

HEWLETT  PACKARD

MODEL
30

**9830A
CALCULATOR**

TECHNICAL DATA JANUARY 1973



9830A CALCULATOR AND 9866A PRINTER

DESCRIPTION

The Hewlett-Packard 9830A (Model 30) is a general purpose programmable calculator designed for a wide range of applications.

The language of the Model 30 is BASIC. This easy to use language couples simplicity with power and appeals to the new calculator owner as well as the experienced programmer. The Model 30 automatically inherits a comprehensive range of proven software packages, including finance, mathematics, statistics, and education.

A minimum Model 30 provides 3520 8-bit bytes (1760 words) of user read/write memory. This can be expanded to 7616 bytes (3808 words). In addition the user can select from a wide range of read-only-memory (ROM) plug-in blocks for increased computational capability or peripheral control or both! The Model 30 allows up to 16 K bytes of add-on ROM.

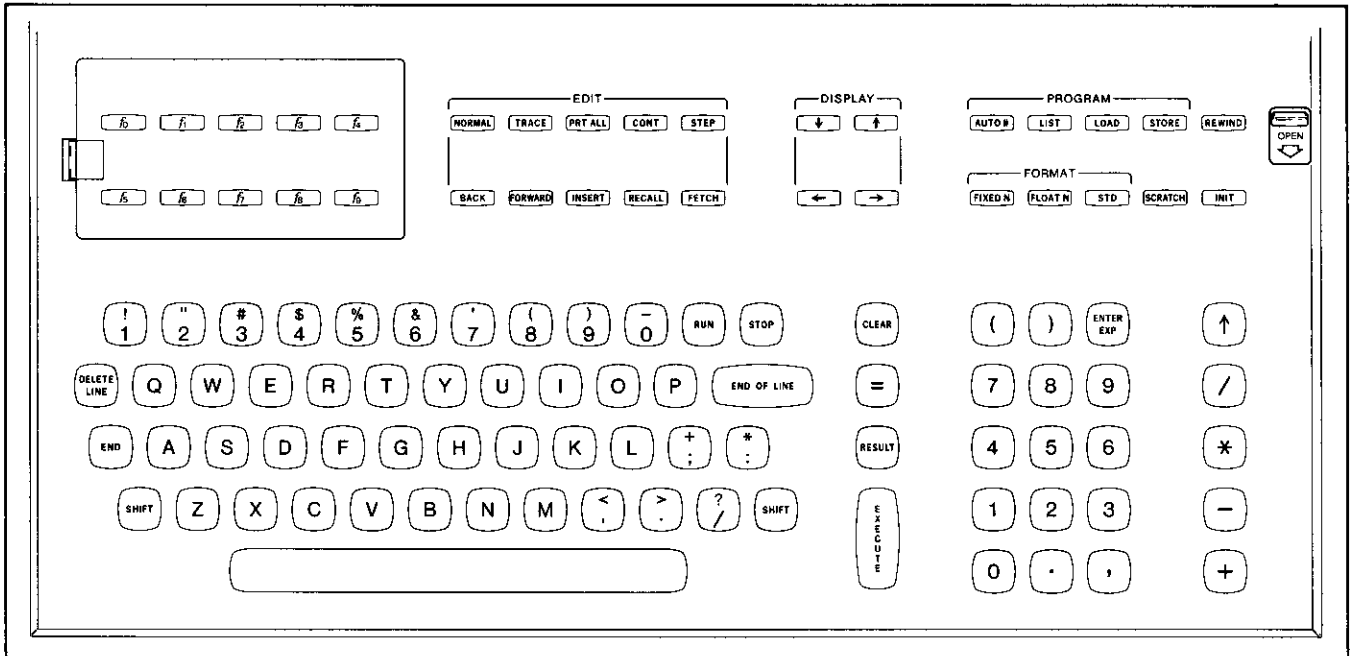
The broad range of 9800 Series peripherals is

available with the Model 30 calculator to allow the user maximum flexibility in putting together that specific system required to solve his problem.

The result is a cost-effective calculator that can meet your data handling problems today and continue meeting them as your needs expand.

FEATURES

- * Alpha Keyboard
- * 32 Character LED Alphanumeric Display
- * Built-in Tape Cassette
- * BASIC Language
- * 12 Significant Digits
- * Full Trigonometric Capability
- * Special Function Keys
- * Easy Editing
- * Expandable User Memory
- * Add-On Read-Only Memory
- * Formatted Output
- * Broad Range of Peripherals



KEYBOARD

The Model 30 calculator keyboard has been designed for maximum user flexibility. The major portion of the keyboard duplicates that of a typewriter or teletype. The numeric keys are repeated in normal desk top calculator sequence.

Other groups of keys include the arithmetic operators, the special function keys, the edit keys, display control keys, and a group of program keys.

ALPHAMERIC DISPLAY

Light-emitting diodes provide a bright, 32-character display, which is easy to read over a wide range of angles and distances. Each of the 9/32 inch (.714 cm) high characters uses a 7 x 5 dot matrix to provide naturally-shaped numbers, letters, and symbols in this size:

A+SOR (B+3.2)
(ACTUAL SIZE)

When greater than 32 characters are being input, the characters will automatically shift to the left to allow room for the additional characters being keyed in. To view the beginning of the input, press \rightarrow ; this moves the characters in the display to the right. Pressing \leftarrow performs the reverse operation.

Although the display is 32 characters, an 80-character line can be keyed in with the automatic scrolling both for program lines and keyboard operations.

KEYBOARD MODE

The Model 30 is a very powerful programmable calculator. But it is also very easy to use in simple keyboard operation. Some features which make this so:

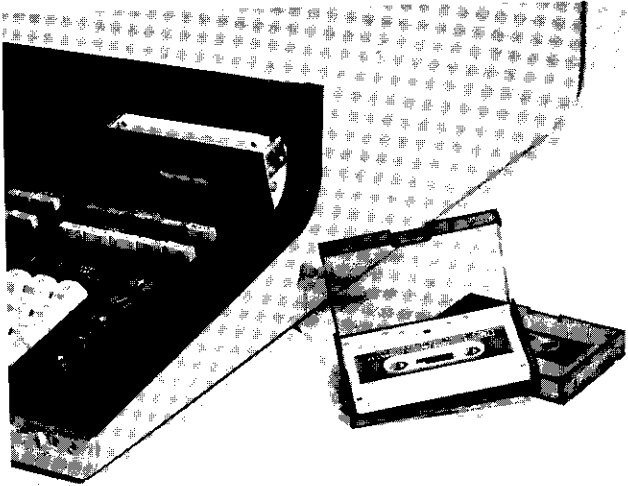
EXECUTE The *EXECUTE* key, when pressed will cause the calculator to execute what is currently shown in the display. If the display line contains an arithmetic expression the calculator will perform the indicated operations and display the results.

RESULT Pressing *CLEAR RESULT EXECUTE* displays the numerical value of the last arithmetic statement that was executed. The result key can also function as an "accumulator" for "adding machine" calculations.

RECALL Pressing *RECALL* will result in bringing the last line that was executed to the display. This allows the user to alter or edit the line without rekeying the entire expression.

CASSETTE MEMORY

The Model 30 calculator features a built-in cassette for program, data, or special function key storage. In addition to the internal cassette the Model 30 can operate with up to nine peripheral cassettes (HP Model 9865A).



MODEL 30 CALCULATOR TAPE CASSETTE AND CARTRIDGES

Tape and data manipulations not usually available on large computer magnetic tape systems are easily performed on the 9830. Files may be recalled from the cassette, modified, and restored in the same location, thus eliminating the need for a second tape unit. All files are numbered sequentially and a high-speed bi-directional search is used to locate a specified file from any point on the tape; program execution times are significantly reduced by eliminating the need for tape rewind in order to begin searching for a file.

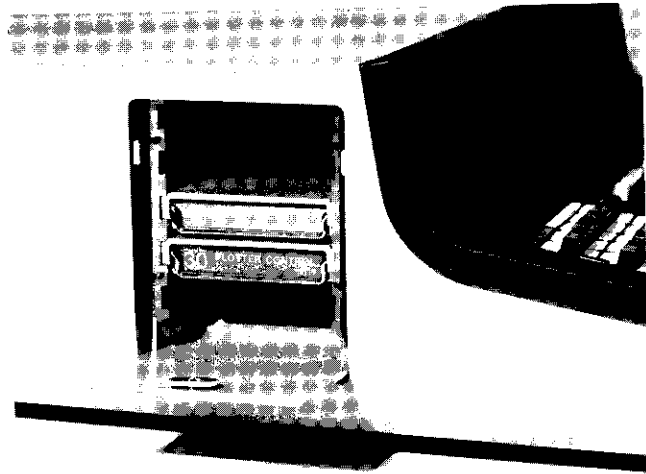
Cassette storage may be optimized by selecting different file sizes which correspond to the program length and/or data storage of the program. Several Cassette Memories may be used in a system and each can be selectively addressed.

The cassette system has an interrupt mode for simultaneous calculator operation and cassette file search. A single tape cassette can hold up to 80,000 bytes (40,000 words) depending on the file structure set up by the user.

The following tape cassette commands are programmable: *MARK*, *STORE*, *LOAD MERGE*, *LINK*, *REWIND*, *FIND*, *STOREKEY*, *LOADKEY*, *STOREDATA*, *LOADDATA*, and *TLIST*. These commands are also available in keyboard mode.

MEMORY EXPANDABILITY

The memory of the Model 30 is expandable in two separate ways. The user read/write memory is expandable from 3520 bytes (1760 words) to 7616 bytes (3808 words). Add-on read-only-memory (ROM) can be added in 2 K byte increments to a total of 16 K bytes.



MODEL 30 CALCULATOR WITH MATRIX AND PLOTTER ROMS INSTALLED

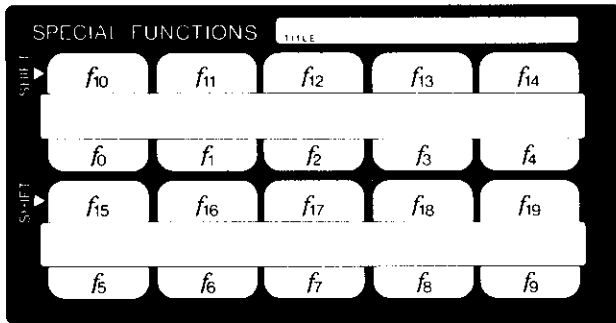
Choose the memory configuration that meets your needs. You can always add power with plug-in memory boards to solve future problems. In addition you can tailor your Model 30 with exactly the peripheral control and language features required for your application with simple plug-in ROM's. The following 2 K byte ROM's are available now.

- 11270B Matrix--adds complete matrix arithmetic capability to the Model 30.
- 11271B Plotter--necessary for control of the Model 62 Plotter.
- 11272B Extended I/O--provides additional input/output capability particularly formatted input.
- 11274B String variables--adds full conversational capability.
- 11277B Terminal 1--allows the Model 30 Calculator to be used in conjunction with a modem as a terminal to a remote time share system.

Additional ROM's will be developed in the future. The above plug-in ROM's are described more fully in their individual data sheets.

SPECIAL FUNCTION KEYS

There are ten special function keys in the upper-left keyboard area of the Model 30. Each key can have two functions or programs assigned to it for a maximum of twenty.



The special function keys can be used effectively in 3 different ways.

1. To represent text where text is used as a typing aid.
2. To represent functions. The functions can be single or multi-line functions and different parameters can be passed to the function from the mainline program or between functions.
3. To represent an entire program.

Programming and editing rules for the special function keys are the same as those for normal programming.

PERIPHERALS

The Model 30 accepts up to four peripherals at one time (up to five if the Model 9866 Printer is included). This can be expanded to 13 peripherals with the use of the Model 9868 I/O Expander. This virtually limitless I/O capability coupled with the broad range of 9800 series peripherals allows the user to configure the exact system necessary for his application.

The peripherals now available for use with the Model 30 are:

Model 9860A	Marked Card Reader
Model 9861A	Output Typewriter
Model 9862A	X-Y Plotter
Model 9863A	Paper Tape Reader
Model 9864A	Digitizer
Model 9865A	Tape Cassette
Model 9866A	Page Width Printer

Model 9868A	I/O Expander
Model 9869A	Hopper Card Reader
ASR Model 38	Teletype
Model 2895A	Paper Tape Punch
Model 2748A	Paper Tape Photo Reader

MODEL 66 PRINTER

The Model 9866A Page-Width Printer was designed specifically for the Model 30 calculator. The Model 66 Printer is a quiet thermal printer capable of printing 80 characters per line. It can print the same numbers, symbols, and letters that can be displayed by the calculator.

The characters are generated from a 5 x 7 dot matrix. A sample program listing:

```
10 FORMAT F16.5,2F16.0,F17.5
20 PRINT TAB5"DEC.DEG";
30 PRINT TAB29"DEG"; "MIN"; "SEC"
40 DISP "DECIMAL DEGREES =";
50 INPUT X
60 IF X=0 THEN 140
70 S=ABSX
80 D=SGNX*INTS
90 S=(S-ABSD)*60
100 M=SGNX*INTS
110 S=SGNX*(S-ABSM)*60
120 WRITE (15,10)X,D,M,S
130 GOTO 40
140 PRINT
150 END
```

ACTUAL SIZE PRINTOUT

The Model 66 Printer provides the Model 30 calculator with optimum print capability in terms of speed, line length, and character set. The integrated product design and quiet operation make it ideal for laboratory or office use.



PROGRAMMING IN BASIC

The Model 30's use of a formal high level language-BASIC is new to the world of programmable calculators.

A program written in BASIC is a sequence of statements which are instructions to the calculator. This is a BASIC statement:

```
10 INPUT A,B,C,D,E
```

A statement contains a maximum of 80 characters. A statement may also be called a line.

Statements may be entered in any order; they are usually numbered by fives or tens so that additional statements can be easily inserted. The calculator keeps them in numerical order no matter how they are entered.

A statement can also give an instruction to the calculator. If the instruction requires further details, operands (numeric details) are supplied.

The operands specify what the instruction acts upon; for example what is printed, or where to go. The complete program looks like this:

```
10 INPUT A,B,C,D,E
20 LET S=(A+B+C+D+E)/5
30 PRINT S
40 IF S > 25 THEN 10
50 END
```

The *END* statement has been added in this and is the stopping point in the program when S is less than 25.

Depending on your needs, you may choose to do all your own programming. If you've already been working with *BASIC*, you can, with minor modifications, use your existing programs. Since *BASIC* is a standard computer language, you will find there are many programs already written and available at nominal cost.

To insure that a system starts to work the moment it arrives, HP can provide packaged solutions for finance, structural engineering, statistics, electronic engineering, mathematics, and education. Hewlett-Packard is continually expanding this software library to meet the increasing applications for the Model 30.

EDITING

A program line is keyed into the Model 30 display. Pressing *END OF LINE* places the line in the calculator's read/write memory as a program line. As individual lines are placed into memory or after the entire program has been placed into memory it may be necessary to perform some editing. The Model 30 has some unique features which makes editing very simple:

ERROR NOTES: Language syntax errors are detected immediately and an error appears in the display. A list of error notes is available on pull out reference cards identifying the type of error.

LIST Any portion or all of the program in memory may be listed on the printer. The program listing serves as both an editing aid and a permanent file record.

FETCH Brings the desired line to the display.

BACK FORWARD The *BACK* and *FORWARD* keys can be used to edit expressions in the display. Successive presses of the *BACK* key will move a blinking cursor to the desired location within the display. Editing can then be performed at this location. The *FORWARD* key moves the cursor in the opposite direction. At the location of the blinking cursor the following editing can be performed:

1. Characters can be inserted.
2. Characters can be changed by overscoring with other characters.
3. Characters can be deleted.

PRT ALL In the *PRINT ALL* mode, each program line is printed when *END OF LINE* is pressed. All error messages are also printed.

STOP *STOP* commands can be positioned from the keyboard in a program without disturbing the actual program--this allows the user to check intermediate results without program modification.

With these editing and debugging features the user can quickly and easily insert or delete individual characters or program lines. There is no need to retype an entire line and the calculator does all the necessary bookkeeping.



SPECIFICATIONS

Model 9830A Calculator

Temperature: 0°C - 45°C

Power: 100V +5%, -10%
120V +5%, -10% } selected by
220V +5%, -10% } switch settings
240V +5%, -10%

50-60 Hz, 150 VA maximum

Numeric Format: 12 decimal digits,
floating point

Dynamic Range: (±)9.9999999999 E+99
to (±)1E-99 and 0

Weight: 43 lbs (19,5 kg)

Shipping Weight: 52 lbs (23,59 kg)

Dimensions: 5.75" (14,61 cm) high
17.75" (45,09 cm) wide
25" (63,50 cm) deep

CASSETTE MEMORY

Capacity: 80,000 8-bit bytes

Search Speed: 26 inches per second

Read/Write Speed: 10 inches per second

Information Transfer Rate: 3,000 bits per
second

Tape Life: At least 1,000 head passes

Tape Cassette (300 foot tape): Part No. 0162-
0050

Model 9866A Printer

Temperature: 0°C - 45°C

Power: 100V +5%, -10%
120V +5%, -10% } selected by
220V +5%, -10% } switch settings
240V +5%, -10%

50-60 Hz, 250 VA maximum

Printing Technique: Thermal, 5x7 dot matrix

Speed: 250 lines/min

Weight: 40 lbs (18,14 kg)

Shipping Weight: 54.6 lbs (24,77 kg)

Dimensions: 6.1" (15,49 cm) high
17.75" (45,09 cm) wide
16.1" (40,90 cm) deep

PURCHASE PLANS:

Check with one of the Hewlett-Packard world
wide sales and service offices for specific prices
and plans in your area.

Service Contracts Available.

For more information, call your local HP Sales Office or East (201) 265-5000 • Midwest (312) 677-0400 • South (404) 436-6181 • West (213) 877-1282. Or write: Hewlett-Packard, Calculator Products Division, P.O. Box 301, Loveland, Colorado 80537. In Europe: P.O. Box 85, CH-1217 Meyrin 2, Geneva, Switzerland; Canada: 275 Hymus Boulevard, Pointe Claire, 730, Quebec; Japan: YHP, 1-59-1, Yoyogi, Shibuya-Ku, Tokyo, 151; Other areas of the world: HP International, 3200 Hillview Ave., Palo Alto, California 94304.