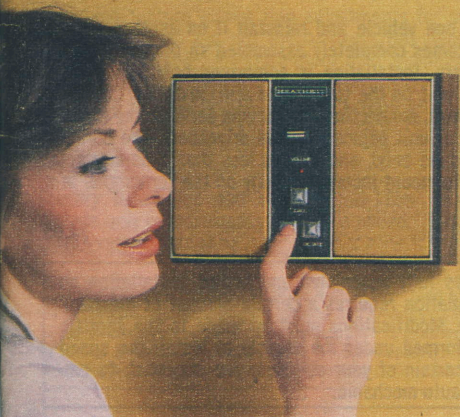# Heathkit®

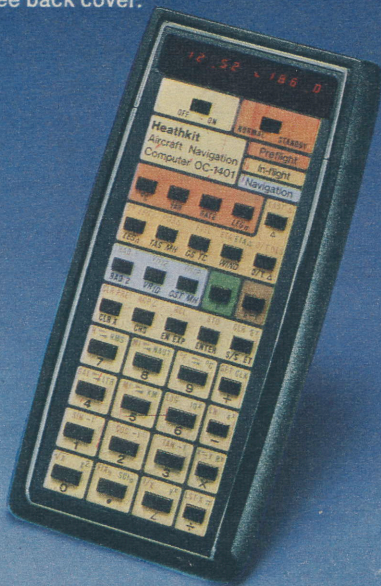## PRACTICAL PROJECTS FOR YOUR KITBUILDING FUN!

FALL 1978

NEW! TWO-WAY WIRELESS INTERCOM—See page 2.

NEW! COMING SOON! LINEAR PHASE SPEAKER SYSTEM

NEW! WORLD'S FIRST TRUE HAND-HELD AIRCRAFT NAVIGATION COMPUTER
See back cover.

NOW... OUR COMPUTERS ARE FULLY ASSEMBLED AND TESTED—AS WELL AS IN MONEY-SAVING KIT FORM
See pages 64-75.

NEW! A FLOPPY DISK SYSTEM FOR OUR H8 COMPUTER—See page 69.

HEATHKIT MAIL ORDER CATALOG 841
See handy index on back cover

Heathkit "Total System"

The value standard in personal computing systems featuring two powerful computers with better software, full documentation and service support from the Heath Company.

Heathkit computers and peripherals are designed to give the computer user, whether beginner or advanced, the most value and versatility for the money. Each unit, computer or peripheral, is an advanced product offering substantial benefits over competitive products. And now, with floppy disk storage available for the H8 (coming soon for the H11), these Heathkit computer systems rank with the finest computer products available anywhere at any price!

Personal computing is the exciting new hobby that's sweeping the country. Using a computer for games, educational and practical applications has proven itself to be stimulating, creative, educational and satisfying. Programming a computer to do things for you is not only interesting and challenging, it's FUN!

What's more, your personal computer doesn't have to be just a game-player. There are literally hundreds of applications you can program it for — checkbook balancing, keeping track of savings, charting stocks, budget planning, taxes, etc. — use it in your home for awhile and you'll be amazed at what it can do. Any data storage and retrieval application can be done faster, more accurately and more efficiently when it's done by a computer.

The business applications of computers are obvious too — payroll accounts, sales records, inventory control, accounting and bookkeeping operations, etc. Computers help you increase efficiency, streamline your operation, and save you time AND money by doing many time-consuming routine procedures with lightning speed.

Owning and using a computer can also be an exciting learning experience. You learn how to solve problems, how to program, and simply how computers work. Knowledge of this kind can really pay off because computers are being used everywhere and their application is

Personal Computers– the ones you can start with and stay with!

becoming even more widespread as low-cost mini- and microcomputers are incorporated into new devices.

Using Heath computer equipment to start and pursue your computer hobby is the really smart thing to do. We have everything you need to go from learning programming (our Microprocessor program and computer trainer, pages 88-89) to a full 16-bit machine with complete peripherals. The computer products are offered either fully assembled and tested or in money-saving, easy-to-build kit form. And every Heathkit computer product is backed by the resources of Heath Company — full service facilities, comprehensive step-by-step instruction manuals and complete technical consultation.

We're confident you'll find the Heathkit computer line one of the most intelligent, sensibly developed and complete product lines available today. It offers you total versatility and expansion capability to go wherever your imagination and computing prowess take you. And, in the Heathkit tradition, it offers the best price/performance and reliability combination you'll find anywhere.

Heath User's Group

HUG®—The Heath User's Group Keeps You in Touch and Up to Date

The Heath User's Group puts you in contact with other Heath computer owners and keeps you up to date on Heath products. There's an informative newsletter, 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 newsletter
- Software library allowing you to submit programs and obtain programs submitted by others. There is a small fee for program duplication.
- An attractive 3-ring binder to hold newsletters, software documentation and other materials.
- Program submission forms ● Software library catalog

Dues are $14.00 per year, and must be paid in full (no bank cards or Heath revolving charge). Full details are included with every Heathkit computer product. H11 owners are also eligible for membership in DECUS, see page 71 for details.

BASIC Programming Self-Instructional Program teaches essential computer language

- **Essential for personal computing**
- **Uses programmed instructions backed by "hands-on" experiments**

*Continuing Education Units (CEU's) are a nationally recognized means of acknowledging participation in non-credit adult education.

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. It uses programmed instructions backed by practical hands-on computer experiments and demonstrations to reinforce and personalize the text material. An optional final exam (passing grade 70%) brings you a Certificate of Achievement and 3.0 Continuing Education Units*. While this BASIC Course is keyed to the Heathkit H8 Computer, it is also applicable to any computer system using BASIC.
EC-1100, Shpg. wt. 7 lbs. **39.95**

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THE HEATHKIT H8 PERSONAL COMPUTER

$379⁰⁰ Kit

Requires at least one H8-1
Memory Board to operate

The powerful, easy-to-use personal computer with the "intelligent" front panel featuring octal entry keyboard and digital readout — plus a fully wired and tested 8080A CPU and system software (BASIC, assembler, editor and debug) at no extra cost!

6 EVENING KIT
Fast, Easy Assembly

- 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
- Includes BASIC, assembler, editor and debug software

The Heathkit H8 computer is the ideal choice for personal or hobby computing. 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.

The H8 is complete with superior Heathkit documentation and complete systems software to get you up and running fast and easy.

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

The H8 is supplied with complete systems software 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 away. See next page for a rundown of this powerful software.

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 convection 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. 16¼" W x 6½" H x 17" D. Switch- selected 120/240 VAC, 50/60 Hz. Requires at least one H8-1 memory board to operate.

Software is supplied in audio cassette form and is also available on diskettes and paper tape.

Order the H8 and accessories from page 68.

FOR FASTEST SERVICE — USE THE HEATHKIT HOTLINE!
(616) 982-3411 day or night
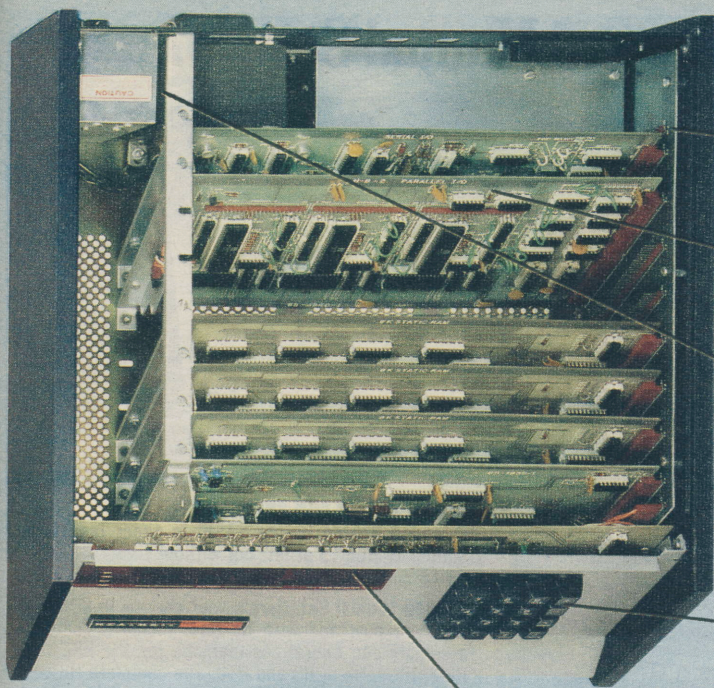
Here's the "inside" story on the H8 Computer — just look at these unique features!

The unique Heath-designed 50-pin bus is implemented on a heavy-duty printed circuit board with copper-foil bus lines. The 9-position mother board is complete with all connectors. The bus lines are fully buffered to eliminate noise and crosstalk, and "glitch-free" to prevent timing problems.

Modular circuit boards slide into the H8 mainframe for easy memory and I/O expansion and easy access for servicing. The boards are in a semi-vertical position with unconfined heat sinks to enhance convection cooling and improve heat dissipation.

Heavy-duty power supply, rugged steel chassis and securely mounted and braced circuit boards make the H8 a truly reliable and long-life machine.

Memory Display

Register Display

I/O Port Display

The H8 Computer "tells" you about operations

The H8's "intelligent" front panel provides the most informative display of any personal computer we've seen. All displays are continuously updated even while your program is executing, giving you instant access to registers and memory for direct monitoring of program activity. The memory display shows memory location and contents using 6 digits for address and 3 digits for data. The register display shows CPU-register contents using 6 digits for data and 2 digits for register identification. The I/O port display shows I/O port data and location using 3 digits for data and 3 digits for port address.

One of the most useful front panels available anywhere!

The unique front panel keyboard makes the H8 one of the most powerful and sophisticated low-cost general-purpose computers available. It provides direct access to registers and memory even while programs are running; one-button load and dump for fast, easy system startup; a single instruction key for "stepping" through programs for easy debugging, program evaluation and learning; and input/output keys for communicating directly with any port.

The software supplied with the H8 makes it "ready" for your programming!

The H8 software is the "heart" of your computer system. The software supplied with 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. H8 software is memory efficient to give you more computing power for your memory dollar, has modular design for easy expansion, and is thoroughly documented for easy programming and maximum effectiveness.

Software supplied with the H8 computer includes: PANEL MONITOR (PAM-8). This 1K ROM program monitor controls the front panel and permits you to load, execute and debug programs written in 8080 machine language. It provides memory contents display and alteration, register contents display and alteration, program execution control, self-contained bootstraps for one-button program loading and dumping, and port input and output routines.

BENTON HARBOR BASIC. This conversational programming language uses simple English statements and familiar algebraic equations to perform operations and solve problems. It is compact enough to run in the Heathkit H8 with limited memory, yet powerful enough to satisfy most problem-solving requirements. Requires a minimum of 8K memory. Extended Benton Harbor BASIC is also available, order from page 90.

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, BASIC and other languages, 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, break-pointing, load and dump from tape storage. It requires a minimum of 4K memory plus user program.

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H8 Accessories, Software and Manual Set

Order your H8 Computer and Accessories from the listings below. See previous pages for a complete description of the H8.

Kit H8, Shpg. wt. 30 lbs. **379.00**
Assembled and tested version of H8.
WH8, Shpg. wt. 30 lbs. **475.00**

NEW! WH8-16 16K Wired Memory Board for H8. Lets you expand the H8 to the full capacity of the 8080A CPU (65K). Available Sept. 15th. Fully assembled and tested.
WH8-16, Shpg. wt. 2 lbs. **395.00**

H8-1 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**

H8-3 Chip Set. 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**

H8-2 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. Compatible with all Heath software. 390 mS maximum transfer time.
**Kit H8-2,** Shpg. wt. 3 lbs. **150.00**

H8-5 Serial I/O and Cassette Interface. Connects the H8 to serial devices such as the H9 video terminal (page 74) or the H36 DEC Writer II (page 73). Features jumper selectable data rate from 110 to 9600 baud, plus common input/output interfaces including 20 mA current loop and EIA RS-232C compatible levels. The cassette recorder interface permits use with the Heathkit ECP-3801, page 73. Uses the popular Byte/Manchester recording format but runs at 1200 baud. Has control lines for remote start and stop of two cassette units to allow separate record and playback capability. LED test circuit for easy setup servicing.   **Kit H8-5,** Shpg. wt. 3 lbs. **125.00**

NOTE: Proper operation of the H8-5 is assured only if you use the Heath ECP-3801 cassette player/recorder and Heath-recommended recording tape (ECP-3802, page 73). Heath is not responsible for improper operation associated with other cassette units.

Extended Benton Harbor BASIC With Files: An enhanced and more powerful version of the BASIC supplied with the H8. 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. Complete files capability lets' you store and retrieve data records and programs. Minimum of 12K memory is required to run this BASIC, 16K is preferred if full use is to be made of its capabilities.
HC8-13 (1200 baud audio cassette) Shpg. wt. 1 lb. 20.00
Paper Tape Systems Software: A paper tape version of the systems software supplied with the H8. Four fan fold paper tapes. **H8-15,** Shpg. wt. 1 lb. 20.00

WH8-16

H8-1

H8-2

H8-5
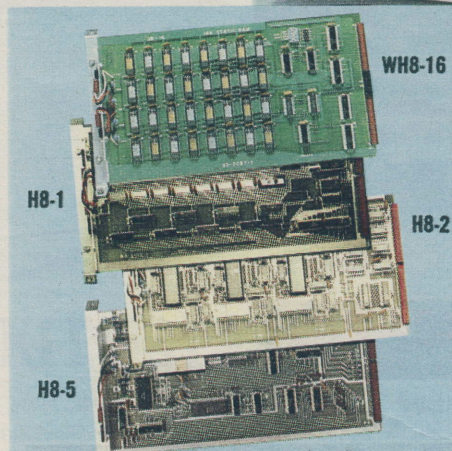
Extended Benton Harbor BASIC in paper tape form: Similar to HC8-13 at left but without files.
H8-14, Shpg. wt. 1 lb. 10.00

HM-800 Manual Set. Here's your chance to LOOK before you buy, and with no risk! Includes complete assembly and operations manuals for the H8, H8-1, H8-2, H8-3, H8-5, H9 and H10. The complete H8 software documentation is also included! All in a handsome 3-ring binder. You can deduct the price of the manual set when you buy your H8.
HM-800, Shpg. wt. 11 lbs. 25.00
Note: Individual product manuals are included with each kit.

Applications Software for the H8

BIORHYTHM. This popular applications program computes standard biorhythm information and plots sinusoidal curves of your physical, emotional, and intellectual characteristics over a given time period. The biorhythm program will show you your ups and downs and will tell you your good and bad days. It will help you plan your activities. While this program is not a game, it is an entertaining activity that you and your friends and family will enjoy. The program runs under extended BASIC and requires 16K of RAM. **PA-82,** Shpg. wt. 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 a variety of problems. A truly challenging sophisticated and entertaining computer game. Requires 24K RAM.
PA-83, Shpg. wt. 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, Hmrabi, and Derby. 8K RAM or more is required. These games will provide hours of entertainment for you and your family. **PA-84,** Shpg. wt. 1 lb. 10.00

NOTE: Above applications software is in 1200 baud audio cassette form.

How to Configure your H8 System to fill your needs now...and in the future!

Because of the great flexibility of the H8 and its ease of expansion, there are many ways to configure it. You can start with the H8 and a single memory card (H8-1). This will give you the minimum workable system and can be an ideal computer trainer. Or you can purchase the H8 with full expansion capability (the WH8-16 or four 8K cards, H8-1 with H-3 chip sets), and a variety of I/O interfaces. For data and program storage you can select our floppy disk system (next page); cassette recorder/player (page 73) or our paper tape reader/punch (page 73). Terminals available include our H9 video terminal (page 74) and the H36 DEC Writer II (page 73).

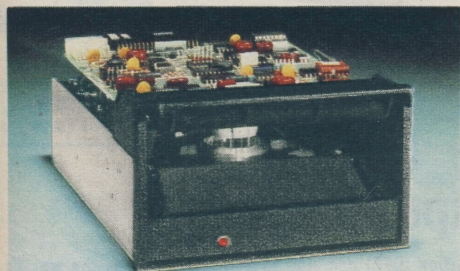### Buy a complete computer system and SAVE!

You can choose a complete computer system consisting of the H8 computer, one major peripheral, plus memory and accessories, and deduct 5% from the purchase price (excluding shipping and handling charges).

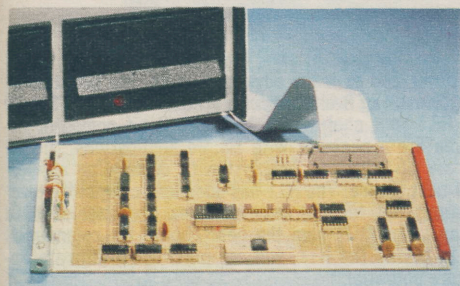# The WH17 Floppy Disk System Makes Your H8 a Real "Pro"!

Shown with optional second drive

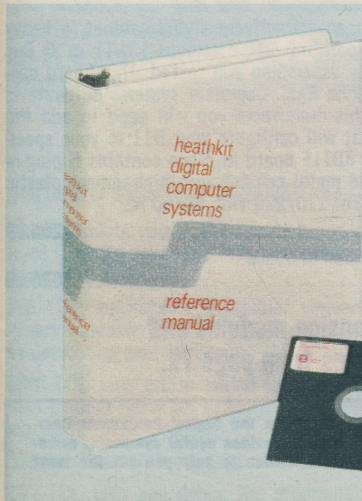**$675⁰⁰** Assembled with single drive

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 WH17 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 WH17 Floppy Disk and Its Operating System.

The WH17 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 WH17 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 WH17 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 WH17 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 WH17 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 WH17 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. The complete floppy disk drive unit is also fully assembled and tested. With single blank diskette.

WH17, Factory assembled and tested. Shpg. wt. 28 lbs. 675.00

H17-1, Optional Second Drive for WH17, Shpg. wt. 4 lbs. 295.00

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

DUAL-DRIVE COMBO OFFER — SAVE $95.00! WH17 Floppy Disk, H17-1 Second Drive, and H8-17 Operating System. If purchased separately, $1070.00.

**WHS-171, Shpg. wt. 53 lbs. 975.00**

SINGLE-DRIVE COMBO OFFER — SAVE $80.00! WH17 Floppy Disk plus H8-17 Operating System. If purchased separately, $775.00.

WHS-170, Shpg. wt. 42 lbs. 695.00

WH17 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:** 13.5" W x 6.25" H x 13.5" D.

The unique diagnostic supplied with the WH17 includes: a drive speed test to check floppy rpm; a general test to verify total system operation including R/W; a media test to examine disk for defects; and a seek time test to vary the seek time to determine the most reliable speed and efficient operation.

Complete Operating Instructions Are Included in a Handsome and Rugged Three-Ring Binder

Expanded, Hard-Sectored 40-Track Diskette Contains All Software Programs

Here's the complete Operating Systems Software for the WH17 Floppy Disk System

The Operating Systems Software for the WH17 Floppy Disk System includes a diskette containing the standard H8 software plus a unique diagnostic for optimum system setup and evaluation. This software includes extended Benton Harbor BASIC with strings and files; a 2-pass absolute assembler that generates efficient machine language codes; a text editor to prepare source code for BASIC and other languages; a console debugger for easy debugging of user machine language programs via an external terminal; and a full set of disk utility programs for convenient file manipulation. Special features of this operating system include Dynamic File Allocation which automatically keeps free space available to permit unlimited file size and prevent squeezing of disks. It also prevents estimating or predeclaring file size before writing to provide more efficient use of file space. 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 for added flexibility. 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. With comprehensive operations and instruction manual.

H8-17, Shpg. wt. 12 lbs. 100.00

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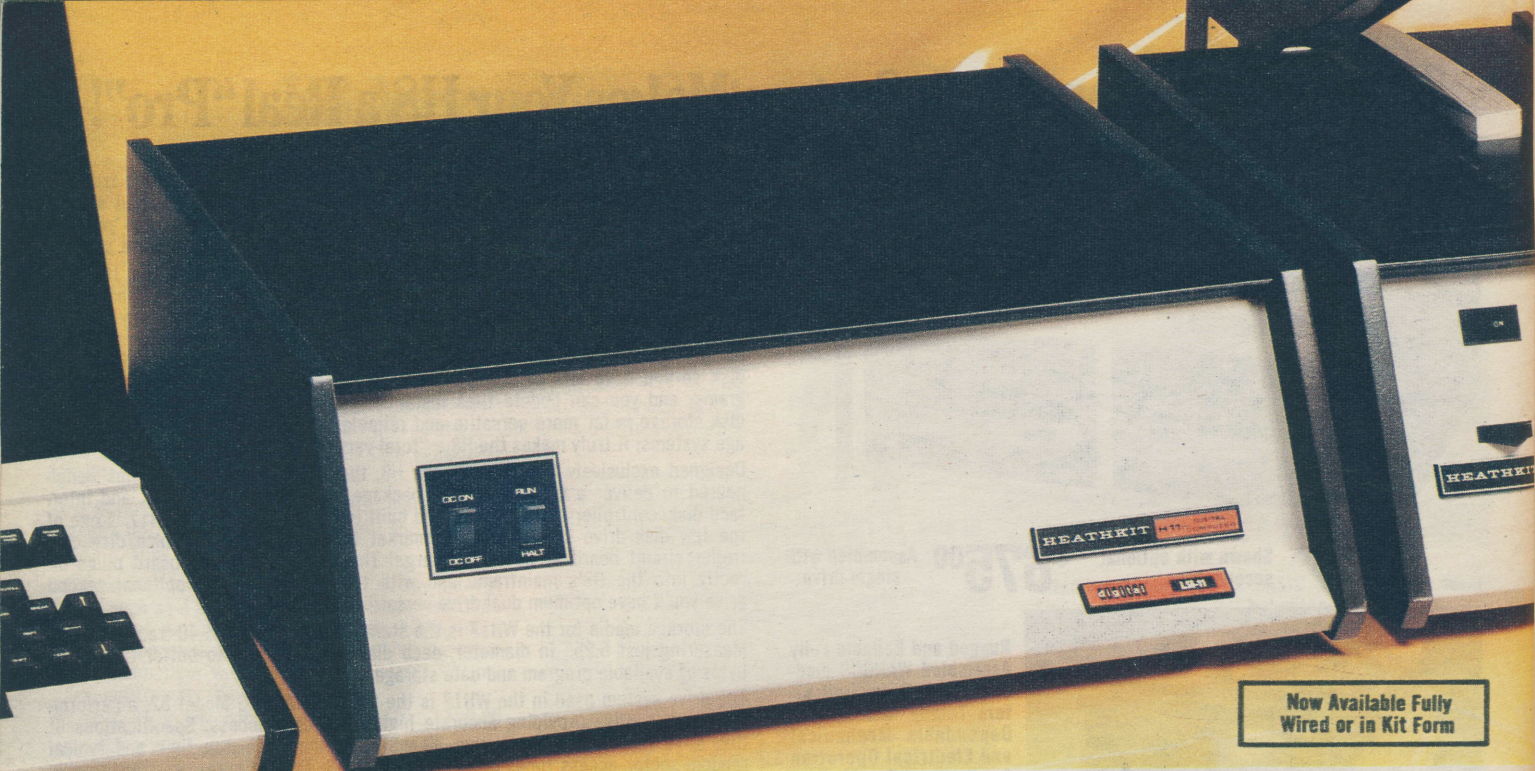
Heathkit/DEC H11 16-Bit Computer

$1295.00 Kit

Two of the finest names in modern electronics, Heath and Digital Equipment Corporation (DEC) combine to bring you one of the world's first 16-bit computers priced within reach of the general public! Equivalent commercial versions of this powerful computer would cost $1000's of dollars more!

The Heath/DEC H11 combines the advanced, performance-proven hardware and software of the LSI-11 with Heath's expertise in kit design and documentation to bring you a personal computer of almost incredible power and versatility.

What is The H11?

The H11 is Heath's top-of-the-line computer.

The H11 is designed for the serious computer hobbyist. It is the world's most powerful hobby computer. It offers the advance hobbyist the power and potential to implement more sophisticated applications. Most hobbyists discover that their problem solving and programming capabilities grow quickly as they learn more about the computer. Before long, many advanced hobbyists simply run out of computing power. Their small low cost system may be inadequate to produce the performance required by some advance applications. The H11 is the computer that meets the demand for superior performance in hobby applications. When you buy the H11 you buy virtually unlimited potential.

The H11 is also useful in education, industry and small business. Its computing power and expansion capability make it ideal for such applications. The H11 is for those who want commercial performance at hobby prices.

The Heathkit H11 is virtually identical to DEC's famous PDP-11/03 microcomputer. It features the popular LSI-11 (KD11F) microcomputer. The performance of the H11 is identical to DEC's PDP-11/03 but at a fraction of the cost. In addition, complete software is supplied with the H11. This software is worth over $1,000 when purchased separately for the DEC PDP-11/03. The H11 is clearly a spectacular hardware/software value.

The H11 is complete with superior Heathkit documentation and versatile systems software

The 16 Bit vs. 8 Bit Issue

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 H11 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 hobbyist with demanding applications, the H11 is clearly your best choice. The H11 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 H11, you are purchasing ultimate immediate performance and future potential.

The H11 Mainframe

A basic H11 computer is supplied with an attractively styled cabinet, a heavy duty power supply, a back plane incorporating DEC's famous LSI-11 or Q Bus and the powerful KD11F CPU board fully assembled and tested. This board contains the LSI-11 computer and 4K dynamic RAM. Complete systems software is also supplied in paper tape form. To this mainframe you will need to add the various memory and I/O accessories that will configure your H11 to your specifications. The H11 back plane with the KD11F board in place contains 6 plug-in slots for memory and I/O cards. Rugged metal cabinet with high-impact plastic sides measures 19" W x 6½" H x 17" D. For 110/220 VAC, 50/60 Hz.

Kit H11, Shpg. wt. 43 lbs. 1295.00
WH11, Factory Assembled and tested version of above.
Shpg. wt. 43 lbs. 1595.00

Order memory expansion modules and interface accessories from page 72.

NOTE: H11 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.

Here's the "Inside Story" on the H11!
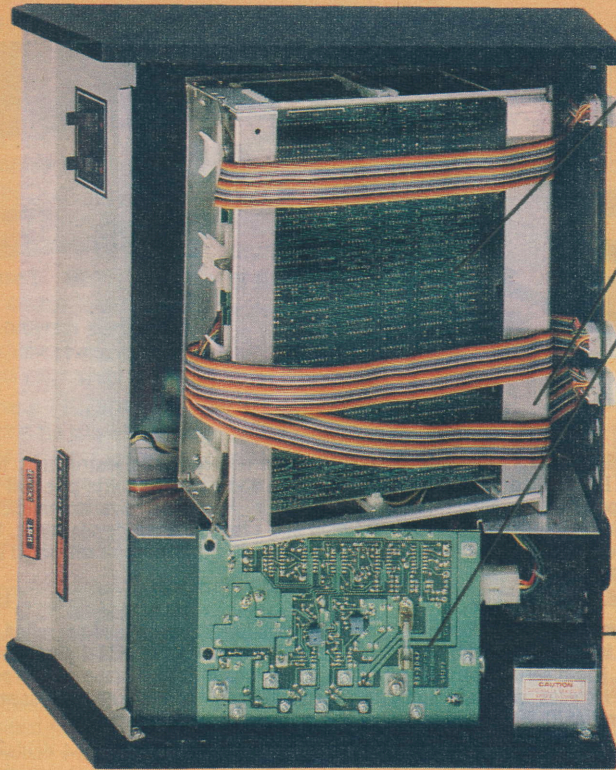
Card cage with backplane accommodates up to six accessory cards in addition to LSI-11. The card cage swings up for easy access and service even while the H11 is operating. Accessory boards slide directly into card guides with all connectors supplied.

Rugged steel chassis and extra-thick backplane with heavy, solid connectors for added strength and years of superior performance.

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.

Built-in quiet-running fan provides efficient cooling and prevents heat buildup.

16K Memory Board
32K Memory Board
Microcomputer Board

Fully Wired and Tested KD11F Board

The "heart" of the H11 computer is the standard DEC LSI-11 microcomputer board. The 16-bit CPU functions are contained in four silicon gate N-channel MOS LSI integrated circuit chips for high reliability and superior performance. The 4096-by-16 read/write MOS semiconductor memory is composed of LSI 4K dynamic RAM chips that provide fast access time and require little operating power. The CPU executes the powerful PDP-11/40 instruction set with over 400 instructions. There are no separate memory I/O or accumulator instructions, so you can manipulate data in peripheral device registers as easily and flexibly as in memory registers. The LSI-11 board is supplied fully wired and tested to facilitate kit assembly and provide greater reliability.
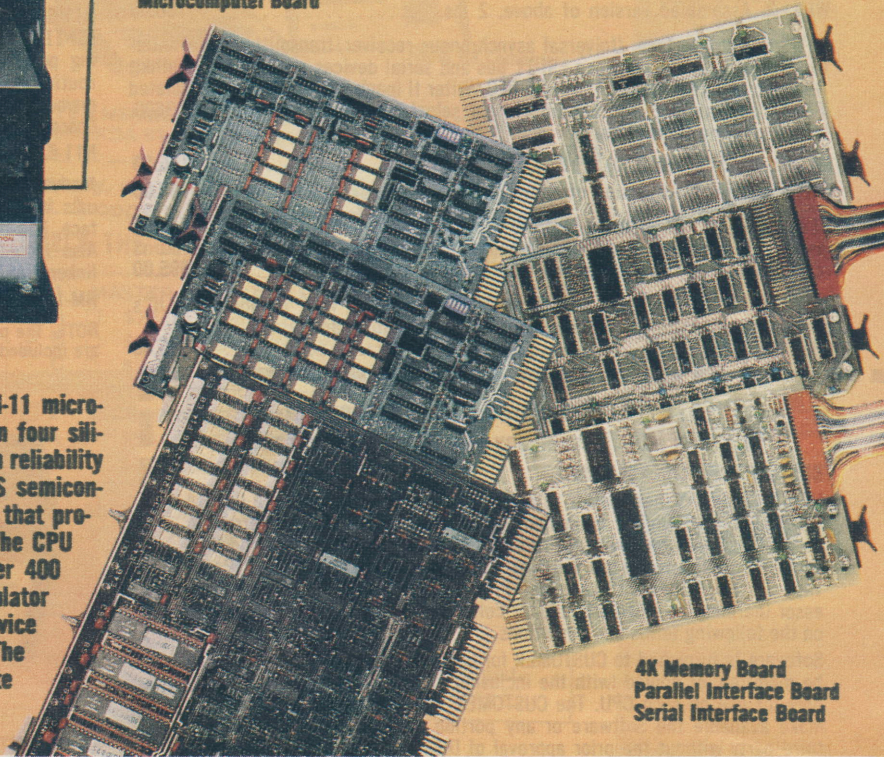
4K Memory Board
Parallel Interface Board
Serial Interface Board

Software supplied with the H11 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 H-11. The module is loaded into the H-11 via the Absolute Loader.

Absolute Loader. Loads tapes into the H11 memory for execution.

ODT-11X. Lets you debug the programs which you have created. Permits modi-

fying 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.

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.

H11 Accessories, Software and Manual Set

Order your H11 from page 70, order the accessories and interfaces you need for a custom-designed computer system below.

H11-1 4K Memory Expansion Module: Plugs into H11 backplane, adds 4K x 16-bit word capacity to H11 memory. Uses high-reliability 1Kx4 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 version of above, 2 lbs. 275.00

H11-2 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. Four control lines for output data ready, output data accepted, input data ready and input data accepted logic operations. Maximum data transfer rate, 90K words per second under program control. Maximum drive capability, 25-ft. cable.

The H11-2 is required for interfacing the H11 to the H10 Paper Tape Reader/Punch.

Kit H11-2, Shpg. wt. 2 lbs. 95.00

WH11-2, Assembled version of above, 2 lbs. 150.00

H11-5 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 74) or H36 DEC Writer II (page 73). Has optically isolated 20 mA current loop and EIA interfaces; selectable baud rates of 50 to 9600. With all mating connectors.

Kit H11-5, Shpg. wt. 2 lbs. 105.00

WH11-5, Assembled version of above, 2 lbs. 150.00

NEW! WH11-16 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. Shpg. wt. 1 lb. 995.00

NEW! WH11-32K. Identical to 16K memory above, but with 16 additional IC's containing an additional 16K of memory. Fully assembled and tested. Shpg. wt. 1 lb. 1995.00

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, subtract, multiply and divide. Helps minimize arithmetic subroutines, speeds up program execution and eases program development. Saves memory space too. 40-pin dual-inline package IC plugs into socket on H11 CPU board.

H11-6, Shpg. wt. 1 lb. 159.00

Manual Set for H11 Computer: Includes complete assembly and operation manuals for the H11 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 — monitor, editor, assembler, linker, BASIC, FOCAL and related software. 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 H11. Manuals are included with each kit.

Configure your H11 System to fit your needs.

To use the H11, additional memory and I/O interfaces must be added. The minimum configuration consists of 4K memory and the H11-5 serial interface to an external video or hard copy terminal. The H11-2 parallel interface is required to connect the H11 to the H10 paper tape reader/punch. These two interface cards occupy two of the available 6 slots in the backplane. This leaves four additional slots for memory expansion. With the new modules available, you can easily expand to the full 32K word capability of the H11. With 4K of memory you can write simple programs in machine language. The FOCAL interpreter also runs in 4K. To run the other computer software, including BASIC, assembler, editor and others, at least 8K of memory is required. 12K to 16K of memory is recommended depending upon your applications.

Buy a complete H11 System and SAVE!

You can choose a complete computer system consisting of the H11 computer, one major peripheral, plus memory and accessories, and deduct 5% from the total price!

Heathkit H10 Paper Tape Reader/Punch

Gives You the Reliability, Durability and Trouble-Free Handling You Need for Effective Mass Storage of Programs and Data

Uses Standard 1" Wide Roll or Fan-Fold 8-Level Paper Tape

$350.00

- Reader with stepper motor for accurate positioning
- Copy control for fast, easy tape duplication
- Ratchet/solenoid drive for high accuracy
- 24-pin interface connector and mating cable

The H10 paper-tape reader/punch is a general-purpose mass storage peripheral using reliable low-cost paper tape. It's fully compatible and styled to match the H8 and H11 computers, and it works reliably with any other computer through a parallel interface.

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. Sensitive Darlington photo transistors and an incandescent lamp reader head provide reliable reading. The punch operates up to maximum speed of 10 characters per second. Ratchet/solenoid drive and solenoid control of punches provide high-accuracy and consistent punching.

Controls include power on-off, read and punch start. A feed control feeds blank tape through the punch for leader tape, 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 fan-fold 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 H10, Shpg. wt. 29 lbs. **350.00**

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

Three Boxes Fan-Fold Tape. Approx. 1000 ft. each.
H10-3, Shpg. wt. 5 lbs. **15.00**
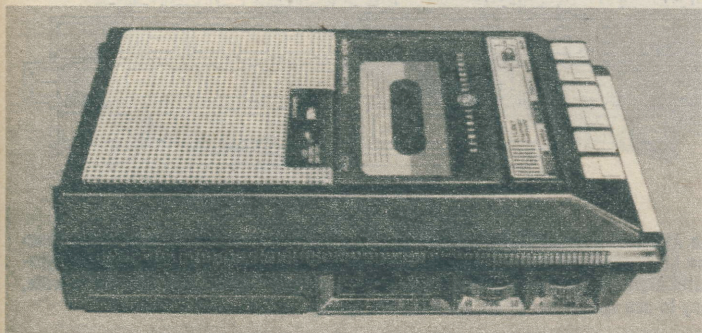
Cassette Recorder/Player Mass Storage Peripheral

Heath-recommended cassette recorder for use with H8 computer and H8-5 serial I/O and cassette interface. Provides complete mass storage capability on easy-to-handle standard cassettes. Assembled and tested, not a kit.
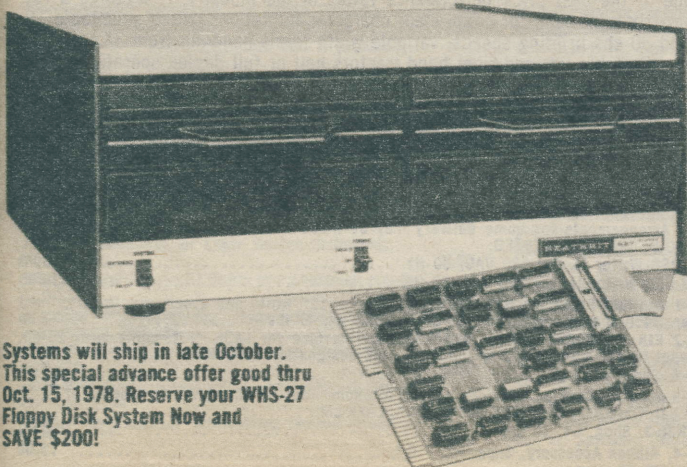
ECP-3801, Shpg. wt. 4 lbs. **60.00**

Heath-recommended high output, low noise, premium-grade audio recording tape. Pack of three 30-min. cassettes.
ECP-3802, Shpg. wt. 1 lb. . . . . **per pack 6.00**

NOTE: Proper operation of the H8-5 and H8 software is assured only with the use of the ECP-3801 cassette recorder/player and ECP-3802 tape. Heath does not assume responsibility for improper operation resulting from the use of other cassette units.

Reserve your WH27 Floppy Disk System for the H11 Now and SAVE $200!

Systems will ship in late October. This special advance offer good thru Oct. 15, 1978. Reserve your WHS-27 Floppy Disk System Now and SAVE $200!

DUAL-DRIVE, Z80 BASED

The WH27 Floppy Disk System will be available factory assembled in our next catalog.

Here's your chance to get advance-order savings on the new floppy disk system for the H11 — and what a floppy it is! At a price that's a lot less than comparable systems on the market, here's what you'll get: dual-drive versatility for a total of 512K bytes of program and data storage. Head motion of 6 mS for super-fast data access time. IBM 3740 8" disk format. A Z80 microprocessor-based controller for top speed and efficiency. Full compatibility with DEC® RX01® (PDP-11/03) hardware and software. Unique features include a built-in self-test on power-up; a mechanical interlock to prevent disk damage; a write-protect function and reformatting procedure. The software for the WH27, sold separately, includes BASIC with files capability, utilities including a macro-assembler, text editor and others. The WH27 operating system requires at least 8K words of memory, with 16K recommended to use its full capabilities.

WH27 Floppy Disk Alone **2495.00**

HT-11 Operating System **250.00**

HT-11-1, Fortran for HT-11 Operating System **150.00**

WHS-27 Floppy with HT-11 Operating System . . . . Reg. Price **2595.00**

WHS-27 Floppy with HT-11 Operating System. Advance Order Price **2395.00**

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THE HEATHKIT H9 VIDEO TERMINAL

$550.00 Kit

charg-a-kit
HEATH REVOLVING CHARGE

One of the lowest-cost ASCII terminals available anywhere — features a bright 12" CRT display with twelve 80-character lines, 67-key keyboard, all standard serial interfaces, plus a fully wired and tested control board and a wiring harness for simplified assembly.

The H9 video terminal is a general-purpose peripheral designed for use with the Heathkit H8 or H11 computers, or any digital computer. It provides keyboard input and a CRT for the convenient entry and display of computer programs and data. It can be used with any computer in dedicated stand-alone applications or in time-sharing systems.

Character format is standard upper case 5x7 dot matrix. The long form display is twelve 80-character lines. The short form display is forty-eight 20-character lines in four 12-line columns. An automatic line carry over feature executes line feed and return when line exceeds character count on both long and short-form displays. A built-in oscillator/speaker generates a 4800 Hz tone and serves as an audible end-of-line warning.

Auto-Scrolling is featured in both long and short-form. In the long form, as the line enters at bottom, the top line scrolls off-screen; in the short form, as the column enters from the right, the left column scrolls off-screen. Auto-scrolling can be defeated with a front panel switch. The cursor mark indicates the next character to be typed for accurate positioning. Cursor controls include up, down, left, right and home. Serial data baud rates are selectable from 110-9600. Baud rate clock output and reader control are available on the rear panel connector.

The erase mode permits automatic full page erase or erase to end of line starting at cursor position. A transmit page function allows a full page to be formatted, edited and modified, then transmitted as a block of continuous data.

The plot mode permits graphs, curves and simple figures to be displayed. Plotting can be accomplished via the front panel keyboard or from external inputs.

The H9 serial interface provides EIA RS-232C levels, a 20 mA current loop and standard TTL levels. Parallel interfacing includes standard TTL levels, 8 bits input and 8 bits output and 4 handshaking lines for connection to H10.

The PC control board is fully assembled and tested for added reliability and simplified kit assembly. A wiring harness complete with connectors helps reduce time-consuming point-to-point wiring.

Ultra-compact size, only 12½" H x 15⅝" W x 20¾" D, makes the H9 ideal for desktop or console applications. For 110 VAC, 60 Hz or 230 VAC, 50 Hz.

Kit H9, Shpg. wt. 50 lbs. 550.00
WH9, Assembled and Tested Version of Above. Shpg. wt. 50 lbs. 675.00

Long-Form Display — Twelve 80-Character Lines with Automatic Scrolling — New Line Enters at Bottom, Top Line Scrolls Off-Screen.
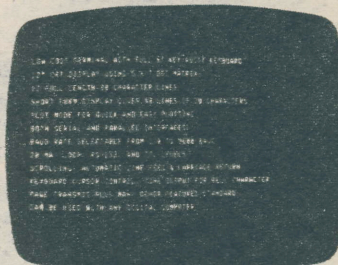
Short Form Display — Forty-Eight 20-Character Lines in Four Columns — As new Column Enters Screen from Left, Left Column Scrolls Off-Screen.
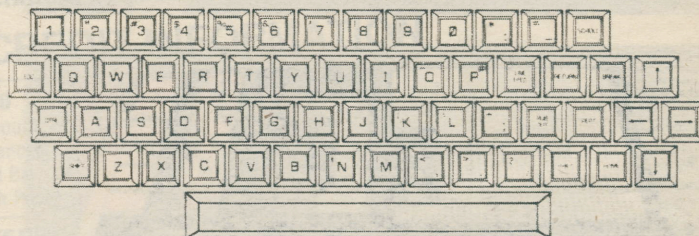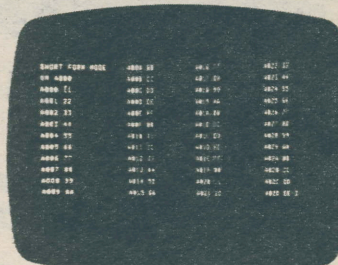
The ASCII 67-key keyboard on the H9 offers many convenient features. The function keys are positioned away from the keyboard to prevent miskeying; the typewriter-style keyboard allows easy, more accurate input; and the extra-wide, easy-to-use spacer bar helps aid accurate typing.

LA36 DEC Writer II Printer Terminal For "Hard-Copy" Computer Readout
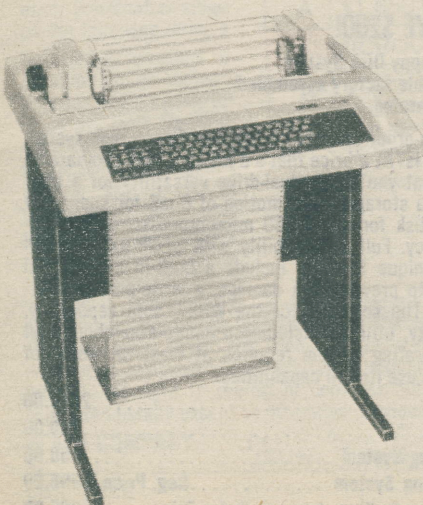
The famous LA36 DEC Writer II with true 30-cps throughput variable-width forms handling, 128-character upper/lower case set, and extra-quiet operation. Fully assembled, factory tested and ready to use!

SENSATIONAL LOW MAIL-ORDER PRICE

$1495.00

The LA36 is an advanced technology teleprinter offering fast, reliable operation at one of the best price/performance ratios in the industry. It features a 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, 27½" W x 33¼" H 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 ACCEPTED.

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. 3450 sheets per carton. H-36-1, 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, LAXX-LM).
Kit H36-3, Shpg. wt. 10 lbs. 250.00
H36-4, Ribbon Accessory, Shpg. wt. 7 lbs. 15.00

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