

Christmas 1984



**Heathkit**

Helping you make things better



# Meet HERO JR. — the home and personal robot with an entertaining personality

HERO JR. is fully preprogrammed with speech output, light and sound sensors, an ultrasonic sonar, drive and steering motors and an on-board computer control system.

Low kit price of  
**\$599.95**  
with voice



- Has a dynamic personality consisting of six traits
- Sings songs, tells nursery rhymes, plays games
- Performs tasks at specific times in the future
- Guards your home and challenges intruders
- Wakes you up on time and announces special dates
- Lets you modify his personality as desired
- Add capabilities with additional plug-in cartridges

Meet the first affordable, personal robot with a dynamic personality... HERO JR. A very friendly robot, HERO JR. will fit right in with your family and into your home. He sings songs, plays games, tells nursery rhymes, recites poems, guards your home and he can even wake you in the morning. Without supervision or help, HERO JR. will explore his surroundings and will seek to remain near his human companions. HERO JR.'s personality is preprogrammed and doesn't require any computer programming skills to operate.

**HERO JR.'s personality consists** of six individual traits. Each trait is assigned a level of priority depending on how frequently or how seldom you want each task performed. You can change the Robot's personality by simply changing the priority level of any given trait. Press the SET-UP key and select a level of activity from zero to nine for each trait. This gives you the unique capability of modifying HERO JR.'s behavior to fit any situation.

**The traits comprising HERO JR.'s dynamic personality** include: singing songs like "Daisy" and "America"; speaking preprogrammed English phrases; exploring and moving about, using his sensors to avoid most obstacles and seeking out humans; playing games such as "Cowboys and Robots," "Let's Count" and "Tickle Robot"; telling a nursery rhyme; and gabbing in "Roblish" (a robot gibberish that sounds like English). All routines are stored in 32K of built-in ROM. Additional functions can be easily added to HERO JR. through optional plug-in cartridges.

**In addition to these six traits**, HERO JR. has an internal clock with a 100-year calendar that even compensates for Daylight Savings Time (if observed in your area). With this time-keeping ability, HERO JR. can act as an alarm clock and awaken you at a specified time. After your wake-up call, the Robot listens to be sure you are awake or permits two ten-minute snoozes if you desire. You can also make HERO JR. announce the day of the week, date and time at predetermined intervals or just at one important time and date. With his on-board 2K of RAM, HERO JR. can store and then remind you of birthdays and anniversaries, or other calendar events — up to sixteen dates per year.

**To see, hear and speak, and to move about**; HERO JR. uses a light sensor, ultrasonic sonar and motion detector, sound detector, speech synthesizer and an internal clock which are controlled by an on-board computer using a Motorola 6808 microprocessor. The light sensor has an adjustable 256-part resolution range and a 30-degree reception angle. A Polaroid ultrasonic sonar transceiver is used for the Robot's sonar and motion detector which is accurate from four inches to 26 feet. The sound sensor has a 256-part adjustable resolution range and a 200-5000 Hz bandwidth. An optional infrared sensor easily installs to add superior heat/motion detection capability.

**Show off HERO JR.'s many talents** to your friends using the single-button DEMO feature. In this mode, a built-in "Robot Variety Show" demonstrates the Robot's ability to see, hear, speak, tell time and move. You can even participate in the show as HERO JR. tells you what to do and when.

**HERO JR. can perform other very useful tasks**, including security guard. In this mode, HERO JR. will guard your home against intruders with a coded security system. You can even leave HERO JR. in the Guard mode while you are at home. If you are detected by one of the Robot's sensors, you simply respond with the proper password when requested by the Robot. Should an intruder be detected, the Robot gives a verbal warning and requests the password. If you own the Heath GD-2800 Security System (page 20), HERO JR. can activate a GDA-2800-3 RF Security Transmitter (page 20) when it challenges someone and an incorrect password or no response is given. HERO JR. can guard a specific area or patrol randomly around the house.

**HERO JR. also has another human-like characteristic**, it can go to sleep. This occurs randomly as part of his personality and allows the Robot to conserve battery power by keeping only critical circuits energized. You can make HERO JR. go to sleep with the SLEEP switch or by activating the Wake-Up Alarm feature.

**HERO JR. can duplicate all English sounds** using its built-in Votrax SC-01 phoneme synthesizer. This permits the Robot to say just about anything. Volume and pitch

adjustments tailor the Robot's voice to whatever sounds best to you. All of HERO JR.'s vocabulary is preprogrammed for you.

**Although HERO JR. normally speaks, sings and performs tasks** between moving about at random, an optional wireless remote unit allows the Robot to be manually driven from place to place. HERO JR. will also speak while moving about on the remote control. Four buttons on the handheld RF remote transmitter control the Robot's forward and backward movement, stop, and left and right steering. The remote operates at 75 MHz and provides control from up to 150 feet away.

**A number of easy-to-install accessories** are available for HERO JR. Install the Infrared Motion Detector Accessory to improve HERO JR.'s ability to seek out humans and to detect intruders. An RS-232 Accessory allows you to program the Robot using a special BASIC language through the console of a video terminal or computer. Add two extra batteries to double HERO JR.'s operating time. And, extend HERO JR.'s capabilities even further by adding on the Cartridge Adapter Accessory. It enables you to plug in a variety of preprogrammed cartridges that expands HERO JR.'s list of routines, songs, games and phrases. Even a BASIC cartridge that will allow you to program the Robot through a home computer.

**Once you understand** all the facets of the Robot's personality, you can advance your skill level to that of "Robot Wizard" which permits HERO JR. to identify you by name. Other wizardry enables you to change the Robot's name, adjust the sensitivity of the light and sound sensors, and make HERO JR. measure distances and more. Learn secret passwords and become a Robot Wizard.

**HERO JR. is powered** by two six-volt rechargeable batteries that allow the Robot to operate from 4 to 6 hours, with an average amount of exploring. The batteries recharge overnight from a plug-in wall charger that's included with the kit. HERO JR. is 19 inches tall, weighs 21½ lbs. and can carry your favorite beverage (up to 10 pounds) on a 94 cubic inch compartment built into the top of his head. Three wheels, including a single rear drive and steering wheel, enable him to move about. HERO JR. is easily assembled in approximately twenty hours.

**HERO JR. is also equipped** with a 17-key keypad which permits the owner to modify the Robot's personality or initiate a special task. The alphanumeric keypad features clearly marked function keys including Sing, Play, Poet, Gab, Alarm, Guard, Help, Plan, Set Up and Enter. Eight data LEDs flash in time with his speech.

**Kit RT-1, HERO JR., Shpg. wt. 32 lbs. .... 599.95**

**SAVER! Kit RTR-1-1, HERO JR. with RS-232 and Cartridge Adapter Accessories. Shpg. wt 35 lbs. .... 649.95**

**SAVER! Kit RTR-1-2, HERO JR. with Infrared Motion Detector, Remote Control, RS-232, and Cartridge Adapter Accessories, Shpg. wt. 38 lbs. .... 849.95**

## Accessory kits for HERO JR.:

**RTA-1-1, Infrared Motion Detector Accessory** detects rapid changes in temperature within a zoned range of approximately 35' long x 20' wide. Includes two window stickers that read "Warning, This Area Protected By A Security Robot" Shpg. wt. 1 lb. .... **119.95**

**RTA-1-2, Remote Control Accessory** offers manual, wireless control of HERO JR.'s movements up to 150 feet away, operates at 75 MHz, Shpg. wt. 2 lbs. ... **179.95**

**RTA-1-3, RS-232 Accessory** allows you to program HERO JR. in BASIC (RTC-1-8) from a terminal or computer (requires HCA-10 or HCA-11 RS-232 cable on page 95 and terminal emulation software such as CPS), Shpg. wt. 1 lb. .... **49.95**

**RTA-1-4, Two extra batteries**, Shpg. wt. 5 lbs. .... **59.95**

**RTA-1-5, Cartridge Adapter**, permits use of optional plug-in cartridges that increase HERO JR.'s capabilities. Includes additional 8K RAM, 1 lb. .... **49.95**

**Plug-in, preprogrammed cartridges for HERO JR. (all require the installation of the RTA-1-5 Cartridge Adapter Accessory):**

**RTC-1-2, Songs, Phrases and Rhymes #1 Cartridge** increases HERO JR.'s vocal routines and automatically adds to the Robot's personality, 1 lb. .... **19.95**

**RTC-1-3, Animals, Blackjack and Tic Tac Toe Cartridge** enables you to play these additional games with HERO JR., Shpg. wt. 1 lb. .... **39.95**

**RTC-1-4, Special Occasions Cartridge** adds songs for special occasions, includes two versions of Happy Birthday (one using master's name), Jingle Bells and Auld Lang Syne, Shpg. wt. 1 lb. .... **19.95**

**RTC-1-5, Math Master Cartridge**, a timed math game, Shpg. wt. 1 lb. .... **24.95**

**RTC-1-6, Riddle Robot/Tongue Twister Cartridge**, Shpg. wt. 1 lb. .... **24.95**

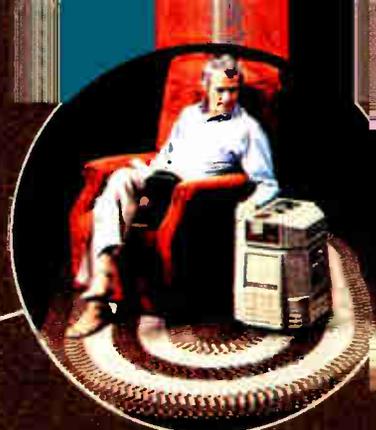
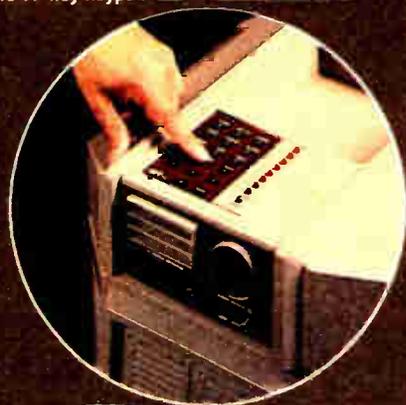
**RTC-1-8, HERO JR. BASIC Cartridge** contains special enhancements for speech, movement, sensors and integer math; and allows the owner to write programs using a video terminal or home computer running a terminal emulation program (such as CPS), requires RTA-1-3 RS-232 port, Shpg. wt. 1 lb. .... **49.95**

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Use your Visa or MasterCard credit cards to purchase your kit!

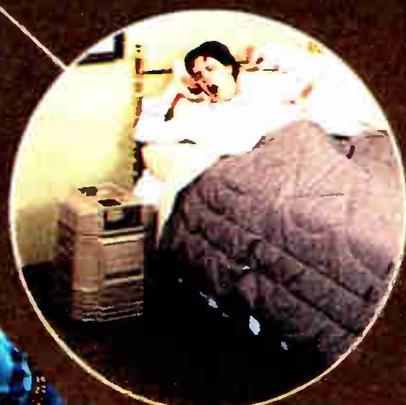
using simple 17-key keypad



Moves about and avoids obstacles while remaining in your company



Guards specific areas or your home against intruders with sensitive detectors



Wakes you up at the time you select, even allows you two 10-minute snoozes



Discover the fun and enjoyment of owning your own personal robot...HERO JR., as he entertains you, your family and friends

# Heathkit clocks combine accuracy and elegance to timekeeping

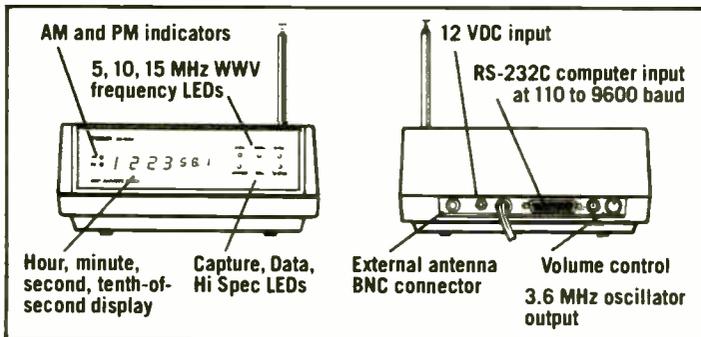
## 1 Have the National Bureau of Standards (NBS) time in your office or home — with the GC-1000

**\$249<sup>95</sup>**

- Synchronize with the NBS cesium-atomic clock
- An accuracy of  $\pm 10$  mS when Hi Spec LED lights
- ASCII computer output provided by RS-232C Accessory

NBS provides the definitive time standard for the USA. Lock onto this standard with the GC-1000 Most Accurate Clock for unparalleled accuracy. The GC-1000 sets itself to the correct time when it locks onto WWV, even after a power failure.

It's the first affordable, microprocessor-based time machine with a guaranteed "Hi Spec" accuracy of  $\pm 10$  milliseconds. The National Bureau of Standards radio station WWV transmits a one-minute stream of time-code data containing day of year, hour and minute data in Universal Coordinated Time (UTC) with a correction factor for UTC1 time, which compensates for earth's rotational wobble.



An RF receiver scans the 5, 10 and 15 MHz frequencies of WWV and locks onto the strongest signal. A mutable audio monitor permits listening to the audio broadcasts on these frequencies. An external antenna is recommended but may not be required in your area.

**Ultimate accuracy:** The front panel provides a bright digital readout in hours, minutes, seconds and tenth-of-seconds (RS-232C Accessory feeds this data and the date to your computer). LEDs show which WWV frequency is being sampled, when 'capture' of the time-encoded NBS carrier occurs, when data is being received and when the Clock is at "Hi Spec" accuracy. During noisy reception conditions, the GC-1000 keeps time with its own crystal oscillator.

The RF receiver circuit board is preassembled and factory-aligned. Propagation delay can be set for up to 18.75 milliseconds (3600 miles from WWV). Internal 3.6 MHz oscillator signal is available at rear panel. Includes a connector and seven feet of cable for connection to an external antenna.

Kit GC-1000, Shpg. wt. 7 lbs. **249.95**

GCA-1000-1, RS-232C Output Accessory, Shpg. wt. 1 lb. **49.95**

GCW-1000, Assembled and tested Most Accurate Clock with RS-232C Output. Shpg. wt. 6 lbs. **425.00**

**GC/GCW-1000 SPECIFICATIONS:** Receiver: AM heterodyne, single conversion with tuned RF amplifier. Sensitivity: 1 $\mu$ V or less for 10 dB S + n/n. Audio Output: 250 mW into 8 ohms. Clock Accuracy: Within  $\pm 10$  ms when Hi Spec LED is on. Internal Oscillator Output: 3.6 MHz. Power Requirements: 120/240 = 15 VAC, 50/60 Hz @ 100 mA or 11-16 VDC @ 750 mA (150 mA with display turned off). Dimensions: 37 $\frac{1}{8}$ " H x 9" W x 6 $\frac{1}{4}$ " D (9.8 x 22.9 x 15.9 cm) less antenna. Operating Temperature: 32 to 100° F (0 to 38° C). Storage Temperature: 0 to 130° F (-18 to 55° C).

## 2 Heathkit Digital Alarm Clock is practical, fun

**\$29<sup>95</sup>**

- Display time in 12- or 24-hour format
- Snooze alarm, flashing display with power disruption

The four-digit blue-green fluorescent display automatically adjusts to ambient light conditions. Displays hours and minutes (with AM/PM indicators in the 12-hour mode). A flashing display lets you know there's been a power disruption.

**Space-age accuracy** is provided by a metal-oxide semiconductor (MOS) integrated circuit. Fast and slow setting switches make it easy to accurately set the time. And rear panel switches make it easy to turn off the alarm or set the alarm for an extra 9-minutes of sleep.

**Get started in kitbuilding today** — and add a new pleasure to your life! Our easy-to-build Digital Clock kit includes a handsome simulated wood-grain cabinet, built-4/CLOCKS

in speaker and an easy-to-follow assembly manual. This practical Alarm Clock operates on 120 or 240 VAC, 50/60 Hz. Overall dimensions: 2 $\frac{1}{4}$ " H x 7" W x 4 $\frac{3}{4}$ " D. Kit GC-1107, Shpg. wt. 3 lbs. **29.95**

## 3 Heath Digital Wall Clock for quartz-precision time

**\$49<sup>95</sup>**

- Quartz-crystal accuracy of  $\pm 1$  minute per year
- Runs up to two years on a single 1.5 AA alkaline cell
- 1" high LCD digits provide a clear, legible display
- Display time in 12- or 24-hour format

Have the accuracy you'd expect from an expensive quartz watch. A crystal oscillator and integrated circuit ensure split-second precision and reliability.

**Battery powered operation** eliminates worries about power outages and accidental disconnection. Put a GC-1720 Wall Clock in a cabin, RV, boat or just about any place. Since the case measures a slim 5 $\frac{1}{4}$ " high x 7 $\frac{1}{8}$ " wide x 1 $\frac{1}{2}$ " deep, it fits in places where many other clocks won't, and the simulated oak case blends with almost any decor.

The GC-1720 Digital Wall Clock is an easy-to-build beginner's kit that takes just one evening to assemble.

Kit GC-1720, Shpg. wt. 2 lbs. **49.95**

**GC-1720 SPECIFICATIONS:** Accuracy:  $\pm 1$  minute per year, after adjustment according to instructions. Display: 4-digit and pulsing colon LCD, 1" digit height. Time Format: 12-hour or 24-hour. Power Requirement: One type AA 1.5 volt penlight battery (not included). Battery Life: One year with carbon-zinc cell; two years with alkaline cell. Dimensions: 5 $\frac{1}{4}$ " H x 7 $\frac{1}{8}$ " W x 1 $\frac{1}{2}$ " D.

## 4 GC-1195 Digital Floor Clock — a stylish timepiece

**\$239<sup>95</sup>**

- Bright digital display adjusts to ambient room light
- Smoked glass shelves display books, knick-knacks
- Excellent kit for the first-time builder

Add elegance to any room in your home with this distinctive clock. Housed in five feet of handsome simulated walnut veneer cabinet with anodized corner pieces, the bright, 3 $\frac{1}{4}$ "-high digital readout adjusts to surrounding light for a subtle gold-toned display.

An excellent first-kit project, the GC-1195 Digital Clock displays hours and minutes with the center colon pulsing once each second. Set the correct time with two easy-to-use time advance switches on the bottom of the clock chassis. Four  $\frac{1}{4}$ "-thick smoked glass shelves show off your knickknacks, plants or books. Add the "Westminster" Electronic Chimes (below) for Old World ambiance. Operates on 120/240 VAC. 60 $\frac{1}{2}$ " H x 14" W x 9 $\frac{1}{2}$ " D.

Kit GC-1195, Shpg. wt. 58 lbs. **239.95**

**GC-1195/1197 SPECIFICATIONS:** Format: 3 $\frac{1}{2}$ -digit (12 hour) time readout. Power Requirements: 120/240 VAC, 50/60 Hz, 30 watts. Dimensions: GC-1195, 60 5" H x 14" W x 9 5" D; GC-1197, 6 5" H x 14" W x 6 25 D.

## 5 Shelf-top version of Digital Floor Clock

Handsome shelf version of our popular Digital Electronic Clock uses the same space-age electronics as the GC-1195 Floor Clock to combine accuracy and an easy-to-read display.

Housed in an attractive walnut-veneer cabinet, the GC-1197 Clock will complement any shelf, table or desktop. Add the "Westminster" Electronic Chimes (below) for an even more distinctive timepiece. This easy-to-build kit makes an ideal project for the first-time kitbuilder.

GC-1197, Shpg. wt. 18 lbs. **129.95**

## Add Westminster Chimes to the Digital Clocks above



Have the sound of London's "Westminster Chimes" with these electronically-synthesized chimes. Sounds 4 notes on the  $\frac{1}{4}$ -hour, 8 on the  $\frac{1}{2}$ -hour, 12 on  $\frac{3}{4}$ -hour and a 16-note passage on the hour. Volume, pitch and sound delay controls. Builds into GC-1195 or GC-1197.

Kit GCA-1195-1, Shpg. wt. 3 lbs. **99.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center

## Heath's Most Accurate Clock

The GC-1000 supplies the most accurate timekeeping available at an affordable price: lock-in on the National Bureau of Standards atomic clock to have the universal time standard (UTC) in your home or office; set the Most Accurate Clock for any of the standard 24 time zones; have time that even corrects for wobble in the earth's rotation; connect that time to your computer with the RS-232C Accessory.



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# Useful, easy-to-build Heathkits for the home, the hobbyist and the family

## The Heathkit® Pledge

Our instruction manuals are written with you, the builder, in mind. They begin with an introduction to the product and a soldering guide for the first-time builder. Step-by-step instructions and clearly-detailed illustrations take you through every phase of construction. In case of difficulty, there's a troubleshooting guide. You can even call or write the Heath Technical Consultants for prompt, courteous answers to any special questions. You can't go wrong, because our ever-growing popularity around the world is based on this one simple pledge:

**"We won't let you fail!"**

### 1 Rechargeable Portable Light makes it easy to see

**\$39<sup>95</sup>**

- Provides more light over a wider area than conventional, harsh flashlights
- Operates for hours on a charge – recharges overnight on 120 VAC or 12 VDC

Indoors or out, the Heathkit Rechargeable Portable Light will bathe your working area with a bright, yet soft-on-the-eyes fluorescent light for a multitude of uses. Helps you to clearly see a wider area without sharp, eye-straining shadows. Safer to use than fire-hazardous candles and kerosene lamps in a power outage or while camping. And it saves money by recharging over and over for just pennies. "Soft start" feature extends tube life. 120 VAC and car lighter socket chargers included. A single charge lasts for several hours. Heavy-duty metal case with handle is 10<sup>3</sup>/<sub>8</sub>" H x 3<sup>1</sup>/<sub>8</sub>" W x 5" D. It's designed to survive rugged use – perfect for camping or night work, home and automotive emergencies – *always ready when you need light!*

Kit GD-1246A, Shpg. wt. 6 lbs. .... 39.95

### 2 Electronic Metronome gives you a perfect beat

**\$24<sup>95</sup>**

- Variable between 40 and 210 beats per minute
- Reliable performance in cherry-finish birch enclosure

Whatever instrument you play, the Heathkit Electronic Metronome will maintain a steady beat so you can practice confidently at the correct tempo. Uses a sound board and solenoid to produce an authentic metronome sound.

Front panel control lets you set the tempo you need. A rear panel control lets you adjust the volume from soft to a loud, conventional "tick-tock" rhythm. Includes a handy label so a student can relate the number of beats per minute to tempos in different time signatures.

Kit TD-1257, Shpg. wt. 2 lbs. .... 24.95

### 3 This AM Portable Radio is an easy kit to build

**\$18<sup>95</sup>**

- Designed for the first-time kit builder
- Optimum AM reception, almost anywhere
- Improved circuitry for extended battery life

A perfect kit that will thrill any youngster! Excellent AM sensitivity gives sensational reproduction of voice and music with a clear, even tone. Take this great little performer with you anywhere for extra fun. High-gain ferrite rod antenna delivers long-distance reception. Uses 9V battery (not included) or PS-2350 Battery Eliminator on page 46. Includes earphone for private listening.

Kit GR-1009, Shpg. wt. 2 lbs. .... 18.95

### 4 Photoelectric Light Switch to protect your home

Great low-cost insurance against break-ins: Turns lights on in the evening, off at dawn – automatically. Gives your home a "lived-in" look to discourage unauthorized entry while you're away. Plug it into any outlet, adjust sensitivity and it controls lamps or other AC-operated devices up to 150 watts. Practical and beneficial security kit, 3<sup>1</sup>/<sub>2</sub>" H x 2<sup>3</sup>/<sub>8</sub>" W.

Kit GD-600, Shpg. wt. 2 lbs. .... 9.95

### 5 Heath's Ultrasonic Cleaner for delicate items

**\$99<sup>95</sup>**

- For those almost-impossible special cleaning chores
- Cleans and sanitizes most precious items that might be damaged by abrasive scrubbing or harsh cleaners

This scientific method is the fastest, most effective way to deep clean dirt, stains and undissolved solids from hard-to-clean jewelry, watch parts, glass, coins, components, dentures, paint brushes, etc. Cleaned objects sparkle like new! All your delicate items, except pearls and turquoises, are safely cleaned without abrasion.

The GD-1151 Ultrasonic Cleaner is efficient, with a maximum power consumption of only 100 watts. Use a standard laundry detergent or softener at any temperature between 32° and 122°F. Filling the 6" L x 4" W x 2<sup>3</sup>/<sub>8</sub>" D tank with one inch of cleaning solution only requires about 1<sup>3</sup>/<sub>4</sub> cups.

Professional artisans, jewelers and watchmakers have used the ultrasonic method for years. This low-cost kit is easy to build, in two evenings – and it lets you take advantage of this safe and efficient cleaning process. 4<sup>1</sup>/<sub>8</sub>" H x 11" W x 5<sup>3</sup>/<sub>4</sub>" D. Operates on 120 VAC.

Kit GD-1151, Shpg. wt. 5 lbs. .... 99.95

### 6 Battery Life Tester saves on replacements

**\$14<sup>95</sup>**

- Ideal for users of portable instruments and equipment
- Check usable life of 1.2V to 9V batteries
- Know when to recharge or replace your batteries

Test all popular-sized batteries and end waste – be certain a battery is dead before you throw it away. Does more than just give a "good-?-bad" reading like other testers – actually indicates *how much useful life* remains on a 0-to-5 meter scale. Tests alkaline or carbon-zinc 9V or 1.5V AA, C & D-size batteries, plus 1.2V rechargeables. Indispensable for households with many independently powered items – tape recorder/players, radios, cameras, toys, smoke or burglar alarms, flashlights, etc. Test eyelet snugs into front slot.

Kit GD-1703, Shpg. wt. 1 lb. .... 14.95

### 7 Inexpensive, easy-to-build Freezer Alarm

**\$19<sup>95</sup>**

- Prevent costly food loss from freezer failure
- Be alerted to a freezer door left open
- Freezer Alarm even works during a power outage

Protect your meats and other frozen foods from spoilage by installing an instant alarm that warns of a failure in your freezer's cooling system or a door left ajar. Two-speed alarm beeps and red LED flashes at a slow rate if inside temperature rises above +20°F; faster if door stays open too long. Requires 2 "C" batteries (not supplied). Slide switch shuts off alarm. Includes 20' of thin hookup wire, plus mechanical, temp and water sensors – with application ideas.

Kit GD-1183, Shpg. wt. 2 lbs. .... 19.95

### 8 Flood Alarm detects water, sounds loud warning

**\$24<sup>95</sup>**

- Easy to install – monitors 24 hours a day
- Helps prevent costly water damage

Don't take chances! Avoid expensive, messy water hazard in your home, office, boat, basement, RV, factory, garage – anywhere excess moisture threatens! The reliable Heathkit Flood Alarm will detect water when it first appears, giving you maximum time for corrective action *before it can do major damage.*

Use it in a hundred places: The water sensor sticks anywhere. When water touches the sensor foil, the Flood Alarm produces a loud, insistent beeping in time with a flashing red LED to get fast attention! Safeguard against water seepage in cellar, kitchen, bathroom, computer room; near dehumidifier, dish or clothes washer, leaky plumbing, sump pump – even place sensor on the edge of a windowsill to wake you if rain comes in an open breezeway. Size: 1<sup>3</sup>/<sub>4</sub>" H x 3<sup>3</sup>/<sub>8</sub>" W x 4<sup>7</sup>/<sub>8</sub>" D.

Kit GD-1701, Shpg. wt. 2 lbs. .... 24.95

### 9 Photobeam Alarm Relay detects intruders and lets you know they are there

Multi-purpose system: Consists of mirror assembly and light source/photocell relay. Uses a narrow, reflected beam to catch intruders instantly, activating lights or any 120 VAC warning devices you have plugged in up to 300 watts total.

Kit GD-1021, Shpg. wt. 3 lbs. .... 19.95



Use your Visa or MasterCard credit cards to purchase your kit!



Easy, one-evening kits are practical, fun-filled introductions to the satisfying experience of kitbuilding. Average assembly time is just a few hours. They're perfect for gaining confidence before you tackle a big kit, birthday and holiday giving, sparking a new interest in young boys or girls, or sharing pride of accomplishment with the whole family!



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Freezer Alarm —  
easy to build,  
protects your food



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## 1 Use Heath's computerized weather station for up-to-the-minute meteorological information



- Displays time and date, indoor and outdoor (F or C) temperatures, wind speed and direction, and barometric pressure (whether it is rising or falling and rate of change)
- Microprocessor accuracy with memory storage of past weather data so you can see trends
- Remote windcup-and-weather-vane transmitter assembly mounts on a 1" to 1½" mast (such as a TV antenna mast) for years of dependable service
- Professional-looking solid walnut cabinet with brushed-aluminum trim panels

The Heathkit Digital Weather Computer uses a microprocessor to instantly give you accurate past and present weather data to aid in forecasting future activities. For professional weather watchers, farmers, boaters, pilots, campers, fishermen, science teachers — for anyone going outdoors — the weather station can let you know what to expect. The microprocessor-controlled display puts ALL the important weather information at your fingertips!

**Complete weather information at the touch of a button:** The ID-4001 Digital Weather Computer gives you the time in AM/PM or 24-hour format, plus the date for log entries; both the indoor and outdoor temperatures, whether above zero or below, in Fahrenheit or Celsius scales; outdoor wind chill factor, plus the indoor/outdoor minimum and maximum temperatures since last memory clearance; instantaneous wind velocity with digital accuracy and 16-point compass resolution, in mph, kph or knots; the average wind speed and direction, and peak gust since last cleared; barometric pressure with four-digit accuracy, in selectable inches or millibars, and whether rising or falling and rate of change.

**Our electronic almanac has more memories to store data:** The Digital Weather Computer records high and low temperatures, minimum and maximum barometric pressures, peak wind speed, and most importantly, the time and date each occurred. The data is stored in memory until you choose to clear it. Even the rate of barometric change is calculated — to let you know when a major storm is about to develop. Connection to an external battery will hold memory contents in case of a brown-out or power failure.

**The anemometer, weather-vane and remote transmitter were designed using an aerospace wind tunnel** to ensure reliable operation under adverse weather conditions. A compact boom assembly relays data to the computerized console indoors. The transmitter utilizes solid-state infrared sensors and optical encoding transmission technology to provide a higher degree of accuracy than is possible with conventional, friction-sensing mechanical devices. For example, our wind speed sensor is sensitive to variations as small as one-tenth of a mile per hour!

**In addition,** the barometer readings are derived from a newly-developed piezoresistive silicon bridge transducer that senses the most minute changes in atmospheric pressure, from 28 to 32 Hg (inches of mercury). The four-digit readout also has separate indicators to show whether the pressure is rising or falling. An output for interfacing with a computer is available for even more sophisticated weather forecasting, research and pattern forecasting.

**The computer contains a 6-digit clock** to display time in either a 12- or 24-hour format. A 4-year calendar also uses the same six digits on alternate cycles, and a rear-panel switch permits selecting either a time or date display.

**Beautiful styling and an easy-to-read digital display:** Not only does this Weather Computer provide more data, but its functionally elegant design will blend in with almost any decor. The readout panel is trimmed in brushed aluminum and features large bright-red ½" LED segment displays against a black background. Solid oiled-walnut computer cabinet has clearly marked front panel buttons.

**If you want the fun and savings of building it yourself,** you'll find the Heathkit Digital Weather Computer surprisingly easy to build. It's an enjoyable kitbuilding experience, with uncrowded circuit boards for easy parts placement and a wiring harness that minimizes point-to-point wiring. Heathkit's easy-to-understand assembly manual leads you through construction, step by step. Or, you can order the IDW-4001 factory assembled and tested version, ready to install and use the very first day. The IDW-4001 comes with 100 feet of 8-wire cable.

**Whether for hobby or professional reasons,** you'll find Heath's Digital Weather Computer an investment that pays for itself, again and again. Order your Weather Computer today, with the length of cable you need, and have reliable, up-to-the-second weather information at your fingertips — whenever you need it!

Kit ID-4001, Shpg. wt. 15 lbs. .... 399.95  
**Computerized Weather Station** factory assembled and tested.  
 IDW-4001, Shpg. wt. 25 lbs. .... 699.95

## 2 Five-function weather station supplies accurate atmospheric and temperature information at a low cost



- Monitors barometric pressure, indoor/outdoor temperatures, wind speed and direction
- Temperature-compensated barometer can be used to an altitude of 10,000 feet
- All solid-state circuitry requires a minimum of power from the AC line
- Walnut grained cabinet can be displayed horizontally on a desk or table, or hung on a wall for comfortable eye-level viewing
- Quality, non-corroding transmitter assembly

For the price, you can't beat the features or the accuracy of the ID-1290 Weather Station. This weather instrument was designed for quality and reliability: it contains professional-grade sensors; the all solid-state circuitry operates from 120 VAC with a minimum power consumption to provide maximum component life; and a non-corroding remote transmitter assembly ensures years of trouble-free service — all for less than \$160.

**Heathkit's ID-1290 provides instant and accurate weather information:** True indoor/outdoor temperatures are displayed in both Fahrenheit and Celsius; thermometer calibration from -40°F to +120°F (-40°C to +49°C), with a switch to select continuous indoor or outdoor readings. A sensitive barometer helps you keep on top of the most significant meteorological parameter (changing atmospheric pressure conditions) by indicating changes as small as 0.05 inches of mercury. Wind speeds can be read in two ranges: from 0 to 30 mph or from 0 to 90 mph. The eight wind direction indicators provide a 16-point compass resolution when two adjacent indicators are lighted.

**Remote, windtunnel-tested anemometer/weather vane assembly** has long-life Teflon bearings that require no lubrication, to ensure accurate readings year after year. Well-insulated 8-wire cables provide excellent weather resistance (not included, order from this page).

**The four instrument dials** are housed in an attractive, simulated wood-grained cabinet. Gold graphics on black dials make the long-range precision scales easy to read. The anemometer/weather-vane transmitter assembly mounts conveniently on any standard 1" to 1½" mast.

**To simplify construction,** all electronic components in the console are mounted on a durable epoxy circuit board. Only a few simple adjustments are needed to place the Weather Station into operation — these can be completed without the use of test instruments.

**Heathkit's well-written assembly manual** is amply illustrated to lead you step-by-step through construction. After just three or four evenings, you can have the ID-1290 Weather Station assembled, installed and working for you. And all the important weather information (wind speed and direction, temperature and barometric pressure) will be yours.

**The ID-1290's walnut grained, sturdy indoor console** can be placed on a wall, or used as a handsome and distinctive desk set with the included triangular stands. Operates on 120 VAC. Measures 7" H x 20½" W x 2" D.

Kit ID-1290, Shpg. wt. 8 lbs. .... 159.95

**ID-1290 SPECIFICATIONS:** Wind Speed: 0-30 mph. - 2 mph; 0-90 mph. ± 5 mph. Direction: 8-point readout over 360. Temperature: 0 to -120 F. - 2 F (typ. INDOOR). - 40 to +120 F (typ. OUTDOOR). Barometric Pressure: 28-31 inches of mercury within 0.5 inches, accurate up to altitudes of 10,000 ft. Operating Temperature: Receiver: 32 to 100 F. Transmitter: -40 to -120 F. Wind Direction: 16-point resolution by lighting two adjacent lights

**ID-4001 SPECIFICATIONS:** DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. WIND VECTOR: Accuracy: ± 5% or better. Direction Display: Accuracy: ± 11.25 degrees. THERMOMETER: Temperature Range: -40 to 70 C. -40 to 158 F. Accuracy: ± 1 on Celsius readings. ± 2 on Fahrenheit readings. BAROMETER: Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury). 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg. - 0.01 in. Hg/°C. Operating Temperature: Outdoor assemblies. -40 C to -70 C (-40 F to 158 F). Unit, 15 to 35°C (59° to 95°F) Power Requirement: 120 240 VAC. Provision for external battery connection for memory backup during power failures. Dimensions: 7 1/4" H x 16" W x 6" D

### 8-Wire Cable for the ID-4001, ID-1290 and ID-1590 Instruments

IDA-1290-1, 50' cable, Shpg. wt. 2 lbs. .... 9.95  
 IDA-1290-2, 100' cable, Shpg. wt. 4 lbs. .... 16.95  
 IDA-1290-3, 150' cable, Shpg. wt. 6 lbs. .... 23.95





## 1 Relative Humidity Indicator monitors air moisture

**\$99<sup>95</sup>**

- Monitors the relative humidity to improve your living environment and reduce heating/cooling costs
- Costs half as much as comparable units and offers more

The ID-2295 Relative Humidity Indicator uses two electronic sensors to let you know the relative humidity indoors and outdoors. Save time and dollars when you know if it's dry enough outside to paint in the summer or time to turn on the humidifier in winter to save on your heating bill.

**Electronic sensors provide accuracy and reliability:** Heath's electronic sensors, unlike most barometers that use animal membrane or hair, uses a conductive film covered with a layer of gold for greater reliability – and electronic sensors permit making accurate readings in remote locations. Place the console in a convenient location, the two sensors where you want to measure relative humidity.

**With both sensors connected,** the console can display readings alternately, 1.5 or 5 seconds apart, or can be switched for a constant display of either reading. Bright red ½"-high digits display the humidity by percentage, from 0 to 99 percent. LEDs identify which sensor's readout is being displayed. A 100-foot easily-concealed transmission cable is included. Assembly and calibration requires only two or three evenings. Console measures 2½" H x 7" W x 5" D.

Kit ID-2295, Shpg. wt. 6 lbs. .... 99.95

## 2 Accurate Digital Wind Speed/Direction Indicator

**\$99<sup>95</sup>**

- Check wind speed and direction with electronic accuracy
- Read wind speeds in mph, kph or knots, from 0 to 99
- Non-corroding outdoor transmitter for years of service

This ID-1590 Digital Wind Indicator skimps on price, but certainly not on accuracy or reliability. The outdoor transmitting unit is one of the best around. It's designed to give you precise wind speed and direction, year after year. The anemometer and weather vane are constructed from non-corroding waterproof materials for error-less readings under any condition.

**The indoor console features** an easy-to-read seven-segment display and can be wired to report in two of three scales: mph, kph and knots. The readout displays wind speeds on these scales from 0 to 99. Incandescent bulbs mark the principal compass points, providing 16-point resolution by temporarily lighting two adjacent bulbs simultaneously. It uses the same transmitter boom as the ID-1290 (shown on page 9).

**In only three evenings,** you can have this Wind Speed/Direction Indicator working for you. And you can calibrate it for true north to gather weather data – or for magnetic north if you are a pilot. Only two simple adjustments are required to place the Indicator in operation, and these can be performed without test equipment. Requires 8-wire cable (see page 8). Operates on 120 VAC.

Kit ID-1590, Shpg. wt. 7 lbs. .... 99.95

## 3 Practical Digital Indoor and Outdoor Thermometer

**\$84<sup>95</sup>**

- Digital display of indoor and outdoor temperatures
- Continuous or alternating Fahrenheit or Celsius display
- Electronic accuracy and reliability with Heathkit quality

**When you compare the advantages** this Digital Indoor/Outdoor Thermometer has over a conventional mercury bulb "sun-or-snow" thermometer, you'll wonder how you did without one for so long. The big, red ½" display digits can be seen easily from across the room, at night and in bright daylight. Eliminate the guesswork in getting accurate temperature readings.

**The ID-1390B Thermometer monitors temperature readings from two sensors** for accurate indoor/outdoor readings. Measure temperatures from -30°F to 120°F outdoors and indoors. This Thermometer has an accuracy of ±1° from 20°F to 120°F, ±2° from -40°F to 120°F. The 2½" digit display has plus and minus indicators for quick identification of above- and below-zero readings. Select Fahrenheit or Celsius temperature scales, with a continuous reading of indoor or outdoor temperatures, or alternate readings of both. The 10' indoor and 75' outdoor cables (included) let you place the sensors almost anywhere (freezer, sauna, basement, etc.).

**Step-by-step instructions** make this kit easy to assemble and calibrate, and it is a practical gift that gives year-round value. Operates at 120 VAC, 60 Hz (order model ID-1390BE for 240 VAC, 50/60 Hz operation). Small size (2½" H x 7" W x 5" D) and an attractive black Cyclocac cabinet with teakwood trim make this Thermometer a handsome addition almost anywhere in your home. Styling is the same as for the ID-1590 Digital Wind Speed/Direction Indicator.

Kit ID-1390B, Shpg. wt. 4 lbs. .... 84.95

## 4 Heath's GR-3000 Deluxe 25" TV Computer System

**Super Saver:** Get a complete deluxe 25-inch TV Computer system that includes a GR-3000, a GRA-3000-1 Programmer Accessory Module, a GRA-3000-2 Auto Rotor Accessory Module with a GDA-1184-1 Electronic Rotor Assembly, and a choice of either a small GRA-705-25 or large GRA-715-25 TV cabinet for the price of the GR-3000 Television alone.

Kit GRS-3000-1 with small TV cabinet, 256 lbs. Mtr. Frt. .... 999.95

Kit GRS-3000-2 with large TV cabinet, 280 lbs. Mtr. Frt. .... 999.95

At first glance, your GR-3000 looks like a normal TV, but revolutionary new hardware, superior performance and advance design make it the world's most talented receiver. And it's all available from your armchair.

**The Remote Control unit uses infrared telemetry** to perform some never-before-possible computerized TV magic. Light-touch buttons have audible feedback and provide complete control of channel selection, volume, color, contrast, brightness, tint and special functions only possible with the GR-3000 TV.

**A special 3-line information display** appears briefly on the screen by direct command or when channels are changed. It identifies the tuned station, current time in the selected 12- or 24-hour format, and current date. A fourth, accessory line shows the function in use or compass rotation and direction status (when the Auto-Rotor is used). All this, at the touch of a button.

**Automatically set your antenna** for optimum reception. The microprocessor-guided GRA-3000-2 Auto-Rotor Accessory Module seeks a maximum signal level when you select any one of the 82 addressable channels. It memorizes antenna orientations and returns to them when those channels are selected. And, you can also change antenna direction directly, or fine tune a direction with ± 2 degrees of resolution to minimize ghosts and snowy pictures.

**A "Learn" mode with eight channels of input space** (94 bytes of soft memory) will let you custom-program up to eight different sequences of TV operation and repeat them with a single command. For example, you can program Receiver on/off, rotor headings and channel changes for preselected times – program daily or even weekly schedules, and use them for a full season.

**Four ways to choose a telecast:** Direct Channel Selection tunes instantly with crystal-controlled PLL frequency-synthesis accuracy. Standard Scan uses the Up and Down keys to skim through all received channels. Valid Scan pauses only on channels where a signal is present. Set Channel Scan lets you bypass any unwanted channels while scanning the full-available range.

**The GR-3000 is cable compatible** for immediate installation in equipped areas. Direct audio and video input and output jacks on the rear panel permit you to connect and switch between a video recorder/disc player or standard channel reception. Have maximum convenience on fully-equipped cable systems: convert (midband, superband and hyperband channels) to convenient UHF positions for easy pushbutton tuning. Two 6" x 9" and two 2" tweeters supply excellent sound.

**A multi-level video display** consists of five different display screens. First is the standard video screen; second is a backdrop screen which can be set for any of sixteen different colors; third is a pattern/text screen for alignment/test purposes and built-in help messages; next is a 40-character display screen for configuring on-screen displays and messages; the fifth is a computer-generated screen, to display text and graphics generated by an external computer.

Kit GR-3000, 129 lbs. Motor Freight .... 999.95

Kit GRA-3000-2, Auto Rotor Accessory Module, Shpg. wt. 2 lbs. .... 19.95

GDA-1184-1, Cornell-Dublier Electronic Rotor Assembly Model AR-40, required for proper Auto-Rotor operation, Shpg. wt. 11 lbs. .... 89.95

**GRA-3000-1, Programmer Accessory Module** gives you preset control of your GR-3000 Television Set. You can preset your TV programming in the weekly mode for a day, or an evening – to repeat once a week by day and time, or once a year in the special mode by calendar date and time.

Kit GRA-3000-1, Shpg. wt. 2 lbs. .... 199.95

**4 Large cabinet for the GR-3000 Television Computer System.** Decorator-design has elegant oak veneer parquet top and sides with antique-finish metal hardware and latticework. Solidly constructed, select hardwood framing. Accepts four wide-range speakers, mounted two on each side of the screen. Measures 32½" H x 50½" W x 20" D with casters and tube cap.

GRA-715-25, 136 lbs. Motor Freight .... 199.95

**5 Small cabinet for the GR-3000 Television Computer System.** Provides maximum efficiency in size and price. Antique brass-rubbed latticework and decorative hardware accent the beautiful, distressed-finish oak veneer top and sides. Measures 33" H x 43" W x 20" D with casters and tube cap. Accepts four speakers from GR-3000 kit, mounted in front, below TV screen.

GRA-705-25, 112 lbs. Motor Freight .... 149.95





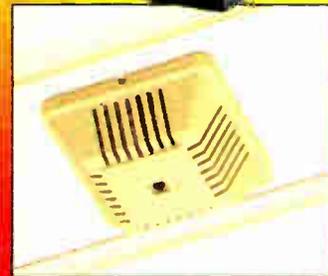
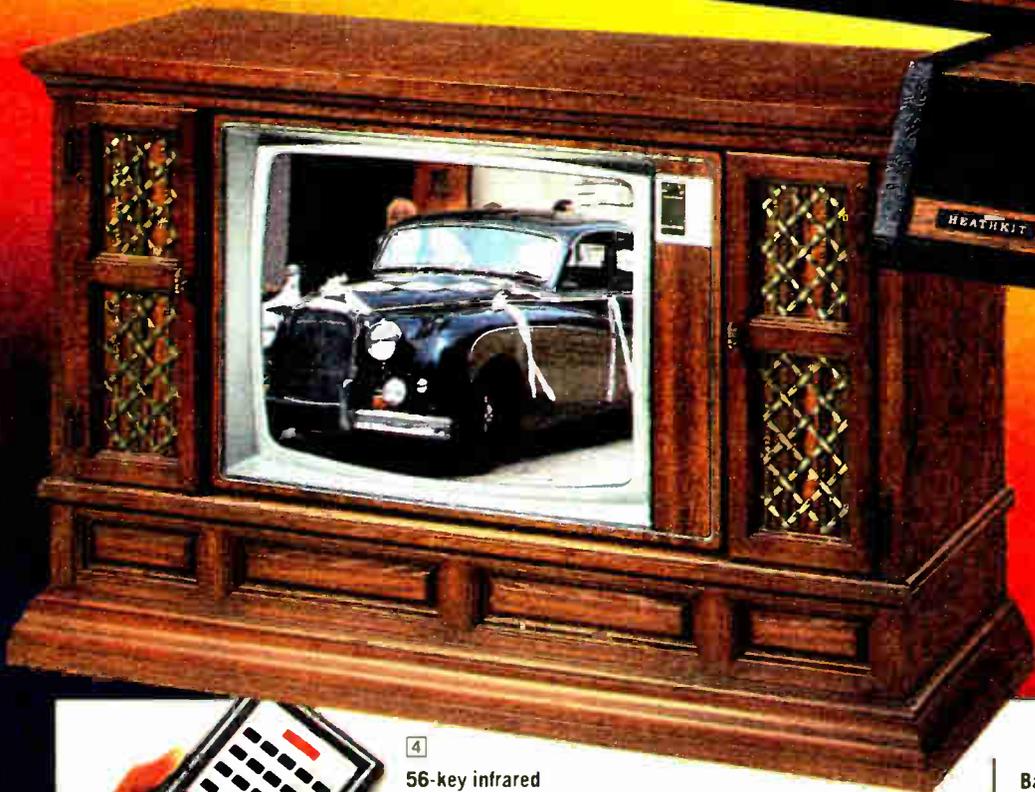
1



2



3



4  
56-key infrared  
Remote Control  
functions



5

Simulated TV pictures



Five different, overlapping  
screens that can eclipse  
each other electronically

Backplane Module  
holds modules

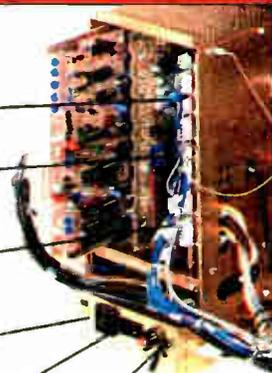
Main Processor  
controls functions

Display Module  
handles video  
and test displays

Receptacle for  
antenna cable  
with GRA-3000-2

Unswitched AC  
power outlet  
handles 300W

ON-OFF switch and  
3-ampere safety fuse



## 1 Advanced System 3 GR-2502 25-Inch Color Television kit with optional Space Phone



\$649<sup>95</sup>

- Colors remain "like new," year after year with exclusive automatic CRT tracking feature
- Improved picture sharpness, even at high brightness levels, and enhanced highlight detail made possible by a high-resolution tri-focus picture tube
- Clearer pictures with greater resolution provided by a special video filter plus a comb filter
- Greater user conveniences with optional space phone and antenna switching accessory

A lot of your friends will buy color TV sets this year. You can build one! Both the outstanding value and magnificent rewards of this easy-to-build kit can be yours in as little as five fun evenings.

**High fidelity picture sharpness is yours** with a Peak Resolution Picture circuit that achieves 25% greater detail than ordinary TV by reproducing up to 330 lines of broadcast resolution. This comb filter eliminates shimmering, spurious color and makes picture detail "pop out" sharp and clear for a lifelike degree of clarity found previously in only the most expensive, professional-quality video monitors. Our Tri-Focus picture tube has three concentrated focusing actions instead of just one — for cleaner, brighter image. The 100% modular chassis design of the GR-2502 guarantees outstanding reliability by using fewer inter-connections, with most modules factory pretested and aligned before you unpack the kit.

**Like a chromatic control center in your TV set**, the sophisticated Color Sentry combines 8 automatic picture and color sub-systems for magnificent viewing pleasure. It maintains accurate color level, life-like flesh tones, tint and contrast — even adjusts the picture brightness as surrounding room lighting changes. One button does it all for you...scene to scene, channel to channel...automatically!

**A sharpness control** lets you adjust the GR-2502's level of picture definition. Advanced digital circuits scan and lock on the broadcast signal, eliminating any kind of vertical and horizontal hold controls. A no-wear, quartz PLL Varactor electronic tuning system seeks out and fine tunes the exact station frequency. Because the tuners are electronic, they have no moving parts to corrode, wear or cause noisy picture problems. A power-sensing voltage regulator helps conserve energy by supplying only the power needed by the TV and maintaining a stable chassis voltage. Electronically self-regulating, it virtually eliminates the effects of household line variations and provides a more constant voltage for improved component and picture tube life. Solid-state automatic fringe-lock circuitry provides unshakable picture stability on fringe area reception. A special phase-locked AFC switch "pulls in" off-frequency signals from cable or master antenna systems and video games. For optimum clarity, a picture control permits you to adjust the contrast and color levels, which maintain proper balance for varying room light conditions. Altogether, the most impressive picture you can build!

**Advanced System 3 means greater value.** Together, the EFL Tri-Focus picture tube, cool-running Triple-Plus chassis, and advanced Color Sentry combine to create

the sharpest, most realistic picture in Heath history! You're assured of fewer service calls, greater reliability and ease of operation.

**Your new GR-2502 comes with our Computer Space Command Remote Control** for scanned or direct access channel selection, on/off with variable volume, on-screen display of channel with current time, and using the Advanced Space Phone. An easy-to-read, on-screen channel/time display appears briefly when channels are changed, or recalled from set or remote control. Expanded 178-channel tuning capability lets you select from up to 122 cable offerings as easily as VHF and UHF, except scrambled premium services.

**Advanced Space Phone is one option worth its price in convenience alone.** With it you can take or make calls anywhere in the world. A dialed number prints out on the TV screen, and in case you get a busy signal you can even program the remote to redial automatically. The TV set itself is readily connected to any telephone line to work as a sensitive speaker phone, so you don't have to leave your easy chair...and the whole family can participate in conversation! And if you don't want the other party to overhear what's being said in the room, there's even a Mute button on the remote control you can touch for complete privacy.

**Equipped with a full stereo system**, the GR-2502 has a five-watt RMS per channel stereo amplifier with a frequency response from 100 Hz to 10,000 Hz into 8 ohms with 2% or less total harmonic distortion. Separate bass, treble and balance controls are provided plus a hi-filter switch and a mode switch for auxiliary stereo or TV audio. Two 5" x 7" oval speakers and two 2" tweeters provide clean, rich audio. Video/audio input/output jacks are also provided.

**Put the GR-2502's custom-installable chassis behind a wall**, mount it in a cabinet of your own custom design or save when purchasing your kit with one of the fine furniture cabinets featured on page 27. Clearly written and fully illustrated, the step-by-step assembly manual has all directions, dimensions and templates necessary to install the TV successfully. No instrument alignment is required. The kit includes a crosshatch generator which you build and use to perform the convergence and color purity setup. After just 15 hours average build time, you can touch the Power button on your GR-2502 and be going to admire a beautiful, lifelike parade of pictures you'll be proud to show off always.

**The commanding 25" Heathkit GR-2502** has a lot more of what you're looking for — top-of-the-line features and performance plus the utmost in service simplicity.

**Kit GR-2502**, Shpg. wt. 100 lbs., Motor Freight ..... **649.95**

**Kit GRA-2502-1**, Advanced Space Phone accessory, 2 lbs. .... **49.95**

**SAVER!** Save \$100.00 on a GR-2502 TV and a Classic cabinet.

**GRS-2502-1**, Shpg. wt. 185 lbs. Mtr. Frt. .... **699.90**

**SAVER!** Save \$100.00 on a GR-2502 TV and a Modern cabinet.

**GRS-2502-2**, Shpg. wt. 182 lbs. Mtr. Frt. .... **749.90**

**GSZ-4600**, Assembled Remote Antenna Switch Accessory, allows selection of four different antenna sources by front panel or remote control, includes AC power supply, Shpg. wt. 4 lbs. .... **29.95**



\$499<sup>95</sup>

## 2 Advanced System 3 GR-1902 19" Color Television kit provides excellent performance

- New CRT tracking system keeps your picture looking brand new — day after day, year after year
- Quartz-controlled tuning of 178 cable and standard broadcast channels with infrared remote control
- Built-in VHF/UHF antennas; earphone included

**This space-saving table-top model** unites a 19" size and spectacular System 3 technology in a meticulous kit design you'll take great pleasure in building.

**Inside the GR-1902, you'll find circuit improvements** that offer enviable advantages over other color TVs. First, the chassis. Cool-running and 100% modular in design, it consists of a clean, uncluttered arrangement of modules. Every module is 100% pre-tested and aligned for outstanding reliability.

**The Tri-Focus Picture Tube attracts your eye** with exceptional — almost three-dimensional — sharpness and detail. It uses an ultra-high-resolution EFL Electron Gun with three extended focusing actions to concentrate the beam and produce a smaller spot than is possible in one-element guns. The precise horizontal alignment brings you an increased image crispness, better highlight definition and crystal clear resolving power, with proper levels of color intensity, tint and contrast.

**A new, advanced Color Sentry** corrects the picture 30 times per second. Eight essential hue and picture sub-systems work together to deliver critically sharp and vivid color reproduction every time...automatically!

**For extra depth and visual presence**, the amazing detail-adding PRP (Peak Resolution Picture) comb filter circuit achieves maximum optical resolution by reproducing all 330 lines of detail being transmitted.

**The GR-1902 gives you 178 UHF/VHF/CATV channel capability** without a converter

(except for scrambled programs). Connect cable directly to the set, and you're in touch with 122 easily-selected cable channels.

**No fine tuning adjustments needed — ever!** In every Advanced System 3 television, a quartz controlled, synthesized channel tuner provides super accurate reception.

**A handy slim-line infra-red Computer Space Command** remote control offers direct access or two way scanned channel selection, volume up/down, muted sound, recall of on-screen channel/time display, and on/off power control from anywhere in the room.

**The elegantly finished pedestal cabinet** measures 17 $\frac{1}{8}$ " H x 26 $\frac{3}{4}$ " W x 17 $\frac{1}{8}$ " D and includes detachable telescoping dipole and clip-on bowtie antennas. Provisions for external UHF/VHF and matched cable-ready CATV/MATV hookup are also provided, with switchable Normal/Special AFC.

**To match the pleasing performance** of what you hear to the clearly superior picture you see, a 1.5 watt amplifier and two 3" x 5" acoustically optimized speakers send out warm, full-bodied sound. For truly room-filling response, the GR-1902 can be connected via an Audio Output jack to your high-fidelity system for richly-toned soundtracks that will enhance your enjoyment of concerts, culture and film. Includes private earphone with 15' cord for discreet listening, and all tools for setup/alignment.

**Kit GR-1902**, Shpg. wt. 101 lbs. .... **499.95**

**GRA-1901-1**, Mobile TV Cart (shown), Shpg. wt. 10 lbs. .... **24.95**

**GRA-2502-1**, Advanced Space Phone Accessory, Shpg. wt. 2 lbs. .... **49.95**

**GSZ-4600**, Assembled Remote Antenna Switch Accessory, allows selection of four different antenna sources by front panel or remote control, 4 lbs. .... **29.95**





The GR-2502's hide-away control panel reduces tampering with TV adjustment. Quartz-controlled electronic tuning gets rid of the need for fine tuning and eliminates the normal wear-and-readjustment common with mechanical tuners. Select any channel being telecast in your area. A built-in computer selector instantly seeks out and locks on to the exact frequency. Have sharp, color-fast television at your fingertips or from a remote location! The panel closes for those fine adjustments.



### Choose the cabinet to suit your decor

Large-Scale Integrated Circuits let these TVs run coolly and economically. Modular construction minimizes connections and makes repair quick and easy — should it ever be required a few years down the line.



Four speakers, two on each side, surround the picture to provide more realism. Choose the elegant Classic or the smart Modern cabinet. Have an attractive piece of furniture and probably the best TV available.



### Simulated TV pictures

Elegantly styled Classic console features the warm tones of richly-grained Pecan finish on top and sides made from durable wood products. Simulated wood front and base matches finish. Cabinet measures 32 1/8" H (with casters) x 43 1/2" W x 19 1/4" D (add 2 3/8" to depth for tube cap).

GRA-706-25, 85 lbs. Mtr. Frt. .... 149.95

Beautifully proportioned, symmetrical design marks this Modern console for the GR-2502. Oak veneers on top, ends and base add to its smart styling. The front is framed with hardwood solids. The cabinet measures 28 3/8" H (gliders included) x 42 1/2" W x 18" D (add 2 3/8" to depth for tube cap).

GRA-716-25, 82 lbs. Mtr. Frt. .... 199.95

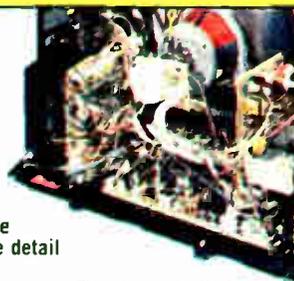


Make and receive phone calls using the optional Advanced Space Phone Accessory

2



- Single UHF/VHF/CATV 75Ω antenna input
- New auto CRT tracking keeps colors like new — year after year
- Peak Resolution Picture Circuit adds 25% more detail
- Internally shielded tri-focus picture tube
- New switchable video filter removes excess picture-noise



- Quartz-controlled electronic tuning of 178 channels
- Complete picture and sound control with audio output



# Television and home video entertainment products for the family

## 1 Heathkit's Video Organizer switches RF sources

**\$59<sup>95</sup>**

- A versatile "control center" for your home video system
- Switch from one program source to another without ever changing cable connections

Tired of the confusing mess of cables behind your television? Heathkit's Video Organizer will eliminate that problem forever! Eight separate input and output jacks allow complete connection to your set: UHF/VHF antenna, cable, subscription TV, videocassc player, game unit, home computer and other auxiliary video equipment such as a satellite receiver or video camera.

Ten front panel pushbuttons permit instant selection of any one of six different program sources for immediate viewing, and any one of three sources for recording. You can even view one source while recording another. The Organizer has better than 60 dB isolation, less than 3.5 dB insertion loss and excellent RF shielding to eliminate electromagnetic interference and maintain pure picture quality. Pewter color side panels and walnut-grain metal top. This no-soldering, one-evening kit includes three 48" 75-ohm coax cables with F-connectors and an AC Power Adapter. Heathkit's easy-to-follow construction manual leads you through assembly, step by step. Order now for hours of uninterrupted video enjoyment.

Kit GS-4500, Shpg. wt. 7 lbs. .... **59.95**  
GSZ-4500, Assembled, Shpg. wt. 8 lbs. .... **69.95**

## 2 Portable 9" TV with sharp picture and 3-way power

Light weight and compact size make the Jet Set an ideal take-along television receiver — whether you take it on a camp-out, to the kitchen or workshop.

Three-way power gives this set flexibility: use 120 VAC, 12 VDC power or the optional Rechargeable Battery Pack below. The Battery Pack forms an attractive pedestal when attached.

GRZ-93, Assembled and tested, Shpg. wt. 14 lbs. .... **99.95**  
GRZ-93-1, Rechargeable Battery Pack, 9 lbs. .... **39.95**

## 3 VHS Hi-Fi for optimum quality in recording

- Full-feature video cassette recorder with remote control
- Stereo, digital-like recordings when taping audio

This revolutionary VHS video recorder is cable-ready with direct tuner access to 136 channels. The 14-day programmable tuner lets you select eight events, and you can record them at SP and EP speeds (LP is available for playback). An electronic tape counter provides a fluorescent display of remaining tape. Connect a camera to record video and two audio channels. Insert editing lets you dub your video or audio recordings. This recorder comes with a T-30 blank video tape.

When you view your tapes, you'll enjoy crisp, clean pictures — with the full-range of slow motion, stop-action, frame-by-frame and special effects. The included 23-function Space Command remote control gives you armchair access to On/Off, channel scan, fast forward, rewind, speed search, pause, slow and stop action and more. The Space Command even works with compatible TV sets.

VHS Hi-Fi lets you make superb audio recordings. The quality of your audio recordings will be limited only by the quality of your microphones. VHS Hi-Fi challenges digital recording with 80 dB dynamic range, Dolby reduction and up to 8 hours on a tape.

GDZ-4000, Shpg. wt. 27 lbs. .... **1049.95**

## 4 Affordable VHS performance with quality

- 14-day, one-event programmable tuner or use a video camera
- Still/pause and frame-by-frame video for the viewing you want

This compact recorder is loaded with features. Select the off-the-air channel you want with 14-position electronic tuning or use a video camera for home recordings. Four-head scanning ensures clean and crisp pictures and excellent sound in SP, LP and EP playback. The cables you need are included. And microphone inputs permit audio dubbing.

GDZ-2000, Shpg. wt. 23 lbs. .... **474.95**  
GDZ-2000-1, Remote control, 1 lb. .... **24.95**

### Finest quality Zenith VHS tapes for your VCR

GDZ-2000-2, T-60, Shpg. wt. 1 lb. .... **7.95**  
GDZ-2000-3, T-120, Shpg. wt. 1 lb. .... **8.95**  
GDZ-2000-4, T-160, Shpg. wt. 1 lb. .... **14.95**  
GDZ-2000-5, T-120 SHG, for optimum quality, Shpg. wt. 1 lb. .... **12.95**

14/VIDEO/TELEVISION

## 5 Take entertainment with you, almost anywhere

**\$139<sup>95</sup>**

- Covers all VHF/UHF channels plus AM/FM radio bands
- Operates on AC, 12 VDC, D-cells or rechargeable battery pack

The GR-5005 combines a 5" black and white TV, AM/FM radio in a compact unit that weighs just 6 pounds without batteries. All 82 VHF/UHF channels and the entire AM/FM radio bands are at your fingertips. A no-wear electronic tuner and calibrated cylinder dial permit easy selection without drift. The LCD quartz digital clock keeps accurate time, even when the unit is turned off. The Sleep Switch/Auto-off control turns the Explorer off 59 minutes after it's activated. Included are a detachable 120 VAC power cube, DC car cord adapter and earphone.

Kit GR-5005, Shpg. wt. 14 lbs. .... **139.95**  
GRZ-5010, Assembled and tested GR-5005 with AM/FM radio and without clock and alarm. Shpg. wt. 9 lbs. .... **159.95**  
GRZ-5005-1, Rechargeable Battery Pack, Shpg. wt. 3 lbs. .... **19.95**

## 6 Personal 13" color TV with remote control

This bedroom, kitchen or camper sized TV has everything — including remote control. A Zenith 1984 model, this television has American Walnut finish, polished nickel-gold color trim and a pedestal base. Electronic tuning eliminates many of the problems that plague mechanical tuners, and the quartz PLL tuning circuit ensures accurate tuning on every channel — 157-channel cable-direct capability, tri-focus picture tube, foldaway handle and much more!

GRZ-1319, Assembled and tested, 44 lbs. .... **359.95**

## 7 GDZ-5000 VCR has modular design

- Detachable full-featured Timer/Tuner and Video Recorder
- Instantly portable VHS video cassette recorder

This VHS Recorder is cable-ready with direct access to 136 channels. Program the timer to record eight events over a 14-day period. Record at SP and EP speeds, and edit with audio and video dubbing. Playback with still/pause, frame-by-frame advance and slow motion, with 7X search speeds at SP and EP. Detach the Video Recorder and you're ready for portable taping. Shoulder strap, T-30 VHS tape and interconnect cables are included.

GDZ-5000, Shpg. wt. 20 lbs. .... **949.95**  
GDZ-5000-1, Rechargeable Battery Pack, Shpg. wt. 2 lbs. .... **39.95**  
GDZ-5000-2, AC Power Supply, Shpg. wt. 2 lbs. .... **49.95**  
GDZ-5000-3, VCR Case, Shpg. wt. 8 lbs. .... **44.95**

## 8 GDZ-6000 Compact Video Movie Camera/Recorder

An ultra-compact, lightweight cassette-loaded video camera/recorder with a high-performance zoom lens and electronic viewfinder for instant playback. Exposure is automatic and electronically monitored to deliver outstanding recordings.

GDZ-6000, Shpg. wt. 10 lbs. .... **1425.00**  
GDZ-6000-1, Cassette Adapter permits standard VCR replay, 1 lb. .... **39.95**  
GDZ-6000-2, Compact Video Cassette, 1 lb. .... **7.99**  
GDZ-6000-3, AC Power Supply/Battery Charger, 4 lbs. .... **129.95**  
GDZ-6000-4, High Capacity Rechargeable Battery, 1 lb. .... **44.95**  
GDZ-6000-5, Shoulder Mount and Strap, 1 lb. .... **39.95**  
GDZ-6000-6, Solid Carrying Case, 6 lbs. .... **109.95**

## 9 Compact, VHS Video Camera

The 1/2" high-band saticon pickup tube delivers outstanding images and has a 20-lux low-light sensitivity. The top quality 6X zoom lens has macro-focus capability. Auto-focusing ensures sharp images, and an electronic viewfinder helps you get the picture you want.

GRZ-1000, Shpg. wt. 5 lbs. .... **949.95**  
GRZ-1000-1, Camera case, Shpg. wt. 2 lbs. .... **29.95**

10 This Generator lets your titles roll, crawl and zoom — for a professional look.  
GRZ-1000-2, Character Generator, Shpg. wt. 1 lb. .... **99.95**

## 11 ADP-1501 Stereo Synthesizer

Use the same technique as professional studios to transform a monaural source into realistic stereo. A new circuit using active filters and a unique summing circuit create a comb response. Operates on 120 VAC or 12 VDC for portable use.

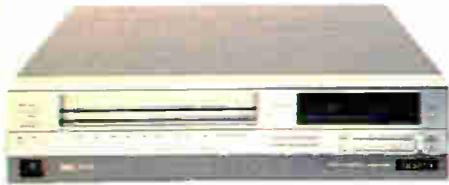
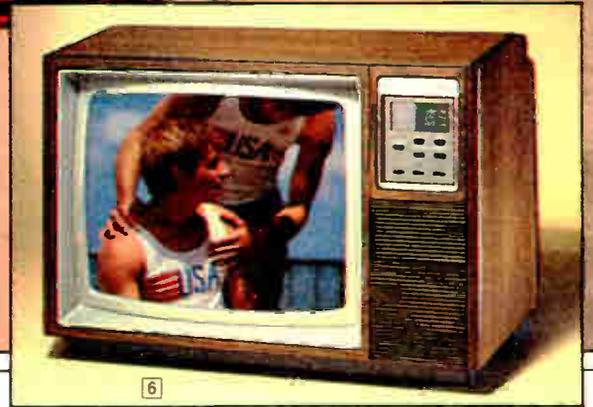
ADP-1501, Shpg. wt. 3 lbs. .... **119.95**



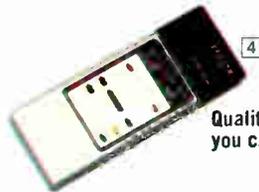
Discover the fun of kitbuilding at your Heathkit Electronic Center.



Simulated TV pictures



VHS Hi-Fi for outstanding video images and audio



Quality VHS recording you can afford



Dockable VHS Tuner-Timer/Recorder has versatility

8 Compact, lightweight movie camera/cassette recorder

NEW



10 Add professional-looking titles to your VCR tapes



9 VHS Video Camera gives your tapes great sharpness and color



11 Enjoy quality stereo sound from your TV or VCR

# Heath products for the home, your health and hobbies

## 1 Program your doorbell to suit your mood

**\$49<sup>95</sup>**

- Program it to play up to 16 beats of your favorite tunes
- Easily programmed for your mood or any special occasion
- Includes song book with over 50 programmable melodies

Changing tunes is easy, by arranging wire leads on a one-octave 'keyboard' behind the front panel. The songbook includes 15 college songs, 7 seasonal songs plus 9 Christmas songs, 5 to commemorate special occasions — and many more to celebrate your mood. The assembly manual has programming instructions for a variety of tunes, or compose your own. Controls for adjusting volume, tone, speed and delay characteristics add synthesized variety to any tune. Attaches easily to existing doorbell transformer. And extra speakers may be wired on to spread the music around your home. You'll even know which door to answer, as the back door button will activate only a portion of the tune you select.

Kit TD-1089, Shpg. wt. 3 lbs. .... 49.95

## 2 Use this Digital Scale to accurately monitor weight

**\$99<sup>95</sup>**

- Battery operated for accuracy and safety anywhere
- No-wear electronic strain-gauge mechanism sensitive to weight change as small as 1/10 of a pound or kg

The Heathkit Digital Scale is a multi-purpose scale that offers far more accuracy than mechanical scales. Dieters and fitness enthusiasts can closely watch their weight improve, and everyone will enjoy a precision readout on items requiring accurate measurement. An electronic transducer element eliminates the springs and weights that wear out on conventional scales.

Four bright, easy-to-read 1/2" digits display the weight. You decide whether to wire the kit to read in pounds or kilograms. Features both manual and automatic modes; in manual, the display is on constantly and can measure weights as small as 2 ounces, to a 300-lb. capacity. On automatic, it conserves power by remaining off until weight is placed on the platform.

Kit GD-1186, Shpg. wt. 9 lbs. .... 99.95

## 3 Get consistent darkroom processing

**\$139<sup>95</sup>**

- Programmable memory recalls up to 10 steps; precise auto-step sequencing and microprocessor control provide more accuracy than dial timers
- Waterproof front panel has selectable backlighting

Have the precise timing required for quality color or black and white prints, and program the timing sequence you need for developing prints and films. Use memory for absolutely consistent exposures when making multiple prints, or make one-time Timer settings. The Programmable Darkroom Timer features a 4-digit timer and a 12-hour LED clock to synchronize printing and developing steps.

Audible alarm settings are available at 1, 30 or 60 second intervals in any combination, or once at the end of a programmed cycle. A 10-second, end-of-cycle alarm tells you when to begin pouring from the tank.

Kit PT-1500, Shpg. wt. 5 lbs. .... 139.95

PTA-1500-1, Optional Single Foot Switch, Shpg. wt. 1 lb. .... 12.95

PTA-1500-2, Optional Dual Foot Switch, Shpg. wt. 3 lbs. .... 29.95

PTA-1500-3, Optional Auxiliary Outlet, Shpg. wt. 1 lb. .... 15.95

## 4 3-Tune Doorbell greets with beautiful music

**\$19<sup>95</sup>**

- Can be built and easily installed in a single night
- Adjustable volume carries tune throughout your home
- The low-cost way to put a difference in your doorbell

If you want to replace your ho-hum doorbell, you'll be proud to install this Electronic Doorbell kit. The TD-2089 plays three different selections: an upbeat 4-note ring, a short tune (Beethoven's *Für Elise*) and a long tune (*Romance*). Two "C" cell batteries (not included) power the electronics while your present 10 to 16 volt doorbell transformer supplies your pushbutton circuits. For use with unlighted doorbells.

Kit TD-2089, Shpg. wt. 1 lb. .... 19.95

## 5 Find buried valuables on dry land or at the beach with Heathkit's Metal Locator

**\$219<sup>95</sup>**

- Find valuable objects where most locators are useless
- Easy-to-read meter installs for left- or right-hand users
- Telescoping shaft collapses to 22 inches
- Search head folds flat for easy storage, portability
- Balanced for easy fatigue-free use

Fully Adjustable Discrimination Circuit filters background signals — screening out pulltabs, metal foil, bottle caps, ferrous and alloyed items. Have the sensitive pushbutton tuning of our best metal locator at a price far below the competition.

A Ground Balance Mode pinpoints treasures even in high-mineral soil. A Very-Low-Frequency induction balance system provides silent operation until that coin or artifact enters the 6-inch diameter search head field of detection. Then a clear tone sounds that grows louder as you approach vertical center.

Use the Groundtrack anywhere. It's lightweight and portable, with a telescoping shaft that collapses for storage. Operates on 6 AA cells (not included) or the optional Rechargeable Battery pack, which includes AC outlet and DC lighter socket chargers for use at home or in-the-field.

Kit GD-1290, Shpg. wt. 5 lbs. .... 219.95

GDA-1190-1, AC/DC Rechargeable Battery Pack, Shpg. wt. 2 lbs. .... 24.95

HDP-1396, Mura Headphones, Shpg. wt. 2 lbs. .... 19.95

**GD-1290 SPECIFICATIONS:** Sensitivity: Locates dime at 4" to 6" typical, may be less depending on soil conditions, mode of operation and amount of discrimination selected. Method of Detection: Induction-balance circuit. Detector Output: Meter, speaker, phone jack. Power Requirement: Six AA cells or Rechargeable Battery Pack. Dimensions: Extended height, 45½"; Net Weight: 3.4 lbs.

## 6 Digital Thermometer for accurate measurements

If you need to accurately measure the temperature of liquids or air, this battery powered electronic thermometer delivers reliable readings every time. This micro-marvel weighs only 5.5 ounces and gives easy-to-read 4-digit temperatures in less than ten seconds. Wand senses from 32° to 230°F (0° to 110°C) with ±0.2°F (±0.1°C) biomedical accuracy and 0.5% overall accuracy with 0.1°F or C resolution.

GD-1226, Assembled and tested, Shpg. wt. 2 lbs. .... 49.95

## 7 Take temperatures quickly with digital accuracy

Eliminate the squinting and guessing that's required when using a conventional mercury-bulb thermometer. Easy-to-read accuracy from 89.6° to 107°F within 60 seconds. When the F symbol stops blinking, the peak temperature is displayed in a digital readout. 10 sanitary probe covers (more can be ordered) and battery are included.

GXP-2121, Assembled, Shpg. wt. 1 lb. .... 15.95

## 8 Electronic Digital Blood Pressure/Pulse Monitor

Eliminate troublesome trips to the doctor's office or clinic. Now you can take those blood pressure and pulse-rate measurements at home. Easy to use and easy to read, this Monitor is ideally suited for the office or home. Just place the cuff in place and inflate. Electronic metering does the rest. Battery powered for portable use — batteries included with unit.

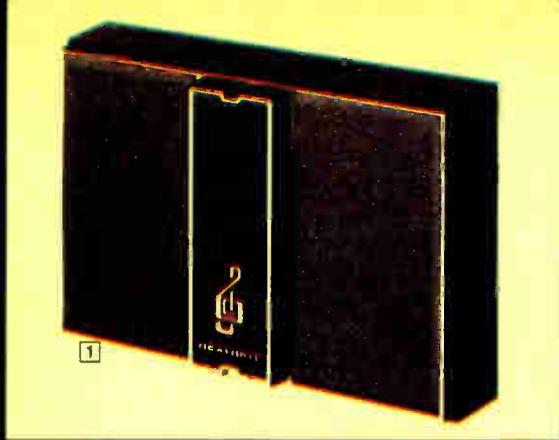
GXP-2120, Assembled, Shpg. wt. 2 lbs. .... 79.95

## 9 Put our Computer on your bike

If losing weight or exercising, this Bicycle Computer can help. Just enter the constant data into the computer memory banks: tire size, your weight, how far you want to ride and time of day. Then the Calculator takes over! Large LCD numerals give you your cycling distance in miles and kilometers, actual cycling time, speed (both average and peak) and the number of calories consumed. A built-in quartz clock and stopwatch monitor speed — a two-speed audible beeper helps you monitor your pace. For use with standard bicycle or spoked-wheel exercise bicycles. Installs in about 20 minutes. Uses two AA batteries (not included).

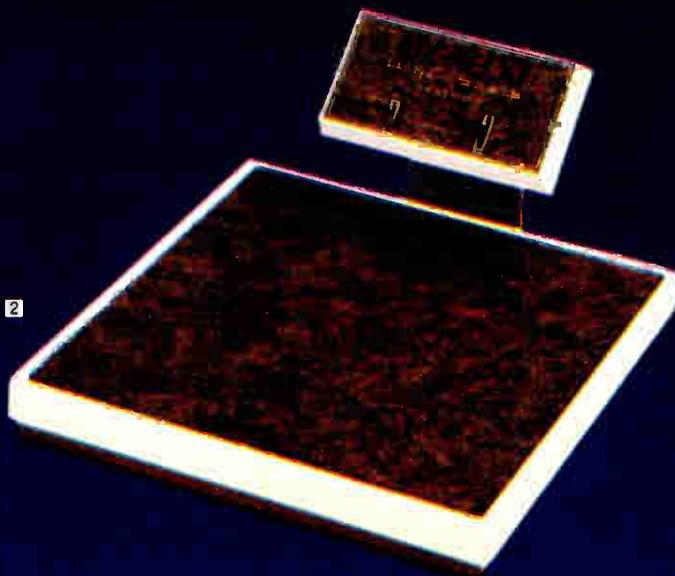
GXP-2105, Assembled, Shpg. wt. 2 lbs. .... 49.95





1

2



3



4



6



5



**NEW**

Portable Electronic Digital  
Blood Pressure/Pulse Monitor

8

**NEW**

7

GXP-2121 Digital Thermometer  
for accuracy and digital readouts



9

Keep track of your  
goals with the  
GXP-2105 Computer

**NEW**

# Advanced electronic security, remote control and home monitoring systems and devices

## BSR X-10 Home Control System commands up to 16 groups of lights and appliances from one location

① **The Controller Command Console** is one of the most ingenious and useful home conveniences ever devised! Now, with a fingertip touch, *you're in complete control by remote control*, from beside the bed or wherever you plug it in. Console signals are transmitted over existing house wiring to the module of your choice. Just plug lights and appliances into the appropriate module. Use as many modules on the same code as you wish. Dim or brighten lights. Two "all lights on" and "system off" buttons provide extra security and savings.

**Control lights, fans, TVs and stereos** anywhere in and around your house from a single location. Or, place other Controller Command Consoles in different rooms for easy access to complete home control at all times. Since all commands are carried through the AC wiring of your home, your control can even extend to unattached garages, barns, sheds, and pool, porch or yard lights.

**The Controller Command Console acknowledges** each command entry by a flashing red LED on the front of the unit. It also includes an ultrasonic receiver and circuitry so that it can be controlled by the GDP-1511 Ultrasonic Cordless Commander described below. Flip-down cover hides command switches.

GDP-1510, Assembled, Shpg. wt. 2 lbs. .... 24.95

② **The Ultrasonic Cordless Commander** transmits signals to the Controller Command Console from up to 30 feet away, using identical pushbuttons. This line-of-sight remote transmitter can duplicate every operation of the GDP-1510 Controller Command Console above.

GDP-1511, Assembled, Shpg. wt. 1 lb. .... 14.95

③ **Timer Command Console** runs everything on time. *Automatically!* Used with the modules, your home can run like clockwork, setting lights and appliances to your family's needs and lifestyle. The possibilities are virtually unlimited! *Away for the weekend?* The Timer is on guard, giving 24-hour control with a lived-in look and sound when you're gone — even simulates movement from room to room — *nobody knows that nobody's home*. Features digital clock with two levels of display brightness. Fast and Slow set keys for easy setting and programming. Daily, Once, and a random Security code: Clear to erase a setting; All Lights On and Now for immediate security and control. No dimming feature. Now has full battery backup (four AA cells, not included) in case of power failure.

GDP-1520A, Assembled, Shpg. wt. 1 lb. .... 69.95

④ **Telephone Responder Console** is the remotest control of all. It lets you enjoy the freedom of calling from anywhere to control up to 8 groups of 120 VAC items. Give your home a lived-in look by activating a TV or a radio to discourage prowlers. Or, give your home a call to turn on most 120 VAC electric heaters, or window air conditioners and fans depending on the weather. Includes modular phone cable. Control center measures 2¼" H x 5¾" W x 5½" D. Remote Responder measures 1-1" H x 2¼" W x 5¼" D and requires one 9 volt battery (not included).

GDP-1515, Assembled, Shpg. wt. 6 lbs. .... 89.95

⑤ **The dream of a computer-operated home or office is now a reality** thanks to Heath's new "universal" RS-232/C to BSR X-10 Interface kit! Connected between your present Heath or other computer and existing electrical wiring, it enables you to control up to 256 groups of modules with unlimited timing patterns.

**The GD-1530 can be used** with any terminal or computer system equipped with an RS-232C Serial Interface Port, no protocol is required or available. This port must be capable of a baud rate between 110 and 2400 baud to work correctly.

**Programming syntax and simple MBASIC program samples**, under H-DOS and CP/M operating systems, are included in the Appendix of the assembly manual. The command syntax for program control with the GD-1530 Interface is defined by the BSR format and is simple to learn and to use.

**The GD-1530 Interface is a fast one-evening kit** that can be assembled in about two hours. It has a red LED that flashes when a valid keyboard entry is being transmitted over the AC line. The GD-1530 operates on 120 VAC, 60 Hz and 3 watts. It measures 3" high x 6¾" wide x 6¾" deep (7.6 x 16.2 x 16.2 cm).

Kit GD-1530, Shpg. wt. 3 lbs. .... 99.95

⑥ **Lamp Module** receives signals from any of the consoles or the GD-1530 Interface to turn incandescent lamps on and off. And dim and brighten lamps through 16 individual levels. Handles up to a maximum of 300 watts.

GDP-1512, Assembled, Shpg. wt. 1 lb. .... 16.95

⑦ **Appliance Module** controls most other devices like televisions, stereos, radios, coffee makers, fans, heaters, etc. Operates lights and self-starting fluorescents, but only to turn them on and off. This module has maximum ratings of a 15 amp resistive load, ½ hp motor, 500 watt lighting load and a 40 watt TV/stereo load.

GDP-1514, Assembled, Shpg. wt. 1 lb. .... 16.95

⑧ **New Burglar Alarm Interface Module** increases the effectiveness of your security system by controlling other BSR modules on your circuit. Has selectable low-voltage or contact closure trigger inputs. If alarm is triggered, module can turn on selected lights and appliances (such as a siren), or selected lights can flash on and off, or only selected lights can turn on.

GDP-1519, Assembled, Shpg. wt. 1 lb. .... 44.95

⑨ **Wall Switch Module** replaces existing standard wall switches. Operates inside and outside lights by remote or local control. Responds to signals from any console controller or GD-1530 Interface. Also brightens and dims lights in 16 steps through remote control. It can handle a maximum load of 500 watts.

GDP-1513, Assembled, Shpg. wt. 1 lb. .... 17.95

⑩ **Three-Way Wall Switch Module and Companion** with independent on/off control. Replaces hallway and upstairs/downstairs 3-way switches. Responds like a lamp module. Handles a maximum load of 500 watts.

GDP-1516, Assembled, Shpg. wt. 1 lb. .... 24.95

⑪ **Air Conditioner Module** is a standard 240 VAC receptacle for air conditioners that's rated for a 15 amp load. See GDP-1517B below for alternate perpendicular-pronged type plug arrangement.

GDP-1517A, Assembled, Shpg. wt. 1 lb. .... 39.95

⑫ **Perpendicular-Pronged Module** is also a 240 VAC receptacle for air conditioners, but accepts perpendicular-pronged AC plugs and is rated for a higher 20 amp load. See GD-1517A for standard-type plug arrangement.

GDP-1517B, Assembled, Shpg. wt. 1 lb. .... 39.95

## ⑬ Use the new Infrared Security Light Control to invisibly detect movement or provide light when needed

- Replace expensive, all-night floodlights with automatic security lighting
- The Security Light Control turns on lights, or a light/alarm combination (up to 500 watts), to make an intruder believe he has been seen
- Adjustable timing circuit automatically turns off lights when motion stops
- All-weather design provides reliable operation in all outdoor conditions

**Have effective security lighting** without the expense of keeping floodlights or mercury vapor lamps burning all night. The Heathkit GD-3511 will turn on up to 500 watts of lights when security lighting is needed. A sensitive, six-zone passive heat sensor detects temperature changes (infrared energy) in the covered area. When an intruder enters the protected area, the Control turns on the security lights — even an interior/exterior alarm can be sounded.

**The infrared sensors** are arranged in a six-array configuration, alternately polarized. If one or two sensors detect heat (whenever a person, animal, or heat-emitting object moves through the invisible pattern of your lighting control) lights are turned on or an alarm is sounded. On the other hand, if all arrays sense the same change in heat intensity (sunshine, for example), the lights/alarm will remain off. Additionally, the Security Lighting Control has a built-in photo transistor to deactivate the system during daylight hours.

**Sensitivity is also adjustable.** Whether you want to detect stray cats and dogs in your yard, or you want to let your own pet out for a romp after dark without triggering the security lighting — you can set the Control sensitivity at the level you need. Properly adjusted, intruders and larger heat-emitting objects will still trigger the Control and turn on security lights.

**An adjustable coverage pattern** lets you protect the area you choose. And the sensor unit is gimbal mounted to let you aim your coverage. Guard a back fence, the passway between your home and a neighbor, your driveway, an entrance or your basement. The GD-3511 Security Light Controller has a typical operating range of 35 feet, and at that range it will provide security for a width of 25 feet.

**Set the time you want the Security Control lights on** when motion is detected. The time delay before lights are turned off is adjustable from ten seconds to more than fifteen minutes after motion is last detected in the protected area.

**For outdoor applications**, purchase the GDA-3511-1 Dual Floodlight Accessory (shown on the opposite page and listed below). The Accessory is designed to attach to the Security Lighting Control. It houses two floodlights that can be aimed to illuminate a specific area. The whole unit can be easily wall mounted in an inconspicuous location. Both Control and Accessory are waterproof.

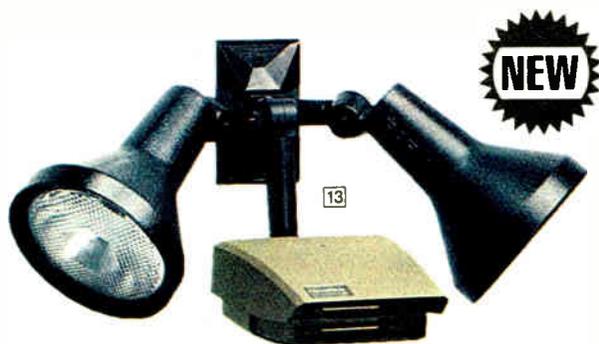
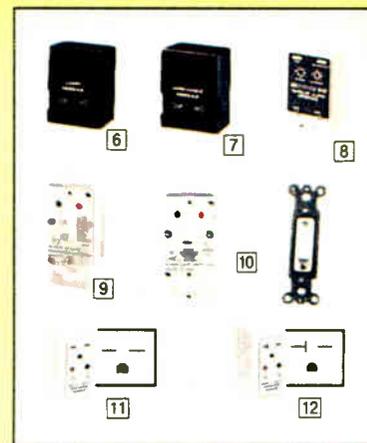
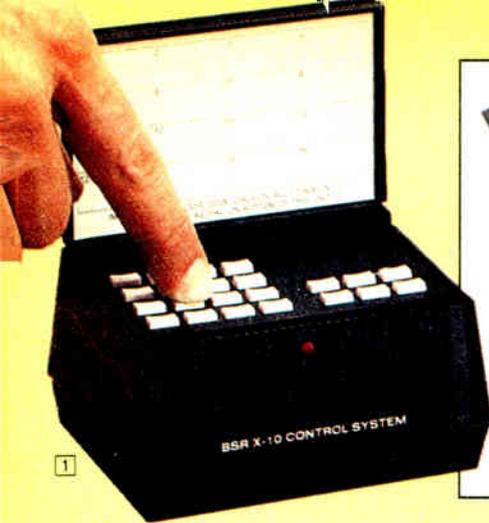
**Inexpensive to operate**, the GD-3511 Security Light Control connects to a standard 120 VAC, 60 Hz household power line. When operating, but not activated, it consumes a mere one watt. 14½" D x 5½" W x 4¾" H.

Kit GD-3511, Shpg. wt. 4 lbs. .... 149.95

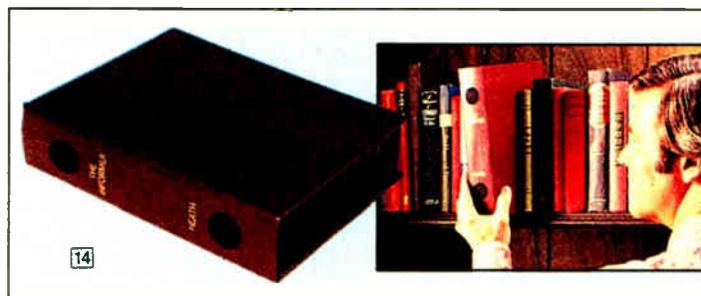
GDA-3511-1, Dual Floodlight Accessory, Shpg. wt. 5 lbs. .... 29.95



Use your Visa or MasterCard credit cards to purchase your kit!



**NEW**



**14 The Informer<sup>®</sup> Ultrasonic Intrusion Alarm**

**ONLY \$69.95**

- "See" up to 25 feet away from unit
- Time delay lets you deactivate alarm
- No one but you will ever know it's there

**Disguised to look like a fine hardcover book**, the Informer will sit quietly on bookshelf or table ... until something or someone enters its wide field of surveillance. Ultrasonic sound waves thwart intruders by sensing their movements during entry. Then it will activate indoor/outdoor buzzers or alarms, table or floor lamps to alert you to an unfamiliar presence within your home.

**Easy to set:** Simply flip a hidden, back panel switch to activate the system. Two AC outlets on the back panel control lights and alarms you have plugged in. Ten seconds after the first movement is detected, the lamp outlet is triggered, suddenly turning on any lights you have connected. Approximately 30 seconds later, the alarm outlet is triggered. Has switch-selectable auto or manual reset. Adjustable control sets the sensitivity of the Informer to movement and therefore its operating range. Solid-state circuitry. Requires 120/240 VAC.

**Kit GD-49, Shpg. wt. 5 lbs. .... 69.95**

**15 Protect your home from theft and damage with the ever vigilant SENSAPHONE Home Monitoring System**

- Lets you know about trouble in your home the moment it happens
- Automatically dials designated numbers and warns of problem in English
- Reports status of unattended home or office when you telephone
- Use as an automatic dialer that stores up to eight phone numbers

**Become the owner of a unique home monitoring system** that informs you of conditions in your unattended home or office. SENSAPHONE continuously checks for power outages, excessively high or low temperatures, unusual sounds and disturbances like a smoke or fire alarm going off, and other alarm conditions when set up to do so.

**Connected to your phone**, SENSAPHONE reacts to an alarm condition by automatically dialing up to four telephone numbers in sequence until the warning



**NEW**

**A new home/office monitoring and security system**

**Automatically dials out to warn of emergency condition**

**Enables you to call for a report**

**Installs in seconds**

message is received and acknowledged. SENSAPHONE talks to the receiving party by identifying itself, giving the time, stating the problem and switching on its built-in microphone so any unusual sounds, if any, can be heard.

**Listen in on your house while you are away.** Just call home. After a preprogrammed number of rings, SENSAPHONE answers and reports on all monitored conditions. Then it lets you listen to room sounds for yourself. Reassured, you can return to work or enjoying your vacation.

**SENSAPHONE keeps working** even though there's a power failure. It automatically switches to its battery power, six "D" cell alkaline batteries (not included), and calls to warn of a loss of electricity. It will also call out when its batteries are running low. Batteries last up to 15 hours when AC power is lost and the unit is in the ON mode and operational.

**As an extra to your small investment**, SENSAPHONE can be used as an automatic dialer storing up to eight of your most frequently called numbers and dialing them automatically at the press of a 1-key code. SENSAPHONE also gives the time and any monitored condition audibly at your command.

**SENSAPHONE easily installs** in a few seconds on any telephone line using a standard telephone modular jack. It can be used with or without a telephone. It measures 7 3/4" wide x 2" high x 8 5/8" deep and weighs 2 pounds.

**GDP-2156, Assembled and tested, Shpg. wt. 3 lbs. .... 199.95**

# Heathkit RF Security System gives total, dependable home protection without wires

The GD-2800 system is easy to operate and provides 24-hour, professional quality security. Installs in a day to protect interior/perimeter zones, entrances, high risk areas. RF controlled, virtually free of false triggering.

- One of the most advanced microprocessor-controlled systems available
- RF control eliminates the hassle of wiring and possible tampering
- Wireless transmitters and control units operate the system
- 8-channel receiver lets you customize the system to meet your needs

**[1] RF Security Receiver/Processor Kit with Outdoor Alarm Horn and Annunciator Speaker** processes all incoming signals to provide appropriate alarm warning action. Four modes (OFF, Home, Away and Panic) control entire system operation. 'Home' monitors doors and windows while you're inside. 'Away' additionally arms indoor motion detectors. Five coded channels give separate alarms for door, windows, indoor motion, fire and emergency situations. Distinctly-patterned Auxiliary and Panic alarm channels alert you to special concerns like fire, breach of computer room, safe or gun cabinet, etc. — *even if the system is OFF*. Unique annunciator tone sounds from indoor speaker (top center, photo) whenever a protected door opens, telling you when a youngster left to play or your daughter returns from her date; also sounds to confirm receipt of mode-change signal from Control Transmitters. Other sophisticated features: time-delayed entry/exit, power to drive two alarm horns, internal 12-hour failsafe battery, highly visible security warning labels for house exterior, system test mode, key-locking master power switch, 32 user-selectable house codes, seven output triggering options for annunciator alarms, lights, automatic dialing devices and more. Permits enforcement to be extended to nearby buildings, shed or garage within 150' receiving range. All mode operations controlled remotely by GDA-2800-4 or -9 Transmitters (at least one required).

Kit GDA-2800-1, Shpg. wt. 24 lbs. .... 299.95

**[2] Passive Infrared Motion Detector/Transmitter.** Offers 25 x 35 ft. indoor space protection without interference to TV remotes. 9V battery required.

GDA-2800-2, Shpg. wt. 1 lb. .... 139.95

**[3] Wired-Circuit Transmitter.** Easy to install. Uses magnetic/reed switches or window bug' glass-breakage sensors to protect doors and windows against entry. Inside mounting prevents tampering or disconnection. Includes one magnetic/reed switch. Also connects to GD-1701 Flood Alarm on page. 8.

GDA-2800-3, Shpg. wt. 1 lb. .... 39.95

**[4] Command Transmitter.** Controls entire system remotely, within 150 ft. range.

GDA-2800-4, Shpg. wt. 1 lb. .... 49.95

**[5] Smoke Detector/Transmitter.** Best type — virtually eliminates nuisance alarms. Has own 85 dB internal alarm; also signals 2800-1 to sound main alarm.

GDA-2800-5, Shpg. wt. 2 lbs. .... 79.95

**[6] Window Bug™ Sensors and take-off contacts.** Package of four. Used with 2800-3 Transmitter, each sensor protects up to 32 sq. feet of glass surface.

GDA-2800-6, Shpg. wt. 1 lb. .... 39.95

**[7] Magnetic/Reed Switch Set.** Package of four (one set shown) for single or series connection to 2800-3 Wired-Circuit Transmitter and its applications.

GDA-2800-7, Shpg. wt. 1 lb. .... 9.95

**[8] Passive Infrared Motion Detector** for hardwired systems. Requires 6-18 VDC.

GDA-2800-8, Shpg. wt. 1 lb. .... 99.95

**[9] 12-Button Digital Keypad Controller** Operates in addition to or in place of 2800-4 command unit. Mounts near door for instant entry/exit control. Operates identically to 2800-4 after entry of user-secret numeric access code.

GDA-2800-9, Shpg. wt. 2 lbs. .... 109.95

GDA-1800-3, Additional Alarm Horn (like shown), Shpg. wt. 2 lbs. .... 24.95

**SAVER! GDS-2800-1 Starter Security System** consists of one 2800-1 Receiver kit with speakers, one 2800-2 IR Motion Detector/Transmitter, one 2800-3 Wired-Circuit Transmitter and one 2800-4 Command Transmitter. Install the basics now, add more components later! Shpg. wt. 20 lbs. .... 499.95

## Make your telephones easier and more pleasant to use — at home or in the office

**[10] Cordless Portable Telephone provides freedom**

**\$229<sup>95</sup>**

- Portable operation, up to 1000 feet from base unit
- Excellent noise rejection for clear voice transmissions
- Automatic dialing of 3 numbers and last number dialed

**Portability combined with features:** two-speed pulse or tone dialing, A/B/C buttons store frequently used numbers, private 6-digit security code, one button redial of last number called, low battery light, hi/low volume and memory backup (battery not included).

**The system includes** 120 VAC recharging base unit, dial-out & receive handset, connector cord with modular plugs and user's manual.

GDP-1341, Assembled, Shpg. wt. 5 lbs. .... 229.95

California law requires the following statement: FCC-approved Freedom Phone 4000 will be serviced under provisions outlined in manufacturer's warranty.

**[11] The Demon Dialer can save you time and money**

**\$89<sup>95</sup>**

- Automatically redial busy and unanswered numbers
- Accurately dial lengthy Alternate Long Distance numbers
- Expansion lets you store up to 176 seven-digit numbers

**The Demon Dialer has a memory** that stores 93 7-digit numbers, 68 11-digit numbers or 55 23-digit numbers. The Memory Expansion Accessory almost doubles the memory by storing the equivalent of 176 7-digit numbers. A 3-volt battery provides memory protection should your electrical power fail.

**Computer-controlled by an on-board CPU,** this Dialer will instantly and automatically dial numbers of up to 32 digits stored under easy-to-remember 2- to 6- digit letter/number codes you devise — for example: DOC, FIRE, POLICE, BILL, MARY, etc. Accurate dialing of lengthy long distance and alternate telephone system numbers is ensured, time after time.

**The Demon Dialer has no equal.** Two-key sequences will redial or 'Demon Dial' after the first try. The Demon will silently dial a busy number 5 times in the 1st minute, every 2 minutes for 10 minutes, then every 10 minutes for up to 2 hours. While it 'Demon' dials, incoming calls can still be received, and a 'success' signal alerts you when the party being called answers. If they're out, the Demon Dialer can call back every ten minutes for up to ten hours.

**Program numbers into the Dialer memory** using an ordinary touchtone phone. Six 20/SECURITY/TELEPHONES

simple commands give you complete control of this versatile instrument. For those who depend on telephone contacts to do their job, the Demon Dialer is a convenient way to save precious time and money. Its whole purpose is to make using your telephone easier, and you can master the commands for speedy operation in just a few minutes. This incredible Dialer operates with any telephone branch equipped and billed for touch-tone service. Extension phones on the same line also have access to the Demon Dialer.

**Constructed on a single circuit board,** the Demon Dialer is housed in a smoky-gray case you can set on your desk, hide in a drawer or wall-mount with its own self-stick bracket. Not intended for use with some multi-line business phone systems. Kit includes AC power cube, 3-volt battery, two cables with modular plugs, series jack, user's manual and a handy reference Dial Guide/List. 1½" H x 5½" W x 5¼" D.

Kit GT-2217, Shpg. wt. 3 lbs. .... 89.95

GTA-2217-1, Memory Expansion Accessory, Shpg. wt. 1 lb. .... 19.95

**[12] Replace telephone bells with a Pleasant Phone Ringer**

**\$29<sup>95</sup>**

- Select from four relaxing telephone signals
- Easy installation and tune selection
- Adjust volume and place extension speakers where needed

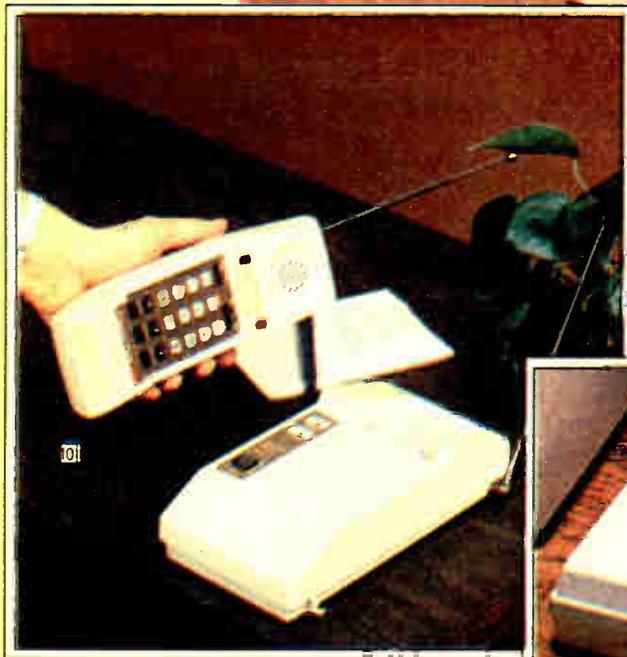
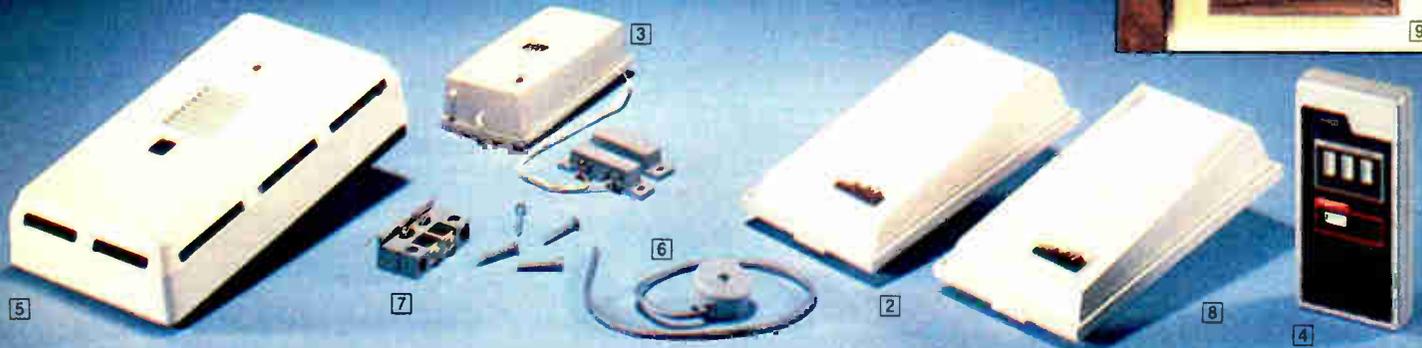
**Replace the boring ring-ring-ring** of your present telephone with this unique little ringer and you'll notice right away what a cheerful difference it can make to hear a tuneful call come in! The pre-programmed polyphonic musical IC in this one-evening kit gives you four choices: a beeping signal, an upbeat four-note chime, ten seconds of Beethoven's "Für Elise" or 20 seconds of "Romance."

**A pushbutton switch** lets you choose either the conventional telephone bell, or in place of its strident jangle, one of the four pleasant synthesized signals from the Phone Ringer. Inside, a variable volume control and two speaker terminals are provided so you can spread the melody to other rooms. Keyhole slots in the caseback make wall mounting simple, if you prefer. Two alkaline "C" cells (not included) can power it for over a year. Simply installs between your telephone and its wall outlet. Kit includes modular phone plugs and 6' of cable. The attractive two-piece beige case quickly snaps open when you wish to select a new tune or adjust the volume. Measures 1¼" H x 5½" W x 4¾" D. Compatible with both tone or rotary phones. Styled to complement all modern decors, the GT-1218 makes a harmonious addition to any home or office. Build one for each!

Kit GT-1218, Shpg. wt. 1 lb. .... 29.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.



LAST CALL on GDP-1341

The Demon Dialer can eliminate misdialing, let you put the telephone book in a drawer and will automatically keep calling

# Products to make your home more energy-efficient, convenient and healthful

## 1 Solar energy can save you fuel-dollars

### Solar energy is economical for do-it-yourselfers

As the cost of fossil fuel continues to rise, and ecological debates increase the national awareness of our environmental responsibility, all forms of alternate energy will become even more promising. We offer the highest quality solar components on the market. You probably cannot hire a contractor to install a system this good. Plus, you can save up to 40% over a comparable dealer-installed system.

Designed as a complement to your existing water heating system, the NS-1100 system is properly sized for your own climate, home size, family and hot water requirements by a sophisticated computer program run at your nearby Heathkit Electronic Center (also available by calling Heath's Marketing Service Dept. at 616-982-3411). *Plug into the sun!*

### Solar gives you the most for your money

- New solar panel absorbs even more sunlight
- Federal Tax Credits can pay for 40% of the total system invoice purchase price
- Many states offer additional tax incentives
- Most systems recover cost in three years
- The Heathkit NS-1100-3 Manual Set answers all your questions about the system

The NS-1100 system preheats water going to your conventional water heater — so instead of cold water, it receives solar-heated water. *This free preheating dramatically lowers the energy requirement of your water heater, allowing it to become a holding tank to keep water at the desired temperature.*

**Build it in as little as three weekends:** Only common carpentry and plumbing tools are required to assemble and install the NS-1100 Solar Water Heater in your home. The profusely illustrated, step-by-step Heathkit manual allows you to plan the complete kitbuilding and installation operation ahead of time. The NS-1100 Water Heater System includes all the components you need for kitbuilding and installation except ¾" copper pipe, insulation and solar fluid.

**Declare your energy independence:** Your first step is to order the NS-1100-3 Manual Set and contact a Heathkit Electronic Center (or Heath Company at 616-982-3411) for the price of a system sized just for you. The manual clearly shows how easy it is to install the NS-1100 Solar Water Heater System, and our unique computer program will show you the tax incentives that are available — and the payback timetable you can expect — from the system.

**SAVE 40% on the NS-1100-3 Manual Set** for the NS-1100 system! Written for people with little or no previous experience, it has the answers to all your questions — everything you need to know to install a customized Heathkit Solar Water Heater System successfully, including complete site evaluation, installation and operation information. A solar shade finder helps you find a site where no trees or buildings will block your solar panel from full sunlight. And the price of this Manual Set is deductible from the cost when you purchase a system.

### SAVE twice with a 10% discount AND tax credits.

All items for the NS-1100 Home Solar Heater System have been discounted 10% so you can start saving this year on your water heating bills. A Federal income tax credit of 40%, plus state tax credits (if available), will also help you pay for your NS-1100 Kit. This credit is not a deduction. It means you receive back 40% of the system cost.

**SAVER! NS-1100-3, Manual Set, 3 lbs. .... Was \$25.00, NOW ONLY 15.00**  
**Kit NS-1100-1, Plumbing Hardware Pack for NS-1100 systems, 65 lbs., Motor Freight Collect .... Was \$589.95 NOW ONLY 530.95**  
**NS-1100-12, 3' x 8' Solar Collector Panel and Mounting Hardware, 136 lbs. Motor Freight Collect .... Was \$575 NOW ONLY 517.50**  
**NS-1100-4, 80-Gallon Capacity Solar Tank, 350 lbs., Shipped Motor Freight Prepaid .... Was \$429.95 NOW ONLY 386.95**  
**NS-1100-5, 120-Gallon Capacity Solar Tank, 447 lbs., Snipped Motor Freight Prepaid .... Was \$599.95 NOW ONLY 539.95**  
**NS-1100-6, 5-Sq. Ft. Heat Exchanger, 18 lbs. .... Was \$169.95 NOW ONLY 152.95**  
**NS-1100-7, 8 Sq. Ft. Heat Exchanger, 20 lbs. .... Was \$189.95 NOW ONLY 170.95**  
**NS-1100-8, 8 Sq. Ft. Double-Walled heat Exchanger (required in Oregon, Los Angeles and Memphis areas), 24 lbs. .... Was \$239.95 NOW ONLY 215.95**

22/HOME/ENERGY

## 2 Clear the air of dust, dirt and unhealthy contaminants

**\$149<sup>95</sup>** • No metalwork or wiring — complete instructions at every step  
 • Removes dust, dirt, cigarette smoke — even allergens  
 • Automatic — works with your furnace or air conditioner

Today's well-insulated homes need the Heathkit Electronic Air Cleaner. With each cycle, it removes almost all airborne contaminants. The Electronic Air Cleaner works with your central heating or air conditioning system to automatically bring you cleaned and refreshed air you'll enjoy.

**Easy to install in place of your old filter.** 120 VAC, 60 Hz Power Supply measures 8" H x 12" W x 4" D. One power supply and at least one filter needed for operation — two filters can be used with a single power supply.

**Electronic Air Cleaner Power Supply:**  
**Kit GD-2196 (needs Filter Accessory below), Shpg. wt. 5 lbs. .... 149.95**  
**Filter Accessory GDA-2196-1, 20" x 25" x 1", 1000 cfm, Shpg. wt. 3 lbs. . . 99.95**  
**Filter Accessory GDA-2196-3, 16" x 25" x 1", 800 cfm, Shpg. wt. 3 lbs. . . 99.95**

## 3 Heath's GD-1298 Office Air Cleaner

**\$199<sup>95</sup>** • Removes pollutants and pollen, dust and odors  
 • Portable and efficient, with quiet operation  
 • A one-evening project for the novice kitbuilder

Remove irritating pollen, dust, mold spores and smoke particles, some as small as .01 microns (less than one-half millionth of an inch) in diameter. Three filters improve your working or living environment: a washable, prefilter removes large particles; the permanent electrostatic filter removes small particles; and a replaceable, activated charcoal filter absorbs odors.

**Kit GD-1298, Shpg. wt. 20 lbs. .... 199.95**  
**GDA-1298-1, Replaceable charcoal filter, Shpg. wt. 2 lbs. .... 7.95**

## 4 Quickly remove dust, dirt, allergens and smoke

**\$289<sup>95</sup>** • Filtering eliminates 99% of pollen and 94% of harmful particles in the air  
 • Three filters purify the air and remove unpleasant odors  
 • Efficient, three-speed fan makes air-cleaning jobs easy

The Heathkit Portable Electronic Air Cleaner takes on your toughest air-cleaning problems. Efficiently remove dust, dirt, smoke and other pollutants from 6,000 cubic feet — that's a 25' by 30' room with an 8' ceiling. Three speeds tackle a variety of jobs and three filters work together to keep your air clean and fresh. And this kit is simple to build — the power supply, variable speed fan control and filter are preassembled. Uses 120 VAC, 60 Hz. 26½" H x 17¼" W x 13½" D.

**Kit GO-1297, Shpg. wt. 59 lbs. .... 289.95**  
**GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297, 2 lbs. .... 9.95**

## 5 Reduce Your Gas Bills With Intelligent Thermostats

- Set the temperature you want for the time of day you want
- Program up to six daily settings, for a full week

It makes sense! Program your furnace and air conditioner for a weekly cycle of temperatures between 60°-82°F. (Not for 2-stage systems).

**Keep your home within 2° of the temperature you want, day-in/day-out.** Use manual and "Slow-Cycle" functions to override programmed settings. Extra value — NE-1211 includes isolation relay (may be required with some systems).

**Kit NE-1211, Shpg. wt. 1 lb. .... 59.95**  
**NEP-1210, Assembled, Shpg. wt. 1 lb. .... 79.95**

## 6 Sound-Activated Switch turns on lights for you

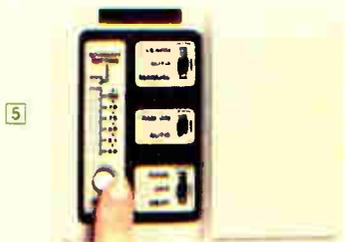
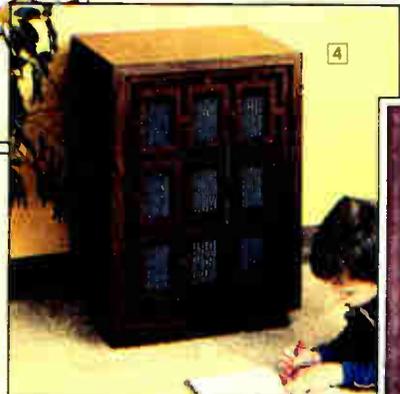
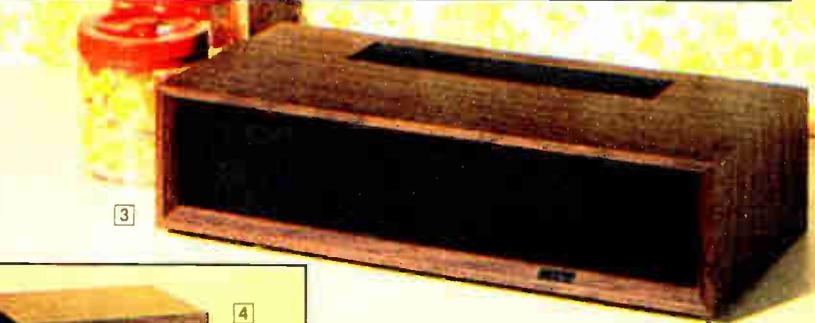
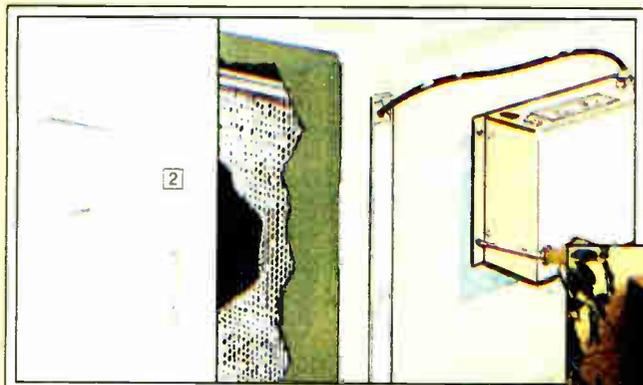
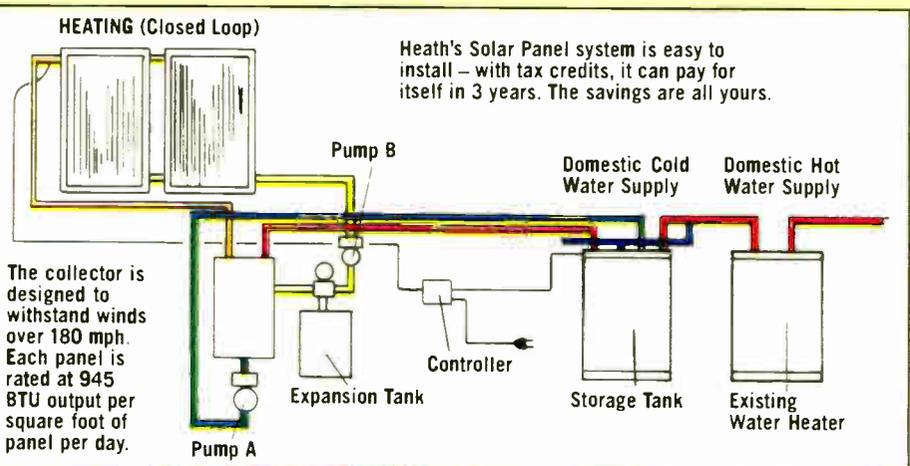
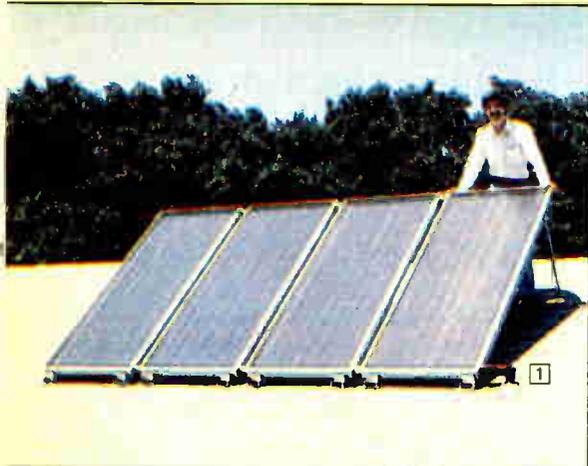
- Instantly turns lights on when it hears you, turns them off when it doesn't
- LED helps you set audio sensitivity level
- Improves home security

Provide extra safety in halls and on stairways. The Sound-Activated Switch turns on lights for you when you enter the area, and saves lots of money by turning them off after you've gone. Solves the problem of children leaving lights on. Operates up to 300 watts of 120 VAC lights. Only two controls — sensitivity adjustment sets the sound-triggering level, and a timing adjustment sets turn-off delay.

**GDP-1270, Assembled, Shpg. wt. 1 lb. .... 29.95**



Use your Visa or MasterCard credit cards to purchase your kit!



**Economize with the Heat Sniffer**



The NE-2112 is easy to use. Turn the unit on and adjust for silence. Then move the Sniffer's sensor along where heating/cooling losses might occur. Changes in temperature set off a beeping alarm and a flashing LED. Use in temperatures from 59°-95°F

(15°-35°C). Requires 9-volt battery (not included).  
Kit NE-2112, Shpg. wt. 2 lbs. . . . . 24.95

**Use the Watt Wizard to economize**

Save money three ways: with a 15% tax credit, by reducing the power consumption of motorized devices and by protecting motors against burn-out

Triple savings: As an energy-monitoring device, the Watt Wizard qualifies for a 15% tax credit of the purchasing price – save part of the cost of running some motorized electrical devices and prolong the life expectancy of appliances. Just plug it in, and start saving. The Watt Wizard Power Factor Controller is proven efficient!



NEP-1662, Assembled, 1 lb. . . . . 39.95

**Fingertip on/off control of lights**

**\$19.95**

- Can also be used conveniently for small appliances, TVs, fans

Instant on/off control at your fingertips Maximum 300 watt load per unit; 150 watts per lamp. Use with TVs to 225 watts, fans to 180 watts and stereo, heaters, etc. to 300 watts maximum. Not for AM radios.

Kit GD-1287, Shpg. wt. 2 lbs. . . . . 19.95



# Quality electronic tools and accessories to make your kit building easier and a lot more fun

The right tool makes any job go easier. That can be especially true during kitbuilding, where the proper tool or utility can make a difference in the quality success of your finished product. These items are Heath-recommended for greater convenience and reliability, every time you tackle a new project.

## 1 Handy 25-watt soldering iron

With its 860-degree F 1/8-inch screwdriver tip, this professional pencil iron makes close soldering jobs cleaner and easier. The GDP-207A is lightweight, has a rugged stainless steel barrel and uses long-life soldering tips. An excellent kit building soldering iron. Operates on 120 VAC. (Color other than pictured.)

GDP-207A, Shpg. wt. 1 lb. .... 14.95

## 2 Weller soldering station

Features an exclusive closed-loop system which automatically controls iron tip temperature at 700 degrees F. Plug-in soldering iron comes complete with heat-shielded holder on a sturdy stand, pilot light and switch, 3-wire cordset, 6 foot power cord, 700-degree tip, tip storage tray and removable sponge.

GDP-1108, Shpg. wt. 5 lbs. .... 79.95

Set of five 700 degree F assorted tips for above.

GDP-1109, Shpg. wt. 1 lb. .... 17.95

## 3 See better, clearer, easier

Illuminated magnifier provides bright, cool light with an energy-conserving 22-watt circulator fluorescent. Eye-strain is relieved by a distortion-free 2 to 1 magnifier with a 5" polished lens. Preferred by professional craftsmen for its exceptional view. Has black enamel housing, safety diffuser and 45" long-reach arm on 360° base. Clamps on any horizontal surface up to 2 1/2" thick. UL listed.

GDP-200, Assembled, Shpg. wt. 7 lbs. .... 79.95

## 4 Flexible extension lamp

Flexes over 360 degrees with a 32-inch reach. Rugged counter-balanced arm clamps in any position. Incandescent bulb is not included.

GDP-202, 4 lbs. ... Was \$26.95. NOW ONLY 19.95

## 5 PanaVise circuit board holder

Clamps and holds steady circuit boards up to 12" wide. Boards mount in spring-loaded arms that can be tilted 220 degrees and rotated 360 degrees.

GDP-1254, Shpg. wt. 2 lbs. .... 19.95

## 6 PanaVise vacuum base

Holds firmly to almost any smooth surface. Base uses a rubber suction pad that doesn't scratch the mounting surface.

GDP-1252, Shpg. wt. 2 lbs. .... 19.95

## 7 PanaVise standard vise head

If you've ever needed a third hand when assembling a circuit board or working on an electronics project, the GDP-1253 could be your answer.

Nylon jaws open to a full 2 1/2". This vise firmly grips even larger and heavier items.

GDP-1253, Shpg. wt. 2 lbs. .... 17.95

## 8 PanaVise standard adapter base

Permanently mount this base on your workbench and use it with any standard (3/8" shaft) PanaVise fixture. An adjustable, special ball-joint permits positioning that board or chassis at the precise angle you need for ease and precision in your work. Three mounting lugs enable you to securely mount this base to your workbench.

GDP-1251, Shpg. wt. 2 lbs. .... 14.95

## 9 PanaVise wide-opening holder

Make working on larger components easier. This vertical-opening vise will position and hold those items — up to 9" in thickness, such as a chassis or cabinet. The Holder is easily mountable (if you prefer) and has replaceable jaw pads to ensure against possible damage to bulkier items.

GDP-1255, Shpg. wt. 2 lbs. .... 15.95

## 10 Magnify small detailed circuits

This magnifier fits comfortably on your head, freeing both hands for work, while it magnifies by 2 1/2 times. See the circuit you're working on in much greater detail. The lenses are finely ground for precision — they are shatter- and scratch-resistant. This light weight magnifier eliminates squinting by concentrating your vision on tiny details while providing greater depth of field. Lens holder flips out of the way and works well with eyeglasses. Focus view area is 8" to 14" below the optical-quality acrylic lens. Headband has adjustable comfort cushion.

GDP-201, Assembled, Shpg. wt. 1 lb. .... 19.95

## 11 Low-cost kitbuilder's tool set

This 11-piece kit is perfect for the beginner or the busy technician. Included in this tool set is a high-quality Weller 25-watt, 800-degree F soldering iron with two interchangeable tips, a soldering-aid tool, a 4 oz. spool of solder, wire strippers, diagonal cutters, 4" long-nose pliers, 1/4" nut driver, and a regular and a phillips screwdriver. Durable 3" H x 10 3/4" W x 10" D carrying case has molded storage tray for all tools and a built-in carrying handle.

GHP-1270, Shpg. wt. 2 lbs. .... 39.95

## 12 NEW! Handy Smart Outlet Box

Senses current flow in a control outlet. When a device plugged into this socket is turned on, power is automatically turned on to ten other sockets. Great for work benches, ham stations, computer or audio systems. MOV device protects units from line surges and transient spikes to a maximum 325 watts at 6500 amps (70 joules one time, 35 joules repeated). Maximum control power is 250 watts at 2A; maximum for all other outlets is 1200 watts at 10A. For further information, see page 99.

Kit GD-1295, Shpg. wt. 4 lbs. .... 49.95

## 13 Multiple outlet junction box

Solves your problem of a shortage of electrical outlets. Has twelve 3-prong outlets, eleven are turned on from a switch while the other always has power to it. Fused 3-hole outlets have 10 amp. max. load.

Kit HD-1274, Shpg. wt. 4 lbs. .... 24.95

## Dependable Deluxe Garage Door Opener ends strain and struggle

**\$189<sup>95</sup>**

- The easiest-to-install screw drive system available
- Door re-opens instantly if obstructed while closing
- Exclusive triple-thread drive system beats chain or belt-driven openers in long-life durability tests
- Security light comes on when garage door is opened

Convenience and security are often primary concerns for home-owners, Moore-O-Matic Garage Door Openers address both of these concerns — at an inexpensive price. Eliminate the need to fumble with a key-locked garage door and keep dry on your way to work and home — a security light sees you safely into the home.

The Electronic Command Garage Door Opener pays for itself in convenience and security. Touch the button on the remote transmitter and the door opens — 80 watts illuminate your garage. Touch the button again, the door closes and positively locks to prevent anyone from opening it from outside by hand (on the GD-3509, the light blinks when the door is closing). The security-timed light will remain on for about five minutes to let you get safely inside the house.

Designed for garage doors up to 18 feet wide and 7 feet high, the powerful 1/3 horsepower motor opens garage doors effortlessly. A shock absorber cushions vibrations and allows for up to two inches of ice buildup or other impediments. Up-limit, down-limit and obstruction pressures are adjustable. In case of difficulty, the quick-release trolley disengages with a simple string tug. A second tug resets the trolley.

Solid-state transmitters and receivers use digitally encoded signals. You have 256 possible code combinations which you can set and change at anytime

to eliminate interference from neighboring units. The electrical control circuits are contained on one removable circuit board, run by an on-board microprocessor.

Electronic Command Opener Systems can usually be installed in a single day, with do-it-yourself ease and no special tools. Requires 120 VAC, 60 Hz. Unit comes partially assembled with a Heath-approved manufacturer's manual for trouble-free installation.

Transmitter, Receiver, Dual Switch and Screw-Drive Door Opener Mechanism.

GD-3509, Shpg. wt. 41 lbs., Motor Freight . 189.95

Economical Chain-Drive Door Opener model includes Transmitter, Receiver and Single-button Wall Switch; has light, but without security-timing delay.

GD-3409, Shpg. wt. 47 lbs. .... 149.95

(UPS shippable)

GDP-3309-A, Transmitter only,

Shpg. wt. 1 lb. .... 29.95

GDP-3319-A, One Transmitter, one Receiver

for 3-wire system, 1 lb. .... 59.95

GDP-3329-A, Two Transmitters,

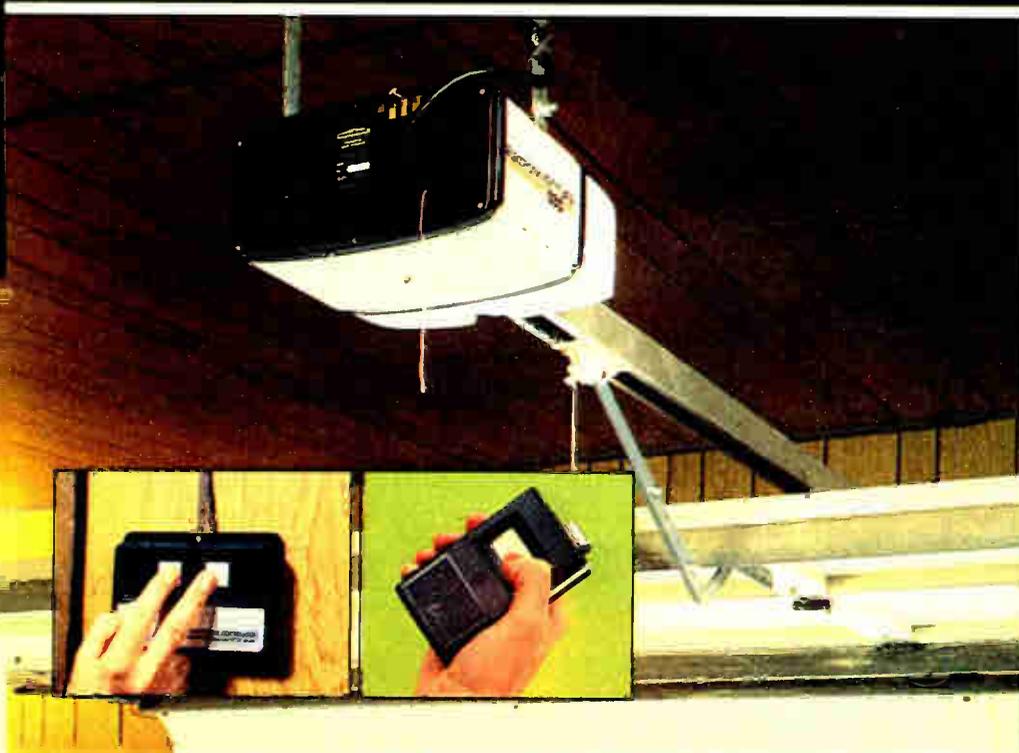
one Receiver for 3-wire system, 2 lbs. .... 89.95

Power Transformer for adapting 2-wire Opener to

3-wire system.

GDA-3309-3, Shpg. wt. 1 lb. .... 9.95





# Heath Pro-Series Audio components bring studio quality and performance to the home

Superlative by any standard, Heath's highly-acclaimed Pro-Series components are engineered for those who insist upon studio-quality sound reproduction. And, by creative and discriminating audiophiles.

## 1 Extremely versatile Deluxe Preamplifier provides complete control of the audio signal

In *Stereo Review Magazine*, Julian Hirsch stated: "In sum, the Heath AP-1800 does practically everything one could want, and does it with perfection."

**Our infinitely versatile Deluxe Preamplifier gives you absolute mastery** over a multitude of source inputs without the introduction of static distortion or coloration. It has a built-in moving-coil preamp, plus two moving-magnet inputs with three sensitivity and capacitance selections to match any turntable cartridge; tape monitoring for two decks, plus deck-to-deck dubbing and the ability to listen to any source while copying; separate bass and treble controls for each channel, plus dial turnover points for precise tone adjustment and bypass. With two-level high (6 or 12 kHz) and low (20 or 50 Hz) filter switches, a continuously variable loudness control, 0/20/40 dB switchable muting, four speaker capability equalization or active, processing added through an adapter loop switch, six convenience outlets and many other high quality features, you're capable of tailoring raw source material with an incredible degree of artful finesse.

Kit AP-1800, Shpg. wt. 27 lbs. .... 399.95  
AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. .... 34.95



## 2 GFT-1A Stereo Tuner from ADCOM features superior performance characteristics

**Designed to maximize your listening pleasure**, the GFT-1A combines outstanding specifications with the utmost in simplicity of operation. Digitally-synthesized tuning, quartz-referenced, locks on to stations with an accuracy of 0.00025%. Your station is tuned in and stays locked in without any drift. Touch the scan button and automatically, or manually, tune the Receiver up or down the AM or FM frequency range. Or, you can program up to eight FM and eight AM stations into the Tuner's memory for instant one-button tuning of your favorite radio station. An FM signal-to-noise ratio of 80 dB for mono and 75 db for stereo provides you with the pure enjoyment of noise-free music.

**The ADCOM GFT-1A features** an FM sensitivity of 17.2 dBf in mono and 34.7 dBf in stereo for 50 dBf of quieting. It has a capture ratio of 1.0 dB to bring you those fringe stations. The Receiver also boasts a low 65 dBf total harmonic distortion. Channel separation is 55 dB at 1000 Hz for clear stereo listening.

**The Tuner matches its performance** with a number of high-quality features. A five-stage LED display clearly indicates the signal strength of a tuned station. A built-in record level oscillator permits you to set up tape deck levels for perfect home recordings. In addition, a high blend switch enables you to reduce high frequency noise in difficult reception conditions. A mute switch is available for turning the FM muting on and off. The AJP-1801 measures 19" W x 3" H x 11 1/2" D (48.3 x 7.6 x 29.2 cm) for use with other rack-mounted audio components in the Pro-Series.

AJP-1801, Assembled, Shpg. wt. 14 lbs. .... 369.95

## 3 Graphic Output Indicator monitors peak power levels

**Accurate monitoring of peak power output is critical** to avoiding overloads and speaker damage. The AD-1701, one of the fastest output indicators on the market, gives you an instantaneous visual check of power amplifier or preamplifier output. Two rows of 15 LEDs (one row for each channel) warn you of dangerous peak loads that could harm other components or ruin your tweeters. When the output range switch is set to select the 0 dB reference level for high or low level input, the Indicator exactly displays your system output with a 53 dB dynamic range, calibrated in RMS values between each vertical pair of LEDs. The six-position range switch offers extremely wide sensitivity with response time capturing transient bursts as short as one-half cycle of 20 kHz. A peak hold/average button allows you to supplement slow and restricted VU meters.

Kit AD-1701A, Shpg. wt. 15 lbs. .... 199.95  
AEA-1800-3, Solid Oak End Panels, Shpg. wt. 2 lbs. .... 19.95

## 4 Build the finest high-level Stereo Power Amplifier

**The phenomenal dynamic range** of new audio sources requires more power and headroom to faithfully reproduce the total sound spectrum. Without that power, musical peaks get hard-clipped and the dynamic range is compromised. Additionally, amplifiers driven to clipping can have more than 40% harmonic distortion and may force a speaker to dissipate twice the normal heat.

**The Pro-Series AA-1800 Amplifier has the power** modern recording techniques require. Deliver 250 watts continuous power per channel into an 8-ohm load; and on those troublesome transient peaks, the AA-1800's typical dynamic headroom of 3 dB translates into 500 watts per channel. Hum and noise are down a full 85 dB, and sound/phase distortions are virtually eliminated. *This amplifier is ready for DC and digital recordings!*

**A patented protection system** double-safeguards your speaker from damaging input signals. Special overload and high-frequency cutoff circuitry, a thermal circuit breaker and 8-second turn-on/turn-off delay circuits further protect your system from destructive voltages, disconnecting the speakers and causing a front panel Protection LED to glow. Massive heat sinks cool the electrical network while LEDs for each channel precisely indicate full power output.

**Two line cords** with remote AC switching relieve your preamp from the burden of transferring high current. Twin inputs, level controls, speaker outputs and a line fuse are on the back panel. Rack handles ease installation.

**September 1982 High Fidelity Magazine reported:** "In short, the AA-1800 is as fine an amplifier as one could want, sonically neutral, and powerful enough for just about any reasonable domestic application. And provided you don't mind spending a few evenings behind a soldering iron, its price is a bargain."

Kit AA-1800, Shpg. wt. 75 lbs. .... 649.95

## 5 10-Band Octave Equalizer alters tonal parameters

**Adjust the audio response of records, tapes and FM broadcasts** to your creative taste by adding the Pro-Series Equalizer to your rack. It's an accessory that can dramatically enhance the performance of every other system component, and improve your environmental acoustics *without contributing noise*.

**Ten ISO-centered frequency band slide controls** for each channel give you octave-by-octave boost or cut preference over the entire audible range. They let you eliminate 'live' or 'dead' room spots for smooth, flat-graph characteristics. You'll notice right away that selective frequency-band equalization can enrich cartridge response, cut harmful subsonics, boost deep bass response to the anatomical vibration level and put lively resonance back into woofer, midrange and tweeter efficiency. A six-way mode/monitor combination network allows you to equalize, monitor, record or bypass without rearranging any cables. Left and right channel LED clipping indicators warn of peak overload conditions. Harmonic distortion is a phenomenally low 0.001% from 20-20,000 Hz at rated output.

Kit AD-1703, Shpg. wt. 17 lbs. .... 274.95  
AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. .... 34.95

## 6 Active Audio Processor increases your dynamic range

**Dynamic range is to music what perspective is to painting or photography.** It gives audio depth and feeling. Some of the dynamic range in most music is lost in the recording or broadcast process, but the expansion circuit in the AD-1706 can restore up to 8 dB of this loss. You'll discover your music has even more realism, better definition and lower background noise while maintaining full response and ultralow distortion — even at high volume levels. The superb noise reduction circuitry sifts out up to 10 dB of noise from records and hiss from tapes, to effectively increase your system's total dynamic range by up to 18 dB. A 7 kHz linear-phase filter can be switched in to reduce ultrasonic noise.

**Front panel LEDs** indicate relative noise reduction and dynamic range expansion levels precisely. Compatibilities between the built-in tape monitor and mode selector switch let you apply processing either during or after recording, specify the processor insertion point or bypass the Processor completely.

Kit AD-1706, Shpg. wt. 18 lbs. .... 299.95  
AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. .... 34.95

## 7 Specially-priced turntable-and-cartridge systems

**The Onkyo CP-1130F** (also see page 29) is a high quality, direct drive fully automatic turntable. A turntable with streamlined cabinet design, repeat capability, soft-touch controls, better tracking, vibration isolation — and freedom from the irritating effects of rumble, noise, wow and flutter. In tandem with one of our two professional-status cartridges described below and on page 29, you'll enjoy pristine audio playback pleasure.

ACP-1130, Assembled, Shpg. wt. 15 lbs. .... 249.95

**SAVER!** CP-1130F turntable with world-renowned Dynavector Karat Ruby moving-coil cartridge with 20 to 50,000 Hz frequency response.

ACS-1130A, Shpg. wt. 24 lbs. .... 519.95

**SAVER!** CP-1130F turntable with Shure V-15 Type V cartridge.

ACS-1130B, Shpg. wt. 24 lbs. .... 429.90



Use your Visa or MasterCard credit cards to purchase your kit!

## 8 AD-1702 Variable Electronic Crossover

Add a separate bass channel to your system! Used with a Subwoofer like the AS-1320 on page 28, this component will give a more accurate crossover alignment for lower distortion and clearly-improved low end response down to as low as 20 Hz! Crossover points at 40, 60, 80, 100, 125 and 150 Hz can be frequency scaled up to 6 kHz. Switches select 6 dB/octave or 18 dB/octave slopes for flat frequency response at crossover points and well-defined imaging. Outputs for stereo, monaural and bridged hookup give you the provisions to connect another amplifier and subwoofer to your system.

Kit AD-1702, Shpg. wt. 15 lbs. .... 199.95

AEA-1800-3, Solid Oak End Panels, Shpg. wt. 2 lbs. .... 19.95

Kit AS-1320, Subwoofer, 162 lbs. Motor Freight Collect .... 319.95

**NEW**

## 9 Affordable Sherwood Compact Disc Player

Heath searched for and found an advanced, easy to use and affordable compact disc player for the discriminating audio enthusiast...Sherwood's CDP-100 CD Player. It uses three laser beams, not one, for better tracking. It has two filters, a digital and an analog filter, to give you better sound with less phase distortion at a price that's less than comparable models.

ACD-150, Shpg. wt. 10 lbs. .... 489.95

10 Heath's latest Pro-Series member: the AD-1308 Portable Real-Time Spectrum Analyzer, plus optional ADA-1308-1 Power Supply/Rack-Mount Accessory and AD-1309 Pink/White Noise Generator on page 28.

## Beautiful Pro-Series Rack

Bring all your Heathkit Pro-Series equipment together in one, portable space-saving rack. Compatible with Standard EIA panels of any height, all components are within easy reach for adjustment or inspection. Comes with dividers for storing records and top shelf for a turntable. Locking swivel casters enable quick and easy changes in listening room setups. Handsome walnut veneer side panels will add contemporary taste to your music room and a unified look to a series of components that mirror your exceptional taste. The Pro-Series Rack measures 43½" H x 21½" W x 18" D.

Kit AE-1705, Shpg. wt. 74 lbs. .... 274.95



Handsome optional oak-finished cabinets and solid oak end panels for Heathkit Pro-Series Audio Components (for selected models) are listed and sold separately for each unit.



## 1 Lab-grade Portable Real-Time Spectrum Analyzer

- Use it anywhere, even in your car – operates on six "C" batteries

**An impressive value:** As the world's first hand held, microprocessor-controlled 1/2- and 1-octave Real-Time Spectrum Analyzer, Heath's new Pro-Series AD-1308 is a breakthrough in uncompromising mobile capability. It has comparable specs and more features than many units costing thousands of dollars. It gives the audio technician, recording engineer or home music enthusiast, a precise means of special evaluation for their daily work or increased listening pleasure.

**Sound you can see:** The AD-1308 provides a bright visual display of line input or acoustic-pickup spectral response and sound pressure level, making it possible to optimize your entire audio system. The AD-1308 features 1 or 3 dB scaling for accurate setups – from tape recorders to public address systems.

**Five memories let you store and recall responses for instant comparison,** plus an exclusive Difference mode displays the difference between any two sources. A thumbwheel attenuator selects the scaling in 10 dB steps from 50 to 120 dB SPL, with standard ANSI fast, slow or peak response modes and A or C weighting for precise SPL or 'noise exposure' measurements.

**To ensure absolute measurement accuracy,** every microphone element is tested individually, and a ROM chip programmed to correct for frequency response errors. A machine-drawn calibration curve is also supplied.

**Kit AD-1308,** Shpg. wt. 5 lbs. .... **279.95**  
**SAVER! ADS-1308,** System including AD-1308 Analyzer, ADA-1308-1 Power Supply and AD-1309 Noise Generator, Shpg. wt. 27 lbs. .... **399.95**

**AD-1308 SPECIFICATIONS:** SPL and Spectrum Analyzer Display Range: 23-126 dB SPL. SPL Accuracy:  $\pm 1$  dB A-weighted. Microphone Self-Noise Level:  $\pm 36$  dB SPL. A and C Weighting Filters per ANSI: SI 4-1971 (Rev 1976). Fast and Slow SPL Response per ANSI: SI 4-1971 (Rev 1976). Flatness on Direct Input:  $\pm 1$  dB. Input Impedance:  $\approx 10k$  ohms. Input Sensitivity, 90 dB SPL Range: 0 dB  $\approx 350$  mV RMS  $\approx 10\%$ . Power Requirements: 10 5V,  $\approx 10\%$  @ 425 mA. Low Battery Indications: 6V  $\approx 5\%$ .

## 2 Power Supply/Rack-Mount Accessory

**Affords the best way to install and power your AD-1308** in standard 19" EIA racks, charge the batteries when using NiCads for portable power, and couple your system's audio signals to the Analyzer. Sturdy 9-pin D-connector permits unit to "snap" in and out easily. Has paralleled phono jacks for each channel. Left, Right, L + R or L - R signals can be selected and displayed. Ample space to store small accessories, microphone and AD-1309 behind hinged, swing-up front panel.

**Kit ADA-1308-1,** Shpg. wt. 8 lbs. .... **119.95**

**ADA-1308-1 SPECIFICATIONS:** AMPLIFIER: Frequency Response:  $\pm 2$  dB, 10 Hz to 50 kHz. S/N Ratio: 50 dB ref. 200 mV. L-R Common Mode Rejection: 40 dB, 20 Hz to 10 kHz. Input Impedance: 22k ohms.

## 3 Accurate Pink/White Noise Generator

**The AD-1309 supplies audio energy** with the precise frequency characteristics to properly make measurements with real-time or swept-filter spectrum analyzers – at a fraction of the cost of comparable generators. Front panel phono plug outputs and rotary power level control. Operates on one 9 VDC battery.

**Kit AD-1309,** Shpg. wt. 2 lbs. .... **49.95**

**AD-1309 SPECIFICATIONS:** PINK NOISE: Frequency Response:  $\pm 1$  dB from 20 Hz to 20 kHz. Output Level: RMS average is  $\approx 350$  mV, peak is 1.5 V. WHITE NOISE: Frequency Response:  $\pm 3$  dB from 20 Hz to 20 kHz. Output Level: RMS average is  $\approx 350$  mV, peak is 1.5 V. Dimensions: 2 1/2" H x 4 1/4" W x 4" D.

## 4 Audiophile quality in a medium-powered 30-Watt Stereo Receiver from Heath's Pro-Series engineers

- All-in-one audio quality – designed for highest fidelity first, then for high style
- Exceptional specifications and more performance for your dollar with our high 2.5 dB (53 watt) dynamic headroom

**\$349<sup>95</sup>**

**30 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.009% THD FROM 20-20,000 HZ**

**For the college student, apartment dweller or budget-minded audiophile** who wants a high quality, medium power stereo system, the Heathkit AR-1250 Digital FM Stereo Receiver is a considerable value. Easily assembled in four evenings, this Receiver fuses the best in audio technology with versatile features.

**Heath's award-winning Pro-Series engineers** designed the AR-1250 to meet the highest standards of accurate audio reproduction – just check the specifications. In addition, ease-of-use and versatility were part of the design. LEDs and bargraphs keep you informed of output power, signal strength, center channel tuning

28/STEREO HIGH FIDELITY

and stereo reception. Select A or B speaker systems, or both. Dual pre-amp-out/power-amp-in adapter loops make adding an equalizer, audio processor or electronic equalizer easy. Dub from one tape deck to another at the turn of a switch. Optional AM and Dolby FM Modules are easily added.

**Kit AR-1250,** Shpg. wt. 23 lbs. .... **349.95**

**Kit AJA-1200-2,** AM Module, Shpg. wt. 2 lbs. .... **39.95**

**Kit AJA-1600-2,** Dolby FM Module provides reduced noise and increased dynamic range factors on Dolbyized broadcasts, Shpg. wt. 1 lb. .... **54.95**

**SPECIFICATIONS: FM SECTION:** Mono/Stereo Usable Sensitivity: 1.9 (10.8)/3.5(16.1)  $\mu$ V (dBf). 50 dB Sensitivity: 3.5 (16.1)/38 (36.8)  $\mu$ V (dBf). S/N Ratio: 70/65 dB. Hum and Noise: 65 dB. Harmonic Distortion: 0.15/0.3%. Frequency Response: 30 to 15 kHz @  $\pm 1.5$  dB. PREAMPLIFIER: Frequency Response: 20-20 kHz @  $\pm 0.5$  dB Phono, 20-20 kHz @  $\pm 0.3$  dB Aux. THD and IMD (2 V out): 0.009%. Input Sensitivity (0.5 V out): 1.25 mV Phono, 100 mV Aux. Input Overload: 150 mV Phono, 10 V Aux. S/N: 75 dB Phono, 85 dB Aux. AMPLIFIER IMD: 0.012%. TIM:  $< 0.02\%$ . Frequency Response: 20-20 kHz @  $\pm 0.2$  dB. 1 kHz Separation: 50 dB. A-Weighted S/N: 95 dB. Power: 120 VAC/60 Hz. Antenna Connections: 300 & 75 ohm. Convenience Outlets: 1 switched, 1 unswitched (200 W max.). Dimensions: 4 1/2" H x 17" W x 15 1/4" D.

## 5 AS-1320 Subwoofer for bass you can feel

**Heath uses a 15" long-throw woofer** to reproduce all the low-frequency music on today's digitally-mastered and compact disks. An optimum Thiele-Small alignment provides acoustically flat ( $\pm 3$  dB) response with maximum efficiency. The AS-1320 requires as little as 30 watts for normal-level listening, but it can handle as much as 250 watts. Requires ASA-1320-1 Passive Crossover with a single amplifier or the Pro-Series AD-1702 Electronic Crossover when bi-amplifying.

**Kit AS-1320,** Shpg. wt. 162 lbs., Motor Freight .... **319.95**

**Kit ASA-1320-1,** Passive Crossover, Shpg. wt. 6 lbs. .... **49.95**

**Kit AD-1702,** Electronic Crossover, Shpg. wt. 15 lbs. .... **199.95**

**AS-1320 SPECIFICATIONS:** Freq. Range ( $\pm 10$  dB anechoic): 15-750 Hz. Freq. Response ( $\pm 3$  dB): 22-500 Hz. Impedance: 8 $\Omega$ . Minimum Amplifier Power: 30 W. Maximum Power: 250 W. Driver: High compliance, 15" long-throw design. Cabinet Type: Nine-cubic foot vented box, tuned to 22 Hz using computer-aided modeling techniques. Cabinet Dimensions: 64 1/2" H x 21 1/2" W x 17" D.

## 6 AS-1321 3-Way Speaker Module

**When added to the AS-1320,** this Module completes a 4-Way system that has few equals. Computer-Aided Design (CAD) and careful testing led to driver selection and a crossover design that wipe out time-smears and imprecise location. Now you can listen to music as it was recorded. Features a 6 1/2" polypropylene mid-bass, 2" soft dome Ferro-Fluid midrange and a planar leaf tweeter.

**Kit AS-1321,** 3-Way Module, Shpg. wt. 31 lbs. .... **299.95**

**SAVER! Kit AS-1324, 4-Way Speaker System. Includes AS-1321 3-Way Module and AS-1320 Subwoofer.** Shpg. wt. 208 lbs., Motor Freight .... **599.90**

**SAVER! Purchase a pair of AS-1324 Systems.**  
**Kit 1324-2,** Shpg. wt. 416 lbs., Motor Freight .... **1149.80**

**AS-1321 SPECIFICATIONS:** Frequency Range ( $\pm 10$  dB): 70 Hz to beyond 25,000 Hz; with AS-1320, 15 Hz to beyond 25,000 Hz. Frequency Response ( $\pm 3$  dB): 100-20,000 Hz; with AS-1320, 22-20,000 Hz. Midbass: Sealed in a baffle board sub-enclosure aligned at 100 Hz. Midrange: Ferro-Fluid damped voice coil for optimum transient response. Tweeter: Advanced-design planar leaf, optimally-damped for 4000 Hz resonance. Tweeter and Midrange Controls: Dual 2-position switches to provide  $\pm 2$  dB output boost or normal (flat) operation. Impedance: 6 $\Omega$  (4 ohms minimum). Recommended Amplifier Power: 30-250 watts per channel. Crossover Frequencies ( $\pm 6$  dB): 100, 600 and 4000 Hz. Sensitivity: 90 dB SPL. Module Dimensions: 17" H x 17 3/8" W x 9" D.

## 7 A 3-Way System to please the most critical ear

- Careful design delivers superb source accuracy and wide dynamic range; mirror-image driver mounting creates a sharp stereo image

**Designed for use with the best audio components,** the 10" woofer provides gutsy, well-defined bass response, with a 500 Hz woofer/midrange crossover frequency to ensure smoothness and minimize intermodulation distortion. The 4 1/2" mid-range driver has a polyester-damped subenclosure to prevent woofer reflections, while a 1" dome tweeter exhibits excellent power handling.

**Driven to sensational sound** by as little as 10 watts, a higher-powered amplifier like the AA-1800 (p. 26) reveals their awesome dynamic range and three-dimensional clarity. *Music will take on a new feeling.* Two frequency controls optimize response for your listening area. Individual driver fuses provide full overload protection. Comes with assembled walnut veneer cabinet.

**Kit AS-1373,** Shpg. wt. 68 lbs. .... **each 224.95**

**AS-1373 SPECIFICATIONS:** Frequency Response ( $\pm 3$  dB): 40-20,000 Hz. Maximum Power: 250 watts per channel. Crossover: 500 Hz (12 dB/octave) and 3000 Hz (12 dB/octave). Controls: 3 kHz switch, flat or 2.5 dB attenuation; 10 kHz switch, rolloff or flat. Dimensions: 26" H x 14 1/2" W x 11 7/8" D.



Discover the fun of kitbuilding at your Heathkit Electronic Center.



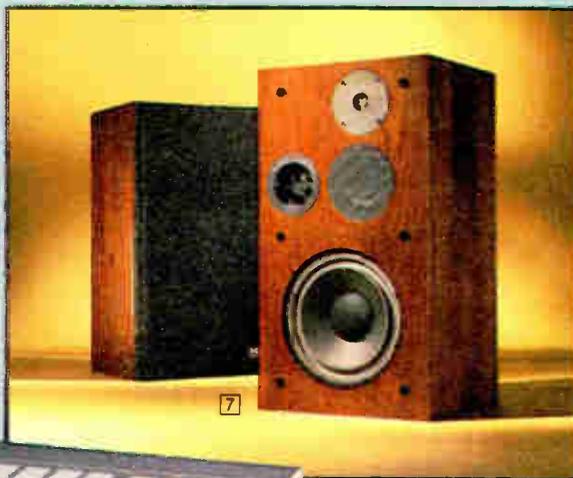
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### State-of-the-art phono cartridges

**Dynavector Karat Ruby** moving-coil cartridge with wide 20-50,000 Hz response and superior tracking ability. Greater than 20 dB separation at 1 Hz; 0.2 mV output.

ADP-1370, Shpg. wt. 1 lb. .... 310.00

**Shure V-15 Type V** with Dynamic Stabilizer has 10-28,000 Hz response, 3.2 mV output and greater than 25 dB separation with 1.0 to 1.25 gm tracking force.

ADP-1261, Shpg. wt. 1 lb. .... 199.95

### Anti-resonant direct-drive memorymatic Onkyo turntable

This quality turntable features two-speed, microcomputer-controlled, fully-automatic operation. Soft-touch control,  $\pm 3\%$  variable pitch,  $>72$  dB S/N ratio.

ACP-1130, Assembled, Shpg. wt. 15 lbs. .... 249.95

**SAVER!** Onkyo CP-1130F turntable with Dynavector Ruby cartridge.

ACS-1130A, Shpg. wt. 24 lbs. .... 519.95

**SAVER!** CP-1130F with Shure V-15 Type V cartridge.

ACS-1130B, Shpg. wt. 24 lbs. .... 429.90

### Multi-purpose Monophonic Amplifier

**3.25 WATTS MINIMUM  
RMS INTO 8 OHMS  
WITH 1.5% THD FROM  
40-20,000 HZ**



This solid-state kit takes a minimum 250 mV signal from a source (ceramic phono cartridge, monophonic AM or FM receiver, tape player, etc.) and amplifies it cleanly. Drives 8-ohm speakers to surprising sound levels! Has rear panel speaker terminals and input jack; front panel power switch with 'on' lamp, headphone jack, volume and tone controls in a 2 $\frac{1}{2}$ " H x 7 $\frac{3}{4}$ " W x 5 $\frac{1}{2}$ " D metal case. Fuse protected for 120/240 VAC.

Kit AA-18, Shpg. wt. 4 lbs. .... 44.95

# From Heath – two of the best Transceivers available, at any price

## ① Heathkit HW-5400 Synthesized HF SSB/CW Transceiver is a price-performance triumph

NOW ONLY  
**\$499<sup>95</sup>**

- Save \$250 more on the world's most fascinating rig and experience performance others only dream of
- PLL-synthesized stability with crystal accuracy
- Patented 2-speed tuning knob with 50 Hz resolution
- Digital display with direct keypad frequency entry, two memories per band and mode/status symbols

**The world's first and only kit-form synthesized HF Transceiver:** For every ham who dreams of owning the finest quality, multi-purpose equipment they can "get their hands on," Heath has created a special new assemble-it-yourself rig.

**A long overdue standard of price-performance payback:** Heath breaks the cost barrier to having more sophisticated, dependable talk power and microtech flexibility for use while at home, in the field or on the road. The compact HW-5400 Synthesized Transceiver is a marvel of modern kit-form engineering design. Controlled and monitored by a custom 8-bit microprocessor, it yields quick-change versatility in adapting to uncertain band conditions. From the moment it arrives, you start an interfacing experience that will put the *original* sense of thrill, skill and adventure back into Amateur Radio.

**Three modes, eight bands and plenty of power for HF excitement:** The HW-5400 operates in USB, LSB, and CW on 80-10 meters with automatic sideband selection. Completely solid-state and broadbanded, it has full break-in (QSK) for proficient CW ops, sixteen memories, power supply activation at the transceiver panel, defeatable amplifier relay for quiet keying, maximum shielding on the PA, reverse and over-voltage protection as well as high VSWR forward power cutback circuitry for the cool-running finals.

**The HW-5400's high-resolution tuning system** employs a dual-speed technique so uniquely practical and efficient, Heath has applied for patent rights. An infrared optical shaft encoder and two rotation holes control the scan speed. One uses a capacitive-touch metallic insert so you can rapidly scan a band in 1 kHz increments, while tuning with the other lets you pick out closely-packed calls for more QSOs over a narrow frequency range at 50 Hz per step.

**Beats the QRM every time:** A tremendously versatile *Split-Memory Access* function lets you review and change the transmit frequency while in receive without missing a single word or fragment of code from the station in contact.

**Total Transceiver status at a glance:** Seven mode and function symbols left of the frequency display inform you of current mode, T/R status, split operation, split-access memory handling, and whether the transmit frequency is outside the band edge. They can be set to one of three brightness levels.

**Half the controls on most transceivers, twice the performance of many:** The HW-5400 front panel is clean and uncluttered, with all functions marked for easy operation. Three dual-concentric knobs command every aspect of signal isolation and maintenance. Essential vox and sidetone controls are located behind the nameplate, which flips open at your touch.

**More microprocessor ingenuity:** With the inexpensive HWA-5400-3 Keypad option wired in, you've got extra pushbutton power and signal-capturing advantage. It allows instantly synthesized direct QSY to any position in the band, and permits fast DX, contest and net work when using the Split-Memory function. This cursor-controlled, single-digit, random or sequential access to any frequency and 50 Hz PLL accuracy improves contact agility.

**Matched to this Transceiver,** The HWA-5400-1 Power Supply/Speaker/Digital Clock provides a well-regulated, 13.8 volt source of DC power.

**As you build the 5400 kits circuit by circuit,** you'll learn their engineering details with hands-on understanding. The fully illustrated, step-by-step manual guides you all the way through assembly.

**For the price- and quality-conscious ham** who wants the greater pride, knowledge and performance only hand-crafted gear can provide, these kits offer the highest value for your hamshack dollar.

**With the knowledge** you gain to keep it performing at peak efficiency, the HW-5400 is the only rig to make real the dream of every amateur – a greater, more worthwhile return in pleasurable, year-to-year results on a premium investment. The new HW-5400. If you've got the time, *this is the Transceiver!*

Kit HW-5400, Transceiver, 24 lbs. . . . . Was \$749.95, NOW ONLY 499.95

Kit HWA-5400-1, Power Supply, Shpg. wt. 39 lbs. . . . . 199.95

Kit HWA-5400-3, Frequency Entry Keypad, Shpg. wt. 1 lb. . . . . 59.95

HWA-5400-2, Deluxe 2.1 kHz 4-Pole SSB Crystal Filter provides sharper skirt selectivity in the IF bandpass for ten total poles of filtering and optimum receiver performance. Shpg. wt. 1 lb. . . . . 59.95

## ② The SS-9000 Deluxe Synthesized HF Transceiver sets new standards in Amateur Radio Performance

HIGHEST TECHNOLOGY  
AT A MODEST COST

**\$1799<sup>00</sup>**

- Microprocessor-based circuitry controls the entire operation of the SS-9000 for easy, reliable performance
- Entirely solid-state, broadbanded in design – this Transceiver delivers 100 watts to a 50 ohm load
- A built-in Terminal Interface with an RS-232C I/O port allows instant and direct control of operating parameters via ASCII terminal, modem or computer
- Nine-band operability, including the newly-allocated 10, 18 and 24 MHz WARC bands and WWW at 15 MHz

**Brave new Transceiver:** The Heath SS-9000 is a quantum leap forward in terminal-controllable communications gear. Consummate in every engineering detail, its design evolved with the future of Amateur Radio in mind, and whose operators who are exploring the leading edge of convergent radio and computer technology. Streamlined for extraordinary results even without keyboard control, experienced amateurs will ultimately use it to establish new high standards for performance.

**Versatility has been designed into the SS-9000:** Operate LSB, USB, CW-wide, CW-medium, CW-narrow and RTTY. The SS-9000 Transceiver delivers an RF power output of 100 watts PEP minimum on SSB, and a 100 watts minimum on CW and RTTY. That's enough power to get your signals out there, and with low distortion rates. Excellent sensitivity and selectivity ensure that you'll be able to read his transmissions.

**Completely synthesized for absolute accuracy:** A crystal-controlled master oscillator provides exact reference to phase-lock the BFO and HFO for super stability and repeatability. Likewise, a single precise VFO is tied to each display through 256 bytes of CMOS Random Access Memory. This extended on-board storage capacity accepts three separate inputs per band (preserved with battery backup) for a total of 27 frequencies to recall and work at will.

**Two displays are better than one:** Smart operators know our unique dual digital display is more than a cosmetic friill. Simultaneous working readout gives serious contesters and DX hunters greater advantage in frequency-handling speed and agility. Pushbutton exchange with (and copy into) memory or opposite display permits instantaneous QSY. Place it under terminal control and you can enjoy a versatility in QSO capture that shatters all precedent.

**The Terminal Interface:** At the heart of your SS-9000, an "intelligent" controller circuit assists a serial interface in maintaining communications protocol between external requests, via front panel controls or terminal guidance, and the internal circuits on the synthesizer, T/R and audio circuit boards. It allows two-way control/monitor communication between the Transceiver and a video terminal (such as the H/Z-29 on page 100), hard copy ASCII teletypewriter, or computer (such as the HS-89 All-In-One on pg. 90 and 91).

**Total control, simple controls:** Commands are available to select, display and change the band, mode, all 27 operating and memory frequencies, passband shift, band scan and baud rates, lock and release one or all switches to their terminal-controlled or physical states and print *all* parameters. Keyboard command also allows you to place the SS-9000 in transmit or receive mode, assign and toggle T/R/Tr status on the dual readouts, and freely manipulate the three stored frequencies on each band, with full diagnostic error-prompting at the terminal. All keywords are short, and easy to learn.

**An SS-9000 can be connected to the Heathkit SA-1480 Remote Coax Switch.** When changing bands (either manually or via remote control, using the Motorized Band Switch) the proper antenna is selected *automatically*.

**Free software:** A 5¼" hard-sectored floppy diskette is supplied with every SS-9000. It demonstrates many ways of providing useful communication between a computer and the Transceiver, using graphics and video text to introduce you to its amazing control capabilities.

**The PS-9000 Power Supply/Speaker is a perfectly matched component:** As the SS-9000 powerplant, it provides 13.8 VDC for base operation with high temperature, short circuit and current surge protection. Each digital clock has independent 12- or 24-hour capability for local and UTC timekeeping.

**This is the HF Transceiver the world has been waiting for.** There is no other, no better system than the SS/PS-9000 team. See it at your nearby Heathkit Electronic Center. Try out the demonstration disk. Listen to what others say about its performance advantages. Then put it on the air from your club or QTH. *And take command of the world's most capable Transceiver!*

SS-9000, Assembled and tested, 35 lbs. . . . . 1799.00

PS-9000, Assembled and tested, 33 lbs. . . . . 199.00





**HWA-5400-1 SPECIFICATIONS** — **Line Voltage:** 120/240 VAC, 50/60 Hz. **Output Voltage:** 13.8 VDC at rated load. **Protection:** 20-ampere DC output fuse, 7- and 4-ampere slow blow fuses for 120 and 240 VAC primaries, respectively. **Output Current:** As required by Transceiver, up to 18 (20 peak) amperes during transmit. **DC Output Regulation:** 7% from receiver load to transmit load at 120 VAC primary; 4% additional with AC primary at 110-130 or 220-260 VAC. **Ripple:** 50 mV or less at rated load. **Duty Cycle:** 9 amperes DC continuous, 18 amperes at 50% (5 min. on, 5 off). **Speaker:** 4 ohms impedance, 300-3000 Hz response, 2 watts peak power. **Clock:** 4-digit blue fluorescent display in 12 or 24 hour format, synchronized to line frequency. **Cabinet Dimensions:** 4 1/4" H x 8 1/2" W x 14" D (10.8 x 21.6 x 35.6 cm). **Net Weight:** 26 lbs. (11.8 kg).

**HW-5400 SPECIFICATIONS** — **GENERAL:** Overall Band Coverage: 80 through 10 meters, 10 MHz WWV; WARC bands operational. **Frequency Coverage:** 3.450 - 4.050, 6.950 - 7.350, 10.000 - 10.200, 13.950 - 14.400, 18.018 - 18.218, 20.950 - 21.500, 24.840 - 25.040, 28.000 - 29.750 MHz. **Frequency Readout:** 2-digit vacuum fluorescent display with special symbols. **Readout Symbols:** — (Split), — (Out of band), L (LSB), U (USB), C (CW Wide), C (CW Narrow), M (Memory), T (Transmit). **Readout Accuracy:** To nearest 50 Hz. **Frequency Control:** Synthesized. **Synthesized Lock Indicators:** Display reads "PLL" and LEDs show which loops are unlocked. **Transmitter:** is disabled. **Dual Rate Frequency Tuning:** Slow = 50 Hz per step, 1.25 kHz per knob rotation. Fast = 1 kHz per step, 25 kHz per knob rotation. **Tuning Backlash:** None. **Split Frequency Operation:** Transmit from memory frequency, receive from displayed frequency. **Memory:** Stores two frequencies per band. **Frequency Stability:** Less than 50 PPM drift from turn on. **Modes:** SSB Normal and Reverse; CW, Wide or Narrow. **Operating Temperature:** 0° to 40°C. **Power Requirements:** 11 to 16 VDC, 120/240 VAC with optional AC power supply. All specifications referenced to 13.8 VDC. **RECEIVER:** Sensitivity: less than 0.35  $\mu$ V for 10 dB, S + N/N. **Selectivity:** With standard filter, 2.0 kHz minimum at 6 dB to 6 kHz maximum at 60 dB; with HWA-5400-2 optional filter, 1.8 kHz minimum at 6 dB; CW active audio filter, 250 Hz minimum at 6 dB centered at 700 Hz. **Overall Gain:** Less than 1  $\mu$ V for 0.25 watt audio output. **Audio Output:** 2 watts minimum into 4 ohms, less than 10% THD. **AGC:** Selectable Fast or Slow (no more than 8 dB audio change for a 100 dB or greater input signal range). **Intermodulation Distortion:** 70 dB minimum at 25 kHz. **Image Rejection:** 80 dB minimum. **If Rejection:** 100 dB minimum. **IF Shift Tuning:**  $\pm$  600 Hz in Receive only. **Internally Generated Spurious Noise:** All below 1.0  $\mu$ V. **Audio Hum and Noise:** Greater than 40 dB below maximum output. **Receiver Incremental Tuning:** = 350 Hz. **TRANSMITTER: RF Output:** High SSB, 100 watts PEP power minimum, except 80 watts on 10 meters. CW, 100 watts minimum, except 80 watts on 10 meters. **Duty Cycle:** Continuous SSB (voice), 50% receive-transmit ratio on CW, 5 min on 5 min off. **Load Impedance:** At least 90% rated power with less than 2:1 SWR. Protected against high VSWR. **Carrier Suppression:** = 50 dB minimum from a 100 watt, single-tone (1000 Hz). **Unwanted Sideband Suppression:** = 50 dB minimum from a 100 watt, single-tone (1000 Hz). **Spurious Radiation:** = 60 dB minimum, referenced to 100-watt output. **Third Order Distortion:** = 30 dB minimum from a 100 watt PEP two-tone output. **T/R Operation:** SSB = PTT or VOX, CW = full break-in (simplex only). **CW Sidetone:** 700 Hz to speaker or headphones. **Microphone Input:** High impedance (25k ohm) with -55 dBm rating. **Operation with External Linear Amplifier:** Linear relay, linear ALC rear panel connections. **Front Panel Meter:** Automatically-switched S-units in Receive, ALC in Transmit. **Available Accessories:** HWA-5400-1 AC Power Supply with 12/24-hour clock and speaker, HWA-5400-2 2.1 kHz SSB Filter, HWA-5400-3 Frequency Entry keypad kit. **Cabinet Dimensions:** 4 1/4" H x 11 1/4" W x 14" D (10.8 x 28.6 x 35.6 cm). **Weight:** 24 lbs. (10.9 kg).

**PS-9000 SPECIFICATIONS** — **GENERAL:** Output Voltage: 13.8 VDC, regulated (adjustable). **Maximum Output Current:** 25 amperes intermittent (50%, 10 minutes on-off) and 15 amperes continuous. **Power Requirements:** 110 to 130 VAC at 6 amperes or 220 to 260 VAC at 3 amperes, 50/60 Hz. **Regulation:** Less than 4% from no load to 25 amperes. **Ripple:** Less than 2% at 25 amperes. **Circuit Breaker:** 20 amperes for 110 to 130 VAC primary, 10 amperes for 220 to 260 VAC primary. **Current Limiting:** Over-current protected (set typically for 28 amperes). **Thermal Protection:** Automatic shutdown with over-temperature on the heat sink. **DUAL CLOCK:** Display: Two independent readouts with four digits and a colon. **Clock Format:** 12- or 24-hour display. **Accuracy:** Determined by the line frequency (no cumulative error). **Power Requirements:** 120 or 240 VAC, 50 or 60 Hz, 3.5 watts. **Cabinet Dimensions:** 6 1/8" H x 9 5/8" W x 13 3/4" D (15.6 x 24.4 x 34.9 cm). **Weight:** 33 lbs. (15 kg). Specifications apply when the Power Supply is used with the SS-9000.

**SS-9000 SPECIFICATIONS** — **GENERAL:** Tuning: 100 Hz per step, 5 kHz per knob rotation with pushbutton up and down scan (rate is internally adjustable). **Operation:** Split transmit/receive or transceive from either readout. **Synthesized Lock Indicators:** Visual indication when synthesizer is unlocked. **Transmitter is disabled.** **Frequency Coverage (MHz):** 1.8-2.0, 3.5-4.0, 7.0-7.3, 10.1-10.15, 14.0-14.350, 18.068-18.168, 21.0-21.450, 24.890-24.990, 28.0-29.7; WWV @ 15.0 (\*Extended Frequency Coverage). **Frequency Stability:** Less than 3 ppm from turn-on for first 15 minutes; Less than 3 ppm/hour drift after 15 minutes warmup; Less than 20 PPM drift from 0°C to +40°C (single crystal-controlled 10 MHz frequency standard). **Modes of Operation:** LSB, USB, CW-Wide, CW-Medium, CW-Narrow, RTTY. **Operating Temperature:** 0°C to +40°C. **Power Requirements:** 11 to 16 VDC with a nominal current maximum of 25 amps at 100 watts CW output. Receiver current is: 2 amps nominal. (\*All specifications are referenced to 13.8 VDC at 25°C ambient). **Rear Panel Connectors & Control:** Antenna (SO-239), Linear ALC In, Linear ALC Adjust, Low Power Enable, Spares (5); DC Power Input, CW Key Jack, External Transmit Audio In (2), Speaker Out, External Receiver Audio, T/R In, T/R Out, Mute, Mute (inverted), External Relay (linear), and RS-232 Interface. **TRANSMITTER: RF Power Output:** SSB = 100 watts PEP minimum, CW & RTTY = 100 watts minimum. **Load Impedance:** 50 ohms. **VSWR:** Stable at any VSWR and load impedance. Cutback circuitry guarantees at least 80% of rated power at any VSWR less than 2:1 and a minimum of 15 watts at any VSWR. **Carrier Suppression:** 50 dB down from a 100 watt, single-tone (1000 Hz) output. **Harmonic Radiation:** 50 dB down below 50 MHz, 65 dB down above 50 MHz. **Spurious Radiation:** 50 dB down, except at 17 meters (40 dB down). **Third Order Distortion:** 30 dB down from a 100 watt PEP two-tone output. **Unwanted Sideband Suppression:** 55 dB down from 100 watt, single-tone (1000 Hz) output. **T/R Operation:** SSB = PTT or VOX, CW = semi break-in. **CW Sidetone:** 750 Hz tone, adjustable level. **Microphone Input:** High impedance (25k ohm) with -55 dBm rating. **RECEIVER: Sensitivity:** 0.3  $\mu$ V for 10 dB (S + N)/N SSB on the 40 through 10 meter bands, 0.5  $\mu$ V on the 160 and 80 meter bands. **Selectivity:** 2.1 kHz at 6 dB down, 5 kHz at 60 dB down. CW filters, CWM = 400 Hz at 6 dB down and 1.5 kHz at 60 dB down. CWN = 200 Hz at 6 dB down and 1 kHz at 60 dB down. **Overall Gain:** Less than 1 microvolt for a 0.25 watt audio output. **Audio Output:** 1.5 watts into 4 ohms at less than 10% THD. **AGC:** Fast-attack with switch selectable Off, Fast and Slow decay. **Intermodulation Distortion (20 kHz spacing):** -70 dB (except -65 dB on the 17 and 12 meter bands). **Second IF Rejection:** -90 dB. **First IF Rejection:** -80 dB (except -60 dB on the 40 and 30 meter bands). **Internally Generated Spurious Signals:** All below 1  $\mu$ V equivalent. **RIT:** = 250 Hz. **Available Accessories:** PS-9000 AC Power Supply/Speaker with built-in dual 12/24-hour clock and Customer Service Manual. **Cabinet Dimensions:** 6 1/8" H x 14" W x 13 3/4" D (15.6 x 35.6 x 34.9 cm). **Weight:** 35 lbs. (15.9 kg).

## 1 The all-new HW-9 Deluxe QRP CW Transceiver

\$249<sup>95</sup>

- Broadband circuits cover CW in the 80, 40, 20 and 15 meter bands — expandable to 30, 17, 12 and 10 meter bands
- Front panel relative signal/power strength meter
- Continuously variable RF output, up to 4 watts
- Receiver Incremental Tuning for more versatility

Totally new design of the transmitter and receiver sections brings state-of-the-art performance to avid QRP operators, newcomers and old timers alike. Micro-electronic circuits reduce transceiver weight, while providing a level of performance and features unexpected at this price. Among these features are: broadband design, wide dynamic range, AGC, single conversion, product detector, active audio filter and RIT.

**Broadband design** eliminates the need to tune circuits within a band. The wide-band front-end uses a double-balanced mixer and 4-pole crystal filter to handle wide dynamic range signals with ease and eliminate the customary RF amplifier in the receiver section. AGC circuits provide superior performance.

**A single conversion** in the main signal path reduces spurious responses and maintains superior image rejection. Signals are pulled through the sensitive front-end with ease. A balanced product detector followed by an active audio filter provide outstanding performance. RIT (receiver incremental tuning) permits tuning the receiver 1 kHz above or below the transmit frequency.

**Rugged and lightweight** the HW-9 is ideal for portable operation. The Transceiver can be powered from batteries, a lighter socket, solar photovoltaic array or by 120 VAC 50/60 Hz with the PSA-9 Power Supply below.

Kit HW-9, Shpg. wt. 8 lbs. .... 249.95

Kit HWA-9, Accessory Band Pack, Shpg. wt. 1 lb. .... 39.95

Kit PSA-9, Accessory Power Supply, Shpg. wt. 4 lbs. .... 39.95

**HW-9 SPECIFICATIONS: TRANSMITTER:** — RF Output Power: 4 watts, except 3 watts on 10 meters. Transmitter Frequency Offset: App. 700 Hz. Antenna Load Impedance: At least 90% of rated power with less than 2:1 SWR. Protected against high SWR. Harmonic & Spurious Radiation: — 35 dB & 40 dB minimum, at rated output. T/R Operation: CW, full break-in. RECEIVER: — Sensitivity: 0.2  $\mu$ V for readable signal, 0.5  $\mu$ V or less for 10 dB S/N. Selectivity: Wide, 1 kHz max. @ 6 dB. Narrow, 250 Hz @ 6 dB. Dynamic Range: 85 dB. Image & IF Rejection: 60 dB, min. Audio Hum Noise: 60 dB. Audio Output: 1 watt into 8 $\Omega$ . GENERAL: — Frequency Stability: Less than 150 Hz/hour drift after 30-minute warmup. Power Requirement: 11-16 VDC, 12.6 specified. Dimensions: 4 1/2" H x 9 1/4" W x 8 1/2" D.

## 2 New SW-7800 General Coverage Receiver

\$349<sup>95</sup>

- Five-digit LED display provides 1 kHz frequency accuracy
- Lower Sideband, Upper Sideband, CW and AM (wide and narrow) modes of operation
- Excellent sensitivity and selectivity for clean signals
- Portable capability coupled with lower power consumption

The SW-7800 General Coverage Receiver covers 150 kHz through 30 MHz continuously in 30 overlapping, 1 MHz bands. Broadband front-end circuits eliminate the need to tune circuits within a band.

The design of the wide-band front-end stages eliminate the need for the customary RF amplifier. This results in a Receiver that can properly handle incoming signals within a wide dynamic range. An up-converting, double-conversion mixing design is used to provide excellent image rejection.

Plus other features you'll appreciate: AGC time-constant switch. Muting provision to allow operation with a transmitter. Local/DX switch to protect against overload from very strong local stations. Front panel jack for taping received material — unaffected by volume control setting. Telescoping whip antenna for local reception and portable operation. Only a VTVM is required for Receiver alignment.

Kit SW-7800, Shpg. wt 12 lbs. .... 349.95

High-performance trapped dipole antenna for use with any general coverage or shortwave receiver. Eight high-Q parallel-tuned traps reduce length and isolate various segments of the antenna for full coverage of the 11, 13, 16, 19, 25, 31, 41, 49 and 60 meter bands.

HDP-7800, Shpg. wt. 3 lbs. .... 59.95

**SW-7800 SPECIFICATIONS: GENERAL:** — Frequency Coverage: 150 kHz to 30 MHz in thirty 1 MHz ranges. Frequency Readout: LEDs, 5 digits. Readout Accuracy: Nearest 1 kHz. Frequency Control: Synthesized (PLL and LC VFO). Modes: USB, LSB, CW and AM (wide or narrow). Sensitivity: SSB CW, less than 35  $\mu$ V for 10 dB (S/N); AM, less than 2.5  $\mu$ V for 10 dB (S/N). Selectivity: SSB CW, 2.5 kHz min. at 6 dB. AM, 5.5 kHz min. at 6 dB. Selectivity Shape Factor: 1.5 at 6/50 dB. Image Rejection: 55 dB min. OTHER: Antenna: Built-in telescoping whip. Connection for 50 ohm, unbalanced, external antenna (S0239) and high-impedance wire. Audio Output: Internal speaker, jack for headphone or external speaker. Muting: External jack for use with transmitter. Recorder Output: Miniature phone jack. Power Requirements: 120 VAC, internally; 13.8 VDC at 4-ampere, externally. Dimensions: 11 1/2" W x 10 1/2" D x 4 5/8" H

32/AMATEUR RADIO

## 3 40-Channel Aircraft/Marine/Public Service Scanning Radio finds the action

\$249<sup>95</sup>

- The GR-740 scans 40 programmable channels across seven bands, at the touch of one or two buttons
- Microprocessor control and direct keyboard tuning in all seven VHF/UHF bands
- Only kit scanner to cover aircraft, marine and public service bands, all in one unit

Seven band UHF/VHF coverage puts a wide variety of radio services at your fingertips. Receive hams, police, government, U.S. weather bureau, forestry, conservation, mobile telephones, press, fire, aircraft, marine, utility services, business and industrial communications, hospitals, ambulances, highway and special emergencies, diaster relief, school buses, taxicabs, railroads, trucks, riot/narcotic squads and remote paging (if these services are used in your area). Scan 40 preselected frequencies or search between two frequencies on a band. Automatic squelch is factory-set for optimum reception; includes operator override.

**A versatile 24-key keyboard** is divided into program and operation sections for rapid and easy use. Program any frequency within the seven bands covered into the two banks of 20 channels each. Operate by setting and controlling automatic scan and manual select, bank select, direct channel access, service search, search and scan speeds, search start/hold, priority channel, upper/lower frequency search limits and program and delay or lockout of any frequency. Direct channel access permits instant tuning of a channel without stepping through interim channels. Or press one button to step through an entire 20-channel bank.

**Microprocessor control** also adds other convenient features. Some of these are: priority channel sampling every two seconds, with interrupt when a signal is detected; patented track tuning, for automatic, optimum reception across the full band without adjustment; full-featured display, to let you know how you've programmed your scanner and what it is doing; scan delay, for channels where replies are expected; and there is much more.

**Factory assembled, aligned and tested circuit boards** ensure optimum performance. Only minor adjustments are made when assembling this kit.

Kit GR-740, Shpg. wt. 8 lbs. .... 249.95

**GR-740 SPECIFICATIONS: Frequency Coverage:** Low band (30-50 MHz), aircraft (118-136 MHz), 2-meter Amateur (144-148 MHz), High band (148-174 MHz), 70 cm Amateur (421-450 MHz), UHF band (450-470 MHz), UHF-T band (470.0125-512.45 MHz). RF Sensitivity: 0.4  $\mu$ V (30-50, 144-174 MHz) and 0.8  $\mu$ V (421-512 MHz),  $\pm$  5 kHz deviation 12 dB SINAD; Aircraft, 1  $\mu$ V for 10 dB S/N, 60% modulation. IF Selectivity: 55 dB @ 25 kHz. Scan/Search Speed: 5- or 15-channels per second. Audio Output: 0.75 watt RMS into 8-ohm load, 10% THD. Front Panel: Volume (on/off), squelch, display, keyboard, speaker, position A/B. Rear Panel: 13.8 VDC input, antenna connector, speaker connector, 120 VAC receptacle. Antenna: Telescoping, 50- to 70-ohm external connector. Power Requirement: 120 VAC, 50/60 Hz @ 20 watts; or 13.8 VDC @ 9 watts. Dimensions: 3 1/2" H x 10 5/8" W x 8" D.

## Matching Wattmeter and Antenna Tuner for the dedicated QRP operator

### 4 HF/VHF Wattmeter with 3:1 SWR bridge

- Wire for three different frequency ranges
- Compact, reliable, and above all, affordable

Put your best QRP signal on the air with confidence and keep your low-watt station at peak power efficiency with the responsive HM-9 Wattmeter. It simplifies continuous metering of exciter or amplified output level and gives you a quick, exact SWR readout to fine-tune your antenna system.

An exclusive Heathkit option lets you wire the HM-9 for monitoring in three different ranges: 1.8-30, 50-54 or 144-148 MHz. QRP fans will love it. Active hams on the 2- and 6-meter VHF bands can use it to measure output of their barefoot and boosted HTs, mobile or base transceivers.

Kit HM-9, Shpg. wt. 3 lbs. .... 49.95

### 5 50-Watt Antenna Tuner with 4:1 balun

- Designed for repeated dependability using the finest-quality components

The HFT-9 provides an exact, 100% transmatch to a wide range of output impedances, with a built-in 4:1 ferrite balun. Connectors for coaxial feed, balanced line and long-wire antennas.

A large 12-tap, air-wound inductor with silver-plated wire and tap switch gives you an almost unlimited matching capability between 1.8 and 30 MHz. Continuously variable transmitter/antenna controls make optimum adjustments easy.

Kit HFT-9, Shpg. wt. 3 lbs. .... 54.95

SAVER! QRS-9, HM/HFT-9 Pair, 14 lbs. .... 99.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.



## ① HD-1986 Microlizer tailors your microphone for optimum voice clarity and maximum talk-power on SSB

- Obtain maximum SSB output with clearer sounding signal
- Variable high and low response and audio gain permit adjusting for differences between microphone and transmitter
- Tailor your voice for maximum clarity when transmitting
- Battery-operated with automatic battery test circuit
- Easy-to-build Amateur Radio starter kit

One of the greatest needs in amateur radio is to improve the quality of transmitted speech. In the shack, a poor microphone or just the pitch of a speaker's voice can make SSB transmissions difficult to understand. And in mobile operation, peaks at the lower end of the voice range are common and frequently obscure clarity.

The Heathkit HD-1986 Microlizer lets you optimize the clarity of your voice transmissions and get a better match between your microphone and transceiver. Make sure you're heard — clearly. This microphone equalizer fits in series with your microphone and transceiver, using a standard 4-pin microphone jack and  $\frac{1}{4}$ " phone output jack. Continuously variable high and low frequency controls provide a  $\pm 12$  dB (boost or cut) at 490 Hz and 2800 Hz. Increase or decrease over-all gain of the microphone signal you feed to your transceiver for more efficient and cleaner operation.

**Battery power** eliminates the need of yet another AC outlet. When the Microlizer is turned on, the front panel LED will light briefly to let you know the battery is still good. Turn the power switch to off, and the Microlizer is bypassed to provide a direct connection between your microphone and transceiver.

**Low-profile design and small size** make it easy to add the HD-1986 Microlizer to your present ham gear. Attractive, charcoal styling blends in with almost any equipment. The Microlizer is an economical addition to your shack that will provide dramatic improvement in your transmitted audio.

**One-evening assembly:** Heathkit's comprehensive instruction manual leads you every step of the way through assembly. Requires a 9-volt battery (not included).

**Kit HD-1986**, Shpg. wt. 2 lbs. .... 39.95

**HD-1986 SPECIFICATIONS:** Adjustable Microphone Gain: Low Frequency Response:  $-12$  dB at 490 Hz; High Frequency Response:  $-12$  dB at 2800 Hz; Input Impedance: 100 k nominal; Maximum Input Level: 500 mV RMS; Frequency Response: 200 Hz to 10 kHz; Distortion: 0.5% or less; Power Requirement: 9-volt transistor battery; Dimensions: 5 $\frac{3}{4}$ " W x 2" H x 4 $\frac{1}{4}$ " D.

## ② SA-2060A Deluxe Antenna Tuner with dual wattmeter/SWR bridge matches 1.8-30 MHz

- Covers 160 through 10 meter bands with continuous tuning
- Eliminates the loss of precious, mismatched power
- Select coaxial antenna, long-wire feed or bypass
- Constructed to minimize RF loss at high frequencies
- Exciting and enjoyable three-evening project

**Touchy solid-states finals can rob you of precious bandwidth.** The SA-2060A Deluxe Antenna Tuner can solve that problem. The built-in wattmeter/SWR bridge has an accuracy of  $\pm 5\%$  forward accuracy. Bypass for your tri-band beam or dummy load, or select either of two coax outputs. Connect unbalanced feedlines or long wire antennas — a built-in 4:1 balun lets you use balanced feedlines. A convenient front panel counter permits quickly setting the continuously-variable inductor to previously calibrated frequencies. The SA-2060A Tuner will match your antenna to any frequency in the 160-10 meter HF spectrum, including MARS frequencies and the recently approved new band allocations.

**Dual wattmeters read both forward and reflected power** simultaneously for more efficient low band operation. Measures output up to 200/2000 watts in the forward direction and up to 50/500 watts reflected. Silver-plated straps and roller contact assembly minimize RF loss at high frequency operation. Large feed-through insulators withstand high-voltage RF. This Tuner can handle power inputs of up to 2000 watts PEP on SSB and 1000 watts CW.

**This easy-to-build kit** is an enjoyable three-evening project that will help you get maximum range from each watt. And easy-to-follow, step-by-step Heathkit instructions guide you from unpacking until your SA-2060A is on the air.

**Kit SA-2060A**, Shpg. wt. 20 lbs. .... 249.95

**HDZ-63-3**, 3-ft. RG-8/U jumper with PL-259 connectors, 1 lb. .... 4.95

**SA-2060A SPECIFICATIONS:** Frequency Coverage: Continuous coverage, 1.8 to 30 MHz; Input Impedance: 50  $\Omega$  at match; Impedance Transformation: 4:1 balun; Output Impedance: Wide range; Insertion SWR: Less than 1.1:1; Power Input Capacity: Full legal limit; Dimensions: 5 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{7}{8}$ " D.

## ③ Heathkit's SA-2500, the world's only automatic antenna tuner with 18 inductor presets

- Continuously variable roller inductor optimizes efficiency
- Preset the roller inductor for two frequencies on each of nine bands, from 160 to 10-meters
- Tuner automatically adjusts presets for proper match

**Preset the roller inductor for 18 different frequencies** — a high and low on each of the nine bands. In the Auto mode, just select the band and the high or low position; the Auto-Tune Antenna Tuner will set the roller inductor to the pre-selected value and adjust the transmitter and antenna capacitors.

**Remote operation** lets you automatically tune selected frequencies to the proper SWR, using only your transmitter band switches if your transmitter is equipped for remote operation.

**Manual tuning is made easy** with three front panel lever switches and dual wattmeters. The wattmeters read forward and reflected average power and SWR in two ranges. An auto-range circuit automatically switches the wattmeters.

**Effectively tune and match** unbalanced feed lines and single-wire antennas at the full legal power limit of your station. Add the 4:1 Balun Accessory below for use with balanced ladder line antennas. Use the front panel coax switch to select from three different, permanently connected antennas and bypass. Changing between antennas couldn't be easier.

**Heath's Auto-Tune Antenna Tuner** installs directly into the transmission line to measure power on all frequencies between 1.8 and 30 MHz — 200/2000 watts in the forward direction and 50/500 watts reflected. SWR readings on the reflected meter provide direct readings from 1:1 to 3:1.

**High efficiency operation is ensured** whether you tune automatically or manually. Silver-plated straps and roller contact assembly minimize losses at high frequencies. And large feed-through insulators withstand high-voltage RF.

**Front panel indicators** let you know Tuner status: when the roller inductor, transmitter and antenna capacitors are being adjusted, the number of active roller inductor turns, high or low meter range and when the tuned SWR exceeds the selected ratio (an audible warning is also available).

**Now is the time to update your station.** Heath's SA-2500 Auto-Tune Antenna Tuner gives you continuous band coverage with 18 inductor presets for automatic tuning, and dual wattmeters make optimum tuning of other frequencies a snap. The active turns indicator makes it easy to reset the roller inductor for any frequency. Select from three different antennas and bypass at the turn of a switch.

**Kit SA-2500**, Shpg. wt. 26 lbs. .... 599.95

**SA-2500-1**, 4:1 Balun Accessory, Shpg. wt. 2 lbs. .... 39.95

**SA-2500 SPECIFICATIONS:** Frequency Range: 1.8 to 30 MHz; Input Power Capability: 2000 watts SSB; 1000 watts CW; Input Impedance: 50 $\Omega$ ; Output Impedance: Wide range; Impedance Transformation: Optional 4:1 Balun; Meter Functions: Forward, reflected, average power and SWR; Meter Ranges: Forward, 200/2000 watts; reflected, 50/500 watts and 1:1 to 3:1 SWR; Wattmeter accuracy: 200, 2000 watts forward and 500 watts reflected,  $\pm 5\%$  average; 50 watts reflected,  $\pm 7.5\%$  average; Auto-range Wattmeter: User selected; Insertion SWR: Less than 1.1:1; Automatic Tune Requirements: Cycle time, about 15 seconds; input power level, 20 watts min. for SWR Set; VWSR, user selected; Power: 120 VAC 50/60 Hz @ .25 amps max., internal; 12 VDC at 1 amp. max., externally; Dimensions: 14 $\frac{1}{2}$ " W x 20" D x 6 $\frac{3}{4}$ " H; Net Weight: 19 lbs., including optional balun.

## ④ HL-2200 2 kW Linear Amplifier combines Heath's trusted reputation with many convenience features

- Low-price per watt in a 2 kilowatt Linear Amplifier
- Standby switch lets you go barefoot or perform tune-ups

**More of what you want:** When it comes to comparison, the HL-2200 has the rugged dependability, features, engineering sophistication and cost-effective performance that amateurs expect from a linear amplifier.

**More power in the pile-ups:** A pair of world-famous 3-500Z's run at 2000 watts of QRM-bursting PEP on sideband and load to 1 kW for CW and RTTY. The broadband, pre-tuned pi input yields maximum efficiency with extremely low distortion over the 80-15 meter spectrum. Just 100 watts of exciter will drive the Amplifier to full output — with the kind of signal that catches the new DX, gets priority traffic through and your call sign heard clearly, year after year.

**More savings for other shack gear:** When you build the HL-2200, you save money for other equipment, have kitbuilding pride and a linear that will last for years.

**Don't waste time losing contacts!** Order the HL-2200 today — this Linear Amplifier will give you all the power you need for professional operation.

**Kit HL-2200**, Shpg. wt. 68 lbs. .... 799.95

**HDZ-63-3**, 3-ft. RG-8/U jumper with PL-259 connectors, 1 lb. .... 4.95



1 **NEW**



NEW



3

2



5



4



6



**5 μMatic Memory Keyer started a revolution in CW**

- Adds programmable excellence to all your CW
- Ten variable length buffers for 240 characters of text
- Four-level random practice mode has 6,400 different 3,000-character code copy training sessions

Patented "command strings" let you store text in the buffers, select the speed, weight, spacing or message repeat count for each one, and link them together in any sequence you desire. A special editing feature lets you recover from errors. Enter text at whatever speed and weight are comfortable to you, and send them with any other setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents, last-selected speed, spacing, weight and repeat count when the Keyer is without power.

Kit SA-5010, Shpg. wt. 3 lbs. .... 99.95  
 PS-5012, 120 VAC Power Adapter Cube, 1 lb. .... 15.95

**SA-5010 SPECIFICATIONS:** Speed Range: 1 to 99 wpm. Character/Word Spacing: Less than or equal to speed setting. Number of Buffers: 1 to 10. May be used to store text or commands. Buffer Size: 240 characters plus commands, total. Weighting: Normal plus 5 light and 5 heavy settings. Auto Message Repeat: 0 to 9 (sent 1 to 10 times). Keyer Output: Solid state: - 250 volts @ 100 mA; - 200 volts @ 40 mA. Memory Backup: Three 1.5-volt alkaline batteries (included) - 1 year typical life (No battery drain unless Keyer is removed from AC power source). Sidetone: Approximately 300 to 1500 Hz, adjustable. Power Requirements: External transformer (optional) or 11 to 16 VDC @ 200 mA. Dimensions (excluding paddles): 1 5/8" H x 4 1/8" W x 6" D.

**6 Electronic Keyer offers a choice of speed ranges**

Select between two variable ranges: 10-35 or 10-60 wpm when you build the kit. Travel and tension of the paddles are adjustable. True iambic operation ensures accurate and precise CW signals. This inexpensive keyer has features you'll appreciate: adjustable volume and sidetone frequency, built-in speaker, weighted cabinet, removable line cord, headphone jack, 96" of shielded cable, connection for an external keyer, tune-up 'hold' switch, receiver audio input and 'power on' lamp. Three phono and one phone plug are supplied with kit. 3" H x 5" W x 7 3/8" D.

Kit HD-1410, Shpg. wt. 4 lbs. .... 59.95

**7 HD-1418 multi-mode SSB/CW/TTY Active Audio Filter makes the tough ones easy to copy**

Twelve total poles of filtering can be combined to work as SSB & Notch, CW, CW2, SSB & Peak, RTTY and fixed configurations with razor-sharp skirts. Solve such problems as partially overlapped sideband signals, overmodulation splatter, close-packed CW stations, full RTTY reception through heavy interference, heterodyne whistle and noise that other filters find impossible to conquer. Versatile power requirements make this Filter usable almost anywhere. Just supply 7-13.5 volts AC or 9-18 volts DC.

Kit HD-1418, Shpg. wt. 3 lbs. .... 129.95  
 PS-5012 Power Cube, For 120 VAC operation, Shpg. wt. 1 lb. .... 15.95

# Reliable and money-saving accessories to improve the performance of your radio station

## 1 New Heathkit HD-1481 Remote Coax Switch

**\$89<sup>95</sup>**

- Remotely controlled coax switch uses only a single feedline to operate up to four antennas

Conveniently control the switching of antennas from inside your station with the HD-1481 Remote Coax Switch. Two units, a remote and indoor control unit, interconnect through a single coaxial cable to eliminate the need for any multi-conductor control cable. The remote unit, a tower- or mast-mounted RF remote coaxial switch, needs only one feedline to operate up to four antennas. It is rain tight and easily mounts with a single clamp.

The control unit contains the power supply and provides the switching signals to the remote. A front-panel switch selects the desired antenna. The HD-1481 can handle 2000 watts PEP and has a VSWR of 1.15:1 or less. It has an impedance of 50 to 70 ohms and has a loss at 54 MHz of less than 0.2 dB. The control unit operates from 120 VAC at 50/60 Hz and measures 2½" H x 5½" W x 7½" D. The remote measures 7¾" H x 8¾" W x 4½" D.

Kit HD-1481, Shpg. wt. 5 lbs. .... 89.95

## 2 Dual HF Wattmeter measures up to 2000W PEP

**\$99<sup>95</sup>**

- Reads PEP or average power from 1.8 to 30 MHz
- Has factory assembled and calibrated sensor
- An enjoyable and easy-to-build two-evening kit

Installed in your transmission line, the HM-2140A monitors both forward and reflected power simultaneously. A second scale on the reflected meter reads SWR directly from 1:1 to 3:1 for fast, easy measurement of your outgoing signal.

Measure your transmitter's output up to 200/2000 watts PEP ( $\pm 5\%$ ) in the forward direction, and up to 50/500 watts reflected. Pushbutton-switched high and low power ranges plus a factory-tested sensor ensure precise readings every time. Another dual-position switch enables you to read PEP or Average power.

The HM-2140A can be operated on a 9-volt battery (not included) or use 120 VAC with the PS-2350 Battery Eliminator. The precision RF sensor can be mounted in the cabinet or used up to four feet away.

Kit HM-2140A, Shpg. wt. 5 lbs. .... 99.95

PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. .... 7.95

HDX-63-3, 3 ft. RG-8/U cable with PL-259 connectors, 1 lb. .... 4.95

## 3 Highly accurate Dip Meter covers 1.6 to 250 MHz

**\$79<sup>95</sup>**

- Injection and absorption modes let you measure energized and de-energized circuits, also acts as signal injector

The multi-purpose HD-1250 has dozens of practical uses in your lab and hamshack. It can aid in finding the approximate resonant and operating frequency of either energized or de-energized circuits and help you adjust traps, detect parasitic oscillations and harmonics, measure unknown Q/L/C values, locate sources and frequencies of RF energy, or functions as a signal generator, relative field strength meter, or receiver alignment tool.

For a delicate instrument of this type, only exceptional-grade components are used. In the balanced Colpitts RF oscillator, silver mica coupling capacitors provide improved frequency stability. The detector uses a broadband MOSFET amplifier, hot-carrier diodes and a Q-multiplier for improved sensitivity and a better dip action. A responsive 150  $\mu$ A meter movement yields sharper resonance indications. Includes a headphone jack for positive modulation monitoring. Operates on one 9-volt battery (not included) and goes anywhere you do.

Kit HD-1250, Shpg. wt. 4 lbs. .... 79.95

**HD-1250 SPECIFICATIONS:** Frequency Range: 1.6 to 250 MHz Controls: Tuning capacitor, oscillator level control, and ON/OFF switch. Meter Movement: 150 microamperes Solid-State Circuits: 1 NPN transistor oscillator, 1 dual-gate MOSFET amplifier and two diffused silicon hot carrier diode detectors Power Source: 9-volt NEDA type 1604 battery Net Weight: (Meter, case and coils) 2 lbs. Dimensions: 2" H x 2½" W x 5" D

## 4 Heath 'Cantenna' load resistor dissipates RF

This important device has improved specifications, better components and our famous low, build-it-yourself kit price. The HN-31A handles 1 kilowatt of RF energy (2 kW PEP) with VSWRs always less than 1.5:1 for frequencies up to 450 MHz. Stabilized ceramic resistor element provides ideal 50 ohm noninductive load to your setup. Power derating curves and spring-loaded lid vent help maintain

a high safety factor. The Cantenna eliminates unnecessary QRM during tune-up and minimizes mistakes while performing 'hot' gear maintenance or alignment. Holds one gallon of transformer oil (not supplied).

Kit HN-31A, Shpg. wt. 3 lbs. .... 24.95

## 5 Low-cost, quieting Mura 8-ohm headphones

Make copying traffic a lot easier with the Mura SP-104 Headphones featuring a wide 40 to 15,000 Hz frequency range, 2¼" dynamic speakers for clear comprehension, individual volume controls, and isolating ear cups. Headphones have 10-foot coiled cord with plug.

HDP-1396, Assembled, Shpg. wt. 2 lbs. .... 19.95

## 6 Lightweight ProCom 300 headset frees hands

High-quality performance in a featherweight headset with exceptional audio performance. Receiver has a 100 to 3500 Hz frequency response while the microphone has a frequency response of 100 to 8000 Hz. Includes ON/OFF VOX. Aviation-style, single-side eartip receiver is ideal for listening to environmental sounds while monitoring the radio.

HDP-1497, Assembled, Shpg. wt. 1 lb. .... 99.95

## 7 Low-noise professional ProCom 200 headset

Fully adjustable Telex headset for the amateur and professional offers almost hands-free operation. Boom-mounted, pivotal electret microphone has selectable high or low impedance. Both receiver and microphone have a frequency response of 100 to 8000 Hz. Phone cord has in-line ON/OFF VOX control.

HDP-1496, Assembled, Shpg. wt. 2 lb. .... 99.95

## 8 CONTROLLED MAGNETIC Fixed Station Microphone

- High-output, durable, totally reliable CONTROLLED MAGNETIC cartridge encased in black, high-impact casing

Heath's model HDP-444 Microphone was designed by Shure with amateur radio features. The Microphone has dual selectable output impedance and a frequency response tailored for speech intelligibility. An easily accessible slide switch permits selection of high or low impedance. A second slide switch permits choosing between Normal and VOX operation. The push-to-talk switch bar allows for momentary or locked operation. A three-conductor plus shielded cable easily connects to any ham rig. The coiled cord ensures a neat, orderly and uncluttered appearance next to your rig. The high-impact case is virtually indestructible, comfortable to hold in any temperature or humidity, and will not rust or corrode. The Microphone is height adjustable for operator comfort during transmitting.

HDP-444, Shpg. wt. 3 lbs. .... 59.95

## 9 End your TVI problems with this low-pass filter

Solve emissive RF interference problems with this fine low-pass Barker & Williamson filter designed for use in the 160 to 10 meter frequency range. It provides a minimum of 70 dB of attenuation. Cut-off frequency is 34 MHz and has less than a 0.3 dB insertion loss. It has a 50 ohm impedance and rated for legal power.

HDP-3700, Assembled, Shpg. wt. 2 lbs. .... 34.95

HDX-63-3, 3-foot RG-8/U with PL-259 connectors, Shpg. wt. 1 lb. .... 4.95

## 10 Twelve-socket power Outlet Strip has many uses

Handy HD-1274 Outlet Strip multiplies convenience by providing extra electrical outlets for your equipment in a hamshack, workshop, office, basement or garage. It has eleven fused 3-hole outlets that can be switched on and off. It also has one unswitched outlet that can be used for a clock or equipment equipped with memory saver circuits. The Outlet Strip is rated at a 10-amp maximum load and has a 12-foot cord. The HD-1274 is an excellent way to extend 120 VAC to a large group of equipment in one location.

Kit HD-1274, Shpg. wt. 4 lbs. .... 24.95

## 11 Long-wire SWL Antenna for the serious listener

This 75-foot SWL antenna really helps you pull in distant stations. Copper line antenna has a 30' lead-in with all insulators and hardware for easy setup.

GRA-72, Shpg. wt. 2 lbs. .... 9.95





1

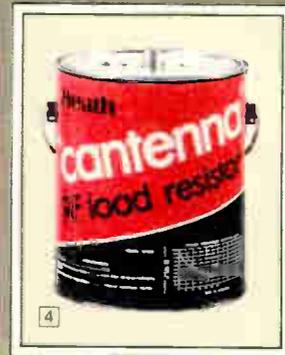
**HD-1481 Remote Coax Switch** operates up to four antennas



2



3



4



**12 Coaxial Switch for routing up to 4 antennas**

The HD-1234 is designed to switch one RF source or receiver to any one of four antennas, or RF loads while grounding the unused connectors. It has a power handling capability of 1000 watts (2 kW PEP) with a maximum 1.1:1 SWR to 250 MHz. A mounting bracket is included that allows you to conveniently hang the Switch on the side of an equipment enclosure, onto a desk, or on any wall.

Kit HD-1234, Shpg. wt. 1 lb. .... 19.95

**13 Mobile Antenna for the 146 to 148 MHz range**

Cushcraft AMS-147 5/8-wave 2-meter mount with 90 lb. grip-tight magnet. Boasts 3 db gain for more range. Stainless steel whip with thumb-lock adjustment and chrome-plated base. Includes PL-259 connector and coax.

HDP-1472, Shpg. wt. 3 lbs. .... 37.95

**14 80 to 10 meter Cushcraft AV5 has long DX reach**

Vertically-polarized omni-directional antenna is designed to provide complete CW and SSB coverage on 80-40-20-15-10 meters. Its especially effective high-Q stabilized traps give wider bandwidth. SWR is 1.5:1 or less at resonance on each band. Self-supporting height is 25 ft. (7.4 m). Built-in coax connector accepts PL-259 on your station feedline. Antenna handles 2000 watts PEP.

HDP-1473, Shpg. wt. 10 lbs. .... 119.95

**15 Specially designed short wave listening antenna**

Completely assembled and ready to use, the heavy 14-gauge HDP-7800 antenna covers 60-49-41-31-25-19-16-13-11 meters. A high-performance trapped dipole with an overall length less than 43 feet.

HDP-7800, Shpg. wt. 3 lbs. .... 59.95

## 1 UltraPro CW Keyboard sends letter-perfect code and offers the versatility of easy programming

**\$199<sup>95</sup>**

- The most intelligent microprocessor-based CW keyboard, with more functions and user-flexibility than any other
- Four-level random practice mode allows 1000 different and repeatable, 3000-character training sessions with unique 'copy' mode to teach typewriter proficiency "hands on"

The HD-8999 UltraPro CW Keyboard represents the long-awaited third generation of code computers. It contains a host of specialized prompting features and a simplified operating system that minimize key errors and increase the ease and accuracy of high-speed sending. Exclusive component-level diagnostic capability and two-key rollover (to keep up with proficient typists) make it the most advanced and first truly 'friendly' keyer. It uses a customized microprocessor and the latest in comfortable, 'human engineered' keyboard designs as a foundation for the most productive CW operating aid you can own. Status indicators, a non-volatile CMOS RAM (batteries included) and power-up diagnostics combine in what 73 Magazine called "a compact gem of a keyboard."

Kit HD-8999, Shpg. wt. 7 lbs. .... Was \$249.95 NOW ONLY 199.95

**HD-8999 SPECIFICATIONS:** Key Nomenclature: 1 through 0 and A through Z in a standard QWERTY format SET, WPM, PRAC/SPC'G, PROT WT, PREV'SN, LOAD, STOP, TONE/CLICK, TUNE, DELETE WORD, DELETE, HOLD, SHIFT (two), AR, SK, BT, ES, KN, AS BK, DE and CQ. Punctuation: ? " ' ( ) , comma and period. **Speed Range:** 1-99 WPM. **Spacing:** less than or equal to speed. **Weighting:** Normal plus five 'light' and five 'heavy' settings. **Serial Number:** 1-9999, automatically generated. **Text Buffers:** 495 characters, total capacity. Individual buffers may be protected. **Keyer Output:** - 25 V @ 100 mA; - 200 V @ 40 mA. **Memory Backup:** Three mini-cells (included) with typical 1 year life. **Sidetone:** 300-1500 Hz adjustable. **Indicators:** 4-digit display plus SET, MSG, LOAD, PRAC and type-ahead buffer status LEDs. **Operating Range:** 32-140 F (0-40 C) **Power Requirements:** 7.5 to 11 VAC or 11 to 16 VDC, 450 mA max. Input for PS-5012 120 VAC Adapter (on page 35). **Dimensions:** 2" x 15 1/2" x 4" D

## 2 Get in on the fun of the RTTY revolution with the HD-3030 RTTY Terminal Interface

**\$249<sup>95</sup>**

- A "universal" terminal interface - works with most popular personal and home computers
- Built-in supply for noncomputer 20/60 mA TTY operation

The features you need most for enjoyable copy: Weak or distorted signals are no problem. Six poles of active preselect filtering deliver strong, readable tones that print clearly, even in a crowded band. Optional filters for 425 and 850 Hz audio shifts enable even more performance. With separate RTTY and CW demodulator boards, 170 Hz standard shift, crystal-controlled AFSK generator, capability for full FSK with equipped transmitters, true mark/space detection, oscilloscope tuning outputs, front panel LED bargraph tuning, data and status indicators, the

## Let Heath's Amateur Radio Courses put you on the air, at the level you want

### 4 Heathkit's Novice Course will get you on the air

**\$39<sup>95</sup>**

- Communicate with nearly a million other hams all around the world...right from your own home or car...transmitting and receiving CW on a variety of frequencies
- Heath guarantees that you will pass the Novice FCC test - or we will refund the full purchase price of the course

Join the expanding world of Amateur Radio. Where else do you have the opportunity to communicate one-on-one with such a diversity of people - this hobby spans all professions, in all countries. You'll probably get to know most of the hams in your area on a personal level, and you'll be able to participate in Novice field-day competitions, take part in Novice traffic nets to relay third-party messages and in case of an emergency you can provide a public service.

Long a leader in Amateur Radio technology, Heath has prepared a self-instruction program that's guaranteed to help you earn a Novice ticket. Everything you need to get your license and become a part of a privileged fraternity is in this comprehensive, well organized study package, including information on how you apply to take the latest FCC Novice exam. Also, it provides helpful guidelines for setting up and operating a good station when your license and personal call sign arrive.

The course is organized in nine separate learning modules corresponding to the subject areas you'll find covered in the Novice exam. Each subject is presented in a clear, step-by-step manner for upward progress at your personal learning rate.

At the end of each module, multiple-choice questions help you review and check your understanding and retention of the material. After Module 9, three practice exams and a final styled after the new FCC Novice examination impart the experience and test-taking confidence you want to pass the first time with flying colors.

The Course includes two audio cassette tapes full of important knowledge. The 38/AMATEUR RADIO

HD-3030 Terminal Interface has no equal in quality or function for the price. TTL and RS-232C I/O compatibility, plus a built-in loop supply make it a great buy and regardless of the rig or printer you prefer!

Kit HD-3030, Shpg. wt. 8 lbs. .... 249.95

Universal 425/850 Hz Filter Circuit Board Accessory. Provides frequency shift of 425 or 850 Hz (builder's option). -Plugs directly into HD-3030 motherboard.

Kit HDA-3030-2, Shpg. wt. 1 lb. .... 14.95

170 Hz Preselector Filter Circuit Board Accessory. Dramatically improves performance of standard shift tones by removing strong adjacent channel signals.

Kit HDA-3030-4, Shpg. wt. 1 lb. .... 19.95

**HD-3030 SPECIFICATIONS:** Displays: LEDs for Power, Send, RDA, Mark, Space. Ten-segment bargraph tuning indicator. **PUSHBUTTONS:** Power, Operate/Standby, Send/Receive, CW/RTTY, Send/Receive (Reverse Shift), Preselect Bypass, and 170 Hz, 425 Hz, 850 Hz (independent and interlockable audio frequency shifts). **REAR PANEL:** Loop jack input (100 VDC @ 20 or 60 mA); 25-pin DB-25 I/O connector for TTL and RS-232 computers, terminals or printers. 120 VAC 340 W auxiliary power outlet. **groundpost:** line cord. **CW DEMODULATOR:** Center Frequency: 750 Hz - 3 dB Bandwidth: 70 Hz - 20 dB Bandwidth: 240 Hz. **Dimensions:** 3" H x 7 1/2" W x 10" D (7 6 x 19 x 25.4 cm).

**SUPER CW Software** for Heath H-8 and H/Z-89 computers. Has auto CW-ID, user-configurable parameters, type-ahead buffer. Requires H-DOS 1.5 or above.

HDP-1010, Shpg. wt. 2 lbs. .... 49.95

**SUPER RTTY Software** for Heath H-8 and H/Z-89 computers. ASCII/Baudot system uses full disk/graphics capabilities. Requires H-DOS 1.5 and 24K memory.

HDP-1020, Shpg. wt. 2 lbs. .... 49.95

### 3 Heathkit's HD-3006 Crossfire Tuning Indicator

- Quick and easy tuning of RTTY transmissions, without the need of an oscilloscope or costly equipment

The Heathkit HD-3006 Crossfire is a visual tuning indicator for radioteletype (RTTY) communication. Sixteen LEDs make up the display. Eight vertical LEDs identify mark signal strength; eight horizontal LEDs do the same for space signal strength. Just tune your receiver for maximum vertical and horizontal display - you'll get a strong signal for your computer or printer.

The Crossfire has a wide voltage range and is compatible with almost any interface/terminal unit that has oscilloscope outputs for tuning. Put your scope back on the workbench.

Kit HD-3006, Shpg. wt. 3 lbs. .... 59.95

**HD-3006 SPECIFICATIONS:** Display: Two B-LED bars. Each bar requires approximately 14 dB no-signal-to-signal voltage ratio (5:1) for full use of the bars. **Input Level:** Threshold, 0.3 volts RMS on AC and 0.5 volts DC. Maximum, 15 volts RMS on AC and 15 volts DC. **Power Supply:** B-16 volts AC/DC power cube (included with kit). **Dimensions:** 3-1/2" H x 5" W x 4" D.

first is an introduction to Amateur Radio, an explanation of the RST signal reporting system, a review of electronic circuit components, and a study of practical circuits. The second tape will teach you the International Morse Code in letter groups quickly and effectively, and then help boost your send and copy speeds to 5 words per minute for the CW test.

ER-3701, Shpg. wt. 7 lbs. .... 39.95

Kit HD-1416, Code Oscillator (see below), Shpg. wt. 2 lbs. .... 24.95

### 5 Build up your speed code with this handy kit

**\$24<sup>95</sup>** • Sturdy telegraph key with adjustable rebound, built-in speaker with volume and tone controls

Use this CW Code Oscillator to get your code speed up and pass your FCC exam in a simple and inexpensive way. This handy Practice Oscillator features a telegraph key with adjustable rebound, built-in speaker, volume and tone controls, plus a headphone jack for private listening. And once you get your license, it can serve as a side tone oscillator for any transmitter using negative-grid block keying. 2 5/8" H x 4 1/2" W x 4 3/8" D. Operates on 9V battery (not included).

Kit HD-1416, Shpg. wt. 2 lbs. .... 24.95

### We'll help you get started in Amateur Radio

Save 23% by purchasing the ER-3701 Novice Course and HD-1416 CW Oscillator together. Includes 10% certificate good for up to \$10 off Heathkit equipment.

**SAVER!** ERS-3701, Shpg. wt. 9 lbs. .... 49.95



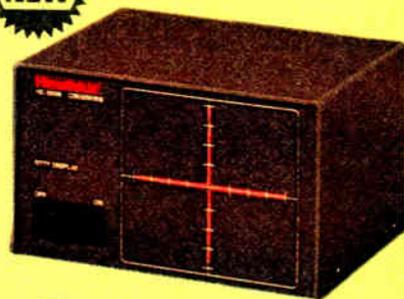
Use your Visa or MasterCard credit cards to purchase your kit!

1 This CW Keyboard lets you send letter-perfect code every time

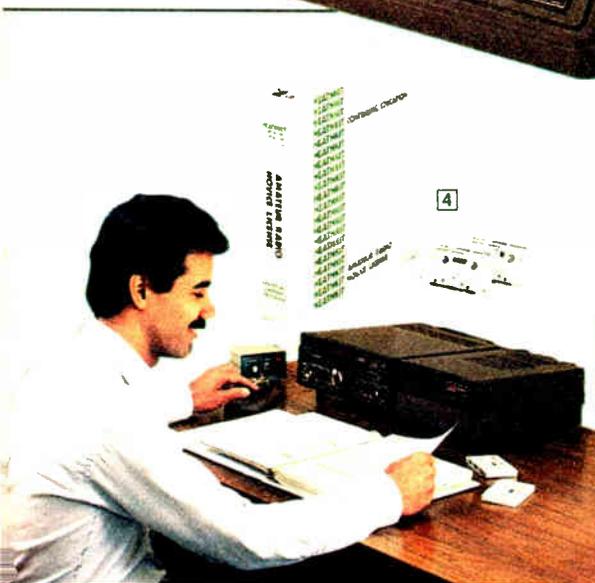


2 The HD-3030 Terminal Interface will put you into RTTY inexpensively

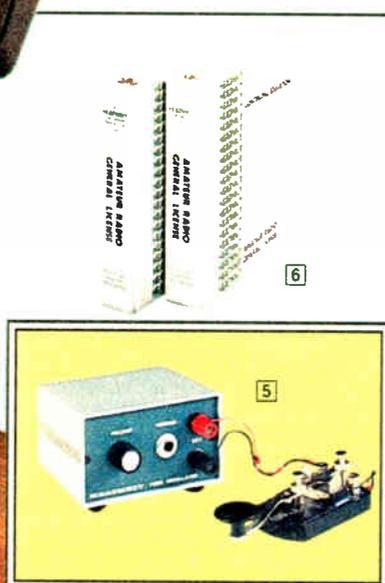
**NEW**



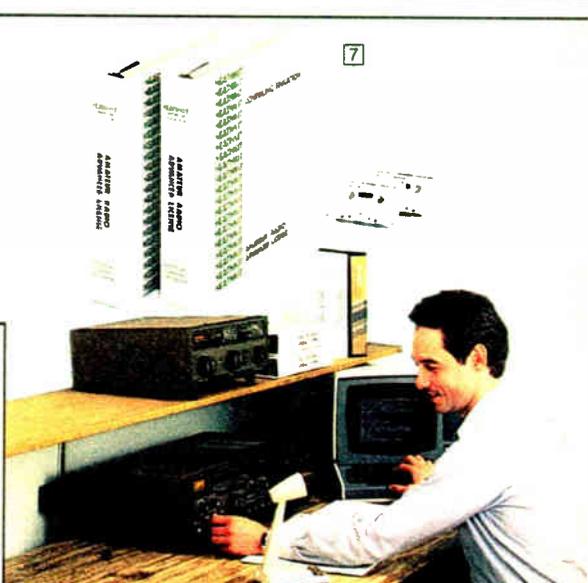
3 Use the HD-3006 to fine-tune RTTY — put your scope back on the bench



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## 6 Take our General License Course for voice communication and move up to the General Class

**\$59<sup>95</sup>**

- Leave the CB or Novice bands behind and progress to the full range of Amateur Radio experiences. Send your words and images around the world

Move up to the General Class and get all the added privileges — more frequencies to operate on, plus voice transmission, radio teletype, slow-scan TV, facsimile, satellite activity — an impressive list of incentives that add up to more QSOs, QSLs and thousands of new friends gained via these modes.

An informative text takes you through the subjects covered on the new FCC written test. Its in-depth coverage will give you a wealth of concentrated information — more than enough to pass either the Technician or General Class written examinations. Later, keep it handy as a valuable reference.

The Course provides extra code practice to bring your send and copy speeds up to 15 words per minute. Since the FCC requires only 13 wpm to pass the General exam, the extra 'two-word edge' gives you more confidence to pass the code test.

Four simulated FCC written tests give you test-taking experience, and allow you to review problem areas so you'll be better prepared for the actual exam. Once you pass your General exam, send us a copy of your new license or FCC notice of passing to receive 5.0 CEU's and a Certificate of Achievement.

We guarantee you'll pass the General Class exam — or we'll refund your money for the program materials when you return them with a copy of your FCC rejection notice. It's a claim exclusive to Heath.

ER-3702, Shpg. wt. 24 lbs. .... 59.95

## 7 Upgrade with the Advanced Class Amateur Radio License Course to achieve Advanced Class status

**\$49<sup>95</sup>**

- Well-organized to make the most efficient use of your time
- We guarantee you'll pass the FCC exam the first time — if you fail to pass the enclosed exam, we'll refund program cost

Prepared with the General Class license holder in mind, ER-3703 is the first completely up-to-date compilation of the technical and examination material required to help you achieve Advanced Class status. It assumes you have a General license or have the equivalent skills and background knowledge.

Designed in the modular style proven most effective by educators, the Advanced License Course includes self-test reviews after each chapter to assure greater retention of the material. This format also makes it easy to identify problem areas before the FCC test. The self-instructional nature of the Course allows you to progress at your own pace and backtrack to review any subject.

Fully one-fifth of the 80-15 meter HF spectrum in four specific subbands (3800-3890, 7150-7225, 14175-14275 and 21270-21350 kHz) is allocated to the Advanced and Extra Class license holders. Why be left out? These are the choicest kilocycles with more DX hot spots and experienced amateurs. Demonstrate your desire for self-improvement and upgrade your ticket with the Heathkit/Zenith Advanced Class License Course. Send us a copy of your new license or FCC notification of passing to receive 4.0 Continuing Education Units and a personalized Certificate of Achievement. Don't delay — start by ordering your guaranteed Course today!

ER-3703, Shpg. wt. 9 lbs. .... 49.95

## 1 IO-4360 60 MHz Triple Trace Oscilloscope available with optional digital display

\$999<sup>95</sup>

Simultaneously view a waveform on the IO-4360 Oscilloscope and directly read its frequency, period, pulse width or its averaged  $\pm 0\text{C}$  voltage at any point on the digital display of the optional IOA-4200 Time-Voltage Module. Do all this with one probe and do it accurately, easily and fast. Increase your troubleshooting effectiveness and cut your time spent on alignments with all the information provided by this versatile scope/meter combination.

**Multi-trace oscilloscope:** Two of the IO-4360's channels are controlled by an attenuator network of 12 calibrated ranges from 2 millivolts/cm to 10 volts/cm. This provides you with the needed sensitivity to make low signal measurements within an accuracy of 3% using AC or DC coupling. The IO-4360's third trace, available at the external input, can be viewed by simply pressing the TRIPLE trace button. For added versatility, Channel 2's input signal can be inverted and "added" to Channel 1's signal for making differential measurements.

**Extra wide 0C to 60 MHz bandwidth:** The IO-4360 provides you with the bandwidth needed to view waveforms in both digital and analog circuits. Even though this multi-trace scope has a specified bandwidth of 60 MHz, signals up to and beyond 90 MHz can be displayed on its 8 x 10 cm screen. Intensity, focus and astigmatism controls adjust trace brightness and sharpness.

**Sweep control:** Besides providing the sweep speeds to observe fast logic pulses, the IO-4360 also supplies a delayed sweep for fast and accurate timing measurements. Internal vertical delay lines ensure that the horizontal sweep starts at the beginning of the input signal. This permits you to view a complete vertical waveform. With its very fast 7 ns rise time, rapid rise-time signals are faithfully reproduced. Also providing sweep control is the calibrated time base. It ranges from 0.1 second/cm to 100 ns/cm in a 1-2-5 stepped sequence. And, any sweep speed can be expanded 10 times by simply pulling a switch. A delayed sweep allows you to see the leading edge of a waveform as well as select the exact portion of a waveform for expansion by any factor you desire.

**Complete trigger system:** The oscilloscope can be triggered from either one of the vertical input channels, line voltage, or from an external trigger which is also the input for the third trace. A filter network allows you to choose the AC, DC, low or high frequency component of a signal to be used for triggering the scope. This filter network also allows you to reject either the horizontal or vertical sync pulses of TV signals when using them for triggering on video waveforms. Fine trigger adjusting is done with a precise level control. When a trigger signal isn't used, the baseline can be automatically displayed by using the scope's automatic mode.

Kit IO-4360, Shpg. wt. 41 lbs. . . . . **999.95**  
Save \$50.00 and purchase both the IO-4360, Scope and IOA-4200 Module.  
IOA-4200, Shpg. wt. 52 lbs. . . . . Separately \$1349.90 **ONLY 1299.90**

**IO-4360 SPECIFICATIONS:** Display Modes: Y1, Y2, Add (Y1 + Y2). Dual trace, Triple trace, ALT/Chop. VERTICAL: (CH. Y1 and Y2) Deflection Factors: 2 mV/cm to 10 V/cm, 12 steps in a 1-2-5 sequence, continuously variable to approx. 30 V/cm. Accuracy: Within 3%. Bandwidth: DC to 60 MHz (5 mV to 10 V/cm); DC to 50 MHz (2 mV/cm). Rise Time: 7 ns or less. Delay Line: Allows at least 20 ns of pretriggered waveform display. CH. Y3: Sensitivity: 200 mV/cm or 2 V/cm. Response: DC to 25 MHz. Rise Time: 14 ns. Accuracy: Within 3%. HORIZONTAL: Display Modes: A, A int, B, and B Time Base Ranges: 100 ms/cm to 0.1  $\mu\text{s}/\text{cm}$ , 19 steps in 1-2-5 sequence; continuously variable to approx. 300 ms/cm. Accuracy: Within 3%. Magnifier: Timesten. TRIGGERING: Source: Y1, Y2, EXT, Line. Coupling: AC, DC, AC-HF, AC-LF, TV-V, TH-H. Modes: Automatic baseline, Normal, Single Sweep. Hold Off: Variable, including 'B-bends-A' position. GENERAL: Internal Calibrator Accuracy: 1 VP-P within 2%. CRT: Mesh-expanded with 8 x 10 cm internal graticule. Accelerating Potential: 10 kV regulated. External Z Axis: Continuously adjustable. Power Requirements: 108-132 or 216-264 VAC, 50/60 Hz. Dimensions: 6" H x 11 1/2" W x 18" D, with handle folded. Complete specifications are available by calling the Heath Co. at 800-253-0570 or requesting ONLY the IO-4360 specifications on catalog order form.

## 2 Versatile IOA-4200 Time-Voltage Module Accessory

- Optional autoranging digital display adds frequency counter and OC voltmeter capabilities to high-performance IO-4360 Oscilloscope

Automatically analyze any waveform displayed on the IO-4360 by installing the IOA-4200 Module atop the 60 MHz oscilloscope. Specially designed for the IO-4360, this Time-Voltage Module displays time, frequency and DC voltage measurements made with the scope's probe at the press of a pushbutton. Autoranging display indicates reading and range in bright 3 1/2 digit display.

**Measure time intervals** from 1.0 s to less than 20 ns and waveform frequencies from 1 Hz to 19.99 MHz. Read  $\pm$  DC voltages from a low 0.1 mV to 199.9 V with an accuracy of 0.75%. Separate, isolated inputs enable the Module to measure voltages up to a higher  $\pm$  1000 volts. Automatic placement of the decimal point

plus time and frequency unit indicators provides directly read measurements. Mark any portion of a waveform displayed on the oscilloscope and obtain an instant readout of its period, frequency or pulse width. Just as easily measure and read out risetimes, burst or ringing frequencies, and the time difference between pulses from different sources. Variable controls place scope reference and measurement cursors for fast, easy measuring.

**Polarity and overrange indicators** provide even more measuring convenience for the user of this low-profile accessory to the IO-4360 60 MHz Oscilloscope.  
Kit IOA-4200, Shpg. wt. 7 lbs. . . . . **349.95**

**IOA-4200 SPECIFICATIONS:** TIME: Ranges:  $\pm$  10 s to  $\pm$  2.0  $\mu\text{s}$  (1, 2, 5 fullscale sequence). Basic Accuracy\*:  $\pm$  2% reading,  $\pm$  1 count. FREQ: Ranges:  $\pm$  1.0 Hz to  $\pm$  0.5 MHz (1, 2, 5, f.s. sequence). Maximum Display: 19.99 Hz on 100 ms to 19.99 MHz on 0.2  $\mu\text{s}$ . Accuracy\*:  $\pm$  3%,  $\pm$  1 cm. VDC (internal): Ranges:  $\pm$  0.2 V, 2V on 2 mV to 50 mV;  $\pm$  2 V, 20V on 100 mV to 0.5 V;  $\pm$  20 V, 200V on 10 V to 10 V; auto-ranging. Accuracy\*:  $\pm$  1.0% ( $\pm$  0.75%),  $\pm$  2 cnt. GENS: EXT VDC: Ranges: 2 V to 2000 V; auto-ranging. Basic Accuracy\*:  $\pm$  0.5% ( $\pm$  0.25%),  $\pm$  1 cnt. DISPLAY: Display: 3 1/2 digit. LED, Automatic minus for negative, positive implied. Dimensions: 1 1/2" H x 10 3/4" W x 9 3/4" D. \*Accuracy specs are for built-in calibration. Numbers in parentheses are for laboratory standards calibration.

## 3 Portable IO-3220 20 MHz Dual Trace Oscilloscope takes bench scope features into the field

\$649<sup>95</sup>

- Dual trace capability for viewing or comparing signals
- Wide 20 MHz bandwidth and fast 18 ns vertical rise time
- Low 2mV/cm sensitivity across the full bandwidth
- Complete X-Y operation with external Z-axis input
- Triggered sweep for full control of displayed waveform
- Fully portable with optional battery pack that recharges through an internal battery charger
- Includes protective front panel cover and easy-carry handle that adjusts for easy scope viewing

**Laboratory-grade instrument:** The IO-3220 packs into its small case all the features of oscilloscopes used in laboratories and service shops. Its two channel input lets you control trace size and position. A 1-2-5 stepped attenuator for each channel has 12 calibrated ranges from 2 mV/division to 10 V/division. The inverting second channel allows algebraic addition of two signals in the scope's ADD function. This portable scope also features calibrated time-base ranges from 0.1 s/division to 100 ns/division, also in a 1-2-5 step sequence. In addition, a calibrated 1 V P-P square wave signal is available through a front panel connector.

**Versatile triggering:** To precisely stop a signal at any point along its positive or negative slope, you use the IO-3220's trigger switch and level control. Also use auto baseline, and different low or high frequency triggering. Even select external triggering to trigger the trace from any waveform. A X5 magnifier is available to expand your trace for closer examination.

**Full X-Y operation** produces trapezoidal and Lissajous patterns that show modulation characteristics of phase and frequency comparisons. Rear panel switches match the power transformer to line voltages from 105 V to 270 VAC.

Kit IO-3220, Shpg. wt. 24 lbs. . . . . **Was \$699.95 NOW ONLY 649.95**  
SO-3220, Assembled, tested and calibrated, Shpg. wt. 22 lbs. . . . . **995.00**

**Probe Set with Pouch for IO/SO-3220 Portable Oscilloscope:** Attaches to scope and includes two 4.5 foot PKW-105 X1/X10 Oscilloscope Probes.

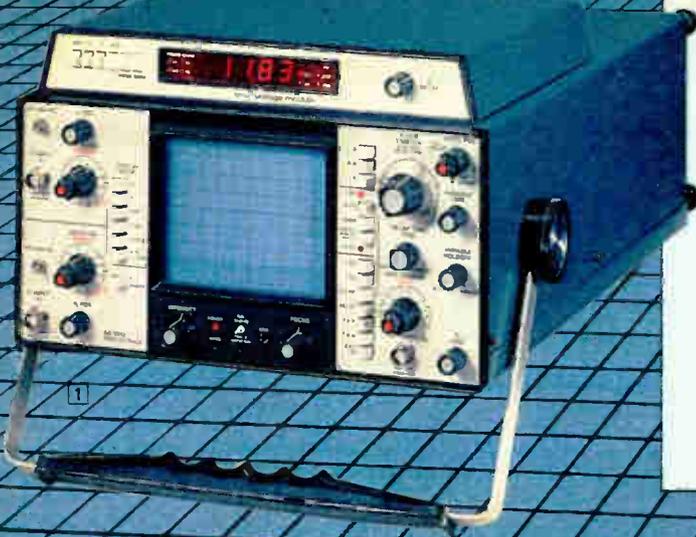
IOA-3220-1, Shpg. wt. 1 lb. . . . . **59.95**

**Rechargeable Gel-Type Cell Battery Pack for IO/SO-3220 Portable Oscilloscope:** Provides a minimum of two hours continuous operation from a full charge. Batteries are recharged when the scope is in the charging mode or automatically recharged while the scope is operating from AC line voltage.

IOA-3220-2, Shpg. wt. 7 lbs. . . . . **44.95**

**IO/SO-3220 SPECIFICATIONS:** Vertical: Frequency: DC, DC to 20 MHz ( $-3$  dB); AC, 3 Hz to 20 MHz ( $-3$  dB). Rise Time: Less than or equal to 18 ns. Overshoot: Less than or equal to 5%. Deflection Factor: 2 mV/division in 12 calibrated steps, 1-2-5 sequence. Variable between steps. Vertical Windows: Two minimum (16 divisions). Input Impedance: One megohm shunted by approximately 35 pF. Maximum Input Voltage: 400 volts (DC plus peak AC). Display Modes: Y1, Y2, Dual (TB selected), Add. Accuracy: 3% (20-30°C), 5% (10-40°C) (Variable in cal. position). Horizontal: Time Base: 0.1 sec./division to 100 ns/division in 19 steps, 1-2-5 sequence. Variable between steps. X5 magnifier increases sweep speed to 20 ns/division. Accuracy: 3% (20-30°C), 5% (10-40°C) - except X5 within 5% (20-30°C), 7% (10-40°C) (Variable in cal. position). X-Y: X Channel: Same performance as vertical. Y Channel: Same performance as vertical, but with limited response of 2 MHz. Phase Shift: Less than 3 $^\circ$  at 100 kHz. Triggering: Source: Internal A or B ( $\pm$ ), External ( $\pm$ ), Line ( $\pm$ ). Modes: AC, DC, Low-Frequency Reject. High-Frequency Reject (Automatic baseline in absence of trigger when in auto mode). Sensitivity: Automatic, Adjustable over 10 divisions; Normal, Adjustable over 10 divisions; External, Adjustable over 0.8 Volt in either auto or normal mode. Input Impedance (External): 1 megohm shunted by approximately 100 pF. Z Input: Full On or Full Off: 0 to 5 volts. Maximum Input: 50 volts peak.





1



## 2 IOA-4200 Time-Voltage Module Accessory

- Add-on accessory module to IO-4360 60 MHz Oscilloscope adds to your troubleshooting effectiveness
- See a waveform and read its frequency, time interval or  $\pm$  DC voltage at any circuit test point
- Position the adjustable cursors on any part of a displayed waveform for a readout of period, frequency or pulse width
- Measure  $\pm$  DC voltages in four ranges up to 1000 volts using separate and isolated input jacks



3



4

## 4 IO-4235 35 MHz Dual-Trace Oscilloscope

- Wide frequency range with practical observation of frequencies above 50 MHz and fast 10 nanosecond vertical rise time
- Complete trigger system with delayed sweep measurements

A top performer with outstanding features at a low price. The IO-4235 Oscilloscope features two high-sensitivity channels with calibrated 12-step attenuator switches ranging from 2 mV/cm to 10 V/cm. Either channel can be inverted which allows signals on both channels to be added algebraically.

A calibrated time base provides sweep speeds from 0.2 s/cm to 50 ns/cm from a 21-position time/cm switch. Any sweep speed can be expanded by a factor of five for closer observation of waveforms. And, using the scope's delayed sweep, any portion of a waveform can be selected and expanded.

Precise trigger control with several triggering options are available with the IO-4235. Signals can be triggered using line frequency, channels 1 or 2, or an external source. Bandpass and TV coupling switches affect trigger signal. Also features baseline display in automatic and normal modes of operation.

Kit IO-4235, Shpg. wt. 52 lbs.

849.95

**SPECIFICATIONS:** **VERTICAL:** Sensitivity: 2 mV/cm. Positions: 12 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3% (20 to 30 degrees C); Within 5% (10 to 40 degrees C), referred to 1 V/cm. **Vertical Response:** DC Coupling: DC to 35 MHz (-3 dB). **AC Coupling:** 1 Hz to 35 MHz. **Rise Time:** 10 ns. **Overshoot:** Less than 3%. **Delay Line:** Allows display of at least 20 ns of pre-triggered waveform. **Vertical Input:** Impedance: 1 megohm, shunted by 30 pF (Capacitance depends on probe used for calibration). **Maximum Input:** 400 volts peak, combined AC and DC. **Connector:** BNC. **Vertical Modes:** Y1, Y2, Y1 and Y2 chopped, Y1 and Y2 alternate, algebraically add ( $\pm$  Y1 plus  $\pm$  Y2). **HORIZONTAL:** **Time Bases:** Ranges: 0.2 s/cm to 50 ns/cm. **Positions:** 21 steps in 1-2-5 sequence. Variable: Continuous between ranges to approximately 600 ms/cm. **Accuracy:** Within 3% (20 to 30 degrees C); 5% (10 to 40 degrees C) referenced to 1 ms/cm. **Magnifier:** X5 (Accurate to within 5%, 20 to 30 degrees C; Within 7%, 10 to 40 degrees C). **External Horizontal:** Sensitivity: Approximately 0.1 V/cm. **Impedance:** 1 megohm. **TRIGGER:** Source: Y1, Y2, External or line. **Coupling:** AC, DC, AC Fast, TV. **Modes:** Automatic Baseline, normal, single sweep. **Hold Off:** Variable, including a "B ends A" position. **External Trigger Sensitivity:** 100 mV at 50 MHz. **Input Impedance:** 1 megohm, shunted by 30 pF. **GENERAL:** CRT TYPE: 8 x 10 cm mesh with internal graticule. **Phosphor:** P31. **CRT Acceleration Potential:** 10 kV, regulated. **Z Axis:** Full On to Full Off: 0 to 5 volts. **Positive Input Impedance:** 5 kilohms. **Power Supplies:** Fully Regulated. **Power Requirements:** 120/240 VAC, 50/60 Hz, 85 W (at 120 VAC). **Overall Dimensions:** 7 3/4" H x 13 3/4" W x 24" D with handle folded.

## 1 IO-4550 Dual Trace 10 MHz Oscilloscope features precise performance and outstanding value

- Dual trace capability with a DC to 10 MHz response and 35 ns rise time
- Two identical vertical input channels with eleven calibrated ranges from 10 mV/cm to 20 V/cm including variable between-range control
- Calibrated time base ranges in 19 steps from 0.2 s/cm to 0.2  $\mu$ s/cm with variable sweep speed control plus a X5 expansion factor of any range
- Automatically shifts between Chop and Alternate as sweep speed changes
- Trigger select switch and level control allow precise triggering at any point along the positive or negative slope of a displayed signal
- Front panel access to a 1-volt P-P square wave calibrating signal

**Outstanding features** place this laboratory-grade instrument at the top of many an oscilloscope user's list. This dual trace scope combines the most desirable features required for precise measurement and display, such as a fast vertical rise time, good trace brightness and high input sensitivity. In addition, solid-state circuitry provides excellent sensitivity, stability, and versatility.

**A complete trigger system** features various trigger signals including the choice of sampling either channel, an externally applied trigger signal or using part of the line voltage. To control the trigger input bandpass, a tri-level mode switch is provided. A special TV position of this switch cuts off unwanted high frequency signals for easier triggering on TV vertical signals.

**Rugged construction and dependable operation** make the IO-4550 a versatile tool for either the hobbyist or the service technician. Its fully-regulated, high-voltage power supply eliminates problems caused by variations in line and load conditions. To calibrate the IO-4550 oscilloscope, an accurate source of square waves is required, such as the Heathkit IG-4505 on page 46 or the IG-4244 Precision Calibrator on this page.

**Kit IO-4550**, Shpg. wt. 27 lbs. . . . . Was \$469.95 NOW ONLY 449.95

**IO-4550 SPECIFICATIONS:** VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm-20 V/cm, 11 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: 3%. Vertical Response: DC Coupling: DC-10 MHz. AC Coupling: 2 Hz-10 MHz. Rise Time: 35 ns. Overshoot: Less than 5%. Attenuator: Vertical Input: Impedance: 1 megohm, shunted by 38 pF. Maximum Input: 400 volts peak, combined AC and DC. Connector: BNC. Modes: Single, Y1 or Y2 selected by position control; Dual, Chopped (200 kHz) or alternate automatically selected by time/cm switch. HORIZONTAL: Time Base, Ramp: 200 ns/cm to 0.2 s/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 s/cm. Accuracy: 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). EXTERNAL: Sensitivity: Approximately 0.1 V/cm. Impedance: Approximately 100 kilohms. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to 1 MHz. Connector: BNC. Trigger: Internal: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: + or - Impedance: 1 megohm, shunted by 40 pF. Connector: BNC. X-Y: Y Channel: Same as vertical. X-Channel: Same as vertical, except response is limited to 1 MHz. GENERAL: Operating Temperature Range: 50-104 degrees F (10-40 degrees C). Power Requirement: 120/240 VAC, 50/60 Hz, 70 watts. Overall Dimensions: 6 $\frac{7}{8}$ " H x 12 $\frac{7}{8}$ " W x 19 $\frac{1}{4}$ " D (17.6 x 32.7 x 48.9 cm) without handle.

## 2 IO-4205 Oscilloscope provides dual trace capability in the DC to 5 MHz bandwidth range

- Excellent 10 mV/cm input sensitivity with variable attenuation
- Triggered horizontal sweep stabilizes nearly all types of waveforms
- Special TV trigger coupling function allows easier TV signal triggering

**An outstanding value**, the IO-4205 Dual Trace Oscilloscope is a welcome addition to the laboratory, service shop, or home work shop. It is a compact, versatile, and easy-to-build test instrument that lets you study waveforms in many different types of electronic circuits. Its many features provide the accuracy and capability found only in higher-priced oscilloscopes.

**Dual-trace capability** of the IO-4205 enables you to directly compare two signals as well as check phase and other timing functions. And, the scope's 10 mV/cm input sensitivity and DC to 5 MHz bandwidth allow you to use it in many low-level waveform applications.

**Seven calibrated time bases**, from 200 ms/cm to 0.2  $\mu$ s/cm, is another feature of this value-packed oscilloscope. In addition, each range is variable controlled for added user convenience and accuracy. With the IO-4205 you can even display X-Y signals by applying an external horizontal signal.

**A stable triggering circuit**, a feature found on more expensive scopes, brings the advantages of triggered sweep with automatic sync to the IO-4205. This scope also has a special TV setting in the triggering network. It allows low frequencies to pass while rejecting high frequencies.

**Other features include** an 8 x 10 cm graticule and a bright CRT that allows users to make quick and accurate waveform measurements. A precise source of square

waves like those provided by the IG-4505 (page 46) or the IG-4244 Calibrator on this page is needed to calibrate the IO-4205 Oscilloscope.

**Kit IO-4205**, Shpg. wt. 25 lbs. . . . . 349.95

**IO-4205 SPECIFICATIONS:** VERTICAL: Bandwidth: DC to 5 MHz,  $\pm$  3 dB. Sensitivity: 10 millivolts/centimeter. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nanoseconds. Overshoot: Less than or equal to 5 percent at 1 kilohertz. Impedance: 1 megohm, shunted by 38 picofarads. Sweep: Type: Triggered. Range: 200 milliseconds to 0.2 microseconds in seven steps, plus variable. Trigger Source: Y1, Y2, External, Line. Trigger Modes: AC, DC or TV, plus or minus slope; automatic or normal. HORIZONTAL: Sensitivity: 0.1 volt/centimeter. Bandwidth: DC to 1 megahertz. Impedance: 1 megohm, shunted by 50 picofarads. External Horizontal Input: X1 and X10 attenuator, as well as variable. GENERAL: CRT: 5DEP31F, 8 x 10 centimeters viewing area, blue-green medium-persistence phosphor, 5-inch round flat-face tube. Accelerating Potential: Approximately 1.6 kilovolts. Graticule: Screened, 8 x 10 centimeters. Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 8" H x 13" W x 17" D.

## 3 IO-4105 Single Trace 5 MHz Oscilloscope

- An excellent low-cost oscilloscope with the features and performance capability of higher-priced dual trace oscilloscopes

**An excellent low-priced alternative**, the IO-4105 is an economical choice for situations requiring only a single-trace oscilloscope. Its 10 mV/cm sensitivity and eleven calibrated attenuator steps from 20 V to 10 mV provide this scope with a variety of input ranges including variable gain control between settings. Seven calibrated time bases, also variable controlled, ranges from 200 ms/cm to 0.2  $\mu$ s/cm. An external input is also available.

**As with our more expensive models**, a stable triggering circuit provides solid waveform displays. Trigger controls include selection of: internal, external or line triggering; AC, DC or TV coupling; + or - slope; and normal or automatic modes. To calibrate the IO-4105, a precise source of square waves like those produced by the IG-4505 (page 46) or the IG-4244 (this page) is needed.

**Kit IO-4105**, Shpg. wt. 25 lbs. . . . . 249.95

**IO-4105 SPECIFICATIONS:** VERTICAL: Bandwidth: DC to 5 MHz,  $\pm$  3 dB. Sensitivity: 10 mV/cm adjustable to 20 mV/cm in 11 ranges. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 ns. Overshoot: less than or equal to 5% at 1 kHz. Impedance: 1 megohm, shunted by 38 pF. SWEEP: Type: Triggered. Range: 200 ms to 0.2  $\mu$ s in 7 steps, plus variable. Trigger Source: INT, Ext and Line. Trigger Modes: AC, DC, or TV; + or - slope; automatic or normal. HORIZONTAL: Sensitivity: 0.1 V/cm. Bandwidth: DC to 1 MHz. Impedance: 1 megohm, shunted by 50 pF. External Horizontal Input: X1 and X10 attenuator and variable. Dimensions: 13" W x 8" H x 17" D.

## 4 IG-4244 Precision Oscilloscope Calibrator helps to maintain oscilloscopes at their peak performance

- Provides accurate time and amplitude signals for calibrating most scopes
- Less than 1 nanosecond rise time for calibrating scopes above 100 MHz
- Serves equally well as a bench standard or experimental signal source

**A laboratory-precise calibrator**, the IG-4244 provides a source of accurate time and amplitude signals for making critical scope adjustments and calibrations. With its range of outputs and accuracy, this quality instrument is exceptionally equipped for calibrating scopes to over 100 MHz.

**Two crystal oscillators** supply twenty-four square-wave signals with very accurate times from 0.5 seconds (2 Hz) to 10 nanoseconds (100 MHz) through a 1-2-5 sequenced range switch. The rise time of these signals is less than 1 nanosecond (with less than 2% or 10 mV aberrations) making them very well suited for making high frequency compensation adjustments on oscilloscope vertical amplifiers. Time accuracy is held to a critical 0.015%.

**Sixteen precise square-wave voltages**, at about 1 kHz, are available for scope vertical calibration and attenuator compensation adjustments. These voltages range from 1 mV to 100V peak through a 1-2-5 sequenced switch. Also available is a sine wave signal output of approximately 1 kHz at 1V peak-to-peak. This signal is especially useful in adjusting scope trigger circuits.

**In addition** to its use as a scope calibrator, the IG-4244 can be used as a bench standard for calibrating other test equipment. Or, this Precision Calibrator can be used as a signal source for testing equipment or other experimental projects. The IG-4244 is easily assembled in about 8 hours and uses either 120 or 240 VAC (50/60 Hz). It measures a compact 3" H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D (7.6 x 18.4 x 24.1 cm).

**Kit IG-4244**, Shpg. wt. 6 lbs. . . . . 149.95

**SG-4244**, Assembled and tested Calibrator, Shpg. wt. 6 lbs. . . . . 249.95

**IG/SG-4244 SPECIFICATIONS:** Time: Range: 0.5 s to 10 ns. Amplitude: 0.5 s to 20 ns, 100 mV to 1 V peak; 10 ns, 100 mV to 0.5 V peak. Rise Time:  $\leq$  1 ns. Leading Edge Aberrations:  $\leq$  2% of peak-to-peak amplitude or 10 mV, whichever is greater. Output Impedance: 50 ohms, nominal. Voltage: Range: 1 mV to 100 V peak in a 1-2-5 sequence. Accuracy:  $\pm$  1%. Rise Time:  $\leq$  5  $\mu$ s. Frequency: 1 kHz. Sine Wave Frequency: Approx 1 kHz. Amplitude: Approx. 1 V P-P. Power Requirements: 120/240 VAC, 50/60 Hz, 25 watts maximum. Dimensions: 3" H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D.



1  
10-4550 Dual  
Trace 10 MHz Scope



2 10-4205 Dual Trace 5 MHz Scope



3 10-4105 Single Trace 5 MHz Scope

### Use this handy chart to select a Heathkit oscilloscope to fit your needs.

Model(s)	Number of Traces	Bandwidth Rise Time	Sensitivity	Time Base Ranges	Delayed Sweep	Vertical Add	Delay Line	X-Y	Z Axis	External Horizontal Input	Battery Operation	Compatible with Time-Voltage Module	CRT
10-4380	3	DC-60 MHz 7 ns	2 mV/cm to 10 V/cm	0.1 s/cm to 100 ns/cm	✓	✓	✓	✓	✓			✓	8 x 10 cm, mesh-expanded internal graticule
10-4235	2	DC-35 MHz 10 ns	2 mV/cm to 10 V/cm	0.2 s/cm to 50 ns/cm	✓	✓	✓	✓	✓	✓			8 x 10 cm, mesh-expanded internal graticule
10/50-3220	2	DC-20 MHz 18 ns	2 mV/div to 10 V/div	0.1 s/div to 100 ns/div		✓			✓		✓		8 x 10 div 0.6 cm/div internal graticule
10-4550	2	DC-10 MHz 35 ns	10 mV/cm to 20 V/cm	0.2 s/cm to 200 ns/cm				✓		✓			8 x 10 cm
10-4205	2	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 ms/cm to 200 ns/cm						✓			8 x 10 cm
10-4105	1	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 ms/cm to 200 ns/cm						✓			8 x 10 cm

NOTE: All Heathkit oscilloscopes feature mu-metal shielding for protection from interfering signals, and regulated power supplies for highly-reliable operation and measurements.

# Quality Heathkit test equipment for use in the shop, on your workbench or in the field

## 1 Versatile IT-2232 Component Tracer effectively increases your troubleshooting efficiency

**\$249<sup>95</sup>**

- Test unpowered circuit boards and components
- Quickly identifies defective circuit boards
- Displays comparisons between boards or components

An extremely helpful troubleshooting tool, the IT-2232 enables a user to check digital and analog circuits that have no power applied to them. In either of its two channels, the Tracer can display the unique E/I characteristic curve of components or circuits on its 3-inch CRT. In the superimposed mode, two components or circuit boards can be easily compared as one channel uses a dotted line display made possible by a new patent-pending circuit. Two ranges, 5 and 50 volts, are provided for testing low and high voltage capacity devices.

Kit IT-2232, Shpg. wt. 15 lbs. **249.95**

**IT-2232 SPECIFICATIONS:** Display Modes: Channel A: Channel B: Dual. Channel A: Solid line trace. Channel B: Dotted line trace. Test Voltages: 5 volts and 50 volts peak-to-peak. Current Limits: 5 volts peak-to-peak at 5 milliamps; 50 volts peak-to-peak at 0.5 milliamps. Operational Controls: Focus, Intensity, Vertical and Horizontal Position. Cathode Ray Tube (CRT): 3RP1A, round 3-inch flat face. Accelerating Potential: Approximately 1.1 kilovolts. Operating Temperature Range: 50 degrees F to 104 degrees F (10 degrees C to 40 degrees C). Power Requirements: 120/240 VAC, 50/60 Hz, 22 watts. Dimensions: 4" H x 10" W x 12 1/2" D (10.2 x 25.4 x 31.5 centimeters). Weight: 8.4 lbs. (3.8 kg.).

## 3 Accurate IM-2264 True RMS Digital Multimeter

**\$249<sup>95</sup>**

- True RMS readings of all AC voltages and currents
- Special diode test function checks semiconductors
- Features analog meter, alarm and crest warning LED

**True RMS reading digital meter:** Capabilities include: five DC and AC voltage ranges extending from 0.1 mV to 1000 VDC and 750 VAC, six DC and AC current ranges from 0.1  $\mu$ A to 10 A, and six resistance ranges from 0.1 ohm to 20 megohms. The IM-2264 also uses a special circuit that electronically converts all AC signals into true RMS values for accurate measurements of complex waveforms.

**Additional features:** An auto-polarity analog meter complements the LCD digital display making nulls, peaks and trends easier to follow. A switch-enabled alarm function allows quick testing of voltage and continuity. A flashing crest warn LED alerts the operator of possible erroneous readings of AC signals due to an excessive crest factor. Battery or AC operated with PS-2404 (p. 24).

Kit IM-2264, Shpg. wt. 7 lbs. **249.95**

**IM-2264 SPECIFICATIONS:** Voltage Ranges: 200 mV, 2 V, 20 V, 200 V, and 1000 VDC (750 VAC). Basic Accuracy: DC:  $\pm$  (0.5% of reading + 1 count). AC:  $\pm$  (0.75% of reading + 2 counts). DC and AC Current Ranges: 200  $\mu$ A, 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Basic Accuracy: DC:  $\pm$  (0.5% of reading + 1 count). DC:  $\pm$  (0.75% of reading + 2 counts). Resistance Ranges: 200, 2 k, 20 k, 200 k, 2000 k and 20 M. Basic Accuracy:  $\pm$  (0.5% of reading + 1 count). Special Features: Crest Warn Indicator, Audible Alarm, Analog Meter. Dimensions: 3" H x 8 1/2" W x 11" D.

## 5 Five-function IM-2260 features economy

**\$119<sup>95</sup>**

- Convenient autozero, autodecimal and autopolarity
- Special test function checks diodes and transistors

**Excellent performer:** Bright, easy-to-read LEDs in a 3 1/2 digit display show DC and AC voltages in four ranges up to 1000 VDC and 750 VAC. Pushbutton switches select all functions including DC and AC current in five ranges up to 10 amps and resistance in five ranges to 20 megohms. Input protection is provided.

**Special features:** To help determine the condition of a diode or transistor, the IM-2260 measures forward conducting voltage and reverse leakage resistance. DC or AC operation is possible with either six "C" size batteries (not included) or a PS-2404 battery eliminator (p. 24). A built-in battery charger keeps nickel-cadmium batteries (if used) recharged.

Kit IM-2260, Shpg. wt. 5 lbs. **119.95**

SM-2260, Assembled and tested, Shpg. wt. 4 lbs. **189.95**

**IM-2260 SPECIFICATIONS:** Voltage: Ranges: 2 V, 20 V, 200 V, and 1000 VDC (750 VAC). Basic Accuracy: DC:  $\pm$  (0.5% of reading + 1 count). AC:  $\pm$  (1.0% of reading + 3 counts). Frequency Response: 40 to 1 kHz.  $\pm$  0.5%. Input Impedance: 10 megohms. Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Basic Accuracy: DC:  $\pm$  (1.5% of reading + 1 count). AC:  $\pm$  (2.0% of reading + 1 count). Ohms: Ranges: 2 k, 20 k, 200 k, 2000 k, and 20 M. Basic Accuracy:  $\pm$  (0.25% of reading + 1 count). Dimensions: 3" H x 8 1/2" W x 11" D. Weight: 2 3/4 lbs. (excluding batteries)

## 2 Handheld IM-2400 Frequency Counter

**\$139<sup>95</sup>**

- High sensitivity allows very low signal pickup
- Crystal oscillator maintains excellent accuracy
- Includes rechargeable batteries for true portability

Measure frequencies in two ranges from 50 Hz to 512 MHz with a guaranteed sensitivity 25 mV RMS (typically 10 mV RMS). Seven digit LED display gives an excellent 10/100 Hz resolutions in low/high ranges. Uses five rechargeable 1.2 VDC nickel-cadmium batteries (included). Housed in rugged, compact case.

Kit IM-2400, Shpg. wt. 3 lbs. **139.95**

SMA-2400-1, Telescopic Antenna with BNC connector, Shpg. wt. 1 lb. **9.95**

PS-2404, 120 VAC Battery Eliminator/Charger, Shpg. wt. 1 lb. **7.95**

PS-2405, 240 VAC Battery Eliminator/Charger, Shpg. wt. 1 lb. **12.95**

**IM-2400 SPECIFICATIONS:** Frequency Range: 50 Hz to 50 MHz and 40 MHz to 512 MHz. Input Impedance: 50 Hz to 50 MHz range, 1 megohm shunted by less than 24 pF. 40 MHz to 512 MHz range, 50 ohms. Input Protection: 50 Hz to 50 MHz range, 150 volts RMS to 100 kHz derating to 10 volts RMS at 50 MHz. 40 MHz to 512 MHz range, 5 volts RMS. Time Base: Frequency: 10 MHz. Setability:  $\pm$  1 part per million (PPM). Temperature Stability:  $\pm$  10 PPM from 0 degrees C to 40 degrees C. General: Gate Time: 1.0 second or 0.1 second, switch selectable. Resolution: 50 Hz to 50 MHz, 10 Hz with time base set at 1.0 second. 40 MHz to 512 MHz range, 100 Hz with time base set at 1.0 second.

## 4 IM-2215 DMM provides bench meter features

**\$89<sup>95</sup>**

- Basic 0.25% DC accuracy when set to lab standards
- Checks semiconductors and in-circuit resistances
- Easy fingertip control of ranges and functions

The IM-2215 supplies all the advantages of a DMM: a large and easily readable display, high accuracy and resolution, and superior overload protection. Other features include autozero, autopolarity and automatic decimal point placement. Maintains a high 10 megohm input resistance on DC/AC volts ranges. Large 3 1/2 digit LCD display has overload and low battery status indicators. Powered by ordinary 9-volt transistor battery (NEDA #1604, not supplied) or from AC line voltage using the optional PS-2350 120 VAC converter.

Kit IM-2215, Shpg. wt. 2 lbs. **89.95**

IMA-2215-1, Rugged leather Carrying Case, Shpg. wt. 1 lb. **14.95**

PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. **7.95**

**IM-2215 SPECIFICATIONS:** DC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 1000 V. Accuracy: Lab Standards:  $\pm$  0.25% of reading + 1 count (SM-2215,  $\pm$  0.1%). Built-in Standards:  $\pm$  0.35% of reading + 1 count. AC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 750 V. Accuracy: Lab Standards:  $\pm$  0.5% of reading + 3 counts. Built-in Standards:  $\pm$  0.6% of reading + 3 counts. DC and AC Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA. Basic Current Accuracy: 0.75% (DC), 1.5% (AC). Resistance: Ranges: 200, 2 K, 20 K, 200 K, 2000 K, 20 M. Basic Accuracy: 0.25%. Dimensions: 2" H x 3 3/4" W x 7 1/2" L.

## 6 Deluxe handheld SM-77 multimeter features dual digital and analog measurement display

**\$119<sup>95</sup>**

- Manual and autoranging display with 0.3% DC accuracy
- "Touch-Hold" function locks in stable meter readings
- Auto self-test checks all critical functions

This easy-to-use 3 1/2 digit multimeter combines the precision of a digital meter with an analog bar-graph display. Get all the advantages of a DMM: autozero, autopolarity, and autoranging with accuracy and high resolution. Each time you turn the meter on you activate a 2-second diagnostic self-test of critical functions and the battery. The "Touch-Hold" function holds the value of a stable reading in the display even when the probes are removed. A quality meter from FLUKE.

SM-77, Assembled and tested, Shpg. wt. 3 lbs. **119.95**

SMA-77-1, Soft Carrying Case, Shpg. wt. 1 lb. **9.95**

**SM-77 SPECIFICATIONS:** DC Volts: Ranges: 320 mV, 3.2 V, 32 V, 320 V, 1000 V. Sensitivity: 0.1 mV (320 mV range). Accuracy: 320 mV-320 V Range:  $\pm$  (0.3% of reading + 1 digit). 1000 V Range:  $\pm$  (0.4% of reading + 1 digit). Input Resistance: 10 megohms. Overload Protection: 1000 V (500 V on 320 mV range only). AC Volts: Ranges: 3.2 V, 32 V, 320 V, 750 V. Sensitivity: 1 mV (3.2 V range). Accuracy: 3.2 V Range (45 Hz - 500 Hz)  $\pm$  (2.0% of reading + 2 digits). Input Impedance: 10 megohms shunted by approx. 50 pF. Overload Protection: 750 VAC. Ohms: Ranges: 320, 3200, 32K, 320K, 3.2M, 32M. Sensitivity: 0.1 ohm (320 range). Accuracy: 320 Range:  $\pm$  (0.5% of reading + 2 digits). 32M Range:  $\pm$  (2.0% of reading + 1 digit). Power Supply: Single standard 9V battery.





Handheld convenience plus accurate and reliable measuring capability



IM-2400  
Frequency  
Counter has 50 Hz  
to 512 MHz range



IM-2215 DMM  
had 3½ digit  
display and full  
measuring capability



SM-77 with  
LCD digital  
display and  
analog bar graph

# Laboratory-quality instruments and accessories for use in all areas of electronics

## 1 IT-2250 Capacitance Meter features hand-held convenience and an auto-ranging digital display

**\$159<sup>95</sup>**

- Measures capacitors to 199.9 mF with  $\pm 0.2\%$  accuracy
- Zero offset control compensates for stray capacitance and ensures repeatable display accuracy
- Special built-in circuitry detects leaky capacitors

To measure the capacitance of any type of capacitor in any work environment, use the versatile IT-2250 Auto-Ranging Digital Capacitance Meter. It quickly and accurately measures the value of any capacitor within a range from 0 pF to 199.9 mF. Automatically, this instrument will select the correct range and display the units of capacitance on its large 3½ digit liquid-crystal display. Light-emitting diodes indicate the correct units: pF, nF,  $\mu$ F or mF.

Key features include a Kelvin (4-terminal) error-reducing connector, current protected input, zero compensation control and the ability to detect a leaky capacitor. Other advantages: a low test voltage, a remote extension cable, and either battery (9-volt transistor battery) or AC (PS-2350) operation.

Kit IT-2250, Shpg. wt. 3 lbs. ....	159.95
IMA-2215-1, Leather Carrying Case, Shpg. wt. 1 lb. ....	14.95
PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. ....	7.95

**IT-2250 SPECIFICATIONS:** Ranges: 199.9 pF, 199.9 nF, 19.99  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 199.9  $\mu$ F, 199.9 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 199.9 nF, 19.99  $\mu$ F, 199.9  $\mu$ F, 199.9  $\mu$ F, 199.9 mF ranges = (0.2% of reading + count + 0.5 pF); 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 199.9  $\mu$ F, 199.9 mF and 199.9 mF ranges = (5% of reading + 1 count). Using Heath Supplied Standards: 199.9 pF, 199.9 nF, 19.99 nF, and 199.9 nF ranges = (0.75% of reading + 1 count + 0.5 pF); 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 199.9  $\mu$ F, 199.9 mF and 199.9 mF ranges = (6% of reading + 1 count). NOTE: The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply to a temperature range of 67 to 77 degrees F (19 to 25 degrees C). Conversion and Display Rate: For values up to 199.9  $\mu$ F, less than 1.5 seconds; For values up to 199.9 mF, less than 10 seconds. Display: 3½ digit (maximum count, 1999); liquid crystal. Testing Voltage: 2.00 VDC maximum; typically varying from 0.6 to 1.4 VDC. Operating Temperature Range: 32 to 104 degrees F (0 to 40 degrees C). Storage Temperature Range: -4 to +140 degrees F (-20 to +60 degrees C). Battery Life: Approximately four to ten hours, in continuous operation. Battery Indicator: Displays "LO BAT" warning when battery is down to approximately 5 VDC. Overall Dimensions: 2" H x 3¼" W x 7¼"

## 2 IM-2420 Frequency Counter for accurately measuring frequencies into the UHF range

**\$269<sup>95</sup>**

- Extra-wide 5 Hz to 512 MHz range for measuring frequency, period and ratios between frequencies
- Proportionally-controlled crystal oven for greater frequency measuring stability and accuracy

A multi-function counter, the IM-2420 provides the versatility and reliability required for a broad spectrum of applications. Measure frequencies from 5 Hz to 512 MHz in two ranges with a resolution of as low as 0.1 Hz. With a typical sensitivity of 15 mV, 25 mV guaranteed, low-level signals are measured as easily as high-level frequencies. Measure the period of a signal between 5 Hz and 10 MHz with a display resolution as low as 100 ns. For ratio measurements, an effective range of 1.6 to 1.024 x 10<sup>8</sup> is guaranteed.

Other outstanding features include: an internal time base accuracy to within 0.2 PPM, standby mode, over-voltage protection, adjustable trigger and more.

Kit IM-2420, Shipping, wt. 9 lbs. ....	269.95
SM-2420, Assembled and tested, Shpg. wt. 9 lbs. ....	320.00
SMA-2400-1, Assembled Telescopic Antenna, Shpg. wt. 1 lb. ....	9.95

**IM/SM-2420 SPECIFICATIONS:** INPUTS: Frequency Ranges: 5 Hz to 50 MHz and 40 MHz to 512 MHz. Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical. Input Impedance: 5 Hz to 50 MHz range: 1 megohm shunted by less than 25 pF; 40 MHz to 512 MHz range, 50 ohms nominal. Input Protection: 5 Hz to 50 MHz range, 250 V RMS to 100 kHz (derating to 25 V RMS at 50 MHz); 40 MHz to 512 MHz: 5 V RMS. Period Measurement Mode: Input: 5 Hz to 50 MHz only. Range: 5 Hz to 10 MHz. Display Resolution (Least Significant Digit): 100 ns to 0.1 ms, in decade steps. Ratio B/A Measurement Mode: Input Frequency Limits: 5 Hz to 25 MHz and 40 MHz to 512 MHz. Effective Measurement Range: From 1.6 to 1.024 x 10<sup>8</sup>, guaranteed. Time Base: Frequency: 10 MHz. Setability: to within 0.2 parts per million (PPM). Temperature Stability: 0.2 PPM from 32°F to 104°F (0°C to 40°C). Crystal Aging Rate: Less than 1 PPM per year. Oven Operating Temperature: 167°F ± 9°F (75°C ± 5°C). Warm-up Time From Cold Oven (unplugged): Start: 10 minutes to within 1.0 PPM, 20 minutes to within 0.1 PPM. External Input: TTL or 2.5 V RMS from 50 ohm source (10 MHz). Input Protection: Any voltage with peak-to-peak limits between -3.5 and +10 volts. Output: Will drive one standard TTL (i.e. 7400) load. Short circuit protected. General Gate Time: 0.01 second, 0.1 second, 1 second, and 10 seconds (switch selectable). Sampling Rate: Every 0.1 second, 0.33 second, 1 second or 10 seconds.

## 3 IM-2410 Frequency Counter provides economy and accuracy for measurements into the VHF range

**\$129<sup>95</sup>**

- Precise frequency measurements from 10 Hz to 225 MHz
- Dual gate times provide decimal point positioning

The IM-2410 is an easy-to-use counter that supplies full frequency measurement capability at an economical price. The crystal-controlled time base provides an excellent  $\pm 10$  parts-per-million (PPM) long-term accuracy. Eight, large LEDs display the frequency reading directly in MHz providing a high 10 Hz resolution at 225 MHz. A dual gate switch sets the decimal point at the desired location. Complete voltage protection is also provided. The IM-2410 can be assembled to operate either on 120 VAC or 240 VAC at 50 Hz or 60 Hz.

A low 25 mV input sensitivity permits the use of the optional SMA-2400-1 telescopic antenna (this page) for indirect frequency measurements. A locking swing-down stand provides a choice of an alternate display viewing angle.

Kit IM-2410, Shpg. wt. 6 lbs. ....	129.95
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**IM-2410 SPECIFICATIONS:** Sensitivity: 10 Hz to 50 MHz range, 25 mV RMS maximum, 10 mV typical from 10 Hz to 30 MHz, 50 mV RMS maximum from 30 to 50 MHz, 20 MHz to 225 MHz range, 25 mV RMS maximum, 10 mV typical from 20 to 150 MHz, 50 mV RMS maximum from 150 to 225 MHz. Input Impedance: 1 megohm, shunted by less than 24 pF. Input Protection: 150 VAC, up to 100 kHz - derating to 5 VAC from 160 to 225 MHz. Time Base Frequency: 3.58 MHz. Setability:  $\pm 1$  PPM. Temperature Stability:  $\pm 10$  PPM, from 0 to 40 degrees C. Gate Time: 0.1 or 1.0 second, switch selectable. Frequency Resolution: 10 Hz to 50 MHz range - 1 Hz with gate time set at 1.0 second and  $\pm 10$  Hz with gate time set at 0.1 second; 20 MHz to 225 MHz range,  $\pm 10$  Hz with gate time set at 1.0 second,  $\pm 100$  Hz with gate time set at 0.1 second. Display: Eight-digit LED display. Overall Dimensions: 3¾" H x 7¼" W x 9¼" D (8.6 x 18.4 x 24.1 cm). Net Weight: 5 lbs. (2.3 kg).

## 4 Deluxe PKW-105 combination 10:1/direct probe

This versatile probe is ideal for all frequency counter and scope uses from DC to 15 MHz when used in the X1 position and from DC to 80 MHz when in the X10 position. Has a 4 ns rise time in X10 and a compensation range of 15-50 pF.

PKW-105, Assembled, Shpg. wt. 1 lb. ....	32.95
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## 5 PK-1 low-capacitance isolation scope probe

Two-position probe offers direct and X10 operation for minimal loading of low bandwidth oscilloscopes. Features 10 megohm impedance and BNC coaxial connector with separate alligator-clip ground connector.

PK-1, Assembled, Shpg. wt. 1 lb. ....	14.95
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## 6 PK-3A RF test probe for use with DC voltmeters

Provides RF voltage measurement capability for DC voltmeters with 10 and 11 megohm input impedances. For use up to 100 MHz.

PK-3A, Assembled, Shpg. wt. 1 lb. ....	12.95
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## 7 Scope and voltmeter demodulator/detector probe

For use in IF/RF measurements, this versatile probe can be used in circuits up to 500 VDC or 30 VRMS. Has banana plug and coaxial cable with ground clip.

Kit 337-C, Shpg. wt. 1 lb. ....	12.95
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## 8 IG-4505 Oscilloscope Calibrator and bench standard

For use with most oscilloscopes, the IG-4505 supplies crystal-controlled time signals from 0.5 s to 1  $\mu$ s for use in adjusting sweep speeds, delay-line terminations and high frequency compensation networks. The square-wave output has a fast rise time of less than 4 ns. Accurate voltage signals from 1 mV to 100 V are also available for use in calibrating scope vertical inputs and attenuator compensation adjustments. This calibrator serves equally well as a bench standard for other equipment or as a signal source for test circuits.

Kit IG-4505, Shpg. wt. 4 lbs. ....	59.95
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## 9 30 kV DC Probe for meters with 20 megohm input

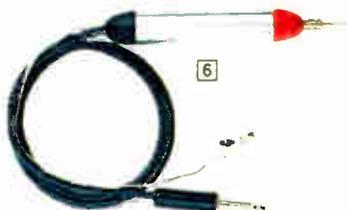
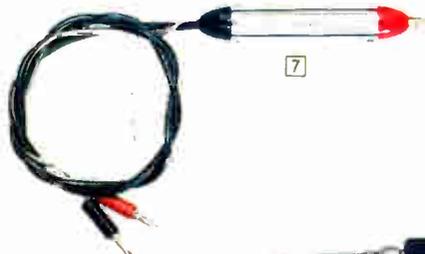
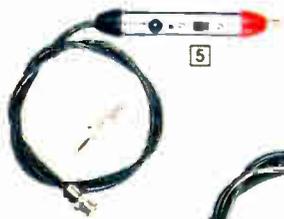
Extend the measurement capability of DC voltmeters with input impedances of 10 megohms. This X100 accessory probe features a phone plug connector, alligator ground clip and molded housing.

Kit IMA-100-10, For 10 megohm input meters, Shpg. wt. 1 lb. ....	14.95
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SMA-100-10, Assembled, Shpg. wt. 1 lb. ....	19.95
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Kit IMA-100-11, For 11 megohm input meters, Shpg. wt. 1 lb. ....	14.95
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# Expand the testing capabilities of your work bench with these quality Heathkit instruments

## 1 IG-5218 Sine/Square Wave Audio Generator

Designed for service and testing, the IG-5218 generates sine waves from 1 Hz to 100 kHz and square waves from 5 Hz to 100 kHz. The sine wave output, with less than 0.1% distortion, is adjustable through eight ranges from 0.003 to 10 volts and is monitored by a front panel meter. The square wave output has a 50 ns rise time and is available in three ranges up to 10 V P - P. Kit is easy to assemble. Dimensions are 5½" H x 13¼" W x 7" D.

Kit IG-5218, Shpg. wt. 10 lbs. .... 139.95

## 2 IG-1271 0.1 Hz to 1 MHz Function Generator

This quality instrument produces sine, square and triangular waveforms over six variably-controlled frequency ranges. It supplies a 10 V P - P signal into a 50-ohm load through a calibrated attenuator that is adjustable in 10 dB steps from 0 to 50 dB. Includes a 20 dB variable attenuator. Uses 120/240 VAC at 50/60 Hz and draws 15 watts maximum. Measures 8½" D x 7¼" W x 2" H without handle.

Kit IG-1271, Shpg. wt. 7 lbs. .... 159.95

SG-1271, Assembled and tested, Shpg. wt. 6 lbs. .... 225.00

## 3 IG-5240 Color Generator supplies 16 TV signals

**\$74<sup>95</sup>**

- Hand-held instrument easily slips into a shirt pocket
- Includes unique 5-minute battery saver circuit

A portable color pattern generator, the IG-5240 supplies color bar, dot, crosshatch, and vertical and horizontal line patterns for aligning color and B&W TV sets. Three crystals controlling the RF channel carrier, and color and timing oscillators provide a stability and frequency accuracy of ±0.005%. The RF carrier frequency is calibrated to channel 4 but can be changed to channel 3 as an option. Two 9-volt DC transistor batteries are required to power this 8-ounce generator and are protected by a five-minute turn-off circuit.

Kit IG-5240, Shpg. wt. 2 lbs. .... 74.95

## 4 Convenient clamp-on AC measurements

**\$49<sup>95</sup>**

- Electrician's tool for testing power/lighting circuits
- Homeowner's aid for checking appliance current usage

**Clamp-on current meter:** Really easy to operate, the SM-2206 measures the 50 and 60 Hz current flow in a circuit or appliance by simply clamping its inductive pickup around a conducting AC wire. Five current ranges of 6A, 15A, 60A, 150A and 300A allow monitoring of almost any AC current. For checking AC voltages, the Meter has three ranges of 150V, 300V and 600V. A resistance range of 0 to 5 kilohms is also available for such uses as circuit continuity checks, and other home and shop resistance measurements.

**Convenient:** For those hard to reach one-handed current measurements, the SM-2206 features a convenient finger-operated pointer lock switch. With this special switch, the Meter's pointer can be locked into position during a measurement. The meter is then removed from the circuit and the current is directly read from the scale.

**Rugged:** Whether it's the homeowner looking for possible savings by checking appliance current usage or an electrician checking power and lighting circuits, the SM-2206 is built to take constant use. The Meter is protected by a shock-resistant housing and a pointer lock-down switch. Included are test leads, 1.5 V "AA" battery, spare resistance range fuse and carrying case.

SM-2206, Assembled, Shpg. wt. 2 lbs. .... 49.95

## 5 IN-3117 Decade Resistance Box for the bench

**Rugged substitution box** provides resistances from 1 to 999,999 ohms in 1 ohm steps. All resistors are 1 watt, 0.5% tolerance type. It features a rugged case and binding posts for easy test set-ups. This laboratory-type Decade Resistance Box has dimensions of 5" H x 7½" x 6¾" D.

Kit IN-3117, Shpg. wt. 3 lbs. .... 59.95

## 6 IT-3120 Portable FET and Transistor Tester

This quick checker tests transistors, diodes, FETs, SCRs, triacs and UJTs in- and out-of-circuit. Shows gain, transconductance and leakage current. Uses two 1.5 VDC "D" cells (not included). Dimensions are 5¼" H x 8½" W x 8¾" D.

Kit IT-3120, Shpg. wt. 5 lbs. .... 79.95

## 7 IG-1277 Pulse Generator for precision pulses



- Generates a range of pulses at three separate outputs
- Independent control over pulse period, width and delay
- Indicator warns of overlapping width and period settings

An essential instrument for digital and pulse applications, the IG-1277 Pulse Generator produces pulse repetition periods from 200 ns to 1 s (5 MHz to 1 Hz) with identical pulse width and delay ranges from 100 ns to 1 s in seven decade ranges. All ranges are continuously variable using 1-decade vernier range switches. The pulse width is fully adjustable to 100% duty cycle.

**Three separate outputs, with fast rise/fall times.** The 50-ohm output offers an adjustable DC offset with an open circuit output range from 0.2 to 20 volts P - P including a rise/fall time that is less than 15 ns for a 5 volt level change. One TTL output drives loads using a fixed level for a logic "0" of less than 0.4 V and logic "1" of greater than 2.4 V with a rise/fall time less than 25 ns. The third output can be used either to trigger oscilloscopes or to drive up to 3 TTL loads using the same logic levels as the TTL output. Operates on 120 VAC at 30 watts.

Kit IG-1277, Shpg. wt. 9 lbs. .... 179.95

## 8 New IM-5215 40 kV Probe with built-in meter

The IM-5215 measures voltages up to 40,000 volts DC (negative ground) and is accurate to within ±3%. Probe dimensions are 1½" H x 1⅞" W x 15" L.

Kit IM-5215, Shpg. wt. 2 lbs. .... 29.95

## 9 IMA-100-10 test probe for checking kilovolts

Use this accessory probe to extend the DC voltage measuring range of any 10-megohm input multimeter up to 30,000 volts. Encased in molded housing.

Kit IMA-100-10, Shpg. wt. 1 lb. .... 14.95

SMA-100-10, Assembled and tested, Shpg. wt. 1 lb. .... 19.95

## 10 IT-7410 Logic Probe checks digital circuits

Detects and indicates high and low logic levels in 5 VDC TTL and CMOS circuits up to 100 MHz and 15 VDC CMOS circuits up to 80 MHz. Powered from circuit under test through 34" long power leads. Includes detachable ground clip.

Kit IT-7410, Shpg. wt. 1 lb. .... 39.95

## 11 IM-4180 FM Deviation Meter measures peak FM

Measures the peak deviation (frequency modulation) of transmitters and signal generators whose carrier frequencies are between 25 and 1000 MHz. Monitor a line directly or use an optional antenna. Portable or AC operation.

Kit IM-4180, Shpg. wt. 7 lbs. .... 169.95

Kit IMA-4180-1, Battery Charger/Eliminator, Shpg. wt. 2 lbs. .... 32.95

SMA-2400-1, Swiveling Telescopic Antenna, Shpg. wt. 1 lb. .... 9.95

## 12 IM-5228 Service Vacuum Tube Voltmeter

**Features:** 11 megohm input impedance, 7 DC voltage ranges up to 1500 volts, 7 AC voltage ranges up to 1500 volts RMS, and 7 resistance ranges to x1 megohm. Requires one "C" battery. Uses 120/240 VAC.

Kit IM-5228, Shpg. wt. 6 lbs. .... 79.95

PKW-4, Assembled Replacement Probe for IM-5228, Shpg. wt. 1 lb. .... 19.95

## 13 Low-cost IT-5230 CRT Tester and Rejuvenator

A must for every TV shop, the IT-5230 offers pushbutton control of individual gun testing, cleaning and rejuvenation. Check for shorts, gas, life expectancy.

Kit IT-5230, Shpg. wt. 9 lbs. .... 139.95

**CRT Socket Adapter** allows you to test even more CRTs. Uses universal clip leads to hook up and test CRTs with known basing configurations.

ITA-5230-1, Shpg. wt. 1 lb. .... 29.95

## 14 IM-5217 Utility Solid-State Voltmeter

**Features** ± DC and AC voltage ranges up to 500 volts and four ohmmeter ranges up to x1 megohm. Requires two 9-volt transistor batteries and one "C" cell.

Kit IM-5217, Shpg. wt. 4 lbs. .... 44.95





**NEW**



**NEW**



8 IM-5215 High-Voltage Test Probe with built-in meter



9 IMA-100-10 30 Kilovolt Test Probe increases the DC voltage range of 10M ohm input meters



10 IT-7410 Logic Probe tests TTL/CMOS digital circuits



# Power supplies and economical test equipment for work bench and experimental projects

## 1 IP-2760 Heavy Duty Battery Eliminator

**\$169<sup>95</sup>**

- Output variable from approximately 9 to 15 volts
- Continuous 12A current output or 20A intermittent
- Front panel meters monitor voltage and current

For any high-current usage between 9 and 15 volts DC, such as for Ham and CB radio servicing, the IP-2760 reliably supplies all your required power. When a lot of current is required, the Battery Eliminator maintains less than a 2% output change under varying load conditions. Effective filtering removes AC for less than a 1% output ripple at full load. Double heatsinks allow the IP-2760 to run cooler while its four power transistors are fused at 20 amps to protect it against overloads. Front panel meters show output voltage and current.

Kit IP-2760, Shpg. wt. 31 lbs. .... 169.95

**IP-2760 SPECIFICATIONS:** Output Voltage: Variable from 9-15 VDC. Output Current: 12A continuous, 20A intermittent (per derating curve in manual). Ripple: Less than 1% at full load. Regulation: Less than 2% variation from no load to full load. Fuses: 7A, 3AG slow-blow primary; 20A, 3AG output. Power Requirement: 120/240 VAC, 50/60 Hz, 840 watts. Dimensions: 5¼" H x 11" W x 11" D.

## 2 IP-2718 Tri-Power Supply has three outputs

**\$109<sup>95</sup>**

- Features a 5 VDC output at 1.5 amps plus two separate adjustable 20 VDC outputs at 0.5 amps
- Current limiting protects outputs from short circuits
- All outputs are independent but can be gang connected

Ideal for design or experimentation, the IP-2718 supplies the voltages and currents needed for most digital devices. A constant 5 VDC output is rated at 1.5 amps which is capable of powering most any experimental digital circuit. The two variable 20 VDC outputs provide 0.5 amps each and feature a special "tracking" mode. In this mode, a preset voltage difference can be maintained between the power supplies. This feature is ideal for providing + and - voltages in operational amplifier circuits. All three outputs can be operated independently from each other with either floating or referenced grounds. Or, the three supplies can be connected in series to provide up to 45 VDC or connected in parallel to supply higher current to a load. All outputs and controls are easily accessible.

Kit IP-2718, Shpg. wt. 12 lbs. .... 109.95  
SP-2718, Assembled and tested, Shpg. wt. 12 lbs. .... 195.00

**IP/SP-2718 SPECIFICATIONS:** Outputs: 5 VDC at 1.5A; Two outputs at 0-20 VDC at 0.5A. Regulation: No Load to Full Load: - 0.1% variation on 20V supplies; -3% variation on 5V supply. For 10V Line Voltage Change: - 0.2% variation on 20V supplies; - 0.2% variation on 20V supplies; - 0.15% variation on 5V supply. Power Requirement: 120/240 VAC, 50/60 Hz, 100 watts full load. Dimensions: 4¼" H x 10¾" W x 9" D. 11 4 x 27 3 x 22.9 cm. Weight: 10 lbs. (3.7 kg).

## 3 IP-2717A Regulated High Voltage Power Supply

**\$189<sup>95</sup>**

- Separate 0 to 400 VDC, 100 mA high voltage output and 0 to -100 VDC, 1 mA bias voltage output
- With separate 6.3 VAC and 12.6 VAC filament outputs

For higher voltage and tube circuits, the IP-2717A Power Supply is a convenient source of regulated power. The high voltage output provides an adjustable 0 to 400 VDC at a continuous 100 mA or an intermittent 125 mA with less than 10 mV RMS ripple and varies less than 1% from a no load to a full load condition. The bias output supplies from 0 to -100 VDC up to 1 mA.

Separate tube filament voltages of 6.3 and 12.6 VAC are also available for use as vacuum tube heater voltages or as an AC source for low voltage power supply circuits. These two outputs are rated at 2 amps and may be used at the same time if a combined power of 25 volt-amperes isn't exceeded. For the user's convenience, a separate transformer is used for the filament voltages allowing tubes to be left on while the high voltage is removed by a front panel switch.

A front panel meter monitors either high voltage or bias voltage as determined by the setting of a meter selection switch. High voltage DC current is also monitored by a 0 to 150 mA meter. The IP-2717A measures 13¾" W x 11¼" D x 5½" H and is housed in a rugged cabinet which features insulated output binding posts.

Kit IP-2717A, Shpg. wt. 19 lbs. .... 189.95  
SP-2717A, Assembled and tested, Shpg. wt. 20 lbs. .... 239.95

**IP/SP-2717A SPECIFICATIONS:** Outputs: High Voltage: 0 to 400 VDC. Bias Voltage: 0 to -100 VDC. Filament Voltages: 6.3 VAC and 12.6 VAC. Regulation: Less than 1% from no load to full load for output of 100 to 400 VDC. Ripple: Less than 10 mV RMS. Output Impedance: Less than 10 ohms from DC to 1 MHz (per manual impedance curve). Power Requirements: 120/240 VAC, 50/60 Hz.

## 4 IP-2728 Regulated Low-Voltage DC Power Supply

An ideal low-voltage supply, the IP-2728 furnishes a regulated 1 to 15 volts DC up to 500 milliamps. It has a continuously variable output with less than 5 mV ripple and noise. This convenient power source has fully adjustable current limiting from 10 mA to over 500 mA. A three-terminal floating output enables either positive or negative voltage outputs. Programming terminals on the rear panel allow AC or DC voltage control of the IP-2728's voltage output.

Kit IP-2728, Shpg. wt. 5 lbs. .... 44.95

## 5 AD-1309 Portable Pink/White Noise Generator

The AD-1309 is designed for use with the AD-1308 Spectrum Analyzer but it can be used with any real-time or swept-filter spectrum analyzer to check out audio systems. See page 28 for further details about this portable generator.

## 6 AD-1308 Portable Real-Time Spectrum Analyzer

A professional audio test instrument, the AD-1308 provides microprocessor control of audio spectrum analysis and sound pressure level measurement. See page 28 for more information about this analyzer and its rack mount accessory.

## Heathkit 5280 Series Test Equipment features bench instruments at an economical price

Designed for the beginning hobbyist, service person or student, the 5280 Series comprises a versatile set of work bench test instruments. Each of these high-quality kits is priced under \$50 so that a complete troubleshooting and test work station can be easily and economically assembled. Whatever your need, the 5280 Series represents a real value.

Your choice only  
**\$49<sup>95</sup>**  
each

## 7 IG-5282 Sine and Square Wave Audio Generator

- Sine and square wave outputs from 10 Hz to 100 kHz at 0 to 3V RMS
- Separate outputs may be used simultaneously or independently

Useful in many audio applications, the IG-5282 Audio Oscillator provides sine and square wave frequencies from 10 Hz to 100 kHz in four ranges. This frequency range makes the IG-5282 ideal as a signal source for harmonic distortion measurements of audio amplifiers. The square wave output can also be used to trigger instruments such as frequency counters and oscilloscopes. The sine and square wave levels are independently adjustable from 0 to 3 volts.

Single circuit board construction makes this versatile audio oscillator easy and quick to assemble. The rugged cabinet can be stacked with its companion test instruments and features a handy storage compartment. The IG-5282 Audio Oscillator requires two 9-volt batteries for portable use or the IPA-5280-1 Power Supply on page 51 for AC operation.

Kit IG-5282, Shpg. wt. 5 lbs. .... 49.95

**IG-5282 SPECIFICATIONS:** Frequency Output: 10 Hz to 100 kHz in four ranges. Sine Wave Output Voltage: 0 to 3 volts RMS. Square Wave Output Voltage: 0 to 3 volts peak. Dimensions: 11" H x 5¾" W x 7¾" D. Weight: 3¼ lbs.

## 8 IB-5281 RLC Bridge for field or bench work

- Directly read unknown values of resistance, capacitance and inductance
- Front panel meter accurately shows balanced measuring-bridge condition

A very useful general-purpose instrument, the RLC Bridge lets you easily determine unknown values of resistors, inductors and capacitors. With the IB-5281, you can clean up that pile of unknown components that always accumulates on a test bench. It has a resistance range of 10 ohms to 10 megohms, an inductance range of 10 μH to 10 H, and a capacitance range from 10 pF to 10 μF. Terminals are provided for the use of an external standard.

A rugged cabinet houses a single and easily assembled circuit board. A snap-tight compartment in the cabinet stores test leads and component clip accessories. Two 9-volt transistor batteries power the IB-5281 for portable operation or the IPA-5280-1 Power Supply on page 51 for AC use on a bench.

Kit IB-5281, Shpg. wt. 5 lbs. .... 49.95

**IB-5281 SPECIFICATIONS:** Resistance Ranges: 10 ohms to 10 megohms. Inductance Ranges: 10 μH to 10 H. Capacitance Ranges: 10 pF to 10 μF. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1. Cabinet Dimensions: 11" W x 5¾" H x 7¾" D. Weight: 3¼ lbs.





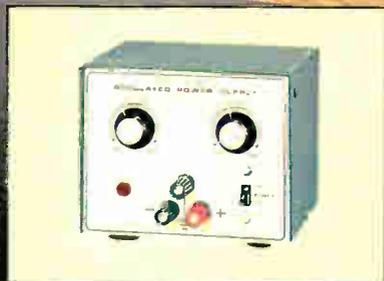
1



2



3



4 IP-2728 Regulated DC Power Supply



5 AD-1309 Noise Generator



6

AD-1308 Spectrum Analyzer



7



8



9



10

## 9 IG-5280 RF Oscillator for radio/TV aligning

- Five bands provide a wide 310 kHz to 110 MHz range of frequencies

The portable IG-5280 provides an accurate source of amplitude modulated and unmodulated RF signals for aligning tuned stages in AM, FM and television receivers. The RF Oscillator's output is divided into five overlapping bands covering AM, FM, TV, longwave and shortwave broadcasting. Use of calibrated harmonics allows the usefulness of the IG-5280 to be extended up to 220 MHz. A built-in 1 kHz oscillator provides modulation for the RF signal and serves as a convenient audio signal source. Operates on two 9V batteries or IPA-5280-1.

Kit IG-5280, Shpg. wt. 5 lbs. .... 49.95

**IG-5280 SPECIFICATIONS:** RF Output: Frequency Range: 310 kHz to 110 MHz in five bands, 100 to 220 MHz on harmonics. Output Voltage: 100 mV approx. Internal Modulation: 1000 Hz. AF Output: Frequency: 1000 Hz Voltage: 2.0 volts RMS (open circuit).

## 10 IT-5283 Signal Tracer checks radio/TV circuits

- Audible ohmmeter/voltmeter function works as a useful logic tracer

Simple, yet effective. The IT-5283 Signal Tracer is ideal for troubleshooting radio and TV circuits. Track down problems in all types of audio circuits. Check out logic circuits. Operates on two 9-volt transistor batteries or from IPA-5280-1.

Kit IT-5283, Shpg. wt. 5 lbs. .... 49.95

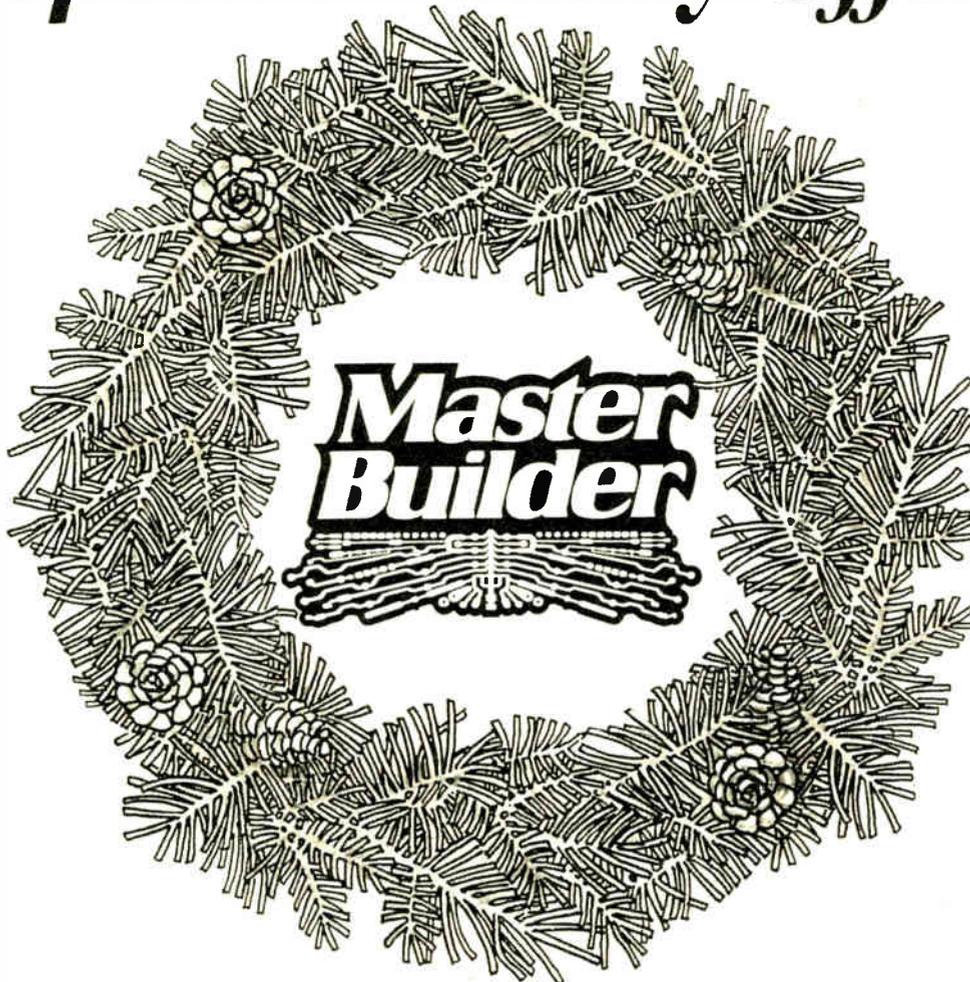
**IT-5283 SPECIFICATIONS:** Functions: Substitute speaker, AF signal tracing, RF signal tracing. Audible volt/ohmmeter. Speaker: 3" permanent magnet. Dimensions: 11" W x 5 3/4" H x 7 3/4" D.

## AC Power Supply for all 5280 Series Instruments

The IPA-5280-1 Power Supply simultaneously supplies a regulated + and - 9 volts DC to all the 5280 Series instruments from a selectable 120 or 240 VAC.

Kit IPA-5280-1, Shpg. wt. 3 lbs. .... 34.95

# *Special Holiday Offer*



## **500 Holiday Bonus Points**

**Claim your Bonus Point Certificate by November 15, 1984!**

To our favorite Heathkit Customers:

Come to the Heathkit Electronic Center near you and claim your Certificate for 500 Holiday Master Builder Points. This valuable Certificate is yours with kit purchase of \$49.95 or more.

Why an offer this special? Because this has been an exciting year! Response to the new Master Builder Club has been thrilling and we want to thank our present members.

And, if you're not a member, then take this golden opportunity to join! There's no purchase necessary to join the Club and you'll get recognition for the pride you build into Heath kits. Better yet, you can continue to earn Master Builder Points

with eligible kit purchases and those Points are good for higher ratings, awards and discounts.

Hurry! Your 500 Bonus Point Certificate is waiting for you at your Heathkit Electronic Center. You must pick it up by November 15, 1984 and validate it with a kit purchase of \$49.95 or more by December 15, 1984.

So, don't delay. Claim your Certificate by November 15. We'll thank you – with 500 HOLIDAY BONUS POINTS – for making this a very good year! The Certificate expires December 15, 1984.

Happy Holidays!

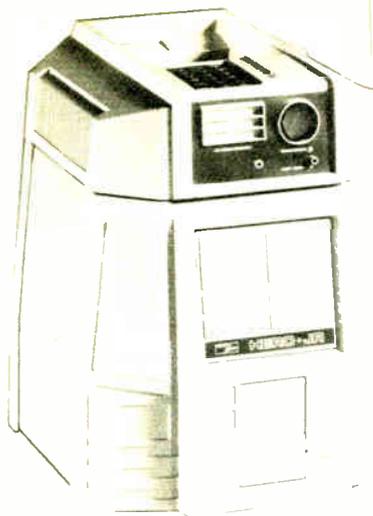
# Take your family beyond computers to...New HERO • JR.

Enter the fascinating world of the home robot with HERO JR. He'll wake you in the morning, guard your home at night, and entertain throughout the day with small talk, songs, and games.

You don't need to know anything about robots. His "personality" is pre-programmed so he can be charming without *any* input. Yet you can change personality traits with simple keystrokes. And you can move him about with a wireless remote control. Slip in a new cartridge for more pre-programmed phrases, games and actions. And, with his RS-232 interface, optional HERO JR BASIC and a personal computer, you can easily write your own "personalities."

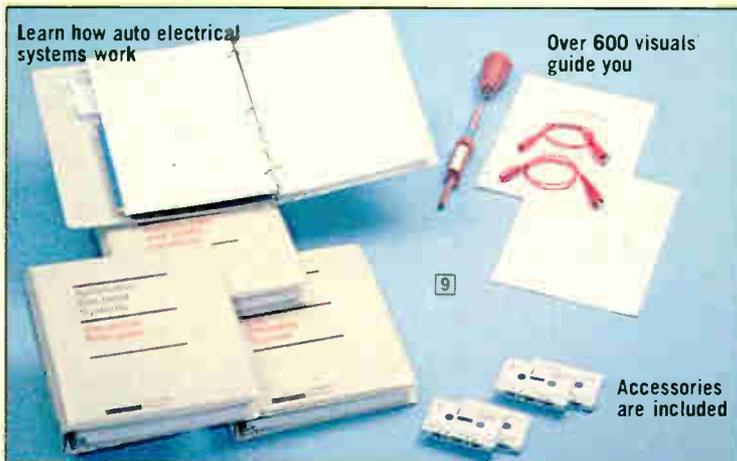
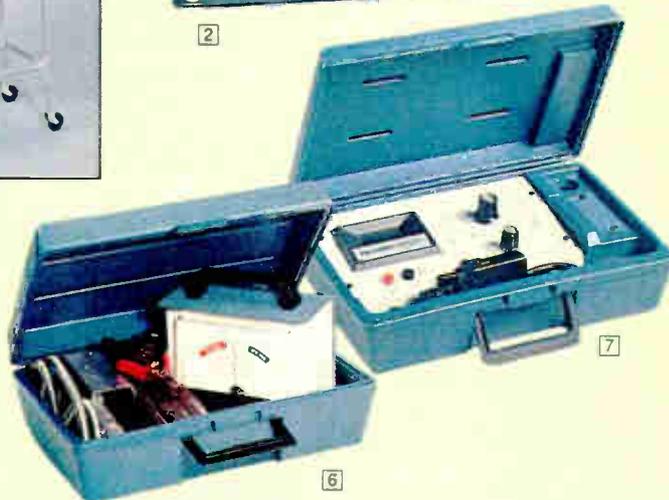
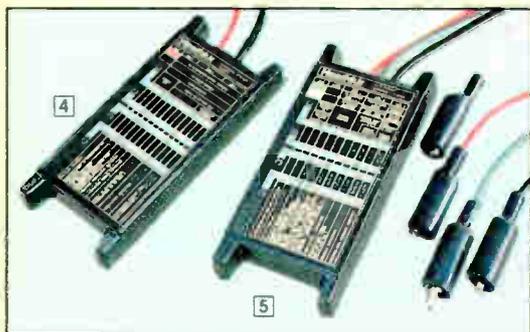
So, for less than the cost of a home computer, introduce your family to the wonders of robotics. See the New HERO JR at your Heathkit Electronic Center.

**Learn more about HERO JR – and claim your Bonus Point Certificate – at the store near you!**



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- **ANAHEIM, CA**  
330 E. Bail Rd.  
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- **CAMPBELL, CA**  
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- **EL CERRITO, CA**  
6000 Potrero Ave.  
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203-678-0323
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8262 Arlington Expressway  
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4705 W. 16th Ave., Hialeah  
305-823-2280
- **FT. LAUDERDALE, FL**  
7173 W. Broward Blvd.  
Plantation  
305-791-7300
- **TAMPA, FL**  
4019 W. Hillsborough Ave.  
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5285 Roswell Rd.  
404-252-4341
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98-1254 Kaahumanu St.  
808-487-0029
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312-583-3920
- **DOWNERS GROVE, IL**  
224 Ogden Ave.  
312-852-1304
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2112 E. 62nd St.  
317-257-4321
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913-362-4486
- **NEW ORLEANS, LA**  
1900 Veterans Memorial Hwy  
Kenner  
504-467-6321
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502-245-7811
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301-661-4446
- **ROCKVILLE, MD**  
5542 Nicholson Lane  
301-881-5420
- **PEABODY, MA**  
242 Andover St. (Rt. 114)  
617-531-9330
- **WELLESLEY, MA**  
165 Worcester Ave. (Rt. 9)  
617-237-1510
- **FARMINGTON HILLS, MI**  
29433 Orchard Lake Rd.  
(At 13 Mile Rd.)  
313-535-4171
- **EAST DETROIT, MI**  
18149 E. Eight Mile Rd.  
313-772-0416
- **ST. JOSEPH, MI**  
Lakeshore Dr.  
616-982-3215
- **MINNEAPOLIS, MN**  
101 Shady Oak Rd., Hopkins  
612-938-6371
- **ST. PAUL, MN**  
1645 White Bear Ave.  
612-778-1211
- **ST. LOUIS, MO**  
3794 McKelvey Rd., Bridgeton  
314-291-1850
- **GREENSBORO, NC**  
4820C W. Market St.  
919-299-5390
- **OMAHA, NE**  
9207 Maple St.  
402-391-2071
- **ASBURY PARK, NJ**  
1013 State Hwy. 35, Ocean  
201-775-1231
- **FAIR LAWN, NJ**  
35-07 Broadway (Rt. 4)  
201-791-6935
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3476 Sheridan Rd., Amherst  
716-835-3090
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15 Jericho Turnpike  
516-334-8181
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937 Jefferson Rd.  
716-424-2560
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7 Reservoir Rd.  
914-761-7690
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10133 Springfield Pike  
Woodlawn  
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28100 Chagrin Blvd.  
216-292-7553
- **COLUMBUS, OH**  
2500 Morse Rd.  
614-475-7200
- **TOLEDO, OH**  
48 S. Byrne Rd  
419-537-1887
- **OKLAHOMA CITY, OK**  
2727 N.W. Expressway  
405-848-7593
- **FRAZER, PA**  
630 Lancaster Pike (Rt. 30)  
215-647-5555
- **PHILADELPHIA, PA**  
6318 Roosevelt Blvd.  
215-288-0180
- **PITTSBURGH, PA**  
3482 Wm. Penn Hwy  
412-824-3564
- **WARWICK, RI**  
558 Greenwich Ave.  
401-738-5150
- **DALLAS, TX**  
2715 Ross Ave.  
214-826-4053
- **FORT WORTH, TX**  
6825-A Green Oaks Rd  
817-737-8822
- **NORTH HOUSTON, TX**  
5050 FM 1960 W. (1 mile  
west of Stuebner-Airline Rd.)  
713-583-1163
- **HOUSTON, TX**  
1704 W. Loop N.  
713-869-5263
- **SAN ANTONIO, TX**  
7111 Blanco Rd  
512-341-8876
- **SALT LAKE CITY, UT**  
58 East 7200 South, Midvale  
801-566-4626
- **ALEXANDRIA, VA**  
6201 Richmond Hwy  
703-765-5515
- **VIRGINIA BEACH, VA**  
1055 Independence Blvd  
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206-682-2172
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15439 53rd Ave. S.  
206-246-5357
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516 SE Chaklov Dr  
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5215 W. Fond du Lac  
414-873-8250

**Heathkit®**  
Electronic  
Center



**IMPORTANT:**  
This product is designed for use in emergency vehicles. Consult authorities before installing or operating.

### 8 Siren/PA for mobile public services

**\$99<sup>95</sup>**

- Includes new hi-lo siren circuit and provision for multi-mode emergency lighting control
- For positive or negative ground electrical systems

This compact, 55-watt siren has automatic or manual wail, hi-lo emergency tone and yelp to accommodate different traffic situations. A 20-watt public address circuit amplifies your voice for outside announcement and incoming radio calls to monitor while away from the vehicle. Low-noise, push-to-talk microphone will instantly go from any siren to clear audio-PA mode.

Kit GD-1810, Shpg. wt. 6 lbs. . . . . 99.95

GDA-18-1, Weatherproof Exterior Horn Speaker, assembled, 10 lbs. . . . . 99.95

Kit GDA-18-2, Concealed Grille Speaker, Shpg. wt. 10 lbs. . . . . 99.95

Kit GDA-1558-1, Emergency Lighting Relay, Shpg. wt. 1 lb. . . . . 4.95

### 9 Electrical Systems Course to repair your car at home

**\$39<sup>95</sup>**

- Avoid costly repairs and save both time and money
- Hands-on experiments show you the exact procedures for EAC-1
- Money-back guarantee if you're not 100% satisfied

You'll learn how to care for your battery, how to test each part in your starting and charging systems, how to trace the circuitry throughout your car and repair all lights and accessories. Pass the optional final exam by scoring 70% or better to earn 4.0 Continuing Education Units and a Certificate of Achievement.

EAC-1, Complete 4-Module Course and Accessories, Shpg. wt. 23 lbs. . . . 39.95

Module One, Electrical Principles, EA-11, 5 lbs. . . . . 14.95

Module Two, Starting System, EA-12, 5 lbs. . . . . 14.95

Module Three, Charging System, EA-13, 5 lbs. . . . . 14.95

Module Four, Body/Accessory Circuits, EA-14, 5 lbs. . . . . 14.95

# Automotive test equipment for the amateur, semi-professional or professional mechanic

## 1 Professional tune-ups in your own garage

**\$599<sup>95</sup>**

- Accurately displays primary and secondary waveforms
- Measures RPM, dwell angle and ignition voltage
- Includes illustrated, 75-page Operation Handbook

Designed for the auto hobbyist yet perfect for a professional garage operation, Heathkit's top-of-the-line Ignition Analyzer enables you to perform precision auto tune-ups every time. Rock-steady CRT parade and superimposed patterns are made possible by the latest design in induction pickup circuitry. Select 4, 6 or 8 cylinder operation from front panel pushbuttons. Dwell, RPM and voltage measurements are easily read on a large 8-inch meter.

**Cylinder select buttons** short out cylinders for performing power balance checks and for electrical displays of one or more cylinders. Front panel switches allow both parade and superimposed displays of primary and secondary waveforms with 10:1 and 2:1 trace expansion. Four simple connections enable all tests. Analyzer includes adapter for GM HEI systems as well as all necessary cables, clamps and inductive pickup for full operation.

**Kit CO-2600**, Shpg. wt. 83 lbs. .... **599.95**

**COA-2600-2**, Alternator Test Adapter, Shpg. wt. 1 lb. .... **14.95**

**Timing Light with Advance Meter** plugs directly into the CO-2600 Analyzer and provides a bright timing flash that registers clearly at up to two feet, even in daylight. Built-in RPM/Advance scales measure RPM from 1500 to 4500 and distributor advance from 0 to 60 degrees, includes 10' cable with connector.

**Kit COA-2600-4**, Timing Light, Shpg. wt. 3 lbs. .... **62.95**

**Analyzer Scope Cart** stands at the right height for viewing the CO-2600 while working under the hood. This easy-to-build cart rolls smoothly on durable casters.

**Kit COA-2600-3**, Shpg. wt. 25 lbs. .... **49.95**

**CO-2600 SPECIFICATIONS:** For Use With: Standard, transistorized or C-D ignition systems on 4, 6 or 8 cylinder (4-cycle) or 2-rotor Wankel engines. **Front Panel Controls:** Scope, Intensity, Vertical Position, Vertical Gain, Horizontal Position, Trace Length, 25 kV and 50 kV Secondary Volts, 50 V and 500 V Primary Volts, Parade, Superimpose and eight Power Balance/Single Cylinder pushbuttons plus Cancel. **Tachometer:** 1000 RPM, 3000 RPM, 6000 RPM. **Voltmeter:** 2 VDC, 20 VDC. **Signal Pickup:** Direct for primary, inductive for parade trigger and capacitive for secondary. **Tachometer and Voltmeter Accuracy:** ± 3% of full scale on any range. **Meter Size:** 8 inches. **Scope Vertical Expand:** Minimum 2 to 1. **CRT Size:** 11 1/2 inch diagonal. **Operating Temperature Range:** 32 F to 104 F (0°C to 50°C). **Power Requirements:** 110/130 or 220/260 VAC, 50/60 Hz. **Net Weight:** 53 lbs. (24 kg). **Dimensions:** 12 7/8" high x 25 1/4" wide x 14 1/8" deep (32.7 x 64.1 x 35.9 cm).

## 2 Portable Ignition Analyzer

**\$279<sup>95</sup>**

- Displays primary and secondary waveforms
- Uses clamp-on, inductive pulse pickup method
- Built-in dual range tachometer
- Operates with 3, 4, 6, or 8-cylinder engines

Diagnose and resolve most ignition problems fast with this handy Ignition Analyzer. Quickly detect difficult to pinpoint ignition problems.

Select one of four different patterns, primary or secondary in parade or superimposed displays. For a detailed analysis of a waveform's components, horizontal traces can be expanded 10 to 1 and the vertical sweep can be expanded 2 to 1.

Use it with any standard, transistorized or C-D ignition on 3, 4, 6, or 8-cylinder engines with distributors. Includes adapter for GM HEI systems. Optional 12-volt inverter mounts to the rear of the unit for portable operation. Accompanying handbook illustrates dozens of detailed cause-and-effect waveforms. Operates on 120/240 VAC.

**Kit CO-1015**, Shpg. wt. 22 lbs. .... **279.95**

**Kit COA-1015-1**, 12 VDC lighter-socket Power Inverter, Shpg. wt. 3 lbs. .... **39.95**

## 3 Wiper Delay makes driving safer

- Normal and delay modes
- Variable wiper sweeps, from 30 to .5 seconds

The inexpensive CH-1068 is an easy, one evening project that keeps your view clear on the highway. Kit includes test lamp with special instructions to locate and identify hookup leads in your auto wiring system. Designed to fit most single and 2-speed wipers. Incompatible with motor-reversing hidden wipers; contact your auto dealer for specifics. Unit mounts quickly and easily using gimbal bracket or double-sided tape strip from kit.

**Kit CH-1068**, Shpg. wt. 2 lbs. .... **19.95**

## 4 Reliable Electronic Ignition Tester saves time

- Quick and easy to use – takes the guesswork out of pinpointing defective components in modern electronic ignitions
- Inexpensive, and small enough to pack in a pocket or purse

Performs four tests that quickly tell you: if your battery is sufficiently charged, if the reluctor and pickup coil are providing an input to the ignition module, if the ignition module is properly switching the coil primary, and the location of a faulty component in the ignition primary circuit. Requires some ignition knowledge; pickup coil test won't work on new Hall-effect ignitions. Keep one handy in every family vehicle for troubleshooting unexpected breakdowns on the road.

**Kit CI-2055**, Shpg. wt. 2 lbs. .... **19.95**

## 5 Low-cost Charging System Tester finds trouble

- Portable and reliable – lets you diagnose faulty components in your vehicle's charging system with foolproof ease
- A 'natural' for any good auto mechanic's tool collection

Two-wire setup and three quick tests tell you: if the battery has sufficient charge to reliably start the engine, if the battery is being charged by the alternator, if the voltage regulator is at fault (causing the battery to become overcharged), and if the alternator stator windings, and rectifier diodes are functioning properly. Lightweight and portable like the Ignition Tester, it also uses digital ICs to evaluate performance characteristics and cause LEDs indicative of the problem to light. No external power or battery required. Measures 3/4" H x 2 3/4" W x 5 1/2" L. Be prepared in case of trouble – don't be stranded without the help these Testers provide!

**Kit CI-2065**, Shpg. wt. 2 lbs. .... **19.95**

## 6 Exhaust Gas Analyzer for tune-up evaluations

**\$119<sup>95</sup>**

- Squeeze more performance power from gasoline
- Includes all you need for total exhaust vapor analysis

Perhaps the best way to guarantee your engine is running at maximum potential and emitting as few pollutants as possible is by testing it with the Heathkit Exhaust Gas Analyzer. A CI-1080 can monitor for minimum pollution, review the emission control system and indicate positive diagnosis.

By measuring thermal conductivity of your exhaust gases, it can show the air-to-fuel ratio, overall combustion efficiency and percentage of carbon monoxide present. From these you can determine if an auto's fuel mixture is unnecessarily too rich or lean for best economy. It's essential when tuning up engines to meet a specific rating for clean air standards in many states. Not intended for use with Chrysler "lean burn" engines.

To facilitate setup, the easy-to-read, 4 1/2" color-coded meter is designed to hang on a partly open window or stand upright without marring paint finishes. The removable sensor/probe assembly uses a flexible stainless steel tube for safe routing of all gaseous material. The CI-1080 is housed in a rugged polyduralene case with foldaway handle for easy portability and storage. Powered by 6 or 12-volt battery in auto under test. All accessories included.

**Kit CI-1080**, Shpg. wt. 6 lbs. .... **119.95**

## 7 Portable digital Engine Analyzer

**\$129<sup>95</sup>**

- Measures dwell angle, engine speed, DC voltage, resistance and current
- 3 1/2 digit LCD display is easily readable even in bright sunlight

Versatility at an affordable price, that's the CM-1551. With this self-powered portable digital analyzer, you can make critical tune-up measurements to help determine if your vehicle is operating at peak performance. Check dwell on 4, 5, 6 and 8-cylinder engines from 0 to 90° within ± 0.2%. Check idle speed in two tachometer ranges up to 10,000 RPM with an accuracy of ± 0.1%. Measure DC voltage in two ranges up to 200 volts at ± 1.5%, current to 20 amps with ± 3% accuracy and resistance to 2 megohms at ± 1.5%.

Using the optional Shunt Accessory (below), the CM-1551 can measure starting current and battery charge/discharge currents. Power is supplied by a 9-volt battery (not included). Analyzer displays circuit polarity, low battery and overranges.

**Kit CM-1551**, Shpg. wt. 5 lbs. .... **129.95**

**CMA-1550-1**, 400-Ampere Shunt, 1 lb. .... **15.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center.



## 1 Gain an edge in commercial and sport fishing with an advanced Video Fish Recorder

**\$499<sup>00</sup>**

- See below your boat down to 480 feet using eight separate depth ranges
- Designed for simple and easy console, overhead, dashboard or cockpit installation

Make your fishing ventures a lot more enjoyable and successful with the sophisticated MIP-2915 Video Fish Recorder. On its 5½" high-contrast, anti-glare screen appears a vast amount of information besides a picture of the bottom and any fish in between. A range scale divides the display with dashed lines into one of eight selected depth regions: 0-30', 30-60', 0-60', 60-120', 0-120', 120-240', 0-240' or 240-480'. Depth selection is determined by two range switches.

Also displayed on the screen are movable bar indicators that show the position of both the bottom and surface alarms. You select the maximum and minimum depth levels to warn you of a rising bottom or a strong fish echo. Four distinct shades of gray illustrate bottom conditions as well as the presence of fish. A brightness control adjusts the screen for varying light conditions.

The MIP-2915 also features an adjustable sweep speed for broader or a more condensed image while a freeze position holds the image for analysis. A gain control adjusts the Video Recorder's sensitivity where needed. The MIP-2915 comes with a transom-mount transducer with 25' cable and bracket. Its five pound weight and compact 6" H x 7½" W x 7¼" D size enables the Recorder to be placed almost anywhere. Operates on +12 VDC and comes with a power cable.

MIP-2915, Assembled and tested, Shpg. wt. 8 lbs. .... **499.00**

## 2 Automatic, dual-range Digital Depth Sounder

- Alarm settings alert you to depth changes both audibly and visually

Features self-adjusting range selection that monitors water's depth from 2' to 499'. Big, easy-to-read LCD display with automatic night light shows depths in 0.1' increments to 9.9' and in 1' intervals from 10' to 499'. Has alarm settings at 2', 4', 10', 20' and 40' with built-in keel offset. Operates on 12 volts DC. Cabinet measures 7" W x 2½" H x 5½" D without its gimbal bracket mount.

Kit MI-2916-1, Depth Sounder with Through-Hull Transducer, 8 lbs. .... **189.95**

Kit MI-2916-2, Depth Sounder with Transom-Mount Transducer, 7 lbs. .... **179.95**

Kit MI-2916-3, Depth Sounder with Flush-Mount Transducer, 8 lbs. .... **199.95**

## 3 Digital Remote Depth Sounder repeater station

Works with the MI-2916 with independent alarm/depth settings and keel-offset capability. Includes 25' connector cable and gimbal-mount bracket.

Kit MI-2917, Shpg. wt. 4 lbs. .... **69.95**

## 4 Flush-mount Digital Remote Readout for sailboats

Operates like the MI-2917 and requires MI-2916. Has 5" diameter cabinet.

Kit MI-2918, Remote with visual warning only, Shpg. wt. 4 lbs. .... **89.95**

Kit MIA-2918-1, Audible alarm for MI-2918, Shpg. wt. 1 lb. .... **12.95**

## 5 Two low-cost Heathkit Digital Knotmeter/Trip Log

**\$99<sup>95</sup>**

- Keeps track of nautical speed and distance with ±5% accuracy
- Tough, durable and designed to be used with all types of hulls

The most accurate knotmeter/log of its kind. This precise knotmeter/Trip Log constantly computes and updates speed and distance every two seconds with ±5% accuracy. Transducers for the MI-2956 and MI-2958 both feature a special optimizing speed calibration that enables you to fine tune the circuits to the shape of your individual hull. Each has an easy-to-read LCD display with automatic backlighting for night outings. See your speed in mph (or knots), from 0.1 to 40 mph; or distance traveled from 0 to 99 miles (or nautical miles).

Order the MI-2918 Knotmeter/Trip Log for your sailboat or the MI-2956 Knotmeter/Trip Log for power boats. Choose from two types of transducers according to the size of your boat or your individual preference.

Kit MI-2958, Sailboat Knotmeter/Trip Log, Shpg. wt. 4 lbs. .... **99.95**

Kit MI-2956, Powerboat Knotmeter/Trip Log, Shpg. wt. 4 lbs. .... **99.95**

MIA-2950-1, Through-Hull Transducer, Shpg. wt. 2 lbs. .... **39.95**

MIA-2950-2, Transom-Mount Transducer, Shpg. wt. 2 lbs. .... **29.95**

## 7 Sensitive Deluxe Dual-Range Fish Spotter

A Heathkit Deluxe Fish Spotter should be standard tackle for any serious angler. It can help you increase the size and weight of your catches by detecting single or schools of fish swimming, and submerged objects between the surface and any preset depth you choose. Two sounding ranges, 0-60 or 0-240 feet, insure the high accuracy and sharp definition so important in an instrument of this type.

Two precision instruments in one portable package: The MI-2901 will locate the best fishing habitats and stand duly as a dependable depth sounder for navigation through unknown waters. Has sensitivity control, corrosion-resistant aluminum case, sun-shielded dial and watertight ceramic transducer element with suction cup mount. Powered by two 6-volt lantern batteries (not included).

Kit MI-2901A, Shpg. wt. 9 lbs. .... **139.95**

Scanning Transducer Bracket for use with MI-2901, Has C-clamp mounting, scans 360° and locks in any position. Accepts 1½" transducer element.

Kit MIA-2900-1, Shpg. wt. 4 lbs. .... **39.95**

## 8 Deluxe Dual-Range Depth Sounder

Whether you're fishing, cruising or scuba diving, this Dual-Range Depth Sounder will add an extra measure of safety to your boating season pleasure. When selected, a high-pitched beeping alarm alerts you to shoals or submerged objects projecting above any preset depth from 5 to 240 feet, thus eliminating the need for continuous visual monitoring. Two ranges, one for depths to 60 feet and one for depths to 240 feet, provide extremely accurate readings instantly.

Depth Sounder with through-hull transducer and 25 feet of connector cable.

Kit MI-1031-1, Shpg. wt. 8 lbs. .... **119.95**

Depth Sounder with transom-mount transducer and 25 feet of connector cable.

Kit MI-1031-2, Shpg. wt. 8 lbs. .... **119.95**

## See our kits on display at Heathkit Electronic Centers Units of Veritechnology Electronics Corporation

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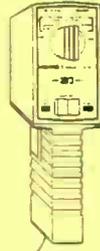
HERO 1 is completely equipped to demonstrate every major robotic concept



1



Hexadecimally keypad and LED display



Teaching Pendant controller



NEW optional RF Remote Control Accessory enables direct and computer control of HERO 1 from up to 100 feet away

## Move into the world of robotics with HERO 1

### 1 HERO 1 is the ideal robotics training tool

HERO 1 is a completely equipped trainer designed to demonstrate every major robotic concept and all the basic systems found on the modern and increasingly sophisticated robots and automated machines of industry.

Bring the concepts of high-technology robotics to life with practical hands-on training using the teaching robot, HERO 1. This computer-controlled, electro-mechanical device allows you to explore and work with all the fundamental components and circuitry associated with robot technology. Completely self-contained, HERO 1 is capable of interacting with you and its environment. It detects light, sound, motion and obstacles in its path; and it can travel over a predetermined course. When using its optional arm, the robot can be programmed to pick up small objects with its manipulator. And with its optional voice synthesizer, HERO 1 can even speak in complete sentences.

**An intelligent robot,** HERO 1 has a computer brain consisting of an on-board 8-bit 6808 microprocessor. Following programmed instructions, the microprocessor can guide HERO 1 through complex maneuvers, activate and monitor sensors, and modify the robot's actions as a result of sensor or real-time clock inputs. Memory consists of 8K of ROM and 4K bytes of RAM. This can be increased up to 56K with the addition of an optional memory expansion board. Preprogrammed ROMs are also available for installation on this board that allow HERO 1 to demonstrate its many capabilities.

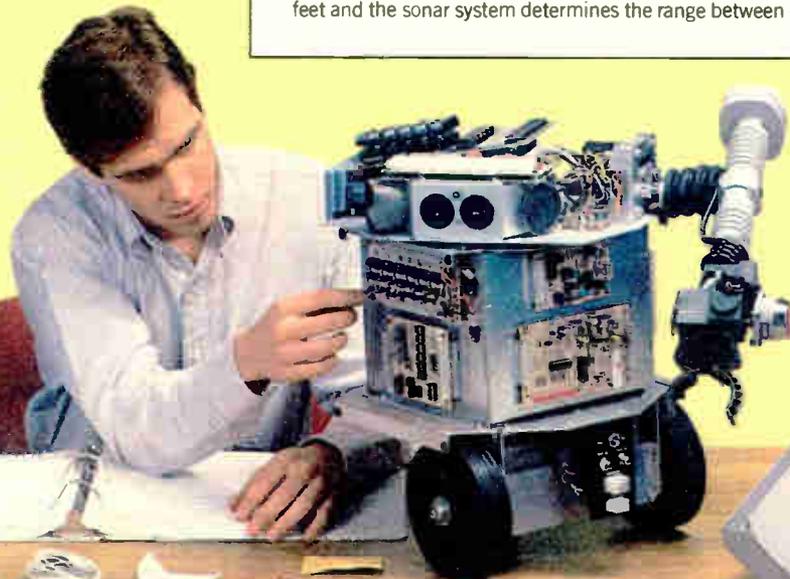
**Program HERO 1 using any one of several methods.** From the top-mounted 17-key keyboard you can easily enter, verify and modify programs as well as select any of the seven operating modes. Also access any of the microprocessor's registers through the keyboard. An attachable Teaching Pendant lets you manually control all motor and arm movements or store them in memory for later duplication. A rear-panel serial port allows programs stored in memory to be transferred to a cassette tape for later reloading and use.

**Two totally new methods** to control HERO 1 are now available. One is a remote, radio frequency-controlled transmitter available in 3 models, each operating at a different frequency. It controls all keyboard and Teaching Pendant operations from up to 100 feet away. An RS-232 connector on this accessory also permits a computer to remotely operate the robot. The Remote has a self-contained rechargeable battery that provides operating power for up to five hours. Control is also provided through an optional RS-232 Interface that plugs onto the top breadboard providing a direct link between a host computer and HERO 1.

**Light, sound and motion detectors** plus a sonar ranging system gives HERO 1 the ability to see and hear. The sound detector hears over a 300 to 5000 Hz frequency range while the light detector sees over the entire visible spectrum and into the Infrared spectrum. The motion detector senses movement up to a distance of 15 feet and the sonar system determines the range between objects and the robot.

2

3



An experimental breadboard, mounted on the top of HERO 1, provides a means of experimenting with and interfacing user-designed circuits to the robot's CPU. Direct access is available to an I/O port, a user-defined interrupt, CPU control lines, and +12 and -5 VDC power terminals.

The optional **Arm and Gripper Mechanism** enables HERO 1 to grasp and manipulate objects. Arm movements through five axes of motion are provided by five stepper motors. The arm assembly is capable of lifting 16 ounces when retracted and 8 ounces when fully extended.

The optional **Speech Synthesizer** gives HERO 1 a voice. It uses a phoneme-based synthesizer system that generates 64 phonemes or speech sounds. You link the phonemes together in your computer programming to simulate human speech, several different languages are possible, and various sound effects.

**Kit ET-18**, Basic HERO 1 Robot (less arm, voice), 69 lbs. .... **799.95**

**Kit ET-18-1**, HERO 1's Arm (Arm and Gripper Mechanism), 6 lbs. .... **349.95**

**NEW! ETW-18-1**, Assembled HERO 1 Arm, Shpg. wt. 5 lbs. .... **549.95**

**Kit ET-18-2**, HERO 1's Voice (Phoneme Speech Synthesizer) 1 lb. .... **99.95**

**NEW Kit ET-18-35**, Remote Control Accessory for HERO 1, operates at 75.43 MHz, Shpg. wt. 5 lbs. .... **299.95**

**NEW! ETW-18-35**, Assembled ET-18-35 Accessory, 5 lbs. .... **399.95**

**NEW! Kit ET-18-36**, Remote Control Accessory for HERO 1, operates at 75.67 MHz, Shpg. wt. 5 lbs. .... **299.95**

**NEW! ETW-18-36**, Assembled ET-18-36 Accessory, 5 lbs. .... **399.95**

**NEW! Kit ET-18-37**, Remote Control Accessory for HERO 1, operates at 75.87 MHz, Shpg. wt. 5 lbs. .... **299.95**

**NEW! ETW-18-37**, Assembled ET-18-37 Accessory, 5 lbs. .... **399.95**

### Special \$100.00 Discount Offer!

Save \$100.00 when you purchase a kit or fully assembled HERO 1 Robot along with any kit or fully assembled Remote Control Accessory. On your order, specify the model number of the remote which operates at the frequency you desire and then deduct \$100.00 from your order.

**ET-18-4**, Demo ROM, a plug-in ROM containing several routines demonstrating all of HERO 1's motor and sense circuits including voice, 1 lb. .... **49.95**

**ET-18-5**, Monitor ROM listing, Shpg. wt. 1 lb. .... **39.95**

**NEW! ET-18-6**, Memory Expansion Board, an add-on circuit board to HERO 1's CPU board for the addition of up to six extra memory devices, 2 lbs. .... **59.95**

**NEW ETA-18-6**, Memory Expansion RAM, an 8K x 8 random access memory chip that installs on the ET-18-6 memory board, Shpg. wt. 1 lb. .... **39.95**

**ET-18-7**, Automatic Mode ROM, a plug-in ROM that enables HERO 1 to move independently about while avoiding obstacles, 1 lb. .... **29.95**

**NEW ET-18-9**, HERO 1 BASIC, a plug-in ROM that allows you to program HERO 1 in a simple integer BASIC with modifications that enable you to use the Robot's voice synthesizer and its various motors and sensors. To use HERO 1 BASIC you'll need: an ET/ETW-18 Robot, an ET-18-6 Memory Expansion Accessory, one or more ETA-18-6 Memory Expansion RAM, an ET-18-10 RS-232 Interface Accessory, a terminal or computer with a terminal emulation program, and a serial interface cable such as the HCA-10 or HCA-11 on page 95. Shpg. wt. 1 lb. .... **49.95**

**NEW! ET-18-10**, RS-232 Interface, allows serial communications between HERO 1 and a terminal or host computer, requires ET-18-6 Memory Expansion Board, Shpg. wt. 2 lbs. .... **59.95**

**NEW! ET-18-11**, HERO 1 Demo Cassette, programs on cassette tape demonstrating HERO 1's sensors and voice plus arm and body movements, 1 lb. .... **14.95**

**ETW-18**, Completely assembled and tested HERO 1 with arm and voice accessories installed, Shpg. wt. 70 lbs. .... **2199.95**

**NEW ETW-18-WA**, Assembled HERO 1 without arm accessory, 65 lbs. .... **1699.95**

**SAVE \$50.00!** HERO 1 Robot kit including arm with gripper mechanism and phoneme-based voice synthesizer.

**Kit ETS-18**, Shpg. wt. 91 lbs. .... **1199.85**

## Companion home study courses provide training in the basic technology of robotics

### NEW! Advanced Programming Experiments for HERO 1

Unlock the power of HERO 1's **Robot Language Interpreter** and learn about the subroutines in the Robot's monitor ROM. Sixty-one programming experiments provide a wide range of examples designed to teach general programming principles. Learn how to make HERO 1 really perform with these experiments.

**EB-1802**, Shpg. wt. 1 lb. .... **24.95**

## 2 Robotics and Industrial Electronics Course

**\$99<sup>95</sup>**

- The entire field of robotics is covered in a two-volume set filled with informative charts and diagrams
- Optional experiments using HERO 1 provide hands-on experience and mechanical familiarity with robots

A comprehensive course in robot technology, the Robotics and Industrial Electronics Course is the perfect start for your journey into the world of robotics with an A to Z look at how robots work. This course reviews elementary electronic principles used in the robotics field and introduces new concepts associated with robots and automated machines.

In this self-study course, the mechanics of robots as well as computer control is completely covered. You master each concept before proceeding to the next. An introduction to low, medium, high-technology robots begins this challenging course. Progressing at your own speed, you become acquainted with the operation of various AC and DC motors and generators, industrial hydraulic and pneumatic systems, and DC stepper motors.

Computer applications are then linked with mechanical principles for complete robotics system coverage. Microprocessors are introduced and you are shown how to write robot control programs. Sensing systems are covered along with how a robot can be made to talk using voice synthesis. Also covered are the skills needed to make a robot perform tasks.

Optional hands-on experiments using the unique teaching robot, HERO 1, are also included with this course. They provide you with a tremendous opportunity to learn, practice and apply the basic principles of: industrial electronics, computers, automated equipment, sensors, servos, stepper motors, controllers and other components of industrial robots. Working with HERO 1 you gain practical experience with the elements of robotics including: programming, electronically-controlled movement and positioning, interfacing and data acquisition.

Pass the optional final examination with a 70% or better score and earn 8 Continuing Education Units and receive a Certificate of Achievement.

To better understand the material in this Course, you should complete the following subjects or have a knowledge equivalent to: EE-3101A DC Electronics (p. 61), EE-3102A AC Electronics (p. 61), EE-3201A Digital Techniques (p. 63), and EE-3401 Basic Microprocessors (p. 65).

**EE-1800**, Shpg. wt. 12 lbs. .... **99.95**

## 3 Robot Applications Course keeps up with changes

**\$99<sup>95</sup>**

- Briefly reviews robot basics, introduces new concepts and provides a knowledge base for the changing field
- Uses HERO 1 to perform many challenging experiments including the construction and use of an EPROM burner

Keep pace with the rapidly expanding field of robotics. In the Robot Applications Course learn about the concepts and technologies that make advanced industrial robots a reality. See how tasks, payback, reliability, quality and other factors govern the selection of an industrial robot. Learn about the process of signal conditioning which gets the signal from a sensor to the microprocessor controller. Covered in detail are different types of vision, tactile and environmental feedback sensor systems. After finishing this course, you'll better understand the capabilities as well as the limitations of today's industrial and domestic robots.

A look into a future manufacturing plant is also presented. In this plant, "computer-aided" production is viewed. Present uses of industrial robots are then discussed with a look at possible future robot applications.

Nine experiments add to your training experience. All are performed on the versatile robotics trainer, HERO 1. These experiments provide a hands-on opportunity to become acquainted with the concepts and technology you have studied in the text. Experiments covered in the course include: a smoke detection/vocal warning system, a heat sensor, color discrimination, object identification, vision-aided positioning, array tactile sensor, a controller memories/EPROM burner, stationary home security robot and a mobile home security robot. All components needed to complete the experiments (including a programmable ROM) are included. An audio cassette tape containing several programs for HERO 1 is also supplied with this course.

After completing the optional final exam and passing with a 70% or better score, you'll earn 4 Continuing Education Units (a nationally recognized method of awarding achievement in non-credit adult education). Plus, you'll also receive recognition in the form of a Certificate of Achievement.

For a fuller understanding and to better prepare yourself for the information presented in this course, completion of the Robotics and Industrial Electronics Course is highly recommended.

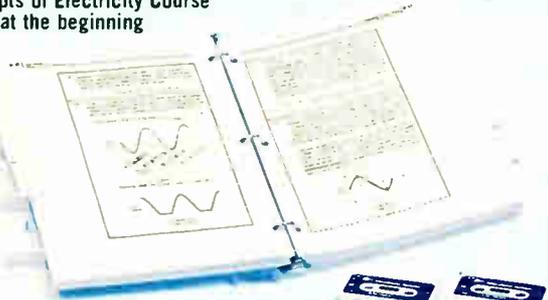
**EE-1812**, Shpg. wt. 6 lbs. .... **99.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center.

# Develop a solid foundation for all your studies in electronics with these entry level courses

Concepts of Electricity Course starts at the beginning

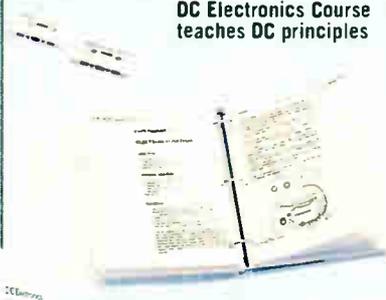


Fundamentals of electricity and an introduction to electronics

1



DC Electronics Course teaches DC principles



Optional audio-visual accessory available

2



Build and experiment with DC circuits

AC Electronics Course teaches AC principles



Enhances understanding of electronics and AC

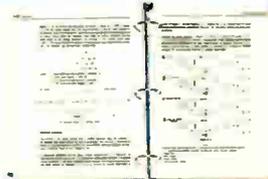
Optional audio-visual accessory available

3



AC experiments included

Semiconductor Devices Course covers theory



Covers technology of semiconductors

Optional audio-visual package available

4



Includes parts for experiments

## 5 Increase your learning success with hands-on experiments

\$99<sup>95</sup>

ET-31008 Experimenter and Trainer

Compact, rugged, reliable and versatile, experimental and circuit design tool

Variable power supplies and 200 kHz to 200 kHz frequency generator



Solderless bread-board sockets for circuit building

Center-tapped transformer supplies 30 V RMS and 60 Hz signal

Built-in 1 kilohm and 100 kilohm variable resistors



## Tutorial Electronics Dictionary

This Tutorial Dictionary does more than clearly define electronics technical terms in 832 pages. This Dictionary also contains a summary of 16 electronics-related topics. These outlines allow this informative and well-illustrated Dictionary to become a low-cost self-instructional course in electronics. Each topic outline lists related terms making it an effective learning tool. Approximately 20,000 terms are covered in a clear and concise manner. Make this Learning Dictionary part of your professional library.

EB-1010, Shpg. wt. 3 lbs. . . . . 14.95

## 1 Concepts of Electricity Course for the beginner

**\$29<sup>95</sup>**

- Provides a working knowledge in the fundamentals and concepts of both AC and DC electricity
- Expands into circuit theory and electromechanical systems

**From the very beginning:** For those without previous knowledge or experience in the field of electronics, this programmed Course is designed to examine the subject at a beginner's level. And, at the same time, act as an introduction to other electronics courses. Begin by learning about the fundamental concepts of both direct and alternating current. Then you expand into the areas of circuit theory and associated electromechanical systems such as motors, generators and meters.

**Reviews:** Each audio/visual section is followed by a programmed instruction section designed to reinforce what you have just covered. And, a review at the end of each unit tests your understanding of the material.

**Course Goals:** When you complete this Course, you'll be able to explain the difference between AC and DC, and be able to explain the operation of DC and AC generators and motors. After completing the Course in your own step-at-a-time pace, you'll know the difference between resistors, capacitors, diodes and other electronic components. Besides being able to solve basic problems involving current, voltage, and resistance, you'll know how to measure them.

**Final Examination:** Besides being an excellent learning activity, it provides a comprehensive review of the material you've covered. With a passing grade on the Exam, you are awarded an attractive certificate and 1.0 Continuing Education Unit.

EE-3100, Concepts of Electricity Course, Shpg. wt. 5 lbs. .... 29.95

### MONEY-BACK GUARANTEE

If you are dissatisfied with any self-instruction course for any reason, return all course materials (except trainer) and your receipt for a full refund of purchase price.

## 3 AC Electronics Course teaches principles of AC

**\$54<sup>95</sup>**

- Gives a firm foundation in the principles of AC electronics
- Shows how various components react in AC circuits
- Demonstrates the application and use of AC components

**Advance your knowledge** with a comprehensive coverage of the principles of alternating current. Presented are AC theory, measurement and circuit behavior. Programmed reviews and experiments reinforce text material. Uses the ET-3100B Trainer. Recommend using multimeter and scope for experiments. Earn 1.5 CEUs after passing final exam.

EE-3102A, AC Electronics Course, Shpg. wt. 7 lbs. .... 54.95

EEA-3102A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. ... 19.95

**SAVER!** Buy both the AC Course and the ET-3100B Trainer and save \$20.

EES-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 19 lbs. .... ONLY 134.90

**Spanish Language AC Electronics Course:** Spanish translation of this course. less EB-6102-30 Parts for the experiments (see page 75).

EE-3102S, AC Electronics Course in Spanish, Shpg. wt. 7 lbs. .... 59.95

## 5 Versatile ET-3100B Electronic Design Experimenter

**Allows you to construct, modify and test circuits.** Designed for hands-on use with experiments from the DC, AC, Semiconductor, Electronics Circuits, Electronic Communications, Electronics for Hobbyists and Test Equipment Courses.

Kit ET-3100B, Trainer, Shpg. wt. 6 lbs. .... 99.95

ETW-3100B, Assembled and tested, Shpg. wt. 6 lbs. .... 169.95



Accredited by the NHSC



Licensed school - State of Michigan

### Approved by nationally recognized organizations

Heathkit/Zenith Continuing Education is accredited by the National Home Study Council and licensed as a school by the State of Michigan. These acknowledgements are your assurance that all Heathkit Self-Instruction Programs are quality self-study programs.



Guide" for course recommendations. If you have taken and passed the examinations on pages 61 to 64 (EE-3101A, -3102A, -3103A, -3104A, -3105A, -3201A, -3401) or EC-1100 on page 103, you may be eligible for college credit.

## 2 DC Electronics Course for essential principles

**\$49<sup>95</sup>**

- Complete background coverage of basic DC electronics
- Positive reinforcement provided through experiments
- Optional audio-visual package enhances learning process

**DC electronics coverage:** An ideal point at which to begin your electronics training, the EE-3101A Course explains the necessary principles required for understanding DC electronics. Subjects covered include: current, voltage, resistance, Ohm's Law, magnetism, electrical measurements, DC circuits, inductance and capacitance. The use of a multimeter is also covered.

**Self-instructional learning:** Heathkit/Zenith's programmed learning allows you to work at your own pace. Review tests are provided so that you can check your progress while reinforcing what you learned. An optional audio/visual package contains two audio tapes and a 123-page illustration booklet with over 230 illustrations to enhance your learning experience. Also included are experiments to help you see concepts as they are put into use. These experiments use the ET-3100B Experimenter/Trainer and a multimeter, like the IM-2260 (p. 44). By taking the final exam and passing with a score of 70% or better, you can earn 2.0 Continuing Education Units and be awarded a handsome certificate.

EE-3101A, DC Electronics Course, Shpg. wt 6 lbs. .... 49.95

EEA-3101A, Optional Audio-Visual Accessory, Shpg. wt. 2 lbs. .... 19.95

**SAVER!** Save \$20 with the purchase of both the DC Electronics Course and the ET-3100B Kit Experimenter/Trainer. Separately they cost \$149.90.

EES-3101B, Includes EE-3101A and ET-3100B, Shpg. wt. 17 lbs. .... ONLY 129.90

## 4 Semiconductor Devices Course covers solid-state

**\$54<sup>95</sup>**

- Examines semiconductor materials and their electrical properties to form a basic foundation of study
- Completely covers diodes, transistors, and integrated circuits and how they are used in circuits.

**A self-instructed semiconductor education:** Step-by-step you learn about the micro-sized world of diodes, transistors and integrated circuits. You examine zeners, bipolar transistors, FETs, thyristors, and UJTs. See how they are made, how they operate and how they are used. Programmed reviews check your progress while optional experiments illustrate and reinforce your understanding of important concepts with hands-on training.

**Trainer and final exam:** To perform the experiments in this Course you'll need the ET-3100B Trainer. A multimeter is also recommended to make measurements. Pass the optional final exam with a 70% or better score and earn 3.0 CEUs.

EE-3103A, Semiconductor Devices Course, Shpg. wt. 6 lbs. .... 54.95

EEA-3103A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. ... 19.95

**SAVER!** Save \$20 when you purchase both the EE-3103A Semiconductor Course and ET-3100B Trainer at the same time.

EES-3103B, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 18 lbs. .... ONLY 134.90

**Spanish Language Semiconductor Devices Course:** Spanish translation of this course. less EB-6103-30 Parts Package for experiments (see page 75).

EE-3103S, Semiconductor Devices Course in Spanish, Shpg. wt. 6 lbs. ... 59.95

### Save \$60 on entire Fundamental Electronic Series

Purchase the DC and AC Electronics, Semiconductor Devices, Electronic Circuits and Test Equipment Courses along with the ET-3100B Kit Trainer.

**SAVER!** EES-3115B, Listed Courses and Trainer, 66 lbs. .... 329.70

### Earn College credit for many Heathkit/Zenith courses

The American Council on Education recommends that member colleges grant credit for several of our courses. Consult "The National

Guide" for course recommendations. If you have taken and passed the examinations on pages 61 to 64 (EE-3101A, -3102A, -3103A, -3104A, -3105A, -3201A, -3401) or EC-1100 on page 103, you may be eligible for college credit.

If your college participates in this program, and you have taken the course and passed the final exam, order the Heathkit/Zenith College Credit Program Exam. To order, simply take the course number (for example EE-3101A) and change the prefix to ECC. In our example, you would specify ECC-3101 to order the exam.

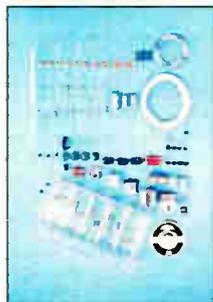
ECC-3101, ECC-3102, ECC-3103, ECC-3104, ECC-3105, ECC-3201, ECC-3401, ECC-1100, Shpg. wt. 1 lb. each ..... each 25.00



Use your Visa or MasterCard credit cards to purchase your kit!

# Continue your education in the fundamentals of electronics with these challenging courses

## Electronics Circuits Course explains circuits



Parts for experiments

Optional audio-visual package

1

## Test Equipment Course shows operation and use of equipment



Includes all parts for experiments

Uses optional audio-visual package

2

## Electronic Communications Course covers wide area



All parts included for experiments

3

## Digital Techniques Course begins with the fundamentals and theory of digital circuitry



All electronic parts needed for 24 experiments

Optional audio tapes

4

## ET-3200B Trainer with test lab features

**\$99<sup>95</sup>**  
Kit

- Provides many facilities for experimentation
- Used for experiments and circuit prototyping



- Four LED logic indicators
- Three-frequency generator
- Logic and data switches
- Three power supply outputs
- Large solderless breadboard

Put your digital knowledge to work with the ET-3200B Electronic Trainer. Designed for the experiments in both the Digital Techniques and CMOS Digital Techniques Courses, the ET-3200B is a useful tool that helps to speed comprehension by allowing practical application of Course material. This versatile Trainer also allows you to build and test prototypes, confirm circuit operation and test digital ICs.

Built-in regulated power supplies furnish  $\pm 12$  VDC and  $+5$  VDC. Solderless breadboard sockets accept 14- or 16-pin dual in-line ICs; and 24-, 28- or 40-pin DIPs. Has four binary data switches, two no-bounce logic switches, three-frequency pulse clock generator, and more.

Kit ET-3200B, Shpg. wt. 6 lbs. **99.95**  
ETW-3200B, Assembled and tested, Shpg. wt. 6 lbs. **179.95**

## CMOS Course stresses practical application



## **\$89<sup>95</sup>** CMOS Digital Techniques Course

- Stresses practical applications and advantages
- Shows interfacing with other logic families

Learn about CMOS (complementary metal-oxide semiconductor) and why these devices are so desirable in a circuit. This self-instruction Course covers the basic concepts of CMOS technology to complex CMOS circuits designed to acquire and process information. Seven units cover such topics as: an introduction to CMOS, interfacing, logic blocks, multi-vibrators, counters and registers, and analog applications.

Learn by doing with practical experiments that illustrate topics from each unit. All components are included with the Course for the experiments that are performed on the ET-3200B Trainer. Also recommended for the experiments is the use of an oscilloscope and a multimeter. The EE-3201A Course or equivalent knowledge is a prerequisite. Earn 3.0 CEUs.

EE-3202A, Shpg. wt. 6 lbs. **89.95**

## 1 Electronics Circuits Course shows how electronic theories work together to make a circuit operate

**\$64<sup>95</sup>**

- Put your knowledge to work and build more skills
- Hands-on experiments add to your enjoyment and help to explain technical concepts presented in the Course
- Optional audio-visual accessory package available

Go directly from theory to practice with the Heathkit/Zenith Electronics Circuits Course. Seven carefully designed units cover electronic circuits from basic amplifiers through modulation and demodulation. The easy-to-understand text carefully explains a concept before moving on to the next. In this way, you completely master the Course without missing any vital information. Many informative illustrations help explain difficult ideas and add to your understanding of the material presented.

The Heathkit/Zenith Electronic Circuits Course exposes you to the circuits you'll find in everyday electronics — and explains them fully.

The proven self-instruction format lets you learn at your own pace: Professionally-prepared text, backed up by easy-to-understand visuals, let you learn more now — and retain more knowledge for years to come.

The Electronic Circuits Course will teach you how to identify power supply rectifiers, filters and regulation circuits — and explain how they work. You'll develop an understanding of amplitude and frequency modulation along with the heterodyne principle and modulation and detection circuits. You will be able to construct transistor and integrated circuit amplifiers, oscillators, active filters and pulse-shaping circuits, power supplies and power supply regulation circuits — even a basic amplitude modulation and demodulation system.

Like all Heathkit/Zenith Courses, the Electronic Circuits Course leads you step by step through this challenging subject. Contained within the clear and easy to understand text are sections on basic amplifiers; including the importance of amplifiers, amplifier configurations, biasing and coupling. The next section brings you a discussion of typical amplifiers. Details are provided on audio amplifiers and push-pull, power, video, RF and IF amplifiers. Then on to operational amplifiers, power supplies, oscillators, pulse circuits and various types of modulation.

Included with your Electronic Circuits Course is a well-illustrated and concise text, complete with an attractive and durable vinyl binder. You are also supplied with over 100 electronic components for use in the 18 experiments outlined in the text. The optional Audio-Visual Accessory Package aids your understanding of text material. You should complete DC and AC Electronics and Semiconductor Devices Courses (EE-3101A-3103A) or have equivalent knowledge. We suggest a dual-trace oscilloscope, a VOM and the ET-3100B Trainer to complete the experiments in this challenging Course.

Pass the optional final exam with a 70% or better score and receive 4 Continuing Education Units (CEUs). You'll also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems that's suitable for framing.

EE-3104A, Shpg. wt. 7 lbs. .... 64.95  
**SAVER! EES-3104B, EE-3104A and ET-3100B Kit Trainer, 19 lbs. ONLY 144.90**  
 EEA-3104A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. .... 19.95

## 3 Learn Electronic Communications quickly, easily

**\$59<sup>95</sup>**

- Includes a comprehensive 400-page text and all electronic components for conducting experiments
- Hands-on learning provided by detailed experiments

Learn all about the fascinating variety of new technologies involved in electronics communication, in your spare time and at your own pace. With this clearly written Electronics Communications Course, you can develop a full understanding of broadcast and data communications fundamentals.

It covers a wide variety of information: amplitude, frequency, phase and angle modulation; through a study of transmitters and antennas; and an analysis of a communications receiver and specific circuits; to an understanding of state-of-the-art broadcasting and data communications. Seven units in all.

In seven hands-on experiments you'll build an AM transmitter, balanced modulator, AM detector, FM transmitter, receiver, pulse modulator, time division multiplex transmitter and data communications modem. All necessary parts are included. The ET-3100B Trainer (page 61) or equivalent is required.

This specialized Course is suggested as a follow-up to the EE-3101A through EE-3104A Courses. Successful passage of the final exam earns you 2.0 Continuing Education Units and a personalized Certificate of Achievement.

EE-3106A, Shpg. wt. 7 lbs. .... 59.95  
 EEA-3106A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. .... 19.95  
 Kit ET-3100B, Trainer, Shpg. wt. 6 lbs. .... 99.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.

## 2 Practical Electronic Test Equipment Course

**\$64<sup>95</sup>**

- Learn to use a wide variety of test equipment including oscilloscopes, meters, counters and other instruments
- Includes experiments that allow a look into the operation and practical applications of test equipment

This Electronics Test Equipment Course offers the knowledge you need to make measurements with digital and analog meters; explain the operation of, and use of the oscilloscope in electronic testing and servicing. From this Course you'll also learn to use frequency generators and frequency counters. A unit on special measuring instruments covers bridge circuits, transistor testers, curve tracers, spectrum analyzers and logic probes. The optional Audio-Visual Accessory Package enhances your learning process in these areas.

Fifteen interactive experiments give you the chance to actually use many different types of test equipment. All components for the experiments are included with the Course. You should have access to the following equipment to obtain the full benefit from the experiments: a digital multimeter, an analog meter, oscilloscope, frequency generator and frequency counter. Uses the ET-3100B Trainer.

Pass the optional final examination with a 70% or higher score and earn 6.0 Continuing Education Units (CEUs). Also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems. A previous knowledge of material in the EE-3101A thru EE-3104A and EE-3201A is required for this Course.

EE-3105A, Shpg. wt. 9 lbs. .... 64.95  
**SAVER! EES-3105B, EE-3105A and ET-3100B Kit Trainer, 21 lbs. ONLY 144.90**  
 EEA-3105A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. .... 19.95

## 4 Comprehensive Digital Techniques Course provides a thorough training in logic circuits

**\$89<sup>95</sup>**

- Learn to design and apply modern digital circuitry
- Loaded with practical, hands-on experiments
- Learn in your spare time, at your own speed at a fraction of college or technical school costs

Gain a working knowledge of Digital Techniques the fast Heathkit/Zenith way. Begin with the fundamentals and theory of digital logic including number systems. Become familiar with Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design. Learn at your own pace and when you have the time. After you've completed the Course, you'll know how to design digital circuitry for virtually any modern application. All this knowledge at an invitingly low price.

Many explanatory illustrations, audio aids and experiments speed your comprehension of concepts and practical applications presented in the text. Learn using three methods — by reading, listening and doing — a proven method that helps you understand complex subject matter more easily and naturally. Self-test reviews, included with each unit of the Digital Techniques Course, aid retention of important points and help you check yourself before moving on to the next concept. Unit exams further summarize material and test your understanding of the material presented in the Course.

Included with the Course are all of the electronic components for performing all of 24 experiments. This expertly-organized Course is contained in two heavy-duty vinyl binders. They'll keep your text material together and ready for use as a reference long after you've completed the Course. A pair of optional audio cassettes are available which contain supplemental verbal text that can be used to help you with your study of digital circuitry.

This Course is designed for those with a basic electronics background. Such a background is obtainable by completing Heathkit/Zenith DC, AC, Semiconductors and Electronic Circuits Courses on this and the preceding page. The ET-3200B Trainer is required for performing the 24 experiments in the Course. To obtain the full benefit from the experiments in this Course, a multimeter and a dual-trace oscilloscope are recommended.

Earn 4.0 Continuing Education Units (CEUs) by passing the optional final examination with a 70% or better score. And, receive a personalized Certificate of Achievement from Heathkit/Zenith Educational Systems.

A money back guarantee ensures your satisfaction with this and all the Heathkit/Zenith Self-Instruction Courses. We're that sure we've put together the information you need in a clear and comprehensive format. If it doesn't, simply return all course materials (excluding Trainer) and your receipt.

EE-3201A, Shpg. wt. 7 lbs. .... 89.95  
**SAVER! Buy the Digital Techniques Course and the ET-3200B Trainer Kit together and save \$15.00. Individually they would cost \$189.90.**  
 EES-3201B, Shpg. wt. 14 lbs. .... ONLY 174.90  
 EEA-3201A, Optional Learning Cassettes, Shpg. wt. 2 lbs. .... 19.95

Heathkit

TECHNICAL

Educational  
Systems

**WINNER**

International Award  
Society for Technical  
Communication

1 Programmed-instruction course with visual aids and hands-on experiments using an expandable trainer

Also audio instruction

Learn all about microprocessors, microcomputers, interfacing and programming

Includes all components for experiments

2 ET-3400A Microprocessor Trainer

512 bytes of random access memory (RAM)

MC6808 Central Processing Unit

Connectors supplied for power, switches, LEDs

Six 7-segment LED information display

1K monitor ROM program

Hexadecimal keyboard

Solderless breadboarding sockets

3 ETA-3400 Trainer Accessory

RS-232 connector for terminal

Shielded 120 VAC power supply

Heath/Pittman Tiny BASIC ROM

Terminal monitor ROM

Cassette input/output port

Add up to 4K user RAM

Connector cable

The ETA-3400 Microprocessor Trainer Accessory converts the ET-3400A into a full personal microcomputer system.

# Learn all about 8-bit microprocessing with this Microprocessor Course and Trainer

## 1 Award-winning EE-3401 Microprocessor Course



- Covers all the basics of microprocessors, microcomputers and machine level programming
- Includes hands-on hardware, memory interfacing and programming experiments
- Learn about microprocessors faster and more efficiently through programmed instruction with audio and illustrative visual aids
- Includes reviews for self-check of progress
- Self-instruction course provides an economical and self-paced study-at-home method of training in 8-bit microcomputer technology

**You'll start learning** about microprocessors, microcomputers and computer programming as soon as you begin this complete microprocessor self-instruction course from Heathkit/Zenith Educational Systems. Microprocessor basics, computer arithmetic, programming and interfacing... everything you need to know to get a start in the exciting and fascinating world of computers is presented in an efficient and well-organized manner.

**Preliminary training** begins with a review of the basics of computer number systems and codes. Then you apply that knowledge as our prize-winning Microprocessor Course takes you step-by-step through computer arithmetic, programming, examination of popular microprocessors, interfacing and input/output operations that you can put to use immediately.

**Concepts are carefully integrated** into ten learning units for a thorough training in microprocessors. Starting off is Unit 1 on number systems and codes. It covers decimal, binary, octal and hexadecimal numbering systems. It also includes conversions between number systems, binary codes and positional notation. Unit 2 on microcomputer basics teaches terms and convention, and introduces you to several programming instructions plus how programs are written and executed. In Unit 3 you learn about binary addition, subtraction, multiplication and division, and two's complement arithmetic. You'll also see how to use Boolean logic operators like NOT, AND, OR, Exclusive OR and INVERT.

**Progressing at your own speed** you are introduced to programming in Unit 4. Here you find out about branching, conditional branching, algorithms and programming instructions. In the next two units, 5 and 6, the 6800/6808 microprocessor is studied. Covered in detail is its architecture, instruction set, addressing modes, stack operations, subroutines, input/output operations and interrupts. Units 7 and 8 continue your education of the 6800/6808 microprocessor with interfacing and its fundamentals. Included is interfacing with random access memory (RAM), displays, switches, and the Peripheral Interface Adapter (PIA).

**Programming experiments** are the subject of Unit 9. In this unit, you'll write and experiment with a wide variety of increasingly complex programs. At the beginning you'll actually turn the ET-3400A Trainer (used in all the experiments) into a teaching machine that'll give you drills and practice in computer numbering systems. In later experiments, you'll use all instructions and addressing modes including subroutines, stack operations and more.

**The final unit** of this microprocessor Course involves interfacing experiments. Here you put into practice everything you've learned about programming and interfacing. Using the electronic components supplied with this Course you convert the ET-3400A Trainer into a digital clock, a musical instrument and a digital voltmeter. You experiment with address decoding, PIAs, input and output of data, parallel-to-serial conversion techniques, digital-to-analog and analog-to-digital conversion techniques, and interrupts.

**Everything is included** with this thorough course. Text is clearly written in the time-proven step-by-step self-instruction format. Colorful visual presentations and reinforcing audio cassette tapes of text material help you to understand concepts more completely. Nineteen hardware experiments provide a hands-on opportunity to apply microprocessor theory in practical applications. All components are included: RAMs, a Peripheral Interface Adapter integrated circuit, a digital to analog converter, op-amps and a variety of other microprocessor-oriented devices. All experiments are performed on the ET-3400A Microprocessor Trainer which was designed for this award-winning course.

**Pass the optional final exam** with a 70% or better and earn 8.0 Continuing Education Units. In addition, you'll receive a Certificate of Achievement.

**Continue your microprocessor education** with the EE-3402 Microprocessor Interfacing Course on page 67 after completing this course. It continues with advanced training in the use of the 6800/6808 microprocessor.

EE-3401, Shpg. wt. 12 lbs. .... 99.95

## 2 ET-3400A Microprocessor Trainer doubles as a learning tool and a low-cost 8-bit computer

**Functioning as a miniature digital computer**, the ET-3400A Trainer is used with the experiments in the EE-3401 through EE-3405 microprocessor related courses. It features the popular 6808 microprocessor as the central processing unit (CPU) and a built-in 1K ROM monitor program for controlling the unit's operation. Also built in is 512 bytes of random access memory (RAM).

**A 17-key hexadecimal keyboard** enables you to access memory locations and to examine their contents on a six-digit hexadecimal 7-segment LED display. Through the keyboard you can step backward or forward to examine or alter other memory locations, examine or change any of the microprocessor's internal registers, set break points for program debugging, or reset the CPU. The flexible instruction set of the 6808 permits use of five addressing modes, two accumulators, an index register and a stack pointer.

**A microprocessor breadboard**, the ET-3400A features solderless sockets for rapid assembly of IC circuitry. All microprocessor address, control and data busses are buffered and terminated on the front panel for easy connection to experimental memory and interface circuits. There's also a 40-pin external connector for expanding memory and the Trainer's I/O capacity.

**Other experimental features include:** eight individual and independent buffered LEDs for monitoring logic states, eight SPST binary data switches for logic level switching, built-in +5 and  $\pm 12$  VDC power supply connections and a clock output. The ET-3400A requires 120 VAC at 50/60 Hz and uses 30 watts.

**As a general-purpose training tool and a design aid**, the ET-3400A offers flexibility and low cost in a microprocessor breadboard. Team it up with the ETA-3400 Microprocessor Trainer Accessory for increased personal microcomputing power.

Kit ET-3400A, Shpg. wt. 7 lbs. .... 239.95  
ETW-3400A, Assembled and tested, Shpg. wt. 6 lbs. .... 339.95

## 3 ETA-3400 Microprocessor Trainer Accessory

**Add this accessory** to your ET-3400 or ET-3400A Microprocessor Trainer and turn it into an 8-bit cassette-based microcomputer system. It increases the computing power of the Trainer so that you can run more sophisticated programs. The Accessory's memory expands to 4K bytes of RAM with optional memory.

**A serial interface** with EIA and 20 mA loop formats enables hook-up to a smart video terminal or a 20 mA ASCII teletypewriter machine. The Accessory also provides a cassette interface which allows you to store programs on convenient cassette tapes. The ROM monitor/debugging program lets you implement the standard trainer monitor functions through the external terminal. Memory locations can be examined or changed, break points initiated and program debugging can be accomplished with a single-instruction step feature. A tiny BASIC Interpreter in ROM lets you program in easy-to-learn BASIC language. User function lets you run machine code routines from BASIC — the same machine code routines you learned in the EE-3401 Microprocessor Course.

**The ETA-3400 easily connects** to the ET-3400 or ET-3400A Trainer through a 40-pin connector supplied with the Accessory. Parts required to modify the trainer are included. Since modifying the trainer changes the clock frequency, experiments in the EE-3401 through EE-3405 Courses which use timing loops will be changed. It is recommended that all experiments in these courses be completed before adding the Accessory. An H-29 or Z-49 Video Terminal is required to use BASIC and monitor features of the ETA-3400 Microprocessor Accessory.

Kit ETA-3400, Shpg. wt. 8 lbs. .... 175.00  
EWA-3400, Assembled and tested, Shpg. wt. 8 lbs. .... 275.00  
ETA-3400-1, Optional 3K Chip Set, Shpg. wt. 1 lb. .... 49.95

**SAVER!** Order the EE-3401 Microprocessor Course and the ET-3400A Trainer together and save \$25.00. If purchased separately, \$339.90.

ETS-3400A, Shpg. wt. 25 lbs. .... **ONLY 314.90**

**SAVER!** Order the EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together and save \$70.00. If purchased separately, \$564.85.

ETS-3401A, Shpg. wt. 46 lbs. .... **ONLY 494.85**



Use your Visa or MasterCard credit cards to purchase your kit!

**6809 Microprocessor Course**

Includes 6909 module for ET-3400 or ET-3400A Microprocessor Trainer

10 hands-on experiments

**Low-cost Microprocessor Interfacing Course**

Easy-to-understand text

Includes all electronic components necessary to conduct the experiments

**SAVE \$30.00 on a complete microprocessor education with these Courses and Trainer**

Purchase both the award-winning EE-3401 Microprocessors Course and the popular EE-3402 Microprocessor Interfacing Course plus the ET-3400A Trainer kit and save \$30.00. Everything you need to know about microprocessors and how to interface them is covered in these two Courses. The ET-3400A Trainer is required to perform the 29 course-related experiments. If purchased separately, you would spend \$429.85 for this complete microprocessor training set (pictured at the left). Take advantage of the savings today.

**SAVER! EES-3402, Shpg. wt. 49 lbs. . . . . 399.85**

**Two popular voice synthesis methods are covered**

Includes two complete chip sets and components for experiments

Voice Synthesis Course teaches digitized and phoneme voice techniques in an easy-to-follow format with experiments

**\$99<sup>95</sup>**

**\$99<sup>95</sup>**

Understand how a microprocessor can sense and control events in an analog world

Experiments show how microprocessor control is applied

**Microprocessor Applications Course** fills the knowledge void between the real analog world and the microprocessor

## Expand your digital and microprocessor knowledge with these four courses

### 1 6809 Microprocessor Course with Trainer adapter

Save \$50

**\$49<sup>95</sup>**

- Learn to program and interface the 6809 microprocessor
- Learn to use this microprocessor's flexible instruction set that includes over 1400 different commands
- Includes an assembled module which converts the ET-3400 or ET-3400A into an advanced 6809 microprocessor trainer

Progress to programming and interfacing the extremely fast logic processor with the Heathkit/Zenith EE-3404 6809 Microprocessor Course. This seven-unit Course completely covers programming and interfacing the advanced 6809 microprocessor. And ten programming experiments provide hands-on experience.

Seven units take you from concepts and 6809 chip structure to interfacing applications. In Unit 1 you begin with fundamental 6809 concepts and how the integrated circuit is structured. This includes the 6809's design philosophy, its evolution and the improving it has undergone. At your own speed, you progress through the 6809's addressing modes in Unit 2; and, go into register and data movement instructions in Unit 3. Unit 4 explains arithmetic, logic and test instructions for the 6809 microprocessor. Unit 5 covers branch and miscellaneous instructions while Unit 6 explains the 6809's input and output signals. The final unit, Unit 7, teaches 6809 interfacing and applications.

Ten hands-on programming experiments are included to enhance your understanding of the 6809 family of microprocessors. These optional programming exercises use the ET-3400 or ET-3400A Microprocessor Trainer (not included). By performing these experiments you'll reinforce the concepts learned from the text, thereby retaining more and understanding material better.

A special adapter module is included which converts the ET-3400 or ET-3400A Microprocessor Trainer into a 6809-based microprocessor trainer. This assembled module includes a handy debugging routine, contained in the 2K byte ROM monitor program. NOTE: This module is not compatible with the ETA-3400's monitor ROM of tiny BASIC.

Four appendices are included with the text. They contain listings for the 6809/6809E Instruction Set and the 6820/6821 Peripheral Interface Adapter (PIA), specification sheets for the MC6809 through MC68B09E microprocessors and peripheral devices, and a summary of the MC6809 Instruction Set.

To prepare yourself for the material contained in the 6809 Microprocessors Course, we recommend that you successfully complete the EE-3401 Microprocessor Course or obtain an equivalent knowledge.

Earn 3.0 Continuing Education Units (CEUs) by passing the optional final exam with a 70% or better score. In addition, receive a Certificate of Achievement in recognition of your effort from Heathkit/Zenith Educational Systems.

EE-3404, Shpg. wt. 6 lbs. .... Was \$99.95 NOW ONLY 49.95

### 2 Detailed Microprocessor Interfacing Course

**\$99<sup>95</sup>**

- Begins where the EE-3401 Microprocessor Course ends with a logical continuation to your studies of the 6809 processor
- Provides in-depth coverage of the 6800 microprocessor family and introduces the powerful 6809 and 68000
- Add to your knowledge with detailed interfacing techniques

Continue your study of microprocessors with this low-cost course from Heathkit/Zenith. The EE-3402 Microprocessor Interfacing Course is a natural starting point after completing the EE-3401 Microprocessor Course. Gain additional knowledge about microprocessors, interfacing techniques and more advanced microprocessors. Programmed self-learning allows you to proceed at your own speed through step-by-step mastery of each important concept.

Eleven in-depth units let you explore topics like: the advanced Peripheral Interfacing Adapter (PIA), analog conversion, serial data communications, peripheral and memory devices, programmable timers, and a thorough discussion of both the 6809 and 68000 advanced microprocessors. Four detailed appendices at the end of the Course contain useful listings, data sheets and a summary of the 6800 microprocessor family for you to use as a quick reference guide.

Ten hands-on experiments focuses your attention on concepts presented in the text. You'll experiment with display multiplexing, I/O control and handshaking using the PIA, analog-to-digital conversion and ADC interfacing, parallel-to-serial conversion using the 6850 ACIA, serial standard conversion, 2708 EPROM programming, ROM/EPROM interfacing, 6840 PTM input and output, and 6809 software operation. All components required for the experiments are included. All experiments are performed on the ET-3400 or ET-3400A Microprocessor Trainer.

Before attempting this comprehensive Course, we recommend that you complete the EE-3401 Microprocessors Course or already have an equivalent working

knowledge of the material contained in that course.

Pass the optional final examination with a 70% or better score and earn 7.0 Continuing Education Units. Also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems that's suitable for framing.

EE-3402, Shpg. wt. 11 lbs. .... 99.95

### 3 Voice Synthesis Course details techniques

- Course covers the hardware and software used in voice synthesis
- Includes complete chip sets for digitized and phoneme voice synthesis
- Practical Course featuring a great deal of experimentation

Get on speaking terms with your computer by taking the EE-3403A Voice Synthesis Course. With this Course, you can learn state-of-the-art techniques in easy-to-follow format with hands-on experiments that will have you ET-3400 or ET-3400A Microprocessor Trainer talking to you in no time at all.

The two most popular methods of voice synthesis are thoroughly covered, digitized voice synthesis which uses a fixed vocabulary with human voice qualities and phoneme voice synthesis which allows you to reproduce any English word and almost all pronounceable sounds.

The five units of this clearly written Course cover the human voice, with an overview of voice reproduction and voice patterns including: linear and logarithmic coding, delta modulation and variable slope delta modulation, speech synthesis by linear predictive coding, the phoneme speech synthesizer (PSS), and advanced programming for the phoneme speech synthesizer.

By completing the hands-on experiments, you learn about the basic hardware and software necessary for breadboarding (on the ET-3400 or ET-3400A Trainer) computer-synthesized speech. Also learn about the programming and interfacing needed for both digitized and phoneme voice synthesis. In addition, this Course prepares you to write machine code programs tailored for the ET-3400 and ET-3400A Microprocessor Trainer. All components are included for experiments.

Complete chip sets for both digitized and phoneme voice synthesis are included, purchased separately they would cost over \$150.00. The digitized set contains both a ROM chip and a synthesizer chip, featuring a vocabulary totaling more than 200 words. The phoneme synthesizer is self-contained on a single integrated circuit which can produce an unlimited vocabulary.

To better prepare yourself for the material in the Voice Synthesis Course, the EE-3401 Microprocessors Course (p. 65) or equivalent knowledge is needed. Take the optional final examination and earn 3.0 Continuing Education Units and receive a Certificate of Achievement after passing with a 70% or better score.

EE-3403A, Shpg. wt. 4 lbs. .... 99.95

### 4 Real-world Microprocessor Applications Course

Save \$30

**\$69<sup>95</sup>**

- Put previous microprocessor knowledge to work
- Learn how microprocessors can sense and control events
- See practical demonstrations of microprocessor use

The Microprocessor Applications Course shows you practical ways to adapt and utilize the power of the microprocessor. A complete discussion of analog circuits starts you on your way to an understanding of how a microprocessor can sense and control events in an analog world. This includes digital-to-analog and analog-to-digital conversion techniques along with analog signal conditioning and the circuitry associated with these processes.

A microprocessor must first sense or receive information before it can carry out an assigned task. To acquaint you with this side of a microprocessor, the EE-3405 Course covers in depth sensors and transducers and how they interface to a microprocessor to sense real-world events. Completely covered are temperature, light, position, motion, force, pressure, flow, and level sensors and transducers of various types and styles.

Further units describe microprocessor control of devices and circuits. Covered are control devices and motors including: transistor arrays, SCRs, TRIACs, relays, DC motors and stepper motors. Phase-locked loops, used more and more frequently in microprocessor applications, are presented with interfacing and controlling them with a microprocessor. Numerous examples of microprocessor uses are shown in consumer, industrial and business applications.

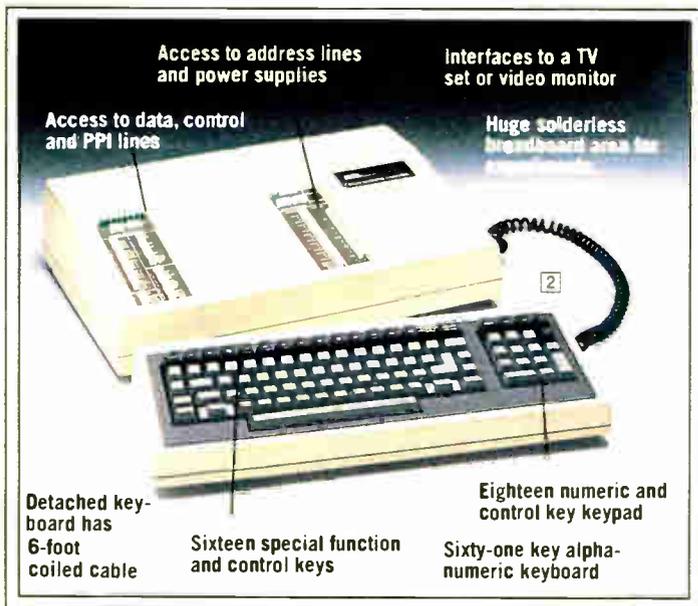
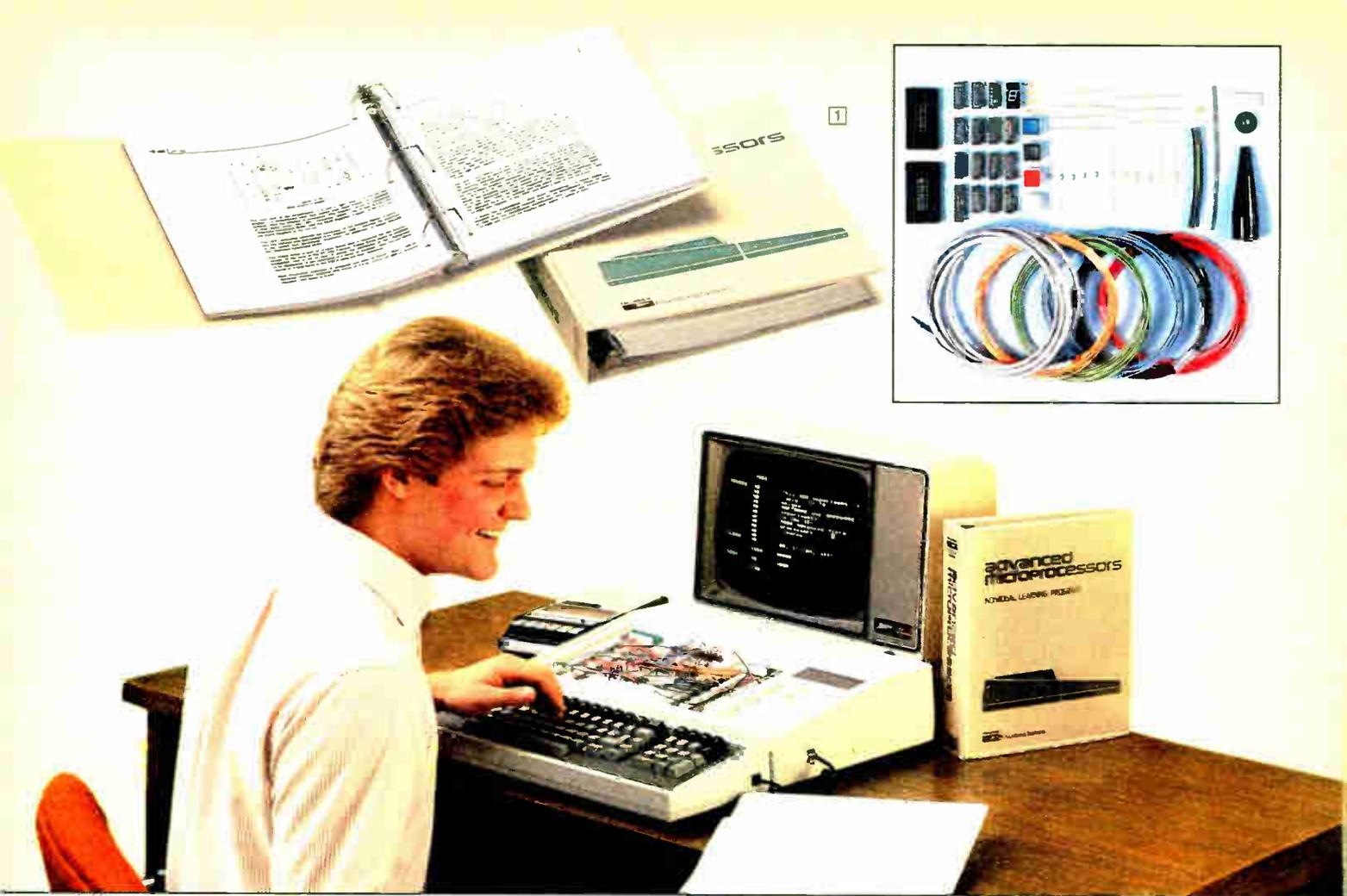
The last unit takes a look at present and future microprocessor applications. It was written to stimulate your imagination by examining several actual and possible consumer, industrial and business applications of the microprocessor.

To perform the 13 experiments in this Course, you'll need the ET-3400 or the ET-3400A Microprocessor Trainer featured on page 65, plus a VOM and an oscilloscope. You should also complete the EE-3401 Microprocessor Course, also on page 65, and the EE-3402 Microprocessor Interfacing Course on this page or have an equivalent knowledge before attempting this Course.

EE-3405, Shpg. wt. 10 lbs. .... Was \$99.95 NOW ONLY 69.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.



# Master 16-bit microprocessing with the Advanced Microprocessor Course and the ET-100

## 1 In-depth Advanced Microprocessor Course

\$99<sup>95</sup>

- Covers 16-bit computer technology and the 8088 microprocessor used in the H/Z-100 and other computers
- Learn to program and interface powerful and incredibly fast 16-bit microprocessors as used in the H/Z-100
- Reinforce your studies with experiments designed to illustrate concepts learned in each unit
- Perform all experiments on the ET-100 Trainer, a low-cost 16-bit computer that expands into a disk-based system

**Complete training system:** Heathkit/Zenith introduces a truly remarkable, dual learning package. The first half consists of an Advanced Microprocessors Course...EE-8088. A comprehensive training course, it provides an indepth study of 16-bit microprocessors and covers terms, architecture, and programming. In addition, thorough coverage is given to interfacing the microprocessor to its support devices and to the outside world. The second half is a one-of-a-kind 16-bit training computer, the ET-100 (see below). Available separately, the ET-100 supports the EE-8088 as a working computer-trainer. When the course is completed, the ET-100 can be used as a valuable learning tool, a low cost engineering proto-typing fixture, or a very powerful computer.

**Future technology:** Already being used to control some personal and small-business computers, 16-bit microprocessors are expected to dominate the marketplace in the very-near future. To help you keep up with this trend, the Advanced Microprocessors Course eases you into the world of 16-bit computing. It begins by acquainting you with microprocessor terms and then introduces assembly language. Progressing at your own speed, you then proceed through program writing, addressing modes, memory, logic and control lines, and a dynamic and static RAM. After completing the EE-8088 Course, you'll have acquired a solid background in 16-bit microprocessors.

**Hands-on learning:** To bring your study material to life, the EE-8088 provides more than three hundred pages of experiments. These include experiments in software programming and hardware interfacing. Because it is both a trainer and a computer, both types of experiments can be carried out on the ET-100 Trainer.

## 2 The world's lowest priced 16-bit computer is our most advanced computer trainer...ET-100

- Teaches 16-bit microprocessing with EE-8088 Course experiments
- Features the H/Z-100's super-fast 16-bit 8088 microprocessor
- Has buffered access to all 8088 address, data and control lines
- Permits solderless computer circuit building on its large breadboard
- Comes with 16 kilobytes of RAM that can be expanded to 64 kilobytes
- Has a powerful assembler, screen editor and debugger in 32K of ROM

**Advanced Trainer:** For engineers, the ET-100 is ideal for breadboarding computer circuits that interface to the 8088 microprocessor. All control, data, and address lines are readily available around the three solderless breadboards. Even the programmable parallel interface (PPI) is accessible. All access lines are buffered to protect the microprocessor from damage. The ET-100 allows experimenters and technicians to easily and conveniently modify circuits, build interfaces, or simply experiment with the 8088. Four power supply voltages, independently regulated from the logic board supply for protection, are also available on the breadboard to power your projects. For moving your circuit to another location for testing or safekeeping, the top breadboard is removable so you can move the entire circuit without disassembling it. And to those students using the EE-8088 Course, the ET-100 teaches 16-bit microprocessor fundamentals through course experiments.

**16-bit computer:** The ET-100 Learning Computer uses the same sophisticated 8088 microprocessor that's found in our H/Z-100 Desktop Computer. A powerful editor, assembler and debugger are permanently stored in ROM for your program writing and editing convenience. The ET-100 has its own cassette port for loading and storing programs and data. And, its RS-232 Input/Output port can be used with a printer or other peripherals. A detached 95-key keyboard includes 16 function keys and a numeric keypad. It generates a full ASCII character set plus 33 graphic characters. The ET-100's video output can be displayed in twenty-four 80-character lines on a monitor, like the ZVM-122A or ZVM-123A (p. 89). Or, display twenty 40-character lines on either channel 3 or 4 of a television using a TV modulator listed at the right.

Kit ET-100, Basic Learning Computer, Shpg. wt. 33 lbs. .... 799.95  
ETW-100, Assembled and tested, Shpg. wt. 33 lbs. .... 1095.00

Together, the EE-8088 Advanced Microprocessor Course and ET-100 Trainer provides you with the knowledge and experience to master 16-bit microprocessors and computers.

**Course materials:** An easy-to-read self-instruction program, the EE-8088 consists of 1200 pages of text divided into ten units. Units one through eight cover the subject material and units nine and ten contain experiments to be done following each completed unit. Included with the course are all the parts necessary for performing every end-of-unit experiment.

**Course Contents:** *Unit 1* examines microprocessors and introduces the 8088 microprocessor with instruction addressing modes. *Unit 2* introduces machine and assembly language programming. *Unit 3* shows conditional/unconditional loops and loop addressing plus subroutines. *Unit 4* details the instruction set of the 8088 along with a summary of its addressing modes. *Unit 5* discusses memory segmentation. *Unit 6* explains input/output operations, internal/external interrupts, and string operations. *Unit 7* describes the various MPU bus and control lines, typical address and data bus networks, and data handling techniques. *Unit 8* examines the memory system in detail and goes into the various forms of input/output interfacing. *Units 9 and 10* contain programming and interfacing experiments. An *Appendix* ends the Course with additional educational information like reviews of number systems and computer math, program code, hardware and data sheets.

**Exams:** A thorough examination ends each unit and tests your understanding of the material. After completing the course, you can take the optional "Final Examination." Besides testing your knowledge, the final exam provides an excellent review of the material you've covered. After successfully passing the exam with a 70% or better score, you'll receive a handsome Certificate of Achievement and 8 Continuing Education Units (CEUs).

**Prerequisites:** A better understanding of the material in the EE-8088 Course is achieved with a prior knowledge of digital electronics. This can be obtained through the Heath/Zenith Educational Systems "Digital Techniques" course (EE-3201A, p. 63) or a similar program. You should also be familiar with binary and hexadecimal numbering systems, and computer math.

EE-8088, Advanced Microprocessor Course, Shpg. wt. 10 lbs. .... 99.95

## 3 ETA-100 Learning Computer Accessory turns the ET-100 into a disk-based 16-bit computer system

- Increases user RAM to 128K which can be expanded up to 192K
- Adds a separate programmable timer for timing internal events
- Provides two RS-232C serial ports and one Centronics parallel port
- Includes a disk controller board and one 320K 48 TPI disk drive
- Provides bit-mapped video graphics that can be upgraded to color
- Includes MS-DOS and Z-BASIC software packages

**Powerful upgrade package:** Turns your ET-100 Trainer into a powerful 16-bit disk-based computer that helps you with a variety of applications, such as data processing, telecommunications, and financial analysis. The ETA-100 package consists of two circuit boards, a boot ROM, and an external disk drive unit. A dust cover is also included so that a monitor such as the ZVM-122A or ZVM-123A (p. 89) can be placed on top of the Computer.

**H/Z-100 features:** After installing the ETA-100 package, your Computer will gain many features found in our most powerful desktop computer, the H/Z-100. Features like, 128K bytes of RAM that can be expanded to 192K bytes with the addition of accessory Z-205-1 (p. 83). A programmable timer is included that's independent of the system clock. Two full RS-232C serial ports permit communication with printers, modems and voice synthesizers.

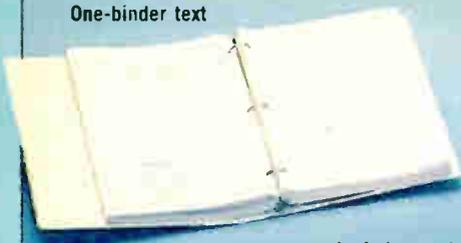
**Further features:** With the addition of the floppy disk controller and 48 TPI disk drive, the ETA-100 can store up to 320K bytes of data. And by adding a second 48 TPI drive with accessory Z-207-3, storage can be doubled to 640K bytes. The ETA-100 uses bit-mapped graphics where individual pixel dots are controlled for a 640 x 225 pixel high-resolution graphics display. For an eight-color display, add two Z-219-1 video RAM chips sets found on page 83.

Kit ETA-100, Expansion Accessory, Shpg. wt. 70 lbs. .... 1299.95  
ETS-100, Kit ET-100 and ETA-100, Shpg. wt. 102 lbs. .... 1999.90  
EWA-100-A, Assembled Expansion Accessory, plus software, 70 lbs. ... 1650.00  
EWS-100-A, Assembled ET-100 and ETA-100, plus software, 96 lbs. ... 2750.00  
ETA-100-1, Extra Removable Breadboard, Shpg. wt. 1 lb. .... 29.95  
ETA-100-2, Channel 4 Modulator, use with TVs, Shpg. wt. 1 lb. .... 39.95  
ETA-100-3, Channel 3 Modulator, use with TVs, Shpg. wt. 1 lb. .... 39.95



Use your Visa or MasterCard credit cards to purchase your kit!

### One-binder text

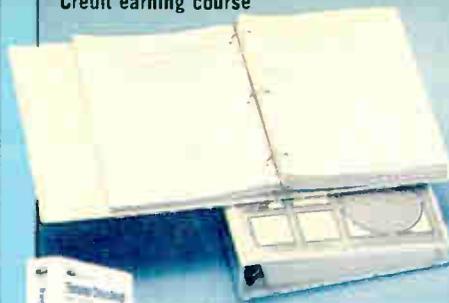


Includes parts



- 1 **Passive Circuit Design Course** teaches fundamentals of design

### Credit earning course



- 2 **Transistor Circuit Design Course** shows how to design useful circuits

### Build your own circuit boards



Clearly illustrated text shows detailed steps of every process

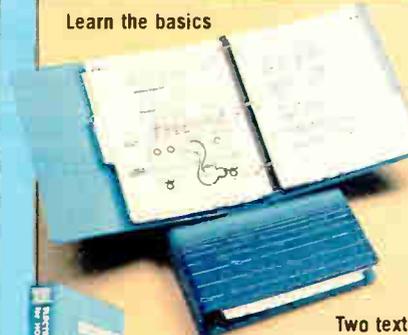
Includes everything you need to make your PC boards



Actually build two kits that can be very useful

- 3 **Printed Circuits Course** shows techniques of circuit board building

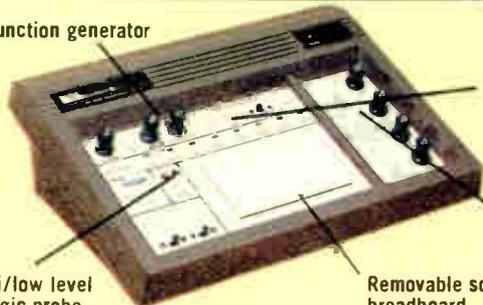
### Learn the basics



Two textbooks and parts for experiments

- 4 **Electronics for Hobbyist Course** for basic knowledge usable in many fields

### Function generator



Sine/square/triangle 1 Hz to 100 kHz generator

Variable and fixed DC power supplies

Hi/low level logic probe

Removable solderless breadboard

## Analog/Digital Circuit Design Trainer enables hands-on experience

- A versatile tool for learning circuit design through experiments
- A complete mini-lab for assembling and testing prototype circuits

A complete mini-lab for dedicated circuit design: For students taking electronic courses or engineers requiring a flexible, all-in-one prototyping unit, the ET-1000 Circuit Design Trainer provides a self-contained source of breadboarding capability. Has binary logic and data switches, eight buffered LED logic indicators, a five-range pulse-width selector, 1 k $\Omega$  and 100 k $\Omega$  linear potentiometers and more.

Kit ET-1000, Shpg. wt. 14 lbs. . . . . 199.95  
 ET-1000-1, Extra Removable Breadboard Accessory, 1 lb. . . . . 29.95  
 ETW-1000, Assembled and tested Circuit Trainer, Shpg. wt. 13 lbs. . . . . 349.95

## Low cost Metric and Intermediate Algebra Courses



"Think Metric, U.S.A." Course: Learn the international standard system of weights and measurements in a fun and easy way. A self-instructional text and audio cassette acquaints you with all the aspects of measuring with metrics and the simple rules for conversion. Earn 1.0 CEU and receive a Certificate of Achievement

EM-2, Shpg. wt. 4 lbs. . . . . 5.00

Intermediate Algebra Course: Nine learning units and nine audio cassette tapes cover: two variable expressions, special functions, binomial expansion, solving problems by graphing equations, logarithms, functions, quadratic equations, relations and inverses, probability and more. Earn 3.0 CEUs.

EM-5, Shpg. wt. 7 lbs. . . . . 24.95

## Variable Speed Recorder and Player



Get a full range of pitch-corrected speeds, from normal to 2 times faster, to cut your listening time in half and still understand every word that you hear. This speed-listening tape recorder features slow-down to 90% of normal speech, built-in microphone, tape counter and multiple external connectors. Compact and lightweight with AC or battery operation.

ECP-3804, Assembled, Shpg. wt. 3 lbs. 139.95  
 Premium quality 30-minute cassette tapes.

ECP-3802, Three cassettes, Shpg. wt. 1 lb. . . . . 6.00

# Learn to design and build your own circuits and boards with these self-instructional courses

## 1 Passive Circuit Design Course teaches circuit analysis and design using passive components

**\$49<sup>95</sup>**

- First in the Engineering Design Series teaches successful passive-component circuit design
- Step-by-step programmed learning begins with how to analyze circuits and the needed mathematical skills
- Real components and their properties are discussed

Learn to analyze and design practical circuits using components that do not provide a power gain, such as: resistors, capacitors, inductors, voltage and current sources, transformers and diodes. And, establish a foundation for other design courses in the continuing Engineering Design Series like the EE-1002 Transistor Circuit Design Course on this page.

**Before you can design circuits, you must be able to analyze them.** For this reason the first three units provide a thorough review of the techniques and associated mathematical concepts. Unit 1 is devoted to DC Circuit Analysis, Unit 2 teaches you Mathematics for Circuit Design and Unit 3 follows with AC Circuit Analysis. But a circuit that "works" on paper may not do what you want it to once built. Consequently, Unit 4, Real Circuit Components, is devoted exclusively to the nonideal properties of real components and various guides to help you select an appropriate-type component for a given application.

**The remaining units** concentrate on using these techniques to design circuits. Unit 5, Unregulated Power Supplies, discusses the design of numerous rectifier circuits and smoothing filters. Unit 6, Additional Passive Circuits, examines how clippers, clamping, peak detectors, multipliers, RC and other waveshaping circuits are designed. Unit 7, Selected Applications, illustrates seven general and nine measurement applications for passive circuits. In addition, Unit 8 contains ten hands-on experiments which reinforce the text material by giving you direct experience in prototype design. Requires the ET-1000 Circuit Design Trainer.

**Two appendices** with a resistor color code chart plus circuits, equations and parameters related to passive circuit design conclude the material.

**Prerequisites** for the Passive Circuit Design Course are a basic knowledge of DC and AC electronics, algebra and trigonometry and a *desire to learn*.

EE-1001, Shpg. wt. 9 lbs. .... **49.95**

## 3 Printed Circuits Course shows how to design, layout and build printed circuit boards

**\$64<sup>95</sup>**

- Learn direct pattern and photographic etching techniques
- Copy printed circuit board layouts from electronics books and magazines or fabricate your own from schematics
- Includes all materials to etch your own circuit boards
- Make boards for and construct a photoelectric lamp switch and a touch switch for appliances

Learn to make your own printed circuit boards in this fascinating Course. Make them from scratch using either the direct pattern or the photographic transfer technique. Learn about circuit board circuit board materials, layout, preparing artwork, image transfer and assembly.

Learn about the properties of different types of printed circuit board materials and the processes used in manufacturing them. In accompanying experiments learn how to design a circuit, prepare the artwork and transfer clean art images to the circuit board. Also learn how printed circuit boards are assembled using automated insertion machines and wave soldering techniques.

**For experiments** you'll actually design, layout and etch circuit boards for two home electronic kits: the GD-600 Photoelectric Lamp Switch and GD-1287 Touch Switch. All necessary materials, components and hardware to complete the kits and experiments are included. An etch-resistant pen, rub-on transfers, art tape, etchant, solvent and plastic bags are provided to make printed circuit boards by the direct pattern method. A positive pattern, clear acetate, photographic developer and sensitized printed circuit boards are also provided for making boards using the photographic method.

**No previous training is needed** as you proceed to an in-depth knowledge of circuit board manufacturing and the completion of two useful Heathkit products. The GD-600 can turn lamps up to 150 watts on at dusk and off at dawn. The GD-1287 turns appliances on and off with just a slight touch.

**Pass the optional final exam** with a 70% or better score and earn 2.0 Continuing Education Units and receive a Certificate of Achievement. Course is available only within the continental United States.

EI-3134, Shpg. wt. 7 lbs. .... **64.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center.

## 2 Transistor Circuit Design Course teaches how to design a multitude of useful circuits

**\$59<sup>95</sup>**

- Second in the educational Engineering Design Series
- Focuses on the fundamental techniques of successful transistor circuit design using programmed learning
- Includes experiments that integrate theory with practical hands-on experience in transistor circuit design

Continuing with the development of the skills necessary for successful circuit design is the Transistor Circuit Design Course. This clearly written course presents basic techniques used in designing circuits using transistors. It begins by describing transistor characteristics and defining their relevant parameters. Using simplified models, you are shown how to develop the appropriate AC and DC equivalent circuits needed in designing transistor circuits. It continues by having you analyze these equivalent circuits to determine how various component values affect their operation. In the final phase of the Course, you move step-by-step through the actual circuit design process.

**Consisting of nine units**, complete transistor design theory and its implementation are presented plus complementary experiments. Unit 1 through 8 covers: Bipolar Transistors, Biasing Schemes, Common-Emitter Voltage Amplifiers, Common-Base and Common-Collector Voltage Amplifiers, Power Amplifiers, Multiple-Transistor Circuits, Field Effect Transistors and Common-Emitter Frequency Effects. Unit 9 contains thirteen experiments that help you to develop the know-how and the confidence to construct various types of transistor-based application circuits. All experiments are performed on the ET-1000 Engineering Design Trainer on page 70. It contains all the functions necessary to complete all the experiments.

**Completing the Course** is a 35-page appendix filled with summary and design guides from Units 1 through 8. Included are device data sheets, formula and conversion tables, operating modes, graphical information and notational summaries. By referring to these guides you could use them to easily design a multitude of useful transistor circuits.

**After completing this Course**, you should be able to analyze and design many different types of voltage, power and differential amplifier circuits. You should also be able to describe their characteristics as well as predict the approximate lower and upper cutoff frequencies.

**To better understand** the information in this Design Course, some previous electronics background is needed. All needed material is thoroughly covered in the Passive Circuit Design Course on this page.

EE-1002, Shpg. wt. 9 lbs. .... **59.95**

## 4 Electronics for Hobbyists Course presents a basic knowledge that is applicable in many fields

**\$64<sup>95</sup>**

- Gain an overview of electronics that can apply to hobbies and many other areas of interest
- Be able to understand do-it-yourself electronics magazine projects and other basic electronics articles
- Optional 26 experiments that offer an insight into the world of electronics and its broad range of applications

**Understand** those articles about interesting projects in popular electronics magazines. You can, after you complete the easy-to-understand Electronics for Hobbyists Course. In seven units, you are taken step-by-step through an excellent course on an introduction to the various fields of electronics.

**Subjects covered include:** voltage, current, resistance, power, fundamental mathematics of electronics, and magnetism. Direct and alternating current are introduced along with the operation of transformers, diodes, transistors and ICs. The use of the voltmeter, ammeter and ohmmeter for measurement is also discussed. Different analog and digital circuit operations are presented as in the complex world of computers including programming and software. The last unit surveys electronics hobbies, experimentation, radio controlled models, computers, audio and amateur radio.

**Previous knowledge of electronics** isn't required with this course. Arranged in a logical manner, all information is presented to make learning easier.

**To perform the experiments** included with the Course you'll need the use of the ET-3100B Trainer on page 62. A multimeter and oscilloscope are also needed to make measurements and to observe waveforms.

**Complete the optional final exam** with a 70% or better score and earn yourself 4.0 Continuing Education Units and receive a Certificate of Achievement.

EE-3140, Shpg. wt. 11 lbs. .... **64.95**

## Advanced Electronics Series



1 Optoelectronics Course



3 Phase-Locked Loops Course



2 Active Filters Course



4 Operational Amplifiers Course



5 I.C. Timers Course

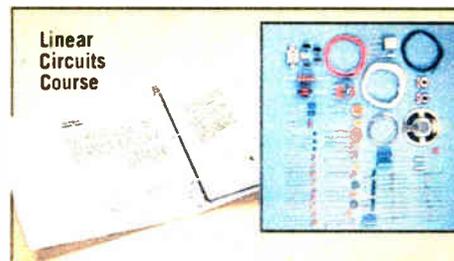


Linear Circuits

Linear Circuits



6



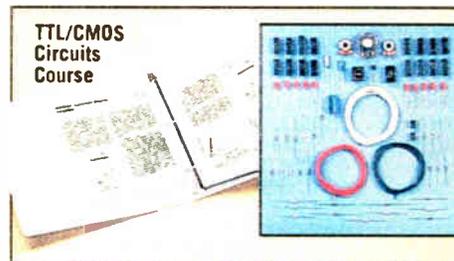
Linear Circuits Course

TTL/CMOS Circuits

TTL/CMOS Circuits



7



TTL/CMOS Circuits Course



8

ET-3300B Trainer designed for use in experiments in the Advanced Electronics Series Courses

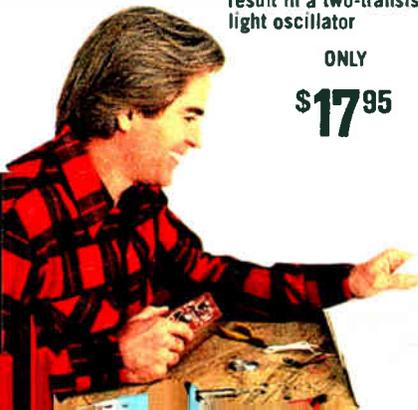


## An outstanding Soldering Course for all kitbuilders

- Six soldering experiments result in a two-transistor light oscillator

ONLY

**\$17<sup>95</sup>**



The **EI-3133 Soldering Course** is a fun and easy way to perfect your soldering skills whether you're a novice or an experienced kitbuilder. It teaches professional facts and techniques in detail using the proven method of hands-on learning. Topics covered include: the chemistry of solder, proper soldering iron size, cleaning and tinning, the characteristics of good solder connections, solder bridges, visual troubleshooting for repair, and the best methods of desoldering. This handy practice kit comes complete with circuit board, components and solder. This is an ideal course for individuals, and for use in instructing large numbers of people in industrial and school room situations. Course requires the use of a soldering iron and small hand tools.

EI-3133, Shpg. wt. 3 lbs. . . . . 17.95

## SAVE on Electronic Courses and ET-3300B Trainer

Take advantage of this valuable cost-cutting discount offer on all five of the Advanced Electronics Series Courses plus the ET-3300B Trainer designed for their experiments. Get the EE-105 Optoelectronics Course, EE-102 Active Filters Course, EE-104 Phase-Locked Loops Course, EE-101 Operational Amplifiers Course, EE-103 I.C. Timers Course and the ET-3300B Trainer for \$60.00 off the total cost of \$339.70...that's like getting the Optoelectronics Course for free. Order the entire group now and start expanding your electronics knowledge in these specialized areas that are both interesting and important.

**SAVER! EES-1015A, 34 lbs. . . . . 279.70**

# Advanced Electronics Series courses and others specialize in specific areas of electronics

Whether you're an electronics professional, part-time student, or inquisitive hobbyist, the Heathkit/Zenith Advanced Electronics Series provides you with the latest state-of-the-art information on specific subjects. All Courses contain parts for included experiments which can be performed on the ET-3300B Trainer. All five are worth 3.0 Continuing Education Units.

## 1 Optoelectronics Course covers latest devices

**Course focuses** on light sources and the different types of optoelectronic displays available, including how to drive and multiplex them. It also provides an in-depth look at light-sensitive components such as: photodiodes, phototransistors, solar cells, optocouplers, lasers and fiber optics. Experiments require the use of a multimeter and an oscilloscope. A previous knowledge of the EE-3101A and EE-3201A Courses is needed.

EE-105, Shpg. wt. 5 lbs. .... 59.95  
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs. .... 99.95  
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95  
**SAVER! EES-105B**, Combined EE-105 and ET-3300B, 11 lbs. ... **ONLY 149.90**

## 2 Active Filters Course shows how filters work

**Gain a complete understanding** of this critical element of circuit design. Acquire a proficiency in: designing active filters with op-amps; plotting and predicting frequency responses; breadboarding first-order low- and high-pass active filters; second- and higher-order filters; plus bandpass and state-variable filters. The ET-3300B Trainer, an oscilloscope and a function generator are needed to perform the experiments in this Filters Course.

EE-102, Shpg. wt. 5 lbs. .... 39.95  
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs. .... 99.95  
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95  
**SAVER! EES-102B**, Combined EE-102 and ET-3300B, 11 lbs. ... **ONLY 124.90**

## 3 Learn the principles of Phase-Locked Loops

**See** how these state-of-the-art devices work and how they operate. Topics cover: PLL principles, phase detector, voltage controlled oscillator, loop filter, digital frequency synthesizers, and monolithic PLL ICs and their applications. A DC voltmeter, a dual-trace oscilloscope and an audio generator are needed to perform the experiments included with this Course. A previous knowledge obtained in the EE-3101A through EE-3104A and EE-3201A Courses is desirable.

EE-104, Shpg. wt. 5 lbs. .... 49.95  
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs. .... 99.95  
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95  
**SAVER! EES-104B**, Combined EE-104 and ET-3300B, 11 lbs. ... **ONLY 139.90**

## 4 Learn about the ideal amplifier in Op-Amps Course

**A comprehensive text** details common op-amp parameters, basic op-amp linear circuits, integrator and differential circuits, and the performance of op-amp constant current sources. Also discussed are current/voltage and voltage/current converters, and more. Experiments use a multimeter, an oscilloscope, and a function generator. Prerequisites include courses EE-3101A through EE-3104A.

EE-101, Shpg. wt. 5 lbs. .... 44.95  
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs. .... 99.95  
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95  
**SAVER! EES-101B**, Combined EE-101 and ET-3300B, 11 lbs. ... **ONLY 129.90**

## 5 IC Timers Course covers the many uses of timers

**See how IC timers work**, what they do and where they are used in this Advanced Electronics Course. Learn the applications of common IC timers to: logic functions, output drive and time delay circuits, wide-range pulse generators, voltage/frequency converters, freewheeling and sine/square wave oscillators, universal timers, speed alarms and precise clock sources. To get the most from the experiments in the Course, a multimeter and an oscilloscope are recommended. Knowledge obtained from the EE-3201A Course is needed.

EE-103, Shpg. wt. 5 lbs. .... 44.95  
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs. .... 99.95  
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95  
**SAVER! EES-103B**, Combined EE-103 and ET-3300B, 11 lbs. ... **ONLY 129.90**

## 6 Linear Circuits Course covers basic circuits

- Cover dozens of basic circuits and their many modifications
- Includes components for building more than 30 experimental circuits
- Build up each circuit as you study each component's importance

**Learn from concise descriptions** of basic circuits and their operation. Progress through a series of circuits where each is used in a schematic and then modified showing how useful parameters can be altered. Construct over 30 linear circuits including various amplifiers, astable and monostable multivibrators, pulse position and width modulators, active filters and many more applications.

**To observe circuit operation**, a voltmeter and an oscilloscope are required. The ET-3300B Trainer provides an orderly working area for your experiments. DC and AC Electronics and Semiconductor Devices Courses' knowledge is needed.

**Earn 4.0 Continuing Education Units** and receive a Certificate of Achievement by passing the optional final exam with a 70% or better score.

EH-701, Shpg. wt. 2 lbs. .... 49.95

## 7 Advanced digital logic TTL/CMOS Circuits Course

- Examines TTL and CMOS circuits in detail while you learn by doing
- A series of circuits arranged in a logical sequence for studying
- Includes electronic components for assembling over 50 circuits

**Learn practical digital logic design** and IC applications in this learning and doing Course. Put theory to work as you construct decoders, adders, flip-flops, gates, selectors, distributors, comparators and more.

**For observing the operation** of your experimental circuits, a voltmeter and a dual-trace oscilloscope are needed. All experiments are easily performed on the ET-3300B Trainer. Knowledge obtained in the AC, DC and Semiconductor Devices Courses is needed to fully understand the material in this Course.

**Earn 4.0 Continuing Education Units** and receive a Certificate of Achievement by passing the optional final exam with a 70% or better score.

EH-702, Shpg. wt. 3 lbs. .... 59.95

**SAVER! EHS-712**, Purchase the EH-701 Linear Circuits and EH-702 TTL/CMOS Circuits Courses and save \$30.00, 6 lbs. .... **ONLY 79.90**

## 8 Versatile ET-3300B Breadboard Trainer makes doing experiments a lot easier and a lot more fun

**\$99<sup>95</sup>**  
KIT

- Redesigned to match our fully updated electronics courses
- Features convenient breadboards and multiple power supplies for large, complex circuits
- Short circuit protected by fuse and current limiting

**Designed to make your experimental circuit assembly more fun**, the ET-3300B Trainer provides several circuit building conveniences. Featured are seven solderless circuit boards, room enough for your larger and more complex circuits. These sockets are designed to accept up to #20 (0.032") solid wire and most common component leads for fast circuit assembly and easy circuit modifications. Accommodates any size dual, in-line integrated circuit package.

**Three self-contained power supplies** add the convenience of optional voltages to power breadboarded experiments. Save set-up time and eliminate long and tangly power hook-up wires. Output voltages available at output sockets are +5 volts DC ( $\pm 4\%$ ) at 1.5 amp, 0 to +12 volts DC at 100 mA, and 0 to -12 volts DC at 100 mA. All the supplies are short-circuit protected by fixed current limiting.

**A multi-purpose Trainer**, the ET-3300B is specifically designed for use with the specialized experiments contained in all the courses on this page. If you've ever tack-soldered an experimental circuit together just to see what happens, you'll really enjoy the convenience of this plug-in breadboard Trainer. No mess. No parts confusion. No tangled wires. And no connections that come unsoldered.

**The ET-3300B Trainer** is a light and portable experimental tool that can be assembled in a fast two evenings. It is a UL listed device that requires 120 VAC and 60 Hz power. It measures 3½" H x 12" W x 12" D.

Kit ET-3300B, Shpg. wt. 6 lbs. .... 99.95

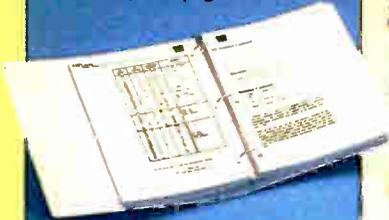
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs. .... 179.95

**SAVER! EES-1015A**, Purchase all five courses in the Advanced Electronics Series (EE-101, EE-102, EE-103, EE-104 and EE-105) and the ET-3300B Trainer at the same time and save \$60.00. Shpg. wt. 34 lbs. .... **279.70**



Use your Visa or MasterCard credit cards to purchase your kit!

Effective, 450-page text



Glossary of terms included in Appendix



All components for experiments included except for 9V battery

## Learn all about state-of-the-art Fiber Optics in this exciting course

- Comprehensive Course covers theory, components and fiber optic system in detail
- Includes components and instructions to develop a two-way fiber optic link and other experiments
- Self-instructional course enables self-paced learning with reviews for reinforcing important concepts

Managers, engineers, students and hobbyists will benefit from this broad, in-depth introduction to the fascinating and challenging science of lightwave technology. Fiber optics is an important, future-shaping breakthrough in rapid signal transmission with cost/performance benefits that promise to revolutionize the world of data communications. Even now fiber optics is used as a transmission medium for multiple and simultaneous telephone and television signals. Prepare yourself for the future with this overview of fiber optics.

The five-unit Heathkit/Zenith Fiber Optics Course covers the fundamentals of fiber optics. Unit 1, Optical Energy, deals with the nature of light. Just as electronics students need a basic understanding of atomic structure and the nature of electrons, so does the student of fiber optics need an understanding of optical radiation. Once this is established, you move on.

Unit 2, Optical Fibers, describes the principles of the transmission medium. You will learn the various fiber types and their construction, how they propagate light, the importance of such characteristics as numerical aperture, source area and radiation pattern in the energy launch, and loss factors

Units 3 and 4 deal with the active devices used to generate and detect the light used in fiber optic transmission. As you progress through the study of Fiber Optic Light Sources, you will learn much about light-emitting diodes. This unit covers their physical construction, theoretical operation, biasing characteristics and several types of fiber optic LED design considerations. A detailed discussion of laser emissions and principles associated with the use of injection laser diodes in fiber optic circuits concludes the unit.

Finally in Unit 5, Fiber Optic Systems, you will tie all of the component parts together into an operational fiber optic link. You will examine the requirements of the various types of links and learn which components best fulfill certain requirements. Four optional hands-on experiments are also included in the course to enhance your understanding of the text. You will construct a modulated source driver circuit, a fiber optic receiver circuit, and fabricate actual fiber optic links. These experiments will allow you to gain valuable design experience, and let you observe the parameters of a fiber optic link directly. To perform them, you will need either a Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer or the ET-3200B Digital Techniques Trainer, an oscilloscope, a multimeter and common hand tools (not included). All other necessary parts are furnished with the course.

In addition to the text, two supplemental appendices support the learning program. A listing of standard resistor values will come in handy when the student is building actual circuits from mathematically-derived schematics. Typical data sheets for several fiber optic devices will help in evaluating your newly acquired knowledge. Includes 25-page glossary of terms.

Earn 3.0 Continuing Education Units and a Certificate of Achievement by passing the enclosed optional final exam with a score of 70% correct or better.

**Prerequisites:** It is recommended that a student pass the Heathkit/Zenith EE-3101 DC Electronics and EE-3102 AC Electronics courses (or have equivalent knowledge) before taking the Fiber Optics Course. EE-3201A Digital Techniques is also recommended, but not required. If not completely satisfied, return course materials for a refund of the purchase price.

EE-4201, Shpg. wt. 6 lbs. 99.95



## Teach Computer-Aided Drafting and Design with EC-1300 CAD Graphics Software

Featuring AUTOCAD, the EC-1300 is a low-cost software package that can teach nearly all the features of a full-fledged industrial CAD system. AUTOCAD is easy to learn, easy to use and it runs on low-cost microcomputers. Draw buildings and landscapes; or layout mechanical, electrical, chemical, structural and civil engineering designs; and arrange parts on printed circuit boards.

Through on-screen menus, create drawings of any size to any scale. Use previously created drawings or use basic drafting elements such as lines (of any width), circles, arcs and solid-filled areas. A large set of editing commands allow drawn objects to be moved, copied, modified, erased, rotated, and scaled vertically and horizontally. A full bi-directional zoom enables a drawing to be worked on at any desired level of detail. Selectively view or plot drawings as if they were transparent overlays using eight different colors. Use up to 127 layers that can be turned on and off as desired, and viewed and plotted separately or together.

Complete details are available in colorful brochures. See your local Heathkit Electronics Center.



## CEU exams for Classroom Courses

A new opportunity: Students and employees using classroom versions can earn Continuing Education Units. Each package contains ten copies of that course's CEU exam, with full instructions.

### CEU exam for DC Electronics Classroom Course:

EB-6101-80, Shpg. wt. 2 lbs. ....	100.00
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EB-6201-80, Digital Techniques, 2 lbs. ....	100.00
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## Easier learning through new Video Training

Video Courses from Heathkit's Video Training Series provide a complete, convenient, effective and economical approach to learning. Through video animation techniques, students actually see how electronic processes work for better understanding and a higher retention factor. Get across complicated concepts and principles more quickly, vividly and economically than any other method of communication. Courses available include: Microprocessors, Digital Techniques and Soldering.

Complete details are available in colorful brochures. See your local Heathkit Electronics Center.

# Heathkit/Zenith Classroom Courses are carefully designed to fit your custom training needs

Now you can apply famous Heathkit/Zenith learning courses to meet your special training needs. Success-oriented with just the right amount of technical theory and a maximum emphasis on real-world applications, Heathkit/Zenith Classroom Courses incorporate the very latest methods and materials that are available. Specify them with confidence, because our pledge prevails:

*"We won't let you fail."*

Classroom courses are available in these areas:

- **Exploratory Courses:** Concepts of Electronics, Printed Circuit Boards
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- **Advanced Electronic Series:** Operational Amplifiers, Active Filters, IC Timers, Phase-Locked Loops, Optoelectronics, Robotics and Industrial Electronics, Robot Applications, HERO 1 Advanced Experiments, Passive and Transistor Circuit Design
- **Microprocessor Technology:** Digital Techniques, Microprocessors, Microprocessor Interfacing, 6809 Microprocessors, Advanced 16-bit Microprocessors, Microprocessor Applications
- **Computers:** BASIC Language Programming
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**SIX NEW HIGH-TECHNOLOGY COURSES:** Add these new learning programs to your classroom curriculums for the future... courses in Passive Circuit Design, Transistor Circuit Design, Advanced 16-bit Microprocessors, Robotics and Industrial Electronics, plus Robot Applications. See box in chart.

Heathkit/Zenith Classroom Courses are the complete answer for all types of industries, government agencies, and forward-thinking schools who want to teach technical subjects with maximum efficiency at minimum cost. Courses start at the entry level of electronics and move into new state-of-the-art technology, branch into the use of instruments or teach computer literacy. All of these multimedia courses employ the latest learning enhancement techniques. Text material is presented in concise, fast-paced units of study, with major topic areas highlighted in modular subsections. "Hands-on" experiments provide positive reinforcement through interactivity. Illustrations are used profusely for fast, thorough mastery by students of all ages and previous technical experience.

**Organized in three separate publications:** Each course is designed for greater student and teacher convenience. The student text is the core of the learning material, supported by a workbook with exams and experiments keyed to the text presentation. All courses are written in a logical learning sequence that first explains concepts and then builds upon them for a thorough understanding of each topic. The instructor's guide lets the teacher add his or her own parameters for challenge and guidance—providing each student with a fully rounded learning experience. At a fraction of the cost of institutional options.

**Separate parts packs for each student or group of students** contain all the electrical and accessory components necessary for implementing the workbook experiments. To complete the full range of experiments integrated within each program, assembled Heathkit/Zenith trainers are required (see chart list).

If rapid advances in technology are leaving your employees or students behind, they can catch up quickly and comprehensively. Review the extensive list of courses below, and contact us for more information regarding your needs.

Course	Text Shpg. wt. 2 lbs.	Price	Workbook Shpg. wt. 2 lbs.	Price	Instructor's Guide Shpg. wt. 1 lb.	Price	Assembled Trainer Wt. 6 lbs.	Price	Parts Shpg. wt. 1 lb.	Price	Cassettes Shpg. wt. 2 lbs.	Price	
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	AC Electronics	EB 6102	19 95	EB 6102 40	10 95	EB 6102 50	9 95	ETW 3100B	169 95	EB-6102-30	15 95	EEA 3102A 19 95	
	Semiconductor Devices	EB 6103	19 95	EB 6103 40	10 95	EB 6103 50	9 95	ETW 3100B	169 95	EB-6103-30	15 95	EEA 3103A 19 95	
	Electronic Circuits	EB 6104	19 95	EB 6104 40	10 95	EB 6104 50	9 95	ETW 3100B	169 95	EB-6104-30	29 95	EEA 3104A 19 95	
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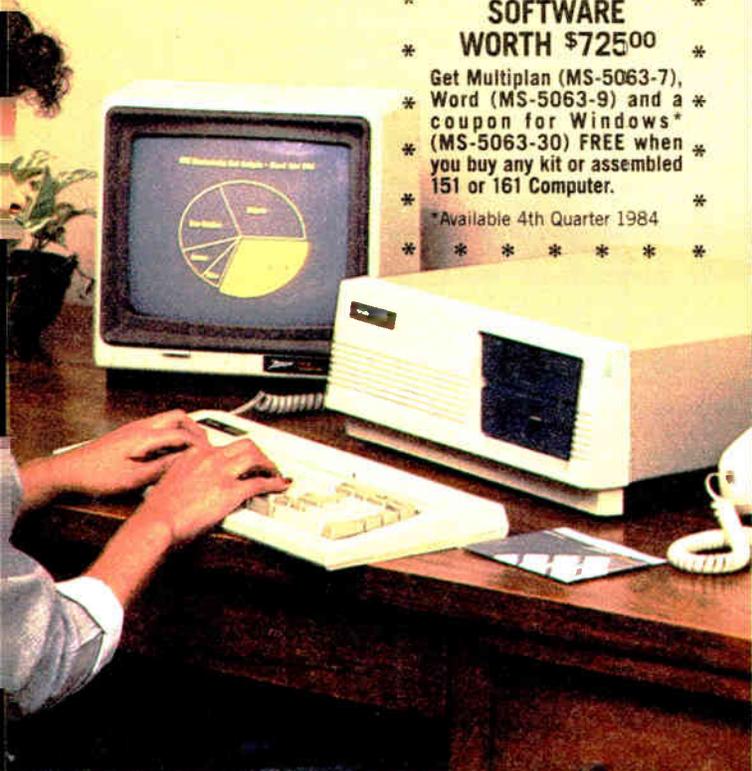
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## HS-151 Personal Computer Desktop System features Heathkit quality and IBM compatibility

Kit price as  
low as  
**\$1599<sup>00</sup>**

- A kit computer with enhanced features that takes advantage of IBM software and hardware
- Standard 128K memory capacity expandable to 320K on the motherboard and to 640K via expansion slot
- Available with one or two 5.25 inch floppy disk drives or optional Winchester hard disk drive
- MS-DOS operating system included at no extra charge

Heath/Zenith proudly offers a new and exciting personal computer...the HS-151 Desktop Personal Computer...with the enhanced features that you are looking for. A quality personal computer, the HS-151 PC provides Heathkit excellence in design and workmanship along with access to the wealth of available IBM software and hardware.

Using the advanced 16-bit 8088 microprocessor, the HS-151 PC gains a great deal of high speed computing power along with the ability to run sophisticated and high quality 16-bit software. In addition, the 8088 supports the MS-DOS operating system. This allows you to select software from the full range of applications software developed for the IBM Personal Computer and run it on the Desktop PC.

A standard 128 kilobytes (KB) of RAM user memory, with internal parity checking, is available on all models of the HS-151. For larger programs where additional memory is needed or desired, 64 KB increments can be added to the main memory board for up to 320 KB of RAM. A very useful debugger is permanently stored in ROM along with a pre-set auto-boot routine which can be disabled.

Optional single or dual 5.25-inch floppy disk drives supply the HS-151 PC with high-capacity auxiliary storage. These double-density drives are IBM formatted and each stores up to 360 KB of data. An optional hard disk drive provides an extensive 10.6 megabytes (MB) of added storage.

Four open IBM compatible slots are provided for your future expansion. Use one of these slots to expand memory up to 640 kilobytes, or use one for a Winchester controller card, or both. By being able to accept most peripheral boards designed for the IBM-PC, the HS-151 PC provides unlimited off-the-shelf flexibility in hardware configurations. With more hardware choices available, you can choose from a wider variety of software programs and peripherals.



## HS-161 Portable Personal Computer with Heathkit capability and IBM compatibility to go

Kit priced  
at  
**\$1699<sup>00</sup>**

- Designed for a computer user to be more productive wherever or whenever the need arises
- Takes advantage of off-the-shelf IBM compatible hardware and software
- Combines compatibility, unique capabilities and features with improved performance and ease of use

For those who need a computer to go, Heath/Zenith introduces the HS-161 Portable Personal Computer. It does everything a personal computer can do, perhaps a bit more, and it can do it on the go. Designed-in are Heathkit quality and performance with the added plus of IBM compatibility. Move it from the office, to meetings, to the hotel room, and to your home. Use the computer at your convenience and be able to take advantage of virtually all IBM programs and hardware without changing any computer hardware. With the HS-161 PC, you get problem-solving power, portability and flexibility...a powerful combination.

Extensive memory and storage capacity are two advantages of the new HS-161 Portable. A standard 128 kilobytes (KB) of RAM is available on all models which can be expanded on the main board to 320 KB. For auxiliary storage, the portable computer is available with one or two high-capacity 5.25-inch floppy disk drives. Each drive stores data in the standard IBM format on double-sided, double-density disks for a total capacity of 360 KB. When not in use or during transit, the disk drive section can be lowered into the computer.

For future expansion, four open slots are available for almost any off-the-shelf IBM compatible accessory boards. This allows you access to hundreds of software and hardware alternatives to meet your ever-changing computer needs.

A 9-inch amber phosphor video display monitor is built into the HS-161 PC with full business graphics capability. The amber monitor is most preferred by users for easy-on-the-eyes viewing during long periods of use. A "gray scale" feature allows color intensities to be programmed for easier viewing of color programs on a monochrome screen. As an option, an RGB color monitor can be used with the portable for a more exciting graphics display.

A detached 84-key keyboard connects to the main unit by a coiled cable. This allows

Two video outputs on the rear panel of the Desktop PC provide connections for either a color or monochrome video display monitor. Connect an RGB monitor to the standard nine-pin D connector and enjoy the benefits of a full color presentation. In the character mode, see a colorful 80 character by 25 line display in a selectable one of eight background colors and 1 of 16 foreground colors. In the graphics mode, each pixel of a 320 x 200 area can be painted in one of four colors selected from 1 of 2 color palettes. For easier viewing of word processing and accounting programs, a standard phono type connector allows the use of monochrome video display monitors. On a monochrome monitor, color displays are represented by a corresponding gray level.

A detached low-profile keyboard adds to the HS-151 Personal Computer's ease of use. The user-friendly keyboard is clearly labeled and has color-coded keypads that permit rapid key identification. It is laid out in the standard typewriter format. Ten programmable function keys, and separate plus and minus keys increase the HS-151 PC's accurate data entry capability. A calculator-style keypad, with entry key, allows rapid entry of large groups of numbers. LED indicators on the keyboard give instant operating status notice at a glance. An audible click is sounded at each keypress to signal successful key entry. This lightweight keyboard connects to the main unit by a coiled cord that expands up to six feet and plastic legs swing out for two levels of keyboard adjustment.

Two communication ports provide the HS-151 PC with the flexibility to expand. Available are an IBM compatible serial port and a parallel port that can be used with peripherals such as a matrix or letter quality printer or a modem. The serial I/O port is a standard EIA HS-232 DTE connector capable of baud rates between 110 and 9600 operating in asynchronous full or half duplex. The parallel interface is a Centronics compatible printer port using a 25 pin D connector.

Three separate testing procedures allow you to check your Desktop PC's hardware accuracy and adds to your data entry protection. These three levels of diagnostics include: power-on checks with their results indicated on eight internal LEDs; a ROM-based user-implemented screen diagnostic; and an extensive disk-based set of diagnostics. The diagnostic floppy disk is included only with the HS-151 PC and provides an easy and broad range of diagnostic tests.

Many editing capabilities are provided with the HS-151 Desktop PC to aid you in your program writing. With the HS-151, you can insert and delete characters and lines; erase a line; erase to the beginning of a line, to the end of line, or to the end of the page. Control the cursor with up, down, left, right, and home controls. Scroll through your programs with options such as jump or smooth scroll, or a scroll that's ROM or software selected.

the user to locate the keyboard at a convenient working position. The keyboard is laid out like a standard typewriter. Keypads are clearly marked and color coded for easy identification. Ten programmable function keys can be user defined for special software applications. Separate plus and minus keys and an L-shaped return key increase the Portable's ease of operation. LED indicators, for caps lock and numeric lock, give instant notice of operating status. When moved, the keyboard safely locks into the front of the computer.

Utilize the two input/output ports of the HS-161 and expand the usefulness of this portable computer. A parallel port and an IBM compatible serial port are available on the rear panel of use with dot matrix or letter quality printers, modems and other computer-expanding peripherals.

Protect your data entries by using three separate testing procedures to check the HS-161 Portable's hardware accuracy. One test is automatically conducted when the portable computer is powered up. Eight internal LEDs indicate the results of this test. Access the ROM or monitor diagnostic which is displayed on the CRT. Or, use the diagnostic disk that's included with the computer.

Your access to a wealth of software, is another plus feature of the HS-161 Portable Computer. Included with the HS-161 PC is the powerful MS-DOS operating system (page 81) that allows you to use all the applications software developed for the IBM-PC. Many software packages can be found on pages 78-81.

**Heathkit** Kit HSA-161-21, Portable Personal Computer with non-glare 9" amber CRT, 128K RAM, one 5.25" disk drive, 70 lbs. .... 1699.00

**Heathkit** Kit HSA-161-22, Portable Personal Computer with non-glare 9" amber CRT, 128K RAM, two 5.25" disk drives, 70 lbs. .... 1999.00

**Heathkit** Kit HSG-161-21, Portable Personal Computer with non-glare 9" green CRT, 128K RAM, one 5.25" disk drive, 70 lbs. .... 1699.00

**Heathkit** Kit HSG-161-22, Portable Personal Computer with non-glare 9" green CRT, 128K RAM, two 5.25" disk drives, 70 lbs. .... 1999.00

**Zimmer data systems** ZFA-161-21, Assembled Portable Computer with non-glare 9" amber CRT, 128K RAM, one 5.25" disk drive, 55 lbs. .... 2399.00

**Zimmer data systems** ZFA-161-22, Assembled Portable Computer with non-glare 9" amber CRT, 128K RAM, two 5.25" disk drives, 59 lbs. .... 2999.00

Z-205-1, 64K RAM Expansion Set consists of a nine chip set that installs onto main board for expanding RAM memory of the Computer. Three sets are required for 320K main board limit. Shpg. wt. 1 lb. .... Each set 100.00



Special quantity and system discounts are available on assembled computer products. See page 78.

Filled with important extras, the HS-151 PC lets you enjoy using a computer. Enjoy such features as a ready-to-use computer three to four seconds after applying power, easy hardware configuration with a menu- and diagram- driven program, booting from any drive, smooth scroll search, flickerless video and much more.

In the office or in the home, the HS-151 Desktop Personal Computer is ready to provide even more ways to help you be more productive and creative. One way is with the MS-DOS operating system that's included with the computer. It'll start you on the way to using software packages like those found on pages 78-81.

**Heathkit** Kit HS-151-21, Low-Profile Personal Computer, 128K RAM, one 5.25" disk drive with 360K storage, 73 lbs. .... 1599.00

**Heathkit** Kit HS-151-22, Low-Profile Personal Computer, 128K RAM, two 5.25" disk drives with 640K storage, 81 lbs. .... 1899.00

**Zimmer data systems** ZF-151-21, Assembled Low-Profile Personal Computer, 128K RAM, one 5.25" disk drive with 360K storage, 38 lbs. .... 2199.00

**Zimmer data systems** ZF-151-22, Assembled Low-Profile Personal Computer, 128K RAM, two 5.25" disk drives with 640K storage, 41 lbs. .... 2799.00

**Zimmer data systems** ZW-151-22, Assembled Low-Profile Personal Computer, 128K RAM, Winchester hard disk drive and 5.25" disk drive, 42 lbs. .... 4499.00

Z-205-1, 64K RAM Expansion Set consists of a nine chip set that installs onto main board for expanding RAM memory of the Computer. Three sets are required for 320K main board limit. Shpg. wt. 1 lb. .... Each set 100.00

**NEW!** Kit H-305, 128K Memory Expansion Board plugs into the Computer and adds 128K of RAM to memory. Requires 320K of RAM. Shpg. wt. 2 lbs. 235.00

**NEW!** Z-316, 8087 Numeric co-processor significantly improves performance of Personal and Portable Computers in arithmetic-intensive activities such as those found in FORTRAN programs and graphic displays. 1 lb. .... 225.00

**NEW!** Z-319, Assembled Video Card plugs into Personal and Portable Computers to provide high resolution, 8-color, 640 by 225 pixel-mapped graphics. Emulates H-100 video attributes and uses mapping to functionally emulate the keys of an H-100 keyboard. Shpg. wt. 1 lb. .... 499.00

**NEW!** HS-317, Winchester Upgrade Kit includes controller board, hard disk drive, instructions and mounting hardware, Shpg. wt. 33 lbs. .... 1499.00

**NEW!** TM-150, Programmer's Reference Manual provides information about the HS-151's features as related to programming, 5 lbs. .... PLEASE CALL

Second Optional 5.25" Disk Drives are available by visiting your local Heathkit Electronics Center or calling 800-253-7057 from 8 AM to 4:30 PM ET Mon-Fri.

**NEW!** Kit H-305, 128K Memory Expansion Board plugs into the Computer and adds 128K of RAM to memory. Requires 320K of RAM. Shpg. wt. 2 lbs. 235.00

**NEW!** Z-316, 8087 Numeric co-processor significantly improves performance of Personal and Portable Computers in arithmetic-intensive activities such as those found in FORTRAN programs and graphic displays. Includes IC and installation instructions. Shpg. wt. 1 lb. .... 225.00

**NEW!** Z-319, Assembled Video Card plugs into Personal and Portable Computers to provide high resolution, 8-color, 640 by 225 pixel-mapped graphics. Emulates H-100 video attributes and uses mapping to functionally emulate the keys of an H-100 keyboard. Shpg. wt. 1 lb. .... 499.00

Second Optional 5.25" Disk Drives are available by visiting your local Heathkit Electronics Center or calling 800-253-7057 from 8 AM to 4:30 PM EST Mon-Fri.

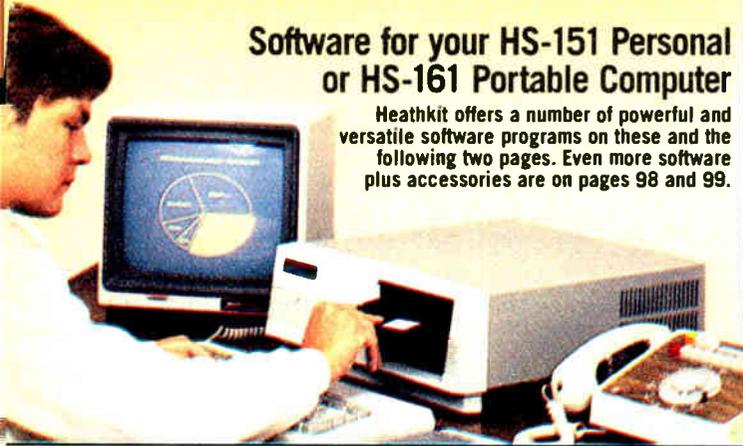
**HS-151 and HS-161 SPECIFICATIONS:** Processor: Intel 16-bit 8088. Clock: 4.77 MHz. On-Board Memory: 128 KB standard expandable to 320 KB on main board, up to 640 KB total memory via expansion slot VIDEO DISPLAY: CRT (HS-161 only): Non-glare 9-inch diagonal, amber phosphor Display Format: 25 lines of 80 characters. Display Size: 5.0" high x 7.0" wide. Character Size: 0.165" high x 0.075" wide. Character Type: 8 x 8 dot matrix. Dot Resolution: 640 horizontal x 200 vertical. Colors: Characters 1 of 8 background colors with 1 of 16 foreground colors. Graphics. Each pixel can be 1 of 4 colors selected from 1 of 2 color palettes. Gray Scale: Eight levels on a monochrome display. Video Outputs: RGB with intensity control and composite monochrome. Cursor: Blinking underline or reverse video or off. Cursor Controls: Up, down, left, right, home Cursor Addressing: Relative and direct. Tab: 8 columns. Refresh Rate: 60 Hz, 50 Hz Edit Functions: Insert and delete characters or lines. Erase Functions: Erase line, erase to beginning of line, erase to end of line, erase to end of page. Bell: Audible alarm in receipt of ASCII BEL command. BUS STRUCTURE: Type: IBM compatible. Slots: 8, 4 available for expansion. KEYBOARD: Type: 84 keys, 57 alphanumeric and 10 special function plus 17 keypad keys including separate numeric keypad Key Click: Yes. DISK SYSTEM: Drives: single or dual 5.25-inch double-sided double-density 48 TPI floppy disk drive Capacity: IBM formatted for 360 KB each. Winchester Drive: Optional internal 5.25-inch rigid disk drive and single 5.25-inch floppy disk drive. Capacity: 12.76 MB unformatted, 10.68 MB formatted. INPUT/OUTPUT: Serial I/O: One DTE RS-232C port. Baud Rate 110-9600 Operation: Asynchronous full or half duplex. Parallel I/O: Centronics compatible. Power Supply: 120 240, 50/60 Hz, 300 watts (maximum). Dimensions: HS-151: 16" W x 6 1/4" H x 16 1/2" D (40.6 x 15.9 x 42 cm). HS-161: 19 1/2" W x 8 3/8" H x 19 1/8" D (20.9 x 49.5 x 48.6 cm) Weight: HS-151 Approximately 42 lbs with keyboard and two disk drives HS-161 39 lbs

More accessory boards and software for the HS-151 Personal and HS-161 Portable Computers can be found on pages 98 and 99.

MS is a registered trademark of Microsoft, Inc.

## Software for your HS-151 Personal or HS-161 Portable Computer

Heathkit offers a number of powerful and versatile software programs on these and the following two pages. Even more software plus accessories are on pages 98 and 99.



### Easy Word processing for all your written material

**Word from Microsoft\*** is a versatile software word processing package that can produce letters, memos, reports, brochures, pamphlets, and even book-length manuscripts for office, school or personal use. Word lets you type and correct documents easily and efficiently. With a few keystrokes, turn a rough draft into a final copy with a polished appearance. Word offers a great deal of flexibility in maintaining documents and provides user-friendly conveniences to make your writing projects a lot easier to do.

Use **Word** for creating all written material on an HS-151 Personal or HS-161 Portable Computer using one 5.25" disk drive, 128K of memory and MS\*-DOS.

**MS-5063-9**, Shpg. wt. 3 lbs. .... **375.00**

**NEW**

### Powerful and flexible WordStar\*

Turn out letters and memos like you'd expect from an expensive dedicated word processing system. See page 93 for more details.

This version of WordStar requires an HS-151 Personal or HS-161 Portable Computer with 128K of RAM, one 5.25" disk drive and MS-DOS.

**MP-5063-10**, Shpg. wt. 3 lbs. .... **399.00**

**NEW**

### WordStar Professional Options Package

Add on several companion programs to the world's best selling word processing program, WordStar. The Options Package includes: CorrectStar,\* an automatic proofreader with an expandable 65,000 word base; StarIndex,\* for creating a table of contents and an index plus lists of figures and tables; and MailMerge,\* lets you address labels and produce personalized mailings. To run this Package, an HS-151 PC or an HS-161 Portable PC requires 192K of RAM and one 5.15" disk drive plus the MS-DOS operating system.

**MP-5063-12**, Shpg. wt. 3 lbs. .... **PLEASE CALL FOR PRICE**

**NEW**

### Complete WordStar Professional\* Package

A four program word processing package to handle all your text management and printing needs. The Professional Package includes

WordStar, CorrectStar, StarIndex and MailMerge. This Package requires an HS-151 PC or an HS-161 Portable PC equipped with 192K of RAM, one 5.25" disk drive and the MS-DOS operating system.

**MP-5063-13**, Shpg. wt. 3 lbs. .... **PLEASE CALL FOR PRICE**

### Analyze data faster and easier with Multiplan\*

For both business and personal use, Multiplan is a powerful modeling and planning tool that helps you analyze data. Do sales analysis, make sales decisions and put together a budget with this personal productivity tool. An electronic spreadsheet, Multiplan offers a worksheet 255 rows long and 63 columns wide for words, numbers and formulas. Use English commands and formulas.

Use **Multiplan** on an HS-151 Personal or HS-161 Portable Computer equipped with 128K of RAM and one 5.25" disk drive while using MS-DOS.

**MS-5063-7**, Shpg. wt. 3 lbs. .... **250.00**

\*Microsoft, MS and Multiplan are trademarks of Microsoft Corp. WordStar, CorrectStar, StarIndex, MailMerge and WordStar Professional are trademarks of Microsoft, Inc. Peachtext 5000 is a trademark of Peachtree Software, Inc. Lotus and Lotus 1-2-3 are trademarks of Lotus Development Corp. Ashton-Tate and dBase II are trademarks of Ashton-Tate. Heathkit Electronic Centers are units of Veri-technology Electronics Corp.

## Super Savings Available on Assembled Z-151 Personal, Z-161 Portable and Z-100 Desktop Computer Systems

Take advantage of tremendous savings on computer systems that you design around factory assembled Z-151 Personal Computer, Z-161 Portable PC or Z-100 Desktop Computers. Discounts are now available on these powerful and flexible top-of-the-line computers when combined with printers, modems, or other accessories or peripherals featured in this catalog. Configure a complete computer system that will satisfy all of your needs, immediately out of the box.

In addition with the discount on any of these computer systems we're also offering discounts on software that'll run on your selected computer system. Choose from BASIC, Pascal, COBOL, LOTUS 1-2-3, Peachtext 5000, Multiplan, Wordstar and other software in this catalog.

For more information about these big discounts call TOLL-FREE: 800-253-7057; or write Heath Company, Benton Harbor, MI 49022.

### SuperCalc<sup>3</sup> with graphics and data management

Besides being a powerful electronic spreadsheet for budgeting, estimating and forecasting, SuperCalc<sup>3</sup> features a fully integrated graphics function and a data-management capability, all on a single disk. Also makes excellent use of color.

To run SuperCalc<sup>3</sup> on an HS-151 Personal or HS-161 Portable Computer, two 5.25" disk drives and 128K of RAM are required plus MS-DOS.

**SC-5063-3**, Shpg. wt. 4 lbs. .... **395.00**



### dBase II\* management system for Ashton-Tate

A powerful, yet easy-to-use data base management system, dBase II puts all your data at your fingertips. See page 86 for details. This version requires an HS-151 Personal or HS-161 Portable PC with 128K of RAM, one 5.25" disk drive and the MS-DOS operating system.

**AT-5065-1**, Shpg. wt. 4 lbs. .... **495.00**

### PeachText 5000\* helps to improve your efficiency

PeachText 5000 is a combination word processor, spelling checker, on-line thesaurus, mailing list program and a spreadsheet. And, all programs are integrated using a central menu. Create and manipulate a variety of documents using sophisticated edit and print capabilities. Set the cursor at a word, access the thesaurus and select from a list of alternate suggestions. Over 4,400 indexed words and 26,000 synonyms are available. After completing your document, check it for spelling errors with the expandable 21,000 word dictionary.

Turn your computer into an electronic spreadsheet for fast data analysis that can be merged with your documents. The spreadsheet is simple and straightforward and can contain up to 254 rows by 64 columns of text, numbers and formulas. The List Manager is a data base program that handles name and address lists and simple inventories. It can be used with the word processor to create form letters to multiple addresses, even down to the salutation.

To use this version of PeachText 5000, an HS-151 or HS-161 requires 128K of RAM, two 5.25" disk drives and the MS-DOS operating system.

**RS-463-75**, Shpg. wt. 3 lbs. .... **395.00**

### Handle many tasks faster and easier with LOTUS 1-2-3\*

• An attractive package of spreadsheet, graphics and data base functions

In one simple and powerful program, LOTUS 1-2-3 has combined a comprehensive spreadsheet, a very capable data base and outstanding graphics. It is fast and is menu-driven with an extended series of help screens. 1-2-3 provides a huge worksheet of 256 columns by 2,048 rows... over half a million cells. The data base features 2,048 records with up to 256 fields in each record. They can be sorted, highlighted, reorganized, extracted and displayed in a separate table. Graphing capabilities include line, bar, pie, stacked bar and x-y charts using data from the worksheet. While 1-2-3 is complex, it is not difficult to use and on-line HELP makes this integrated software all the more easier.

To use LOTUS 1-2-3 on the HS-151 Personal or the HS-161 Portable Computers, they must be equipped with 192K of RAM, two 5.25" disk drives and MS-DOS.

LOTUS 1-2-3 is available at Heathkit Electronic Centers\* nationwide. This product is not available via mail order.

**LS-5063-1**, Shpg. wt. 3 lbs. .... **495.00**

# Open the door to computerized accounting with the BPI family of accounting programs

- All packages can work together as a system or be used individually



Run these programs on a Personal or Portable Computer equipped with two 5.25" disk drives, a minimum of 192 KB RAM, a compatible monitor and a printer that can print a minimum of 80 columns. Needs MS\*-DOS and GW\* BASIC.

tributing invoice amounts to accounts. This accounting program can also be used with BPI General Accounting, Job Cost Accounting or Inventory Control.

BP-5063-3, Shpg. wt. 5 lbs. .... 595.00

## Payroll program simplifies your company's payday

- Use several options to tailor a payroll system to your company
- Maintains employer-sponsored IRA's, tips and tips deemed to be wages

Payroll offers a choice of three principal methods by which you can pay your employees: salary, by the hour, or by commission. When using pay by commission, this accounting program allows you to figure base pay plus percentage of sales, base pay plus piece rate, it allows pay drawn against commission, and allows you to calculate and manually enter commissions. You can specify up to nine deductions including FICA, federal income tax and state income tax, plus six optional deductions. Pay employees each week, every two weeks, twice a month, or once a month. Then print paychecks and a check register listing all check numbers and amounts for the current pay period. Also print out W-2 forms at the end of the year. Operates independently or with BPI General Accounting and Job Cost Accounting.

BP-5063-4, Shpg. wt. 3 lbs. .... 595.00

## Inventory Control for versatile inventory management

- A versatile accounting package offering capabilities not found even with much larger computerized packages
- Made to track back orders and to cost your existing inventory

With Inventory Control, you can choose one of three accounting methods to cost your inventory: first-in, first-out; last-in, first-out; or average. Establish up to ten departments in your company, each with its own sales, cost of sales, inventory overage and inventory shrinkage accounts. Enter purchase orders as quickly and easily as you make journal entries and produce single or consolidated income and expense statements. Inventory Control automatically creates back orders and tracks low balance inventory items. List your inventory by twelve different methods, such as item number, department number, description or vendor to name just a few. One thousand accounts are available in the Inventory Control System. Automatically transfer current general ledger activity to the BPI General Accounting or BPI Accounts Receivable programs with a single command.

BP-5063-5, Shpg. wt. 3 lbs. .... 795.00

## Job Costing for quick and accurate job estimates

- Keep track of job costs and print out up-to-date reports

With Job Costing, you can report job income by the completed job or by percentage of completion. Keep more accurate track of costs for each job and print out a status report that compares actual to estimated costs and quantities on a percentage of completion basis. Also, be able to obtain job profit and loss reports in print that provide a monthly statement of job income and expenses. With this system, you establish coded names for jobs and also parts of jobs. Then you estimate their cost by entering quantities, rates and dollar amounts. Print out a job estimate that shows a rate per unit measure, the number of units, and the estimated dollar amount to do the job. Keep on top of jobs and all current activity. Use Job Costing with the BPI General Accounting, Payroll and Accounts Payable systems.

BP-5063-6, Shpg. wt. 3 lbs. .... 795.00

## Personal Accounting manages your own finances

- Record daily transactions, balance accounts, and print reports

Personal Accounting enables you to take advantage of computerized accounting for your own personal finances. Set up accounts to handle your assets, liabilities, net worth, income and expenses. With Personal Accounting, you can plan a budget for income and expenses. Use this program to figure your checkbook balance when the monthly statement arrives. Other uses include keeping track of checks and deposits in up to ten separate accounts. Likewise, record your credit card charges in up to ten separate credit card accounts. Even use this program to tally other financial incomes like interest from savings accounts. Available are printed reports on checks written and deposits made for each checking account plus a list of outstanding checks and deposits in transit. Print out an amortization schedule on which the system calculates the interest and principal portions of each payment on a loan or mortgage.

BP-5063-8, Shpg. wt. 3 lbs. .... 195.00

\*MS and GW are trademarks of Microsoft Corporation

## General Accounting is more than a general ledger

- Has all the features you'll need to run a business in one program
- Allows fast entry of cash register tapes
- Produces flexible and professional financial reports

The General Accounting system offers flexibility, fast data entry, informative reports, accuracy and practice data with which to learn the system. Tailor this system to your company's needs with detailed accounts receivable and payable ledgers. Produce single or multiple income statements for up to as many as ten departments or stores. Set up a payroll ledger and print out checks automatically. To reduce the number of data entries, single transactions are made on all appropriate ledgers. Even enter regular monthly entries by a single command. Reports generated are: a balance sheet, a trial balance, income statements, four different ledgers, journals and schedules. End of month procedures clear the data disk of current transactions and close accounts for the current period. Operates independently or in conjunction with additional BPI accounting systems.

BP-5063-1, Shpg. wt. 3 lbs. .... 595.00

## Self-Training Series for BPI General Accounting

- Learn how to operate the General Accounting system

This self-training series consists of two disks and a guide to help both the first-time or inexperienced user and the experienced user become fully acquainted with this accounting system. The training disks contain eight lessons on the system's basics. The lessons cover use of the keyboard and the General Accounting commands and features. A companion guide lists all the commands and gives a brief description of each one. The guide also contains completed worksheets for a sample company. For reference purposes, the guide includes examples of trial balances, balance sheets, income statements, and standard entries to help you along. A quick reference card is also included for your convenience.

BP-5063-71, Shpg. wt. 1 lb. .... 69.00

## Accounts Receivable offers choice of account detailing

- User can choose either balance forwarding or open item accounts
- Specify two levels of finance charges and still waive finance charges for specific customers

This Accounts Receivable program details each item on the receivable ledger with amounts and dates. This allows you to print an alphabetical listing of all accounts, cross-indexed to their account numbers, or analyze the account at any time. The system automatically produces an aged accounts receivable report for early account collection and business planning. This program automatically checks for valid account numbers and balancing entries. On a floppy diskette, you can enter up to 1000 customer accounts with each account holding up to 360 transactions per billing period. And, any number of customers can be designated to receive up to 100 repetitive charges in a period. This package can also be used in conjunction with the BPI General Accounting and Inventory Control programs.

BP-5063-2, Shpg. wt. 3 lbs. .... 595.00

## Accounts Payable computerizes vendor control

- Eliminates time spent on figuring payments and when they are due.
- Prints at any time, over twenty analyses and listings detailing vendor, voucher and check information

Accounts Payable Allows you to choose between two different accounting methods, cash or accrual. When using the accrual method, you can maintain two open fiscal periods. This accounting program offers three check printing options, including: payment of individual vouchers, individual vendors, or all open vouchers due on a date that you select. You can maintain vendor files dealing with specific information such as name and address, regular due date, discount percentage, discount due date and general ledger account distribution. It is even possible to assign general ledger account prompts to appear on the screen as data for dis-

Discover the fun of kitbuilding at your Heathkit Electronic Center.



# More software for the new HS-151 Personal and HS-161 Portable Computers



On these two pages you'll find more 16-bit business software, programming languages and other software for the Heathkit Personal and Portable Computers. Still more software, educational and for the home, can be found on page 99.

## General Ledger maintains a financial picture

A simple, easy-to-operate system from Peachtree\* Software that lets you maintain a complete financial picture of your business. It can be used independently or in connection with Accounts Receivable and Accounts Payable Peachtree accounting packages. Keep up-to-date with many comprehensive reports that are accurate and timely descriptions of your company's current financial condition. Comparative data includes financial status of company a year ago to date. Number of accounts are limited only to available disk space.

General Ledger will run in an HS-151 Personal or HS-161 Portable Computer with 192K of RAM, two 5.25" disk drives, under MS\*-DOS and GW\*-BASIC.

RS-5065-1, Shpg. wt. 3 lbs. .... 499.00

## Prepare billings with Accounts Receivable package

Peachtree Accounts Receivable package helps you prepare bills for and obtain timely collections from customers. Used independently or together with General Ledger, this accounting package can reduce lost or delayed income because of bookkeeping errors or paperwork delays. This complete invoicing system will provide invoices, statements and aging reports. It will also maintain customer account information, sales taxes and accounting detail for posting to the General Ledger. Number of accounts and transactions only limited by disk space.

Accounts Receivable will run in an HS-151 Personal or HS-161 Portable Computer with 192K of RAM, two 5.25" disk drives, under MS-DOS and GW-BASIC.

RS-5065-2, Shpg. wt. 3 lbs. .... 499.00

## Accounts Payable business application package

Peachtree's Accounts Payable package maintains a complete file for each of your vendors. It will show which of your invoices to pay by the due date, by the specified discount date or according to certain cash requirements. Save money by claiming all the discounts available. At the same time, keep your vendors accounts always up to date. Even print out checks with this accounting package and keep a check register. Accounts Payable can be used independently or together with the General Ledger program on this page.

The Accounts Payable package will run in both the HS-151 Personal and HS-161 Portable Computers with 192K of RAM and two 5.25" disk drives, while using the MS-DOS operating system and GW-BASIC.

RS-5065-3, Shpg. wt. 3 lbs. .... 499.00

## Inventory Control covers all aspects of inventory

Speed and simplify the demanding task of effective inventory control with the Peachtree Inventory Management System. Inventory Control permits the entry of four types of transactions: sales, returns, receipts and adjustments. Improve your inventory control, reduce your management costs and decrease customer response time with this straightforward method of updating your inventory records. Comprehensive reports include: price lists, reorders, current period status, physical inventory, departmental summaries and more. Can be used independently or in conjunction with Accounts Receivable and Sales Invoicing.

To run this accounting package, an HS-151 Personal and HS-161 Portable Computer needs 192K of RAM and two 5.25" disk drives, and use the MS-DOS operating system along with the GW-BASIC programming language.

RS-5065-5, Shpg. wt. 3 lbs. .... 499.00

## Sales Invoicing bridges accounting packages

The Peachtree Sales Invoicing System is capable of accessing and updating both the Accounts Receivable and Inventory Control. In one process update customer accounts with sale or return information, update inventory with returned or sold stocked items, and then retain this information for printing invoices or credit memos. Other features include credit checking during invoice entry, automatic sales tax calculation and a check of inventory against quantity ordered.

Sales Invoicing will run under MS-DOS and GW-BASIC in an HS-151 Personal or HS-161 Portable Computer with 192K of RAM and two 5.25" disk drives. Accounts Receivable and Inventory Control packages are also required.

RS-5065-6, Shpg. wt. 3 lbs. .... 399.00

## Powerful Condor\* Relational Data Base Management

Powerful and simple enough for all business applications, rDBMS\* enables you to design and create data bases for keeping records on any subject you choose. Quickly search, sort, merge, analyze, index and print out up to 32,767 records per data base. Create a new data base in minutes. Use up to 1023 bytes for each record. Condor is so easy to use that you can achieve meaningful results within a few hours. Condor uses the relational data base concept which allows unrelated information to become dynamically related.

This version of Condor's data base package requires an HS-151 or HS-161 Computer with 128K of RAM, two 5.25" disk drives and MS-DOS.

CD-5063-1, Shpg. wt. 5 lbs. .... 650.00

## Fast and easy-to-use Condor File Management System

The Condor FMS package offers basic rDBMS capability. Features include: processing of up to 32,767 records per data base, up to 1023 bytes per record, create new data bases within minutes, calculation of statistics for field values, and help menus and command files that you create. Quickly search, sort, merge, analyze and print out records with ease.

This version of Condor FMS requires an HS-151 or HS-161 Computer which has 128K of RAM, two 5.25" disk drives and uses the MS-DOS operating system.

CD-5063-2, Shpg. wt. 3 lbs. .... 299.00

## Valuable Pecon Peachtree to Condor Interface System

A valuable business tool, this utility program allows the transfer of data from master and transaction files in Peachtree accounting programs to data bases that can be processed using the Condor system. Each program in the system displays instructions and messages that enable even the inexperienced user to use it with minimum instruction time and reference to the manual. Now all the power of a data base manager can be applied to your accounting records.

Running the Pecon Interface System on an HS-151 Personal or HS-161 Portable Computer requires 192K of RAM, two 5.25" disk drives, the MS-DOS operating system, a minimum of one Peachtree accounting package, and either the Condor rDBMS or FMS software as found on this page.

CB-5063-9, Shpg. wt. 3 lbs. .... 99.00

## Microsoft Standalone Sort for sorting and merging

MS-Sort is a stand alone utility that accepts data files from many different programming languages and arranges the records in these files in any order you assign. MS-Sort can be used for many tasks including: selecting and sorting records for reports; sequencing transactions to be merged into a master file; grouping and arranging items to be displayed on-screen; and converting a data file type to another, including one language to another.

Simple, easy-to-learn, yet powerful within its scope, MS-Sort is a programming language that manipulates files on the record level. It is fast, changing files by rejecting or reordering whole records. This simple language also allows fast program development to save you time.

And MS-Sort is adaptable. When numerous reports are needed based on selections of data sorted in different orders, MS-Sort can be quickly changed and executed without any compile or link steps. MS-Sort programs can even prompt for and accept any changeable statements while loading from a disk.

MS-Sort recognizes Microsoft BASIC, COBOL, Pascal or FORTRAN data types and file organizations including: sequential, random, relative, line sequential and indexed. Consequently, no matter which of the above programming languages are used or the file type the data files are constructed, or what types of data the files contain, MS-Sort can read and sort their records. For greater user convenience, MS-Sort can even process files created by programs written in different languages in the same MS-Sort program.

MS-Sort requires an HS-151 Personal Computer or an HS-161 Portable PC using the MS-DOS operating system. Although MS-Sort can be run using one 5.25" disk drive, two are recommended so that a greater number of sort tasks can be accomplished. MS-Sort resides in approximately 37K of memory. After loading, it takes advantage of all unused memory remaining and provides you with a total working memory equal to the space available for a modular program minus 37K. Since MS-Sort is capable of handling files up to 4 billion bytes, it's speed and power in an application is limited only by memory and disk space.

MS-5063-12, Shpg. wt. 1 lb. .... 199.00

\*MS and GW are trademarks of Microsoft Corp. Peachtree is a trademark of Peachtree Software Inc. Condor and rDBMS are trademarks of Condor Computer Corp.

## 3Com EtherSeries brings you computer networking

This series of Ethernet products provides you with the opportunity to network **HS-151 Personal** and **HS-161 Portable Computers**. Increase your capabilities and resources with a shared hard disk drive, electronic mail and shared printers.

### EtherLink circuit board provides basis of system

**EtherLink** is a basic prerequisite for connecting up to 300 HS-151 Personal and/or HS-161 Portable Computers into a common network that can share all the other products in the EtherSeries. It is a printed circuit board that easily installs into any unused computer expansion slot. A Thin Ethernet coaxial cable is then used to connect all computers in your network. Included with the EtherLink Card is user software. This software runs on floppy disk-equipped computers and allows them access to the disk or printer of a Winchester-equipped computer.

**Computers connected to the network must have:** at least one 5.25" disk drive, at least 128K of RAM (192K if EtherMail is used), MS-DOS Version 2, and an EtherLink card. One of the network computers must be equipped with a Winchester hard disk drive for use as a File Server. Each end of a network must have a Terminator attached (see accessories below).

**TC-5063-1**, Shpg. wt. 4 lbs. .... **795.00**

### Share both hardware and software with EtherShare

**Make use of greater data storage.** Share information and programs. EtherShare provides these advantages and more to all users connected to the same Ethernet Network. EtherShare allows a network to use the resources of a hard disk drive subject to network control and security.

**EtherShare** consists of server software for the Winchester-equipped computer, now called the network server, in a network using Ethernet products. It allows other computers in the network to use allotted portions of the hard disk. And, it also allows the server to act as a normal user computer.

**The server computer must include:** MS-DOS Version 2, a fixed hard disk drive, at least 256K bytes of memory, an EtherLink card, and a 5.25" disk drive for installing the software and for backing up copies of hard disk data.

**TC-5063-2**, Shpg. wt. 3 lbs. .... **599.00**

### EtherMail adds electronic mail service to network

**Compose, forward and reply to messages** and send them to anyone else on the network with the EtherMail package. In addition, you can read, file and print out any messages sent to you. You can also send messages to a single individual or to an entire group by way of a distribution list.

**The first part of EtherMail** is the server software. It allows the computer with the hard disk drive to act as a post office where messages are held until requested by the recipient. The second part, user software, is used for composing, reading, sending and receiving messages. Server software requires 320K of RAM, the MS-DOS Version 2 operating system and EtherShare. User requires 192K of RAM.

**TC-5063-3**, Shpg. wt. 3 lbs. .... **749.00**

### EtherPrint allows network users to share printers

**Cut your printer costs** by allowing many users access to a single printer. Or, offer network users a choice of a line printer or a letter-quality printer that's connected to your server computer. Program, data and text files are stored and then printed out when the printer is available in the order they are received.

**EtherPrint software** requires at least 128K of RAM, two disk drives, MS-DOS Version 2 and the EtherShare software that has been previously installed.

**TC-5063-4**, Shpg. wt. 3 lbs. .... **499.00**

### Thin Ethernet Cables and Accessories:

**TC-5063-5**, 25 foot Thin Ethernet coaxial cable, 1 lb. .... **20.00**

**TC-5063-6**, 100 foot Thin Ethernet coaxial cable, 6 lbs. .... **50.00**

**TC-5063-7**, Ethernet Terminator Kit, Two Terminators, 1 lb. .... **25.00**

**TC-5063-8**, Ethernet (BNC/BNC) Barrel Connector, Shpg. wt. 1 lb. .... **6.00**

### CPS for Personal Computer communications capability

**Turn your Personal or Portable Computer** into an enhanced communications device with this Computerized Phone System (CPS) software. Communicate at up to 9600 baud with other computers. To run this CPS software, an HS-151 or HS-161 requires 128K of RAM, one 5.25" disk drive, MS-DOS and a modem.

**CB-5063-7**, Shpg. wt. 2 lbs. .... **49.00**



## Integrated GrafTalk\* produces business graphs

**GrafTalk** is a versatile and flexible package with a wide range of features. Further information is available on page 84. Requires an HS-151 Computer or HS-161 PC with 128K of RAM and two 5.25" disk drives under the MS-DOS operating system.

**RG-5065-1**, Shpg. wt. 3 lbs. .... **499.00**



## Microstat\* offers extensive statistical tests

**Microstat** is an interactive statistics package for data manipulation and statistical testing. Developed for real-life applications. Further information is available on page 87. For HS-151/161 Computers with 128K of RAM, two 5.25" disk drives and using MS-DOS.

**ES-5063-1**, Shpg. wt. 3 lbs. .... **PLEASE CALL FOR PRICE**

## HS-151 and HS-161 Personal Computer Diagnostic Disk

**Reduce service costs and minimize hardware downtime** with the programs contained on this 5.25" floppy disk. Designed to operate with a minimum of operator interaction. Alarm sounds when a fault is found. Requires a computer with 128K of RAM and one disk drive. Included with HS-151 and HS-161 Computers.

**CB-5063-13**, Shpg. wt. 3 lbs. .... **79.00**

## Use the advanced MS-DOS Version 2 operating system

**This enhanced operating system** has many new features including: subdirectories, input/output redirection and pipes and filters. Included with HS-151 and HS-161 Computer and requires 128K of RAM and one 5.25" disk drive.

**OS-63-50**, Shpg. wt. 5 lbs. .... **150.00**



## MS-\*DOS Version 2.0 Programmer's Package

**This package is designed for programmers and system developers** who wish to modify features of MS-DOS or develop programs which will run under the MS-DOS environment. These programmer's tools include a Basic Screen Editor, Macro Assembler, cross-reference utility, three versions of source BIOS plus other useful programs including a number of filters.

**CB-5063-16**, Shpg. wt. 3 lbs. .... **199.00**



## GW-BASIC 2.0 is now expanded and more powerful than previous versions

**New features include** directory support, I/O redirection, enhanced graphics capability and more. New options for graphics, as well as some completely new commands allow you to rotate a figure in single degree increments. And now you can paint in patterns. Also select a part of a screen as a view port and have graphics only in that part. Music capabilities expand to more options for music trapping and PLAY strings. Larger record numbers are now allowed. And a timer variable has been added plus other enhancements. HS-151/161 Computers require one 5.25" disk drive and the MS-DOS operating system.

**MS-5063-13**, Shpg. wt. 3 lbs. .... **100.00**

## More programming languages for use with the HS-151 Personal Computer and HS-161 Portable PC

**FORTRAN:** Conforms to the ANSI X3.1978 standard (including most of the features of FORTRAN-77 except the COMPLEX data type). Requires 192K of RAM, one 5.25" disk drive (two are recommended) and the MS-DOS operating system.

**MS-5063-2**, Shpg. wt. 5 lbs. .... **195.00**

**COBOL:** Certified with the Federal Compiler Testing Center to be at the low intermediate level of compliance with the ANSI X3.1978 standard. Large programs are managed effectively because data and procedures can be hierarchically structured for efficient, clean, top-down design. It requires 128K of RAM, one 5.25" disk drive (two are recommended) and MS-DOS.

**MS-5063-3**, Shpg. wt. 5 lbs. .... **395.00**

**Pascal:** Use this version of Pascal at the ISO standard level for transporting programs to and from other computers. Program capabilities allow you to manipulate data at the machine level for faster program execution. Requires 192K of RAM, one 5.25" disk drive and the MS-DOS operating system.

**MS-5063-5**, Shpg. wt. 5 lbs. .... **295.00**

\*MS and GW are trademarks of Microsoft Corp. GrafTalk is a trademark of Redding Group Services. Microstat is a trademark of Ecosoft Corp.



Use your Visa or MasterCard credit cards to purchase your kit!

HSG-1121-22 All-In-One Computer  
with two 5.25" DSDD disk drives



## The Advanced H-100\* All-In-One Desktop Computer

As low as  
**\$2149<sup>00</sup>**

- Dual microprocessors to run both 8/16-bit software
- Standard 128 KB RAM expandable to 768 KB
- High-capacity 320 KB single disk drive storage
- Built-in monochrome monitor with choice of CRTs
- Standard parallel and dual serial output ports
- Highly detailed graphics in monochrome or color
- MS-DOS operating system included

Dual 16- and 8-bit microprocessors offer the best of both worlds. The 8088 microprocessor provides for significantly improved performance from the H-100 Computer by allowing use of sophisticated 16-bit applications software. Run programs faster, up to 10 times faster than 8-bit software, and manipulate more information, or both. The H-100 also uses an 8-bit 8085 microprocessor that allows you to run most 8-bit CP/M\* software programs.

A standard 128K byte RAM memory in the H-100 provides the capacity to handle most all software programs. For larger, more comprehensive business programs, memory can be easily expanded to 192K bytes right on the motherboard. For even larger programs, memory can be expanded up to 768K bytes via S-100 expansion slots. Optional Z-205 RAM memory board lets you add 256K to memory.

Designed for expansion, the H-100 features four open expansion slots. These are industry standard S-100 slots that can be filled with memory and peripheral devices as you need them. This add-on capability protects your computer investment by being able to take advantage of advancing future technology.

Excellent high-resolution graphics is made possible on the H-100 through bit-mapping. With individual dot (pixel) control of a 640 by 225 pixel area, you can create highly detailed drawings and graphs. Thirty-three special graphic characters are available through the keyboard for use in less detailed graphics. Install two



HS-1101-22 Low-Profile  
with optional HVM-122A

## Modular H-100 Low-Profile Desktop Computer

As low as  
**\$1999<sup>00</sup>**

- Features all the advantages of the All-In-One less the built-in monochrome video display
- Offers you the option of selecting either a monochrome or high-resolution color video display
- Expandable memory and high-capacity disk drives
- Three ports for extensive communications access
- MS-DOS operating system included

Offering all the features of the H-100 All-In-One, the Low-Profile version also provides a modular alternative to a complete computer. Select either an RGB color monitor or a high-resolution monochrome display at additional cost. Then place your Low-Profile H-100 where you like to work and the monitor where you choose.

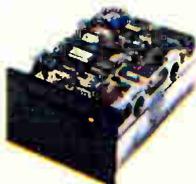
Power, performance and flexibility marks the Low-Profile Computer like the All-In-One. An advanced 8088 microprocessor provides 16-bit computing power while an 8085 microprocessor runs 8-bit software faster than ever before...both processors run at 5 MHz. Enjoy the benefits of 16-bit software and retain access to the huge base of 8-bit CP/M software.

For easy access to information, the Low-Profile Computer features one or two 5.25-inch floppy disk drives. Each double-sided double-density drive can store up to 320K bytes of data. Support for an external 8-inch drive (HS-207 on page 89) for up to 2.5 megabytes of data storage is standard.

128 kilobytes of RAM is standard and an additional 64K bytes can be added to the main board for up to 192K of memory on the motherboard. And that can be expanded up to 768K bytes with the addition of two 256K RAM Upgrade boards.

ZW-111-32 Low-Profile  
Computer with Winchester  
and 5.25" disk drive

Winchester  
drive with  
11 MB storage



## Assembled Low-Profile Computer with Winchester

Huge on-line data storage, that's what you get with an H-100 that has a built-in 11 megabyte Winchester hard disk drive. It allows you to conveniently store data that would otherwise require several dozen floppy diskettes. With a Winchester drive you can easily handle those large amounts of data encountered with lists of accounts and large inventories.

For serious computer users, a Winchester disk drive can be an economical data storage alternative to a 5.25-inch floppy disk system. Especially when many disk drives, costing more than a Winchester drive, are required to put all needed information "on-line" at the same time.

Dramatically decreasing seek time over floppy disk drives, a Low-Profile Computer with a Winchester drive can be finished retrieving information while a 5.25-inch correct disk system is just getting started. This high speed access to information is ten to twenty times faster than systems using 5.25-inch floppy disk

Z-219-1 Color Video RAM Sets and get 8 levels of intensity or 8-color capability with the addition of an optional color monitor.

**A built-in 12-inch monochrome video display** provides an easy-to-read screen in your choice of non-glare green, amber or white. Besides bit-mapped graphics, the monitor also displays 25 lines of 80 characters each in both upper and lower case.

**Three communication ports**, one parallel and two serial, provide flexibility and convenient expansion capability without using a single expansion slot. The parallel port, with its 25-pin D connector, allows use of industry standard printers. The two serial RS-232C connectors, one DTE and one DCE, can be used with printers, modems, speech synthesizers, terminals and plotters.

**High capacity disk drive storage** is another advantage of the H-100. Choose from models with one or two 5.25-inch double-sided double-density disk drives that store up to 320K bytes of data. Dual disk drives mean more on-line storage and faster operational speed. For still greater storage capacity, connect the HS-207 8-Inch Disk System (p. 89) for up to 2.5 megabytes of external data storage. For the storage capacity necessary for large accounting, inventory or technical jobs, an internal 11 megabyte Winchester hard disk drive (below) could be your solution.

**An easy-to-operate sculptured typewriter-style keyboard** allows you to work faster and more accurately than ever before. Plus 13 user-programmable special function keys and an 18-key keypad add to the users convenience. Even a software-controlled help key is available whenever needed.

**Included** with all kit and factory-assembled H-100s is the MS-DOS operating system. LOTUS\* 1-2-3 is included with fully assembled Z-100s.

-  **Kit HSA-1121-21**, Monochrome graphics, non-glare amber CRT, 128 KB RAM, one 320 KB 5.25" drive, MS-DOS, 109 lbs. . . . . **2149.00**
-  **Kit HSA-1121-22**, Monochrome graphics, non-glare amber CRT, 128 KB RAM, two 320 KB 5.25" drives for a total of 640 KB storage, MS-DOS, 114 lbs. . . . . **2449.00**

**For even greater flexibility**, the H-100 Low-Profile Computer comes standard with two serial ports, one parallel port and 4 open S-100 expansion slots. Two RS-232C ports as well as a Centronics standard parallel port are provided for use with a matrix or letter quality printer, a modem or plotter without using an expansion slot. The standard IEEE-696 S-100 slots can be used when required for extra memory or peripheral devices to meet your changing needs. See page 98.

**Enhanced graphics capability** helps you create and display highly detailed drawings and graphs in either monochrome or high-resolution color. You control each individual pixel (dot) out of 144,000 pixels. Or, display 25 lines of 80 characters. Add two Z-219-1 Color Video RAM Sets and get 8 levels of intensity. Connect a color monitor and each pixel can be assigned one of 8 colors.

**Included with all kit and assembled H-100 Computers** is the powerful MS-DOS operating system. Also included with assembled models is the popular LOTUS 1-2-3 business package. H-100 Computers also operate under the CP/M operating system for access to an even wider range of applications software.

-  **Kit HS-1101-21**, Low Profile, monochrome graphics, 128 RAM, one 320 KB 5.25" drive, MS-DOS, 78 lbs. . . . . **1999.00**
-  **Kit HS-1101-22**, Low-Profile, monochrome graphics, 128 KB RAM, two 320 KB 5.25" drives, MS-DOS, 83 lbs. . . . . **2299.00**
-  **ZF-101-31**, Assembled Low-Profile, monochrome graphics, 192 KB RAM, one 320 KB 5.25" drive, 54 lbs. . . . . **3029.00**
-  **ZF-111-22**, Assembled Low-Profile, color graphics, 128 KB RAM, two 320 KB 5.25" drives, 54 lbs. . . . . **3499.00**
- Z-205-1**, 128 KB to 192 KB RAM Upgrade Kit, Shpg. wt. 1 lb. . . . . **100.00**
- NEW! Z-216**, 8087 Numeric Co-Processor, 2 lbs. . . . . **379.00**

drives. Add an increased data packing technique to high speed access and you have a Winchester drive that can transfer data at 5 megabytes per second. All of which results in an H-100 Computer with increased efficiency in applications requiring a great many disk operations.

**ZW-111-32**, Assembled and tested Low-Profile Computer with internal 11 MB Winchester disk drive, one 320 KB 5.25-inch disk drive, 192 KB of RAM, color graphics capability, MS-DOS and LOTUS 1-2-3, 55 lbs. . . . . **5499.00**

**ZWG-121-32**, Assembled and tested All-In-One Computer with internal 11 MB Winchester disk drive, one 320 KB 5.25-inch disk drive, 192 KB of RAM, non-glare green CRT, MS-DOS and LOTUS 1-2-3, 68 lbs. Mtr. Frt. . . . . **5599.00**

**NEW! HS-217, Winchester Upgrade Kit:** Kit contains the controller and data separator boards, and an assembled and tested Winchester disk drive. The hard disk controller board installs in one of the H-100's S-100 expansion slots and the Winchester drive fits in one of the 5.25" disk drive locations. Kit includes all

-  **Kit HSG-1121-21**, Monochrome graphics, non-glare green CRT, 128 KB RAM, one 320 KB 5.25" drive, MS-DOS, 109 lbs. . . . . **2149.00**
-  **Kit HSG-1121-22**, Monochrome graphics, non-glare green CRT, 128 KB RAM, two 320 KB 5.25" drives, MS-DOS, 114 lbs. . . . . **2449.00**
-  **Kit HSW-1121-21**, Monochrome graphics, non-glare white CRT, 128 KB RAM, one 320 KB 5.25" drive, MS-DOS, 109 lbs. . . . . **2149.00**
-  **Kit HSW-1121-22**, Monochrome graphics, non-glare white CRT, 128 KB RAM, two 320 KB 5.25" drives, MS-DOS, 114 lbs. . . . . **2449.00**
-  **ZFG-121-32**, Assembled All-In-One H-100, 12" green CRT, 192 KB RAM, two 320 KB 5.25" drives, 68 lbs. Mtr. Frt. . . . . **3729.00**

## SAVER Save 50% on any or all of the items listed below when you purchase an H-100

Get a big 50% discount on any or all of the following items when you buy them within 90 days of your H-100 purchase.

**Any three individual Heath/Zenith software packages.** This also applies to the powerful Peach Text 5000 and LOTUS 1-2-3™ business packages described on page 86.

**Two Z-219-1 Color Chip Sets:** Adds color video to your H-100. Regularly \$145.00 each . . . . . **Discount price 72.50 each**

**One Set of TM-100 Technical Manuals:** Details the inner workings of your kit H-100 Computer. Regularly \$110.00 . . . . . **Discount price 55.00**

- Z-205**, 256 KB RAM Upgrade Circuit Board, Shpg. wt. 2 lbs. . . . . **799.00**
  - Z-219-1**, Color Video RAM Chip Set, Shpg. wt. 1 lb. . . . . **145.00**
  - ZA-100-4**, S-100 Extender Board, Shpg. wt. 1 lb. . . . . **79.00**
  - HDC-100**, Dust Cover for Low-Profile Computer, Shpg. wt. 1 lb. . . . . **16.00**
  - HDC-120**, Dust Cover for All-In-One Computer, Shpg. wt. 1 lb. . . . . **16.00**
  - TM-100**, H Z-100 Technical Manuals, Shpg. wt. 22 lbs. . . . . **110.00**
- Second 5.25" drives** for computers with one drive, visit your nearest Heathkit Electronic Center (list on p. 57) or call 800-253-7057 from 8 AM to 4:30 PM ET.

**H-100 SPECIFICATIONS: PROCESSORS:** 16-bit: Intel 8088. 8-bit: Intel 8085. Clock: 5 MHz. **DATA STORAGE:** Disk Controller: Standard Z-207 controller, supporting both 5.25" and 8" drives simultaneously. One soft-sectored, double-sided, double-density, 48 TPI 320KB 5.25" floppy disk drive standard in kits. Two drives standard in assembled units. **Disk Storage Expansion:** 11 megabyte 5.25 Winchester disk drive, which installs in second internal drive slot of H Z-100, optional; up to 2.5 on-line megabytes of external 8" floppy disk storage (Z-207-41, 42, p. 89) is also available. **EXPANSION:** Five IEEE-696 (S-100) standard card slots available for expansion. Disk controller occupies one S-100 slot. **DISPLAY:** Display Form: 24 lines x 80 characters, plus 25th line for user information. 225 lines of 640 dots in graphics mode. **Character Set:** 128-character ASCII set, upper and lower case. **Character Type:** 8 x 9 dot character block (0.2" H x 0.1" W), definable to other values using software. **Colors:** Red, green, blue, white, black, cyan, magenta, and yellow. Color memory RAM standard in Z-110, optional in all kits and Z-120. **Cursor:** Blinking, underline or reverse. **Cursor Addressing:** Relative and direct. **Tab:** Eight columns, software addressable. **Video:** Normal or reverse video by character. **Video Output:** Z-110, RGB; H Z-120, monochrome standard. **KEYBOARD:** General: Sculptured, typewriter-style keyboard with 95 keys. **Numeric Keypad:** 18 keys (including cursor-control keys). **Special Function Keys:** 13. **INPUT/OUTPUT PORTS:** Serial I/O: Two EIA RS-232C serial interface ports at 110 to 38,400 baud. Accessible from rear of unit. **Modes:** Asynchronous full- or half-duplex; synchronous. **Parallel I/O:** Centronics-compatible printer port with a 25-pin D connector.

mounting hardware, complete documentation, and step-by-step installation instructions. Upgrade kit is for use with H-100 Computers only. For Z-100 Computer use, contact your nearest Heathkit Electronics Center.

- HS-217**, For models with full height drives, 33 lbs. . . . . **1799.00**
- HS-217A**, For models with half height drives, 30 lbs. . . . . **1799.00**

 Heathkit computer products and assembled Zenith Data Systems computer products are designed and built for home and business use, and meet all FCC Class B requirements.
 

\*H-100 is a trademark of Heath Company. LOTUS is a trademark of Lotus Development Corp. CP M is a registered trademark of Digital Research Inc. Z-DOS is a trademark of Zenith Data Systems Corp. MS is a trademark of Microsoft Corp.



Special quantity and system discounts are available on assembled computer products. See page 78.



## A wide variety of software for your H/Z-100

In support of your H/Z-100 Desktop Computer, Heathkit offers a wide range of quality software from operating systems, to programming languages, to utility and applications software. On the following pages you'll find 16-bit software and on pages 92 to 95 you'll find many 8-bit packages that'll run on the Desktop Computer. For even more software options see page 92 and the H/Z-100 Software Directory.

**NEW**

### GrafTalk\* for easy and exciting graphics

- An interactive business graphics package that enables the user to completely control graphic presentations

Produce dramatic bar, pie, line and symbol charts almost instantly with this sophisticated and powerful software. An interactive program, GrafTalk immediately responds to English-like commands so that even a novice can produce complete and meaningful graphs. Includes screen editor and menu mode.

To run GrafTalk, an H/Z-100 Desktop Computer requires two 5.25" disk drives and the MS-DOS operating system. A printer is needed for screen copies.

RG-463-1, Shpg. wt. 5 lbs. .... 449.00

**NEW**

### CPS\*-86 Computerized Phone System

- A 16-bit software system that simplifies and enhances the use of your H/Z-100 as a data communications device

With this software and a modem, use your H/Z-100 Computer to access the many information services, computerized bulletin boards and other time sharing systems currently available to the public. Even communicate with other computers using this or some other CPS software. Includes many useful features.

This CPS package needs an H/Z-100 Computer equipped with 128K of RAM and one 5.25" disk drive while using MS-DOS (Vers. 1.25 or higher).

CB-463-7, Shpg. wt. 3 lbs. .... 40.00

8-bit CPS computer phone system software for the H/Z-100 Computer: Requires 128K of RAM, one 5.25" disk drive and CP/M\* (Version 2.2 or later).

CB-253-7, Shpg. wt. 1 lb. .... 40.00

**NEW**

### MP/M-86 provides multi-user capability

- A compact and powerful multi-user, multi-tasking operating system for use with the H/Z-100 Desktop Computer

Designed for microcomputers using the 8086/8088 microprocessor, MP/M-86 offers multi-user support while allowing users to run different programs simultaneously. It manages up to a megabyte of memory and supports a wide range of peripheral devices. The MP/M-86 file system allows larger files than CP/M, supports password protection, and reads all files generated by CP/M systems. Features include: real-time capability, record and file locking, date and time stamps, and extensive error-handling and reporting.

OS-63-5, Shpg. wt. 6 lbs. .... 649.00

**NEW**

### 16-bit MS-DOS Version 2 and 8-bit CP/M

- Two operating systems that offer disk file handling efficiency and versatile peripheral support

MS-DOS Version 2 provides a number of significant improvements over previous versions of the MS-DOS operating system. Among the enhancements that increase its speed and functionality are new support programs, command line I/O redirection and a hierarchical file system.

OS-61-8, Version 2, Shpg. wt. 5 lbs. .... 150.00

CP/M operating system offers flexibility and a logical structure. It supports many different disk drive systems and peripherals, and includes fast and easy-to-use software development tools. See EC-1120 CP/M Course on page 103.

OS-53-2, Version 2.2, Shpg. wt. 5 lbs. .... 150.00

**NEW**

### UCSD p-System,\* a universal operating system

- Lets you use a variety of hardware and languages plus a full library of p-System application programs that are already available

With the UCSD p-System, you get a powerful screen-oriented text editor, two printing utilities, a File and a Library Manager, disk recovery tools and three configuration utilities. It also includes a Pascal and an 8086 Assembler. An H/Z-100 needs 128K of RAM and one 5.25" disk drive for this system.

OS-61-3, Shpg. wt. 14 lbs. .... 399.00

### Efficient and powerful CP/M-86\* operating system

- Manages the full 768 kilobytes of the H/Z-100 Computer's memory

Designed for the 8086/8088 microprocessor, CP/M-86 is an efficient and powerful operating system that supports small to complex applications programs. Its file structure is compatible with that of 8-bit CP/M (OS-53-2 on this page).

CP/M-86 manages up to 768K of memory which allows software programs to take full advantage of the 8088's address space, the 16-bit microprocessor that's used in the H/Z-100 Desktop Computer. All 5.25-inch, 8-inch and Winchester disk drives used with the H/Z-100 are supported under this disk operating system. And all necessary utility programs for creating and editing text and data files are included with full documentation manual.

OS-63-2, Version 1.2, Shpg. wt. 3 lbs. .... 250.00

### Z-Chart\* graphs help make better business decisions

- Design and display bar, pie, side bar, line, multiple pie, trend line and three-dimensional bar charts
- Create graphs with data entered from other business programs
- Create a slide presentation of graphs with multiple screen displays

Communicate and analyze your company's data faster and easier with the Z-Chart business graphics program. Clear up business reports muddled with hard to find data and replace them with clear, concise graphic representations. See trends and relationships that might otherwise go unnoticed. Z-Chart was designed to help you in these areas by enabling you to create effective and easy-to-read business charts with your H/Z-100 Desktop Computer.

Running Z-Chart requires an H/Z-100 Computer with 128K of RAM, at least one 5.25" disk drive, the MS-DOS operating system and Z-BASIC.

CB-463-11, Shpg. wt. 3 lbs. .... 150.00

**NEW**

### Check your H/Z-100 with disk-based tests

- Tests run with a minimum of user commands for easy operation and provides audio alarm with visual error messages

Greatly reduce service costs and hardware down time with the tests contained in the H/Z-100 Series Disk-Based Diagnostics program. Emphasis is placed on ease of operation, consistency of screen messages, and clarity of information displayed for the user. Resolve faults to the subassembly, microprocessor or support ICs, and to individual ROMs or RAMs. Once a fault is detected all information required to correct the error is given on-screen. Save the fault information by transferring it to a printer for future reference. A real time clock dates printouts for easier tracking. All tests can be run continuously.

Checking out an H/Z-100 Computer using this diagnostic program requires a computer with 128K of RAM and one 5.25" disk drive.

CB-463-13, Shpg. wt. 4 lbs. .... 79.00

GrafTalk is a trademark of Redding Group. MS and Multiplan are trademarks of Microsoft Corp. Z-DOS and Z-Chart are trademarks of Zenith Data Systems Corp. CPS is a trademark of Robert Mathias. CP/M and CP/M-86 are registered trademarks of Digital Research, Inc. Condor is a registered trademark of Condor Computer Corp. SuperCalc is a registered trademark of Sorcim Corp. WordStar is a registered trademark of MicroPro International Corp. UCSD p-System is a trademark of SofTech Microsystems, Inc.

## Pascal/MT+ programming language for CP/M

- A full implementation of the standard Pascal programming language

This 8-bit software system is useful for both data processing applications and for real-time control applications. With its added enhancements, Pascal/MT+ becomes more suitable for commercial programming by increasing its power to develop high-quality, efficiently maintainable software. The Pascal/MT+ system includes a compiler, linker and programming tools.

DR-253-5, Shpg. wt. 5 lbs. .... 349.00

## Zenith Local Area Network connects H/Z-100s

- ZLAN packages enable shared computing among many H/Z-100s

Create a fast and efficient communication network between H/Z-100 Computers equipped with 5.25" disk drives and one or more H/Z-100s with a Winchester drive. In this network, each computer functions as if it had all the capacity of its own hard disk without conflict and almost transparently to one another. ZLAN simplifies the use of commonly shared information and data by eliminating the need to keep multiples of disk copies. It also provides for batch processing.

To establish a ZLAN network you'll need at least two H/Z-100 Desktop Computers and a ZSS-100-22 Two-Computer ZLAN System package. One of the Computers must be equipped with a version 2.5 Monitor ROM, a Winchester hard disk drive, and a 256K Memory Upgrade Board (Z-205 on page 83). The other H/Z-100 Computer must be equipped with at least one 5.25-inch disk drive. The ZLAN System package that enables these computers to become a network consists of two Interface Cards, one for each computer, plus Server and Node software. The Interface Cards are assembled and tested, and install easily. The Server software is installed into the H/Z-100 with the Winchester drive and permits access by other computers to information and data residing on the hard disk. Node software (using MS-DOS 1.25) is installed into the floppy disk H/Z-100 and enables users to call up files or send files to the Server hard disk drive. Coaxial cables, available in two lengths, connect the computers.

Up to 255 H/Z-100 Desktop Computers can benefit from ZLAN. Each H/Z-100 connected into the network must have the ZSS-100-23 Add-On System package installed. It consists of an Interface Card and Node software.

ZSS-100-22, Two-Computer ZLAN System that includes Server and Node software plus two Interface Cards, Shpg. wt. 10 lbs. .... 1499.00

ZSS-100-23, ZLAN Add-On System for expanding a ZLAN network and includes Node software and one Interface Card, Shpg. wt. 8 lbs. .... 599.00

HCA-60, 25 foot cable, Shpg. wt. 1 lb. .... 20.00

HCA-61, 100 foot cable, Shpg. wt. 4 lbs. .... 40.00

## Multiplan\* a sophisticated electronic spreadsheet

- Powerful modeling and presentation capabilities for business uses
- Easy to learn and to use with on-line references and plain commands

Make better, faster business decisions and explore alternatives faster with Multiplan. Its 255 row by 63 column worksheet provides a giant financial ledger sheet which can be set up with titles and numbers. Make number, word or formula entries and change the screen display around by widening or shrinking columns to suit your needs. Use upper or lower case for titles and left or right justify them, or align text left and numbers right, as you see fit. Easily move and insert text and data anywhere on the worksheet and then, just as easily, remove it. Use any arithmetic operation plus: Boolean algebra, trigonometric functions, scientific notation, rounding off, and dollar and percent formats.

Multiplan's real power lies in its ability to automatically perform calculations. Because this program remembers the relationship between entries, "what if" questions can be easily answered to test out plans and prepare forecasts. When you make a change on the worksheet you immediately see the results of that change throughout the sheet and any related worksheets.

Running Multiplan on an H/Z-100 Computer requires one 5.25" disk drive and the MS-DOS operating system. Multiplan only accesses 64K of RAM for data.

MS-463-7, Shpg. wt. 6 lbs. .... 250.00

## Microsoft\* BASIC-80, an excellent 8-bit interpreter

- Features a full set of built-in and a group of special functions

An extensive application of 8-bit BASIC, Microsoft BASIC-80 has many enhancements including sequential and random file manipulation. Plus, this programming language has direct access to CPU ports and memory locations. Commands

and statements include an IF-THEN-ELSE control structure which allows execution of conditional statements. String and numeric variables can be used while a full range of logical and mathematical operators are available for additional user convenience. Extensive editing and output capabilities are also available with this interpreter. BASIC comes with a simply organized Reference Manual for easy referrals and includes a handy reference card.

To run BASIC-80, an H/Z-100 Computer requires one 5.25" disk drive and the CP/M operating system (Version 2.2).

MS-253-1, Version 5.22, Shpg. wt. 3 lbs. .... 175.00

## Languages and compilers for all programming situations

For home, hobby, mathematical or business related needs, you'll find a programming language or compiler below to fit your specific requirements. They meet the skill level and the needs of both the experienced and the entry level user. Easy-to-read manuals with instructions in use and operation are included.

### Z-BASIC, a 16-bit color interpreter for the H/Z-100

A high-level and easy-to-use language, Z-BASIC has many more commands and features than previous versions of BASIC. It is designed both for users with little programming experience and very experienced computer programmers. It accomplishes many functions with only a few ordinary English statements which are easy to learn and easy to use. An H/Z-100 Computer must have one 5.25" disk drive and use the MS-DOS operating system to run the Z-BASIC language with all its programming advantages.

MS-463-1, Shpg. wt. 5 lbs. .... 175.00

### FORTRAN for scientists, mathematicians and engineers

FORTRAN-86 Compiler accepts programs written according to the ANSI X3.1978 standard (including most of the features of FORTRAN-77 except the COMPLEX data type). Rigorous syntax rules permit the user to fully define the characteristics of the solution to a problem in a series of precise statements. Therefore, a general understanding of FORTRAN is recommended. To run the FORTRAN Compiler, an H/Z-100 requires one 5.25" disk drive (two are recommended), 192K of RAM and the MS-DOS operating system.

MS-463-2, Shpg. wt. 4 lbs. .... 195.00

### Powerful COBOL business programming language

Certified to be in compliance with the ANSI X3.23-1974 standard, this COBOL-86 Compiler has many standard features plus extensions designed to make it more useful for your business data processing tasks. Built-in utilities also extend the versatility of this programming language. An H/Z-100 Computer requires one 5.25" disk drive (two are recommended) and the MS-DOS operating system to run this programming language.

MS-463-3, Shpg. wt. 3 lbs. .... 395.00

### Z-BASIC Compiler increases program execution speed

Use the Z-BASIC Compiler with the Z-BASIC Interpreter above to provide yourself with an extremely powerful BASIC programming environment. With this complementary Interpreter, you can quickly run and debug your programs. Then compile your programs with the Z-BASIC Compiler to increase their execution speed and reduce the amount of memory space required to store the programs. This Compiler requires an H/Z-100 Computer with one 5.25" disk drive and the MS-DOS operating system to run properly.

MS-463-4, Shpg. wt. 3 lbs. .... 250.00

### High-level Pascal Compiler programming language

This highly extended version of the Pascal language makes system programming and applications programming a lot easier for you. Some of the valuable extensions found in the Pascal Compiler include structured constants, super arrays, variable length strings, string reads, separate compilation and more. The hardware required to run this Compiler on an H/Z-100 is one 5.25" disk drive (although two are recommended for user convenience) and 192K of RAM. Software requirements include the MS-DOS operating system.

MS-463-5, Shpg. wt. 4 lbs. .... 295.00

\*Multiplan and Microsoft are trademarks of Microsoft, Inc.



Use your Visa or MasterCard credit cards to purchase your kit!

## More versatile and powerful software to take advantage of the H/Z-100's capability

Software that includes: accounting and integrated accounting packages, word processing with spelling editor, data base management, computer-assisted instruction, a sorter, terminal emulators, an electronic spreadsheet and more on page 99.

### PeachText 5000\* integrated software package

- A powerful applications package with menu-driven features

A complete system that includes the PeachText\* Word Processor, Spelling Proofreader, Random House Electronic Thesaurus,\* PeachCalc,\* and a List Manager. All modules are fully integrated using a central menu.

For an H/Z-100 Computer to run PeachText 5000, 128K of RAM, two 5.25" disk drives and the MS-DOS operating system are needed.

RS-463-75, Shpg. wt. 3 lbs. .... 395.00

**SAVER!** Verifiable H-100 Computer owners... save \$120 ..... **ONLY 275.00**

### LOTUS 1-2-3\* combines popular decision-making tools

- Menu-driven with an extended series of help screens

Three important electronic aids to decision making are combined in one fast, easy-to-use business package. And, they perform interactively and instantly at the press of a key. LOTUS 1-2-3 provides you with information management, spreadsheet analysis, and a business graphics program all in one.

An H/Z-100 Computer needs two 5.25" disk drives, 192K of RAM and the MS-DOS operating system to run this integrated software package.

LS-463-1, Shpg. wt. 4 lbs. .... 495.00

### WordStar\* 3.3 offers performance and flexibility

- User-friendly features like simple commands and instant response

Upgraded WordStar 3.3 is a powerful word processing system that adds a number of new capabilities to its many well-known word processing advantages. Increased support is given to the H/Z-100 Computer's function and numeric keypad keys.

To use WordStar, an H/Z-100 requires one 5.25" disk drive and MS-DOS.

MP-463-10, Version 3.3, Shpg. wt. 4 lbs. .... 399.00

### MailMerge\* combines files with WordStar documents

- Allows you to turn form letters into personalized letters

Combine files containing names and addresses with WordStar letter text files. Requires WordStar 3.3 and the MS-DOS operating system when used with the H/Z-100 Computer. Includes many versatile printing features.

MP-463-11, Version 3.3, Shpg. wt. 3 lbs. .... 249.00

### SpellStar\* checks WordStar files for spelling errors

- Original dictionary consists of approximately 20,000 words

SpellStar 3.3 rapidly checks WordStar files and labels or adds words to dictionary as desired. Create specialized dictionaries. Requires MS-DOS operating system and WordStar 3.3 for use in an H/Z-100 Computer.

MP-463-6, Version 3.3, Shpg. wt. 5 lbs. .... 149.00



### WordStar Professional\* for language processing

- WordStar plus three programs for efficient word processing

WordStar Professional provides everything you need to handle all your text management and printing needs. Included are SpellStar,\* an automatic proofreader; StarIndex,\* for generating an index and table of contents; and MailMerge for customizing all your mailings. This package requires an H/Z-100 with two 5.25" disk drives and 192K of RAM using the MS-DOS operating system.

MP-463-13, Shpg. wt. 5 lbs. .... 695.00

PeachText 5000, PeachText, and PeachCalc are trademarks of PeachTree Software, Inc. Random House Electronic Thesaurus is a trademark of Random House, Inc. MS is trademark of Microsoft, Inc. WordStar, MailMerge, SpellStar, WordStar Professional and StarIndex are trademarks of MicroPro International Corp. Lotus 1-2-3 is a trademark of Lotus Development Corp.



### Sorting and merging with Microsoft Sort program

- A stand alone utility used with many programming languages

Full details on this simple and powerful utility, see page 80. It requires an H/Z-100 Computer 128K of RAM under MS-DOS 2.0. Two 5.25" disk drives.

MS-5063-12, Shpg. wt. 1 lb. .... 199.00

### SuperSort\* for powerful, yet easy-to-use sorting

Make your work go faster by being able to sort and merge up to 32 files into a single file at a rate of 560 records per minute. Perform all functions on data files compatible with BASIC, FORTRAN, COBOL and Assembler applications programs. Use fixed or variable length records and fields.

To use SuperSort on an H/Z-DOS Computer, one 5.25" disk drive (two are recommended) and at least 128K of RAM are needed along with MS-DOS.

MP-463-1, Shpg. wt. 3 lbs. .... 199.00

### SuperCalc\* for solving everyday financial problems

- An indispensable tool for budgeting, estimating and financial forecasting

A powerful 16-bit electronic spreadsheet, SuperCalc provides a simple and straightforward tool for solving financial problems. It contains a worksheet 254 rows by 63 columns large where numbers and text can be easily entered. Use with an H/Z-100 Computer equipped with a 5.25" drive and MS-DOS.

SC-463-1, Shpg. wt. 4 lbs. .... 195.00



### dBASE II\* management system from Ashton-Tate

- Relational data base management system

Quickly and easily create a full information system that does exactly what you need and lets you expand in the future. Simple English-like commands let you add, delete, edit, display, print and handle your information. Features 64,000 records per file, 1000 characters per record and 32 fields per record.

To run this data base system on an H/Z-100 Computer, one 5.25" disk drive and 128K of RAM are needed with the MS-DOS operating system.

AT-5065-1, Shpg. wt. 4 lbs. .... 495.00

### Condor\* Relational Data Base Management

- Design and create data files with this powerful filing system

Quickly and economically search, sort, merge, analyze, index and print out your data base records. Process up to 32,767 records per data base with up to 1023 bytes in a record. Create your own help menus. Produce sophisticated reports.

An H/Z-100 Computer requires two 5.25" disk drives, a minimum of 128K RAM and the MS-DOS operating system to run this data base system.

CD-463-1, Shpg. wt. 4 lbs. .... 650.00

### Fast and easy File Management System from Condor

- Easily and quickly design and create data bases using many options

Sort, merge files, analyze and print out information using plain and simple English commands. Process up to 32,767 records per data base with this fast, easy-to-use and powerful data base management system.

To use this File Management System, an H/Z-100 Computer requires two 5.25" disk drives and a minimum of 128K of RAM while using MS-DOS.

CD-463-2, Shpg. wt. 4 lbs. .... 299.00

### Pecon Peachtree\* to Condor Interface System

Transfer data from master and transaction files in Peachtree accounting files to data bases processed under either Condor file management systems.

An H/Z-100 Computer with 192K of RAM and two 5.25" disk drives operating under MS-DOS are needed to run this software. Also required are either Condor packages and a minimum of one Peachtree accounting package.

CB-463-9, Shpg. wt. 3 lbs. .... 99.00

SuperSort is a registered trademark of MicroPro International Corp. SuperCalc is a registered trademark of Sorcim Corp. Ashton-Tate and dBase II are trademarks of Ashton-Tate. Condor is a registered trademark of Condor Computer Corp. Pecon is a trademark of Zenith Data Systems Corp. Peachtree is a trademark of Peachtree Software Inc.

## Five Peachtree accounting packages

Maintain a complete financial picture of your business. On an H/Z-100 Computer, you'll need two 5.25" disk drives, 192K of RAM, the MS-DOS operating system and the Z-BASIC programming language.

### General Ledger System keeps your financial records

- Provides a complete and updated financial picture of your business
- Use alone or in connection with other Peachtree accounting packages

**Financial transaction record:** The General Ledger System allows you to record the financial transactions of your company during a specified accounting period. Included are accurate and timely statements describing your company's current financial status as well as comparative data of a year ago to date. Can be used with Accounts Receivable, Accounts Payable, and Sales Invoicing programs.

RS-463-1, Shpg. wt. 5 lbs. .... 399.00

### Accounts Receivable System helps in your collections

- Prepares bills and helps obtain timely collections from customers
- Minimizes lost or delayed revenues through bookkeeping errors

**A complete invoicing system,** the Accounts Receivable package maintains a record for each of your customers including: name, address, phone number, current balance, sales tax, credit limit, and other pertinent information. It is easy to operate and produces comprehensive, up-to-date reports.

RS-463-2, Shpg. wt. 4 lbs. .... 399.00

### Accounts Payable System helps control your cash flow

- A simple, easy-to-operate system that provides complete vendor records

**Payable information:** Accounts Payable package maintains current and aged accounts. It keeps a complete file for each of your vendors, determines whether invoices should be paid by the due date or by the specified discount date, and automatically prints checks and a check register. Security measures are provided to protect the privacy of your data. Can also be used with General Ledger.

RS-463-3, Shpg. wt. 4 lbs. .... 399.00

### Inventory Control for all aspects of inventory operations

- Speeds and simplifies the demanding task of inventory management

**Improve your inventory control,** reduce your dollar investment in inventory management, and decrease the response time to your customers with this effective and straightforward program. Keep your inventory records current and print out comprehensive reports that completely cover the inventory operation. Use independently or in conjunction with Accounts Receivable and Sales Invoicing.

RS-463-5, Shpg. wt. 4 lbs. .... 499.00

### Sales Invoicing System bridges accounts packages

- Accesses and updates Accounts Receivable and Inventory Control

**Systems bridge:** Actually a subsystem of the Accounts Receivable and Inventory Management systems. Provides the capability to access and update the data files of both systems. Update customer accounts with sale or return information. Update inventory with the stocked items returned or sold.

RS-463-6, Shpg. wt. 4 lbs. .... 299.00

### Write courses and tests using ZDS\* Teacher program

- Design and create an entire course of study including tests
- Create your courses without any previous programming experience

**One-half of a two-part educational programming package,** ZDS Teacher can be used for any instructional purpose that requires written text. You select the topic, decide how the course is to be structured, write the text, and create test and quiz questions. Then the second package, ZDS Student, is used to take the individualized course and exam questions.

**To use ZDS Teacher,** an H/Z-100 Computer needs a minimum of 128K of RAM and one 5.25" disk drive while using the MS-DOS operating system.

TA-463-1, Shpg. wt. 3 lbs. .... 299.00

### Use ZDS Student program to take courses and exams

- Run customized instructional courses and exams created by your instructor developed with the ZDS Teacher program

**The second part of an educational package** that includes the ZDS Teacher program. Take courses or programs written by your instructor. On-disk instructions show how to use the program. Run the program on an H/Z-100 Computer with one 5.25" disk drive and using the MS-DOS operating system.

TA-463-2, Shpg. wt. 2 lbs. .... 100.00



### ZSTEM\* allows H/Z-100 to emulate VT100 terminal

- An asynchronous terminal emulator that allows any H/Z-100 Computer to operate in a DEC mainframe environment

**Add the capability** of the popular DEC VT100 and VT102 terminals to the power and performance of your H/Z-100 Computer. ZSTEM uses XMODEM and XON/XOFF protocols with baud rates between 45.5 and 19,200. This software offers programmable softkeys, local printing, and VT100 graphics and keyboard layout. ZSTEM requires an H/Z-100 Computer equipped with 128K of RAM and one 5.25" disk drive while using the MS-DOS operating system.

KE-463-1, Shpg. wt. 3 lbs. .... PLEASE CALL FOR PRICE

### H/Z-100 Remote Batch Terminal Emulator

- For distributed processing, remote job entry, and more

**Batch processing:** Add terminal capability to your microcomputer with this versatile software package. It allows the H/Z-100 Computer to emulate several IBM mainframe terminals including the 2770, 2780, 3780, 2968, and the 3741. Capabilities include baud rate of 2000, 2400 and 4800; Bell 201A3, 201C, 208A and B compatible; EIA RS-232C communications; and more.

**What you need:** 128K of RAM, one 5.25" disk drive and MS-DOS.

WI-463-1, Shpg. wt. 4 lbs. .... 899.00

### 3270 Emulator emulates IBM 3270 display station

- Runs on either leased line or dial-up configurations

**Dual operation:** With the 3270 Emulator program, your H/Z-100 Computer can do microprocessing as well as teleprocessing that results in a substantial savings for you. The emulator is also compatible with a variety of IBM or similar host computers using display attributes such as structured fields. Special key labels are provided to show you the relationship between emulator keys and the IBM display station keys. A unique 25th line displays the status of certain system functions.

**Hardware and software requirements:** On an H/Z-100 Computer, one 5.25" disk drive and 128K of RAM are needed. MS-DOS is also required.

PO-463-1, Shpg. wt. 2 lbs. .... 650.00

### Microstat\* performs statistical tests and procedures

- Developed for real life applications using large data sets
- Computational algorithms selected for speed and accuracy

**Human engineered:** Microstat is designed to be flexible and fail-safe in operation and use. All algorithms have been selected with great care to ensure your complete confidence in analysis results. A wide range of statistical tests and a complete set of programs for data manipulations are offered. Most tests use data files for easy changing, sorting, merging and printing. Many tests have a number of variations of the basic test like two different regressions, three time series tests, etc. Microstat programs handle between 2500 and 5000 numeric values per data file depending on available memory. All analysis programs offer screen and printer output, and in most programs, you can get both types of output without rerunning the analysis. Versatile statistical analysis for you.

**This package includes** programs such as sort, rank-order, lag transformation, descriptive statistics, frequency distributions, scatterplot, correlation matrix, probability distributions, factorials, permutations, combinations, hypothesis tests, nonparametric statistics, crosstabs and more.

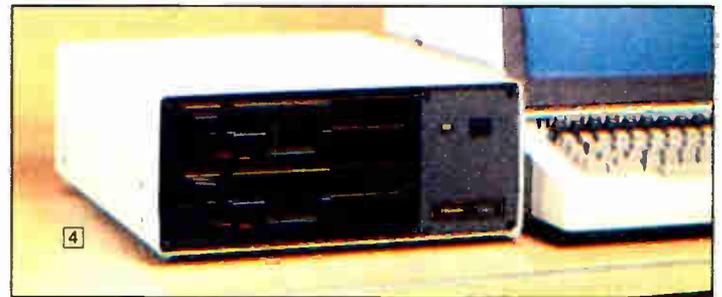
**Hardware and software requirements:** To run Microstat on an H/Z-100 Computer, a minimum of 128K of RAM and two 5.25" disk drives are required. The MS-DOS operating system is also required. Z-BASIC is also needed.

ES-463-1, Version 2.3, Shpg. wt. 2 lbs. .... 249.00

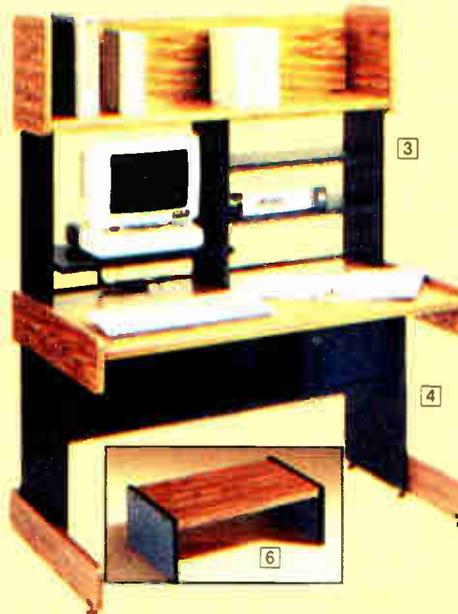
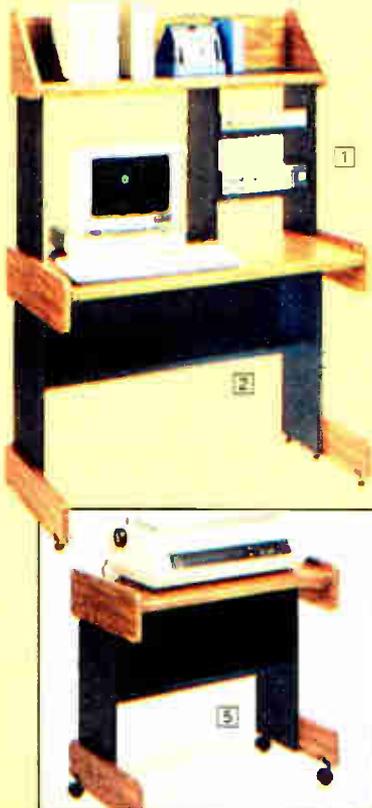
ZDS is a trademark of Zenith Data Systems Corp. Microstat is a registered trademark of Ecosoft Corporation. ZSTEM is a trademark of KEA Systems Limited. MS is a trademark of Microsoft Corp.



Discover the fun of kitbuilding at your Heathkit Electronic Center.



## Beautiful computer workcenter furniture for your home or private office



These smart looking modular furniture pieces enable you to create a workcenter that fits your needs and your computer system. Cantilever design provides ample leg room and strength for heavy loads. Wood grain and black finish.

### 2 Computer System Desk

Computer Desk offers a 35 $\frac{3}{4}$ " W by 21" D work area, a back opening for printer paper, storage shelf, floor levelers and stands 28" high.

PF-125, Shpg. wt. 51 lbs. .... 119.95

### 3 Hutch for Large Desk

Add-on Hutch is 33" H x 45 $\frac{1}{2}$ " W x 11 $\frac{1}{4}$ " D and securely fastens onto Large Desk. Its adjustable monitor shelf holds up to a 13" monitor. Has 11 $\frac{1}{2}$ " deep bookshelf and two adjustable shelves.

PF-131, Shpg. wt. 46 lbs. .... 99.95

### 4 Large Computer Desk

Spacious Desk measures 28" H x 45 $\frac{1}{2}$ " W x 29" D and features a lockable cabinet. Has storage shelf.

PF-130, Mtr. Frt. 85 lbs. .... 169.95

### 5 Roll-Around Printer Stand

Versatile Stand has storage shelf and back opening for printer paper. Measures 28" H x 28 $\frac{1}{4}$ " W x 19" D and has dual-wheel casters.

PF-120, Shpg. wt. 35 lbs. .... 79.95

### 6 Add-On Monitor Platform

Use with either Computer Desk or Printer Stand to hold 13" monitor. 6 $\frac{1}{4}$ " H x 19" W x 11 $\frac{3}{4}$ " D.

PF-132, Shpg. wt. 6 lbs. .... 17.95

### 1 Hutch for Computer Desk

Companion hutch to PF-125 Desk stands 28" high and 35 $\frac{3}{4}$ " wide. It has a 9" deep full-length bookshelf with an electrical plug opening. An adjustable 20 $\frac{3}{4}$ " wide by 10 $\frac{3}{4}$ " deep monitor shelf can be positioned to the left or right of the desk. Has two adjustable storage shelves.

PF-126, Shpg. wt. 33 lbs. .... 79.95

# Economically-priced video monitors with high-resolution monochrome and full color displays

## 1 CV-2562 25-inch Diagonal Color Video Monitor

- High-resolution display of up to 450 lines on large 25-inch screen
- Direct RGB inputs plus direct TV and VCR video and audio inputs

The new CV-2562 is a versatile monitor that can be used with your personal computer or enjoyed with your component television system, video cassette recorder/disc player, or video game. Advanced circuitry, developed for use with computer monitors provides improved picture performance with a maximum horizontal picture resolution capacity of up to 450 lines using either RGB or Composite Video inputs. A three-in-one tri-focus system of red, green and blue color guns improves picture sharpness and enhances details.

A unique green-only switch eliminates all other colors so that monochrome text material can be easily displayed. This is especially helpful when using the CV-2562 to view computer accounting programs or other text intensive programs that require a lot of reading. Flip the switch back to color and enjoy true color reproduction from other video sources.

**Other quality features** include: automatic light sensor; automatic monitoring and control of picture, color, tint and black level; audio amplifier with 2" x 6" speaker; and 120 VAC 60 Hz. Monitor measures 22¾" H x 25½" W x 20¼" D.

CV-2562, Assembled and tested. Shpg. wt. 108 lbs. Mtr. Frt. .... 729.95

ZVM-134-1, Cable for H/Z-100 Computers, Shpg. wt. 2 lbs. .... 20.00

ZVM-134-21, Cable for HS-151 and IBM-PC Computers, 1 lb. .... 20.00

## 2 HVM-122A 12" Amber Monochrome Video Monitor

- Compatible with most of today's popular personal computer systems
- Excellent character definition and intensity at an economical price
- Specially equipped for displaying either 40 or 80 characters per line

A sharp display is always seen on the HVM-122A. A wide 15 MHz bandwidth and a fast 30 nanosecond rise time combine to produce a noticeably improved character definition. An special DC-coupling circuitry enables the video display to retain its brightness even when the screen is full of information.

An easy-to-read 25 lines containing 80 characters each are displayed on the 12-inch diagonal non-glare screen. A special 40-80 character switch accommodates computers whose video formats have a 40-column display output.

**Adjustment controls** are conveniently located behind a fold-down front panel door. These controls include: power, black level, contrast, horizontal and vertical hold, and vertical height. Get super video from computers such as: the H/Z-100 Desktop and new Personal Computers, the IBM-PC (with color board) and PCjr, Apple II and III, Compaq, Texas Instruments 99/4, and the Atari 800 and 1200.

Kit HVM-122A, Shpg. wt. 22 lbs. .... Was \$109.95 NOW ONLY 89.95

ZVM-122A, Assembled with non-glare amber CRT, Shpg. wt. 18 lbs. .... 139.95

ZVM-123A, Assembled with non-glare green CRT, Shpg. wt. 18 lbs. .... 139.95

ZVM-124, Assembled monitor for use with IBM-PC and PC compatible computer systems, amber CRT, needs monochrome printer adapter card, 18 lbs. ... 199.00

ZVM-123-2, Tilt Base, Shpg. wt. 2 lbs. .... 15.00

ZVM-121-1, Cable for IBM-PC, Shpg. wt. 1 lb. .... 5.00

ZVM-121-2, Cable for Atari 800 and 1200, Shpg. wt. 1 lb. .... 15.00

## 3 Compact 13" Assembled Color Video Monitors

- Three models with true color reproduction for use with personal computers, VCRs, video discs, video games and modular TV tuners
- All have unique "green screen only" switch for easier text display

ZVM-131: Medium-resolution monitor; composite video and RGB input; audio capability; 25 line display with 40 characters per line; composite video "loop-thru" feature; and easy-to-reach front access controls.

ZVM-131, Shpg. wt. 38 lbs. .... 379.00

ZVM-133: A high-resolution RGB-only color monitor featuring an 80-column display. Permits the display of as many as 640 pixels horizontally and supports the IBM brown. Includes IBM-PC/HS-151 Personal computer cable.

ZVM-133, Shpg. wt. 39 lbs. .... 559.00

ZVM-136: Has all the features of the ZVM-133 RGB-only monitor with the added advantage of a long-persistence phosphor CRT.

ZVM-136, Shpg. wt. 39 lbs. .... 799.00

**Cables for use with ZVM-131/136/133 Color Video Displays:**

ZVM-135-1, For the H/Z-100 Desktop Computer, 1 lb.

ZVM-135-2, For the IBM Personal Computer, 1 lb.

ZVM-135-3, For the Apple III Computer, 1 lb.

ZVM-135-4, For Texas Instruments and Atari Computers, 1 lb.

ZVM-135-5, For IBM-PC jr with audio, 1 lb.

**\$25**  
EACH

## 4 HS-207 8-Inch Disk System with 2.5 MB storage

- Expands the storage capabilities of the H/Z-100 Desktop Computer with optional one or two 8-inch drives
- Compact low-profile unit uses slim half-height drives

Add additional data storage capacity to the H/Z-100 Computer with either one or two 8-inch disk drives in the HS-207 Disk System. Each drive uses soft-sectoring to store up to 1.26 MB on both sides of an 8-inch double-sided double-density disk for a total of 2.52 MB of unformatted data storage. Disks are formatted in the industry-standard IBM 3740 style.

**Factory configured** to operate with the H/Z-100 Computer, the HS-207 System is ready to go by just connecting the flat 50-conductor command and information cable to a computer and plugging it in. Requires 125 VAC.

**Heathkit** Kit HS-207-41, Eight-Inch Floppy Disk System with one disk drive, 1.25 MB of data storage. Shpg. wt. 57 lbs. .... 999.00

**Heathkit** Kit HS-207-42, Eight-Inch Floppy Disk System with two 8" disk drives, 2.5 MB of data storage. Shpg. wt. 69 lbs. .... 1599.00

**Zenith Data Systems** Z-207-41, Assembled and tested single drive Eight-Inch Floppy Disk System with 1.25MB data storage. Shpg. wt. 53 lbs. .... 1599.00

**Zenith Data Systems** Z-207-42, Assembled and tested Eight-Inch Floppy Disk System with two disk drives and 2.5MB storage. Shpg. wt. 60 lbs. .... 2299.00

Z-207-6, Assembled and tested second Half-Height Eight-Inch Disk Drive. 1.25MB double-sided, double-density storage. Shpg. wt. 8 lbs. .... 699.00

HDC-207, Dust Cover for the HS/Z-207, Shpg. wt. 1 lb. .... 16.00



## Join with other Heath/Zenith computer users

With a HUG membership, you join thousands of other Heath/Zenith computer owners who are kept informed of new products and of more uses for your computer. You gain access to over 700 low-cost programs. You receive a one-year subscription to the monthly REMark magazine. You can participate in REMark's interactive forum with other members and use an on-line bulletin board via CompuServe.

Included with your Heath Users Group membership is the exclusive REMark magazine which you'll receive monthly. In it you'll be kept informed of new Heath/Zenith computer products. You'll be kept in touch with other members through REMark's open forum. Here members share hardware modifications, improvements to software programs and ideas on other computer topics.

With a HUG membership you receive a constantly expanding Software catalog.

Another exclusive is access to the HUG Bulletin Board. With a HUG membership, a modem program and a CompuServe time-sharing membership, you can receive the latest news on Heath/Zenith computer developments and HUG activities.

Also receive a fully indexed REMark (Jan.) and an official HUG Identification Card.

You'll find a HUG application enclosed with each Heath computer.

Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085.

Yes, I want to become a member of HUG and keep up to date on the latest Heath/Zenith computer developments, while I expand my software library.

I've enclosed \$\_\_\_\_\_ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Annual Rates:	U.S.	Canada/Mexico	International
New Members:	\$20	\$22	\$30
Renewal:	\$17	\$19	\$24

Name \_\_\_\_\_ 865

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Country \_\_\_\_\_

Signature \_\_\_\_\_

## 1 Versatile H-89 All-In-One Computer features a professional keyboard and video terminal

The H-89 All-In-One Computer is an outstanding single-component system that's ready to work for you. Use it to increase your office's efficiency with business applications and word processing. Create your own programs with versatile operating systems and languages. And, manage your home easier with financial programs and information services. See page 98 for more accessories.

All New  
Low Price of  
**\$799<sup>95</sup>**  
for kit H-89

### FEATURES A SAVINGS OF UP TO \$100

- Dual 8-bit microprocessors for faster computing
- 48K byte RAM memory that expands to 64K bytes
- Internal 5.25" disk drive stores up to 100K bytes
- High-quality, professional typewriter keyboard
- Uses both H-DOS and CP/M operating systems

**Separate microprocessors:** The H-89 uses two Z-80 microprocessors, one for video and keyboard functions and the other for just powerful computing. With the terminal using its own microprocessor, the computer can concentrate on high-speed processing for more versatility than other 8-bit desktop computers.

**Expandable memory:** At 48 kilobytes of RAM, the H-89's memory is large enough to run most 8-bit software. And for larger programs, memory can be increased up to 64 kilobytes. To add the extra 16 kilobytes of RAM, you simply install the wired WH-88-16 RAM Expansion Kit (p. 91).

**Increased data storage:** For most of your data storage needs, the H-89 comes with an internal 5.25-inch floppy disk drive (H-17-1 on page 91) and an H-88-1 hard-sectored disk controller board (p. 91). This standard equipment allows you to store up to 100K bytes of data on a single floppy diskette. When you need more storage space, the H-89 answers with many add-on storage capacities in a number of different ways. You can increase the amount of disk storage by connecting an H-77/Z-87 external floppy disk system (p. 91) with its one or two disk drives to your H-89. This now brings the total storage capacity up to 300K bytes (100K bytes per drive). Storage capacity can be further increased by replacing the H-88-1 controller board with a Z-89-37 soft-sectored disk controller board (p. 91). With the Z-89-37 board installed in your H-89, total storage (with H-77/Z-87 connected to the H-89) becomes 480 kilobytes. Still more storage is gained by

replacing the internal disk drive with a double-sided double-density disk drive (H-17-5 on page 91) and replacing the H-77/Z-87 with an H-37 external floppy disk system. This arrangement increases storage capacity to a massive 1.92 megabytes. See page 91 for more information on storage capacities.

**Professional keyboard:** With its standard typewriter keyboard, the H-89 allows touch-typists to immediately take advantage of word processing. Typists easily move from their electric typewriters to the keyboard of the H-89 without losing time in retraining. And, the rugged, highly-reliable keyboard is built to take the constant use found in the office environment. For programmers, the keyboard can display the entire ASCII character set, both upper and lower case, along with 33 graphic symbols. A 12-key keypad beside the keyboard allows accountants to rapidly enter numbers while using bookkeeping and other spreadsheet programs.

**Quality video terminal:** All information is shown on a 12-inch high-quality video display tube (or CRT) that provides highly detailed characters. The optional white or green CRT displays 24 rows of 80 characters each as well as a software-controlled 25th line. The display is always bright even when the maximum 2000 characters fill the screen. On the screen, upper-case characters are formed by a 5 x 7 dot matrix while lower-case characters use a 5 x 9 dot matrix.

**Add on the peripherals:** For your convenience and the H-89's versatility, three EIA standard RS-232C serial interface ports are part of the H-89. These three standard serial ports let you connect peripherals that make the H-89 more useful to you. Connect a printer such as the H-125, located on page 97, for printed copies. Or connect a modem (page 97) and use the H-89 to talk to other computers or access information services with their wealth of interesting, useful and profitable information, and services. See page 98 for increased capability.

**H-89 software:** Choose from either H-DOS or CP/M (both on p. 92) as your disk operating system, or use both. Each operating system features sophisticated system control and both support all Heath/Zenith disk systems. Software that can be used with either H-DOS or CP/M can be found on pages 92 through 95 and page 99. This includes: programming languages, financial modeling and planning software, utilities, word processing software, learning software and games. By joining HUG (p. 89) you can gain access to its library of over 700 software programs for your H-89 which are constantly being updated.

Heathkit computer products meet FCC requirements for use in residential areas.

Zenith Data Systems computer products in this catalog are fully assembled and tested.



**User oriented manuals:** A step-by-step assembly manual shows you exactly how to assemble your own H-89 computer. Each step is clearly written and well illustrated to ensure a properly built and working kit.

**Heathkit** Kit HS-89-2, All-In-One Computer with anti-glare green CRT, Shpg. wt. 96 lbs. .... **Was \$ 949.95, NOW ONLY 799.95**

**Heathkit** Kit HS-89-3, All-In-One Computer with standard white CRT, Shpg. wt. 96 lbs. .... **Was \$899.95, NOW ONLY 799.95**

**Z-90-90**, Assembled and tested H-89 with Z-89-37 Controller Board, 64K RAM, less disk drive, Shpg. wt. 53 lbs. .... **1599.00**

**Z-90-92**, Assembled and tested H-89 with Z-89-37 Controller Board, 64K RAM, 48 TPI disk drive, Shpg. wt. 55 lbs. .... **1899.00**

**H-89A SPECIFICATIONS: CPU AND MEMORY: Processor:** Z80. **Clock:** 2.048 MHz. **Memory:** 8K bytes used by system for ROM and RAM, 48K bytes user RAM (expandable to 64K). **VIDEO TERMINAL: CRT:** 12-inch Diagonal. **Display Size:** 6½" H x 8½" W (16.5 x 21.6 cm). **Character Size:** Approximately ⅛" H x ⅛" W (0.5 x 0.3 cm). **Character Type:** Upper case and lower case without descenders, 5 x 7 dot matrix; Lower case with descenders, 5 x 9 dot matrix; Graphics, 8 x 10 dot matrix. **Keyboard:** 84 keys (60 alphanumeric keys and 12 function/control keys) – plus a 12-key numeric/control pad. **Cursor:** Blinking, non-destructive underline or block. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space and tab. **Cursor Addressing:** Relative and direct. **Tab:** Standard eight-column tab. **Refresh Rate:** 60 Hz at 60 Hz line frequency, 50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line or page, from beginning of line or page, to end of line or page. **Bell:** Audible alarm on receipt of ASCII BEL. **Video:** Normal and reverse, by character. **FLOPPY DISK (H-88-4):** Tracks: 40. **Sectors:** 10. **Formatted Bytes Per Sector:** 256. **Spindle Motor Speed:** 300RPM – 1%. **Data Transfer Rate:** 128 kHz. **Motor Start Time:** 1 second. **ACCESSORIES: Interfacing:** Three EIA standard RS-232C Serial Interface ports are provided. **GENERAL: Operating Temperature Range:** 50-95 degrees F (10-35 degrees C). **Power Requirements:** 120/240 VAC, 50/60 Hz, 90 watts. **Dimensions:** 13" H x 17" W x 20" D (33 x 43.2 x 50.8 cm). **Weight:** 46 lbs. (20.7 kg).

## 2 Add more data storage capacity to the H-89

**Increased data storage:** As your need for more disk storage space increases, the H/Z-89 and Z-90 Computers easily expand to supply the storage capacity you need. There are several different ways to accomplish this storage increase. You can use the standard internal H-88-1 hard-sectored disk controller board of the H-89 and externally add more single-sided 5.25-inch floppy disk drives to your computer. Or, replace the standard controller board with a Z-89-37 soft-sectored disk controller board and use either single-sided or high-capacity double-sided 5.25-inch floppy disk drives (all featured below).

**HS-77 and Z-87:** Increase the amount of data your H-89 Computer can store on disk by adding on a kit HS-77 or Z-87 Floppy Disk System with optional single or

dual 5.25-inch disk drives. Each single-sided drive (H-17-1, below) of either system is capable of storing 100K bytes on a diskette for an added 200K bytes of storage capacity. That brings the total storage capacity of 300K bytes, counting the 100K byte capacity of the computer's internal disk drive.

**Different versions:** The kit HS-77 is available in one or two drive versions as desired. Start with only a one-drive model, HS-77-1, and add a second drive later when your needs demand more data storage. If you need 200K bytes of extra data storage that a two-drive system can deliver, order an HS-77-2. An assembled two-drive system for an H-89 Computer is available by ordering a Z-87-89. A two-drive system for a Z-90 Computer is obtained by ordering a Z-87-90. Refer to the chart below for shipping weights and prices.

**Z-89-37 controller board:** Replace the standard hard-sectored controller board in an H-89 with the Z-89-37 soft-sectored disk controller board and increase data storage capability by 1.6 times. The Z-89-11 enables the single-sided disk drive to store up to 160K bytes of data. Used with an HS-77 or Z-87 Floppy Disk, this soft-sectored controller increases their storage capacity up to 320K bytes. With the 160K byte storage of the internal H-89 drive, you can have a system that has a total storage capacity of 480K bytes.

**HS-37 Floppy Disk System:** With a Z-89-37 controller board and a two-drive HS-37 Disk System, up to 1.28 megabytes of additional data storage is provided. The high-capacity double-sided 96 TPI H-17-5 disk drive used in the HS-37 makes this amount of storage possible with its large 640K byte per drive storage capability. By replacing the internal single-sided drive with an H-17-5 drive, a huge 1.92 megabytes of total disk storage space becomes available.

**Two versions:** The kit HS-37 Disk System is also available with one (HS-37-1) and two (HS-37-2) double-sided floppy disk drives. Get a one-drive system now and add another drive later. An assembled two-drive system, ZC-37, is available for ready-to-use increased storage capacity.

**Separate components:** Besides the Floppy Disk Systems themselves, each component of these systems is available separately so that you can build a storage system that fits your needs. Get the storage you need now and then add on more data storage handling capability later. All disk storage accessories are listed at the bottom of the page.

**Compatible:** Both the H-88-1 and the Z-89-37 controller boards can be used in an H-89 or Z-90 Computer at the same time. This provides even more storage possibilities to choose from. The H-88-1 can only be used with single-sided disk drives, but the Z-89-11 can be used with both single- and double-sided drives.

**Quality components:** All controller boards and disk drives are factory assembled and tested to ensure worry-free system operation. All operate on 120 VAC.

### How to order external 5.25" disk storage for H/Z-89s, Z-90s

Storage Capacity Using Controller Boards:		Order Model		Includes Cabinet Power Supply And:	Shpg. Wt.	Price
H-88-1	Z-89-37	Kit	Assem.			
100K bytes	160K bytes	HS-77-1	—	One H-17-1 (Single-Sided)	34 lbs.	459.00
200K bytes	320K bytes	HS-77-2	—	Two H-17-1 (Single-Sided)	47 lbs.	659.00
		—	Z-87-89 for H/Z-89		30 lbs.	659.00
		—	Z-87-90 for Z-90		30 lbs.	659.00
—	640K bytes	HS-37-1	—	One H-17-5 (Double-Sided)	34 lbs.	699.00
—	1.28 megabytes	HS-37-2	—	Two H-17-5 (Double-Sided)	47 lbs.	1199.00
—	1.28 megabytes	—	ZC-37	Two H-17-5 (Double-Sided)	28 lbs.	1199.00



Need help?  
Call TOLL FREE: 800-253-7057

For ordering assistance or information, call toll-free between 8:00 A.M. and 4:30 P.M. ET, Monday through Friday. In Alaska, Hawaii and Michigan, call 616-982-3411.

### SAVE ON SOFTWARE!

Purchase an H-89 Computer and receive FREE your choice of either H-DOS or CP/M (hard- or soft-sectored) operating systems. And, save 50% on any H-89 software package when you order an H-89 Computer.

## Optional Disk Drive Accessories

**H-88-1, Hard-Sectored Disk Controller Board for H/Z-89 Computers:** Assembled and tested. Use only with H-17-1 single-sided disk drives. 3 lbs. .... **150.00**

**Z-89-37, Soft-Sectored Disk Controller Board for H/Z-89 Computers:** For use with single- and double-sided drives, assembled and tested. 4 lbs. .... **299.00**

**H-17-1, Single-Sided Floppy Disk Drive for HS-77/Z-87 Disk Systems:** Assembled and tested 48 TPI drive for use with H-88-1 Controller Board, stores 100K bytes with H-88-1 and 160K bytes with Z-89-37, Shpg. wt. 5 lbs. .... **295.00**

**H-17-5, Double-Sided Floppy Disk Drive for HS-37 Disk System:** Assembled and tested 96 TPI drive requires Z-89-37 Controller Board, stores up to 640K bytes on a compatible disk, Shpg. wt. 5 lbs. .... **550.00**

**HCA-5-77, Dust Cover:** Protects HS-77/Z-87 and HS-37 Disk Systems from dust and contaminants, Shpg. wt. 1 lb. .... **14.00**

## Accessories for H/Z-89 and Z-90 Computers

**WH-88-16, Assembled 64K RAM Expansion Kit:** Assembled circuit board expands RAM capacity of H/Z-89 Computers to 64K, requires 48K RAM, 1 lb. .... **115.00**

**HA-88-3, 3-Port Serial Interface:** For older H-89s, Shpg. wt. 2 lbs. .... **150.00**

**H-88-9, High-Capacity Drive Installation Kit:** Hardware required to install H-17-4 drives into older H-89 Computers, Shpg. wt. 4 lbs. .... **50.00**

**H-88-5, Cassette Interface:** (Not used with CP/M), Shpg. wt. 2 lbs. .... **49.00**

**Kit H-88-10, Wire Wrapping Board with Bus Connectors:** For making custom computer circuits, uses HCA-7, Shpg. wt. 1 lb. .... **30.00**

**Kit HCA-7, Wire Wrapping Socket Kit:** Includes 36 3-level wire wrapping sockets ranging from 14-pin to 40-pin, used with H-88-10, 1 lb. .... **29.95**

**HCA-5-89, Dust Cover:** Protects H/Z-89 and Z-90 Computers and H/Z-19 Terminals from dust and contaminants, Shpg. wt. 1 lb. .... **14.00**



Discover the fun of kitbuilding at your Heathkit Electronic Center.



## A full line of software for your H/Z-89 or Z-90 Computer

For use in the office or in the home, Heath has software solutions for your everyday needs that are ready to run on your Heathkit/Zenith Computer. Many of these software programs are menu-driven and use easy-to-understand common English commands for easier and faster program usage.

You'll find a wide variety of software programs on this and the following pages. They include: operating systems, programming languages, utility and applications programs. For an even greater selection of software programs, there's the Heath User's Group (HUG) on page 89 with its software library of over

700 programs which is constantly expanding.

All these software packages come with easy-to-understand instructions manuals and are fully indexed to make it easy to locate specific information. Many include glossaries of terms and appendices filled with useful information. All software is subjected to stringent tests to ensure quality and user satisfaction. All software is stored on high-quality disk media for longer worry-free operation.

Several of the software packages on this and the following pages are compatible with and ready for use in the H/Z-100 Desktop Computer. Also see page 99.

### World popular CP/M\*-80 operating system provides a common hardware interface

- Most popular operating system available for microcomputers
- More applications software available than any other system

**Industry standard:** The CP/M operating system provides a common interface to a large variety of computer hardware. And, it provides a general environment for program development, editing, operation, and storage which frees the user from having to understand the details of underlying hardware. This has brought about a vast production of software programs...more languages, utilities and applications software programs than any other disk operating system.

**Comprehensive file management:** CP/M can accommodate files up to 8 megabytes and can access them both sequentially and randomly. In the CP/M operating system, files are named for easier location and are allocated dynamically. Programs can be stored in both source and machine executable form.

**Disk management:** The Basic Input/Output System (BIOS) of CP/M provides the operations to access up to two disk drives, 5.25-inch and/or 8-inch, or a Winchester hard-disk system. The Basic Disk Operating System (BDOS) controls one or more disk drives containing independent file directories. BDOS implements disk allocation strategies which provide fully dynamic file construction while minimizing head movement across the disk during the access of a file. A Console Command Processor controls the input and output of programs.

**Utilities:** CP/M includes standard programs like: an 8080 assembler, an editor, a debugger, a hardware configuration utility, a file copy program, a system and disk status utility, plus others. Special programs include, a disk duplication and verification utility, disk formatting utility and many more.

**Hardware requirements:** To run this version of CP/M on an H/Z-89 or Z-90 Computer, at least 48K of RAM is needed. Although one disk drive is also needed, two drives are highly recommended. In turn, CP/M supports the H/WH-17, H/Z-37, H/Z-47, Z-67 and the H-77/Z-87 Floppy Disk Systems.

**HDS-8917-2**, CP/M-80 on hard-sectored 5.25" disk, Shpg. wt. 5 lbs. . . . **150.00**

**HDS-8937-2**, CP/M-80 on soft-sectored 5.25" disk, Shpg. wt. 5 lbs. . . . **150.00**

\*CP/M is a registered trademark of Digital Research Corp.

### Heath Disk Operating System is user-oriented and simple to operate with built-in error reporting

- Offers many of the functions of large commercial computers
- Designed for the efficient use of memory and disk space
- Recognizes and reports many command and reference errors

**Simplified system:** H-DOS\* provides a complete environment for program construction, storage, and editing. It also provides assembly and checkout facilities. The H-DOS system has a high degree of flexibility and is structured to function with many commands executed on an internal basis. This relieves the user from having to consciously command each step of a program sequence. Increased system discipline, and the ability of H-DOS to recognize and report all command and reference errors saves operators time, reduces mistakes and helps prevent inadvertent loss of valuable data. An easy-to-use Benton Harbor BASIC programming language is included along with ASM Assembly Language, a two-pass 8080 assembler. Also included are several utilities.

**Hardware requirements:** An H/Z-89 or Z-90 Computer using H-DOS must have a minimum of 48K RAM and one disk drive. However, two disk drives are recommended. H-DOS supports all Heathkit/Zenith disk systems except the Z-67.

**HDS-817-1**, H-DOS on hard-sectored 5.25-inch disk. Shpg. wt. 5 lbs. . . . **150.00**

### UCSD P-System for program flexibility, clear readability, and reliable execution

**The UCSD P-System, Version IV**, is an operating system designed around a high-level programming language with a complete environment for easy program development and execution in small computers. With its built-in Pascal Compiler, large tasks can be divided into manageable smaller, easier tasks.

**Hardware requirements:** An H/Z-89 or Z-90 Computer requires a minimum of 48K RAM, but, 64K is highly recommended. Two soft-sectored 96 TPI disk drives are also needed to run the P-System and the Pascal Compiler.

**HDS-8937-3**, UCSD P-System on soft-sectored 5.25" disk, 7 lbs. . . . . **495.00**

\*H-DOS is a trademark of Heath Company.

## SOFTSTUFF Quality software tools to fit your budget

**H-00S - CP/M File Converter:** Easily transfer H-DOS text files to CP/M-80 disks and vice versa, to effectively double the information handling capability of your H/Z-89 Computer. Requires 48K RAM, two disk drives, and H-DOS and CP/M.

**SF-8512**, On hard-sectored 5.25" disk, Shpg. wt. 1 lb. . . . . **30.00**

**Typing Tutor:** Learn to touch type faster and more efficiently using the H/Z-89 typewriter-style keyboard. H/Z-89 requires 48K RAM and one 5.25" disk drive.

**SF-9018**, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. . . . . **40.00**

**PIE Full-Screen Text Editor:** Access files and make changes anywhere on-screen. Special user-defined function keys are used to perform operations. Requires an H/Z-89 with 48K RAM, one 5.25" disk drive, and H-DOS or CP/M.

**SF-9200**, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. . . . . **50.00**

**H-00S and CP/M CPS:** To run this Computerized Phone System (CPS) software, an H/Z-89 requires 48K RAM, one drive, H-DOS or CP/M, and a modem.

**SF-9503**, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. . . . . **40.00**

**CP/M Z-90 CPS:** Z-90 needs 48K RAM, one soft-sectored drive, CP/M and modem to run this computerized phone system software.

**SFS-9103**, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. . . . . **40.00**

## Software Directory for the H/Z-100 Desktop Computer



- Lists more than 475 programs for the H/Z-100
- Products grouped by subheadings for easier locating

**H/Z-100 software locator:** The Software Directory, second edition, is designed to help H/Z-100 Computer users locate software products that meet their specific needs. It lists more than 475 programs that have been reported as available and operable on the H-100 and Z-100 microcomputers.

**Contents:** This edition is divided into 21 chapters from accounting to word processing. Within chapters, products are categorized into subsections for easier location of specific product types. All products are listed alphabetically within each subsection.

**Each listing contains** a description of the software product as provided by the vendor. The description contains: the amount of memory required; language required, if any; the disk format; documentation; and a brief summary of the program. Along with the description is the vendor's name, address and phone number for those interested in a specific program.

**The last two sections** of the Software Directory contain a Heath/Zenith product index of all non-Zenith and non-Heath software, and a Vendor index.

**CB-463-15**, Shpg. wt. 3 lbs. . . . . **25.00**

## SuperCalc\* – one of the most versatile and comprehensive electronic spreadsheets available

**Decision-making tool:** Quickly and easily calculate "what if" and "how what" questions on a spreadsheet covering 63 columns and 254 rows. Worksheet uses self-explanatory error messages and a help function key that lists choices. Other attractive features include powerful editing capabilities and cell protection.

**Hardware and software requirements:** This version of SuperCalc needs an H/Z-89 or Z-90 Computer with 48K of RAM, one disk drive, and the CP/M\* operating system. For printouts, a printer is also needed.

HSC-817-1, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 195.00  
HSC-837-1, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 195.00

## Powerful WordStar\* word processing system features versatility, convenience and multi-level help messages

**Dynamic system:** WordStar is a screen-oriented word processor that lets you create and format text in any form you desire. Powerful editing commands let you insert, delete and move text within a file as well as copy or read text from other files. Choose either a ragged or justified right margin, or mix them together. You control the page length, top and bottom margins, heading/footer/page number locations and other pagination directives. Most of these formatting functions take place immediately so that you see on the screen what will actually be printed.

**Advanced output capabilities:** Additional enhancements can be added to your file as it is printed out. Some of these options are: boldface, double strike, underline, strikeout, subscripts, superscripts, variable character pitch and variable line height. WordStar also supports simultaneous printing and editing.

**Hardware and software requirements:** To run WordStar on an H/Z-89 or Z-90 Computer, 64K RAM and two disk drives are needed. CP/M-80 is the required operating system. A letter quality printer is recommended for documents. To run this soft-sectored version of WordStar on an H/Z-100 Computer two disk drives are needed along with the CP/M operating system for the H/Z-100.

HMP-817-2, Vers. 3.3 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 395.00  
HMP-837-2, Vers. 3.3 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 395.00

## Use MailMerge\* to add mailing list and file merging capabilities to WordStar word processing

**Powerful file merging:** With MailMerge, you can combine a file containing names and addresses with a file in WordStar containing a letter text. Automatically, data can be inserted where variables are specified, even in mid-paragraph.

**Hardware and software requirements:** The MailMerge program can be run on an H/Z-89 or Z-90 Computer having 64K RAM and two disk drives. The CP/M operating system and WordStar software are needed. To use MailMerge on an H/Z-100 Computer, two disk drives and the CP/M operating system for the H/Z-100 are required along with WordStar.

HMP-817-3, Vers. 3.3 on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 135.00  
HMP-837-3, Vers. 3.3 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 135.00

## Easy-to-use Magic Wand\* places excellent power and outstanding versatility at your fingertips

**Comprehensive range of functions:** Magic Wand combines the most-asked-for features in a word processor with a very easy-to-handle price. In creating and editing documents, you can move the cursor around the screen with single key-stroke commands. To replace characters, you can simply type over them. You can also delete text by characters, words, lines or blocks with checks in line and block deletions to prevent an accidental erasing. Other editing features include single and multiple search and replacements, block moves and copying, and two ways to insert text. Even examine the disk directory while editing.

**Smooth print control:** You can set your print requirements with commands from the keyboard when it's time to print your document or embed them while you are writing it. You control the margins, page length, paragraph indentation, text alignment (left or right justified, or ragged), hyphenation and line spacing (single-, double-, and 1½ spaced). On capable printers, you can underscore words or sentences, use boldface or overstrikes, and add superscripts and subscripts.

**Additional features:** With Magic Wand, you can define up to 128 variables of up to 55 characters each that can be used for repetitive jobs. And merge with Magic Spell to automatically proofread your documents.

**Hardware and software requirements:** To run Magic Wand, an H/Z-89 or Z-90 computer requires 48K of RAM, one disk drive and the CP/M operating system. A letter quality printer is also recommended for printed documents. An H/Z-100 Computer needs one disk drive and the H/Z-100 CP/M operating system.

HRS-817-9, on hard-sectored 5.25" disk, Shpg. wt. 3 lbs. .... 295.00  
HRS-837-9, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 295.00

## Magic Spell automatic proofreader checks spelling in documents written with Magic Wand

**Automated proofreading:** Magic Spell is designed to help you isolate spelling and typographical errors in Magic Wand documents. Its spelling system looks through documents of any size and compares each word to an internal 20,000 word standard usage dictionary. Amazingly fast, a typical floppy system using double-density disks can check a 10,000 word document in less than a minute.

**Extensive capabilities:** To its standard 20,000 word dictionary, you can add any number of additional words or you can build your own dictionaries. You can add, subtract or customize them to meet your needs.

**Easy to use:** One of Magic Spell's distinct advantages is that you can request all its features from a simple menu. This spelling checker also contains many reference displays that can be displayed on the screen at any time you desire.

**Hardware and software requirements:** An H/Z-89 or Z-90 Computer requires 48K bytes of RAM, one double-density disk drive, CP/M-80, and Magic Wand. On an H/Z-100 Computer, one disk drive and CP/M are needed along with Magic Wand.

HIS-837-1, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 295.00

\*SuperCalc is a trademark of Sorcim Corp. CP/M is a registered trademark of Digital Research, Inc. WordStar and MailMerge are trademarks of Micropro International Corp. Magic Wand is a trademark of Peachtree Software, Inc.

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| <input type="checkbox"/> Microsoft MACRO-80       |  |

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# Programming languages, emulators and other software for the H-89 All-In-One Computer

## Flexible C BASIC Version 2.0 programming language

- Includes a pseudo-code and a run-time interpreter with extremely versatile disk file accessing facilities

**Structure:** C BASIC consists of three programs. The first is a pseudo-compiler that converts your source code into a series of coded operations and then places them in an intermediate disk file. The second, a run-time monitor, directly carries out the operations included in the intermediate file. The third and final program, called XREF.COM, produces a cross-reference listing of all variables used in a C BASIC source program. Files can be directed to a printer.

**Hardware and software requirements:** To run C BASIC, an H/Z-89 or Z-90 Computer needs 48K of RAM, one floppy disk drive and the CP/M\* operating system. An H/Z-100 requires one disk drive and CP/M.

HCM-817-1, Vers. 5.2 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 115.00

HCM-837-1, Vers. 5.2 on soft-sectored 5.25" disk, Shpg. wt. 1 lb. .... 115.00

## Microsoft\* BASIC Interpreter provides many features

- Includes many enhancements that make it more powerful and versatile than most other versions of the BASIC language

**Complete programming system:** An extensive implementation of BASIC, this general purpose programming language has become one of the standards for microcomputers. This is because it provides ease of use plus features that make a microcomputer perform like a minicomputer or large mainframe.

**Interpreter's features:** The IF-THEN-ELSE control structure allows for highly structured programming including editing during programming and random or sequential filing capabilities. You get access to CPU ports and memory locations.

**What you need:** To use this language, an H/Z-89 or Z-90 requires 48K or RAM, one disk drive, and the H-DOS\* or the CP/M operating system.

HMS-817-1, Vers. 5.2 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. . 175.00

HMS-837-1, Vers. 5.2 on soft-sectored 5.25" disk for CP/M-80, 4 lbs. . 175.00

H-8-21, Vers. 4.8 on hard-sectored 5.25" disk for H-DOS, 3 lbs. .... 150.00

## Fortran for scientific and engineering programs

- Provides more power to meet your heavier programming requirements

**Powerful compiler:** The many extended features of this system make it comparable to FORTRAN compilers used on large mainframes and minicomputers. It includes all the features of ANSI FORTRAN X3.9-1966, except COMPLEX data type. This means you can take advantage of the many utility and applications programs already written in the FORTRAN language.

**What you need:** To run FORTRAN, an H/Z-89 or Z-90 Computer needs 48K of RAM, two disk drives, and either H-DOS or CP/M-80.

HMS-817-2, Vers. 3.4 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. . 195.00

HMS-837-2, Vers. 3.4 on soft-sectored 5.25" disk for CP/M-80, also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 4 lbs. .... 195.00

H-8-20, Vers. 3.4 on hard-sectored 5.25" disk for H-DOS, 4 lbs. .... 175.00

## Emulator software for H/Z-89s and Z-90s

**Remote Batch Terminal Emulator:** Adds IBM 3780, 2780, 3741 and 2770 terminal emulation functions to H/Z-89 and Z-90 Computers. Requires 48K RAM, one 5.25" disk drive, a Z-89-11 board and CP/M.

HWI-8917-1, On hard-sectored 5.25" disk, 4 lbs. .... 895.00

HWI-8917-2, HWI-8917-1 and Z-89-11 I/O, 12 lbs. .... 945.00

**3270 Emulator:** Adds popular IBM 3270 display station emulation to H/Z-89 and Z-90 Computers. Requires 64K RAM, one 5.25" disk drive, a Z-89-11 board and the CP/M operating system.

HPO-8917-1, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 650.00

HPO-8937-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 650.00

HPO-8917-2, HPO-8917-1 and Z-89-11 I/O, 3 lbs. .... 699.00

HPO-8937-2, HPO-8937-1 and Z-89-11 I/O, 3 lbs. .... 699.00

## Z-89-11 Multi-Mode Interface for H/Z-89s and Z-90s

**Input/Output Board:** Use with the above software programs and an H/Z-89 or Z-90 to emulate various IBM data terminals. Has a Centronics-style output port for use with parallel printers. Needs CP/M.

Z-89-11, Assembled, Shpg. wt. 1 lb. .... 99.95

## Microsoft BASIC compiler speeds program execution

- Compile your programs with this M8ASIC Compiler, Version 5.2, and eliminate time-consuming interpretation

**Increased execution speed:** Compiled programs are fast because the BASIC Compiler produces highly optimized machine code which is directly executed. During the compiling of a program, expressions are recorded to minimize temporary storage and, whenever possible, to transform floating point division into multiplication. Constant multiplications are optimally distributed.

**Hardware and software requirements:** To run this compiler, and H/Z-89 or Z-90 Computer needs 48K RAM, two disk drives, and either H-DOS or CP/M-80.

HMS-817-41, On hard-sectored 5.25" disk for H-DOS, 4 lbs. .... 250.00

HMS-817-4, On hard-sectored 5.25" disk for CP/M-80, 4 lbs. .... 250.00

HMS-837-4, On soft-sectored 5.25" disk for CP/M-80, 4 lbs. .... 250.00

## Powerful and versatile MACRO-80 Assembly Language

- Provides most "big computer" assembler features without sacrificing speed or memory space

**Features:** MACRO-80 supports a complete, Intel-standard macro facility which accepts Intel 8080 and Zilog 80 mnemonics. Nesting of macros is limited only by the amount of memory and conditionals, up to 255 levels, can be nested.

**Utilities include:** LINK-80, a linking loader for connecting modules together; LIB-80, a library manager for creating and modifying libraries which are linked to compiled programs; and CREF-80, a cross reference facility used to generate special listings that can be used as diagnostic tools.

**What you need:** An H/Z-89 or Z-90 Computer needs 48K or RAM, one disk drive (two drives are recommended) and either the H-DOS or CP/M operating system.

HMS-817-51, On hard-sectored 5.25" disk for H-DOS, 2 lbs. .... 65.00

HMS-817-52, On hard-sectored 5.25" disk for CP/M-80, 2 lbs. .... 65.00

HMS-837-52, On soft-sectored 5.25" disk for CP/M-80. Also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 3 lbs. .... 65.00

## COBOL Compiler for business-oriented computing

- An ideal programming language for business data processing tasks

**A powerful business programming language,** COBOL is designed for business applications including: inventory, personnel, payroll, order entry, accounting and forecasting. It supplies the tools to meet the rising challenge of information processing. These tools consist of a powerful use of disk files, easy-to-use syntax, long variable names and readable programs.

**To run the COBOL Compiler,** an H/Z-89 or Z-90 needs a minimum of 48K RAM and two disk drives. Also required is either H-DOS or CP/M-80.

HMS-817-31, On hard-sectored 5.25" disk for H-DOS, 4 lbs. .... 395.00

HMS-817-3, On hard-sectored 5.25" disk for CP/M-80, 5 lbs. .... 395.00

HMS-837-3, On soft-sectored 5.25" disk for CP/M-80. Also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 4 lbs. .... 395.00

## ZDS Teacher program to write courses and tests

- Features creating, updating and printing course material as well as quizzes and tests for the courses you develop

**A built-in full screen editor** aids you in creating and developing individualized courses including quizzes and tests. On-screen messages assist programming. An H/Z-89 or Z-90 Computer requires 48K RAM, one 5.25" disk drive and CP/M (2.2 or higher).

HTA-817-1, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 295.00

HTA-837-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 295.00

## ZDS Student program for computer-assisted study

- Enables a student to independently view, study and be tested on customized courses written with the ZDS Teacher program

**Helpful on-screen messages** keep students concentration on material. ZDS Student has no authoring capabilities and must be used with ZDS Teacher software. It runs on an H/Z-89 or Z-90 Computer with 48K RAM and one 5.25" disk drive using CP/M 2.2 or higher.

HTA-817-2, On hard-sectored 5.25" disk, Shpg. wt. 1 lb. .... 40.00

HTA-837-2, On soft-sectored 5.25" disk, Shpg. wt. 1 lb. .... 40.00

## SuperSort\* for sorting almost any kind of record

- SuperSort can be used with WordStar,\* Magic Wand\* or by itself to sort, merge and select information from your data files

**Performance and flexibility:** SuperSort can sort and merge 32 input files (up to 512 kilobytes) into a single master file in one simple and efficient operation at an unmatched speed of 560 records a minute. This sorter accepts a wide variety of records in which data can be justified; or include floating decimals, exponential notation, or upper and lower case letters. Data can also be in several formats: binary, EBCDIC, BDC, ASCII and others. With SuperSort, you can sort fixed and variable length records and fields. Sorting is even possible with a different number of fields in each record. Specify up to 32 different criteria.

**Software compatibility:** SuperSort works with BASIC, Assembly Language, Microsoft FORTRAN and Microsoft COBOL programs as well as with text editors. It may also be linked to Magic Wand, WordStar and other MicroPro\* programs.

**Hardware and software requirements:** An H/Z-89 requires 48K bytes of RAM and one disk drive to run SuperSort. The CP/M operating system is also needed. An H/Z-100 Computer requires one disk drive and the CP/M operating system.

HMP-817-1, On hard-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 195.00  
HMP-837-1, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 195.00

## MAC\* Assembler for easier Assembly Language writing

- MAC features an SIO-compatible symbol table file for debugging use

**Designed for the sophisticated Assembly Language programmer,** MAC supplies many features that make your program writing easier. Some of these are additional conditional assembly operators, title and page pseudo-operands, full Intel-compatible macro definitions, repeating macro calls and disk macro libraries. And MAC has the ability to generate an SID-compatible symbol table file.

**MAC is fully compatible** with CP/M's Assembly Language and comes with a manual that provides a text book study of macro assemblers. An accompanying disk contains a variety of macro libraries for performing useful tasks.

**To run this Assembler,** an H/Z-89 needs 48K or RAM and one disk drive plus CP/M. An H/Z-100 needs one disk drive and the CP/M operating system.

HDR-837-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 85.00

## Print a file and work on another with DESPOOL\*

- A multi-tasking printer utility that provides simultaneous printing of one file while working on another file

**Improve your computer's efficiency** with DESPOOL by allowing the use of two programs at the same time. Taking up little memory space, DESPOOL can be loaded and stored in your computer until needed. An H/Z-89 needs a minimum of 48K of RAM and one disk drive to run this program. The CP/M operating system is also needed. An H/Z-100 Computer needs one disk drive and CP/M.

HDR-817-3, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 50.00  
HDR-837-3, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 50.00

## High-quality supplies and accessories for all Heath/Zenith computers

### Pre-wired, 10-foot RS-232 cables (connects pins 1-8, 20)

HCA-10, Male-to-Male Cable, Shpg. wt. 1 lb. .... 20.00  
HCA-11, Male-to-Female Cable, Shpg. wt. 1 lb. .... 20.00  
HCA-12, Female-to-Female Cable, Shpg. wt. 1 lb. .... 20.00

### Pre-wired, 10-foot special application cables

HCA-14, Parallel Cable for H/Z-89 with Z-89-11 Input/Output Board, Shpg. wt. 1 lb. .... 25.00  
HCA-19, Bisynchronous Modem Cable for use with Z-89-11, 1 lb. .... 20.00

### Pre-wired, 10-foot Personal and Portable IBM cables

HCA-51, Male-to-Female Cable, Shpg. wt. 1 lb. .... 30.00  
HCA-52, Female-to-Female Cable, Shpg. wt. 1 lb. .... 30.00  
HCA-53, Parallel Cable, Shpg. wt. 2 lbs. .... 30.00

### Protection for your floppy disks and computer system

HCA-16, Surge Suppressor protects computer equipment, 1 lb. .... 65.00  
HCA-18, Storage Cabinet for 8" floppy disks, Shpg. wt. 5 lbs. .... 30.00

## SID/ZSID\* is an upgraded version of DDT Debugger

- Debugging utility includes both 8080-compatible SID and Z-80-compatible ZSID at a substantial savings over separate prices

**While maintaining all CP/M's DDT features,** SID/ZSID allows the use of names at the source level. It can draw histograms, maintain pass counts and provide trace-backs of execution paths to selected breakpoints plus many more advanced features. SID/ZSID requires an H/Z-89 with 48K RAM, one disk drive and CP/M. The MAC Assembler is recommended for the full use of SID/ZSID's capabilities. An H/Z-100 Computer requires one disk drive and the CP/M operating system.

HDR-817-2, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. .... 125.00  
HDR-837-2, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 125.00

## Condor\* Relational Disk Base Management

- Easy data base creation and maintenance for simplified information processing without professional computer programmer assistance
- Effortless data entry and updating using self-designed screen formats with complete menu selections you tailor to your requirements
- Extensive analysis and information report writing capabilities

**Condor's Relational Data Base Management System** is a series of programs designed for simple and fast information storage, sorting and filing. rDBMS\* allows you to design and create files of information, data bases, for keeping records of any subject you desire. With this System you can quickly search, sort, merge, analyze, index and print out any records. Condor's rDBMS is a powerful data management system that can process up to 32,767 records per file.

**Written in Assembly Language,** rDBMS operates much faster than other data base management systems available. With this System's outstanding capabilities you can create new data bases within minutes, calculate statistics for field values within a data base and efficiently post transactions to a master file.

**Besides being powerful,** rDBMS is so easy to use that a new user can achieve results within several hours. A number of built-in operator aids such as help screens, command files and user-defined messages make your program use a lot easier. You can further simplify the use of this relational data base management system by creating your own different help menus.

**With rDBMS you can perform** addition, subtraction, multiplication, division and other arithmetic operations on numeric entries, Julian calendar dates and dollar amounts. Specify up to 32 logical conditions including AND, OR and NOT Boolean operations. And, extensive error checking helps prevent clerical errors.

**To effectively run this version of Condor rDBMS,** an H/Z-89 or Z-90 Computer is needed and must be equipped with a full 64K of RAM plus two high-capacity soft-sectored 5.25" 96 TPI disk drives. The CP/M operating system is also required.

HCD-8937-1, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. .... 650.00

\*CP/M, MAC, DESPOOL and SID/ZSID are trademarks of Digital Research, Inc. Microsoft is a trademark of Microsoft, Inc. H-DOS is a trademark of Heath Company SuperSort. WordStar and MicroPro are trademarks of MicroPro International Corp. Magic Wand is a trademark of Peachtree Software, Inc. Condor and rDBMS are trademarks of Condor Computer Corp.

## High-quality, highly-reliable 5.25" and 8" floppy disks

HCS-70, 5.25" hard-sectored, single-sided floppy disks with a capacity of up to 100K bytes. Used with H-17-1 48 TPI drives and H-88-1 Controller Board. Shpg. wt. 1 lb. .... **Package of ten, 40.00**

HCS-66, 5.25" soft-sectored, single-sided, double-density floppy disks. For use in H/Z-89 Computers equipped with 48 TPI H-17-1 or H-17-5 disk drives and Z-89-37 Controller Board for up to 160K byte storage capacity on a single disk. Shpg. wt. 1 lb. .... **Package of ten, 45.00**

HCS-71, 5.25" soft-sectored, double-sided, double-density floppy disks. These 48 TPI disks are used with H-17-5 drives and Z-89-37 Controller Board to store up to 320K bytes of data on a single disk. 1 lb. .... **Package of ten, 50.00**

HCS-68, 5.25" soft-sectored, double-sided, double-density floppy disks. These 96 TPI disks are used with H-17-5 drives and Z-89-37 Controller Board for storing up to 640K bytes of data. Shpg. wt. 1 lb. .... **Package of ten, 55.00**

HCS-69, 8" soft-sectored, single-sided, single-density floppy disks. IBM 3740 formatted, 250K bytes storage, Shpg. wt. 2 lbs. .... **Package of ten, 55.00**

HCS-64, 8" soft-sectored, single-sided, double-density floppy disks. up to 500K bytes of data storage. Shpg. wt. 2 lbs. .... **Package of ten, 60.00**

HCS-65, 8" soft-sectored, double-sided, double-density floppy disks. One mega-byte of data storage on a single disk. 2 lbs. .... **Package of ten, 70.00**



Discover the fun of kitbuilding at your Heathkit Electronic Center.

# Your one-stop shopping center for Heath/Zenith and IBM-PC accessories and peripherals

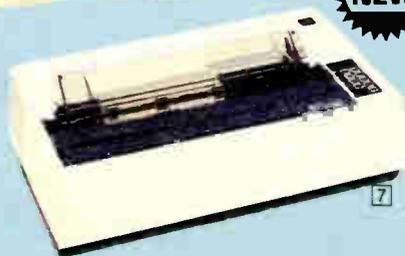
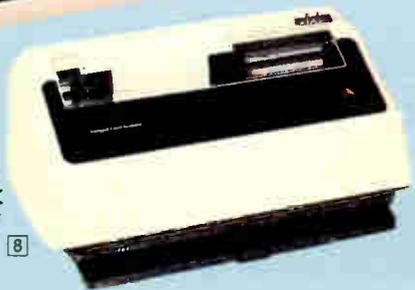
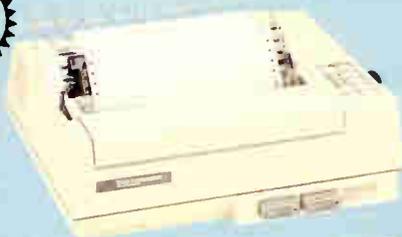
For over 40 years Heath has built a reputation for providing you with quality products. And we've backed them up with technical consulting help by telephone from the factory...plus local assistance at 64 Heathkit Electronic Centers across the country. We're now extending the same philosophy to a special group of selected accessories and peripherals for the IBM-PC, Heath/Zenith HZ-151 PC, HZ-161 Portable, H-100 Desktop and H-89 All-in-One Computers.

We've looked at hundreds of "compatible" items and selected those shown here on pages 97 through 99 as "best of breed." Functional checks and product tests

have been performed on each item and our support team stands ready to provide information to you regarding installation and/or connection of any of these products to your IBM-PC or appropriate Heath/Zenith computer.

We'll even install any of the boards on page 98 that you buy at a Heathkit Electronic Center **FREE OF CHARGE** when you bring in your computer.

Even though covered by manufacturers' warranty, we're so confident you'll be satisfied with these products that we're offering a 90-day money-back guarantee. Either you're happy with the product or return it and we'll cheerfully refund your money.



## 1 High-Speed H-125 Dot Matrix Line Printer

**\$899<sup>00</sup>**  
Kit

- Prints at over 150 characters per second
- Compatible with most computers and terminals
- Capable of printing 33 graphics characters

Packed with valuable features, the H-125 offers speed and quality for both personal and business printing uses. It can print the full 96-character ASCII set (including upper and lower case letters, descenders and underlining) at a rate of over 150 characters per second. The H-125 offers variable pitches of 10, 12, 13.2 and 16.5 cpi. Vertical spacing can be set, either at six or eight lines per inch.

The H-125 communicates through either an RS-232 Serial Interface or a 20 mA current loop. Communication speeds are adjustable from 110 to 9600 baud. A specially-designed cabinet completely encloses the printing mechanism of the H-125 for quieter operation. The H-125 measures 8¼" H x 26½" W x 18½" D and operates on 120/250 VAC, 50/60 Hz.

Kit H-125, Shpg. wt. 85 lbs. .... 899.00  
HDC-125, Protective Dust Cover, Shpg. wt. 1 lb. .... 16.00  
HCA-9, Printer Stand with wire paper tray, Shpg. wt. 21 lbs. .... 99.00

## 2 New Digital X-Y Plotter for superior graphics

**\$349<sup>95</sup>**  
Kit

- Compact and lightweight Plotter is fast, highly accurate and very reliable
- Operates on simple commands from a computer

Draw high-resolution graphics with excellent line quality using the new IR-5208 kit version of the popular Sweet-P Plotter. It draws virtually every graphic format you'll ever need including pie charts, bar graphs, straight and curved line graphs, illustrations, and alphanumeric labeling on plain bond paper or overhead transparency material. Line segments are accurate to four-thousandths (0.004) of an inch at a maximum speed of six inches per second.

Hook up to the Plotter to the parallel port of a computer for colorful graphs and engineering graphics. Support Packs, listed below, include a parallel interface cable for use with the entire line of Heath/Zenith Computers as well as the IBM-PC and its compatibles. A software support package is also included with the cable. It is an easy-to-use tutorial that prompts you through each step to help you get the most out of the Plotter. Four pens (red, green, blue and black) are included in the Support Pack. The Plotter is compact (14" W x 8½" D x 3" H) and lightweight (7.2 lbs.) enough to be carried in a standard briefcase.

Kit IR-5208, Shpg. wt. 10 lbs. .... 349.95  
IRA-5208-1, Support Pack for H/Z-100, HS-151, HS-161. IBM-PC and IBM-PC compatible computers, Shpg. wt. 1 lb. .... 19.95  
IRA-5208-2, Support Pack for the H/Z-89 Computer with CP/M\* software on hard-sectored 5.25" disk, requires Z-89-11 interface Board (p. 94) and CP/M 2.2.04, Shpg. wt. 1 lb. .... 19.95  
IRA-5208-3, Replacement Pen Set includes 4 black pens. 1 lb. .... 9.95  
ET-500, Assembled Plotter, 12 lbs. .... Was 795.00, NOW ONLY 499.95

## 3 Sophisticated DTC 380Z Daisy Wheel Printer

Ideally suited for professional, commercial and personal uses, the 380Z can be connected to a computer or terminal through either its standard EIA RS-232 or parallel Centronics interface. Prints out between 10 to 32 characters per second.

PP-260, Assembled and tested, Shpg. wt. 43 lbs. .... 1295.00  
PPA-260-1, Tractor Feeder, Shpg. wt. 6 lbs. .... 149.95  
PPA-260-2, Cut-Sheet Feeder, Shpg. wt. 10 lbs. .... 574.95  
PPA-260-4, RS-232 Cable, Shpg. wt. 2 lbs. .... 49.95  
PPA-260-5, Parallel Cable, Shpg. wt. 2 lbs. .... 49.95

## 4 High-quality Primage I Daisy Wheel Printer

Delivering speed and quality, the Primage I Printer prints out letter-quality documents at 45 characters per second. It uses a 100-character daisy wheel allowing use of special accents and characters without changing wheels. With its serial and parallel ports, the Primage I can be plugged into virtually any computer printer port. And, this printer fully emulates Diablo 630 commands. An optional sheet feeder easily installs for automatic printing of up to 200 sheets of normal stationery. Replaceable cartridges make ribbon changing a "clean hands" operation. Requires either HCA-10 or HCA-53 cable (p. 95).

PP-250, Assembled and tested, Shpg. wt. 63 lbs. .... 1699.00  
PPA-250-1, Cut-Sheet Feeder, Shpg. wt. 18 lbs. .... 299.95  
PPA-250-2, Tractor Feeder, Shpg. wt. 6 lbs. .... 275.00



Use your Visa or MasterCard credit cards to purchase your kit!

## 5 Advanced MPI-150 Impact Matrix Printer

Print up to 6120 individually addressable dots per square inch for exceptional graphics and special character resolution. Requires AP-PAK on page 101.

MPI-150, Assembled and tested, Shpg. wt. 35 lbs. .... 995.00

## 6 Easy-to-use MPI-99 Impact Matrix Printer

Bi-directional printer features: print speed of 100 cps, serial RS-232C or parallel Centronics interfacing and more. Needs AP-PAK on page 101.

MPI-99, Assembled and tested, Shpg. wt. 11 lbs. .... 599.00

## 7 TI 855 Dual Mode Printer offers flexibility

Dual function dot matrix printer offers data processing capability and letter quality printing. Outstanding features include: 35 cps for documents, 150 cps for drafts, bi-directional printing, selectable type fonts, 256 character buffer and more. Requires HCA-22 or HCA-24 cables on page 101.

WH-64, Assembled and tested, Shpg. wt. 18 lbs. .... 995.00

## 8 Dot Matrix Printer with full color capability

Handle virtually any printing requirement with this DataProducts dot matrix printer that offers document printing approaching daisy wheel quality. Uses 4-color output for graphs or graphics in a choice of two colored ribbons. Features include: logic seeking bi-directional printing; 150 cps in proportional mode and 200 cps in draft mode; 10, 12, or 16.8 cpi; 6 or 8 lines per inch spacing; serial EIA RS-232C or parallel Centronics-type interfacing; automatic, multiple line buffering of 1500 bytes; and more.

PP-210, Assembled and tested, Shpg. wt. 44 lbs. .... 1795.00  
PPA-210-4, Parallel Cable, Shpg. wt. 2 lbs. .... 59.95  
HCA-11, RS-232 Cable, Shpg. wt. 1 lb. .... 20.00

## 9 Superior DTC Style Writer Daisy Wheel Printer

A letter quality printer, the Style Writer communicates through its standard parallel Centronics interface at speeds up to 130 wpm. Requires HCA-53 (p. 95).

PP-270, Assembled and tested, Shpg. wt. 24 lbs. .... 599.00  
PPA-270-1, Tractor Feeder, Shpg. wt. 6 lbs. .... 149.95  
PPA-270-2, Cut-Sheet Feeder, Shpg. wt. 11 lbs. .... 249.95  
PPA-270-3, 32K Buffer Extender, Shpg. wt. 1 lbs. .... 49.00

## 10 ID-4803 properly erases EPROMS for reuse

Compact and easy to use, the ID-4803 EPROM Eraser will erase all your ultraviolet erasable integrated circuits for you to use again and again. Interlock system prevents accidental eye exposure to ultraviolet rays. Includes lamp on indicator and locking non-removable tray. Easy one-evening kit.

Kit ID-4803, Shpg. wt. 4 lbs. .... 49.95

## 11 Hayes Automatic 300 baud Smartmodem makes

Automatically dial, answer, send, receive, and disconnect calls. Use with rotary or TOUCH-TONE phone systems. Has RS-232 connector and includes 120 VAC adapter and phone cable. Requires HCA-11 (p. 95) and CPS software.

WH-43, Assembled and tested, Shpg. wt. 3 lbs. .... 279.00

## 12 Convenient acoustic modem transfers data

The LEX-11 operates at 300 baud in half or full duplex. Includes AC adapter. Requires an HCA-11 cable (p. 95) and CPS software.

WH-23, Assembled and tested, Shpg. wt. 3 lbs. .... 139.00

## 13 US Robotics 1200 Baud Auto-Answer Modem

Features full and half duplex operation, direct connection to RJ11C standard phone jack, auto and manual answer and originate modes. Includes cable.

PP-300-F, Shpg. wt. 3 lbs. .... 449.00

## 14 Compact, versatile and easy to use modem

Novation J-CAT 300 Baud Modem is compatible with Bell 103 modems, and can automatically select answer and originate mode. Includes cables.

PP-310, Assembled and tested, Shpg. wt. 2 lbs. .... 129.95

Accessories to peripherals on this page are found on page 101.

\*CP/M is a registered trademark of Digital Research, Inc.



## Accessories and software for all Heathkit/Zenith Computers and the IBM-PC

1 Expand the capabilities of your Heath/Zenith or IBM-PC Computer with these "best-of-breed" plug-in accessory boards. All are Heath checked for quality and high reliability.

### Add-on SixPakPlus multi-function card from AST

Expands user memory of an HS-151 Personal or HS-161 Portable Computer to a system total of 640K. Comes with 64K of memory and more. Also used in IBM-PC.  
PC-120, Shpg. wt. 2 lbs. .... 299.00  
PCA-120-1, Game Port Option, Shpg. wt. 1 lb. .... 50.00

### Novation Access 1-2-3 Modem plug-in card

A fully integrated 300 or 1200 baud communications system for your HS-151 Personal or HS-161 Portable Computer and IBM-PC. Includes Crosstalk-XVI.  
PC-130, Shpg. wt. 4 lbs. .... 399.00

### DG Magic RAM 64K Card increases memory capacity

Four-bank memory card includes Z-205-1 64K RAM Chip Set. Remaining sockets allow memory expansion with additional Z-205-1 Chip Sets (see below) or 256K memory chips. For use with HS-151, HS-161 and IBM-PC Computers.

PCS-140, Shpg. wt. 2 lbs. .... 199.00

### Add joystick capability with DG Analog Game Port

Plug-in Analog Game Port allows the addition and use of joysticks and graphic pads (such as WICO and KOALAPAD) and other analog devices. Supported by GW\*-BASIC. For use with the HS-151, HS-161 and IBM-PC Computers

PC-110, Shpg. wt. 2 lbs. .... 49.95

PCS-110, PC-110 with clock/calendar chip, battery, software, 1 lb. .... 99.95

### Powerful DG Super 89 enhanced processor board

Replaces central processor board in H/Z-89 and Z-90 Computers and features: 128K RAM, fully compatible with all Heath/Zenith products, full CP/M\* and H-DOS\* compatibility, 256K expandable memory, two serial ports, on-board real-time clock, 4 MHz operation, 5 I/O board slots, expanded boot ROM, software and more. Fully assembled and tested.

PC-310, Shpg. wt. 3 lbs. .... 799.00

### SAVER! Get a big 50% discount on extra 64K of RAM

Purchase extra Z-205-1 64K RAM Chip Sets within 90 days of a PC-120, PCS-140 or PC-310 board purchase and receive half off the regular price.

Z-205-1, Shpg. wt. 2 lbs. .... Regularly \$100.00 Discount price 50.00

### MAGNOLIA MICROSYSTEMS CP/M-Plus and RAM Board

Get the power of CP/M-Plus and add an additional 128K of RAM to your 48K populated H/Z-89 or Z-90 Computer for a total memory capacity of 176K. And, your computer still retains full compatibility with existing operating systems.

PC-300, Shpg. wt. 10 lbs. .... 495.00

### US Robotics Auto-Dial Modem Card for H/Z-100s

An integrated serial telecommunications device, this modem features: a 0 to 300 and 1200 baud rate, Bell 212A/103 compatibility, auto and manual dial and answer modes. Plugs into an H/Z-100 expansion slot and to standard RJ11C phone jack. Phone cable included. Uses Hayes-type programming commands.

PC-200, Shpg. wt. 2 lbs. .... 449.00

PA-100-1, US Robotics TELPAK Software, uses MS\*-DOS, 2 lbs. .... 99.00

### Programmable Sound/Speech/Time (P-SST) Card

From Software Wizardry, a plug-in circuit board for the H/Z-100 Computer that features: a real-time clock/calendar with battery backup, three channel sound synthesizer, two general purpose parallel I/O ports, a phoneme speech synthesizer with adjustable voice pitch, and an audio amplifier with adjustable volume control plus an output connector for an external speaker.

PC-220, Shpg. wt. 3 lbs. .... 395.00

### Smart RS-232 Interface Cable from IQ Technologies

An intelligent interface cable, Smart Cable looks at the RS-232 signals from the computer and the peripheral and uses its own logic circuitry to match up all data, handshake, and control lines automatically. It derives power from the lines.

PP-100, Shpg. wt. 1 lb. .... 89.95

### WICO Computer Command Analog Joystick

Arcade quality joystick adds to the fun of playing games on your HS-151 Personal or HS-161 Portable Computer. Features: selectable self-centering or non-centering mode, arcade size handle, external trim controls and more. Used with the PC-110 Analog Game Board. Can also be used with the IBM-PC.

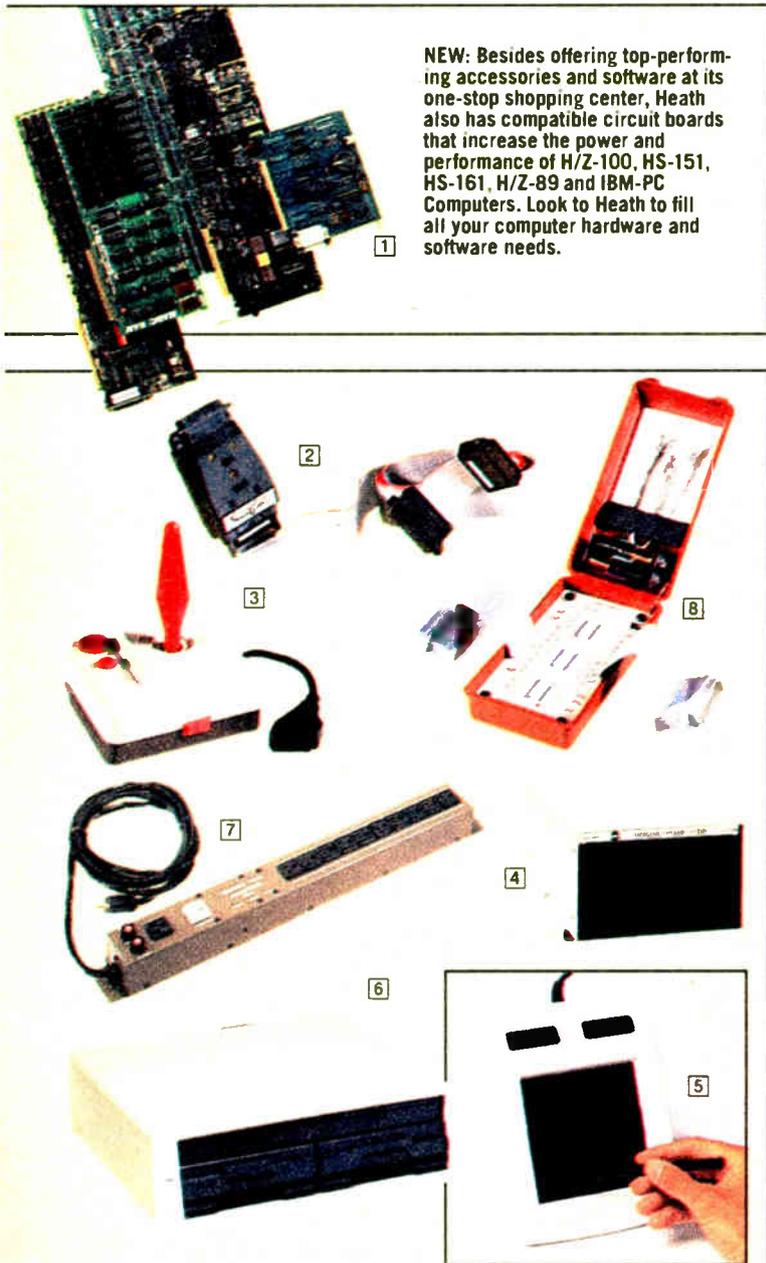
PP-401, Shpg. wt. 2 lbs. .... 39.95

### Emergency Power System protects your computer

This completely self-contained 200 watt emergency power system automatically

\*CP/M is a registered trademark of Digital Research, Inc. H-DOS is a trademark of Heath Company. MS is a registered trademark of Microsoft Corp

NEW: Besides offering top-performing accessories and software at its one-stop shopping center, Heath also has compatible circuit boards that increase the power and performance of H/Z-100, HS-151, HS-161, H/Z-89 and IBM-PC Computers. Look to Heath to fill all your computer hardware and software needs.



protects your small computer from black-outs without any installation. Plug the power system into an AC outlet and all your computer equipment into the PP-110. With a 200-watt load, you'll have 5 minutes to safely shut down your equipment. With lesser loads, more time is available. Built-in AC line filters clamp transients and surges for clean on-line power. Ten millisecond switchover time.

**PP-110**, Shpg. wt. 38 lbs. .... **349.00**

## 5 KOALAPAD Touch Tablet and software

Control your **HS-151 Personal** or **HS-161 Portable Computer** by simply moving your finger across the 4" x 4" surface of the KOALAPAD. Uses some features of GW-BASIC Vers. 2.0. Requires PC-110 Analog Game Card. Also used in IBM-PC.

**PP-400**, Shpg. wt. 3 lbs. .... **99.95**

## 6 Ten megabyte disk storage from IOMEGA

The **Bernoulli Box** from **IOMEGA Corp.** may well put the Winchester drive on the back shelf. Offering the hard disk capacity and speed of a Winchester plus the economy and convenience of flexible disks, the Bernoulli Box is the answer to more reliable, versatile and economical data storage. Each 8½" by 11" removable cartridge houses a flexible disk that stores ten megabytes of data. And, it doesn't require special handling as do familiar 5.25" and 8" disks.

Available in two versions, single and dual drive units, the Bernoulli Box combines a number of technological breakthroughs that result in a storage system of amazing simplicity. Data and mechanical reliability is unmatched and the cost per megabyte of storage is dramatically low. The Bernoulli Box complements the **HS-151 Personal Computer** and the **HS-161 PC** as well as the **IBM-PC**. Exceeds the capacity of hard disk drives and has a faster access time. And, it features full support of the **MS-DOS** operating system. Includes interface card, software, cable and one cartridge per drive.

**PP-500-1**, Single drive 10M storage, Shpg. wt. 53 lbs. .... **2695.00**

**PP-500-2**, Dual drive 20M storage, Shpg. wt. 63 lbs. .... **3695.00**

**PPA-500-1**, Blank 8" cartridge, Shpg. wt. 3 lbs. .... **79.00**

**PPA-500-2**, Tri-Pak Blank 8" Cartridges, Shpg. wt. 5 lbs. .... **199.00**

**PPA-500-3**, Head Cleaner Kit, Shpg. wt. 3 lbs. .... **79.00**

## 7 Smart Outlet Box powers up all your peripherals

Plug the **AC line cord** of your computer into the special current-sensing socket of the outlet box and your peripherals into the remaining ten switched outlets. The moment you turn your computer on, current flow in the socket is sensed which automatically supplies power to the other sockets. Internal MOV device protects your computer from line surges and voltage transients. Remaining outlet socket is unswitched for powering clocks or other constant AC devices. See page 24 for current handling and other information.

**GO-1295**, Shpg. wt. 4 lbs. .... **49.95**

## 8 Breakout Box RS-232 Terminal Interface Tester

Isolate problems within a computer system with this pocket sized, self-contained tester. LEDs signal line condition. Includes jumper pins and test points.

**WH-15**, Shpg. wt. 1 lb. .... **159.00**

## Home and children's educational software programs

Here are some software selections from familiar names to help you in the home and with your child's education. Various software packages are available for different Heath/Zenith computer systems.

### Home computer programs from *The Software Toolworks*

**MYCALC SPREADSHEET**: An easy-to-use calculating tool you can use to compute your budget, record and project your investment returns and can even be used to figure your taxes. Use formulas, labels, variable column width, logical operations, references across worksheets, sort and print. Display formats include scientific, financial and bar graph. Program options are listed on the command line while 23 on-line help screens keep you going.

**PA-250-1**, For use on **HS-151**, **HS-161** and **H/Z-100 Computers**, 1 lb. .... **59.95**

**PA-250-3**, On **H/Z-89 Computers** using **CP/M**, soft-sectored, 1 lb. .... **59.95**

**PA-250-5**, On **H/Z-89 Computers** using **CP/M**, hard-sectored, 1 lb. .... **59.95**

**MYCHESS**: A world class championship chess game. Nine skill levels let you tailor this chess game to any opponent. An opening play can be any one of the 850 moves. This program can save games in progress for playing later. It will even print game listings during or after a game. **MYCHESS** features full color graphics.

**PA-251-1**, On **HS-151**, **HS-161** and **H/Z-100 Computers**, 1 lb. .... **34.95**

**PA-251-3**, On **H/Z-90 Computers** using **CP/M**, soft-sectored, 1 lb. .... **34.95**

**PA-251-4**, On **H/Z-89 Computers** using **H-DOS**, 1 lb. .... **34.95**

**PA-251-5**, On **H/Z-89 Computers** using **CP/M**, hard-sectored, 1 lb. .... **34.95**

**COMPUTER CHEF**: An automated recipe file that eliminates cook book page flipping and portion figuring for different numbers of servings. Plus, you can list the food items on hand and **COMPUTER CHEF** will suggest recipes. This works great for planning your week's menu from supermarket ad specials. **COMPUTER CHEF** contains over 70 kitchen-tested recipes from salad to desert. And, you can enter your own recipes for an even greater selection. When you need more or fewer servings than the recipe calls for, **COMPUTER CHEF** automatically scales the recipe to your needs.

**PA-252-1**, For **HS-151**, **HS-161** and **H/Z-100 Computers**, 1 lb. .... **29.95**

**PA-252-3**, On **H/Z-89 Computers** using **CP/M**, soft-sectored, 1 lb. .... **29.95**

**PA-252-5**, On **H/Z-89 Computers** using **CP/M**, hard-sectored, 1 lb. .... **29.95**

**BEST OF WOK TALK**: Oriental cuisine made easier by computer. From the Chinese culinary newspaper, **Wok Talk**, are assembled over 100 recipes from all over China. Select recipes by ingredients, type of cuisine, or key words. This program automatically scales your recipes for the ingredients on hand or the number of people to be served. List recipes on a printer as you need them.

**PA-253-1**, For **HS-151**, **HS-161**, **H/Z-100 Computers**, 1 lb. .... **29.95**

**PA-253-3**, On **H/Z-89 Computers** using **CP/M**, soft-sectored, 1 lb. .... **29.95**

**PA-253-5**, On **H/Z-89 Computers** using **CP/M**, hard-sectored, 1 lb. .... **29.95**

**WHAT'S FOR DINNER**: This software package contains over 200 delicious recipes already formatted for use with **COMPUTER CHEF** (not included). A collection of over 100 main and side dishes plus over 100 dessert items. It has everything from quick and easy dinners for two to entertaining a crowd in style.

**PA-254-1**, For **HS-151**, **HS-161** and **H/Z-100 Computers**, 1 lb. .... **19.95**

**PA-254-3**, On **H/Z-89 Computers** using **CP/M**, soft-sectored, 1 lb. .... **19.95**

**PA-254-5**, On **H/Z-89 Computers** using **CP/M**, hard-sectored, 1 lb. .... **19.95**

## Computer learning fun from **SPINNAKER**

**SPINNAKER FACEMAKER**: An educational program for children ages 4-12 that helps them become comfortable with computer fundamentals and having fun at the same time. **FACEMAKER** is three games in one. First the child completes a face by choosing eyes, nose, etc and then makes the face smile, wink, frown or wiggle its ears. The third game asks the child to repeat the sequence of faces on the screen, helping to improve the child's memory and concentration.

**PA-200-1**, For use on **HS-151** and **HS-161 Computers**, 1 lb. .... **29.95**

**DELTA DRAWING**: For all ages 4 to adult, this educational program provides an easy and friendly introduction to computer learning through drawing and coloring. This learning program helps build an understanding of programming concepts and procedural thinking, and encourages children to exercise their creativity.

**PA-201-1**, For use on **HS-151** and **HS-161 Computers**, 1 lb. .... **49.95**

**FRACTION FEVER**: Makes learning fractions an exciting challenge for ages 7 to adult. Combine the fast action of a pogo stick arcade game with learning about fractions. Develop an understanding of relationships between different fractions and visual representations of fractions.

**PA-202-1**, For use on **HS-151** and **HS-161 Computers**, 1 lb. .... **29.95**

**KIDS ON KEYS**: This educational program introduces children from ages 3 to 9 to the computer keyboard. Three exciting games teach them the location of letters and numbers while they have fun with the computer. There are four levels of difficulty, plus special bonus rounds. And in each game, your child will enjoy sound effects and is rewarded with points and colorful graphics.

**PA-203-1**, For use on **HS-151** and **HS-161 Computers**, 1 lb. .... **29.95**

**KINDERCOMP**: A collection of six fun learning games that encourages young children ages 3 to 8 to start learning on the computer. Kids create colorful pictures and interesting sounds while they familiarize themselves with a computer keyboard. **KINDERCOMP** challenges children to find letters and numbers and rewards them with spectacular pictures and sounds.

**PA-204-1**, For use in **HS-151** and **HS-161 Computers**, 1 lb. .... **29.95**

**STORY MACHINE**: For ages 5 to 9, **STORY MACHINE** helps children learn to write sentences, paragraphs and simple stories. This program also helps to develop a positive attitude towards writing. Children create stories from supplied lists of nouns, verbs, prepositions and other parts of speech. Then watch your child's excitement as the story comes to life.

**PA-206-1**, For use on **HS-151** and **HS-161 Computers**, 1 lb. .... **29.95**



Discover the fun of kit building at your Heathkit Electronic Center.

COMPUTERS/99



## Versatile and compatible terminals that provide quality and economy

### 1 Smart H-29 Terminal features performance

- Built-in flexibility provides room to grow as your needs increase
- Complete communications compatibility with terminals and computers

One of the most user-friendly terminals available, the H-29 allows a user to configure parameters from on-screen selections. Even a user-settable 24-hour clock is accessible for keeping track of standard or elapsed time. A keyboard HELP key is also provided for prompts or help messages used with some software. And, a special screen saver automatically shuts off the display after 15 minutes of nonuse for those forgetful moments.

The H-29 Terminal is compatible with many ANSI protocol terminals including the popular Heathkit H-19 Terminal. For greater versatility in education and business, the H-29 emulates the Lear-Siegler ADM-3A and the Hazeltine 1500A Display Terminals. And, it is compatible with the DEC VT52 Terminal and has many attributes of the DEC VT100 Terminal, all at a lower price than either.

Information is clearly displayed in 25 lines of 80 characters each on a nonglare green CRT in normal or reverse video. Select a block or underline and a blinking or nonblinking cursor. The detached keyboard of the H-29 has 91 keys and includes a separate numeric keypad. All keys are a nonglare type to provide nonslip finger contact and reduce eye-fatiguing glare.

Along with a 128-character ASCII set, the H-29's keyboard can generate codes for an alternate character set of 33 special symbols in an 8 x 10 dot matrix. Besides lower and upper case letters, other characters include: superscript and subscript letters, Greek symbols, H/Z-19 graphics, VT-100 graphic and other symbols.

Designed as an input/output device for a computer system, the H-29 Terminal can be hooked either directly or through telephone lines (using a modem) to any computer. It has two RS-232 standard connectors, a DTE type for computers or modems and DCE type for an auxiliary device. All parameters are set through keyboard selections and stored in nonvolatile memory until reset.

	<b>Kit H-29</b> , Shpg. wt. 41 lbs. ....	<b>549.00</b>
	<b>Z-29</b> , assembled and tested H-29, 38 lbs. ....	<b>799.00</b>
	<b>NEW! Z-29-A</b> , Z-29 with amber CRT, 45 lbs. ....	<b>PLEASE CALL</b>
	<b>Z-29-1</b> , Palm Rest Accessory, Shpg. 1 lb. ....	<b>15.00</b>
	<b>Z-29-2</b> , ROM Source Listing, Shpg. wt. 4 lbs. ....	<b>25.00</b>

**H/Z-29 SPECIFICATIONS:** DISPLAY: CRT: 12" P31, green, non-glare video screen. Display Format: 25 rows of 80 characters. Display Size: 6" H x 8 1/2" W. Character Type: 8 x 10 character cell. Character Size: 0.2" H x 0.1" W (approx.). Video Attributes: Normal or reverse character, normal or underline character, normal or half-intensity character, normal or blinking. Can be in any or all combinations. Refresh Rate: 60 Hz, or 50 Hz. CURSOR: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Controls: Up, Down, Left, Right, Backspace Tab, Back Tab, Back, Home, Carriage Return and Line Feed. Addressing: Direct and relative. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 75 - 19,200 baud. Mode: Half or full duplex. Code: ASCII. Format: Serial asynchronous. Word Length: 7-data bits, one parity bit. Stop Bits: 2 at 75 and 110 baud rates, 1 at all other baud rates. Sync: Auto XON and XOFF. Parity: Even, odd, mark or space. Power Requirements: 105 - 127 VAC at 60 Hz and 45 watts.



### 2 HT-10 Terminal for a low-cost data-entry point

- Instant and user-friendly access to personal and business computers

Information processing terminal with DEC-VT 52 compatibility features integral RS-232 standard port that functions at speeds from 110 to 9600 baud. Also has easy-to-use keyboard, built-in prompts and parallel port for use with printer.

	<b>Kit HT-10</b> , Terminal includes ZVM-121 video monitor without modem, Shpg. wt. 36 lbs. ....	<b>399.00</b>
	<b>Kit HTX-10</b> , Terminal less monitor and modem, 10 lbs. ....	<b>279.00</b>
	<b>ZT-10</b> , Assembled and tested Terminal, includes video display monitor without modem, Shpg. wt. 32 lbs. ....	<b>499.00</b>
	<b>ZTX-10</b> , Assembled HT-10 less monitor and modem, 6 lbs. .	<b>399.00</b>

**HT-10 SPECIFICATIONS:** Character Set: 95 ASCII, 33 graphics. Keyboard: 63 keys (26 alphabet, 10 numeric, 4 cursor/special function, 12 control, 11 punctuation). Cursor: Blinking or steady block, or off. Video: RS170 compatible. Printer: Parallel (Centronics-type).

### 3 HT-1011 for access to time sharing services

- Single key access of up to 26 pre-selected information sources

Telecomputing system features internal modem and single key dialing of information services or normal voice calls. Log-on procedure includes account numbers, escape codes and passwords. Includes battery-protected memory system.

	<b>Kit HT-1011</b> , Includes ZVM-121 video display monitor, RS-232C port and 300 baud modem, Shpg. wt. 44 lbs. ....	<b>449.00</b>
	<b>ZT-11-Z</b> , Assembled and tested HT-1011 with video display, RS-232C port and modem, Shpg. wt. 32 lbs. ....	<b>579.00</b>
	<b>ZTX-11-Z</b> , Assembled and tested HT-1011 with modem RS-232C port less video display monitor, Shpg. wt. 6 lbs. ....	<b>479.00</b>
	<b>ZT-1-UZ</b> , Assembled and tested Terminal with monitor and modem less RS-232C serial port, Shpg. wt. 30 lbs. ....	<b>549.00</b>
	<b>ZTX-1-UZ</b> , Assembled and tested Terminal with modem less monitor and RS-232C serial port, 6 lbs. ....	<b>449.00</b>

#### Accessories for the HT-10 and HT-1011 Terminals

<b>ZT-1-2</b> , Terminal Carrying Case, Shpg. wt 2 lbs. ....	<b>24.99</b>
<b>ZTA-1-1</b> , Parallel Cable, Shpg. wt. 1 lb. ....	<b>25.00</b>
<b>ZVM-121</b> , Optional Monochrome Video Display, 18 lbs. ....	<b>139.95</b>
<b>ZVM-121-Z</b> , ZVM-121 with H/Z-100 matching cabinet, 18 lbs. .	<b>139.95</b>
<b>HTX-10-1</b> , Auto-dial/answer 300-baud modem, 1 lb. ....	<b>69.95</b>
<b>ZT-1-3</b> , Universal ROM, one key access upgrade, 1 lb. ....	<b>49.95</b>

## 4 Z-49 Terminal features increased flexibility

- 14" non-glare CRT displays 25 rows of a selectable 80/132 characters

The very friendly Z-49 Video Display Terminal is designed to satisfy all your business and personal needs while providing the greatest degree of user convenience. All Terminal functions, even screen brightness, are easily set up by programming selections through the keyboard as plain-English menus are displayed on-screen. These selections are then stored in non-volatile memory.

The Z-49 features an advanced 92-key keyboard that has: automatic key repeat, status indicators, user-defined function keys, and full cursor control keys. Other Terminal features include: a 14" Chromogold II™ (amber) screen; DTE and DCE connectors; H/Z-29, H/Z-19, DEC VT52 and VT100 compatibility; smooth scrolling; normal and alternate character sets; and more.

	<b>Z-49</b> , Assembled and tested, Shpg. wt. 37 lbs. ....	<b>1099.00</b>
	<b>Z-49-G</b> , Z-49 with green CRT, Shpg. wt. 37 lbs. ....	<b>1099.00</b>

**Z-49 SPECIFICATIONS:** DISPLAY: CRT: 14" diagonal, enhanced contrast, video screen. Display Format: 25 rows of 80 characters or 25 rows of 132 characters. Display Size: 6.75" H x 9.25" W. Character Type: 80-column display, 10 x 12 character cell. 132-column display, 8 x 12 character cell. Video Attributes: Normal or reverse character, normal or underlined character, half intensity character and background normal or blinking display. Refresh Rate: 50 or 60 Hz. CURSOR: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Addressing: Direct or relative. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 50 - 19,200 baud. Mode: Half or full duplex. Code: ASCII. Format: Serial asynchronous. Sync: Auto XON and XOFF. Power: 105 - 127/210 - 254 VAC, 50/60 Hz, 73 watts.

## 5 NEW economical and user-friendly Z-22 Terminal

- On-screen parameter selection and storage in nonvolatile memory

Featuring parameter selection like the smart H-29 Terminal, the Z-22 also offers user programming of automatic logons to information services and programmable function keys. Ergonomic features include a low profile detachable keyboard with a 75-key standard QWERTY-type layout and an 18-key auxiliary keypad. The 12-inch monitor with Zenith's special Chromgold II phosphor tilts and rotates.

The easy-on-the-eyes CRT displays 25 rows of 80 characters, 24 rows of regular data plus a 25th status row which is user selectable between terminal status and defined through user selection. The Terminal displays a 96 character set including upper and lower case, numbers and punctuation. Three sets of graphics are also displayed which include 33 graphics characters, 33 Zenith graphic characters and 33 foreign characters. The cursor can be set for blinking or nonblinking character, or blinking or nonblinking underline.

The Z-22 Terminal also features compatibility with the popular Lear Siegler ADM11 and TeleVideo 914 terminals which are found on many of today's systems.

	<b>Z-22</b> , Shpg. wt. 25 lbs. ....	<b>PLEASE CALL FOR PRICE</b>
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**Z-22 SPECIFICATIONS:** DISPLAY: CRT: 12" diagonal, Chromogold II. Display Format: 25 rows x 80 characters. Character Size: 5 x 7 dot matrix with descenders. Refresh Rate: 60 Hz or 50 Hz. CURSOR: Type: Blinking or nonblinking block character or line. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 300 - 19,200 baud. Format: Serial Asynchronous. Data Transmission Control: Hardware and software (XON and XOFF) handshaking. Power: 120/220 VAC, 50/60 Hz.

## Supplies and accessories for your Heath/Zenith computers and peripherals

### Pre-wired 10-foot special application cables

<b>HCA-22</b> , WH-64 Parallel Cable, Shpg. wt. 1 lb. ....	<b>35.00</b>
<b>HCA-24</b> , WH-64 Serial Cable, Shpg. wt. 1 lb. ....	<b>35.00</b>

### Quality printer paper at economical prices

<b>HCS-1</b> , Premium 8.5" x 11" one-part fan-fold paper, continuous 2700 sheets, Shpg. wt. 28 lbs. ....	<b>32.00</b>
<b>HCS-2</b> , Standard 8.5" x 11" one-part fan-fold paper, continuous 3200 sheets, Shpg. wt. 31 lbs. ....	<b>32.00</b>
<b>HCS-3</b> , Standard 14.875" x 11" one-part fan-fold paper, continuous 3200 sheets, Shpg. wt. 47 lbs. ....	<b>42.00</b>
<b>HCS-4</b> , Bond form-feed 8.5" x 11" one-part fan-fold paper, continuous 1000 sheets, Shpg. wt. 13 lbs. ....	<b>25.00</b>

### Convenience accessories for your computer system

**PM-100**, Locking 5.25" floppy disk storage cabinet, holds 70 disks in charcoal-colored copolymer plastic case. Comes with rigid dividers, index tabs, and built-in handles, Shpg. wt. 3 lbs. .... **19.95**

### Cartridge Fonts for the WH-64 Printer

<b>HCS-30</b> , Prestige Elite Font with 12 cpi pitch, 1 lb. ....	<b>40.00</b>
<b>HCS-31</b> , Orator 85 Font with 10 cpi pitch, Shpg. wt. 1 lb. ....	<b>40.00</b>
<b>HS-32</b> , Courier Italic Font with 12 cpi pitch, Shpg. wt. 1 lb. ....	<b>40.00</b>
<b>HCS-33</b> , Modern PS Font with proportional spacing, Shpg. wt. 1 lb. ....	<b>40.00</b>

### High-quality, long-life printer ribbons

<b>HCS-50</b> , 3 plug-in cloth ribbons for Primage and Diablo 1640/630, 1 lb. ....	<b>18.00</b>
<b>HCS-51</b> , 3 plug-in film ribbons for Primage and Diablo 1640/630, 1 lb. ....	<b>18.00</b>
<b>HCS-52</b> , 3 ribbons for H/WH-14 and ASR-33 Printers, Shpg. wt. 1 lb. ....	<b>8.00</b>
<b>HCS-54</b> , One ribbon for LA-34 Printer, Shpg. wt. 1 lb. ....	<b>29.00</b>
<b>HCS-55</b> , One plug-in ribbon cartridge for MX-80 Printers, 1 lb. ....	<b>14.00</b>
<b>HCS-56</b> , 2 plug-in ribbon cartridges for H/Z-25 and H/Z-125, 3 lbs. ....	<b>20.00</b>
<b>HCS-57</b> , One plug-in ribbon cartridge for WH-64 Printer, 1 lb. ....	<b>12.00</b>

### Accessories for the MPI-99 and MPI-150 Printers

<b>MPI-99-1</b> , Replacement ribbon cartridge for MPI-99 Printer, 1 lb. ....	<b>12.00</b>
<b>MPI-99-2</b> , Single-sheet feeder for MPI-99, Shpg. wt. 2 lbs. ....	<b>35.00</b>
<b>MPI-99-3</b> , Sound cover attachment for MPI-99 Printer, Shpg. wt. 3 lbs. ....	<b>35.00</b>
<b>MPI-150-1</b> , Replacement ribbon cartridge for MPI-150 Printer, 1 lb. ....	<b>20.00</b>

<b>MPI-150-2</b> , Serial adapter card for MPI-150 Printer, allows asynchronous serial data transfer up to 9600 baud, Shpg. wt. 1 lb. ....	<b>110.00</b>
<b>MPI-150-3</b> , MPI-150 programmable status keypad, Shpg. wt. 2 lbs. ....	<b>130.00</b>
<b>MPI-150-4</b> , 64K buffer memory expansion for MPI-150, 1 lb. ....	<b>259.00</b>
<b>MPA-1</b> , H/Z-100 AP-PAK, a graphics applications package (including cable) for printing any H/Z-100 Computer character, 1 lb. ....	<b>75.00</b>
<b>MPA-3</b> , H/Z-89 AP-PAK, a graphics applications package (including cable) for printing any H/Z-89 character, 1 lb. ....	<b>75.00</b>
<b>MPA-4</b> , Z-90 AP-PAK, a graphics applications package with cable that enables printing of all Z-90 Computer characters, 1 lb. ....	<b>75.00</b>

### Accessories for the DataProducts Color Printer

<b>PPA-210-1</b> , Black ribbon, Shpg. wt. 1 lb. ....	<b>12.95</b>
<b>PPA-210-2</b> , Primary color ribbon (red, green, blue and black), 1 lb. ....	<b>24.95</b>
<b>PPA-210-3</b> , Process color ribbon (yellow, cyan, magenta, and black), 1 lb. ....	<b>24.95</b>

### Printwheels for the Primage I daisy wheel printer

<b>PPA-250-4</b> , Courier 10 printwheel with 10 cpi, Shpg. wt. 1 lb. ....	<b>19.95</b>
<b>PPA-250-5</b> , Prestige Elite printwheel with 12 cpi, Shpg. wt. 1 lb. ....	<b>19.95</b>
<b>PPA-250-6</b> , Versa-Tile PS printwheel and proportional spacing, 1 lb. ....	<b>19.95</b>

### Ribbons and printwheels for the DTC 380Z Printer

<b>PPA-260-3</b> , Three replacement ribbons, Shpg. wt. 1 lb. ....	<b>9.95</b>
<b>PPA-260-6</b> , Brougham printwheel with 10 cpi, Shpg. wt. 1 lb. ....	<b>26.95</b>
<b>PPA-260-7</b> , Prestige printwheel with 10/12 cpi, Shpg. wt. 1 lb. ....	<b>26.95</b>
<b>PPA-260-8</b> , Anelia printwheel with proportional spacing, 1 lb. ....	<b>26.95</b>
<b>PPA-260-9</b> , Script printwheel with 10/12 cpi, Shpg. wt. 1 lb. ....	<b>26.95</b>
<b>PPA-260-20</b> , Quadro printwheel with 10 cpi, Shpg. wt. 1 lb. ....	<b>26.95</b>

### Ribbons and Printwheels for DTC Style Writer Printer

<b>PPA-270-4</b> , Three black replacement ribbons, Shpg. wt. 1 lb. ....	<b>16.95</b>
<b>PPA-270-5</b> , Two red replacement ribbons, Shpg. wt. 1 lb. ....	<b>6.95</b>

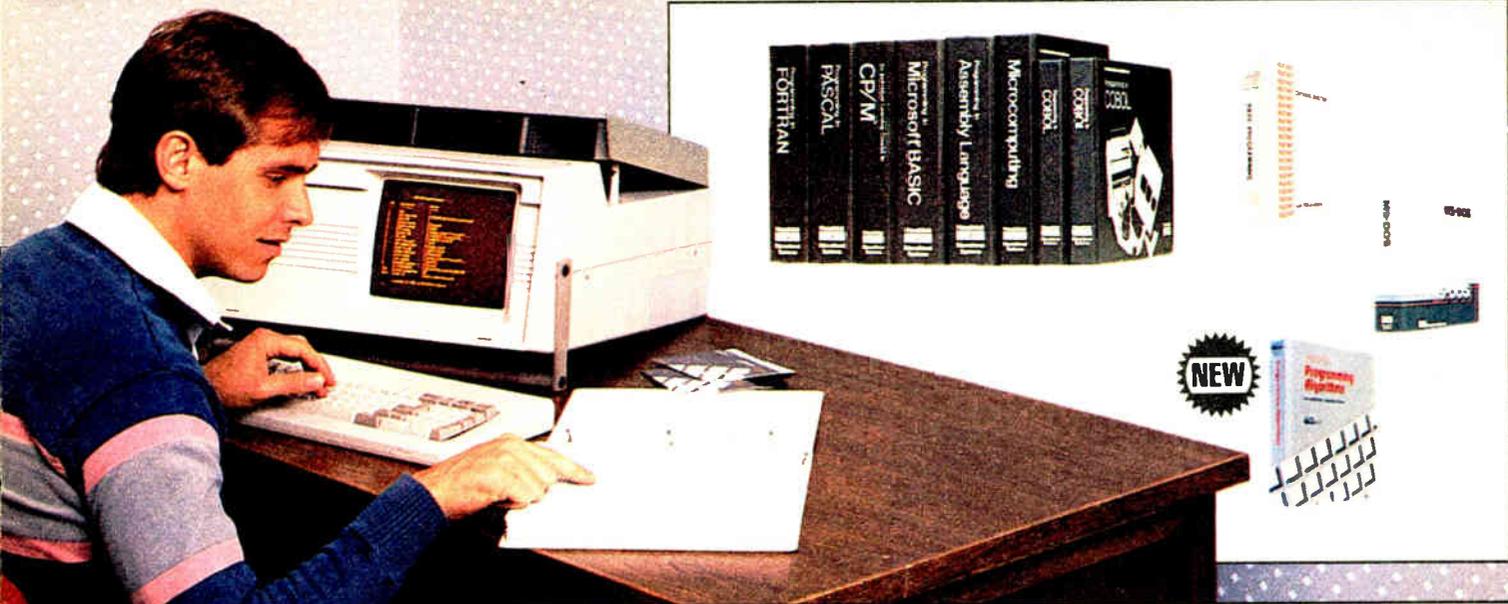
Style Writer uses same printwheels as DTC 380Z Printer.

### Accessories for the single-pen ET-500 Plotter

<b>ETA-500-1</b> , 100 sheets of 8½" x 11" plotter paper, 1 lb. ....	<b>7.50</b>
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## Learn computer programming effectively and thoroughly with these self-study courses

### NEW! Macro-86 Programming Algorithms Course

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- Gain familiarity with algorithms as programming tools
- Run experiments on an H/Z-100 Desktop or PC Computer

Heath/Zenith Educational Systems introduces the first in a new computer programming series, the Programming Algorithms Course. It is a seven-unit Course that shows you how to solve problems using a computer. As a programmer, you decide on a particular plan (or algorithm) and implement that plan in a programming language. This Course has you using programs that are provided or using programs that you write to demonstrate applications of the ideas presented.

The Programming Algorithms Course demonstrates the importance of the algorithm phase in developing a program. It begins by introducing computer programming as problem solving and then describing algorithms. Control structures, extended examples of translating algorithms into Assembly Language and programming conventions are also discussed. You'll learn how to develop a clear problem definition and how to write algorithms, the tools of a programmer.

In addition to writing algorithms, you'll translate algorithms into MACRO-86/Intel 8088 Assembly Language programs. You'll also use the data structures of arrays, stacks and linked lists in learning to use this programming method. In this Course, the techniques of linear and binary searches are discussed along with the Insertion, Shell and Heap sorting methods.

When you complete this Course, you'll be able to write routines that search text files and routines to Encrypt and Decrypt files using the substitution method when the key is known. You'll be able to compress files and then expand them out again. You will study multiword integer operations including: addition, subtraction, multiplication, division, input and output. In addition, you'll become familiar with the operations necessary for dealing with floating point numbers. And, learn to perform simple floating point operations including: addition, subtraction, multiplication, division, extracting the square root, finding the sine and cosine, and input and output.

Experiments at the end of each unit are written for a computer system using the Intel 8088 microprocessor, such as the: H/Z-100 Desktop Computer, HS-151 Personal Computer, the HS-161 Portable PC and the IBM Personal Computer. The MS-DOS operating system and the MACRO-86 Assembler and Linker are used in all experiments. A 5.25" floppy disk supplied with the Course contains experiments, programs and demonstrations for use in the Programming Algorithms Course. A programmers pad is also supplied.

Before you begin this Course, you should be familiar with the instruction set for the 8088 microprocessor and its various addressing modes. You should also know the commands to your operating system that manipulate files and the Macro-86 Assembler and Linker as well as basic programming techniques.

After completing the Course, take and pass the optional final examination with a 70% or better score to earn 4.0 Continuing Education Units. You'll also receive a handsome Certificate of Achievement that's suitable for framing.

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### MS-DOS Course covers fundamentals and organization

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- Complete coverage with how to access system routines, to do console input/output and work with disk files

In seven units, this comprehensive Course teaches how MS-DOS is organized and all about how to use it. Directed toward the novice computer user, this study course provides instructions in all the built-in commands and in the typical transient utilities. It also provides an understanding of what Assembly Language is and how to use the system routines and program debugger.

About MS-DOS the EC-1121 Course begins with a disk operating system background and explains how the disk is organized. Then the most often used commands are discussed along with how to enter and edit command lines. Examined next are the CHKDSK, COMP, DSKCOMP, and RDCPM and commands. This is followed by a study of the file editor, EDLIN, with all its features. DEBUG, the program editor, is then explained. The final unit teaches system interfacing through Assembly Language with how to input and output characters and strings, to read and write disk files, and to use directory entries within programs.

A new audio-tutorial full-section narration method is used in the MS-DOS Course. It consists of three audio cassette tapes that introduce each section and guide you through the entire Course. In everyday language, these cassettes provide an overview of the material before you study and a review afterwards.

Fifteen computer exercises, included on a 5.25" floppy disk, give you a chance to use MS-DOS features and commands on an H/Z-100, HS-151, HS-161, or IBM PC personal computers.

Pass the optional final examination with a 70% or better score and earn 3.0 Continuing Education Units. And, receive a Certificate of Achievement.

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### Assembly Language Course in computer programming

**\$49<sup>95</sup>**

- Workbook includes discussion of DOS console I/O

Learn to program in the low-level language your computer understands best, Assembly Language. It uses labels, operands, comments and assembler directives that enable you to create a source code that's both easily read and adapted to your computer system. Symbolic notation and easy-to-carry-out documentation methods make program listings easy to understand.

Learn to write programs that run 10 to 100 times faster than BASIC. Using a mnemonic for every machine operation, Assembly Language programs require less memory space and run faster.

Workbook contains experiments for use on H/Z-89 and H/Z-100 computers.

Take and pass the optional final examination with 70% or better score and earn 6.0 Continuing Education Units plus receive a Certificate of Achievement.

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## Learn programming in Microsoft\* BASIC Course

- Learn to write and modify programs using popular Microsoft BASIC
- Uses audio-tutorial method for more effective learning

Cover every aspect of programming using Microsoft BASIC, one of the most versatile programming languages for microcomputers. Learn how to get the most from this programming language and improve your programming skills whether you're using an H/Z-89, TRS-80, APPLE or other computer.

A comprehensive text and programming experiments combine to give you complete coverage of MBASIC programming fundamentals. You'll learn about: computer arithmetic, program structures, sequences, branching, and more.

To obtain the full benefit from this Course, you'll need access to a computer that uses the Microsoft BASIC language. Pass the optional final examination with a 70% or better score and earn 5.0 Continuing Education Units plus receive a Certificate of Achievement from Heath/Zenith Educational Systems.

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## Learn modular Pascal programming with this course

- Pascal is the ideal language for beginning and experienced users
- Pascal is sophisticated, structured, efficient, powerful, easy to use

Whether you're an experienced user or just a beginner, this programming course can teach you to write programs in the high-level language of Pascal. Our audio-tutorial format shows you how to program in this powerful modular language with quick results. And, programming experiments provide experience.

A clearly written text and five audio cassette tapes combine to form an integrated and effective learning program. You are shown how to identify and write simple Pascal programs. Then you learn to identify and write self-contained procedures. Other areas covered include: the decision making part of programming; how and when to incorporate IF, THEN, ELSE and CASE statements; Boolean variables; and how to use REPEAT, UNTIL, WHILE, DO and FOR loops.

Further coverage consists of: data types and how to declare them; the use of arrays and character strings; procedures; the need of records and sets; the differences between pointers, linked lists, stacks, queues, binary trees and statements; and a description of sequential files and standard Pascal files.

Earn 4.0 Continuing Education Units by taking and passing the optional final exam with a 70% or higher score. Also receive a Certificate of Achievement.

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## FORTRAN Programming Course for science/math

- Learn all about FORTRAN, the powerful programming language preferred by scientists, mathematicians and engineers

A powerful program, FORTRAN simplifies complicated scientific and mathematical problem solving. Learn its fundamentals and how to use its power with the economical and effective Programming in FORTRAN Course.

This 11-Unit Course begins with a special introduction to computers and then introduces FORTRAN programming. Subjects covered in this Course include: program analysis, variables, expressions, input and output, identify and write self-contained procedures, making decisions, loops, data types, and more.

Hands-on experiments provided with this Course enable you to actually write FORTRAN programs. Coding forms are included. To get the most from the experiments, as well as the Course, we recommend that you perform the experiments on a computer such as the H/Z-89, H/Z-100, HS-151 Personal or HS-161 Portable Computer. With these computers, you'll need the appropriate CP/M\* or MS-DOS operating system and the Microsoft FORTRAN programming language.

Pass the optional final examination with a 70% or better score and earn 5.0 Continuing Education Units. Plus, receive a Certificate of Achievement.

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## BASIC Course teaches you to program in one of the most popular microcomputer languages

- Learn to write and make corrections to powerful computer programs
- Includes many valuable hands-on computer programming exercises

Learn to write BASIC programs that instruct computers to perform certain tasks. In fourteen programmed instruction units, you proceed at your own speed and learn the standard words and commands of BASIC. In this Course you cover: many versions of BASIC, formats, statements, procedures, tools of the language, how to define and plan a program, and how to format and write a program.



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The Course also includes a workbook filled with exercises in writing and running BASIC programs. Consequently, access to a computer is recommended. In addition, a handy reference card with Benton Harbor BASIC statements, ASCII numbers and BASIC direct command statements are included.

Take and pass the optional final exam with a 70% or higher score and earn 3.0 Continuing Education Credits. And, receive a Certificate of Achievement.

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College Level Examination: Earn valuable college credit for successfully completing this course. For more information see page 61.

ECC-1100, Shpg. wt. 1 lb. .... 25.00

## Learn how to use CP/M and how to get the most from this industry-standard operating system

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**\$59.95**

- Covers all aspects of the CP/M Operating system
- Use with many 8080/Z-80/8085 computer systems
- Uses proven audio-visual tutorial method

Learn all about this popular operating system. It begins with the very basics, so elementary that even a first-time computer user, without a previous background in CP/M or Assembly Language, can easily learn about it.

A 500-page text and five audio cassette tapes make learning CP/M very easy. Begin with an introduction of the operating system and how to use basic CP/M commands. Learn: major control functions, diagnosing problems from error messages, built-in commands, transient programs, how to use STAT and CONFIGUR commands, to use PIP, the text editor's capabilities, and about submitting files.

This Course is designed for use with computers having 48K bytes of RAM and able to use the CP/M operating system, such as the H/Z-89 and H/Z-100 Computers. A printer is recommended to obtain the full benefit from this Course.

Pass the optional final exam with a 70% or higher score and earn 2.5 Continuing Education Units, plus receive a personalized Certificate of Achievement.

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## COBOL Programming Course teaches you to write and run programs in the business language

- Introduces the language that handles large, structural data files
- For beginners and others interested in commercial data processing

COBOL is especially useful in applications involving manipulation of large, highly structured data files like those found in accounting functions, inventory control and other business applications. In these areas it's more efficient than BASIC.

This comprehensive Course with nine audio cassette tapes covers the basics of encoding, input characteristics, program hierarchy, identification, environment and more. Both ANS-74 and ANS-68 versions of COBOL are presented.

Six programming exercises are included at the end of the workbook that'll help you get the most from this Course. We recommend that you do these programs on a computer system that has 48K RAM, two disk drives and using an appropriate operating system. The H/Z-89 and H/Z-100 Computers are ideal.

Earn 3.0 Continuing Education Units and receive a Certificate of Achievement by passing the optional final exam with a 70% or better score.

EC-1105, Shpg. wt. 7 lbs. .... 149.95

## Microcomputing Course teaches you the basics of computers and what they can do for you

- See how a computer can be used to solve your everyday problems
- Learn about microcomputer fundamentals and BASIC programming

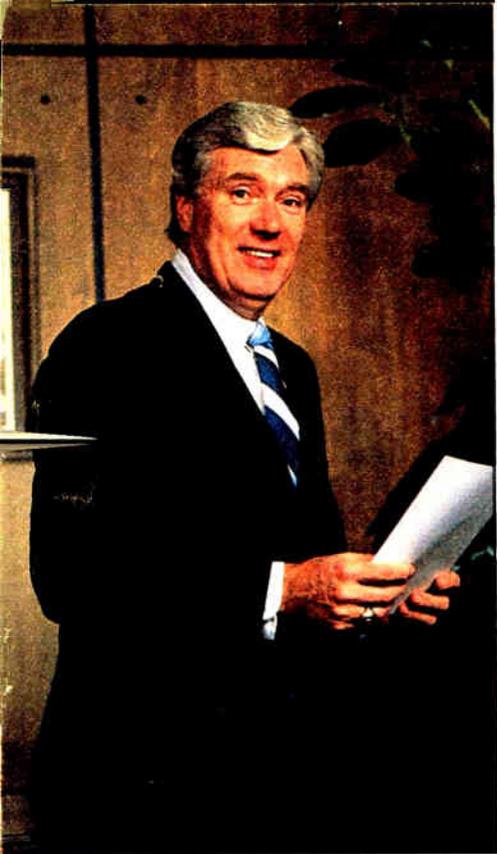
For those who want to know what a computer can do for them, this Microcomputing Course is an ideal place to start. In easy and simple terms, you are shown the different parts of a computer and how to apply its capabilities to your specific needs. Two audio cassette tapes accompany the Course.

Five easy-to-understand units teach fundamentals to those without an extensive electronics or computer background. Learn how to compare computers by understanding how each performs. Learn to evaluate small computer systems by understanding how different system components work together. Learn to choose the right software programs for your needs.

Pass the optional final exam with a 70% or better score and be awarded 1.0 Continuing Education Unit, plus receive a handsome Certificate of Achievement.

EC-1000, Shpg. wt. 5 lbs. .... 44.95

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## The President's Letter:

Dear Friends,

### 500 HOLIDAY BONUS POINTS in the Master Builder Club.

That's what we'll give you when you come to your Heathkit Electronic Center and make a qualifying purchase (more details on page 52). We're making this special offer as a holiday gift. And we're offering it because we want you to be as excited as we are about the Master Builder Club.

There's more to be excited about! Look up the **new** HERO JR robot on page 2. There's a brand **new** computer graphics plotter on page 97. And if you're a programming buff, see the **new** Algorithm course on page 102.

There's a lot of good news in this catalog. But remember first to qualify for your 500 Holiday Bonus Points. Come that much closer to your next rating, award or discount!

Have a happy holiday!

Joseph M. Schulte  
President  
Veritechnology Electronics  
Corporation

See Pages 52 and 53 for more details.

## The Heathkit Handy Index

**AMATEUR RADIO:** high-tech transceivers, amplifiers, CW keyboard, antenna tuners, accessories, courses ..... 30-39

**AUTOMOTIVE:** ignition and engine analyzers, testers, siren/PA, courses, wiper delay. 54 & 55

**CLOCKS:** ..... 4 & 5

**COMPUTERS:** IBM compatible, dual 16/8-bit, 8-bit, terminals, plug-in accessory boards, peripherals, modems, printers, software, courses ..... 76-103

**EDUCATION:** advanced electronics, 72-74; advanced microprocessing, 69; amateur radio, 38 & 39; automotive, 54; circuit design, 71; classroom courses, 74 & 75; computer programming, 102 & 103; digital and microprocessors, 64-67; fundamental electronics, 60-63; industrial arts, 70-71; robotics, 58.

**ENERGY:** intelligent thermostat, heat sniffer, power factor controller ..... 22 & 23

**GENERAL INFORMATION:** ..... 52 & 53

**HEATHKIT ELECTRONIC CENTERS\*:** addresses, phone numbers ..... 57

**HOME PRODUCTS:** air cleaners, 22; home controller, 18; digital scale, 10; garage door opener, 24; lighting controls, 18-19 & 23; telephone equipment, 19 & 20; doorbells, 16; blood pressure monitor, 16; bicycle computer, 16; thermometers, 16.

**INSTRUMENTS:** handheld testers, generators, power supplies, frequency counters, digital and analog voltmeters, scope calibrators ..... 40-51

**MARINE:** video fish recorder, fish spotters, speedometers, digital and flashing depth sounders ..... 56 & 57

**METAL LOCATOR:** ..... 16

**NAME PLATE:** solid brass engraving ..... 9

**NEW PRODUCTS:** HERO JR., 2 & 3; Video Fish Recorder, 57; Stereo Tuner, 26; Compact Disc Player, 27; Personal and Portable Computers, 76 & 77; plug-in accessory boards for new computers, 98; software for new computers, 78-81 & 99; Digital Plotter, 97; Pulse Generator, 48; 40 KV Probe Meter, 48; RTTY Tuning Display, 38; Automatic Antenna Tuner, 34; General Coverage Receiver, 32; Kit Bearcat Scanner, 32; 25" & 19" TV's, 12; Security Lighting Control, 18; Sensaphone, 19

**ORDERING INFORMATION:** ..... 52 & 53

**PHOTOGRAPHY:** darkroom timer ..... 17

**SECURITY:** home and business alarms, outdoor security lighting ..... 18-21

**SOLAR:** domestic water heating system ..... 22

**STARTER KITS:** ..... 6 & 7

**STEREO HIGH FIDELITY:** Pro-Series equipment, amplifiers, speakers, rack cabinet, turntable ..... 26-29

**TELEPHONE:** dialer, ringer, cordless ..... 20

**TV-VIDEO:** color and B/W TVs, 5" 9" 13" 19" 25" screens, VHS video cameras and recorders, character generator, video organizer, stereo synthesizer ..... 10-15

**TOOLS:** quality kitbuilding aids, multiple and smart outlet boxes, lamps ..... 24 & 25

**WEATHER:** computerized weather station, thermometer, humidity meter, barometer ..... 8-11

\*Units of Veritechnology Electronics Corporation in the U.S.



For the Heathkit Electronic Center\* nearest you see page 57. Retail prices, special offers herein are effective October 16, 1984 through December 31, 1984. Prices, product availability and specifications are subject to change without notice. Veritechnology Electronics Corporation cannot be responsible for typographical and pictorial errors. Printed in the U.S.A.

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