

The Hewlett-Packard Personal Computation

DIGEST

Product Catalog

Volume Eight, 1981 \$2.50



NEW IN THIS ISSUE:
The HP-41C in Space
See Page 2.

Quality By Design
See Page 4.

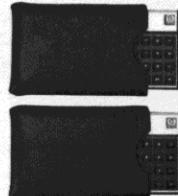
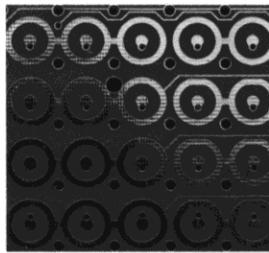
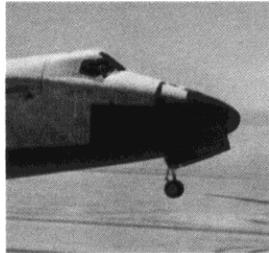
The Hewlett-Packard Personal Computation **DIGEST**

Product Catalog

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Hewlett-Packard offers a written warranty on all of its calculators and accessories. A copy of the complete warranty statement is available upon request.

Please note, for consumer sales in the United Kingdom any warranty given shall not apply to consumer transactions and shall not affect the statutory rights of a consumer. In relation to such transactions the rights and obligations of Seller and Buyer shall be determined by statute. Hewlett-Packard products are manufactured by Hewlett-Packard worldwide.



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Calculator displays in all photography simulate typical appearance.

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We'll be celebrating ten years of HP calculators in January, 1982. As a commemorative reminder, HP is producing a special limited edition calendar with original illustrations. A well-known artist has been commissioned to illustrate HP calculators in several applications, such

HAPPY ANNIVERSARY!

as the space shuttle, the 1980 America's Cup winner *Freedom*, and the Double Eagle II balloon flight. The applications span the entire line of HP calculators, from our first scientific handheld, the HP-35, to the alphanumeric HP-41C. For more information about the calendar, see your local HP dealer.

The HP-41 Family. Now there are two HP-41 calculators to choose from! The HP-41C with up to 441 program bytes, expandable to 2,233 program bytes by adding up to four Memory Modules or one

Quad Memory Module. Or, choose the HP-41CV with the full 2,233 program bytes built in. Turn to page 8 for more information on the HP-41 family.

Tap into new solutions. Now there's a Petroleum Fluids Pac (00041-15039) for the HP-41. This pac focuses on reservoir applications and contains programs to improve forecasting and optimization of oil and gas production. Eighteen programs calculate such fluid properties as compressibility, formation volume factor, and viscosity for gases, oil, and water. Additional programs include calculating gas properties from composition, Z-factor, total compressibility, and unit conversion. For a complete listing of programs, see page 11.

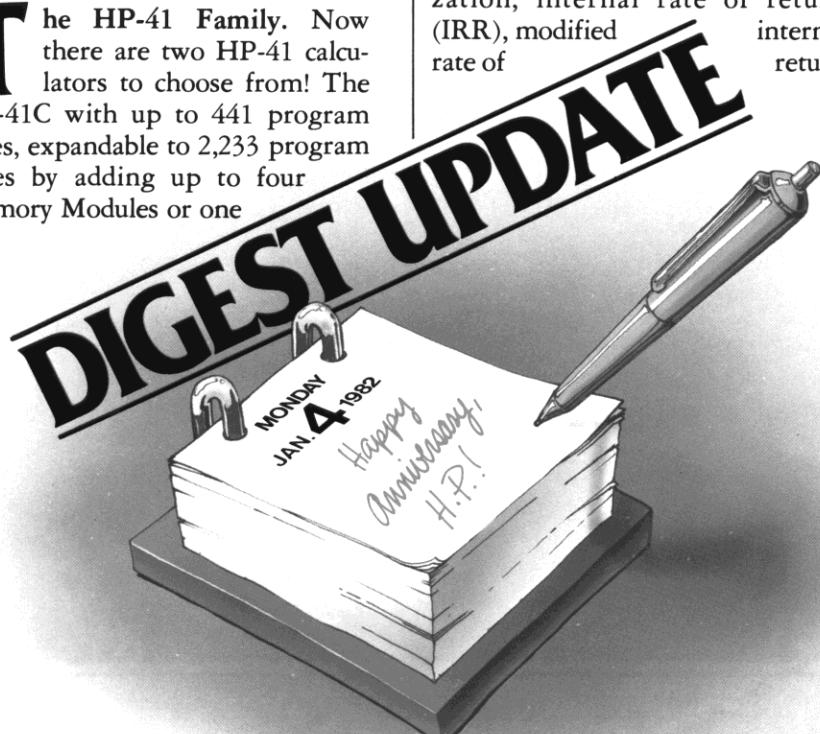
For Sale! The HP-41 Real Estate Pac (00041-15016) is now available. Basic financial programs within the Pac include: compound interest and loan amortization, internal rate of return (IRR), modified internal rate of

(MIRR), net present value (NPV), and depreciation schedules. An income property analysis program analyzes the investment potential (on both a pre- and post-tax basis) of income-producing properties. Other programs in the Pac include: wrap-around mortgage, home owner's equity analysis, and rent-or-buy decision analysis. Turn to page 11 for a complete listing of programs.

Put your company's best brains into an HP custom calculator. The Hewlett-Packard Custom Services Program continues to provide solutions for an ever-growing number of companies. From banking to fuel savings, from technical design to sales, HP-41 custom solutions are already saving time, improving accuracy and lowering costs for their users.

Now, to assist customers in developing their custom programs, the Custom Services Program provides special utility routines for enhancing HP-41 programs. Over 20 different routines increase your programming capabilities and make execution faster. For more information on how Custom Services can put power and portability to work for you, contact your nearest Hewlett-Packard sales representative.

You've got our number. Need to find the HP dealer nearest you? Information on new products or service repair? Corvallis, Oregon is long distance for just about everyone, but for those of you in the continental U.S.A., you can talk to us TOLL FREE. Just dial 1-800-547-3400. In Oregon, Alaska, or Hawaii call (503) 758-1010.



The HP-41C: A Trip To Remember

In the early morning light of April 12, the space shuttle *Columbia* cleared the launch tower at Cape Canaveral to herald NASA's return to manned space flight. And what was aboard to assist the return to earth? Two HP-41C Calculators.

Nearly a year and a half ago, NASA began its search for the right calculator. They chose the HP-41C over any other calculator because of its large memory capacity plus its ability to accommodate the long space shuttle programs. The HP-41C's also had an extra edge—an easy-to-read alphanumeric, liquid-crystal display.

Like all space shuttle hardware, the HP-41C was subjected to rigorous testing before NASA judged it flight-worthy. They put it through shock, vibration and high temperature tests before they were confident that the HP-41C would continue displaying in the demanding space shuttle environment.

As the launch date approached, NASA technicians prepared two HP-41C's for the space shuttle. Each calculator

was outfitted with four Memory Modules, giving each calculator the capacity to store more than 2,000 program lines. Both HP-41C's were placed in a special pouch in the flight suit of astronaut *Robert Crippen*. Two HP 82104A Card Readers, preprogrammed magnetic cards, extra Memory Modules, and spare batteries were stowed away on mid-deck as backup equipment.

Each HP-41C contained its own critical program. One was dedicated to the Acquisition of Signal, the other to the Center of Gravity. Each program required some 1,000 program lines! Both programs were loaded into the calculators shortly before launch and, thanks to the HP-41C's Continuous Memory feature, the programs were retained even after the calculators were turned off.

Beginning simultaneously with launch, the Acquisition of Signal program began to run. The HP-41C told the *Columbia* the next ground station to contact, when contact would be made, for how long, and which frequency (UHF or S-Band) could be used.



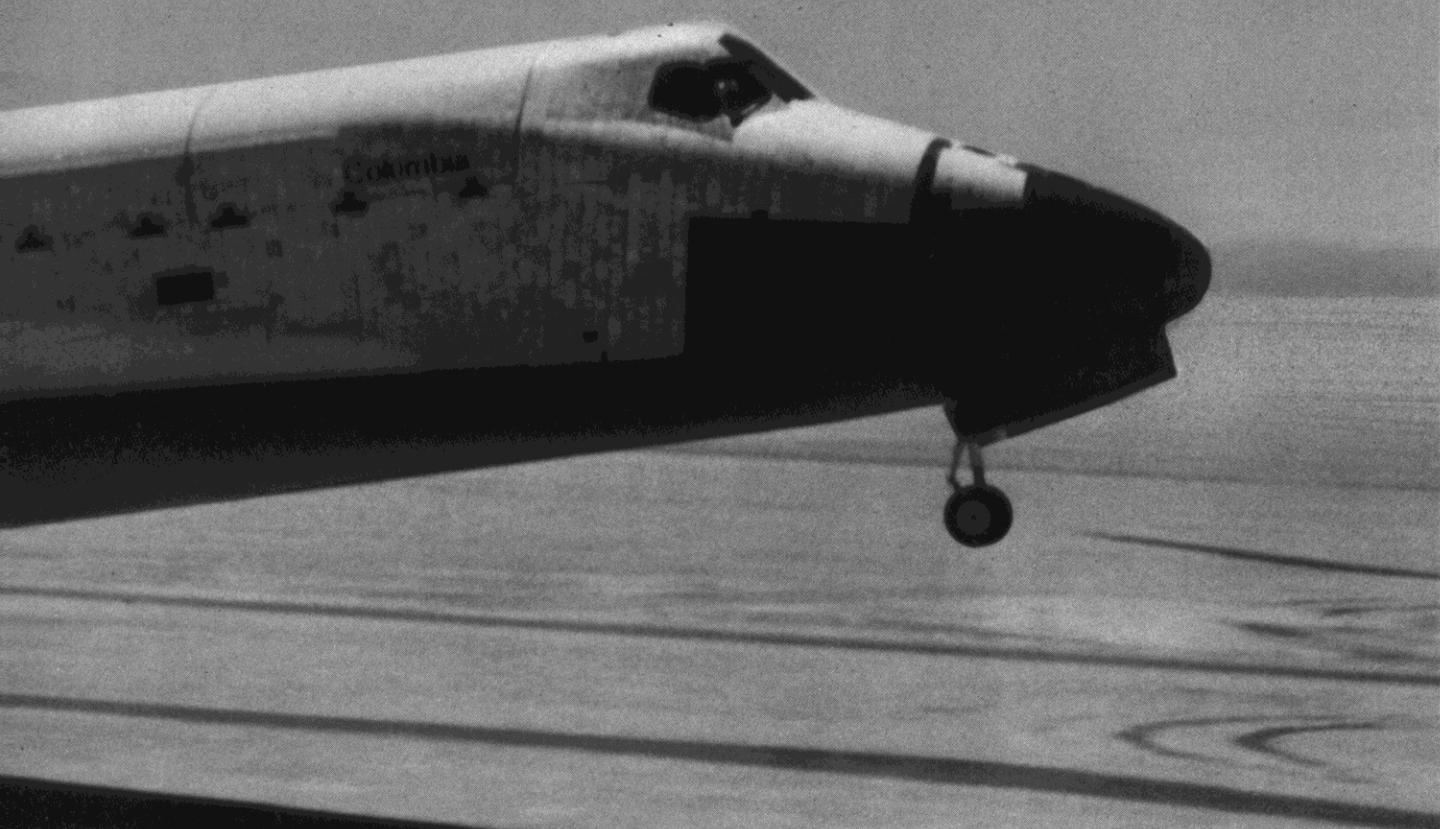
The HP-41C made its contribution to nearly a decade of HP support in space exploration.

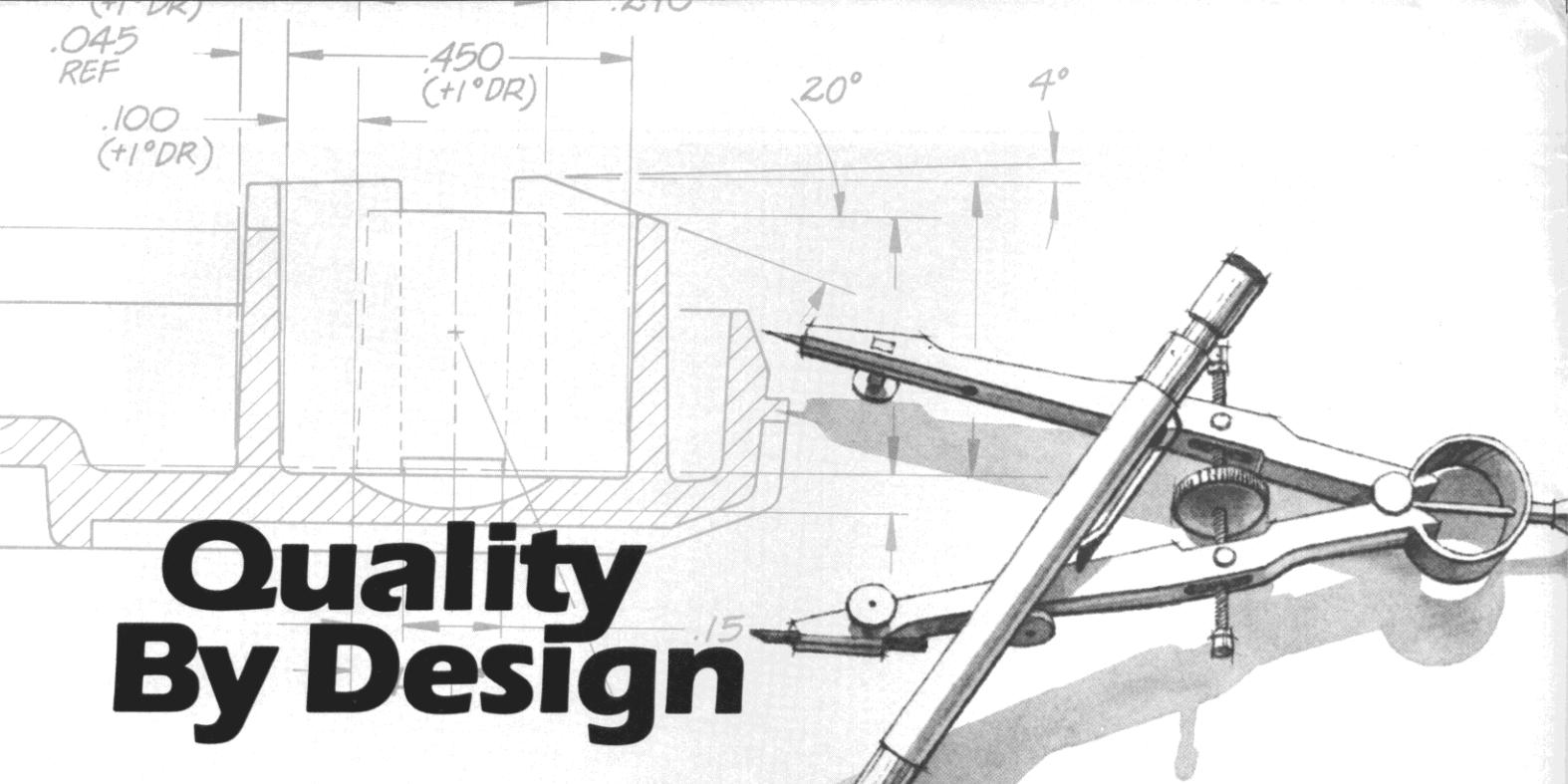
After two successful days in orbit, the Center of Gravity program, termed "flight critical" by NASA, enabled the astronauts to determine the proper balance for the space shuttle immediately before re-entry. The HP-41C calculated *Columbia*'s pre-entry center of gravity (balancing point) and the amount of fuel that would have to be burned from each tank to establish that center of gravity for re-entry.

On April 14, *Columbia* touched down on the dry lake bed of Edwards Air Force Base, California, with a perfect landing. The HP-41C, the most powerful programmable

calculator ever made by HP, had made its contribution to nearly a decade of HP support in space exploration. For example, the HP-35, Hewlett-Packard's first scientific calculator, was standard equipment on three manned *Skylab* missions. And, during the 1975 USA-USSR *Apollo-Soyuz* link-up in space, an HP-65 performed critical calculations for *Apollo*'s mid-course correction maneuvers.

Now the excitement over the shuttle's successful maiden flight has shifted to the second space shuttle mission. And again, HP will be there. In addition to determining the center of gravity and acquisition of signal, NASA plans to have the HP-41C do even more. In the event of an emergency landing, a De-Orbiting program called Targeting will help the astronauts prepare the space shuttle for landing on one of six alternative runways around the world. NASA also foresees the use of HP-41C peripherals, such as the HP 82143A Thermal Printer/Plotter, in future shuttle flights. NASA knows that when performance must be measured by results, they can turn to Hewlett-Packard.



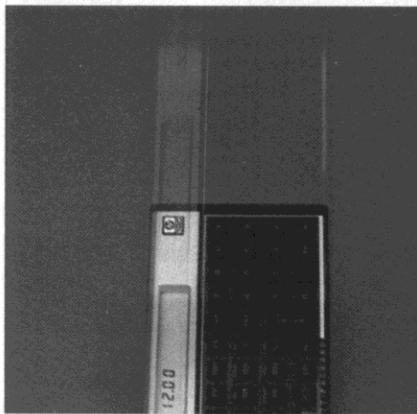


Quality By Design

Hewlett-Packard wants you to know what we mean by quality. For almost a decade, we've been designing our calculators to provide lasting value to our customers. We monitor our products during production to assure that each customer-quality design goal has been met. Here's just part of our quality story.

Rugged Design

Both the HP-11C and HP-12C have shock mounted displays that help the calculators resist damage due to impact. That's why the HP-11C and



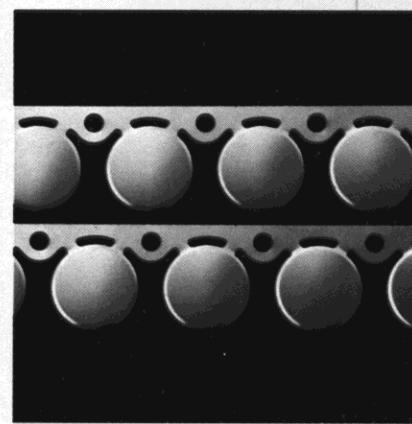
The Hewlett-Packard 12C.

HP-12C are slightly thicker than other slim-line and credit card calcu-

lators. The calculator's logic assembly and liquid-crystal display (LCD) are attached to a rectangular mylar frame that "floats" between shock-foam cushions. These cushions are mounted on both sides of the logic assembly/LCD at each of the four corners. In the event the calculator is dropped, the foam helps to cushion the impact.

Key Reliability

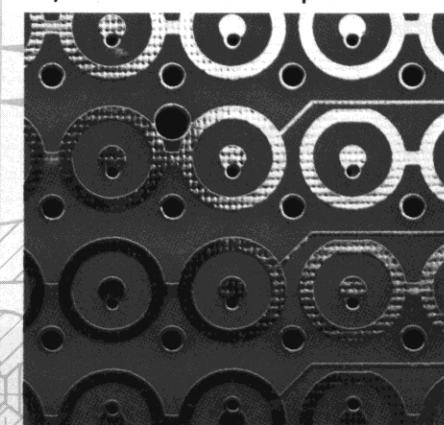
To help guard against key failure, each key makes contact with a high-precision metal key actuator designed for maximum endurance.



Metal key actuators.

play (LCD) are a rectangular mylar frame that "floats" between shock-foam cushions. These cushions are mounted on both sides of the logic assembly/LCD at each of the four corners. In the event the calculator is dropped, the foam helps to cushion the impact.

These dome-shaped actuators provide a positive click as you press a key, letting you know that your keystroke has been completed.

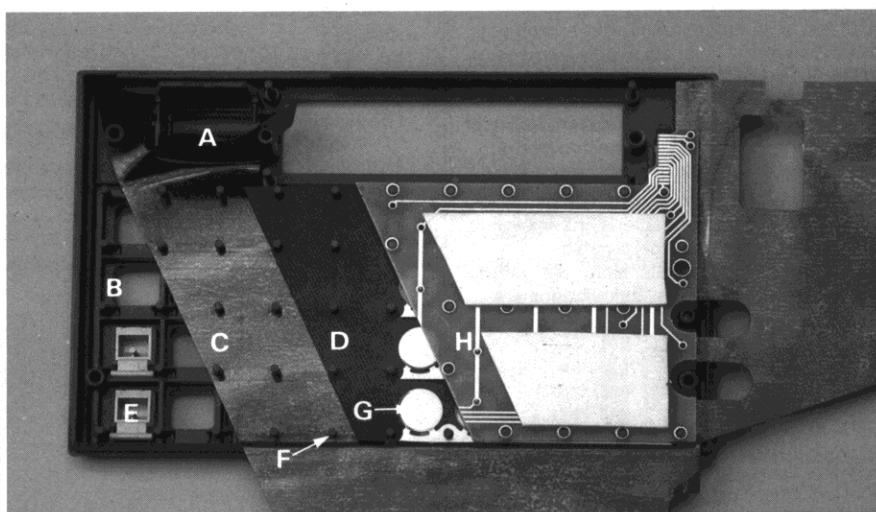
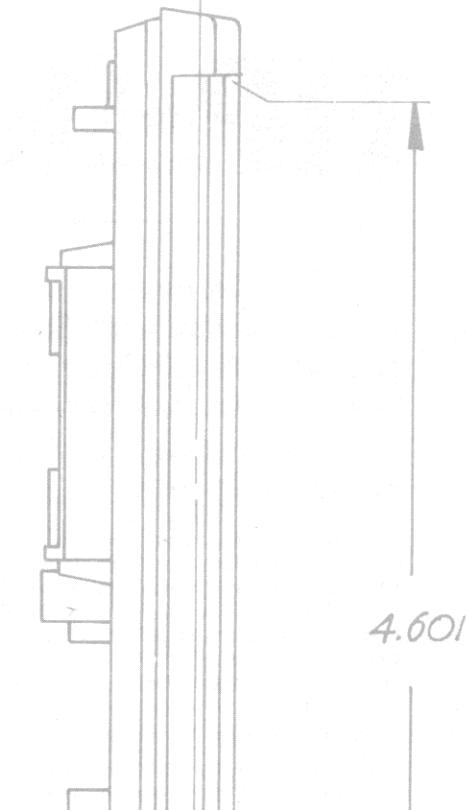
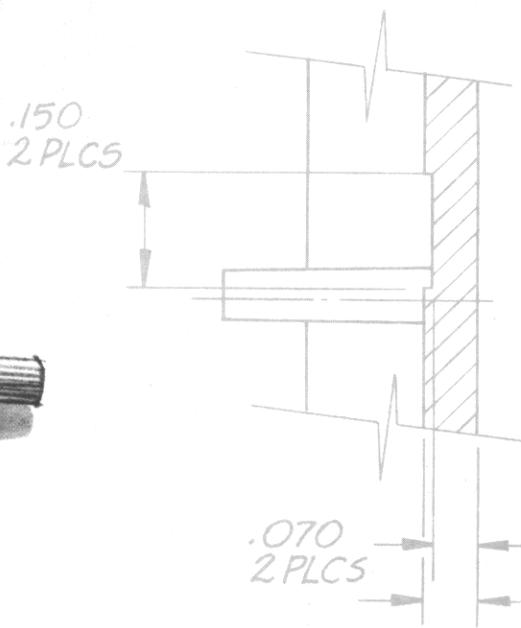


Gold-plated circuit board.

To further ensure definite actuator contact, every HP-11C and HP-12C circuit board is plated with gold. Because the actuator strikes the metal contact on the board at every keystroke, a durable metal, resistive to wear and corrosion must be employed. The extensive use of gold, rather than compromising with other metals, further attests to HP's refusal to trade off quality for price.

Electro-Static Discharge Protection

To protect against electro-static discharge (ESD), which may inter-



Cut-away view of HP-11C face-down.

fer with your calculator's performance, both the HP-11C and HP-12C have a five-layer, mylar "sheet" wrapped around the printed circuit board. This mylar sheet is impregnated with polycarbonate, so if ESD should pass through the case, the charge is dissipated throughout the sheet without affecting the calculator's electronics. Another piece of mylar is attached to the back of the LCD and the attached logic assembly to protect the entire unit from ESD interference.

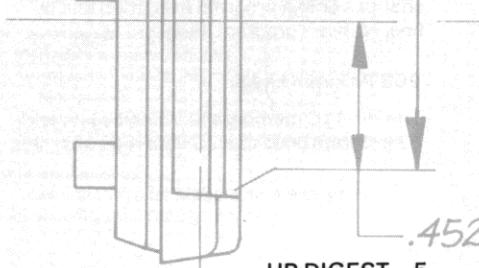
In addition to the mylar sheets, teflon strips are inserted inside the

calculator at both sides and along the bottom. These teflon strips help guard against ESD, if it should enter through the side and bottom seams of the calculator.

Our Commitment to Quality

Impressive? It has to be. Our customers deserve the quality we strive for. With the HP-11C and HP-12C you get more than just a calculator. You get a *quality* solution.

- A. Battery compartment
- B. Four walls surrounding key well (key removed)
- C. Protective cover which wraps around key actuators and printed circuit (PC) board
- D. Elastic sheet surrounds each pin, and is compressed during assembly between key well walls and PC board, sealing each key contact.
- E. Underside of key
- F. Pin
- G. Key actuator
- H. Extra-thick PC board



HP-11C

Slim-Line Advanced Programmable Scientific with Continuous Memory

The HP-11C is Hewlett-Packard's newest scientific programmable calculator, featuring a handsome slim-line design and an easy-to-read liquid-crystal display.

With its advanced programming tools and built-in scientific functions, the slim-line HP-11C is a powerful yet portable problem-solver. The HP-11C has the convenience of Continuous Memory, so even after the calculator is turned off, the HP-11C retains any data or programs keyed in.

Advanced Programming Power.

Take advantage of the HP-11C's array of programming tools to simplify repetitive calculations by using eight conditional tests and two flags for program decision making. Additional programming tools include five user-definable keys, four subroutine levels, 15 labels, conditional and unconditional branching, and controlled looping.

Editing Features.

Add new instructions by using the go to (GTO) key to access any part of your program. Delete a program line instantly by

the index register. The calculator automatically converts one data storage register into seven lines of program memory, one register at a time, as you need them.

User Mode.

With user mode, save time and keystrokes by branching to any one of five independent programs at the touch of a single key.

Random Number Generator.

Add the unpredictable to your work or programmed games with the random number generator. The HP-11C's random number generator uses either an automatically stored "seed" or a "seed" you key in.

Extensive Function Set.

Get fast answers to trigonometric problems, hyperbolics and inverses simply by pressing a key. With the HP-11C's statistics keys, you can calculate the mean and standard deviation, linear estimate and correlation coefficient. Even linear regression by the least squares method is push-button easy. The HP-11C also makes conversions between degrees and radians or between rectangular and polar coordinates. Logarithms, exponentials, factorials, gamma functions and probability calculations are

For a list of key features and functions, see the Comparison Chart on page 18.

The HP-11C Slim-Line Advanced Programmable Scientific with Continuous Memory comes complete with:

- The HP-11C Owner's Handbook and Problem-Solving Guide
- Three long-life disposable batteries
- Soft carrying case

HP-11C Solutions Handbook (00011-90009)

■ Mathematics

Coordinate Transformations
Complex Operations
First and Second Order Differential Equations
16-Point Gaussian Quadrature
Base Conversions
Circle Determined by Three Points
Vector Operations

■ Statistics

Normal Distribution
Inverse Normal Distribution
Chi-Square Distribution
t Distribution
F Distribution
Moments, Skewness and Kurtosis
Analysis of Variance (One Way)
Spearman's Rank Correlation Coefficient
Contingency Tables

■ Electrical Engineering

Reactance Chart
Ohm's Law
Impedance of a Ladder Network
Smith Chart Conversions

■ Mechanical Engineering

Ideal Gas Equation of State
Conduit Flow
Simply Supported Beams
Equations of Motion
Soderberg's Equation for Fatigue
Composite Section Properties

■ Chemistry

pH of Weak Acid/Base Solutions
Beer's Law

■ Economic Analysis

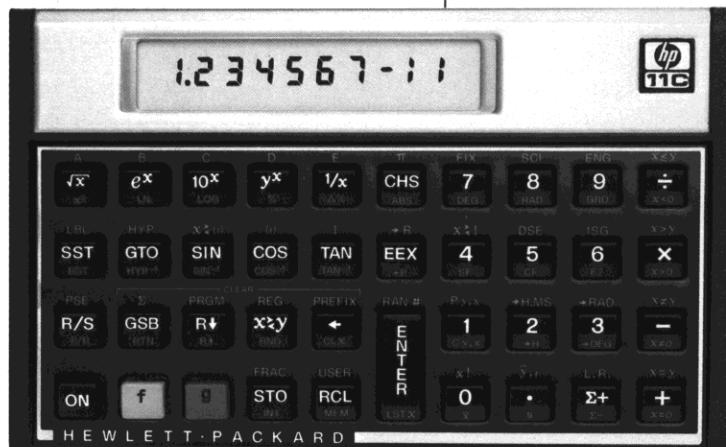
Mortgage Loan Interest Rate
Discounted Cash Flow Analysis
Amortization Schedule
Depreciation
Moving Average
Break-Even Analysis

■ Games

Moon Rocket Lander
Arithmetic Teacher
Nim

■ Surveying and Energy Conservation

Field Angle Traverse
Building Heat Loss and Heating Cost



pressing the backarrow (←) key. Other editing functions let you step through a program one line at a time, so you can make changes or test program execution line by line, or insert program lines.

203 Program Lines.

The HP-11C memory allocation begins with 63 program lines and 20 data registers, plus

preprogrammed into the calculator so all you have to do is press a key to determine the answer.

Physical Specifications:

- Length: 12.7 cm (5")
- Width: 8.0 cm (3 1/8")
- Height: 1.5 cm (5/8")
- Weight: 113g (4 oz)

HP-12C

Slim-Line Financial Programmable with Continuous Memory and Special Functions

The new HP-12C Financial Programmable combines a powerful set of business functions with a rugged slim-line design to give you shirt-pocket portability.

The HP-12C features a liquid-crystal display that's easy to read even in bright sunlight and long-life disposable batteries to keep your calculator powered when you need it most. You also get data-saving Continuous Memory, a feature that enables the HP-12C to retain your programs and data even after the calculator is turned off.

Powerful Bond Functions.

The HP-12C boasts a pair of bond functions: price and yield-to-maturity. You'll quickly determine bond prices based on a desired yield. Or, find bond yields based on quoted prices and coupon rates.

Keystroke-Simple Depreciation.

With the HP-12C, you can easily determine depreciation and remaining depreciable value using one of three methods: straight-line, sum-of-years' digits, and declining balance.

present value (NPV) and internal rate of return (IRR) functions. The HP-12C can handle up to 20 groups of even or uneven cash flows.

Statistics

The HP-12C also finds the mean and standard deviation for one or two variables, linear regression and estimate, correlation coefficient, summations, and factorials. And with the HP-12C's broad range of mathematical functions, simply press a key to find reciprocals, square roots, logarithms, exponentials, or factorials instantly.

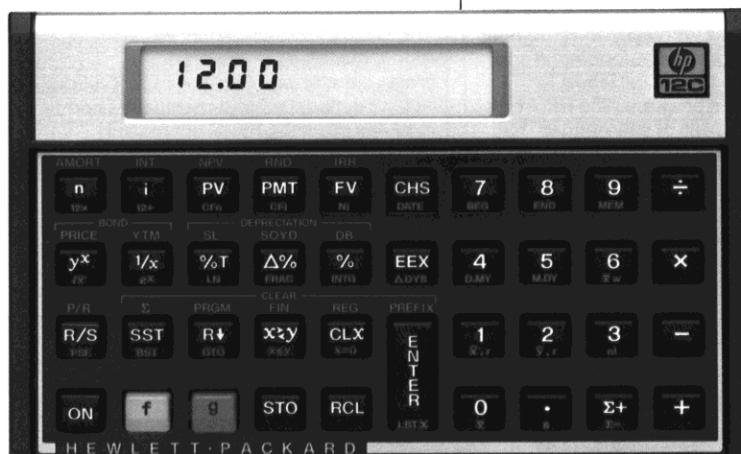
Easy Programming Features

Cut long or repetitive analyses down to size with HP-12C programmability. The HP-12C has 20 data storage registers which can be converted to a maximum of 99 program lines when you need them. You also get such handy programming features as program review (singlestep and backstep), two conditional tests, unconditional branching, and pause.

Physical Specifications:

- Length: 12.7 cm (5")
- Width: 8.0 cm (3 1/8")
- Height: 1.5 cm (5/8")
- Weight: 113g (4 oz)

For a list of key features and functions, see



Basic Time and Money Problems.

Built-in keys let you compute simple interest, compound interest, and odd-days' interest in seconds. The HP-12C enables you to generate amortization schedules quickly. The AMORT function will separate any payment or group of payments into either the amount applied toward interest or the amount applied toward principal.

Discounted Cash Flow Analysis.

Evaluate your investment opportunities involving multiple cash flows with the net

the Comparison Chart on page 18.

The HP-12C Slim-Line Financial Programmable with Continuous Memory and Special Functions comes complete with:

- The HP-12C Owner's Handbook and Problem-Solving Guide
- Three long-life disposable batteries
- Soft carrying case

HP-12C Solutions Handbook

(00012-90009)

- Real Estate Refinancing

Wrap-Around Mortgage

Income Property Cash Flows Analysis
Before-Tax Cash Flows
Before-Tax Reversions (Resale Proceeds)
After-Tax Cash Flows
After-Tax Net Cash Proceeds of Resale

■ Lending

Loan With a Constant Amount Paid Towards Principal
Add-On Interest Rate Converted to APR
APR Converted to Add-On Interest Rate
Add-On Rate Loan With Credit Life
Interest Rebate—Rule of 78's
Graduated Payment Mortgages
Variable Rate Mortgages
Skipped Payments

■ Savings

Initial Deposit With Periodic Deposits
Number of Periods to Deplete a Savings Account or to Reach a Specified Balance
Periodic Deposits and Withdrawals
Savings Account Compounded Daily
Compounding Periods Different From Payment Periods

■ Investment Analysis

Lease vs. Purchase
Break-Even Analysis
Operating Leverage
Profit and Loss Analysis

■ Securities

After-Tax Yield
Discounted Notes

■ Forecasting

Simple Moving Average
Seasonal Variation Factors Based on Centered Moving Averages
Gompertz Curve Trend Analysis
Forecasting With Exponential Smoothing

■ Pricing Calculations

Markup and Margin Calculations
Calculations of List and Net Prices With Discounts

■ Statistics

Curve Fitting
Exponential Curve Fit
Logarithmic Curve Fit
Power Curve Fit
Standard Error of the Mean
Mean, Standard Deviation, Standard Error for Grouped Data
Chi-Square Statistics
Normal Distribution
Covariance
Permutation
Combination
Random Number Generator

■ Personal Finance

Homeowner's Monthly Payment Estimator
Tax-Free Individual Retirement Account (IRA) or Keogh Plan
Stock Portfolio Evaluation and Analysis

■ Canadian Mortgages

Periodic Payment Amount
Number of Periodic Payments to Fully Amortize a Mortgage
Effective Interest Rate (Yield)
Balance Remaining at End of a Specified Period

■ Miscellaneous

Learning Curve for Manufacturing Costs
Queueing and Waiting Theory

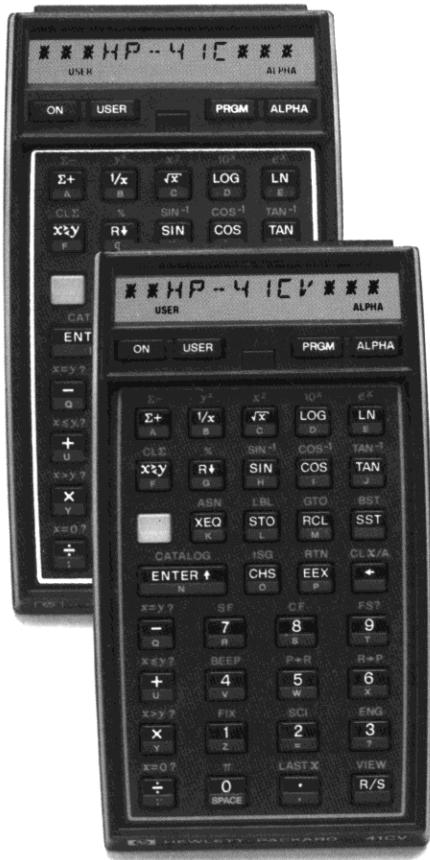
HP-41C/CV

Alphanumeric Full Performance
Programmables With Continuous Memory

A Calculator. A System. A Standard for Professionals.

The Calculator.

The HP-41 incorporates the latest in calculator technology to give you the most powerful personal calculator Hewlett-Packard has ever designed. And now you have two models to choose from. The HP-41C with 441 bytes of program memory or 63 storage registers, expandable to 2,233 bytes or 319 registers. And the HP-41CV with the full 2,233 program bytes built in. Both models are powerful, yet easy to use. The alphanumeric capabilities provide communication in words as well as numbers, so operation is simple even for the novice. And you can customize the keyboard to meet special needs. Add to this Continuous Memory, preprogramming ease and sophistication, the added capabilities of optional peripherals, and RPN logic, and you have an HP-41—a genuine contribution to calculator technology from Hewlett-Packard.



Communication with the HP-41.

The HP-41's alphanumeric capability lets you name and label programs, functions, variables, constants—and prompt for data with words or sentences. Status annunciators indicate mode conditions. Messages pinpoint calculation errors and ten different tones provide aural feedback. And the HP-41 utilizes a liquid-crystal display (LCD) that is easy to read whether you're in the office or out in bright sunlight.

Customization to Your Own Design.

There are over 130 separate operations in the function library and 58 functions right on the keyboard. And, you can reassign any standard function, any programs you've written, or programs provided in the Application Modules—to almost any keyboard location you wish. Simply indicate your key assignments on a keyboard overlay for immediate reference.

Continuous Memory Saves Everything.

Continuous Memory preserves all your program, data and key assignments even when the calculator is turned off. As a result, you can program frequently needed calculations once and call them up again and again. This capability means reduced power consumption and longer battery life.

Enhanced Programmability.

With the HP-41 there is no complicated language to learn. And alpha capability lets you label programs with easy-to-remember names. Each program is autonomous and each can have up to 99 local labels for branching within a program. The HP-41 also features up to 6 levels of subroutines, 10 conditional tests, 56 internal flags, powerful loop control, indirect addressing, and local and global branching.

Optional Peripherals.

Adding any or all of the optional plug-in peripherals and modules to the HP-41 expands its capabilities to keep pace with your growing computational requirements.

Physical Specifications:

- Length: 14.4 cm (5.7")
- Width: 7.9 cm (3.0")
- Height: 3.3 cm (1.3")
- Weight: 210g (7.4 oz)
- Operating temperature range: 0° to 45°C (32° to 113°F)
- Storage temperature range: -20° to 65°C (-4° to 149°F)

For a list of key features and functions, see the Comparison Chart on page 18.

The HP-41C and HP-41CV Alphanumeric Full Performance Programmable Calculators with Continuous Memory come complete with:

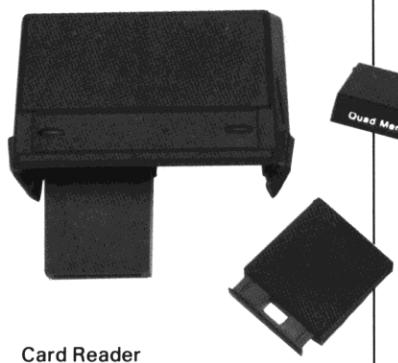
- HP-41 Owner's Handbook and Programming Guide
- A tough, pliable carrying case
- Four type N batteries
- Overlay packet
- HP-41 Quick Reference Card
- HP-41 Standard Applications Book
- Module Holder
- Subscription form for the Hewlett-Packard Users' Library

The System.

Expand System Capabilities.

Alone, the HP-41 is a powerful programmable problem-solving calculator. Adding optional plug-in peripherals and modules gives the HP-41 increased capability and adds new dimensions in flexibility. It can become a printing calculator, can save hundreds of programs on magnetic cards, or can even become a "specialized" problem-solving machine. You can plug in any number of options, up to four, in any combination that you need.

Quad Memory Module
HP 82170A



Card Reader
HP 82104A

Memory Modules
HP 82106A



Magnetic
Cards

Self-Contained Peripherals.

Each quick-connect peripheral and module is self-contained, with its own set of functions that can be added to the calculator's existing function library. And each is fully portable, coming complete with what you need for immediate use—including comprehensive instructions.

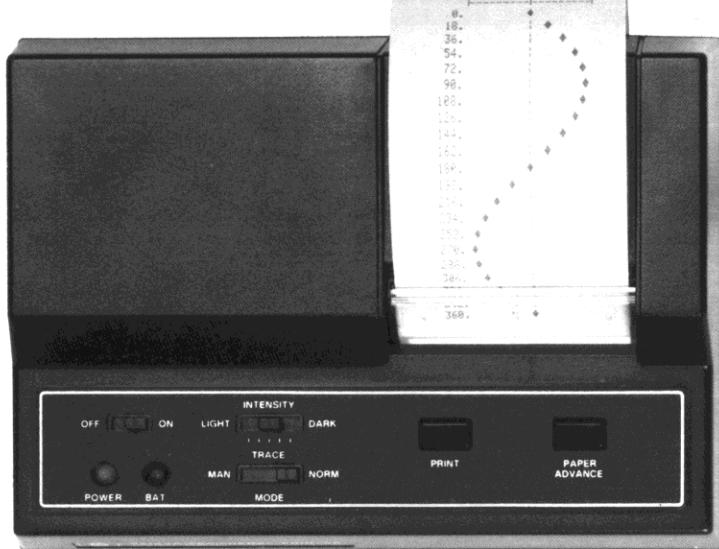
Memory Modules.

These handy Memory Modules can actually quintuple the HP-41's memory. Just plug in as many as you need—up to four—to increase data storage and program memory. Each Memory Module contains 64 data storage registers or up to 448 program bytes or any combination you select. Or, plug in one Quad Memory Module for 256 storage registers or 1,792 program bytes of additional memory. The three remaining ports in your HP-41C are free for peripherals or application modules.*

Like the calculator itself the Memory Modules have Continuous Memory. When installed in the HP-41C, a module maintains data and program lines even when the calculator is turned off.

Card Reader.

The HP-41 Card Reader is a valuable option which lets you save programs and data on small magnetic cards. This extra-smart Card Reader keeps track of cards as they are read and it even prompts you for the next card. A security feature permits a program to be run but not reviewed or altered through normal operations. An added bonus is that it also accepts program cards from the HP-67 and HP-97, although some programs may require additional Memory Modules.



Printer/Plotter
HP 82143A

Printer/Plotter.

The HP-41 Printer/Plotter is a whisper-quiet, battery-operable thermal printer which easily plugs into the calculator. It gives you numeric, upper- and lower-case alpha, double-wide characters, plotting capability, and intensity control for optimum contrast and readability. It even allows you to define your own "special" characters. Portable and lightweight, the HP-41

Printer/Plotter operates on batteries or ordinary house current, working when and where you need it.

The HP-41 Printer/Plotter is a valuable aid in editing programs or checking long calculations. You will see everything at once, clearly on tape.

Application Modules.

Each preprogrammed Application Module turns the HP-41 into an answer machine for a particular discipline. Whether you're an engineer or technician, student or scientist, business person or other professional, you'll find an Application Module to solve problems in your area of interest. Each comes with a comprehensive manual and, when applicable, a keyboard overlay. Areas of application include: Aviation, Clinical Lab and Nuclear Medicine, Circuit Analysis, Financial Decisions, Mathematics, Petroleum Fluids, Securities, Statistics, Structural Analysis, Surveying, and others...

Optical Wand.

The Wand allows you to load programs and data into the HP-41 quickly and easily. Plugged into one of the HP-41 ports, the Wand reads bar codes from a printed page, translating these codes into HP-41 program and data information and loading it into the calculator.

A Standard for Professionals.

The HP-41 is more than an impressive list of functions and options. It is a standard in personal calculators for professionals. Its power, flexibility, and ease-of-use are the result of a remarkable synthesis of the finest state-of-the-art developments and traditional Hewlett-Packard human engineering.

* Neither the HP-41C nor the HP-41CV memory capacity can exceed 319 registers. Users should not plug Memory Modules or Quad Memory Modules into an HP-41CV. Users should not plug more than one Quad Memory Module into the HP-41C. Exceeding the memory capacity of your HP-41 may damage your calculator.



Optical Wand
HP 82153A

HP-41 Software

HP-41C Software

The outstanding HP-41 features free you to focus on solutions. And Hewlett-Packard helps provide those solutions with unparalleled software support. You may find the solutions in your field in the form of Application Pacs or Solutions Books. HP-41 software has been carefully designed to effectively increase your problem-solving potential by adding power, flexibility, and versatility to your calculator. And HP-67 and HP-97 magnetic card pacs are compatible, although some programs require additional Memory Modules. By utilizing any of these software solutions you can make your calculator a highly specialized tool in seconds.

HP-41 Application Pacs

HP-41 Application Pacs are complete with detailed manuals including examples, and plug-in Application Modules that increase the versatility of the HP-41—adding to your personal decision-making potential.

Mathematics (00041-15003)

- Matrix Operations
- Solution to $f(x)=0$ on an Interval
- Polynomial Solutions/Evaluation
- Numerical Integration
- Differential Equations
- Fourier Series
- Complex Operations
- Hyperbolics
- Triangle Solutions
- Coordinate Transformations

Clinical Lab and Nuclear Medicine (00041-15024)

- Clinical Chemistry
 - Beer's Law
 - Body Surface Area
 - Creatinine Clearance
 - Blood Acid-Base Status
 - Oxygen Saturation and Content
 - Red Cell Indices
- Nuclear Medicine
 - Total Blood Volume
 - Thyroid Uptake
 - Radioactive Decay Corrections
- Radioimmunoassay
- Statistics
 - Basic Statistics
 - Chi-square Evaluation and Distribution
 - t Statistics
 - t Distribution

Circuit Analysis (00041-15006)

- General Network Analysis
- Ladder Network Analysis

Financial Decisions (00041-15004)

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

Securities (00041-15026)

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

Statistics (00041-15002)

- Basic Statistics for Two Variables
- Moments, Skewness and Kurtosis
- Analysis of Variance (One Way)
- Curve Fitting (Linear, Exponential, Logarithmic and Power Curve)
- Multiple Linear Regression
- Polynomial Regression
- t Statistics
- Chi-Square Evaluation
- Contingency Table
- Spearman's Rank Correlation Coefficient
- Normal and Inverse Normal Distribution
- Chi-Square Distribution

Stress Analysis for Mechanical Engineers (00041-15027)

- Section Properties
- Beams
- Simply Supported Continuous Beams
- Columns
- Mohr Circle Analysis
- Strain Gage Data Reduction
- Soderberg's Equation for Fatigue
- RPN Vector Calculator

Structural Analysis for Civil Engineering (00041-15021)

- Section Properties
- Beams
- Simply Supported Continuous Beams
- Settling of Continuous Beams
- Continuous Frame Analysis
- Steel Column Formula
- RPN Vector Calculator
- Reinforced Concrete Beams
- Concrete Columns
- Effective Moment of Inertia for Concrete Sections

Surveying (00041-15005)

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

Home Management (00041-15023)

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

Games (00041-15022)

- Submarine Hunt
- Space War
- Super Bagels
- Hangman
- Pinball

- Craps
- Biorhythms
- Random Number Generator

Machine Design (00041-15020)

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

Thermal and Transport Science (00041-15019)

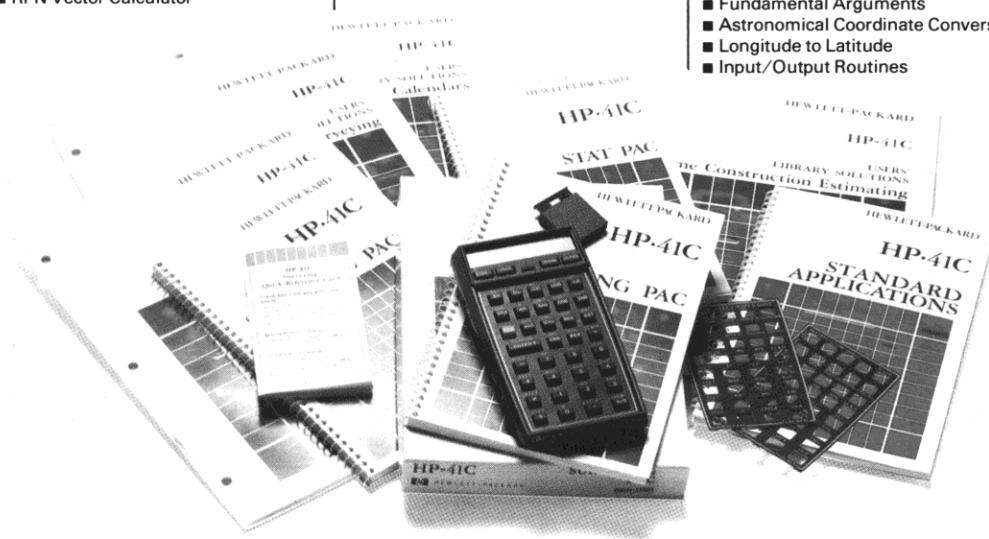
- Equations of State
- Polytropic Processes for an Ideal Gas
- Isentropic Flow for Ideal Gases
- Conduit Flow
- Energy Equation for Steady Flow
- Heat Exchangers
- Black Body Thermal Radiation

Aviation (00041-15018)

- Flight Management
- General Aircraft Weight and Balance
- Flight Plan
- Determining In-flight Winds
- Position by One or Two VORTS
- Mach Number and True Airspeed

Navigation (00041-15017)

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



Real Estate (00041-15016)

- Compound Interest and Loan Amortization
- Modified Internal Rate of Return
- Depreciation Schedules
- Income Property Analysis
- Graduated Payment Mortgage
- Wrap-Around Mortgage
- Home Owner's Equity Analysis
- The Rent or Buy Decision

Petroleum Fluids Pac (00041-15039)

- Z Factor
- Gas Isothermal Compressibility
- Gas Formation Volume Factor
- Gas Viscosity
- Pseudocritical Temperature and Pressure From Gas Gravity
- Gas Properties From Composition
- Oil Isothermal Compressibility
- Oil Formation Volume Factor
- Oil Viscosity
- Gas-Oil Ratio
- Gas Point Pressure
- Two-Phase Formation Volume Factor
- Water Isothermal Compressibility
- Water Formation Volume Factor
- Water Viscosity
- Gas-Water Ratio
- Rock Compressibility
- Total Isothermal Compressibility

HP-41 Solutions Books

HP-41 Solutions Books provide complete step-by-step keystroke listings, to help provide you with answers to your general or specialized programs. Printed bar code is available.

BUSINESS

Business Statistics / Marketing / Sales (00041-90094)

- Forecasting Using Exponential Smoothing
- Seasonal Variation Factors (SEVAR)
- Multiple Linear Regression
- Normal, t and F Distributions
- Basic Statistics for Two Variables
- Moving Average
- Breakeven Analysis
- Gompertz Curve and Trend Analysis
- Experience (learning) Curve for Manufacturing Cost
- Price Elasticity of Demand

Home Construction Estimating (00041-90096)

- Concrete Volume
- Linear to Board Feet Conversions and Costing
- Framing Board Feet
- Lumber Estimate
- Shingle Estimate
- Wall and Ceiling Areas Estimate
- Wallpaper Estimate
- Drywall and Insulation Estimate
- Sheathing and Subfloor Estimate
- Painting Estimate
- Wood Floor Estimate

Small Business (00041-90137)

- Hourly Payroll
- Invoicing
- Account Posting
- Tabulator
- Retail Inventory Monitor
- Estimating Inventory
- Inventory Ordering
- Order Point Calculations
- Working Capital Needs—Bardahl Formula
- Depreciation Schedules
- Breakeven Analysis

Lending, Savings and Leasing (00041-90086)

- Constant Payment to Principal Loan
- Rules of 78's
- Amortization Schedule
- Add-on to APR with Odd Days
- Savings Plan
- Interest Conversions
- Lease with Additional Payments in Advance
- Skipped Payments
- Compounding Periods Different from Payment Periods
- Compound Interest Solutions

Real Estate (00041-90136)

- Income Property Analysis
- Wrap-Around Mortgage
- Amount of Equity at Any Time
- Mortgage Yield
- Mortgage Pricing
- Investment Analysis for Property and Land
- Residential Analysis (Rent or Buy)
- Variable Analysis of Real Estate Investment
- Internal Rate of Return (IRR)
- Ellwood Income Valuation for Income Property Appraisal

COMPUTATION

Geometry (00041-90084)

- Sine Plate Solutions
- V Notches and Long Radii
- Internal and External Tapers
- Points of Tangency with Circles and Arcs
- Line-Line Intersection
- Points on a Straight Line
- Grid of Points: Calculates All Points
- Grid of Points: Calculates Discrete Points
- Tangent Circle to Two Straight Lines with a Given Radius
- Distance Between Lines in Space

High-Level Math (00041-90083)

- Sine, Cosine, Exponential Integrals
- Eigen value/vectors of 3rd Order Systems
- Eigen values for 3rd Order System
- Chebyshev, Legendre, Hermite, and Laguerre Polynomials
- Sixteen-Point Gaussian Quadrature
- Gamma Function
- Bessel Functions, Error Function
- Characteristic Equation of a 4×4 Matrix
- 4×4 Matrix Operations

Test Statistics (00041-90082)

- One Sample Test Statistics for the Mean

Test Statistics for the Correlation Coefficient

- Differences Among Proportions
- Behrens-Fisher Statistic
- Kruskal-Wallis Statistic
- Mean-Square Successive
- The Run Test for Randomness
- Intraclass Correlation Coefficient
- Fisher's Exact Test for a 2×2 Contingency Table
- Bartlett's Chi-Square Statistic
- Mann-Whitney Statistic
- Kendall's Coefficient of Concordance

ENGINEERING

Antennas (00041-90093)

- Loaded Vertical Antennas
- Loaded Dipole Antennas
- Gain of a Horizontal Rhombic Antenna at Zero Azimuth
- Azimuth Pattern of Cylindrical Array of Antennas
- Colinear Antenna Gain and Pattern
- Beam Pattern for Uniform Array
- Radar Antenna Beamwidth and Gain
- Antennas
- Parabolic Antenna Calculations
- RF Path Loss, dB
- Antenna Gain or Power of a Remote Transmitter
- Planar Phased Array Radar Beam Positions
- Short Wave Transmission Path Calculations

Chemical Engineering (00041-90100)

- Straight Fin Efficiency
- Conservation of Energy
- Hydrocarbon Combustion
- Heat Transfer through Composite Cylinders and Walls
- Von Karman Analogy for Heat and Mass Transfer
- Equations of State
- Reversible Polytropic Process for an Ideal Gas
- Conduit Flow
- Fluid Transport Numbers
- Single Stage Equilibrium Flash Calculation
- Weak Acid/Base Titration Curve

Civil Engineering (00041-90089)

- Steel Column Formula
- Reinforced Concrete Beams
- Stress in Thick-Walled Cylinders
- Properties of Special Sections
- Compressive Buckling
- Vectors
- Beams Fixed at Both Ends
- Simply Supported Beams
- Cantilever Beams
- Bolt Torque

Control Systems (00041-90092)

- Frequency Response of a Transfer Function
- Bode of Transfer Function that has Each Pole and Zero Given
- Bode of Third-Order Over Fourth-Order Transfer Function
- Bode of Third-Order Over Third-Order Times $S^{**}N$ Transfer Function

- Routh Test for Continuous and Discrete Time System Stability
- Convert Frequency Response—Open Loop, Closed Loop
- Aid to Root Locus Plots I—Real Poles
- Aid to Root Locus Plots II—Complex Poles
- Classical Control Gains
- First Order Regulator
- Second Order Regulator

Electrical Engineering (00041-90088)

- RC Timing
- Frequency Response of a Transfer Function
- Transistor Amplifier Performance
- Class A Transistor Amplifier Bias Optimization
- Active Filter Design
- Butterworth Filter Design
- Chebyshev Filter Design
- Bode Plot of Butterworth and Chebyshev Filters
- Transmission Line Calculation
- Transmission Line Impedance

Fluid Dynamics and Hydraulics (00041-90139)

- Conduit Flow
- Flow with a Free Surface
- Pipe Slide Rule
- Forces at Bends and Fittings
- Valve Sizing
- Pipe Network Analysis
- Restriction Metering Orifice Calculation
- Energy Equation for Steady Flow
- Compressible Flow in Ducts
- Flood Routing and Hydrographs

Heating, Ventilating, and Air Conditioning (00041-90140)

- Overall Heat Transfer Coefficient
- Insulation Break Even Analysis
- Air Flow in Circular Ducts
- Air Duct Conversion
- Equations of State
- Black Body Thermal Radiation
- Psychometric Properties
- Heat Exchangers
- Decibel Addition and Subtraction
- Temperature Conversions

Mechanical Engineering (00041-90090)

- Gear Forces
- Stress on an Element
- Equations of State
- Soderberg's Equation for Fatigue
- Spring Constant
- Progression of a Slider Crank
- Free Vibrations
- Interference Fits
- Linear or Angular Deformation
- Constant Acceleration

Solar Engineering (00041-90138)

- Solar-Beam Irradiation
- Sun Altitude, Azimuth, Solar Pond Absorption
- Energy Equivalents—Fuels and Prices
- Heat Exchangers

HP-41C Software

Solar Engineering (Cont.)

- View Factor
- Heat Transfer through Composite Cylinders and Walls
- Black Body Thermal Radiation
- Economic Breakeven for Solar Equipment
- Solar Panel Array
- Conduit Flow

OTHER

Calendars (00041-90145)

- Calendar Date/Julian Date Conversion
- Day of Year—Day of Week
- Number of Weekdays Between Two Dates
- In What Year is a Given Date an M-Day
- Number of M-Days Between Two Dates and Nth M-Day of Month
- Holidays
- Religious Holidays
- Chinese Years to/from Gregorian Years
- New Moon and Full Moon Day of Month
- Calendar Printout

Cardiac/Pulmonary (00041-90097)

- Pulmonary Functions/Vital Capacity
- Body Surface Area
- Blood Chem I
- Blood Chem II
- Cardiac Outputs

Chemical (00041-90102)

- Cardiac Shunts
- Contractility and Stroke Work
- Lung Diffusion
- Valve Area
- Ventilator Setup and Corrections (Radford)

Chemistry (00041-90102)

- pH of Weak Acid/Base Solutions
- Acid-Base Equilibrium (Diprotic)
- Weak Acid/Base Titration Curve
- Equations of State
- Van Der Waals Gas Law
- Beer's Law and Absorbivity Calculations
- Activity Coefficients from Potentiometric Data
- Crystallographic to Cartesian Coordinate Transformations
- Kinetics using Lineweaver-Burk or Hofstee Plots
- Mixture Viscosities

Games (00041-90099)

- Hexapawn
- Wari
- Wumpus
- 3-D Tic Tac Toe
- Planet Lander
- Orbital Lander
- Flip Flop
- Robot Trap
- Scatter
- Simon

Optometry I (General) (00041-90143)

- Aniseikonia
- Crossed Prism Resultant
- Oblique Cylinder Sum
- Acuity Demand from Letter Size and Working Distance
- Contact Lens, Telescope Calculations
- Calculation of Needed Magnification, Add, and Working Distance
- Effective, Equivalent and Neutralizing Power
- Positional Effective Power
- Pratt, Sheard, Percival Methods of Near Rx
- Four Accommodative R_x's and Their Average

Optometry II (Contact Lens) (00041-90144)

- Back Vertex Power of PMMA Contact Lens
- Effective Power of Spectacle Lenses at Corneal Plane
- Residual Cylinder Induced at Tear/Cornea Interface by Contact Lens
- Cylinder Induced by Toric Contact Lens
- Contact Lens Power Necessary to Correct Ametropia
- Toric Contact Lens Parameters
- Tabb Contact Lens of 1st Approximation

Surveying (00041-90141)

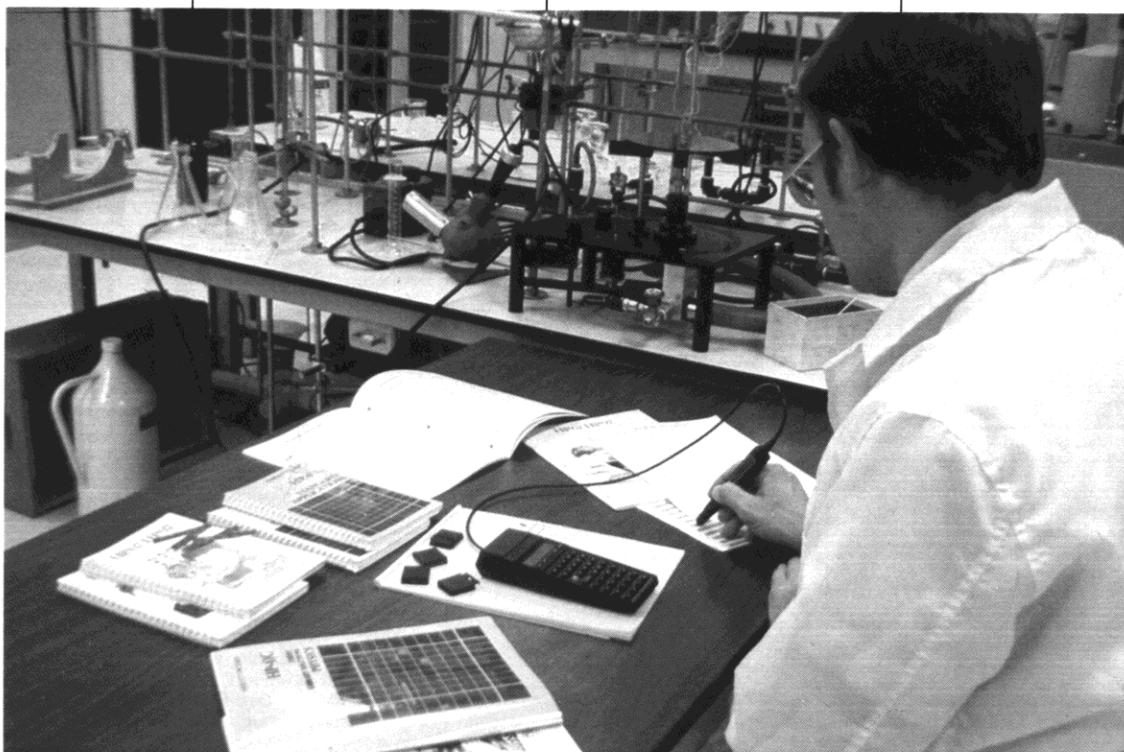
- May-Grant Contact Lens of 1st Approximation
- Roggenkamp Specifications for Prism Ballast Front Toric or Prism Ballast Contact Lens
- Brungardt I
- Brungardt II

Surveying (00041-90141)

- Spiral Curve Layout
- Two-Instrument Radial Survey
- EDM Slope Reduction
- Stadia Reduction
- Three Wire Leveling
- Azimuth of the Sun
- Taping Reduction
- Triangle Solutions
- Traverse for Auto Adjust Routines
- Auto Adjust for Compass Rule
- Auto Adjust for Crandall's Rule

Physics (00041-90142)

- Black Body Thermal Radiation
- Black Hole Characteristics
- Special Relativity Conversions
- Three-Dimensional Special Relativity
- Einstein's Twin Paradox
- Delta-V Orbit Simulator
- Equations of Motion
- Isotope Overlap Corrections
- Semi-Empirical Nuclear Mass Formula
- Clebsch-Gordon coefficients and 3j Symbols Evaluation
- 32-P Remaining on Day of Year



HP-32E HP-33C

Scientific with Statistics

Programmable Scientific with Continuous Memory

Extraordinary problem-solving power plus an unparalleled combination of keyboard and display functions.

HP-32E

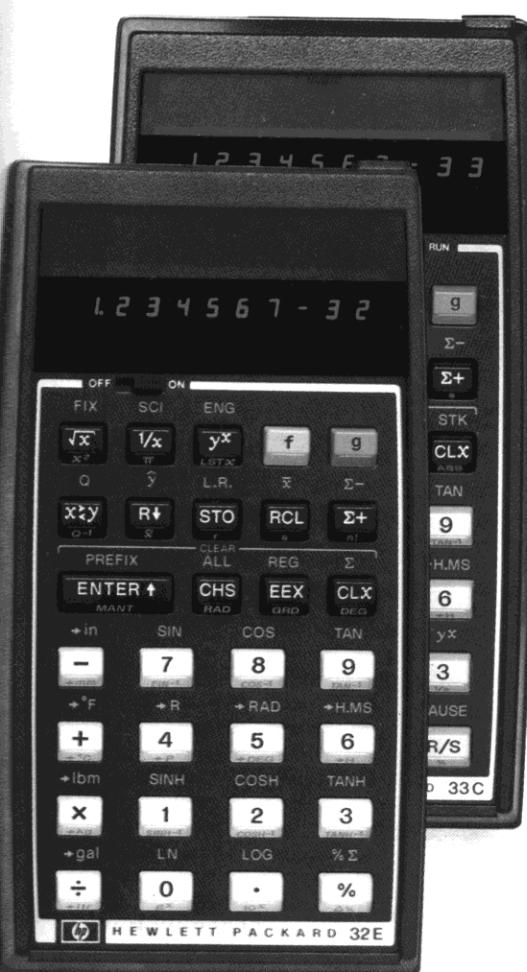
The HP-32E offers sophisticated statistics, as well as thorough scientific capability, at the touch of a key.

Statistics.

The HP-32E calculates means and standard deviations for one or two variables—with a keystroke. It lets you determine the slope and y-intercept of a least-squares line and compute the correlation coefficient. The HP-32E also has both "normal" and "inverse normal" distribution functions.

Data Accumulation and Correction.

Σ automatically accumulates Σx , Σy , Σxy , Σx^2 , and Σy^2 in designated storage registers. Correcting a data pair is easy.



15 Addressable Storage Registers.

The HP-32E has 15 addressable storage registers. In addition to storing and recalling data, you can also perform arithmetic operations on the contents of the registers.

Trigonometric Functions Including Hyperbolics.

Besides providing sine, cosine, and tangent and their inverses, the HP-32E also computes hyperbolic trigonometric functions (sinh, cosh, tanh and their inverses).

Rectangular/Polar Conversions and Vector Arithmetic.

The HP-32E quickly converts rectangular coordinates (x, y) to polar coordinates (r, θ), or vice versa. And vector arithmetic is easy using the rectangular/polar functions.

HP-33C

The HP-33C is a keystroke programmable calculator with fundamental programming capability as well as a complete set of preprogrammed scientific functions. Plus Continuous Memory, so you can key data and programs in once, and retain them even when the calculator is turned off.

Programming is Easy.

Programming the HP-33C is simple—just switch to PRGM and press a problem-solving series of keystrokes to be renumbered by the calculator. Then switch to RUN, key in any known data, and hit the run/stop key. The HP-33C does the rest, executing those keystrokes in a few seconds over and over. There's no complicated programming language to learn.

49 Lines of Program Memory.

The HP-33C remembers your program in a special memory—49 lines of it. And no matter whether a keyboard operation is one, two or three keystrokes, it occupies only a single line of memory, so you can easily load programs of 100 keystrokes or more.

Powerful Decision-Making Capability.

The HP-33C also has eight conditional tests for branching and the GTO (go to) command for unconditional branching.

Three Levels of Subroutines.

Using the GSB (go to subroutine) instruction, you can save memory and make your programs much more efficient. After a section of memory has been called up as a subroutine, a RTN (return) instruction then returns execution to the next line after the GSB call.

Fast, Easy Editing.

Besides being able to go to any line number with GTO, you can also use SST and BST to single step or back step through a program, *without* execution, to any point you want in program memory. Changing a program is easy too—you just key in a new instruction and it automatically replaces the old one.

Pause.

The PAUSE function in a program actually lets you see a result or an intermediate answer for a second before resuming execution.

Eight Addressable Storage Registers.

In addition to the 49-line program memory, the four-register stack, and the LAST X register, the HP-33C has 8 addressable storage registers for data. And you can perform storage register arithmetic on these addressable registers too.

HP-32E and HP-33C Physical Specifications:

■ Length:	140 mm (5.6")
■ Width:	75 mm (3.0")
■ Height:	30 mm (1.2")
■ Weight:	220g (7.7 oz)

For more details on features, see the Comparison Chart on page 18.

The HP-32E and HP-33C come complete with:

- Owner's Handbook
- "Solving Problems with your Hewlett-Packard Calculator" booklet.
- Recharger/AC adapter
- Rechargeable battery pack
- Soft carrying case
- Quick Reference Card (HP-33C only)
- Standard Applications Book

HP-33C Application Books

Mathematics (00033-90030)

Statistics (00033-90031)

Student Engineering (00033-90032)

Surveying (00033-90033)

HP-34C

Advanced Programmable Scientific
with Continuous Memory

Advanced keystroke programming plus computer strength Solve and Integrate keys.

Designed for technical professionals and students who need the flexibility and power of advanced programming to handle their frequent and repetitive problems, as well as a full set of preprogrammed scientific functions including "Solve" and "Integrate." And Continuous Memory, so you can key data and programs in once, and retain them even when the calculator is turned off.

Solve and Integrate.

The Solve and Integrate operations are the most advanced and powerful ever found on a handheld calculator. Yet both feature an ease of operation that must be seen to be appreciated. Solve finds the real roots of equations, and Integrate finds the definite integrals of any function which can be keyed into program memory. To use either Solve or Integrate begin by simply keying in the function you wish to evaluate. Then . . .

. . . to find a root, enter two guesses and put Solve to work for you. Even if your guesses don't bracket the root, Solve's sophisticated algorithm expands the search automatically. The HP-34C's

ability to find a root is one of the most advanced ever created—even compared to full scale computers. Imagine, *this* power in a personal, handheld product!

. . . to calculate an integral, enter the limits of integration and let the HP-34C take care of the laborious computations. The HP-34C's ability to find an integral was previously found only in large computer systems—it has never been this easy.

Dynamic Memory Allocation.

The HP-34C's memory allocation begins with 70 lines of program memory and 21 data storage registers. When you need more than 70 lines of program memory, the HP-34C *automatically* converts data registers, one at a time, to a maximum of 210 program lines—as you need them. And you don't have to remember current memory allocation. The HP-34C does that for you.

Programming and Editing.

Each fully-merged program instruction, whether one, two, or three keystrokes, requires only one line of program memory. This means the HP-34C's maximum of 210 program lines are comparable to as many as 370 program lines on other calculators. And editing is no problem. The HP-34C's editing keys let you easily review programs and insert or delete instructions as needed.

More Programming Features.

The HP-34C's 12 reusable address labels let you easily create branches and subroutines. With the conditional test set of four x/y comparisons, four x/0 comparisons, four flags, plus the increment/decrement loop counter, you can program the HP-34C to make a wide range of program control decisions. And, with the versatile I-register, you can indirectly address data and program locations.

Physical Specifications:

- Length: 140 mm (5.6")
- Width: 75 mm (3.0")
- Height: 30 mm (1.2")
- Weight: 220g (7.7 oz)

For a list of key features and functions, see the Comparison Chart on page 18.

The HP-34C Advanced Programmable Scientific with Continuous Memory comes complete with:

- HP-34C Owner's Handbook and Programming Guide
- "Solving Problems with your Hewlett-Packard Calculator" booklet
- HP-34C Standard Applications Book
- HP-34C Quick Reference Card
- Recharger/AC adapter
- Rechargeable battery pack
- Soft carrying case

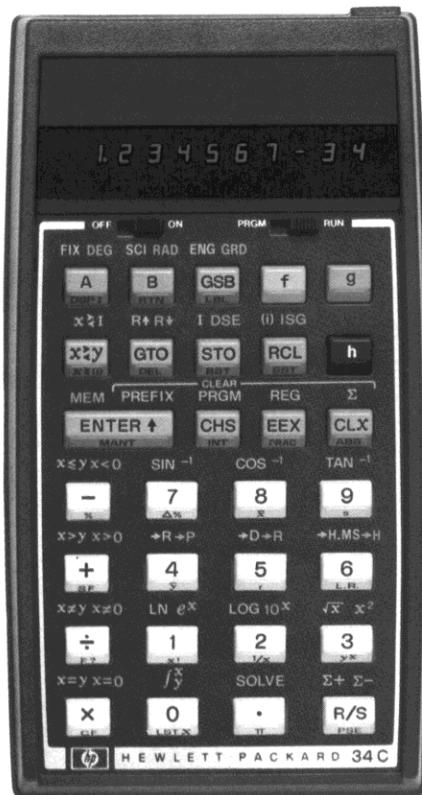
HP-34C Applications Books

Mathematics (00034-90032)

Statistics (00034-90033)

Surveying (00034-90034)

Student Engineering (00034-90035)



HP-37E HP-38C

Business

Advanced Financial Programmable With Continuous Memory

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

HP-37E

The HP-37E is a Series E/C calculator designed specifically for the residential real estate, retailing, and business professionals who need to make fundamental business and financial decisions quickly and accurately.

Simple, Complete Financial Functions.

In addition to built-in price and percent functions and advanced statistical functions, the HP-37E features the basic time and money functions; number of periods (n); interest (i); present value (PV); payment (PMT); and future value (FV). Ordinary or annuity due problems can also be directly calculated at the flip of a switch.



Amortization Schedules.

The HP-37E calculates an amortization schedule for any number of time periods.

Retail-Style Percent Functions.

Whether you're solving for percent, percent change, or percent of total, you'll appreciate the logical, consistent operation of the HP-37E. And the unique PRICE function calculates the selling price if you know the cost and the margin.

Seven Addressable Storage Registers.

Besides the five financial registers and the Hewlett-Packard four-register automatic memory stack, the HP-37E is equipped with seven other memories in which you can store or recall constants, answers, or any number you want to save during your calculations.

Statistics at Your Fingertips.

For research and analysis, the HP-37E is packed with useful statistical functions. The $\Sigma+$ key automatically accumulates the values needed to calculate the means (averages) and standard deviations for one or two sets of data.

The HP-37E also provides a linear regression, or trend line function and can compute the correlation coefficient. A factorial function is also available, as well as the unique *price* function to determine selling list price when only cost (net) and desired margin (discount) are known.

HP-38C

The HP-38C is a powerful financial calculator which provides capabilities that are invaluable to business professionals and students. The HP-38C offers all the financial capability of the HP-37E plus Continuous Memory, so you can key data and programs in once, and retain them even when the calculator is turned off.

Powerful Discounted Cash Flow Analysis.

The HP-38C calculates net present value (NPV) and internal rate of return (IRR) with even or uneven cash flows.

Easy, Instant Programming.

The HP-38C is so easy to use you'll be writing programs in minutes—or keying in prewritten programs available from one of the optional application books.

Dynamic Memory Allocation.

The HP-38C's memory allocation begins with 70 lines of program memory and 21 data storage registers. When you need more than 70 lines of program memory, the HP-38C automatically converts data registers, one at a time, to a maximum of 99 program lines—as you need them. And you

don't have to remember current memory allocation. The HP-38C does that for you.

A Handy 2000-Year Calendar.

The built-in HP-38C calendar can easily calculate the actual number of days between two dates on a 360- or 365-day year, day of the week, or a past or future date.

Statistics at the Press of a Key.

The HP-38C offers all of the statistical capability of the HP-37E plus linear estimate of x for a known y and x_w (weighted average).

HP-37E and HP-38C

Physical Specifications:

- Length: 140 mm (5.6")
- Width: 75 mm (3.0")
- Height: 30 mm (1.2")
- Weight: 220g (7.7 oz)

For a list of key features and functions, see the Comparison Chart on page 18.

The HP-37E and HP-38C come complete with:

- Owner's Handbook
- "Your HP Financial Calculator: An Introduction to Financial Concepts and Problem-Solving" booklet
- Recharger/AC adapter
- Rechargeable battery pack
- Soft carrying case
- Coupon for your choice of one of the following application books:
Real Estate
Real Estate II
Investment Analysis & Statistics
Lending, Savings & Leasing
Marketing & Forecasting
Personal Finance (HP-38C only)

HP-37E, HP-38C

Application Books

Real Estate (00038-90024)

Real Estate II (Income Property Analysis)
(00038-90051)

Lending, Savings, & Leasing
(00038-90025)

Investment Analysis & Statistics
(00038-90026)

Marketing & Forecasting (00038-90049)

Personal Finance (HP-38C only)
(00038-90052)

HP-67 HP-97

Handheld Fully Programmable

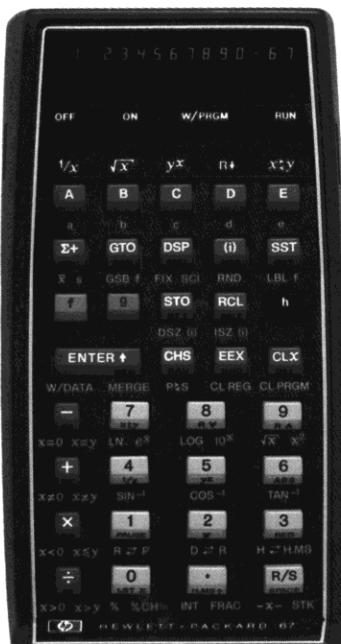
Desktop Fully Programmable Printing

Proven Performance in Fully Programmable Calculators.

These proven performance calculators are designed for the most demanding professionals and students who require programming power and versatility to handle multiple and lengthy business and scientific programs. The HP-67 provides the identical power of the HP-97 in the classic handheld size.

Exceptional power easily handles your lengthy, repetitive problems.

The HP-67/97 lets you write programs of up to 224 lines. Every function (one, two or three keystrokes) is merged to take only one line 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-67/97 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-67/97 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 line in the program, and to easily insert lines 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.

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

“Smart” Magnetic Card Reader.
With the magnetic card reader in both 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-67 and HP-97 automatically record the angular mode setting, the display setting and the status of the four flags.

10 User-Definable Keys.

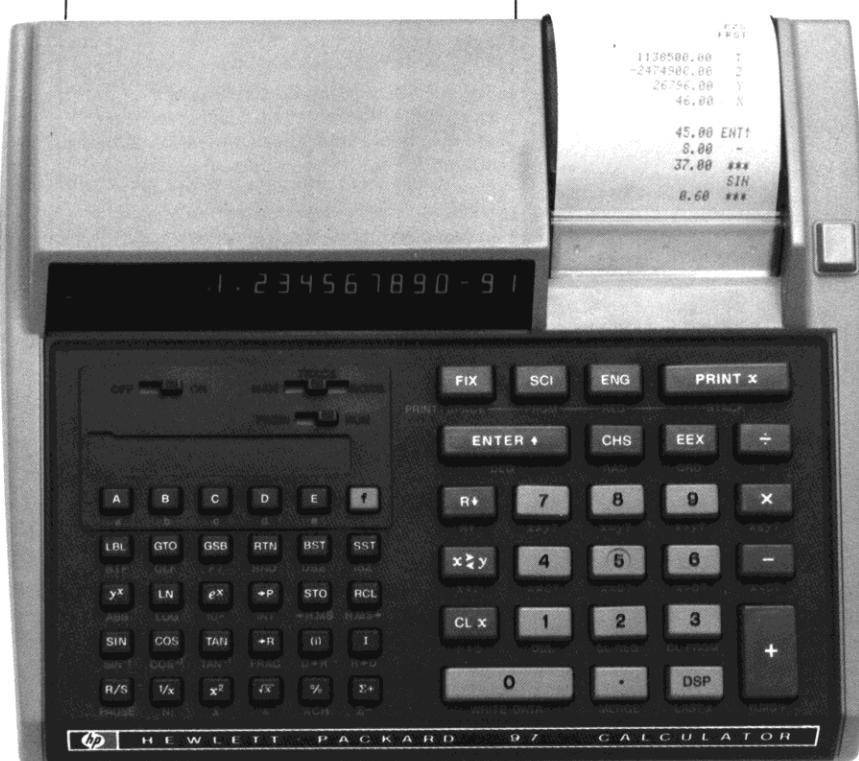
There are ten user-definable keys you can use for any special function you may require—such as defining portions of your program for subroutines or branches. In addition, there are ten numerical labels (LBL 0 through LBL 9).

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

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

Conditional Branching.

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.



Flags.

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

Indirect Addressing.

You can perform a direct branch or subroutine to a label specified by the current positive number in the I-register using several programming 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 lines specified.

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.

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—Quiet Thermal Printer lists your programs for checking and editing.

With the HP-97, you can list a program (line number, 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.

HP-67 Physical Specifications:

- Length: 152.4 mm (6")
- Width: 81 mm (3.2")
- Height: 18 to 34 mm (0.7 to 1.4")
- Weight: 298g (10.5 oz)
- Recharger weight: 241g (8.5 oz)
- Shipping weight: 2.3 kg (5.1 lb)
- Operating temperature range: 10°C to 40°C (50°F to 140°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 172-154V, 50 to 60 Hz
- Battery Power Requirement: 3.75 Vdc nickel cadmium rechargeable battery pack

HP-97 Physical Specifications:

- Width: 228 mm (9")
- Depth: 203 mm (8")
- Height: 63 mm (2.5")
- Weight: 1.13 kg (2.5 lb)
- Recharger weight: 268g (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

For a list of features and functions, see the Comparison Chart on page 18.

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

- Owner's Handbook and Programming Guide
- Quick Reference Card (HP-67 only)
- Standard Pac
- Battery pack
- Recharger/AC adapter
- Soft carrying case
- Programming pad
- Users' Library and newsletter subscription card
- 2 rolls of thermal paper (HP-97 only)

Application Pacs

Application Pacs contain 15 to 26 pre-printed, prerecorded program cards, a

program card holder and a manual of complete documentation.

Electrical Engineering Pac (00097-13131)

Business Decisions Pac (00097-13144)

Clinical Lab and Nuclear Medicine Pac (00097-13165)

Civil Engineering Pac (00097-13195)

Navigation Pac (00097-13205)

Surveying Pac (00097-13175)

Statistics Pac (00097-13111)

Math Pac (00097-13121)

Mechanical Engineering Pac (00097-13155)

Games Pac (00097-13185)

Note—67/97 programs will also work in the HP-41. Lengthy programs may require additional Memory Modules.



Comparison Chart

HP-12C HP-37E HP-38C HP-41C/CV HP-67/97 HP-11C HP-32E HP-33C HP-34C

Type of Calculator:

Business/Financial	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Scientific/Engineering		██████████	██████████	██████████	██████████	██████████	██████████	██████████
Programmable	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████

Operating Features:

Alpha display/keyboard	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Audible tones		██████████	██████████	██████████	██████████	██████████	██████████	██████████
Continuous Memory	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Maximum number of digits displayed	10	10	10	10	10	10	10	10
Rechargeable batteries/AC recharger	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
RPN logic system	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Storage register arithmetic	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████

Peripherals:

Card Reader	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Optical Wand		██████████	██████████	██████████	██████████	██████████	██████████	██████████
Printer/Plotter	████	██████████	██████████	██████████	██████████	██████████	██████████	██████████

Maximum Memory Size:

Maximum data registers	20	7	25	319*	26	21	15	8	21
Maximum program lines	99		99	2,233*	224	203		49	210

Programming Features:

Alpha program labels	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Alpha program lines		██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
Conditional tests	2		2	10	8	8		8	8
Controlled looping (DSE, ISG)	████	████	████	████	████	████	████	████	████
Flags		56		4	2			4	
Indirect addressing/control	████	████	████	████	████	████	████	████	████
Insert/Delete editing	████	████	████	████	████	████	████	████	████
Levels of subroutines		6		3	4		3	1	
Pause	████	████	████	████	████	████	████	████	████
Single- and backstep	████	████	████	████	████	████	████	████	████
Unconditional branching	████	████	████	████	████	████	████	████	████

General Functions:

$+, -, \times, \div, y^x, \sqrt{x}, \text{CHS}$	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
$\text{LN } x, e^x$	████	████	████	████	████	████	████	████	████
$\text{Log } x, 10^x$		████	████	████	████	████	████	████	████
x^2		████	████	████	████	████	████	████	████
π									
Absolute value	████	████	████	████	████	████	████	████	████
Integer/fraction truncation	████		████	████	████	████	████	████	████

HP-12C	HP-37E	HP-38C	HP-41C/CV	HP-67/97	HP-11C	HP-32E	HP-33C	HP-34C
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Business Functions:

Amortization	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Bond:								
Yield-to-maturity	■■■■■		■■■■■	■■■■■				
Price	■■■■■	■■■■■	■■■■■	■■■■■				
Calendar functions	■■■■■		■■■■■	■■■■■				
Depreciation	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■			
n, i, PV, PMT, FV	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■			
NPV/IRR	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Price	■■■■■		■■■■■	■■■■■				■■■■■
Simple interest	■■■■■		■■■■■	■■■■■				

Scientific Functions:

Decimal angle \leftrightarrow angle in degrees	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
(hrs)/min/sec	■■■■■							
Decimal/octal conversion	■■■■■							
Degrees \leftrightarrow radians	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Engineering notation	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Fixed and scientific notation	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Hyperbolics and inverses	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Integrate (numerical integration)	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Metric conversions	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Rectangular \leftrightarrow polar coordinates	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Solve (root finder)	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Trigonometric functions:								
Modes (degrees, radians, grads)	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Sin, Sin ⁻¹ , Cos, Cos ⁻¹ , Tan, Tan ⁻¹	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■

Statistical Functions:

Correlation coefficient	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Factorial function	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Gamma function	■■■■■		■■■■■	■■■■■	■■■■■			
Linear regression/estimate	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Mean (1- or 2-variable)	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Normal distribution	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Percent	■■■■■		■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Percent change	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Percent of total	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Permutations and combinations	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Random number generator	■■■■■		■■■■■	■■■■■	■■■■■		■■■■■	■■■■■
Standard deviation (1- or 2-variable)	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Summation (n, Σx , Σx^2 , Σy , Σy^2 , Σxy)	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■

Symbols: ■ Built-in feature or function.

- * The HP-41C has 441 program bytes built in or 63 data registers (expandable to 2,233 bytes or 319 data registers with Memory Modules). The HP-41CV has 2,233 program bytes built in.

s Available in software form.

Accessories

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

Hewlett-Packard provides the most extensive software and accessories for professional calculators.

Software:

- A. HP-11C/HP-12C Solutions Handbooks**—Refer to pages 6 and 7.
- B. HP-41 Application Pacs**—Refer to page 10 for a complete listing of HP-41 Application Pacs.
- C. HP-41 Solutions Books**—Refer to page 11 for a complete listing of HP-41 Solutions Books.
- D. HP-67/97 Application Pacs**—Refer to page 17 for a complete listing of HP-67/97 Application Pacs.
- E. Series E/C Application Books**
 - **HP-33C Application Books**—Refer to page 13 for a complete listing of HP-33C Application Books.
 - **HP-34C Application Books**—Refer to page 14 for a complete listing of HP-34C Application Books.
 - **HP-37E, HP-38C Application Books**—Refer to page 15 for a complete listing of HP-37E/HP-38E Application Books.

F. Owner's Handbooks

- **HP-11C**
00011-90001
- **HP-12C**
00012-90001
- **HP-32E**
00032-90001
- **HP-33E/C**
00033-90039
- **HP-34C**
00034-90001
- **HP-37E**
00037-90001
- **HP-38E/C**
00038-90038
- **HP-41**
00041-90313
- **82104A Card Reader**
82104-90001
- **82143A Printer/Plotter**
82143-90001
- **82153A Optical Wand**
82153-90001
- **HP-67**
00067-90011
- **HP-97**
00097-90001



Accessories: Optional and Replacement

G. HP-41 Accessories

- **HP-41C Memory Module**
82106A
- **HP-41C Quad Memory Module**
82170A
- **HP-41 Standard Module**
00041-15001
- **HP-41 Overlay Kit**
82152A
- **HP-41 Module Holders (2)**
82151A
- **Multipurpose Rechargeable Battery Pack**
82120A
- **HP-41 50 Blank Overlays**
82172A
- **HP-41 "Creating Your Own Bar Code" Manual**
82153-90019

H. Battery Pack

- **HP-31E, HP-32E, HP-33E/C, HP-34C, HP-37E, HP-38E/C**
82109A
- **HP-10, HP-19C**
82052A
- **HP-21, HP-22, HP-25, HP-25C, HP-27, HP-29C**
82019B
- **HP-35, HP-45, HP-55, HP-65, HP-67, HP-70, HP-80**
82001B
- **HP-91, HP-92, HP-97, 82143A Printer/Plotter**
82033A

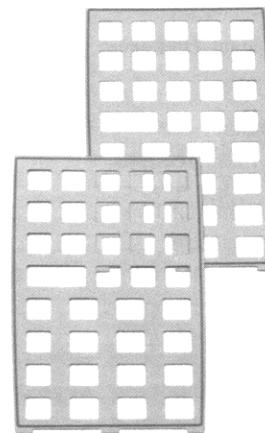
I. Reserve Power Pack

Keeps a spare battery pack fully charged. Comes complete with a spare battery pack. A built-in light emitting diode tells you that the battery pack is recharging.

- **HP-31E, HP-32E, HP-33E/C, HP-34C, HP-37E, HP-38E/C**
82103A
- **HP-35, HP-45, HP-55, HP-65, HP-67, HP-70, HP-80**
82004A
- **HP-21, HP-22, HP-25, HP-25C, HP-27, HP-29C**
82028B
- **HP-91, HP-92, HP-97, 82143A Printer/Plotter**
82037A

J. Recharger/AC Adapter

- **HP-31E, HP-32E, HP-33E/C, HP-34C, HP-37E, HP-38E/C**
82087B (110 Vac)
82090B (220 Vac)
- **HP-35, HP-45, HP-55, HP-65, HP-67, HP-70, HP-80**
82002A (110/220 Vac)



- HP-10, HP-19C, HP-91, HP-92, HP-97, 82120A, 82143A Printer/Plotter 82059B (110 Vac) 82066B (Euro 220 Vac)
- HP-21, HP-22, HP-25, HP-25C, HP-27, HP-29C 82041A (110 Vac) 82026A (110/220 Vac Switchable)

K. Security Cable

When leaving your HP calculator unattended in the office or lab you can help guard it against theft or unauthorized borrowing by means of a ruggedly constructed security cable.

- Security Cable for HP-10*, HP-19C*, HP-91, HP-92, HP-97, 82143A Printer/Plotter (Cable) 82044A

L. Soft Vinyl Case

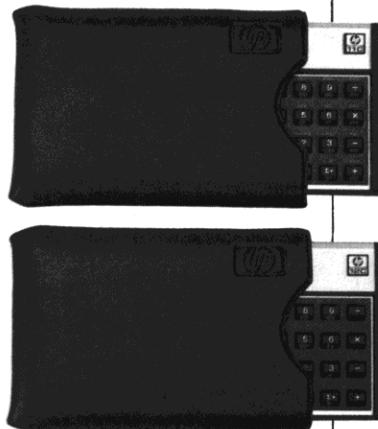
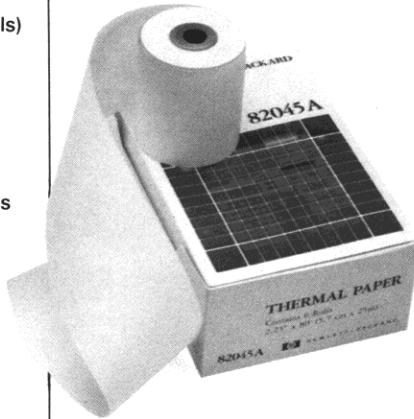
- HP-11C, HP-12C 82174A
- HP-31E, HP-32E, HP-33E/C, HP-34C, HP-37E, HP-38E/C 82110A
- HP-41 (Plus Card Reader 82104A) 82111A
- HP-67, HP-65 82053A
- HP-91, HP-92, HP-97 82035A
- HP-29C 82027A
- HP-10, HP-19C 82064A

M. Calculator/Printer Supplies

- Blank Program Cards HP-65, HP-67, HP-97, 82104A Card Reader 40 card pac with holder 00097-13141 120 card pac with 3 holders 00097-13143 1000 card pac (no holders) 00097-13206
- Program Card Holders (3) HP-65, HP-67, HP-97, 82104A Card Reader 00097-13142
- Program Pad HP-11C, HP-12C, HP-19C HP-25, HP-25C, HP-29C, HP-33E/C, HP-34C, HP-38E/C, HP-41, HP-55, HP-65, HP-67, HP-97 00097-13154

- Thermal Printing Paper (6 rolls) HP-10, HP-19C 82051A HP-91, HP-92, HP-97, 82143A Printer/Plotter 82045A

* Available only for later models with spring-loaded latch.





*When performance must
be measured by results*



**HEWLETT
PACKARD**

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Corvallis, OR 97330 U.S.A.

Printed in U.S.A. 11/81

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Jardim Sao Pedro
Caixa Postal 1349
13100 Campinas, SP

Canada

Hewlett-Packard
(Canada) Ltd.
6877 Goreway Drive
Mississauga, Ontario
L4V1M8

**Europe, North Africa
Middle East**

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Geneva, Switzerland

Hong Kong

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5th & 6th Floors
Sun Hung Kai Centre
30 Harbour Road
Hong Kong

Japan

Yokogawa-Hewlett-Packard Ltd.
29-21, Takaido-Higashi
3-chome
Suginami-ku, Tokyo 168

New Zealand

Hewlett-Packard (N.Z.) Ltd.
P.O. Box 9443
Kilbirnie, Wellington 3

Singapore

Hewlett-Packard
Singapore (Pty.) Ltd.
Alexandra Post Office
P.O. Box 58, Singapore 9115

South Africa

Hewlett-Packard SA
(Pty.) Ltd.
Private Bag, Wendywood
Sandton, Transvaal, 2144
South Africa

United States

Hewlett-Packard
Corvallis Division
1000 N.E. Circle Blvd.
Corvallis, Oregon 97330

Other Countries

Hewlett-Packard
Intercontinental
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Palo Alto, California 94304
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