PRE-RECORDED PROGRAM CARDS CHANGE YOUR PERSONAL "COMPUTER" INTO A *SPECIALIZED* CALCULATOR

They turn your complex, lengthy or repetitive calculations into a few simple steps anyone can do quickly.

THREE NEW PACS

Standard Pac

The Standard Pac is *included* in the HP-65 Outfit.

Demonstrates the versatility of the HP-65. Also provides cards to diagnose functions and to clean the read-program head. The Standard Pac consists of the following cards:

■ **DAY OF THE WEEK.** Calculates the day of the week for any date since September 14, 1752.

■ **MEAN, STANDARD DEVIATION, STANDARD ERROR.** Computes the mean, standard deviation and standard error when given a set of data.

■ **GREAT CIRCLE NAVIGATION.** When given the coordinates of two points on the globe, calculates the great circle distance between them and the initial heading.

■ **INTEGER BASE CONVERSION.** Converts an integer of one base to an equivalent integer of a second base. (Both bases must be in the range 2 to 10.)

■ **BODY SURFACE AREA (BOYD).** Calculates the body surface area when given a person's height and weight. With additional data of cardiac output, also calculates the cardiac index.

■ **PI NETWORK IMPEDANCE MATCHING.** Computes element values for a lossless PI network given desired input and output impedance Z_i and Z_2, operating frequency f, and quality factor Q.

■ **EDM SLOPE REDUCTION—GIVEN ELEVATION.** Reduces slope distance to horizontal distance at the instrument point elevation, after considering the earth's curvature.

■ **TEMPERATURE CONVERSION.** Converts interchangeably between degrees Kelvin, Fahrenheit, Celsius (centigrade), and Rankine.

■ **WEIGHT-MASS CONVERSION.** Converts interchangeably between grams, kilograms, pounds, ounces and slugs.

■ **VOLUME CONVERSIONS.** Converts interchangeably between U.S. gallons, Imperial gallons, cubic inches, cubic centimeters and liters.

■ **COMPOUND INTEREST.** Computes the fourth given three of the following—interest, number of periods, present value or future value.

■ **LOAN REPAYMENT.** Given the interest rate and the number of payment periods, calculates the present value given a payment, or vice versa.

■ **RECONCILE CHECKING ACCOUNT.** Aids in balancing checkbook against bank statement.

■ **ITERATIVE SOLUTION OF f(x) = 0.** Finds the zeros for equations of the form f(x) = 0 by choosing better and better approximations.

■ **QUADRATIC EQUATION.** Finds either real or complex roots of quadratic equations.

■ **AREAS, AND SOLUTIONS OF RIGHT TRIANGLE.** Calculates areas of circles, elipses, rectangles, triangles, and combinations thereof. Also finds the third side of a right triangle, given the other two.

■ **THE GAME OF NIMB.** A game of logic which the user can play against the HP-65.

■ **USER DIAGNOSTIC PROGRAM I.** Checks condition of various HP-65 functions: flags, relational operators, decrement and skip on zero, subroutine calls and tangent.

■ **USER DIAGNOSTIC PROGRAM II.** Diagnoses arithmetic functions; "f," "Inverse f" and "g" functions on 0-9 and decimal point; registers 6 and 8; Change Sign and Enter Exponent functions, and Run/Stop control.

■ **HEAD CLEANING CARD.** An abrasive (and unrecorded) card designed to clean the read-program head. (Used infrequently.)

A TOTAL OF 19 PRE-RECORDED CARDS.
20 blank magnetic cards are also included.

Finance Pac I

NEW

Addresses frequently encountered problems in personal and business finance.

■ **COMPOUND AMOUNT.** Solves for number of time periods, interest rate, present value or future value in compound interest problems.

■ **DIRECT REDUCTION LOAN.** (Two magnetic cards.) Given the interest rate, solves for number of time periods, loan amount, or payment amount of a direct reduction loan (*e.g.,* mortgage loan). Second program solves for the interest rate.

■ **DIRECT REDUCTION LOAN WITH BALLOON PAYMENT.** (Two magnetic cards.) Given the interest rate, solves for number of time periods, payment amount, present value or balloon payment amount for direct reduction loans terminated by a balloon payment. Second program solves for the interest rate.

■ **SINKING FUND.** (Two magnetic cards.) Given the interest rate, solves for number of time periods, payment amount, or future value of a sinking fund. Second program solves for the interest rate.

■ **PERIODIC SAVINGS, ANNUITY DUE.** (Two magnetic cards.) Similar to SINKING FUND program, except payments are annuity due (payments in advance) instead of ordinary annuity (payments in arrears).

■ **PRESENT VALUE, ANNUITY DUE.** (Two magnetic cards.) Similar to DIRECT REDUCTION LOAN program, except payments are "in advance" (annuity due).

■ **PRESENT VALUE, ANNUITY DUE WITH BALLOON PAYMENT.** (Two magnetic cards.) Similar to DIRECT REDUCTION LOAN WITH BALLOON PAYMENT program, except payments are "in advance" (*e.g.,* leases).

■ **SAVINGS-COMPOUND PERIODS DIFFERENT FROM PAYMENT PERIODS.** Calculates future value or payment amount of a savings fund when compounding periods and payment periods occur at different frequencies.

■ **NOMINAL TO EFFECTIVE/EFFECTIVE TO NOMINAL RATE CONVERSION.** Converts between nominal annual interest rates and effective annual interest rates (higher because of the compounding effect). Also handles continuous compounding.

■ **DIRECT REDUCTION LOAN ACCUMULATED INTEREST/REMAINING BALANCE.** Finds total interest paid over a specified number of payment periods. Calculates remaining balance at the end of the last specified period.

■ **DIRECT REDUCTION LOAN AMORTIZATION SCHEDULE.** Computes payment to interest, payment to principal, remaining balance and total interest paid to date for each payment of a loan.

■ **ADD-ON RATE INSTALLMENT LOAN.** (Two magnetic cards.) Calculates monthly payment amount, total finance charge, and annual percentage rate (APR) for an add-on rate loan. Handles "odd days" interest, where the time until first payment is more than one month.

■ **CONSTANT PAYMENT TO PRINCIPAL LOAN AMORTIZATION SCHEDULE.** Finds the payment to interest, total payment, remaining balance and total interest to date for each payment of a constant payment to principal loan.

■ **INTEREST REBATE—RULE OF 78's.** Computes the unearned interest (rebate) and remaining principal balance of a loan using the Rule of 78's method.

■ **INTERNAL RATE OF RETURN, UNEVEN CASH FLOWS.** (Three magnetic cards.) First program (two cards) calculates the internal rate of return of an initial investment and up to 12 positive cash flows. Second program handles up to seven positive or negative cash flows.

■ **DISCOUNTED CASH FLOW ANALYSIS.** Given a minimum desired yield (discount rate), solves for the net present value of an investment and its future cash flows.

■ **STRAIGHT LINE DEPRECIATION SCHEDULE.** Calculates depreciation amount, remaining depreciable value, remaining book value and total depreciation to date for each year of an asset's life, using the straight line method.

■ **SUM-OF-THE-YEARS'-DIGITS DEPRECIATION SCHEDULE** . Similar to STRAIGHT LINE, except sum-of-the-years'-digits method is used.

■ **VARIABLE RATE DECLINING BALANCE DEPRECIATION SCHEDULE.** Similar to STRAIGHT LINE, except variable rate declining balance method is used.

■ **CROSSOVER POINT-DECLINING BALANCE TO STRAIGHT LINE.** Calculates the year that crossover should be made from the declining balance to the straight line depreciation method, and the remaining life and book value at that point.

■ **DAYS BETWEEN DATES.** (Two magnetic cards.) Finds the actual number of days between any two dates occurring between 1901 and 2099. Second program uses the 30/360 convention (30-day month, 360-day year) to find the number of days.

■ **BOND PRICE AND YIELD.** (Three magnetic cards.) Using traditional formulas, these programs calculate the price and yield (to maturity or to call) of periodic coupon bonds. First program calculates bond price, second and third calculate yield depending on number of remaining coupon periods. These programs may be used in conjunction with DAYS BETWEEN DATES programs.

■ **ACCRUED SIMPLE INTEREST.** Computes the amount of simple interest accrued on either a 360- or 365-day basis.

■ **LINEAR REGRESSION (TREND LINE).** Given a series of x,y data pairs, calculates the equation of the regression line (y = mx + b) and the coefficient of determination. Program will project estimates of y for given x values.

■ **EXPONENTIAL CURVE FIT (GROWTH CURVE).** Performs a least squares regression on x,y data pairs to determine best exponential curve fit and coefficient of determination. Projects y values for given x values.

■ **TOTAL, AVERAGE AND PERCENT OF TOTAL.** Computes the total, each item's percent of the total, and the average value of up to eight items.

■ **MOVING AVERAGES.** Calculates a two to six unit moving average for a series of data values.

■ **INVOICING.** Finds net line totals given the number of units, price per unit and discount rate (optional). Maintains running sub-total and grand total.

A TOTAL OF 40 PRE-RECORDED CARDS.
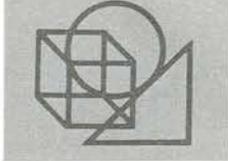
Math Pac 1

■ **HYPERBOLIC FUNCTIONS.** This program computes the hyperbolic functions . . . sinh, cosh, tanh, csch, sech and coth.

■ **FIRST ORDER DIFFERENTIAL EQUATION.** This program may be used to solve a wide variety of first order differential equations numerically, using the third order Runge-Kutta method.

■ **SOLUTION OF AN OBLIQUE TRIANGLE (Given a,b,c or a,b,C).** Given the three sides, or two sides and their included angle, this program finds the remaining unknown side(s) and angle(s).

■ **3 X 3 MATRIX INVERSION.** Finds the inverse of a given 3 X 3 matrix, in conjunction with DETERMINANT AND CHARACTERISTIC EQUATION OF A 3 X 3 MATRIX program.

■ **FIFTH DEGREE POLYNOMIAL EQUATION.** Finds one real root of a fifth degree polynomial equation with real coefficients, then reduces the equation to a fourth degree polynomial equation which may be solved by FOURTH DEGREE POLYNOMINAL EQUATION program.

■ **FACTORS OF AN INTEGER.** This program finds all prime factors of a positive integer and, therefore, determines if the number is a prime factor.

■ **GREATEST COMMON DIVISOR, LEAST COMMON MULTIPLE.** Computes the greatest common divisor (GCD) and the least common multiple (LCM) for two given integers: A, B. Also finds integral coefficients S and T such that GCD (A, B) = SA + TB.

■ **ARITHMETIC AND HARMONIC PROGRESSIONS.** Provides options to: (1) display the terms of an arithmetic progression; (2) find a particular term of an arithmetic progression; (3) find the sum of an arithmetic progression; (4) display the terms of a harmonic progression.

■ **GEOMETRIC PROGRESSION.** Can be used to: (1) display the terms of a geometric progression; (2) find the value of a particular term of a geometric progression; (3) find the sum of the first n terms of a geometric progression; (4) find the infinite sum of a geometric progression if the ratio of two successive terms has an absolute value less than one.

■ **FUNCTIONS OF x AND y.** Can be used to find: (1) y raised to the x power for any real y and x (if y is negative, x must be an integer); (2) logarithms of y to base x; (3) y (mod x) = y — x (integer part of [y/x]) ; (4) permutations of y things taken x at a time; (5) combinations of y things taken x at a time.

■ **QUADRATIC EQUATION.** Finds the roots (real and/or imaginary) of a quadratic equation.

■ **CUBIC EQUATION.** Extracts a real root from the cubic equation, reducing it to a quadratic equation. (Then use QUADRATIC EQUATION program.)

■ **FOURTH DEGREE POLYNOMIAL EQUATION.** Can be used with the above two programs to find the roots (real and/or imaginary) of a fourth degree polynomial equation with real coefficients.

■ **SIMULTANEOUS EQUATIONS IN TWO UNKNOWNS.** Finds the solution for two simultaneous linear equations in two unknowns.

■ **SIMULTANEOUS EQUATIONS IN THREE UNKNOWNS.** Finds the solution for three simultaneous linear equations in three unknowns.

■ **SYNTHETIC DIVISION.** Performs synthetic division on a polynomial of degree seven or less with real coefficients.

■ **RECTANGULAR, SPHERICAL CONVERSIONS.** Converts rectangular coordinates to spherical coordinates, and vice versa.

■ **TRANSLATION AND/OR ROTATION OF COORDINATE AXES.** Finds the new coordinates for a point whose coordinate axes have either been rotated, translated or both.

■ **ANGLE CONVERSIONS.** Converts an angle in one angular unit to another angular unit. Angles can be expressed in degrees, radians, grads or mils.

■ **SECONDARY VALUES OF $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$.** Computes secondary values of arc sine, arc cosine and arc tangent. Angles can be in degrees, radians or grads.

■ **TRIGONOMETRIC FUNCTIONS.** Provides options to compute the values of cotangent, secant or cosecant, and their inverses.

■ **INVERSE HYPERBOLIC FUNCTIONS.** Computes the inverse of sinh, cosh, tanh, cosch, sech and coth.

■ **SOLUTION OF A TRIANGLE (Given a, A, C or a, B, C).** Given either one side, the opposite angle and an adjacent angle, or else one side and two adjacent angles, this program finds the remaining angle(s) and side(s) of an oblique triangle.

■ **SOLUTION OF A TRIANGLE (Given B, b, c).** Given an angle, opposite side, and an adjacent side, this program finds the remaining side and angles of an oblique triangle.

■ **SPHERICAL TRIANGLE SOLUTION. (Given A, b, c, or a, b, c.)** Given either two sides and their included angle, or three sides, this program finds the remaining unknowns.

■ **AREA OF A TRIANGLE.** Finds the area of a triangle, given either (1) three sides, (2) two sides and their included angle, (3) one side and its adjacent angle, or (4) the coordinates of the vertices.

■ **AREA OF A POLYGON.** Finds the area of a polygon (convex or concave), given the coordinates of the vertices.

■ **CIRCLE DETERMINED BY THREE POINTS.** Solves for the radius and center point of a circle drawn through three distinct points.

■ **EQUALLY SPACED POINTS ON A CIRCLE.** Given the radius, the center point and the initial angle, this program yields the coordinates of n equally spaced points on a circle (n is a given positive number).

■ **POLYGONS INSCRIBED IN AND CIRCUMSCRIBED ABOUT A CIRCLE.** Given the number of sides of a regular polygon inscribed in a circle or circumscribed about a circle, this program finds the lengths of the sides and the area of the polygon.

■ **UNIT CONVERSIONS: C → F; ft, in → cm; lb → kg.** Performs units conversions between: (1) centigrate and Fahrenheit, (2) feet, inches and centimeters, and (3) pounds and kilograms.

■ **UNIT CONVERSIONS: mi → km; gal → ltr; yd → m; ac → ft².** Performs unit conversions between: (1) miles and kilometers, (2) gallons and liters, (3) yards and meters, and (4) acres and square feet.

■ **POLYNOMIAL EVALUATION (Real).** Evaluates polynomials with real coefficients. The degree of the polynomial must be equal to or less than eight.

■ **LINEAR AND LAGRANGIAN INTERPOLATIONS.** Linear or Lagrangian Interpolation formula Is used for data points in the region of tabulated data.

■ **FINITE DIFFERENCE INTERPOLATION.** Interpolates for data points in the region of tabulated data for uniformly spaced abscissas, with a specified spacing. The equation used is the backward interpolation formula of Gauss, which uses pairs of data points and sets up the cubic equation for interpolation.

■ **NUMERICAL INTEGRATION (Discrete Case).** Approximates definite integrals by the trapezoidal rule, or by Simpson's Rule. The values of the function at evaluation points are all that must be known.

■ **SIMPSON'S RULE FOR NUMERICAL INTEGRATION.** Approximates definite integrals by Simpson's Rule.

■ **ROOTS OF f (X) = 0 IN AN INTERVAL.** Uses the principle of interval-halving to find real roots of an equation in a closed interval. The equation may be algebraic, rational or transcendental.

■ **DETERMINANT AND CHARACTERISTIC EQUATION OF A 3 X 3 MATRIX.** Finds the determinant and coefficients of the characteristic equation of a 3 X 3 matrix.

■ **2 X 2 MATRIX OPERATIONS.** Performs addition, subtraction and multiplication of 2 X 2 matrices.

A TOTAL OF 40 PRE-RECORDED CARDS.
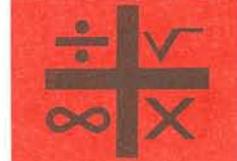
Math Pac 2

This Pac provides a variety of advanced mathematical functions, including:

■ **BASE CONVERSION.** This program converts positive decimal numbers to equivalent numbers in another base A. It also converts positive numbers of base A to decimal numbers. The base A may be any integer from 2 through 99.

■ **COMPLEX FUNCTIONS $|z|$, z^2, $\sqrt{z}$, $1/z$.** This program performs absolute value, square, square root, and reciprocal operations for complex numbers.

■ **GAUSSIAN QUADRATURE FOR $\int_a^b f(x)dx$.** (Two magnetic cards.) For a finite range between a and b, this program computes the integral of the single-valued function f(x) by the six-point Gauss-Legendre quadrature formula.

■ **BESSEL FUNCTION $J_n(x)$.** Computes the value of the Bessel Function $J_n(x)$ of first kind with an integer order n.

■ **COMPLETE ELLIPTIC INTEGRALS.** Computes the generalized complete elliptic integral of the second kind. Special cases include the complete elliptic integral of the first kind.

■ **COMPLEX ARITHMETIC.** Performs addition, subtraction, multiplication and division of complex numbers.

■ **COMPLEX TRIGONOMETRIC AND HYPERBOLIC FUNCTIONS.** (Three magnetic cards.) sin z, sinh z csc z, csch z; cos z, cosh z , sec z, sech z; tan z, tanh z, cot z, coth z.

■ **COMPLEX INVERSE TRIGONOMETRIC AND HYPERBOLIC FUNCTIONS.** (Three magnetic cards.) $\sin^{-1} z$, $\sinh^{-1} z$, $\csc^{-1} z$, $\operatorname{csch}^{-1} z$; $\cos^{-1} z$, $\cosh^{-1} z$, $\sec^{-1} z$, $\operatorname{sech}^{-1} z$; $\tan^{-1} z$, $\tanh^{-1} z$, $\cot^{-1} z$, $\coth^{-1} z$.

Other programs are:

■ OCTAL ARITHMETIC.

■ INTEGER BASE CONVERSION.

■ COMPLEX FUNCTIONS z^n, $z^{1/n}$.

■ COMPLEX FUNCTIONS e^z, ln z, a^z, $\log{}_a z$.

■ COMPLEX FUNCTIONS z^w, $z^{1/w}$, $\log_z w$.

■ POLYNOMIAL EVALUATION (Complex).

■ INTERSECTIONS OF A LINE AND A CONIC SECTION. (Two magnetic cards.)

■ VECTOR PRODUCTS AND ANGLE BETWEEN VECTORS.

■ PARTIAL SUM AND PARTIAL PRODUCT.

■ GAUSSIAN QUADRATURE FOR $\int_a^\infty f(x)dx$.

■ KELVIN FUNCTIONS.

■ EULER Φ FUNCTION.

■ GAMMA FUNCTION. (Two magnetic cards.)

■ INCOMPLETE GAMMA FUNCTION.

■ ERROR FUNCTION AND COMPLEMENTARY ERROR FUNCTION.

■ CONFLUENT HYPERGEOMETRIC FUNCTION.

■ GAUSSIAN HYPERGEOMETRIC FUNCTION.

■ CHEBYSHEV POLYNOMIAL.

■ LEGENDRE POLYNOMIAL.

■ HERMITE POLYNOMIAL.

■ LAGUERRE POLYNOMIAL.

■ SINE INTEGRAL.

■ COSINE INTEGRAL.

■ EXPONENTIAL INTEGRAL.

■ FRESNEL INTEGRALS.

A TOTAL OF 40 PRE-RECORDED CARDS.
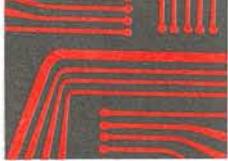
EE Pac I

This pac provides a variety of programs for use in electronic and electrical engineering projects.

■ **REACTANCE CHART.** This program determines the missing value in the relation

$$f = \frac{1}{2\pi\sqrt{LC}},$$

given any two of the three variables.

■ **IMPEDANCE OF LADDER NETWORK.** This program computes the input impedance of an arbitrarily long ladder network containing series or shunt R, L, and C.

■ **TRANSMISSION LINE IMPEDANCE TRANSFORMATION.** This program computes the input impedance of a length l of transmission line of characteristic impedance Z_o terminated in Z_t.

This problem is commonly solved graphically on a Smith Chart.

■ **S ⇆ Y PARAMETER CONVERSION.** (Two magnetic cards.) This program converts complex two-port s-parameters to y-parameters and vice-versa.

■ **FOURIER SERIES.** This program computes the Fourier coefficients given a large enough number of samples of a periodic function.

Other programs are:

■ SERIES RESONANT CIRCUIT.
■ PARALLEL RESONANT CIRCUIT.
■ T ATTENUATOR.
■ PI ATTENUATOR.
■ WYE-DELTA OR DELTA-WYE TRANSFORMATION. (Two magnetic cards.)
■ MINIMUM-LOSS PAD MATCHING.
■ PI NETWORK IMPEDANCE MATCHING.
■ BAND PASS FILTER DESIGN. (Two magnetic cards.)
■ ACTIVE FILTER—LOW PASS.
■ ACTIVE FILTER—HIGH PASS.
■ BUTTERWORTH FILTER.
■ CHEBYSHEV FILTER. (Two magnetic cards.)
■ CAPACITANCE OF PARALLEL PLATES.
■ SELF-INDUCTANCE OF STRAIGHT ROUND WIRE.
■ INDUCTANCE OF A SINGLE-LAYER CLOSE-WOUND COIL.
■ SKIN EFFECT AND COIL Q.
■ TRANSFORMER DESIGN.
■ REED RELAY DESIGN. (Two magnetic cards.)
■ IMPEDANCE OF TRANSMISSION LINE.
■ MICROSTRIP TRANSMISSION LINE.
■ POWER SUPPLY RECTIFIER CIRCUITS.
■ CONTROLLED RECTIFIER CIRCUITS.
■ INTEGRATED CIRCUIT CURRENT SOURCE.
■ TRANSISTOR BIAS.
■ JFET BIAS AND TRANSCONDUCTANCE.
■ PHASE-LOCKED LOOP.
■ DECIBEL CONVERSION.
■ VOLTAGE TO dBm.
■ WIRE TABLES Al & ANNEALED Cu.
■ HEAT SINKS.

A TOTAL OF 40 PRE-RECORDED CARDS.

Stat Pac I

Provides basic and advanced functions required for statistical calculations, such as:

■ **MEAN, STANDARD DEVIATION, STANDARD ERROR.** Given a set of data points, this program determines the mean, standard deviation, and standard error of the mean (with error corrector).

■ **RANDOM NUMBER GENERATOR.** This program generates uniformly distributed random numbers, or normally distributed random numbers when the mean and standard deviation are given.

■ **ANALYSIS OF VARIANCE (One Way).** The one-way analysis of variance tests the difference between means of k treatment groups (balanced or unbalanced). Output includes treatment sums, F statistic, degrees of freedom. Error corrector for erroneous data (within treatment) is provided.

■ **MULTIPLE LINEAR REGRESSION.** (Two magnetic cards.) For a set of data in three dimensional space, this program fits a linear equation by the least squares method. Output includes regression coefficients, estimated value on the regression line and sums derived from given data (with error corrector).

■ **2 x k CONTINGENCY TABLE.** This program computes the chi-square statistic to test the independence of two variables. Coefficient of contingency is also computed.

■ **SUMS FOR TWO VARIABLES.** Calculates the sums and, simultaneously, the sums of squares for two variables. Error corrector for erroneous input data is provided.

Other programs are:

■ BASIC STATISTICS (Two Variables).
■ LINEAR REGRESSION.
■ BARTLETT'S CHI-SQUARE STATISTIC.
■ BIVARIATE NORMAL DISTRIBUTION.
■ BINOMIAL DISTRIBUTION.
■ CHI-SQUARE EVALUATION.
■ EXPONENTIAL CURVE FIT.
■ F DISTRIBUTION.
■ HYPERGEOMETRIC DISTRIBUTION.
■ INVERSE NORMAL INTEGRAL.
■ LOGARITHMIC CURVE FIT.
■ LEAST SQUARES REGRESSION OF $y = cx^a + dx^b$.
■ MOMENTS, SKEWNESS AND KURTOSIS (Grouped or Ungrouped Data). (Two magnetic cards.)
■ ARITHMETIC, GEOMETRIC, HARMONIC AND GENERALIZED MEANS.
■ MEAN, STANDARD DEVIATION, STANDARD ERROR (Grouped Data).
■ NORMAL DISTRIBUTION. (Two magnetic cards.)
■ POISSON DISTRIBUTION.
■ POWER CURVE FIT.
■ PERMUTATION AND COMBINATION.
■ PARABOLIC CURVE FIT.
■ SPEARMAN'S RANK CORRELATION COEFFICIENT.
■ PAIRED t STATISTIC.
■ t STATISTIC FOR TWO MEANS.
■ CHI-SQUARE DISTRIBUTION.
■ WEIBULL DISTRIBUTION.
■ t DISTRIBUTION.
■ LOGARITHMIC NORMAL DISTRIBUTION.
■ NEGATIVE BINOMIAL DISTRIBUTION.
■ KENDALL'S COEFFICIENT OF CONCORDANCE.
■ BISERIAL CORRELATION COEFFICIENT.
■ MANN-WHITNEY STATISTIC.

A TOTAL OF 40 PRE-RECORDED CARDS.

Medical Pac I

Allows for the rapid calculations of more than three dozen common problems, such as:

■ **MALE VITAL CAPACITY.** (Three magnetic cards.) This program accepts the height and age of a male subject, along with measured pulmonary function values, and calculates the percent of the predicted values for the person. Calculations include vital capacity, forced expiratory volume after 1 second, maximum expiratory flow rate, maximum ventilatory volume after 12 seconds, residual volume, total lung capacity, functional residual capacity, and forced expiratory flow from 25% to 75%.

■ **FEMALE VITAL CAPACITY.** (Three magnetic cards.) Female VC, FEV1, MEFR, MVV, RV, TLC, FRC and FEF (25%-75%).

■ **DUBOIS BODY SURFACE AREA.** This program calculates the body surface area in square meters from the patient's height and weight using the Dubois formula. Additionally, given the cardiac output, the cardiac index is calculated.

■ **DYE CURVE CARDIAC OUTPUT.** This program allows calculation of cardiac output from dye curve analysis.

■ **OXYGEN SATURATION AND CONTENT.** This program utilizes the virtual oxygen tension and calculates the percentage saturation from the hemoglobin dissociation curve, and given the hemoglobin content, calculates the oxygen content of the blood. This can be defined as arterial or venous (which stores in an internal register) for later use by other programs.

■ **ENGLISH-METRIC CONVERSIONS.** This program allows conversion between the most commonly used metric and English units of length, weight, and temperature. The metric units used are centimeters, kilograms, and degrees centigrade. The English units to which these can be converted and vice versa are inches, pounds (avdp.) and degrees Fahrenheit.

■ **VENTILATOR SETUP.** (Two magnetic cards.) Ventilator setup (Radford). Ventilator setup corrections.

■ **RESPIRATORY GAS CONVERSIONS.** (Two magnetic cards.) Water vapor pressure. Respiratory gas conversions.

Other programs are:

■ WEIGHT CONVERSIONS. (Three magnetic cards.)
■ LENGTH CONVERSIONS. (Two magnetic cards.)
■ VOLUME CONVERSIONS. (Three magnetic cards.)
■ P_aCO_2 NORMALIZATION (SUWA).
■ BOYD BODY SURFACE AREA.
■ VIRTUAL PO_2.
■ BLOOD ACID-BASE STATUS.
■ DEAD SPACE FRACTION.
■ $A\text{-}aO_2$ DIFFERENCE.
■ PHYSIOLOGICAL SHUNT AND FICK.
■ VALVE AREA.
■ FICK CARDIAC OUTPUT.
■ MASTER PATIENT IDENTIFICATION.
■ LUNG DIFFUSION.
■ ANATOMIC SHUNTS.
■ STROKE WORK.
■ ANAEROBIC PCO_2 AND pH CHANGE.
■ ANAEROBIC PO_2 CHANGE.
■ CONTRACTILITY.

A TOTAL OF 38 PRE-RECORDED CARDS.

More Pacs on Back Page

Choose the Application Pacs you need from the constantly increasing Hewlett-Packard selection.

Each Application Pac contains up to 40 pre-recorded program cards, to save you hundreds of hours of calculating time!

To extend the versatility of the HP-65—or to concentrate its capabilities in your field(s) of interest—you can select from an ever-expanding selection of pre-recorded program cards packaged in Application Pacs.

Although each card is less than one-half inch by three inches in size, it contains a complete program (up to 100 steps long) directing the HP-65 to perform a predetermined routine, to solve a specific problem or series of problems. The HP-65 incorporates a magnetic card reader to duplicate the program on the magnetic card into the HP-65's program memory.

All you need do is run a pre-recorded program card through the HP-65 (a two-second operation), then key in your known data and run the program as described by the instructions furnished for the program. In seconds, your complex problems are solved, with extreme accuracy. And each card can be used thousands of times.

Each Application Pac contains up to 40 pre-recorded program cards. In addition, each Pac includes a manual which gives program descriptions, user instructions and program listings. Also included are a set of 20 two-sided Pocket Instruction Cards, each of which holds two program cards and space for listing their program instructions.

Pacs are already available in the following categories: Mathematics, Statistics, Surveying, Medical Technology, Electrical/Electronic Engineering, Finance, Navigation and Aviation.

Pacs in other disciplines will continue to be introduced.

Here's how easy it is to load a program card into the HP-65
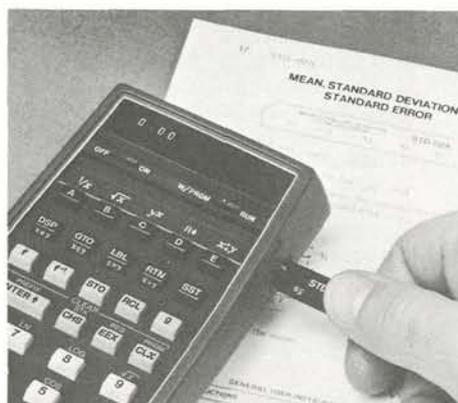
Simply insert a pre-recorded program card into the magnetic card reader that's part of the HP-65. In less than two seconds . . .

. . . the card's entire program is duplicated in the HP-65's program memory. Then the card exits for further use whenever you need it.

Navigation Pac I

Written for the marine navigator, but also well suited for the air or land navigator. Contains programs for piloting and dead reckoning, celestial navigation, relative motion and miscellaneous everyday computations for the navigator.

■ **GREAT CIRCLE COMPUTATION.** This program computes the latitude corresponding to a specified longitude on a great circle passing through two given points. If GREAT CIRCLE NAVIGATION has been run previously, this program computes the location of a vertex of the great circle.

■ **LONG TERM ARIES ALMANAC.** (Two magnetic cards.) Computes the Greenwich Hour Angle of the first point of Aries (the Vernal Equinox)—the celestial reference point from which Sidereal Hour Angle is measured. The inputs are date and time.

■ **1974-1975 SUN ALMANAC DATA.** (Two magnetic cards.) Computes the sun's declination and Sidereal Hour Angle and the Equation of Time, storing them appropriately for use in other programs.

■ **LONG TERM STAR ALMANAC DATA.** (Eight magnetic cards.) Stores position data for any of the programmed stars for use by the ALMANAC POSITIONS program. The stars are: Achernar, Acrux, Aldebaran, Alpheratz, Altair, Antares, Arcturus, Betelgeuse, Canopus, Capella, Deneb, Denebola, Dubhe, Fomalhaut, Peacock, Pollux, Procyon, Regulus, Rigel, Rigil Kentaurus, Schedar, Sirius, Spica, Vega.

■ **ALMANAC POSITIONS.** (Two magnetic cards.) These two programs, to be run after the SUN ALMANAC or STAR ALMANAC program, compute the declination of an object and its SHA, GHA or LHA.

■ **SIGHT REDUCTION TABLE.** This program calculates the computed altitude and azimuth of a celestial body, given the observer's latitude and the local hour angle and declination of the body. The program may be used alone to replace H.O.214, etc., or it may be used in conjunction with the almanac programs to reduce a set of celestial observations to a position fix.

■ **MANEUVERING RELATIVE TO ANOTHER VESSEL.** (Three magnetic cards.) This program computes the course change necessary to come within distance d of a ship having range r_1 and bearing B_1 at time t_1, and range r_2 and bearing B_2 at time t_2.

Other programs are:

■ LENGTH CONVERSIONS.
■ SPEED, TIME AND DISTANCE.
■ TIME—ARC CONVERSION.
■ PROPELLER SLIP.
■ FUEL CONSUMPTION.
■ DISTANCE TO OR BEYOND HORIZON.
■ DISTANCE BY HORIZON ANGLE AND DISTANCE SHORT OF HORIZON.
■ DEAD RECKONING.
■ RHUMBLINE NAVIGATION.
■ GREAT CIRCLE NAVIGATION.
■ COMPOSITE SAILING.
■ SEXTANT ALTITUDE CORRECTIONS. (Three magnetic cards.)
■ SUNRISE, SUNSET AND TWILIGHT.
■ MOST PROBABLE POSITION.
■ FIX BY TWO OBSERVATIONS.
■ FIX BY THREE OBSERVATIONS.
■ DISTANCE OFF AN OBJECT BY TWO BEARINGS.
■ VECTOR ADDITION.
■ VELOCITY TO CHANGE RELATIVE POSITION.

A TOTAL OF 40 PRE-RECORDED CARDS.

Aviation Pac I

Here are programs for flight and preflight calculations—primarily for the private pilot, but also useful for commercial pilots.

■ **AIRCRAFT FLIGHT PLAN WITH WIND.** Solves the wind triangle, giving correct values for airplane heading and ground speed. Works for multiple leg lengths, computing the time for each leg, cumulative time, and fuel consumed for each leg. It corrects reported winds from true heading to magnetic heading before using them in a calculation.

■ **FLIGHT MANAGEMENT.** This program calculates either time flown, distance flown or ground speed, using two of the variables as inputs. It also computes fuel consumed or fuel consumption, given either, and the time flown.

■ **GENERAL AIRCRAFT WEIGHT AND BALANCE.** Calculates the final values of gross weight and moment, or gross weight and center of gravity, used to determine position in the weight-balance envelope furnished with an aircraft.

■ **CUSTOMIZED WEIGHT AND BALANCE.** Using this program and a constant card (made by the user), it is easy to calculate the weight and balance of a two- or four-place light aircraft.

■ **FLIGHT PLANNING AND FLIGHT VERIFICATION.** Computes ETA's, ground speeds, cumulative distance, times for each leg, and cumulative time.

■ **NAVIGATION BY TWO VORS.** Used to navigate between any two points, provided that signals can be received from two VOR stations.

■ **POSITION BY ONE VOR.** Computes the distance from a VOR station to an aircraft, without having to fly at right angles to the station.

■ **COURSE CORRECTION.** Calculates new heading and distance to destination for aircraft which has strayed a known distance off course.

■ **RHUMBLINE NAVIGATION.** This program—the basis of spherical navigation—accepts the coordinates of two points on the globe and calculates the rhumbline heading and distance between them.

■ **HEADWINDS AND CROSSWINDS.** With the aircraft heading and reported winds as inputs, this program calculates both the headwind and crosswind components. The program works both at altitude and at landing and takeoff.

■ **LINE OF SIGHT DISTANCE.** Calculates either the aircraft altitude or the line-of-sight distance from an aircraft to a transmitting station.

■ **PILOT UNIT CONVERSIONS.** Included are conversions between Fahrenheit and Celsius degrees, statute miles and nautical miles, liters and gallons, and gallons of gasoline and pounds of gasoline.

Other programs are:

■ TRUE AIR TEMPERATURE AND DENSITY ALTITUDE.
■ MACH NUMBER AND TRUE AIR SPEED.
■ PREDICTING FREEZING LEVELS.
■ TURN PERFORMANCE.
■ RATE OF CLIMB AND DESCENT.
■ DETERMINING IN-FLIGHT WINDS.
■ STANDARD ATMOSPHERE. (Two magnetic cards.) For altitudes 0-36089 and 36089-82000.
■ LOWEST USABLE FLIGHT LEVEL.
■ GREAT CIRCLE PLOTTING.
■ GREAT CIRCLE NAVIGATION.
■ POSITION, GIVEN HEADING, SPEED AND TIME.
■ POSITION BY TWO VORS.
■ DME SPEED CORRECTION.
■ AVERAGE WIND VECTOR.
■ TIME OF SUNRISE AND SUNSET. (Two magnetic cards.)
■ AZIMUTH OF SUNRISE AND SUNSET.
■ CUSTOMIZED UNIT CONVERSIONS.

A TOTAL OF 31 PRE-RECORDED CARDS.

Surveying Pac I

Permits the rapid solution of calculations needed in the field, such as:

■ **FIELD ANGLE TRAVERSE.** This program will accept angles right, angles left, deflections right and deflections left, as well as horizontal or slope distances. The coordinates of the next point are calculated, and area in square feet and acres are available upon completion of the traverse.

■ **HORIZONTAL CURVE LAYOUT.** Given the curve radius, the point of curvature station and station on the curve, this program computes deflection angles from the tangent and chord lengths from the point of curvature.

■ **BEARING-DISTANCE INTERSECT.** This program calculates the coordinates of the point of intersection of two lines—one of known bearing through known coordinates and the other of known length from a point of known coordinates. Both solutions are computed.

■ **STADIA REDUCTIONS.** This program computes the elevation of and horizontal distance to points from an instrument station using stadia methods. Required inputs are the height of instrument, and the zenith angle, the rod reading, and the rod stadia interval.

■ **VOLUME BY AVERAGE END AREA.** This program computes end area for any station, volume from previous station, and accumulated volume to the present station.

Other programs are:

■ BEARING TRAVERSE.
● CLOSURE FOR FIELD ANGLE AND BEARING TRAVERSES.
■ INVERSE FROM COORDINATES.
■ SIDESHOTS.
■ COORDINATE TRANSFORMATION.
■ COMPASS RULE ADJUSTMENT.
■ TRANSIT RULE ADJUSTMENT.
■ TWO INSTRUMENT RADIAL SURVEY.
■ CURVE SOLUTION—Given △ & R or △ & T.
■ CURVE SOLUTION—Given R & T or R & L.
■ CURVE SOLUTION—Given △ & C or R & C.
■ ELEVATIONS ALONG A VERTICAL CURVE.
■ TRIANGLE SOLUTION—Given SSS or SAS.
■ TRIANGLE SOLUTION—Given SSA.
■ TRIANGLE SOLUTION—Given ASA or AAS.
■ BEARING-BEARING INTERSECT.
■ DISTANCE-DISTANCE INTERSECT.
■ DISTANCE FROM A POINT TO A LINE.
■ TAPING CORRECTIONS.
■ EDM SLOPE REDUCTION—Given Zenith Angle.
■ EDM SLOPE REDUCTION—Given △ Elevation.
■ AZIMUTH OF THE SUN.
■ THREE WIRE LEVELING.
■ SLOPE STAKING—Given Centerline Terrain Elevation.
■ SLOPE STAKING—Given Centerline Cut/Fill.
■ FIELD ANGLE CHECK.
■ PREDETERMINED AREA—Line Through a Point.
■ PREDETERMINED AREA—Two Sides Parallel.
■ VOLUME OF BORROW PIT.

A TOTAL OF 34 PRE-RECORDED CARDS.

To order any Pac, use Order Form or write to:

HEWLETT hp PACKARD

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Cupertino, California 95014

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