Using the world's first fully programmable pocket calculator is as easy as switching on your favourite TV programme.

Slot in a program strip, enter the data, get the exact answer...

Insert a program strip in the lower slot on the right side of the HP-65. Whrrr! In 1.2 seconds it passes through the reader, storing a complete, magnetically recorded computer program, and ejects through a slot on the left side, slip the program strip into the upper slot, where it's visible, and you've labelled the five keys in the upper row for your specific program or subroutines. And, with that, you've just programmed the world's most powerful hand-held calculating instrument.

You've programmed it to perform a complex series of mathematical operations at the touch of a few keys: enter the data for your problem, start the program and in moments your answer, accurate to 10 digits - up to 9 decimal places - appears on the display.

Engineering, surveying, navigational, statistical, financial calculations... whatever kind of problem you work with, there are prewritten programs on magnetic strips to solve them. Or you can write your

own program for your specific application, and use it again and again. The pocket electronic calculator has come of age. The professional computing instrument of virtually unlimited capability. The HP-65.

You've utilised the HP-65's higher preprogrammed functions such as testing by flags, testing by arithmetic comparison, decrementation to zero, which in turn caused your program to branch to subroutines or loop the memory, directly or indirectly.

How second generation pocket calculator technology works to reduce complex calculations to a purely mechanical operation.

The magnetic strip

We've already come a long way from the electronic calculator which only performs arithmetic operations, but the HP-65 has even more. The convenience of setting up an automatically repeatable key-stroke sequence, or program, is a self-evident advantage; but, it would be unnecessarily time-consuming to have to key in, each time, a program which is used more than once. The HP-65 solution: record the program on a magnetic strip 1.1 cm. wide by 7.1 cm long. It takes a couple of seconds to store a prerecorded sequence in the program memory, and your calculation is ready to run. Key in only the data for the particular problem; start the program; read your answer - it's as simple as that! And, of course, strips can be linked to provide longer program sequences.

Once you've established a key-stroke sequence for a specific calculation, using the program memory described above, you can record it - in a simple pass through the strip reader- on a blank program strip and use it again and again. Or, easier still, you can draw on the ever-expanding Hewlett-Packard library of prewritten programs on magnetic strips. (see page 4).

The strip reader

Similar in principle to a magnetic tape recorder, the strip reader is a built-in unit consisting of a miniaturised electro-mechanical transport and read/write head. Inserting a program strip into the reader slot (right hand side) activates the motorised transport which grips the strip, draws it through the reader and ejects it (left hand side). As a prerecorded strip is drawn across the read/write head (like the playback and record heads on a tape recorder), magnetically recorded electronic impulses on the strip are picked up and stored in the program memory. Conversely, a new program sequence, keyed and stored in the program memory, is recorded when a "blank" strip passes across the read/write head, making the strip an addition to your program library, to be re-used

whenever you need it. Clipping the corner off the strip makes it permanent: that is, the reader will not record on it (so that a strip containing a program you wish to save cannot be inadvertently recorded over). Another built-in safeguard ensures that a program strip has been perfectly read and stored. A flashing signal on the display indicates that, for some reason, the recording has not been correctly picked up, and the strip should be passed through again before the program can be run.

The memory

Most of us repeat the same calculations, with different sets of data, in our daily work, and the repetition of a long sequence of steps is both time-consuming, and a source of error. This is where the HP-65 becomes a revolutionary new personal computing instrument. Its extensive memory capacity gives it the ability to learn a sequence of steps, which it can automatically run through, from top to bottom at the touch of a start key. You can assign one hundred program steps to your HP-65, including sub-routines, logical decisions and automatic utilisation of any preprogrammed function. In effect, once you have worked out the series of operations for solving a problem on your HP-65, you can "teach" the machine the series and then just key in data, press the start key and, in seconds, all the series of steps are done automatically and you read the answer on the display. The program steps allow for a much more extensive sequence than is immediately apparent in the number, one hundred. they include subroutines and automatic utilisation by the calculator of the operational stack, addressable registers and all preprogrammed functions. As each of the latter effectively compresses a number of complex operations (such as extracting integers, raising a number to a power, trigonometric functions, conversions, etc.) to one or two key strokes, " one hundred steps" can turn out to be a lot more.

The stack

Most of your step-by-step operations on the HP-65 are performed by means of the four-register operational memory stack. When you key in a number, it's stored

in the first register, X (each register holds a full number, 10 digits plus decimal point and 2 digit exponent) and appears on the display. If you then touch $\boxed{\text{ENTER} \uparrow}$, to indicate that the number is complete, the entry is automatically lifted up one register to Y, leaving X "vacant" for the next entry. A second number entry, at the $\boxed{\text{ENTER} \uparrow}$ stroke, is lifted into the Y register, and the first automatically moves up one more, to the Z register. A third number entry causes another shift up: the new number into Y, second into Z and first into register T, the top of the stack. A fourth entry into X only is possible at this point if you don't press $\boxed{\text{ENTER} \uparrow}$ There's plenty of operating room in these four stacks, because whenever you perform an arithmetic function with two numbers (press $\boxed{+}$ instead of $\boxed{\text{ENTER} \uparrow}$ after the second number, for instance), the contents of X are added to the contents of Y. The result becomes the contents of X, shown on the display, and the contents of Z and T automatically drop down one register. It works automatically with all arithmetic functions, so you can do endless serial or chain calculations with intermediate results stored in the stack - and no need for a note pad.

The registers

Now, for longer calculations with several expressions to be evaluated and then combined, you obviously need more than four registers. Well, you still won't need the old note pad. because the HP-65 gives you nine more *addressable* arithmetic memory registers, R_1, R_2, ... R_9. So, when you have an intermediate result to use later, or a constant factor to be used at various stages in calculations, you enter your data, press $\boxed{\text{STO}}$ for "store", and a number from one to nine to assign a register. When you need it, press $\boxed{\text{RCL}}$ for "recall" and the register number. Your stored data then appears on the display, and is in X operational register ready for use (previous X contents have been automatically lifted to Y). Recalling the number and using it have not wiped it out from its memory register: it's still there - you don't even have to "put it back" - and it remains there until you clear it, or overwrite it with new data in the same register.

You can pick any of these ready written program Pacs.

Instantly converting your HP-65 from a powerful general-purpose calculator to a very sophisticated, specialised machine for the most complex computations, prewritten magnetic strips in standard Pacs give you an extensive program library from the beginning. Between 20 and 40 different program are included in each Pac, yet the Pac is so small that it slips into a pocket in the HP-65's carrying case. Program strips are permanently protected against accidental overwriting. Sophisticated programs, written by expert analyst/programmers, have been carefully selected and tested to solve most efficiently the widest range of problems in each specific discipline. Yet, so simple are they to use, even personnel with no training in calculators can be taught in a short time to run the most complex programs routinely.

Each program strip is clearly labelled with title and special subroutine designations. The five upper, user definable keys, [A] through to [E], are automatically assigned specific functions by the recorded program When the strip is inserted in the upper slot ("run" position), the designations

of the five keys' alternate functions are covered up. Thus, with the program stored in memory, and the keyboard set up for visual control, it's a simple matter to enter the data and let the calculation run itself.

With each standard Pac, you receive an instruction booklet containing a description of each program formulae used in the solution, examples and easy-to-follow instructions for data input and running the program. New programs are constantly being written (or adapted from computer program routines) by experts at Hewlett-Packard Program Development Centres in Geneva and in the United States.

Standard Pac

1. Personal Investment Program
2. Mean, Standard Deviation, Standard Error
3. Great Circle Navigation
4. Integer Base Conversion
5. Body Surface Area (Boyd)
6. PI Network Impedance Matching
7. EDM Slope Reduction - Given▲ Elevation
8. Temperature Conversions
9. Weight Mass Conversions
10. Volume Conversions
11. Compound Interest
12. Loan Repayment
13. Reconcile Checking Accounts
14. Iterative Solution of f(x) = 0
15. Quadratic Equation
16. Areas and Solution of Right Triangles
17. NIMB
18. User Diagnostic I
19. User Diagnostic II
20. Head Cleaning Card
21-40. Blank Cards

Math Pac I

1. Factors of an Integer
2. Greatest Common Divis or, Least Common Multiple
3. Arithmetic and Harmonic Progression
4. Geometric Progression
5. Functions of x and y
6. Quadratic Equation
7. Cubic Equation
8. Fourth Degree Polynomial Equation
9. Fifth Degree Polynomial Equation
10. Simultaneous Equations in Two Unknowns
11. Simultaneous Equations in Three Unknows
12. Synthetic Division
13. Rectangular, Spherical Conversions
14. Translation and/or Rotation of Coordinate Axes
15. Angle Conversions
16. Secondary Values of $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$,
17. Trigonometric Functions
18. Hyperbolic Functions
19. Inverse Hyperbolic Functions
20. Solution of a Triangle (Given a, b, c, or a, b, C)
21. Solution of a Triangle (Given a, A, C, or a, B, C)
22. Solution of a Triangle (Given B, b, c)
23. Spherical Triangle Solution (Given A, b, c, or a, b, c)
24. Area of a Triangle
25. Area of a Polygon
26. Circle Determined by Three Points
27. Equally Spaced Points on a Circle
28. Polygons Inscribed in and Circumscribed about a Circle

Stat Pac I

1. Mean, Standard Deviation, Standard Error
2. Mean, Standard Deviation, Standard Error (Grouped Data)
3. Permutation and Combination
4. Arithmetic, Geometric, Harmonic and Generalized Means
5. Sums for Two Variables
6. Basic Statistics (Two Variables)
7. Moments, Skewness and Kurtosis (For Grouped or Ungrouped Data)
8. Random Number Generator
9. Analysis of Variance (One Way)
10. Normal Distribution
11. Inverse Normal Integral
12. Chi-Square Distribution
13. t Distribution
14. F Distribution
15. Bivariate Normal Distribution
16. Logarithmic Normal Distribution
17. Weibull Distribution
18. Binomial Distribution
19. Negative Binomial Distribution
20. Hypergeometric Distribution
21. Poisson Distribution
22. Linear Regression
23. Exponential Curve Fit
24. Power Curve Fit
25. Logarithmic Curve Fit
26. Least Squares Regression of $y = cx^a + dx^b$
27. Multiple Linear Regression
28. Parabolic Curve Fit
29. Paired t Statistic
30. t Statistic for Two Means
31. Chi-Square Evaluation
32. 2 x k Contingency Table
33. Bartlett's Chi-Square Statistic
34. Sperman's Rank Correlation Coefficient
35. Mann-Whitney Statistic
36. Kendall's Coefficient of Concordance
37. Biserial Correlation Coefficient

29. Unit Conversions C° F° Ft in→ cm. lb→kg.
30. Unit Conversions: mi— Km, gal→ltr, yd→m, ac→ft²
31. Polynomial Evaluation (Real)
32. Linear and Lagrangian Interpolations
33. Finite Difference Interpolation
34. Numerical Integration (Discrete Case)
35. Simpson's Rule for Numerical Integration
36. First order Differential Equation
37. Roots of f(x) = 0 in an Interval
38. Determinant and Characteristic Equation of a 3x3 Matrix
39. 2x2 Matrix Operations
40. 3x3 Matrix Inversion

EE Pac I

1. Reactance chart
2. Series resonant circuit
3. Parallel resonant circuit
4. Impedance of ladder nework
5. T attenuator
6. PI attenuator
7. Wye-delta or delta-wye transformation
8. Minimum-loss pad matching
9. PI network impedance matching
10. Band pass filter
11. Active filter-low pass
12. Active filter-high pass
13. Butterworth filter design
14. Chebyshev filter design
15. Capacitance of parallel plates
16. Self inductance of straight round wire
17. Inductance of a single-layer close-wound coil
18. Skin effect and coil Q
19. Transformer design
20. Reed relay design
21. Impedance of transmission line
22. Transmission line impedance transformer
23. Microstrip transmission line
24. S=Y parameter conversion
25. Power supply rectifier circuits
26. Controlled rectifier circuits
27. Integrated circuit current source
28. Transistor bias
29. JFET bias and transconductance
30. Phase lock loop
31. Fourier series
32. Decibel conversion
33. Voltage to dBm
34. Wire tables Al & Annealed
35. Heat sink

Other Pacs include Math Pac 2, Medical Pac I Surveying Pac I and Financial Pac I.
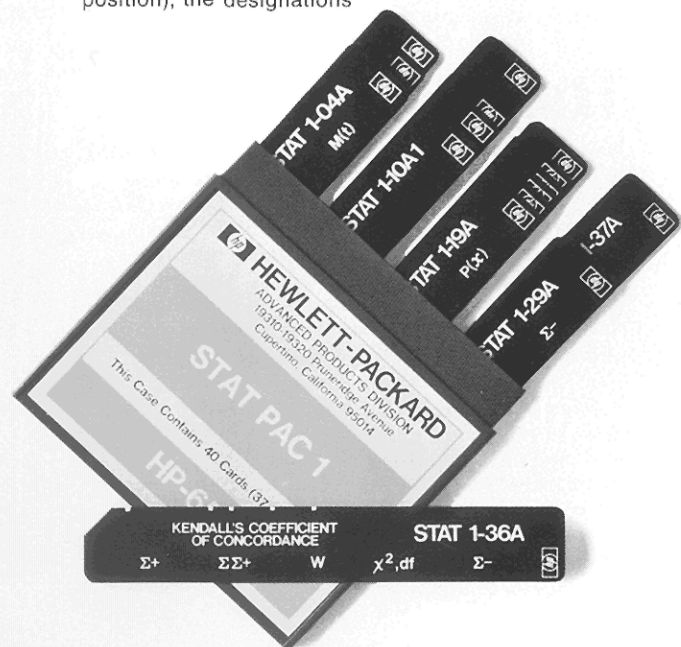
The HP-65 has four basic calculator keyboards giving you 188 calculating functions & operations – and that's without the program strips.

Take a look at the keys. The [f] [f-1] and [g] keys are "shift keys" - rather like the shift key on a typewriter. By pressing them first you get the pre-programmed functions of their colour on the keys. That's how we give you four keyboards.

The HP-65's three prefix keys in row 3 enable each of the suffix keys to perform multiple calculating functions — [f] , [f-1] , and [g]

Calculating Functions
Arithmetic Functions

Add	[+]
Subtract	[−]
Multiply	[×]
Divide	[÷]

Logarithmic Functions

Natural logarithm or antilogarithm (base e)	[f] or [f-1]	LN
Common logarithm or antilogarithm (base 10)	[f] or [f-1]	LOG

Trigonometric Functions

Set operating mode (decimal-degrees, radians or grads) — [g] [DEG] , [RAD] , or [GRD]

Sine or arc sine	[f] or [f-1]	SIN
Cosine or arc cosine	[f] or [f-1]	COS
Tangent or arc tangent	[f] or [f-1]	TAN
Add or subtract degrees minutes/seconds (or hours minutes/seconds)	[f] or [f-1]	D.MS+
Convert angle from operating mode to or from degrees/minutes/seconds	[f] or [f-1]	→D.MS
Convert rectangular coordinates to or from polar coordinates	[f] or [f-1]	R→P

Exponential Functions

Square root or square	[f] or [f-1]	$\sqrt{x}$
Raising a number to a power	[g]	y^x

Other Preprogrammed Functions

Reciprocal	[g]	1/x
Extract integer or decimal portion of a number	[f] or [f-1]	INT
Factorial	[g]	n!
Recall value of π to 10 significant digits	[g] π [DSP] 9	
Convert decimal-base integers to or from octal-base integers	[f-1] or [f]	→OCT
"Roll down" or "Roll up" numbers in the operational stack	[g] R↓ or R↑	
Clear display	[CLX]	
Clear operational stack or all nine addressable storage registers	[f] STK or REG	
Recall last input argument from special "last-x" storage register	[g]	LSTX

Store or recall numbers from any of the nine addressable storage registers (By pressing an arithmetic operation key immediately after the STO key, you can perform regular arithmetic, e.g.: — [STO] or [RCL] 1 , 2 … 9

double the content of register 3 — 2 [STO] [×] 3

Direct branching or looping — [GTO] 0 , 1 … 9

Arithmetic comparison, internally tested and branching or looping on result.	[g] x=y x≠y x>y x≤y
Decrementation to zero, internally tested and branching or looping on result.	[g] DSZ
Flags - internally tested as set or not set and branching or looping on result	[f] or [f-1] SF1 SF2 ... TF1 TF2

HEWLETT·PACKARD 65

# By working out a problem on the HP-65 you've written your own program. The keys do the rest for you.

To people who don't work directly with programmable calculators and computers, there's no need to be intimidated by the idea of programming an HP-65. *You don't have to be a professional programmer to turn the full strength of this remarkable instrument's computational power to the solution of your problems.*

It is absolutely not necessary to have any experience whatsoever in programming to be able to solve problems on the HP-65. And, once you have solved a problem, you have, in effect, written a program which can be repeated for that kind of problem over and over. Basically, a "program" is nothing more than a list of keystrokes in sequence necessary to solve one type of problem. When you perform a calculation, you're defining the list of keystrokes. If you then run through the list of keystrokes, but without the data for the original problem, and insert a few additional steps to define the beginning and end, you have written a complete program. Record it on a blank magnetic strip, mark in the spaces provided, appropriate labelling, and you've just started your own personal program library.

Now, as an experienced programmer knows, there are often several valid approaches to programming solutions to the same problem, some offering greater efficiency, others greater flexibility. Along with your HP-65, you'll receive a complete programming Guide and a pad of blank programming forms. Following step-by-step (key-by-key) instructions, you can immediately start programming your calculator. As you work with it, the Guide will show you how to convert formulae to keystroke sequences, how to define problems in terms of more and more sophisticated programs. In fact, you can use your HP-65 and its accompanying instructional materials to teach

yourself a great deal about principles and practice of programming, directly applicable to large programmable calculators and computers. And at the same time, using your HP-65, without programs, with powerful standard Pac programs and with your own programs, to easily, instantly solve the most complex problems that come up in your work.

If you *are* an experienced programmer, you'll be delighted with the challenge of writing programs which, on a battery-powered machine you can carry in your pocket, can handle anything but the most sophisticated computational tasks.
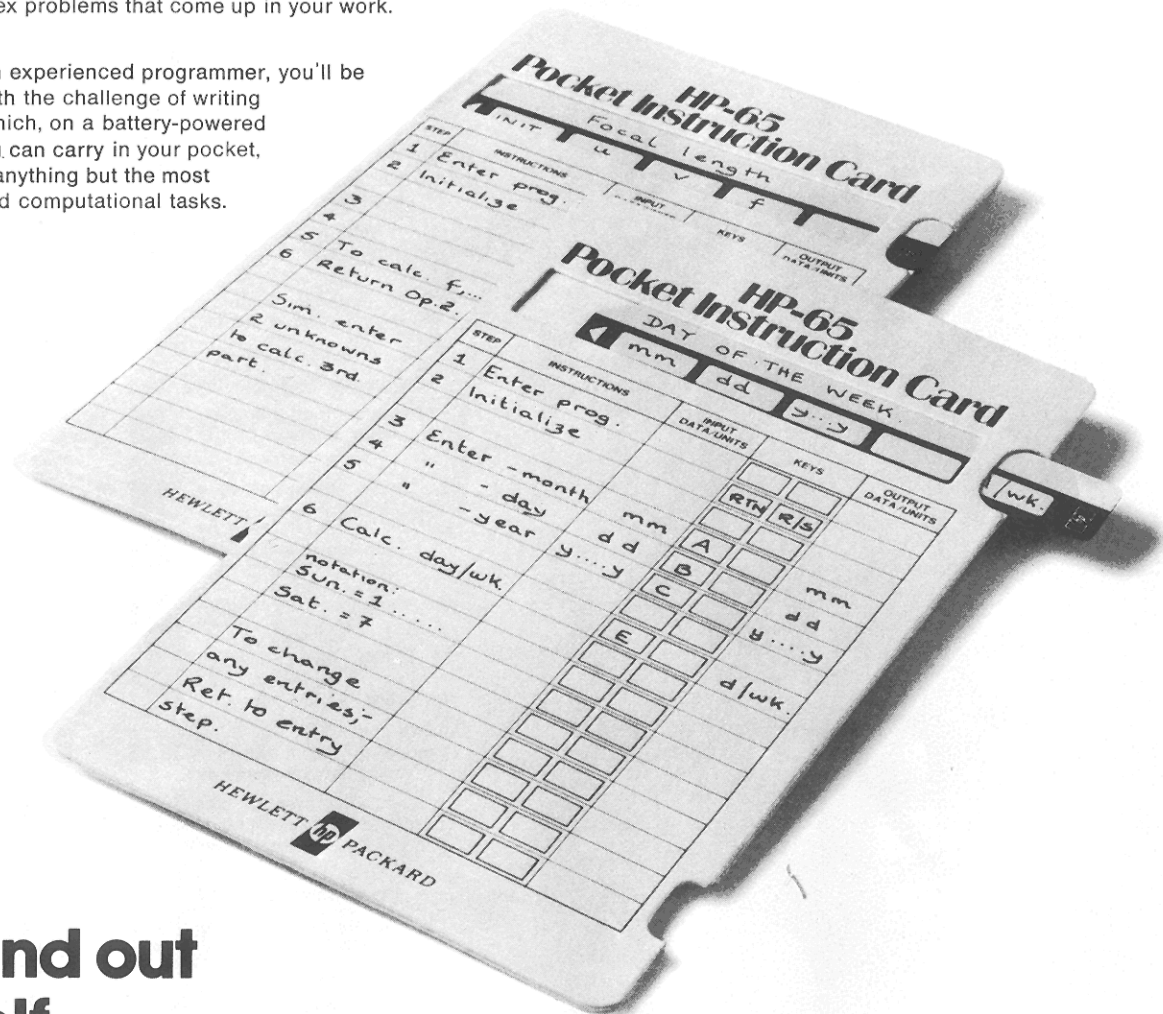
This is the easiest way to find out how to program for yourself.

Demonstration program Pac, quick reference guide, operating manual.

To help you decide, and to help you start getting full advantage of the world's most capable pocket calculator as soon as possible, you'll receive the most extensive package of instructional materials ever offered with a calculating device.

As with any *programmable* large calculator or computer, the software is every bit as important as the hardware. The software that is standard with the HP-65 is as impressive as the high technology of the machine. Hundreds of man hours of research and preparation have gone into the making up of instructional materials which, step by step, quickly and easily, bring every user up to the highest utilisation of advanced programmed computation.

Magnetic program strips in the demonstration Pac included with every HP-65 are thoughtfully conceived to (1) show, in simple terms, how a basic program works; (2) demonstrate how programmed solutions can be applied to any kind of problem; and (3) illustrate the vast range of existing programs and what they can do.

Designed to enable you to use all of the HP-65 features immediately, the *Quick Reference Guide* - in a pocket-sized, flip-chart format - takes you key-by-key through solutions to most types of problems, and shows you how to operate all of the functions. Because the HP-65 was designed to be as easy to operate as it is capable, you won't need to refer to this Guide for long - but you'll appreciate having it at first.

Intensive work and contributions from everyone who helped design, build and program the HP-65 make the *Owners Handbook* complete and comprehensive - you may refer to it years from now. In addition to complete instructions on all phases of operations with the calculator, and simple maintenance requirements, it can teach you everything you need to know about defining problems, converting formulae into programs and using the most sophisticated programmed solutions to all kinds of problems.

7754 NFT 5-74 GB/en

Order the HP–65 now – and increase your personal computing power.

If you have a serious need for calculations in your work you will soon find out how much easier every day work becomes when you own an HP-65. Only when you apply it to your own needs can you fully realise what a powerful extension the HP-65 will make to every facet of your computing capabilities.

Take it home with you, run the demonstration programs and see just how much it can do. Take it to the job site, to meetings and conferences, into other offices and watch the expression on your colleagues' faces when you solve, in a minute or two, problems they would automatically send to the computer - and perhaps wait days or weeks for the results . . . That's what the HP-65 is designed for: to go anywhere, self-contained, operating on its own internal battery pack, yet such a powerful system that it gives you the confidence of having a computer terminal at your elbow - anytime, anywhere.

So just fill in the order form - there's a copy for your files - and an HP-65 will be on its way to you.

Order now for the big cash discount

If you order now you are eligible for a substantial cash with order discount on your HP-65.

Please send me by registered delivery an HP 65 Pocket Calculator complete with standard accessories.

☐ Payment of £ 469.92* enclosed
☐ Please invoice my company for £ 489.50*
   Confirmation letter or order enclosed
   *Includes 10% V.A.T. and postage and packing to
   U.K. addresses.
☑ Method of payment

All prices are valid from April 16th, 1974, and are subject to change without notice, but with prior Government approval.

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HEWLETT **hp** *PACKARD*

7754 NFT 5-74 GB/en

HP-65 complete with battery pack.

Standard Program Pac (17 representative programs, 2 diagnostic program cards, 20 blank program cards, a head cleaning card and instruction booklet), program pac, and 20 pocket card holders (each holds two cards; provides space for labelling so you don't have to carry the entire Pac when you know in advance you'll only need to use one or two programs).

Illustrated owner's handbook.

Safety travel case for calculator.

Soft carrying case, with belt loop.

115/230 V.A.C. adaptor, recharger. (115 Volts not applicable in UK)

Self-adhesive name tags.

HP-65 complete with battery pack.

Quick reference guide.

Optional accessories:

Prerecorded Application Pacs for a wide variety of disciplines (see separate listing for details).

Security cradle.

Spare battery holder.

Hard leather field carrying case.

Additional blank program cards.

Additional program work sheets.

Additional pocket cardholders.

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