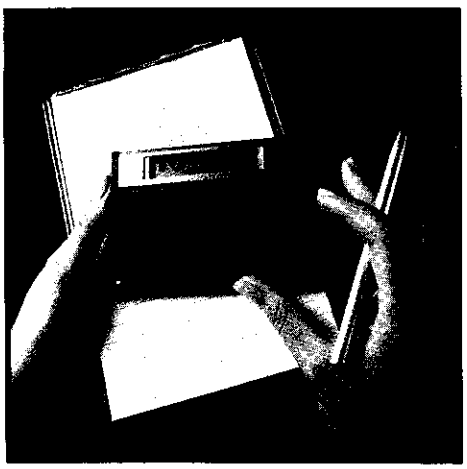
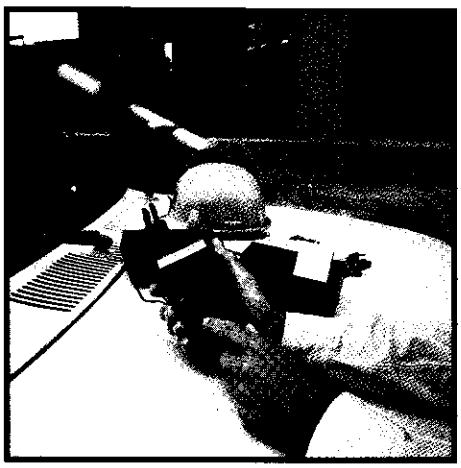
HEWLETT PACKARD

HP's Personal Computation Selection Guide

Choosing The Right Solution



Left to right bottom row; • Series 10 Professional Calculators • Series 40 Handheld Computers • Series 70 Portable Computers

The Information Age is no longer dawning, it's *here.*

Personal Computers that in recent years were available mainly to professionals in science, engineering and business, are now available to millions of users.

But how do you choose the right tool for your Information Age job?

Hewlett-Packard is particularly well suited to help because the six series in the HP product line, shown above, exemplify the full range of personal computation devices available today.

- Series 10 Professional Calculators
- Series 40 Handheld Computers
- Series 70 Portable Computers
- Series 80 Personal Computers
- Series 100 Personal Office Computers
- Series 200 Personal Technical Computers

The first step in choosing the right tool for your job is deciding what type of computer – calculator, handheld, portable, personal, office or technical – is

Applications described in this brochure are drawn from HP user files: names have been changed.

Left to right top row; • Series 80 Personal Computers • Series 100 Personal Office Computers • Series 200 Personal Technical Computers

right for your job environment. Typical users of computers from each of the six series are portrayed in this brochure to help you find the type that's most appropriate in your work situation.

The next step is to analyze your job in terms of how computer solutions might be applied for greater productivity and an easier, more fulfilling workday.

Begin your comparison shopping by determining which software will carry out your desired applications and which computers can run that software.

Use the selection factors defined here to help you choose a personal computer system that meets your present and future needs.

A scorecard is provided on the inside back cover as a means of organizing your thoughts and impressions.

Series 10 Professional Calculators

HP Series 10 Professional Calculators are actually pocket-size computers that have been pre-programmed by Hewlett-Packard to function as calculators dedicated to solving problems that professionals face daily in various realms of science, engineering, math and business. In addition to having pre-programmed function sets, they are programmable by the user.

HP Series 10 Professional Calculators were designed for heavy-duty use and are extremely durable. Their keypads are spaced to make data entry easy, and they provide tactile feedback to confirm that each entry has been made. Their liquid-crystal displays are highly readable. They all employ a step-saving, reliable logic system called RPN, developed and used exclusively by Hewlett-Packard. The Continuous Memory feature of these devices enables them to retain programs and data when power is off.

- The HP-10C has built-in scientific and statistical functions and ample memory for user programs (79 lines). Students appreciate its versatility, ease of use and low price.

- The HP-11C has advanced programming capabilities, memory for up to 203 program lines and extended function sets for math, science and statistics.

- The HP-12C Financial Programmable Calculator shown here can perform virtually any business-oriented operation. Its real estate applications include, for example, on-the-spot

calculations for mortgage payments, income property analysis, depreciation schedules and internal rates of return to help make lease or buy decisions.

- The HP-15C is dedicated to advanced math. It simplifies matrix operations and calculations with complex as well as real numbers. Makes pushbutton work out of finding the roots of an equation or the definite integral of a function. Widely used in electrical circuit analysis, surveying, navigation and other fields that call for fast, accurate calculation.

- The HP-16C is a "logic master" designed for computer science and digital electronics applications with four number base conversions and 64-bit capability.

Series 40 Handheld Computers

Handheld Computers, exemplified by the HP-41CV at right, bridge the gap between calculators and desktop computers because they can interface with a wide range of peripheral devices and communicate with the user in words through an alphanumeric display. The HP-41 is readily programmable and has extensive memory "on-board" for storing programs and data. Battery powered for use in the field, it can run on AC current, too. Its ability to interface with larger computers, its programming power and its computational capability make it an extremely versatile tool, capable of cutting the most complex jobs down to size.

HP Series 40 Handheld Computers are readily customized and expanded. They contain four built-in ports for applications software ROMs with prewritten programs to adapt the computer to your specific tasks. Pre-written programs are also available on magnetic cards and bar code. You can further customize an HP Series 40 Handheld Computer by assigning alternative functions or programs to keys and using keypad overlays to label your new definitions. If your requirements are special, Hewlett-Packard will help you tailor your Handheld Computer to meet them.

The expandability of an HP Series 40 Handheld Computer is enhanced by the HP Interface Loop (HP-IL) which enables the computer to control and communicate with a digital cassette drive for mass memory storage, a printer/plotter for program listings and graphic displays and many other peripherals. As many as 30 other devices – peripherals, instruments or other computers – can be accessed via HP-IL from one HP-41 port. The availability of battery-operable peripherals means that you can bring a whole system to your job site.

The new Series 40 Plotter Module provides bar code generation and plotting capabilities. With either the HP 7470A Graphics Plotter or the battery-operable printer/plotter, you can print Series 40 bar code or non HP bar code.

Easy editing features and function mnemonics are conveniences that users soon regard as indispensible. Programs can be stored, retrieved, deleted and even run by name. All of your programs and functions can be catalogued, eliminating the need to memorize program code names. The 12-character alphanumeric display provides error messages and prompts in everyday English.

HP Handheld Computers are so widely used that over 6000 programs have been written for them and are available to you. (NASA even programmed an HP-41 to operate as a back-up computer on board the space shuttle *Columbia* to aid in navigation and landing should the main flight computers fail).

Calculator And Handheld Computer Selection Factors

Here's a checklist of factors to take into account in selecting a calculator or handheld computer. Begin by deciding which factors are *musts* in terms of your own needs. This enables you to quickly eliminate models that, no matter what advantages they may offer, don't meet your real requirements.

☐ **PROGRAMMABLE** Yes or no? If so, is it designed so that programs and data are not erased when the machine is turned off but are retained in Continuous Memory? Is it easy to write and edit programs? Can you run them by name? Is the device designed to solve problems with minimum keystrokes? Does it offer RPN logic for maximum input speed and programmability? Does the calculator interface with mass storage so programs can be stored and saved?

☐ **SOFTWARE** Are prewritten programs readily available, especially in your field of interest? (It may take longer to accomplish your goals if you have to do all your own programming).

☐ **FUNCTIONS** What mathematical and computational functions do you require? Are they available as standard operations?

☐ **EXPANDABILITY** Will it interface with peripherals, instruments and other computers? How readily and how many?

☐ **PORTABILITY** Is it durable enough for daily use in the field? Rechargeable? Are battery-operable peripherals available?

☐ **KEYPAD** Comfortable size and spacing? Is data entry an easy operation? Is there tactile feedback to confirm that an entry has been made? Can it be customized with user-defined keypad functions?

☐ **DISPLAY** Liquid crystal? Alphanumeric? How many characters? Readable at different angles and in bright light?

☐ **PROMPTS** Does the machine have good error checking and display routines? Can it save you time by providing keynames or help when you need explanations? Does it notify you clearly if you've made an illegal entry or programming error?

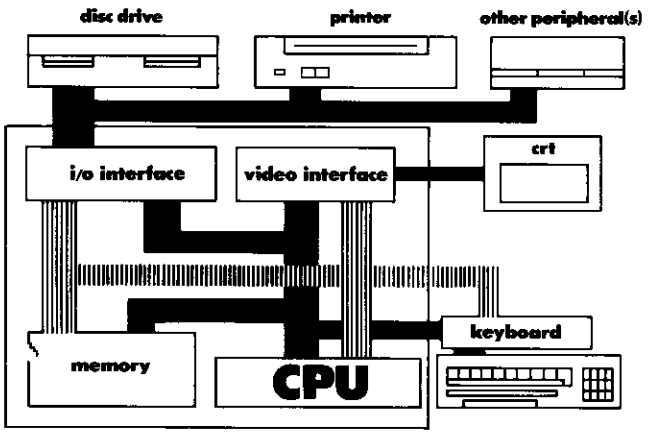
☐ **DOCUMENTATION** Is it clear and comprehensive? Easy to use? Does it contain a handy index of key words for easy reference?

☐ **RELIABILITY** How well tested by the manufacturer? Does the manufacturer have an established reputation for long-lasting products and quality control?

About Personal Computers

The major components of a personal computer system are shown in the illustration below.

The microprocessor chip at the center of the system contains the central processing unit (CPU) where all logical operations on data are carried out. It can transmit data to and from memory and various peripherals.



RAM (Random Access Memory) can be "read from" or "written to" by the microprocessor. Data in RAM can be changed, making RAM the general workspace and programming area within the computer. RAM chips are volatile; their contents are lost when the main power is turned off. However, a manufacturing process known by the abbreviation CMOS produces chips that consume so little current that batteries suffice to power the circuit and maintain data in RAM.

ROM (Read Only Memory) chips are pre-programmed with software or data that cannot be lost when the computer is turned off. ROM usually holds the system monitor, the program controlling start-up and standard system functions such as interpreting keyboard input and controlling mass storage.

The wires interconnecting different parts of the computer are the data and address buses (light and dark paths in illustration). Most personal computers transmit data internally via an 8-bit data bus and a 16-bit address bus in parallel form, through as many wires as bits. Components of the system are enabled one at a time through the address bus to communicate with the microprocessor via the data bus. The width of the address and data buses can determine the computer's speed and memory-addressing capability.

All operations within the computer are synchronized by a high-frequency signal called the system clock. The computer's speed of operation is determined by the frequency of the system clock.

The user inputs data to the CPU through the keyboard interface, which consists of a typewriter-style ASCII keyboard and dedicated or programmable command keys. How the CPU responds to the user's typed commands is controlled by the program being run. If the program requires that the data be displayed, the computer addresses the video interface and sends it. The video interface then converts the data and sends it to the video monitor to be displayed on a Cathode Ray Tube (CRT). The CRT is the actual screen on which data is displayed as "softcopy".

In order to communicate with devices such as disc drives, printers or other peripherals, the computer must contain an input/output interface (I/O) for the transmission of data. There are many accepted standards for data transmission between computers and peripherals. Some peripherals require a parallel interface while others accept data one bit at a time through a serial interface. The I/O interface accepts data from the computer or peripherals and converts it to the form necessary for transmission.

A disc drive for mass storage and a printer for "hardcopy" output are the two peripherals most often included in a personal computer system. A color graphics plotter for generating hardcopy visual displays and a modem for data transmission over phone lines are other widely used devices.

Personal Computer Selection Factors

☐ **SOFTWARE** Software refers to programs that can be run by a computer. It is generally distributed on media such as disc or cassette for use on various computer systems and is available from your dealer or the manufacturer: Software can also be user-written for specific applications.

The software you intend to use will determine the hardware you'll need. Suppose you want your computer to replace your typewriter and maintain all your personal or business records and accounts. For openers, you might choose software for word processing, file and information management and accounting.

Your Hewlett-Packard dealer or sales representative can provide literature about the software available for your intended purposes. The documentation on a given software package will tell you what type of computer system is required to run it and how much memory is needed.

The performance of any computer system depends on the quality of the programs controlling it. Good software has to perform as many of your required tasks as possible. It executes major functions quickly and correctly, cutting the time you spend waiting. It provides on-screen help such as menus, or multiple choice prompts to guide you through problems without constant reference to the manual.

Good software should also accept all possible input errors and notify you without crashing (stopping suddenly), in which case data can be lost. It should be able to guide you out of trouble with on-screen commands and resume program execution with all data intact.

Another point about good software: it should be thoroughly tested and debugged by the software author. (In many cases the software author is not the manufacturer of the computer you are using). Hewlett-Packard provides its own tested applications software for its personal computers, designed to utilize their expanded capabilities such as screen-labeled softkeys. Additional sources drawn upon include independent authors who produce "HP PLUS" applications programs, and HP users, whose innovations become part of the HP Users' Library and available to all.

The language in which the software is written is the set of commands that comprise the dialog between the programmer or user and the computer and all peripherals. Many different languages exist, each with its own level of complexity and power and were written for a different purpose. BASIC, the Beginners All-purpose Symbolic Instruction Code, was written to enable more people to operate and program computers through simple statements derived from common English. The Standard and Enhanced versions of BASIC onboard Hewlett-Packard Personal Computers contain extra built-in commands that transform sequences of steps into one-step operations. The result is easier operation and greater programmability.

As you observe various software categories, learn which languages are popular in your field(s) of interest. Try to learn the characteristics of popular languages and determine the ability of each to solve your problems. FORTRAN is a high-level programming language often used in scientific applications. COBOL is designed to handle large amounts of data and was written for use in business environments. FORTH is a complex, very effective programming language that enables the user to compile a dictionary of routines that comprise program "kernels". Pascal is an English-oriented language written to be compatible on many computer systems and to encourage more logical programming practices. Excellent programs can be written in any of the higher-level languages described here.

Languages vary in efficiency and speed of execution – the same tasks take less time in faster languages. Assembly language produces machine code instructions represented by a list of binary numbers. This is the simplest and fastest form for the computer to understand and execute but the most difficult for the programmer.

Learning about software can be a complex endeavor, but having a single source of software, hardware and information can make it easier. The range and quality of software and hardware offered by Hewlett-Packard provides the right tool for the job in many fields. The growing library of programs includes such "best-sellers" as:

VisiCalc®	• HP's enhanced versions of this "electronic spreadsheet" can graphically highlight data that might otherwise be buried.
WordStar™	• A word-processing system using the power of CP/M® to produce your letters and documents.
File Management	• For organized entry and retrieval of information, better record keeping and decision making.
Communications Terminal Emulation	• For modem control and file transfer or communication between other terminals and a host computer.
Training Courses	• On-screen training in computer use and programming.
Graphics Power	• Software utilizing built-in commands to easily design visual displays and control color plotter reproduction.

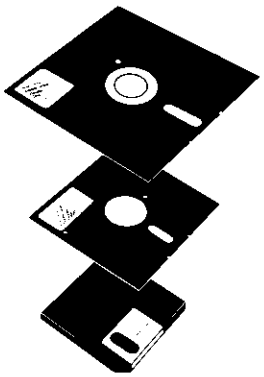
Some of the software described in this brochure is not available in all countries.

☐ **MEMORY/MASS STORAGE.** Memory storage capacity is measured in bytes. A byte is a group of eight binary digits (called bits) that represents one character. To the computer a byte represents a number from 0 to 255 that is interpreted according to the program being run. For example, a word processing program may interpret a byte of data from a disc as a letter "T", whereas a graphics program could interpret it as part of a shape.

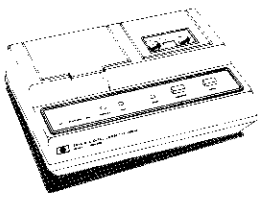
Data storage systems are measured in Kilobytes or Megabytes. K = 1,024 bytes. M = 1,046,576 bytes.

Personal computers contain varying amounts of memory onboard (internally) in the form of RAM and ROM. As your demands increase, onboard memory can be added with plug-in modules or chips up to the system limits.

The amount of memory your system will require is determined by your applications.



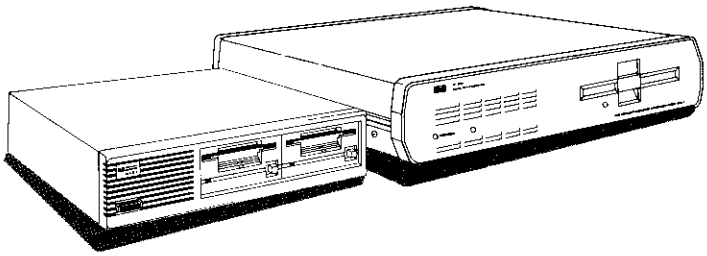
Consult the documentation on your desired software to determine the storage requirements of your largest jobs. 64 Kbytes of onboard memory and dual 5¼" floppy-disc drives may be sufficient memory for many small business uses of a personal computer. But because everybody's applications differ, so do their needs. Larger jobs involve programs that can handle larger files and call for greater amounts of onboard and mass storage memory.



Cassette tape is a relatively inexpensive, high-capacity medium for memory storage. Information is stored on a cassette tape as a series of magnetic pulses representing binary data. A cassette drive enables a computation device to access memory on tape. The HP 82161A battery-operable digital cassette drive shown here offers computer control of its functions, whereas conventional drives have to be manipulated by the user.

Discs, handled by peripherals called disc drives, are the most widely used form of external memory for storing and retrieving programs and data. There are two basic types: flexible discs made of mylar, known as floppies and rigid aluminium discs called hard discs or Winchesters (after the powerful rifle). Standard disc sizes are 8", 5¼" and the new 3½" diameter "microfloppy". Discs have a smooth magnetic surface on which information is stored as a series of pulses along lines called tracks. Information is transmitted to and from the spinning disc by a read/write head on the drive unit. Because the head can go to any part of the disc directly, discs are random access storage devices and provide faster retrieval than cassette tape, which has to be positioned to the exact point being accessed. Winchester discs rotate faster than floppies and hold much more data.

The mechanical functions of a disc drive are controlled by software called a disc operating system (DOS) which enables the computer to read, write, or erase to modify the contents of the disc under software control. To accommodate the varying needs of users, Hewlett-Packard makes a wide range of drives capable of handling various combinations of disc sizes and types. High-capacity storage can be obtained with Winchester disc drives such as the HP 9135A which handles a 4.6 Mbyte hard disc and a 270 Kbyte 5¼" floppy for back-up. If desk space is as high a consideration as disc space, the HP 9121D runs two 3½" floppies, providing 540 Kbytes of formatted mass storage while taking up about as much room as a phone book on your desk. The new microfloppies come in a hard case with a sliding cover that protects the media surface. Hewlett-Packard microfloppies have a unique "media monitor" that warns you if the disc is about to wear out – protecting both your data and the read/write heads of your drive unit.



Magnetic cards are another form of mass storage. They are magnetically encoded strips that can be written to or read from by a small device called a card reader. They provide an inexpensive, easy way to store programs and data. Hewlett-Packard offers a built-in card reader on the HP-75C Portable Computer and a plug-in model for Series 40 Handheld Computers. An extensive and growing library of software on magnetic cards is maintained by HP to help develop your applications.

An optical wand is a peripheral that transforms printed bar codes into data that can be transferred to the computer – making paper available as an indirect, inexpensive mass storage medium.

Series 70 Portable Computers

A Portable Computer that can run popular applications software is the right tool for sales representative Mark Wilbur – and every other professional who wants access to essential resources of the office while on the road. The HP-75C Portable Computer weighs only 26 ounces and fits easily into Mark's briefcase along with a printer/plotter and a digital cassette drive to give him a complete information management system. It has a built-in HP Interface Loop (HP-IL), runs on AC current or the rechargeable battery pack, and turns any place Mark happens to be – even his airplane seat – into an office. The HP-75C, *the* computer for the professional on the move.

- Touch-type keyboard has friendly editing keys and 194 keycodes redefinable by user programs or ROM.

- Powerful onboard BASIC provides 147 commands. 22 operating-system commands for file management and control of the HP-75's real-time clock. Multiple file structure provides instant access to commonly used programs.

- Liquid-crystal display serves as a 32-character window on a 96-character line. Its 5 by 9 dot-matrix provides great legibility. Video monitor interface adds display capability of sixteen 32-character lines.

- Lots of user memory – 16 Kbytes of RAM, expandable to 24 Kbytes – and three ports that hold up to 48 Kbytes of applications ROM modules. Applications software is also available on magnetic cards. The HP-75C's built-in card reader provides low-cost, off-line program and data storage.

- Sophisticated 8-bit CMOS Series 80 CPU and other chips provide Continuous Memory and enable operation for a month of normal use without recharging batteries. Compatability with HP Series 80 Personal Computers means that programs can be readily transferred to and from Mark's desktop computer at the home office.

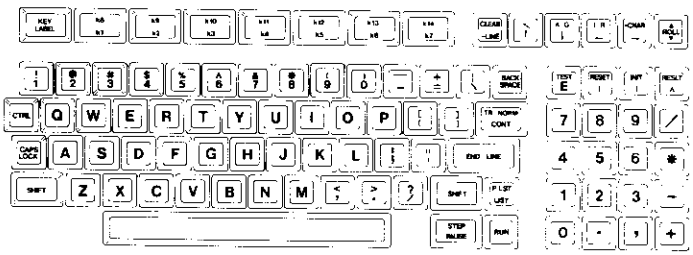
- Keyboard overlays permit all keys to be redefined by the user for customized applications.

- Appointment mode with 10 different audible alarms replaces Mark's old scheduling aids – calendar, appointment book, alarm clock, etc.

- The elegance and versatility of this computer are inspiring Hewlett-Packard and its third-party suppliers to provide a wide range of first-rate software for the HP-75C.

☐ **KEYBOARD/EASE OF USE.** The keyboard enables you to communicate with the computer. More than any other factor, its characteristics determine ease of use. Some of the major conveniences, to look for are:

• USER-DEFINABLE SOFTKEYS Let you type in frequently-used multi-character commands that can then be executed with the touch of a single softkey. In word processing, programming or any use on a regular basis, this timesaving feature means more creative time and less typing time. Most Hewlett-Packard Personal Computers not only have a full set of softkeys but provide inverse-video blocks on your screen for labeling the softkeys according to your definitions.



• A NUMERIC KEYPAD Simplifies entry of long lists of numbers. The layout resembles that on a standard business calculator. Essential if your job requires arithmetic input as in accounting, statistics or cash management.

• A DISPLAY EDITING SYSTEM With single keys for full-function display and editing operations such as cursor positioning, scrolling, rolling, clearing the screen and deleting and inserting characters and complete lines in programs and text.

• SYSTEM COMMAND KEYS Enable entry of commonly used commands such as LIST, RUN, or PAUSE with a single keystroke.

• "FEEL" Comfortable spacing, molded keycaps and tactile feedback are desirable features. But there is no substitute for a hands-on evaluation in this area.

• QUALITY AND DURABILITY Varies greatly. It is safest to choose a manufacturer that employs rigorous testing methods to produce machines that receive daily use in business environments.

• DETACHED KEYBOARD You may prefer the compactness of a built-in keyboard but if your applications require that the keyboard be separate from the main unit, the right tool for the job is a detached keyboard.

• ROTARY CONTROL KNOB Standard on the Series 200 Model 16. It can be used for fast program editing, cursor positioning, analog-like input and fine adjustments during testing or drawing.

Series 80 Personal Computers

Personal Computers can mean the difference between success or failure to the operator of a small business such as Ann Perry, whose architectural firm designs energy-efficient commercial and residential buildings. Ann wanted a computer with large memory capacity and a powerful operating system that would be readily programmable for a wide variety of applications. She also wanted a complete range of available software and easy expansion to a printer and a plotter. She chose an HP-86 Personal Computer with a 12" video monitor. It comes with 64 Kbytes of onboard user memory, expandable by plug-in modules to 576 Kbytes. Writing programs to minimize heat loss in various designs is simplifed by the HP-86's powerful onboard BASIC, full set of softkeys and special keyboard overlays. Dedicated printer and disc drive interfaces are built right into the computer. Software is available to handle virtually all of her engineering, graphics and business requirements. And doing a lot of work with numbers, Ann appreciates the numeric keypad.

• Ann uses File/80 to keep track of materials costs. VisiCalc PLUS lets her conduct "what if" analyses on design alternatives. She generally provides her clients with optional plans, letting them know the differences in materials costs, rates of heat loss, and projected fuel costs.

• She uses Word/80 for writing her letters and memos. Because she has a plotter for graphics purposes, she decided to get an HP 2602A Daisy Wheel Printer for "letter quality" correspondence. Ann believes in "clean lines whenever possible".

• HP PLUS structural analysis software, enables Ann to make all the calculations involved in designing a building – from calculating how strong the concrete must be in the foundation to the orientation and pitch of the roof for optimum solar intake.

• Graphics Presentations software, plus the large number of resident graphic commands on the HP-86, make it easy to generate multi-colored charts, graphs and mock-ups for presentations to clients.

• Ann uses project management software, such as Milestone™ whenever she's supervising a construction job. Based on data she gets from the general contractor, she issues a critical path management schedule to make sure that every step of the job gets done on time.

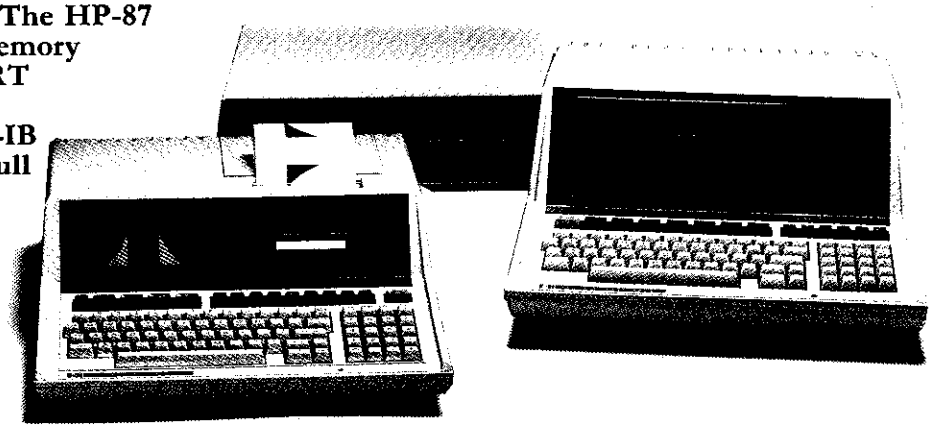
• HP's Peachtree Accounting Software provides everything she needs to handle her general ledger and accounts payable and receivable.

Milestone™ is a registered trademark of Organic Software.

• Most of the programs which Ann has written herself deal with energy budgeting. She recently wrote an energy management program to monitor the lighting, heating and air-conditioning in her own office.

What's the secret of Ann's success? She decided to apply computer solutions to certain aspects of her work, chose the appropriate software and then picked a system that could run that software to full advantage.

The HP-85 (left) and HP-87 (right) Personal Computers are designed to fulfill the specific needs of many individual users. The HP-85 is a self-contained system with built-in cassette storage and a quiet thermal printer. The HP-87 can expand to 640 Kbytes of user memory and has a vivid, 80-column wide CRT screen. All HP Series 80 Personal Computers can make use of the HP-IB interface for quick connection to a full range of highly reliable peripherals, guaranteed to be hardware and software compatible.



☐ **VIDEO DISPLAY** The display, also known as the video monitor (although monitor may imply an external device) is a Cathode Ray Tube (CRT) with circuitry to decode text and graphics information from a computer and present it in the form of dots activated on the screen. The quality of the video display will determine how easy it is to use your computer for long periods. High-risolution displays produce legible characters, reducing eyestrain. Some offer the added convenience of variable brightness.

The right video display for you depends on your job. The software you intend to employ will make demands on your display. For example, many CP/M based programs require an 80-character by 25-line display to be used to their full effectiveness. The main criteria for selecting a video monitor are:

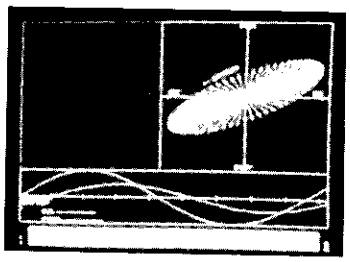
• **Display size** The overall size of the display is usually given as a diagonal measurement in inches or centimeters. Preferences are highly subjective. Some people want compactness; others feel its "the bigger the better". Hewlett-Packard's Personal Computers offer a range of display sizes.

• **Display Matrix** This refers to the number of characters that can appear on the screen at one time. Common display matrices range from 16 lines of 32 characters to 24 lines of 80 characters per line. The HP-87 Personal Computer contains a built-in 9" by 5" high-resolution video display with a matrix of 24 by 80 characters.

• **Character Matrix** As illustrated here, characters appear on the CRT as groups of dots within a rectangular matrix. The more data that can be activated within the matrix, the greater the legibility provided. A 5 by 7 dot matrix capable of producing "true descenders" (g, j, p, q, y) is considered a prerequisite for good legibility.

• **Other Monitor Features** To look for are glare prevention and a tilt/swivel base that allows you to adjust the screen to the most convenient viewing angle.

☐ **GRAPHICS CAPABILITIES.** If your work can be enhanced by charts, graphs, or other visual displays, your computer should be capable of generating high-resolution graphics. Graphics software interprets data entered by the user to activate dots on the CRT screen, thereby producing patterns. The greater the number of displayable dots (also known as pixels), the higher the resolution. High-resolution displays produce smoother curves and finer lines. Typical high-resolution displays start at 250 dots horizontally by 200 dots vertically.



Graphics software differences among personal computers can be determined by studying the commands that a given system makes available. Look at the instruction set provided in the documentation: the more graphics commands resident on a system, the better. Find the commands that pertain to onscreen or hardcopy graphics control. There should be enough to draw lines, plot points, draw circles and squares, fill shapes, erase, manipulate, save to disc, etc. Each of these routines should be written to run as fast as possible. Your HP dealer or sales representative will let you compare the graphics capabilities of the models you're considering.

Versions of BASIC provided on Hewlett-Packard Personal Computers contain extensive commands for designing screen graphics and controlling hardcopy devices. They're designed to enable you to generate fast, accurate drawings and plots. Sophisticated software such as HP Graphics Presentations cuts design time and enhances the effect of your artwork.

In order to produce color hardcopy of your graphics designs your system should include a plotter, a peripheral that uses colored pens to reproduce, on paper or transparent film, shapes transmitted via the computer.

In choosing one you should ask these questions:

• Is it easy to understand and operate? Is paper loading and positioning a simple process?

• Is the resolution fine enough for your applications? Do you get truly straight lines and smooth curves?

- Can it produce complex plots in a matter of minutes?

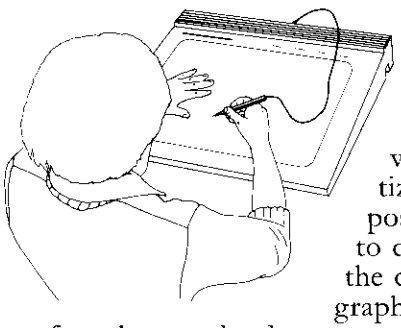
- Can you plot on transparent film for overhead slide presentations?

- Does it contain different software-selectable typefaces and styles for text and graphics mixtures?

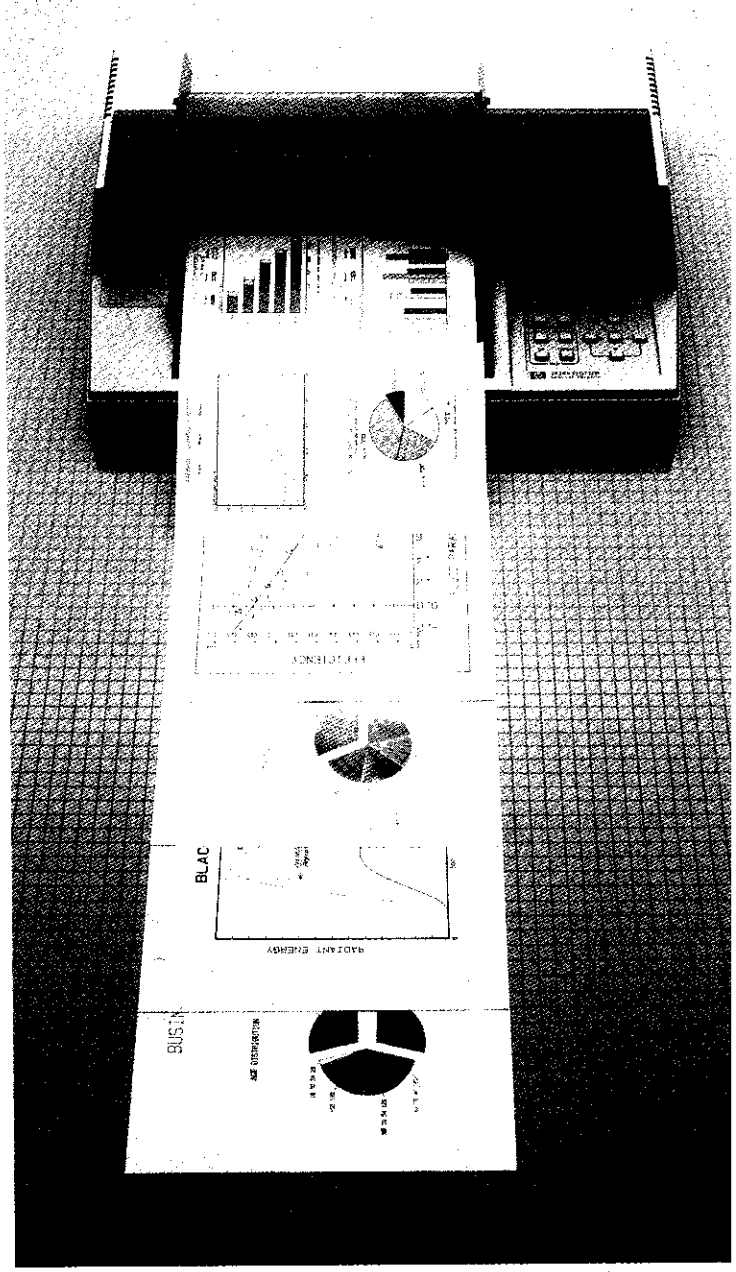
- How many pen colors are available?

- How readily will it interface with your computer? Is your computer capable of utilizing the full capabilities of the plotter?

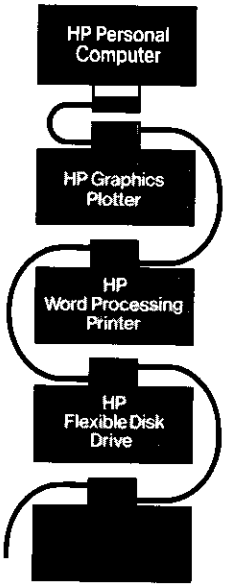
HP 7470A Graphics Plotter at right produces vivid designs on paper or transparent film. The plotter holds two pens. It moves the paper or film under one pen at a time to complete your desired plot. Software selects the pens and controls lifting and placement of them on the paper, making two-color plotting a one-step process. A spectrum of colors is available through mixing and changing pens. The HP 7470A employs a state-of-the-art technology, moving both pen and paper to produce fast plots with fine resolution to 1,000 dots per inch.



Efforts to bring artists and designers closer to the computer have led to the development of devices such as the digitizer, which converts a position on a flat surface to data understandable by the computer and the graphics tablet, a pad-like surface that can be drawn on with a stylus.



☐ **INTERFACES** **In order to use the right tool for the job, you need the right connections.** Over the years people have learned to apply computers in many environments requiring different interfaces. Serial and parallel, the two main types of interfaces common on computer systems today, exist in many configurations. Some require an I/O port for every peripheral you use, which can limit the uses of your system. Many computers are sold without the necessary interfaces for mass storage and for a printer – peripherals essential to many personal computer systems. Acquiring interfaces, if they are not built-in or available from the manufacturer, can be very time consuming and costly (and with some computers may not be possible at all).

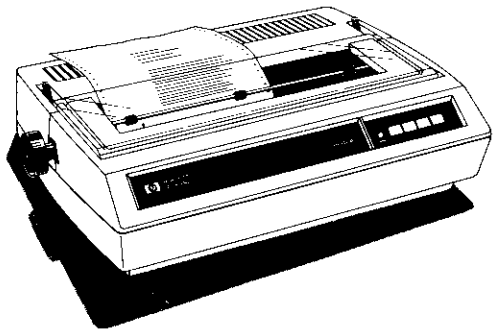


Hewlett-Packard interfaces are the product of long-standing leadership in the field of high technology instrumentation. The range of available interfaces includes models for use in any system. The HP Interface Loop (HP-IL) enables handheld and portable computers to control and communicate with up to 30 instruments, battery or AC-operable peripherals, and HP Personal Computers. The HP Interface Bus (HP-IB), compatible with the industry standard IEEE-488, enables an HP Personal Computer to control as many as 14 instruments and peripherals from one I/O port. An RS-232C serial interface is available for controlling modems, printers and equipment using this widely accepted standard. Another parallel configuration available from HP is supported by the GPIO general purpose interface.

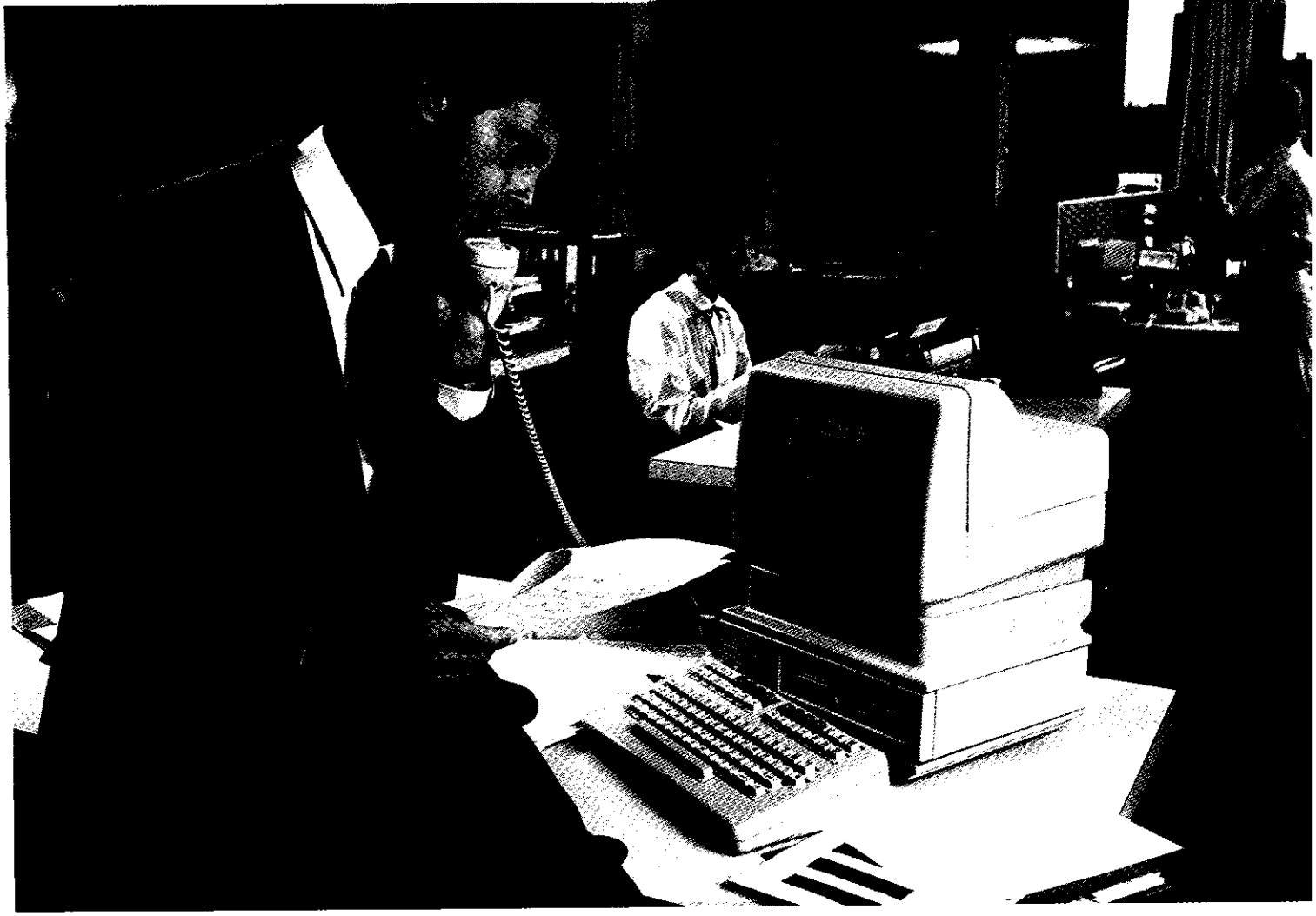
Because the interface itself doesn't appear as a peripheral, its hidden importance can be overlooked – resulting in inconvenience, extra costs and a system with limited abilities. It cannot be overemphasized: in order to use the right tool for the job, you need the right connections.

☐ **PERIPHERALS** Any device external to but interfacing with the CPU is a peripheral, including the keyboard and display. Two widely used peripherals – mass storage devices and plotters – have been described above in reference to memory and graphics. Your intended applications will determine whether these and/or other peripherals should be included in your system. To maximize your flexibility now and in the future, your computer should provide easy access through its interfaces to as many peripherals as possible. For ease of use, your peripherals should be able to run off of a common bus. As explained above, there should be no hidden costs or inconveniences involved in adding peripherals to your computer. **The advantage of buying all your gear from a single vendor is that you are guaranteed that all the devices were designed to work with each other as an integrated system for maximum efficiency.**

Most personal computer applications require that hardcopy be produced by a printer. The three main types are dot-matrix impact, dot-matrix thermal and daisy wheel printers. If your system doesn't include a plotter and you want some graphics capabilities, dot-matrix printers enable you to reproduce simple designs. If you need "letter quality" hardcopy for business or other purposes, you should choose a daisy wheel printer. The HP 2601A and HP 2602A *(shown here)* Daisy Wheel Printers offer similar output capabilities for high or low volume word processing printing requirements.



Many applications involve the use of a modem, a peripheral that enables a computer to interface with telephone lines. Users can connect or "log on" to other computers to exchange messages, data and programs. You can access an information network for such services as news and Dow Jones quotations.



Series 100 Personal Office Computers

Personal Office Computers increase the productivity of administrators in large companies and serve as departmental or personal work stations for secretaries and other dedicated users. Vernon King and Ellen Meyer work in a transaction-intensive office, the regional headquarters of a large insurance company. The acquisition of HP Series 100 Computers has provided each of them the right tool for the job and made their office a more efficient place.

Vernon wanted a personal computer that would give him back his desk (the old computer had covered it almost completely) while giving him all the analytical and communications power he needs to increase his productivity as a manager. He got it from the HP 120, which has the smallest "footprint" of any full-function desktop computer. Ellen wanted a large, highly readable screen on a system that would be easy to use for word processing and record keeping. She got it from an HP 125, which has a 12" high-resolution, low-glare CRT with 9 by 15 dot-matrix characters and variable brightness.

Each of these two totally compatible computers:

- Is configured to serve as a terminal, tying into the company data base through an HP 3000 mainframe.
- Has two Z80A microprocessors, one serving as the CPU and another making the display screen "smart". Dual microprocessors lead to much faster operation because the data-handling CPU doesn't have to perform all the functions of the terminal (scan the keyboard, etc.).
- Has a detached, sculpted keyboard with a full set of screen-labeled softkeys, system command and editing keys, and an optional numeric pad.
- Is supported by outstanding business-oriented software written to take advantage of the HP Series 100 computers' screen-labeled softkeys. The user is guided by menus through the most sophisticated programs. You don't need CP/M training to run CP/M based programs on an HP Series 100 "applications engine".

Vernon uses his HP 120 to do data analysis with VisiCalc®. His computer interfaces with the HP 3000 mainframe to run his most complex analysis programs. His favorite software includes CONDOR*, a powerful data management system. Ellen can access the HP 3000, consult the customer's file and provide up-to-the-minute information on any aspect of it.

*CONDOR is a trademark of Condor Computer Corporation.

☐ **QUALITY, RELIABILITY AND SUPPORT** Buying a personal computer is like buying a car. What you want are high-quality products that don't break down and a dependable seller who will make life easier if and when you need repairs, parts, accessories or advice. Reliability, isn't easy to determine at the point of sale, but the manufacturer's overall reputation is significant.

Hewlett-Packard tests all its personal computer products extensively, places them under warranty, and maintains a network of Field Repair Centers. Users have a choice of economical support plans, including an On-Site Maintenance Agreement that guarantees fast service at your workplace or home. If it's advice you need, HP systems engineers are available by phone. HP also offers user and programmer training. But most important, Hewlett-Packard products are built to last.

It is important to bear in mind that quality determines the economic soundness of any computer purchase. Low price must not be confused with high cost-effectiveness. **Computation gear that doesn't break down, that is readily expandable and for which the manufacturer provides first-rate service and support is the ultimate bargain.**

☐ **SPEED AND POWER** These aspects of computer performance are especially important in laboratories and other technical work environments. The speed at which the microprocessor steps through memory and carries out its instructions is controlled by the system clock, a high-frequency signal measured in Megahertz (MHz). Power refers to direct memory-addressing capability. It is determined by the computer's internal architecture - the width of the data path and the length of the programmable registers contained in the CPU. A wide data path enables more complex operations in single steps (as opposed to sequences of smaller steps). Most personal computers available today are 8-bit machines. The new HP Series 200 Model 16 is a 16-bit machine with a state-of-the-art 68,000 microprocessor controlled by an 8 MHz system clock. Dedicated processors handle such tasks as peripheral control, freeing the 68,000 for program execution. Its 16/32-bit architecture enables 16-bit data handling over an extremely large memory-addressing range. More operations per instruction cycle result in faster execution times.

☐ **CONVENIENCES/INTANGIBLES** The actual amount of space a personal computer occupies on your desk - its "footprint" is an important selection factor. Some will occupy your whole desk, making it difficult for you to function effectively. Some take up floor space, too. **Hewlett-Packard's design goal is compactness – maximum performance, minimum size – epitomized by the personal computers described in this brochure.**

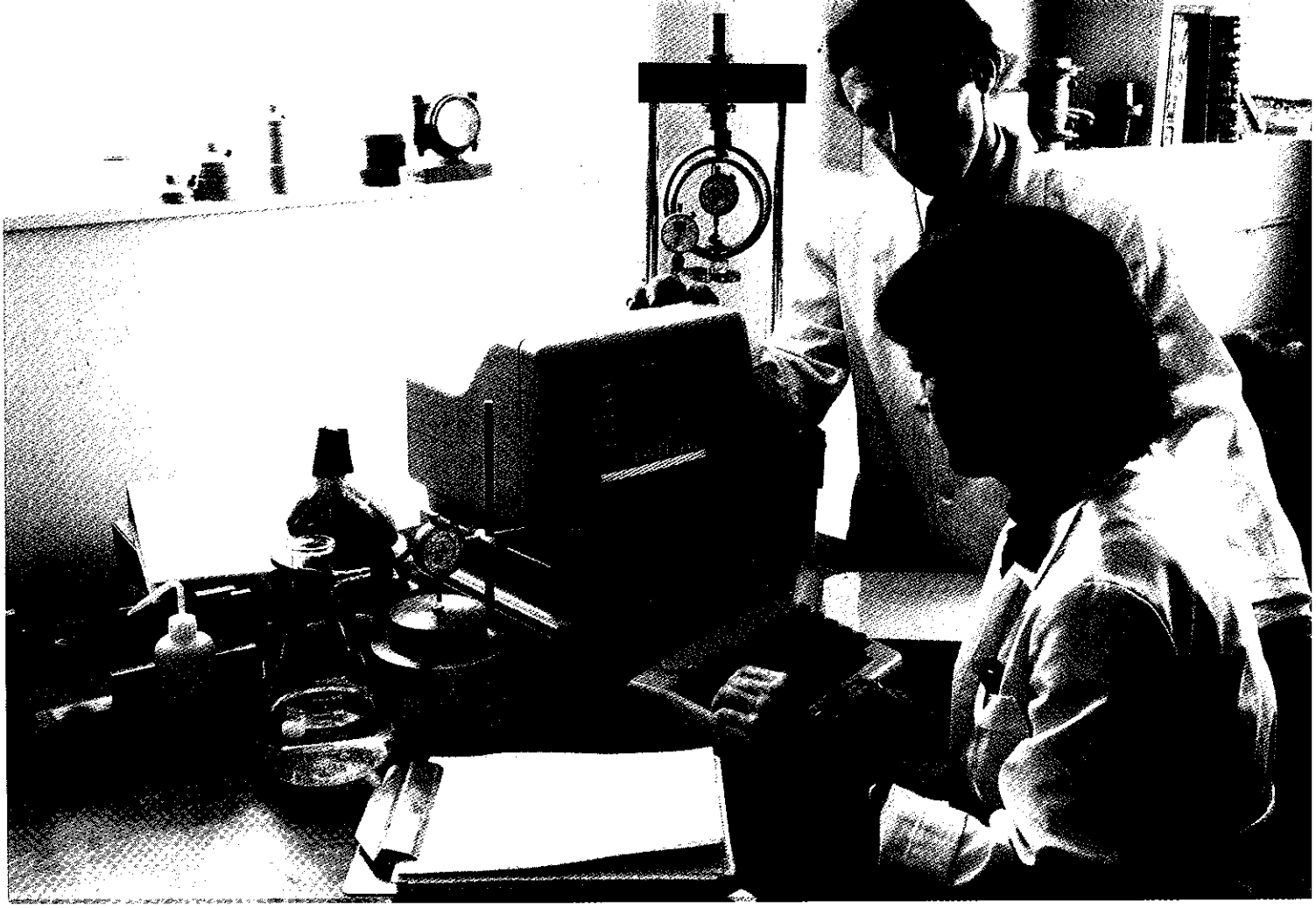
Well-designed personal computers and peripherals should run a self-test at the start of operation – a diagnostic program to confirm that all parts of the system are working properly.

Portability is another useful convenience, even if it is not your main prerequisite. You might not need a battery-operable portable for use on the road or in the field; but you might on occasion want to take your personal computer home, bring it to a different work site, or have it on hand to make a presentation outside your office. Portability is determined by weight, overall size and whether or not a carrying case is made for the model. (Battery-operable portable computers should be rechargeable).

A highly subjective factor, important nonetheless, is appearance. You're going to be spending a lot of time with your computer and it shouldn't be an eyesore. If you're expanding your system, remember that peripherals should be compatible with your computer visually as well as electrically.

Another intangible worth considering is the likelihood that the manufacturer will be on hand tomorrow to offer the hardware and software enhancements you might desire.

☐ **DOCUMENTATION** The quality of the manuals and guides provided by the manufacturer of a given hardware or software product will affect how long it takes you to get the product working and whether you'll be able to take full advantage of its capabilities. Good documentation tends to be brief and informative. It generally includes complete examples of operations, relevant illustrations, an index of key terms and either a glossary or clear definitions integrated with the text. Good documentation is written in a style you can understand, helps you carry out your intended applications and may even suggest applications you hadn't considered. Manufacturers and dealers will supply you with documentation on the products you're interested in. Study documentation as a short-cut method of comparison shopping.



Series 200 Personal Technical Computers

The HP Series 200 Model 16 represents the state-of-the-art in personal computation. Designed for scientists and engineers, it is the right tool for anyone who wants maximum computing power in a compact, expandable package.

Bill O'Brien runs a laboratory specializing in chemical and bacterial analyses of soil, water and air. His clients need results "yesterday"; so Bill needs a technical computer with maximum speed and power. He also needs a personal computer that will enable him to do documentation and communications. And he can't give up much room on his workbench.

Bill solved his problems by getting an HP Series 200 Model 16. Data from soil samples, taken from his gas chromatograph and other instruments, are fed into the Model 16. Test results emerge almost instantly.

Bill's productivity has increased, his service to his clients has improved and his turn-around time has been reduced from days to hours thanks to the HP Series 200 Model 16.

- Its 68,000 microprocessor with 8 MHz system clock and 16/32-bit architecture result in extremely fast, precise program execution and data handling. Up to 768 Kbytes of user memory are available.

- Built-in HP-IB and RS-232C interfaces provide quick, easy connection to instruments and peripherals. Plug-in cards provide alternative interface capabilities.

- 9" diagonal CRT has sharp 300 by 400 dot resolution, enhancing onscreen graphics. 80-character by 25-line display is built in.

- Detached, full-function keyboard has five user-definable softkeys (10 with shift) and a rotary control knob for fine-tuning.

- Supported language systems: BASIC, HPL and Pascal. Supported software includes computer-aided engineering, powerful math modules such as Statistics for analyzing data from instruments and fine-tuning the results, and business aids such as Project Management and VisiCalc®.

- A hardware/software package called Shared Resource Manager (SRM) can link as many as 11 Model 16s to one printer and one mass storage device, creating significant economies as a business expands.

How To Use The Scorecard

On the inside back cover is a scorecard that lists the key factors to take into account in buying a personal computer. It is intended to help you do focused comparison shopping.

The scorecard is designed for comparing two models of the same computer type – portable, personal, office or technical.

The Factors listed on the left are defined and discussed throughout the pages of this booklet. In the columns on the right you should establish the Personal Relevance of each factor to your situation by assigning it a value on a scale of 1 to 5. In the next column write in your factor-by-factor Evaluation of the computer under consideration (also on a scale of 1 to 5). Multiply the numbers you've entered in those columns and enter the result in the Weighted Rating column to reflect your personal emphases and standards.

Add up all of the Weighted Rating columns. The model that receives your highest total Weighted Rating should best satisfy your personal computer needs.

Please bear in mind that the scorecard is only a method of organizing your thoughts and impressions of each computer under consideration. The results obviously shouldn't be taken as binding – though we hope they'll be illuminating.

SELECTION FACTOR	MODEL A			MODEL B		
	PERSONAL RELEVANCE	EVALUATION	WEIGHTED RATING	PERSONAL RELEVANCE	EVALUATION	WEIGHTED RATING
☐ GRAPHICS CAPABILITY	2	4	8			
☐ KEYBOARD/EASE OF USE	5	5	25			

For example, take the factor "Graphics Capability". If you don't presently intend to use your computer to generate charts or other visual displays, and if the one you're considering has good but not excellent graphics capabilities, you might put down 2 for Personal Relevance, 4 for Evaluation and 8 as the Weighted Rating. Or take "Keyboard/Ease of Use". If the time-saving made possible by a full-function keyboard is very important to you, and if the model at hand has all the features you're looking for, you would give it a 5 for Personal Relevance, a 5 for Evaluation and a Weighted Rating of 25 (the highest possible).

Personal Computer Selection Factor Scorecard

Check the type of computer under consideration:
☐ Portable ☐ Personal ☐ Office ☐ Technical

FACTOR	Described on Page:	MODEL A			MODEL B		
		PERSONAL RELEVANCE	EVALUATION	WEIGHTED RATING	PERSONAL RELEVANCE	EVALUATION	WEIGHTED RATING
☐ SOFTWARE	(7)						
☐ MEMORY/MASS STORAGE	(8)						
☐ KEYBOARD/EASE OF USE	(10)						
☐ VIDEO DISPLAY	(12)						
☐ GRAPHICS CAPABILITIES	(12)						
☐ INTERFACES	(14)						
☐ PERIPHERALS	(14)						
☐ QUALITY, RELIABILITY, SUPPORT	(16)						
☐ SPEED AND POWER	(16)						
☐ CONVENIENCES/INTANGIBLES	(16)						
☐ DOCUMENTATION	(16)						
TOTAL:							

For More Information

For additional information and a personal demonstration of Hewlett-Packard's six versatile series of comuptation systems, see your nearest HP dealer or local Hewlett-Packard representative.

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