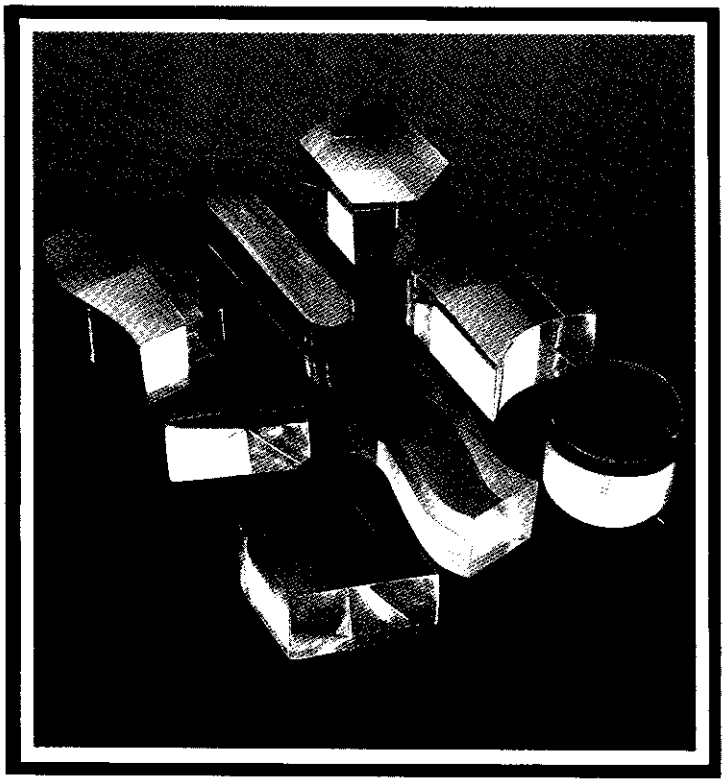
HP Enhanced BASIC

Powerful, yet easy to use



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HP Enhanced BASIC —
For the programmer who's not playing games

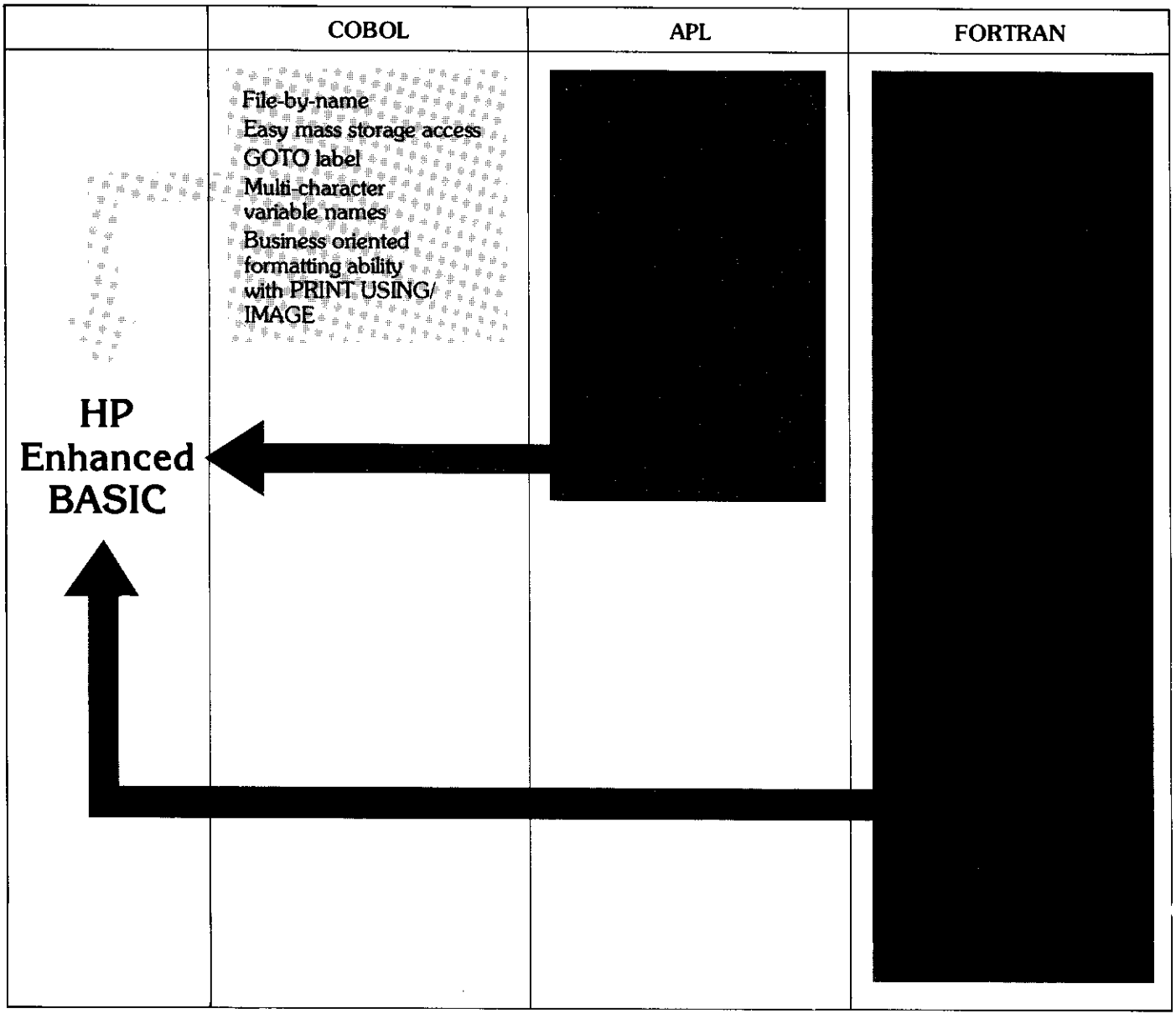
If you're a programmer with tough problems to solve, you want a language that's power-packed and fast — two good reasons you should consider Hewlett-Packard's enhanced BASIC language.

Sure, HP BASIC is still BASIC — conversational and easy to use. It incorporates all the standard ANSI BASIC statements. But it also extends way beyond ANSI BASIC to give you the powerful features normally associated with such languages as FORTRAN and APL. HP enhanced BASIC offers you more than 200 operators, functions, and statements. That's more than four times what standard ANSI BASIC has to offer. In addition, subprograms, multi-dimensional arrays and 15-character variable names have all been added making HP BASIC a language that can solve your more complex programming problems.

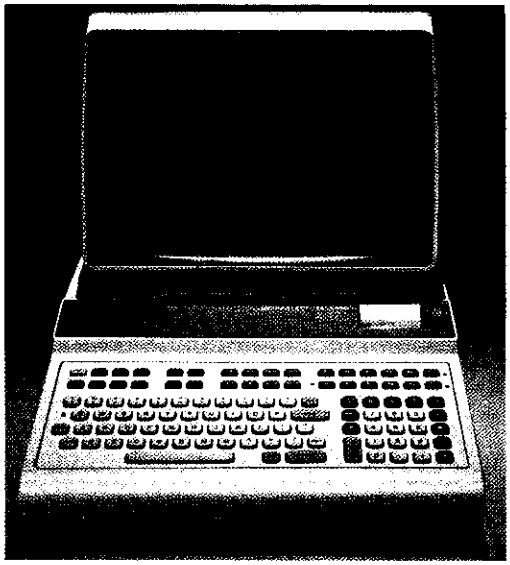
So, if you've been using FORTRAN or APL because you thought BASIC lacked the programming strength you require, look through some of the examples in this brochure. HP enhanced BASIC may have all the power you need.

HP BASIC's high level language enhancements

The following chart shows features of APL, FORTRAN and COBOL that are built-in to HP enhanced BASIC — making it a powerful programmer's tool.



HP's BASIC language desktop computers put powerful programming at your fingertips

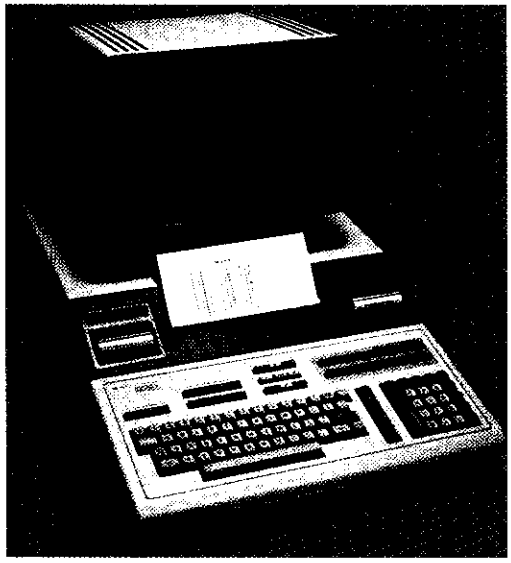


System 35 is a powerful, versatile tool for data acquisition and control, computation or both. Large memory, buffered I/O, Direct Memory Access, 15 levels of priority interrupt, built-in I/O drivers, and ready-made interface cards give the System 35 an impressive range of interfacing capabilities.

System 35 is available with an alphanumeric CRT or a lower cost, single-line LED display.

The System 35 also features a 217K-byte tape cartridge, live keyboard, add-on read only memories, user definable Special Function keys and optional strip printer.

For the experienced programmer, System 35 can also be programmed in assembly language which saves time in specialized operations. This optional feature allows complete access to System 35's central processor. Subprograms can be written in assembly and called by BASIC programs. And assembly language source code can be entered through the keyboard just as if it were a BASIC program.



System 45, the next step up on HP's desktop computer ladder, gives you a system with almost unlimited application possibilities. This system offers you CRT graphics, read only memories, live typewriter-like keyboard, optional 80-column thermal printer, dual tape drives, and high performance I/O — all in one integrated package.

This system has the problem solving capability normally associated with larger computers. With it you can do a Fast Fourier Transform on a set of up to 4000, 12-digit numbers or do a ten-variable stepwise regression with 500 observations.

With System 45's graphics option, plotted data becomes visible practically as fast as it is generated — anytime. To copy formatted information from the CRT, you simply type DUMP GRAPHICS and the CRT image transfers directly to the printer.

Ready-made interfacing cards and cables make interfacing easy. Direct Memory Access allows you to capture real-time data from high speed devices. And System 45's dual processors provide you with overlapped processing which saves you time by allowing I/O and computation operations to be done at the same time.

To further enhance your desktop computer, you can choose from a wide range of Hewlett-Packard plug-in peripherals. You can tailor a system to suit your needs by choosing from HP printers, plotters, paper tape punch, paper tape reader, card reader, digitizer, cartridge tape drive and disk drives. In addition, HP also offers numerous software packs in a variety of application areas.

As your applications grow, Hewlett-Packard has other BASIC language computers to meet your future needs. BASIC is common to HP's 250, 300, and 3000, so no matter how you grow, your investment in software will not be lost. For more information, call your local HP sales office or write: Hewlett-Packard, 3400 E. Harmony Road, Fort Collins, Colorado 80525.

..simple statements for difficult tasks

Unified graphics commands†

The HP graphics language not only controls the CRT (in the case of System 45), but works with the optional printers and plotters as well. There are single commands for PLOT, SCALE, CLIP, LABEL, AXES, MOVE, DIGITIZE, GRID, SHOW, plus 28 more functions. These new BASIC statements make it easy to define your problem; scale, draw, and label axes and grids; then execute X-Y, incremental or relative plots.

```
20    GRAPHICS                          ! Enables the CRT.
30    LIMIT 0,184.47,0,149.82           ! Sets Hard Clip limits of the CRT.
40    CLIP 20,80,30,75                  ! Sets plotting area to specified coordinates.
50    FRAME                             ! FRAMEs the plotting area.
60    MOVE 0,0                          ! MOVEs to point 0,0 in GDU's.
70    Xgdu_max=100*MAX(1,1*RATIO)       ! Computes X point.
```

Unified mass memory commands††

Both System 45 and System 35's Unified Mass Memory Commands are compatible with all Hewlett-Packard mass memory devices; so whether you're using a flexible disk, hard disc, or tape cartridge, you won't have to change your whole program. You can address each new device with only a single program line change. You assign meaningful mnemonic names to files (up to 6 characters) and the system maintains a directory of all stored files by name. Data files can be organized either serially or randomly, depending on your storage needs.

```
20    CREATE "RATES",50          ! CREATEs storage on the Mass Storage device.
30    ASSIGN #1 TO "DATA"        ! ASSIGNs #1 to the data file for future access.
40    ASSIGN #10 TO "RATES"      ! ASSIGNs #10 to the rate file.
50    READ #1,1                  ! Sets the file pointer to the beginning.
60    READ #1;A(*)               ! READs the data array serially.
70    FOR N=1 TO No_employee     ! Begins a loop.
```

Edit and debug

HP enhanced BASIC makes entering, editing, and debugging your programs fast and easy.

Entering... Specially defined editing keys, such as Delete Line, Delete Character, Insert Line, Insert Character, Edit, and Edit Line, make entering your programs simpler.

And when it comes to getting your program syntax entered correctly the first time around, HP BASIC — an interpretive language — makes it easy by checking the syntax as each line is stored. Should there be an error, you get an immediate and concise error message. A blinking cursor shows you where the error is.

Editing... Should you want to modify your program, you simply call the specific line into the display. It appears right in the middle of the screen so you can easily make the change, then press the STORE key and it's done. If you need to insert or delete program steps, the affected parts of the program can be automatically renumbered.

Debugging...A variety of tracing statements — TRACE, TRACE ALL, TRACE PAUSE, TRACE VARIABLES and TRACE WAIT — enable you to locate program bugs quickly. You select the trace you need for a specific situation. For example you can trace both program flow and variable by simply typing TRACE ALL. TRACE WAIT 1000 tells the program to hesitate for 1000 milliseconds after the trace message, giving you a chance to decide what your next step will be.

Error trapping has also been improved with HP enhanced BASIC. When an error occurs you can branch to a section of the program which can recover from the error rather than having the program stop.

If you've got a bug that's really tough to find, HP's live keyboard (found on both System 35 and 45) can make things easier on you. While the program is running, you can interrogate or change a variable, enter commands, evaluate expressions, list programs and alter program flow. You can even store program lines while the program is running.

Between HP's enhanced BASIC language and the System 35 or System 45, you get powerful developing, debugging and computing tools that get your programs up and running fast.

```
TRACE--LINE 715, Temp(*)  CHANGED VALUE
TRACE--FROM 720 TO 1280
TRACE--LINE 1290, Mainframes$(1) = Prod #1
TRACE--LINE 1290, Mainframes$(2) = Prod #2
TRACE--LINE 1290, Mainframes$(3) = Prod #3
TRACE--LINE 1305, I = 1
```

†Provided by add-on Graphics ROM.

††Provided by add-on Mass Storage ROM.

BASIC language enhancements.

Multi-character identifiers

Multi-character identifiers allow you to use up to 15 characters to identify variable names, line labels, and sub-program names. You can actually describe the function in the program, making debugging and documenting easier.

```
10    DIM Name$[30],Address$[50],Phone$[10]          ! String sizes set-up.
20    FOR I=1 TO Number_of_bills                     ! Initialize loop.
30       READ #1;Name$,Address$,Phone$,Paymentdue    ! Read from Mass Storage.
40       PRINT Name$,Address$,Phone$,Paymentdue      ! Print bills.
50    NEXT I                                         ! Complete loop.
```

Array operations

Higher level array operations simplify standard array manipulations. Choose any of the following operations:

- Matrix multiplication
- Element-by-element multiplication and division
- Row and column sums
- Total array sum
- Relational operations
- Matrix inversions
- Numeric or string arrays up to six dimensions

```
20    DIM Employee_rate(30,12),Pay(30,12)  ! Set-up employee arrays.
30    DIM Monthly_payroll(12)              ! Set-up payroll array.
40    MAT Pay=(40)*Employee_rate           ! Calculate employee paychecks.
50    MAT Monthly_payroll=CSUM(Pay)        ! Calculate total pay per month.
60    PRINT "TOTAL MONTHLY PAYROLL"
```

Subprograms and function subprograms

HP enhanced BASIC also allows independent program segments. A subprogram may be called and executed, variables evaluated and passed to the main program — all on a temporary basis and upon demand. Subprograms avoid repetition of long and complex groups of statements in a program and allow efficient use of memory due to dynamic memory allocation. Also, structured programs allow independent development of subprograms which anybody can use.

In addition, these subprograms allow you to:

- Pass parameter by reference or by value (Parameters can be simple numeric, string arrays, or file identifiers)
- Have both local and global variables
- Have recursive programming
- Divide large programs into modular segments
- Pass data through common blocks
- Dynamic memory allocation and de-allocation

```
30        CALL Conversion(Hrs,Min,Am_pm$,Militarytime)    ! Passes parameters.
40    PRINT Hrs;":";Min;Am_pm$;" is";Militarytime;"hours" ! Prints the answer.
50    END                                                 ! Ends the mainline.
60        SUB Conversion(H,I,J$,K)                        ! Parameters received.
70        K=100*H+I
```

I/O commands†

With System 45 and System 35 you can communicate to a variety of external devices in easy-to-use BASIC statements without sacrificing performance.* Communication with devices of various speeds is facilitated by several types of I/O. Slow devices, such as digitizers, can be handled through vectored interrupt. Since they are serviced only when they are ready to send or receive data, they do not slow down or stop execution of a mainline program. Fast devices, such as high speed digital voltmeters or analog/digital converters, can be handled via direct memory access or through a second type of high speed transfer called fast handshake.

I/O with Hewlett-Packard desktop computers is largely a matter of plugging in the right I/O card. To automate, you just plug in your instruments and go straight into application programming.

```
30    ON INT #3 GOTO Done                                  ! Interrupt branch for SC 3.
40    OUTPUT 9 USING "K";"Abort/Unit1=Input2/Unit1Go"!  Resets clock and starts.
50    ENTER 3 BINT NOFORMAT;A$                             ! Enter,interrupt when done.
60    GOTO 60                                              ! Wait for interrupt.
70 Done:   OUTPUT 9 USING "K";"Unit1Halt/Unit1Value"!  Interrupt branches here.
80    ENTER 9;B$                                           ! Reads elapsed time.
```

*Assembly language programming is an optional feature on System 35.

†Provided by add-on I/O ROM.

3400 E. Harmony Road, Fort Collins, Colorado 80525

For assistance call: Washington (301) 948-6370, Chicago (312) 255-9800, Atlanta (404) 955-1500, Los Angeles (213) 877-1282. Ask for an HP Desktop Computer representative.

Printed in U.S.A.
(11/78)20M

5953-1001(40)