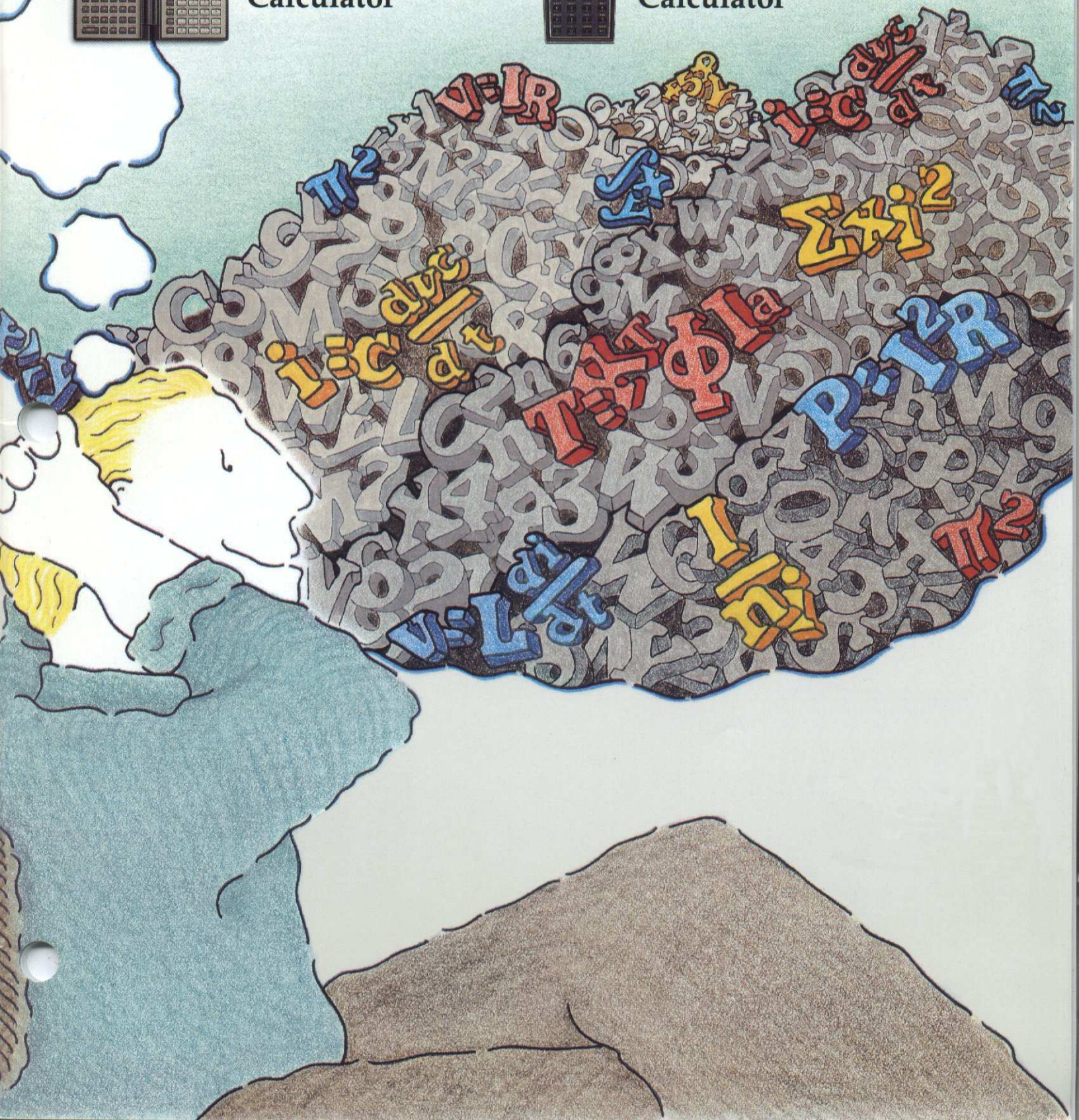
HEWLETT-PACKARD

Put Power-Full Computational Tools to Work for You:

HP-28C Scientific Professional Calculator

HP-41 Advanced Programmable Calculator

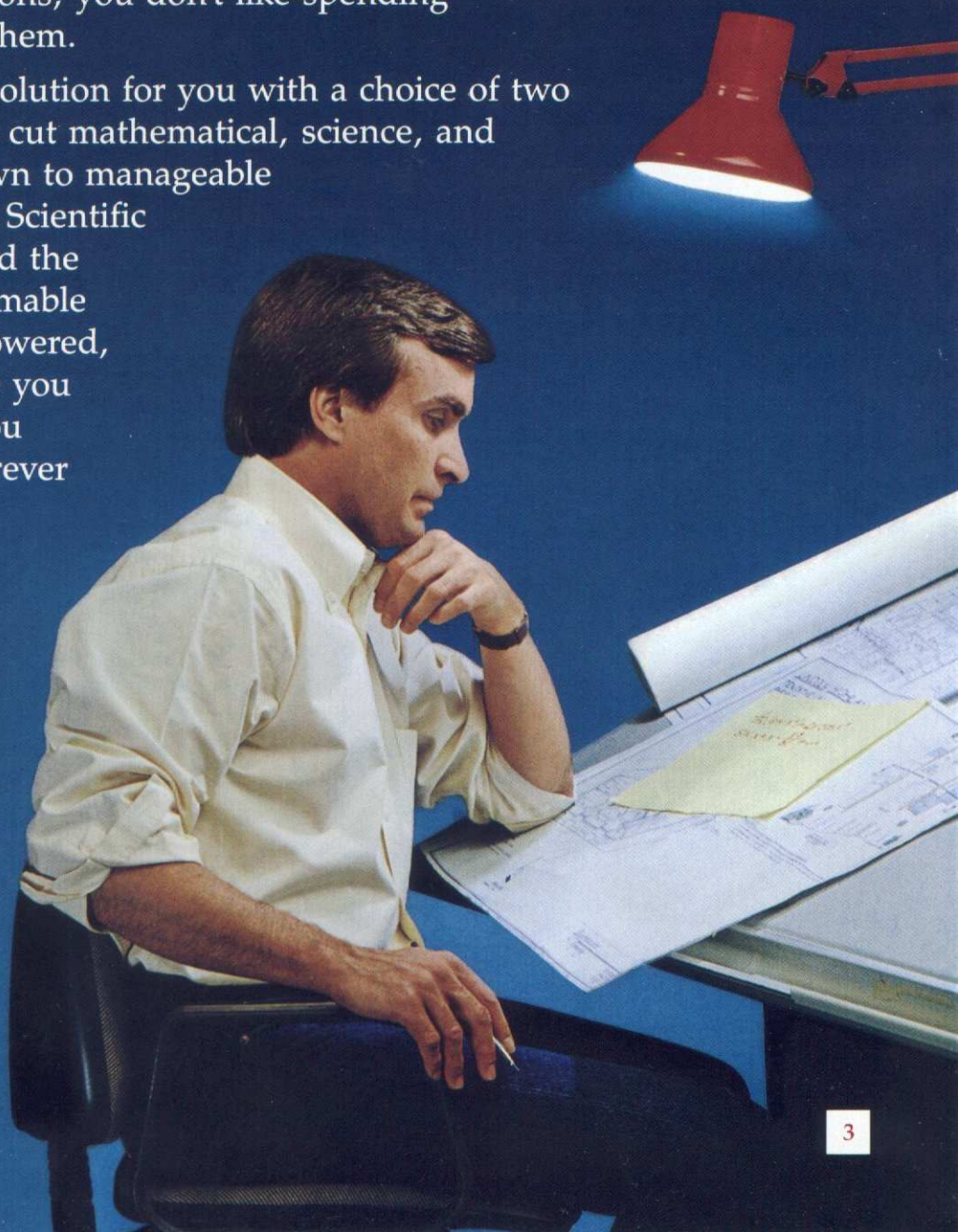


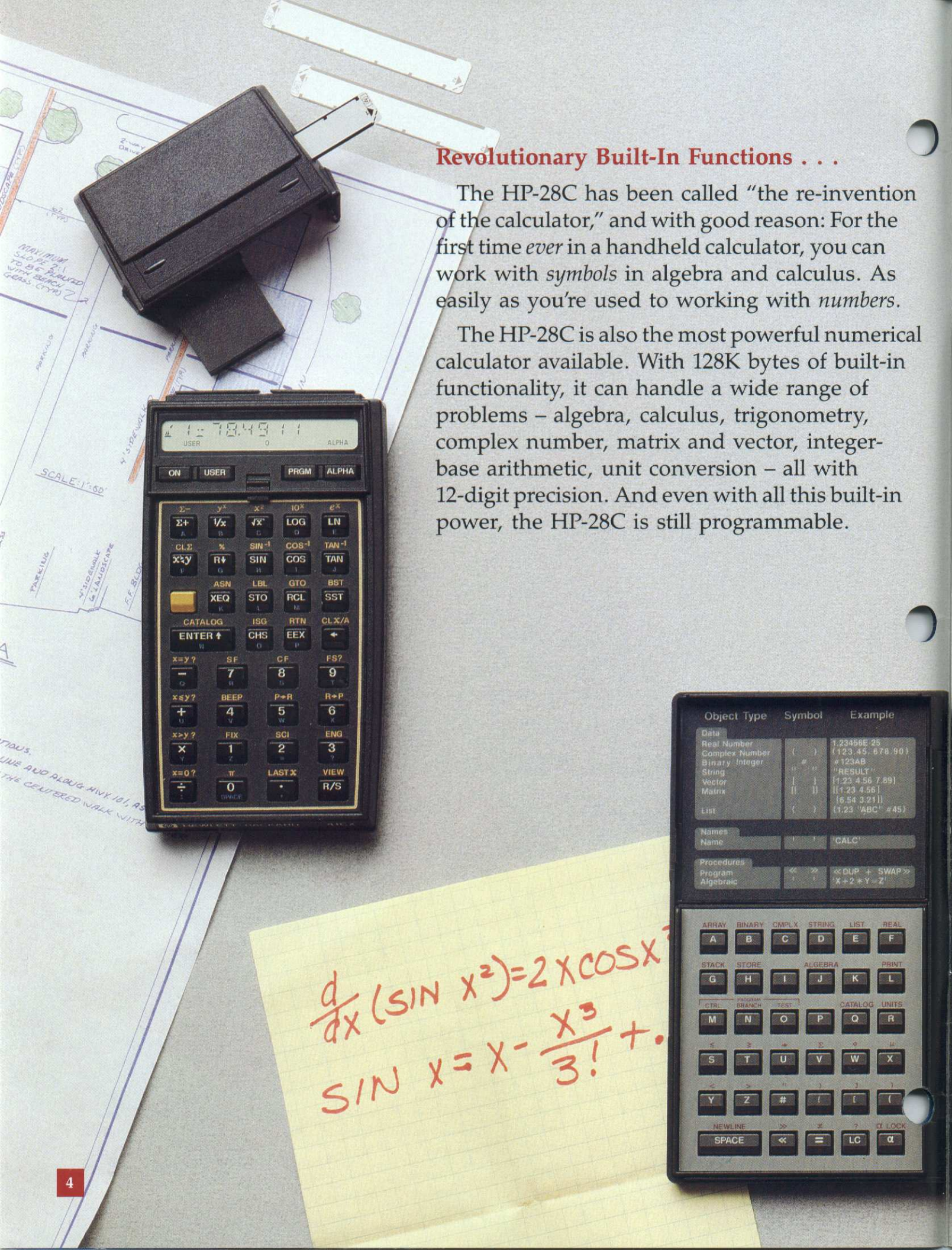
The HP-28C and the HP-41 Calculators – Full of Power the Way *You* Want It: Revolutionary Built-In Functions or Flexible, Expandable Systems.

Whatever field you're in – engineering, science, mathematics, or technical management – you spend a good deal of your time solving math problems and analyzing data. And while you like finding the solutions, you don't like spending precious time arriving at them.

Hewlett-Packard has a solution for you with a choice of two power-full calculators that cut mathematical, science, and engineering problems down to manageable size *and* time: the HP-28C Scientific Professional Calculator and the HP-41 Advanced Programmable Calculator. Both battery-powered, hand-held calculators give you problem-solving power you never had before . . . wherever you go.

Choose the one that's right for you!





Revolutionary Built-In Functions . . .

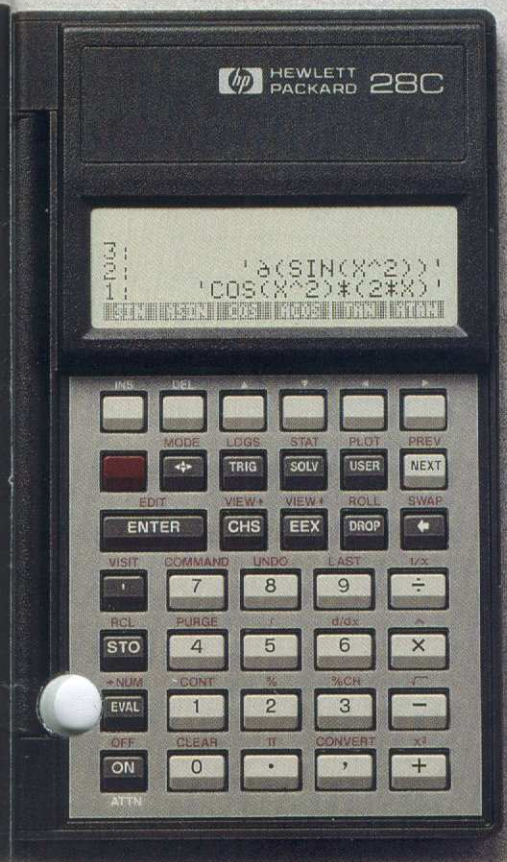
The HP-28C has been called "the re-invention of the calculator," and with good reason: For the first time *ever* in a handheld calculator, you can work with *symbols* in algebra and calculus. As easily as you're used to working with *numbers*.

The HP-28C is also the most powerful numerical calculator available. With 128K bytes of built-in functionality, it can handle a wide range of problems – algebra, calculus, trigonometry, complex number, matrix and vector, integer-base arithmetic, unit conversion – all with 12-digit precision. And even with all this built-in power, the HP-28C is still programmable.

. . . Or Flexible, Expandable Systems

The HP-41 Advanced Programmable Calculator gives you power of another kind: Expandability. No other calculator *anywhere* offers you the thousands of software options, enhancements, and peripherals available for the HP-41. Options that allow you to zero in on programs specifically tailored to engineering, math, applied sciences, statistics, and a wealth of other fields. Options that let you easily handle operations like numerical integration, differential equations, Fourier series, and complex number operations. And extras such as extended memory, a magnetic card reader, or an optical wand.

Even without all the options and extras, the HP-41 is a powerhouse on its own. The HP-41CV has a 12K-byte operating system and 128 functions built in, while the HP-41CX has 24K bytes of operating system and more than 200 built-in functions. And both can make use of HP-IL (Interface Loop) to become system controllers, capable of addressing mass storage devices, printers and various instruments.



The Choice Is Yours!

Whether you're an engineer, a student, a mathematician, a scientist, or a technical manager, the HP-28C or the HP-41 can suit your needs exactly. Choose the power – built-in or expandable – that works best for you. And look forward to the easiest, most efficient problem-solving ever.

HP-28C/HP-41 Functions Comparison Chart

Use this chart to help determine which calculator suits your needs best. If you want revolutionary built-in power, choose the HP-28C. If you prefer to customize your calculator with programs and peripherals, the HP-41 is for you!

	HP-28C	Both	HP-41CV/CX
Symbolic algebra and calculus	First time on a calculator		
Equation solver	Built-in		
Four-line LCD display	On-screen menus		
Function and data plotting		HP-28C: Built in HP-41: Software available	
Unit conversions		HP-28C: Built in HP-41: Software available	
Base conversions		HP-28C: Built in HP-41: Software available	
Advanced statistics		HP-28C: Built in HP-41: Software available	
Matrices and complex functions		HP-28C: Built in HP-41: Software available	
Printer option		HP-28C: Infrared interface HP-41: Directly connected and HP-IL	
Advanced numeric computation		Yes	
Programmable		Yes	
HP-IL			Optional interface
Software			Plug-in modules. Thousands of user-contributed programs.
Mass storage			Card reader. Optical wand. Digital cassette drive. 3½" disk drive.
Alarms and date calculations			CX: Built in CV: Software available

The HP-28C Scientific Professional – Unleash the Power of a Mathematical Genius

If you spend a lot of your time with numbers and mathematical symbols, the HP-28C may completely change the way you work. For the better. The revolutionary HP-28C is a giant step beyond other calculators . . . and a giant time-saver for you. The superior built-in functionality of the HP-28C means you have immediate access to incredible mathematical power.

Since the HP-28C allows you to perform algebra and calculus with *symbols* as well as numbers, you can key in an equation and solve it symbolically by using variables such as x and y in place of numbers. With just a few simple keystrokes, you can formulate the problem, carry out the analysis, and view the solution.

The HP-28C is just as impressive with numerical calculations. Functions are available through on-screen menus and associated softkeys, or directly from the keyboard. With the HP-28C, you can make short work of algebraic expressions, real-number axioms, the chain rule of differentiation, multiple roots of equations, the properties of matrices and vectors, algebraic expansion, and simplification or substitution.

Built-in matrix, vector, and complex number arithmetic capabilities are also key features of the HP-28C . . . with solutions easier than on any other calculator available. And if you're tired of dragging along conversion tables for your calculations, you'll especially appreciate automatic conversions among arbitrary combinations of 120 built-in units as well as units you define yourself.

In addition to all the built-in functions, the HP-28C is also programmable. But two automated systems – an equation solver and plotting – may eliminate any need for you to program. The equation solver lets you solve equations for any unknown, anywhere in the expression. You can also plot expressions to see their behavior and use digitized points from the plot as initial values for the solver.

The HP-28C offers RPN (Reverse Polish Notation) logic plus algebraic entry as well. With its *enhanced* RPN, the HP-28C also features a versatile display that shows up to four levels of the stack at a time. And, the stack can handle any number (within available memory) of real, complex, and binary numbers; arrays; vectors; strings; lists; programs and even algebraic expressions. The HP-28C handles these multiple data types as easily as real numbers.

When you're ready to record your calculations, you can send print directions to an optional battery-operated strip printer via infrared signals. Since infrared light makes the print connection, no cords clutter your workspace. A revolutionary printer for a revolutionary calculator.

Because the HP-28C is battery-powered and small enough to fit in your hand, you can use this mathematical genius wherever you are. In the classroom. In the field. In the office. And once you've used it, you'll wonder how you've ever gotten along without it.

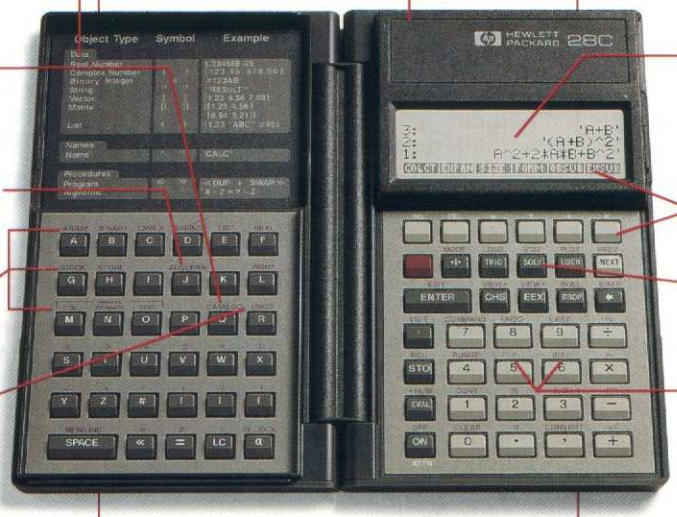
Ten Data Types
Unmatched flexibility and calculator power.

Built-in Function Catalog
Easy access to commands and quick reference to command use.

Algebra Softkey Commands
Manipulate algebraic expressions without pencil and paper.

Softkey Menu Selection
Up to 6 commands per menu and more than 50 menus to choose from.

Unit Conversions
Use 120 built-in units or define your own.



Infrared Printer Interface
Infrared beam makes an invisible link between the HP-28C and optional strip printer.

Four-Line LCD Display
Room for softkey labels, function plots, matrices, or four lines of stack contents. (Scrolling permits viewing of objects larger than four rows high or 23 characters long.)

Menu Labels and Softkeys
Fast, easy access to hundreds of functions.

Equation Solver
Solves equations for any variable anywhere in the equation.

Calculus Functions
Fully symbolic differentiation; numerical integration; symbolic integration of polynomials and polynomial approximations.

HP-28C Scientific Professional Calculator

The HP-28C Scientific Professional Calculator gives new meaning to the word *calculator.* With its unique ability to solve symbolically as well as numerically and its unprecedented 128K bytes of built-in functionality, it stands alone today as the most advanced problem-solving calculator available.

HP-28C Features

- **Symbolic algebra and calculus capability** Using just a few simple keystrokes, you can formulate a problem symbolically, find a symbolic solution that shows the global behavior of the problem, and obtain numerical results from the symbolic solution. Helps reduce the need for paper-and-pencil calculations.
- **Numerical computation** Because you can work with multiple data types, you can use complex numbers, vectors, and matrices as easily as real numbers. And you can easily solve a system of linear equations. Whole matrices can be viewed on the four-line display, and scrolling allows viewing or editing of lengthier objects.
- **Built-in functionality** A full 128K bytes of ROM provide more built-in capability than any other calculator. With so much emphasis placed on keyboard power, you may never need to program.
- **Menu labels and softkeys** Functions are grouped by common application into menus. Once you choose the menu you need, menu labels appear in the display above the softkeys. By choosing a menu label and pressing the corresponding softkey, the function executes. You can also enter your own variables and programs, and the HP-28C automatically assigns them to a menu.
- **Enhanced RPN** Reverse Polish Notation (RPN) provides a consistent and efficient logic system. RPN minimizes keystrokes by eliminating the need for equals and parentheses keys. RPN lets you see intermediate results and allows you to apply additional functions to results of previous calculations. With *enhanced* RPN, you can enter calculations in algebraic form, too – just as they're written. Enhanced RPN also allows the stack to handle any number (within available memory) of real, complex, and binary numbers; matrices; vectors; strings; lists; programs and even algebraic expressions.
- **Equation solver** Enter your own equation, activate the solver function, and the HP-28C automatically creates a menu with all the equation variables assigned to softkeys. Use the softkeys to store values for all variables except one, then to solve for the remaining variable – no matter where or how often it appears in the equation.
- **Plotting capability** Take an equation, expression, or program you're using with the equation

Key Features of the HP-28C	What They Do for You
• Built-in symbolic algebra and calculus capability.	Solves problems conceptually in terms of expressions and solves equations using variables such as *x*, *y*, and *zebra*.
• Built-in matrix, vector, and complex number arithmetic capability.	Handles complicated calculations with ease. Applies ordinary math functions to each data type. Eliminates tedious mechanics.
• Built-in equation solver.	Solves for any variable in any order by entering the equation only once.
• Function and data plotting.	Plots expressions, equations, and statistical data on the display for visual analysis.
• 120 built-in units for automatic conversion, plus user-definable units.	Eliminates the need for conversion tables or specialized unit conversion calculators.
• Enhanced RPN.	Allows entry of calculations in either RPN or algebraic form. Expandable stack can handle arbitrary number of multiple data types.
• Softkey selection.	Offers easy access to the large number of built-in functions and allows for user-generated menus.
• Built-in infrared printer interface.	Provides optional printing capability via infrared light beam – no cords to clutter desks or work areas.
• Four-line by 23-character display.	Shows up to four levels of the stack, the results of past calculations, matrices, formulas, plots, and programs.
• Catalog function.	Lists the necessary stack elements for all built-in programmable functions.
• Separate alpha and numeric keyboards.	Presents numbers and letters on straightforward, easy-to-use keyboards.

solver and plot it on the 32 x 137-pixel display. Use the plot to study the behavior of your equation or to find initial guesses for the equation solver. Eliminates the guesswork in finding all the roots of equations with multiple roots. You can also plot statistical data.

- **Programming** Fully programmable, the HP-28C uses keystroke sequences augmented by high-level control structures.
- **Continuous memory** When you turn off the HP-28C, all data in the calculator, including the contents of the display, are stored for future reference. If the calculator is inactive for about 10 minutes, it automatically turns off to conserve battery power. Once you turn it on again, the data you've been working on is right in front of you.
- **Infrared printer interface** HP's optional infrared printer allows you to print your calculations selectively or continuously to trace your steps as you work. An invisible infrared light "connects" the printer to the HP-28C, so no cords clutter your workspace. And unlike cords, the reliable infrared connection will never fray, never short out, never get tangled.
- **Portability** Three 1.5V N-cell alkaline batteries supply all the power you'll need. With its compact size, the HP-28C fits in wherever you are. In its sturdy, self-contained case, it goes easily wherever your work takes you.
- **Dot matrix display** The adjustable display contrast makes for easy reading and reduction of glare from sunlight and other sources. Low power consumption minimizes battery drain. The display allows you to view four lines of stack contents with 23 characters per line.

HP-28C Physical Specifications

DIMENSIONS . . . 19.05 cm (7.50 in) x 15.88 cm (6.25 in) x 1.27 cm (.50 in) (when open) 9.22 cm (3.63 in) x 16.51 cm (6.50 in) x 1.60 cm (.63 in) (when closed)

WEIGHT . . . . . 226.8 g (8 oz) with batteries

POWER
Batteries . . . . . Three replaceable 1.5V N-cell alkaline

BATTERY CURRENT
(worst case) . . . . . 35 mA (operating, heavy graphics printing)
14 mA (operating, heavy text printing)
8 mA (operating, no printing)
2.5 mA (idle)
25 μA (off)

AVERAGE BATTERY LIFE . . . Up to nine months (battery life depends upon use; shorter when printer is used)

OPERATING REQUIREMENTS
Operating temperature . . . 0° to 45°C (32° to 113°F)
Storage temperature . . . –20° to 65°C (–4° to 149°F)
Humidity . . . . . 90% relative humidity at 40°C (104°F) maximum

DISPLAY (Liquid-crystal)
Size . . . . . 32 x 137 pixels
Status annunciators . . . 7
Character font . . . 5 x 7 dot matrix
Capacity . . . . . 4 lines. Scrolling allows viewing of objects larger than the display.
Window size . . . . 23 characters per line.

REDEFINABLE KEYS 6

CHARACTER RANGE
A-Z, a-z, 0-9, plus other mathematical symbols and punctuation. 116 characters can be displayed; 219 can be printed.

DYNAMIC RANGE
Real precision . . . 1.0×10^{-499} to $9.99999999999 \times 10^{499}$ Numbers are shown with a maximum of 12 mantissa digits and a 3-digit exponent. Displayed numbers are rounded to 12 significant digits or fewer as selected by the user. Internal calculations are carried out to 15 digits with a 5-digit exponent.
Integer precision . . 64 bits
Variable types . . . Real floating point numbers, complex numbers, binary integers, strings, real vectors, complex vectors, real matrices, complex matrices, lists, names, programs, algebraic expressions.

ROM/RAM
Built-in operating system ROM . . . 128K bytes
Built-in RAM . . . . 2K bytes (.3K used by operating system)
Built-in interface . . Infrared printer

HP-28C CALCULATORS COME WITH:
- This owner's documentation: Getting Started Reference Manual and three N-cell alkaline batteries.

HP-28C Commands and Operations

ALGEBRA FUNCTIONS
COLCT – Collects like terms.
e – Symbolic constant e.
EXGET – Gets a subexpression.
EXPAN – Expands an algebraic expression. Expands a subexpression.
EXSUB – Substitutes a subexpression.
FORM – Changes the form of an algebraic expression.
i – Symbolic constant i.
ISOL – Solves an expression or equation.
MAXR – Symbolic constant maximum real.
MINR – Symbolic constant minimum real.
OBGET – Extracts an object from an algebraic expression.
OBSUB – Substitutes an object into an algebraic expression.
QUAD – Solves a quadratic polynomial.

(Continued on next page)

HP-28C Commands and Operations (continued)

SHOW – Resolves all references to a name implicit in an algebraic expression.
SIZE – Finds the dimensions of a list, array, string or algebraic expression.
TAYLR – Computes a Taylor series approximation.
π – Symbolic constant Pi.

ALGEBRAIC IDENTITY OPERATIONS

AF – Adds fractions.
A→ – Associates to the right.
DINV – Double inverts.
DNEG – Double negates.
D→ – Distributes to the right.
E^ – Replaces power-of-product with power-of-power.
E( ) – Replaces power-of-power with power-of-product.
LEVEL – Displays the level of the selected subexpression.
L( ) – Replaces product-of-log with log-of-power.
L* – Replaces log-of-power with product-of-log.
M→ – Merges right factors.
1/( ) – Double inverts and distributes.
-( ) – Dougle negates and distributes.
*1 – Multiplies by 1.
/1 – Divides by 1.
^1 – Raises to the power 1.
[←] – Moves FORM cursor left.
[→] – Moves FORM cursor right.
←A – Associates to the left.
←D – Distributes to the left.
←M – Merges left factors.
↔ – Commutes arguments.
→( ) – Distributes prefix operator.
+1–1 – Adds and subtracts 1.

ARITHMETIC

INV – Inverse (reciprocal).
NEG – Negates an argument.
SQ – Squares a number or matrix.
x^2 – Executes function SQ.
1/x – Executes function INV.
+ – Adds two objects.
– – Subtracts two objects.
* – Multiplies two objects.
/ – Divides two objects.
^ – Raises a number to a power.
$\sqrt{\ }$ – Takes the square root.

CALCULUS

d/dx – Derivative (∂ function).
∫ – Definite or indefinite integral.
∂ – Derivative.

CATALOG

CATALOG – Activates CATALOG softkey menu.
FETCH – Exits CATALOG or UNITS, writes the current command or unit in the command line.
PREV – Displays the previous command in catalog.
QUIT – Exits CATALOG. Exits USAGE display.
SCAN – Advances automatically through CATALOG.
STOP – Stops scanning through CATALOG.
USE – Indicates stack contents required to use a function.

CHARACTER STRINGS

CHR – Converts a character number to a one-character string.
DISP – Displays an object.
NUM – Returns character code of a string character.
POS – Finds a substring in a string.
STR→ – Parses and evaluates the commands defined by a string.
→STR – Converts an object to a string.
SIZE – Finds the dimensions of a list, array, string or algebraic expression.
SUB – Extracts a portion of a list or string.

COMPLEX NUMBERS

ABS – Absolute value.
ARG – Argument.
CONJ – Complex conjugate.
C→R – Complex-to-real conversion.
IM – Returns the imaginary part of a number or array.
NEG – Negates an argument.
P→R – Polar-to-rectangular conversion.
R→C – Real-to-complex conversion.
RE – Returns the real part of a complex number or array.
R→P – Rectangular-to-polar conversion.
SIGN – Tests for positive, zero or negative value of real number. Returns unit vector for complex number input.

COMPUTER MATH OPERATIONS

AND – Logical or binary AND.
ASR – Arithmetic shift right.
BIN – Sets binary base.
B→R – Binary-to-real conversion.
DEC – Sets decimal base.
HEX – Sets hexadecimal base.
NOT – Logical or binary NOT.
OCT – Sets octal base.
OR – Logical or binary OR.
RCWS – Recalls the binary integer wordsize.
RL – Rotates left by one bit.
RLB – Rotates left by one byte.
RR – Rotates right by one bit.
RRB – Rotates right by one byte.
R→B – Real-to-binary conversion.
SL – Shifts left by one bit.
SLB – Shifts left by one byte.
SR – Shifts right by one bit.
SRB – Shifts right by one byte.
STWS – Sets the binary integer wordsize.
XOR – Logical or binary XOR.

LISTS

GET – Gets an element from an object.
GETI – Gets an element from an object and increments the index.
LIST→ – Moves list elements to the stack.
PUT – Puts an element into an array or list.
PUTI – Puts an element into an array or list and increments the index.
SIZE – Finds the dimensions of a list, array, string or algebraic expression.
SUB – Extracts a portion of a list or string.
→LIST – Combines objects into a list.

LOGS

ACOSH – Arc hyperbolic cosine.
ALOG – Common (base 10) antilogarithm.
ASINH – Arc hyperbolic sine.
ATANH – Arc hyperbolic tangent.
COSH – Hyperbolic cosine.
EXP – Exponential or natural antilogarithm.
EXPM – Exponential of (argument-1).
LN – Natural logarithm.
LNP1 – Natural logarithm of (argument+1).
LOG – Common (base 10) logarithm.
SINH – Hyperbolic sine.
TANH – Hyperbolic tangent.

MATRICES AND VECTORS

ABS – Absolute value.
ARRY→ – Replaces an array with its elements as separate stack numbers.
CNRM – Computes a column norm.
CON – Creates a constant matrix.
CONJ – Complex conjugate.
CROSS – Cross product of two three-element vectors.
C→R – Complex-to-real conversion.
DET – Determinant of a matrix.
DOT – Dot product of two vectors or matrices.
GET – Gets an element from an object.
GETI – Gets an element from an object and increments the index.
IDN – Creates an identity matrix.
IM – Returns the imaginary part of a number or array.
NEG – Negates an argument.
PUT – Puts an element into an array or list.

HP-28C Commands and Operations (continued)

PUTI – Puts an element into an array or list and increments the index.
RDM – Redimensions an array.
RE – Returns the real part of a complex number or array.
RNRM – Computes the row norm of an array.
RSD – Computes a correction to the solution of a system of equations.
R→C – Real-to-complex conversion.
TRN – Transposes a matrix.
→ARRY – Combines numbers into an array.
SIZE – Finds the dimensions of a list, array, string or algebraic expression.
1/x – Executes function INV.
x^2 – Executes function SQ.

MENU GROUPS

Redefine the six softkeys under the display.

ALGEBRA	PRINT
ARRAY	REAL
BINARY	SOLV
BRANCH	STACK
CMPLX	STAT
CTRL	STORE
LIST	STRING
LOGS	TEST
MODE	TRIG
PLOT	USER

OPERATING MODE

DEG – Sets degrees mode.
ENG – Sets engineering display format.
FIX – Sets FIX display format.
PRMD – Prints and displays current modes.
RAD – Sets radians mode.
RDX. – Sets . as the radix mark.
RDX, – Sets , as the radix mark.
SCI – Sets scientific display format.
STD – Sets standard display format.
+CMD – Enables COMMAND.
+LAST – Enables LAST.
+ML – Selects multi-line display mode.
+UND – Enables UNDO.
–CMD – Disables COMMAND.
–LAST – Disables LAST.
–ML – Selects single-line display mode.
–UND – Disables UNDO.

PLOTTING

AXES – Sets intersection of axes.
CENTR – Sets center of plot display.
CLLCD – Clears the display.
CLMF – Clears the system message flag.
COLΣ – Selects statistics matrix columns.
DEL – Deletes character at cursor; digitizes point.
DISP – Displays an object.
DRAW – Creates a mathematical function plot.
DRAX – Draws axes.
DRWΣ – Creates a statistics scatter plot.
INDEP – Selects the plot independent variable.
INS – Switches between insert and replace modes; digitizes point.
PIXEL – Turns on a display plot pixel.
PMAX – Sets the upper-right plot coordinates.
PMIN – Sets the lower-left plot coordinates.
PPAR – Recalls the plot parameters list.
PRLCD – Prints an image of the display.
RCEQ – Recalls the current equation.
RCLΣ – Recalls the current statistics matrix.
RES – Sets the plot resolution.
SCLΣ – Auto-scales the plot parameters according to the statistical data.
STEQ – Stores the current equation.
STOΣ – Stores the current statistics matrix.
*H – Adjusts the height of a plot.
*W – Adjusts the width of a plot.

PRINTING

CR – Prints a carriage-right.
NORM – Disables printer trace mode.
PRLCD – Prints an image of the display.
PRMD – Prints and displays current modes.
PRST – Prints the stack.
PRSTC – Prints the stack in compact format.
PRUSR – Prints a list of variables.
PRVAR – Prints the contents of a variable.
PR1 – Prints the level 1 object.
TRACE – Enables printer trace mode.

PROGRAM BRANCHING

DO – Part of DO . . . UNTIL . . . END.
ELSE – Begins ELSE clause.
END – Ends program structures.
FOR – Begins definite loop.
IF – Begins IF clause.
IFERR – Begins IF ERROR clause.
IFT – If-then command.
IFTE – If-then-else function.
NEXT – Ends definite loop.
REPEAT – Part of WHILE . . . REPEAT . . . END.
START – Begins definite loop.
STEP – Ends definite loop.
THEN – Begins THEN clause.
UNTIL – Part of BEGIN . . . UNTIL . . . END.
WHILE – Begins WHILE . . . REPEAT . . . END.

PROGRAM CONTROL

ABORT – Aborts program execution.
BEEP – Sounds a beep.
CLLCD – Clears the display.
CLMF – Clears the system message flag.
CONT – Continues a halted program.
DISP – Displays an object.
ERRM – Returns the last error message.
ERRN – Returns the last error number.
HALT – Suspends program execution.
KEY – Returns a key string.
KILL – Aborts all suspended programs.
SST – Single-steps a suspended program.
WAIT – Pauses program execution.

PROGRAM TEST

AND – Logical or binary AND.
CF – Clears a user flag.
FC? – Tests clear status of a user flag.
FC?C – Tests and clears a user flag.
FS? – Tests set status of a user flag.
FS?C – Tests and clears a user flag.
NOT – Logical or binary NOT.
OR – Logical or binary OR.
RCLF – Returns a binary integer representing the user flags.
SAME – Tests two objects for equality.
SF – Sets a user flag.
STOF – Sets all user flags according to the value of a binary integer.
TYPE – Returns the type of an object.
XOR – Logical or binary XOR.
<– Less-than comparison.
≤ – Less-than-or-equal comparison.
== – Equality comparison.
≠ – Not-equal comparison.
≥ – Greater-than-or-equal comparison.
> – Greater-than comparison.

REAL NUMBERS

ABS – Absolute value.
CEIL – Next greater integer.
e – Symbolic constant e.
FACT – Factorial or gamma function.
FLOOR – Next smaller integer.
FP – Fractional part.
IP – Integer part.
MANT – Returns the mantissa of a number.
MAX – Returns the maximum of two numbers.
MAXR – Symbolic constant maximum real.
MIN – Returns the minimum of two numbers.
MINR – Symbolic constant minimum real.
MOD – Modulus.
NEG – Negates an argument.
RAND – Returns a random number.
RDZ – Sets the random number seed.
RND – Rounds according to real number display mode.
SIGN – Tests for positive, zero or negative value of real number. Returns unit vector for complex number input.
XPON – Returns the exponent of a number.
% – Percent.
%CH – Percent change.

(Continued on next page)

HP-28C Commands and Operations (continued)

%T – Percent of total.
π – Symbolic constant Pi.

STACK MANIPULATION

CLEAR – Clears the stack.
DEPTH – Counts the objects on the stack.
DROP – Drops one object from the stack.
DROPN – Drops n + 1 objects from the stack.
DROP2 – Drops two objects from the stack.
DUP – Duplicates one object on the stack.
DUPN – Duplicates n objects on the stack.
DUP2 – Duplicates two objects on the stack.
LIST→ – Moves list elements to the stack.
OVER – Duplicates the object in level 2.
PICK – Duplicates the nth object.
ROLL – Moves the level n + 1 object to level 1.
ROLLD – Moves the level 1 object to level n.
ROT – Moves the level 3 object to level 1.
SWAP – Swaps the objects in levels 1 and 2.

STATISTICS AND PROBABILITY

CLΣ – Purges the statistics matrix.
COLΣ – Selects the statistics matrix columns.
CORR – Correlation coefficient.
COV – Covariance.
LR – Computes a linear regression.
MAXΣ – Finds the maximum coordinate values in the statistics matrix.
MEAN – Computes statistical mean.
MINΣ – Finds the minimum coordinate values in the statistics matrix.
NΣ – Returns the number of data points in the statistics matrix.
PREDV – Predicted value.
RCLΣ – Recalls the current statistics matrix.
SDEV – Computes standard deviation.
STOΣ – Stores the current statistics matrix.
TOT – Sums the coordinate values in the statistics matrix.
UTPC – Upper-tail Chi-square distribution.
UTPF – Upper-tail F-distribution.
UTPN – Upper-tail normal distribution.
UTPT – Upper-tail t-distribution.
VAR – Computes statistical variances.
Σ+ – Adds a data point to the statistics matrix.
Σ– – Deletes the last data point from the statistics matrix.

STORAGE ARITHMETIC

SCONJ – Conjugates the contents of a variable.
SINV – Inverts the contents of a variable.
SNEG – Negates the contents of a variable.
STO* – Storage arithmetic multiply.
STO+ – Storage arithmetic add.
STO– – Storage arithmetic subtract.
STO/ – Storage arithmetic divide.

SYMBOLIC SOLUTIONS

EXPR= – Evaluates the current equation.
ISOL – Isolates first occurrence of a variable in an expression.
LEFT= – Evaluates the left side of the current equation.
QUAD – Solves a quadratic polynomial.
RCEQ – Recalls the current equation.
ROOT – Finds a numerical root.
RT= – Evaluates the right side of the current equation.
SHOW – Resolves all references to a name implicit in an algebraic equation.
STEQ – Stores the current equation.

TRIG

ACOS – Arc cosine.
ARG – Argument.
ASIN – Arc sine.
ATAN – Arc tangent.
COS – Cosine.
C→R – Complex-to-real conversion.
D→R – Degrees-to-radians conversion.
HMS+ – Adds in HMS format.
HMS– – Subtracts in HMS format.
HMS→ – Converts from HMS format.
P→R – Polar-to-rectangular conversion.
R→C – Real-to-complex conversion.
R→D – Radians-to-degrees conversion.
R→P – Rectangular-to-polar conversion.
SIN – Sine.
TAN – Tangent.
→HMS – Converts a number to HMS format.

USER VARIABLES

CLUSR – Purges all user variables.
MEM – Returns available memory.
ORDER – Rearranges the user menu.

UNIT CONVERSIONS

CONVERT – Performs a unit conversion.
FETCH – Exits UNITS, writes the current unit in the command line.
NEXT – Advances to next unit in catalog.
PREV – Displays the previous unit in catalog.
QUIT – Exits UNITS. Exits USAGE display.
STOP – Stops scanning through UNITS.
UNITS – Activates UNITS softkey menu.

OTHER KEYBOARD COMMANDS

ATTN (ON) – Aborts program execution; clears the command line; exits catalogs, FORM, plot displays.
CHS – Changes the sign of a number in the command line or executes NEG.
COMMAND – Moves an entry from the command stack to the command line.
DEL – Deletes character at cursor; digitizes point. Shifted DEL deletes character at cursor and all characters to the right.
EDIT – Copies the object in level 1 to the command line for editing.
EEX – Enters exponent in command line.
ENTER – Parses and evaluates the command line or executes DUP.
EVAL – Evaluates an object.
INS – Switches between insert and replace modes; digitizes point. Shifted INS deletes all characters to the left of the cursor.
LAST – Returns last arguments.
LC – Switches between upper-case and lower-case modes.
ON (ATTN) – Turns the calculator on; aborts program execution; clears the command line; exits catalogs, FORM, plot displays.
ON DEL – Cancels system halt or memory reset if pressed before ON is released.
ON INS ▶ – (Memory Reset) Stops program execution, clears local and user variables, clears the stack, resets user flags.
ON + – Increases the display contrast.
ON – – Decreases the display contrast.
ON ▲ – (System Halt) Stops program execution, clears local variables, clears the stack.
ON ▼ – Starts system test.
ON ◀ – Starts continuous system test.
OFF – Turns the calculator off.
RCL – Recalls the contents of a variable, unevaluated.
STO – Stores an object in a variable.
UNDO – Replaces the stack contents.
VIEW↑ – Moves the display window up one line.
VIEW↓ – Moves the display window down one line.
VISIT – Copies an object to the command line for editing.
▲ – Moves cursor up one space. Shifted ▲ moves cursor up all the way.
▼ – Moves cursor down one space. Shifted ▼ moves cursor down all the way.
◀ – Moves cursor left one space. Shifted ◀ moves cursor left all the way.
▶ – Moves cursor right one space. Shifted ▶ moves cursor right all the way.
⬅ – Backspace.
α – Switches alpha mode on or off.
αLOCK – Locks alpha mode on.
→NUM – Evaluates an object in numerical mode.

HP 82240A
Infrared Printer for the HP-28C

HP's battery-powered infrared printer is a revolutionary companion to the HP-28C: since it operates by an invisible infrared beam, no cord is necessary to connect it to the calculator. Producing hard copies – in a car, in the field, in your office – couldn't be simpler.

Operation of the infrared printer is easy, too. Simply aim the HP-28C at the printer (from up to a foot-and-a-half away), send print directions, and receive a neat, clean copy of your calculations. You can print out a complete record of your work or select and print only what you need.

Just four AA alkaline batteries give the infrared printer go-anywhere portability. Or, to save battery drain, plug in the optional AC adapter.

Key Printer Features	What They Do for You
• Battery powered.	Goes anywhere, prints anywhere.
• Compact size.	Fits neatly in hand for carrying, takes up little space on desk.
• Graphics capability.	Gives you hard copies of your plots and graphs for extended analysis.
• Infrared light beam.	Provides an invisible connection to the HP-28C with no cords to clutter desk or work areas.
• Optional AC adapter.	Saves batteries when working at your desk or near an outlet.
• 24 characters per line.	Provides easy-to-read copies of your work.

HP 82240A Infrared Printer Physical Specifications

DIMENSIONS . . .9.1 cm (3.6 in) x 18.5 cm (7.3 in) x 6.35 cm (2.5 in)

WEIGHT . . . . . .472 g (16 oz) with paper and batteries

INTERFACE . . . .Infrared

POWER REQUIREMENTS

Batteries . . . . . .Four replaceable 1.5V AA alkaline

AC adapter current . . . . . .9 to 12V AC or DC; 500 to 1500 mA (HP 82241A in U.S.)

Operating time . . .Approximately 6,000 lines of continuous printing with one set of non-rechargeable batteries.

OPERATING REQUIREMENTS

Operating temperature . . .0° to 50°C (32° to 122°F)

Storage temperature . . .–40° to 60°C (–40° to 140°F)

Relative humidity . . . . .5% to 95% at 40°C (104°F)

PRINT FORMAT

Technique . . . . . .Thermal dot matrix

Speed . . . . . .1.8 seconds/line at low battery. 0.8 seconds/line with fresh batteries or adapter.

Text mode character cell structure . . .5 x 7 dot matrix

Graphics mode resolution . . . . .166-dot columns at 90.7 dots/inch horizontal; 72.6 dots/inch vertical; 8-dot printhead. Paper advances 8-dot rows after each line, for continuous graphic printing.

Line length (characters) . . . .24 per line

Character set ROMAN8

Printhead life . . . .500,000 lines

PAPER FEED . . . .Friction

PRINT BUFFER . .200 characters

HP-28C Step-by-Step Booklets

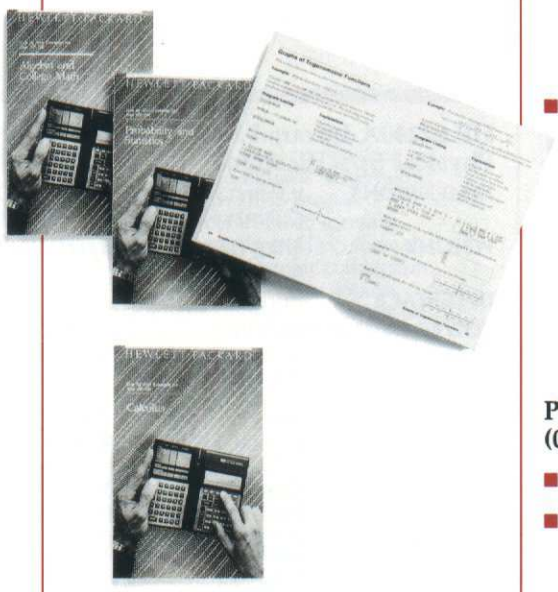
Over a hundred pages of examples and solutions in each booklet show how you can solve your technical problems more easily.

Algebra and College Math (00028-90041)

- Algebra
  - Rational Functions and Polynomial Long Division
  - Functions
  - Simultaneous Linear Equations
  - Quadratic Equations
  - Logarithms
  - Graphs of Algebraic Functions
  - Polynomial Equations
  - Determinants of Matrices
  - Systems of Linear Equations
  - Infinite Sequences and Series
- Trigonometry
  - Trigonometric Functions for One and Two Angles
  - Graphs of Trigonometric Functions
  - Trigonometric Relations and Identities
  - Inverse Trigonometric Functions
  - Trigonometric Equations
  - Complex Numbers
- Analytic Geometry
  - Rectangular Coordinates
  - Polar Coordinates
  - The Straight Line
  - The Circle
  - The Parabola
  - The Ellipse and Hyperbola
  - Parametric Equations

Vectors and Matrices (00028-90044)

- General Matrix Operations
  - Sum of Matrices
  - Matrix Multiplication
  - Inverse of a Matrix
  - Transpose of a Matrix
  - Conjugate of a Complex Matrix
  - Minor of a Matrix
  - Compute Rank
  - Hermitian Matrices
- Systems of Linear Equations
  - Non-homogeneous System
  - Homogeneous System
  - Iterative Refinement
- Vector Spaces
  - Basis
  - Orthogonality
  - Vector Length
  - Normalization
  - Gram-Schmidt Orthogonalization
  - Orthonormal Basis



- Eigenvalues
  - The Characteristic Polynomial
  - Eigenvalues from Expansion
  - Eigenvectors
  - Eigenvalues from $|\lambda I-A|$
- Least Squares
  - Straight Line Fitting
  - Quadratic Polynomial
- Markov Chains
  - Steady State of a System
- Forest Management
  - The Harvest Model
  - Optimal Yield

Calculus (00028-90042)

- Function Operations
  - Definition
  - Composition
  - Analysis
  - Angles Between Lines
  - Angles Between a Line and a Function
- Differential Calculus
  - Maxima, Minima
  - Implicit Function Theorem
  - Taylor Series (Tangent and Normal Lines to a Curve)
  - Implicit Differentiation
- Integral Calculus
  - Symbolic Polynomial Integration
  - Area Between Curves (Double Integration)
  - Arc Length of a Function
  - Arc Length of a Parametric Function
  - Surface Areas
  - Solids of Revolution

Probability and Statistics (00028-90043)

- Combinations and Permutations
- General Statistics for Grouped or Ungrouped Data
  - Basic Statistics for Two Variables
  - Moments, Skewness and Kurtosis
- Analysis of Variance and Covariance
- Curve Fitting
  - Straight Line, Exponential, Logarithmic, Power Curves
- Multiple Linear Regression
- Polynomial Regression
- Test Statistics
- Probability Distributions and Distribution Functions

The HP-41 Advanced Programmable Calculator – Expand the Power To Suit Your Needs

If you're in the market for a powerful handheld calculator, but you want one you can tailor to your specific needs now *and* in the future, take a good look at the HP-41 Advanced Programmable Calculator. For power, expandability, and versatility, it has no equal.

The battery-operated, highly portable HP-41 is deceiving in looks. Even though it fits easily into the palm of your hand, what you see is not all you get. The HP-41 offers capabilities you'd expect to find in large computers, since its software, peripherals, and enhancements expand it into one of the most powerful, versatile calculators available today.

With the HP-41, you can focus on specific operations in engineering, science, navigation, surveying, machine design, or a variety of other fields with the thousands of programs available to HP-41 users (see list on p. 35). If a program you want isn't available, design it yourself with the HP-41's easy programming – just enter the keystrokes and create a masterpiece tailored specifically to your needs.

Use the HP-41 at work or school to quickly demolish intricate mathematical, scientific, engineering, and technical problems. Easily perform iterative calculations such as approximating integrals, evaluating infinite series, and solving simultaneous equations. And deal with trigonometric and statistical problems almost effortlessly.

You can choose between two HP-41 models – the HP-41CV with 2,233 bytes of main memory and 128 built-in functions, and the HP-41CX with 3,101 bytes of main and extended memory and more than 200 built-in functions. In addition to all the built-in functions of the HP-41CV, the HP-41CX features built-in Time and Extended Functions/Memory modules, a text-file editing function, and 19 other functions not available as HP-41CV options.

The redefinable keyboard adds more flexibility to the HP-41. Position special functions where *you* want them, whether they're built in, come in plug-in modules, or are functions you've devised.

The RPN (Reverse Polish Notation) logic system allows you to solve your most complicated calculations with ease. And you'll see the intermediate results of each operation, so you can recover from errors easily. For printouts of your work, choose among several optional printers and plotters.

The HP-41 is also capable of acting as a controller, transmitting and receiving data and performing a wide variety of system management functions. Simply team it up with HP-IL (Interface Loop) and take full advantage of its input/output capability.

Versatile. Expandable. Powerful. The HP-41 is the calculator you buy to suit your needs today . . . and customize to suit your needs tomorrow.

***Optional Card Reader**
Inexpensive, efficient way to save programs and data which can be easily reproduced and distributed.

***Four Plug-in Ports**
For software modules, peripherals, interfacing, memory expansion modules, and added flexibility.

***12-Character LCD**
Easy to read, with scrolling up to 24 characters.

Built-in Time Module
Provides time, calendar, alarm, and stopwatch functions.

***Continuous Memory**
Saves programs and data even when it's turned off.

***Alphanumeric Keyboard**
Allows naming and labeling of programs, functions, and results.

24K-Byte Operating System
More than 200 separate operations. (HP-41CV: 12K-byte operating system, 128 separate operations.)

***Optional HP-IL Interfacing**
Capability for connection to battery-operated cassette drive or printer, instrument control, video monitor, full-width printers, larger systems, acoustic coupler (modem).

***Optional Optical Wand**
Easily reads bar codes; allows for quick, inexpensive reproduction of programs and data.

***RPN Logic**
For fast, efficient operations.

***58 Functions**
Immediate keyboard access.

Text-File Editor
Allows up to 254 ASCII characters per record for storing information.

Built-in Extended Functions/ Memory Module
Adds memory, power, and flexibility in setting up and manipulating programs.

*Applies to both HP-41CX and HP-41CV.

Models: HP-41CV/HP-41CX

The HP-41 goes anywhere, from the classroom to the job. If you want an expandable system with input/output capability and lots of available software, the HP-41 is for you.

Take Your Choice

There are two HP-41 models from which to choose – the HP-41CX and the HP-41CV. The two models differ in the amount of extended memory, as well as in functionality and expandability.

The HP-41CV, with 128 built-in functions, is powerful enough for many applications. The addition of Extended Functions/Memory and Extended Memory modules lets your HP-41 expand when your needs grow.

The HP-41CX, with 200 built-in functions and 20 additional functions for enhanced programming, has the power and flexibility to solve complex problems. The built-in Time and Extended Functions/Memory modules leave the four I/O ports open for other peripherals and software plug-ins. Text-file editing is an added built-in feature in the HP-41CX.

HP-41 Memory Capabilities

	HP-41CV	HP-41CX
Main memory		
Bytes	2,233	2,233
Registers	319	319
Extended memory		
Bytes	868 (optional)	868
Registers	124 (optional)	124
Extended Memory Modules*		
Bytes	1,666	1,666
Data registers	238	238
Maximum memory		
Bytes	6,433	6,433
Data registers	919	919

*Add a maximum of two.

Key Features of the HP-41	What They Do for You
• Four I/O ports.	Potential for plug-in ROM software, peripherals, interfacing, and more, to provide problem-solving versatility.
• Software.	Well-established base of thousands of software solutions. Fast, accurate results in a multitude of applications are pre-tested and ready to go. Plug-in ROM modules, magnetic cards, cassettes and bar code available.
• Optional HP-IL interface.	Increased expansion options for mass storage, larger computer connections and instrument control make the HP-41 a powerful, custom tool.
• RPN.	Consistent, effective logic system. Friendly. Saves time in calculations by reducing the number of keystrokes necessary.
• Continuous memory.	Entire contents of memory, including key assignments, are preserved even when the HP-41 is turned off. No reloading of programs necessary.
• Battery powered.	Offers maximum portability. Optional battery pack may be recharged easily.
• User-definable keyboard.	Assigns any program or function to almost any key. Customizes the keyboard to the user's needs. Toggle selection of either User or Normal keyboards for customized key performance or original key functions.
• Alphanumeric keyboard.	Names and labels programs, functions, and results. Prompts in words for easy interpretation.
• Custom products.	HP can manufacture your own software as plug-in modules, magnetic cards, or cassettes; you choose the key labels.

You can further expand the memory with non-volatile extended memory modules to give either model a maximum of 919 registers.**

HP-41 Features

- **RPN** Reverse Polish Notation provides a consistent and efficient logic system. RPN is fast, eliminating the need for equals and parenthetical keystrokes.

**All information in the extended memory is organized in program, data or text files. The functions necessary for accessing these files are available in the Extended Functions/Memory Module and in the HP-41CX.

Error recovery is simplified by automatic storage of the last entry. It also lets you see your intermediate results.

- **Four input/output ports** Plug in ROM software modules or add to existing memory capacity with plug-in memory modules. The HP-IL Interface Module allows connection to peripheral devices. A Time Module expands your system with time information and time-controlled operations and the Extended I/O Module

enhances the HP-41's control of the HP-IL loop. Customize your applications with plug-in custom modules that provide your own means of permanent and private program storage. The Time and Extended Functions/Memory modules are built right into the HP-41CX, leaving all four ports open for other special-function plug-ins.

- **Software** A broad range of available software provides immediate, accurate solutions. HP-written application pacs with plug-in modules, solutions books with keystroke listings and bar code, and Users' Library programs are just a few of the software options available.
- **Expandable** Maximum memory is 6.4K bytes with two extended memory modules. Interfacing capabilities allow the use of various printers, plotters, monitors, mass storage devices, acoustic couplers, instruments, and access to the power of larger computers.
- **Redefinable keyboard** Over 200 separate operations (over 128 in the HP-41CV) reside in the HP-41CX function library, with 58 of these right on the keyboard. Each key may be redefined. Or, choose an operation from an application pac or program and assign it to almost any key.
- **Continuous memory** Preserve everything from stored data to user-defined keyboard assignments while the HP-41 is turned off. Enter frequently needed calculations once, and then perform them as often as necessary, without having to reenter the program.
- **Built-in operating system** A 24K-byte operating system (12K in the HP-41CV) allows for immediate solutions to complex problems.
- **Portable** Four 1.5V N-sized, alkaline batteries supply all the power you'll need. Carry the HP-41 in your pocket or briefcase. There will always be room for it on your desk or workstation.
- **Liquid-crystal display** The display is easy to read and helps to eliminate glare problems from sunlight and other sources. Low power consumption minimizes battery drain. The display allows you to view ten digits or twelve alpha characters. Automatic scrolling shows you up to 24 alpha characters.

HP-41 Specifications

DIMENSIONS . . .14.2 cm (5.6 in) x 7.9 cm (3.1 in) x 3.3 cm (1.3 in)

WEIGHT . . . . . .205 g (7.2 oz) with batteries

POWER

Batteries . . . . . .four 1.5V, size N batteries (replaceable by user)

Battery current (worst case) . . .20 mA (operating)
2 mA (idle)
50 μA (off)

Average alkaline battery life . . . .up to 6 months (battery life depends upon use, less when a peripheral device without its own power source is in use)

OPERATING REQUIREMENTS

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

Storage temperature . . . −20° to 65°C (−4° to 149° F)

Humidity . . . . . .40°C at 95%

DISPLAY

Capacity . . . . . .10 digits; 12 alpha characters displayed (scroll to view 24); 12 annunciator words; each character position consists of 17 segments, including 3 punctuation segments.

CHARACTER RANGE

A-Z, a-z, 0-9, plus 37 special characters, some of which can be obtained only by using optional plug-in peripherals.

DYNAMIC RANGE

$\pm 1.000000000 \times 10^{-99}$ to $\pm 9.999999999 \times 10^{99}$, plus zero.

Numbers are shown with a maximum of ten digits, or an 8-digit mantissa and a 2-digit exponent.

Displayed numbers are rounded to the last displayed digit, calculations are performed internally with at least ten digits.

HP-41 CALCULATORS COME WITH:

- The appropriate owner's documentation:
  HP-41CX Owner's Manual (Vol. I and Vol. II)
  HP-41CX Pocket Operating Guide
  HP-41CV Owner's Manual: BASIC Operation
  HP-41CV Quick Reference Card
- And the following:
  Tough, pliable carrying case
  Four type N batteries
  Overlay packet
  Users' Library card

HP-41 FUNCTIONS LIST

■ – Shift key.
+ – Addition operator.
− – Subtraction operator.
* – Multiplication operator.
/ – Division operator.
1/X – Reciprocal.
10↑X – Common antilogarithm.
ABS – Absolute value.
ACOS – Arc (inverse) cosine.
ADV – Advance paper.
AOFF – Alpha mode off.
AON – Alpha mode on.
APPEND – Append characters (←).
ARCL – Alpha recall.
ASHF – Alpha shift left.
ASIN – Arc (inverse) sine.
ASN – Assign.
ASTO – Store Alpha data in register.
ATAN – Arc (inverse) tangent.
AVIEW – Alpha view.
BEEP – Beeper.
CAT – Catalog.
CF – Clear flag.
CHS – Change sign.
CLA – Clear Alpha register.
CLD – Clear display.
CLP – Clear program.
CLRG – Clear register.
CLΣ – Clear statistics registers.
CLST – Clear stack registers.
CLX – Clear X-register.
COPY – Copy program from module or peripheral into program memory.
COS – Cosine.
D→R – Degrees to radians conversion.
DEC – Octal to decimal conversion.
DEG – Degrees mode.
DEL – Delete program memory lines.
DSE – Decrement, skip if equal.
EEX – Enter exponent.
END – End program.
ENG – Engineering notation.
ENTER↑ – Enter number in X-register into Y-register.
E↑X – Natural antilogarithm.
E↑X−1 – Natural antilogarithm for arguments close to zero.
FACT – Factorial.
FC? – "Flag clear" test.
FC?C – "Flag clear" test and clear.
FIX – Fixed point display.
FRC – Fractional portion of number.
FS? – "Flag set" test.
FS?C – "Flag set" test and clear.
GRAD – Grads mode.
GTO – Go to label.
HMS – Decimal hours to hours, minutes, seconds conversion.
HMS+ – Hours, minutes, seconds addition.
HMS− – Hours, minutes, seconds subtraction.
HR – Hours, minutes, seconds to decimal hours conversion.
INT – Integer portion of number.
ISG – Increment, skip if greater.
LASTX – Recalls LAST X register contents to X-register.
LBL – Program label.
LN – Natural logarithm.
LN1+X – Natural logarithm for arguments close to one.
LOG – Common logarithm.
MEAN – Mean.
MOD – Modulo (remainder).
OCT – Decimal to octal conversion.
OFF – Power off.
ON – Power on (continuous) function.
P→R – Polar to rectangular conversion.
PACK – Pack program memory.
% – Percent.
%CH – Percent of change.
PI – Pi (3.141592654).
PROMPT – Prompt.
PSE – Pause.
R↑ – Roll up stack.
R→D – Radians to degrees conversion.
R→P – Rectangular to polar conversion.
R/S – Run or stop a program.
RAD – Radians mode.
RCL – Recall data from register into X-register.
RDN – Roll down stack.
RND – Round.
RTN – Return.
SCI – Scientific notation.
SDEV – Standard deviation.
SF – Set flag.
Σ+ – Accumulations for statistics.
Σ− – Accumulation correction.
ΣREG – Statistical register block specification.
SIGN – Sign of x.
SIN – Sine.
SIZE – Size of data storage register allocation.
SQRT – Square root.
ST+ – Storage register addition.
ST− – Storage register subtraction.
ST* – Storage register multiplication.
ST/ – Storage register division.
STO – Store numeric data in register.
STOP – Stops program execution.
TAN – Tangent.
TONE – Tone.
VIEW – View register contents.
X=0? – X=0? conditional test.
X≠0? – X≠0? conditional test.
X<0? – X<0? conditional test.
X<=? – X≤0? conditional test.
X>0? – X>0? conditional test.
X=Y? – X=Y? conditional test.
X≠Y? – X≠Y? conditional test.
X<Y? – X<Y? conditional test.
X<=Y? – X≤Y? conditional test.
X>Y? – X>Y? conditional test.
X<> – Exchange X- and any register.
X<>Y – Exchange X- and Y- registers.
XEQ – Execute.
X↑2 – Square.
Y↑X – Exponential.

FUNCTIONS UNIQUE TO THE HP-41CX

ASROOM – Number of bytes left in working ASCII file.
CLALMA – Clear alarm by Alpha register.
CLALMX – Clear alarm by X-register.
CLRALMS – Clear all alarms.
CLRGX – Clear a specified block of registers.
ED – Text Editor.
EMDIRX – Access extended memory directory.
EMROOM – Number of unused registers in extended memory.
ΣREG? – Return number of first statistics register to X.
GETKEYX – Return ASCII code to X-register and keycode to Y-register.
RCLALM – Recall alarm.
RESZFL – Resize ASCII or data file.
SWPT – Activates stopwatch and sets pointers.
CAT6 – Lists all user key assignments in order of key code.
X=NN? – conditional test.
X≠NN? – conditional test.
X<NN? – conditional test.
X≤NN? – conditional test.
X>NN? – conditional test.
X≥NN? – conditional test.

EDITING

← – Correction key.
GTO. – Go to the line number of Alpha label.
GTO.. – Go to end of program memory.
BST – Back step.
SST – Single step.

KEYBOARD MODES

HP-41CV/CX:
Normal – Primary or shifted key functions available.
User – Activates functions or programs assigned by user to keys.
Alpha – Activates ALPHA entry capability.

HP-41CX:
Alarm Catalog – Allows user to examine all pending alarms.
Stopwatch – Activates stopwatch functions and allows user to access functions from keyboard.
Text Editor – Activates text editing functions and ALPHA keys for creation and editing of text files.

HP-41 Extended Memory Modules

Make your HP-41 even more versatile with extension modules. By adding one HP 82180A Extended Functions/Memory Module (built into the HP-41CX) and two HP 82181A Extended Memory modules, you can give your HP-41 a maximum of 4.2K bytes of non-volatile mass storage memory.* The Extended Functions/Memory Module also increases the HP-41 programming set.

* No more than one HP 82180A Extended Functions/Memory Module or two HP 82181A Extended Memory Modules should be plugged into an HP-41CV. The HP 82180A is required when using the HP 82181A.

Physical Specifications

DIMENSIONS . . .3.2 cm (1.3 in) x 1.0 cm (0.4 in) x 2.9 cm (1.2 in)

OPERATING REQUIREMENTS

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

Storage temperature . . . –20° to 65°C (–4° to 149° F)

Extended Functions/Memory Module Functions List

PROGRAMMABLE FUNCTIONS

PASN – Programmable ASN function.
CLKEYS – Clear all key assignments.
PCLPS – Delete named program and all following it from main memory.
PSIZE – Programmable SIZE function.
SIZE? – Return number of data storage registers to X-register.
GETKEY – Return keycode for pressed key.
REGMOVE – Copy contents of a block of registers.
REGSWAP – Swap contents of two blocks of registers.
RCLFLAG – Recall flag-status data to the X-register.
STOFLAG – Restore flag status.
X<>F – X-register exchange with flag 00-07 status.
ATOX – Convert left-most ALPHA character to numeric character code.
XTOA – Convert X-register to its equivalent character and append to ALPHA register.
ALENG – Return number of characters in ALPHA register.
ANUM – Value of an ALPHA-formatted number.
POSA – Position of ALPHA character.
AROT – Rotate contents of ALPHA register.
APPCHR – Append contents of ALPHA register at the end of current register.
APPREC – Append contents of ALPHA register as a new record at the end of current file.
ARCLREC – Append record from current file to main memory.
CRFLAS – Create text (ASCII) file.
CRFLD – Create data file.
DELCHR – Delete characters in file.
DELREC – Delete record in current file.
EMDIR – Directory of extended memory files.
FLSIZE – Return number of registers in file.
GETAS – Copy text (ASCII) file from mass storage.
GETP – Replace last program in main memory.
GETR – Copy data file to main memory registers.
GETREC – Copy record from current file to main memory.
GETRX – Copy current data-file registers to X-register.
GETSUB – Copy program into main memory.
GETX – Copy current register in current file to X-register.
INSCHR – Insert contents of ALPHA register into text (ASCII) file.
INSREC – Insert contents of ALPHA register as a new record.
PURFL – Purge file.
RCLPT – Recall pointer value of current file.
RCLPTA – Recall pointer value of named file.
SAVEAS – Copy text (ASCII) file to mass storage.

Enhancements

HP-IL

The Hewlett-Packard Interface Loop (HP-IL) is a bit-serial interface designed for low-cost, battery-operable systems. HP-IL lets you use your HP-41 as system controller, capable of transmitting and receiving data, and performing a wide variety of information management and instrument control functions. In this system, devices are connected by two-wire cables leading from the output port of one device to the input port of the next, until all devices form a closed loop. This loop structure provides a unique capability through auto address assignment, device capability identification, power ON/OFF control and error checking.

Several HP-IL peripherals support STANDBY mode, allowing you to power the peripherals on or off, under program control, to conserve battery life. The power ON/OFF feature lets you use an HP-IL system for remote applications.

Key Features	What They Do for You
• Battery powered.	Completely field portable. Runs during power failure.
• Simple connector system.	Keyed cables for easy, error-free connection.
• Auto addressing.	Devices can be connected in any order.
• Manual addressing.	Control of two similar devices can be determined programmatically.
• Device-powered loop.	Each device powers its section of loop, allowing 30 devices and up to 10 meters between devices (up to 100 meters with twisted, shielded pairs).
• Automatic error checking.	Assures that the message sent was received correctly.
• Bit-serial, loop structure.	Allows automatic error checking.
• STANDBY mode.	Conserves battery life as programs control power up/power down.
• Common mode rejection.	Eliminates unwanted voltage transients.

HP 82160A HP-IL Interface Module

The HP-IL Interface Module plugs into any one of the four ports in the HP-41 connecting your advanced calculator with the extensive family of HP-IL peripherals and instruments. The module gives your HP-41 simultaneous control of up to 30 devices on the loop. There are three function sets supplied by the HP-IL Module: printer, mass storage, and general input/output (I/O).

Physical Specifications

DIMENSIONS . . .2.8 cm (1.1 in) x 1.3 cm (0.5 in) x 7.4 cm (2.9 in)

WEIGHT . . . . . .42.5 g (1.5 oz)

CABLE LENGTH
(two attached cables) . . . . . .79 cm (31 in) each

OPERATING REQUIREMENTS
Operating temperature . . .0° to 45°C (32° to 113°F)
Storage temperature . . .−40° to 75°C (−40° to 167°F)

DATA TRANSFER RATE
150 bytes per second

HP-IL Module Functions List

PRINTER OPERATIONS
ACA – Accumulate ALPHA register into print buffer.
ACCHR – Accumulate character into print buffer.
ACCOL – Accumulate column into print buffer.
ACSPEC – Accumulate special character into print buffer.
ACX – Accumulate X-register into print buffer.
ADV – Advance paper, print the print buffer right-justified.
BLDSPEC – Build special character.
FMT – Accumulate format specifier into print buffer.
LIST – List program lines.
PRA – Print ALPHA register.
PRAXIS – Print y-axis.
PRBUF – Print buffer left-justified.
PRFLAGS – Print flags and other status information.
PRKEYS – Print reassigned keys.
PRP – Print program.
PRPLOT – Plot function interactively.
PRPLOTP – Plot function noninteractively.
PRREG – Print registers.
PRREGX – Print registers as directed by X.
PRΣ – Print statistics registers.
PRSTK – Print stack.
PRX – Print X-register.
REGPLOT – Plot single line using data in registers.
SKPCHR – Skip characters, accumulate in print buffer.
SKPCOL – Skip columns, accumulate in print buffer.
STKPLOT – Plot single line using data in stack.

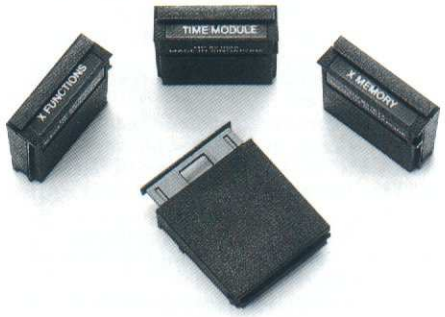
MASS STORAGE OPERATIONS
CREATE – Create new file with zero values.
DIR – Display or print a directory of stored files.
NEWM – Initialize medium.
PURGE – Remove file from medium.
READA – Read "write-all" file.
READK – Read key-assignment file and reassign keys.
READP – Copy program file, replacing last program in memory.
READR – Copy data file into HP-41 registers.
READRX – Copy part of data file according to X-register.
READS – Read status file and set calculator status.
READSUB – Copy program file after last program in memory.
RENAME – Rename stored file.
SEC – Secure a stored file.
SEEKR – Position medium to specified file data register.
UNSEC – Unsecure a stored file.
VERIFY – Verify that a stored file can be read.
WRTA – Store "write-all" file onto medium.
WRTK – Store key assignments onto medium.
WRTP – Store program onto medium.
WRTPV – Store program onto medium and make file private.
WRTR – Copy all storage registers into data file.
WRTRX – Copy some storage registers according to X-register.
WRTS – Store calculator status onto medium.
ZERO – Fill data file with zero values.

INTERFACE CONTROL OPERATIONS
AUTOIO – Set interface to Auto mode.
FINDID – Find address of selected device.
INA – Input ALPHA string from selected device.
IND – Input decimal number from selected device.
INSTAT – Input status information from selected device.
LISTEN – Set device as a listener, or remove all listeners.
LOCAL – Set selected device to local mode.
MANIO – Set interface to Manual mode.
OUTA – Output ALPHA string to selected device.
PWRDN – Set all devices to low power state.
PWRUP – Set all devices to operating power state.
REMOTE – Set selected device to remote mode.
SELECT – Select device as primary device.
STOPIO – Stop I/O communication in loop.
TRIGGER – Trigger all devices set to respond.

HP 82182A
Time Module

(Built into the HP-41CX, optional for the HP-41CV.)

The time module expands your HP-41 system with time information and time-controlled operations. Using the quartz-crystal controlled time module, your HP-41 can become the heart of a time-based system controller, an alarm clock, an appointment reminder, a calendar, a timer, even an advanced stopwatch.



Physical Specifications

DIMENSIONS . . .3.2 cm (1.3 in) x 1.0 cm (0.4 in) x 2.9 cm (1.2 in)

OPERATING REQUIREMENTS

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

Storage temperature . . . –20° to 65°C (–4° to 149°F)

Time Module Functions List

REAL TIME AND DATE

ADATE – Append number to ALPHA register as a date.
ATIME – Append number to ALPHA register as a time.
ATIME24 – Append number to ALPHA register in a 24-hour time format.
CLK12 – Switch to 12-hour time display format.
CLK24 – Switch to 24-hour time display format.
CLKTD – Switch clock to time and date display.
CLOCK – Display the clock.
CORRECT – Set time and adjust accuracy factor.
DATE – Place number for current date in X-register.
DMY – Switch date format to Day-Month-Year.
MDY – Switch date format to Month-Day-Year.
RCLAF – Recall clock accuracy factor.
SETAF – Set clock accuracy factor.
SETDATE – Set clock date.
SETTIME – Set clock time.
TIME – Place current time number in X-register.
T+X – Adjust clock time by specified factor.
■ON – Display the clock.

CALENDAR FUNCTIONS

DATE+ – Calculate new date from date and number of days.
DDAYS – Calculate days difference between two dates.
DOW – Replace a date number with a Day-of-Week number.

STOPWATCH

RCLSW – Place stopwatch time in X-register.
RUNSW – Run stopwatch.
SETSW – Set stopwatch to specified starting time.
STOPSW – Stop running stopwatch.
SW – Set the calculator to Stopwatch mode.

ALARMS

XYZALM – Set alarm.
ALMCAT – Provide listing of alarms.
ALMNOW – Activate past due label alarms.

HP 82183A Extended I/O Module

The HP 82183A provides easy-to-use I/O functions that enhance the HP-41's control of the HP-IL loop. This 4K-byte module provides 59 functions that extend the I/O capabilities beyond those provided by the HP 82160A HP-IL Module. These functions enhance mass storage, character manipulation, HP-IL control and advanced control of the HP-41 and devices on the loop.

Physical Specifications

DIMENSIONS . . .3.2 cm (1.3 in) x 1.0 cm (0.4 in) x 2.9 cm (1.2 in)

OPERATING REQUIREMENTS

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

Storage temperature . . .−20° to 65°C (−4° to 149°F)

Extended I/O Module Functions List

MASS STORAGE OPERATIONS

COPYFL – Copies nonprivate file (named in ALPHA) from master device to device addressed by number in X.

DIRX – Returns to ALPHA file name whose position in primary medium's directory is specified by number in X.

FLLENG – Places in X the length of the file specified in ALPHA.

FLTYPE – For file named in ALPHA, places in X a two-character ALPHA string representing file type.

MCOPY – Copies contents of master medium onto all other media.

MCOPYPV – Same as MCOPY, except all HP-41 program files are made private.

MVERIFY – Checks each mass storage device to verify number of records specified in X can be read without error.

CHARACTER MANIPULATION FUNCTIONS

ALENGIO – Places in X the length of current ALPHA string.

ANUMDEL – Returns to X the value of a number represented by a string of numerical characters in ALPHA register.

ATOXL – Removes first character from ALPHA and places in X the corresponding character code.

ATOXR – Places character code of last character of ALPHA string into X and deletes that character from string.

ATOXX – Places number in X with code for character in ALPHA position indicated by that number.

X<>FIO – Exchanges value in X with decimal equivalent of binary value represented by flags 00 through 07.

XTOAL – Adds to left of first non-null character in ALPHA the character corresponding to character code in X.

XTOAR – Appends to end of current string in ALPHA the character corresponding to character code in X.

YTOAX – Replaces character in ALPHA with another character specified by character code in Y.

HP-IL CONTROL FUNCTIONS

AID – Places in X the accessory ID of primary device.

CLRDEV – Resets primary device to its initial state.

CLRLOOP – Simultaneously clears all devices on loop.

DEVL – Sends to primary device the Device-Dependent Listener command number specified in X.

DEVT – Sends to primary device the Device-Dependent Talker command number specified in X.

FINDAID – Uses accessory ID to locate device of specific class or type.

ID – Returns to ALPHA a string containing ID of primary device.

POLL – Sends Identify message around loop and indicates loop's response by displaying a number from 0 to 255.

POLLD – Disables parallel poll response of primary device.

POLLE – Enables primary device to respond to a parallel poll.

POLLUNC – Disables parallel poll responses of all devices.

RCLSEL – Returns HP-IL address specified by most recent execution of SELECT.

SRQ? – Tests loop for service request by sending HP-IL Identify message.

STAT – Reads up to 23 bytes of status from primary device and stores these bytes as character string in ALPHA.

XFER – Until End of Transmission message received, transfers data from primary device to the device specified by the HP-IL address in X.

XFERC – Transfers data from primary device to device specified by HP-IL address in X.

XFERCL – Transfers data from primary device to device specified by address in X.

(Continued on next page)

HP 82183A Extended I/O Module Functions List (continued)

XFERE – Transfers number of bytes specified by address in X.
XFERN – Transfers number of bytes specified in Y from primary device to device at address specified by value in X.

ADVANCED CONTROL FUNCTIONS

ADROFF – Disables the automatic loop addressing and talker/listener commands used by data transfer functions.
ADRON – Enables the automatic loop addressing and talker/listener commands used by data transfer functions.
DDL – Sends Device-Dependent Listener command message specified by value in X to all active listeners.
DDT – Sends Device-Dependent Talker message specified by value in X to currently active talker.
INAC – Replaces contents of ALPHA with string of bytes from primary device.
INACL – Replaces ALPHA contents with a dummy "D" character and a string of bytes from primary device.
INAE – Replaces ALPHA contents with string of bytes from primary device.
INAN – Replaces ALPHA contents with a string of up to 23 bytes from primary device, and terminates string with dummy "D" character.
INP – Causes primary device to send to HP-41 a series of bytes that the HP-41 can translate into a program.
INXB – Directs primary device to send one byte of data to X.
LAD – Switches to listener the device specified by HP-IL address in X.
LOCK – If primary device has remote override switch (for manually placing device into Local mode), disables this switch.
NLOOP – Places value in x indicating number of devices currently on HP-IL, excluding HP-41 itself.
NOTREM – Returns devices having Remote and Local modes to Local mode control, disables not-remote-enabled state.
OUTAC – Sends all but first non-null character in ALPHA string to device.
OUTACL – Sends string in ALPHA – minus first non-null character – to primary device.
OUTAE – Sends ALPHA string – minus first non-null character – to primary device.
OUTAN – Transmits to primary device up to 23 ALPHA characters, as specified by value in X.
OUTP – Sends from HP-41 to primary device the program containing the global label in ALPHA.
OUTXB – Sends to primary device the eight-bit byte equivalent of decimal byte value in X.
SEND – Sends to primary device the command message specified by command number in X.
TAD – Switches to talker the device specified by HP-IL address in X.
UNL – Removes all currently addressed listeners from listener status.
UNT – Removes current talker from talker status.

Automatic Start and Cassette Duplication Module (00041-15042)

The automatic start feature provides a means of writing "foolproof" HP-41 programs. With the automatic start module installed, the HP-41 goes through a special sequence when it is turned on. This sequence lets you write programs that automatically set status, configure memory, access peripherals, or prompt the user. The mass copy feature provides an easy-to-use means of duplicating programs and data. Use it to copy information from cassette to cassette, cassette to 3½" disc, and from disc to disc. The information on one HP 82161A Digital Cassette Drive can be copied onto as many as 29 other cassettes.

HP-IL Development Module (00041-15043)

Adding a second HP-41 to the HP-IL loop becomes a possibility with the aid of the HP-41 HP-IL Development Module. In scope mode, a second HP-41 can be used for displaying the mnemonics of HP-IL messages as they travel around the loop. Giving direct access to the HP-IL integrated circuit, the development module allows you to change the contents of any control register and poll certain status bits. Characters can be inserted at, or removed from, any position in the Alpha register.

Key Features	What They Do for You
• Alpha register functions.	Add or remove characters from any position in the Alpha register.
• I/O buffer.	Circumvents the loss of characters with byte values of zero.
• Direct access to HP-IL integrated circuit.	Change the contents of any control register and poll certain status bits.

HP 82104A Card Reader

The HP-41 Card Reader is a valuable peripheral that lets you save programs and data on small magnetic cards. This "smart" card reader keeps track of cards as they are read and it even prompts you for the next card. A security feature permits a program to be run, but not reviewed or altered through normal operations. An added bonus is that it also accepts program cards from the HP-67 and HP-97 calculators, automatically making the necessary translations into HP-41 code.

Key Features

- Powered by HP-41's batteries.
- 224-byte magnetic cards.
- Uses one HP-41 port.
- Reads both HP-67/97 and HP-41 magnetic cards.
- Writes contents of HP-41 registers onto cards.
- Fits inside the HP-41 carrying case.

What They Do for You

Allows small size, total portability.

Programs and data easily modified. Cards easily stored. Easy to write contents on card's face. Inexpensive to duplicate.

Leaves other ports free for peripherals, modules, application ROMs and HP-IL interfacing.

Thousands of Users' Library programs available.

Can record programs and data on space-saving magnetic cards for inexpensive off-line mass storage.

Compact, convenient, protected.

Physical Specifications

DIMENSIONS . . .7.4 cm (3.0 in) x 7.9 cm (3.2 in) x 3.6 cm (1.4 in)
WEIGHT . . . . . .92 g (3.2 oz)

COMPATIBILITY
Plugs into the HP-41, also reads HP-67/97 magnetic cards.

OPERATING REQUIREMENTS
Voltages . . . . . .regulated 6 Vdc supplied by HP-41. Unregulated 6 Vdc supplied by HP-41 batteries.
Current . . . . . .2 mA maximum (no card inserted)
200 mA maximum (card inserted, motor off)
500 mA maximum (card inserted, motor on)
Operating temperature . . .10° to 45°C (50° to 113°F)
Storage temperature . . .–40° to 75°C (–40° to 167°F)

HP-41 MAGNETIC CARDS

DIMENSIONS . . .7.11 cm (2.8 in) x 1.14 cm (0.45 in) x 0.003 cm (0.008 in)

WEIGHT . . . . . .0.258 g (0.001 oz) per card
00097-13141 – 40 Card Pac
00097-13143 – 120 Card Pac
00097-13206 – 1000 Card Pac without holder

STORAGE CAPACITY . . . .16 registers (112 bytes) per track
2 tracks per card

READ/WRITING SPEED . . . . . .6.35 cm/sec (2.5 in/sec)

HP 82104A Card Reader Functions List

HP-41 FUNCTIONS
MRG – Merge program from card.
RDTA – Read data card.
RDTAX – Read data card as directed by X.
RSUB – Read subroutine.
VER – Verify track.
WALL – Write all.
WDTA – Write data card.
WDTAX – Write data card as directed by X.
WPRV – Write private program card.
WSTS – Write status card.

HP-67/97 COMPATIBLE FUNCTIONS
7CLREG – Clear registers.
7DSP0 through 7DSP9 – Display 0 through 9 decimal places.
7DSZ – Decrement and skip on zero.
7DSZI – Decrement and skip on zero indirect.
7ENG – Engineering notation.
7FIX – Fixed notation.
7GSBI – Go to subroutine indirect.
7GTOI – Go to label indirect.
7ISZ – Increment and skip on zero.
7ISZI – Increment and skip on zero indirect.
7P<>S – Exchange primary and secondary register contents.
PRREG – Print registers.
7PRSTK – Print stack.
7PRTZ – Print X.
7RCLΣ – Recall contents of statistics registers.
7SCI – Scientific notation.

HP 82143A Printer/Plotter

The HP 82143A Printer/Plotter is a whisper-quiet, battery-operable thermal printer that easily plugs into the HP-41. It gives you numeric, upper- and lowercase alpha, double-wide characters, plotting capability and intensity control for optimum contrast and readability. It even lets you define your own "special" characters. Portable and lightweight, the printer/plotter operates on batteries. The batteries can be recharged with the HP 82059D AC Recharger that is included with the product. The printer/plotter is a valuable aid in editing programs, checking long calculations, or presenting results in graphics form.

Key Features / What They Do for You

Key Features	What They Do for You
• Battery powered.	Allows complete portability.
• 24-character print line size.	Makes smaller print possible.
• Single- and double-wide characters.	Highlight output.
• Automatic right and left justification and centering.	Format control.
• 128-character set.	More precise communication.

Physical Specifications

DIMENSIONS . . .17.8 cm (7.0 in) x 13.2 cm (5.2 in) x 6.1 cm (2.4 in)

WEIGHT . . . . . .808 g (1.8 lbs) (includes paper and battery)

CABLE LENGTH 86 cm (34 in)

POWER REQUIREMENTS
Battery . . . . . .four-cell, 4.4 to 6 volt, quick-charge, nickel-cadmium battery pack
Battery current, (worst case) . . .250 mA (idle), 5 A (printing)
Recharging time . . . . . .14 to 16 hours (printer/plotter ON or OFF)
Operating time . . .3 to 6 hours

CHARACTER SETS
96 standard ASCII
127 modified-expanded ASCII

SPECIAL MODES
Column, Double wide, Single wide

PRINT FORMAT
24 standard characters, 12 double-wide characters, 168 dot-columns per line
Upper- and lowercase letters
Special-character generation
Plotting capabilities
Graphics capabilities
43-character buffer

PRINTING SPEED . . . . . .24 characters/sec

OPERATING REQUIREMENTS
Operating temperature . . .0° to 45°C (32° to 113°F)
Charging temperature . . .15° to 40°C (59° to 104°F)
Storage temperature . . . −40° to 55°C (−40° to 131°F)
Humidity . . . . . .10% to 90% (non-condensing) at 40° C

THERMAL PAPER
Width . . . . . .5.7 cm (2.2 in)
Roll length . . . . .25 m (80 ft)
Colors . . . . . .blue, black
6 rolls/box

INTERFACE
Plugs into the HP-41 calculator, unique.

HP 82143A Printer Functions List

ACA – Accumulate ALPHA register.
ACCHR – Accumulate character.
ACCOL – Accumulate column.
ACSPEC – Accumulate special character.
ACX – Accumulate X-register.
ADV – Advance paper.
BLDSPEC – Build special character.
LIST – List program lines.
PRA – Print ALPHA register.
PRAXIS – Print axis.
PRBUF – Print buffer.
PRFLAGS – Print flags and status information.
PRKEYS – Print reassigned keys.
PRP – Print program.
PRPLOT – Plot function interactively.
PRPLOTP – Plot function noninteractively.
PRREG – Print registers.
PRREGX – Print registers as directed by X.
PRΣ – Print statistics registers.
PRSTK – Print stack.
PRX – Print X-register.
REGPLOT – Plot single line using data in registers.
SKPCHR – Skip characters, accumulate in print buffer.
SKPCOL – Skip columns, accumulate in print buffer.
STKPLOT – Plot single line using data in stack.

HP 82153A Optical Wand

The HP 82153A Optical Wand makes using the HP-41 even faster and easier. Plug the wand into one of the HP-41 ports, and load programs and data into memory by passing the wand across a printed page of bar code. The wand translates the information into HP-41 programs and data, and then loads it into the HP-41. Bar code is an inexpensive distribution medium for programs and data. Store your bar code sheets in a three-ring binder if you choose. And share your programs quickly and easily – just photocopy and distribute.

Key Features

- Reads special HP-41 bar code.
- Plugs into and powered by the HP-41.
- Inexpensive bar code.

What They Do for You

Makes low cost and high reliability possible.

Economical data entry and processing. Portable.

Minimizes software distribution expense.

Physical Specifications

DIMENSIONS . . .13.0 cm (5.1 in) x 2.3 cm (0.9 in)

WEIGHT . . . . . .55 g (1.9 oz)

CABLE LENGTH .81.3 cm (32 in)

INTERFACE
Plugs into the HP-41 calculator, reads HP-41 bar code only.

OPERATING REQUIREMENTS
Voltages . . . . . .regulated 6 Vdc supplied by the HP-41. Unregulated 6 Vdc supplied by HP-41 batteries.
Current . . . . . .2 μA maximum (read switch off, computer off) 65 mA maximum (read switch on, computer on)
Operating temperature . . .0° to 45°C (32° to 113°F)
Storage temperature . . .−20° to 65°C (−4° to 149°F)

OPERATING LIMITS
Scan angle . . . . . .within 25° of perpendicular (10° to 20° optimum)
Scan speed . . . . .7.6 to 76 cm/sec (3 to 30 in/sec)
Subject to electro-magnetic interference.

HP 82153A Wand Functions List

WNDDTA – Scan one row of data bar code.
WNDDTX – Scan and store data bar code as directed by X.
WNDLNK – Scan and execute bar coded subroutine.
WNDSUB – Scan bar coded subroutine.
WNDSCN – Scan row of specialized bar code.
WNDTST – Scan bar code to test for correct reads.

HP 82161A Digital Cassette Drive

The Digital Cassette Drive uses a digital-quality mini-cassette, capable of storing up to 128K bytes of information. Files can be located easily by name on the cassette drive. Rewind time is under 30 seconds and it can access over 250 bytes of information per second. All tape movement is under microprocessor control, unlike the more common audio cassette drives that must be operated manually. The HP 82161A can locate files when under program control. It also features STANDBY mode, enabling an HP-IL controller to turn the drive on or off remotely. This unique feature helps extend system battery life and allows for system operation in remote applications.

Key Features

- Battery powered.
- 128K bytes per cassette.
- Variable record length, file-by-name organization, tape directory.
- Internal buffer space.
- STANDBY mode.

What They Do for You

Take it anywhere.

Large storage capacity.

Access data quickly and easily; save file space.

Minimizes tape motion, access time.

HP-IL controller can turn drive on or off from a remote location; conserves battery power.

Physical Specifications

DIMENSIONS . . .17.8 cm (7.0 in) x 13.2 cm (5.2 in) x 6.1 cm (2.4 in)

WEIGHT . . . . . .798 g (1.8 lbs)

POWER REQUIREMENTS

Batteries . . . . . .four-cell, 4.4 to 6 volt, quick-charge, nickel-cadmium battery pack

Pack recharging time . . . . . .14 to 16 hours (Drive turned on or off)

Usage . . . . . .ON – 2 watts maximum (motor off)
ON – 3.5 watts maximum (motor on)
STANDBY (on) – 2.3 watts maximum (motor off)
STANDBY (on) – 3.8 watts maximum (motor on)
STANDBY (off) – 0 watts maximum (motor off)

DATA FORMAT

Number of tracks .2

Density . . . . . .335 bits/centimeter (850 bits/in)

Format . . . . . .256 bytes/record (8 bits/byte)

Formatted capacity 512 records (131,072 bytes)

Encoding method bi-phase/level-phase encoding

DRIVE MECHANISM

Type . . . . . .two-motor, hub drive

Read/Write speed 23 centimeters (9 in) per sec

Search/Rewind speed . . . . . .76 centimeters (30 in) per sec

INTERFACE

Type . . . . . .HP-IL (Hewlett-Packard Interface Loop)

Default address on power up . . . . .undefined

Default address after auto address unconfigured . .2

OPERATING REQUIREMENTS

Operating temperature . . .10° to 40°C (50° to 104°F)

Charging temperature . . .15° to 40°C (59° to 104°F)

Storage temperature without tape . . . –40° to 75°C (–40° to 167°F)

DIGITAL CASSETTE

Type . . . . . .Hewlett-Packard Mini-Data Cassette (HP 82176A)

Tape length . . . . .24 m (80 ft)

Temperature limits . . . . . .10° to 45°C (50° to 113°F)

Humidity (tape storage) limits . . . . . .20% to 80% relative humidity

SPECIAL MODES

Standby

HP 9114B Portable Disc Drive

Collect data with your HP-41 and store it with the HP 9114B Disc Drive. The drive is small enough to fit into a briefcase, yet each disc holds about as much information as you can pack into 175 pages of single-spaced, typed text.

This compact, portable drive provides 128K bytes* of information storage. It reads and writes double-sided, double-density format on 3½" flexible discs, and rotates at 600 RPM. The HP 9114B weighs about 5½ pounds.

The HP 9114B can be used with the HP-41, HP-71, and other Hewlett-Packard computers too, making it an integral part of a powerful information collection and manipulation system.

*HP-41 use requires Users' Library program 41-09114 for full 630K byte capacity.

Key Features	What They Do for You
• Battery powered.	Take it anywhere.
• Reads double-sided, double-density format on 3½" flexible discs.	Keeps more information in a smaller amount of space.
• Hard discs.	Prevent contamination from fingerprints, dust, and damage from handling.
• Discs have a hard center.	Provides precise head placement.
• Auto shutter contamination shield over read/write window.	Protects the disc from damage.
• Media Monitor	Tracks the amount of life left in flexible discs and tells you, with a flashing light, when to replace them.
• Weighs only 5½ lbs.	Take it with you.

Physical Specifications

DIMENSIONS . . . 7.8 cm (3.1 in) x 28.7 cm (11.5 in) x 20.0 cm (8.0 in)

WEIGHT . . . . . 2.68 kg (5.9 lbs)

POWER REQUIREMENTS

Batteries . . . . . 6 volt lead-acid dry cell (HP 88014A)

Recharging time . . 5 hours (80% capacity)
16 hours (100% capacity)

Battery life . . . . . 1.8 hours with recharger plugged in (100% duty cycle)
1 hour without recharger plugged in (100% duty cycle)
No limit with recharger plugged in (5% duty cycle)

Source . . . . . 90-120 Vac

Line frequency range . . . . . 48-66 Hz

Power consumption (max.) 6W

OPERATING REQUIREMENTS

Operating temperature . . . 10° to 40°C (50° to 104°F)

Storage temperature . . . −40° to 60°C (−40° to 140°F)

HUMIDITY

Operating . . . . . 8% to 80% non-condensing (20°C maximum wet bulb temperature)

Storage . . . . . 5% to 95% non-condensing

Operating altitude . . . . . 0 to 4572 m (0 to 15000 ft)

Storage altitude . . . . . −304 to 15240 m (−1000 to 50000 ft)

DATA FORMAT

Formatted capacity . . . . . 128K bytes per unit*

Sectors per track . . 16

Tracks . . . . . 80 (3 spared) per surface

Recording surfaces . . . . . 2 per disc

Tracks . . . . . 135 per inch

Transfer rate . . . 5.5K bytes per second (max. sustained)

Average access time . . . . . 225 msec (on)
825 msec (off)

Rotation speed . . . 600 RPM

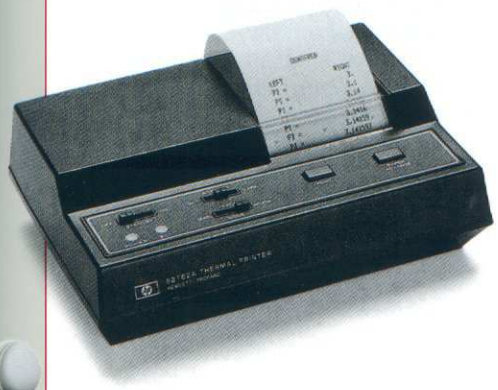
Recording format . . . . . Double density

INTERFACE

Type . . . . . HP-IL (Hewlett-Packard Interface Loop)

HP 82162A Thermal Printer/Plotter

The HP 82162A provides fast printouts with 24-character lines. It's battery-powered, so you can produce hard copy in the field.



This HP-IL compatible printer/plotter automatically centers and justifies text to the left or right. It has numeric upper- and lowercase alpha, double-wide characters, and intensity control for optimum contrast and readability. Additionally, it supports STANDBY mode that lets any HP-IL controller on the loop manage its power consumption.

Key Features

- Battery powered.
- Automatic centering and left or right justification.
- 24 characters per line.
- Both single- and double-wide characters.
- 128-character set.
- STANDBY mode.

What They Do for You

Take it anywhere.

Provides formatting control; saves time.

Makes smaller print possible.

Allows highlighting of output.

Allows more precise communication.

HP-IL controller can turn printer on or off from remote location; conserves battery power.

Physical Specifications

DIMENSIONS . . .17.8 cm (7.0 in) x 13.2 cm (5.2 in) x 6.1 cm (2.4 in)

WEIGHT . . . . .808 g (1.8 lbs) (includes paper and battery)

CABLE LENGTH .86 cm (34 in)

POWER REQUIREMENTS
Battery . . . . . .four-cell, 4.4 to 6 volt, quick-charge, nickel-cadmium battery pack
Battery current, (worst case) . . .250 mA (idle), 5 A (printing)
Recharging time . . . . . .14 to 16 hours (printer/plotter ON or OFF)
Operating time . . .3 to 6 hours

CHARACTER SETS
96 standard ASCII
127 modified-expanded ASCII

SPECIAL MODES
Standby, Parse, HP Bar code, Column, Double wide, Single wide, 8-bit escape

PRINT FORMAT
24 standard characters, 12 double-wide characters, 168 dot-columns per line
Upper- and lowercase letters
Special-character generation
Plotting capabilities
Graphics capabilities
101-character buffer

PRINTING SPEED . . . . . .24 characters/sec

OPERATING REQUIREMENTS
Operating temperature . . .0° to 45°C (32° to 113°F)
Charging temperature . . .15° to 40°C (59° to 104°F)
Storage temperature . . .−40° to 55°C (−40° to 131°F)
Humidity . . . . . .10% to 90% (non-condensing) at 40°C

THERMAL PAPER
Width . . . . . .5.7 cm (2.2 in)
Roll length . . . . .25 m (80 ft)
Colors . . . . . .blue, black
6 rolls/box

INTERFACE
Type . . . . . .HP-IL (Hewlett-Packard Interface Loop)
Startup conditions .normal (inactive or active-listener, selected at power-on)
Default address . .undefined (normal startup) or 1 (active-listener startup)

HP 2225B ThinkJet Printer

The battery-powered ThinkJet prints bidirectionally at 150 characters per second to produce 80-column pages quickly in the office or in the field. With sound registering under 50 decibels, printer noise need never interrupt your train of thought again.

An inexpensive, disposable cartridge holds the print head and ink reservoir, and is capable of printing approximately 500 full pages before replacement. Ink is delivered to the paper on demand, and dries immediately.

The 11 x 12 dot-matrix format text mode has a logic-seeking feature to find the fastest print route. Add a bold mode that won't slow printing speed to handle most of your letter-quality needs. A ROMAN8 character set provides 216 USASCII printable characters for use in many languages. Print on single sheets or fanfold paper.

Key Features

- Quiet 150 cps printing.
- Battery-powered, compact, and lightweight.
- High quality text and graphics.
- Comprehensive print features:
  - four print pitches
  - underline and bold
  - printable control codes
- Disposable print head.
- Pin or friction feed.

What They Do for You

Quickly, quietly generate memos, graphics, reports, and spreadsheets.

Hard copies on the spot, anywhere.

Easy-to-read text and impressive graphics.

Highlight and vary your output to meet text and graphics needs.

Fast, clean print head replacement.

Use continuous fanfold paper or cut sheets.

Physical Specifications

DIMENSIONS . . .8.9 cm (3.5 in) x 29.2 cm (11.5 in) x 20.6 cm (8.1 in)

WEIGHT . . . . . .2.5 kg (5.5 lbs)

INTERFACE
Type . . . . . .HP-IL (Hewlett-Packard Interface Loop)

POWER REQUIREMENTS
Battery . . . . . .6 cell, 4.4 to 6 volt, quick-charge, nickel-cadmium battery pack (HP 82199A)
Battery current, (worst case) . . . .20 mA (idle), 1.5 A (printing)
Recharging time . . . . . .14 hours approximately (Battery either in printer or out)
Operating time . . .over 200 typical pages

OPERATING REQUIREMENTS
Operating temperature . . .10° to 40°C (50° to 104°F)
Storage temperature . . . −20° to 60°C (−4° to 140°F)
Relative humidity . . . . .10% to 90%

PRINT FORMAT
Technique . . . . . .Ink-jet dot matrix
Speed . . . . . .150 characters/sec; bidirectional; logic-seeking in text mode
Text mode character cell structure . . . . .11 x 12 dot matrix
Graphics mode resolution . . . . .96 x 96 or 192 x 96 dots/in

Print Pitch (CPI)		Line Length (characters)
12.0	Normal	80
6.0	Expanded	40
21.3	Compressed	142
10.7	Expanded–Compressed	71

Character Set ROMAN8

Printhead life . . . . . .500 typical pages

PAPER FEED
Pin feed
Friction

PRINT BUFFER
One kilobyte

HP-IL Interfaces And Instruments

HP-IL Interfaces

HP 82164A
HP-IL/RS-232C Interface

The HP 82164A RS-232C Interface translates HP-IL signals into RS-232C signals and vice versa. It is designed to allow the interconnection of HP-IL systems with RS-232C devices. The interface operates in an asynchronous mode providing 5-, 6-, 7-, or 8-bit data formats with one or two stop bits and odd, even, zero, one, and no parity modes. A configuration control block allows the user to change the signals at the connector from a terminal (DTE) configuration to a modem (DCE) configuration so a host computer can be emulated.

HP 82169A
HP-IL/HP-IB Interface

The HP 82169A expands HP-41 control and communication capabilities by linking low-cost HP-IL (Hewlett-Packard Interface Loop) systems with high-performance HP-IB (IEEE 488) computers and lab equipment. It puts a variety of peripherals, instruments, and computers at your disposal, including more than 120 HP-IB-compatible devices made by HP and many more offered by other manufacturers.

With the HP-IB Interface, you can operate HP-IB versions of the HP 82906A Printer; operate and control power supplies and instruments such as the HP 1980 Oscilloscope; and talk directly with HP-IB computers such as HP Series 80, 100, 200, even the HP 1000 and 3000.

HP 82938A
HP-IL/Series 80 Interface

With the HP 82938A, a Series 80 computer can act as a system controller or device in an HP-41 HP-IL system. You can take advantage of Series 80 graphics capabilities to display information from an HP-41 in easy-to-understand graphs and charts. Or, with Series 80 data communications products, you can pass information to larger computers.

HP 82165A
HP-IL/GPIO Interface

Use your HP-IL system to control equipment operating with parallel bus structures. The GPIO Interface contains the port buffering and a built-in power supply that operates from an HP standard AC adapter which is supplied with the interface. Interface to computers for data collection, to specialized devices in production or lab environments, and to other devices.

HP 92198A HP-IL
80-Column Video Interface

You can use this interface to display data and listings from an HP-41 HP-IL system on a standard video monitor. Add an RF modulator and use it with a conventional TV set. View your applications in 24 row by 80 column format, or choose 20 rows by 40 columns. Characters can also be displayed in inverse video (dark characters on a light background).

HP 82166C
HP-IL Interface Kit*

The HP-IL Interface Kit provides the special components necessary for building HP-IL into your product. Three components are key to implementing the HP-IL interface standard: the HP-IL integrated circuits, the HP-IL transformer set, and the HP-IL panel receptacle. Included are complete component-level documentation, four complete sets of parts for prototype evaluation, and HP-IL development software for use on HP-41 systems. Components may be purchased individually when design is completed.

HP-IL Instruments

A variety of instruments for use with the HP-41 are available from your local HP sales office.

- HP 1630A/D/G Logic Analyzers
- HP 1631A/D Logic Analyzers
- HP 3421A Data Acquisition Control Unit
- HP 3468A/B Digital Multimeter
- HP 4945A Transmission Impairment Measuring Set (TIMS)
- HP 5384A/5385A (Opt. 003) Frequency Counters
- HP 8590A Portable Spectrum Analyzer

*Not available at retail outlets. To order an HP 82166C HP-IL Interface Kit, contact your local HP sales office.

HP-41 Software

Hewlett-Packard offers a wide range of application pacs and solutions books to increase the versatility of your HP-41.

- **Application pacs** come with comprehensive manuals, plug-in modules and, when applicable, prerecorded magnetic cards, keyboard overlays and quick reference card.
- **Solutions books** come with complete documentation, keystroke listings, and printed bar code. Magnetic cards, 3½" discs and mini data cassettes are also available.
- **Users' Library** programs are another source of software solutions for the HP-41. Thousands of member-contributed programs are available in such diverse applications as real estate, navigation, medicine and mechanical engineering.

Each program is reviewed by the Users' Library and comes with complete documentation, to give you ready-to-go solutions. You can expect detailed program descriptions, warnings, or limits; sample problems and examples as appropriate; instructions on running the program; step-by-step listings of program keystrokes; and HP bar code. You can purchase Library programs on pre-recorded magnetic cards, mini data cassettes or 3½" discs.

When you subscribe to the Library, you will receive a free software catalog, a software bonus, and notification of special discounts and promotions. For more information about Library solutions, contact:

Users' Library, Dept. 39UL
1000 NE Circle Blvd.
Corvallis, OR 97330
503-757-2000 ext. 3003

Application Pacs and Solutions Books

For Science And Engineering:

Application Pacs

HP-41 Advantage
(00041-15055)
- Comprehensive Advanced Matrix Math
- Real and Complex Matrix Operations
- Simultaneous Equations on Real and Complex Numbers
- Solve (roots of f(x)–0) and Integrate
- Three-dimensional Vector Operations
- Complex Number Operations
- Number Base Conversions and Boolean Logic
- Curve Fitting
- Roots and Evaluation of Polynomial Equations
- Differential Equations
- Coordinate Transformations
- Time Value of Money
- User-accessible Subroutines

Aviation
(00041-15018)
(For pre-flight use.)
- Flight Management
- General Aircraft Weight and Balance
- Flight Plan
- Determining In-Flight Winds
- Position by One or Two VORS
- Mach Number and True Airspeed

Circuit Analysis
(00041-15006)
- General Network Analysis
- Ladder Network Analysis

Clinical Lab and Nuclear Medicine
(00041-15024)
- Beer's Law
- Body Surface Area
- Creatinine Clearance
- Blood Acid-Base Status
- Oxygen Saturation and Content
- Red Cell Indices
- Total Blood Volume
- Thyroid Uptake
- Radioactive Decay Correction
- Radioimmunoassay
- Basic Statistics
- Chi-Square Evaluation and Distribution
- t Statistics
- t Distribution

Machine Design
(00041-15020)
- Circular Cams
- Generation of a Four Bar Linkage
- Progression of Four Bar System
- Progression of Slider Crank
- Gear Forces
- Standard External Involute Spur Gears
- Helical Spring Design
- Force Oscillator with Arbitrary Function
- Coordinate Transformation
- Points on a Circle
- Circle by Three Points
- Unit Conversions

Math/Stat
(00041-15049)
- Matrix Operations
- Solution to f(x) = 0 on an Interval
- Polynomial Solutions/Evaluation
- Numerical Integration
- Differential Equations
- Fourier Series
- Complex Operations
- Hyperbolics
- Triangle Solutions
- Coordinate Transformations
- Basic Statistics for Two Variables
- Moments, Skewness and Kurtosis
- Analysis of Variance (One Way)
- Analysis of Variance (Two Way)
- Analysis of Covariance (One Way)
- Curve Fitting (Linear, Exponential, Logarithmic and Power Curve)
- Multiple Linear Regression
- Polynomial Regression
- t Statistics
- Chi-Square Evaluation
- Contingency Table
- Spearman's Rank Correlation Coefficient
- Normal and Inverse Normal Distribution
- Chi-Square Distribution

Navigation
(00041-15017)
- Great-Circle Course and Distance
- Great-Circle Position
- Rhumb-Line Course and Distance
- Rhumb-Line Position
- Great-Circle Plotting and Voyage Planning
- Dead Reckoning
- Sight Reduction
- Perpetual Almanac – Stars, Sun, Planets, Moon
- Almanac Interpolator
- Sight Reduction Table
- Calendar Functions
- Greenwich Sidereal Time
- Star Almanac
- Fundamental Arguments
- Astronomical Coordinate Conversion
- Longitude to Latitude
- Input/Output Routines

Petroleum Fluids Pac
(00041-15039)
- Z Factor
- Gas Isothermal Compressibility
- Gas Formation Volume Factor
- Gas Viscosity
- Pseudocritical Temperature and Pressure From Gas Gravity
- Gas Properties From Composition
- Oil Isothermal Compressibility
- Oil Formation Volume Factor
- Oil Viscosity
- Gas-Oil Ratio
- Bubble Point Pressure
- Two-Phase Formation Volume Factor

Petroleum Fluids Pac (00041-15039) (continued)
- Water Isothermal Compressibility
- Water Formation Volume Factor
- Water Viscosity
- Gas-Water Ratio
- Rock Compressibility
- Total Isothermal Compressibility

Includes unit management systems subroutines.

Standard Applications Module (00041-15001)
- RPN Primer
- Calendar Functions
- Word Guessing Game
- Arithmetic Teacher
- Hexidecimal-Decimal Converter
- Financial Calculations
- Root Finder
- Curve Fitting
- Vector Operations
- Blackjack

Stress Analysis for Mechanical Engineers (00041-15027)
- Section Properties
- Beams
- Simply Supported Continuous Beams
- Columns
- Mohr Circle Analysis
- Strain Gage Data Reduction
- Soderberg's Equation for Fatigue
- RPN Vector Calculator

Structural Analysis for Civil Engineers (00041-15021)
- Section Properties
- Beams
- Simply Supported Continuous Beams
- Settling of Continuous Beams
- Continuous Frame Analysis
- Steel Column Formula
- RPN Vector Calculator
- Reinforced Concrete Beams
- Reinforced Concrete Columns
- Effective Moment of Inertia for Concrete Sections

Surveying (00041-15005)
- Traverse, Inverse and Sideshots
- Compass Rule Adjustment
- Transit Rule Adjustment
- Intersections
- Curve Solutions
- Horizontal Curve Layout
- Vertical Curves and Grades
- Resection
- Predetermined Area
- Volume by Average End Area
- Volume of a Borrow Pit
- Coordinate Transformation

Thermal and Transport Science (00041-15019)
- Equations of State
- Polytropic Processes for Ideal Gas
- Isentropic Flow for Ideal Gases
- Conduit Flow
- Energy Equation for Steady Flow
- Heat Exchangers
- Black Body Thermal Radiation

Includes unit management system subroutines.

Solutions Books

- Antennas (00041-90093)
- Chemical Engineering (00041-90100)††
- Chemistry (00041-90102)††
- Civil Engineering (00041-90089)
- Control Systems (00041-90092)
- Electrical Engineering (00041-90088)
- Fluid Dynamics & Hydraulics (00041-90139)
- Geometry (00041-90084)
- Heating, Ventilating & Air Conditioning (00041-90140)
- High-Level Math (00041-90083)
- Mechanical Engineering 00041-90090)
- Optometry I (General) (00041-90143)
- Optometry II (Contact Lens) (00041-90144)
- Physics (00041-90136)
- Solar Engineering (00041-90138)
- Structural Design (cassette based) (00041-90441)†
- Surveying (00041-90141)††
- Test Statistics (00041-90082)
- Time Module Solutions I (00041-90395)†

For Business:

Application Pacs

Financial Decisions (00041-15004)
- Compound Interest Solutions
- Internal Rate of Return
- Modified Internal Rate of Return (FMRR)
- Net Present Value
- Loan Amortization Schedules
- Depreciation Schedules
- Bond Price and Yield
- Days Between Dates

Home Management (00041-15023)
- Home Budgeting
- Travel Expense Record
- Stock Portfolio Evaluation
- Checking Account Reconciliation
- Your Financial Calculator
- Accumulated Interest and Remaining Balance
- Home Owner's Equity Analysis
- The Rent or Buy Decision
- Tax Free Individual Retirement Account (IRA) or Keogh Planning
- The True Cost of an Insurance Policy

Real Estate (00041-15016)
- Compund Interest and Loan Amortization
- Internal Rate of Return
- Modified Internal Rate of Return
- Net Present Value
- Depreciation Schedules
- Income Property Analysis
- Graduated Payment Mortgage
- Wrap-Around Mortgage
- Home Owner's Equity Analysis

Real Estate (00041-15016) (continued)

- The Rent or Buy Decision
- Price and Yield of a Mortgage Traded at a Discount/Premium
- APR of a Loan With Fees
- Present Value of an Increasing/Decreasing Annuity

Securities (00041-15026)

- Bond/Note Price and Yield
- Routines for Option Writers Using the Black-Scholes Evaluation Method
- Warranty and Option Hedging
- Yield on Call Option Sales
- Butterfly Options
- Bull Spread Option Strategy
- Convertible Bond Investment Analysis
- Stock Portfolio Valuation
- Bond Speculation Using Margin
- Convertible Security Analysis

Standard Applications Module (00041-15001)
(See Scientific and Engineering Applications)

Solutions Books

- Business Statistics/Marketing Sales (00041-90094)
- Calendars (00041-90145)
- Home Construction Estimating (00041-90096)
- Lending, Savings & Leasing (00041-90086)
- Real Estate (00041-90136)
- Small Business (00041-90137)

For Entertainment:

Application Pacs

Games (00041-15022)

- Submarine Hunt
- Space War
- Super Bagels
- Hangman
- Pinball
- Craps
- Biorhythms
- Random Number Generator

Solutions Books

- Games I (00041-90099)
- Games II (00041-90443)

Custom Products

HP's successful custom products program combines customer-generated software and the powerful HP-41 Advanced Programmable Calculator.

Custom products offer a personal, tailor-made approach to traditional problems. If your organization has groups of people who perform identical jobs, you may be able to save time and money, as well as improve productivity with customized products.

Independent Custom Consultants (ICCs) are trained experts who can provide you with the level of service you require, whether it's to have your own software made into a custom product, or comprehensive consultation. Then, the ICC will arrange with the HP factory to have your custom products manufactured. For more information see the custom products brochure and ICC Capabilities Guide.

There are several options from which to choose, and all are designed to tailor a problem-solving system to your professional demands. Use custom software modules for program storage. HP-41 custom keyboard touchpads personalize your keyboard to make data entry and program execution faster and easier.

Custom software modules in 4K-, 8K- and 12K-byte capacities are available.

The right custom option puts power and portability to work for you, swiftly transforming questions into answers and problems into solutions.

For more information on custom products, contact your local HP sales office.

Scientific Calculator Buyer's Comparison Chart

Key

- ■ Built-in feature or function
- H Owner's, solutions and application handbooks
- Mem Unlimited within available memory
- C Choice of software: custom ROMs, cassettes, magnetic cards
- S Application pacs, solutions books, thousands of Users' Library programs
- PA Dedicated and HP-IL peripherals and add-ons
- * 16-bit registers
- ** User memory: program steps for HP-11C, -15C, -16C; bytes in RAM for HP-28C; minimum/maximum bytes in RAM for HP-41CV/CX

	HP-28C	HP-41CV	HP-41CX
			
PHYSICAL FEATURES			
Display	4-line, 23-chara. LCD	1-line, 12-chara. LCD	1-line, 12-chara. LCD
Batteries	Disposable	Rechargeable/Disposable	Rechargeable/Disposable
Keyboard	Alpha/numeric & softkeys	Alpha/numeric	Alpha/numeric
Dimensions	Open 7½"x6½"x1½" Closed 3⅝"x6½"x⅝"	3"x5½"x1⅜"	3"x5½"x1⅜"
CONFIGURATION			
Peripherals/add-ons (I/O)		PA	PA
Infrared printer interface	■		
Built-in memory (registers)	N/A	319	319
Built-in extended memory			124
Maximum user memory**	1709	2237/6433	2237/6433
Clock, stopwatch, alarms		S	■
Text file editor	■		■
Software	H	S, C	S, C
Redefinable keyboard	Softkeys	Full	Full
SCIENTIFIC/MATH FEATURES			
Base conversions and math	■	S	S
Bit manipulation	■		
Boolean operators	■	S	S
Calculus:			
Numeric integration	■	S	S
Symbolic polynomial integration	■		
Symbolic derivatives	■		
Complex-value functions	■	S	S
Equation solver	■		
Factorial	■	■	■
Function plotting:			
to display	■		
to printer	■	S	S
Hyperbolics/inverses	■	S	S
Matrix operations	■	S	S
Solve (root finder)	■	S	S
Symbolic algebra	■		
Trigonometric functions	■	■	■
Unit conversions	■	S	S
STATISTICAL FUNCTIONS			
Combinations/permutations		S	S
Correlation coefficient	■	S	S
Data plotting:			
to display	■		
to printer	■	S	S
Linear regression	■	S	S
Mean/standard deviation	■	■	■
Probability analysis	■	S	S
PROGRAMMING FEATURES			
Alpha string manipulation	■	■	■
Conditional tests	22	14	20
Flags	64	56	56
Indexed looping	■	■	■
Levels of subroutines	Mem	6	6
Program labels	Mem	Mem	Mem
GENERAL ARITHMETIC FUNCTIONS			
+, −, ×, ÷, $\sqrt{x}$, 1/x, CHS	■	■	■
Ln x, e^x	■	■	■
y^x, Log x, 10^x, x^2, %, π	■	■	■

Hewlett-Packard Co.
Handheld Computer
& Calculator Operation
1000 N.E. Circle Blvd.
Corvallis, Oregon 97330

HEWLETT PACKARD

The following are HP regional headquarters. To locate the HP office nearest you, consult your local telephone directory.

Hewlett-Packard Canada
6877 Goreway Dr.
Mississauga, Ontario
Canada, L4V1M8
Tel: 800-387-3867

Hewlett-Packard Asia
47/F China Resources Bldg.
26 Harbour Road
Hong Kong
Tel: (5) 833-0833

Hewlett-Packard Japan
Yokogawa-Hewlett-Packard Ltd.
29-21, Takaido-Higashi 3 Chome
Suginami-ku, Tokyo 168
Tel: (03) 331-6111

HP Australia/New Zealand
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