available at the push of a button.

HP-85B, HP-86B

Supplier:

Responsive Logic  
156 Donald Street  
Oregon City, OR 97045



## Recreational

### Games and Games II

Two games pacs offer card games (including blackjack), board games, dynamic action games, and games of pattern generation. Games II is a series of graphically-displayed action games.

Games:

HP-85B Cart.	82818A	Opt. 610
HP-85B 3 1/2"	82818A	Opt. 630
HP-85B 5 1/4"	82818A	Opt. 650

Games II:

HP-85B Cart.	82819A	Opt. 610
HP-85B 3 1/2"	82819A	Opt. 630
HP-85B 5 1/4"	82819A	Opt. 650

### Galaxy Patrol

Galaxy Patrol turns your HP-86B into the cockpit of a sleek interceptor craft on the fringes of the galaxy. As the captain of this powerful starship, you're patrolling the galactic border, repelling any alien incursions you discover.

As you drop out of warp drive, an alien ship screams across your field of vision. You blast it out of the sky only to discover a larger, more menacing ship closing in on you. Now it is your turn to be the hunted. Are you up to the challenge?

HP-86B	3 1/2"	92248FA	Opt. 630
HP-86B	5 1/4"	92248FA	Opt. 650

### Action Games

Transform your HP-86B into an electronic amusement center with six challenging arcade-style video games. Try your hand at the galactic shooting gallery *Criss-Cross*, where you and enemy space ships go head-to-head in a fight to the death. Perhaps *Dodge Ball* is more your speed. It's just like the schoolyard game. If you're a driving machine, *Race* will test your mettle as you careen around corners in your Formula I car. Try to grab the cheese before giant predators grab you in *Mouser*. A three-dimensional maze with a twist. Try hopping from one side of the screen to another in *Spools*. Sound easy? Not when your landing pads are moving. If trapping is more your game, try *Heebie-Geebies*. Trap the Heebie-Geebies before they eat you.

HP-86B	3½"	92248DA Opt. 630
HP-86B	5¼"	92248DA Opt. 650

### Additional Solutions Series 80 Users' Library

The Series 80 Users' Library contains over 400 contributed programs written by owners of Series 80 personal computers. Applications include business and finance, software tools, physical and life sciences, and many more. For complete information on purchasing or contributing programs to the library, consult the Series 80 Software Catalog, HP part number 5953-7804 (available from your local HP dealer or sales representative).

### Trademarks

UCSD p-System and UCSD Pascal are trademarks of The Regents of the University of California.

VisiCalc® is a registered trademark of VisiCorp.

WordStar® MailMerge® and SpellStar® are registered trademarks of MicroPro International Corporation.

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Milestone® is a registered trademark of Organic Software. Datebook™ and Personal Datebook™ are trademarks of Organic Software, Inc.

PeachPay™ is a trademark of Peachtree Software, Inc.

TAJ™ and The Accounts Journal™ are trademarks of Production Data Systems.

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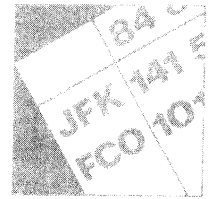
DOCUMATE is a trademark of Applied Microcomputer Systems.

MicroPlan™ is a trademark of Chang Laboratories, Inc.

# Hewlett-Packard

## Series 80

### VisiCalc® PLUS



VisiCalc offers one of the most powerful and widely used analytical tools available for personal computers. And, with Series 80 VisiCalc PLUS, you get the power of VisiCalc, PLUS additional graphics and computational capabilities.

You can use it to do *what-if* planning, statistical analysis or financial analysis.

### Applications

VisiCalc PLUS's potential applications include anything that involves using a grid or matrix. Some of these uses include:

- Spreadsheets for budgeting and financial planning.
- Statistical analyses in research or manufacturing environments.
- Forecasting sales or production.
- Chronological *what-if* analyses.

### Operation

The VisiCalc PLUS worksheet is a grid of 63 columns and 254 rows. The intersections of columns and rows define hundreds of positions (called "cells") on the worksheet. In any cell, you can enter an alphabetic label, a

#### Features

- Takes Advantage of Expandable Memory of HP-86B
- Statistical and Financial Analysis Functions
- Graphics Capability
- Recalculating Capability

#### Benefits

*Increases your problem-solving power*—Lets your personal computer handle very large worksheets (63 columns by 254 rows).

*Enhance your productivity*—You get a broad range of analytical capability, including standard deviation and mean calculations, as well as Net Present Value and Internal Rate of Return functions.

*Improves communication and analysis*—You can turn your worksheet results into pie, line, or bar charts.

*Improves analyses for decision-making*—Lets you evaluate a model or business plan by showing results under different scenarios.

number, or a formula. If you enter a formula, the computer will change its value if you change related entries in other cells. With VisiCalc PLUS, a Series 80 computer display screen becomes a window that looks upon a much larger electronic worksheet.

Expand an HP-86B Personal Computer to maximum memory, and it gives you a worksheet large enough to handle a five-year forecast with over 250 line items and subtotals. That's comparable to a worksheet 5 feet wide and over 20 feet tall, if each cell covers a square inch.

VisiCalc® is a registered trademark of VisiCorp.

A1										
9884										
	A	B	C	D	E	F	G	H	I	J
1										
2	MAINCORP PLAN 1983-1988									
3										
4	OPERATING RESULTS:				JAN	FEB	MAR	1QTR	APR	MAY
5	REVENUES									JUN
6		RENTALS & SERVICES				104.4	99.6	100.5	304.5	103.5
7		SALES				243.6	232.4	234.5	710.5	241.5
8	TOTAL REVENUES				348	332	335	1015	345	350
9	COSTS AND EXPENSES									
10		COS				212.28	202.52	204.35	619.15	210.45
11		DEPREC				6.612	6.308	6.365	19.285	6.555
12		INTEREST				3.828	3.652	3.685	11.165	3.795
										214.72
										6.688
										3.872



## Specifications

### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B
- Memory:
  - 32K Total RAM (for HP-85B)
  - 64K Total RAM (for HP-86B—minimum memory required; will support additional memory)
- Peripherals and Enhancements:
  - For Disc Storage*
    - HP Disc Drive (single minimum, dual recommended)
    - HP 82937A HP-IB Interface (for HP-85B)
  - For Hard-copy Output of 8½" × 11" Worksheets*
    - Printer
    - HP 82937A HP-IB or other interface
  - For Graphics Output*
    - HP Graphics Plotter
    - 00085-15002 Plotter/Printer ROM (for HP-85B)
    - 00087-15002 Plotter ROM (for HP-86B)
    - HP 82936A ROM Drawer
    - HP 82937A HP-IB Interface (for HP-85B)

### DISPLAY

HP-86B .....80 columns × 12 or 20 lines  
 HP-85B .....32 columns × 12 lines

### WORKSHEET

SIZE ..... 63 columns × 254 rows  
 (maximum)

### CHARACTERS PER CELL

HP-86B .....160 maximum  
 HP-85B .....64 maximum

### FUNCTIONS

AVERAGE—Computes the average (or MEAN) of the values in the range.  
 COUNT—Counts the number of non-blank entries in a specified list of entries.  
 DISCOUNT—Computes the present value of a series of cash flows.  
 ERROR—Results in an error value that makes all expressions using the value display "ERROR".  
 IRR—Returns the internal rate of return using a range of cash flows.  
 LOOKUP—Looks up a value in a table and returns a value that corresponds to it.  
 MAXR—Computes maximum value in a range.  
 MEAN—Computes the mean (or AVERAGE) of values in a range.  
 MINR—Computes the minimum value in a range.  
 NA—Results in a "Not Available" value that makes all expressions using the value display "NA". Lets you trace the effect of a particu-

lar value through the worksheet.

NPV—Computes the net present value of cash flows in a range.

STDEV—Computes the sample standard deviation of the values in a range.

SUM—Computes sum of values in a range.

VARIANCE—Computes sample variance of the range values.

Mathematical functions—ABS, ACS, ASN, ATN2, CEIL, COS, COT, CSC, DATE, DTR, EPS, EXP, FLOOR, FP, INF, INT, IP, LGT, LOG, MAX, MIN, PI, RMD, RND, RTD, SEC, SGN, SIN, SQR, TAN, TIME.

### COMMANDS

/B Blank	/P Print
/C Clear	/R Replicate
/D Delete	/S Storage
/E Edit	/T Titles
/F Format	/V Version
/G Global	/W Window
/I Insert	/~ Repeating labels
/M Move	/? Display commands

### WORKSHEET SIZE (in cells)\*

		Amount of Memory:					
		32K	64K	128K	192K	256K	384K 640K
HP-85B	500						
HP-86B			3000	4850	6700	10450	16100

\* These figures assume that each cell contains a label that is 15 alphanumeric characters in length—to illustrate the capacity of the expandable memories of the HP-86B Personal Computers. Figures are approximate and will vary if formulas and numbers are used instead of labels.

## Ordering Information

HP Part Numbers:

*For HP-85B*

- HP 82800A Opt. 610—Tape Cartridge
- HP 82800A Opt. 630—3½" Disc Media
- HP 82800A Opt. 650—5¼" Disc Media

*For HP-86B*

- HP 82830A Opt. 630—3½" Disc Media
- HP 82830A Opt. 650—5¼" Disc Media

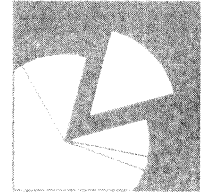
Product Includes:

- Software Media
- Owner's Manual
- Pocket Reference Guide

# Hewlett-Packard

## Series 80

### Graphics Presentations



Graphics Presentations is an easy-to-use software solution for creating professional-quality, multi-color charts and graphs. Combined with a Hewlett-Packard plotter, this pac lets you create graphics on paper for analysis and inclusion in reports, or on transparencies for overhead presentations.

#### Applications

Graphics Presentations is a powerful tool for anyone who needs to simplify masses of numerical information. Here are some examples of graphics in a variety of fields:

##### Marketing

- Sales Forecasting
- Sales Performance vs. Quota
- Competitive Price Analysis

##### Finance

- Forecasting Expense Levels
- Cost of Goods Sold vs. Projections
- Net Profit vs. Sales

##### Production

- Shipping Targets vs. Actuals
- Tracking Inventory Levels vs. Target
- Forecasting Labor and Material Cost

##### R&D

- Project Cost Distribution
- Forecasting Staffing Levels
- Projecting Return on Investment

#### Features

- Softkey-driven Software
- High-quality, Flexible Output Capability
- On-screen Preview
- Graphics File Output
- Powerful Character Set
- Chart Storage

#### Benefits

*Makes chart creation easy*—Keys act as a guide through chart preparation, modification, and storage.

*Saves time*—You don't have to relearn operations or complicated command codes.

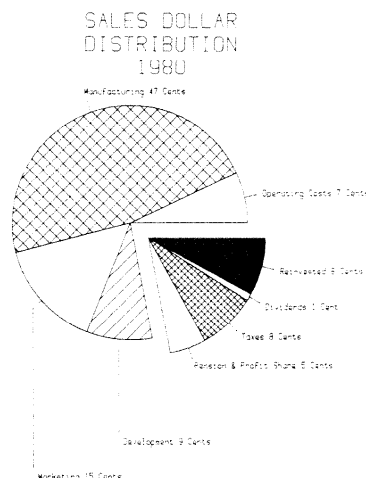
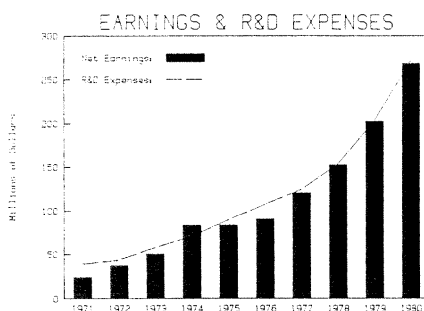
*Provides professional-looking results*—Charts look like a graphics artist created them. Plus, the computer does it much faster, and makes producing duplicates as easy as pressing a key. Charts are supported by a wide range of HP plotters—from 8½" × 11" to size E (44" × 34") drafting paper.

*Saves time*—During chart creation, you can preview and modify slides on the screen prior to plotting.

*Increases your flexibility*—Enables you to store charts as graphics files and use them with WORD/80 (HP-86B word processing software) to include graphics in reports and memos.

*Offers variety of appearances*—Create the desired look and necessary emphasis with 9 letter sizes, 6 line types, 3 character fonts, and additional character sets—French, German, Spanish, Scandinavian, and Math.

*Increases productivity*—Lets you keep a permanent record of charts that can be plotted again, modified, or easily transported to another location.



## Operation

Graphics Presentations is easy to learn. A few examples get you started. Then, instructions right in the program make it easy to create the charts you need. Graphics Presentations is easy to use, too. Since it's menu-driven and supported by softkeys, you don't have to learn complicated control codes to

operate it. And it's powerful—you can use Graphics Presentations to create:

- Bar Charts—single, stacked, negative bar, clustered, etc.
- Pie Charts—single or dual, up to 24 pieces per pie, exploded or regular.
- Line Charts—single or multiple (up to 6 lines per chart) supporting 6 types

of lines (dotted, dashed, etc.) for trend analysis and comparison.

- Text Charts—allow you to prepare organization charts, flow charts and logos or symbols. Enter text phrases, lines, arcs, and circles in any combination.

### Specifications

#### SYSTEM REQUIREMENTS

- Computer:
  - HP-85B, HP-86B
- Memory:
  - 96K Total RAM (for HP-86B)
  - 32K Total RAM (for HP-85B)
- Peripherals:
  - HP Disc Drive (single supported, dual recommended; optional for HP-85B)
  - HP Graphics Plotter
  - Printer for hard-copy output (optional)
  - 00087-15002 Plotter ROM (for HP-86B)
  - 00085-15002 Plotter/Printer ROM (for HP-85B)
  - HP 82936A ROM Drawer
  - HP 82937A HP-IB Interface (for HP-85B)

#### DISPLAY

HP-85B	32 columns × 24 lines (256 × 192 Pixel)
HP-86B	80 columns × 24 lines (400 × 240 Pixel)

#### CHARACTER FORMATION

Fonts	normal, smooth, and roman with slanted or normal presentation for each font
-------	---

Placement options	auto center, normal, auto underline
-------------------	-------------------------------------

Character sizes	9
Character sets	German, French, Spanish, Scandinavian, Math

#### PEN COLORS

Sixteen colors are supported.

#### LINE CHARTS

Data points per line	24 maximum
Line types	6 maximum
Lines per chart	6 maximum

#### TEXT AND DRAW CHARTS

Arcs per slide	25
Circles per slide	25
Endpoints per line	100
Characters per phrase	76 maximum, depending on character size

#### PIE CHARTS

Number of pies per slide	1 or 2
Number of slices per pie	1 to 24
Hatch shading types	6
Exploded sections	
Text and value labels	
Move/insert/delete slice	

#### BAR CHARTS

Bar types	single, stacked, clustered, negative
Number of bars/stacks/clusters	24
Number of bars per stack/cluster	6
Hatch shading types	6
Solid fill	

#### STORAGE

Number of charts stored on 3½" or 5¼" media (numbers approximate):

Pie charts	64
Bar charts	64
Text charts	19

#### SPECIAL FEATURES (HP-86B only)

Line and arc drawing  
Move and copy  
Graphics file dump  
On-screen preview

\* Due to different hardware specifications, some of the advanced features of the Graphics Presentations Pac are not supported on the HP-85B. These include: interface to printer, line and arc drawing, and move and copy.

## Ordering Information

HP Part Numbers:

For HP-85B

- HP 82801A Opt. 610—Tape Cartridge
- HP 82801A Opt. 630—3½" Disc Media
- HP 82801A Opt. 650—5¼" Disc Media

For HP-86B

- HP 82831A Opt. 630—3½" Disc Media
- HP 82831A Opt. 650—5¼" Disc Media

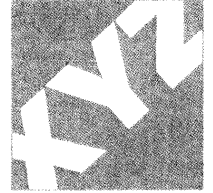
Product Includes:

- Owner's Manual
- Pocket Reference Guide
- 2 Program Discs, plus Rev. B Charts Disc (Program Cartridges included in HP-85B version, Opt. 610)

# Hewlett-Packard

## Series 80

### WORD/80



WORD/80 is a complete software solution that lets you produce memos, letters, and reports using an HP-86B Personal Computer. It's so easy to use that you can learn the basics of WORD/80 in as little as half an hour.

### Applications

WORD/80 is well suited for individual professionals who create memos, reports, and letters. Such professionals include:

- *Sales and Marketing Managers* to prepare interoffice correspondence.
- *Financial Analysts* to prepare portfolio rough drafts and finished reports.
- *Engineers* to develop technical design and test reports.

WORD/80 can also be an excellent solution for low-volume clerical applications.

### Operation

WORD/80 consists of two parts:

- An *Editor* that you use to create, type, print, and store documents.
- A *Formatter* for formatting and printing files you create with the Editor.

The Editor feature set is designed to provide most of the capabilities that professionals need on a daily basis. You can access these in an interactive manner—what you see on the screen is what you'll get. Special function keys let you select additional editing capabilities and access formatting selections.

Additional Editor features let you:

- Create files
- Insert text easily
- Make a working copy of your document or access the original document
- Use all available RAM—approximately 170 pages of text can reside in memory
- Output files to printer, display, or text file

### Features

- Softkey-driven Software
- Block Moves
- Global Search and Replace
- Text Justification
- Merge File
- Merge Graphics

### Benefits

*Makes report and memo writing easy*—Keys act as a guide through document preparation and storage.

*Saves time*—You don't have to relearn operations or type complicated command codes.

*Increase efficiency*—You can cut, copy, and move lines and columns anywhere in a document.

*Saves time*—Lets you change one word or phrase (for example, a misspelling) throughout a document.

*Gives you professional-looking results*—On-screen left and right justification lets you preview how documents will look.

*Saves time*—Lets you set up "boiler plate" files (for commonly-used information) and merge them into current documents.

*Enhances the impact of your work*—Permits insertion of chart or graph right into the document.

File **Demo:d700** Editor Page: **1** Line: **21** Col: **47**

Voyager 2 spacecraft each carry 11 different scientific sensors to measure various physical properties of the outer planets and of their vast kingdoms of moons and rings and of interplanetary space. High-resolution cameras, held 15 times steadier than even the tiny movement of a clock's hour hand, have already shown us details on Jupiter and Saturn over 1,000 times more sharply than ever seen from Earth.

PLANETS BEYOND MARS		
NAME	Distance From Sun (million miles)	Length of Solar Year (years)
Jupiter	84	11.9
Saturn	888	29
Uranus	1785	84
Neptune	2796	164.8
Pluto	3660	248

**1** Mark **2** Select **3** Spread **4** Cut **5** Copy **6** Paste **7** Reformat

- Format the document in any of these ways:
  - Right or left justified (or both)
  - Centered
- Have a dynamic file size—your file may grow to fill entire disc space

The Formatter provides extensive editing capabilities for applications that require more elaborate formatting.

The Formatter is controlled by embedded commands. These instructions are typed right in an Editor file, to format the text, but do not appear in the printed document.

Among the Formatter capabilities:

- Create a text file
- Print with no formatting
- Number pages

- Create numbered/unnumbered section headings
- Print a table of contents that combines section headings and page numbers
- Use printer control codes
- Use alternate or foreign character sets available with HP printers
- Prevent widows

## Specifications

### SYSTEM REQUIREMENTS

- Computer:
  - HP-86B
- Memory:
  - 128K Total RAM
- Peripherals:
  - HP Disc Drive (single is supported, dual recommended)
  - Printer for hard-copy output
- Enhancements:
  - 00087-15002 Plotter ROM for embedded graphics
  - HP 82936A ROM Drawer (if using Plotter ROM)

### DISPLAY

Maximum text in information window is 1,680 characters (80 columns × 21 lines).

### STORAGE

Maximum text per file is 276,000 characters (approximately 85 pages of text per 3½" or 5¼" disc, including work copy).

### EDITOR SPECIAL FUNCTION KEY COMMANDS

Search	Spread	Create
Replace	Cut	Exit
Again	Copy	Formatr
Catalog	Paste	Open
Put	Reformat	Pause

Get	Abandon	Reject
Close	Accept	Retry
Mark	Continue	Stop
Select		

### FORMATTER SPECIAL FUNCTION KEY COMMANDS

Catalog	Format	Skip
Continue	Layout	Start
Editor	Output	Stop
Exit	Pause	

### FORMATTER EMBEDDED COMMANDS

.BM	Bottom Margin
.BO	Boldface
.BP	Begin Page
.BR	Break
.CC	Command Character
.CD	Character String Delete
.CO	Comment
.CS	Character String
.DE	Display End
.DG	Dump Graphics
.DS	Display Start
.EC	Escape Character
.EF	Even-page Footer
.EH	Even-page Header
.FG	Figure
.FI	Fill
.IE	Ignore End

.IN	Indent
.IP	Indented Paragraph
.IS	Ignore Start
.JC	Justify Center
.JL	Justify Left
.JR	Justify Right
.JU	Justify
.LM	Left Margin
.LP	Left Paragraph
.MC	Multiple Command Character
.NF	No Fill
.NO	Normal Printing
.NX	Next File
.OF	Odd-page Footer
.OH	Odd-page Header
.PL	Page Length
.PP	Paragraph
.PS	Pause
.QP	Quoted Paragraph
.RD	Read File
.RM	Right Margin
.SE	Section
.SP	Space
.TC	Table of Contents
.TI	Temporary Indent
.TM	Top Margin
.TP	Test Page
.UN	Underline
.VS	Vertical Spacing

## Ordering Information

HP Part Numbers:

For HP-86B

- HP 82823A Opt. 630—3½" Disc Media
- HP 82823A Opt. 650—5¼" Disc Media

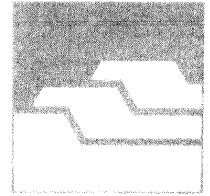
Product Includes:

- Software Media (including demonstration files and files to implement features of the HP 82905B and HP 2601A printers)
- Owner's Manual
- Pocket Reference Guide

# Hewlett-Packard

## Series 80

### FILE/80



Turn your HP-86B into a paperless, electronic filing system. Develop master forms and, as you fill them with data, create file records. FILE/80 lets you modify or delete records, add new ones, and search existing records for specific information. Then, using your file, you can produce reports, labels, or form letters. FILE/80 can manage up to 65,000 separate records—with up to 100 items of information per record.

### Applications

FILE/80 is well suited for individual professionals with file management needs, and small office applications involving single file access. Examples include:

- *Sales and Marketing Managers* to store information on their sales regions or marketing resources.
- *Financial Analysts* to maintain a file of investment opportunities.
- *Engineers* to establish a personal library of technical information on specific subjects.
- *Real Estate Professionals* to maintain records of clients and listings; and to communicate with impact through customized letters.
- *Agricultural Professionals* to maintain records of crops, livestock, customers, or distributors.

### Operation

FILE/80 lets you:

- **CREATE and QUERY**—you can produce a data file and update any of its records.
- **FORMAT OUTPUT**—you can define the way your reports, labels, and form letters look; once created, your formats can be stored for future use.
- **GENERATE OUTPUT**—using your formats, print out your results to a hard-copy printer or the display screen.

### Features

- Softkey-driven Software
- On-screen Form Creation
- Efficient and Extensive Output Capability
- Multiple Index Keys
- Multiple-condition Search Capability
- File Modification

### Benefits

*Makes file management push-button easy—* You're in control with powerful single-key commands; the keys lead you through your application one step at a time.

*Saves time—* You don't have to type complicated command code or relearn operations.

*Makes record development and updating quick and easy—* You create the form that best organizes your information. Then, you see your data as you enter and store it. You can make fast changes, deletions, and additions.

*Adds a professional touch—* Lets you create high-quality reports and printouts. You can even customize letters or labels.

*Makes you more productive with less work—* You can create report formats and store them for future use.

*Save time—* By defining an indexed order for your records, you can retrieve one in seconds.

*Gives you fast, accurate data retrieval—* You can do very specific information searches.

*Saves time—* Instead of creating a whole new file, you can restructure an existing data file to suit new needs.

```

** SEARCH **
ACCOUNT2###-###          PHONE_###(###)###-###
                           CHANEY, MANN, AND HILL
                           Consulting Engineers
                           CLIENT QUICK REFERENCE FILE

LAST MODIFIED ON_###/###/###
LAST NAME$###
FIRST NAME_###
MIDDLE INITIAL_###
COMPANY_###

1 RELATION 2 RANGE 3 ?ANY CHR 4 *MATCH 5 FORM 6 ABORT 7 ACCEPT
```

## Specifications

### SYSTEM REQUIREMENTS

- Computer:
  - HP-86B
- Memory:
  - 128K Total RAM
- Peripherals:
  - HP Dual Disc Drive
  - Printer for hard-copy output

### FILE AND RECORD PARAMETERS

File size ..... 65,000 records maximum\*  
Password  
length ..... 10 characters maximum  
Master form  
size .... 80 columns × 60 lines maximum  
Fields per record ..... 100 maximum\*  
Bytes per record ..... 1,020 maximum  
Field name  
length ..... 27 characters maximum  
Text length  
per record .... 4,800 characters maximum  
Six field types:  
Character .... 1-50 characters (formatted)  
Integer ..... 1-12 digits  
Float ..... 8-9 digits  
Currency ..... 3-12 digits  
Autodate ..... 8 characters  
Date ..... 8 characters

\*Actual number depends on your system's disc memory capacity.

### SEARCH FEATURES

#### Relational Search Conditions

- [=]**—Accesses records with field entries equal to those specified.
- [<>]**—Accesses records with no field entries equal to those specified.
- [>]**—Accesses records with field entries greater than those specified.
- [>=]**—Accesses records with field entries greater than or equal to those specified.
- [<]**—Accesses records with field entries less than those specified.
- [<=]**—Accesses records with field entries less than or equal to those specified.
- [INCL]**—Accesses records that contain a string you specify for a particular character field.

#### Other Search Conditions

- [RANGE]**—Accesses records falling within

specified upper and lower bounds for a particular field.

**[?ANY CHAR]**—Accesses records with strings that you partially specify for a particular character, date, or autodate field.

**[\*MATCH]**—Accesses records that have a string starting with a specified sequence of characters for a particular character field.

#### Additional Search Capability

**[FORM 2]**—Gives you a second master form for specifying an alternate set of search conditions. Records satisfying conditions on the original form or FORM 2, or both, are accessed.

### SEARCH PARAMETERS

Search conditions ..... 10 maximum

### SORT FEATURES

Fields can be designated as keys to facilitate ordering records for output. These indexing aids include:

Primary key—Can consist of up to four fields whose combined length can be a maximum of 50 characters.

Secondary keys—Up to four secondary keys, each consisting of one field, can be specified.

Primary keys, secondary keys or any other field can be designated as a sort field. Sort fields can be sorted in ascending or descending order.

### GENERATING REPORTS

#### Parameters

Width ..... 132 columns maximum  
When sorting records, choose up to 5 fields to specify printing order.

#### Capabilities

**[DUMP ALL]**—Prints or displays a file's master form structure and each file record in its entirety.

**[GRAND]**—Provides grand totals for up to 15 numeric fields of a report.

**[SUB]**—Provides subtotals for up to 5 numeric fields of a report.

**[MEAN]**—Provides averages for up to 5 numeric fields of a report.

**[MIN/MAX]**—Provides minimum/maximum values for up to 5 numeric fields of a report.

**[CONTROL]**—Designates a control break field. If subtotals are specified, they will be printed. A break will occur on the report, and then the next record will be printed.

**[PAGE]**—Designates a page break field so that the next record is printed at the top of the next page.

### GENERATING LETTERS

#### Parameters

Size .... 80 columns × 60 lines maximum  
Fields per letter ..... 100 maximum  
Text length  
per letter .... 4,800 characters maximum  
When sorting records, choose up to 5 fields to specify printing order.

#### Capabilities

Justify—Eliminates blank spaces in a field printed on the letter by moving the field's contents to the left; and eliminates the printing of blank fields.

### GENERATING LABELS

#### Parameters

Label height ..... 1.3-7.6 cm (0.5-3 in.)  
Label width ..... 5-12.7 cm (2-5 in.)  
Number of labels ..... 1-4 across page  
Text, Fields,  
Date ..... any or all can be printed  
Smallest-sized label  
text length ..... 60 characters maximum  
(20 columns × 3 lines)

Largest-sized label  
text length ..... 900 characters maximum  
(50 columns × 18 lines)

When sorting records, choose up to 5 fields to specify printing order.

#### Capabilities

**[cm]**—Lets you define label dimension in centimeters.

Justify—See Justify under GENERATING LETTERS.

**Note:** ☐ indicates a softkey command.

## Ordering Information

HP Part Numbers:

For HP-86B:

- HP 82824A Opt. 630—3½" Disc Media
- HP 82824A Opt. 650—5¼" Disc Media

Product Includes:

- Program Discs
- Owner's Manual
- Pocket Reference Guide
- Demonstration Disc with a sample data file and sample outputs

# Hewlett-Packard

## Series 80

### Support

Hewlett-Packard's commitment to ongoing support helps you get maximum performance from your Series 80 computer. From training courses to phone-in software consulting and preventive maintenance, we offer a range of services to let you tailor a complete support program to your particular needs. See your HP dealer or sales representative for help in choosing the right combination of services.

#### Boost Your Personal Productivity with HP Training

Whether you are a first-time user or an experienced programmer, you can get up to speed quickly with hands-on courses taught at training centers near you.

**HP Series 80 Beginner's Course** is designed for the first-time user with no programming experience. This two-day course introduces you to Series 80 Personal Computers. It covers operating and programming essentials to get you off to a good start.

HP 35048A

**HP Series 80 VisiCalc® PLUS Course** teaches beginners and experts how to use the features of VisiCalc PLUS, the "electronic spreadsheet", as well as demonstrating how to hook up the necessary equipment.

HP 35118A

**HP Series 80 Graphics Presentations Course** shows you how to use the Graphics Presentations Pac to create bar, line, and pie charts as well as text slides.

HP 35117A

**HP Series 80 I/O Course** offers, in three days, intensive information on device-to-computer communications methods, I/O programming techniques, and HP-IB, Serial, GPIO, and BCD interfaces.

HP 35046A

**HP Series 80 Assembly Language Course** introduces Assembly Language programming techniques to experienced high-level programmers. (Three days.)

HP 35047A

#### Stay Productive with Quick and Effective Software Assistance

##### Stay Productive with Quick and Effective Phone-In Assistance

Thoroughly trained engineers provide answers to your software and hardware questions through our complimentary Phone-In Consulting Service. At no cost to you, you can receive assistance with your Series 80 hardware, software, operating systems, and programming languages.

#### Protect Your Investment with HP Maintenance

Planning for its maintenance helps you realize the full long-term value of your investment in a Series 80 computer. HP offers several service programs that let you choose from a range of prices and response times.

**Dealer Repair Center Service**, at authorized Hewlett-Packard Dealer Repair Centers, provides a variety of services to meet your maintenance needs.

**HP On-Site Product Service** provides comprehensive next-day coverage for your Series 80 computer products for a fixed monthly charge, including all travel, labor, and parts required for remedial maintenance.

**HP Volume Repair Service** offers on-site, volume-discount service to customers with 25 or more eligible products. It provides weekly visits to an on-site work area.

**HP Field Repair Service** lets you save by returning your Series 80 products to a conveniently located Field Repair Center. The fixed monthly charge for this service covers all labor, parts, and one-way shipping required to maintain your products in good operating condition.

**HP Per-Incident Service** offers you a fixed price, per-incident service alternative to maintenance agreements. This program provides you with a guaranteed repair at a standard price.

#### Service at a Glance

	Dealer Repair Center Service	On-Site Product Service**	Volume Repair Service**	Field Repair Service	Per-Incident Service
Relative Price	*	1	.5	.5	N/A
Performance Response	*	Next day	Weekly visit	3 day or less turnaround	5 day or less turnaround
Location	*	On-site	On-site	Carry/Ship In	Carry/Ship In
Hours	*	8 am-5 pm	8 am-5 pm	8 am-5 pm	8 am-5 pm
Benefits	One local place for product and service needs	Quick response for equipment in critical applications	Economy through volume (25 unit minimum)	Economical service for individual owners	Alternative to maintenance agreement

\*Authorized Hewlett-Packard Dealer Repair Centers provide complete repair services tailored to their customers' needs, at varying prices. Call 800-835-HPHP for the location of the nearest Dealer Repair Center.

\*\*Available if you're located within 100 miles (160 km) of an HP Service Responsible Office.



# Hewlett-Packard

## Series 80

### Configuration Guides

Use the information on the following charts to assemble a complete personal computer system with an HP-85B, or HP-86B. Software configuration information, starting on page 76, shows the system elements you need to operate each software package described in this brochure.

The peripherals configuration section below lists the interfaces, enhancements, and other hardware required to connect your system with peripherals. On page 31, you'll find information on how to configure communications products and optional operating systems available for Series 80 Personal Computers. (A notation of N/A means a product is not supported by a particular computer.)




## Peripherals Configuration Guide


PERIPHERAL	HP-85B	HP-86B
Mass Storage HP 9121D/S HP 82901M HP 82902M HP 9133V HP 9133V Opt. 004 HP 9133XV Opt. 010 HP 9134XV Opt. 010	HP 82937A (HP-IB interface)*	HP 10833 A, B, C or D HP-IB Cable*
Printers ThinkJet (HP 2225A) HP 82905B Opt. 001, 002, 003, 004** (HP-IB version) HP 82906A HP 2602A Opt. 046† HP 2670 Series  ThinkJet (HP 2225C) HP 82905B Opt. 142, 242, 342, 442** (Parallel interface)  HP 82905B Opt. 240, 340, 440** (Serial interface) HP 2601A HP 2602A Standard† HP 2930 Series	HP 82937A HP-IB interface* HP 82936A ROM Drawer 00085-15002 Plotter/Printer ROM  HP 82949A Printer interface HP 82936A ROM Drawer 00085-15002 Plotter/Printer ROM  HP 82939A Serial interface HP 82936A ROM Drawer 00085-15002 Plotter/Printer ROM	HP 10833 A, B, C or D HP-IB Cable*      HP 82949A Printer interface      HP 82939A Serial interface
Plotters HP 7470A Opt. 002 HP 7475A Opt. 002 HP 7550A HP 7580B Opt. 058 HP 7585B Opt. 058 HP 7586B Opt. 058	HP 82937A HP-IB interface* HP 82936A ROM Drawer 00085-15002 Plotter/Printer ROM	HP 10833A, B, C or D HP-IB Cable* HP 82936A ROM Drawer 00087-15002 Plotter ROM
Graphics Tablet HP 9111A Opt. 085 (HP-85B only), or Opt. 086 (HP-86B only)	HP 82937A HP-IB interface* HP 82936A ROM Drawer 00085-15002 Plotter/Printer ROM or Built-in I/O ROM (gives more flexibility to users writing own programs)	HP 10833A, B, C or D HP-IB Cable* HP 82936A ROM Drawer 00087-15002 Plotter ROM or 00087-15003 I/O ROM (gives more flexibility to users writing own programs)
* No more than one HP 82937A HP-IB interface is required per system. A one-meter HP 10833A HP-IB Cable is included with the HP-86B, but additional cables will be needed if you plan to use more than one peripheral.		
** Option number depends on voltage requirements. See page 19 for voltage options.		
† Serial (RS-232C) interface comes standard on HP 2602. For HP-IB version specify HP 2602 Opt. 046.		

## Software Configuration Guide


































With the charts on this and the following page, you can determine the system elements you need to run a particular software program on either the HP-85B or HP-86B. Note that ROMs are different for the HP-85B and the HP-86B. Their part numbers appear in product descriptions throughout this brochure.

### Legend:

-  = required
-  = optional (recommended or supported)
-  = optional (needed to support the software's hard-copy graphics capabilities)

 = indicates software on which additional RAM memory will provide expanded data handling capabilities. The number shown indicates minimum memory required.

### HP-85B SOFTWARE

Software	User Memory in K bytes	Enhancements				Peripherals			Other
		Plotter/Printer ROM	Adv. Prog. ROM	ROM Drawer	HP-IB Interface	HP Printer	HP Plotter	HP Disc Drive (#)	
VisiCalc® +	32								
Graphics Pres.	32								
File Mgr.	32							(2)	
Info. Mgt.	32							(2)	
TAJ I-85	32								
Portfolio Mgt.	32								Modem
Financial Decisions	32								
General Statistics	16								
Basic Stat. & Data Manipulation	16								
Regression Analysis	16								Basic Stat. & Data Manip.
Linear Programming	16 								
Waveform Analysis	16 								
AC Circuit Analysis	16 								
Math	16								
Surveying	16 								
BASIC Training	16								
Games; Games II	16								

# HP-86B SOFTWARE

Software	User Memory in K bytes	Enhancements					Peripherals**			Other
		I/O ROM	Plotter ROM	Adv. Prog. ROM	ROM Drawer	CP/M	HP Printer†	HP Plotter	Dual Disc Drive	
Personal Productivity Pac	192									
Perfect Pac	160									
VisiCalc® +	64									
Microsoft® MultiPlan™										
MicroPlan										
MicroPlan Consolidation Option®										
Graphics Pres.	96									
WORD/80	128									
WordStar; SpellStar; MailMerge	—									
Perfect Writer/ Perfect Speller										
FILE/80	128									
dBASE II	—									
File Mgr.	64									
Milestone	—									
Datebook II; Personal Datebook										
Peachtree Accounting (5 modules)	64									
Financial Decisions	64									
Home Budget Manager										
Aardvark Tax Planning										
CP/M: Personal Professional	—									
p-System: (all 4 pacs)	96									
General Statistics	64									
Basic Stat. & Data Manipulation	64									
Regression Analysis	64									Basic Stat. & Data Manip.
Linear Programming	64									
Waveform Analysis	64									
AC Circuit Analysis	64									
Math	64									
Surveying	64									
Galaxy Patrol										
Action Games										
BASIC Training	64									

\*\* All HP-86B systems require at least one disc drive for operation.

† For hard-copy output, a printer is required.

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## For More Information

For additional information about Hewlett-Packard's versatile Series 80 personal computing systems, see your nearest HP dealer or local Hewlett-Packard representative. In the U.S. for the address of the one nearest you, call TOLL FREE 800-FOR-HPPC weekdays, Pacific Time — 6 a.m. to 12 midnight (Monday-Friday), 8 a.m. to 10 p.m. (Saturday & Sunday). Or write to one of the addresses below. TTY users with hearing or speech impairments, please dial 503-758-5566.

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