Heathkit®

Quality Electronics You Can Build Yourself

SUMMER 1979

NEW

Our exciting new products are highlighted on pages:

- One-Button Automatic Telephone Dialer — See page 2
- Ground-Balanced Deluxe Metal Locator — See page 3
- Economy DC-5 MHz Single-Trace Oscilloscope — See page 37
- Complete All-In-One Personal Computer System — See pages 70-71
- CW (QSK) Amateur Radio Transmitter — See page 25
- Kit-Form X-Y Chart Recorder See page 46
- Digital Readout Auto-Ranging DMM — See page 33
- Versatile Portable Lab-Quality Multimeter — See page 41

SAVE $199⁹⁵

on the popular Modulus™ Stereo System—See page 89

HEATHKIT MAIL ORDER CATALOG 845

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See Handy Index on Back Cover

Get into Personal Computing the easy, effective Heathkit way

Microprocessor Self-Instruction Program teaches you about computers

This Microprocessor Self-Instruction Program Teaches you Microprocessor Programming and Applications Techniques. It covers microprocessor basics, computer arithmetic, programming, interfacing and much more. It assumes a knowledge of electronics equivalent to Heath's Digital Techniques Program.

You can teach yourself all about computers and programming with this easy-to-use program and the ET-3400 Trainer.

If you're involved in scientific or electronic pursuits, microprocessors are becoming a way of life and a dominant factor in your success or failure. The EE-3401/ET-3400 self-learning program and accompanying computer trainer is the easy, effective way to learn about these powerful devices. The program uses Heath's proven self-instructional techniques including programmed instructions and audio-visual aids to teach computer programming, microprocessor operation, interfacing and related topics. **The microprocessor program is organized into 10 learning units as follows:**

UNIT 1: NUMBER SYSTEMS AND CODES. Covers decimal, binary, octal, hexadecimal number systems; conversions and binary codes, positional notation.

UNIT 2: MICROCOMPUTER BASICS. Covers terms and conventions, computer words, executing a program, addressing.

UNIT 3: COMPUTER ARITHMETIC: Covers Binary addition, subtraction, multiplication and division; two's complement arithmetic; Boolean operations — AND, OR, Exclusive-OR, INVERT.

UNIT 4: INTRODUCTION TO PROGRAMMING: Covers branching, conditional branching, algorithms, additional instructions.

UNIT 5: THE 6800 MICROPROCESSOR — PART 1. Covers architecture, instruction set and addressing modes.

UNIT 6: THE 6800 MICROPROCESSOR — PART 2. Covers stack operations, subroutines, input-output (I/O) operations and interrupts.

UNIT 7: INTERFACING — PART 1. Covers interfacing fundamentals; interfacing with random access memory (RAM); interfacing with displays.

UNIT 8: INTERFACING — PART 2. Covers interfacing with switches; the Peripheral Interface Adapter (PIA); Using the PIA.

UNIT 9: PROGRAMMING EXPERIMENTS. Covers experiments with binary/decimal, hexadecimal/decimal, and straight line programs; arithmetic and logic instructions, branches, additional instructions, new addressing modes, arithmetic operations, stack operations and subroutines.

UNIT 10: INTERFACING EXPERIMENTS. Covers memory circuits, clock, address decoding, data output, data input, peripheral interface adapter, audio output, key matrix and parallel-to-serial conversion, digital-to-analog and analog-to-digital conversion.

The EE-3401 is complete with 62 electronic components required to complete the experiments. These components include two 2112 256x4-bit RAM's, 6820 PIA interface chip, 1406 digital to analog converter, 741 and 301 op amps and a variety of other microprocessor-oriented devices. The ET-3400 Computer Trainer, on page 67, is required for the experiments in the Program.
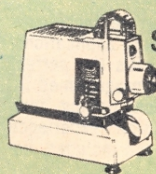
If you choose to take the optional final exam, a passing grade of 70% or better earns you 8.0 Continuing Education Units and a Certificate of Achievement.

EE-3401, Shpg. wt. 12 lbs. **89.95**

EE-3401-1 Slides. Optional 35 mm Slides duplicate the audio-visual flip charts in the EE-3401 program. Shpg. wt. 2 lbs. **60.00**

EE-3401-2 Filmstrip. Optional 35 mm Filmstrip duplicates the audio-visual flip charts in the EE-3401 Program. 1 lb. **20.00**

Get Real Computing Power with this Trainer and Accessory

Use with the EE-3401 program to learn the fundamentals of microprocessors, programming and interfacing

Trainer Accessory plugs into ET-3400

Microprocessor Trainer for EE-3401 Program lets you get "hands on" computer experience

$189⁹⁵ Kit

- Uses the popular 6800 microprocessor
- Built-in 1K ROM Monitor Program
- Breadboarding Socket for Prototyping
- 17-Key Hexadecimal keyboard and LED display

Functioning as a miniature digital computer, the ET-3400 Microprocessor trainer is essential for the experiments in the EE-3401 self-instruction program. After completing the program, the ET-3400 is ideal for breadboarding, prototyping and system design. The ET-3400 features a built-in 1K ROM monitor program for controlling unit operation; 6-digit hexadecimal 7-segment LED display for address and data readout; 17-key hexadecimal keyboard for entering programs and data. Has 256 bytes of random access memory (RAM) built-in expandable to 512 bytes with the RAM's supplied in the EE-3401 program. Also has 8 buffered binary LED's for display of breadboard logic states, 8 SPST DIP switches for binary input to breadboard circuits, a breadboarding socket for prototyping, interfacing and memory circuits. All microprocessor address, control and data busses are buffered and terminated on the front panel for ease of connection to prototyped circuits. There's also provision for a 40-pin external connector to extend memory and I/O capacity. Built-in +5, +12 and −12 volt power supplies. Order trainer and accessory from listings below.

Microprocessor Trainer Accessory

Makes the Microprocessor Trainer into a complete, low-priced personal computer system. It provides an audio cassette interface so you can store programs on convenient cassettes, it also provides an additional 1K bytes of memory so you can run longer and more sophisticated programs through the ET-3400. The memory can be expanded to 4K bytes with the optional 3K chip set (ETA-3400-1, order at right). A serial I/O with EIA or 20 mA loop format in the accessory lets you hook up a terminal such as the H9. The ROM monitor/debugger program lets you implement the standard trainer monitor functions through the external terminal. Memory locations can be examined or changed, break points can be initiated, and program debugging can be accomplished with a single instruction step feature. A tiny BASIC interpreter is provided in ROM to let you program using BASIC. Connects to the trainer by means of a 40-pin ribbon cable supplied. Parts required to modify Trainer are included. 3" H x 11" W x 12" D. For 110-130 VAC, 60 Hz. Order from listing at right.

Use the Trainer, Accessory and a Terminal for a complete low-cost computer system.
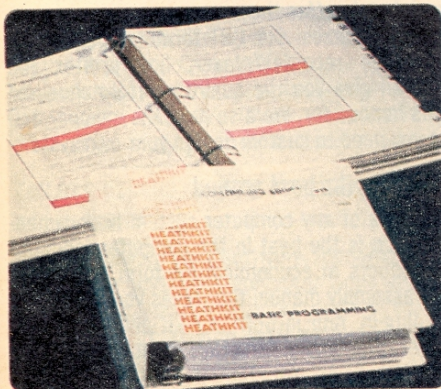
Microprocessor Trainer.
Kit ET-3400, Shpg. wt. 7 lbs. 189.95
Factory Assembled and Tested.
ETW-3400, Shpg. wt. 6 lbs. 240.00

Microprocessor Trainer Accessory.
Kit ETA-3400, Shpg. wt. 8 lbs. 150.00
Factory Assembled and Tested.
EWA-3400, Shpg. wt. 9 lbs. 250.00

Optional 3K Chip Set.
ETA-3400-1, Shpg. wt. 1 lb. 47.00

SAVE $120.95 on this complete computer system. For ET-3400 owners only. Consists of H9 Video Terminal, Trainer Accessory, 3K Chip Set and BASIC Programming. If purchased separately, $715.95.
ETS-349, Shpg. wt. 58 lbs. 595.00

NOTE: A terminal such as the H9 is required to use the BASIC and monitor software with the trainer accessory. See page 72 for details on the H9.

Self-Instruction for Programming in BASIC — The Essential Computer Language

This BASIC self-instruction program will help you get the most benefit from your H8 or H11A computer system. It's easy and fun to learn, and gives you a thorough background for creative programming!

This program teaches you how to program your computer using the popular BASIC language. BASIC (Beginner's All-Purpose Symbolic Instruction Code) is essential for hobby and personal computing, it is also widely used in education and business. The course covers all formats, commands, statements and procedures plus the creative aspects of computer programming so you can make practical use of it in solving problems and creating your own unique programs.

The program is divided into 14 segments, each with its own review test, introduction and objectives. Subjects covered are: BASIC words, decision making, numbers, statements, functions, loops, lists and arrays, strings, programming techniques, programming tools, defining the program, step-by-step plans for writing a program, formating the program and improving the program. A workbook provides programming instructions and experiments. While the BASIC program is keyed to Heathkit computers, it is equally applicable to any computer system using BASIC. An optional final exam (passing grade 70%) brings you a Certificate of Achievement and 3.0 Continuing Education Units.
EC-1100, Shpg. wt. 7 lbs. 39.95

Only Heath Offers All These Buying Advantages for the

When you buy your computer system from Heath you get the total package — hardware, software, interfaces, peripherals and accessories — PLUS service and satisfaction and Value! BIG Value!

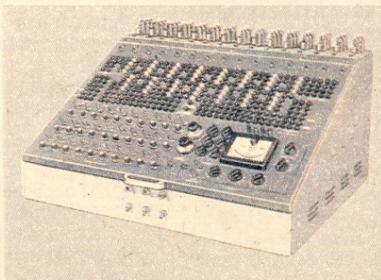## We're the world's leader in quality electronic kits!

And whether you buy our computer products in kit or assembled form, you get the backing and reliability of a company that's been in business for well over 50 years! You can count on us for quality, service, reliability and value. We're world-renowned for our Amateur radio equipment, our test instruments, our hi-fi components, our color TV systems, our marine gear and our other products — and the same kind of engineering expertise and design excellence that went into those products has gone into our computer systems. When you buy your computer system from Heath, you get well-thought-out, expertly designed products that offer substantial benefits over competing models, plus the world's most complete documentation, service and support — at prices that give you more value and performance for your dollar!

We're Interested in Computing and Computer Systems

Heath was one of the first to offer a personal computing system, when we designed an analog computer back in 1957. We felt, even back then, that computers were the wave of the future, and we kept up our interest and enthusiasm for them. Recent technological developments have allowed us to enter the digital computer field in a big way!

Our "Total System" design makes up a "one-stop" source!

The Heathkit computer systems have been designed from the ground up to be total systems that meet all the needs of personal or small business computing. Our computers, peripherals, interfaces and memory boards give you everything you need for total system setup and expansion, no matter what your application, and our software programs give you the usefulness and versatility you need!

We have both 8-bit and 16-bit machines

The Heathkit computer system line is based around two powerful and fully expandable mainframes — the 8-bit H8 and the 16-bit H11A. The H8 uses the popular and versatile 8080A microprocessor module to take advantage of the tremendous amount of existing programs, documentation and source materials available for this module. The H11A is based on the Digital Equipment Corporation's (DEC) PDP-11/03, one of the most powerful and sophisticated computers available anywhere. It gives you the extra speed, power and versatility only a 16-bit machine can provide.

And a complete line of peripherals

The Heathkit Computer peripherals offer the same competitive advantages of our two computer mainframes. Our CRT terminal, paper tape reader/punch, cassette storage recorder/player, line printer and floppy disk storage systems all give you the quality, performance and value that Heath company is famous for. We also have the memory, I/O interfaces and accessories you need to custom design your own system.

Heath documentation is among the best around

One of the most important parts of any computer system is documentation and Heath documentation is the best in the computer industry. If you buy our computer products in economical kit form, you get a comprehensive step-by-step assembly manual that takes you right from unpacking the kit to final plug-in. And in both our kit and assembled computer products, the operating and instruction manuals are fully detailed, thorough and accurate.

Personal Computing Activist!

Our complete systems software gets you up and running fast

The optional systems software offered with the Heathkit computer systems is designed to let you start writing your own programs fast and easy. And, with this catalog, we are offering a new line of applications software for the H8, plus BASIC and FORTRAN language programs. This new H8 software will make your H8 computer one of the most versatile computers available anywhere. Similar software is currently being developed for the H11.

Our backup service and support give you a real advantage!

With Heath company computer products, as with all our products, technical assistance and expertise is just a phone call away! While our kit manuals are considered by many to be the finest in the world, we also back our products with complete technical assistance and service facilities, so if you do run into trouble, you can be assured that Heath company will help you service your computer systems to make them work right and last for years.

Sales and Service are also available at Heathkit Electronic Centers Coast-to-Coast

Not only do you get Heath service and support from the Heath factory in Benton Harbor, but all Heathkit Electronic Centers (Units of Schlumberger Products Corporation) have service facilities. There are 54 Heathkit electronic centers nationwide and service or consultation is just a phone call away. Check store list on page 95 of this catalog for the location of the Heathkit Electronic Center nearest you.

You can depend on your Heathkit computer systems now and in the future

Heath hardware and software, peripherals and accessories comprise one of the best-value computer lines around. All this, combined with our complete documentation, service and nationwide support, make your Heathkit computer system one you can depend on — to work right the first time, and to keep working for years to come.

Here's how to get a big 5% System Discount on Heathkit Computers and Peripherals

Simply choose the H8 or H11A and one major peripheral plus any I/O devices and accessories you need for a complete custom computer system. Then you can deduct 5% from the total price (excluding shipping and handling charges). It's the ideal way to get the exact computer system you need!

HUG — The Heath Users' Group Keeps You in Touch and Up to Date With The Heathkit Personal Computing World

The Heath Users' Group puts you in contact with other Heath computer owners and keeps you up to date on Heath products. There's an informative magazine, a complete program library and exchange, new product information and hardware/software ideas. Membership in HUG is a useful way to get the maximum benefit from your Heathkit Computer System. Here's what you get:

- 1 year subscription to the quarterly magazine
- An attractive 3-ring binder to hold magazines, software documentation and other materials.
- Program submission forms ● Official Identification Card
- Access to the software library which now contains over 400 user-submitted H8 programs including special utility routines, computer aided instruction, financial packages, Amateur Radio applications programs and games. These programs are described in the software catalog which is a part of the initial HUG membership package.

Membership application information and details are included with your Heath computer. H11 owners are also eligible for membership in DECUS, see page 80 for details.

Heath Users' Group

One of the biggest advantages you have in owning a Heathkit Computer System is membership in HUG — a worldwide organization.

69

Introducing the Heathkit All-In-One Computer

New personal computer brings everything together in one compact unit

- Floppy disk storage
- Smart video terminal
- Two Z80 microprocessors
- 16K RAM expandable to 48K
- Professional keyboard
- Numeric keypad

Now in one compact, desk-top computer, you can have all the power and built-in peripherals needed for any personal computing task. The new 8-bit All-In-One Computer makes it easy to computerize your home or business. It's loaded with convenience features that make it easy to program and operate.

Smart Video Terminal

The All-In-One Computer has one of the most sophisticated terminals ever designed. Both terminal and computer have their own Z80 microprocessors, so terminal never shares processor power with computer, as do most desk-top computers. That makes this terminal capable of a multitude of high-speed functions.

Heavy-duty professional keyboard

All terminal functions can be controlled by keyboard or software. Eight user-definable keys let you program your own special functions. Baud rates of up to 19,200 are keyboard selectable.

Direct cursor addressing lets you insert and delete characters and lines anywhere on the screen and gives you line graphics capability from keyboard or computer. Special field protect feature lets you maintain a form while changing data within the form.

Sharp screen image

12-inch diagonal cathode ray tube produces clear, easy-to-read characters. The format of 25 lines by 80 characters includes upper and lower case letters, formed by a 5 by 7 dot matrix. Lower case letters with descenders use a 5 by 9 dot matrix.

Built-in Floppy Disk System

The floppy system makes this a true All-In-One Computer and gives you limitless storage capacity for programs and data. Each 5¼-inch diskette has more than 102K bytes of storage area, enough to hold entire files.

The WANGCO 82 single-drive system gives you high-speed access to any piece of information. Programs can be loaded in seconds from the keyboard. Data can be accessed and updated instantly. This is the same H17-1 drive described on page 77.

Expand to meet your needs

The All-In-One Computer comes with 16K RAM and is expandable to 48K. Memory diagnostics are built in for fast, easy memory checks.

Accessory interfaces let you communicate with printers, cassettes or time-share systems. All communication is EIA RS-232 Standard.

Rugged construction

Convenient lift-off top gives you easy access to insides. Rugged structural foam cabinet withstands toughest working environment.

Two independent Z80 microprocessors enable terminal and computer to act independently, processing more data faster. Both CPU's are completely wired and tested.

Accessory interfaces include two-port serial I/O and audio cassette for hook ups to printers, time-share systems and cassette storage. H88 and H89 come with cassette interface.

To add memory simply plug IC's into sockets. Add up to 48K. No soldering is necessary.

High-resolution CRT with P4 phosphor produces sharp, easy-on-the-eyes images. Screen displays 1,920 characters at one time.

Professional electronic keyboard in typewriter format has stepped rows for easier reach and concave keys for surer touch. Each key stroke is affirmed by an audible click.

Built-in mini-floppy system features rugged WANGCO 82 Disk Drive. Standard 40 track diskettes hold 102K bytes.

Numeric keypad in calculator format permits faster, easier entry of arithmetic programs. Shifted functions give you cursor control for insertion and deletion of lines and characters.

SPECIFICATIONS: Processor: Z-80. **Clock:** 2.048 MHz. **Memory:** 16K bytes user RAM (expandable to 48K). **Character Type:** 5 x 7 dot matrix (upper case); 5 x 9 dot matrix (lower case with descenders). **Keyboard:** 80 keys. **Cursor:** Blinking, nondestructive underline. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space, and tab. **Cursor Addressing:** Relative and direct. **Tab:** Standard 8-column tab. **Refresh Rate:** 60 Hz at 60 Hz/50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase page, erase to end of line, and erase to end of page. **Power Requirement:** 120/240 volts, 50/100 Hz at 90 watts max. **Size:** 13" H x 17" W x 20" D. (33 x 43.2 x 50.8 cm).

Never before has so much been built into one computer for such a low price:
Only $1595.00 for H89

It speaks the language of today's most popular software

The All-In-One Computer runs programs written in MICROSOFT™ BASIC and ASSEMBLER Languages. That includes scores of practical programs for home and business.

Systems Software for the All-In-One Computer includes Extended Benton Harbor BASIC. Assembly Language (HASL-8), Text Editor (TED-8), and Console Debugger (BUG-8). **H88-18,** Shpg. wt. 13 lbs. **20.00**

Systems Software for All-In-One Floppy Disk. For complete description, see H8-17 on page 75. **H89-17,** Shpg. wt. 14 lbs. **100.00**

MICROSOFT™ BASIC for All-In-One. For complete description, see H8-21 on page 75. **H8-21,** Shpg. wt. 3 lbs. **100.00**

H88 All-In-One Computer, without floppy disk system. Includes audio cassette interface (H88-5). **Kit H88,** Shpg. wt. 59 lbs. **1195.00**

H89 All-In-One Computer with floppy disk system. Includes audio cassette interface (H88-5). **Kit H89,** Shpg. wt. 86 lbs. **1595.00**

WH89 Completely" assembled H89 All-In-One Computer with floppy disk system. Does not include audio cassette interface. **WH89,** Shpg. wt. 50 lbs. **2295.00**

All-In-One Computer without floppy disk system. Order Model H88

Accessories
16K Memory Chip Set lets you expand RAM.
H88-2, Shpg. wt. 1 lb. **150.00**
Two-port Serial I/O lets you communicate with H-14 Line Printer or any serial peripheral, or time-share systems via MODEM.
H88-3, Shpg. wt. 2 lbs. **85.00**

Floppy Disk System, includes drive and interface for H88 Computer. Gives you over 204K bytes of storage area. **Order No. H88-4.**
H88-4, Shpg. wt. 22 lbs. **450.00**

Audio Cassette Interface lets you communicate with a mass storage cassette recorder/player. Included in H88 and H89.
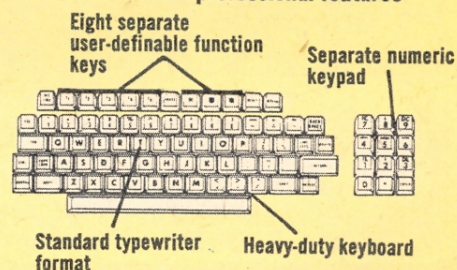**H88-5,** Shpg. wt. 2 lbs. **95.00**

Introducing the Smart Video Terminal with professional keyboard and super-sharp display

$675⁰⁰ Kit

- Z80 microprocessor-based for fast, efficient data handling
- Full professional keyboard in familiar typewriter format
- Extremely wide bandwidth monitor for easy-to-read images
- Prints the complete ASCII set including upper and lower case characters, plus special graphic symbols

Look at these professional features

Eight separate user-definable function keys

Separate numeric keypad

Standard typewriter format

Heavy-duty keyboard

New Heathkit H19 Microprocessor-based "Smart" Video Terminal

The H19 Video Terminal is a top-of-the-line general-purpose peripheral designed for use with the Heathkit H8 and H11A computers or with any EIA RS-232 Standard interface. Its powerful Z80 microprocessor makes it ideal for a variety of high-speed data handling tasks.

The familiar typewriter format enables you to start right in programming from the keyboard. The terminal's 32 separate functions can be controlled from keyboard or computer. A special 12-key numeric pad in calculator format lets you make fast, easy entry of arithmetic programs.

Baud rates of up to 19,200 are keyboard selectable for easy changes. Eight user-definable keys let you program your own special functions. The H19 prints the entire ASCII character set, including upper and lower case letters. The print format is 24 lines by 80 characters (with software controlled 25th line). Addressable blinking cursor lets you make correc-tions or edit anywhere on the screen. Reverse video lets you emphasize any portion of the screen by reversing white on black.

The big 12" diagonal CRT has outstanding resolution for a bright, clear readout. The terminal also displays 33 different graphic characters that can be arranged for a variety of graphic displays and effects.

Compact structural foam cabinet withstands the rigors of daily use. A removable top gives you quick access to circuitry for easy servicing. Convection cooled power supply assures quiet, fan-free operation.

Kit H19, Shpg. wt. 54 lbs. **675.00**

Factory Assembled and Tested Version of above.
WH19, Shpg. wt. 40 lbs. **995.00**

H19 SPECIFICATIONS: CRT: 12" Diagonal, P4 phosphor. **Display Size:** 6½" high x 8½" wide. **Character Size:** 0.2" high x 0.1" wide (approx.). **Character Set:** 128 characters (95 ASCII and 33 graphic). **Character Type:** 5x7 dot matrix (upper case), 5x9 dot matrix (lower case with descenders). **Keyboard:** 80 keys (60 alphanumeric, 12 function) plus a 12-key numeric pad. **Cursor:** Blinking, non-destructive underline. **Cursor Controls:** Up, down, left, right, home, CR, LF and tab. **Cursor Addressing:** relative and direct. **Tab:** standard 8-column tab. **Refresh Rate:** 60 Hz. **Erase Functions:** erase page, erase to end of line, erase to end of page. **Scroll:** auto or line/page freeze. **Bell:** audible alarm on receipt of control C. **Video:** normal and reverse using an escape sequence. **Interface:** EIA RS-232C at 110 to 19,200 baud. **Communications Mode:** full or half duplex. **Parity:** even, odd, stick or none. **Operating Temperature:** 0-40°C ambient. **Power Requirements:** 105-135 or 200-270 VAC, 50/60 Hz, 45 watts. **Dimensions:** 13" H x 17" W x 20" D. **Net Weight:** 45 lbs.

Bright 12" CRT displays twelve 80-character lines

$479⁰⁰

SAVE $71⁰⁰
Was $550.00

H9 CRT Video Terminal and Keyboard

For use with the Heathkit H8 or H11A computers. Has long-form display of twelve 80-character lines, short form display of forty-eight 20-character lines in four columns. Has auto-scrolling, plot and erase modes, automatic line carryover, cursor and built-in speaker. The serial interface provides EIA-RS-232C levels, 20 mA current loop and TTL levels. Parallel interfacing includes TTL levels, 8 bits input, 8 bits output and 4 handshaking lines. With fully assembled PC control board. 12½" H x 15⅝" W x 20¾" D. For 110 VAC, 60 Hz or 230 VAC, 50 Hz.
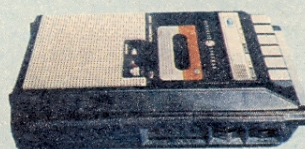
Kit H9, Shpg. wt. 50 lbs. Was $550, Now only 479.00
Adapter Cable for H9. Provides EIA industry standard electrical and mechanical interface between H9 and other devices. **WH9-1,** Shpg. wt. 1 lb. **15.00**

Assembled Cassette Recorder/Player

Ideal for data storage

$60⁰⁰

Has volume and tone controls, pushbuttons for record, play, rewind, fast forward, stop and eject, built-in 3 digit counter with reset button. Factory wired, not a kit. **ECP-3801,** Shpg. wt. 4 lbs. **60.00**
Heath recommended high output, low noise, premium grade audio recording tape. Pack of three 30-minute blank cassettes. **ECP-3802,** Shpg. wt. 1 lb. **per pack 6.00**

Select a printer

The World-Famous LA36 DEC Writer II Provides "Hard Copy" Printout for Your H8 or H11A

Sensational Low Mail Order Price!

Fully Assembled! Prepaid Shipment!

Has 7x7 dot matrix print head for crisp, clear character formation; switch selectable 10, 15 and 30 cps printing speeds; variable width forms handling from 3" to 14⅞" wide; adjustable left and right hand tractors half or full duplex operation; ANSI-standard multi-key rollover and a typewriter-like keyboard. It prints 10 characters per inch horizontal spacing and 6 lines per inch vertical spacing. The integral 20 mA current loop interface makes the LA36 compatible with both the H8 and H11 computers, as well as most others. With connecting cable and integral stand. Overall size, 33¼" H x 27½" W x 24" D.

The H36 (LA36 DEC WRITER II) is shipped Motor Freight, prepaid to your nearest terminal within the Continental U.S. Include your phone number on order for notification of arrival. Arrangements for home delivery may be made at no extra charge in most cases. NO C.O.D. ORDERS.
H36 DEC Writer II, For 120 VAC, 60 Hz. 1495.00
H36J DEC Writer II, For 220 VAC, 50 Hz. 1495.00

H36-1 Fan-fold Paper for H36. Standard 14⅞" x 11" white and green, single-part, lined paper. 3200 sheets per carton. **H36-1,** Shpg. wt. 47 lbs. **30.00**

H36-2 EIA Interface. Provides EIA RS232-C Interface for LA36, 9-ft. cable with 25-pin data-set type connector is also supplied. (DEC designation, LAXX-KG).
H36-2, Shpg. wt. 1 lb. **65.00**

H36-3 Acoustic Coupler. Provides hookup to phone lines for time-sharing. Mounts in LA-36 with hardware provided. (DEC designation, LAZX-LM).
Kit H36-3, Shpg. wt. 10 lbs **250.00**
H36-4, Ribbon Accessory, Shpg. wt. 7 lbs. **15.00**

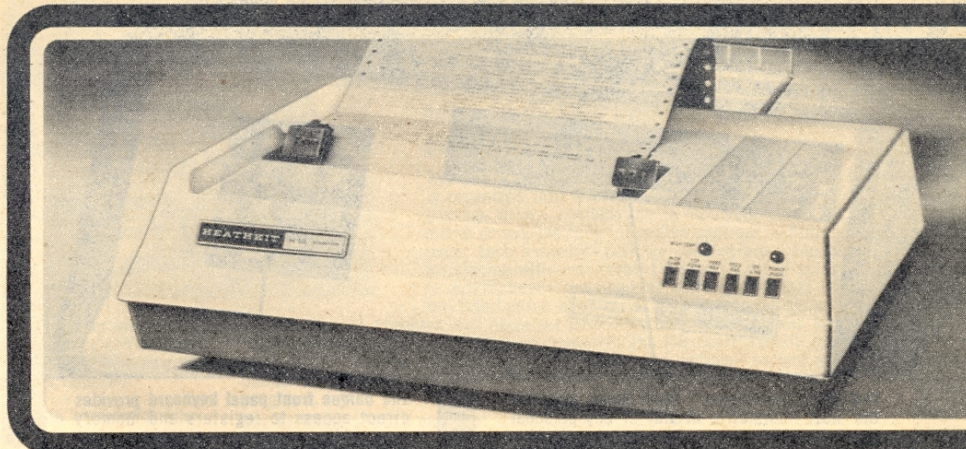## LA34 DEC Writer IV Desktop Computer Teleprinter

NEW

Convenient desktop design makes the LA34 ideal for office uses

Desktop teleprinter prints the full 128 character ASCII set with switch selectable 110 and 300 baud rates. Offers true 30 cps print speed, adjustable character widths, adjustable line spacing, clear printing through a 9x7 dot matrix head. Designed like a standard typewriter for operator ease and convenience, the LA34 features standard sculptured keyboard, cartridge ribbon change, automatic line feed and more. Includes EIA RS232C standard interface. 7" H x 22" W x 15½" D. For 120 VAC, 60 Hz. **WH34 DEC Writer IV, Fully Assembled and Tested.** Shpg. wt. 30 lbs. **1295.00**

H14 Line Printer gives you "hard copy" output of your programs as you execute them

One of the lowest-cost line printers available — designed for use with the H8 and H11A computers — can also be used with most any other computer through a standard serial interface

The H14 is a versatile, low-cost microprocessor-controlled line printer designed to give you a "hard-copy" permanent printout of your computer programming. These copies provide added convenience in reading, editing, debugging and modifying your programs. It also provides handy printed copies of address lines, lists, or other programming data you need for your hobby or business applications.

The H14 prints the standard 96-character ASCII set (upper and lower case) on a 5x7 dot matrix print head. The impact printer uses readily available 0.5" wide nylon inked ribbon on 2" diameter spools. Maximum instantaneous print speed is 165 characters per second with a selectable line length of 80, 96 or 132 characters. Line spacing is 6 lines per inch with 8 lines per inch software selectable. Baud rates are selectable from 110-4800. The adjustable width sprocket feed allows the use of edge-punched fanfold paper forms from 2.5" to 9.5" wide with a maximum thickness of 0.006".

The H14 connects to the H8 or H11A computer by the use of a standard (RS-232C) serial interface or 20 mA current loop. Handshaking is provided by a busy control signal. A 25-pin male EIA connector is provided for easy and convenient hookup. A convenient paper rack to keep printer output handy and organized is included at no extra cost.

The H14 is designed for years of reliable trouble-free service. It is supplied in kit form or fully assembled and factory tested. 18⅓" W x 4⅘" H x 14⅓" D. For 100-135, 200-270 VAC, 50-60 Hz. Requires H8-17, H8-18 or HC8-14 software for H8; HT-11 or H11-18 software for H11 or H11A.
Kit H14, Shpg. wt. 33 lbs. **595.00**
WH14, Assembled version of above.
Shpg. wt. 27 lbs. **895.00**
H14-1, 3200 Sheets 9½" x 11" Fan-Fold Paper for use with H14. 31 lbs. **30.00**

H14 SPECIFICATIONS: Printing Speed: Initial time per full line is approximately 1.75 seconds on 60 Hz power line and 2.1 seconds on 50 Hz power line. Print head temperature is monitored after each line and then limited by slowing the printing. The maximum throughput is determined by print density and ambient temperature. The maximum instantaneous printing rate is 165 c.p.s. **Characters:** 5 x 7 dot matrix, 96 character ASCII. Upper and lower case. Impact prints 0.11" high characters. **Format:** 6 or 8 lines per inch vertical. 10 characters/inch (80 columns). 12 characters/inch (96 columns). 16.5 characters/inch (132 columns). 10 and 16.5 characters/inch are both hardware and software selectable. 12 characters/inch are software selectable only. **Forms Handling:** Sprocket feed with adjustable widths, 2.5"/sec slew rate. Edge-punched fanfolded forms, 2.5" to 9.5" wide, maximum thickness 0.006". Form depth selectable from 0.021" to 1365". **Ribbon System:** Standard typewriter ribbon with automatic ribbon reversing mechanism. **Panel Indicators:** Power on/off light (LED). Printhead temperature monitor (LED). **Operator Controls:** Power on/off. On line/off line. Reverse feed. Forward feed. Top of form. Wide characters. **Internal Controls:** 50/60 Hz operation. 110/220 volt operation. Self test mode. Baud rate selection (110, 150, 300, 600, 1200, 2400 and 4800).

NEW

CAT Acoustic Modem

Cat Modem by Novation lets your computer talk to other computer systems over standard telephone lines. Also communicates with any Bell 103 compatible modem. Designed especially for the small computer, the Cat Modem lets businessmen work at home on payroll, inventory or accounts receivable. Hobbyists can talk to each other and even exchange programs.
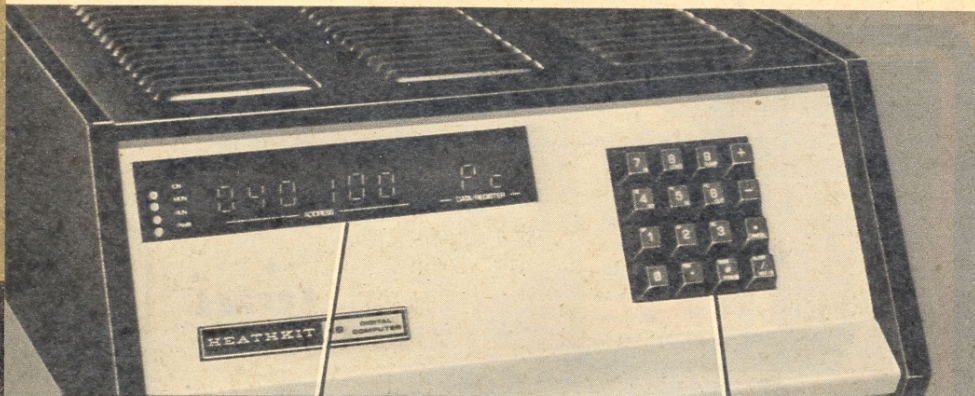
Cat Modem features selectable originate and answer modes, LED display of unit status, and special acoustic self-testing. Compact powerpack plugs directly into wall sockets, reducing heat and voltage hazards. Data exchange occurs at any speed up to 30 characters per second, via standard EIA RS-232C.

Cat Modem is the ideal computer communications link. It adds a new dimension of fun, as well as practical applications to your computer. Send for yours today.

WH13, Fully Assembled, Shpg. wt. 3 lbs. **195.00**

WH-13 SPECIFICATIONS: Frequencies: TX-ANS, TX-ORIG, RX-ORIG, RX-ANS. **Mark:** 2225 Hz, 1270 Hz. **Space:** 2025 Hz, 1070 Hz. **Receiver Sensitivity:** —45 dBm. **Power:** 115 VAC, 2.5 watts max. **Dimensions:** 2.3" H x 10.2" W x 4.7" D.

73

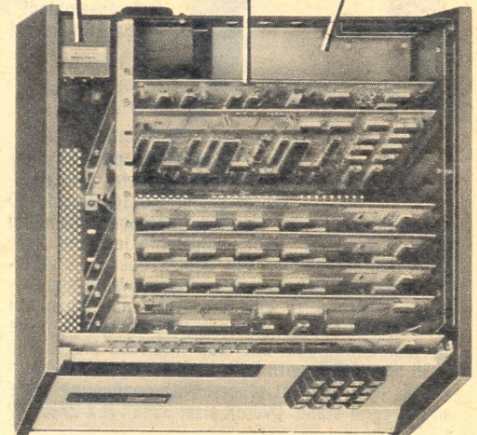# The Heathkit H8 Personal Computer – now with Operating

The H8's "intelligent" front panel provides the most informative display of any personal computer we've seen. The memory display shows memory location and contents. The register display shows CPU-register contents. The I/O port display shows I/O port data and location.

The unique front panel keyboard provides direct access to registers and memory even while programs are running; one-button load and dump; a single instruction key for "stepping" through programs; and input/output keys for communicating directly with any port.

Heavy-duty power supply, rugged steel chassis and securely mounted and braced circuit boards.

The unique Heath-designed 50-pin bus is implemented on a heavy-duty printed circuit board.

Modular circuit boards slide into the H8 mainframe for easy memory and I/O expansion and easy access for servicing.

8080A-based with front panel keyboard and digital readout

SAVE $90!
Was $379.00

Now $289.00

Requires at least one H8-1 Memory Board to operate

- Built-in extended ROM monitor controls front panel program
- Heavy-duty power supply handles to 65K memory
- Exclusive Heath 50-line fully-buffered bus has positions for up to 9 plug-in circuit boards
- Built-in speaker provides audible feedback for keyboard entry
- Convection cooled power supply — no fan needed

6 EVENING KIT
Fast, Easy Assembly

The Heathkit H8 computer is the ideal choice for personal computing activities. Its combination of unique features and low cost make it an outstanding value among general-purpose computers, and, thanks to Heath's exclusive design, it is one of the most versatile. It is easy-to-build, and simple to operate. And while it is an ideal entry level machine, it provides the expansion capability that allows you to build it into a powerful general-purpose computer system. The H8 lets you start small and increase its power and versatility as you increase your programming prowess.

The H8, with the addition of 4K of memory, makes an ideal computer trainer. Its 16-key front panel keyboard provides octal data entry and gives you direct access to registers and memory, one-button program load and dump, and input/output keys for direct communication with any port. Its 9-digit octal readout provides far more information than conventional computers — memory, registers and I/O port displays are updated even while programs are running for direct monitoring of program activity.

With the addition of more memory peripherals and interfaces, the H8 can become even more powerful and versatile, allowing you to write highly sophisticated and practical programs. And because the H8 is based on the world-famous 8080A CPU, the amount of existing software (programs) from both Heath and other sources makes it one of the most immediately practical computers you can own.

See the following pages for complete descriptions of H8 peripherals and accessories, and our exciting new Floppy Disk System.

The H8's optional software is supplied in 1200 baud audio cassette form to get you up and running fast. Benton Harbor BASIC, HASL-8 2-pass absolute assembler, TED-8 line-oriented text editor, and BUG-8 terminal console debug program let you begin communicating with the H8 right way. See next page for a rundown of this powerful software plus new Microsoft™ BASIC.

Other features of the H8 include: exclusive Heath-designed 50-pin fully buffered bus; mother board with positions for up to 9 plug-in circuit boards that accept the CPU, front panel memory, I/O and other accessory cards; built-in convec-

tion cooled power supply; built-in speaker for audible feedback and special effects; front panel status lights and more. The CPU board is fully wired and tested for easy system setup and kit assembly. It features the 8080A chip, clock, systems controller, ROM monitor and full bus buffering. Seven vectored interrupts are available for quick response to I/O requests.

The H8 is housed in a heavy-duty metal cabinet with modern, high-impact structural foam side panels.. 6½" H x 16¼" W x 17" D. Switch-selected 120/240 VAC, 50/60 Hz. Requires at least one H8-1 memory board to operate.

Kit H8, Shpg. wt. 31 lbs. . . . . .Was $379.00 Now 289.00

Factory Assembled and Tested Version of H8.

WH8, Shpg. wt. 29 lbs. 475.00

Save up to $189.00 on complete systems

HKS81 Hobbyist System
includes:
- H8 Computer
- H8-5 Serial I/O and Cassette Interface
- H8-1 8K Memory Board
- H8-3 4K Chip Set
- H9 CRT Terminal
- ECP-3801 Audio Cassette Recorder
- H8-18 Cassette Software

Purchased separately: $1183.00
Purchased together: $1095.00

You save $88.00
HKS81, Shpg. wt. 94 lbs. . . .$1095.00

HKS82 Advanced System
includes:
- H8 Computer
- H8-4 Four Port Serial I/O
- H8-16 16K Memory
- H17 Floppy Disk
- H9 CRT Terminal
- H8-17 HDOS Software

Purchased separately: $2184.00
Purchased together: $1995.00

You save $189.00
HKS82, Shpg. wt. 143 lbs. **$1995.00**

NOTE: To specify a complete computer system using the H8, you will need both memory and interface accessory cards. The type and number of memory and interface accessories that you need for the H8 will be determined by your particular applications. The memory and I/O accessories are offered separately so you have complete freedom to assemble the system that meets your specific computing needs.

74

Software PLUS NEW Microsoft™ Computer Languages!

Operating Software for H8

The optional systems software for the H8 computer has a number of features that make it easier to use and more practical than other systems. Automatic "command completion" simplifies typing; dynamic syntax checking instantly alerts you to errors and a special user configuration lets you personalize your system.

The System Software for the H8 includes: BENTON HARBOR BASIC. This conversational programming language uses simple English statements and familiar algebraic equations to perform operations and solve problems. Requires a minimum of 8K memory.

ASSEMBLY LANGUAGE (HASL-8). This two-pass absolute assembler lets you create source programs using letters, numbers and symbols to generate efficient machine language code. It assembles the source program into a listing and an object program in binary format executable by the H8. A minimum of 8K memory is required.

TEXT EDITOR (TED-8). Converts the H8 computer and terminal into a powerful typewriter for generating text and editing. It prepares the source code for H8 assembly language and can be used to prepare reports, write letters and edit manuscripts. Requires a minimum of 8K memory.

CONSOLE DEBUGGER (BUG-8). This enhanced and extended version of the front panel monitor allows entry and debugging of user machine language programs via an external terminal. It features single or multiple stepping through programs, breakpointing, load and dump from tape storage. It requires a minimum of 4K memory plus user program. The software is supplied in 1200 baud audio cassette form.
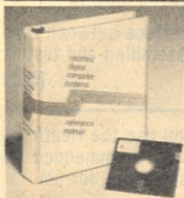H8-18, Shpg. wt. 11 lbs. **20.00**

BASIC for H8

Extended Benton Harbor BASIC. An enhanced version of BASIC with strings and files. It provides even faster operation and includes character strings, additional convenience commands and math functions, dynamic storage allocation, access to real time clock, keyboard interrupt processing, expanded error messages and recovery ability, LED display control and key pad support. Requires H8-17 (below) and a minimum of 12K memory. 16K is preferred if full use is to be made of its capabilities. Supports WH-14 line printer and WH8-4 Interface Board. Supplied in 1200 baud audio cassette format. HC8-14, Shpg. wt. 13 lbs. **20.00**

MICROSOFT™ BASIC. Perhaps the most popular BASIC for personal computers, it features the following capabilities: Direct access to CPU ports and memory locations (INP, OUT, PEEK, POKE); IF — THEN — ELSE control structure for more highly-structured programming; Powerful program edit and file management facilities; Powerful string processing functions including LEFTS, RIGHTS, MIDS, ASC, CHRS and concatenation; Automatic line numbering and renumbering; Double precision floating point number; PRINT USING for control of output formats; Error control via ON ERROR command; Variety of mathematical and logical functions as well. Requires H8-17 (below) and a minimum of 32K memory. H8-21, Shpg. wt. 3 lbs. **100.00**

5% systems discount on software

For purchases of complete computer systems, software may be included in the total price for a 5% discount. See page 69 for a description of what constitutes a system.
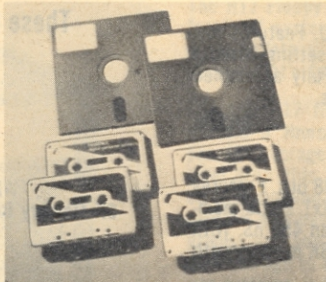

Operating Systems Software for the H17 Floppy Disk System

The Operating Systems Software for the H17 Floppy Disk System includes a diskette containing the standard H8 software. This software includes extended Benton Harbor BASIC; a 2-pass absolute assembler; a text editor to prepare source code for BASIC and other languages; a console debugger for easy debugging of user machine language programs; and a full set of disk utility programs for convenient file manipulation. Special features of this operating software include Dynamic File Allocation which automatically keeps free space available to permit unlimited file size and prevent squeezing of disks. Special facilities support running and backup of single-drive configurations to permit copying and transferring between disks even with a single-drive system. Device independence permits direct communication between any program and any device. A file utility program allows two kinds of wild cards for fast, easy bulk manipulation of files. The software is supplied on a standard diskette.
H8-17, Shpg. wt. 14 lbs. **100.00**

NEW — Problem-Solving Applications Software to make your H8 a computer system that will help you operate your business better and more efficiently

This total accounting business system (available midyear) is organized into five separate packages. You can install a package in any combination to suit your particular requirements or buy the fully integrated package by ordering all five units. Each individual package can operate independently for interfacing with your present system. A set of control reports is automatically produced by each system that will provide the information necessary for your present system. Systems are supplied on standard H17 diskettes (one containing the programs and one containing sample data from a fictitious company). The Microsoft™ BASIC (described at left), an H17 Floppy Disk System equipped with the optional second drive are required for proper operation. Each diskette contains between twelve and twenty programs.

The GENERAL LEDGER package* is the heart of the total accounting system. It keeps a detailed record of all financial transactions and generates the balance sheet and income statement to provide timely information on the financial status of your company. Produces departmental and summary income statements showing current and year-to-date amounts, percentages by category and, optionally, comparative data with last year's ledger. Accepts data from all other software systems described below. 150 accounts, 450 transactions.
H8-32, Shpg. wt. 5 lbs. **350.00**

The ACCOUNTS RECEIVABLE package* is a complete invoice and monthly statement generating package that keeps track of the current and aged accounts receivable. A customer file is maintained including credit information and account status. The current status of any account is instantly available. Permits sales or dun messages to be printed on statements, facilitates accurate posting of payments and justifies amounts due. Debits and Credits can be passed automatically to the General Ledger software above. 250 customers, 750 transactions.
H8-30, Shpg. wt. 5 lbs. **350.00**

The ACCOUNTS PAYABLE package* keeps track of current and aged accounts payable and incorporates a check writing feature. It maintains a complete vendor file with information on purchase order and discount items as well as active account status. Vouchers regular monthly notes and payments, summarizes year-to-date purchases and latest payments for current analysis, prepares checks, compiles management reports, prepares payable entry for direct posting to books. Passes debits and credits automatically to General Ledger. 220 vendors, 450 transactions.
H8-31, Shpg. wt. 5 lbs. **350.00**

The PAYROLL package* prepares the payroll for hourly, salaried and commissioned employees while accumulating the necessary information for tax reporting. It generates the monthly, quarterly and annual returns to be filed with local, state and federal governments. It also prepares employee's W-2 and maintains an up-to-date information reference for each employee. The package includes tables for federal withholding and FICA plus withholding for up to 50 states and 20 cities from precomputed or user-generated tables. It can be programmed to automatically write payroll checks. 225 employees.
H8-33, Shpg. wt. 5 lbs. **350.00**

The INVENTORY system package* helps you achieve effective inventory control. Provides a data base for complete inventory records to be kept on-line, permits custom structuring of files and reports, lists inventory balance and breakdown of events leading to balance, displays inventory status of any item, provides accurate stock counting and reconcilation, records sales and print receipts while updating the inventory data base, determines critical reorder areas, provides cost analysis, cumulative sales picture, and labels showing item number and unit cost. 650 items.
H8-34, Shpg. wt. 5 lbs. **350.00**
*Available for delivery August 1979.

Entertaining Cassette Software for the H8

BIORHYTHM. Plots sinusoidal curves of your physical, emotional, and intellectual characteristics over a given time period. Runs under extended BASIC and requires 16K of RAM. PA-82, 1 lb. **10.00**

SPACE WAR. This is perhaps the most popular computer game available. It allows you to guide, control and command the Starship Enterprise in its travels through the galaxy, fighting Klingons and solving problems. A truly challenging computer game. Requires 24K RAM. PA-83, 1 lb. **10.00**

GAME SET #1. This software package lets you play 8 popular computer games. These games include Craps, Orbit, Tic Tac Toe, Nim, Hexapawn, Hangman, Hamrabi, and Derby. 8K RAM or more is required. These games will provide hours of entertainment for you and your family. PA-84, 1 lb. . . **10.00**
NOTE: Above applications software is in 1200 baud audio cassette form.

Accessories and Manual Set for Your H8 Computer

16K Wired Memory Board for H8

Lets you expand your H8 to the full capacity of the 8080A CPU. Features low power consumption for cool operation, DIP switch for address setting without soldering, better than 450 nS access time for fast operation. Fully assembled and tested, and factory burned-in to eliminate memory problems.

WH8-16, Shpg. wt. 2 lbs. 395.00

8K Memory Board

8Kx8 memory card supplied with 4K memory plugs directly into H8 bus. Features maximum storage capacity of 8192 8-bit words. Uses modern 4Kx1 static memory IC chips for easy assembly and service. Access time, less than 450 nS. With on-board regulators, heat sinks and full buffering. Expandable to 8K memory with H8-3 chip set below.

Kit H8-1, Shpg. wt. 2 lbs. 125.00

Chip Set for H8-1

Kit of eight 4K static memory IC's. Expands H8-1 to full 8K storage. With sockets.

Kit H8-3, Shpg. wt. 1 lb. 85.00

Assembled and Tested 8K memory board

Combination of H8-1 plus H8-3. Access time is better than 450 nS.

WH8-8, Shpg. wt. 2 lbs. 250.00

Parallel Interface

Connects H8 to any parallel device such as a paper tape reader/punch. Has three independent parallel ports each with 8 bits input and 8 bits output and universal handshaking capability. 390 μS maximum transfer time. With diode-clamped inputs, buffered outputs and full interrupt capability. Compatible with all Heath software.

Kit H8-2, Shpg. wt. 3 lbs. 150.00

New Four Port Serial Interface

Required to interface the H8 to the H14 line printer. Has four serial I/O ports, all supporting standard RS-232-C interface including MODEM controls. One port is switch programmable to a 20 mA current loop. All ports feature solderless address and vector interrupt jumpers for easy setting. Also has interface connector for DCE and DTE modes. Software programmable baud rate. Includes one WH8-41 cable for connection to H14 line printer.

Kit H8-4, Shpg. wt. 2 lbs. 150.00

Factory Assembled and Tested Version of Above.
WH8-4, Shpg. wt. 3 lbs. 250.00

Adapter Cable for use with H8-4

Provides EIA industry-standard electrical and mechanical interface between H8-4 and other peripherals. Factory assembled and tested.

WH8-41, Shpg. wt. 1 lb. 15.00

Serial I/O and Cassette Interface

Connects the H8 to serial devices such as the H9 or H19 video terminal (page 72) or the H36 DEC Writer II (page 73). Features jumper selectable data rate from 110-9600 baud plus common input/output interfaces including 20 mA current loop and EIA RS-232-C compatible levels. The cassette recorder interface permits use with the Heathkit ECP-3801 cassette recorder/player mass storage device (page 72). Uses the popular Byte/Manchester recording format but runs at 1200 baud. Note: a second H8-5 cannot be used to connect the H8 to the H14 line printer. The H8-4 above is recommended for H8 computer systems not using cassettte data storage.

These Circuit Boards plug right into the H8 for fast, easy and convenient hookup

WH8-8
8K Memory Board

H8-2
Parallel
Interface Board

H8-4 Four-Port
Serial Interface Board

H8-5 Serial
I/O and Cassette
Interface Board

H8-7
Breadboard Card

WH8-16
16K Memory Board

Kit H8-5, Shpg. wt. 3 lbs. 125.00
Factory assembled and tested version of above.
WH8-5, Shpg. wt. 2 lbs. 150.00

Adapter Cable for use with H8-5

Provides EIA industry-standard electrical and mechanical interface between H8-5 and other peripherals. For use with H8 computer. Factory assembled and tested.

WH8-51, Shpg. wt. 1 lb. 15.00

> Note: Proper operation of the H8-5 is assured only if you use the Heath ECP-3801 cassette player/recorder (page 72) and Heath-recommended recording tape (ECP-3802, page 72). Heath is not responsible for improper operation associated with other cassette units.

Circuit Design Breadboard Card

Lets you custom design your own analog or digital circuits for additional interfacing, creating your own memory boards, etc. Uses solderless breadboard area, also provides address decoding and bus buffering. A 5 VDC power supply for logic circuits is provided on the board. Experimental circuits may be torn down easily and the H8-7 reused or permanent circuits can be created.
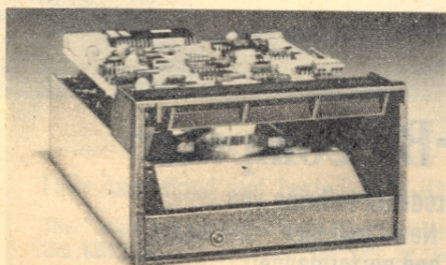
Kit H8-7, Shpg. wt. 2 lbs. 90.00

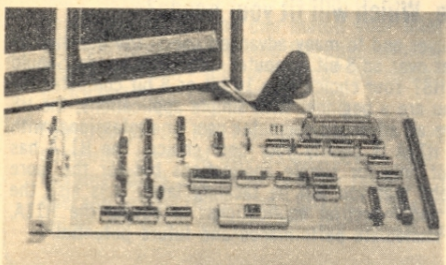# The H17 Floppy Disk System Makes Your H8 a Real "Pro"!

Shown with optional second drive

$575.00

Kit with single drive

Rugged and Reliable Fully Assembled WANGCO model 82 Disk Drive Unit offers Totally Reliable and Dependable Mechanical and Electrical Operation for Years of Trouble-Free Service.

The H17 Includes the Interface/Disk Controller Circuit Board — An Extra Cost Option with Most Other Units.

NOTE: The H8 Computer Requires at Least 16K of RAM to Use the H17 Floppy Disk and Its Operating System.

The H17 Floppy Disk System is the peripheral that will make your H8 a true professional system! You'll be able to, load programs in seconds instead of minutes, update files and data virtually instantly, and have storage and program access that's far faster and more efficient than paper tape or cassette storage!

The new H17 floppy disk system is the one you've been waiting for. It makes the H8 a thoroughly sophisticated, completely versatile computer that gives you the storage and programming capacity you need for virtually any application! With this floppy disk system, you can load programs instantly so you're up and running fast; you can store literally hundreds of programs on a single disk so you have lots of storage space and immediate access to all your programs; and you can update files instantly and efficiently to save time. Floppy disk storage is far more versatile and reliable than paper tape or cassette storage systems; it truly makes the H8 a "total versatility" computer system.

Designed exclusively for use with the H8, the H17 has been "systems" engineered to deliver a fully assembled package including: a disk drive, and interface disk/controller circuit board, and built in power supply. The H17 is one of the few disk drive systems on the market to include the interface/disk controller circuit board at no extra charge! The controller circuit board plugs directly into the H8's mainframe and with the addition of the optional second drive you'll have optimum dual-drive versatility.

The storage media for the H17 is the standard, hard-sectored 40-track diskette. Measuring just 5.25" in diameter, each disk offers access to better than 102K bytes of available program and data storage area.

The drive system used in the H17 is the famous WANGCO Model 82, a performance-proven drive providing accurate high-speed data access. Specifications of this drive include a conservative 30 mS maximum track-step time and typical random sector access times of less than 250 mS. These figures are considerably better than most equivalent competitive drives.

The WANGCO 82 drive system is supplied fully assembled and tested. It's backed by extremely reliable mechanical and electrical operation. To use the H17 effectively with the H8 computer, you require 16K of RAM (see WH8-16 on p. 76) and operating software (see H8-17 on p. 75). The H17 includes a single blank diskette.

Kit H17, Shpg. wt. 28 lbs. 575.00
WH17, Factory assembled and tested. Shpg. wt. 25 lbs. 675.00

Optional Second Drive. Adds dual-drive versatility to H17 for a total of over 204K bytes of available program and data storage area.
H17-1, Shpg. wt. 5 lbs. 295.00

Package of 5 Blank Diskettes.
H17-2, Shpg. wt. 1 lb. ....each 25.00

H17 SPECIFICATIONS: **Storage Media:** 5.25" hard-sectored 40-track diskette. **Drive Type:** WANGCO Model 82. **Track Seek Time:** 30 ms maximum. **Random Sector Access Time:** Less than 250 milliseconds. **Power Requirement:** 120/240 VAC, 50/60 Hz. 75 watts. **Dimensions:** 6.25" H x 13.5" W x 13.5" D.

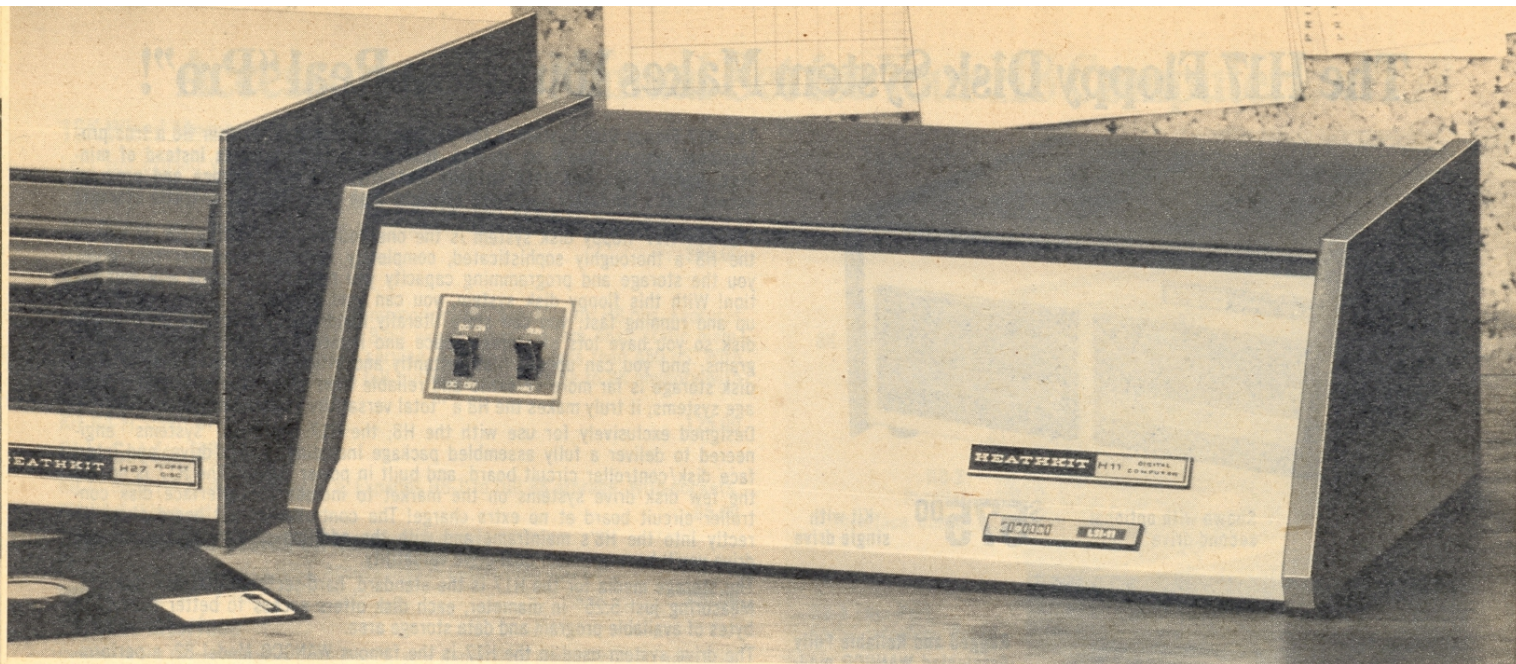## Learning Program for Assembly Language

NEW

Learn to program in the language that puts you in touch with your computer's full potential.

Assembly language is the most versatile language you can use. Anything that can be done in any other language can be done in assembly language. It puts you closer to the heart of your computer because there is a mnemonic for every machine operation. And your programs run much faster because they do not have to be interpreted. It's ideal for serious computer hobbyists who wish to advance past programming in BASIC, and for engineers, technicians and scientists who require more computer capability than BASIC can provide. It gives you a better understanding of machine organization and operations. Programming is taught by a text designed especially for self-study. The program uses actual examples to teach various techniques and concepts. All of the examples used are practical routines that would normally be encountered in assembly level programming. Reinforcement of the programming principles is provided by self-test review questions and practice programming problems.

Various programming exercises and experiments are provided to give you "hands on" experience on an actual computer system. These programming experiments can be carried out on the Heath H8, H88 or H89 computer systems or any other 8080, 8085 or Z80-based computer system. They are fully compatible with the H17 Floppy Disk System. An optional final exam is included with the program. Upon passing this exam, (passing grade 70% or better), you will receive a Certificate of Achievement and 6.0 Continuing Education Units.

EC-1108, Shpg. wt. 8 lbs. 49.95

The Powerful Heathkit®/DEC® H11A 16-Bit Computer

$1095.00 Kit

The H11A uses the new LSI-11/2 family of microcomputer products to bring you a 16-bit machine of almost incredible power and versatility. New "half-size" CPU board gives you more space for memory and I/O to increase power and performance!

The Heath/DEC H11A combines the advanced, performance-proven hardware and software of the state-of-the-art LSI-11/2 with Heath's expertise in kit design and documentation to bring you a personal computer of almost incredible power and versatility.

What is The H11A Personal Computer?

The H11A is Heath's top-of-the-line computer.

It is designed for the serious computer user. It is the world's most powerful hobby computer. It offers the advance hobbyist the power and potential to implement more sophisticated applications. Most computer users discover that their problem solving and programming capabilities grow quickly as they learn more about the computer. Before long, many advanced computer users simply run out of computing power. Their small low cost system may be inadequate to produce the performance required by some advance applications. The H11A is the computer that meets the demand for superior performance in personal computer applications. When you buy the H11A you buy virtually unlimited potential.

The H11A is also useful in education, industry and small business. Its computing power and expansion capability make it ideal for such applications. The H11A is for those who want commercial performance at really affordable prices.

The Heathkit H11A is virtually identical to DEC's famous PDP-11/03 microcomputer. It features the advanced new "half-size" LSI-11/2 (KD11-HA) microcomputer. The performance of the H11A is identical to DEC's PDP-11/03 but at a fraction of the cost. This new half-size configuration allows you to put more computing power and versatility into the H11A cabinet by providing an extra plug-in slot for additional memory or I/O interface. See next page for a complete description of the KD11-HA board.

The H11A is complete with superior Heathkit documentation.

The 16 Bit vs. 8 Bit Issue. Which will fit your needs?

To the first time computer buyer and to many advanced users, the question of the value of a 16 bit computer over an 8 bit computer frequently arises. Should you purchase an H11A or an H8? Your choice of a 16 bit or 8 bit computer depends upon your needs. If you are a beginner with simple applications, the H8 is your best choice. If you are an advanced computer user or professional with demanding applications, the H11A is clearly your best choice. The H11A has adequate computer power not only for simple applications but for the more complex and sophisticated jobs that you will be tackling later. It is also the best choice for commercial and industrial applications. In buying the H11A, you are purchasing ultimate immediate performance and future potential.

The H11A Mainframe is the "heart" of your computer

A basic H11A computer is supplied with an attractively styled cabinet, a heavy duty power supply, a backplane incorporating DEC's state-of-the-art LSI-11/2 bus and the powerful new KD11-HA CPU board fully assembled and tested. This board contains the LSI-11/2 computer. To this mainframe you will need to add the various memory and I/O accessories that will configure the H11A to your particular specifications. The H11A backplane with the KD11-HA board in place contains 7 additional plug-in slots for memory and I/O cards. Complete systems software is optionally available in paper tape and floppy disk form. Rugged metal cabinet with high-impact plastic sides measures 6½" H x 19" W x 17" D. For 110/220 VAC, 50/60 Hz.

Kit H11A, Shpg. wt. 43 lbs. 1095.00
WH11A, Factory Assembled and Tested version of above.
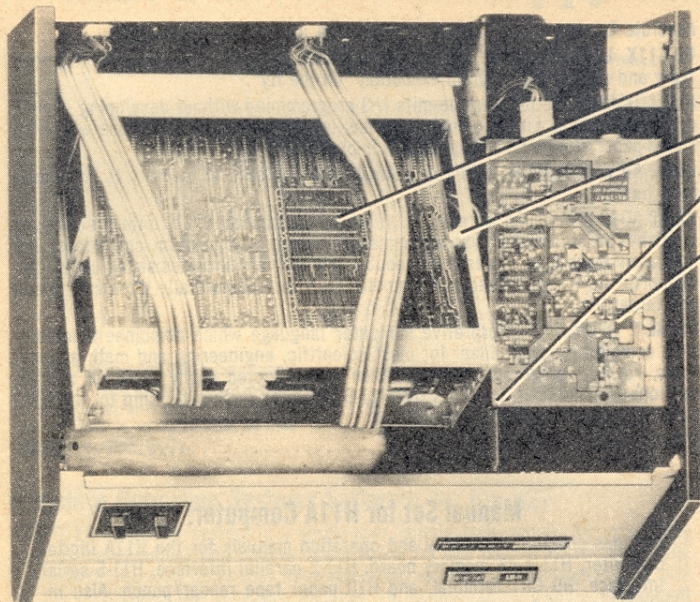Shpg. wt. 43 lbs. 1895.00

Order software, memory expansion modules and interface accessories from pages 79 and 80.
See page 80 for Software Sublicense Agreement

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of Digital Equipment Corporation.

Here's the "Inside Story" on the H11A!

Card cage with backplane accommodates up to seven accessory cards in addition to LSI-11/2. The card cage swings up for easy access and service even while the H11A is operating. Accessory boards slide directly into card guides with all connectors supplied.

Rugged steel chassis and extra-thick backplane with heavy, solid connectors for added strength and years of superior performance.
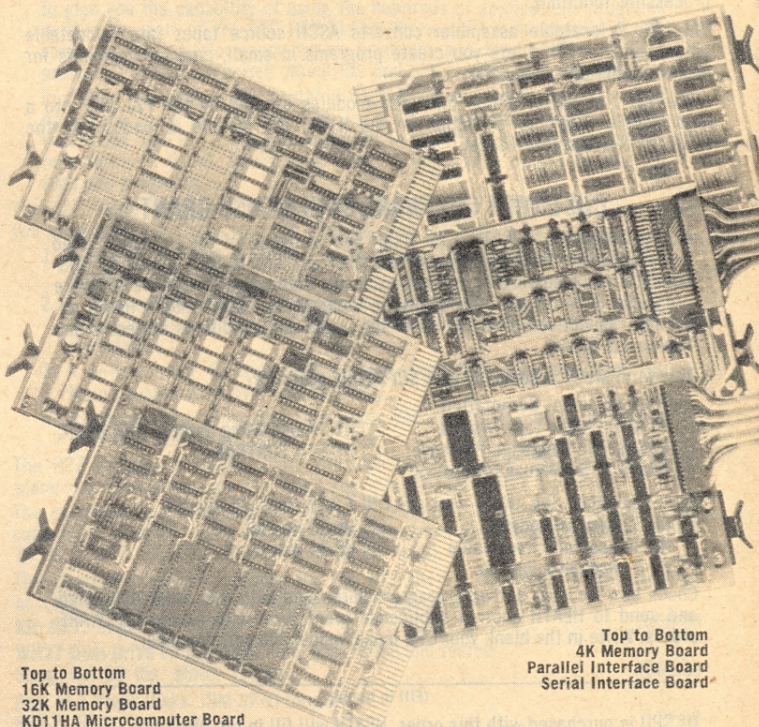
Built-in quiet-running fan provides efficient cooling and prevents heat buildup.

Compact, efficient switching power supply uses less power to operate and generates less heat than conventional supplies. Overvoltage and overcurrent/short circuit protection, along with automatic power-up and power-down sequencing, provide high reliability and long life operation.

Fully Assembled and Tested KD11-HA Circuit Board

The "heart" of the new H11A is the 16-bit microcomputer module, the KD11-HA. It's only half the size of the LSI-11 (KD-11F), but gives you better features and performance, and provides even more flexibility when you configure your system. There is no on-board memory so you can match your RAM/ROM requirements to your particular needs. And full compatibility with the LSI-11 family means you can "mix or match" by combining components from both LSI-11 and LSI-11/2 families.

Features of the KD11-HA include: PDP-11/34 instruction set, raw computer speed of 380 nS microcycle time, resident firmware debugging (ODT) and ASCII console routines, plus single and double operand instructions. The LSI-11/2 gives you the power and flexibility you need for virtually any system configuration you want!

Top to Bottom
16K Memory Board
32K Memory Board
KD11HA Microcomputer Board
(shown with optional H11-6
arithmetic chip installed)

Top to Bottom
4K Memory Board
Parallel Interface Board
Serial Interface Board

H11A Accessories, Memory Boards and Interfaces

4K Memory Expansion Module. Plugs into H11A or H11 backplane, adds 4K x 16-bit word capacity to memory. Uses high-reliability 1K x 4 static MOS RAM chips. Access time is less than 500 nS. Has decode circuitry for operation on 4K address boundaries. Handle for easy removal and insertion.
Kit H11-1, Shpg. wt. 2 lbs. 225.00
WH11-1, Assembled and Tested version of above. Shpg. wt. 2 lbs. 275.00

Parallel Interface. General-purpose parallel interface featuring 16 diode-clamped latched data input lines, 16 latched output lines, 16-bit word or 8-bit byte data transfers. Has LSI-11 bus interface and control logic for interrupt processing and vectored addressing; control status registers compatible with PDP-11 software routines. Maximum data transfer rate, 90K words per second under program control. Maximum drive capability, 25-ft. cable. Also compatible with TTL or DTL logic devices. The H11-2 is required to use H11A or H11 with the H10 Paper Tape Reader/Punch.
Kit H11-2, Shpg. wt. 2 lbs. 95.00
WH11-2, Assembled and Tested version of above. Shpg. wt. 1 lb. 150.00

Serial Interface: Universal asynchronous receiver/transmitter serial interface module for use between LSI-11 bus and serial devices such as the Heathkit H9 video terminal (page 72) or H36 DEC Writer II (page 73). Has optically isolated 20 mA current loop or EIA interfaces, selectable baud rates of 50 to 9600. Plugs into H11 backplane, fully compatible with PDP 11/03 and other LSI-11 backplane machines.

With all mating connectors.
Kit H11-5, Shpg. wt. 2 lbs. 105.00
WH11-5, Assembled and Tested version of above. Shpg. wt. 1 lb. 150.00
Adapter Cable for H11-5. Provides EIA industry standard electrical and mechanical interface between H11-5 and other computer peripherals. For use with H11 or H11A computers. Fully assembled and tested.
WH11-51, 1 lb. 15.00
16K Memory Module. Provides 16K dynamic MOS random access memory on a 5x8½" board. Has on-board refresh, 570 nS cycle time and 250 nS access time. Fully assembled and tested. Max. memory capacity of H11A is 30K.
WHA11-16, Shpg. wt. 2 lbs. 480.00
32K Memory Module. Identical to 16K memory above, but with 16 additional IC's containing an additional 16K of memory. Fully assembled and tested. Max. memory capacity of H11A is 30K.
WHA11-32, Shpg. wt. 2 lbs. 995.00
H11-6 Extended Arithmetic Chip: Adds powerful arithmetic instructions to the LSI-11, including fixed point multiply, divide and extended shifts plus full floating point add, substract, multiply and divide. Helps minimize arithmetic sub-routines, speeds up program execution and development. Saves memory space too. 40-pin dual-inline package IC plugs into socket on H11A or H11 board.
H11-6, Shpg. wt. 1 lb. 159.00

H11A Software, License Agreement and Manual Set

Powerful Heath/DEC PDP-11 Software is available at a nominal charge

The H11A optional software is a sophisticated software system that lets you get your computer up and running with practical programming capabilities. This paper tape based software would cost over $1200 if purchased separately. A minimum of 8K memory is required to run the software. The program includes:

ED-11. Assists you in the creation and modification of ASCII source tapes, also used to write assembly language programs and for general text editing or word processing functions.

PAL-11S. Relocatable assembler converts ASCII source tapes into relocatable binary modules. This lets you create programs in small, modular segments for easier coding and debugging.

LINK-11S. Link editor which links the modules created by the PAL-11S into a load module ready for execution on the H11A. The module is loaded into the H11A via the Absolute Loader.

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This form MUST accompany your SOFTWARE order for:

Digital Equipment Corporation
- ☐ PTSP-11 Paper Tape System
- ☐ FOCAL/PTS Language Processor
- ☐ BASIC/PTS Language Processor
- ☐ HT-11 Operating System with BASIC
- ☐ HT-11-1 FORTRAN

Retail Sciences, Inc. (RSI) — for use ONLY with Heath Model H8
- ☐ H8-32 General Ledger
- ☐ H8-30 Accounts Receivable
- ☐ H8-31 Accounts Payable
- ☐ H8-33 Payroll
- ☐ H8-34 Inventory

Check box for each software program purchased with this order only. Sign and send to HEATH another sublicense grant form with future SOFTWARE orders. Write in the blank your CPU make, model and serial number:

_____
(Fill in blank)

(If CPU is purchased with this order, HEATH will fill in the blank.)
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HEATH COMPANY
By _William F. Johnson_____

CUSTOMER
By _____
Customer's Signature

Absolute Loader. Loads tapes into the H11A memory for execution.

ODT-11X. Lets you debug the programs which you have created. Permits modifying and controlling program execution "on the fly".

IOX. I/O executive program permits I/O programming without developing device-driving programs. Links to your programs using the LINK-11S. For use with high speed paper tape reader/punch and line printer.

DUMP-AB and DUMP-R. Lets you dump binary contents of memory to the paper tape punch.

BASIC. DEC's powerful version of standard Dartmouth BASIC interpreter uses English-type statements and mathematical symbols to perform operations. Immediately translates, stores and executes the program. Includes string capability. Supports the H11-6 Extended Arithmetic Chip for substantially increased speed and versatility.

FOCAL™. DEC's own interpretive computer language which combines simplicity with computing power. Ideal for most scientific, engineering and math applications. FOCAL™ programs can be written and executed easily. Both 4K and 8K versions are included. Supports the H11-6 Extended Arithmetic Chip for substantially increased speed and versatility.

H11-18, Shpg. wt. 7 lbs. **30.00**

Manual Set for H11A Computer:

Includes complete assembly and operation manuals for the H11A Digital Computer, H11-1 4K memory board, H11-2 parallel interface, H11-5 serial interface, H9 CRT terminal, and H10 paper tape reader/punch. Also includes complete software documentation. In handsome 3-ring binder.

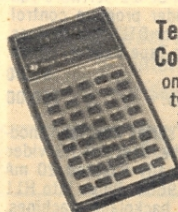**HM-1100 Manual Set,** Shpg. wt. 12 lbs. **25.00**

NOTE: The price of the manual set can be deducted when you order an H11A. Manuals are included with each kit.

Joining DECUS can help you get the most value and versatility from your computer

H11A and WH11A Owners are eligible for membership in the Digital Equipment Computer User's Society (DECUS). This organization provides useful symposia, newsletters, program library and other useful information to help you get the most from your LSI-11 computer.

Choose the H11A System that meets your particular needs and save a big 5%. Simply choose an H11, any major peripheral including the H27 floppy disk, plus the software, memory and accessories you need. Then deduct 5% from the total price (excluding shipping and handling charges). It's the easy, efficient way to get your complete computer system and save money too!
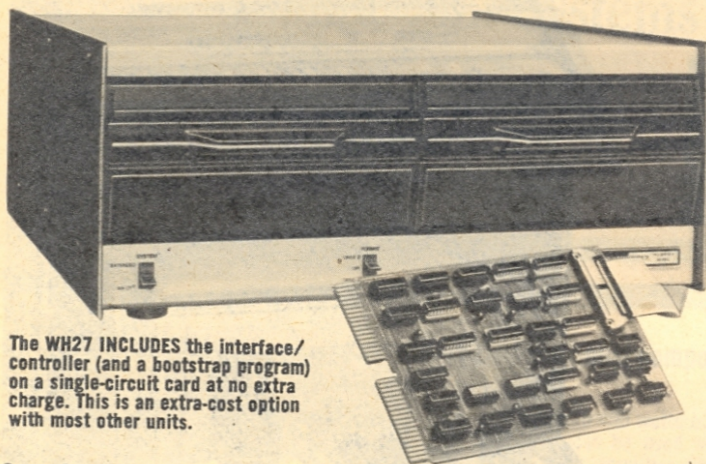
Texas Instruments TI Programmer — A Calculator for Computer Hobbyists! An ideal handheld calculator for anyone who works with computers. You can make conversions between octal, decimal and hexadecimal number systems. You set 3-key independent memory with 15 levels of parenthesis and special logic operation for computer applications. With rechargeable battery and adapter/charger. 5½″ H x 3″ W x 1¼″ D. Fully assembled.
PC-11, Shpg. wt. 2 lbs. **59.95**

80

H27 Dual-Drive Floppy Disk System for H11 and H11A

The WH27 INCLUDES the interface/controller (and a bootstrap program) on a single-circuit card at no extra charge. This is an extra-cost option with most other units.

Make your H11/H11A a real "Pro"!

$1895.00 Kit

- Z80 Microprocessor-based Controller
- Full Compatibility with DEC RX01® (PDP-11/03)
- Head Step Time of 6 mS
- Dual-drive for a total capacity of 512K bytes

The H27 floppy disk system is the one H11 owners have been waiting for — it brings enormous power and versatility to the H11 (or H11A) computer system — at a price that's a lot less than comparable floppy disk systems on the market. Here's what you get:

Full compatibility with DEC® RXV11® (PDP-11/03 hardware and software) to give you the capability of using the hundreds of applications programs written by users of the DEC PDP-11/03, the world's most popular microcomputer. This performance-proven hardware and broad software base provides virtually unlimited versatility and outstanding computing power.

Dual-drive versatility with a total of 512K bytes of program and data storage space gives you enough room for most all general-purpose application needs. And the Z80 micro-controller in the WH27 gets average access time down to 6 mS. You'll have virtually immediate access to all your files and programs.

The H27, while maintaining full compatibility with the RX01 system, also gives you some unique features you won't find on other RX01 systems:

1. A built-in self-test diagnostic on power-up that protects existing programs on your disks.
2. A mechanical interlock that prevents accidental media damage. (If floppy is not seated properly, the door will not close and the H27 will not operate.)
3. A write-protect function that protects important files and programs from being written over inadvertently.
4. A reformatting procedure that gives you the capability of writing in IBM 3740 standard format.

The H27 includes a single board interface/bootstrap that uses just one backplane slot. This leaves you with more space for memory and I/O devices.

The precision dual-drive system (Memorex drives) is housed in a rugged metal cabinet to provide years of reliable performance. Overall dimensions: 8" H x 18" W x 20" D. For 100-135 or 200-270 V, 60 Hz AC.

The Operating System Software for the H27 (HT-11) described at left requires at least 16K words of memory to use its full capabilities.

Kit H27, Shpg. wt. 93 lbs. 1895.00

WH27 Dual-Drive Floppy Disk. Fully assembled and tested.
Shpg. wt. 69 lbs. Motor Freight 2595.00

Pkg. of 5 Blank Disks. IBM 3740 format.
H27-2, Shpg. wt. 2 lbs. 25.00

Complete Operating Systems Software for the H27

The HT-11 Operating system is a single-user, single task system for interactive program development and on-line applications for the H11 or H11A computers. Features of the HT-11 include: easy operation with NO system generation procedure; contiguous file structure for easy file manipulation; device-independent I/O programming; real-time interrupt capabilities to handle synchronous, asynchronous and event-driven I/O; low-overhead monitor with memory swapping functions for most efficient use of memory space. HT-11 Programs include:

EDIT — a text editor to create/modify files for programs and documentation.

EXPAND, ASMBLE and CREF — utilities for macro-expansion, assembly language processing and cross-reference listings. Supports several pseudo-operators in addition to the entire PDP-11 instruction set. Also offers the convenience of linkable object modules with global symbols.

LINKER — converts object modules produced by the assembler or the FORTRAN compiler into a run time format. Services include relocation of code; linking of global references and creation of a runable program file for use by the rest of the system. Allows any number of overlays in any number of memory areas, subject only to memory size. Also picks called modules automatically from system or user created libraries.

LIBRARIAN — creates and maintains libraries of subroutines for use by the linker.

PIP — the Peripheral Interchange Program is the file maintenance and transfer utility of the HT-11. It has commands for moving, copying and renaming files, plus other commonly used file operations.

ODT — On-line Debugging Technique aids in debugging user programs by providing commands to display and alter the state of a running program.

BASIC INTERPRETER — high-level conversational programming language. Offers access to the HT-11 I/O system and file structure through the BASIC language. Extensions to standard BASIC in this program include: variable-length strings, sequential files, "virtual memory" arrays, chaining and overlay capability, "desk calculator" mode for once-only calculations or to aid in debugging.

MISCELLANEOUS PROGRAMS — DUMP program prints the contents of HT-11 files in any of several useful formats; SRCOM compares two files and prints a summary of their differences.

Minimum requirements for operation of the HT-11 include a Heathkit H11 or H11A computer with at least 16K words of main memory, a console terminal and interface, and a Heathkit floppy disk drive, controller and interface.

*HT-11 Operating System with BASIC. Shpg. wt. 12 lbs. 350.00

FORTRAN for HT-11 System. Binary software features complete ANSI standard 1966 FORTRAN IV with extensions for increased speed. Some of the extensions include: relaxation of statement ordering, use of expressions nearly anywhere, direct access I/O, TYPE, ACCEPT and PRINT I/O statements, ENCODE and DECODE statements, END and ERR parameters, random number generator, IMPLICIT statement, more.

*HT-11, Shpg. wt. 9 lbs. 250.00

*NOTE: The HT-11 Disk Operating System and HT-11-1 FORTRAN are compatible only with the Heath H27 or WH27 Floppy Disk Systems. To obtain this software, the Customer Software Sublicense Grant must be signed and you must include the make, model and serial number of your CPU in the blank provided on page 80.

NEW H10A Paper Tape/Reader Punch

The H10A paper-tape reader/punch is a general-purpose storage peripheral using reliable low-cost paper tape. The reader reads tape up to a maximum rate of 50 characters per second. A full sensitivity adjustment on each channel permits any color, thickness, quality (oiled or unoiled) paper tape to be used. The punch operates up to maximum speed of 10 characters per second. A copy control provides fast, easy tape duplication. Interfacing is provided by separate 8-bit parallel input and output buses with standard TTL logic levels and handshaking lines for both reader and punch. A rear panel 24-pin interface connector and mating cable are supplied. Accessories include holder for roll paper tape, chad collector tray and collector box for fanfold tape, 8" roll (900 ft.) blank paper tape. Cabinet with metal top and rugged steel chassis. 12⅝" H x 9¾" W x 19⅝" D. For 110-130 VAC, 60 Hz or 220-240 VAC, 50 Hz.

Kit H10A, Shpg. wt. 33 lbs. 395.00

H10-2, Three Rolls Blank paper tape. Each 8" diam., 900-ft. min., 5 lbs. **10.00**

H10-3, Three Boxes Fan-Fold Tape. Approx. 1000 ft. each. 5 lbs. **15.00**