

# Heathkit®



The Heath Company  
Salutes American  
High-Technology

## Heathkit clocks combine accuracy and elegance to timekeeping

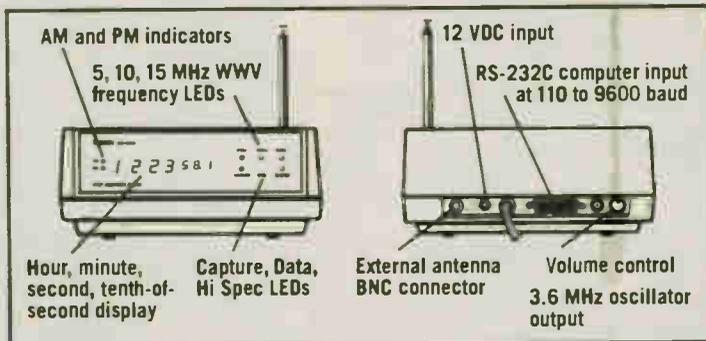
### 1 Have the National Bureau of Standards (NBS) time in your office or home – with the GC-1000

**\$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:  $1\mu\text{V}$  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  $\pm 15$  VAC, 50/60 Hz @ 100 mA or 11-16 VDC @ 750 mA (150 mA with display turned off). Dimensions: 3 $\frac{7}{8}$ " 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-2/CLOCKS



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

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.

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



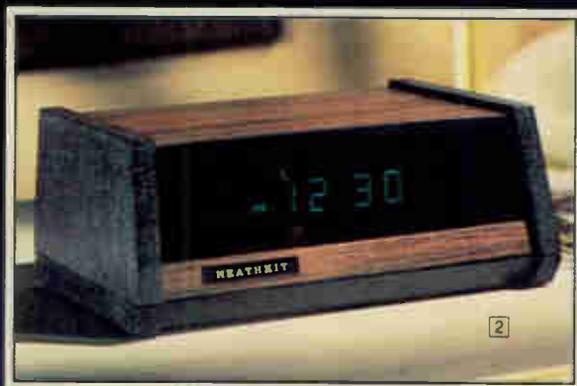
Have the sound of London's "Westminster Chimes" with these electronically-synthesized chimes. Sounds 4 notes on the  $\frac{1}{4}$ -hour, 8 on the  $\frac{1}{2}$ -hour, 12 on  $\frac{3}{4}$ -hour and a 16-note passage on the hour. Volume, pitch and sound delay controls. Builds into GC-1195 or GC-1197.

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

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## 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.



## 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>3</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>5</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 turquois, 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>5</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>5</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

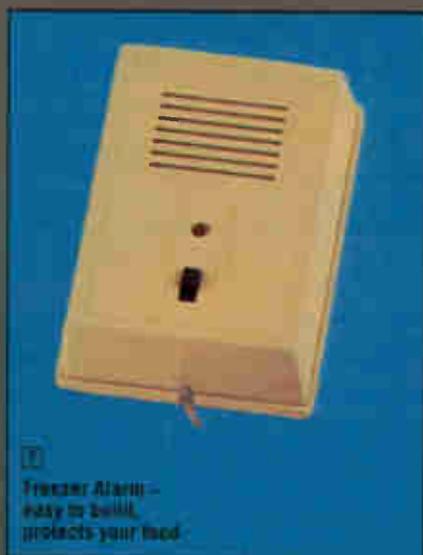
Multi-purpose system: Consists of mirror assembly and light source/photocell relay. Uses a narrow, reflected beam to catch intruders instantly, activating lights or any 120 VAC warning devices you have plugged in up to 300 watts total.

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





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!



F  
Freezer Alarm -  
easy to build,  
protects your food



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

**\$399<sup>95</sup>**

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

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:** Compare the ID-4001 Digital Weather Computer to higher priced units: Ours 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, weathervane 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 infra-red 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 piezo-resistive 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. The handsome, 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. Ready to use the day you receive it, and guaranteed to provide accurate, up-to-date weather data.

IDW-4001, Shpg. wt. 25 lbs. .... **699.95**

## ② Electronically accurate weather information at a low cost

**\$159<sup>95</sup>**

- Monitors barometric pressure, indoor/outdoor temperatures, wind speed and direction
- Temperature-compensated barometer may be used at altitudes to 10,000 feet
- All solid-state circuitry requires a minimum of power consumption
- Stylish instrument plaque and long-life sensors for reliable accuracy
- Desktop or wall-mounted display

**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. Easy and enjoyable to build, the ID-1290 makes a rewarding project for first-time kitbuilders. Operates on 120 VAC. Measures 7" H x 20½" W x 2" D. Take up an interesting hobby and improve your knowledge of weather — order the ID-1290 five-function Weather Station today.

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

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

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

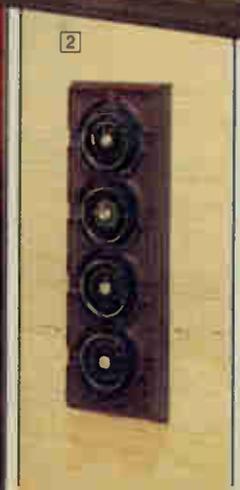
**ID-1290 SPECIFICATIONS:** Wind Speed: 0-30 mph, = 2 mph, 0-90 mph, = 5 mph. Direction: 8-point readout over 360° Temperature: 0° to +120°F, = 2°F (typ. INDOOR), -40° to +120°F (typ. OUT-DOOR) Barometric Pressure: 28-31 inches of mercury within .05 inches, accurate up to altitudes of 10,000 ft. Operating 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: 7¼" H x 16" W x 6" D



## 1 Heath's Best Weather Station

Styled to match any decor, Heath's computerized Weather Station offers instant access to more comprehensive atmospheric data than was ever available before to the layman with a serious interest in weather forecasting. The remote transmitter assembly (shown below) attaches firmly and easily to TV antenna mast. Cable for Kit ID-4001 must be ordered separately in the length required.







- 1 Monitor the relative humidity to improve your living environment and reduce heating/cooling costs



Two humidity sensors and 100-feet of cable are included to permit monitoring two locations



- 2 Check wind speed and direction with electronic accuracy



- 3 Digital readings of indoor/outdoor temperatures

# 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 *Fur 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

GDA-1190-2, Superex Headphones, Shpg. wt. 2 lbs. .... 14.95

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, 45 1/2". 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.

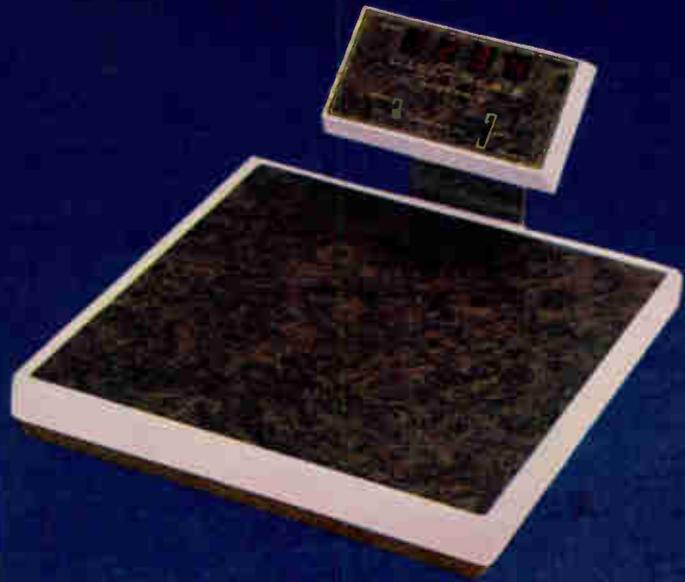
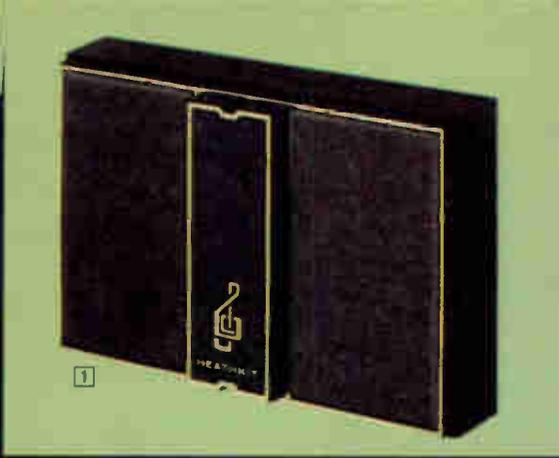
GXP-2120, Assembled, Shpg. wt. 2 lbs. .... 79.95

## 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





**NEW** Portable Electronic Digital Blood Pressure/Pulse Monitor

8

**NEW** GSP-2121 Digital Thermometer for accuracy and digital readouts

9



Keep track of your goals with the GXP-2105 Computer

**NEW**

COMBI QUARTZ

# BSR X-10 Home Control System now offers battery backup, security and RS-232C interfacing

## Control up to 16 groups of lights or appliances from one central, portable 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. Whatever or wherever you want control over a light or appliance, all you have to do is plug in one of the BSR X-10 home control modules described on this page. All signals transmitted by the Command Console are encoded for modules and won't interfere with your television set or stereo FM receiver.

**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 — so *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) to protect your program in case of power failure while you're away. You'll save time, save steps and save energy!

**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 1 3/4" H x 5 3/4" W x 5 1/2" D. Remote Responder measures 1 1/4" H x 2 1/4" W x 5 1/4" 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. Completely automate your home or office for a more efficient use of your time and energy through computer control.

Through a terminal or computer keyboard, completely control any or all of the different modules of the Home Control System listed on this page with the GD-1530 Interface. With a computer, the GD-1530 and an installed Home Control System, you can automatically control lights and appliances in varying sequences and at differing times. Automate your home to your schedule from waking up to morning coffee to turning on the electric blanket at night. Or, make your home look like it's going through a normal routine even though you're on vacation.

**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 6 3/8" wide x 6 3/8" deep (7.6 x 16.2 x 16.2 cm) and weighs 1 pound and 11 ounces (0.77 kg).

**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, 1/2 hp motor, 500 watt lighting load and a 400 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. Lights will remain on after alarm system resets to indicate there has been an alarm condition. Test button verifies your setup.

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

**9 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**

**10 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**

**11 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**

**12 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**

## The Informer® Ultrasonic Intrusion Alarm provides effective protection against trespassers

ONLY  
**\$69.95**

- "Sees" 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. The beautifully styled Informer will blend in with most any book collection.

**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. Use it for security purposes or as an automatic light switch in garage, basement or attic. Or, install it in a bedroom to alert you that a child has gotten out of bed. 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**





### 13 Use our Infra-red Security Light Control to invisibly detect movement and deter criminal intruders or provide light when needed

- Make your home safer at night by detecting motion with invisible infra-red sensors
- 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 ceases
- All-weather design provides reliable operation in all outdoor conditions
- Attach the Dual Floodlight Accessory for illumination of specific areas

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 (infra-red 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.

A well-lighted yard will deter most intruders. Especially if the lights come on *after* he has entered the covered area! The intruder will believe he has been observed.

The GD-3511 Lighting Control has other practical uses as well. Use the Control to automatically provide switching to illuminate stairways, walkways and driveways – affording safety to your family, friends and visitors. In addition, it provides a convenient light for you when you return home after dark, and it will light the way for friends and neighbors when they call on you.

The infra-red 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 40 feet, and at that range it will provide security for a width of 35 feet. Adjust the sensitivity control for the detection pattern of distance and width you need!

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. Set the GD-3511 delay for the time that best suits your needs, indoors or out.

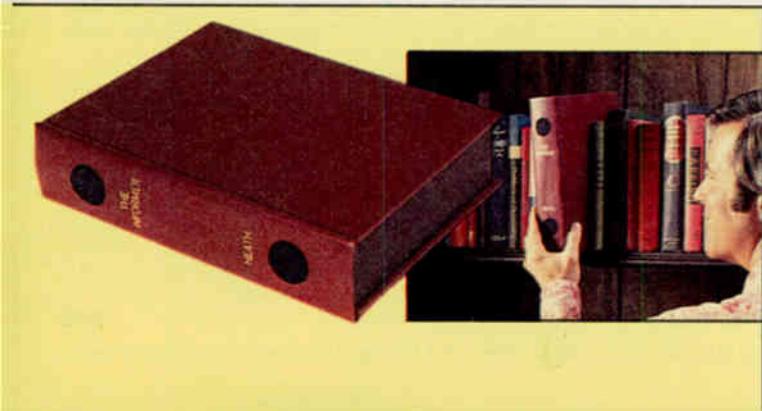
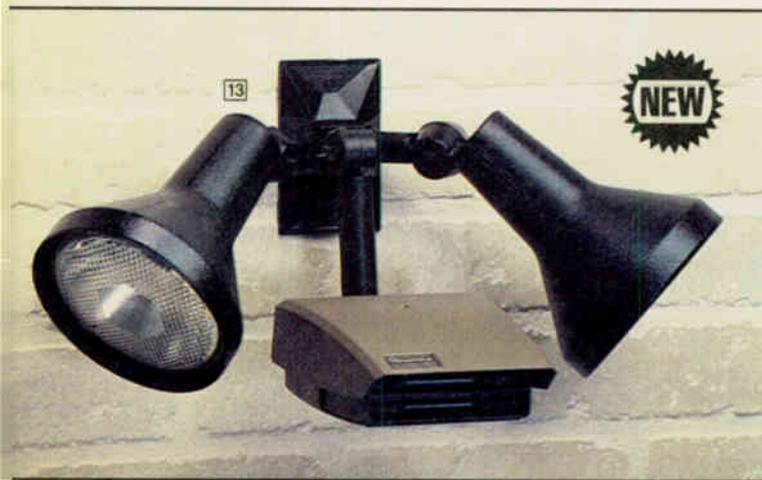
Your Heathkit Security Control is a flexible instrument that incorporates the latest state-of-the-art design techniques. Housed in an attractive, molded cabinet, its neutral coloring easily blends with its background. This economical, compact Security Lighting Control will give you many years of safety and reliable service.

For outdoor applications, purchase the GD-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. The Control and Accessory are waterproof for reliable outdoor installation.

The GD-3511 Security Light Control is a fast and easy kit that can be assembled in one evening. A famous Heathkit assembly manual leads you through construction, ample illustrations lead you through mechanical assembly and the manual has suggestions for installation and use. This economical and compact Security Lighting Control will give you many years of safety and service.

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. You only use lighting power when you need it. 1 1/2" D x 5 1/2" W x 4 9/16" H.

- Kit GD-3511, Shpg. wt. 4 lbs. . . . . 149.95
- GDA-3511-1, Dual Floodlight Accessory, Shpg. wt. 3 lbs. . . . . 29.95



# 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 200' 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

## 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 14/SECURITY/TELEPHONES



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

**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 200 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

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. 1 7/8" H x 5 7/8" W x 5 1/4" 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

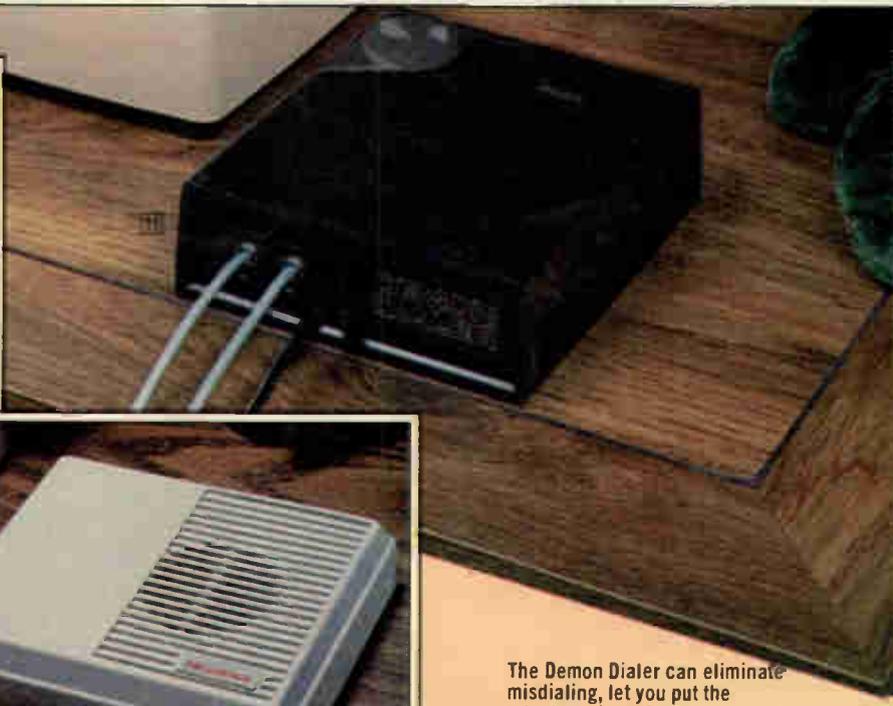
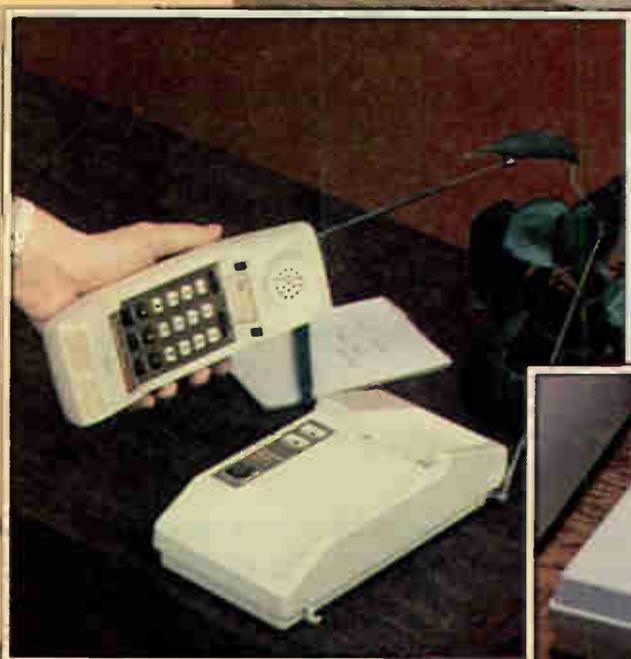
**\$29<sup>95</sup>**

- 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-energizing 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 1 1/4" H x 5 7/8" W x 4 3/4" 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



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 3/4" 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.

<b>SAVER!</b> 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., Shipped 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

16/HOME/ENERGY



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

## 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. 26 1/2" H x 17 1/4" W x 13 1/2" D.

Kit GD-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 60-82F. (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

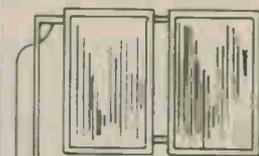
- Instantly turns lights on when it hears you, turns them off when it doesn't
- LED helps you set audio sensitivity level
- Improves home security

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.

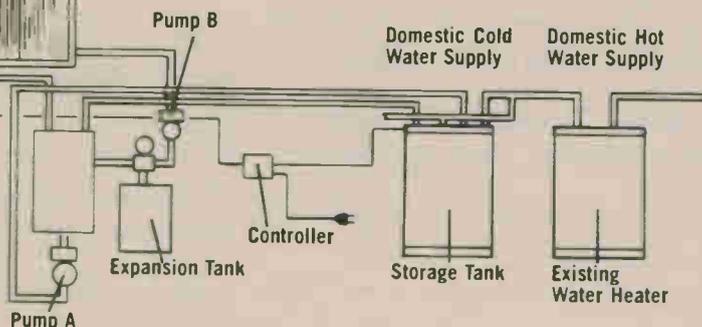
GDP-1270, Assembled, Shpg. wt. 1 lb. .... 29.95



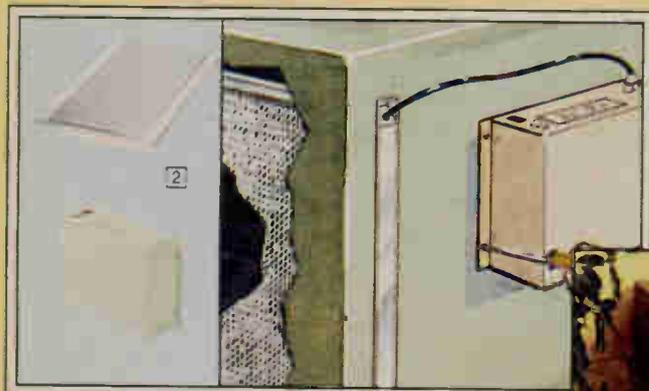
### HEATING (Closed Loop)



The collector is designed to withstand winds over 180 mph. Each panel is rated at 945 BTU output per square foot of panel per day.



Heath's Solar Panel system is easy to install — with tax credits, it can pay for itself in 3 years. The savings are all yours.



### Economize with the Heat Sniffer



FAST EASY  
1-EVENING KIT  
**\$24<sup>95</sup>**



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

115 -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 up to 60% 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

### Save up to 60% running motor-operated devices.

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

- 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



FAST EASY  
1-EVENING KIT



# 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 Weller 25-watt soldering iron

With its 860-degree F  $\frac{1}{8}$ -inch screwdriver tip, this professional pencil iron makes close soldering jobs cleaner and easier. The GDP-207 is lightweight, has a rugged stainless steel barrel and uses long-life soldering tips. An excellent kitbuilding soldering iron. Operates on 120 volts AC.

GDP-207, 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 2½" 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 2½". 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 ( $\frac{1}{8}$ " 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 2½ 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

## 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 Opener 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  $\frac{1}{3}$  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

## 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,  $\frac{1}{4}$ " nut driver, and a regular and a phillips screwdriver. Durable 3" H x 10¾" 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

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. (UPS shippable) .... 149.95

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 so they can be used by professional studios, sound engineers or recording artists. And by creative, discriminating audiophiles.

## 1 Nikko ND-1000C Cassette Deck with Dolby C noise reduction attains the highest level of performance

**Electromagnetic properties differ from tape to tape.** This is true not only for different types of tape but also different brands of the same type. But the amazing, microcomputer-based Tape Evaluation and Control System of the ND-1000C will actually record test signals, evaluate the results... then optimize bias and sensitivity for any tape you elect to use. At the touch of a button, each recording parameter is automatically adjusted in order to extract the maximum level of playback performance from every tape formulation. Without compromising the distortion or dynamic range specifications, it assures extended flat high frequency response. It's even possible to commit the optimized parameters of your favorite tape types — normal-bias, chrome and metal — to the memory.

**Feather-touch, IC-logic tape transport control** allows direct change of operating mode with built-in delay and 'flying start' recording. The accurate 2 motor, 3-head design has off-the-tape monitor capability, memory play, auto repeat, Dolby C noise reduction, two mic inputs, headphone jack and bargraph LED peak level meters. In all, a fully-compatible tape recording system with a remarkable style of improving playback performance.

ATP-1846, Assembled and tested, Shpg. wt. 16 lbs. **549.95**  
ATP-1845-1, Rack-mounting Accessory to fit AE-1705, 1 lb. **24.95**

## 2 Get better reception with this Digital AM/FM Tuner

**As the center of a powerfully-endowed stereo music system,** the AJ-1600 AM/FM Stereo Tuner carries a set of outstanding specifications and performance characteristics. For prime reception, it has a digital frequency display plus center-tune meter for the most exact tuning with selectable wide/narrow IF bandwidth for the lowest interference distortion and a high capture ratio in all station areas. An RF input attenuator reduces overload and cross modulation, while a mute switch can improve station tuning. A switchable signal strength/multipath meter will assure precise antenna orientation and maximum reception of a broadcast, so music comes through with spacious separation and brilliant clarity.

**The Tuner's significant specifications include** a sensitivity of 1.8  $\mu$ V (mono) and 3.5  $\mu$ V (stereo) for clean, crisp realization of weak and distant stations, signal-to-noise ratio of 83 dB mono/75 dB stereo for purer enjoyment of noise-free music, total harmonic distortion levels below 0.1% at 1 kHz, and channel separation better than 45 dB at mid-frequencies for full, expressive stereo listening and clear spatial imaging. One audition will convince you of its musical worth.

Kit AJ-1600, Shpg. wt. 25 lbs. **449.95**  
Kit AJA-1600-2, Dolby FM Noise Reduction Module, Shpg. wt. 1 lb. **54.95**  
AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. **34.95**

## 3 Preamp provides complete audio signal control

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 Preamp 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 dual 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**

## 4 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**

## 5 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**

## 6 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** 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**

## 7 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 processing 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**





### 8 Variable Electronic Crossover extends bass response

Add a separate bass channel to your system! Used with a Subwoofer like the AS-1320 on page 14, 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. Better control of drivers is possible in bi-amp and tri-amp applications, so you can play music at live performance levels without the slightest distortion. Has bass level control, crossover bypass switch and a 15 kHz infrasonic filter to remove annoying record warp noise.

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



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.

9 The latest Pro-Series member: Heath's AD-1308 Portable Real-Time Spectrum Analyzer, plus optional ADA-1308-1 Power Supply/Rack-Mount Accessory and AD-1309 Pink/White Noise Generator can be seen on page 22.

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

The Onkyo CP-1130F (see also pg. 23) is a high quality, direct drive fully automatic turntable. One 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.

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

**SAVER!** ACS-1130A, CP-1130F with Dynavec-tor Ruby moving-coil cartridge. 24 lbs. 519.95

**SAVER!** ACS-1130B, CP-1130F with Shure V-15 Type V cartridge. 24 lbs. .... 429.90

### Beautiful Pro-Series Rack

Put your Pro-Series audio equipment together in portable, space-saving rack so all controls are within easy reach! Comes with dividers for sorting records and top shelf for turntable. Has locking swivel casters for quick mobility. Handsome walnut veneer side panels add contemporary taste to any room. EIA standard rack measures 43½" H x 21½" W x 18" D.

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



## 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: ±1 dB A weighted Microphone Self-Noise Level: 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: ±1 dB Input Impedance: 10k ohms Input Sensitivity, 90 dBspl Range: 0 dB = 350 mV rms ±10% Power Requirements: 10 5V ±10% @ 425 mA Low Battery Indications: 6 V ±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: ±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: ±1 dB from 20 Hz to 20 kHz Output Level: rms average is 350 mV, peak is 1.5 V WHITE NOISE: Frequency Response: ±3 dB from 20 Hz to 20 kHz Output Level: rms average is 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

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

- 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

**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

22/STEREO HIGH FIDELITY



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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 selected broadcasts, Shpg. wt. 1 lb. .... 54.95

**SPECIFICATIONS:** FM SECTION: Mono/Stereo Usable Sensitivity: 1.9 (10 B)/3.5(16 1) µV (dBf) 50 dB Sensitivity: 3.5 (16 1)/38 (136 B) µV (dBf) S/N Ratio: 70/65 dB Hum and Noise: 65 dB Harmonic Distortion: 0.15 0.3% Frequency Response: 30 to 15 kHz @ ±1.5 dB PREAMPLIFIER: Frequency Response: 20 20 kHz @ ±0.5 dB Phono 20-20 kHz @ ±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 @ ±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 1/2" 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 (±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 (-10 dB anechoic): 15-750 Hz Freq. Response (±3 dB): 22 500 Hz Impedance: 8Ω 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 where it was recorded. Features a 6 1/2" polypropylene midbass, 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 (-10 dB): 70 Hz to beyond 25,000 Hz; with AS-1320, 15 Hz to beyond 25,000 Hz Frequency Response (-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 ±2 dB output boost or normal (flat) operation Impedance: 6Ω (4 ohms minimum) Recommended Amplifier Power: 30 250 watts per channel Crossover Frequencies (-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. 13) 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 (±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 1/8" D



## 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.

**AOP-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.

**AOP-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 $\frac{5}{8}$ " 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

# Heath's Deluxe 25" Television Computer System sets new high-tech standards

For its picture alone, the GR-3000 is one of the finest state-of-the-art television receivers on the market. But add up other built-in and optional features, and it offers performance that makes it a new kind of receiver. Have the most powerful Television in the world at your fingertips — meeting the needs of multiple-source programming and capable of expanding to meet the communication needs of tomorrow. The Programmer Accessory lets you preselect the programs to be viewed — on a daily, weekly or once-a-year basis. An Auto-Rotor Accessory automatically turns your antenna to preselected location for each channel.

**The only TV that's tuned in on tomorrow:** We're at the dawn of a spectacular new age of leisure and business living that promises instant access to vast information resources, goods and services. This growing universe of diverse options is led by the technologies of direct broadcast, two-way interactive cable, teletext, data retrieval networks, and the unlimited opportunities for personal potential they deliver. At the heart of this life-transforming phenomenon is the television set. Homes will become electronic environments for learning, working and finding a tremendous variety of leisure entertainment through TV, and the GR-3000 is prepared to meet the future head on. It's a flexible new tool for advancement that can be called upon to act as entertainer, tutor, telephone, modem, microcomputer monitor, graphics or information display terminal, bulletin board, and many other practical ideas.

**Much more than meets the eye:** At first glance your GR-3000 looks like a normal TV, but revolutionary new hardware, superior performance and upgrade planning make it the world's most talented, too. Above all, it's *user-friendly*.

**The comfortable GR-3000 Remote Control** uses wireless infrared telemetry to perform some never-before-possible computerized TV magic, using lite-touch buttons with positive audible feedback. You'll find it even offers complete handheld command over color, contrast, brightness and tint. Now, total and instant picture correction control — from wherever you're seated!

**A special 3-line information display** can appear anywhere on the screen for a brief interval when channels change or by direct recall. It contains the tuned station (CHANNEL 2), current AM/PM time in 12 or 24-hour format (P 10:06:29), and current date (SAT 20-FEB). A fourth 'accessory' line shows a function in use (VOLUME, BLACKLEVEL, LEARN, etc.) or compass rotation and direction status (CCW, NW, etc.) when the Auto-Rotor is operating.

**GRA-3000-1 Television Programmer Accessory Module** lets you preselect (with one minute resolution): control power on/off; auxiliary power outlet on/off; select channels; exclude (from being viewed) channels; display messages and access most numeric functions. Preset your TV programming in the weekly mode for a day or evening, or once a week by day and time — even once a year by calendar date and time. Battery back-up in the GR-3000 preserves programmer memory in case of a power outage.

**The GRA-3000-2 Auto-Rotor Accessory Module:** Its micro-guided 'brain' will seek maximum signal when you select any of the 82 addressable channels, memorize their antenna bearing and return to each one's exact orientation whenever tuned. No ghosts will haunt this picture! You can modify the computer-selected heading by setting it to a desired vector directly, or smoothly fine-tune a jittery signal with  $\pm 2$  degrees of command resolution.

**Many of the GR-3000's programmable functions are made possible** by an on-board real-time clock. One such feature is the Message Center, which permits you to program infinitely useful notes, instructions or reminders using up to 24 lines of 40 characters each that can be displayed on the screen at any preset time. With full cursor and line positioning control, it's ideal for urging youngsters off-to-bed, reminding you of special occasions, communicating personal surprises and creating unique character-graphic displays, with any combination of the sixteen overlay text and background colors to choose from.

**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. This mode is limited only by the user's imagination, and can access almost any programmable feature in the Television's repertoire. For example, it can be used to automatically turn the set on and off, alter the rotor heading and switch between channels at pre-selected times, memorize daily or even weekly schedules and repeat them for a whole season, display imaginative messages at particular times or in conjunction with broadcasts, censor-mute the audio or video, etc. You can even link two or more learn mode channels together for greater flexibility!

**The GR-3000 memory circuits have battery backup.** Three alkaline 'AA' cells will preserve the current channel, last set levels of volume, brightness, contrast, color and tint, the time-day-date clock, display timing parameters with on-screen position, rotor vectors, password code and all programmed Learn functions for up to a year, should AC power to the Television be interrupted.

**Effective protection from young and key-curious fingers:** There's never a problem with picture-tampering. An Exclusion Password function 'locks in' many of the preset parameters such as brightness, contrast, color, tint, time functions and display position, but still allows anyone to change channels, adjust volume and mute the audio or video. It requires the correct password (which you can change at any time) before these settings are operable again.

**Have preselected control of your television:** The GR-3000, permits this control with one minute resolution, program when the set is turned on or off, select (or exclude) accessible channels, write programmed messages on the screen for display at the time you select. You can even plan and preset your GR-3000 for daily or weekly programs by day and time, or for once a year in the special mode. For one-time-use-only, weekly and special programs can be deleted after they have been executed.

**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 valid channels while scanning the range.

**Channel Transposition** gives you the freedom to assign any of the 42 cable channels that are not normally tuned (midband, superband and hyperband) to convenient UHF positions, so their pushbutton fine-tuning is possible.

**The GR-3000 has a multi-level video display:** Think of it as five different, overlapping screens that can eclipse each other electronically. First is the standard Video Screen, containing whatever has been selected for typical family viewing. Second is the Backdrop Screen, which can be set to any of 16 colors including transparent, the only color which will not opaque the Video Screen. Third is the Pattern Text Screen which displays the numerous graphic patterns built into the TV for alignment and test purposes, or the built-in Help messages and any messages you may create. Next is the 40-character Display Screen which functions with the Pattern Mode to configure the on-screen information display and your own messages. The fifth, Computer-Generated Screen (not represented) will display text and graphics that are created on an external computer when tied to the forthcoming Serial Interface Module.

**A separate Monitor Mode can be entered to provide a rock-stable display** when the TV screen is used for text display or as a computer and graphics terminal.

**As your needs expand, so can your GR-3000 TV system:** Two new modules in the 3000 series are currently under development:

**Serial Interface Module** — Indispensable to computerists, it will provide immediate access and use of services like The Source, CompuServe, MicroNet, Dow Jones or Lockheed's Dialog using its accessory plug-in ASCII lap keyboard. It also allows the TV to be used as a high-definition color graphics terminal and monitor which can be directly interfaced (indirectly, via modem) to yours, or any compatible computer in the world.

**Directory Dialer & Modem Phone Interface Module** — Enables the TV to act as a two-way speaker phone with multi-number memory capacity using the GR-3000 Remote Control. It provides auto-dial of frequently called numbers, plus auto-dial and modem connection for the Serial Interface.

**Trouble-saving hookups:** 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. A separate input labeled Channel 1 Audio lets you pre-empt program sound (during a commercial, for example) with that from an external source like FM radio, which can be enabled by selecting channel 1 on the remote as usual.

**Two pair of 6" x 9" mid-bass and 2" tweeter speakers** in the kit deliver dynamic, full range sound to every program source and create an astonishing aural experience when connected in parallel to your home music system.

**The GR-3000 is an exciting new species** of receiver monitor years ahead in its readiness to access the huge resources of valuable information both on-line and on the horizon. It's not just a TV. *It's the Television with a future.*

**Kit GR-3000**, 129 lbs. Motor Freight . . . . . Was \$1099.95, **NOW ONLY 999.95**

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

**GDA-1184-1**, Cornell-Dublier Electronics 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. In case of a brown-out or power outage, backup batteries supply power to the Programmer memory and clock.

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





### GR-3000 Remote Transmitter Keyboard gives more armchair or bedside control

Turn the GR-3000 on or off — increase or decrease brightness. Select any of the 82 addressable channels from the keyboard. Scan up or down the addressable channels for your programs. Fine-tune or adjust color without having to get up, turn the volume up or down.



Backplane Module bus for other modules

Main Processor controls Remote and video functions

Display Module integrates video/text overlays

Receptacle for antenna cable with GRA-3000-2

Unswitched AC power outlet handles 300 watts of accessory load

ON-OFF switch and 3-ampere safety fuse



All programmed functions are accessed by 2- and 3-digit codes via remote control

Sixteen colors available for Backdrop and Text: transparent, black, light/medium/dark green, blue, red and light/dark yellow, cyan, magenta, gray and white.



HELP key (shown being pressed) generates six screens of commands

Purity, color bar, crosshatch and dot patterns are built in for testing and adjustment

### Rear Panel Controls



Simply switch between TV and VCR, adjust tone of the GR-3000 speakers or switch to external speakers



Connector for Auto-Rotor Accessory plus master on/off switch and I/O slot for future expansion

### Fine Furniture Television Cabinets

1 For the GR-3000 Television Computer System (on page 24). 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. Size: 32" H x 50" W x 20" D with casters and tube cap.

GRA-715-25, 136 lbs., Mtr. Frt. 199.95

2 For the GR-3000 Television Computer System (on page 24). Provides maximum efficiency in size and price. Antique brass-rubbed latticework and decorative hardware accent the beautiful, distressed-finish oak veneer tops and sides. Overall dimensions: 33" H x 43" W x 20" D with casters and tube cap. Accepts four speakers from kit, mounted in front, below TV screen.

GRA-705-25, 112 lbs., Mtr. Frt. 149.95



## 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 being 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 of more what you're looking for — top-of-the-line features and performance plus the utmost in service simplicity at an affordable kit price! Add an extra dimension of pride to your television viewing this year. Build a GR-2502 and share the beautiful rewards with everyone.

Kit GR-2502, Shpg. wt. 100 lbs., Motor Freight	649.95
Kit GRA-2502-1, Advanced Space Phone accessory, 2 lbs.	49.95
GRS-2502-1, GR-2502 TV in Classic cabinet, 185 lbs. Mtr. Frt.	699.90
GRS-2502-2, GR-2502 TV in Modern cabinet, 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

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



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

- 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 1/8" H x 26 3/4" W x 17 1/2" 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. Motor Freight	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**



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.



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.

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 32½" H (with casters) x 43½" W x 19¼" D (add 2½" 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 28¾" H (gliders included) x 42½" W x 18" D (add 2½" 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

Single UHF/VHF/CATV  
75Ω antenna input

New auto CRT tracking keeps colors like new — year after year

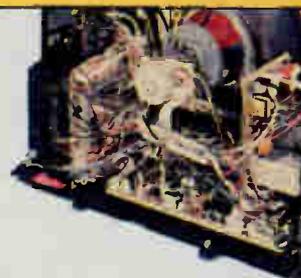
Internally shielded tri-focus picture tube

Peak Resolution Picture Circuit adds 25% more detail

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, videodisc 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. 25 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

## 5 Take entertainment with you, almost anywhere

**\$149<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. .... 149.95

GRZ-5005, Assembled and tested, GR-5005 with clock, alarm and AM/FM radio bands, Shpg. wt. 14 lbs. .... 179.95

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-1327, Assembled and tested, 44 lbs. .... 379.95

## 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. 19 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. 6 lbs. .... 949.95

GRZ-1000-1, Camera case, Shpg. wt. 8 lbs. .... 29.95

10 This Generator lets your titles roll, crawl and zoom — for a professional look.

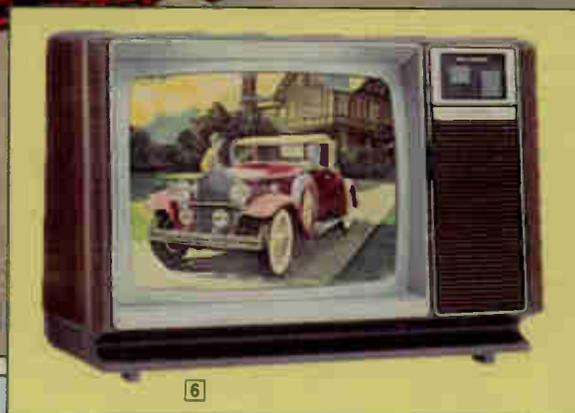
GRZ-1000-2, Character Generator, Shpg. wt. 1 lb. .... 99.95

## 11 ADP-1501 Stereo Synthesizer

Use the same technique as professional studios to transform a monaural source into realistic stereo. A sophisticated design using bucket delay technology creates a comb response. Operates on 120 VAC or 12 VDC for portable use.

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





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

# 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 WWV 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 frill. 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. OC 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: 4¼" H x 8½" W x 14" D (10.8 x 21.6 x 35.6 cm) Net Weight: 26 lbs. (11.8 kg)

**HWA-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: 7-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 µV 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 µV 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: ± 600 Hz in Receive only. Internally Generated Spurious Noise: All below 1.0 µV. 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: 4¼" H x 11¼" 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: 6¼" H x 9½" W x 13¼" 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 µV for 10 dB (S + N)/N SSB on the 40 through 10 meter bands, 0.5 µV 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. Image Rejection: – 80 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 µV 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: 6¼" H x 14" W x 13¼" 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, automatic AGC, single conversion, balanced product detector, active audio processing 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. Automatic 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 active audio processing 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  $\mu$ B or less for 10 dB S+N/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 1/4" H x 9 1/4" W x 8 3/4" 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 over-lapping, 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)/N. AM, less than 2.5  $\mu$ V for 10 dB (S+N)/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 (SO239) 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 3/4" H

## 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, disaster 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



1

NEW



2

NEW



NEW

3

## 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
- 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 ¼" 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:  $\pm 12$  dB at 490 Hz. High Frequency Response:  $\pm 12$  dB at 2800 Hz. Input Impedance: 100 k nominal. Maximum Input Level: 500 mV RMS. Frequency Response: 200 Hz to 10 kHz. Distortion: 5% or less. Power Requirement: 9-volt transistor battery. Dimensions: 5¼" W x 2" H x 4¼" 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
- 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 at match. Impedance Transformation: 4:1 balun. Output Impedance: Wide range. Insertion SWR: Less than 1.1. Power Input Capacity: Full legal limit. Dimensions: 5¼" H x 14¼" W x 13" 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 induction 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. 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: 14½" W x 20" D x 6¼" 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 broad-band, 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**

JHWIX



**3**



**2**



**4**



**5**



**7**

**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): 15 1/8" H x 4 1/8" W x 6" O.

**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 whistles and noise that other filters find impossible to conquer. Versatile power requirements make this Filter usable almost anywhere. Just supply 7-13.5 VAC or 9-18 VDC.

Kit HD-1418, Shpg. wt. 3 lbs. .... 129.95

PS-5012 Power Cube, For 120 VAC operation, Shpg. wt. 1 lb. .... 15.95

# Highest quality Heath products for reliable, quality amateur radio performance

## 1 Heathkit's 75-watt VHF All-Mode Base Amplifier has reaching power

**\$279<sup>95</sup>**

- Add power to your home base
- Nominal 10 watts of drive produces more than 75 watts
- FM, RTTY, single sideband and CW modes of operation

You probably hear stations that can't hear you. A one-sided rig with a hot receiver takes half the fun out of working 2-meters from a fixed location. But, with the Heathkit VL-2280 All-Mode Base Amplifier backing you up with 75 watts of working power, you can permanently bridge those communication gaps. And, you can give your signal a big boost when and where you need it most.

Reviewers and owners have praised the VL-2280 for including the time-saving features of simple operation and easy self-serviceability they appreciate and recommend. A built-in power supply operates from 120/240 VAC, portable generator or even a 12 VDC backup battery while running remote or in an emergency. And, the VL-2280 has plenty of reserve to power most exciters directly from an accessory socket on the back panel, providing a regulated 13.6 VDC source at 4 amps maximum load.

High quality Heath engineering built in. Broadband circuitry maintains a stable, specified output across the entire 2-meter band without retuning. Extra large heatsinks provide more than adequate cooling, to give you a 50% duty cycle and more "on" time. An extremely clean signal results from low IMD products, with a special circuit design that gives ultra-low distortion SSB performance and switchable VOX delay. A built-in antenna changeover relay enables transmit mode immediately with either RF-sensed or manual keying.

Kit VL-2280, Shpg. wt. 32 lbs. .... 279.95  
HDZ-63-3, 3-ft. RG-8/U jumper with PL-259 connectors, 1 lb. .... 4.95

**VL-2280 SPECIFICATIONS:** Frequency Range: 144-148 MHz (aligned at 146 MHz) Power Input: 1 to 10 watts Power Output: 75 watts nominal at 13.8 VDC with 10 watts of drive. 80-85 watts typical. I/O Impedance: 50 ohms. VSWR 2:1 maximum. Insertion Loss: Less than 0.6 dBc. Conducted Spurious and Harmonics: 60 dBc or better. IM Distortion: 24 dBc referenced to one of two tones. Third Order Harmonics: 30 dBc referenced to CW power. Operating Range: 4 F to 104 F | 20 C to 40 C. Duty Cycle: 50% 10 minutes on 10 minutes off. Power Requirements: 240 VAC at 3.5 amps or 120 VAC at 7 amps. 50-60 Hz. Dimensions: 5" H x 13 1/4" W x 12 1/4" D. Net Weight: 27 lbs.

## 2 Dual HF Wattmeter accurately measures up to 2000 watts PEP

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

- Reads PEP or average power from 1.8 to 30 MHz
- Has factory assembled and calibrated sensor

Is your station performing at peak efficiency on the low bands? The HM-2140A monitors forward and reflected power. A second scale on the reflected meter reads SWR directly from 1:1 to 3:1.

Measure your transmitter's output up to 200/2000 watts PEP in the forward direction, and up to 50/500 watts reflected. Pushbutton-switched high and low power ranges plus a factory-tested sensor ensure precision readings. Another dual-position switch enables you to read PEP or Average power instantly. The precision RF sensor can be mounted in the cabinet, or up to four feet away.

36/AMATEUR RADIO



Kit HM-2140A, Shpg. wt. 5 lbs. .... 99.95  
PS-2350, 120 VAC Battery Eliminator, 1 lb. ... 7.95  
HDZ-63-3, 3 ft. RG-8/U, PL-259 connectors, 1 lb. .... 4.95

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

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

- Injection/absorption modes let you measure energized and de-energized circuits

The multi-purpose HD-1250 has dozens of practical uses in your lab and ham shack. 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 function 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 for the most exact metering indications and injection signal fidelity. 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 closer sensitivity and a better dip action. A responsive 150  $\mu$ A movement yields sharper resonance indications. Includes a headphone jack for positive modulation monitoring. Operates on one 9V 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 indicator, oscillator level control and On/Off switch. Meter Movement: 150 microamperes. Solid-State Circuits: 1 NPN transistor oscillator, 1 dual-gate MOSFET amplifier and 2 diffused silicon hot carrier diode detectors. Power Source: 9 volt NEDA Type 1604 battery. Net Weight: (Meter case and coils) 2 lbs. Dimensions: less coils, 2" H x 2 1/2" W x 5 1/2" D

## 4 Heathkit Remote Coax Switch

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

- Use a single feedline to select from up to four antennas

The Heathkit HD-1481 Remote Coax Switch is a tower- or mast-mounted RF coaxial switch that you can conveniently control from inside your house. The Switch consists of a remote unit — outdoor switching network — and an indoor control unit.

The remote unit is rain tight and contains the RF switches that permit selecting the desired antenna. The unit is easily mounted with a single clamp. The control unit contains the power supply and provides switching signals to the remote unit. A front panel switch permits selecting the desired antenna. The Remote Coax Switch will handle 2000 watts PEP with a VSWR of 1.15:1 or less below 30 MHz.

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

## 5 Heath 'Cantenna' dissipates RF

This important device has improved specifications, better components and our famous low, build-it-yourself kit price. HN-31A now handles 1 kW of RF energy (2kW PEP) with VSWRs always less than 1.5:1 for frequencies up to 450 MHz. Provides ideal 50-ohm non-inductive load to your setup, and eliminates unnecessary QRM during tune-up maintenance or alignment. Prolongs life of your finals. Holds one gallon of transformer oil (not supplied).

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

## 6 Low-cost, quieting headphones

Copy more traffic: Mura SP-104 Headphone has isolating ear cups, wide 40-15,000 Hz frequency response, individual volume controls and 2 1/2" dynamic speakers for clear comprehension. 8-ohm impedance. Ten foot coiled cord with plug. HDP-1396, Assembled, Shpg. wt. 2 lbs. .... 19.95

## 7 Lightweight ProCom 300 headset

High-quality performance in a featherweight headset with exceptional audio performance. 100-3500 Hz receiver/100-8000 Hz mic response. On/off VOX. Aviation-style, single-side ear tip receiver is ideal for listening to environmental sounds while monitoring the radio. Great for mobile operation.

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

## 8 Low-noise ProCom 200 headset

Fully adjustable Telex headset for the amateur and professional offers almost hands-free operation. Boom-mounted, pivotal electret mic has selectable high or low impedance, 100-8000 Hz receiver/mic response. In-line on/off VOX control.

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

## 9 CONTROLLED MAGNETIC Fixed Station Microphone

Heath's model HDP-444 Microphone was designed by Shure with amateur radio features. The Microphone has dual selectable output impedances 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. The Microphone is height adjustable and has rubber, non-slip feet.

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

## 10 Change antennas in seconds with a convenient Remote Coax Switch

Saves money! — replaces five expensive coax feedlines with just one; LEDs show which antenna is connected. Erasable front panel lets you label antenna positions. Accepts signals to 150 MHz; rated for full legal power. VSWR under 30 MHz is 1.05:1 or less; better than 1.2:1 under 150 MHz. Sixth LED position grounds all antennas at once for lightning protection. Almost no insertion loss — silver-plated switch contacts reduce attenuation to less than 0.2 dB at 100 MHz. 50-70 ohm impedance; SO-239 connectors. Requires 8-wire cable below. Shielded, weatherproof U-mount solenoid housing.

Kit SA-1480, Shpg. wt. 8 lbs. .... 99.95

IDA-1290-3, 150-ft. 8-cond. cable, 6 lbs. ... 23.95

IDA-1290-2, 100-ft. 8-cond. cable, 4 lbs. ... 16.95

IDA-1290-1, 50-ft. 8-cond. cable, 2 lbs. .... 9.95

## 11 Low-Pass Filter ends TVI trouble

Solve emissive RF interference problems with this fine low-pass Barker & Williamson filter. Provides a minimum of 70 dB attenuation. Cut-off frequency is 34 MHz. Less than 0.3 dB insertion loss. For 160-10 meters. 50 $\Omega$  impedance. Rated for full legal power.

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

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

Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.



### 12 Twelve-socket power Outlet Strip

Multiplies convenience by providing extra electrical outlets. Has eleven switched and one unswitched (for clock or memory save), fused 3-hole outlets with 10A maximum load. For 120 VAC.

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

### 13 75-ft. Long-wire SWL Antenna

Really helps you pull in distant stations. Copper line with 30' lead-in, all insulators and hardware for easy setup. A must for the serious shortwave listener.

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

### 14 Coaxial Switch routes input RF

Choose from up to five antennas. Switches one RF source to any one of several antennas or loads. 2 kW PEP with maximum 1:1 SWR up to 250 MHz.

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

### 15 146-148 MHz Mobile Antenna

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

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

### 16 Cushcraft AV5 has long DX reach

Vertically-polarized omni-directional antenna designed to provide complete CW and SSB coverage on 80-10 meters. Especially effective high-Q stabilized traps give wider bandwidth. SWR always 1.5:1 or less at resonance on each band. Self-supporting height is 25 ft. (7.4m). Full legal power. Built-in coax connector accepts PL-259 on your station feedline.

Whether roof- or ground-mounted, this antenna will handle 2000 watts PEP. Antenna elements are hard-drawn aluminum and have a minimum air surface of 1.89 cubic feet.

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

## 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:** 1-1999 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. **Sidelone:** 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 1/2" H x 15" W x 8" 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

### 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. **Inecord 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 CS-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 with 24K memory.

HDP-1020, Shpg. wt. 1 lb. .... 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 8-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:** 8-16 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 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 3/8" 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



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

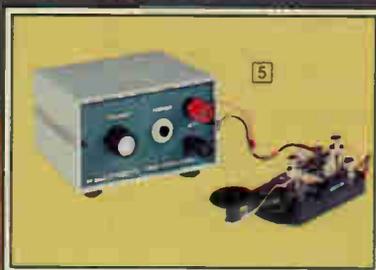
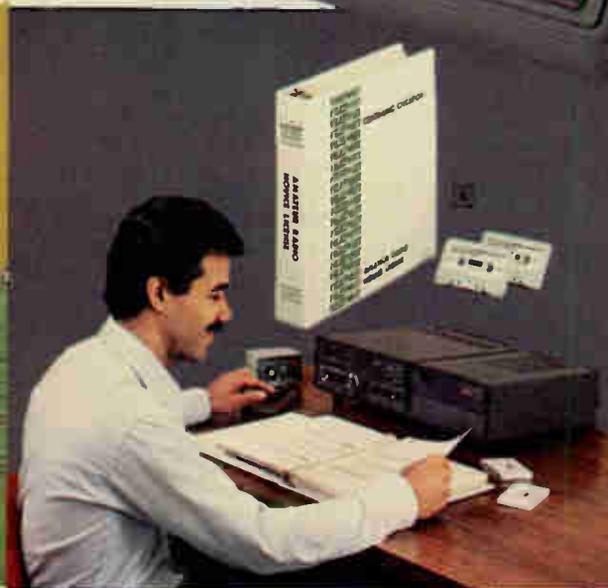
1 This CW Keyboard lets you send letter-perfect code every time



2 The HD-3030 Terminal Interface will put you into RTTY inexpensively



3 Use the HD-3006 to fine-tune RTTY – put your scope back on the bench



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  $\pm$  DC voltage at that 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 spend 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 DC 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, int B, and B Time Base Ranges: 100 ms/cm to 0.1  $\mu$ s/cm, 19 steps in 1-2-5 sequence, continuously variable to approx. 300 ms/cm. Accuracy: Within 3%. Magnifier: Times ten. 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-ends-A' position. GENERAL: Internal Calibrator Accuracy: 1 V/P.P. within 2%. CRT: Mesh-expanded with 8 x 10 cm internal graticule. Accelerating Potential: 10 kV regulated. External X 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 DC 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

40/INSTRUMENTS



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

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  $\mu$ 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  $\mu$ s. Accuracy\*:  $\pm$  3%,  $\pm$  1 cm. VDC (internal): Ranges:  $\pm$  0.2 V, 2V on 2 mV to 50 mV;  $\pm$  2 V, 20 V on 100 mV to 0.5 V<sub>i</sub>;  $\pm$  20 V, 200 V on 1 V to 10 V, auto-ranging. Accuracy\*:  $\pm$  1.0% ( $\pm$  0.75%),  $\pm$  2 cnts. EXT VDC: Ranges: 2 V to 2000 V; auto-ranging. Basic Accuracy:  $\pm$  0.5% ( $\pm$  0.25%),  $\pm$  1 cnt. GENERAL: 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
- 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-3200 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

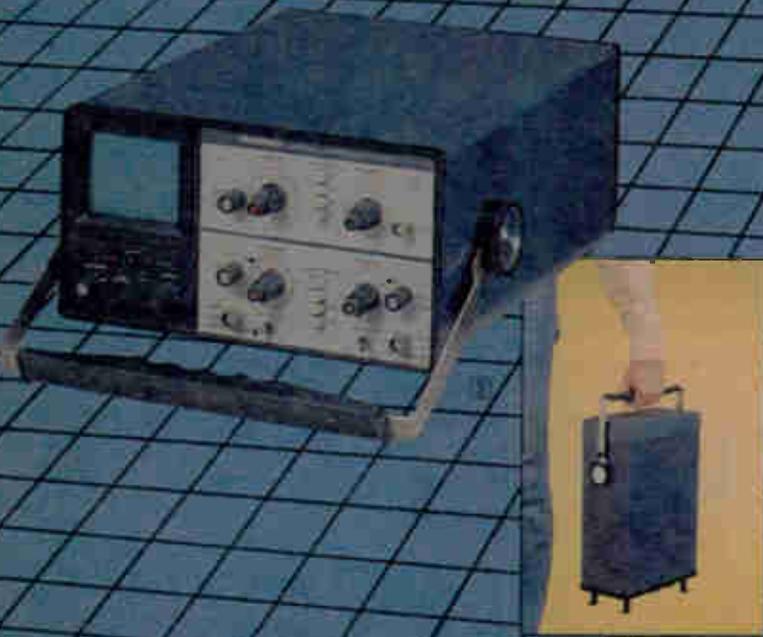
Probe Set with Pouch for IO/SO-3220 Portable Oscilloscope: Attaches to scope and includes two 4.5 foot PKW-105 X1/X10 Oscilloscope Probes.

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° 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.



### IOA-4200 Time-Voltage Module Accessory

- Add-on accessory module to IO-4350 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



### 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

Last call on this top performer while quantities last. 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  $\mu$ s/cm to 50  $\mu$ s/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.

Kit IO-4235. Ship. wt. 52 lbs. 849.95

IO-4235, Assembled and tested, Ship. wt. 38 lbs. 1370.00

**IO-4235 SPECIFICATIONS:** VERTICAL: Sensitivity: 2 mV/cm. Post-corr: 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% (30 to 40 degrees C), referred to 1 V/cm. Vertical Response: DC Coupling: DC to 30 MHz; 1-3 dB; AC Coupling: 1 Hz to 35 MHz. Rise Time: 10 ns. Overshoot: Less than 2%. Delay Line: Allows display of at least 20 ns of the triggered level. Vertical Input Impedance: 1 megohm, shunted by 30 pF. Capacitive inputs for probe use for calibration. Maximum Input: 400 volts peak, controlled AC and DC. Connector: BNC. Vertical Modes: Y1, Y2, Y1 and Y2 channel, Y1 and Y2 alternate, algebraically add Y1 plus or Y2. HORIZONTAL: Time Bases: Ranges: 0.2  $\mu$ s/cm to 50  $\mu$ s/cm. Pulses: 21 steps in 1:2.5 sequence. Variable: Continuous between steps to approximately 600 ns/cm. Accuracy: Within 3% (20 to 30 degrees C), 5% (30 to 40 degrees C) referred to 1 cm/cm. Magnifier: X5. Accuracy: Within 5% (20 to 30 degrees C), Within 7% (30 to 40 degrees C). External Horizontal: Sensitivity: Approximately 0.1 V/cm. Bandwidth: 1 megohm. TRIGGER: Switch: Y1, Y2, External or line. Coupling: AC, DC, AC Fast, TV. Modes: Automatic, Normal, Single Sweep, Hold Off, Variable, including a 70 mV/cm position. External Trigger Sensitivity: 100 mV at 50 MHz. Input Impedance: 1 megohm, shunted by 30 pF. GENERAL: CRT TYPE: 5 x 10 cm mask with internal glaucous. Phosphor: P31. CRT Acceleration Potential: 30 kV regulated. X Axis: Full 50 to Full Off: 0 to 5 units. Positive Input Impedance: 5 V/mV. Power Supplies: Fully Regulated. Power Requirements: 120-240 VAC, 50/60 Hz, 95 W (at 220 VAC). Overall Dimensions: 13 1/2" H x 13 1/2" 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<sup>3/4</sup>" H x 12<sup>7/8</sup>" W x 19<sup>1/4</sup>" 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 bright CRT allows the user 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 20V to 10 mV to 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<sup>1/4</sup>" W x 9<sup>1/2</sup>" 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 1V 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<sup>1/4</sup>" W x 9<sup>1/2</sup>" D





1  
IO-4550 Dual  
Trace 10 MHz Scope



2 IO-4205 Dual Trace 5 MHz Scope



3 IO-4105 Single Trace 5 MHz Scope



4

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
IO-4360	3	DC-60 MHz 7 ns	2 mV/cm to 10 V/cm	0.1 cm/cm to 100 ns/cm	✓	✓	✓	✓	✓			✓	8 x 10 cm, mesh-expanded internal graticule
IO/SO-4235	2	DC-35 MHz 10 ns	2 mV/cm to 10 V/cm	0.2 cm/cm to 50 ns/cm	✓	✓	✓	✓	✓	✓			8 x 10 cm, mesh-expanded internal graticule
IO/SO-3220	2	DC-20 MHz 18 ns	2 mV/cm to 10 V/cm	0.1 cm/cm to 100 ns/cm		✓		✓	✓		✓		8 x 10 cm, 0.6 cm dia. internal graticule
IO-4550	2	DC-10 MHz 35 ns	10 mV/cm to 20 V/cm	0.2 cm/cm to 200 ns/cm				✓		✓			8 x 10 cm
IO-4205	2	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 cm/cm to 200 ns/cm						✓			8 x 10 cm
IO-4105	1	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 cm/cm to 200 ns/cm						✓			8 x 10 cm

NOTE: All Heathkit oscilloscopes feature mu-metal shielding for protection from interfacing 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 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

## 3 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 3½ 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)  $\pm 0.2\%$  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

## 5 Five-function IM-2260 features economy

**\$119<sup>95</sup>**

- Convenient autozero, autodecimal and autopolarity
- Special test function checks diodes and transistors
- All functions protected with fully-isolated circuitry

**Excellent performer:** Bright, easy-to-read LEDs in a 3½ 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. For in-circuit resistance checks, the meter's 2 k to 2000 k ranges use a low 0.2 volt resistance test voltage. 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: 40 to 1 kHz:  $\pm 0.5\%$  of reading + 1 count AC:  $\pm 1.0\%$  of reading + 3 counts Frequency Response: Accuracy: 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: 2k, 20k, 200k, 2000k, and 20M Basic Accuracy:  $\pm 0.25\%$  of reading + 1 count Dimensions: 3" H x 8" W x 11" D Weight: 2¼ lbs. (excluding batteries)

## 2 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 3½ 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/SM-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" W x 7½" L

## 4 New 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
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**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 12½" D (10.2 x 25.4 x 31.5 centimeters) Weight: 8.4 lbs (3.8 kg)

## 6 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

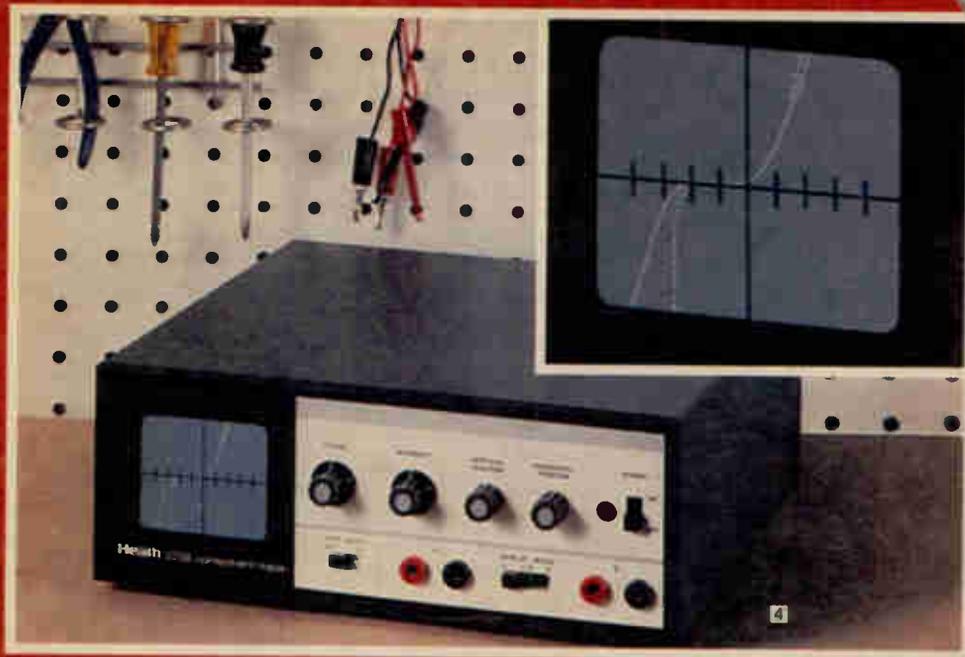
**True RMS reading digital meter:** Capabilities include: five DC and AC voltage ranges extending from 0.1 mV to 1000 VDC and 750 VAC, six DC and AC current ranges from 0.1 µA to 10 A, and six resistance ranges from 0.1 ohm to 20 megohms. The IM-2264 also uses a special circuit that electronically converts 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
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**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 µA, 2 mA, 20 mA, 200 mA, 2000 mA, 10 A Basic Accuracy: DC:  $\pm 0.5\%$  of reading + 1 count AC:  $\pm 0.75\%$  of reading + 2 counts Resistance Ranges: 200, 2k, 20k, 200k, 2000k and 20M Basic Accuracy:  $\pm 0.5\%$  of reading + 1 count Special Features: Crest Warn Indicator, Audible Alarm, Analog Meter Dimensions: 3" H x 8" W x 11" D





4



1



6



2



5

Deluxe Handheld  
SM-77 meter



3

Digital display  
with analog bar  
graph indicator

# 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:** Accuracy: 199.9 pF, 1999 pF, 19.99 nF, 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 1999  $\mu$ F, 19.99 mF, 199.9 mF. Range: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges  $\pm 10\%$  of reading + count  $\pm 0.5$  pF; 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 1999  $\mu$ F, 19.99 mF and 199.9 mF ranges  $\pm (5\%$  of reading + 1 count). Using Heath Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF, and 199.9 nF ranges  $\pm (0.75\%$  of reading + 1 count  $\pm 0.5$  pF); 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 1999  $\mu$ F, 19.99 mF and 199.9 mF ranges  $\pm (6\%$  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 1999  $\mu$ 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. Stability: 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  $\pm$  9° F (75° C  $\pm$  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

**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,  $\pm 1$  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

## 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

## 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

## 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

## 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

## 9 30 kV DC Probe for meters with 20 megohm input

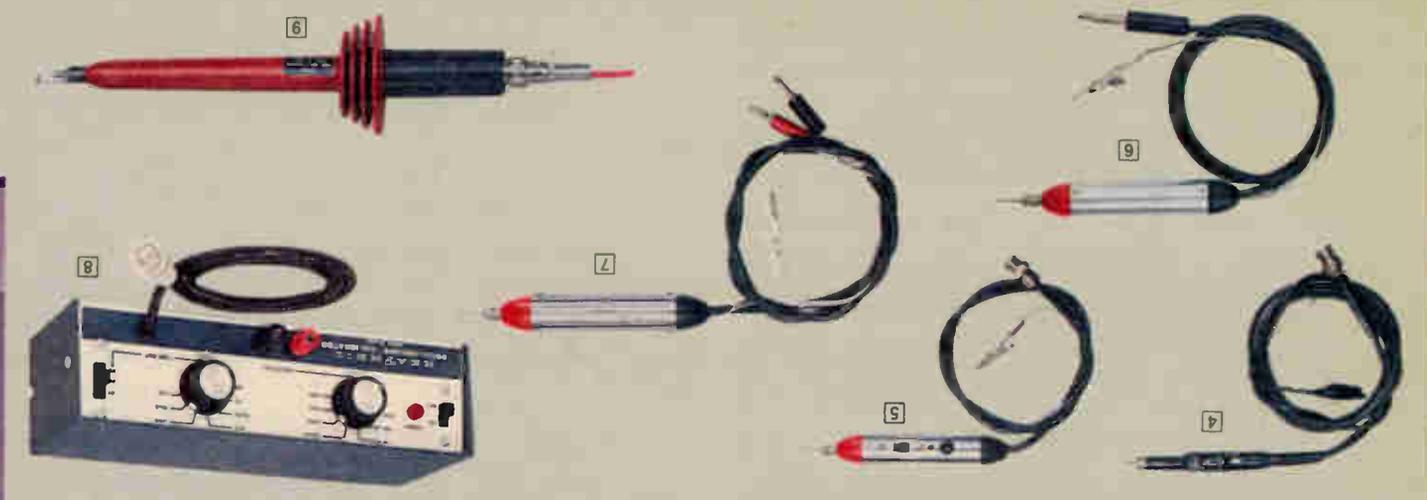
Extend the measurement capability of DC voltmeters with input impedances of 10 megohms. This X100 accessory probe features a phone plug connector, alligator ground clip and molded housing.

Kit IMA-100-10, For 10 megohm input meters, Shpg. wt. 1 lb. .... 14.95

SMA-100-10, Assembled, Shpg. wt. 1 lb. .... 19.95

Kit IMA-100-11, For 11 megohm input meters, Shpg. wt. 1 lb. .... 14.95





# Expand the testing capabilities of your work bench with these quality Heathkit instruments

## 1 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  $\pm 0.005\%$ . 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.

Kit IG-5240, Shpg. wt. 2 lbs. .... 74.95

## 2 NEW 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 ns (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 0.4V and a logic "1" of greater than 2.4V 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.

Kit IG-1277, Shpg. wt. 9 lbs. .... 179.95

## 3 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 10V P-P.

Kit IG-5218, Shpg. wt. 10 lbs. .... 139.95

## 4 IG-5257 TV Post-Marker/3-Range Sweep Generator

For TV and FM tuned circuits, the IG-5257 is an ideal as well as a versatile and accurate alignment generator. It supplies fifteen crystal-generated markers plus three linear sweep ranges (2.5 to 5.5 MHz, 38 to 49 MHz, 64 to 72 MHz) for both TV and FM alignments. Modulation at 400 Hz is also provided for trap FM tuner alignments. Also includes 70 dB attenuator pad.

Kit IG-5257, Shpg. wt. 16 lbs. .... LAST CALL 279.95

## 5 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 10V 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.

Kit IG-1271, Shpg. wt. 7 lbs. .... 159.95

SG-1271, Assembled and tested, Shpg. wt. 6 lbs. .... 225.00

## 6 IM-5215 40 kV Meter with built-in meter



- Checks positive high-DC voltages in TVs and oscilloscopes
- Easy-to-assemble kit goes together in one evening

The new IM-5215 is an ideal instrument to use in measuring voltages up to 40,000 volts which are normally found in television and oscilloscope circuits. All measurements made with this self-contained probe are accurate to within  $\pm 3\%$ .  
Kit IM-5215, Shpg. wt. 2 lbs. .... 29.95

## 7 IMA-100-10 test probe for checking kilovolts

Use this accessory probe to extend the DC voltage measuring range of any 10-megohm input digital multimeter up to 30,000 volts.

Kit IMA-100-10, Shpg. wt. 1 lb. .... 14.95

SMA-100-10, Assembled and tested, Shpg. wt. 1 lb. .... 19.95

## 8 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. A memory indicator shows when a threshold level is crossed. Powered from circuit under test.

Kit IT-7410, Shpg. wt. 1 lb. .... 39.95

## 9 Convenient SM-2206 Clamp-on AC Current Meter

**\$49<sup>95</sup>** • Allows quick checks of power and lighting circuits  
• Helps homeowners locate energy-robbing appliances

Rugged clamp-on meter measures current flow in 50 or 60 Hz AC circuits in five current ranges: 6, 15, 60, 150 and 300 amps. Also measures AC voltage in three ranges: 150, 300 and 600 volts. Has resistance range of 0 to 5 kilohms.

SM-2206, Assembled and tested, Shpg. wt. 2 lbs. .... 49.95

## 10 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. Can monitor a line directly or use an optional antenna.

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

## 11 IM-5228 Service Vacuum Tube Voltmeter

**\$79<sup>95</sup>** • Accurately measures  $\pm$  DC and AC voltages plus resistances  
• Simple and rugged for use by techs, engineers and hobbyists

A dependable and indispensable tool, the IM-5228 features: 11 megohm input impedance, seven DC voltage ranges up to 1500 volts with an accuracy of  $\pm 3\%$ , seven AC voltage ranges up to 1500 volts RMS with an accuracy of  $\pm 5\%$ , and seven resistance ranges to x1 megohm. Needs "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

## 12 Low-cost IT-5230 CRT Tester and Rejuvenator

**\$139<sup>95</sup>** • Tests, cleans and restores almost any TV picture tube  
• Use on color and B&W CRTs, even in-line-gun tubes

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 the IT-5230 to test even more CRTs. This versatile accessory uses universal clip leads to hook up and test CRTs with known basing configurations.

ITA-5230-1, Shpg. wt. 1 lb. .... 29.95

## 13 IT-3120 Portable FET and Transistor Tester

This quick checker tests transistors, diodes, FETs, SCRs, triacs and JUTs in- and out-of-circuit. Shows gain, transconductance and leakage current.

Kit IT-3120, Shpg. wt. 5 lbs. .... 79.95

## 14 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. Includes binding posts.

Kit IN-3117, Shpg. wt. 3 lbs. .... 59.95

## 15 IM-5217 Solid-State Utility Voltmeter

**\$44<sup>95</sup>** • Compact and battery-powered general purpose meter  
• An ideal first project for the electronics novice

This portable voltmeter is perfect for home repairs and service calls. It features  $\pm$  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**

2 The IG-1277 Pulse Generator puts laboratory-precise signals into the price range of the hobbyist. Select almost any desired pulse signal within a frequency range from 1 Hz to 5 MHz.



**Economical high-voltage and logic test probes**

**NEW**

6 IM-5215 High-Voltage Test Probe

7 IMA-100-10 30 Kilovolt Test Probe

8 IT-7410 Logic Probe



# Four regulated and adjustable power supplies 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. A front panel voltage meter indicates the output voltage.

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: 5 1/2" 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 5V supplies, ±0.15% variation on 5V supply Power Requirement: 120-240 VAC, 50-60 Hz, 100 watts full load Dimensions: 4 1/2" H x 10 1/2" W x 9" D

## 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 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 13 1/4" W x 11 1/4" D x 5 1/2" 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 22 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 22 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 5 1/4" W x 7 3/4" D Weight: 3 1/4 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 to 10 Ω Cabinet Dimensions: 11" W x 5 1/4" H x 7 1/4" D Weight: 3 1/4 lbs





### 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 batteries or from IPA-5280-1 below.

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. Power: Two 9-volt transistor batteries and/or IPA-5280-1 Power Supply. Dimensions: 11" W x 5 1/2" H x 7 1/4" 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

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**FREE**

when you purchase any kit from this catalog!

P.S. Remember, this offer expires September 15, 1984, so order today!

WP-412

**The LCD Time Pen Features:**

- Digital display of hours, minutes, seconds, month and date
- Accuracy to within three minutes per year
- Uses Parker refill



A  
**\$995**  
VALUE



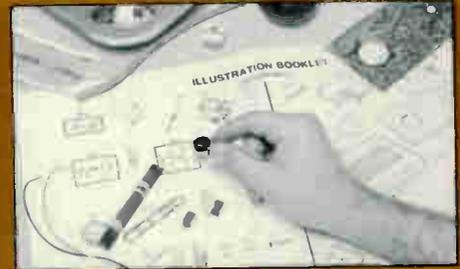
World-famous step-by-step Heathkit manuals are the key to easy, enjoyable and successful kitbuilding. Remember our motto:  
**"We won't let you fail!"**



**PARTS INVENTORY:** All components of the kit are checked against a parts list.



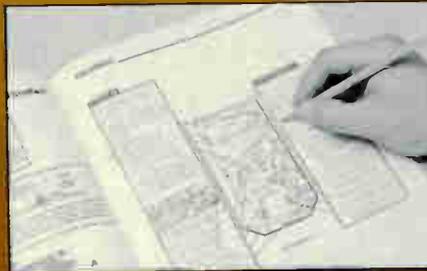
**ASSEMBLY ORGANIZATION:** The manual shows you how to organize for easy kitbuilding.



**PARTS AND ASSEMBLY ILLUSTRATIONS:** We don't just tell you how to build one of our kits – we show you.



**PROPER SOLDERING TECHNIQUES:** Most Heathkit manuals teach reliable soldering, for maximum life from your kit.



**GOOF-PROOF STEP-BY-STEP INSTRUCTIONS:** You check-off each kitbuilding step as it's completed.



**INITIAL TESTING:** Before final assembly, you test the kit to insure that it is operating properly.



**OPERATION:** Turn switch to 'on' and experience the unique pride and satisfaction of a successful kitbuilder!



**MAINTENANCE INSTRUCTIONS:** Save on service calls! The manual shows you how to troubleshoot problems and make repairs.



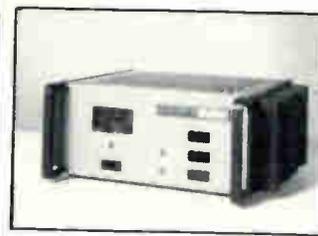
**TECHNICAL ASSISTANCE:** Experts are available by phone, by mail or at Heathkit Electronic Centers.

## Here's what recent happy kitbuilders say about the Heathkit experience:



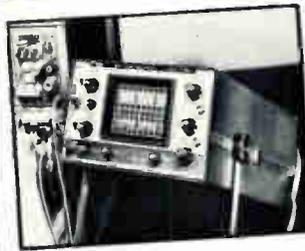
"I am 8 years old. This is my first electronics kit. My father and I did the clock in five nights. The directions were understandable even to me. It was fun."

Joel Sumner  
Succasunna, NJ



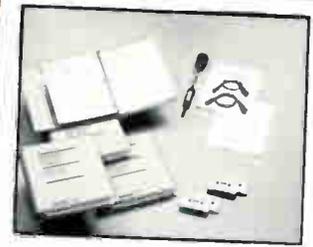
"I have built Heath audio and amateur radio equipment since the early '50's ... Your design technology, quality of components and instructions, and customer service are better than ever."

Roger Stachour  
Grundy Center, IA



"As an electrical engineer, I recognize the superior engineering that went into the design and preparation of this kit. The troubleshooting section was especially useful..."

J. Wayne Morris  
St. Albans, WV



"I just must tell you how very pleased, even amazed, I am at the quality of instruction in your Automotive Electrical Course. I wish I could tell everyone!"

John J. Sullivan  
Newport News, VA

**These are just four of thousands of satisfied kitbuilders who have learned while having fun, by building Heathkit products. Join our family today. It's as simple as A-B-C!**

## When you build Heathkit products, you get the finest kits money can buy — with space-age technology, high-quality components and complete instructions

Everything we do at Heath is aimed to keep our customers happy — and to make your kitbuilding experience successful.

Our engineers design high-technology quality and reliability into each Heathkit product, using only the highest-quality parts and components. Expertly-written manuals allow you to build our kits with a minimum of hassles. Each kit is test-built to ensure kitbuilding ease.

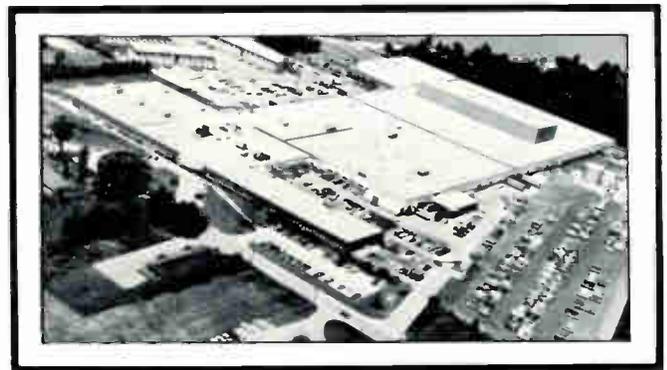
Heathkit products are backed by expert technical consultation, available by phone or mail, and by service technicians at the factory and at Heathkit Electronic Centers\* throughout the country.

At Heath, the customer still comes first. That's what keeps satisfied customers coming back to try new kitbuilding experiences.

## More factory-trained service technicians are ready to serve you



We make technical advice and service more convenient for you. Consultation is as close as your telephone. And service is as close as your Heathkit Electronic Center.



For more than half a century, Heath Company has designed kits for people who want build-it-yourself quality.

Every year, thousands of people buy and build Heathkit products. They buy with confidence, knowing that they are purchasing the best from a company who will stand behind them.

At our plant and headquarters on the shores of Lake Michigan in St. Joseph, Michigan, Heath Company today employs more than a thousand people and markets over 400 electronic kits.

Heath makes easy-to-build kit products ranging from microcomputers and test instruments to computerized color TVs, audio components, amateur radio equipment ... even products using solar energy!

All of our kits are described in your new, colorful 104-page Heathkit Catalog. You'll find informational product descriptions inside.



## HOW TO FIGURE YOUR SHIPPING AND HANDLING CHARGES

1. Find your zone number using the Zone Chart at the right.
2. Locate the shipping weight of the item in the first column of the Rate Chart.
3. Determine the shipping charge for the area.

### ZONE CHART

Your zone is indicated by the first three digits of your ZIP Code.

Zip Code Prefixes	Zone										
006-009	8	260-261	3	363-369	5	476-477	4	598-599	7	820-822	5
010-069	5	282-278	4	370-386	4	478	3	600-609	2	823-826	6
070-089	4	279	5	387	5	479-489	2	610-619	3	827	5
090-099	5	280-283	4	388	4	490-491	1	620-623	4	828-832	6
		284-285	5	389-397	5	492	2	624-628	3	833	7
		286-293	4			493-495	1	629-668	4	834	6
100-108	5	294-295	5	400-406	3	496-499	3	669-679	5	835-838	7
109	4	296-297	4	407-409	4			680-687	4	840-847	6
110-119	5	298-299	5	410-412	3	500-516	4	688-693	5	850-864	7
120-123	4			413-422	4	520-524	3			865-884	6
124-126	5			423	3	525	4	700-722	5	890-898	7
127-128	4	300-303	4	424-426	4	526-528	3	723-727	4		
129	5	304	5	427-432	3	530-534	2	728-768	5	900-921	8
130-152	4	305-307	4	433-436	2	535-539	3	769	6	922-928	7
153	3	308-329	5	437-457	3	540	4	770-778	5	930-934	8
154-160	4	330-334	6	458	2	541-546	3	779-789	6	935	7
161	5	335-338	5	460-462	3	547-548	4	790-792	5	936-960	8
162-183	4	339	6	463-464	2	549	3	793-799	6	961	7
164-185	3	340	4	465-466	1	550-566	4			962-976	8
166-199	4	350-352	4	467-469	2	567	5	800-803	5	977-979	7
				470-472	3	570-572	4	804-805	6	980-987	8
200-232	4	355-359	4	473	2	573-588	5	806-807	5	988-994	7
233-237	5	360-361	5	474-475	3	590-597	6	808-816	6	995-999	8
238-259	4	362	4								

## The following notice is required by the Fair Credit Billing Act:

### IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL

The Federal Truth in Lending Act requires prompt correction of billing mistakes.

1. If you want to preserve your rights under the Act, here's what to do if you think your bill is wrong or if you need more information about an item on your bill:

a. Do not write on the bill. On a separate sheet of paper write (you may telephone your inquiry but *doing so will not preserve your rights under this law*) the following:

- i. Your name and account number (if any).
- ii. A description of the error and an explanation (to the extent you can explain) why you believe it is in error.

If you only need more information, explain the item you are not sure about and, if you wish, ask for evidence of the charge such as a copy of the charge slip. Do not send in your copy of a sales slip or other document unless you have a duplicate copy for your records.

iii. The dollar amount of the suspected error.

iv. Any other information (such as your address) which you think will help the creditor to identify you or the reason for your complaint or inquiry.

b. Send your billing error notice to the address on your bill which is listed after the words: "Send inquiries to:"

Mail it as soon as you can, but in any case, early enough to reach the creditor within 60 days after the bill was mailed to you. If you have authorized your bank to automatically pay from your checking or savings account any credit card bills from that bank, you can stop or reverse payment on any amount you think is wrong by mailing your notice so the creditor receives it within 16 days after the bill was sent to you. However, you do not have to meet this 16-day deadline to get the creditor to investigate your billing error claim.

2. The creditor must acknowledge all letters pointing out possible errors within 30 days of receipt, unless the creditor is able to correct your billing during that 30 days. Within 90 days after receiving your letter, the creditor must either correct the error or explain why the creditor believes the bill was correct. Once the creditor has explained the bill, the creditor has no further obligation to you even though you still believe there is an error, except as provided in paragraph 5 below.

3. After the creditor has been notified, neither the creditor nor an attorney nor a collection agency may send you collection letters or take other collection action with respect to the amount in dispute; but periodic statements may be sent to you, and the disputed amount can be applied against your credit limit. You cannot be threatened with damage to your credit rating or sued for the amount in question, nor can the disputed amount be reported to a credit bureau or to other creditors as delinquent until the creditor has answered your inquiry. However, you remain obligated to pay the parts of your bill not in dispute.

4. If it is determined that the creditor has made a mistake on your bill, you will not have to pay any FINANCE CHARGES on any disputed amount. If it turns out that the creditor has not made an error, you may have to pay FINANCE CHARGES on the amount in dispute, and you will have to make up any missed minimum or required payments on the disputed amount. Unless you have agreed that your bill was correct, the creditor must send you a written notification of what you owe; and if it is determined that the creditor did make a mistake in billing the disputed amount, you must be given the time to pay which you normally are given to pay undisputed amounts before any more FINANCE CHARGES or late payment charges on the disputed amount can be charged to you.

5. If the creditor's explanation does not satisfy you and you notify the creditor in writing within 10 days after you receive this explanation that you still refuse to pay the disputed amount, the creditor may report you to credit bureaus and other creditors and may pursue regular collection procedures, but the creditor must also report that you think you do not owe the money, and the creditor must let you know to whom such reports were made. Once the matter has been settled between you and the creditor, the creditor must notify those to whom the creditor reported you as delinquent of the subsequent resolution.

6. If the creditor does not follow these rules, the creditor is not allowed to collect the first \$50 of the disputed amount and FINANCE CHARGES, even if the bill turns out to be correct.

7. If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them, if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:

- a. You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
- b. The purchase price must have been more than \$50.

However, these limitations do not apply if the merchant is owned or operated by the creditor, or if the creditor mailed you the advertisement for the property or services.

## RATE CHART

Heath Shipping and Handling Charges, mailable items only. See special shipping and handling information for Motor Freight items

Your shipping and handling charges are indicated in the zone column across from the shipping weight

NOTE: UPS 2nd Day Air Service covers continental U.S. Zone D Covers HI (Hawaii)

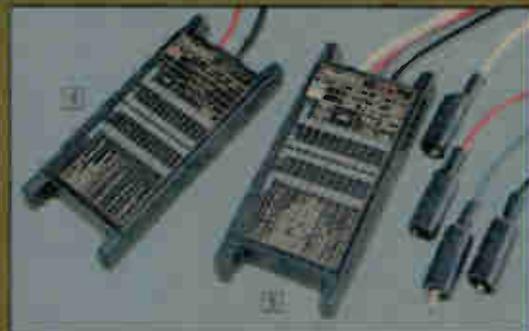
IMPORTANT: Shipping weights listed for model numbers shipped in more than one carton, or of excessive length, have been adjusted to provide correct postage

For weights over 50 lbs. and up to 70 lbs.

Shpg. wt.	Zone 1 & 2		Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	UPS 2nd DAY AIR SERVICE	
	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Zone H	Zone A	Zone B
1	\$1.29	\$1.32	\$1.36	\$1.40	\$1.46	\$1.52	\$1.59	\$1.65	\$3.00	\$4.53
2	1.37	1.44	1.51	1.59	1.71	1.83	1.97	2.00	5.00	5.71
3	1.46	1.55	1.66	1.79	1.96	2.15	2.36	2.50	6.00	6.89
4	1.54	1.67	1.82	1.98	2.22	2.45	2.74	2.90	7.00	8.07
5	1.63	1.78	1.97	2.18	2.47	2.78	3.13	3.30	8.00	9.25
6	1.71	1.90	2.12	2.37	2.72	3.09	3.51	3.70	9.00	10.43
7	1.80	2.02	2.26	2.57	2.96	3.41	3.90	4.10	10.00	11.61
8	1.88	2.13	2.43	2.76	3.23	3.72	4.28	4.50	11.00	12.79
9	1.97	2.25	2.58	2.96	3.48	4.04	4.67	4.90	12.00	13.97
10	2.05	2.36	2.73	3.15	3.73	4.35	5.05	5.30	13.00	15.15
11	2.14	2.48	2.89	3.35	3.99	4.67	5.44	5.70	14.00	16.33
12	2.22	2.60	3.04	3.54	4.24	4.98	5.82	6.10	15.00	17.51
13	2.31	2.71	3.19	3.74	4.49	5.30	6.21	6.50	16.00	18.69
14	2.39	2.83	3.35	3.93	4.75	5.61	6.59	6.90	17.00	19.87
15	2.48	2.94	3.50	4.13	5.00	5.93	6.98	7.30	18.00	21.05
16	2.56	3.06	3.65	4.32	5.25	6.24	7.36	7.70	19.00	22.23
17	2.65	3.18	3.81	4.52	5.51	6.56	7.75	8.10	20.00	23.41
18	2.73	3.29	3.96	4.71	5.76	6.87	8.13	8.50	21.00	24.59
19	2.82	3.41	4.11	4.91	6.01	7.19	8.52	9.00	22.00	25.77
20	2.90	3.52	4.26	5.10	6.26	7.50	8.90	9.40	23.00	26.95
21	2.99	3.64	4.42	5.30	6.52	7.82	9.29	9.80	24.00	28.13
22	3.07	3.76	4.57	5.49	6.77	8.13	9.67	10.20	25.00	29.31
23	3.16	3.87	4.72	5.69	7.02	8.45	10.06	10.60	26.00	30.49
24	3.24	3.99	4.88	5.88	7.28	8.76	10.44	24.00	31.67	
25	3.33	4.10	5.03	6.08	7.53	9.08	10.83	26.00	32.85	
26	3.41	4.22	5.18	6.27	7.78	9.39	11.21	27.00	34.03	
27	3.50	4.34	5.34	6.47	8.04	9.71	11.60	28.00	35.21	
28	3.58	4.45	5.49	6.66	8.29	10.02	11.98	29.00	36.39	
29	3.67	4.57	5.64	6.86	8.54	10.34	12.37	30.00	37.57	
30	3.75	4.68	5.79	7.05	8.79	10.65	12.75	31.00	38.75	
31	3.84	4.80	5.95	7.25	9.05	10.97	13.14	32.00	39.93	
32	3.92	4.92	6.10	7.44	9.30	11.28	13.52	33.00	41.11	
33	4.01	5.03	6.25	7.64	9.55	11.60	13.91	34.00	42.29	
34	4.09	5.15	6.41	7.83	9.81	11.91	14.29	35.00	43.47	
35	4.18	5.26	6.56	8.03	10.06	12.23	14.68	36.00	44.65	
36	4.26	5.38	6.71	8.22	10.31	12.54	15.06	37.00	45.83	
37	4.35	5.50	6.87	8.42	10.57	12.86	15.45	38.00	47.01	
38	4.43	5.61	7.02	8.61	10.82	13.17	15.83	39.00	48.19	
39	4.52	5.73	7.17	8.81	11.07	13.49	16.22	39.00	49.37	
40	4.60	5.84	7.32	9.00	11.32	13.80	16.60	40.00	50.55	
41	4.69	5.96	7.48	9.20	11.58	14.12	16.99	41.00	51.73	
42	4.77	6.08	7.63	9.39	11.83	14.43	17.37	42.00	52.91	
43	4.86	6.19	7.78	9.59	12.08	14.75	17.76	43.00	54.09	
44	4.94	6.31	7.94	9.78	12.34	15.06	18.14	44.00	55.27	
45	5.03	6.42	8.09	9.98	12.59	15.38	18.53	45.00	56.45	
46	5.11	6.54	8.24	10.17	12.84	15.69	18.91	46.00	57.63	
47	5.20	6.66	8.40	10.37	13.10	16.01	19.30	47.00	58.81	
48	5.28	6.77	8.55	10.56	13.35	16.32	19.68	48.00	59.99	
49	5.37	6.89	8.70	10.76	13.60	16.64	20.07	49.00	61.17	
50	5.45	7.00	8.85	10.95	13.85	16.95	20.45	50.00	62.35	
Add 1 lbs	11	14	19	24	32	39	48	1.25	1.48	

## SPECIAL SHIPPING AND HANDLING:

- **MOTOR FREIGHT ITEMS** - Items indicated Motor Freight exceed weight or size limitations of UPS or Parcel Post. Examples are TV's, some speaker systems, garage door mechanisms, antennas, etc. They are shipped with freight charges collect. If one item on your order is Motor Freight, all items will be shipped Motor Freight. Consult your local motor freight carrier for charges and type of service available in your area before ordering.
- **APO/FPO Shipments** - Use the following Zones to estimate costs: West Coast - Zone 8; East - Zone 5; Miami - Zone 6. PAL (Airlift Military) carries packages by air transport for a fee of \$1.00 per package plus postage. Parcel must weigh less than 30 lbs. and not exceed 60" in length and girth.
- **SAM** - Parcel must weigh less than 15 lbs. and not exceed 60" in length and girth. Check with your local postmaster for exceptions to certain APO or FPO numbers.



**IMPORTANT:**  
This product is designed for use in emergency vehicles. Consult authorities before installing or operating.

Highly efficient exterior horn.

Concealed grille horn.

Learn how auto electrical systems work

Over 600 visuals guide you

Accessories are included

### Ⓚ Siren/PA for mobile public services

**\$99.95**

- Includes new hi-to 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-to 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, Sirens, w/ 6 lbs.	99.95
GDA-18-1, Weatherproof Exterior Horn Speaker, assembled, 10 lbs.	99.95
Kit GDA-18-2, Concealed Grille Speaker, Sirens, w/ 10 lbs.	99.95
Kit GDA-1558-1, Emergency Lighting Relay, Sirens, w/ 1 lb.	4.95

### Ⓛ Electrical Systems Course to repair your car at home

**\$39.95**

- 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, Shipp. 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:  $\pm 3\%$  of full scale on any range. Meter Size: 8 inches. Scope Vertical Expand: Minimum 2 to 1. CRT Size: 12 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<sup>7</sup>/<sub>8</sub>" high x 25<sup>1</sup>/<sub>4</sub>" wide x 14<sup>1</sup>/<sub>4</sub>" 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 LCO 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  $\pm 0.2\%$ . Check idle speed in two tachometer ranges up to 10,000 RPM with an accuracy of  $\pm 0.1\%$ . Measure DC voltage in two ranges up to 200 volts at  $\pm 1.5\%$ , current to 20 amps with  $\pm 3\%$  accuracy and resistance to 2 megohms at  $\pm 1.5\%$ .

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.

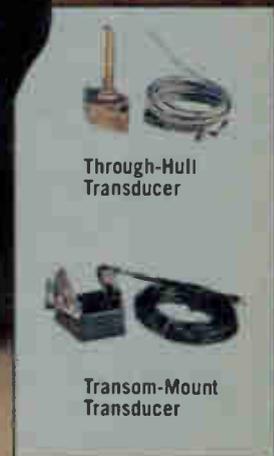
**Kit CM-1551**, Shpg. wt. 5 lbs. .... **129.95**

**CM-1550-1**, 400-Ampere Shunt, 1 lb. .... **15.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

AUTOMOTIVE/55





## 1 Automatic, dual-range Digital Depth Sounder has five alarm depths for assured safety

As low as **\$179<sup>95</sup>**

- Detects changes in depth from 2 to 499 feet
- Alerts you to depth changes both audibly and visually
- Built-in, adjustable keel offset for greater accuracy

Pays for itself if it sounds the alarm just once! A great aid for coastal navigation. Features self-adjusting range selection that monitors water's depth from 2' to 499'. Also has self-adjusting gain for accurate depth readings in fresh or salt water. Crystal oscillator updates depth readings every 0.9 seconds. Big, easy-to-read LCD display with automatic night light shows depths in 0.1' increments from 2' to 9.9' and in 1' intervals from 10' to 499'.

Has 5 alarm settings at 2', 4', 10', 20' and 40'. Built-in keel offset automatically subtracts displacement hull depths for exact depth readings. Made from weather-resistant materials. Back connector for MI-2917 or MI-2918 Remotes.

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

MI-2916 SPECIFICATIONS: Frequency: 200 Hz. Accuracy:  $\pm 5\%$ , 1 count Power: 10 to 17 VDC

## 2 Digital Remote Depth Sounder repeater station

Works off the MI-2916 model above, providing added alerting station. Has same display, all-weather sealed cabinet construction, audio-visual alarm, but with independent alarm/depth settings and keel-offset capability. Includes 25' connector cable. Same size as MI-2916, with tilting gimbal-mount bracket.

Kit MI-2917, Shpg. wt. 4 lbs. . . . . 69.95

## 3 Flush-mount Digital Remote Readout for sailboats

5" diameter, operates like MI-2917 as readout repeater. Requires MI-2916.

Kit MI-2918, Remote with visual-warning only, Shpg. wt. 4 lbs. . . . . 89.95  
 Kit MIA-2918-1, Audible warning alarm for MI-2918, Shpg. wt. 1 lb. . . . . 12.95

## 4 Low-cost Heathkit Digital Knotmeter/Trip Log

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

- Keeps track of nautical speed and distance with  $\pm 5\%$  accuracy; designed to be used on all types of hulls
- Designed to be used with all types of hulls
- Priced 50% lower than comparable-performing models

Upgrade your boat by installing the low-cost, but highly accurate Heathkit Digital Knotmeter/Trip Log. For sailors, it allows you to trim sails for maximum racing speed. For fishermen, it lets you control boat speed for best lure action, and mark distance to your favorite "hot spots." For powerboat owners, it improves navigation for reduced fuel consumption. And for water skiers, it lets you earmark speeds for safe towing of one or more skiers.

The most accurate knotmeter/log of its kind! The Heathkit digital Knotmeter/Trip Log features integrated circuits for precise speed and readouts. These circuits,

See our kits on display at Heathkit Electronic Centers Units of Veritechnology Electronics Corporation

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### St. Joseph, 49085

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 Suite 100  
 St. Joseph, 49085

using three active filters, constantly compute and update your average speed and distance every two seconds with  $\pm 5\%$  accuracy. Transducers for the MI-2956 and -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 that shows speed or distance. The readout is in three 1/2' digits, with automatic backlighting for night outings. With the flip of a switch, it will tell your speed in mph (or knots), from 0.1 to 40 mph; or tell you distance travelled from 0 to 99 miles (or nautical miles).

It's tough and durable: The housing, including the on/off and speed/distance switches, is completely sealed for protection against salt spray and corrosion.

It's available in two models: You can order the MI-2958 Knotmeter/Trip Log for your sailboat or the MI-2956 Knotmeter/Trip Log for power boats. What's more, you have a choice of transducers to correctly match the necessary transmitting unit to your individual preference, or according to the size of your craft.

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

## 6 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 1 3/8" transducer element.

Kit MIA-2900-1, Shpg. wt. 4 lbs. . . . . 39.95

## 7 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.

Underwater obstacles will trigger a bright neon flash alongside the perceived depth from the object on one of two circular scales. In addition to its use as a fine navigational instrument, a sensitivity control aids in discriminating between bottom readings and those returned by single or schools of fish.

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

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# Journey into the future with the complete HERO 1 robotics high-tech training system

HERO 1 trainer and companion courses provide an affordable first step into the world of robotics



HERO 1 -- the completely equipped robotics trainer

New optional remote control accessory

Padded gripper opens and closes up to 3 1/2 inches

Wrist rotates 350° and pivots 180°

Arm pivots 150° and extends up to 5 inches

Teaching Pendant controls all arm and body movements



Includes real time clock and calendar

Powered by four 3.8 amp-hour rechargeable gel-type batteries

Serial cassette interface

Phoneme synthesizer supplies voice and sound effects

Top-mounted bread-board for experiments and interfacing of user-designed circuits



Hexadecimal keypad to enter, verify and modify programs, and to select any one of seven modes

Sonar system determines range and direction of objects from 4" to 8"

Other sensing systems include sight, sound and motion detectors

Plug-in circuit boards easily snap in and out for convenient experimentation or maintenance

Front wheel provides drive and steering with 12" turning radius



## 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 in 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 44K with the addition of an optional memory expansion board and extra 8K RAM chips. 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. 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 finding 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. The motion detector senses movement up to a distance of 15 feet and the sonar system determines the range between objects and the robot.

**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. Accurate arm movements through five axes of rotation 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 through 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**

**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 Remote Control, Shpg. wt. 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 Remote Control, Shpg. wt. 5 lbs. .... **399.95**

**NEW! 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 Remote Control, Shpg. wt. 5 lbs. .... **399.95**

**ET-18-4**, Demo ROM, a plug-in ROM containing several routines demonstrating all of HERO 1's motor and sense circuits including voice, Shpg. wt. 1 lb. .... **49.95**

**ET-18-5**, Monitor ROM Listing, Shpg. wt. 1 lb. .... **39.95**

**NEW! ETA-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, 1 lb. .... **39.95**

**NEW! ET-18-6**, Memory Expansion RAM, an 8K x 8 random access memory chip that installs onto the ET-18-6 memory board, Shpg. wt. 2 lbs. .... **59.95**

**NEW! ET-18-7**, Automatic Mode ROM, a plug-in ROM that enables HERO 1 to move independently around a room while avoiding obstacles, 1 lb. .... **29.95**

**NEW! ET-18-10**, RS-232 Interface, allows serial communication between HERO 1 and a host computer, 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**

**SAVE \$50.00!** HERO 1 Robot kit including arm with gripper mechanism and phoneme-based voice synthesizer.

**Kit ETS-18**, Shpg. wt. 91 lbs. .... **\$1249.85 separately, NOW ONLY 1199.85**

## Companion home study courses provide training in the basic technology of robotics

### 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.

**These subjects are covered in the Heathkit/Zenith Robotics Course:**

1. Robot Fundamentals
2. AC and Fluidic Power
3. DC Power and Positioning
4. Microprocessor Fundamentals
5. Robot Programming
6. Heathkit/Zenith Robot Microprocessor
7. Data Acquisition (Sensors)
8. Data Handling and Conversion
9. Voice Synthesis
10. Interfacing
11. Industrial Robots at Work

**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**

**NEW! E8-1802**, HERO 1 Advanced Experiments, over 60 challenging and fun experiments in programming HERO 1, Shpg. wt. 1 lb. .... **24.95**

### 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.

**These subjects are covered in the Robot Fundamentals Course:**

1. Management Considerations
2. Environmental Feedback
3. Vision Systems
4. Tactile Sensing
5. Computer Aided Manufacturing (CAM)
6. 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**

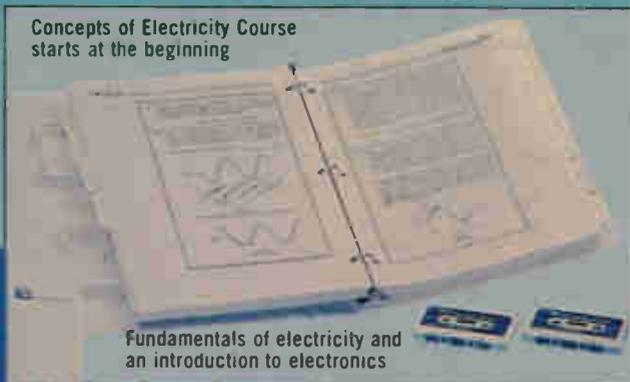


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EDUCATION/59

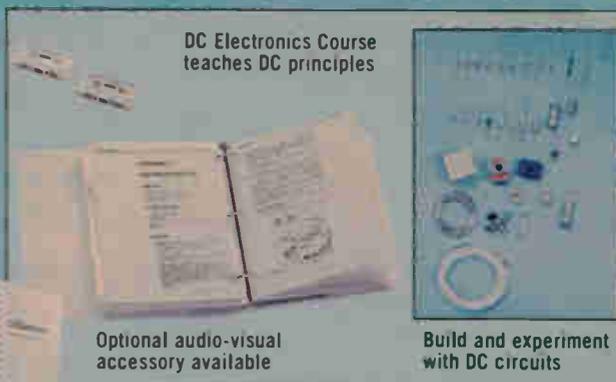
# Develop a solid foundation for all your studies in electronics with these entry level courses

Concepts of Electricity Course starts at the beginning



Fundamentals of electricity and an introduction to electronics

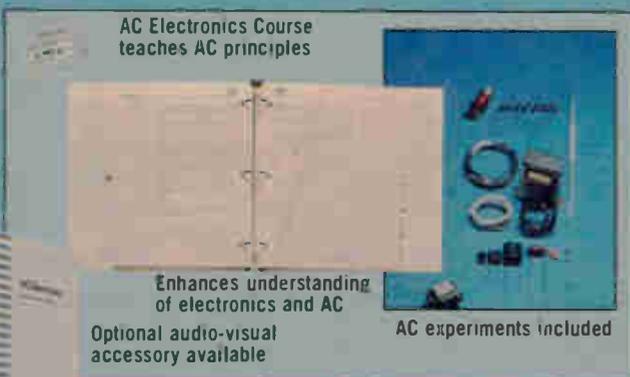
DC Electronics Course teaches DC principles



Optional audio-visual accessory available

Build and experiment with DC circuits

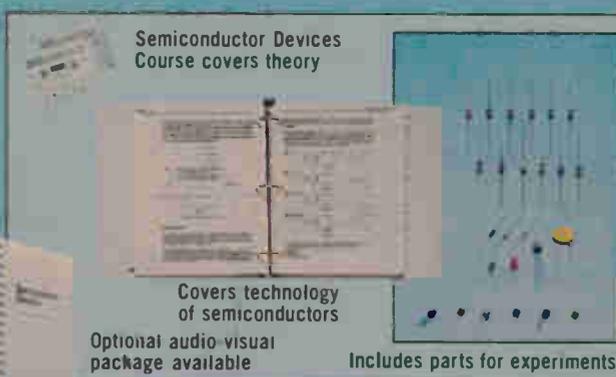
AC Electronics Course teaches AC principles



Enhances understanding of electronics and AC  
Optional audio-visual accessory available

AC experiments included

Semiconductor Devices Course covers theory



Covers technology of semiconductors  
Optional audio-visual package available

Includes parts for experiments

## 5 Increase your learning success with hands-on experiments

**\$99<sup>95</sup>** ET-3100B Experimenter and Trainer

Compact, rugged, reliable and versatile, experimental and circuit design tool

Variable power supplies and 200 Hz 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 electronic technical terms in 532 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, Ship. 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 unit 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 DC and AC, 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 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 in 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

## 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 of 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



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.



### 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 70 to 74 (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.

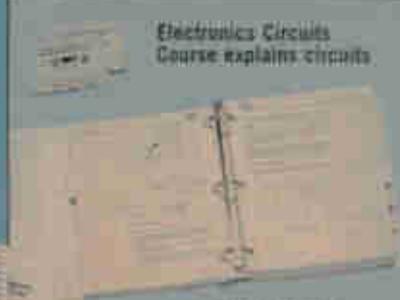
ECC-3101, ECC-3102, ECC-3103, ECC-3104, ECC-3105, ECC-3201, ECC-3401, ECC-1100, Shpg. wt. 1 lb. each . . . . . each 25.00



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska, Hawaii and Michigan Residents Call: 616-982-3411.

# Continue your education in the fundamentals of electronics with these challenging courses

**Electronics Circuits Course explains circuits**

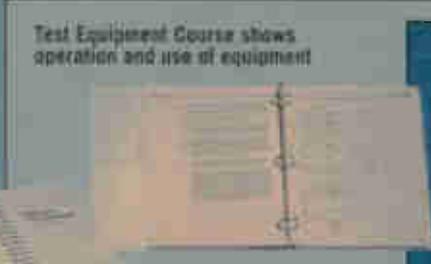


**Optional audio-visual package**



**Parts for experiments**

**Test Equipment Course shows operation and use of equipment**



**Uses optional audio-visual package**



**Includes all parts for experiments**

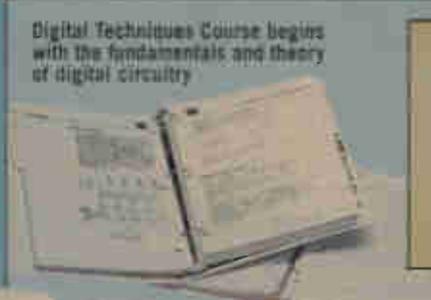
**Electronic Communications Course covers wide area**



**All parts included for experiments**



**Digital Techniques Course begins with the fundamentals and theory of digital circuitry**



**Optional audio tapes**



**All electronic parts needed for 24 experiments**

**ET-3200B Trainer with test lab features**

**\$99.95 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  $\pm 5$  VDC. Solderless breadboard sockets accept 14- or 16-pin dual in-line ICs and 24-, 28-, or 40-pin DIPs. Also four binary data switches, two no-bounce logic switches, three-frequency pulse clock generator, and more.

Kit ET-3200B, Shop wt. 6 lbs. **99.95**

ETW-3200B, Assembled and tested, Shop wt. 6 lbs. **179.95**

**CMOS Course stresses practical application**



**\$89.95 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-3202A Course or equivalent knowledge is a prerequisite. Earn 3.0 CEUs.

EE-3202A, Shop 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 VQM 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**

## 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**



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EDUCATION/63

Heathkit

Train

Educational  
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International Award  
Society for Technical  
Communication

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



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 bread-  
boarding sockets

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.

ET-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.

ET-3401A, Shpg. wt. 46 lbs. .... **ONLY 494.85**

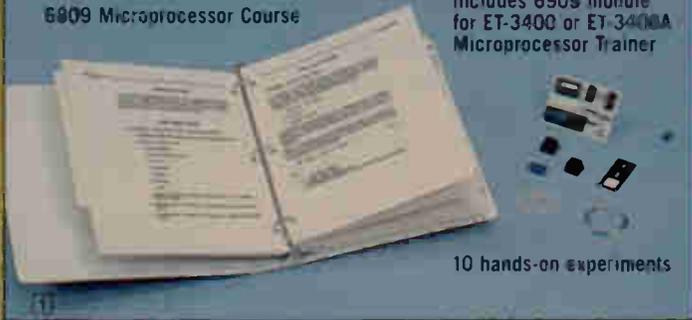


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EDUCATION/65

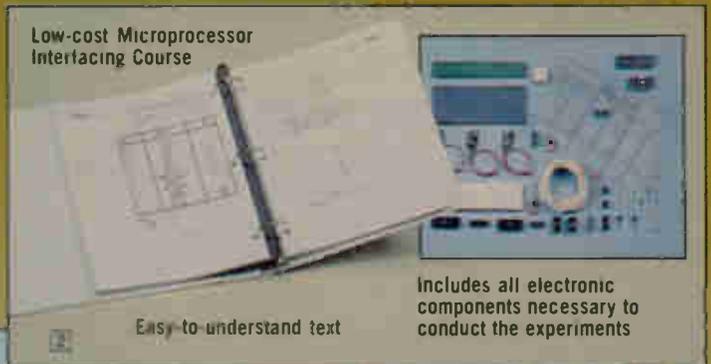
### 6909 Microprocessor Course

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

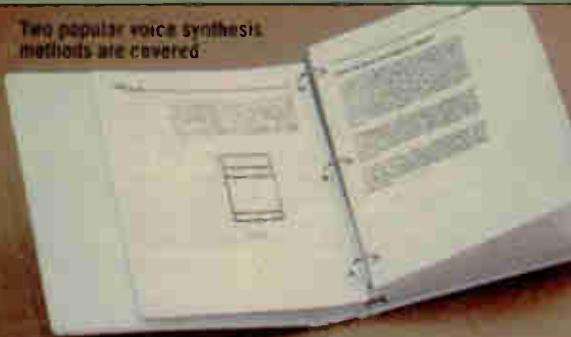
## SAVE \$30.00 on a complete microprocessor education with these Courses and Trainer



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



3

Voice Synthesis Course teaches digitized and phoneme voice techniques in an easy-to-follow format with experiments

**\$129<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

## Expand your digital and microprocessor knowledge with these four courses

### 1 6809 Microprocessor Course with Trainer adapter

**\$99<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. .... 99.95

### 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 your 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

- Put previous microprocessor knowledge to work in real-world situations
- Learn how microprocessors can sense and control events in analog world
- See practical demonstrations of microprocessor use in 13 experiments

**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.

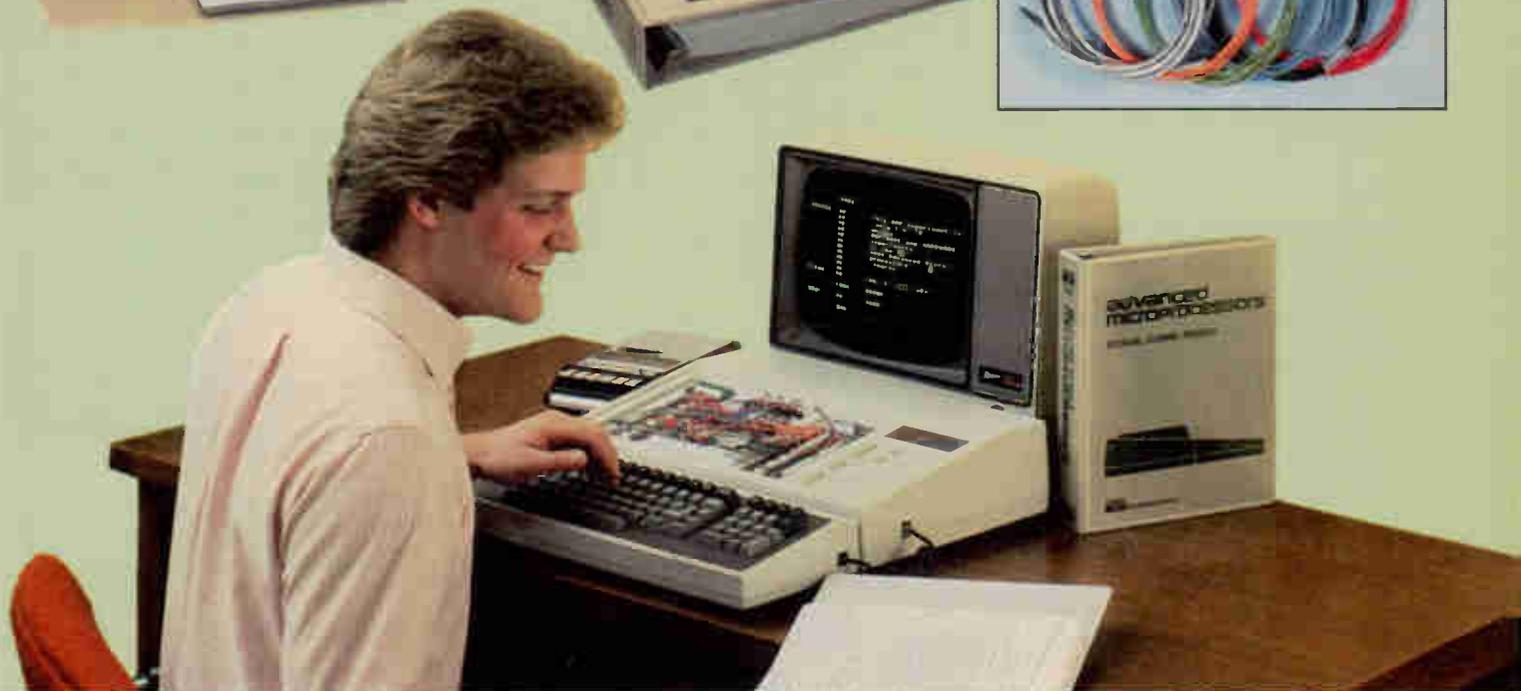
**To perform the 13 experiments in this Course**, you'll need the ET-3400 or the ET-3400A Microprocessor Trainer featured on page 65, plus a VOM and an oscilloscope. You should also complete the EE-3401 Microprocessor Course, also on page 65, and the EE-3402 Microprocessor Interfacing Course on this page or have an equivalent knowledge before attempting this Course.

EE-3405, Shpg. wt. 10 lbs. .... 99.95



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EDUCATION/67



# 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/Z-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**

### One-binder text

Includes parts

### Credit earning course

Passive Circuit Design Course teaches fundamentals of design

Transistor Circuit Design Course shows how to design useful circuits

### Build your own circuit boards

Includes everything you need to make your PC boards

Clearly illustrated text shows detailed steps of every process

Actually build two kits that can be very useful

### Learn the basics

Two textbooks and parts for experiments

Printed Circuits Course shows techniques of circuit board building

Electronics for Hobbyist Course for basic knowledge usable in many fields

### Function generator

## 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 bread-boarding 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

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EM-5, Shpg. wt. 7 lbs. .... 24.95

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ECP-3804, Assembled, Shpg. wt. 3 lbs. .... 139.95  
Premium quality 30-minute cassette tapes.

ECP-3802, Three cassettes, Shpg. wt. 3 lbs. .... 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, clampers, 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 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-resist pen, run-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

## 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 is 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 is 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

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EDUCATION/71



## Advanced Electronics Series



1 Optoelectronics Course



3 Phase-Locked Loops Course



2 Active Filters Course



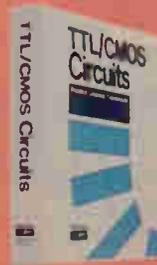
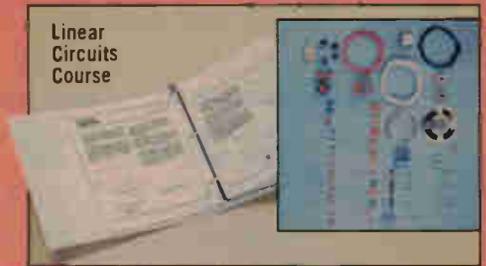
4 Operational Amplifiers Course



5 I.C. Timers Course



Linear Circuits Course



TTL/CMOS Circuits Course



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

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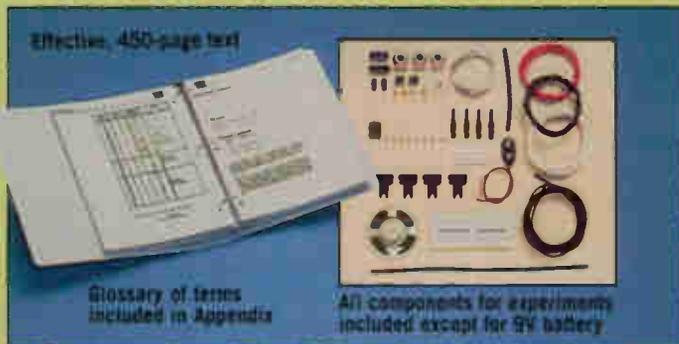
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Managers, engineers, students and hobbyists will benefit from this broad, in-depth introduction to the fascinating and challenging science of lightwave technology. Fiber optics is an important, future-shaping breakthrough in rapid signal transmission 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.

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- Designed for a computer user to be more productive wherever or whenever the need arises
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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, optionally, an extensive disk-based set of diagnostics. The diagnostic floppy disk is included 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 for 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 45) that allows you to use all the applications software developed for the IBM-PC. Several software packages can be found on pages 78-81.

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**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

**Data Systems** ZFA-161-21, Assembled Portable Computer with non-glare 9" amber CRT, 128K RAM, one 5.25" disk drive, 70 lbs. .... 2399.00

**Data Systems** ZFA-161-52, Assembled Portable Computer with non-glare 9" amber CRT, 320K RAM, two 5.25" disk drives, 70 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.

**An all-metal chassis** with decorative bezels blends strength and superior styling into the HS-151 PC. Operates on 120/240 volts AC at 50/60 Hz.

**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

**Data Systems** ZF-151-21, Assembled Low-Profile Personal Computer, 128K RAM, one 5.25" disk drive with 360K storage, 38 lbs. .... 2199.00

**Data Systems** ZF-151-52, Assembled Low-Profile Personal Computer, 320K RAM, two 5.25" disk drives with 640K storage, 41 lbs. .... 2799.00

**Data Systems** ZW-151-52, Assembled Low-Profile Personal Computer, 320K 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

**Second Optional 5.25" Disk Drives** are available by visiting your local Heathkit Electronics Center or calling 800-253-7057 from 8 AM to 6 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 6 PM EST Mon-Fri.

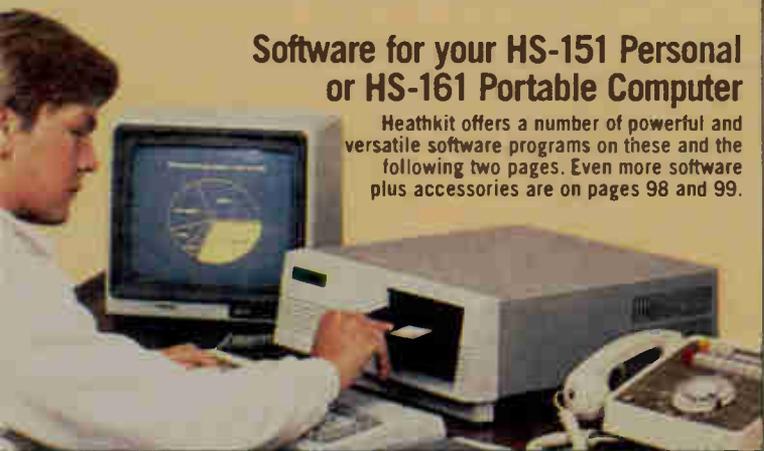
**HS-151 and HS-161 SPECIFICATIONS:** Processor: Intel 16-bit 8088 Clock: 4.77 MHz. On-Board Memory: 128 KB standard expandable to 320 KB on main board, up to 640 KB total memory via expansion slot. VIDEO DISPLAY: CRT (HS-161 only): Non-glare 9-inch diagonal, amber phosphor. Display Format: 25 lines 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 unformatted, 10.68 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 1/2" 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

- Combines uniquely powerful features with exceptional ease of use
- Design and specify formats in advance to standardize documents

**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.

**Packed with an array of powerful and convenient features**, Word taps the increased power and advanced features of the HS-151 Personal Computer and the HS-161 Portable Computer. Powerful editing and formatting features enable you to undo your last command and handle footnotes and titles very conveniently. While you are doing this, your text remains neatly aligned even during the heaviest editing. Give memos and reports a consistent and distinctive style.

**On-screen formatting features** let you see what your document will look like on paper. See boldface appear as high-intensity characters on your display. Other formatting options include italics, underlining, strike-through, small caps, double-spacing, centering and more.

**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 the MS-DOS operating system. Word lets you print your documents on most of the commonly used impact and dot matrix printers and has the capability to support the most sophisticated laser printers and typesetting equipment.

**MS-5063-9**, Shpg. wt. 3 lbs. .... 375.00

### Analyze data faster and easier with Multiplan\*

- A second-generation spreadsheet that's as easy to use as it is useful

**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.

**Multiplan is easy to use**. Use English commands and formulas, like Sales = Costs = Profits, to take the mystery out of spreadsheet use. Extensive on-line help screens get you through problems or any questions about a procedure. Multiplan even checks your commands to make sure that you don't jeopardize your current worksheet or data. This program is easy to master, even if you're a novice.

**A sophisticated worksheet**, Multiplan incorporates all the basic spreadsheet functions, as well as several new ones. One of its impressive abilities allows you to link information between different spreadsheets so that when one is changed, the others are also affected. Another capability is sort, which allows you to sort either alphabetically or numerically. Multiple sorts are also possible, where each sort sheet can be saved separately. Two other extremely flexible features are the alignment and format functions. Multiplan also allows you to consolidate two or more worksheets for increased efficiency.

**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

## 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

- Features high resolution graphics and data management capabilities

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. View or plot data using pie, line, area, bar, stack bar, hi-lo or x-y graphs. SuperCalc<sup>3</sup> makes excellent use of color, including the display of negative numbers in red. Data-management capabilities allow finding and extracting records from within a spreadsheet.

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

### PeachText 5000\* helps to improve your efficiency

- Word processing, financial modeling and basic data management

**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 Electronics Centers\* nationwide. This product is not available via mail order.

**LS-5063-1**, Shpg. wt. 3 lbs. .... 495.00

\*Microsoft, MS, Multiplan and Gali are trademarks of Microsoft Corp. PeachText 5000 is a trademark of Peachtree Software Inc. LOTUS 1-2-3 is a trademark of Lotus Development Corp. Heathkit Electronics Centers are units of Heathkit Electronics Corp.

# 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.

## General Accounting is more than a general ledger

- Has all the features you'll need to run a business in one program

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.

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

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.

BP-5063-2, Shpg. wt. 3 lbs. .... 595.00

## Accounts Payable computerizes vendor control

- Eliminate time spent on figuring payments and when they are due.

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 distributing invoice amounts to accounts.

BP-5063-3, Shpg. wt. 3 lbs. .... 595.00

## Payroll program simplifies your company's payday

- Use several options to tailor a payroll system to your company

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.

BP-5063-4, Shpg. wt. 3 lbs. .... 595.00

## Inventory Control for versatile inventory management

- 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.

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.

BP-5063-6, shpg. wt. 3 lbs. .... 795.00

## Information Management, a powerful and flexible tool

- Enables you to store, retrieve, analyze and report information

Information Management lets you manipulate data in ways you've never thought possible. This software program enables you to quickly and easily design data bases that are compatible with your needs both at home and in the office. Store large amounts of information and design your own files and reports. Create math formulas and employ statistical analyses, and then display the results in graph, table, or chart form. Edit information in a file at any time without rebuilding it. Use this program to search, retrieve and compare information using any criteria you desire. Then display and printout all your information in any format you choose. Also, merge data and text files. In addition to being a computerized filing system, Information Management is also a word processing system for designing your own reports which can be merged with data files.

BP-5063-7, Shpg. wt. 3 lbs. .... 425.00

## 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

# 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 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. 3 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. 3 lbs. .... 195.00

\*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 to you a fast and powerful system for communicating and sharing information

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. Place your computers wherever you wish as long as you maintain at least 3 feet of cable between each one and not exceed a total cable length of 1000 feet.

**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. Each end of a network must have a Terminator attached (see accessories at the bottom of the page).

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 all HS-151 Personal and HS-161 Portable Computers of a network to use the resources of a hard disk drive subject to network control and security. Even install additional peripherals, like extra disk drives, onto the server for all network users to share.

**EtherShare consists of two complementary parts,** server software and user software. The server software runs on the network server or computer with the hard disk drive. It allows others 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 user software runs on the other computers connected into the network and allows them access to the disk or printer of the server 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. .... 499.00

### 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. A screen-oriented message editor makes it easy to enter and edit text. Other word processing features include: word wrap, automatic insert, block move, copy and delete.

**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.

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. Loaded into the server computer, EtherPrint allows many users to share the same printer without having to wait. Program, data and text files are stored and then printed out when the printer is available in the order they are received, a first-in first-out basis.

**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, 4 lbs. .... 50.00

TC-5063-7, Ethernet Terminator, 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. It is an asynchronous communications program that allows you to take maximum advantage of information services, time sharing systems and computerized bulletin boards.

**Communicate at up to 9600 baud** with other computers and easily transfer entire files. To run this CPS software, an HS-151 or HS-161 requires 128K of RAM, one 5.25" disk drive and the MS-DOS operating system.

CB-5063-7, Shpg. wt. 2 lbs. .... 40.00

## HS-151 and HS-161 Personal Computer Diagnostic Disk

**Reduce service costs and minimize hardware downtime** with this specially useful Diagnostic Disk. The programs contained on this 5.25" floppy disk are designed to operate with a minimum of operator interaction. With a single keystroke test all portions that can be accessed without operator input. If a fault is found, an alarm sounds and the problem is displayed on-screen where it can be transferred to a printer. All tests can be run from 1 to 99 times or continuously. Requires a computer with 128K of RAM and one disk drive.

CB-5063-13, Shpg. wt. 3 lbs. .... 79.00

## Use the advanced MS-DOS Version 2 operating system

This enhanced operating system combines many new features with the efficient disk handling capability and peripheral support of previous versions. Some of these are: subdirectories, input/output redirection and pipes and filters. Standard with this product are data encryption program facilities, a print spooler and a solid state memory driver. To use MS-DOS Version 2, an HS-151 or HS-161 Computer requires 128K of RAM and one 5.25" disk drive.

OS-63-50, Shpg. wt. 5 lbs. .... 150.00

## High-level GW\*-BASIC computer programming language

**Includes many new commands and enhanced features,** like: a full screen editor with extensive program editing capabilities, four variable types, a trace facility, error trapping, PEEK, POKE, automatic line numbering, arrays with up to 255 dimensions, Boolean operators, formatted output using a complete print facility, direct access to 65535 I/O ports, event trapping and more.

**To use GW-BASIC,** an HS-151 Personal or HS-161 Portable Computer requires the MS-DOS operating system and one 5.25" disk drive.

MS-5063-1, Shpg. wt. 3 lbs. .... 100.00

## Popular FORTRAN for science and engineering programs

**Rigorous rules of syntax** allow the programmer to fully define the characteristics of a solution to a problem in a series of precise statements. This version of FORTRAN conforms to the ANSI X3.1978 standard (including most of the features of FORTRAN-77 except the COMPLEX data type).

**An HS-151 or HS-161 Computer requires** 192K of RAM, one 5.25" disk drive (two are recommended) and the MS-DOS operating system.

MS-5063-2, Shpg. wt. 4 lbs. .... 195.00

## Powerful COBOL business programming language

**Certified with the Federal Compiler Testing Center** at the Low intermediate level of compliance with the ANSI X3.23-1974 standard, this version of COBOL is an extensive implementation of the COBOL language for microcomputers. Large programs are managed effectively because data and procedures can be hierarchically structured for efficient, clean, top-down design. COBOL requires an HS-151 Personal or HS-161 Portable Computer with 192K RAM, one 5.25" disk drive (two are recommended), and the MS-DOS operating system.

MS-5063-3, Shpg. wt. 4 lbs. .... 395.00

## Structured high-level Pascal programming language

**Use the 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. It gives you single and double precision IEEE floating point arithmetic and numeric operations that take advantage of the 8087 microprocessor. To run this version of Pascal, an HS-151 Personal or HS-161 Portable Computer requires 192K of RAM, one 5.25" disk drive and must be using the MS-DOS operating system.

MS-5063-5, Shpg. wt. 4 lbs. .... 295.00

\*GW is a trademark of Microsoft Corporation

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/Z-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/Z-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 Centronics-type 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 Z-DOS™ MS-DOS operating system. LOTUS® 1-2-3 is included with fully assembled Z-100s.

**Heathkit** Kit HSA-1121-21, Monochrome graphics, non-glare amber CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. .... **2149.00**

**Heathkit** 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, Z-DOS, 114 lbs. .... **2449.00**

**Heathkit** Kit HSG-1121-21, Monochrome graphics, non-glare green CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. .... **2149.00**

**Heathkit** Kit HSG-1121-22, Monochrome graphics, non-glare green CRT, 128 KB RAM, two 320 KB 5.25" drives, Z-DOS, 114 lbs. .... **2449.00**

**Heathkit** Kit HSW-1121-21, Monochrome graphics, non-glare white CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. .... **2149.00**

**Heathkit** Kit HSW-1121-22, Monochrome graphics, non-glare white CRT, 128 KB RAM, two 320 KB 5.25" drives, Z-DOS, 114 lbs. .... **2449.00**

**Zenith data systems** ZFG-121-32, Assembled All-In-One H-100, 12" green CRT, 192 KB RAM, two 320 KB 5.25" drives, 68 lbs. Mrt. 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 PeachText 5000 and LOTUS 1-2-3™ business packages described on page 36.

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**

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 Z-DOS MS-DOS operating system. Learn more about this operating system from the EC-1121 MS-DOS Course on page 103. H-100 Computers also operate under the CP/M operating system for access to an even wider range of applications software.

**Heathkit** Kit HS-1101-21, Low Profile, monochrome graphics, 128 RAM, one 320 KB 5.25" drive, Z-DOS, 78 lbs. .... **1999.00**

**Heathkit** Kit HS-1101-22, Low-Profile, monochrome graphics, 128 KB RAM, two 320 KB 5.25" drives, Z-DOS, 83 lbs. .... **2299.00**

**Zenith data systems** ZF-101-31, Assembled Low-Profile, monochrome graphics, 192 KB RAM, one 320 KB 5.25" drive, 54 lbs. .... **3029.00**

**Zenith data systems** 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. .... **165.00**

**NEW!** Z-216, 8087 Numeric Co-Processor, 2 lbs. .... **379.00**

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.

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 Desktop Computer with internal 11 MB Winchester disk drive, one 320 kilobyte 5.25-inch floppy disk drive, 192 kilobytes of RAM, color graphics capability, 55 lbs. .... **5499.00**

**ZWG-121-32,** Assembled and tested All-In-One Desktop Computer with internal 11 MB Winchester disk drive, one 320 kilobyte 5.25-inch floppy disk drive, 192 kilobytes of RAM, non-glare green CRT, Shpg. wt. 70 lbs. .... **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

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 factory assistance (page 52).

HS-217, For models with full height drives, 33 lbs. .... **1799.00**

HS-217A, For models with half height drives, 30 lbs. .... **1799.00**



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.

\*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.

COMPUTERS/83



## 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.



### 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/Z-DOS operating system. A printer is needed for screen copies.

RG-463-1, Shpg. wt. 5 lbs. .... 449.00



### 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/Z-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



### 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



### 16-bit MS-DOS/Z-DOS Version 2 and 8-bit CP/M

- Two operating systems that offer disk file handling efficiency and versatile peripheral support

MS-DOS/Z-DOS Version 2 provides a number of significant improvements over previous versions of the MS-DOS/Z-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. To learn more about MS-DOS/Z-DOS take the EC-1121 MS-DOS Course on page 103.

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

## 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. It's file structure is compatible with that of 8-bit CP/M (OS-53-2 on this page).

CP/M-86 manages up to a full megabyte 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.

In three steps create graphs the way that you want them and do it quickly and efficiently. Gather your data, design your chart, and then display it. It's that easy with Z-Chart whether you're a novice or an expert computer user. Many options are available from easy-to-understand menus offered in these three steps for a wide range of possible graph representations. And, you can create graphs from data entered from other sources like: Condor\* data bases, Multiplan\* and SuperCalc\* spreadsheets, and WordStar\* documents.

Z-Chart is a series of programs written to take full advantage of the H/Z-100 Desktop Computer's keyboard, screen and versatile design.

Running Z-Chart requires an H/Z-100 Computer with 128K of RAM, at least one 5.25" disk drive, the MS-DOS/Z-DOS operating system and Z-BASIC.

CB-463-11, Shpg. wt. 3 lbs. .... 150.00



## 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 Reading 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.



## Pascal/MT+ programming language for CP/M

- A full implementation of the standard Pascal programming language with several added enhancements

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. The additions fall into four categories: enhanced input/output, additional data types, access to the run-time system, and modules and overlays. This system can generate software for use in a ROM-based environment to use with or without an operating system.

DR-253-5, Shpg. wt. 5 lbs. .... 349.00



## Zenith Local Area Network connects H/Z-100s

- ZLAN software enables 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 one H/Z-100 Computer equipped with a version 2.5 monitor ROM, a Winchester drive, a 256K Memory Upgrade Board (Z-205, page 83), a ZLAN Network Card (NET-100-1 below), and the Server software package. To complete the network you'll need at least one H/Z-100 Computer with a 5.25" disk drive, an installed ZLAN Card, and the Node software package (under Z-DOS Vers. 1.25). Other H/Z-100 Computers added into the network must also have this hardware and software combination.

CB-463-20, Server Package, Shpg. wt. 3 lbs. .... 899.00

CB-463-21, Node Package, Shpg. wt. 3 lbs. .... 149.00

## Local Area Network Interface Card for ZLAN software

Used with ZLAN to form an H/Z-100 Computer network. Completely assembled and tested Card enables interfacing of up to 255 properly equipped computers.

NET-100-1, Shpg. wt. 3 lbs. .... 499.00

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/Z-DOS operating system. Multiplan 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/Z-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/Z-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/Z-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/Z-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/Z-DOS operating system.

MS-463-5, Shpg. wt. 4 lbs. .... 295.00

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## 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

- Five interrelated business programs in one low-priced package
- A powerful applications package with menu-driven features, easy-to-use documentation and quick access to help messages

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 use in a variety of applications. Gain a greater degree of control and flexibility in your work.

For an H/Z-100 Computer to run PeachText 5000, 128K of RAM, two 5.25" disk drives and the MS-DOS/Z-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

- An extraordinary combination of spreadsheet, graphics and data base functions in one attractive and versatile package
- Menu-driven with an extended series of help screens, alternative ways of performing tasks, and excellent on-screen tutorial lessons

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/Z-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

- See on-screen exactly what you print including special print effects
- User-friendly features like simple commands and instant response
- Use with MailMerge and SpellStar options for increased capability

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 plus many more printers are supported. This version has the ability to use the optional Z-205 256K RAM-Upgrade board in the H/Z-100 as a RAM disk. For color equipped computers, color can be specified for text and menu prompts.

To use WordStar, an H/Z-100 Computer requires one 5.25" disk drive and the MS-DOS/Z-DOS operating system. A letter-quality printer is recommended.

MP-463-10, Version 3.3, Shpg. wt. 4 lbs. 399.00

### MailMerge\* combines files with WordStar documents

- Insert the contents of any file into a printed document
- 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/Z-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. 139.00

### SpellStar\* checks WordStar files for spelling errors

- Original dictionary consists of approximately 20,000 words that can be added to at any time or create your own specialized word list

SpellStar 3.3 rapidly checks WordStar files and labels or adds words to dictionary as desired. Create specialized dictionaries. Requires MS-DOS/Z-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. 249.00

PeachText 5000, PeachText, and PeachCalc are trademarks of Peach Tree Software, Inc. Random House Electronic Thesaurus is a trademark of Random House, Inc. MS-DOS is a trademark of Microsoft. Lotus 1-2-3 is a trademark of Lotus Data Systems Corp. WordStar, MailMerge and SpellStar are trademarks of Micropro International Corp. Lotus 1-2-3 is a trademark of Lotus Development Corp.



### SuperSort for powerful, yet easy-to-use sorting

- Superior sorting, merging, and selecting power in a simplified, ready-to-run package

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 is needed along with the MS-DOS/Z-DOS operating system. For printouts, a printer with form feed control is required.

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/Z-DOS.

SC-463-1, Shpg. wt. 4 lbs. 195.00



### dBASE II management system from Ashton-Tate\*

- Relational data base management system handles your most complicated inventory control problems

Quickly and easily create a full information system that does exactly what you need and let's 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/Z-DOS operating system.

AT-5065-1, Shpg. wt. 4 lbs. 495.00

### Condor\* Relational Date 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 in your own format then print them out using left or right justification.

An H/Z-100 Computer requires two 5.25" disk drives, a minimum of 128K RAM and the MS-DOS/Z-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
- Effortlessly store, sort, recall and print out information

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/Z-DOS.

CD-463-2, Shpg. wt. 4 lbs. 299.00



### Pecon Peachtree\* to Condor Interface System

- Another business tool to use in managing your business allows the interchange of data between software packages

With Pecon you can transfer the data from master and transaction files in Peachtree accounting files to data bases that can be processed under either the Condor file management system or DBMS.

An H/Z-100 Computer with 192K of RAM and two 5.25" disk drives operating under MS-DOS/Z-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 Sorbus Corp. Ashton-Tate is a trademark 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/Z-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/Z-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/Z-DOS operating system.

TA-463-2, Shpg. wt. 2 lbs. .... 100.00



### H/Z-100 Remote Batch Terminal Emulator

- For distributed processing, remote job entry, and more
- Transmit and receive data over telephone lines using bisynchronous protocol

**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. And, combine some of the better features of each.

**Capabilities:** A baud rate of 2000, 2400 and 4800; EBCDIC or ASCII transmission code; error detection; Bell 201A3, 201C, 208A and B compatible; half or full duplex; point-to-point data link control; synchronous EIA RS-232C communications; up to 12 character terminal ID; auto-answer; and more.

**What you need:** On an H/Z-100 Computer, 128K of RAM and one 5.25" disk drive along with the MS-DOS/Z-DOS operating system.

WI-463-1, Shpg. wt. 4 lbs. .... 899.00



### 3270 Emulator emulates 3270 display station

- Runs on either leased line or dial-up configurations
- Features unique 25th-line display of system functions

**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.

**Features:** The emulator runs on either leased line or dial-up configurations using BSC multidrop data link procedures and operates at the baud rate of your attached modem. It converts the ASCII alphanumeric character set used by the H/Z-100 into the EBCDIC character set used by the 3270 display system for communications. Special key labels are provided to show you the relationship between emulator keys and the IBM display station keys. A unique 25th line display indicates 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. The MS-DOS/Z-DOS operating system is also required. To emulate an IBM 3276 Control Unit Display, a printer is needed.

PO-463-1, Shpg. wt. 2 lbs. .... 650.00



### Use Microstat to perform statistical tests

- 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/Z-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

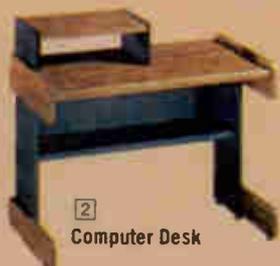


## Beautiful computer workcenter furniture for your own home or private office

Modular furniture pieces enable you to create a workcenter to fit your needs and your computer system. Cantilever design provides strength for heavy loads and ample leg room for freedom of movement. Attractive wood grain and black finish blends with any decor.



**1** Computer Hutch Workcenter



**2** Computer Desk

### **1** Computer Hutch

**Features:** Companion hutch to PF-125 Desk has easily adjustable shelving, spacious full-length bookshelf, and lower storage shelf

PF-126, Shpg. wt. 33 lbs. . . . . 79.95

### **2** Computer Desk

**Features:** Accommodates computers and all peripherals, back opening for printer paper, storage shelf, monitor platform

PF-125, Shpg. wt. 51 lbs. . . . . 119.95

### **3** Large Computer Desk

**Features:** Locking security cabinet, large 44" x 27" work area, storage shelf, rear panel wire harness clips.

PF-130, Mtr. Frt. 85 lbs. . . . . 169.95

### **4** Hutch for Large Desk

**Features:** Easily attaches to Computer Desk, adjustable monitor and storage shelves, 11 1/2" deep book shelf.

PF-131, Shpg. wt. 46 lbs. . . . . 99.95

### **5** Roll-Around Printer Stand

**Features:** Dual-wheel casters for mobility, full-length storage shelf, back opening for printer paper delivery, spacious 28" x 19" table top area.

PF-120, Shpg. wt. 35 lbs. . . . . 79.95

### **6** Add-On Monitor Platform

**Features:** Holds 13" video display monitors, can be used with Large Computer Desk or Roll-Around Printer Stand

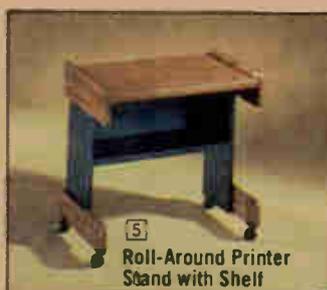
PF-132, Shpg. wt. 6 lbs. . . . . 17.95



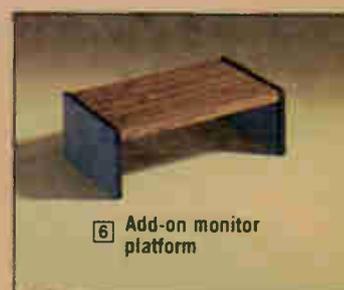
**3** Large Computer Desk with shelf



**4** Large add-on Hutch for Computer Desk



**5** Roll-Around Printer Stand with Shelf



**6** Add-on monitor platform

# 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. 99 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, 2 lbs. .... 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

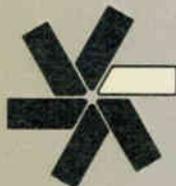
**Heathkit** Kit HS-207-42, Eight-Inch Floppy Disk System with two 8" disk drives, 2.5 MB of data storage, Shpg. wt. 69 lbs. .... 1599.00

**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.

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## 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  
**\$899<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/Z-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.

 **Kit HS-89-2, All-In-One Computer with anti-glare green CRT.** Shpg. wt. 96 lbs. .... **Was \$1049.95, NOW ONLY 949.95**

 **Kit HS-89-3, All-In-One Computer with standard white CRT.** Shpg. wt. 96 lbs. .... **Was \$999.95, NOW ONLY 899.95**

 **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:** 6 1/4" H x 8 1/4" W (16.5 x 21.6 cm) **Character Size:** Approximately 1/4" H x 1/4" 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:** 300 RPM ± 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

double 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
		HS-77-2	—	Two H-17-1 (Single-Sided)	47 lbs.	659.00
200K bytes	320K bytes	—	Z-87-89 for H-Z-89		Two H-17-1 (Single-Sided)	30 lbs.
		—	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



## 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.

**HOS-8917-2, CP/M-80 on hard-sectored 5.25" disk, Shpg. wt. 5 lbs. ... 150.00**

**HOS-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

## SOFTSTUFF Quality software tools to fit your budget

**H-DOS - 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-DOS 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**

### 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.

**HOS-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.

**HOS-8937-3, UCSD P-System on soft-sectored 5.25" disk, 7 lbs. .... 495.00**

\*H-DOS is a trademark of Heath Company

### 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 "now 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, strikethrough, 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.

## MICROSOFT SOFTWARE SUBLICENSER GRANT FORM

(Check all boxes which apply, sign and return to HEATH COMPANY (HEATH).  
 A Sublicense Grant form must be used with each future SOFTWARE order.)

- |                                                   |                                                      |
|---------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> Microsoft BASIC Compiler | <input type="checkbox"/> Microsoft BASIC Interpreter |
| <input type="checkbox"/> Microsoft COBOL          | <input type="checkbox"/> Microsoft FORTRAN           |
| <input type="checkbox"/> Microsoft MACRO-20       |                                                      |

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HEATH COMPANY  
 BY \_\_\_\_\_

*Jay A. Jarrett*

866

ACCEPTED AND AGREED:  
 CUSTOMER'S SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

# 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.

**Expressions available:** C BASIC statements and commands include string constants, integers and real numbers, identifiers, variable and assign statements. Some extended features include the IF, THEN, ELSE and WHILE constructs, integer variables, multiple line functions, and more.

**Hardware and software requirements:** To run C BASIC, and 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 of 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 mathematical and scientific 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

## Emulator software for H/Z-89s and Z-90s

**Remote Batch Terminal Emulator:** Adds IBM 3780, 2780, 3742 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, Save \$50, HWI-8917-1 and Z-89-11 I/O, 12 lbs. ... 995.00

**3720 Emulator:** Adds popular IBM 3720 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, Save \$51, HPO-8917-1 and Z-89-11 I/O, 3 lbs. ... 749.00  
HPO-8937-2, Save \$51, HPO-8937-1 and Z-89-11 I/O, 3 lbs. ... 749.00

## 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 I/O port for use with parallel printers. Needs CP/M.

Z-89-11, Assembled, Shpg. wt. 1 lb. .... 99.95

type. This means you can take advantage of the many utility and applications programs already written in the FORTRAN language.

**Interpreter features:** Relocating Assembler, cross-reference generator for sorting, and a linkage editor to generate runnable load modules.

**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, 4 lbs. . 195.00  
H-8-20, Vers. 3.4 on hard-sectored 5.25" disk for H-DOS, 4 lbs. .... 175.00

## Microsoft BASIC Compiler speeds program execution

- Compile your programs with this MBASIC 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 reordered 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, an 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-837-41, On soft-sectored 5.25" disk for H-DOS, 5 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 of 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-837-51, On soft-sectored 5.25" disk for H-DOS, 4 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, 3 lbs. .... 65.00

## 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

## COBOL Compiler for business-oriented computing

- An ideal programming language for business data processing tasks including processing disk files and data bases

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.

**COBOL's many features** include built-in utilities consisting of a compiler, linking loader, macro assembler, a library manager in CP/M and a cross reference assembler. It has an efficient program structure that makes programs in COBOL faster to write and easier to maintain.

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-837-31, On soft-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, 4 lbs. ....	395.00

## 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, BCD, 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.

**Loaded with features:** Help messages appear automatically to aid the user. If an illegal instruction is entered, a plain-English help message appears and sets you straight. Change record lengths by adding or subtracting fields, or rearrange fields within a record. And, convert files to different records.

**Three output options:** The first is a key-only output. It enables you to build a file index for printing a summary or to form a new data base. The second is a record number output that allows the building of multiple indexes into a single file. Then another program can retrieve the records using direct access by relative record number. The third, pointer output, provides another method of building indexes so that an entirely different program can retrieve records from an original file.

**Software compatibility:** SuperSort works with BASIC, Assembly Language, Micro-soft 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 feature an SID-compatible symbol table file for debugging use and has full Intel-compatible macro libraries on disk

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 textbook 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 of RAM and one disk drive plus CP/M. An H/Z-100 needs one disk drive and the CP/M operating system.

HDR-817-1, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. ....	85.00
HDR-837-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. ....	85.00

\*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.

## 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

## 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 for low-cost, effective information processing

- 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
- Well-documented user's manual includes tutorial lessons

**Data management:** Condor's Relational Data Base Management System (rDBMS\*) 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, or 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 rDBMS is the data management system that simplifies information processing for inventory control, accounting functions, personnel reporting and many other applications. Process up to 32,767 records per file.

**Fast operation:** Written in Assembly Language, rDBMS operates much faster than other data base managers. Since interpretation time is eliminated, commands and operations are quickly carried out. Therefore, you spend less time handling files within rDBMS's impressive data base capacity.

**Powerful:** While rDBMS is fast, it is also one of the most powerful relational 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. Other features allow you to produce sophisticated reports and multi-data base relationships. This program also has an index feature for quick access to information.

**Easy to use:** Besides being powerful, rDBMS is so easy to use that a new user can achieve results within several hours. This is due to a number of built-in operator aids such as help screens, command files and user-defined messages. Help screens simplify operations, especially if the same task is often repeated. You designate what commands are to be contained in a menu which is accessible through the keyboard. The commands (listed by a number) in the menu are actually files of commands required to perform an operation. So instead of using many commands for a single task, all you do is enter a number assigned to do a task. You can further simplify the use of rDBMS by creating different help menus.

**Available operations:** With rDBMS you can perform addition, subtraction, multiplication, division and other arithmetic operations on numeric entries, Julian calendar dates and dollar amounts. Quickly and easily select records by specifying up to 32 logical conditions including the AND, OR and NOT Boolean operations. This data base management software package also has extensive error checking capabilities to help prevent clerical errors.

**Hardware and software requirements:** To effectively run Condor rDBMS, an H/Z-89 or Z-90 Computer requires a full 64 KB of RAM memory and two high-capacity soft-sectored 5.25" 96 TPI disk drives. The CP/M operating system is also needed. An optional line or character printer, preferably with form feed and form length control, is needed for hard copy printouts of reports.

HCD-8937-1, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. ....	650.00
----------------------------------------------------------------	--------



16 MPI-150 Dot Matrix Printer  
uses optional front keypad



17 Durable MPI-89 Dot Matrix Printer



18 WH-84 dual printer



19 DataProducts color dot matrix printer

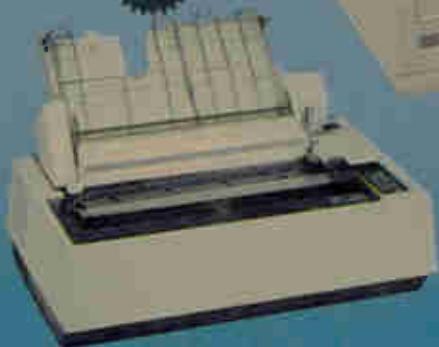
20 DTC 3802 letter-quality daisy wheel printer



21 PTC Style Writer daisy wheel printer



22 Primage 1 fast daisy wheel printer



23 E7-500 single-pen plotter for graphs, charts, drawings and transparencies



24 Low-cost acoustic modem transfers data



25 300 baud direct connect modem



NEW



NEW

## 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.

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. Look for these special products on pages 97 through 99.

# More ways to put your ideas on paper and quality peripherals to use with your computer

## 1 Affordable ET-500 Plotter for superior graphics

- Easy to hook up and use, designed to complement first-time users
- Draws with super-fine plotting resolution and line quality

**Pack a wallop** in your business presentations with graphs and charts drawn with the ET-500 Sweet-P Personal Plotter. It draws virtually every graphic format you'll ever need including colorful pie charts, bar graphs, straight and curved line graphs, illustrations, and alphanumeric labeling on plain bond paper or overhead transparency material. Draw with a line resolution of 250 line segments per inch and at a maximum speed of 6 inches per second.

**Hook it up** to the H/Z-100 Computer's parallel interface port for graph processing and doing engineering graphics. Your H/Z-100 hardware should include one disk drive and 128K of RAM. MS-DOS/Z-DOS\* and Z-BASIC are required.

ET-500, Assembled and tested, Shpg. wt. 12 lbs. .... 795.00

## 2 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 characters per inch. Vertical spacing can be set, either at six or eight lines per inch. Horizontal and vertical tabs are adjustable. Quad tractor feeders with adjustable widths handle standard edge-punched, single or multiple forms (up to six parts thick) or fan-fold paper.

**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

## 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. It can print out between 10 to 32 characters per second while baud rates are switch selectable from 50 to 19,200. Features a standard 48K character buffer and is software compatible with Diablo printers.

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 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 words per minute. A 35K character buffer (optional 67K) stores up to 20 pages of text for printing. Features bi-directional printing and is software compatible with Diablo printers.

PP-270, Assembled and tested, Shpg. wt. 24 lbs. .... 699.00

PPA-270-1, Tractor Feeder, Shpg. wt. 6 lbs. .... 149.95

PPA-270-2, Cut-Sheet Feeder, Shpg. wt. 10 lbs. .... 249.95

PPA-270-3, 32K Buffer Extender, Shpg. wt. 1 lb. .... 49.00

## 5 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. Horizontal spacing is selectable at 10 or 12 characters per inch. Printer supports both RS-232 and parallel Centronics type interfaces using baud rates between 110 and 9600. 2K buffer standard.

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

## 6 Advanced MPI-150 Impact Matrix Printer

**Print up to 6120 individually addressable dots per square inch** for exceptional graphics and special character resolution. Features include: 150 cps logic seeking impact printing, wide carriage, 1K print buffer, large selection of print capabilities, and custom character set development. Requires AP-PAK.

MPI-150, Assembled and tested, Shpg. wt. 35 lbs. .... 995.00

## 7 Easy-to-use MPI-99 Impact Matrix Printer

**Bi-directional printer features:** print speed of 100 cps, serial RS-232C or parallel Centronics interfacing, 7 x 9 or 11 x 9 dot matrix, full upper and lower case 96-character ASCII set with descenders, and more. Needs AP-PAK.

MPI-99, Assembled and tested, Shpg. wt. 11 lbs. .... 599.00

## 8 WH-64 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, superscripts and subscripts, serial EIA RS-232C and parallel Centronics-type interfaces, 256 character buffer, and more.

WH-64, Assembled and tested, Shpg. wt. 18 lbs. .... 995.00

## 9 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. Use 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 and serial EIA RS-232C or parallel Centronics-type interfacing.

PP-210, Assembled and tested, Shpg. wt. 44 lbs. .... 1895.00

## 10 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

## 11 Automatic 300 baud Smartmodem makes connections

**Automatically dial, answer, send, receive, and disconnect calls.** Hayes modem works with standard rotary dial and TOUCH-TONE single-line modular phone systems. Connect to any computer having an RS-232 I/O port. Built-in audio speaker allows listening in on connection. Includes 120 VAC adapter and interconnecting phone cable. Requires HCA-11 cable below. CPS software required.

WH-43, Assembled and tested, Shpg. wt. 3 lbs. .... 279.00

HCA-11, RS-232 Cable, Shpg. wt. 1 lb. .... 20.00

## 12 ID-4803 properly erases EPROMs for reuse

**Compact and easy to use**, the ID-4803 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

## 13 Convenient acoustic 300 baud modem transfers data

**The LEX-11 is compatible to standard 103A modems** and connects to computers using an RS-232 interface. It operates at 300 baud in half or full duplex. Includes AC adapter. Requires an HCA-11 cable and CPS software.

WH-23, Assembled and tested, Shpg. wt. 3 lbs. .... 139.00

HCA-11, RS-232 Cable, Shpg. wt. 1 lb. .... 20.00

## 14 Compact, versatile and easy to use modem

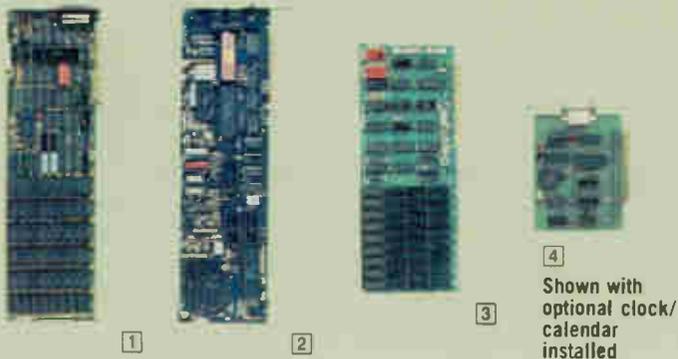
**Novation J-CAT 300 Baud Auto-Answer Modem** is compatible with Bell 103 modems, and can automatically select answer or originate mode. Includes cables.

PP-310, Assembled and tested, Shpg. wt. 2 lbs. .... 129.95

Accessories to peripherals are found on page 101.

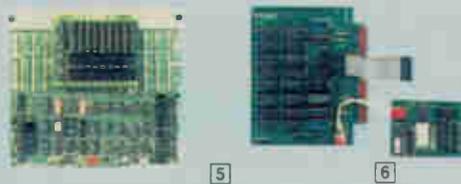
MS is a trademark of Microsoft Corp. Z-DOS is a trademark of Zenith Data Systems Corp. LOTUS is a trademark of Lotus Development Corp.

Accessory boards for the HS-151 and HS-161 Computers and the IBM-PC

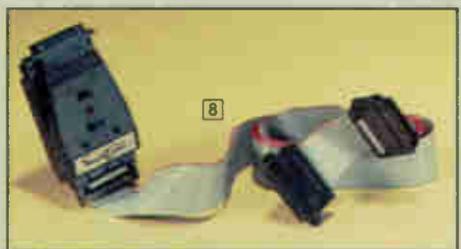


4  
Shown with optional clock/calendar installed

Plug-in circuit boards for the H/Z-89 Computer



7  
Modem board for the H/Z-100 plugs right in



## **NEW** Accessories and software for the IBM-PC and Heathkit/Zenith Computers

### 1 Add-on SixPakPlus 64K memory card from AST

Adds up to 320K of RAM to a fully populated 320K system board in an HS-151 Personal or HS-161 Portable Computer for a system total of 640K of addressable user memory. Comes with 64K of memory and also features a clock/calendar with battery backup and multiple ports. Can also be used in IBM-PC.

PC-120, Shpg. wt. 2 lbs. .... 359.00

### 2 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 instructions, software and cabling. Features full duplex operation, auto-dial and log-on and more.

PC-130, Shpg. wt. 4 lbs. .... 549.00

### 3 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 64K Z-205-1 chip sets (see below) or 256K memory chips. For use in HS-151/161 and IBM-PC.

PCS-140, Shpg. wt. 2 lbs. .... 199.00

### 4 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 on this and the next page) and other analog devices. Supported by GW\*-BASIC. For use with HS-151/161 and IBM-PC.

PC-110, Shpg. wt. 2 lbs. .... 49.95

PCS-110, (PC-110 with optional clock/calendar chip) Shpg. wt. 2 lbs. .... 99.95

### 5 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, 4 MHz operation, 256K expandable memory, two serial ports, hardware clock/calendar, 5 I/O board slots, expanded boot ROM and more.

PC-310, Shpg. wt. 3 lbs. .... 799.00

## 64K RAM Chip Sets

Purchase extra Z-205-1 64K RAM Chip Sets for the PC-120, PCS-140 or PC-310 boards.

Z-205-1, Shpg. wt. 2 lbs. .... 100.00

### 6 MAGNOLIA MICROSYSTEMS CP/M-Plus and RAM Board

Add new system commands and an additional 128K of RAM to your fully 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

### 7 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 Z-DOS/MS-DOS, 3 lbs. .... 99.00

### 8 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. Derives power from lines.

PP-100, Shpg. wt. 1 lb. .... 89.95

### 9 KOALAPAD Touch Tablet video pad 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 on this page. Also IBM-PC.

PP-400, Shpg. wt. 3 lbs. .... 119.95

\*CP/M is a registered trademark of Digital Research, Inc. H-DOS is a trademark of Heath Company. GW is a trademark of Microsoft Corp.

## 10 Emergency Power System protects your computer

This completely self-contained 200 watt emergency power system automatically protects your small computer from black-outs without any installations. 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. Two front panel lights indicate whether the unit is running from line power or battery power. PP-110, Shpg. wt. 38 lbs. .... 349.00

## 11 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 on the previous page. Also use with IBM-PC. PP-401, Shpg. wt. 2 lbs. .... 39.95

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

## 13 Breakout Box RS-232 Terminal Interface Tester

Isolate problems within a computer system with this pocket-sized, self-contained tester. Connect it between equipment and communication lines to monitor 12 different signals. LEDs signal line condition. Interface pins can be cross-patched with the tester's connection jumpers to test and correct problems. Twenty-four in-line switches allow interrupting of any interface signal. 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. Uses 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 Personal and Portable Computers, 1 lb. .... 59.95  
PA-250-3, On H/Z-90 Computers using CP/M, soft-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 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 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 weeks menu from supermarket ad specials. COMPUTER CHEF contains over 70 kitchen-tested recipes from salad to dessert. And, you can enter your own recipes for an even greater selection. When you need more or less servings, 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-90 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-90 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 quicker, 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-90 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. .... 34.95

**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 or 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. .... 34.95

**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. .... 34.95

**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 sound. PA-204-1, For use on HS-151 and HS-161 Computers, 1 lb. .... 29.95

**RHYMES & RIDDLES:** This educational program helps children from 5 to 9 years old, learn reading and spelling by associating specific letters to words they already know. In this program, children are asked to complete nursery rhymes, riddles and famous sayings. When correctly completed, kids are rewarded with colorful graphics and music. Provides hours of enjoyment and educational value. PA-205-1, ..... NOT AVAILABLE AT THIS TIME.

**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. .... 34.95

**SNOOPER TROOPS #1:** A detective game for ages 10 to adult. SNOOPER TROOPS help children learn to take notes, draw maps, classify and organize information, and help in developing vocabulary skills. Your children will question witnesses, uncover background information, and even search dark houses to solve the mystery of the Granite Point Ghost. PA-207-1, ..... NOT AVAILABLE AT THIS TIME.

**SNOOPER TROOPS #2:** Find out why and who stole Lily the Dolphin from the Tobasco Aquarium. All equipment is provided: a Snoopmobile, wrist radio, Snoopnet computer, a camera and a notebook. Ages 10 to adult. PA-208-1, ..... NOT AVAILABLE AT THIS TIME.



## Versatile and compatible terminals that are priced to fit the most demanding budgets

### 1 Z-49 Terminal features increased flexibility

- All features are keyboard accessible; settings are stored in memory
- 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; built-in power-up self check; tilt-adjusted low-profile keyboard with 6' coiled cable; and more.

	Z-49, Assembled and tested, Shpg. wt. 37 lbs. ....	1099.00
	Z-49-G, Z-49 with green CRT, Shpg. wt. 37 lbs. ....	1099.00

**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 Controls: Up, Down, Left, Right, Backspace, Tab, Back Tab, Home, Carriage Return, Line Feed and Brightness 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 Word length: 7 data bits, one parity bit Stop Bits: 1 or 2 Sync: Auto XON and XOFF Parity: Even, odd, mark, space, or none Power: 105 - 127/210 - 254 VAC, 50-60 Hz, 73 watts

### 2 Smart and user-friendly H-29 Display Terminal

- 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 features: parameter configuration from on-screen selections; user-settable 24-hour clock; keyboard help key; and screen saver capability.

Compatible with many ANSI protocol terminals, including: the popular H/Z-19, the DEC-VT 52, the Lear-Siegler ADM-3A, the Hazeltine 1500, and has many attributes of the DEC-VT 100 terminal.

Features: 12" green non-glare CRT with normal and reverse video; DTE and DCE RS-232C interface, at rates of 75 to 19,200 baud; and more.

	Kit H-29, Terminal, Shpg. wt. 41 lbs. ....	549.00
	Z-29, Assembled and tested Terminal, 38 lbs. ....	849.00
	Z-29-1, Palm Rest Accessory, Shpg. wt. 1 lb. ....	15.00
	Z-29-2, ROM Source Listing, Shpg. wt. 4 lbs. ....	25.00

**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 1/4" 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

### 3 HT-10 Terminal for a low-cost data-entry point

- Instant and user-friendly access to personal and business computers
- Professional data display and keyboard capabilities

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.

	Kit HT-10, Terminal includes ZVM-121 video monitor without modem, Shpg. wt. 36 lbs. ....	399.00
	Kit HTX-10, Terminal less monitor and modem, 10 lbs. ....	279.00
	ZT-10, Assembled and tested Terminal, includes video display monitor and without modem, Shpg. wt. 32 lbs. ....	499.00
	ZTX-10, Assembled and tested Terminal less video monitor and without modem, Shpg. wt. 6 lbs. ....	399.00

**HT-10 SPECIFICATIONS:** KEYBOARD/TERMINAL: Character Set: 95 ASCII, 33 graphics. Keyboard: 63 keys (26 alphabet, 10 numeric, 4 cursor/special function, 12 control, 11 punctuation). Storage: Up to 26 names (to 12 characters) and telephone numbers (to 16 digits) Cursor: Blinking or steady block, or off Cursor Controls: Up, down, left, right Cursor Addressing: Direct (VT-52 compatible) Tab: Standard B column tab stops Refresh Rate: 60 Hz Edit Functions: Insert line, delete line Erase Functions: Page, line beginning of line to cursor, cursor to end of line, beginning of page to cursor, cursor to end of page Bell: Audible alarm on receipt of ASCII BEL Video: Normal, reverse, half-intensity, blink INTERFACES: Telephone Connections (modem models only): Standard RJ-11, RJ-12, or RJ-13 telephone jack. Data Rate (modem models only): 110, 150, 300 baud Bell 103 compatible Dial Method (modem models only): Pulse Video: RS170 compatible Printer: Parallel (Centronics-type)

### 4 HT-1011 for access to time sharing services

- Single key access of up to 26 pre-selected information sources
- Automatic answering of incoming calls and unattended operation

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.

	Kit HT-1011, Includes ZVM-121 video display monitor, RS-232C port and 300 baud modem, Shpg. wt. 44 lbs. ....	449.00
	ZT-11, Assembled and tested HT-1011 with video display, RS-232C port and modem, Shpg. wt. 32 lbs. ....	579.00
	ZTX-11, Assembled and tested HT-1011 with modem RS-232C port less video display monitor, Shpg. wt. 6 lbs. ....	479.00
	ZT-1-U, Assembled and tested Terminal with monitor and modem less RS-232C serial port, Shpg. wt. 30 lbs. ....	549.00
	ZTX-1-U, Assembled and tested Terminal with modem less monitor, RS-232C serial port, 6 lbs. ....	449.00

### Accessories for the Personal Information Terminal

ZT-1-2, Terminal Carrying Case, Shpg. wt. 2 lbs. ....	24.99
ZTA-1-1, Parallel Cable, Shpg. wt. 1 lb. ....	25.00
ZVM-121, Optional Monochrome Video Display, for use with HTX and ZTX Terminals. Features high resolution 12" green CRT that can display 25 lines of 80 characters each, Shpg. wt. 18 lbs. ....	139.95
HTX-10-1, Auto-dial and auto-answer 300 baud modem for use only with HTX and ZTX modem terminals, Shpg. wt. 1 lb. ....	69.95
ZT-1-3, Universal ROM set for upgrading older ZT-1s into programmable one-key access models, Shpg. wt. 1 lb. ....	49.95

# High-quality supplies and accessories for your Heath/Zenith computers and peripherals

## 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 to MX-80 Printer, Shpg. wt. 1 lb. ....	25.00
HCA-19, Bisynchronous Modem Cable for use with Z-89-11 Multi-Mode Input/Output Board, Shpg. wt. 1 lb. ....	20.00
HCA-20, Parallel Cable, connects H/Z-100 Computers to MX-80A Printers, Shpg. wt. 1 lb. ....	25.00
HCA-22, WH-65 Parallel Cable, Shpg. wt. 1 lb. ....	35.00
HCA-24, WH-64 Serial Cable, Shpg. wt. 1 lb. ....	35.00

## 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

## Quality printer paper at economical prices

HCS-1, Premium 8.5" x 11" one-part fan-fold paper, continuous 2700 sheets, Shpg. wt. 28 lbs. ....	32.00
HCS-2, Standard 8.5" x 11" one-part fan-fold paper, continuous 3200 sheets, Shpg. wt. 31 lbs. ....	32.00
HCS-3, Standard 14.875" x 11" one-part fan-fold paper, continuous 3200 sheets, Shpg. wt. 47 lbs. ....	42.00
HCS-4, Bond form-feed 8.5" x 11" one-part fan-fold paper, continuous 1000 sheets, Shpg. wt. 13 lbs. ....	25.00

## Cartridge Fonts for the WH-64 Printer

HCS-30, Prestige Elite Font with 12 cpi pitch, 1 lb. ....	40.00
HCS-31, Orator 85 Font with 10 cpi pitch, Shpg. wt. 1 lb. ....	40.00
HCS-32, Courier Italic Font with 12 cpi pitch, Shpg. wt. 1 lb. ....	40.00
HCS-33, Modern PS Font with proportional spacing, Shpg. wt. 1 lb. ....	40.00

## High-quality, long-life printer ribbons

HCS-50, 3 plug-in cloth ribbons for Primage and Diablo 1640/630, 1 lb. ....	18.00
HCS-51, 3 plug-in film ribbons for Primage and Diablo 1640/630, 1 lb. ....	18.00
HCS-52, 3 ribbons for H/WH-14 and ASR-33 Printers, Shpg. wt. 1 lb. ....	8.00
HCS-54, One ribbon for LA-34 Printer, Shpg. wt. 1 lb. ....	29.00
HCS-55, One plug-in ribbon cartridge for MX-80 Printers, 1 lb. ....	14.00
HCS-56, 2 plug-in ribbon cartridges for H/Z-25 and H/Z-125, 3 lbs. ....	20.00
HCS-57, One plug-in ribbon cartridge for WH-64 Printer, 1 lb. ....	12.00

## Convenience accessories for your computer system

PM-100, Locking 5.25" floppy disk storage cabinet, holds 70 disks in black copolymer plastic case with rigid dividers, Shpg. wt. 3 lbs. ....	19.95
HCA-16, Surge Suppressor protects computer equipment from damaging electrical transients, Shpg. wt. 1 lb. ....	65.00
HCA-17, Paper Tractor for printers using tractor feed systems. Acts as a carrier that protects and guides any standard letter or legal size paper through the printing area of any printer. Shpg. wt. 1 lb. ....	12.00

## Accessories for the MPI-99 and MPI-150 Printers

MPI-99-1, Replacement ribbon cartridge for MPI-99 Printer, 1 lb. ....	12.00
MPI-99-2, Single-sheet feeder attachment for MPI-99 Printer, for inserting paper from the front of the printer, Shpg. wt. 2 lbs. ....	35.00
MPI-99-3, Sound cover attachment for MPI-99 Printer, Shpg. wt. 3 lbs. ....	35.00
MPI-150-1, Replacement ribbon cartridge for MPI-150 Printer, 1 lb. ....	20.00
MPI-150-2, Serial adapter card for MPI-150 Printer, allows asynchronous serial data transfer up to 9600 baud, Shpg. wt. 1 lb. ....	110.00

MPI-150-3, MPI-150 programmable status keypad, Shpg. wt. 2 lbs. ....	130.00
MPI-150-4, 64K buffer memory expansion for MPI-150, 1 lb. ....	259.00
MPA-1, H/Z-100 AP-PAK, a graphics applications package (including cable) for MPI-99/150 which allows printing of any H/Z-100 Computer character, Shpg. wt. 1 lb. ....	75.00
MPA-3, H/Z-89 AP-PAK, a graphics applications package (including cable) for MPI-99/150 printers that enables printing of any H/Z-89 character, Shpg. wt. 1 lb. ....	75.00
MPA-4, Z-90 AP-PAK, a graphics applications package with cable that enables both the MPI-99 and MPI-150 printers to print all characters that can be produced by the Z-90 Computer, Shpg. wt. 1 lb. ....	75.00

## Accessories for the DataProducts Color Printer

PPA-210-1, Black ribbon, Shpg. wt. 1 lb. ....	12.95
PPA-210-2, Primary color ribbon (red, green, blue and black), 1 lb. ....	24.95
PPA-210-3, Process color ribbon (yellow, cyan, magenta, and black), 1 lb. ....	24.95

## Printwheels for the Primage I daisy wheel printer

PPA-250-4, Courier 10 printwheel with 10 cpi, Shpg. wt. 1 lb. ....	19.95
PPA-250-5, Prestige Elite printwheel with 12 cpi, Shpg. wt. 1 lb. ....	19.95
PPA-250-6, Versa-Tile PS printwheel with proportional spacing, 1 lb. ....	19.95

## Ribbons and printwheels for the DTC 380Z Printer

PPA-260-3, Six replacement ribbons, Shpg. wt. 2 lbs. ....	9.95
PPA-260-6, Brougham printwheel with 10 cpi, Shpg. wt. 1 lb. ....	26.95
PPA-260-7, Prestige printwheel with 10/12 cpi, Shpg. wt. 1 lb. ....	26.95
PPA-260-8, Anelia printwheel with proportional spacing, 1 lb. ....	26.95
PPA-260-9, Script printwheel with 10/12 cpi, Shpg. wt. 1 lb. ....	26.95
PPA-260-20, Quadro printwheel with 10 cpi, Shpg. wt. 1 lb. ....	26.95

## Ribbons and Printwheels for DTC Style Writer Printer

PPA-270-4, Twelve black replacement ribbons, Shpg. wt. 2 lbs. ....	16.95
PPA-270-5, Two red replacement ribbons, Shpg. wt. 1 lb. ....	6.95

Style Writer uses same printwheels as DTC 380Z Printer.

## Accessories for the single-pen ET-500 Plotter

ETA-500-1, 100 sheets of 8½" x 11" plotter paper, 1 lb. ....	7.50
ETA-500-2, Four replacement pens (red, green, blue and black), 1 lb. ....	9.95
ETA-500-3, Transparency Presentation Package consisting of a set of 50 blank transparencies, two sets of pens and instruction sheet. 4 lbs. ....	89.95

## High-quality, highly-reliable 5.25" and 8" floppy disks for all Heath/Zenith computer systems

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 with up to 250K bytes of total data storage on a single disk. 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 megabyte of data storage on a single disk. 2 lbs. ....	Package of ten, 70.00

**1** MS-DOS Course covers Z-DOS and PC-DOS systems

Teaches the structure and organization of MS-DOS

Exercises on 5.25" floppy disk

**2** Individualized learning Assembly Language Course

Effective self-learning format

Includes computer programming exercises

With text and workbook

**3** Microsoft BASIC Course combines text and experiments to show concepts and use

Audio cassette tapes reinforce text material

**MONEY-BACK GUARANTEE:** If dissatisfied with any Heathkit/Zenith Educational System Course, return course with proof of purchase for a full refund

**4** **5** **6** **7** **8**

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**9**

**NEW**

## 1 MS\*-DOS Course covers the fundamentals and organization of this operating system

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

- Teaches MS-DOS with exercises for the HS-151 Personal, HS-161 Portable and the H/Z-100 computers
- 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 and Z-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.

EC-1121, Shpg. wt. 6 lbs. **99.95**

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## 2 Assembly Language Course teaches you to write faster and more efficient computer programs

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

- Learn to use less memory space and to run faster programs that don't waste time interpreting commands
- 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 a 70% or better score and earn 6.0 Continuing Education Units plus receive a Certificate of Achievement.

EC-1108, Shpg. wt. 7 lbs. **49.95**

## 3 Learn programming in Microsoft\* BASIC Course

- Learn to write and modify programs using popular Microsoft BASIC
- Gain experience in writing BASIC programs by doing experiments

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 Heathkit/Zenith Educational Systems.

EC-1110, Shpg. wt. 7 lbs. .... 99.95

#### 4 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.

EC-1111, Shpg. wt. 7 lbs. .... 99.95

#### 5 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.

EC-1101, Shpg. wt. 7 lbs. .... 99.95

#### 6 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
- Self-instructional format lets you set your own learning pace

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.

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.

EC-1100, Shpg. wt. 7 lbs. .... 44.95

College Level Examination: Earn valuable college credit for successfully completing this Course. For more information see page 61.

EC-1100, Shpg. wt. 1 lb. .... 25.00

#### 7 Learn how to use CP/M and how to get the most from this industry-standard operating system

- Self-study Course covers all aspects of the CP/M Operating system
- Use with many 8080/Z-80/8085 computer systems that run CP/M
- Uses proven audio-visual tutorial method for greater comprehension

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.

EC-1120, Shpg. wt. 6 lbs. .... 99.95

#### 8 COBOL Programming Course teaches you to write and run programs in the business language

- Learn the primary language used in many business applications
- Introduces the language that handles large, structured 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

#### 9 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 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

#### 10 Variable Speed Recorder cuts listening time

- Pitch-corrected playback for fast and clear tape listening

Save yourself time and increase your learning ability with the Variable Speed Recorder. Listen to cassette tapes at a selectable 90% to 200% of normal listening speed. Audio is clear and normal at any speed. Recorder plays standard cassette tapes, has built-in condenser microphone and uses AC or DC.

EC-3804, Shpg. wt. 3 lbs. .... 139.95

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## The President's Letter:

Dear Friends,

Heathkit builders are very special people. It's not every ordinary person who will pick up a soldering iron and build a computer, a color television set or a robot. Or for that matter, even a clock or a metal locator or an AC voltmeter. Special people. Special products.

Every completed Heathkit product reflects pride, knowledge, skill and a measure of quality that only you, the kitbuilder, can put into it. And I'm constantly amazed at how many of you have built so many kits... literally dozens, or scores, even hundreds of them.

We've long considered a way to recognize those accomplishments. And that's why I'm happy to announce the creation of our very special MASTER BUILDER CLUB.

As a member of this select group, you can earn valuable Master Builder Points with each new Heathkit you build. Points that accumulate toward Master Builder Ratings and Awards. And you'll be able to take advantage of special bonus offers and other special benefits exclusively for Club members.

The MASTER BUILDER CLUB is our way of recognizing and rewarding those of you who've helped make us the oldest, and largest and best electronic kit manufacturer in the world. We've had great fun together, we've learned together and we've bridged lots of new technology together.

Tomorrow's technology and tomorrow's kit products promise to be equally exciting. We think you'll enjoy the pride of belonging to the MASTER BUILDER CLUB, the fun of growing with it and the benefits associated with it.

Now for a quick tour of interesting stops in this new catalog. Be sure to review the new IBM-compatible HS-151 Personal Computer and HS-161 Portable PC (including Winchester upgrades) on pages 76 and 77. You'll also find lots of interesting new plug-in boards, peripherals and accessories on pages 98 and 99, plus software products to go with them. There are neat new accessories for HERO 1 on pages 58 and 59, and updated new color television sets on pages 26 and 27. The SW-7800 General Coverage Shortwave Receiver debuts on pages 32 and 33, and it's an outstanding addition to the line; as is the SA-2500 Auto-Tune Antenna Tuner for Hams on pages 34 and 35. You'll also find new kits in the instrument and educational sections of this catalog.

Lots of new kit building opportunities for Master Builders and novices alike!

Have a Happy Summer...

*William E. Johnson*  
William E. Johnson  
President

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\*Units of Veritechnology Electronics Corporation in the U S

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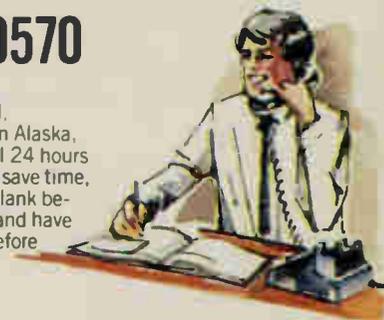
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