



COMPUTING CALCULATOR

Scientific and engineering problem-solver
Model 9100A



9100A

Uses

Statistical and economic analysis
Coordinate geometry calculations
Solution of transcendental equations
Numerical integration
Vector and complex arithmetic
Network analysis
Solution of differential equations

Description

The 9100A is a programmable, electronic calculator which performs operations commonly encountered in scientific and engineering problems. Its log and trig functions are each performed with a single key stroke, providing fast, convenient solutions to intricate equations. Computer-like memory enables the calculator to store instructions and constants for iterative solutions. The easily-readable cathode ray tube instantly displays entries, answers and, when desired, intermediate results.

Operations

Direct keyboard operations include

Arithmetic: addition, subtraction, multiplication, division and square-root.

Logarithmic: $\log x$, $\ln x$ and e^x .

Trigonometric: $\sin x$, $\cos x$, $\tan x$, $\sin^{-1}x$, $\cos^{-1}x$ and $\tan^{-1}x$ (covers all quadrants and any size angle in degrees or radians).

Hyperbolic: $\sinh x$, $\cosh x$, $\tanh x$, $\sinh^{-1}x$, $\cosh^{-1}x$, and $\tanh^{-1}x$.

Coordinate transformation: polar-to-rectangular, rectangular-to-polar, cumulative addition and subtraction of vectors.

Miscellaneous: other single-key operations include taking the absolute value of a number, extracting the integer part of a number, and entering the value of π . Keys are also provided for positioning and storage operations.

Decimal point

Selectable fixed-point or floating-point notation for display of entries and answers.

Fixed-point display: typical display 1234.567890

Up to 10 significant digits with automatic decimal placement and alignment.

Decimal wheel selects 0-9 decimal places, with automatic rounding to the number of places selected.

Left overflow automatically forces display to floating-point notation to allow completion of calculation with no loss of information.

Floating-point display: typical display

1.234 567 890 03

(interpreted as 1.234567890×10^0 or as 1234.567890.)

Dynamic range: accommodates numbers over the range, 10^{-9} to 10^9 .

Up to 10 significant digits with automatic decimal placement and alignment.

Numerical entry

Fixed-point: digits of number are entered from left to right, keying decimal point in its proper position.

Floating-point: significant digits are entered from left to right, exponent of 10 is entered separately.

Memory

Magnetic core memory contains 19 registers:

3 display registers (keyboard, accumulator, temporary).

16 storage registers, with store/retrieve controls.

Total of 2,208 bits in core memory.

Registers: may be used to store 16 constants, or 196 program steps plus 3 constants, or a combination of constants and program steps.

Capacity: register accommodates floating-point number with 12 significant digits (including 2 undisplayed guard digits) plus 2-digit exponent. Alternately, register accommodates 14 program steps.

Read-only memory: contains over 32,000 bits of fixed information for keyboard routines.



Speed

Maximum times for total performance of typical operations, including decimal-point placement:

Add, subtract: 2 milliseconds.

Multiply: 22 milliseconds.

Divide: 27 milliseconds.

Square-root: 30 milliseconds.

Sin, cos, tan: 350 milliseconds.

In x : 70 milliseconds.

e^x : 130 milliseconds.

Coordinate transformation: 280 milliseconds.

These times include core access of 1.6 microseconds.

Programming

The program mode allows entry of program instructions, via the keyboard, into program memory. Programming consists of pressing keys in the proper sequence, and any key on the keyboard, except step program, is available as a program step. Program capacity is 196 steps. No language or code-conventions are required.

A self-contained magnetic card reader/recorder records programs for program memory onto wallet-size magnetic cards for storage. It also reads programs from cards into program memory for repetitive use. Two programs of 196 steps each may be recorded on every reusable card. Cards may be cascaded for longer programs.

Program instructions

Conditional branching: "If" statements make the comparisons—less-than, equal-to-, greater-than—and can be programmed to branch to any of the 196 program addresses.

Unconditional branching: GO-TO statement can be programmed to branch to any of the 196 program addresses. (Also used for manual addressing and correction of individual program steps.)

Flag: provides conditional branching dependent on manual or programmed setting of flag.

Stop: halts program for data entry or display.

Pause: brief display of interim results in computation.

Step program: operator may step through program for visual verification of instructions.

Program library

The program library furnished with the 9100A includes programmed solutions to practical problems in a wide range of scientific and engineering fields. It serves both as an illustration of programming techniques and as a source of ready-to-use programs. Program library holders also receive the *Hewlett-Packard Keyboard*, a periodic publication which provides updating information and a forum for the exchange of programs by 9100A users. Program categories include:

Business	Life Sciences	Statistics
Chemistry	Mathematics	Structures
Electronics	Mechanics	Surveying
Fluid Mechanics	Physics	Thermodynamics

General

Weight: net, 40 lbs (18.1 kg); shipping, 65 lbs (29.5 kg).

Power: 115 or 230 V \pm 10% (slide-switch), 50 to 60 Hz, 400 Hz, 70 watts.

Dimensions: 8¼" high, 16" wide, 19" deep (210 x 406 x 483 mm).

Accessories furnished at no charge:

09100-90001	Operating and Programming manual, \$2.50.*
09100-90002	Program library binder containing sample programs, \$30.*
5060-5919	Box of 10 magnetic program cards, \$10.*
09100-90003	Pad of 100 program sheets, \$2.50.*
09100-90004	Magnetic card with pre-recorded diagnostic program, \$2.50.*
9320-1137	Pull-out instruction card mounted in calculator, \$5.*
4040-0350	Plastic dust cover, \$2.50.*

Additional accessories available:

5000-5884	Single magnetic card, \$2.
09100-90000	Box of 5 program pads, \$10.

Price: HP 9100A, \$4900. Option 001: Pull-out instruction card in French. Option 002: Pull-out instruction card in German. Option 003: Pull-out instruction card in Italian.

*If ordered separately.

Peripherals



9100A with 9120A

Model 9120A Printer: attaches to the top of the calculator and can be added at any time. Prints contents of display registers X, Y, Z, singly or in any combination, upon manual or programmed command. Also lists program upon command. Uses electrostatic principle for silent operation. Available, fall of 1969.



9125A

Model 9125A Plotter: plugs into rear connector on calculator and can be added at any time. Plots upon manual or programmed command, employing calculator's FMT (format) key, 11" x 17" page size. Available mid-1969.