The Hewlett-Packard Personal Calculator

DIGEST

The HP Magazine and Product Catalog

Volume Three, 1977

MICROCODE: Electronic Building Blocks for Calculators.

Business Calculators: The New Blue-Chip Investment.

NEW!

The **HP-10**
Handheld Printing Calculator

The **HP-19C**
Advanced Printing Programmable with Continuous Memory.

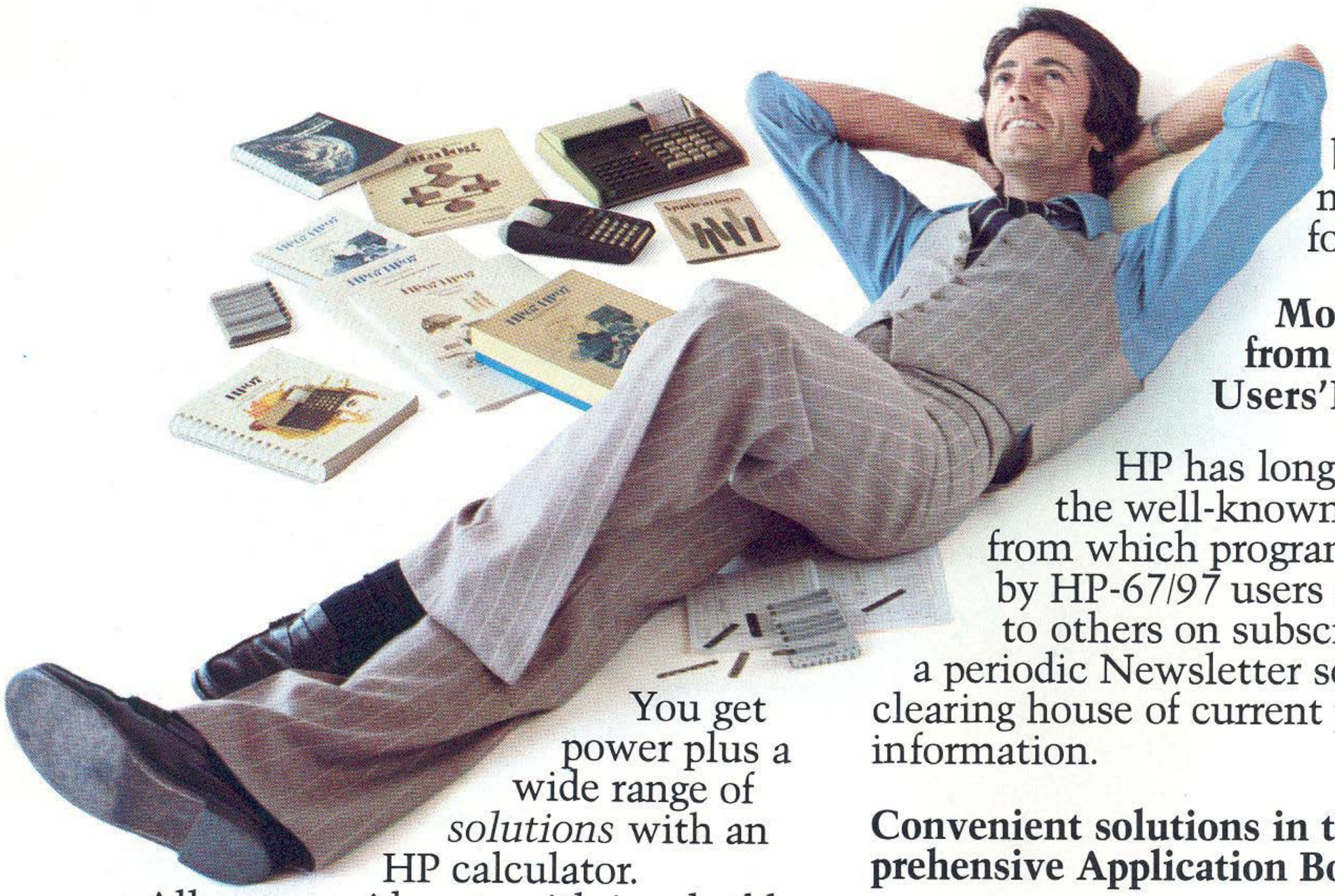
The **HP-29C**
Advanced Programmable with Continuous Memory

The **HP-92** Investor

HP CATALOG BEGINS ON PAGE 7!

The HP-19C.

When you choose HP you've solved your problems.



You get power plus a wide range of *solutions* with an HP calculator.

All can provide you with invaluable help—in science, engineering or business.

Prerecorded solutions for owners of fully-programmable calculators.

The solution you require may already exist in one of ten HP Application Pacs. Prerecorded magnetic cards program your HP-67 or HP-97 in less than 2 seconds. Each program is fully documented with helpful comments.

New Library Solutions add another 40 program booklets.

We recently published forty booklets of up to 76 pages each. They cover business, engineering, mathematics, medicine, statistics, physical science, life science and other subjects. You can easily record the programs in these booklets on magnetic cards for repeated use.

More help from the HP-67/97 Users' Library.

HP has long maintained the well-known Users' Library from which programs contributed by HP-67/97 users are available to others on subscription. And a periodic Newsletter serves as a clearing house of current programming information.

Convenient solutions in the comprehensive Application Books.

These books, available for all HP calculators, have helped thousands of owners find the fastest and best solutions to their problems. They contain all the most-used applications in the specific field.

Owner's Handbooks that are far more than handbooks.

These are among the most complete and helpful reference books ever published for personal calculators, going far beyond the usual how-to-use-it information. Detailed operational data is provided, along with many suggestions for maximum efficiency. And there is page after page of practical applications.

HEWLETT hp PACKARD

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The Hewlett-Packard Full One-Year Warranty*

All Hewlett-Packard handheld and portable printing calculators and their accessories are warranted against defects in materials and workmanship for one (1) year from date of purchase. During the warranty period, Hewlett-Packard will repair or, at its option, replace at no charge components that prove to be defective, provided the calculator or accessory is returned shipping prepaid, to a Hewlett-Packard Repair Center.

This warranty does not apply if the calculator or accessory has been damaged by accident or misuse, or as a result of service or modification by other than an authorized Hewlett-Packard Repair Center. No other express warranty is given by Hewlett-Packard.

Hewlett-Packard shall not be liable for consequential damages.

*A copy of the complete warranty is available upon request.

As of the date of this catalog, all prices, claims, materials and specifications are as shown. However, Hewlett-Packard reserves the right to make changes without notice.

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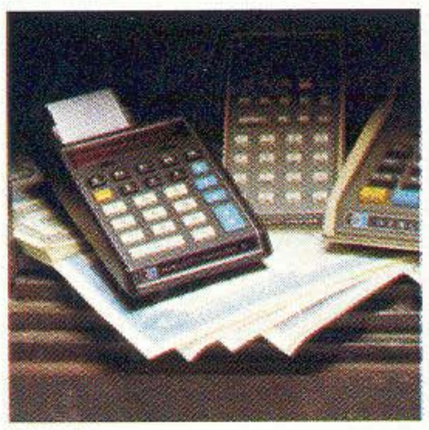

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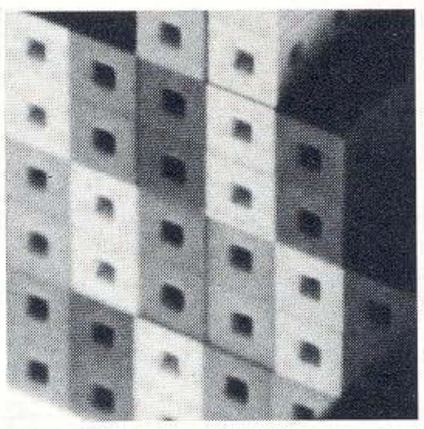

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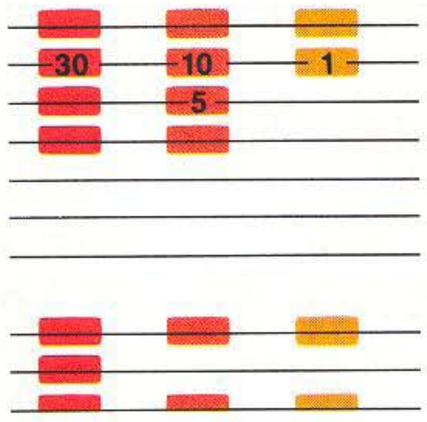

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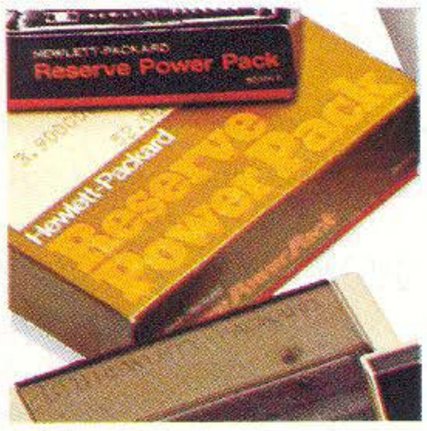

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Features

Catalog

Departments

Letters

Back issues?

I have just received Volume 2 of the "Digest," and must congratulate you on one of the best publications of its type I have ever come across; it is an excellent example of how readability makes for understanding. Please maintain this style.

The letters in this volume make me anxious to read Volume I also, which somehow I missed out on. Have you a spare copy you can send me?

E.A. King-Smith Ph.D.
R & D Specialist
Medical Products Division
3M Company

I have received and read with great interest Volume Two of the H-P Calculator Digest. I unfortunately did not receive Volume One, and would like to get a copy if any are still around. If an entire copy is not available, I would greatly appreciate a "xerox" copy of the article discussing Thermal Printing.

Jerry L. Hautamaki
Staff Engineer
Academic Computer Center
University of Washington

EDITOR'S NOTE: We are happy to send back issues of the Digest upon request.

The "Smart" Card Reader

You have every reason to be proud of the HP Digest. Keep up the good articles.

I would appreciate your assistance in obtaining a copy of the November 1976 *Hewlett-Packard Journal*. The card reader article was good—now I have to learn more about the HP-67 and HP-97.

James Sterlace, Fairport, NY

EDITOR'S NOTE: The HP Journal can be obtained by writing to HEWLETT-PACKARD, 1501 Page Mill Rd., Palo Alto, CA. 94304

Mind-Bending Pleasure

I am not an engineer much less a mathematician.

Many years ago, as a machine shop inspector in the pre-hand-held calculator era, I was regularly faced with the need to measure precise complex conical tapers and compound angles. This involved a considerable amount of trig which was quite time consuming and subject to error in numerous calculations. Much of this tedium was eliminated by self education in logarithms which made it all a piece of cake.

In 1974 I purchased an HP-45. This was a giant step forward from the simple, but then expensive, four-function calculator I owned at the time. The HP-45, too, was well beyond my mathematical capabilities.

Where logarithms had been a piece of cake, the HP-45 became the whole cake which opened up entire new mathematical vistas. My appreciation for this machine was boundless as I acquainted myself with its capabilities and in no way could I foresee surrendering ownership. Then you introduced the HP-25.

Devising new programs and intricate procedures via the conditional tests and other unending capabilities of my HP-25 is a marvelous mind-bending pleasure.

Roy C. King, Kensington, MD.

RPN—a clear favorite

I've got to add my 2¢ worth to the RPN argument because only recently did I realize why I prefer it to the "algebraic" system. All along I thought I was partial only because I had always used HP's. The argument of "entering the equation as it is written" was hard to beat down.

Get a pencil and piece of paper and multiply 76 by 41. What did you do? You wrote 76, then 41, then multiplied. No one writes 76, multiplies, then writes 41. So there is really nothing reverse about HP's calculator. The problem is entered exactly as written—if one intends to solve the problem. So if you want to write equations, buy the other guys—but if you want to solve problems with fewer mistakes, use an HP.

Tom Gegenheimer, Orange, Ca.

I am an advocate of the RPN logic and would like to say that of all the calculators I have seen none of them are 100% 'algebraic'. Many of the models available are not even equipped with parenthetical keys. Some algebraic calculator owners insist that you may rest at ease with their machine since you may key the problem in exactly as you see it. This is true for moronically simple problems. When you finally have to consider problems which demand the division of unwieldly terms, there are little tricks, nonalgebraic in character, that the competitor will supply you with. With your machine (I possessed an HP-55 until it was stolen), all that was needed was to learn the rules of operation and follow them forever with no mistakes. The HP-67 is a wonderful machine. Maybe it's not so bad that I lost my 55 after all.

Gregory Wilson, Cambria Hts, NY.

Contribute to Digest: The Editor would be delighted to hear of any incident or experience you may have had with an HP calculator that would be of interest to our readers. Because of space limitations, not all letters received may be used and all letters are subject to editing. Please address your contributions to Editor, HP Digest, Hewlett-Packard Company, Corvallis Division, 1000 N.E. Circle Blvd., Corvallis, OR 97330, U.S.A.

Business Calculators: The New Blue-Chip Investment.

When Leibniz invented a mechanical calculator back in the 17th century, he said it was ridiculous that intelligent people "lose hours like slaves in the labor of calculation."

Though the Leibniz device didn't catch on, the idea did. Some 300 years later the small electronic calculator, in science at least, has freed the slaves.

And what about the modern business executive? Faced with increasingly complex financial calculations in his professional and personal life, can he be far behind? After all, with an electronic calculator on his desk, he can solve problems in minutes that would take hours of time if he waited to feed them into the big company computer.

Nevertheless, the majority of executives have gone only part way to freedom, typically relying on basic four-function calculators to add, subtract, multiply and divide. And for simple, everyday number crunching there's nothing wrong with that.

But the inadequacies of such calculators in dealing with complex investment and management problems become immediately apparent to anyone willing to invest a few hours experimenting with an advanced professional instrument.

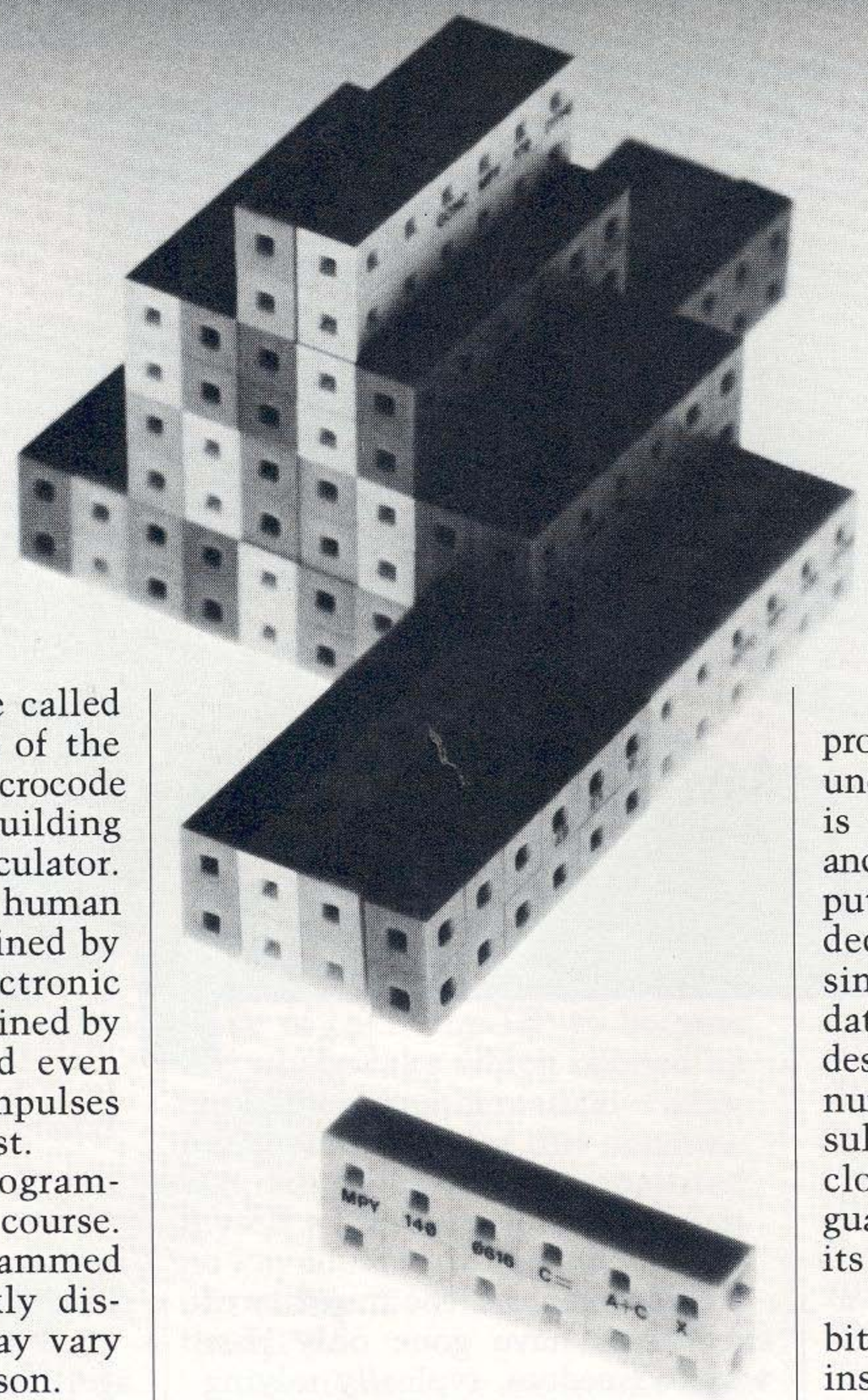
In fact, a major business magazine said recently that the programmable calculator has become as hot an item among some managers as the four-function pocket calculator has become in the mass market.

It is true that "some" managers have discovered the enormous advantages of programmables in decision-making. But for most, complete freedom is easily achieved with a preprogrammed calculator, such as the HP-22, HP-27, HP-80 and the powerful HP-92.

The appeal of the preprogrammed calculator is obvious. It can provide fast and accurate solutions to a wide range of financial and statistical problems, many involving complex computations. And they are extremely easy to use, even for those whose skills in math and statistics are rusty or altogether lacking.

Given these facts, why have business people *(Con't on Page 27)*

Microcode: Electronic Building Blocks For Calculators.



Just as DNA can be called the building blocks of the human organism, microcode can be called the building blocks of the electronic calculator.

But, while the way the human organism works is determined by heredity, the way an electronic calculator works is determined by the highly personal—and even idiosyncratic—creative impulses of a programming specialist.

The principles of programming can be learned, of course. But anyone who has programmed his own calculator quickly discovers that techniques may vary widely from person to person.

Consider the challenge faced by the professional programmer. When you press the key labeled SIN, for example, you expect the calculator to display the sine of the value you have keyed into it—and presto, it does. But in that less-than-a-second interval between keystroke and display, the calculator has executed an internal program of about 3500 steps. And it does this according to the highly individualistic microcode that the programmer has created.

The development of microcode in Hewlett-Packard personal calculators began with the development of the microprocessor in the HP-35—and not coincidentally, since both were developed by the same Hewlett-Packard engineer.

It is the microprocessor that determines the "language" of the internal microcode. If you are familiar with computer languages such as BASIC, FORTRAN, and COBOL, you know that these languages structure the way you write your program on the computer. You can only do what the language lets you do.

The microprocessor is similar to the computer. It provides a language that a clever engineer can then build into a function on the keyboard.

The original HP-35 microprocessor has remained essentially unchanged through the years and is the heart of the new HP-19C and HP-29C. Compared with computer processors, the binary-coded-decimal microprocessor is very simple. It does not handle byte data well, but is, in fact, specially designed for 10-digit floating point numbers (See figure 1.). The resulting microcode language most closely resembles machine language, which is programming at its most basic level.

Most microprocessors use 8-bit instructions and two or three instructions are usually combined to perform one operation. The beauty of HP's calculator microcode is that 10-bit instructions are used and each usually performs a complete operation by itself.

The language's strongest point is its robust arithmetic section of 37 instructions combined with eight field-select options. The field-select options allow the program to apply the instruction to any word-select portion of the register. (See figure 2.)

The language is also designed to use very little storage; only seven registers were used in the HP-35 of which five were user registers. This is done to reduce

costs and to save valuable space. For the design engineer it means that he must accomplish all of his miracles within the program itself.

Based on warranty card analysis and other market research, parameters regarding the desired function set and price are given to the design engineer. It is his job then to determine the specific functions for the calculator and to attempt to fit them in the allotted memory. Price is an important factor to the engineer because it directly influences the amount of memory he has to work with.

Only after several months of hard work writing and compacting microcode will he know if the function set will fit. If it is not possible, the product may be redefined at a higher price with greater performance to increase the available memory. More likely however, the engineer will be forced to pare functions until his program fits.

To give you an idea of how much memory is required, the HP-35 used three pages of 256 instructions each. Each page required a separate ROM (read-only memory). The HP-45 originally took six pages of instructions. But about that time the quad ROM was developed, which, as its name implies, was the equivalent of four conventional ROM'S. So for the HP-45, two quad ROM's were used. It was in the leftover two pages that an enterprising designer placed the celebrated HP-45 clock. Later calculators, listed below, continued to use quad ROM's.

HP-80—2 quads	HP-22—2 quads
HP-65—3 quads	HP-91—3 quads
HP-70—2 quads	HP-29C—4 quads
HP-55—3 quads	HP-27—3 quads
HP-19C—5 quads	HP-25C—2 quads
HP-10—1½ quads	HP-67—5 quads
HP-21—1 quad	HP-97—6 quads
HP-25—2 quads	HP-92—6 quads

Writing the microcode is where the designer's personality is stamped indelibly on the calculator. While it is true that the fundamental algorithms for computing the complex mathematical functions found in HP personal calculators have remained essen-

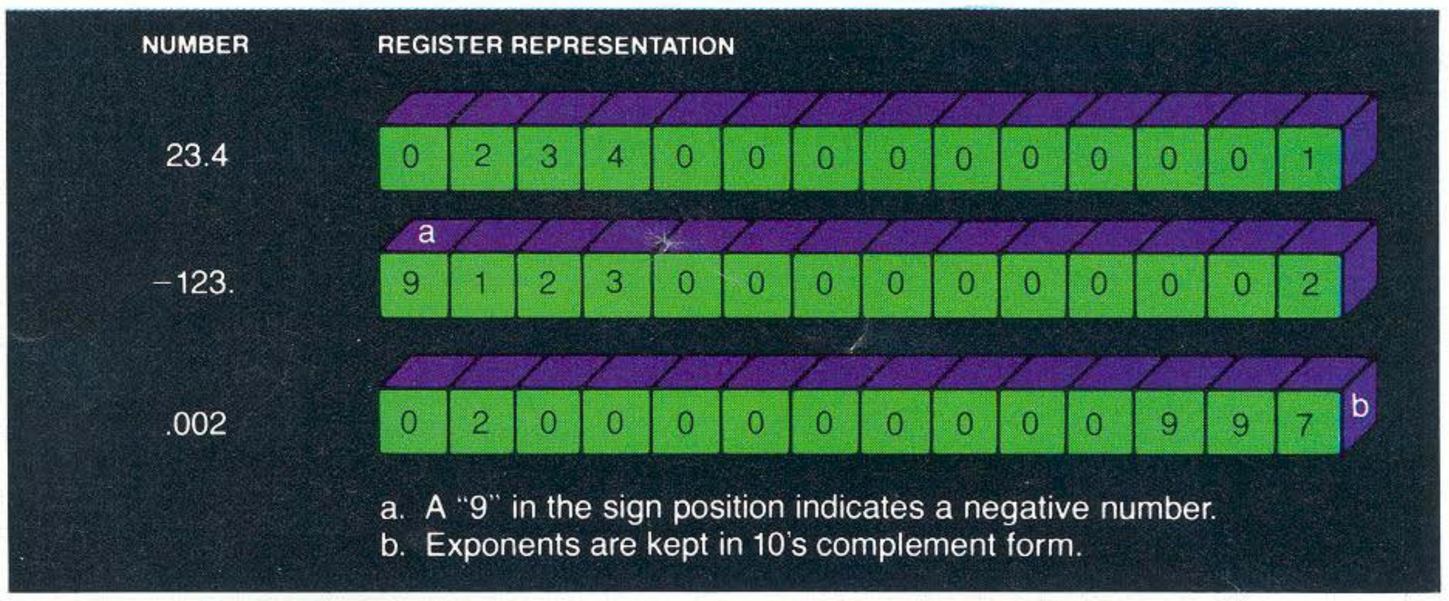
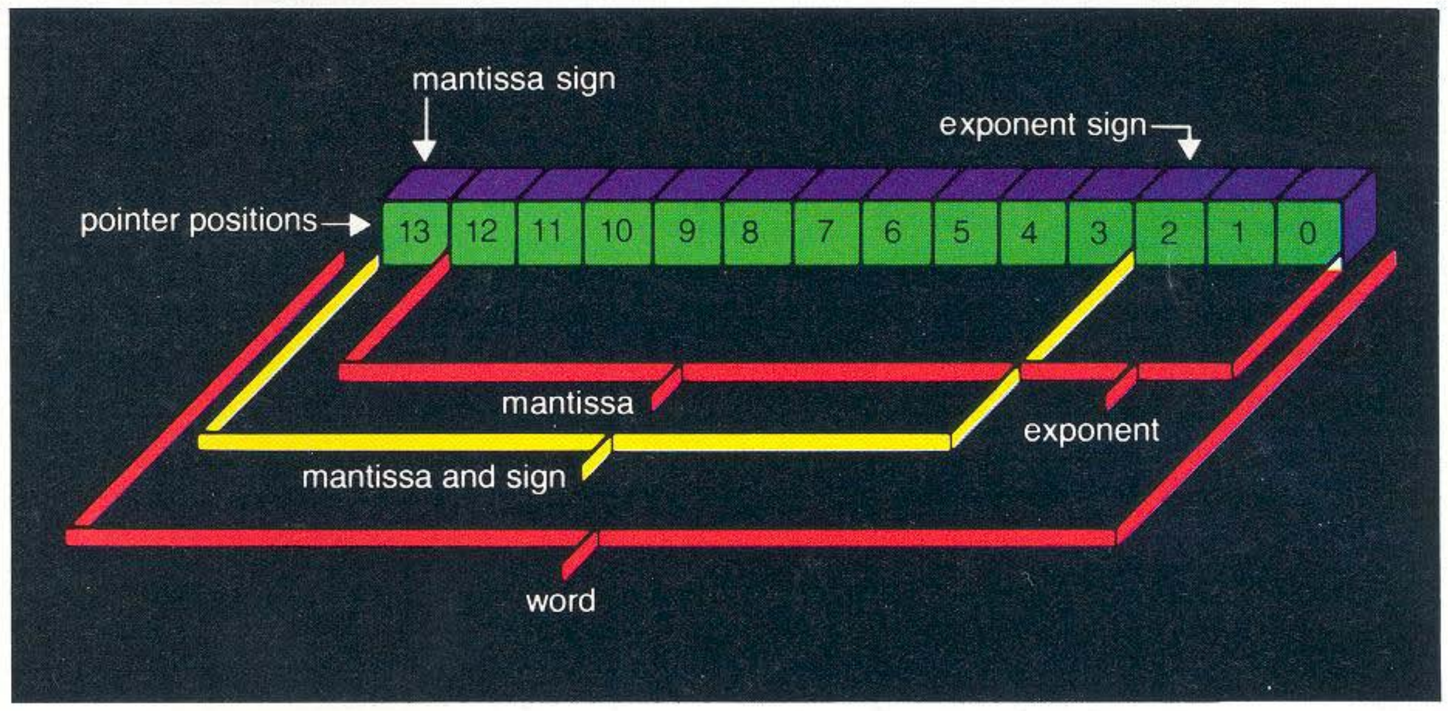


Figure 1. All numbers in registers are in scientific notation with the mantissa portion of the number left-justified in the mantissa portion of the register.



Instructions

A = 0 B = 0 C = 0		Clears word-select portion.
B = A C = B A = C		Copies word-select portion from specified register to specified register.
AB EX AC EX CB EX		Exchanges word-select portion between specified registers.
A = A + B A = A + C C = A + C C = C + C A = A − B C = A − C A = A − C	A = A + 1 C = C + 1 A = A − 1 C = C − 1 C = −C C = −C − 1	Performs stated arithmetic on word-select portion.
A SR B SR C SR		Shifts word-select portion right.
A SL		Shifts word-select portion left.
A SLC		Circular shifts whole A register but does not have word-select option.
? B = 0 ? C = 0 ? A ⩾ C	? A ⩾ B ? A = 0 ? C = 0	Tests word-select portion of given register.

Field-Select Options

1. Mantissa (M)	5. Sign of Mantissa (S)
2. Mantissa and Sign (MS)	6. Pointer (P)
3. Exponent (X)	7. Word (W)
4. Exponent Sign (XS)	8. Word thru Pointer (WP)

Figure 2. Registers are 14-digits long with each digit being four bits. An additional four-bit register is used as a pointer. The programmer can set the pointer to any digit position, change that digit or all digits up to that position.

tially the same since the HP-35, the individual code is substantially different.

Some of the major routines such as those for sine, cosine, and tangent are the same from calculator to calculator. But in most cases if the code cannot be borrowed exactly as it exists in another calculator, it must be rewritten.

Some designers begin by strictly flowcharting the entire program. Others tackle the code directly and leave all but basic flowcharting till the end for documentation purposes only. The code is written originally on paper just as you would write a program on an HP programming pad. It is then either punched on cards or typed into a handy CRT.

The major task in writing the microcode is not only to have the functions produce the correct answers when a key is pressed, but to fit the code into a given amount of memory and make it execute as fast as possible. Compacting the code, that is, rewriting sections of the program to make them more space-efficient, is easy enough, but sometimes results in a loss of speed. These are tradeoffs to which the designer must be constantly attentive.

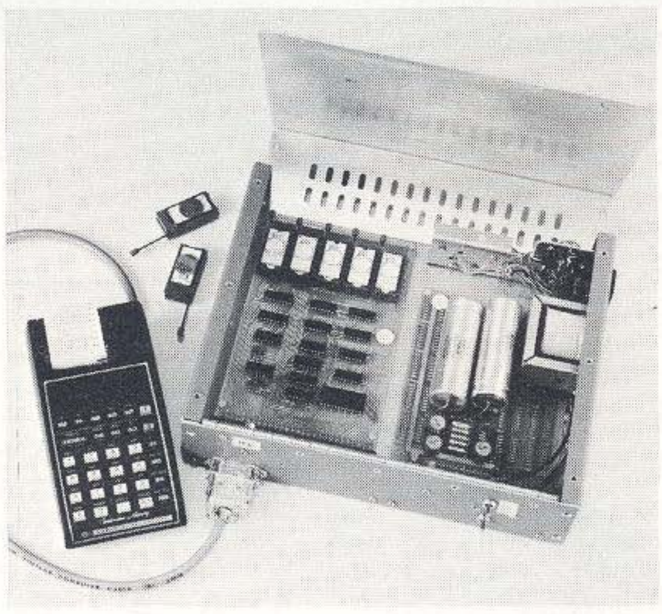
The processor executes approximately three instructions per millisecond, with each instruction taking the same amount of time. The designer takes into consideration the type of function and the necessary speed when writing the code. Straight-line code with no branches of any kind executes the fastest. For the label search function on the HP-67 and the HP-97 the designer duplicated a great deal of code to make it faster. The print instructions for the new HP-19C, on the other hand, did not need to be as fast to keep up with the printer mechanism. So the designer compacted these codes, making them very complex.

In general, programmable calculators go through more gyrations for each function than do preprogrammed calculators because they must generate an intermediate keycode. Where simple functions such as Change Sign, x exchange y, and ENTER require only 100 steps of code on a preprogrammed calculator, the same functions on a programmable calculator might take 150 steps. And a complex function such as rectangular-to-polar conversion might take over 4000 steps, depending on the argument keyed in.

A. **Answer** B. **Multiplicand** C. **Multiplier**

LABEL	CODE		Explanation
	A = 0	W	Clearing space for answer.
	P =	3	Starting at least significant digit.
	GoTo	Mpy100	Starting in middle of loop for speed.
Mpy90	A=A+B	W	Add Multiplicand to partial product the number of times specified by digit being worked on.
Mpy100	C=C−1	P	
	GoNC	Mpy90	NC stands for no carry, i.e. a GoTo is executed unless a digit is carried (or borrowed).
	? P=	12	Have we reached the end of the word?
	GoYes	END	
	P=P+1		Move on to the next digit.
	A SR	W	This does a divide by 10 to line up for the next decade.
	GoTo	Mpy100	Go reenter loop.

Figure 3. Multiplying two numbers uses the basic routine shown above and involves three registers. The starting point of this code assumes the sign and exponent of the answer have already been calculated. END is a common function return which would perform operations such as display formatting, printing, etc.



The engineer uses a computer simulator to write and debug his code. Special programs written for this simulator furnish him with status bit information, register contents, and intermediate answers as an aid in this process.

Once the microcode is completed on the computer, it is transferred to an E-ROM (erasable read-only-memory) simulator for further debugging. (See photo.) The simulator is ideal for this because it is portable and easily updated as bugs are found and corrected. Simulated calculators are given to application engineers and quality assurance engineers to help locate problems.

After much editing, the microcode is ready to be converted into hardware. This usually takes several weeks. In the meantime, the simulators continue to be used heavily and, in most cases, additional bugs are found.

When the completed integrated circuit chips return, the first working models of the calculator are constructed. Final testing is then initiated. Some problems can only be discovered at this stage because of the peculiarities of simulated operation. For example, this is the first time low battery indicators can be checked since the E-ROM simulator does not work on batteries.

At long last, the revised code is ready to be sent for final chips. Although no problems are anticipated at this stage, testing continues to assure traditional Hewlett-Packard reliability.

The tremendous emphasis on testing of the calculators is for practical reasons as well. Incorrect programs cannot be easily corrected as they can be on large computers. Once the code is set in hardware, changes are costly and inconvenient.

When the final chips are approved for production, the development cycle is complete. The design engineer has spent anywhere from six months to 18 months perfecting his building-block design. And whether the end product is a high-powered financial calculator like the HP-92 or a versatile keystroke programmable like the HP-19C, it is first an expression of his personality and creativity.

The 1977 Hewlett-Packard Catalog and Buyer's Guide to Personal Calculators

The Buyer's Guide: Pages 8-9

This guide lists every feature and function found in all HP Personal Calculators. You will find the list extremely useful in determining specific features and functions on any unit and for making fast direct comparisons of two or more units.

The Catalog: Pages 10-26

The catalog provides a description of each HP Personal Calculator with emphasis on its special capabilities and applications in meeting user requirements. Also given are physical specifications and accessories furnished with each unit.

How to order from this catalog:

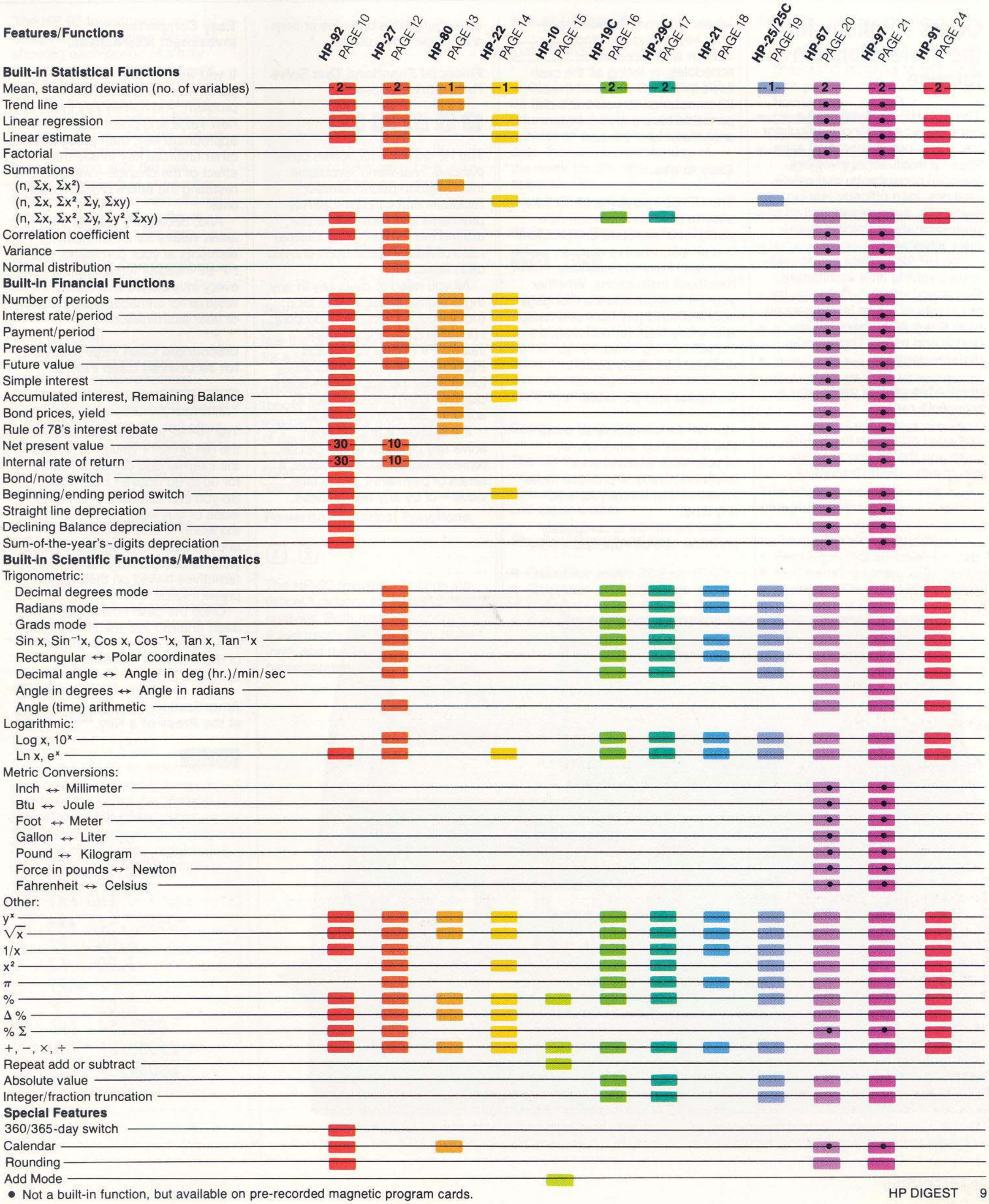
You may order any HP Calculator in this catalog by contacting your nearest HP sales office or distributor. For the name of the office nearest you, write Hewlett-Packard Company. Addresses appear on the back cover of this magazine.

Calculator displays in all photography simulate typical appearance.

Buyer's Guide

Features/Functions	HP-92 PAGE 10	HP-27 PAGE 12	HP-80 PAGE 13	HP-22 PAGE 14	HP-10 PAGE 15	HP-19C PAGE 16	HP-29C PAGE 17	HP-21 PAGE 18	HP-25/25C PAGE 19	HP-67 PAGE 20	HP-97 PAGE 21	HP-91 PAGE 24
RPN Logic System	■	■	■	■		■	■	■	■	■	■	■
Memory												
Automatic four-memory stack	■	■	■	■		■	■	■	■	■	■	■
Addressable memory	30	10	1	10	1	30	30	1	8	26	26	16
Financial memory	8	5		5								
Last x memory	■	■				■	■		■	■	■	■
Program memory						98	98		49	224	224	
Continuous Program Memory						98	98		25C			
Continuous Addressable Memory						16	16		25C			
Positioning Operations												
Stack roll down	■	■	■	■		■	■	■	■	■	■	■
Stack roll up	■									■	■	■
x, y memory exchange	■	■	■	■		■	■	■	■	■	■	■
x, I memory exchange										■	■	
Display												
Fixed notation	■	■	■	■	■	■	■	■	■	■	■	■
Scientific notation	■	■	■	■		■	■	■	■	■	■	■
Engineering notation		■				■	■		■	■	■	■
Automatic overflow into scientific	■	■	■	■		■	■	■	■	■	■	■
Automatic underflow into scientific	■	■		■		■	■	■	■	■	■	■
Enter exponent	■	■				■	■	■	■	■	■	■
Change sign	■	■	■	■		■	■	■	■	■	■	■
Programming Features												
Program review—back step						■	■		■	■	■	
Program review—single step						■	■		■	■	■	
Insert/delete						■	■		■	■	■	
Overwrite									■			
Direct branching						■	■		■	■	■	
Pause						■	■		■	■	■	
Conditional tests						8	8		8	8	8	
Flags										4	4	
DSZ, ISZ (looping)						■	■			■	■	
3 levels of subroutines						■	■			■	■	
Smart card reader:												
Stores programs and data										■	■	
Merges programs and data										■	■	
Automatic prompting										■	■	
Labels						10	10			20	20	
10 user-definable functions										■	■	
Indirect control of:												
Data storage and recall						■	■			■	■	
Storage arithmetic						■	■			■	■	
Unconditional branching						■	■			■	■	
Subroutine branching						■	■			■	■	
DSZ, ISZ										■	■	
Display										■	■	
Relative addressing						■	■			■	■	
Clearing Options												
Clear x	■	■	■	■	■	■	■	■	■	■	■	■
Clear stack	■	■	■					■	■			
Clear all	■			■	■	■	■					■
Clear addressable registers	■	■			■	■	■		■	■	■	■
Clear statistical registers	■	■			■	■	■					■
Clear prefix		■				■	■		■			
Clear program memory						■	■		■	■	■	
Reset financial registers	■	■		■								
Printing Features												
Print x	■				■	■				■	■	■
List stack registers	■					■				■	■	■
List addressable registers	■					■				■	■	■
List statistical registers	■					■				■	■	■
List financial registers	■											
Print crosshatch separator					■							
Paper advance	■				■					■	■	■
Three print modes	■				■	■				■	■	■
Print space					■	■				■	■	
List program						■				■	■	
Trace program						■				■	■	

This chart has been designed for your convenience in making direct comparisons of the features and functions on the HP calculators described in the following pages. For your convenience, page numbers of catalog listings are indicated alongside each calculator.



● Not a built-in function, but available on pre-recorded magnetic program cards.

HP-92 Investor

Offers solutions for the professional in finance.

The new HP-92 Investor is a personal-sized financial calculator that offers preprogrammed solutions for institutional investors, financial consultants, real estate analysts, loan officers, leasing salesmen, accountants and other professionals examining investment alternatives.

The HP-92 Investor solves problems involving time and money. Compound interest. Balloons. Internal rate of return for 30 uneven cash flows. Net present value. Bonds and notes. Three kinds of depreciation.

Invaluable printer gives you a complete record.

The quiet printer on the HP-92 gives you the answers quickly and quietly—with descriptive labels. Whether duplicating your keystrokes, printing amortization and depreciation schedules, or listing all the cash flows in an IRR problem, the HP-92 Investor gives you that indispensable hard copy for instant analysis or later perusal.

Easy to use.

The HP-92 Investor is remarkably easy to use. An important new design lets you state any problem in a simple, intuitive manner, so you don't have to remember handbook instructions. Whether your profession calls it a mortgage with a balloon payment or a lease with a buy back (or residual), it's the same thing to the HP-92—and you can easily solve it.

Compact and portable.

The HP-92 Investor is so small that it takes up only a corner of your desk or fits in your briefcase, ready to produce those investment answers you need—any time.

And the HP-92 is completely portable. You can operate it from its rechargeable batteries or from a convenient AC outlet.

Financial Functions That Solve Real-World Problems.

n i PV FV PMT

The HP-92 Investor solves complicated "real-world" problems involving compound interest, residuals and salvages, partial payments and balloons, wrap-around mortgages, even internal rates of return based upon uneven cash flows.

All you need to do is key in any three or four of the values for n (number of compounding periods), i (interest rate), PV (present value), FV (future value) and PMT (payment)—in any order—followed by the appropriate financial key. Then press the key to solve for the unknown value.

If you know n or i, you can solve any problem which can be represented by an initial value, a series of payments, and a final value—or by any two of these.

Easy Comparison of Investment Alternatives.

If you want to change any of the parameters of a financial problem, you merely key in a new value and press the appropriate key; then press any other financial key to see the effect of the change—without restating the entire problem each time.

And, because it can list the latest values for all financial elements at your command, the HP-92 Investor lets you print every investment alternative, whether for immediate comparison or later examination.

Discounted Cash Flow Analysis for 30 Uneven Cash Flows.

NPV IRR

The HP-92 Investor calculates the net present value (NPV) and the internal rate of return (IRR) for up to 30 uneven cash flows. So you can evaluate whether to lease or buy equipment, balance the worth of an investment with uneven cash flows against desired yield, or compare investment alternatives based on their net present value.

Once the cash flows have been entered into the HP-92, you can change one or any number of them without restating the complete problem.

Amortization Schedules at the Press of a Key.

AMORT

```
10.00      n
 8.75      i
250000.00  PV
 0.00      FV
       END PMT
-38527.41  ***
 8.00      P1
 3.00      P2
           AMRT
 8.00      P
6571.54    INT
29955.87   PRN
68004.57   BAL
```

The HP-92 Investor can print a complete amortization schedule, showing each period of a fully amortized loan with the amount paid to interest, amount to principal, and the remaining balance. Or it can print a partial schedule between any two periods. Labels identify each element of the schedule, and after the last period, the schedule shows the total amount paid to both interest and principal as well as the remaining balance on the loan.

Bond and Note Computations—Quickly and Accurately.

PRICE YIELD

CALL CPN

The HP-92 Investor calculates price, yield, or accumulated interest on bills, notes, bonds, certificates, debentures, warrants, certificates of deposit, and other interest-bearing obligations—and the HP-92 meets the standards for accuracy demanded by the Securities Industry Association.

Useful Percent Functions.

% Δ%

The HP-92 gives you the most useful percent functions: Percent, Percent of Sum, and Percent of Change.

Three Kinds of Depreciation Schedules.

SL SOYD DB LIFE

BOOK FACT SAL

Using the HP-92 Investor, you can quickly and easily compute depreciation using the straight line, sum-of-the-years'-digits, or declining balance method and you can solve for the crossover. The HP-92 can print a complete

```
                DB
      1.00       N
   1512.45     DPN
   6049.78     RDV

      2.00       N
   1209.96     DPN
   4839.82     RDV

      3.00       N
    967.96     DPN
   3871.86     RDV
```

depreciation schedule for the entire life of an asset, or it can calculate the depreciation allowance for a specific period.

And once you've keyed in such elements as an asset's initial (book) value or its salvage value, you can examine each type of depreciation with a single keystroke—and compare all types of depreciation without reentering date.

Powerful Statistical Functions.

r $\bar{x}$

The HP-92 Investor contains statistical functions for research and analysis. Both linear and nonlinear trends can be closely examined, and mathematic models can be generated to make forecasts.

A Built-In Calendar.

DATE+DAYS △DAYS

The calendar functions of the HP-92 Investor can determine a future or past date given the number of days from a known date. It also will print the day of the week for any date, and it calculates the exact number of days between dates.

30 Storage Registers For Data.

STO RCL

Besides the four-register operational stack used for mathematical operations, the HP-92 Investor has 30 addressable storage registers for data storage and recall with storage register arithmetic on 10 registers.

Common Math Functions.

The HP-92 Investor provides the most common mathematical functions like logarithms, square root, and exponentials.

Physical Specifications

- Calculator width: 22.9 cm (9.0″)
- Calculator length: 20.3 cm (8.0″)
- Calculator height: 6.35 cm (2.5″)
- Calculator weight: 1.13 kg (40 oz)
- Recharger/AC adapter weight: 170 gm (6 oz)
- Shipping weight: 2.7 kg (5.9 lb)

Temperature Specifications

- Operating temperature range: 0° to 45°C (32°F to 113°F) with paper, 5% to 95% relative humidity.
- Charging temperature range: 15° to 40°C (59° to 104°F).
- Storage temperature range: −40° to +55°C (−40° to +131°F).

Power Specifications

- AC Power Requirements: 90-120V or 220 ± 10%, 50 to 60 Hz.
- Battery: 5.0 Vdc nickel-cadmium rechargeable battery pack.
- Battery operating time: 3 to 7 hours.
- Battery recharging time: Calculator off, 7 to 10 hours; calculator on, 17 hours.

For a complete list of features and functions, see the Buyer's Guide on Page 8.

The HP-92 Investor comes complete with:

- Rechargeable battery pack
- Recharger/AC adapter
- Soft carrying case
- Illustrated Owner's Handbook
- Applications Book
- Two rolls of thermal paper

HP-27

Financial/Statistical/Scientific Pocket Calculator.

Gives you everything from internal rate of return for 10 uneven cash flows to advanced statistical functions.

The HP-27 Financial/Statistical/Scientific Calculator is the most powerful preprogrammed pocket calculator Hewlett-Packard has ever built.

Its highly sophisticated design effectively integrates financial, statistical, and scientific functions—and thus eliminates the need for separate calculators.

The versatility of the HP-27 will be extremely valuable to any businessman or engineer whose responsibilities extend into such areas as: targeting, budgets, cost analysis, financial and forecasting considerations, technical calculations...

Financial and statistical functions greatly expand your calculating power.

The HP-27 gives you all the most-used financial and statistical functions, including five important functions —net present value, internal rate of return for uneven cash flows, variance, correlation coefficient, and normal distribution.

10 valuable financial functions —all preprogrammed.

All fundamental financial functions are preprogrammed into the HP-27 to eliminate the need for bulky books of equations and interest tables. Two preprogrammed functions—net present value and internal rate of return with uneven cash flows—facilitate capital budgeting and resource allocation.

15 important statistical functions—all preprogrammed.

Summations of data points are stored for easy access. Once your data is keyed in, you can calculate the means, standard deviations and variances for two variables. You can also calculate linear regression, linear estimates and the correlation coefficient for two variables. In addition, you can calculate the density function and upper-tail area under a normal distribution curve.

28 exponential, log and trig functions—all preprogrammed.

The HP-27 gives you all the most-used exponential, log and trig functions—including sines, cosines, tangents and their inverses in three angular modes; natural and common logs and anti-logs; pi; related arithmetic functions; coordinate conversions; angle conversion, addition and subtraction.

20 memories help simplify your most difficult calculations.

In addition to the 5 financial memories, the 4 operational stack memories and a last-x memory, the HP-27 provides 10 addressable memories for data storage.

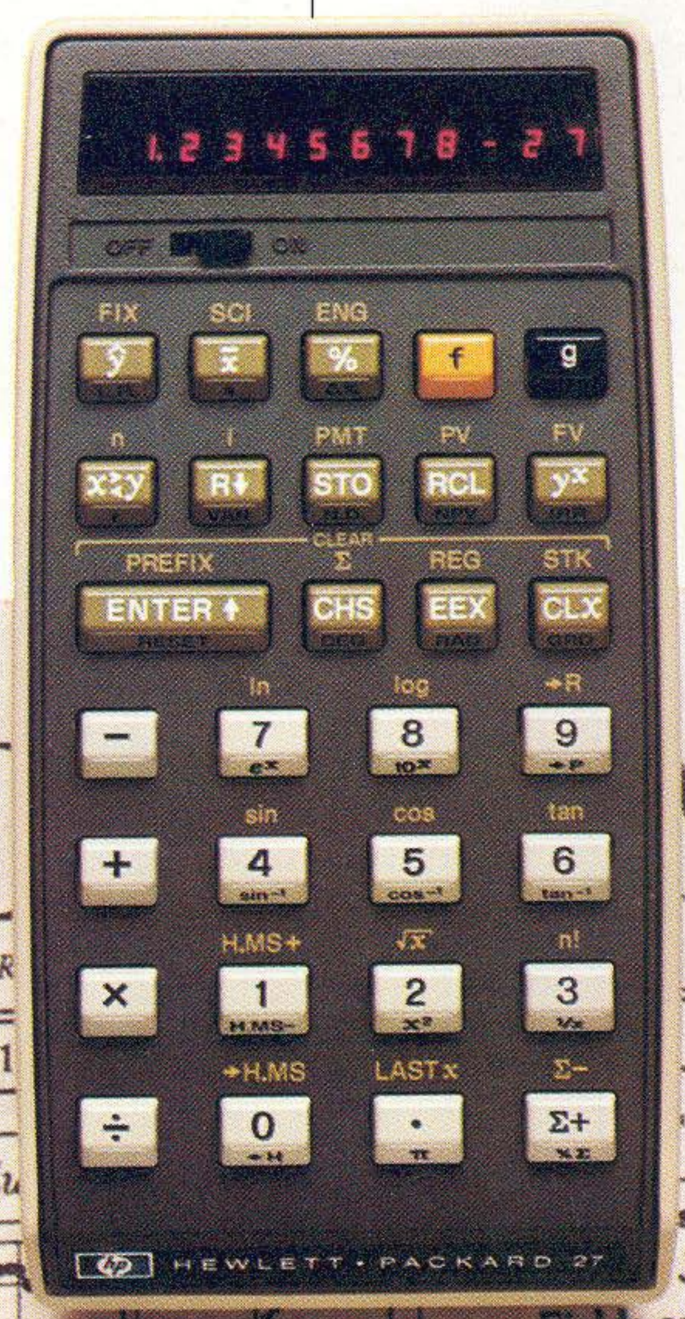
Physical Specifications:

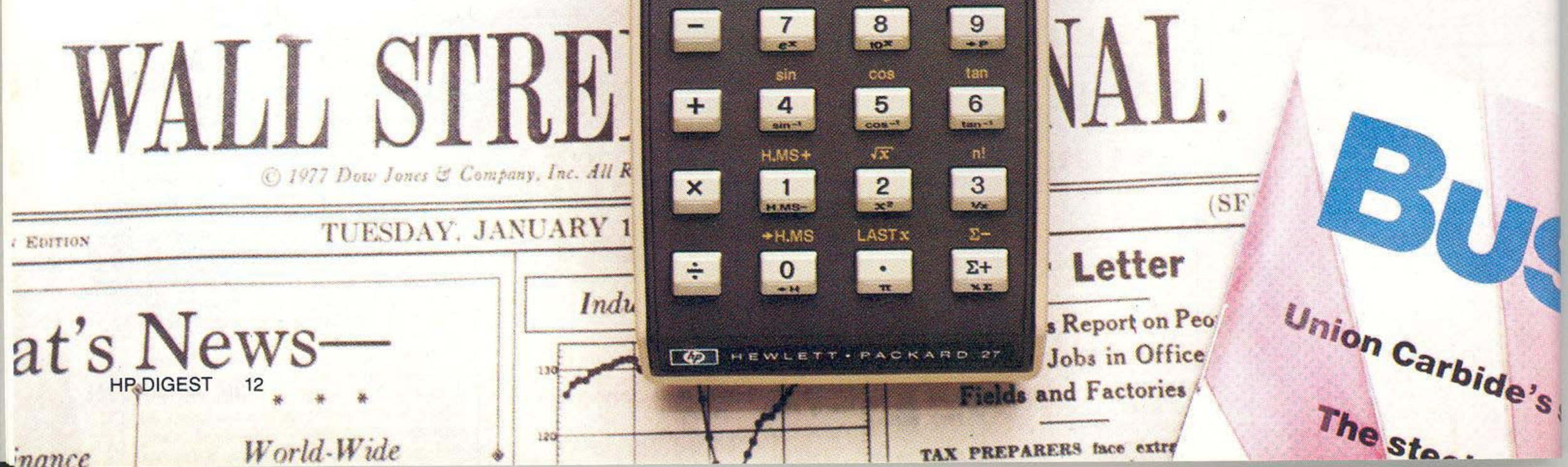
- Calculator length: 130 mm (5-1/8″)
- Calculator width: 68 mm (2-11/16″)
- Calculator height: 30 mm (1-3/16″)
- Calculator weight: 170 g (6 oz.)
- Recharger weight: 141 g (5 oz.)
- Shipping weight: 680 g (1-1/2 lb.)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (59°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- Power requirements: AC: 115V or 230 ± 10%, 50 to 60 Hz
- Battery: 2.5 Vdc nickel-cadmium rechargeable battery pack

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-27 Financial/Statistical/Scientific Pocket Calculator comes complete with:

- Battery pack that under normal use provides 3 hours of operation and fully charges in under 6 hours.
- Recharger/AC adapter that lets you operate the calculator on AC while the battery pack is recharging.
- Soft carrying case with belt loop.
- Illustrated Owner's Handbook with instruction and solved problems.





HP-80 Financial Pocket Calculator.

Specialized features, including bond prices & yields, depreciation, a 200-year calendar, and a comprehensive application book.

The HP-80 Financial Pocket Calculator lets you solve business math or time-and-money problems quickly and easily.

All the interest equations and tables have been built-in. So has a 200-year calendar, used in solving for bond price and yield, or short-term interest.

It's designed to handle general business math problems.

Percentages.

The "%" and "Δ%" keys allow you to easily handle problems concerned with: percentages; net amounts (markups, discounts, chained discounts, dealer discount ratios, anticipation discounts, etc.); and percent difference.

Just press the keys to solve time-and-money problems in seconds.

At the top of the HP-80's keyboard are five keys for solving all types of business problems.

These financial keys save you time and effort when calculating: Amortized (direct reduction) loans (ordinary annuity); Sinking funds (ordinary annuity); Consumer loans; Savings functions (annuity due); Lease and rent functions (annuity due).

Discounted cash flow analysis.

You can quickly and easily perform a discounted cash flow analysis, and calculate the net present value of even, uneven or deferred payment streams.

The HP-80 can also be used to calculate the discounted or internal rate of return.

Equity investment analysis for income property.

You can use the calculator to solve for: equity yield rate; equity investment value and present value; and future value and overall appreciation/depreciation rate.

Bond functions.

The HP-80 has built-in function keys for bond calculations: "Yield-To-Maturity," "INTeRest" and "BOND". You can calculate bond price, yield and after-tax yield, accrued interest (between coupons) and bond amortization. You can also calculate a callable bond price and yield-to-call.

Commercial loans (short term notes).

The HP-80's "INTeRest" key lets you calculate the accrued interest amount or the discount amount and annual yield for a discounted note (for either a 360- or 365-day year).

Calendar functions.

This key puts a 200-year calendar (1900 to 2099) at your fingertips. You can find: the number of calendar days between two dates; the day of the week a date falls on; a future date, or a past date, given the number of days from a known date.

Depreciation functions.

The HP-80 incorporates a unique key labeled "SOD" for calculating sum-of-the-years'-digits depreciation—amount and remaining balance—on a full-year or partial-year basis.

You can also calculate the depreciation amount and remaining balance via the straight-line method, or via the declining-balance method (full year or partial year).

Statistical functions.

By using the "Trend Line" key, you can easily calculate: a trend line (time series linear regression) giving you the y-intercept (value at point 0); the number of time periods; the slope; and automatic projections.

The HP-80 can also calculate: the mean and the standard deviation, with the ability to change data points after a calculation and recalculate. The "Σ+" key provides running totals and computes the sum of the squares and the number of entries.

Memory power.

In addition to the four-memory stack, the HP-80 has an addressable memory for storing constants or other numbers to be used later on in a calculation.

The financial application book.

With the HP-80 you can get a 101-page book offering dozens of keystroke sequences—including Annual Percentage Rate calculations with balloon payments—that benefit brokers, investors, appraisers, assessors, mortgage bankers, analysts and other decision makers in investment analysis.

Specifications:

- Length: 147 mm (5.8 in)
- Width: 81 mm (3.2 in)
- Height: 18 to 33 mm (0.7 to 1.3 in)
- Weight: 255 g (9 oz.) with battery pack
- Recharger: 142 g (5 oz.)
- Shipping weight: 900 g (2 lb)
- AC: 86-127V or 172-254V, 50-60 Hz
- Battery: 3.75 Vdc nickel-cadmium rechargeable battery pack
- Operating temperature range: 0°C to 50°C (32°F to 122°F)

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-80 Financial Pocket Calculator comes complete with:

- Rechargeable battery pack
- Recharger/AC adapter
- Soft carrying case
- Illustrated Owner's Handbook
- Quick Reference Guide

HP-22 Business Management Pocket Calculator.

Provides an ideal combination of the financial, investment and statistical capabilities you need in modern business.

With the HP-22 pocket calculator you can handle everything from simple arithmetic to complex time-value-of-money computations including interest rates; present value/future value; ordinary and due annuities; balloon mortgage balances; long term projections; equity yields; net present value and internal rate of return; and extended percent calculations. You can even handle planning, forecasting and decision analysis.

Built-in functions for ease of use.

Financial and investment equations and statistical formulas are built into the HP-22. All you have to do is key in your data, press the appropriate keys, and see your answers displayed—in seconds.

The financial capabilities.

The five keys in the top row of the HP-22 are the basic financial keys that replace equations and interest tables. To use any of the additional functions, press the gold key first. When you enter three known values with the financial keys, you can solve for another unknown value. For example: enter amount of present value [PV]; enter number of periods involved [n]; enter future value [FV]. Then, push [i] and get interest displayed automatically.

Expanded percentages capability.

Percentage is the common standard of measurement in the business and financial world. For this reason, the HP-22 provides three separate percentage function keys. The [%] key is used to calculate a percentage. The [Δ%] key is used to compute the percentage difference (ratio of increase or decrease) between two numbers. The [Σ%] key is used to find what percentage one number is of another number or of a total sum. The HP-22 saves the base number for multiple percentage calculations of the same base number.

The statistical capabilities.

In addition to the financial capabilities, the HP-22 gives you advanced statistical capabilities for planning, forecasting and analysis. Using the [Σ+] key, you can enter statistical data into five of the ten addressable memories, where it remains unaffected by most other calculations. What's more, using the [Σ−] key you can adjust or correct input data without having to repeat the entire calculation. To project sales, key in past performance data with the [Σ+] key. Then key in the number of the forecast period and press the [ŷ] key to obtain sales at that future point in time. To obtain an average, key in all data, then press the [x̄] key. To find standard deviation (a measure of statistical validity), key in your data, then press the [s] key for the answer.

The mathematical capabilities.

The HP-22 gives you virtually all the math capabilities you need in business, such as logs, antilogs, exponentiation and root extraction so you may work out your own solutions to unusual individual problems.

Expanded memory capacity.

In addition to the 5 financial memories and the 4 operational stack memories, the HP-22 provides 10 addressable memories you can use to store data. For example, to store a displayed value in the first addressable memory, press [STO] [0] and the value will be automatically stored in that memory. To recall the value, press the [RCL] recall key and the [0] key and the value will again be displayed. For added convenience, register arithmetic can be performed with all 10 memories.

The remarkable HP-22 Owner's Handbook.

Even if you lack special training in mathematics, statistics or advanced financial planning, the 148-page Owner's Handbook will make it easy for you to take full advantage of the capabilities of the HP-22. The book is a valuable survey course in modern management problem-solving, analysis and planning. It provides formulas and procedures for solving more than 50 different financial, mathematical and statistical functions on the HP-22.

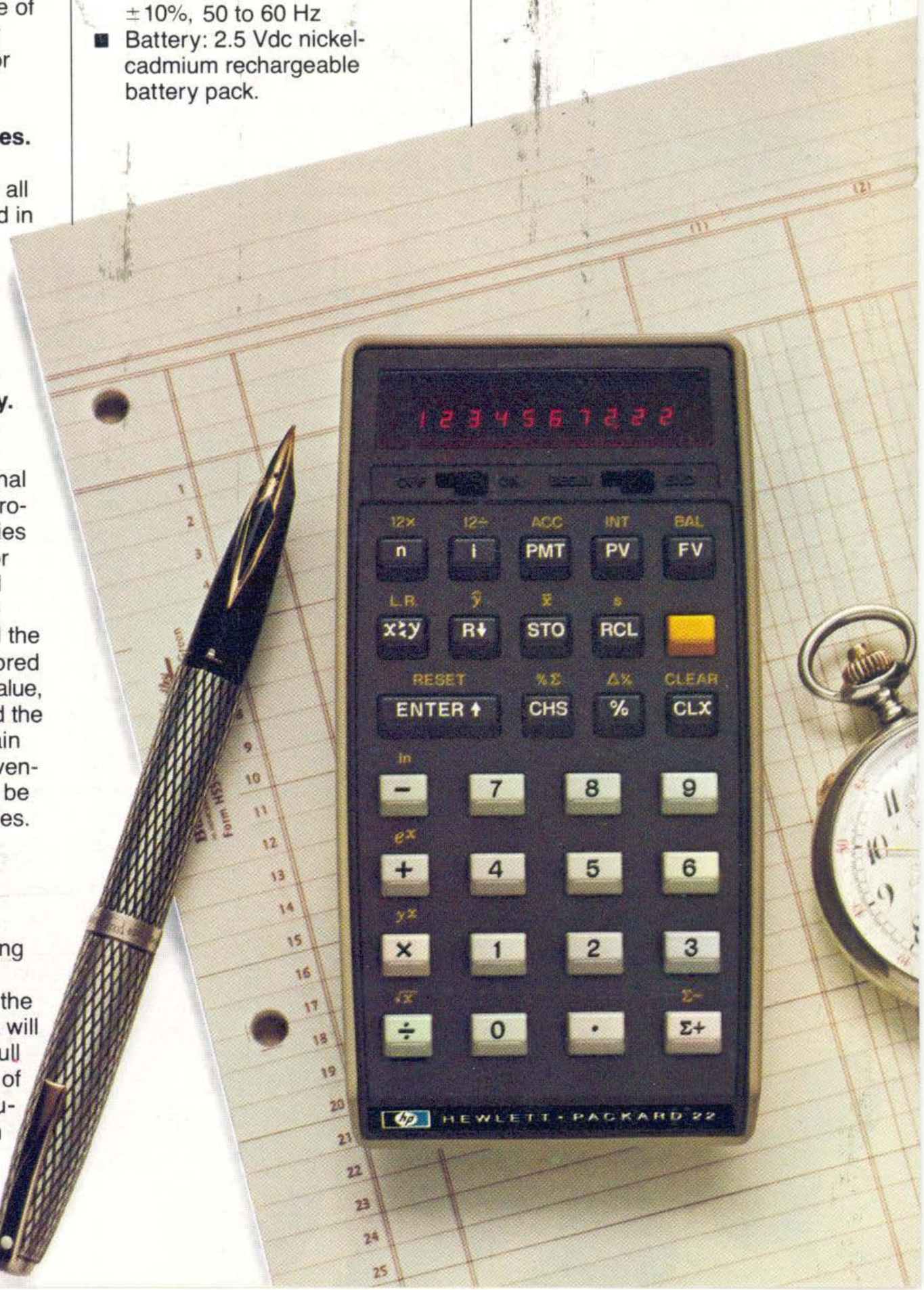
Physical Specifications:

- Length: 130 mm (5-1/8″)
- Width: 68 mm (2-11/16″)
- Height: 30 mm (1-3/16″)
- Weight: 170 g (6 oz.)
- Recharger weight: 141.8 g (5 oz.)
- Shipping weight: 680 g (1-1/2 lb.)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (59°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- Power Requirements: AC: 115V or 230V ±10%, 50 to 60 Hz
- Battery: 2.5 Vdc nickel-cadmium rechargeable battery pack.

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-22 Business Management Pocket Calculator comes complete with:

- Rechargeable battery pack
- Recharger/AC adapter
- Soft carrying case
- Illustrated Owner's Handbook



HP-10

Handheld Printing Calculator

All the features of a desktop office machine—and it's pocket-sized.

Hewlett-Packard's exciting new HP-10 is up to 50% smaller and lighter than other handheld printing calculators—with all the features you'd expect to find in a desktop office machine.

Whisper-quiet thermal printer.

The HP-10 Printing Calculator gives you a printed record of all your calculations. Each function is printed with an identifying label so it's easy to see what you've done.

You can also print a display entry (to label your tapes) without including it in your total and a series of crosshatches to separate problems on the tape.

Or you can switch the printer off and use only the display.

All the functions you need.

State-of-the-art electronics and integrated circuitry have reduced the standard office machine to pocket-size—and still improved it. You get an independent memory, so a constant or separate running total is available at the press of a single key, and you don't have to reenter results in long calculations.

You also get the "add-mode" feature, which automatically positions the decimal point for keying in dollars and cents.

And you get a percent key for taxes, dividends and commissions, a total and subtotal capability, and of course, the four arithmetic keys.

Use it anywhere.

The powerful rechargeable batteries in the HP-10 let you use it anywhere—in an automobile, a taxi, or a commuter train. Stylish and unobtrusive in your office or on your desk, its small size and light weight also make it ideal for pocket or briefcase.

Office machine conveniences.

Familiar adding-machine keyboard has "click-action" keys for positive input, and is buffered so the calculator will "catch up" when you key in numbers very rapidly.

Ten clear, sharp digits are displayed for viewing in dim or bright light.

Physical Specifications:

- Length: 16.5 cm (6.5″)
- Width: 8.8 cm (3.45″)
- Height: 4.0 cm (1.6″)
- Weight with battery pack and paper: 342 g (12.1 oz)
- Shipping weight: 1.18 kg (2.6 lb)
- Operating temperature range: 0° to 45°C (32° to 113°F) With paper, 5% to 95% relative humidity.
- AC Power requirements: 90-120V or 220 ± 10%, 50 to 60 Hz Battery: 5-volt quick-charge nickel-cadmium battery pack.

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-10 Handheld Printing Calculator comes complete with:

- Battery pack that under normal use provides 4-7 hours operating time and fully charges in 6 to 10 hours.
- Recharger/AC adapter
- Illustrated Owner's Handbook
- Soft carrying case
- Three rolls of thermal paper (7.6m each)

HP-19C

Advanced Printing Programmable Handheld Calculator.

On or off, your programs are always there.

The HP-19C and HP-29C both have Continuous Memory capability so the programs you store are saved, ready for use, until you clear or overwrite them.

As a result you can program frequently-needed calculations once, and then perform them as often as necessary—hour after hour, day after day—without bother or lost time caused by reentering your program.

The Continuous Memory of the HP-19C and HP-29C not only retains a program, it also retains the data stored in 16 of its 30 addressable registers and the display register.

Now you can record data in the field and wait to make your final calculations until convenient. The calculators become handy notebooks to save data from previous problems for later use or keep the sum of statistical data entries while taking samples on location.

Operate them on batteries or AC.

Both calculators may be operated on batteries alone or from a convenient electrical outlet while batteries are being recharged.

Battery operating time is significantly extended since the calculators may be switched off between calculations without losing programs or data.

HP-19C's quiet thermal printer lists your programs or data.

With the HP-19C, you can list a program, the contents of the 30 addressable registers, or the contents of the automatic memory stack. And you have a complete record of all your calculations.

The printer is a valuable aid in editing programs or long calculations. You don't have to remember what you've done or what remains to be done. You see everything at once, clearly, on tape.

Create programs of 175 keystrokes—or more.

You can create your own time-saving programs to solve lengthy and repetitive problems because both the HP-19C and HP-29C let you merge keystrokes. Each function—one, two, three or four keystrokes—requires only one step of program memory. And you have 98 steps of program memory to work with.

The HP-19C and HP-29C are keystroke programmable. This means that when you press a key in PRGM mode, it is stored in program memory. There is no complicated programming language, no procedure to memorize.

Branching.

GTO **Go To.**

When followed by a label designator (0 through 9 or i) GTO branches program execution to the specified label.

Three levels of subroutines.

GSB **Go Subroutine.**

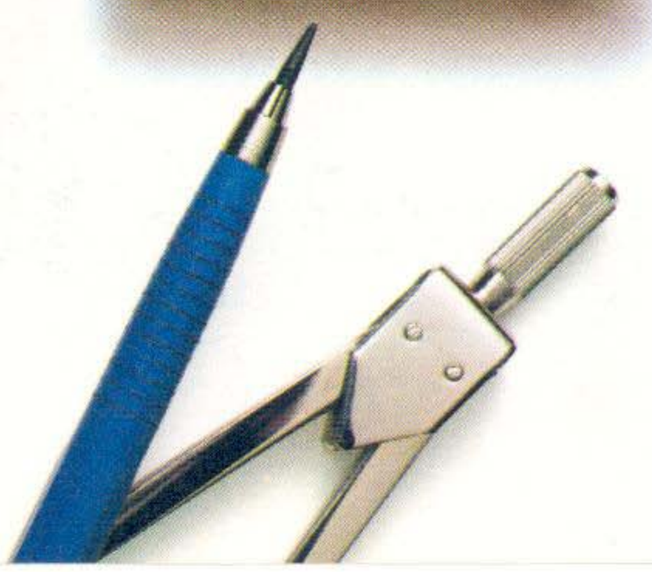
A GSB instruction followed by a label designator (0 through 9 or i) branches program execution to the label specified just as a GTO instruction does. But, using the GSB instruction, program execution is then "returned" automatically to the step following the GSB instruction when the next RTN (Return) instruction is executed.

Conditional Branching.

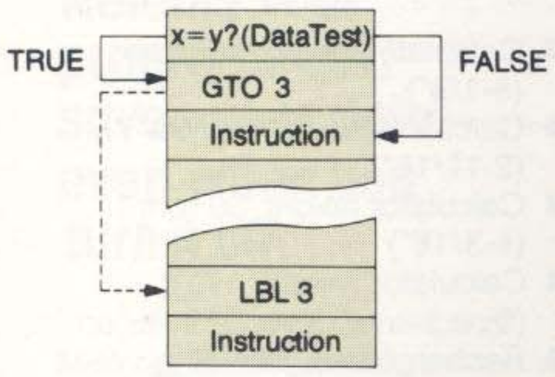
x≠y , x=y , x≤y , x>y

x≠0 , x=0 , x<0 , x>0

These keys allow your programs to make decisions for you by testing the values in the X- and Y-registers or by testing the value in the X- register against zero as indicated. If the data test is true, the calculator will "do" the next instruction in program memory. (Remember "Do if True") If the data test is false, program execution branches around the next instruction.



Advanced Programmable Pocket Calculator. HP-29C



The next step is executed if x = y. Program execution branches around one step if x does not equal y.

Indirect Addressing.

GTO **i** **GSB** **i**

These operations depend on the number in register 0. If it is positive they perform a branch (GTO i) or a subroutine (GSB i) to the label specified.

Relative Addressing.

GTO **i** **GSB** **i**

When the number in register 0 is a negative number, these instructions perform a rapid reverse branch (GTO i) or subroutine (GSB i) the number of steps specified by the current negative number in register 0.

Indirect control of Data Register Operations.

You can also use register 0 to specify the address of a storage register for storing and recalling data or for storage register arithmetic.

Decrement or Increment and Skip on Zero.

DSZ **ISZ**

DSZ subtracts one from the contents of register 0, then tests for a non-zero value. As long as there is a non-zero value in register 0, the calculator performs the next instruction in program memory. When the content of register 0 equals zero, the calculator skips the next instruction.

ISZ works in the same way, only register 0 is incremented rather than decremented.

PAUSE

The PAUSE function interrupts program execution and displays current results for about 1 second.

Editing is fast and easy.

The HP-19C and HP-29C make it easy for you to correct or change your programs.

Moving to the Right Step.

GTO **Go To.**

In order to correct or change a step in your program, you need to be able to display it quickly and easily. Pressing GTO • (step number) lets you do just that, in either RUN or PRGM mode.

SST **Single Step.**

To help find mistakes in your program, you can execute it one step at a time using the SST key in RUN mode. Or, in PRGM mode, you can use SST to step through each instruction and compare the keycodes with your program listing.

BST **Back Step.**

In the RUN mode, press BST to display the contents of the previous step of program memory. In PRGM mode, use BST to back up one step at a time in your program.

Insert and Delete.

You can easily insert operations as needed in your program. All subsequent instructions will be "bumped" down one step in program memory for each inserted operation.

DEL **Delete.**

When you press g DEL, the displayed instruction is erased from program memory and all subsequent instructions move upward one step.

Printed tape simplifies checking programs or calculations.

With the HP-19C you have the additional advantage of a printed tape to help you with your editing. You can list your programs and easily check them for mistakes.

A complete range of preprogrammed functions and features.

The HP-19C and HP-29C feature 30 addressable registers for data storage—16 with continuous memory.

Their preprogrammed functions include log and trig functions; rectangular/polar conversions; mean, standard deviation and statistical summations; and angle (time) conversions.

Both calculators also display in fixed decimal, scientific and engineering notations.

The HP-19C and HP-29C come complete with:

- Illustrated Owner's Handbook and Programming Guide
- Quick Reference Card
- Applications Book
- Battery Pack
- Recharger/AC adapter
- Soft carrying case
- 2 rolls of thermal paper (HP-19C only)

HP-19C Specifications:

- Calculator length: 165 mm (6.5″).
- Calculator width: 88 mm (3.45″).
- Calculator height: 40 mm (1.6″).
- Calculator weight, with battery pack and paper: 350 g (12.4 oz).
- Shipping weight: 1.4 kg (3.0 lbs).
- Operating temperature range: 0° to 45°C (32° to 113°F). With paper, 5% to 95% relative humidity.
- Charging temperature range: 15° to 40°C (59° to 104°F).
- AC Power requirements: 90-120V or 220 ± 10%, 50 to 60 Hz.
- Battery: 5 Vdc, quick-charge nickel-cadmium battery pack.
- Battery operating time: 4 to 7 hours.
- Paper roll length: 7.6m (25 ft.)

HP-29C Physical Specifications:

- Calculator length: 130 mm (5.1″)
- Calculator width: 68 mm (2.7″)
- Calculator height: 30 mm (1.2″)
- Calculator weight: 170 g (6 oz.)
- Recharger weight: 141 g (5 oz.)
- Shipping weight: 680 g (1.5 lb)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (59°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- Power requirements: AC: 115V or 230V ± 10%, 50 to 60 Hz
- Battery: 2.5 Vdc quick-charge nickel-cadmium battery pack
- Battery operating time: up to 3 hours in normal use.

For a complete list of features and functions, see the Buyer's Guide on Page 8.

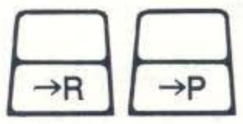
HP-21 Scientific Pocket Calculator.

Extraordinary problem-solving power plus HP quality at an economical price.

The HP-21 is the lowest-priced scientific pocket calculator HP offers, yet it has all the functions and features you'd expect to find in a scientific pocket calculator.

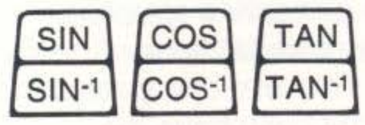
Trigonometric capabilities.

Coordinate conversions—Convert polar coordinates to rectangular coordinates, or vice versa. This lets you do vector arithmetic quickly and easily.



Angular mode selection—Just flip a switch to perform trig operations in either of two angular modes: degrees or radians.

Standard trig functions—The HP-21 gives you all of the standard trig functions: Sin x, Arc sin x, Cos x, Arc cos x, Tan x and Arc tan x.

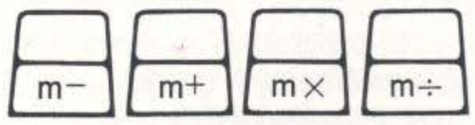


Logarithmic capabilities.

Standard log functions—The HP-21 also gives you all of the standard log and exponential functions: log x, ln x, e^x and 10^x.

Full register arithmetic.

Register arithmetic—The HP-21 has an addressable memory for storing constants or other data, for use later on in a calculation. Any of the four arithmetic operations may be performed directly upon this stored data.



The 120-page HP-21 Application Book. (optional)

Contains major sections on statistics, mathematics, finance, navigation, surveying, conversions. Provides 50 valuable applications to help you get the most from your HP-21 Scientific Calculator.

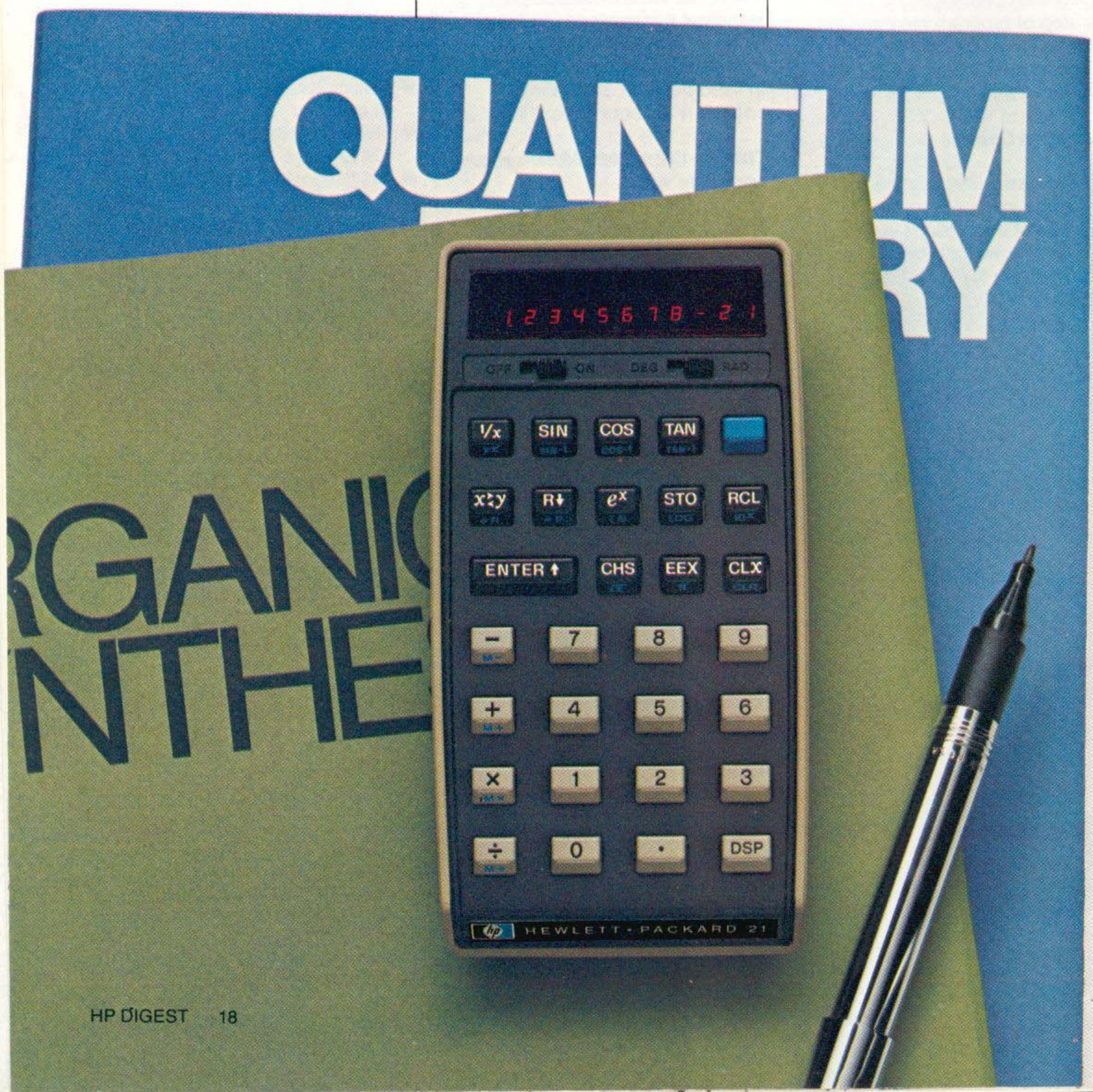
Physical Specifications:

- Calculator length: 130 mm (5-1/8″)
- Calculator width: 68 mm (2-11/16″)
- Calculator height: 30 mm (1-3/16″)
- Calculator weight: 170 g (6 oz.)
- Recharger weight: 141 g (5 oz.)
- Shipping weight: 680 g (1-1/2 lb.)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (59°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- Power requirements: AC: 115 V or 230V ± 10%, 50 to 60 Hz
- Battery: 2.5 Vdc nickel-cadmium rechargeable battery pack.

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-21 Scientific Pocket Calculator comes complete with:

- Rechargeable battery pack
- Recharger/AC adapter
- Soft carrying case
- Illustrated Owner's Handbook



HP-25/25C

Scientific Programmable Pocket Calculators

Retains your programs and saves your data—even when you turn it off.

The HP-25C with Continuous Memory retains all information in its 49-step program memory, and all data in the 8 addressable registers and the LAST-X register.

As a result, you can program a frequently-needed calculation once, and then perform it as often as necessary—hour after hour, day after day—without the bother or lost time caused by reentering your program.

You can also use the HP-25C to store conversion constants for later use or to keep the sums of statistical data entries while taking samples in the field.

The HP-25C and the HP-25 solve repetitive problems quickly and easily.

Both the HP-25 and the HP-25C have all the advanced features described below.

To write a program simply set the HP-25/25C to PRGM mode. Then press the keys you'd normally press to solve the problem. Your program is retained in the HP-25/25C's program memory.

To solve the problem, switch to RUN mode and enter the data. Then press the "Run/Stop" key. Your answer appears on the HP-25/25C display. To solve other problems using the same program, just enter the new data and press the "Run/Stop" key again.

Memory review.

The "BackSTep" and "Single-STep" keys let you review the entire memory one step at a time, in either direction.

If you want to change your program, simply stop it at the appropriate step and key in a new entry, which will overwrite the previous one. To test your program a step at a time, switch to RUN and press "SST" repeatedly. You will see its numeric code when you press the key and the intermediate solution when you release the key.

Decision branching.

Like a computer, the HP-25/25C can be programmed to make decisions, because they can do conditional branching.

You can program them to test the relationship between two values, by means of these tests:

Depending on the outcome of the tests, the HP-25/25C will automatically skip a step of the program ... or will continue through the program in sequence.

Or, by means of the "GoTO" key, you can program the HP-25/25C to branch directly to a specified step, and then continue executing the program.

Pause feature.

Another feature of the HP-25/25C is the "PAUSE" key. You can use it to momentarily interrupt (about one second per PAUSE command) the program execution and display the contents of the X register. This gives you the opportunity to review or write down intermediate results.

Absolute and Truncation functions.

The ABSolute value function allows you to take the absolute value of a number within a programmed calculation.

The INTeger/FRACtion truncation function allows you to keep only the integer or fractional portion of a number.

Extra preprogrammed capability.

Rectangular/polar coordinate conversions.
Angle (time) conversions.
Summations: n, Σx, Σx^2, Σy, Σxy
Mean and standard deviation.

The HP-25 Scientific Programmable Pocket Calculator

The HP-25 is identical in every respect to the HP-25C except for Continuous Memory. It is the logical choice for scientists, engineers or students who do not frequently use a few long programs in their work.

HP-25/25C Physical Specifications

- Length: 130 mm (5-1/8″)
- Width: 68 mm (2-11/16″)
- Height: 30 mm (1-3/16″)
- Weight: 170 g (6 oz.)
- Recharger weight: 141 g (5 oz.)
- Shipping weight: 680 g (1-1/2 lb.)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (59°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- Power requirements: AC: 115V or 230V ± 10%, 50 to 60 Hz
- Battery: 2.5 Vdc nickel-cadmium rechargeable battery pack.

For a complete list of features and functions, see the Buyer's Guide on Page 8.

The HP-25/25C Scientific Programmable Pocket Calculators come complete with:

- Rechargeable battery pack
- Recharger/AC adapter
- Soft carrying case
- Illustrated Owner's Handbook
- Applications Programs Book
- Quick Reference Guide
- Continuous Memory Booklet (HP-25C only)

HP-67 Fully-Programmable Pocket Calculator.

A major leap forward in fully-programmable personal calculators.

These are the most powerful personal calculators Hewlett-Packard has ever made. The HP-97 combines exceptional programming power—plus a battery-operated printer—all in one self-contained unit. The HP-67 provides the identical power of the HP-97 in the classic pocket size.

Exceptional power easily handles your lengthy, repetitive problems.

The HP-97/67 lets you write programs of up to 224 steps. Every function (one, two or three key strokes) is merged to take only one step of program memory. And there are 26 data storage registers to provide the memory you need for your problems. You can record the contents of either program memory or the data storage registers on a magnetic card. Later, you can load all or part of them back into the calculator. The "smart" card reader of the HP-97/67 can handle either job. The HP-67 and HP-97 are also completely compatible. Programs recorded on one unit may be loaded and executed on the other.

So easy to use you'll write programs the first day.

Keystroke programming makes programming the HP-97/67 as simple as pressing the keys needed to calculate answers manually. Merged operations further simplify the task (and expand memory power) by letting you see the complete operation right in the display.

Because many programs require editing of some kind, we added useful features enabling you to easily review programs forward or backward, to easily jump to any step in the program, and to easily insert steps or delete them. RPN logic and the four-register automatic memory stack combine for more efficient problem solving. And RPN logic also helps when you program, because you don't use parentheses that waste valuable program memory.

And there are no pending operations that make editing difficult. RPN lets you slide through the most complicated programs the same easy way it lets you slide through complex calculations—with complete confidence.

An unparalleled program of owner support.

You can supplement your own programs with the extensive HP program library. The Standard Application Pac, with 15 programs in various disciplines, comes free with either calculator.

Also available in many disciplines are HP Application Pacs, where a professionally programmed and documented solution may already exist to solve a problem.

A one-year subscription to the Users' Library and a free Newsletter to keep you abreast of current information are also available.

HP-97

Fully-Programmable Printing Calculator.

The HP-97 provides battery-operation and thermal printing—in one self-contained unit.

The new HP-97 Fully-Programmable Printing Calculator combines exceptional programming power and the great usefulness of a quiet thermal printer. What's more, the HP-97 operates on batteries as well as AC—so you can have a printed record whenever and wherever you need it. In addition, there's an extra-large display for easy readability and a buffered keyboard so data may be keyed in at high speed.

Quiet thermal printer lists your programs on tape for checking and editing.

With the HP-97, you can list a program, (stepnumber, key mnemonic and, optionally, the keycode), contents of the automatic memory stack, or the contents of the data storage registers. And you have three printing modes to choose from.

The printer is a valuable aid in editing programs or long calculations. You don't have to remember what you've done or what remains to be done. You see everything at once clearly, on tape.

Compact in design and light in weight for easy portability.

Total weight of the HP-97 without AC adapter/recharger is only 1.13 kg. (2½ pounds). It's so small it will fit into a standard briefcase so you can take it with you, and operate it in airplanes, taxis, anywhere. For security, a built-in metal tab lets you secure it to your desk easily with a cable or bolt.

The HP-97 and HP-67 give you exceptional programming power you won't outgrow.

"Smart" magnetic card reader.

With the magnetic card reader in both the HP-97 and the HP-67 you can load the entire program memory, or selected portions, either manually or under program control.

You can record data from all registers onto a magnetic card. You can also load every data storage register or selected registers.

When recording programs, the HP-97 and HP-67 automatically record the angular mode setting, the display setting and the status of the four flags.

10 User-definable Keys.

There are ten user-definable keys you can use for any special function you may require—such as defining portions of your program for subroutines or branches. In addition, there are ten numerical labels (LBL 0 thru LBL 9).

GTO **GSB**

You can perform a direct branch or subroutine to a label specified.

A GSB instruction can also be used within a subroutine to a depth of three levels.

Conditional Branching.

x≠y, **x=y**, **x≤y**, **x>y**,

x≠0, **x=0**, **x<0**, **x>0**

These keys allow your program to make decisions for you by testing the values in the X- and Y-registers or by testing the value in the X-register against zero as indicated.

Flags.

You can use the four flags in the calculator for tests in your programs. They can be set, cleared, or tested.

Indirect Addressing.

GTO (i) **GSB (i)**

You can perform a direct branch or subroutine to a label specified by the current positive number in the I-register using these keys. When the number in the I-register is a negative number these instructions perform a direct branch (GTO (i)) or a subroutine (GSB (i)) backward the number of steps specified.

STO (i) **RCL (i)**

You can also use the I-register to specify the address of a storage register for storing and recalling data or for storage register arithmetic.

ISZ (i) **DSZ (i)**

You can also increment (ISZ (i)) or decrement (DSZ (i)) the contents of the storage register specified by the value in the I-register and then test against zero.

HP-97 Specifications:

- Calculator width: 228 mm (9″)
- Calculator depth: 203 mm (8″)
- Calculator height: 63 mm (2.5″)
- Calculator weight: 1.13 kg (2.5 lb)
- Recharger weight: 268 g (9.5 oz)
- Shipping weight: 4.3 kg (9.5 lb)
- Paper temperature range 10°C to 40°C (50°F to 104°F)
- AC Power Requirement: 90-120V or 220 ± 10%, 50 to 60 Hz
- Battery Power Requirement: 5.0 Vdc nickel cadmium rechargeable battery pack

HP-67 Specifications:

- Calculator length: 152.4 mm (6″)
- Calculator width: 81 mm (3.2″)
- Calculator height: 18 to 34 mm (0.7 to 1.4″)
- Calculator weight: 298 g (10.5 oz)
- Recharger weight: 241 g (8.5 oz)
- Shipping weight: 2.3 kg (5.1 lb)
- Operating temperature range: 10°C to 40°C (50°F to 104°F)
- Charging temperature range: 10°C to 50°C (50°F to 122°F)
- Storage temperature range: −40°C to 55°C (−40°F to 131°F)
- AC Power Requirement: 86-127V or 172-254V, 50 to 60 Hz
- Battery Power Requirement: 3.75 Vdc nickel cadmium rechargeable battery pack.

For a complete list of features and functions, see the Buyer's Guide on Page 8.

The HP-67/97 Fully-Programmable Calculators come complete with:

- Illustrated Owner's Handbook and Programming Guide.
- Quick Reference Card. (HP-67 only)
- Standard Pac complete with 40 cards, card holder, and manual.
- Battery pack that under normal use provides about 3 hours of continuous operation.
- Recharger/AC adapter that lets you operate the calculator on AC while the battery pack is recharging.
- Soft carrying case.
- Programming pad.
- Users' Library and newsletter subscription card.
- 2 rolls of thermal paper (HP-97 only).

Application Pacs

EE Pac

(00097-13131)

- Network Transfer Functions
  This program computes various transfer functions of a ladder network composed of any number of standard elements.
- Reactive L-Network Impedance Matching
  This program computes networks which will match any two complex impedances.
- Class A Transistor Amplifier Bias Optimization
  This program simplifies the design of a class A transistor amplifier.
- Transistor Amplifier Performance
- Transistor Configuration Conversion
- Parameter Conversion: S ⇌ Y, Z, G, H
- Fourier Series
- Active Filter Design
- Butterworth or Chebyshev Filter Design
- Bode Plot of Butterworth and Chebyshev Filters
- Resistive Attenuator Design
- Smith Chart Conversions
- Transmission Line Impedance
- Microstrip Transmission Line Calculations
  This program computes relative phase velocity and characteristic impedance for lossless microstrip. It also computes copper loss and resistance per unit length.
- Transmission Line Calculations
  This program computes the input impedance of lossy transmission line terminated in Z_L.
- Unilateral Design: Figure of Merit, Maximum Unilateral Gain Circles
  This program computes u, G_u, G_{min}, G_{max}, G_0, $G_{1\ max}$, and $G_{2\ max}$ from a transistor's s-parameters. It also computes r_{0i} and ρ_{0i} from $G_i \leq G_{max}$ (i = 1, 2).
- Bilateral Design: Stability Factor, Maximum Gain, Optimum Matching
  This program computes the maximum gain available and the load and source reflection coefficients which yield the maximum gain.
- Bilateral Design: Gain and Stability Circles, Load and Source Mapping
  This program computes the location and radius of stability circles. It also computes the source or load reflection coefficient corresponding to a given load or source termination.

Business Decisions Pac

(00097-13144)

- Internal Rate of Return
  Yield of a sequence of uneven cash flows.
- Internal Rate of Return—Groups of Cash Flows
  Yield of groups of uneven cash flows.
- Discounted Cash Flow Analysis—Net Present Value
- Direct Reduction Loans—Sinking Fund
- Accumulated Interest/Remaining Balance
- Wrap-Around Mortgage
  Calculates yield of wrap-around mortgage.
- Constant Payment to Principal Loan
- Add-on Rate Installment Loan/Rule of 78's
- Savings Plan-Leases
- Advance Payments
  Payment and yield calculations when additional payments are made in advance.
- Savings—Compounding Periods Different from Payment Periods
- Simple Interest/Interest Conversions
- Depreciation Schedules
  Straight line, SOYD, declining balance, and crossover between straight line and declining balance.
- Days Between Dates
- Bond Price and Yield
- Interest at Maturity/Discounted Securities
- Linear Regression—Exponential Curve Fit
  Fits a set of data points x, y to a straight line and a curve. Determines goodness of fit.
- Multiple Linear Regression
- Break-Even Analysis
- Invoicing
  Maintains net line totals, subtotal and grand total for invoicing.
- Payroll
  Guide for writing a payroll program.
- Inventory
  Guide for establishing an inventory program.

Clinical Lab and Nuclear Medicine Pac

(00097-13165)

Clinical Chemistry

- Beer's Law
- Protein Electrophoresis
  Given integration counts of a number of protein fractions, finds percentage of each.
- LDH Isoenzymes
  Given values for the five LDH isoenzymes, finds activity of each as a percent of total. Compares results against normal values.
- Body Surface Area
- Urea Clearance
- Creatinine Clearance
- Amniotic Fluid Assay
  Calculations for the spectrophotometric estimation of bile pigments in amniotic fluid.
- Blood Acid-Base Status
  Finds total plasma CO_2 and base excess from PCO_2, ph, and Hgb concentration.
- Oxygen Saturation and Content
  Finds oxygen saturation and content in blood given PO_2, PCO_2, pH, and body temperature.
- Red Cell Indices
  Given hematocrit percent, red cell count, and hemoglobin, finds mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration.

Nuclear Medicine

- Total Blood Volume
- Schilling Test
  The radioisotope determination of vitamin B_{12} absorption.
- Thyroid Uptake
- Radioactive Decay Corrections

Radioimmunoassay

- Radioimmunoassay
  Computes least-squares regression line of logit of net counts vs. log concentration, including regression constants, correlation coefficient, and concentration for a given count.

Statistics

- Basic statistics
  Computes mean, standard deviation, standard error, and coefficient of variation for grouped or ungrouped data.
- Chi-square evaluation and distribution
  Computes the chi-square statistic for goodness of fit.
- t Statistics
- t Distribution

NEW

CE Pac

(00097-13195)

- Vector Statics
- Section Properties (2 Cards)
  The area, centroid, and moments of an arbitarily complex polygon may be calculated.
- Properties of Special Sections
  Section properties for rectangles, triangles, ellipses, circles and concentric circles.
- Stress on an Element
  Reduces data from rosette strain gage measurement and performs Mohr circle analysis.
- Bending or Torsional Stress
  Solves either the bending stress equation (s = Mv/I) or the analogous torsional sheer equation (s = TR/J) interchangeably for all variables.
- Linear or Angular Deformation
- Cantilever Beams
  Calculates deflection, slope, moment and shear for point, distributed, and moment loads applied to cantilever beams.
- Cantilever Beams—Trapezoidal Load
- Simply Supported Beams
- Simply Supported Beams — Trapezoidal Loads
- Beams Fixed at Both Ends
- Beams Fixed at Both Ends—Trapezoidal Loads
- Propped Cantilever Beams
- Propped Cantilever Beams—Trapezoidal Load
- Six-span Continuous Beams
- Steel Column Formula
- Reinforced Concrete Beams
- Bolt Torque

NEW

Navigation Pac

(00097-13205)

- Estimated Time of Arrival
- Great Circle and Rhumb Line Navigation
- Dead Reckoning
- Velocity Triangle and Course to Steer
- Star Sight Planner (2 cards)
  Produces a list of available stars given location, date and time. Also gives approximate time of middle of morning and evening twilight periods.
- Almanac Interpolater
- Sun Line of Position
- Star Line of Position (7 cards)
- Bearing Line of Position
- Two-Angle Line of Position
- Fix from Two Lines of Position
- Radar Plotting Closest Point of Approach
- Beating to Windward
  From measurements made on your boat, your speed-made-good and course-made-good are calculated. Then time to the lay line, course and speed-made-good on the next tack, and time to the mark are computed.
- Distance by Horizon Angle

Surveying Pac

(00097-13175)

- Traverse, Inverse and Sideshots
  Reduction of field traverse data with closure and area calculation.
- Traverse Adjustment
  Adjustment of traverses by compass rule or Crandall's rule.
- Intersections
  Bearing-bearing, bearing-distance and distance-distance intersections and offset from a point to a line.
- Curve Solutions
- Horizontal Curve Layout
- Spiral Curve Layout
- Vertical Curves and Grades
- Resection
  Solution of the "three point problem."
- Two Instrument Radial Survey
- EDM Slope Reduction
- Stadia Reduction/3-Wire Leveling
- Taping Reduction/Field Angle Check
- Azimuth of the Sun
- Predetermined Area
  Location of one side of a land parcel to enclose a specified area.

With HP Application Pacs, the solutions you require may already exist. Application Pacs contain 15 to 26 preprinted prerecorded program cards, a program card holder and a manual of complete documentation. You save significant time because no researching, programming, debugging or documenting is needed.

- Earthwork
- Coordinate Transformation
- State Plane Coordinates—Lambert
- State Plane Coordinates—Transverse Mercator
- State Plane Coordinates—Alaska Zones 2-9

Stat Pac

(00097-13111)

General Statistics

- Basic Statistics for Two Variables
  Basic statistics for two variables, grouped or ungrouped.
- Factorial, Permutation, and Combination
- Moments, Skewness, and Kurtosis (For Grouped or Ungrouped Data)
- Random Number Generator
  Generate up to 500,000 different numbers.
- Histogram
  A histogram program for 24 intervals of equal width between specified upper and lower limits.

Analysis of Variance

- Analysis of Variance (One Way)
- Analysis of Variance (Two Way)
- Analysis of Covariance (One Way)

Distribution Functions

- Normal and Inverse Normal Distribution
- Chi-Square Distribution
- t Distribution
- F Distribution
  This program evaluates the integral of the F distribution for given values of x(>0), degrees of freedom ν_1, ν_2, provided either ν_1 or ν_2 is even.

Curve Fitting

- Multiple Linear Regression
  Linear regression for two independent variables, using least squares method.
- Polynomial Approximation
  This program approximates in the least square sense the function f(x) by a polynomial of degree m, where $2 \leq m \leq 4$. Data from equally spaced points are required.

Test Statistics

- t Statistics
  Paired t statistic tests the null hypothesis Ho: $\mu_1 = \mu_2$ for two observations.
  t statistic for two means tests the null hypothesis Ho: $\mu_1 - \mu_2 = d$ for two independent random samples.
- Chi-Square Evaluation
- Contingency Table
  2 × k and 3 × k contingency tables test the null hypothesis that two variables are independent.
- Spearman's Rank Correlation Coefficient
  This program tests whether 2 rankings are substantially in agreement with one another.

Quality Control

- $\bar{x}$ and R Control Chart
  $\bar{x}$ (mean) and R (range) are used to decide periodically whether a process is in statistical control.
- Operating Characteristic Curves
  This program evaluates the probability P_a of acceptance for a single sampling plan with finite or infinite lot size.

Queueing Theory

- Single- and Multi-Server Queues
  Queueing theory for infinite customers and finite customers.

Math Pac

(00097-13121)

- Factors and primes
- GCD, LCM, decimal to fraction
- Base conversions
- Optimal scale for a graph; plotting
  Finds a "nice" scale for graphing a function; generates ordered pairs for a graph.
- Complex operations
- Polynomial solutions
  Solves polynomial equations up to 5th degree.
- 4 × 4 matrix operations (2 cards)
  Computes determinant and inverse of 4 × 4 matrix, solves 4 simultaneous equations in 4 unknowns, by Gaussian elimination.
- Solution to f(x) = 0 on an interval
  Uses combination of bisection and secant method to guarantee rapid convergence to a root.
- Numerical integration
  Trapezoidal rule and Simpson's rule for discrete case; Simpson's rule for functions known explicitly.
- Gaussian quadrature
  Uses the six-point Gauss-Legendre quadrature method to find integrals over finite or infinite intervals.
- Differential equations
  Solves first- and second-order differential equations by the fourth-order Runge-Kutta method.
- Interpolations
  Linear, Lagrangian, and finite difference.
- Coordinate transformations
  Two- and three-dimensional translation and rotation of axes.
- Intersections
  Line-line, line-circle, circle-circle.
- Circles
- Spherical triangles
- Gamma function
- Bessel functions, error function
- Hyperbolics

ME Pac

(00097-13155)

- Vector Statics
- Section Properties (2 cards)
  The area, centroid, and moments of an arbitrarily complex polygon may be calculated using this program.
- Stress on an Element
  Reduces data from rosette strain gage measurement and performs Mohr circle analysis.
- Soderberg's Equation for Fatigue
- Cantilever Beams
  Calculates deflection, slope, moment and shear for point, distributed, and moment loads applied to cantilever beams.
- Simply Supported Beams
- Beams Fixed at Both Ends
- Propped Cantilever Beams
- Helical Spring Design
  Performs one or two point design for helical compression springs.
- Four Bar Function Generator (2 cards)
  Program designs four bar systems which will approximate an arbitrary function of one variable.
- Progression of Four Bar System
  Calculates angular displacement, velocity, and acceleration for the output link of a four bar system.
- Progression of Slider Crank
  Calculates displacement, velocity, and acceleration of the slider and angular velocity and acceleration of the connecting rod for the progression of a slider crank system.
- Circular Cams
  Computes parameters necessary for design of harmonic or cycloidal, circular cams with roller, flat or point followers.
- Linear Cams
  Computes the parameters necessary for design of harmonic, cycloidal, or parabolic profiles for linear cams with roller followers.
- Gear Forces
  Computes the reaction forces resulting from torque applied to helical, bevel, and worm gears.
- Standard External Involute Spur Gears
  Calculates parameters necessary in design manufacture, and testing of standard, external, involute, spur gears.
- Belt Length
  Computes belt length around an arbitrary set of pulleys.
- Free Vibrations
- Vibration Forced by $F_0 COS \omega t$
- Equations of State
  Ideal gas relation plus Redlich-Kwong model of real gas behavior.
- Isentropic Flow for Ideal Gases
  Replaces isentropic flow tables for ideal gases in converging-diverging passages.
- Conduit Flow
- Heat Exchangers (2 cards)
  Performs analysis of counter-flow, parallel-flow, parallel-counter-flow and crossflow (fluids unmixed) heat exchangers.

Games Pac

(00097-13185)

- Game of 21
- Dice
  Includes the game of "Craps" as well as a dice roller.
- Slot machine
- Submarine Hunt
  Find and then sink the moving submarine with your depth charges.
- Artillery
  Locate and destroy the moving target before it destroys you.
- Space War
  Search out and annihilate the 3 evil Alglogs before time and energy are gone.
- Super Bagels
  Based on "Mastermind."
- Nim$_k$
  Who will pick the last object from the last pile, you or the calculator?
- Queen Board
  You and the calculator take turns moving a chess queen to its target.
- Hexapawn
  You and the calculator command armies of 3 chess pawns each.
- Tic-Tac-Toe
- Wari
  Also known as Man-Kalah.
- Racetrack
- Teaser
  Changing from one pattern to the other looks easy, but ...
- Golf
- The Dealer
  Shuffles and deals a deck of cards to 4 people; also calls Bingo.
- Bowling Scorekeeper
- Biorhythms
- Timer
  Offers 2 visible timers, a count-up and count-down timer, and allows splits to be taken.

Standard Pac

(00097-13101)
(00067-13101)

- Moving average
- Tabulator
- Curve Fitting
- Calendar Functions
- Annuities and Compound Amounts
- Follow Me
  The programmable program.
- Triangular Solutions
- Vector Operations
- Polynomial Evaluation
- Matrix Operations
- Calculus and Roots of f(x)
  Approximates the derivative of a function at a point, evaluates a function at a point, and approximates the integral over a finite interval for a user specified function f(x). Also, approximates real roots of f(x).
- Metric Conversions
- Arithmetic Teacher
  Generates arithmetic problems for preschool and elementary students.
- Moon Rocket Lander
- Diagnostic Program

HP-91 Scientific Printing Calculator.

The battery-operated scientific calculator that delivers a printed record of all your calculations—wherever you go.

The HP-91 Scientific Printing Calculator provides you with a full range of preprogrammed scientific and arithmetic functions—complete with a printed record—all in one compact calculator. And because the HP-91 prints and operates on AC or its own built-in batteries, you can use it anywhere—in the office or the remotest field locations.

Quiet thermal printer provides a complete record of your calculations.

The thermal printing system of the HP-91 records and labels your calculations on heat sensitive paper. Because the HP-91 can print all your calculations, you can print—with labels—statistical summations, contents of the operational stack, or the contents of all sixteen addressable memories.

You select from three printing modes.

With switch set to ALL, the printer will show all entered data, functions, intermediate and final answers. With the switch set to NORMAL, the printer will record entered data and functions only. With switch set to MANUAL, the printer will operate only when you press the Print X key or a list function.

You may operate on battery or AC.

The HP-91 thermal printing system allows you to operate on batteries alone for between 3 and 7 hours, depending on extent of printer use. The AC adapter/ recharger lets you operate from electrical outlets while batteries are being recharged.

You can display and print in decimal, scientific or engineering notation.

The HP-91 will print and display in fixed decimal and scientific notation, common in many scientific calculators. It will also print and display in engineering notation, an exclusive HP feature that displays values with exponents that are multiples of 3. This is useful in working with many units of measure, such as kilograms (10^3), nanoseconds (10^{-9}), etc.

Compact design and light weight for easy portability.

Total weight of the HP-91 without AC adapter/recharger is only 2½ pounds. It will fit into a standard briefcase so you can operate it while you travel in airplanes, taxis, anywhere. A built-in metal tab lets you secure it to your desk easily with a cable or bolt. (A special cable and lock is available as an optional accessory.)

All the most-needed scientific functions—preprogrammed for speed and accuracy.

The HP-91 provides about the same preprogrammed functions found on the widely-used HP-45 pocket calculator—with the added advantage, of course, of a printed record of all your calculations. Its math capabilities include log and trig functions (the latter in degrees, radians or grads), rectangular/polar conversions and three separate percentage functions. Its statistical capabilities include summations, mean and standard deviation, linear regression, linear estimates (all for two variables) and factorial. All this, plus sixteen addressable registers, an automatic four-register stack, a Last-x register for easy error recovery and four clearing options.

Physical Specifications:

- Width: 228.6 mm (9″)
- Depth: 203.2 mm (8″)
- Height: 63.5 mm (2.5″)
- Weight: 1.13 kg (2.5 lb)
- Recharger weight: 268 g (9.5 oz)
- Shipping weight: 3.16 kg (7 lb)
- Operating temperature range: 0°C to 45°C (32°F to 113°F)
- Charging temperature range: 15°C to 40°C (60°F to 104°F)
- Storage temperature range: −40°C to 55°C (−40°F to131°F)
- Paper temperature range (operating & storage): 10°C to 30°C (50°F to 86°F)
- AC Power Requirements: 90-120V or 220 ± 10%, 50- 60 Hz
- Battery: 5.0 Vdc nickel-cadmium rechargeable battery pack

For a complete list of features and functions, see the Buyer's Guide on page 8.

The HP-91 Scientific Printing Calculator comes complete with:

- Battery pack that under normal use provides 3 to 7 hours of continuous operation and fully charges in under 10 hours.
- Recharger/AC adapter that lets you operate the calculator on AC while the battery pack is recharging.
- Soft carrying case with handle.
- Illustrated Owner's Handbook with instructions and applications section.
- Thermal paper (2 rolls).

Accessories

Designed to protect and increase the versatility of Hewlett-Packard Calculators.

Optional Accessories.

A. **DC Adapter/Recharger lets you recharge your calculator in a car or boat.**

This accessory,which is most often asked for by our existing customers, operates from a 12 volt DC battery.

- HP-21, HP-22, HP-25/25C, HP-27/82055A
- HP-80 and HP-67/(Pictured below) 82054A*

B. **Reserve power pack keeps a spare battery pack fully charged.**

You'll always have a fully-charged spare battery pack on hand when you use this reserve power pack, especially designed for Hewlett-Packard pocket calculators. It comes complete with a spare battery pack.

Simply slip the battery pack into the holder, then plug the holder into the recharger/AC adapter that comes with your calculator. A built-in light-emitting diode tells you that the battery pack is recharging. In six to eight hours, you'll have a fully-charged battery pack to exchange for the one in your calculator.†

- Battery pack and holder for models HP-80 and HP-67/82004A*
- Battery pack and holder for models HP-21, HP-22, HP-25/25C, HP-27, HP-29C (Pictured below) 82028A
- Battery pack and holder for models HP-91, HP-92, HP-97/(Pictured below) 82037A

†For models HP-67 and HP-80 the recharging time is between 14 and 17 hours.

C. **Security cradle/cable helps reduce pilferage.**

When leaving your HP calculator unattended in the office or lab, you can help guard it against "mysterious disappearance" by means of this ruggedly-constructed security cradle.

A key is used to lock and unlock the cradle holding your calculator. And while your calculator is in place you have complete access to the keyboard and display, with battery pack or AC operation.

The security cradle may be attached to your desk via: (1) four corner screws, (2) center screw attachment, allowing 360° rotation, (3) removable six-foot steel cable, or (4) extremely hard-to-remove adhesive tape. (All are supplied.)

A security cable provides the same security for the HP-91, HP-92 and HP-97.

- Security cradle for model HP-80/82007A***
- Security cradle for model HP-67/82015A**
- Security cradle for models HP-21, HP-22, HP-25/25C, HP-27, HP-29C (shown), has built-in prism to provide better viewing angle when on flat surface/82029A
- Security cable for models HP-91, HP-92, HP-97/82044A

D. **Hard leather case helps protect your calculator outdoors.**

Using your HP calculator outdoors? Help protect it by carrying it in this hard leather field case. It guards your calculator against normal environmental conditions in the field—dust, dirt, rain, snow, bumps and jars. Calculator removal is easy with the snap-open flap and contoured front opening.

- Field case for model HP-80/82006A***
- Field case for model HP-67/82016A**

*Also usable on HP-35, HP-45, HP-55, HP-65, and HP-70.
**Also usable on HP-65.
***Also usable on HP-35, HP-45, HP-55 and HP-70.

Accessories

Replacement Accessories.

Accessories to replace or replenish those received with your HP calculator.

Owner's Handbook

- HP-10/00010-90001
- HP-19C/29C/ 5955-2110
- HP-21/00021-90001
- HP-22/00022-90001
- HP-25/25C/00025-90001
- HP-27/00027-90001
- HP-67/00067-90011
- HP-80/00080-90001
- HP-91/00091-90001
- HP-92/00092-90002
- HP-97/00097-90001

E. **Soft Case**

- HP-10, HP-19C/ 82064A
- HP-21, HP-22, HP-25/25C, HP-27, HP-29C/82027A
- HP-80/82021A***
- HP-67/82053A** (synthetic)
- HP-67/82017A** (black leather)
- HP-91, HP-92, HP-97/82035A

F. **Battery Pack**

- HP-10, HP-19C/82052A
- HP-21, HP-22, HP-25/25C, HP-27, HP-29C/82019A
- HP-80 and HP-67/(pictured below) 82001A*
- HP-91, HP-92, and HP-97/ 82033A

G. **Recharger/AC Adapter**

- HP-21, HP-22, HP-25/25C, HP-27, HP-29C
- HP-80 and HP-67
- HP-10, HP-19C, HP-91, HP-92, HP-97

Calculator Supplies

- Thermal Printing Paper for models HP-10, HP-19C|82051A (6 rolls)
- Thermal Printing Paper for models HP-91, HP-92, HP-97/ (pictured below) 82045A (6 rolls)
- 3 Program Card Holders for models HP-67 and HP-97/ 00097-13142**
- Program Pad for models, HP-19C, HP-25/25C, HP-29C, HP-67, HP-97/00097-13154**
- Blank Program Cards for models HP-67 and HP-97/ 40 card pac/00097-13141** 120 card pac/00097/13143**

Application Books and Pacs.

Application Books

- HP-19C/29C Applications Book / 5955-2111
- HP-21 Applications Book/ 00021-90016
- HP-25/25C Application Programs/00025-90011
- 55 Math Programs/ 00055-66001
- 55 Statistics Programs/ 00055-66002
- HP-80 Real Estate Applications/00080-66006
- HP-92 Applications 00092-90011

HP-65 Application Pacs

- Standard Pac/00065-67008
- Aviation Pac I/00067-67042
- Chem Engr Pac I/00065-67050
- EE Pac I/00065-67007
- EE Pac II/00065-67056
- Financial Pac I/00065-67044
- Machine Design I/00065-67052
- Math Pac I/00065-67001
- Math Pac II/00065-67002
- Medical Pac I/00065-67004
- Navigation Pac I/00065-67045
- Stat Pac I/00065-67005
- Stat Pac II/00065-67053
- Stress Analysis Pac I/00065-67051
- Survey Pac I/00065-67003

HP-67/97 Application Pacs

- HP-67 Standard Pac/
- 00067- 13101
- HP-97 Standard Pac/
- 00097- 13101
- Business Decisions Pac/
- 00097- 13144
- Civil Engineering Pac/
- 00097- 13195
- Clin Lab & Med Pac/ 00097-13165
- EE Pac I/00097-13131
- Games Pac/00097-13185
- Math Pac I/00097-13121
- ME Pac I/00097-13155
- Navigation Pac/00097-13205
- Stat Pac I/00097-13111
- Survey Pac I/00097-13175

*Also usable on HP-35, HP-45, HP-55, HP-65, and HP-70.
**Also usable on HP-65.
***Also usable on HP-35, HP-45, HP-55 and HP-70.

E

F

G

Continued from page 3
been slower than their scientific brethern in seeing the modern calculator as a powerful professional tool?

Probably there are several reasons. Unlike science types, business people have not been trained in number manipulation and take no special joy from it. But this is changing. A rapidly increasing number of business schools are now offering training in the uses of advanced calculators.

The absence of a paper tape was once a drawback for those accustomed to getting a printed record from a conventional calculator instead of a lighted display. Numbers on paper are tangible, easy to double-check, easy to discuss later with someone else. This, too, has changed. For those to whom a printed record is useful, there is now the HP-10 at the four-function level, the HP-92 at the preprogrammed level and the HP-97 at the fully-programmable level.

A Los Angeles financial advisor, who uses an HP-92 Investor, believes some executives do not yet understand the *magnitude* of the advanced calculator's potential. "Some seem to think that its advantages are subtle. But that attitude changes pretty fast when they see me run up an internal rate of return calculation in two or three minutes or compare several investment alternatives in ten minutes or so."

Like many people who have come to regard their calculators as indispensable to their work, this advisor keeps his HP-92 on his desk during the day and carries it with him in his briefcase on trips. "So many complex calculations can be made with such speed and ease that the calculator becomes a very real extension of my capabilities."

This, of course, is the essential value of the preprogrammed financial calculator. Amortization tables, depreciation schedules, and statistical functions are built in. All the user has to do is enter the numbers involved in the problem, press the appropriate function keys and up comes the answer. And on tape, if needs be. That's freedom, indeed.

But for the professional looking for a quantum leap in his personal capabilities, going far beyond speed and accuracy, the programmable electronic calculator is the bluest chip of all.

A New York stock analyst, who used evenings and weekends to train himself to program his HP-67, now is able to tackle investment alternatives that he may have ignored before, simply because the answers were too difficult and time-consuming to obtain. Many of the computations he routinely requires are already programmed on magnetic cards in the HP Business Decisions Pac. But now that he has learned to create programs of his own he can accommodate the special factors needed in his own theory and practice.

Yet another financial analyst uses his fully-programmable calculator as a data file on the companies in which he specializes. He maintains a magnetic card for each company, programmed with all pertinent financial data. As new data is received, the cards are updated and new analyses run automatically, allowing the analyst to deal with a variety of complex comparisons and trends in a fraction of the time required by his previous methods.

It is understandable that at the beginning of the electronic calculator era, primary emphasis was given to scientific applications. But today, there is a calculator for virtually every business requirement. And the business community is responding with accelerated interest. It is not too much to expect that the day is near at hand when the advanced calculator will be as commonplace in business as it already is in science.

Questions and Answers.

Here are a few more questions we've received, along with the answers.

How can I recharge my calculator while travelling abroad?

Many of our customers travel and work abroad and would like to use their calculators while there. Special rechargers have been designed for use in most countries. There are two major differences between the various recharger versions: plug prong configuration and input voltage. Plug prong adapters are readily available, but voltage transformers are not as common. Rechargers which are compatible to the two predominate foreign voltages, 110 volt and 220 volt, are available in the U.S. (See p. 26.) These individuals will then have to purchase plug adapters for the countries they plan to visit.

Are back issues of the Digest available?

Yes. Volume 1 and Volume 2 are available in the U.S. in limited quantities free of charge. Future issues of the Digest will continue to be available around the world.

Can I recharge my calculator in my car? my boat? my plane?

A recharger that will charge off of a 9-16 volt DC power supply is now available for most of our calculators.

This recharger comes standard with two plugs: one to fit a car cigarette lighter and the other with two leads for connecting directly to the power source. For ordering information, refer to p. 25.

When does my warranty expire?

Calculators are date coded at the time they are manufactured. By date, they are under warranty for one year. If a calculator is purchased from a dealer, the warranty is good for one year from date of purchase. We recommend you keep separate records of your serial number and date of purchase.

Beyond the Call of Duty.

I want to congratulate you on the toughness of your HP-25 and carrying case.

Last night while backing my wife's 73 FORD GRAN TORINO, I opened the door for a better look back and my HP-25 in the carrying case fell out of my coat pocket without me knowing it. Seeing that I needed to pull up and move over, I did and backed up again. This time I heard a thump. Sure enough it was my HP-25. I had run over it with the front wheel against frozen gravel. I was sure it was smashed flat but it was not hurt at all.

I am enclosing a picture of the carrying case with the tire tread mark on it.

Paul W. Aders Richland, Ind.

I was designing a set of stairs going up a tower in the plant, from the top of a scaffolding 40' high. I was using my HP-35 to determine the angle, etc.

I bent over to pick up a measuring tape, and I felt something slide out of my shirt pocket. I looked towards the floor and saw my HP-35 hit the concrete floor and come out of the case in several pieces. I climbed down the scaffold and picked up the pieces and put them back in the warped case in hopes some of it could be reused in another calculator. When I put the battery and all in the case I turned on the switch to find, to my surprise, it worked! The calculator works fine now after I got the case to close up.

PHIFER WIRE PRODUCTS, INC.
Donny E. Stephens
Tuscaloosa, Ala.

My son is in his first year at the Air Force Academy in Colorado Springs. Shortly after arriving, he asked us to mail his HP-21 to him, because his "issue" calculator kept breaking.

Anyway, this is an excerpt of his letter, received last week:

"Yesterday I dropped my calculator coming out of Mitchell Hall and it was stepped on by at least five people. I tried it and it still works fine—HP does it again!"

Mrs. Jean Bigo Blackwood, N.J.

I am employed by a large environmental engineering consulting firm in Downtown Boston and commute—during good weather—about twenty miles to work by motorcycle. About a year and a half ago, I purchased an HP-25 Programmable Calculator and have been amazed with its versa-

tility, convenience and top-quality workmanship. The machine has been an indispensable time saver.

Last week, however, I became a true believer. While commuting to work on Monday morning, I noticed that my briefcase, containing my HP-25, had bounced off its rear luggage carrier. Traveling back down the road, I saw that the case had been run over by a car and its contents were scattered all over the asphalt. The calculator, in its carrying case, was lying smack-dab in the middle of the road. It's the first thing I picked up. Tentatively zipping open the case, I expected to have broken bits of plastic fall out in my hand, but the machine slipped out, surprisingly intact.

The microswitch circuit board had apparently been pushed deeper into the machine because the keys no longer sit as exposed as before; all this indicating that it had been subject to a direct hit. However, the machine and its programming facilities still function perfectly!

I'm convinced and a lifetime devotee. This is one hell of a machine.

Ira D. Cohen Norwood, MA.

40 New Library Solutions Books for the HP-67/97.

The solution you require may already exist. And now Hewlett-Packard has assembled 40 new booklets of Users' Library Solutions for you to choose from. They cover business, math, engineering, statistics, medicine, physical science, life science and other subjects ranging from astrology to games. With up to 76 pages in each booklet, you can solve an astonishing range of problems.

You save valuable time because no researching, programming, debugging or documenting is needed. Simply record the programs on blank magnetic cards (purchased separately) and you can put the full power of the HP-67 and HP-97 to work instantly.

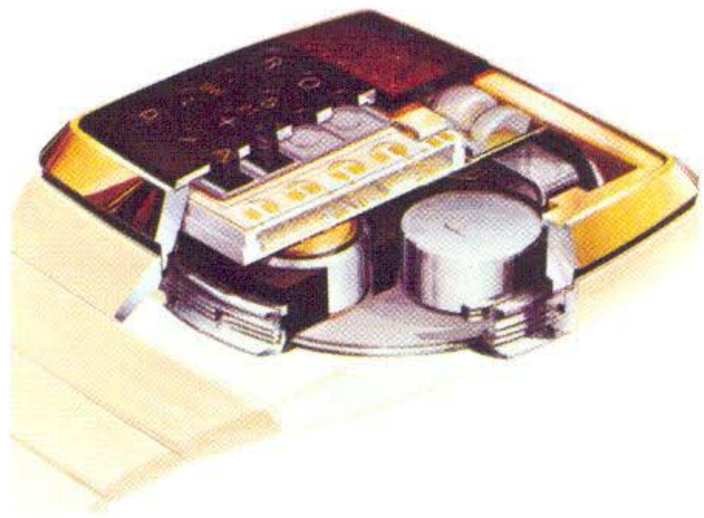
For your information.

By now, you've probably heard about the incredible new HP-01 personal information product introduced by Hewlett-Packard in early summer.

Unlike other wrist-size instruments, the HP-01 is not simply a digital watch with a calculator in the same case. The significant difference is that the HP-01 adds a new dimension of information by providing interaction among all of its basic functions.

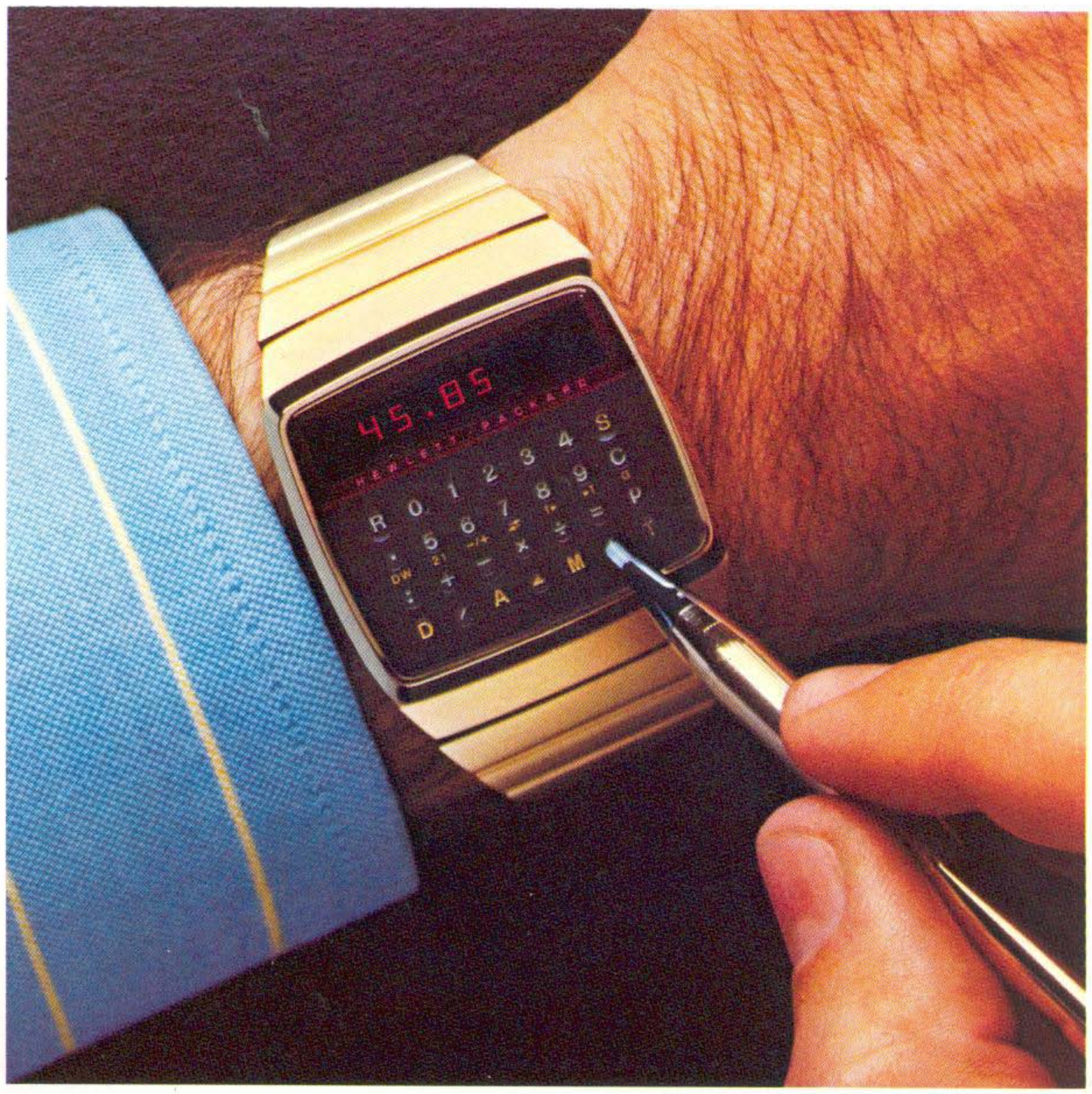
A wide variety of applications are possible with the HP-01, utilizing six basic functions: time, alarm, timer/stopwatch, date/calendar, calculator and a continuous memory.

Among other things, the HP-01 can maintain a running checkbook balance, solve complex pricing problems, store a phone number or date, time long distance phone calls and accumulate costs on the display like a taxi meter.



The HP-01 contains six large-scale integrated circuits equivalent to 38,000 transistors. A nine-digit display is bonded to the multi-layer ceramic module which contains the circuits.

You can put the HP-01 through its paces at selected jewelry stores. **It is not available directly from Hewlett-Packard or from department stores.** The HP-01 is featured in gold-filled and stainless steel cases.



The new HP-92 Investor.

Lets you calculate all your investment alternatives.

HEWLETT hp PACKARD

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New Solutions for the HP-67/97.

Hewlett-Packard has assembled 40 new booklets of Users' Library Solutions for the HP-67 and HP-97. These booklets contain between 10 and 15 programs each in diverse areas such as business, math, statistics, medicine, physical science, life science and others.

Simply record the programs on your own magnetic cards and you have an application pac in your chosen field. You save valuable time because no researching, programming, debugging or documenting is needed.

Business

Options/Technical Stock Analysis/(00097-14009)

- Put & Call Option Fair Values (Black-Scholes)
- Routines for Option Writers
- Curve Fitting, Selecting Best Function
- And 8 more

Portfolio Management/Bonds & Notes/(00097-14010)

- Stock Portfolio Beta Coefficient Analysis
- True Annual Growth Rate of an Investment Portfolio
- Bond Price & Yield
- And 9 more

Real Estate Investments/(00097-14012)

- Income Property Analysis
- Return on Equity Rental Property
- Real Estate Investment Analysis
- And 8 more

Taxes/(00097-14004)

- Tax Planning I
- Maximum Tax on Earned Income—1977 & Later
- Income Averaging Tax
- And 7 more

Home Construction Estimating/(00097-14033)

- Framing Board Feet
- Drywall and Insulation Estimate
- Painting Estimate
- And 8 more

Marketing/Sales/(00097-14032)

- Forecasting Using Exponential Smoothing
- Experience (Learning) Curve for Manufacturing Cost
- Sales Force Requirements
- And 7 more

Home Management/(00097-14031)

- Income Tax Planning—I
- Automobile Cost/Tire Cost Comparison
- Diet Planning
- And 8 more

Small Business/(00097-14039)

- Hourly Payroll
- Invoicing
- Estimating Inventory
- And 9 more

Engineering

Antennas/(00097-14021)

- Azimuth Pattern of Cylindrical Array of Antennas
- Gain of Horizontal Rhombic Antenna at Zero Azimuth
- Colinear Antenna Gain & Pattern
- And 11 more

Butterworth and Chebyshev Filters/(00097-14003)

- Butterworth and Chebyshev Filter Group Delay
- Butterworth and Chebyshev Low-pass Normalized Coefficients
- Normalized Lowpass to Bandstop, Lowpass, or Highpass
- And 7 more

Thermal and Transport Sciences/(00097-14023)

- Equations of State
- Energy Equation for Steady Flow
- Flow with a Free Surface
- And 8 more

EE (LAB)/(00097-14025)

- Complex Impedance Calculator—AC Circuit Calculator.
- 1% Resistor Value Subroutine
- Passive High and Lowpass Composite Filter Design
- And 9 more

Industrial Engineering/(00097-14035)

- Depreciation Schedules
- Single- and Multi-Server Queues
- Learning Curve
- And 7 more

Aeronautical Engineering/(00097-14036)

- Isentropic Flow for Ideal Gases
- Mach Number and True Airspeed
- True Air Temperature and Density Altitude
- And 7 more

Beams and Columns/(00097-14027)

- Reinforced Concrete Beams
- AISC Steel Column Formula
- Column Strength
- And 7 more

Control Systems/(00097-14026)

- Frequency Response of A Transfer Function
- Routh Test for Continuous and Discrete Time System Analysis
- Convert Frequency Response—Open Loop, Closed Loop
- And 9 more

tially the same since the HP-35,

Computation

High-Level Math/(00097-14011)

- Eigenvalues/Vectors of 3rd Order Systems
- Characteristic Equation of a 4 x 4 Matrix
- One Card Determinant and Inverse of a 5 x 5 Matrix
- And 9 more

Test Statistics/(00097-14008)

- Kruskal-Wallis Statistic
- Fisher's Exact Test for a 2 x 2 Contingency Table
- Mann-Whitney Statistic
- And 9 more

Geometry/(00097-14007)

- Internal and External Tapers
- Tangent Circle to Two Straight Lines with a Given Radius
- Distance Between Lines in Space
- And 7 more

Reliability/Quality Assurance/(00097-14030)

- Reliability: Intra-Class Correlation
- Specification Compliance from Limits and Regression Analysis
- Reliability and Probability of Failure of Series and Parallel Systems
- And 7 more

Medical

Medical Practitioner/(00097-14005)

- Bedside Blood-Gas Interpreter
- Anesthesiology Parameters
- Income Tax Planning I and II
- And 10 more

Anesthesia/(00097-14019)

- Anesthesia Parameters I and II
- Copper Kettle Anesthetic Regulation
- Anesthesia: Antoine Values from Experimental Data
- And 10 more

Cardiac/(00097-14018)

- Dye Curve Cardiac Output
- Stroke Work
- Calculation of Left Ventricular Functions From Angiographs
- And 9 more

Pulmonary/(00097-14037)

- Pulmonary Medicine Spirometry Standards
- Blood Acid-Base Status
- Virtual PO_2 & O_2 Saturation and Content
- And 10 more

Physical/Life Sciences

Chemistry/(00097-14006)

- Weak Acid/Base Titration Curve
- Equations of State
- Single-Stage Equilibrium Calculation
- And 9 more

Optics/(00097-14016)

- Lens Calculations-Sag, Angle, Min/Max
- Ray Tracer
- Fraunhofer Diffraction of Light by Spherical Particles
- And 9 more

Physics/(00097-14015)

- Black Body Thermal Radiation
- Three-Dimensional Special Relativity
- Semi-Empirical Nuclear Mass Formula
- And 10 more

Earth Sciences/(00097-14017)

- Physical Properties of Sea Water
- Plunge and Rake of Faults
- Electromagnetic Seismograph Frequency Response
- And 12 more

Energy Conservation/(00097-14029)

- Economic Insulation Thickness
- Sun Altitude, Azimuth, Solar Pond Absorption
- Total Daily Amount of Solar Radiation
- And 7 more

Space Science/(00097-14028)

- Space Science and Technology No. 4 Ballastic Missile Range
- Space Science and Technology No. 5 Kepler's Equation
- Orbit Determination by the Method of Gauss
- And 7 more

Forestry/(00097-14034)

- Lumber Scale-Board Feet Recoverable from a Log
- True Productivity of a Natural Coniferous Forest
- Standing and Running Skyline Loadcarrying Capability
- And 7 more

Biology/(00097-14040)

- Niche Breadth and Overlap/ Shannon's H and Horn's RO
- Demography II: Expectation of Life and Reproductive Value
- Recessive Gene Frequency After Selection, Mutation, Inbreeding
- And 9 more

Other

Games/(00097-14013)

- Duplicate Bridge Score with Running Totals
- Hangman Word Game
- Blackjack with a Permanent Bank
- And 8 more

Games of Chance/(00097-14038)

- Craps
- Roulette
- Horse Race
- And 7 more

Aircraft Operation/(00097-14001)

- Aircraft Flight Plan with Wind
- Head Winds and Cross Winds
- Determining In-Flight Winds
- And 11 more

Avigation/(00097-14002)

- Great Circle Navigation
- Position Given Heading, Speed, and Time
- Position and/or Navigation by Two VOR's
- And 9 more

Calendars/(00097-14024)

- Holidays
- Number of Weekdays Between Two Dates
- New Moon and Full Moon Day of Month
- And 10 more

Photo Dark Room/(00097-14022)

- Color Printing Factors
- Photo/Image Display Parameters
- Time, F-Stop, Magnification, Paper Speed, Enlarging Factors
- And 8 more

COGO/Surveying/(00097-14020)

- Basic Traverse, Inverse and Sideshots
- Traverse of Curve Rotation of Axes
- And 9 more

Astrology/(00097-14014)

- Astro 1: Mean Obliquity of the Ecliptic and Greenwich Sidereal Time
- Astro 3: Local Sidereal Time, Geocentric, Latitude, MC, and Ascendant
- House Cusps, Placidus Method (Exact)
- And 8 more