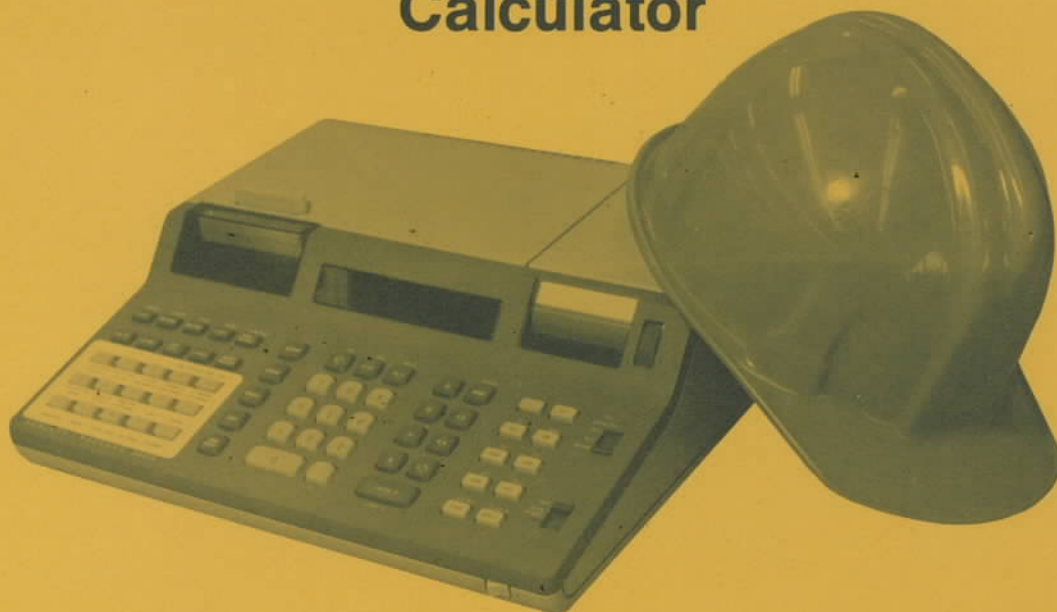# HP9815A
Surveying
Calculator

New Surveying Calculator

The HP9815A is Hewlett-Packard's newest programmable surveying calculator. Its low price compared to performance is unparalleled for surveying computations.

Deceptively Small

The small size of the HP9815A is no measure of its capability. Weighing in at 13 pounds and about the size of an attache case, the HP9815A is almost as portable as Hewlett-Packard's pocket calculators, but has the problem solving power of a mini-computer. This desk-top programmable calculator takes up little space--yet still retains the ability to solve large surveying problems.

HEWLETT hp PACKARD

9815 SURVEYING VOL 2			FII	
A	B	C		
CLOSING ENTRIES	CORRECT LEG			
F	G	H		
TRANSIT ADJ	CRANDALL ADJ	NO ADJ	SS	
K	L	M	N	
STORE	COGO 1	COGO 2	COGO 3	COGO 4

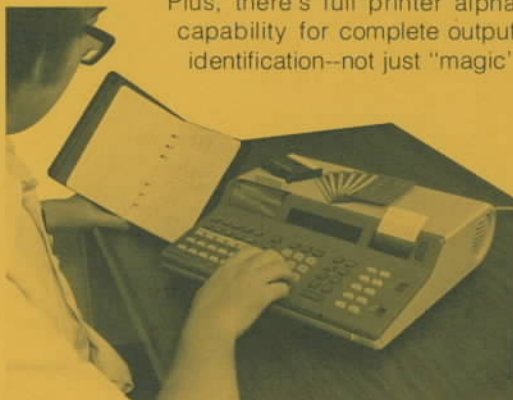### High-Speed Data Cartridge
A Major Technological Innovation

Other than the HP9815's small size, the most visible hardware innovation is the new high-speed bidirectional data cartridge. The cartridge is dual track, ultra high-speed and operates almost 2½ times faster than previous HP cassettes. Combining this speed with the processing ability of the calculator and highly efficient software results in a number of features for surveying computations.

- Programs and data can be stored on the same cartridge--eliminates tape swapping or magnetic program cards.
- 2000 coordinate pairs can be stored for immediate use--eliminates planning around the limitations of a 50 to 300 point storage system.
- Search time for full length of cartridge tapes is only 30 seconds. For most operations, the search time is only 5-8 seconds or less --eliminates long waits for the tape to fetch data or load programs.
- Programs or routines are loaded generally in less time than it takes to press the one or two keys to initiate loading--eliminates hunting for the magnetic program card or tape for the next routine.

Quiet Printer,
Program Section Keys and More

The new data cartridge is only the beginning. There's also Hewlett-Packard's well known built-in thermal strip printer that's so quiet, no one else in the room is distracted or disturbed. Plus, there's full printer alpha capability for complete output identification--not just "magic"

combinations of symbols to decipher. The keyboard has full trigonometric capability plus 15 special function keys. These special keys are used as program and routine loading keys. Pressing a single special key accesses and starts a program or routine. Each key is easily identified by a template which slips over the block of 15 keys.

The HP9815A Surveying Calculator also has an auto start mode which, at turn-on, automatically loads the first file and runs it. Just turn the calculator on and select the program or routine by pressing a special function key.

Software Designed for Ease of Use

The surveying library is divided into two groups of programs. The primary group is for field data reduction (traverse, or location and detail work), followed by coordinate geometry design programs. The second group handles most of the popular secondary programs such as horizontal curve layout, vertical curve grades, triangle solutions, etc.

Ease of use is as important in surveying software as capability. The HP9815A surveying library offers these ease of use features:

- Each program has a unique self-guiding display so the user always knows which step is next.
- The number of user operations are minimized and the routines generalized to optimize the speed and efficiency of using the system.
- The user is never forced to write down any intermediate answers or repeatedly reenter data. For example, recall capability for previously calculated parameters such as bearings is provided in all coordinate geometry programs.
- Movement between programs and routines is fast and convenient. Data collected and stored by the previous program or routine may be used automatically in the next one.
- Modifications are provided to customize the programs to make output match specific needs or speed computations by eliminating features rarely used in your organization.
- Extensive error checking is done on data entries to catch miskeyed data before it is used in computations.

Surveying Software

HP9815 Surveying Vol 1

Universal Triangle Solutions
Circular Curve Solutons
Universal Intersections
Circular Curve Layout (Deflection Angles)
Circular Curve Layout (Tangent Offsets)
Spiral Curve Layout
Vertical Curves and Grades
Line Layout From a Random Traverse
EDM Slope Reduction
Taping Reduction
Resection
Stadia Reductions
Three Wire Leveling
Azimuth by Altitude Observation of the Sun
Field Angle Check
Coordinate Transformation
State Plane Coordinate - Lambert Projection
State Plane Coordinate - Alaska Zones 2 to 9
State Plane Coordiante - Transverse Mecator
Volume by Average End Area
Volume of a Borrow Pit
Map Check with Area & Coordinates

HP9815 Surveying Vol 2 and Vol 3

Field Data Traverse program:
- Field angle entry in the form angle right or left, deflection angles right or left
- Slope distance entry with either zenith or vertical angles or horizontal distance entry
- Ability to close on a point other than starting point
- Angular closure and horizontal closure
- Equiangular balance, no angular balance, or manual angular balance
- Corrector for field angles or distances
- Compass, Transit, Crandall adjustment or no adjustment
- Sideshots
- Rotation, translation, scaling
- Adjusted data stored for use in COGO design programs

Field Bearing Traverse program:
- Angle data entered as quadrant bearings or North or South Azimuth
- All other features and capabilities of Field Data Traverse program
- Adjusted data stored for use in COGO design programs

Two Instrument Radial Survey program:
- Coordinates and elevation of observed points calculated given the angle from a theodolite on one tripod and the distance from a distance meter on an adjacent tripod
- Field angle entry in the form of angles right or left or deflection angle right or left
- Slope distance entry in metres or feet with zenith angles
- Horizontal coordinates stored for use in COGO design programs

Total Station Radial Survey program:
- Utilize data from Total Station instrument (horizontal angles, vertical and horizontal distances)
- Calculates coordinates and elevations

Four Coordinate Geometry (COGO) programs:
- Circle through 3 points
- Line tangent to 1 or 2 circles
- Offsets from a line
- Renumber any or all stored points
- Traverse with angles off last leg or quadrant bearing or North or South Azimuth
- Inverse including curves which use the radius point as check
- Bearing-bearing, bearing-distance, distance-distance intersections
- Area for any figure including curves
- Sideshots
- Coordinate entry by point number
- Curve design from PC or PI
- Offset intersection -- all eight points associated with intersection of two lines and offsets calculated
- Radial stakeout for any points in storage
- Predetermined area -- sliding a side, hinging a side
- Cul-de-sac design -- bulb on corner, or end of street with bulb right, left or centered
- Street intersection design including all curb curve control points
- Bearing between any two points in storage can be recalled
- Angles between lines
- Auto traverse -- lays out any number of points at some bearing and distance
- If applicable, routines use ending point of previous routines as starting point and previous bearing as back sight reference

General Features for all programs:
- Several jobs, each numbered from point "1" or any other starting number, can be stored on same magnetic tape
- Choice of quadrant bearings or North or South Azimuth printout in all programs
- Built-in tape cassette allows storage of 2000 coordinate pairs on each tape
- Programs and data on same tape eliminates tape swapping or program card loading operations
- Additional program/data tapes can be set up using tape duplicating program or are available prerecorded

Working Plot program (Vol 3 only):
- Lines and curves between any of 2000 stored points
- Plot size 15 inches (38.1cm) by any length
- Printed table of lengths, bearings, central angles and radii
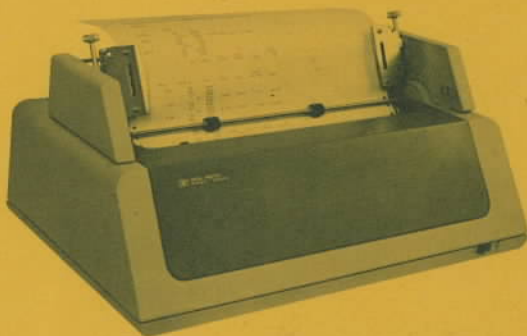
Required Equipment

Vol 1 and Vol 2: HP9815 with Option 001
Vol 3: HP9815 with Option 001, Option 002 & HP9871 with Option 015

HP9815A Surveyor Page-Printer System

Full Page Printout

To compliment the HP9815A Surveyor, the HP9871A Character-Impact Printer is available with software to provide full page-width data output--plus working plots.

Many surveyors prefer to file computed results from field surveys of land designs in a full page-width format rather than the narrow output of most programmable calculators. The HP9871A can use any paper up to 15 inches wide. However, for convenience, the HP developed software prints on a standard 8½ inch wide sheet.

Working Plots

Working plots, the added bonus of the system can be made by linking any of the 2,000 coordi-nates stored on the data cartridge. The plotted lines or curves are made using dots evenly spaced between tick (+) marks at the coordinate points. The spacing between dots can be varied, even reduced to zero, by making minor program modifications provided in the software instructions.

The system numbers each point and prints bearings and lengths of lines in a table on the upper left hand corner of the plot. Curve data, also printed in the table, includes central angle (Δ), arc length and radius.

Since the HP9871A can use contiuous "Z" fold paper or even rolls of paper, the working plots can be 15 inches wide by any length. The standard model uses a pressure roller paper feed, however, a sprocket-type form feed mechanism is available as an option.

To illustrate the speed of making these working plots, the example below was made in about 7 minutes, or about as fast as the operator enters each point number and presses the RUN key. Curves are plotted by entering the P.C. point number, the radius point number, and the P.T.

The speed of the printed output is 30 characters per second or about 2.7 seconds for an 80 character line.

PT	R PT	PT		BRG/DELTA			LENGTH	RADIUS
9		8	NE	62	52	50	446.14	
8		47	SE	77	45	40	90.20	
47		46	NE	86	28	35	165.20	
46		45	NE	79	18	10	82.15	
45		44	NE	62	41	35	72.75	
44		7	NE	42	6	5	80.00	
7		37	SW	15	35	25	277.15	
37	34	38		18	57	30	206.80	625.00
38		39	SE	3	22	5	175.29	
39	40	41		83	1	54	28.98	20.00

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