



"American High Tech" by HEATH

Heathkit

Helping you make things better

RETAIL CATALOG NO. 862

FALL • 1983

Keeps your meats and other frozen foods from spoilage by installing an alarm that warns of a failure in your freezer's cooling system or door left ajar. Alarm beeps and red light flashes if inside temperature rises above +20°F. Requires two "C" batteries. Includes 20' of wire.
Kit GD-1183, Shpg. wt. 2 lbs. 19.95



Great low-cost insurance against break-ins. Turns lights on in the evening, off at dawn — automatically. Gives your home a "lived-in" look while you're away. Plug it into any outlet, adjust sensitivity and it controls lamps up to 150 watts. 3½" H x 2½" W x 2½" D. Enjoyable, get-acquainted kit.
Kit GD-600, Shpg. wt. 2 lbs. 9.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.

STARTER KITS/3

BSR X-10 Home Control System now offers battery backup and RS-232C computer 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.

GDP-1510, Assembled, Shpg. wt. 2 lbs. . . . **34.95**

2 The **Ultrasonic Cordless Commander** transmits signals to the Controller Command Console from up to 30 feet away, using identical pushbuttons.

GDP-1511, Assembled, Shpg. wt. 1 lb. **19.95**

3 **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. Includes modular phone cable.

GDP-1515, Assembled, Shpg. wt. 6 lbs. . . **129.95**

4 **Timer Command Console** runs everything on time. *Automatically!* Used with the modules, your home can run like clockwork, setting lights and appliances to go on and off up to twice a day, according to your family's needs and lifestyle. The possibilities are virtually unlimited! Away for the weekend? The Timer is on guard, giving 24-hour



NEW RS-232C to BSR X-10 Interface

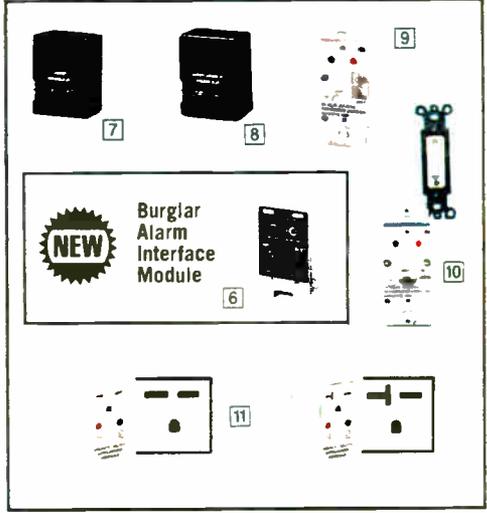
control with a lived-in look and sound when you're gone — even simulates movement from room to room — so *nobody knows that nobody's home*. Features digital clock with two levels of display brightness. Fast and Slow set keys for easy setting and programming; Daily, Once, and a random Security code; Clear to erase a setting; All Lights On and All Units Off 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. 2 lbs. . . **79.95**

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. Optically isolated from transient signal damage to your computer, the Interface acts as an intelligent device for user-programmed control of BSR modules under BASIC or other language capable of output to a printer or output port, at baud rates between 110 and 2400. Programming syntax and simple BASIC program examples included. Requires 120 VAC.

Kit GD-1530, Shpg. wt. 3 lbs. **129.95**

6 **NEW! Burglar Alarm Interface Module** increases effectiveness of your security system. Three modes (with selectable low voltage or dry contact trigger inputs) will turn on, flash or unit-codify any



NEW Burglar Alarm Interface Module

or all lights. Test button verifies your setup.
GDP-1519, Assembled, Shpg. wt. 1 lb. . . . **39.95**

7 **Lamp Module** receives signals to turn incandescent lamps On and Off, and Dim or Brighten them in 16 steps. Handles up to 300 watts max.

GDP-1512, Assembled, Shpg. wt. 1 lb. . . . **19.95**

8 **Appliance Module** controls most other devices like TV, heaters, etc. Operates lights and self-starting fluorescents, but only turns them on and off. Max ratings: 15 amp resistive load; 1/3 HP motor; 500 watt lighting; 400 watt TV/stereo load.

GDP-1514, Assembled, Shpg. wt. 1 lb. . . . **19.95**

9 **Wall Switch Module** replaces existing switch. Operates inside or outside lights; dims them if controlled by GDP-1510. 500 W maximum load. Also has on/off pushbuttons. Easy to install.

GDP-1513, Assembled, Shpg. wt. 1 lb. . . . **19.95**

10 **Three-Way Wall Switch Module and Companion** with independent on/off buttons replaces hallway and upstairs/downstairs 3-way switches, responding like a lamp module. 500 watt maximum load.

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

11 **Air Conditioner Module** is sold in two different 240 VAC configurations. Order according to plug type. Standard Module (left) rated for 15 A load.

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

Perpendicular-pronged Module rated for 20 A load.
GDP-1517B, Shpg. wt. 1 lb. **39.95**

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 movement during entry. Then it will activate indoor/outdoor buzzers or alarms, table or floor lamps to alert you to an unfamiliar presence within your home.

Easy to set: Simply flip a hidden, back panel switch to activate the system. Two AC outlets on the back panel control lights and alarms you have plugged in. Ten seconds after the first movement is detected, the lamp outlet is triggered, suddenly turning on any lights you have connected. Approximately 30 seconds later, the alarm outlet is triggered. Has switch-selectable auto or manual reset. Use it for security purposes or as an automatic light switch. 120/240 VAC.

Kit GD-49, Shpg. wt. 5 lbs. **69.95**
GDA-39-2, 120 VAC Alarm Accessory, Shpg. wt. 5 lbs. **34.95**





NEW **Heathkit RF Security System offers dependable protection without wires**

- The reliability of a hard-wired system, but installs without running wires
- Absolutely one of the finest home security systems available

In the past, a truly reliable security system had to be hard-wired. *Until now!*

1 RF Security Receiver/Professor Kit with Outdoor Alarm Horn and Annunciator Speaker processes all signals and takes appropriate action. Four modes (Off, Home, Away and Panic) control system operation. 'Home' monitors doors and windows while you're inside. 'Away' arms indoor motion detectors. Five separately-coded channels give separate alarms for door, windows, indoor motion, fire and panic. Auxiliary and Panic alarms alert you to fire, breach of computer room or gun cabinet, etc. — *even if the system is off*. Unique Annunciator mode sounds indoor speaker whenever door opens, telling you if a youngster left to play or your daughter returns from her date; also signals to confirm receipt of mode selection from Control Transmitters. Other features: delayed entry/exit, power to drive two horns, internal 12-hour battery, security warning labels, test mode, key-locking master power switch, 32 user-selectable house codes, seven output options for annunciator, alarms and dialing devices, and more. Permits security to be extended to nearby buildings within 200' range. Remotely controlled by GDA-2800-4 or -9 Transmitters (one required). All transmitting units have low battery indication. Measures 3 3/4" H x 11 1/2" W x 3 3/4" D. Order accessory transmitters below.

Kit GOA-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.

GOA-2800-2, Shpg. wt. 1 lb. **139.95**

3 Wired-Circuit Transmitter. Easy to install. Uses magnetic/reed switches or 'window bug' glass-breakage sensors to protect doors and windows against entry. Inside mounting prevents tampering or disconnection. Includes one magnetic/reed switch set (7). Also connects to GD-1701 Flood Alert, at right.

GOA-2800-3, Shpg. wt. 1 lb. **39.95**

4 Command Transmitter. Controls entire system remotely, within 200 ft. range.

GOA-2800-4, Shpg. wt. 1 lb. **49.95**

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

GOA-2800-5, Shpg. wt. 2 lbs. **79.95**

6 Window Bug™ Sensors. Package of four. Used with 2800-3 Wire Circuit Transmitter, it 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 sets (one shown in picture) for 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 hard-wired systems such as the GD-1800 Minuteman II group, at right. Requires 6-18 VDC power.

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

9 12-Button Digital Keypad Controller (not shown). Operates like 2800-4 Command Transmitter after entry of user-secret numeric access code.

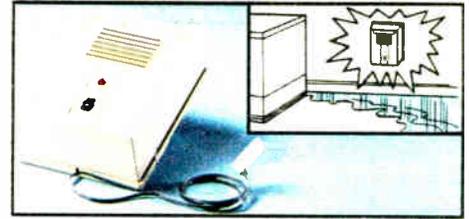
GOA-2800-9, Shpg. wt. 2 lbs. **109.95**

SAVER! GOS-2800-1 Starter Security System consists of one 2800-1 Receiver Kit with speakers, one 2800-2 IR Motion Detector/Transmitter, one 2800-3 Wire Circuit Transmitter and one 2800-4 Command Transmitter. Shpg. wt. 49 lbs. **499.95**

NEW **Flood Alarm warns of water trouble**

- Alerts you to leaks when they first occur — before they do costly damage

Don't take chances! Prevent expensive property damage with a reliable Flood Alarm. Produces a loud, insistent alarm with red flashing LED to get fast attention! Water sensor sticks anywhere. Runs for a year on 9V alkaline battery (not included). Includes 25 ft. of sensor-to-alarm wire. Has adjustable sensitivity and logic output to trigger GDA-2800-3 Transmitter at left. 1 3/4" H x 3 3/8" W x 4 7/8" D. **Kit GO-1701**, Shpg. wt. 2 lbs. **24.95**



Minuteman II Ultrasonic Security System for sure protection all day and night

- Discrete component design offers custom flexibility to match your needs
- Give your family priceless peace of mind against intrusion or vandalism

1 The Ultrasonic Master Control Unit/Detector protects up to 300 square feet with a blanket of harmless, inaudible sound waves. When an intruder disturbs the reception pattern, an immediate alarm signal is activated. Controls on/off functions, entry/exit delays, alarm timer, test circuitry. Add up to three Minuteman Sentinels — along with siren speakers, key-operated switches, magnetic door contacts, window foil, etc. Test switch verifies operating status. Rechargeable NiCad battery backup and AC power cube included.

Kit GO-1800, Shpg. wt. 7 lbs. **199.95**

2 The Minuteman Remote Sentinel connects to GO-1800 unit. Identical detection circuitry guards an additional 300 square feet. Includes 50 feet of wire.

Kit GDA-1800-1, Shpg. wt. 4 lbs. **69.95**

3 Key Switch Accessory provides remote on/off control for Minuteman II alarm system. Loop-secure LED positively indicates armed status.

GOA-1800-2, Shpg. wt. 3 lbs. **29.95**

4 Indoor-Outdoor All-Weather Alarm Speaker produces up to 108 dB of loud, hi-low siren noise (measured at 10'). Includes 50 feet of connecting wire.

GOA-1800-3, Shpg. wt. 2 lbs. **24.95**

Versatile Uni-Bracket Accessory for mounting GDA-1800-1 Sentinel anywhere.

GOA-1800-4, Shpg. wt. 1 lb. **14.95**

Eye-Spy™ Photobeam Alarm Relay detects all

If you're in need of low-priced, linear security this is a versatile, multi-purpose system. When the reflected light beam is broken, relay circuit will activate 120 VAC warning devices up to 300 watts total.

Highly sensitive to its light source, the Alarm Relay works up to 25 feet away from reflecting mirror. Inconspicuous placement is easy. **Businessmen!** — use it to activate alarms, signal the entrance of customers into a shop or room. All mounting included.

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



Open a Heath Revolving Charge with a purchase of as little as \$100!

Heathkit Relative Humidity Instrument monitors moisture content of the air you breathe



The ID-2295 has two sensor units to monitor indoor and outdoor locations. We include 100 feet of easily-concealed transmission cable with every kit.



\$99⁹⁵

- Extremely practical – humidity can affect the daily well-being of people and personal belongings in many ways
- Comparable units for home or business usually cost at least twice as much and offer less reliability
- Sensitivity that rivals laboratory-grade hygrometers

Along with temperature, humidity is the single most important determining factor for personal comfort, indoors or out. Proper levels of humidification promote a healthful environment for you, your family, home furnishings, pets and houseplants. The ID-2295 Relative Humidity Instrument can help!

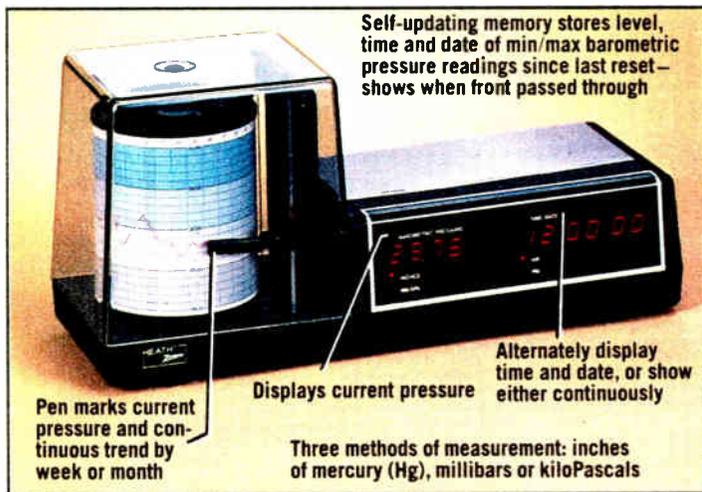
Increase everyone's comfort and save on fuel: During the heating season, low indoor humidity can cause skin irritation, sore throats, and annoying static discharge. Woods lose luster, crack and peel. But correcting low levels of humidity, you can avoid such frequent ills, plus conserve energy, reduce heating costs and prolong the life and appearance of fine wood furniture.

With both sensors connected, the indoor console can display their readings alternately, 1.5 or 5 seconds apart, or can be switched to hold on either readout. Bright red, ½"-high digits indicate the humidity by percentage from 0 to 99 and LEDs denote the sensor being displayed. For 120/240 VAC.

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

ID-2295 SPECIFICATIONS: Measurement Range: 10% to 90% relative humidity. Accuracy: 77°F (25°C). ± 10 counts. 32-135°F (0-55°C). ± 20 counts. Response Time at 77°F/25°C: From 10% to 43% in less than 3 minutes. From 43% to 90% in less than 5 minutes. Operating Range: 32-131°F (0-55°C). Dimensions of Console: 2½" H x 7" W x 5" D. Sensors: 1½" H x 4" W x 4" D.

Get a permanent record of barometric pressure changes – and current readings on three scales



Self-updating memory stores level, time and date of min/max barometric pressure readings since last reset – shows when front passed through

\$199⁹⁵
Kit

- A precision microprocessor-based instrument with many exclusive features, now at our best-ever price value
- See current pressure at a glance, while stylus records your permanent copy of rate and date of fluctuation

Rate of barometric change is the single most important parameter which influences weather. The ID-2090 Digital Barograph will provide an exacting dual readout for hour-by-hour or day-to-day forecasting and long-term trend analysis. On the console, a four-digit display shows the current pressure at the same time it's recorded on the chart. Top-of-cabinet buttons let you recall or clear most recent minimum and maximum peak pressure readings from internal memory. Enclosed in a temperature-stable oven, the pressure transducer maintains a high (± 0.03 in. Hg) level of accuracy – comparable to a mercury column barometer. Seven 31-day and twenty six 7-day calibrated drum charts are included, enough to last for a whole year of recording!

Kit ID-2090, Shpg. wt. 11 lbs. **199.95**

IDW-2090, Assembled and tested, Shpg. wt. 10 lbs. **249.95**

ID-2090 SPECIFICATIONS: Digital Clock & 4-year Calendar: 6-digit time readout in 12- or 24-hour format, with AM/PM indicators. 4-digit month and day. Pressure Range: 28-32 in. Hg (948-1083 M8, 94.8-108.3 KPA). Accuracy of reading: ± 0.03 in. Hg (between 29-31 in. Hg, at 59-95°F, 15-35°C). Overshoot: 0.5% of full scale. Overall error: 0.04 in. Hg. Chart Speed: One revolution every 7 or 31 days. Chart Speed Error: 0.5% max. Power Requirements: 120/240 VAC, 50-60 Hz.

Heathkit Digital Barometer reports environmental pressure change with mercury-column accuracy

- Puts pressure figures, rate of change, direction of change, time and date at your fingertips with three scales: inches, millibars or kiloPascals
- Remembers past min and max pressure readings for tracking air masses

Now you can have access to all the vital barometric information you need to forecast severe or pleasant weather with the ID-1990 Digital Barometer.

The ID-1990 offers our most complete range of digitized barodata. Through separate readouts, you can receive continuously-updated statistics on the current level of atmospheric pressure, rate of hourly change, direction of change, most recent minimum and maximum pressure sensed since memory was last cleared, plus the exact time in 12- or 24-hour format and date each magnitude was recorded. A 'clear' button resets the data memory cycle.

As in the ID-4001 and ID-2090 weather instruments, all sensor intelligence is collected by a unique, highly efficient pressure transducer based on a piezo-resistive silicon bridge electromechanism. Sealed in a thermistor-controlled, temperature-stable oven, this newly-developed pressure probe is far superior in ambient accuracy to mechanically-transferred aneroid diaphragms.

Kit ID-1990, Shpg. wt. 10 lbs. **99.95**

IDW-1990, Assembled and tested, Shpg. wt. 8 lbs. **129.95**



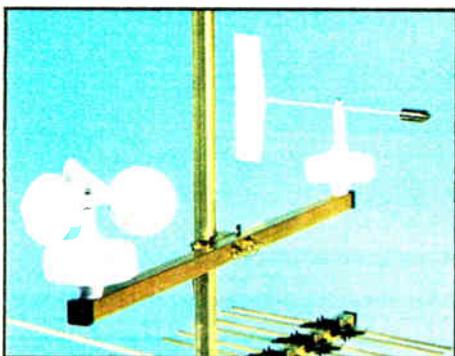
ID-1990 SPECIFICATIONS: Barometer Display: 4-digit readout. Separate indicators show whether the pressure is rising or falling, and whether the display is in inches of mercury, millibars or kiloPascals. Pressure Ranges: 28.00 to 32.00 inches Hg (mercury). 981 to 1050 millibars or 98.1 to 105 kiloPascals. Accuracy: 29.00 to 31.00 Hg ± 0.03 in. Hg at 15-35° C. Power: 120/240 VAC.



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

The only computerized weather station for instant, up-to-the minute meteorological readouts

- Displays time/date, indoor and outdoor (F or C) temperatures, wind speed & direction and barometric pressure (rising or falling)
- Microprocessor accuracy and memory stores past weather data so you can see trends
- Instantly recalls past weather statistics at the push of a button; Clear feature erases memory
- Professional-looking solid walnut cabinet with brushed-aluminum trim panels
- Remote windcup-and-weathervane transmitter assembly mounts on a 1" to 1½" mast for years of dependable, trouble-free service
- Styled to match any decor, it offers instant access to more comprehensive atmospheric data than was ever available before to the layman with a serious interest in weather phenomena and forecasting



Remote transmitter assembly (shown here) attaches firmly and easily to TV antenna mast. Cable for Kit ID-4001 must be ordered separately in length you require.



There's nothing else like it available today! A personal weather computer that not only monitors the current weather data, but also computes significant changes and stores data in its memory for your personal and business planning!

The Heathkit Digital Weather Computer gives you instantly accurate past and present weather data to aid in forecasting future activity. For professional climate watchers, farmers, boaters, pilots, campers, science teachers – for anyone going outdoors – the weather station can tell you what to expect. A microprocessor puts ALL the information at your fingertips!

Weather information at the touch of a button: Compare the ID-4001 desktop weather station to higher priced units (if you can find one that does all this): Ours gives you the time in AM/PM or 24-hour format, plus the date for exact log entries; both the indoor and outdoor temperature, whether it's 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 inches or millibars, and if it is rising or falling. Last but not least, you can use the minimum and maximum barometric pressure readings to determine the passage of weather fronts.

Beautiful styling and a unique digital data display: Not only do you get more weather data, but also functionally elegant design. The readout panel is trimmed in brushed aluminum and features large bright-red ½" LED segment displays on a black background for easy reading. The handsome, solid oiled-walnut computer cabinet has clearly marked front panel buttons.

Our electronic almanac has more memories to store data: The Digital Weather Computer records the high and low temperatures, the minimum and maximum barometric pressures, peak wind speed, and most importantly, the time and date each occurred. It calculates the rate at which the barometric pressure changes so you can be alerted to storm fronts. A push of the button can tell you if the big one is about to break – a rate of 0.02" or 0.03" may mean conditions are developing, but a rate change reading of 0.06" or more tells you a real storm is upon you. The data is stored in memory until you choose to clear it, and you may connect an external battery to hold the memory contents during brown-outs or power interruptions.

Technical sophistication unequaled at this low price: The ID-4001 uses a remote transmitter with anemometer and weathervane that have been designed in an aerospace wind tunnel. A compact boom assembly relays data to the computerized console indoors. Rather than relying on friction-causing mechanical devices, they use solid-state infra-red sensors and transmissive optical encoding technology for higher accuracy than conventional indicators. The wind speed sensor is sensitive to within 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 pressure. It's the first and only, truly digital barometer! And, there's even an output so it can be interfaced to the Heath H-8 computer for more sophisticated weather charting, research and pattern forecasting.

If you want the fun and savings of building it yourself, you'll find the Heathkit Digital Weather Computer surprisingly easy to build, thanks to the fully illustrated step-by-step assembly manual. It's an easy and enjoyable kitbuilding experience, with uncrowded circuit boards for easy parts placement and wiring harnesses that minimize point-to-point wiring. 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.

For business or personal reasons, you'll find it an investment that can pay for itself many times over! It's perfect for radio stations, cable TV companies, yacht or air-sport clubs, pilots, farmers and many more. Order your Weather Computer *today*, with the length cable you desire, and have reliable, up-to-the-second weather information at your fingertips – ALWAYS!

Kit ID-4001, Shpg. wt. 15 lbs. 399.95
 Assembled and Tested ID-4001, including 100' cable.
 IDW-4001, Shpg. wt. 25 lbs. 649.95

B-Wire Cable for the ID-4001, ID-1290 and ID-1590 Instruments:

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

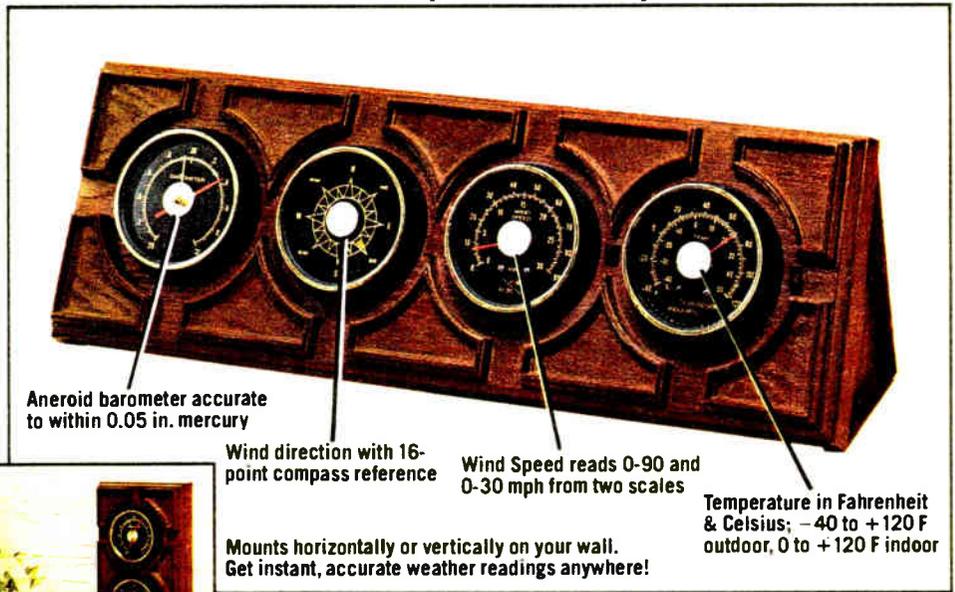
ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: ±5% or better. **Direction Display:** Accuracy: ±11.26% degrees. **THERMOMETER:** Temperature Range: -40° to 70°C, -40° to 158°F. Accuracy: ±1° on 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 plus ±0.01 in. Hg°C. **Operating Temperatures:** Outdoor assemblies, -40°C to +70°C (-40°F to 158°F). Unit, 10° to 35°C (59° to 95°F). **Power Requirement:** 120/240VAC. Provision for external battery connection for memory backup during power failures. **Dimensions:** 7¼" H x 16" W x 6" D.



Discover the fun of kitbuilding at your Heathkit Electronic Center.

The lowest cost, five-function weather station for accurate atmospheric and temperature information

- Stylish instrument plaque and long-life sensors are electronically accurate
- Monitors barometric pressure, indoor/outdoor temperatures, wind speed and direction
- Walnut grained cabinet may be displayed horizontally on table or hung on a wall at comfortable eye level
- Windtunnel-tested anemometer/weathervane transmitter assembly (below) mounts on 1" to 1½" mast for years of reliably remote service
- Black instrument dials have easy-to-read gold graphics with precision scales
- All-solid-state circuitry designed to operate from the AC line with a minimum amount of power consumption
- Temperature-compensated barometer may be used at altitudes to 10,000 feet



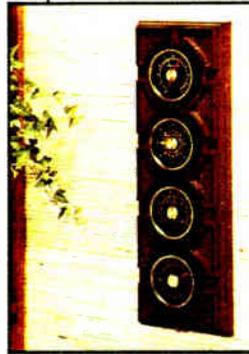
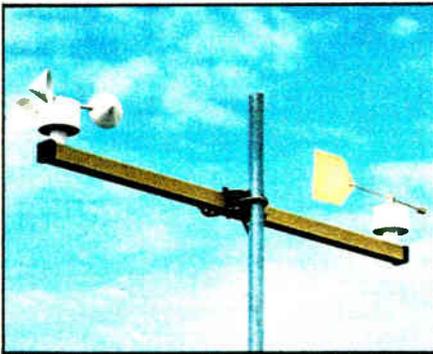
Aneroid barometer accurate to within 0.05 in. mercury

Wind direction with 16-point compass reference

Wind Speed reads 0-90 and 0-30 mph from two scales

Temperature in Fahrenheit & Celsius; -40 to +120 F outdoor, 0 to +120 F indoor

Mounts horizontally or vertically on your wall. Get instant, accurate weather readings anywhere!



For the price, you can't beat the features or the accuracy of the ID-1290. It contains professional-grade instruments plus a quality, non-corroding remote transmitter assembly - super dependability - all for less than \$160.00.

Instantly accurate weather information is provided by the Heathkit ID-1290 Weather Station's five functions. You can depend on the Weather Station to give you the true indoor and outdoor temperatures, in both Fahrenheit and Celsius. The thermometer is calibrated from -40°F to +120°F (-40°C to +49°C), with a switch to select indoor or outdoor readings. A sensitive barometer helps you keep abreast of the most significant meteorological parameter - changing pressure conditions - by indicating movements as small as 0.05 inches of mercury. Wind speed can be read from 0 to 90 miles per hour in two ranges, with eight wind direction lights providing 16-point compass resolution for precision readings.

The remote transmitter assembly with temperature sensor features a ruggedly-designed anemometer and weathervane made from purely non-corrosive materials. Long-life Teflon bearings requiring no lubrication have been used to provide accurate readings year after year.

The ID-1290's walnut grained, sturdy indoor unit can be placed on a wall, or used as a handsome and distinctive desk set with the triangular stands included. The transmitter unit is connected to the weather station with an 8-wire cable, which can be selected below. The cables are well insulated for excellent weather resistance. Easy and enjoyable kit assembly makes the ID-1290 a great project for first-time builders, too. Includes a comprehensive book on weather. 120 VAC. Size 7" H x 20½" W x 2" D.

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

8-wire transmission cables for ID-1290 and ID-1590 Weather Instruments:

IDA-1290-1, 50 ft. cable, Shpg. wt. 2 lbs. 9.95

IDA-1290-2, 100 ft. cable, Shpg. wt. 4 lbs. 16.95

IDA-1290-3, 150 ft. cable, Shpg. wt. 6 lbs. 23.95

ID-1290 SPECIFICATIONS: Wind Speed: 0-30 mph, ±2 mph; 0-90 mph, ±5 mph. Direction: 8-point readout over 360°. Temperature: 0° to -120°F, ±2°F (typ. INDOOR); -40° to +120°F, ±2°F (typ. OUTDOOR). Barometric Pressure: 29-31 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.

Accurate Digital Wind Speed/Direction Indicator

This ID-1590 Digital Wind Indicator may skimp on price, but certainly not on accuracy or reliability. The outdoor transmitting unit is one of the best around. It's designed to give you precise wind speed and direction year after year. The anemometer and weather vane are constructed from non-corroding, weatherproof materials for errorless readings under any conditions. Even the reed switches are hermetically sealed to prevent weathering that could cause inaccurate readings. The indoor unit features an easy-to-read seven-segment digital display and can be wired to report in two of three scales: mph, kph or knots. Switches select mode and front-panel lights show which are in use. The readout displays speeds on these scales from 0 to 99. Incandescent bulbs mark the 8 principal compass points, providing 16-point resolution by temporarily lighting two adjacent bulbs simultaneously. 120 VAC. Housed in a black Cyclocac case with teak-grain vinyl inserts. Requires 8-wire cable (order above).

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



Practical Digital Indoor/Outdoor Thermometer

When you compare the advantages this Digital Indoor/Outdoor Thermometer has over a conventional mercury bulb sun-or-snow thermometer, you'll wonder how you did without one for so long. The big, red ½" display digits can be seen easily in broad daylight, or at night. No guesswork! The ID-1390B accurately monitors two temperatures with two sensors for indoor/outdoor readings, displayed within two degrees. Select Fahrenheit or Celsius temperatures, with continuous readings of one, or alternate readings of both. The 10" indoor and 75" outdoor cables (included) let you place the sensors anywhere (freezer, sauna, basement, pool, solar panel, etc.). Ranges from -30°F to 120°F outdoors and 20°F to 120°F in. Step-by-step instructions make it easy to assemble, and a practical kit that gives year-round value. Same size (2½" H x 7" W x 5" D) and styling, with black Cyclocac cabinet of teakwood trim, as ID-1590. Displayed together, a great set you'll come to rely on daily!

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



HAMS! Heathkit makes kitbuilding more economical with a new low price on this 'spec'tacular rig!



The Heathkit HW-5400 Synthesized HF SSB/CW Transceiver lets you explore true quality

NOW ONLY
\$649⁹⁵

- Save \$100 now on the world's most fascinating radio kit and experience performance others only dream of
- PLL-synthesized stability with crystal accuracy
- Unique dual-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 649.95

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

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

HW-5400 SPECIFICATIONS—GENERAL: Overall Band Coverage: 80 through 10 meters, 10 MHz WWV; WARC bands operational. Frequency Coverage: 3.450–4.050, 6.950–7.350, 10.000–10.200, 13.950–14.400, 18.018–18.218, 20.950–21.500, 24.840–25.040, 28.000–29.750 MHz. Frequency Readout: 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: Store 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 4 1/4" H x 11 1/2" W x 14" D (10.8 x 28.6 x 35.6 cm). Weight: 24 lbs. (10.9 kg)



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

Amateur Radio's most promising challenge – the SS-9000 Deluxe Synthesized HF Transceiver

The age of the microprocessor-enhanced hamshack has finally arrived. All previous resources of skill and imagination are now being challenged by one rig: the SS-9000. Transceiver of the decade.

- This is the Rolls Royce of transceivers: Fully microprocessor-based, entirely solid-state, broadbanded in design – delivers 100 watts to a 50 ohm load
- Microprocessor circuitry controls the entire operation of the SS-9000
- A built-in Terminal Interface with an RS-232 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 those operators who are exploring the leading edge of convergent radio and computer technology. Streamlined for ultraordinary results even without keyboard control, experienced amateurs will ultimately use it to establish new high standards for station, emergency, DX and contest performance.

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" control 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-19, or new H/Z-29 on pg. 70), hard-copy ASCII teletypewriter, or computer (such as the H-89 All-In-One on pg. 68).

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 Transceiver, Shpg. wt. 35 lbs. 2795.00

PS-9000, Assembled and tested Power Supply, Shpg. wt. 33 lbs. ... 295.00

SAVER! SSG-9000, 74 lbs. Save \$95 on System! Both ONLY 2995.00

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. **QUAL 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 9¾" W x 13¾" 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. RFI: ±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 13¾" D (15.6 x 35.6 x 34.9 cm). Weight: 35 lbs. (15.9 kg).



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

NEW

\$129⁹⁵

- Lowpass, highpass, peak and notch controls help user customize upper and lower bandpass edges to isolate desirable signals and reject heavy QRM

As today's bands become increasingly crowded, there's often a problem with too much interference to bother trying to copy a good signal. Heathkit has an easy, affordable answer to effective elimination of dogged interference – the HD-1418 Tunable Active Audio Filter. Optimized for CW, SSB and RTTY reception under the worst possible conditions, it tunes out unwanted QRM like magic and improves the selectivity of receivers by a remarkable degree.

Twelve total poles of filtering can be combined to work as SSB & Notch, CW, CW2, SSB, SSB & Peak, RTTY and Fixed configurations with razor-sharp skirts. By giving full control over receiver bandpass characteristics, it can solve such problems as partially overlapping sideband signals, overmodulation splatter, close-packed CW stations, full RTTY reception through heavy interference, heterodyne whistles and noise that other filters find impossible to

HD-1418 SPECIFICATIONS: High-pass Filter: 5-pole tunable elliptical, with 300-3500 Hz range at -6 dB. Low-Pass: 5-pole tunable elliptical, 300-3500 Hz range at -6 dB. Notch/Peak Filter: 2-pole tunable; 300-3500 Hz range; 200 Hz width at 6 dB; 30 dB depth. Input Impedance: Hi-Z, 5k Ω minimum. Nominal Gain: Unity. Audio Amplifier Output: 1.0 watt into 4 Ω . Input/Output Connections: 1/4" audio phone jack; "Tape Out" at -20 dB, "Input" and "Output" RCA phono jacks; DC power connector. Power Requirements: 7-13.5 VAC or 9-18 VDC, 25-400 mA. Dimensions: 17 $\frac{1}{8}$ " H x 8 $\frac{7}{8}$ " W x 6 $\frac{5}{8}$ " D. Net Weight: 1.5 lbs. Optional Supply: PS-5012 120 VAC power cube (see p. 18)



conquer. Simple to install – just plug it in series between receiver output and speaker. Filter is bypassed when off. Input Overload LED glows if signal exceeds 3 volts, so you can adjust output gain for undistorted response.

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

HL-2200 2kW Linear Amplifier has added convenience features and a trusted reputation

NEW

\$849⁹⁵

- The ham world's most reputable high-power amp has the lowest price-per-watt in 2 kilowatt Linears
- Standby switch lets you remove the HL-2200 from RF line to go barefoot or perform tune-ups

More of what you want: When it comes to comparison, the HL-2200 has the rugged dependability, superior engineering sophistication and cost-effective intelligence that amateurs expect these days. And it gets big results.

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

More savings from the start: When you build the HL-2200, you save money for other gear and enjoy years of lasting pride from the kitbuilding experience.

Don't waste time losing contacts! Order the HL-2200 today – it's the only amp you need to gain all the professional operating proof you want.

HL-2200 SPECIFICATIONS: Band coverage: 80, 40, 20 & 15 meters. Max power input: SSB, 2000 W. PEP, CW, 1000 W; RTTY, 1000 W. Driving power: 100 W. Duty cycle: SSB Continuous voice modulation; CW, Continuous (max. key-down 10 min.); RTTY, 50% (max. transmit time 10 min.). Third order distortion: -30 dB or better. Cabinet dimensions: 8 $\frac{1}{4}$ " H x 14 $\frac{7}{8}$ " W x 14 $\frac{1}{2}$ " D.



Kit HL-2200, Shpg. wt. 68 lbs. 849.95

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

SA-2060A Deluxe Antenna Tuner with dual wattmeter/SWR bridge has increased versatility

NEW

\$279⁹⁵

- Additional feed-through insulator and lug-strap permits permanent connection of three isolated antennas – switch back and forth freely
- A single switch selects either one of two coaxial or balanced antennas, long-wire feed and bypass
- Eliminates the loss of precious, mismatched power

For the active ham who frequently likes to use both coaxial and single-wire or balanced ladder antennas while operating, the new Heathkit SA-2060A Deluxe Antenna Tuner has all the power-handling capability and convenience you could ask for at a price that's hard to beat. It means a perfect match every time, 1.8-30 MHz, including MARS, CAP and the new WARC frequencies.

The SA-2060A combines five of the most useful and important station accessories in one compact, space-saving unit. By clearly indicating forward and reflected average power plus SWR, this 2 kW Tuner exactly matches the selected antenna to any frequency in the 160 to 10 meter spectrum. And it won't take long to get your SA-1060A on the air – this easy-to-build kit is a three-evening project that's going to put every watt to most efficient use.

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



Kit SA-2060A, Shpg. wt. 20 lbs. 279.95

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



There's more for the Ham at Heath

AMATEUR RADIO/11

A real CW challenge—the HW-8 QRP Transceiver can work the world on a couple of watts



\$189⁹⁵

- 80, 40, 20 and 15 meters CW; a minimum 3.5 watts in on 80 with quiet, 0.2 μ V receiver sensitivity
- Adjustable T/R delay and semi break-in capability with 2-position wide/narrow active audio filter
- Excellent mobile/portable rig; weighs only 4 pounds

For real CW fun, you can't do better than the popular Heathkit HW-8 QRP Transceiver. It has a well-deserved reputation as the world's finest low-power rig, with quality-first engineering that always earns top compliments.

The HW-8 provides you with maximum convenience in covering its 3.5-3.75, 7.0-7.25, 14-14.25 and 21-21.25 MHz operating ranges. Performance begins with a quiet, super-sensitive receiver section. Usable signals are pulled through a tunable preselector, direct conversion with RF amplification, and a balanced product detector followed by active audio processing. Add to that:

AF and RF gain controls, pushbutton-controlled diode bandswitching, a stable FET VFO in a temperature-compensated Hartley configuration, a method of pre-mixing the variable and crystal heterodyne oscillators to provide the same dial readout on all bands plus a front panel relative power meter used during alignment to assure perfect adjustment of the transmitter tuned circuits, and you've got one dynamite DX and domestic station-chaser.

The rugged portability of this great little performer means you can take along your hobby wherever you travel. Operate your HW-8 on a campout, or from a suitcase on business trips; power it from a motorcycle battery, car lighter socket, dare to go solar QRP (the ultimate test) or tune it up at home on 120/240 VAC with the HWA-7-1 Power Supply below.

No matter where you operate or how you power yours, just imagine all the fun you're going to have transmitting a tiny signal of powerful proportions to all corners of the earth...and the range of surprised replies you'll receive.

Your HW-8 is an easy and enjoyable kit to build, too. Most parts mount on a single circuit board with a minimum of point-to-point wiring. The thoroughly detailed Heathkit assembly manual guides you every step of the way, and even includes many hints to help you make more contacts once the joy of construction is over and it's time to put your new Transceiver on the air.

Order yours today and join the growing number of amateurs who are discovering the exclusive fun and fraternity of QRP QSL-hunting with the HW-8. Requires headphones. Accept the highest CW challenge. At home or in the great outdoors, it's your passport to more leisure pleasure!

Kit HW-8, Shpg. wt. 6 lbs. 189.95

Kit HWA-7-1, 120/240 VAC Power Supply for HW-8, Shpg. wt. 4 lbs. . 29.95

HW-8 SPECIFICATIONS: TRANSMITTER – Frequency Control: Built-in VFO. Frequency Stability: Less than 150 Hz/hour drift after 60 minute warm-up. Output Impedance: 50 Ω . Spurious and Harmonic Levels: –35 dB or better. Offset Frequency: Approximately –750 Hz, fixed on all bands. RECEIVER – Sensitivity: 0.2 μ V for readable signal; 1 μ V or less for 10 dB S + N/N. Selectivity: Wide, –750 Hz @ –6 dB; narrow, –375 Hz @ –6 dB. Audio Output Impedance: 1000 Ω , nominal. GENERAL – Frequency Stability: Less than 100 Hz/hour drift after 30 minute warmup. Power Requirement: 12-16 VDC, 90 mA, receive; 430 mA, transmit. Dimensions: 4 1/4" H x 9 1/4" W x 8 1/2" D.

Matching low-power station aids for the dedicated QRP operator



NEW

HM-9 HF/VHF Wattmeter and 3:1 SWR bridge

- For the world under 50 watts, Heath makes reliability and versatility affordable in a compact, low-power wattmeter
- Components included to wire it for three frequency ranges

Put your best QRP signal on the air with confidence and keep your low-watt station at peak power efficiency with the sensitive Heathkit HM-9 Wattmeter. It simplifies continuous metering of exciter or amplified output level and allows quick, exact matching when you fine-tune your antenna system.

Versatility is extended with an option of wiring the HM-9 for use in any one of three ranges: 1.8-30 MHz, 50-54 MHz or 144-148 MHz. QRP fans will love it. 12/AMATEUR RADIO

Active hams on the 2- and 6-meter VHF bands can use it to measure output of their barefoot and boosted HT's, mobile or base station transceivers.

The HM-9 circuitry is contained on a single p.c. board utilizing close-tolerance components. Assembly and calibration can be completed in a single, satisfying evening. And the manual includes detailed sections on Operation, Application and Physical Placement for absolutely accurate results. With build-it-yourself quality throughout, QRP loyalists won't find a better Wattmeter than the compact new HM-9 for monitoring output power at a glance!

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

NEW

HFT-9 50-Watt Antenna Tuner with 4:1 balun

- Ideal for QRP station operators who want a perfect match
- Designed with rugged portability and repeated dependability in mind, using only the finest high-quality components

When you're running a signal that peaks at less than 50 watts, there's no room for a mismatched loss of precious power. With the new Heathkit HFT-9 working for you, there's no chance of losing a QSO to stray attenuation.

The HFT-9 provides 100% power transfer to a wide variety of output impedances including dipoles, inverted vees, verticals, mobile whips, windoms, random lengths and similar types fed by coax, balanced line or a single wire. A 4:1 ferrite balun is built-in for use with balanced open-wire feeders.

A large 12-tap air-wound inductor, with silver-plated wire and tap selector, gives you an almost unlimited matching range between 1.8 and 30 MHz. Continuously variable transmitter/antenna controls make optimum adjustments easy. The back panel has two SO-239 coax connectors, a terminal strip for balanced line and long wire antennas and separate ground post.

When every watt counts, and the difference between full contact and a half-copied call sign may rest on the performance of your antenna tuner alone, don't take chances. Buy the best you can find. But remember, the HFT-9 is the only one that offers build-it yourself reliability, coupled with trusted Heath engineering. Altogether, an advantage no other Tuner can match!

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

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



At Heath, we still believe that the customer comes first.

Reliable, money-saving accessories for improved efficiency

1 Heath Cantenna load resistor dissipates RF more efficiently

We've made the original 'Cantenna' even better! This important device now has improved specifications, better components and our famous low, build-it-yourself kit price. HN-31A now handles 1 kW of RF energy (2 kW PEP) with VSWRs always less than 1.5:1 for frequencies up to 450 MHz. Stabilized, ceramic resistor element provides ideal 50 ohm non-inductive load to your setup. Power derating curves and spring-loaded lid vent maintain high safety factor. Works like magic to eliminate unnecessary QRM during tune-up and minimize mistakes while performing 'hot' gear maintenance or alignment. Light enough for easy field portability. Holds one gallon of transformer oil (not supplied). Should be standard equipment in every hamshack. Save your finals!

Kit HN-31A, Shpg. wt. 3 lbs. 24.95
Kit HN-31, (see p. 95), Shpg. wt. 3 lbs. ... 19.95

2 Micoder II dials up repeaters

Upgrade your VHF gear with the Heathkit Micoder II Microphone/Auto Patch Encoder and gain fast telephone access through DTMF-equipped repeaters. Full 300-3000 Hz response is tailored for clear voice transmission. Up to 30 mV rms output for better modulation. PTT bar for convenient one-hand use. High-Z, completely self-contained operation from 9V battery (not supplied) or transceiver. Crystal-referenced IC encoder circuit provides accurate, stable tone quality. LED verifies tone transmission. Includes 6' coiled cord.

Kit HD-1984, Shpg. wt. 1 lb. 49.95

3 Reduce output noise levels with low-priced, ultra-modern Desk Mike

Cardioid pattern of the Heathkit Dynamic Microphone produces 20 dB front-to-back ratio for lowest noise. 150 Hz to 15 kHz response. Switch-selected high/low impedance and VOX or lockable PTT. Beige Cyclac case with 6' coiled cord adds new style and bonafide class to your shack.

HDP-242, Assembled, 2 lbs. 59.95

4 Change antennas in seconds with a convenient Remote Coax Switch

Saves money! — replaces five expensive coax feed lines 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. Use it with our new SS-9000 Deluxe Synthesized Transceiver (see p. 10), for 'auto-magic' antenna control. 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. Includes U-bolt mounting assembly for easy attachment to mast or tower. Specially-shielded, weatherproof solenoid housing protects outdoor unit. 120/240 VAC. Requires color coded 8-wire cable below.

Kit SA-1480, Shpg. wt. 8 lbs. 129.95
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



There's more for the ham at Heath.

5 Coaxial Switch routes input RF

Choose from up to four antennas or interconnecting equipment quickly, efficiently. Switches one RF source to any one of several antennas or loads, while grounding all outputs not in use. Handles 2 kW PEP with maximum 1.1:1 SWR to 250 MHz. Built-in bracket with keyhole slots allows convenient mounting on station cabinets, desk or wall.

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

6 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. Cutoff frequency is 34 MHz. Less than 0.3 dB insertion loss. For 160-10 meters. 50Ω. Full legal power.

HDP-3700, Assembled, 2 lbs. 34.95

HDZ-63-3, 3-ft. coax w/connectors, 1 lb. ... 4.95

7 Twelve-socket Outlet Strip

Multiples convenience by providing extra electrical outlets for your equipment in hamshack, workshop, basement or garage. Has eleven switched and one unswitched, fused 3-hole outlets with 10A max load. Portable or permanent. 120 VAC.

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

8 Yagi Beam for more 2-meter gain

Cushcraft A144 11-element VHF/UHF Yagi features 11.3 dBd gain, 20 dB front-to-back ratio and gamma-matched tuning for minimum SWR. All elements spaced 0.2 wavelength and tapered for wide operating bandwidth. Built-in 1 kW Reddi-Match with PL-259 connector feeds directly with 52 ohm coax. Designed for horizontal or vertical polarization and cut for 144-146 MHz. Boom length: 144," turning radius: 81." Lightweight but rugged. 2:1 VSWR bandwidth is greater than 3 MHz. Some assembly required.

HDP-1470, Shpg. wt. 6 lbs. 47.95

9 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. For the serious shortwave listener.

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

10 146-148 MHz Mobile Antenna

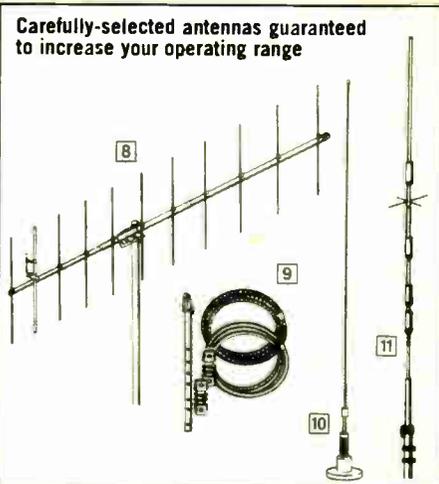
Cushcraft AMS-147 1/2-wave 2-meter mount with 90 lb. grip-tight magnet in a chrome-plated base makes it easy to air a signal in many vehicles — even your boat. Stainless steel whip with thumb-lock adjustment needs no cutting; boasts 3 dB gain for more range. Includes PL-259 and coax.

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

11 Cushcraft AV5 has long DX reach

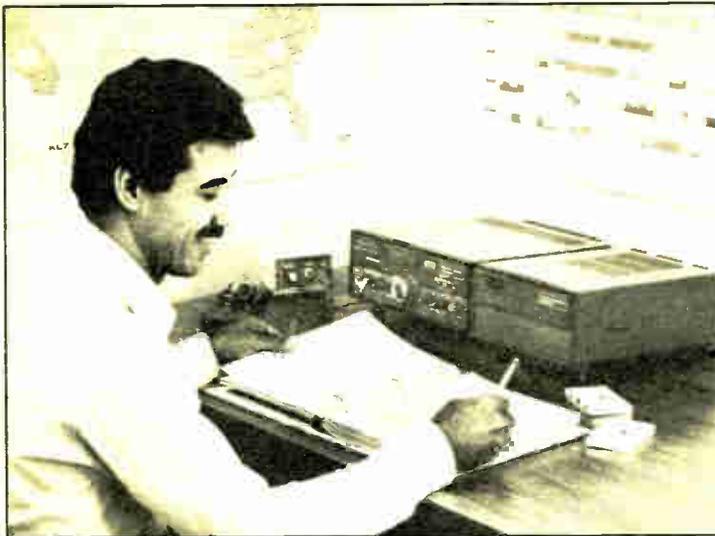
Vertically-polarized, omni-directional antenna designed to provide complete CW and SSB coverage from 80-10 meters. Especially effective high-Q traps give wide bandwidth. SWR always 1.5:1 or less at resonance on each band. Height is 28' 4" on CW and 24' 9" on phone. Use it confidently with any transmitter or transceiver having 50 ohm output at full legal power. Built-in coax connector takes PL-259 on your feed.

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



Carefully-selected antennas guaranteed to increase your operating range

Novice Class License Course is guaranteed to help you become a new Amateur!



Now – for CBer's, electronic hobbyists, and everyone interested in operating world-wide two-way Amateur Radio equipment – Heath makes it easier than ever to pass the required FCC exam. Everything you need to learn comes with the Course!



\$39⁹⁵

**Achievement
Guaranteed**

- 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
- Take the Novice FCC test and ride the airwaves! You can't fail – Heath guarantees that you will pass – or we'll refund the full purchase price of the Course!

From Heath – the leader in Amateur Radio technology – here's a self-instruction program that's guaranteed to help you earn a Novice ticket! Everything you need to get your license and

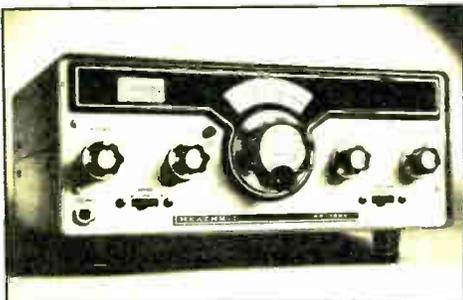
become a part of a privileged fraternity is in this comprehensive, well-organized study aid, including information on how you apply to take the latest FCC exam. Also, it provides helpful guidelines for setting up and operating a good station when your license and personal call sign arrive...

This deluxe learning tool now contains 48 new pages of text material to prepare you for the latest FCC Novice license examination.

The Course is organized in nine separate 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 own pace.

At the end of each module, a multiple-choice review checks your understanding and retention of the material. After Module 9, three practice exams and a final styled after the new FCC examination impart the experience and test-taking confidence you want to pass the first time with flying colors.

Heathkit HR-1680 SSB/CW Receiver is an excellent choice as a first-time receiver



\$199⁹⁵

- Outstanding sensitivity lets you copy very weak signals
- Easy, no-instrument alignment

The HR-1680 is a smart choice for the beginner who wants to tune in on the world of Amateur Radio. Look at the facts: it covers 80, 40, 20, 15 and the lower 1 MHz of the 10 meter band, with a pre-selector-tuned dual conversion front end. Less than 0.5 μ V in gives you a 10 dB signal to noise ratio.

A 4-pole crystal filter and MOSFET amplifier gives the IF selection excellent selectivity and gain. Both the RF and IF stages have AGC to prevent a signal of varying strength from fading and blasting.

The Course includes two audio cassette tapes full of important knowledge. The first is an introduction to Amateur Radio, and 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.

Upon completion of the entire Course, you'll be able to accurately send and receive code at five words per minute, and pass a 20-question multiple-choice written test from the Federal Communications Commission.

An attractive vinyl binder houses the nine modules and cassette tapes. As a bonus, you receive a set of handsome Operating Aids including a colorful 31" x 22" Frequency Spectrum Chart and a matching U.S. Area Call Map, a glossary of common abbreviations used during communication with other Amateurs, an explanation of the twelve most frequent 'Q' signals, instructions for making your own base station antenna, and much more.

So...if you've been putting off getting the Novice ticket because of fear of failing the code test or the technical exam...or if you just didn't know where to start, the Heathkit/Zenith Novice License Course is the correct answer! It contains everything you need to get started on the right track toward the day when you put a rig on the air and start talking to the world. Order it now – the exciting universe of Amateur Radio is waiting for you!

ER-3701, Shpg. wt. 7 lbs. **39.95**
Kit HD-1416, Code Oscillator (see below), Shpg. wt. 2 lbs. **24.95**

Build up your code speed fast with this handy CW kit



\$24⁹⁵

Use this CW Code Oscillator to learn the Morse Code, get your code speed up and pass the FCC license exams in a simple and inexpensive way! It has a telegraph key with adjustable rebound, built-in speaker, volume and tone controls, plus a headphone jack for private listening.

The key furnished with the kit is the only external item you require to form audible code characters. The manual includes sections on Operation, Application and Learning the Code. Once you get your license, the HD-1416 can serve as a sidetone oscillator for any transmitter using negative grid-block keying. Two-tone emerald cabinet is 2 $\frac{3}{8}$ " H x 4 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. Operates on one long-life 9V battery (not included).

Kit HD-1416, Shpg. wt. 2 lbs. **24.95**

We'll help you get started in Amateur Radio

Save 23% on ER-3701 Novice Course and HD-1416 CW Oscillator by purchasing them together. Includes 10% certificate good for up to \$100 off Heathkit equipment. Purchased separately, they'd cost \$64.90.

SAVER! ERS-3701, Shpg. wt. 9 lbs. ONLY 49.95

HR-1680 also features individual crystal heterodyne oscillators for reliable frequency stability, 'S' meter for reading relative signal strength, solid-state diode bandswitching, 100 kHz reference for precise calibration or alignment and a selectable wide/narrow active filter circuit for best audio response. It operates from 12 VDC or internal 120/240 VAC power supply. Assembly is simple and easy to follow step-by-step, with only four boards to construct. Perfect for newly-licensed or aspiring Novice operators. It combines high performance and low cost for serious listeners!

Kit HR-1680, Shpg. wt. 14 lbs. **199.95**

Kit HS-1661, Matching Speaker, 5 lbs. **37.95**



Advanced Class Amateur Radio License Course is the perfect incentive to upgrade

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 possess a General license or have the equivalent skills and background knowledge to do so.

\$49⁹⁵

- Well-organized to make most efficient use of your time
- Join the elite class of Advanced-rank operators
- We guarantee that you'll pass your FCC exam the first time — so sure in fact, that we will refund the cost of the program if you fail to pass after completing the enclosed optional final exam. That's confidence!

In response to the intense interest of General hams to achieve Advanced operating privileges, we've produced a comprehensive self-education Course that's *guaranteed* to aid in obtaining their next license, and earn a new call sign.

Housed in a pair of matching vinyl binders, the Advanced License Course fills over 800 pages. Unlike many, this Course is not simply a repetitious list of questions and answers to be memorized for passing the exam, but a detailed source of technical and appendical material which will improve your overall knowledge and understanding of radio electronics at the Advanced Class level.

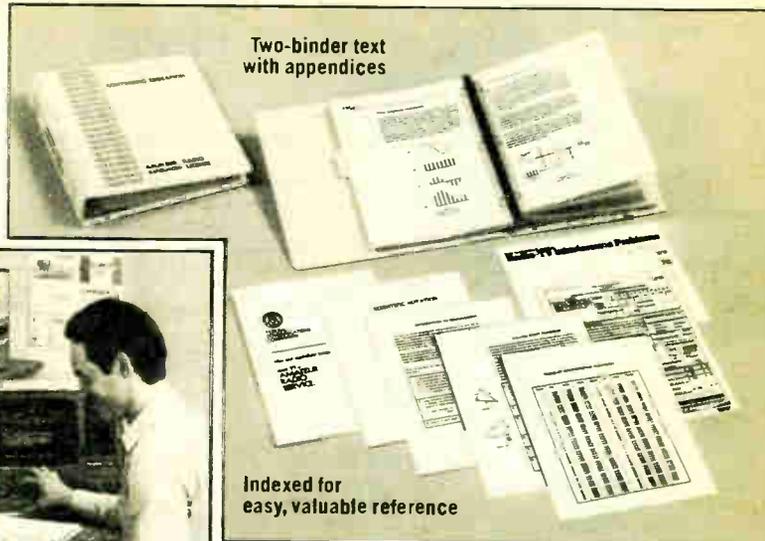
The FCC Element 4(a) written examination deals with the following subjects: Rules and Regulations, Radio Phenomena, Operating Procedures, Emission Characteristics, Electrical Principles, Practical Circuits, Circuit Components, Antennas and Transmission Lines, and Radio Communication Practices. ER-3703 covers them *all* in detail for the exam.

Two multiple-choice, 50-question exams at the end of the Course simulate the actual FCC test, and thereby give you "hands-on" test-taking experience.

The Advanced License Course is arranged in 8 learning units:

- DC and AC Electronics
- Basic Circuits for Equipment Design
- Antennas, Feedlines and Propagation
- Semiconductors
- Transmitter and Receiver Circuits
- Station Operations
- Practice Examinations
- Measurements and Test Equipment

In addition to the text, you receive a copy of Part 97, FCC Rules and Regulations for Amateur Radio Operation, "How to Identify and Resolve Radio-TV Interference Problems" and the FCC's Form 610 license test application.



Two-binder text with appendices

Indexed for easy, valuable reference



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

General License Course promotes Novice to voice communication

\$59⁹⁵

- 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.

This Course now contains additional new material to prepare you for the latest FCC examination.

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 comfortably. We won't let you fail!

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.

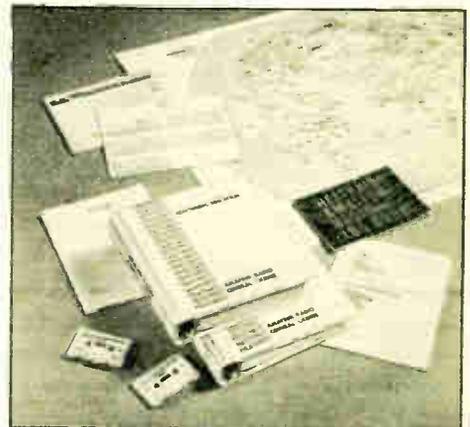
The General Course is arranged in 11 units:

- Ham Radio Operation
- Direct Current
- Alternating Current
- Active Devices
- Electronic Circuits
- Measurements
- Transmitters
- Receivers
- Antennas
- Practice Exams
- Getting on the Air

Your General License Course includes:

- Two Vinyl Binders
- Two 90-min. Code Tapes
- New FCC Form 610
- 4 Simulated Exams
- Station Log Book
- T.V.I. Booklet
- Complete Test
- Code Workbook
- FCC Exam Schedule
- FCC Rules and Regulations
- World Call Map

Upgrading has never been easier because our Course has everything you need, including guaran-



tee of passing 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.

You have nothing to lose — order the best today!
ER-3702, Shpg. wt. 24 lbs. 59.95



Discover the fun of kitbuilding at your Heathkit Electronic Center.

Easy-to-access top controls and BNC connector

Affordable 2-meter handheld

\$199⁹⁵

• Includes everything you need:

One popular 146.94 MHz crystal, long-life rechargeable nickel-cadmium battery pack and drop-in AC charger, flexible "rubber duck" antenna, phonejack and earphone, 8-channel single crystal simplex or duplex capability, universal BNC output connector, separate speaker and microphone for outstanding T/R audio quality.

The VF-2031's Optional Auto-Patch Encoder lets you make phone calls through repeaters



Carry 2-meter action with you wherever you go!

You get a minimum of 2 watts out – more than enough clout to get into your local repeater full quieting every time. Single crystal T/R circuitry covers 8 of your favorite channels. Choose between simplex or duplex operation with a ± 600 kHz split (24 usable frequencies) at the flip of a switch.

With adjustable deviation, volume, squelch and performance-proven Heathkit FM engineering, what your VF-2031 says and hears is always clear. Sensitivity? Less than $0.5 \mu\text{V}$ quiets the 2031's hot receiver section a full 20 dB. Careful design and plenty of internal shielding holds spurs a full 60 dB down. Adjacent channel selectivity is better than 40 dB. Covers 143.5 to 148.5 MHz.

Compact and lightweight, the VF-2031 is a 'versatile friend' while on the go. The more than 200 Hams at Heath give it their highest recommendation. And at this all-inclusive price, it's one of the best 2-meter bargains around!

- Kit VF-2031, Shpg. wt. 5 lbs. 199.95
- VFA-2031-2, Fitted holster-style leather Carrying Case, 1 lb. 19.95
- VFA-2031-3, Auto-Patch Encoder to access telephone lines through repeaters equipped with auto-patch inputs, Shpg. wt. 1 lb. 19.95
- VFA-2031-5, Audible/Sub-audible Continuous Tone/Burst Encoder Accessory to access most repeaters. Builds right into VF-2031. Shpg. wt. 1 lb. ... 9.95
- Kit VFA-2031-6, External PTT Microphone with coiled cord which plugs into VF-2031 so you can transmit without removing unit from holster, 1 lb. 29.95



Dual HF Wattmeter accurate to $\pm 5\%$

NEW

\$99⁹⁵

- Newly styled to match the HW-5400 and SS-9000
- Reads PEP or average power from 1.8 to 30 MHz
- Has a factory assembled and calibrated sensor
- Tune your transmitter for optimum output with at least $\pm 5\%$ forward power accuracy
- Enjoyable, easy-to-build two-evening kit

Is your station performing at peak efficiency on the low bands? Installed in your transmission line, the new HM-2140A monitors both forward and reflected power simultaneously. An additional scale on the reflected meter reads SWR directly from 1:1 to 3:1 for fast, easy measurement of your outgoing signal.

The Hams at Heath designed the HM-2140A to measure your transmitter's output up to 200/2000 watts PEP in the forward direction, and up to 50/500 watts ($\pm 7.5\%$) reflected. Pushbutton-switched high and low power ranges plus a factory-tested sensor insure precision readings every time. Another dual-position switch enables you to read PEP or Average power instantly.

For complete portability in the field, this valuable instrument can be operated on a 9-volt battery (not included). Where AC power is available, you can use the PS-2350 AC Battery Eliminator below. For added convenience, the precision RF sensor can be mounted in-cabinet, or up to four feet away.

A scale labeled BATT on the forward meter, when used with the front panel Sensitivity control, lets you observe the life condition of the battery.

The HM-2140A is housed in a ruggedly portable all-aluminum cabinet and wears the proud new charcoal- and night-brown colors of our latest state-of-the-art transceivers. Like them, this Dual HF SWR/Wattmeter offers you the reliable self-serviceability and satisfaction we pack into every Heathkit product.

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

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

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Heathkit 75-Watt All-Mode Base Amplifier adds more DX power to your rig or repeater

\$279⁹⁵

- Improve transmitter range and work the ones you only hear — 75 watts of output with just 10 watts of drive
- Operates FM, SSB, CW and RTTY with a special circuit design that gives low distortion SSB performance
- No appreciable insertion loss in receiver sensitivity

The VL-2280 is a rugged, no-nonsense amplifier that was designed specifically for base operators who expect dependable operation under heavy demand.

Reviewers and owners have praised it for including the added-value standards of simple operation and self-serviceability they appreciate most. A built-in power supply operates from 120/240 VAC, generator, or even 12 VDC backup battery while running remote or in an emergency. And the VL-2280 has sufficient reserve to power most exciters directly from an accessory jack on the back panel, providing a pure 13.6 VDC source at 4 amps maximum load.

High-quality Heath engineering throughout: Broadbanded circuitry maintains a stable, specified output across the entire 2-meter band without retuning. Extra-large heatsinks provide more than adequate cooling for a 50% duty cycle and more "on" time. An extremely clean signal results from superior specification by design-wise hams like yourself. IMD products are remarkably low, and harmonic output is greater than — 60 dB for better spectral purity. A changeover relay enables transmit mode with either automatic RF-sensed or manual keying, with a switchable VOX delay for smooth SSB operation. A Standby/On switch can let the exciter run barefoot. Lighted meter monitors drive power, power output and relative DC voltage.

The heart of a hefty repeater: When your club wants to update its declining vacuum tube amplifier and replace it with solid-state reliability, the VL-2280



is an outstanding choice that's sure to win applause from active hams.

Kit VL-2280, Shpg. wt. 32 lbs. 279.95

HDZ-63-33, 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 13.6 VDC with 10 watts of drive. Impedance: 50Ω. Input VSWR: 2:1 maximum. Insertion Loss: less than 0.6 dBc. Spurious and Harmonic Output: — 60 dB or better. Third Order Distortion: — 30 dB referenced to CW power. Operating Temperature Range, VL-2280: — 4°F to 104°F (— 20°C to +40°C). IM Distortion: — 24 dB. Duty Cycle: 50%, 10 minutes on 10 minutes off. Power Requirements: 240 VAC at 3.5 amps, 120 VAC at 7 amps; 11.5 to 15 VDC at 11 amps. Dimensions, VL-2280: 5 1/2" H x 13 1/2" W x 12 1/4" D.

Build this 40-Watt VHF Amplifier for your mobile QTH

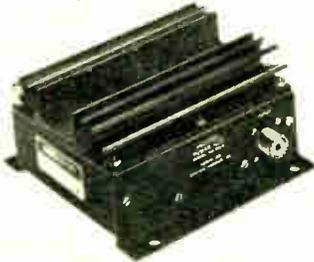
\$64⁹⁵

- Covers any 1.5 MHz portion of the band between 143-149 MHz
- Withstands VSWRs up to 3:1 and stays cool

Increase your VHF fun with a solid 40 watts out for just 10 watts in! The HA-202A has antenna changeover relay and sensing circuitry for automatic T/R switching. Final alignment requires only a VTVM, wattmeter or SWR bridge. Rugged chassis mounts almost anywhere. Puts extra emphasis behind your signal and advances the range of more 2-meter DX while you drive. Includes RF input/output SO-239 connectors for direct hookup. Requires 12-16 VDC. Stop missing the fun because of a weak signal — build and install the HA-202A for more power.

Kit HA-202A, Shpg. wt. 4 lbs. 64.95

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



10-Watt 2-Meter FM Amplifier is a low-cost boost

\$49⁹⁵

- Conducted spurious and harmonic radiation is — 60 dB or greater
- Heavy-duty design for years of service

Want some extra output to enforce your signal for very little money? The compact HA-201A delivers up to 10 watts for a minimum two watts drive. Or you can have 8 watts out strong for only 1 watt in! Has solid-state automatic T/R switching, tuned input and output for maximum efficiency and SO-239 connectors for easy hookup. Withstands infinite VSWR and wide temperature range without failure. VTVM needed for alignment. Operates from 12-16 VDC supply or automotive battery. Ideal for new and old HTs, portable and especially mobile rigs with low output. A must for hams who want a real boost in performance, and more calls coming back after a 2-meter CQ.

Kit HA-201A, Shpg. wt. 2 lbs. 49.95



Highly accurate Dip Meter covers 1.6 to 250 MHz



A useful solid-state Dip Meter can aid in determining the resonant or operating frequency of energized or de-energized circuits and help you adjust traps, detect parasitic oscillations and harmonics, measure Q/L/C values, locate sources and frequencies of RF energy, or function as a signal generator, relative field strength meter or alignment tool. A MOSFET paraphase amplifier and hot-carrier diodes provide more sensitivity

and a better dip. Operates on one 9V battery (not included) and goes anywhere you do. Once built, the rugged aluminum Meter and its accessories store handily in a molded gray carrying case. Assembly manual includes a detailed section on operation and applications to Amateur Radio.

Kit HD-1250, Shpg. wt. 4 lbs. 84.95

Electronic Keyer gives you choice of speed ranges

Your CW transmission can be 100% copy when this solid-state Electronic Keyer joins your base or portable station. You select between two ranges as the kit goes together: 10 to 35 or 10 to 60 words per minute. A continuously variable knob lets you set the most comfortable sending speed. Travel and tension of the paddles are adjustable, too. True iambic operation forms characters with less wrist + fist movement. The HD-1410 operates on 120/240 VAC or polarity protected 12 VDC for mobile-remote QSOs, and features adjustable volume and sidetone frequency, a built-in speaker, weighted cabinet, removable line cord, tune-up 'hold' switch, headphone jack, 96 inches of shielded cable, provision for connection to an external keyer, receiver audio input and front panel 'power on' LED. Three phono and one phone plug are also supplied with the kit for your use as needed. Attractive, two-tone emerald cabinet measures just 3" H x 5" W x 7 3/8" D.

Kit HD-1410, Shpg. wt. 4 lbs. 79.95



There's more for the ham at Heath.



Heathkit *UltraPro CW*™ Keyboard sends letter-perfect code at speeds to 99 WPM

\$249⁹⁵

- 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 Hams at Heath have done it again! They've developed a CW Keyboard of unbelievable versatility that defines a new standard of quality and value.

The HO-8999 *UltraPro CW* Keyboard uses a custom microprocessor and the latest in "human engineered" keyboard designs as a foundation for the most flexible and feature-packed CW operating aid you can own. Much of its capability can be understood by studying the keyboard illustration carefully. At upper left is the status panel, with a 4-digit LED display to show a function or values such as speed, weighting, serial number, remaining message character space, input error, tune mode, plus on/off status of sidetone, keyclick, and buffer protection. To its right, a 3-color, 8-segment LED bar graph indicates the fullness of the type-ahead buffer. All ten memory buffers are variable in size to avoid wasted memory space and can be loaded, edited and transmitted with only 1-3 keystrokes. All operating parameters can be set from the keyboard, and absolute accuracy is assured with a crystal-controlled clock.

Built-in diagnostics perform a complete self-check upon power-up. The back panel has on/off rocker switch, power socket, positive- and negative-keying phono jacks, reset switch, volume/pitch controls and a headphone jack.

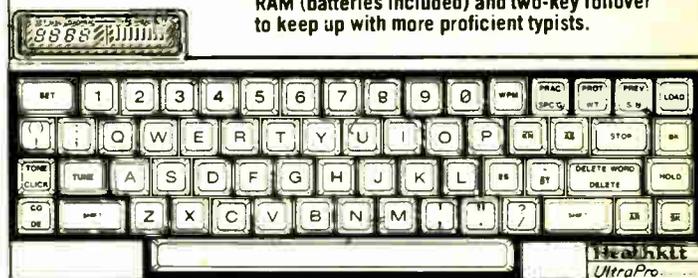
Build the *Ultra Pro* yourself with one of our world-famous assembly manuals and you can pocket the savings, while enjoying one of our most fascinating kits. The *UltraPro* is a professional-action keyboard with many features and innovations not to be found on units at twice the price.

Kit HO-8999, Shpg. wt. 7 lbs. 249.95

HO-8999 SPECIFICATIONS: Speed Range: 1 to 99 WPM. Spacing: Less than or equal to speed. Weighting: Normal plus five "light" and five "heavy" settings. Serial Number: 1 to 9999. Text Buffers: 1 to 10; variable length, with a total capacity of 495 characters. Individual buffers may be protected. 64-character type-ahead buffer. **Keyer Output:** +250 volts @ 100 mA; -200 volts @ 40 mA. **Memory Backup:** Three mini-cells (included) with typical 1 year life. **Sidetone:** Adjustable pitch (300-1500 Hz) and volume. **Indicators:** 4-digit LED display. SET, MSG, LOAD, PRAC and type-ahead buffer status LEDs. **Operating Range:** 32-104°F (0-40 C). **Power:** 7.5 to 11 VAC or 11 to 16 VDC, 450 mA max. **Dimensions:** 27 7/8" H x 15 1/2" W x 8" D. (7.3 x 39.4 x 20 cm) **Net Weight:** 2 lbs.



The HO-8999 also has non-volatile CMOS RAM (batteries included) and two-key rollover to keep up with more proficient typists.



Heathkit *μMatic*™ Memory Keyer has features that will improve the way you handle CW

\$99⁹⁵

- Add programmable excellence to your CW exchanges
- Up to 10 variable-length buffers let you store text or "command strings" so you can sequence alterations
- Four-level random practice mode allows 6,400 different and repeatable 3000-character training sessions



FAST, EASY
2-EVENING KIT

Bring more fun and results to your CW activity! Add iambic programmable speed and automatic message execution to your operating skills with the Heathkit *μMatic* Memory Keyer. Its flexible, 240-character memory and reversible capacitive-touch paddles will revolutionize your code-

sending ability, ease hand fatigue, multiply QSOs — and incoming QSLs.

Memory is effectively increased by the use of patented "command strings" — which let you store text in several buffers and link them together in whatever sequence you desire. Command strings can also select the speed, weight, spacing and auto-repeat count for each of those messages. A special editing feature allows you to recover from any errors made while loading a buffer.

Use the audible-feedback, 22-position keypad to select character formation speeds and spacing, any of 11 weight settings, pause, repeat count, buffer number and mode with ease. Enter text at whatever speed and weight are comfortable for you, and send it with any other settings you wish.

Text may be manually added into a buffer message being sent. Storing a Pause in text or command strings will cause the keyer to rest automatically for insertion of serial numbers, special greetings or station RST reports. A CMOS memory with battery backup retains the buffer contents, last-selected speed, spacing, weight and repeat count whenever it is turned off or unplugged.

Other deluxe features include a built-in sidetone oscillator and speaker with volume/pitch controls, phonejack and earphone, entry error alarm, positive or negative keying, LED mode indication and a money-saving auto shutoff utility should you forget. The *μMatic*'s die-cast zinc case is evenly weighted to



Easy-to-use
paddles unplug
and store in
the
keyer when
not in use

reduce movement during keying. Requires only the 120 VAC power transformer cube below for full operation. Discover the newest phase of CW fun!

Kit SA-5010, Shpg. wt. 3 lbs. 99.95

PS-5012, 120 VAC Power Supply, Assembled, Shpg. wt. 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 to 1 to 10 times). **Keyer Output:** Solid state: +250 volts @ 100 mA; -40 mA (separate, protected output jacks). **Memory Backup:** 3 watch batteries (supplied) — 1 year typical life. (No battery drain unless the Keyer is removed from AC power source). **Sidetone:** Approximately 300 to 1500 Hz, adjustable. **Power Requirement:** External pluggable transformer (optional) or 11 to 16 volts DC @ 200 mA. **Dimensions (excluding paddles):** 1 5/8" H x 4 1/8" W x 6" D.





Value-packed mobile service Siren/PA

- Includes new hi-lo siren circuit and provision for multi-mode emergency lighting control
- For positive or negative ground electrical systems

If your community's volunteer emergency unit or rescue squad is trying to make its dollars stretch as far as possible, the GD-1810 Electronic Siren/PA will meet your requirements for high quality, professional features at low cost.

This compact, 55-watt siren has automatic or manual wail, hi-lo emergency tone and yelp to accommodate different traffic situations. A 20-watt public address circuit amplifies your voice for outside announcement and incoming radio calls to monitor while away from the vehicle. Low-noise, push-to-talk microphone will instantly go from any siren to clear audio-PA mode.

The back-lit front panel makes night reading easy for sure operation as you drive. Siren pitch and radio level adjustments control output. Use with an emergency lighting system requires a properly rated, 12-volt relay (see below).

Includes a microphone with 4' coil cord, mic clip, 12' of 2-conductor hookup wire and 12 VDC power socket. Select your choice of high-output speakers below. Concealed speaker requires 4½" x 4½" x 13" behind grille.

| | |
|---|--------|
| Kit GD-1810, Shpg. wt. 6 lbs. | 109.95 |
| GDA-18-1, Weatherproof Exterior Horn Speaker, assembled, 10 lbs. | 99.95 |
| Kit GDA-18-2, Concealed Grille Speaker, Shpg. wt. 10 lbs. | 99.95 |
| Kit GDA-1558-1, Emergency Lighting Relay, Shpg. wt. 1 lb. | 4.95 |



Exterior horn

Concealed grille horn



Gimbal-mount bracket included

IMPORTANT: This product is designed for use in emergency service vehicles. Consult your local, state or federal authorities before you install or operate the Siren on any vehicle.

3-in-One Auto Tune-Up Meter saves on repair

- Aids troubleshooting and tune-up work
- Power gained from engine under test



This kit can pay for itself in two uses at today's tune-up prices. It enables you to do simple but important dwell angle, engine speed and battery voltage tests which you normally pay a mechanic to do. It combines a distributor cam dwell meter (with scales for 3, 4, 6 and 8-cylinder engines), an electronic tachometer (with 0-1500 and 0-4500 rpm ranges) and a 0-20V DC voltmeter in a single, compact instrument of high precision. Can be used with both 6 and 12-volt positive or negative ground systems, and solid-state or high-energy ignitions. A unique circuit reveals all measurements with just two test lead connections for fast, no-fault setup.

This versatile and money-saving tune-up tool comes complete with leads, applications summary, instructions for proper use and the opportunity to keep your autos in top shape for less, any season of the year.

Kit CM-1073, Shpg. wt. 4 lbs. 49.95



Fault-finding Engine Analyzer pinpoints trouble

Compare the features. Compare the price. Then add in the famous Heath quality and you come up with the best value you'll find in a solid-state Engine Analyzer — anywhere at any price!

You'll save by being able to trouble-shoot and locate problems in the alternator, generator, voltage regulator, distributor, condenser, starter, plugs, points, battery and electrical accessories.

This professional-grade instrument tests conventional, magneto, transistorized and most capacitive discharge systems with positive or negative ground on 3, 4, 6 or 8-cylinder engines of all kinds. The large, color-coded meter can display 0-32 volts DC, 1Ω-100 kilohms, 0-6000 rpm, 0-60° dwell angle, -5 to 90 amps DC, plus qualitative readings for point resistance, alternator and spark output. Separate input jacks permit current checks in conjunction with other functions and a switch-substituted condenser tests for faulty ignition.

The CM-1050 requires three 'C' cells (not included). All test leads, clips and special accessories (including 32-page Operation Handbook) are supplied.

Kit CM-1050, Shpg. wt. 8 lbs. 119.95



Exhaust Gas Analyzer for tune-up evaluations

\$119⁹⁵

- 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 gasses, 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, 4½" 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



For our FULL-LINE of computerware, order your Heathkit Computer Catalog. See page 74

You can perform auto tune-ups like a professional with the Deluxe Solid-State Ignition Analyzer

ONLY
\$599⁹⁵

- Displays primary and secondary patterns on 12" CRT
- Measures RPM, dwell angle and ignition voltage
- Performs ignition advance tests with COA-2600-4
- Shorts out cylinders to facilitate balance tests

Designed for the auto hobbyist yet perfect for the professional garage operation, our top-of-the-line Ignition Analyzer assures you of a precision auto tune-up every time. It provides the most asked-for features in an instrument of quality. Rock-steady parade patterns are made possible by the latest design in inductive pickup circuitry and switch selection of 4, 6 or 8 cylinders.

Has two voltage ranges: 0-2V for corroded connections and points measurements and 0-20V for battery condition and general distribution checks.

Cylinder selection buttons can be pushed in multiple numbers so that banks of cylinders can be shorted out for power balance checks with the built-in tachometer, and for electrical display 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.

High-temperature, oil- and gas-resistant neoprene insulated cables provide easy, positive connections to engine. Includes adaptor for GM HEI ignition systems. For use with 4, 6 or 8-cylinder (4-cycle), or 2-rotor Wankel engines and standard, transistorized or capacitive-discharge ignitions.

Kit CO-2600, Shpg. wt. 83 lbs. **599.95**

Heathkit Timing Light with Advance Meter plugs directly into CO-2600 Ignition Analyzer and provides a bright flash that registers clearly in daylight. Built-in advance meter measures distributor advance from 0 to 60 degrees at 1500 to 4500 rpm. Ten-foot cable with connector included.

Kit COA-2600-4, Shpg. wt. 3 lbs. **62.95**

Alternator Test Adaptor for CO-2600 Ignition Analyzer.
COA-2600-2, Shpg. wt. 1 lb. **14.95**

Solid-State Ignition Analyzer tunes economically

- Ideal test instrument for garage mechanics, service stations and automotive hobbyists
- Clamp-on, inductive pulse pickup method
- Built-in tachometer
- One of the most useful car care tools to own
- Four different patterns: primary or secondary in parade or superimposed
- Expand 2 to 1 vertical and 10 to 1 horizontal



Following the tune-up specifications for any auto and using the Analyzer Operation Handbook, you can detect shorted spark plugs, bad points, defective wiring, worn distributor parts, incorrect dwell angle, cam wobble, plus coil or condenser defects and transistorized or capacitive discharge problems.

Use it with any standard, transistorized or C-D ignition on 3, 4, 6 or 8-cylinder engines with distributors. Includes adaptor for GM HEI systems. Optional 12V Inverter mounts to unit's rear panel for portable or 'on the road' tests.

Kit CO-1015, Shpg. wt. 22 lbs. **279.95**
Kit COA-1015-1, 12 VDC lighter-socket Power Inverter, 3 lbs. **39.95**



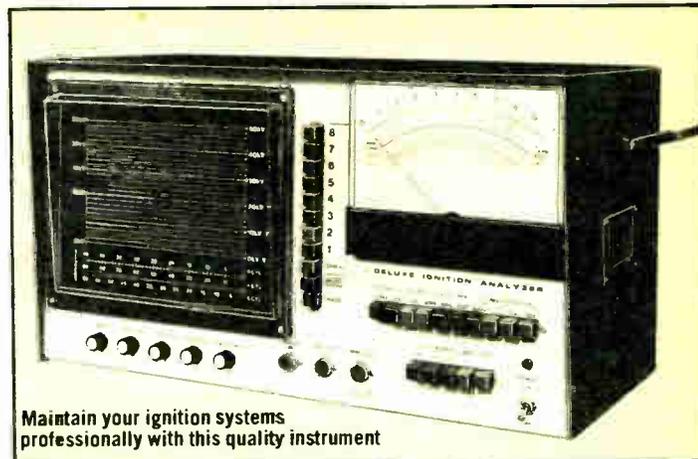
Automatic Battery Charger

Don't let a weak battery make you miss important work and social commitments. The winter chill can't kill your battery when you have the Heathkit Automatic Battery Charger standing by! Solid-state, ten-amp rating will keep your battery at full charge for easier starts in any weather and better overall performance. Won't operate unless properly connected.

Can't overcharge the battery - a protection circuit shuts unit off when fully charged. Easy to use, too! Just connect the cables (included) to 12-volt battery terminals and plug into AC outlet. Dimensions: 5½" H x 9" W x 6¾" D.

Kit GP-21, Shpg. wt. 12 lbs. **59.95**

20/AUTOMOTIVE



Maintain your ignition systems professionally with this quality instrument

CO-2600 SPECIFICATIONS: CRT Size: 12 inches (diagonal). Meter Size: 8 inches. Signal Pickup: Direct for primary, inductive for parade trigger and capacitive for secondary. Tachometer Ranges: 1000, 3000 and 6000 RPM. Voltmeter Ranges: 2, 20 VDC. Tachometer/Voltmeter Accuracy: ± 3% of full scale on any range. Scope Vertical Expansion: 2 to 1 minimum. Operating Temperature Range: 32 to 122 degrees F (0 to 50 degrees C). Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 12½" H x 25¼" W x 14¾" D. (32.72 x 64.14 x 35.89 cm). Optional Accessories for the CO-2600 Ignition Analyzer: COA-2600-4 Timing Light/Advance Meter. COA-2600-2 Alternator Test Adaptor. COA-2600-3 Deluxe Scope Cart.



Deluxe Scope Cart aids viewing and mobility

Keeps the CO-2600 Ignition Analyzer at the ideal viewing angle for easy reading. Rolls from place to place on casters for maximum convenience. Frees workbench for other projects.

COA-2600-3, Shpg. wt. 25 lbs. **49.95**

Portable Engine Analyzer has digital accuracy

- Measures dwell, engine speed, plus DC voltage, resistance and current
- Battery-operated power gives full portability
- Meets GM specs for use with 1981 and later models with Computer Command Control



The Heathkit CM-1551 is a versatile, precision Portable Engine Analyzer with 10 megohm input impedance. It's carefully designed to measure dwell angle, engine RPM, voltage drop, current and resistance. A 3½-digit liquid crystal display - easy to read even in bright sun - provides the resolution you need to adjust idle speed, rapidly test the battery, generator or alternator, voltage regulator, starter and all other electrical circuits on 4, 5, 6 and 8-cylinder engines with the accuracy of a professional racing mechanic.

Using the optional Shunt Accessory, the Engine Analyzer can measure starting current, plus battery charging and discharging current - up to 400 amps with ± 5% accuracy. Compartment holds Accessory and leads when not in use.

Power is supplied by a 9-volt battery (not included), so there are fewer wires under the hood. Has automatic polarity, LO BAT and overrange indication.

Kit CM-1551, Shpg. wt. 5 lbs. **129.95**
CMA-1550-1, 400-Ampere Shunt Accessory, Shpg. wt. 1 lb. **15.95**

COA-2600-2 Alternator Test Adaptor enables you to measure regulator relay charging voltage limits. Connects between battery post and CM-1551. Shpg. wt. 1 lb. **14.95**



Open a Heath Revolving Charge with a purchase of as little as \$100!

Quiet, dependable Moore-O-Matic Deluxe Garage Door Opener ends strain and struggle

\$189⁹⁵

- 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

The Electronic Command Garage Door Opener is an investment that pays off immediately in convenience and security. Is the weather bad? Or is it dark as you pull into the driveway late at night? Touch the button on a remote transmitter in your car and watch the door open automatically to greet you with 80 watts of clear illumination, as the car rolls into safety and dry shelter. Touch the button again — the door closes and *positively locks* to prevent anyone from opening it on the outside by hand. The security-timed light shuts off about five minutes after the opening-closing operation is complete.

Designed for garage doors up to 18 feet wide and 7 feet high, the powerful 1/3 h.p. motor opens even the most reluctant doors effortlessly. Not recommended for one-piece jamb and pivot doors. A spring shock absorber cushions vibrations and allows for up to two inches of ice build-up and other impediments. Up-limit, down-limit and obstruction pressures are adjustable.

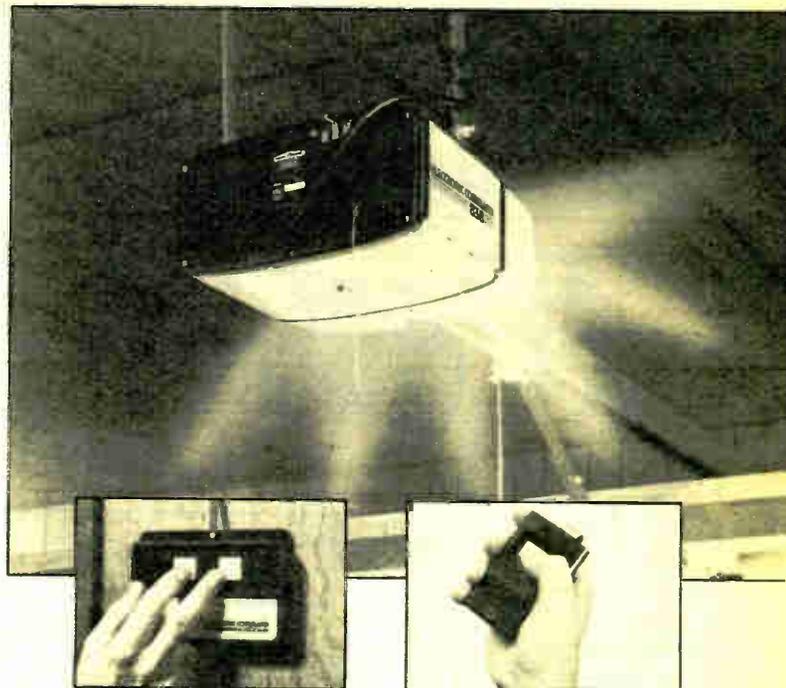
Equipped with more deluxe convenience features: Exclusive triple-thread design of the 3/4" diameter aluminum screw results in a smooth, balanced rotation and greater mechanical integrity. The quick-release trolley disengages with a simple string tug. And reset is just as easy, as one tug snaps it back.

Transmitters and receivers are all solid-state and digitally encoded. There are 256 possible signal combinations, which allows you to set and change your own code anytime — so there's never a chance of interference from neighboring units. The electrical control circuits are contained on one removable circuit board, run by an on-board microprocessor. Most Electronic Command Opener Systems will install in a single day, with do-it-yourself ease and no special tools. UL-listed operator housing requires 120 VAC, 60 Hz. Unit comes partially assembled with a Heath-approved manufacturer's manual supplied for full installation that assures reliable and maintenance-free operation.

The last word in convenience and safety: No longer a luxury, but an important improvement that belongs in every garage to save year-round time and back-painning physical labor. Your spouse will appreciate the thoughtfulness! Provide added welfare for your family, an extra measure of insurance to your garage contents and increased value to your home — order an Electronic Command Garage Door Opener today!

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.



Two-button safety wall switch prevents accidental door movement. Small, single-button portable transmitter activates the microprocessor electronics remotely.

GD-3409, Shpg. wt. 47 lbs. (UPS shippable — a real bargain) 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

Digital Tach/Speedometer monitors performance



More accurate and easier to read, this kit continuously monitors your car's velocity on a bright blue readout. Registers with ±1 mph or kph resolution, maintaining accuracy to 199. Automatic night dimmer. Pushbutton tachometer indicates x100 rpm. For all 4, 6 or 8 cylinder autos with spark or CD ignitions and 12 VDC negative

ground. Has detailed do-it-yourself instructions, hardware and bracket for mounting unit on or below your dash. Measures 1 3/4" H x 4 5/8" W x 3 1/3" D.

Kit CI-1265-1, Shpg. wt. 3 lbs. 64.95

Kit CI-1265-2, for autos with Heath/Dana Speed Control, 3 lbs. 54.95

Kit CSA-2048-1, required for front-wheel drive autos, Shpg. wt. 1 lb. ... 9.95

Matching Digital Clock/Timer has quartz precision



Displays 4-digit time to the minute in 12-hour format and switches freely back and forth to 24-hour trip timer without affecting accuracy of either function. Also acts as a 10-minute stopwatch. Front panel 'hold' button allows elapsed calculation without including stops. Highly dependable, crystal timebase. Readout turns off when ignition is off to conserve battery,

but timing circuit continues to operate. Automatic dimming feature for less nighttime driving distraction. For any 12 VDC negative ground vehicle. As with Speed/Tach above, kit includes bracket, all hardware and hookup info.

Kit GC-1415, Shpg. wt. 2 lbs. 34.95

Build the Wiper Delay for safer driving in wet weather



Are you annoyed by fog, sleet and drizzle? The Heathkit Windshield Wiper Delay can eliminate constant wiper arm movement when an occasional sweep is sufficient. A front panel control selects 'normal' or 'delay' modes, and sets continuously variable timing between 30 seconds for mists and road spray to 0.5 seconds for downpours.

Keeps your vision ahead safe, clean and clear. Designed to fit most single and 2-speed systems. Not compatible with motor-reversing hidden wiper systems; contact your auto dealer for specifics. End switch fumbling forever!

Kit CH-1068, Shpg. wt. 2 lbs. 19.95

Heathkit Auto Timing Light pulses brighter than daylight



You can perform professional timing tune-ups easier with high-intensity equipment like the CI-1040. Recommended for GM HEI and other systems, it features a handy inductive pickup that clips around spark plug wire. Super-bright xenon strobe has a useful light range up to 2' in daylight. Polarity protected; powered by auto battery. Includes all necessary cables, pickup and clips for quick setup.

Kit CI-1040, Shpg. wt. 3 lbs. ... 39.95



Remember — fine tools make your kitbuilding go even easier! See page 50.



Heathkit Programmable Auto Horn lets your car, truck, boat or RV express itself musically

\$49⁹⁵

- Choose from 16 internally pre-programmed tunes. Enter one from our music book of 50 tunes, or add your own tunes
- Select songs instantly with 3-button in-car keypad

Enjoy driving more than before! The easy-to-build Heathkit Programmable Car Horn installs in any car, truck, boat or RV with a 12 VDC, negative ground electrical system. It lets you select from 16 pre-programmed tunes, choose a song from a book of nearly 50 tunes, or program your own tune.

The heart of this Programmable Horn is a microprocessor with 16 pre-programmed tunes – varying from the brief, but exciting "Charge!" to a full 46-beat presentation of "The William Tell Overture."

A full keyboard inside the main unit uses a 13-note octave, plus rest and hold keys, so you can program any tune you want into two open memory circuits – without wires – and you may change tunes as often as you wish. An external control enables you to adjust the tempo to produce the quickness of a marching tune, or to slow down to the relaxed timing of "Swanee River."

The 3-button external keypad, which mounts at any convenient location on the steering column or instrument panel, lets you select any of three different tunes. Two of the tunes can be pre-programmed selections. Or choose two of your own tunes and one pre-programmed tune. Programming guide included.

A weatherproof, 4-ohm, 4-watt speaker (included) mounts behind your vehicle's grille – or at any other convenient outside location. A unique battery-saver feature in the Musical Horn relieves constant power drain after eight days.

An easy-to-build three-evening kit, the Heathkit Programmable Car Horn includes all necessary parts, a step-by-step Heathkit manual – even solder!

Kit CH-1276, Shpg. wt. 3 lbs. **Was \$79.95, NOW ONLY 49.95**

CH-1276 SPECIFICATIONS: Tones: 13, with frequencies from 261 to 522 Hz, ±1%. **Voicing:** Trumpet (approx.) **Sound Pressure Level:** 96 dBA at 1 Meter. **Power Requirement:** 10-17 VDC. **Idle Current:** Less than 95 mA at 13.2 VDC with ignition off. **Cabinet Dimensions:** 1½" H x 7¾" W x 4¾" D



Weatherproof speaker

Control volume and tempo

Select songs on keypad

Pre-programmed Musical Car Horn tunes:

| | | |
|--|---|---|
| <p>  Taps Yankee Doodle Wedding March (Mendelssohn) Stars and Stripes Forever The Great Gate of Kiev </p> | <p> Reveille O Sole Mio Wedding March (Wagner) William Tell Dixie Colonel Bogie March </p> | <p> Never on Sunday Somewhere My Love Greensleeves Post Time Charge </p> |
|--|---|---|

...you can also program your own tunes!

Use Electrical Systems Course to repair your car at home

\$39⁹⁵
for EAC-1

- Covers starting, charging, accessory/body electrical systems
- Features hands-on experiments to show repair procedures

Effective audio-visual teaching method covers major sections of the auto electrical system. Four modules give you an education in automotive electrical systems – complete with hands-on projects. Earn 4 Continuing Education Units – score at least 70% on each optional final exam.

SAVER! Complete Course. EAC-1, 23 lbs. . . 39.95
EA-11, Module 1/Elect. Principles, 5 lbs. . . 14.95
EA-12, Mod. 2/Starting System, 5 lbs. . . 14.95
EA-13, Mod. 3/Charging System, 5 lbs. . . 14.95
EA-14, Mod. 4/Acc. & Body Elec. Sys., 5 lbs. 14.95
 These courses can also prepare you for NIASE exams. Write NIASE, 1825 K St. NW, Wash., DC 20006.

Learn how to tune-up your car with Ignition Systems Course

\$49⁹⁵

- Learn to tune Chrysler/Ford/GM std. and electronic ignitions
- Detect problems early to save costly, time-consuming repairs

Audio-visual course teaches ignition principles, theory of electronic and computer-controlled ignitions and how to dismantle/change/reassemble ignition components. Earn 4 CEUs – score 70% on final exam. Projects require engine and ignition analyzers, timing light, compression tester and

vacuum pressure gauge. Components included.
EA-2000, 12 lbs. 49.95
Compression tester, vacuum pressure gauge and "T" fitting. EAC-2-1, 1 lb. 14.95
SAVER! Order EAC-1, EAC-2000 and EAC-2-1. \$104.85 separately. EAS-2000, 32 lbs. . . 89.95

1 Reliable Electronic Ignition Tester

\$19⁹⁵

- Takes the guesswork out of locating defective components in electronic ignitions

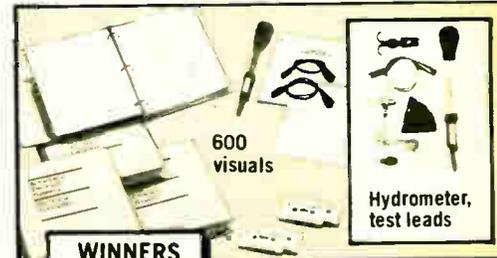
Tests battery condition, function of reluctor and pickup coil, switching of primary coil and location of faulty component in primary ignition circuit. 5½" H x 2½" W x ¾" D. Requires some ignition knowledge. Pickup coil test won't work on '78 and newer Omnis, Horizons, K-cars with Hall-effect ignitions.
Kit CI-2055, Shpg. wt. 2 lbs. **19.95**

2 Low-cost Charging System Tester

\$19⁹⁵

- Lets you quickly diagnose faulty components in your car or truck's charging system

Three quick tests tell you if battery is sufficiently charged, if alternator is charging battery, if voltage regulator is faulty and if alternator is functioning. Keep one in your car to save labor for road emergencies. For 12 VDC, negative ground systems. Enclosed in ¾" H x 2½" W x 5½" D case.
Kit CI-2065, Shpg. wt. 2 lbs. **19.95**



600 visuals

Hydrometer, test leads

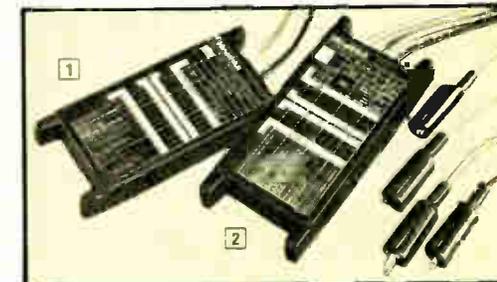


WINNERS
Awards from the Society for Technical Communications

With Champion tune-up chart

188 color flip charts

Ignition test components



Find lost valuables buried in the ground or two feet underwater with a Heathkit Metal Locator



Heathkit Metal Locators punch through ground clutter to uncover old coins, artifacts and treasure — any metal object you want to find. Our finest model pinpoints small objects in any kind of soil. Both models can comb ground submerged in up to two feet of water! What'll you find first? Old pennies? A ring? Rare raw metal? Maybe silver or gold dollars!

- GD-1290 detects objects even in highly mineralized soil where conventional locators are useless
- Has on/off volume, meter, speaker, phonejack, discrimination, ground balance, tuning controls, battery test switch, charging jack, mode switch
- Runs on 6 AA cells or rechargeable battery pack
- Our finest model, with VLF Ground Balance Mode and VLP — a very low price!

The Groundtrack — sensitivity in any soil type

A successful treasure hunting hobby can be exciting and rewarding. No matter where you live — by the sea or mountains, near sand, soil or solid clay — the Groundtrack will provide you with hundreds of surprising discoveries! Go exploring near public parks, old towns and homesites, mines, dumps, battlefields, beaches, fields or your own backyard. The Groundtrack detects valuables in any kind of soil. Yes, even in highly metalized soils that baffle conventional locators. A fully adjustable discrimination circuit eliminates unnecessary digging and lets you look in areas where high "junk" content makes the use of other locators all but impossible. It filters background signals, screening out pulltabs, metal foil, bottlecaps, ferrous and nonferrous items. With pushbutton tuning, only signals caused by items of value receive attention. Our finest metal locator — priced far below the competition! — will give you hour after hour of fun-filled excitement every time you use it.

A **Ground Balance Mode with excellent sensitivity** will pinpoint your treasures even in highly mineralized soil. The fully shielded search coil prevents false signals and is waterproof so you can sweep in up to 2 feet of fresh or salt water. The GD-1290 features a sophisticated, Very-Low-Frequency-modulated, induction balance system — you hear nothing until that ring, coin or antique artifact enters the 6-inch diameter search head's field. A tone sounds, then grows louder as you approach vertical center over the buried valuable.

Use the Groundtrack anywhere. It's lightweight (3.4 lbs) and portable, with a telescoping shaft that collapses for storage. Runs on 6 AA cells (not included) or optional Nickel-Cadmium battery pack, which recharges from home current or in-the-field from car cigarette lighter socket. It's rewarding fun — order one!

| | |
|--|--------|
| Kit GD-1290, Shpg. wt. 5 lbs. | 219.95 |
| GDA-1190-1, 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. Dimensions: Search Coil: 6" diameter. Extended Height: 45½". Collapsed height: 22½". Power Requirement: Six AA dry cells or alkaline, or rechargeable Nickel-Cadmium Battery Pack (GDA-1190-1). Net Weight: 3.4 lbs.

Cointrack Metal Locator highly sensitive to coins

Engineered exclusively for "coinshooting," the GD-1190 finds coins in sand and other general kinds of soil. It has the same fine features and specifications as the GD-1290 above, but no Ground Balance Mode. Rather, it has an off-resonance search coil optimized for coin detection, with adjustable discrimination to cancel out bottle caps, pulltabs, etc. A special pushbutton tuning maintains maximum sensitivity over varied conditions and 6" diameter head is waterproof, for shallow water searches. Take the Cointrack anywhere, because it's lightweight (only 3.4 lbs.), weight-balanced, has a telescoping wand that adjusts to your height and collapses to 22½" for storage and transportation.

| | |
|---|-------------------------------|
| Kit GD-1190, Shpg. wt. 5 lbs. | Was \$149.95, NOW ONLY 129.95 |
| GDA-1190-2, Superex Headphones, Shpg. wt. 2 lbs. | 14.95 |

GD-1190 SPECIFICATIONS: Sensitivity: Typically 4" to 6", may be less depending on coin size, amount of discrimination and soil material. Method of Detection: Off resonance type. Output: Meter, Speaker, Phone Jack. Dimensions: Search-Coil: 6" diameter. Overall length: Shaft extended 45½", collapsed 22½". Power Requirement: Six — AA Dry Cells or Alkaline, or rechargeable Nickel-Cadmium battery pack (GDA-1190-1). Weight: 3.4 lbs.



Discover the fun of kitbuilding at your Heathkit Electronic Center.

Built-in speaker lets you operate without headphones

Toggle switch for selecting Discrimination or Ground Balance modes

Headphone Jack

Pushbutton tuning and ON/OFF volume control (top)

Easy-Grip handle for fatigue-free use

Fully adjustable Discrimination and Ground Balance controls

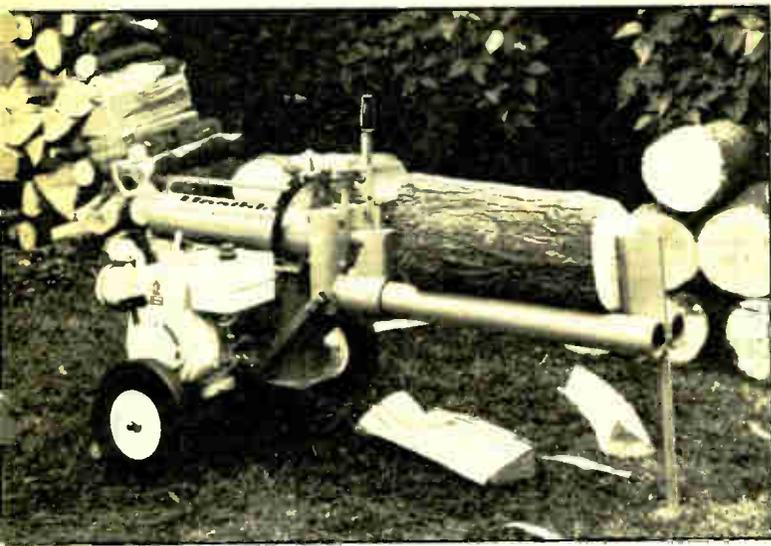
Large easy-to-read meter mounts for right- or left-handed users

Telescoping shaft is height-adjustable; Tough, shielded cable stands up to years of operation

Waterproof head for beach treasure-hunting folds flat for easy storage, and is submersible to 2 feet in fresh or salt water

Detection meter deflects in accordance with discrimination setting; needle deflects upscale and sound increases when valuable object is within search field and grows louder as you approach center of buried item

Win the war on energy — stack more wood quickly with a low-cost, easy-to-build Heathkit Log Splitter



\$629⁹⁵

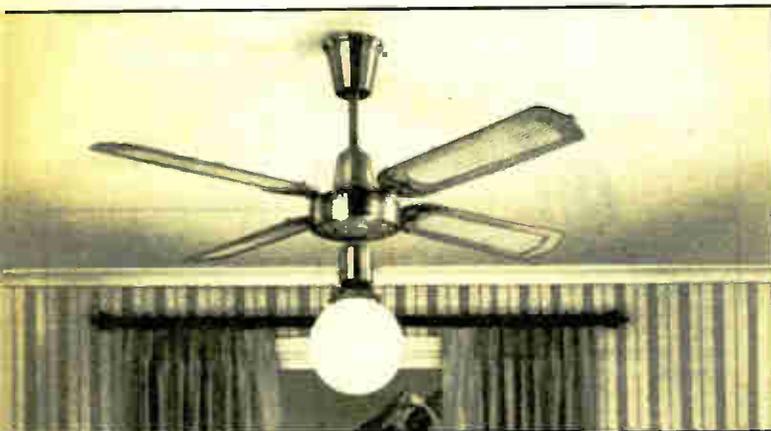
- Splits logs faster than by hand, cuts worktime by hours
- Portable and weight-balanced, wheels to any worksite
- Save money — split wood you cut or buy unsplit wood

Don't strain yourself. Save your back and watch your woodpile grow! Finally, you can enjoy your fireplace or woodstove and put an end to the backbreaking drudgery of splitting timber by hand. With the Heathkit Log Splitter, you can split more wood in less time, and with far less manual labor.

No more wobbling logs or strenuous stooping: A three-position one-hand lever features a non-locking forward, neutral, and detented reverse with 24-second full-cycle automatic return to ready ram for next log at comfortable 15-inch work level. Tubular cradle holds log firmly and safely. Cradle and frame made from industrial-grade steel, painted in OSHA Safety Orange. Uses seven quarts of transmission fluid (not supplied) for hydraulic power.

Power to split the most reluctant log: The GU-1810 is equipped with a high-torque, four-cycle, five horsepower Tecumseh gas engine and a 4.5 gpm pressure-relief protected hydraulic pump. Together, they generate 1550 p.s.i. to ram up to a 21" log into the six-inch, triple-angle steel wedge with an irresistible *ten tons of splitting force*. Build it in one night — cord wood the next day! A one-gallon tank holds enough gas to split for several hours.

Compact design: At 31" H x 31" W x 54" L, it fits neatly into your car trunk, station wagon or pickup truck. Priced much lower than comparable models.
Kit GU-1810, Shpg. wt. 210 lbs., Motor Freight **629.95**



Stay cool and comfortable on hot summer days!

\$149⁹⁵

- Circulates seasonal air to keep you cool—or warm
- Stylish appearance complements any home interior
- Decorative light kit included at no extra charge

Save energy while you stay comfortable! This attractive three-speed ceiling fan from Heathkit can generate a gentle whisper of a breeze, or a full-force, cooling blast of air. You stay comfortable on even the hottest summer days since the large (52" tip-to-tip) blades keep dormant air moving continuously. When temperatures drop in the chilly winter season, reverse the blade rotation to bring warm air down from the ceiling. You'll save energy year-round!

Assembles in less than an hour: You can start enjoying the GD-1338 Ceiling Fan almost immediately. The motor housing is finished in an attractive brass tone and the versatile fan blades can be changed as you update your home decor. On one side, wicker/cane inserts — on the other, the appearance of richly-colored solid wood. The GD-1338 requires 120 VAC, 60 Hz power and is UL listed for safety; covered by manufacturers' 3-year limited warranty.

Kit GD-1338, Shpg. wt. 25 lbs. **149.95**

Watt Wizard saves energy money three ways

- NASA-developed technology can save up to 60% on motor-operated devices around home, at work, or in the shop
- Protects motors from burn-out
- LEDs show relative performance

Triple savings: Gain a federal tax credit amounting to 15% of the purchase price — save up to 60% of the cost of running motorized electrical devices (drills, refrigerators, saws, freezers, air conditioners, washers, dryers, pool filters) — and prolong the life expectancy of appliances using the Watt Wizard Power Factor Controller. *Think of the savings!*

Proven efficiency: Because the Watt Wizard senses the power-factor of a motor, it applies only the exact optimum voltage required to run it a constant quieter speed. Less energy is consumed. Payback for most applications listed above is less than a year. Comes with a full one-year limited warranty from the manufacturer. Fused at 15 amps, 120 VAC, 60 Hz. Order one now and marvel at the cost savings you'll enjoy! Order more later and save even more.

NEP-1662, Assembled, Shpg. wt. 1 lb. **39.95**



A fingertip touch magically turns on the lights



FAST. EASY
1-EVENING KIT

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

\$19⁹⁵

Tap the sensor plate and the remarkable Heathkit Touch Control Switch turns appliances or lights on instantly. No need to go to the expense and bother of installing new outlets or rewiring — the touch plate mounts anywhere and connects to the controller unit with easily-concealed fine white wire (20 feet included). Avoid trips and falls caused by fumbling in the dark for a light switch — install a sensor next to your bed. Two touch plates are included with each kit, or use any ungrounded metal as a sensor. Try burying plate in potted plant soil and touching plant leaf for a unique effect. 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 max. Not for AM radios.

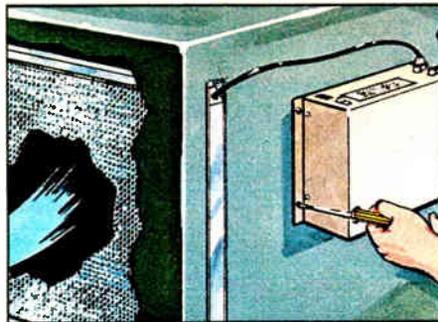
Kit GD-1287, Shpg. wt. 2 lbs. **19.95**





Uses standard filter

Compact power supply



Heathkit Electronic Air Cleaner clears the air of dust, dirt and unhealthy contaminants

\$149⁹⁵

- Easy to build and install – no metalworking or wiring; our complete and concise instructions guide every step
- Removes 70% of airborne contaminants with each cycle
- Automatic – works with your furnace or air conditioner

Today's well-insulated homes need the Heathkit Electronic Air Cleaner. With each cycle, it removes 70% of airborne contaminants – dust, dirt, cigar and cigarette smoke, even allergens – from every room in your home. The Electronic Air Cleaner works efficiently with your central heating or air conditioning system. As your home is heated or cooled, the GD-2196 automatically goes to work, bringing you cleaned and refreshed air you'll enjoy.

Uses standard size 1" thick filter: Installs in place of your old filter. In no time, you and your family will enjoy the benefits of the clean air we deserve. The GD-2196 is ideal for allergy or hay fever sufferers. Breathe deeply and taste purer air again, while unattractive soot and grime particles are being trapped before they can show up on your furniture and belongings! 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. Kits differ: check your furnace's filter size and capacity before ordering. Easy to install. Hard-to-believe results!

Electronic Air Cleaner Power Supply:

Kit GD-2196 (needs Filter Accessory below). Shpg. wt. 5 lbs. 149.95

Filter Accessories (requires GD-2196 Power Supply Kit above):

GDA-2196-1, 20" x 25" x 1", 1000 cfm, Shpg. wt. 3 lbs. 99.95

GDA-2196-3, 16" x 25" x 1", 800 cfm, Shpg. wt. 3 lbs. 99.95

Quickly clear the air in any room of your home



- Remove dust, dirt, smoke and other contaminants from any room – wherever odors accumulate
- Efficient, three-speed fan for any air-cleaning job, large or small
- Easy-to-clean electrostatic filter

The Heathkit Portable Electronic Air Cleaner is up to your toughest air-cleaning task. Efficiently removes dust, dirt and smoke from rooms up to 25' x 30'. Equipped with a three-speed fan for a variety of jobs from a full-speed 250 CFM for smoke-filled rooms, to a quiet and gentle 10 CFM to freshen the air while you sleep.

Use it year-round for pennies a day. It's great for large gatherings of people where unpleasant smoke from pipes, cigars and cigarettes fills the air. In the summer, pollen-allergy sufferers will breathe easier while indoors.

It goes where you need it: Four GDA-1297-1 Deluxe Casters (a \$13.95 value) are included at no extra charge. Just roll it in place and plug it in. Simple-to-build – power supply, variable speed fan control and filter preassembled. Southern Pecan Vinyl finish. 120 VAC, 60 Hz. 26½" H x 17¼" W x 13½" D.

Kit GD-1297, Shpg. wt. 59 lbs. 249.95

GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297, 2 lbs. ... 9.95



Look for the store manager's special – at your nearby Heathkit Electronic Center.

NEW

Stop expensive energy thieves – track down drafts with a Heathkit Heat Sniffer!

\$24⁹⁵



FAST, EASY
1-EVENING KIT



The Heathkit Heat Sniffer locates energy-robbing leaks quickly



New from Heathkit: The answer to every homeowner's need for a quick and accurate way to track down pesky drafts. Gaps in door frames and window sills can cost you a bundle in heating or cooling expenses by letting in hot or cold air from the out-of-doors. With the aid of the NE-2112 Heat Sniffer, you can locate and measure those costly comfort-robbing leaks in seconds.

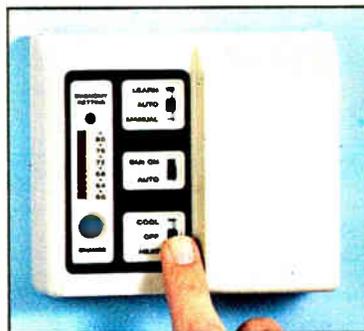
Use with your air conditioner in summer: Find and seal leaks tightly before the chill of winter arrives.

The Heat Sniffer is easy-to-use: Locate drafts with pin-point, electronic accuracy. Turn unit on and adjust knob to silence unit at present room temperature. Then move the Heat Sniffer's sensor along door frames, window sills or any other place where infiltration of cold air might occur. Any change in temperature unbalances the circuit and sets off a loud, beeping alarm and a

bright, flashing LED. The faster the beeping and flashing, the greater the temperature difference – and the bigger the leak. For best results, the indoor and outdoor temperatures should be significantly different (10°F minimum).

One-evening assembly: A comprehensive Heathkit instruction manual leads you every step of the way. For use in ambient temperatures from 59-95°F (15-35°C). Requires a 9 VDC battery (not included). 1½" H x 2¾" W x 8¼" L. Kit NE-2112, Shpg. wt. 2 lbs. 24.95

The Intelligent Thermostat that thinks ahead



- Saves money – turns furnace on at last possible moment to bring your home to desired temperature at desired time
- Saves significantly more energy than any thermostat we know of
- May qualify for 15% tax credit

It makes energy-sense! Program up to six daily settings, for a full week with one button. It can raise the temp before you wake, then lower it after you've left for work or school. May be set anywhere between 60°-82°F, or even deeper for long-away special economy.

Patented feature turns furnace on later on warm mornings; earlier on cold mornings – so your home always reaches the temperature you specify, at the time you specify. "Econo-Save" lets you dial-down to 54°F (heat) or 84°F (cooling) while you are away for long periods. "Slow-Cycle" increases furnace efficiency by reducing energy-wasting on-off cycles while keeping your home within 2 degrees of your desired temperature. Uses present 2, 4, or 5-wire 24 VAC power. Not for dual-stage furnaces. **Extra value** – optional NEA-1210-1 Relay Kit and instructions for use with non-standard control furnaces or automatic ignition (pilot-less) gas furnaces, *now included free* – was \$7.95!

Kit NE-1210, Shpg. wt. 1 lb. 69.95

NEP-1210, Assembled, Shpg. wt. 1 lb. 84.95

Put away long telephone lists!— a Heathkit *Demon Dialer* can speed-call your friends by name

\$99⁹⁵

- Expanded memory stores up to 176 seven-digit numbers
- Fast and smart, it wastes no time redialing unanswered and busy numbers with untiring ease until you get through
- Instantly dials lengthy Alternate Long Distance numbers

The *Demon Dialer* is an amazing telephonic tool with a 93-number memory that connects you faster and far more efficiently than any other method available. This compact, two-evening kit proves you don't need forty-button phones or complex, bulky dialers to enjoy rapid and sophisticated dialing capabilities.

Computer-controlled by an on-board CPU, it will instantly and automatically dial numbers of up to 32 digits stored under easy-to-remember 2- to 6-digit letter/number codes you design, such as TOM, WORK, DOC, BOB3, POLICE, AL, etc. For longer distance or satellite-fed calls, it can retrieve up to 68 11-digit or 55 23-digit numbers, with easy-to-learn command routines.

As a redial device, it has no equal. Two-key sequences will redial or 'Demon-Dial' after the first try. The Demon will silently dial a busy number again and again, 5 times in the first minute, then once every two minutes for up to 2 hours. As it works for the fastest connection, *incoming calls are still received*, and a 'success' signal alerts you when the other party answers. If they're out, Demon can call back every ten minutes for up to ten hours!

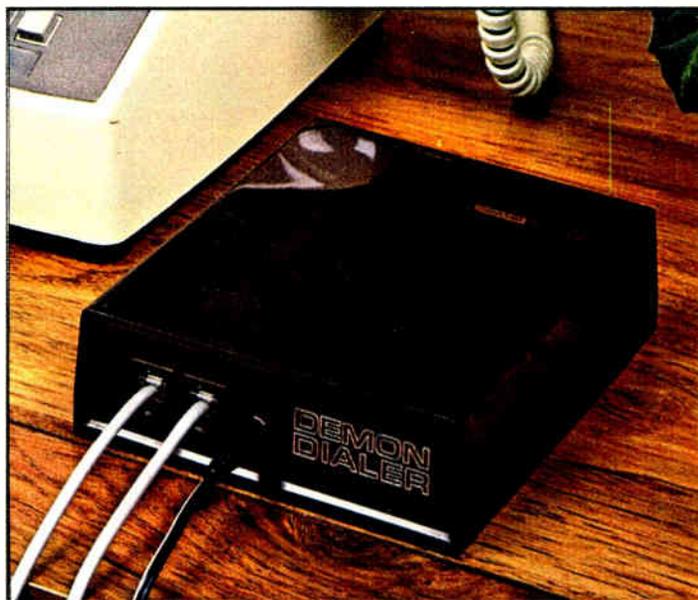
A *Demon Dialer* plugs into your existing phone system and makes all your telephones smart. Perhaps the most remarkable fact is that just one Dialer has the capability to grant Demon power to every extension phone on the same line—and rotary phones can also take advantage of the system.

After you program the numbers from an ordinary touchtone phone, the GT-2217 can do some truly extraordinary things. Using the pound and star keys, six simple commands are all you need to perform its telemagic tricks. Storing a number is as quick as typing: #S#TWA# (actual number here)#. Should you want a flight reservation, typing #TWA# would DemonDial the airport terminal! Its whole purpose is to make using your telephone easy, and you can master the commands for speedy operation in just a few minutes.

The microcomputer 'directory' can be doubled in size quickly with one Memory Accessory to accept the equivalent of 176 seven-digit numbers. Dial a call normally or use the Demon's mnemonic memory—it works either way.

For those who rely heavily on telephone contacts to do their daily job, the *Demon Dialer* is a convenient way to save precious time and money. And this incredibly versatile instrument is as easy to install as it is to use. It operates with any telephone branch equipped and billed for tone dialing service.

For metropolitan and business users, where Alternative Long Distance systems



such as MCI, Sprint or ITT are offered, the Demon can dramatically improve your dialing speed and reliability by actually *detecting* dial and access tones instead of pausing. It's even portable—with built-in battery backup, directory memory is good for up to a year if unplugged from AC or four years with power.

Constructed on a single circuit board, *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 multi-line business phone systems. Kit includes AC power cube, 3-volt battery, two cables with modular plugs, series jack, in-depth users manual and handy reference Dial Guide/List. *Communicate faster*—let your telephone take on a Demon!

Kit GT-2217, Shpg. wt. 3 lbs. 99.95
GTA-2217-1, Memory Expansion Accessory, Shpg. wt. 1 lb. 19.95

Cord-Free Portable Telephone extends mobility

\$149⁹⁵

- Remote works up to 600' from base unit without interference
- Excellent immunity from static noise
- Use it as a desktop or wallmount phone
- Includes one year limited warranty



Why run to answer the telephone when you can take it with you? The Midland 80-250 Long Range Duplex is a ready companion indoors or out. Great for use in the workshop, garage, around the yard...anywhere within its range.

Features one button auto-redial of last number called, base and handset volume controls, on/off power switch, standby switch for lowest drain while waiting for incoming calls, continuous recharge while cradled, touch-pulse operation, branch jack, status LEDs and easy, do-it-yourself hookup to any home or business phone system. Simultaneous talk/listen capability like your present phone. Call button on base unit pages remote instrument. Includes 120 VAC base unit/charging cradle, dial-out & receive handset, connector cable with modular plugs and user's manual. Heath Evaluation rates it "The best we've ever tested." Compare feature for feature—you'll buy Midland!

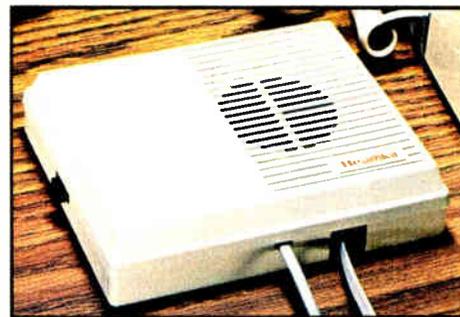
GDP-1339, Assembled and tested, Shpg. wt. 6 lbs. 149.95

26/TELEPHONES

Pleasant Ringer puts the bell out of business

\$29⁹⁵

- Puts a choice of tunes in your telephone
- Inside variable volume control and test button
- Two C cells (not included) power it up to a year
- Styled to match decors in home or office



Replace the monotonous *ring-ring-ring* of your telephone with this unique little device and notice what a difference it makes to hear a tuneful call come in! The Pleasant Phone Ringer makes a harmonious addition to any home or office.

A pre-programmed musical IC in this one-evening kit gives you four choices in place of the bell: 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 harsh jangle, one of four pleasant synthesized signals from the Phone Ringer. Two remote speaker terminals are provided so you can spread the melody to other rooms, and keyhole slots in the caseback make wall mounting simple. Includes modular phone plugs and 6' of cable. Measures 5 7/8" H x 4 3/4" W x 1 1/4" D. Compatible with both touchtone and rotary phones.

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



Open a Heath Revolving Charge with a purchase of as little as \$100!



Passive Circuit Design Course – introductory knowledge for our Engineering Design Series

\$49⁹⁵

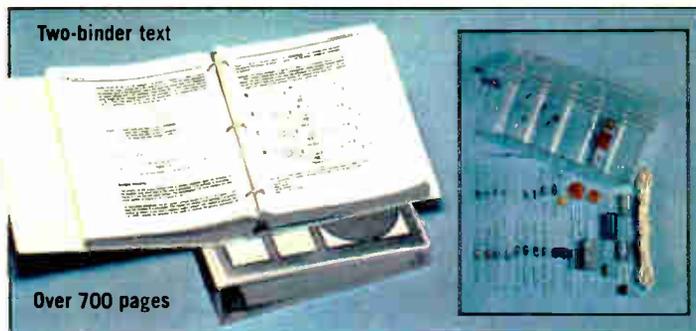


- This new course, first in a series, teaches the fundamentals of successful passive-component circuit design
- Step-by-step programmed learning maximizes retention, with unit exams to summarize material and verify progress
- Earn 4.0 Continuing Education Units by passing the enclosed optional final exam with a score of 70% or better

A passive component is one that does not provide a power gain. Typical examples include resistors, capacitors, inductors, voltage and current sources, transformers and diodes. Now, with the Heathkit/Zenith EE-1001 Passive Circuit Design Course you can become actively involved in learning how to design practical circuits utilizing passive components. It establishes a foundation for more advanced design courses such as the EE-1002 Transistor Circuit Design Course, below.

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. To perform these experiments, you will need 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



Transistor Circuit Design Course teaches how to design a multitude of useful circuits

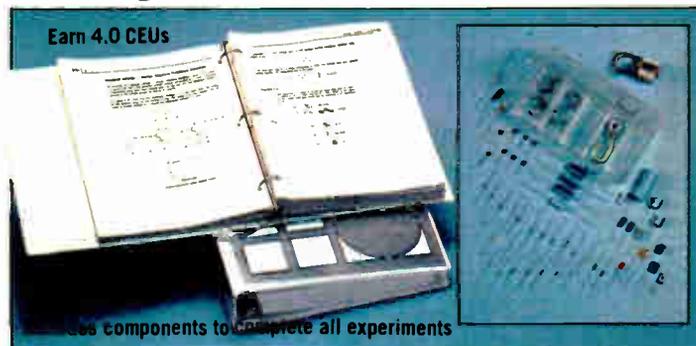
\$59⁹⁵



- Concentrates on teaching the fundamental techniques of successful transistor circuit design using the proven, Heathkit/Zenith programmed-learning approach
- Thirteen experiments integrate theory and practicality; analysis is followed by step-by-step design examples

Learning is, and should be, fun. Our second course in the Engineering Design Series honors that maxim and picks up where the EE-1001 Passive Circuit Design program leaves off, by centering on the challenge of Transistor Circuit Design. In the same informative, friendly and hardware-intensive manner as its predecessor, EE-1002 takes the drudgery out of design theory, adds proven operants and introduces new methods that maximize understanding of each skill.

Complete, state-of-the-art education: Perhaps the most unique feature is the abundance of summary and design guides provided in units 1 through 8. Chapters probe Bipolar Transistors, Biasing Schemes, Common-Emitter Voltage Amplifiers, Common-Base and Common-Collector Voltage Amplifiers, Power Amps, Multiple-Transistor Circuits, Field Effect Transistors, and Common-Emitter Frequency Effects. Unit 9 contains thirteen in-depth, hands-on experiments which develop the important know-how and confidence for constructing various types of transistor-based application circuits. The easiest way to perform these experiments is with the ET-1000 Engineering Design Trainer (below), which contains all of the necessary functions to complete all of the experiments. All prerequisite material is covered in the EE-1001, above.



Lastly, a 35-page Appendix provides a compendium of the circuit configurations, parameters and design guides found throughout the text, including device data sheets, formula and conversion tables, operating modes, graphical info, and notation summaries. As in EE-1001 above, a comprehensive reference index to the text rounds out the course presentation. For the serious student of electronic design theory and implementation, EE-1002 is a concise, low-cost method of gaining valuable experience and knowledge toward the achievement of important career and educational goals.

EE-1002, Shpg. wt. 9 lbs. 59.95



Analog/Digital Circuit Design Trainer is a versatile, multi-purpose learning tool

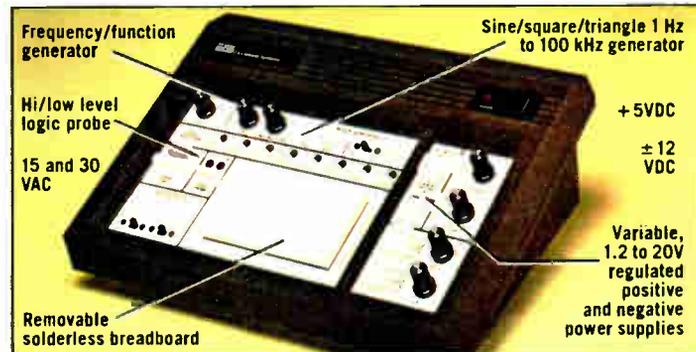
- Quickly build and test circuits for experimentation
- All power supplies protected against short circuit

A complete mini-lab for dedicated circuit design: For students taking electronic courses or engineers requiring a flexible, all-in-one prototyping unit, the ET-1000 Circuit Design Trainer provides a self-contained source of breadboarding capability. Has binary logic and data switches, eight buffered LED logic indicators, a five-range pulse-width selector, 1 kΩ and 100 kΩ linear potentiometers and more. 120/240 VAC. 15¾" H x 10¾" W x 4¾" H.

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



Improve yourself – with a course from Heathkit/Zenith Educational Systems.



Master the fundamentals of high-performance 16-bit microprocessors with the Advanced

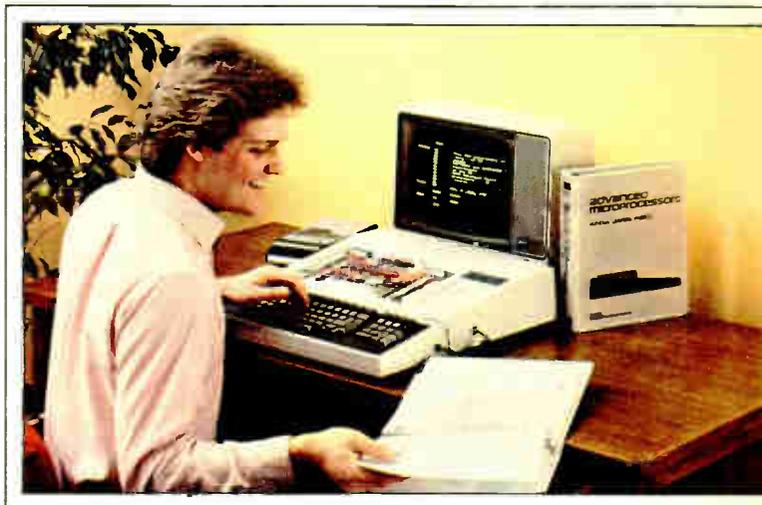
\$99⁹⁵

- Learn to program and interface powerful and incredibly fast 16-bit microprocessors
- Gain an in-depth understanding of the 8088 microprocessor used in the H/Z-100, IBM-PC, DEC Rainbow 100 and many others
- Reinforce your studies with experiments from the course that are designed to illustrate concepts learned in each unit
- Perform all experiments on the unique ET-100 Trainer that is actually a versatile low-cost, cassette-based, 16-bit computer
- Upgrade the Trainer into a disk-based 16-bit computer system capable of running all Heathkit/Zenith 16-bit software



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 in-depth 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 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. 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.

Our lowest priced 16-bit computer is also the world's most advanced computer trainer

- Features the H/Z-100's super-fast 16-bit 8088 microprocessor
- Comes with 16 kilobytes of RAM and can be expanded to 64 kilobytes
- Has a powerful software package in 32K of ROM which includes a CP/M assembler, screen editor, and a debugger

- Has buffered access to all the 8088's address, data, and control lines
- Permits solderless computer circuit building on its large breadboard
- Teaches basics of 16-bit microprocessing with EE-8088 course experiments



16-bit computer: The ET-100 Advanced Microcomputer Trainer 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-121 or ZVM-122 (p. 72). Or, display twenty 40-character lines on either channel 3 or 4 of a TV using a TV modulator (p. 29).

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, separate from the main logic board 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.

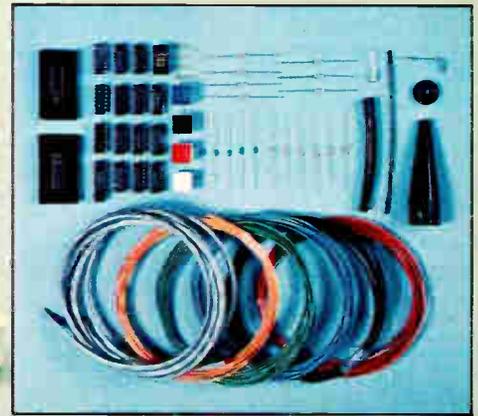
Kit ET-100, Basic Learning Computer, Shpg. wt. 33 lbs. 999.95
ETW-100, Assembled and tested, Shpg. wt. 33 lbs. 1499.95



Microprocessor training system and our most powerful and versatile 16-bit computer

Teaches fundamentals of 16-bit microprocessors and interfacing

Text is easy to read and is well illustrated to speed writing



Experiments using these components clearly show concepts learned in each Unit

As an experiment, build and use a light pen

Course includes thorough self-testing and a final exam

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 including reviews 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, you'll receive a handsome Certificate of Achievement and 8 Continuing Educational 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. 35) 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**

ETA-100 Learning Computer Accessory turns the ET-100 into a full 16-bit computer system

- Increases user RAM to 128K bytes that's expandable to 192K bytes
- Adds a separate programmable timer for timing internal events
- Provides two RS-232C serial ports and a Centronics printer port
- Contains a floppy disk controller for 48 or 96 TPI 5¼" drives

- Provides bit-mapped video capabilities that upgrades to color
- Includes a 48 TPI disk drive with 320 kilobyte storage
- Allows use of all H/Z-100 16-bit software packages

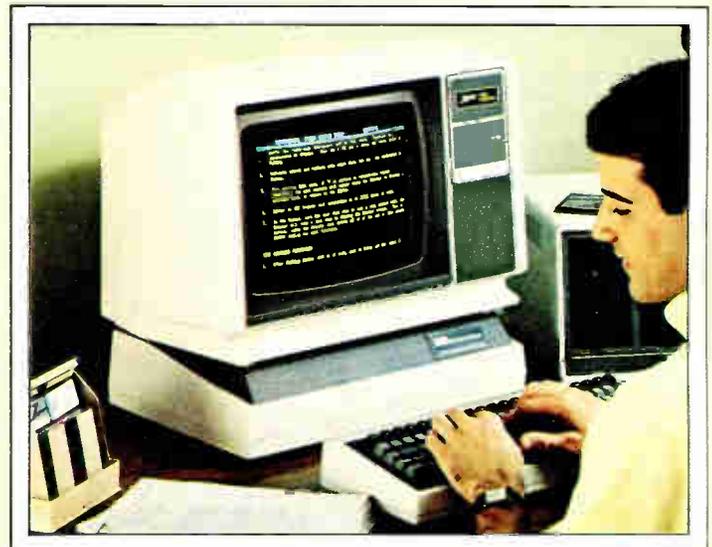
Powerful upgrade package: Turns your ET-100 Trainer into a powerful 16-bit disk-based computer that helps you with a variety of applications, such as data processing, telecommunications, networking and financial analysis. The ETA-100 package consists of two circuit boards, a boot ROM, and an external disk drive unit. A dust cover is also included so that a monitor such as the ZVM-121/122/123 (p. 72) 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. 66). 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 (p. 66), 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 chip sets (p. 66).

H/Z-100 software: Run Z-DOS, Z-BASIC, Multiplan, and all 16-bit software.

- Kit ETA-100**, Expansion Accessory, Shpg. wt. 52 lbs. **1299.95**
- EWA-100**, Assembled Expansion Accessory, Shpg. wt. 52 lbs. **1999.95**
- EWS-100**, Assembled ET-100 and ETA-100, Shpg. wt. 88 lbs. **3199.95**
- ETA-100-2**, Channel 4 Modulator, use with TVs, Shpg. wt. 1 lb. **39.95**
- ETA-100-3**, Channel 3 Modulator, use with TVs, Shpg. wt. 1 lb. **39.95**



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

Move into the world of robotics with the first sophisticated teaching robot—HERO 1

While teaching your robot to move, sense, see, hear, and speak, you can be learning robotics from HERO and its companion Heathkit/Zenith educational course. And it's so inexpensive, with the HERO 1 Robot Kit available from \$999.95 and the assembled Robot, with both arm and voice options, for \$2499.95.

On-board computer provides Intelligence



Three-wheeled base drives and steers HERO

Includes rechargeable batteries and charger

Senses light, sound, motion and distance

Programmed from keyboard, teaching pendant, or cassette port

Speaks with optional phoneme synthesized voice

Programmable robot: Completely self-contained, HERO 1 is capable of interacting with its environment. It detects light, sound, motion and objects in its path. It can travel over a set course and repeat specific functions on a predetermined schedule. With an optional arm and voice, HERO 1 can grasp items and speak.

A computer on wheels: HERO 1 is controlled by an on-board 8-bit 6808 microprocessor. Following programmed instructions, the microprocessor can guide HERO 1 through complex maneuvers, activate and monitor its sensors, and modify the robot's actions as a result of sensor or real-time clock inputs. To store user-programmed instructions, Hero comes equipped with 4K of RAM memory. An 8K ROM stores a number of built-in commands and speeches.

Three programming methods: HERO 1 can be programmed by entering instructions through the hexadecimal keyboard mounted on top of its head. By using a hand-held remote control teaching pendant, manually-controlled motor and arm movements can be programmed into memory. This pendant can be used to select individual motors and their directions of rotation. Another method of programming HERO 1 is through a rear-panel serial cassette port. By connecting an ordinary audio cassette recorder here, programs can be saved on a cassette tape and then reloaded into the robot.

Four sensor circuits: Within HERO 1's head are four sensors which act as its eyes and ears. A sound detector hears sound from 300 to 5000 Hz while a light detector sees light over the visible spectrum. A motion detector senses movement up to 15 feet away and a sonar system determines range.

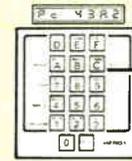
Learn by doing: HERO 1 provides a hands-on knowledge of industrial electronics, mechanics, computer theory and programming as applied to robots by putting them into action. An experimental breadboard is also included for experiments and interfacing user-designed circuits to the on-board microprocessor. The top-mounted breadboard has direct access to a user I/O port, a user defined interrupt, CPU control lines, and +12 VDC and +5 VDC. For a more extensive background in robotics and its associated technology, a companion Robotics Education Course (see opposite page) is available.

HERO contains all the basic systems of today's industrial robots

Side panels snap off for easy access to circuit boards

Hero's hand can grip small objects, pivot, rotate and open up 3½"

Stepper motors rotate the arm, wrist, and extend and retract the gripper up to 5"



Hexadecimal keypad is used to enter, check, and modify programs and select modes

Optional arm provides five axis of motion and lifts one pound when fully retracted

I/O board guides data between the CPU and HERO's motor and sense circuits

Real time clock and calendar accurately tracks the time of day and the date

Top-mounted senses include motion, sound, and light detectors and a voice

HERO's sonar system determines range and direction of objects between 4" and 8'

Plug-in circuit boards are easily removed for experimentation or maintenance

Two independent +12 VDC supplies provide power to the logic circuits and the motor drive circuits

Front wheel drives and steers HERO around objects and provides exceptional maneuverability with its 12-inch turning radius

Rechargeable gel-cell batteries are protected by an automatic voltage sensor—external charger is included

Teaching pendant provides a quick and easy way to program complex arm and body movements

Clear and easy-to-follow instructions guide you through each kitbuilding step

Rechargeable batteries with charger: When HERO 1 tells you that its voltage is low, use the external battery charger even while it is operating.

Grasps small objects With the optional ET-18-1 Arm and Gripper Mechanism, HERO 1 can be programmed to pick up small items. Using five stepper motors, the ET-18-1 is capable of five axis of motion and can perform precision mechanical tasks. On command, the gripper can open up to 3½" and close, the wrist rotates 350 degrees and pivots 180 degrees, the arm pivots 150 degrees, and the arm extends up to 5 inches.

Speech Synthesizer: The ET-18-2 Speech Synthesizer gives HERO 1 a voice. It uses a phoneme-based synthesizer system that generates 64 phonemes (speech sounds). The phonemes are then linked together by your computer program to simulate human speech or various sound effects. Using this system, HERO 1 has access to an unlimited vocabulary.

Kit ET-18, Basic HERO 1 Robot (less arm, voice), 69 lbs. **999.95**

ET-18-1, HERO 1's ARM (Arm and Gripper Mechanism), 6 lbs. **399.95**

ET-18-2, HERO 1's Voice (Phoneme Speech Synthesizer), 1 lb. **149.95**

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

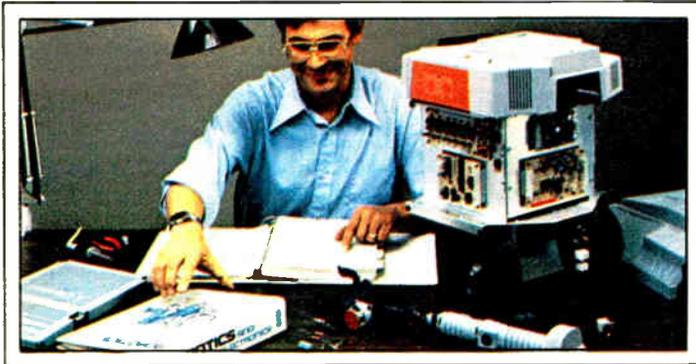
ET-18-5, Monitor ROM Listing, Shpg. wt. 1 lb. **39.95**

ETW-18, Complete Assembled Robot (with arm, voice), 70 lbs. **2499.95**

SAVE \$50.00! Kit ETS-18, complete HERO 1 Robot (with arm and voice), Shpg. wt. 91 lbs. **\$1549.85 separately, NOW ONLY 1499.85**



Robotics course provides a complete education in the fundamentals of robot technology



\$99⁹⁵

- Self-instruction text covers 1200 pages of robot basics
- Programmed self-study allows you to progress at your own rate
- Optional experiments provide you with hands-on experience when done on HERO 1 – the teaching robot
- Pass the final exam and earn 8 CEU's

Covering the basics of robotics, the EE-1800 Robotics and Industrial Electronics Course is the most extensive course ever developed by Heathkit/Zenith Educational Systems. This 1200 page two volume course consists of 11 teaching units – each unit filled with informative illustrations, charts, and diagrams. Step-by-step, the programmed self-study materials guide the student until important concepts are mastered. Self-test reviews at the end of each unit check your understanding of the robotics material you've studied before moving on to the next unit. Progress at your own speed until you've completed the entire course and review tests. Then earn credit and recognition by passing the optional final exam.

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

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

The Course starts out by categorizing industrial robots and introducing some specific robotic terms that are used throughout the course. Building on this, you'll learn how AC power is generated and how it's used to run robots. The course continues on to show how DC batteries and motors give robots total freedom. Then you'll learn about basic microprocessor principles, followed by programming. Next, the course acquaints you with the microprocessor used in HERO 1 – the 6808 – and shows how it operates. The next unit details some of the methods a robot uses to sense its surroundings and how they are used to help it navigate a path. After the sensors obtain information, the next unit shows how the information is converted to a form that is usable by the robot's computer. Continuing on, you'll learn how human speech is generated and then apply that knowledge to producing speech electronically. After becoming acquainted with all the systems that make up a robot, the next section ties these systems together to show how a robot performs a specific task. You'll complete your study of robotics with a look at the different types of robots used in industry and the type of work they perform.

Prerequisites: Before starting the Robotics Course, you should complete EE-3101A DC Electronics (p. 32), EE-3102A AC Electronics (p. 33), EE-3201A Digital Techniques (p. 35), and EE-3401 Basic Microprocessors (p. 36) – or have a basic knowledge of these subjects.

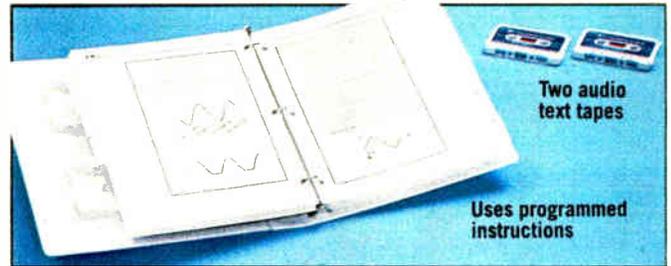
Earn 8 Continuing Education Units (CEU's) and a Certificate of Achievement from Heathkit/Zenith Educational Systems: Pass the optional final examination with a 70 percent or better score.

EE-1800, Robotics Course, Shpg. wt. 12 lbs. **99.95**



Put a ROBOT in your future

Understand the basics of electricity through an effective audio/visual teaching program



\$29⁹⁵

- Start your electronics education right from the beginning with Concepts of Electricity
- Earn 1.0 Continuing Education Unit credit and an attractive Certificate of Achievement

Start right from the beginning with the Heathkit/Zenith basic electricity course. No previous electronics education is needed for this Course, which uses effective audio and visual teaching methods to introduce you to electricity and electronics. This course is designed to provide you with a working knowledge of the basics of electricity.

At a logical step-at-a-time pace, this course leads the student through units that teach the understanding of direct current, circuit theory, electromechanical systems, alternating current theory, generators, motors and meters. After you've completed the easy-to-follow programmed text, you'll know the basics of Ohm's Law, power, series and parallel circuits, electromagnetism, direct and alternating current, and meters that measure DC and AC. Besides providing a foundation in electronics, this course can also be used as an introduction to other Heathkit/Zenith Electronics Courses found on pages 32 – 34.

Reinforced by an illustrated audio/visual presentation, the Concepts of Electricity Course is designed to build upon the student's knowledge a step at a time until a thorough understanding is achieved. With its built-in review examinations, the student can check his knowledge ensuring that the course material is being learned and understood.

EE-3100, Shpg. wt. 5 lbs. **29.95**

Earn College credit for many Heathkit/Zenith courses in the comfort of your own home



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 for the courses on pages 32 through 37 (EE-3101, -3102, -3103, -3104, -3105, -3201, -3401) or EC-1100 on page 80, 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-3101) 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**

Completely updated DC Electronics Course — your entrance to the world of electronics

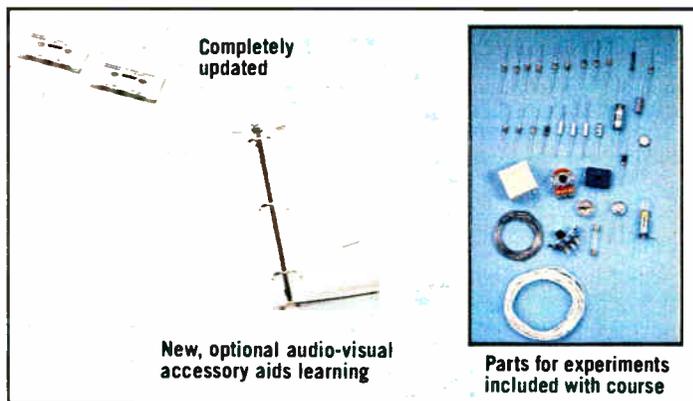
\$49⁹⁵

- An excellent starting point for the person just beginning to learn the theory and applications of electronics
- Course updated; new audio-visual accessory available
- Develop a detailed knowledge of electronics rapidly

Ready to learn electronics? The Heathkit/Zenith DC Electronics Course is the place to start. In addition to a concise and complete knowledge of basic electronics, you'll develop a foundation for expanding your knowledge with other courses available. It covers current, voltage, resistance, magnetism, Ohm's Law, electrical measurements, inductance and capacitance. The course has been completely updated to ensure that you learn the most up-to-date information available.

Learning is easy the Heathkit/Zenith way! This professionally-designed course leads you step-by-step to a complete understanding of DC electronics. This self-instructional text allows you to learn at your own pace, in the comfort of your home. The optional audio-visual presentation adds a new dimension to this learning format. Hands-on experiments increase your knowledge by putting your newly-gained information to work immediately on 20 practical exercises. A mathematics review is included.

Test yourself as you learn: Reviews are spaced throughout the text to give you a chance to check your progress. You can earn valuable Continuing Education Units (CEUs), a national method of recognizing your participation in non-credit educational courses. With a passing grade of 70% or better on the optional final examination, you'll receive 2.0 CEUs. Heathkit/Zenith Educational Systems will also award you a Certificate of Achievement — further proof of your knowledge.



Parts for experiments included with course

The DC Electronics Course includes: Your comprehensive text in a durable vinyl binder and all electronic components needed for the valuable hands-on experiments. To complete the experiments, you need the ET-3100B Experimenter/Trainer (below) and a multimeter like the IM-2260 (p. 58). The optional Audio-Visual Accessory enhances your understanding of DC Electronics, and expands on material presented in the course.

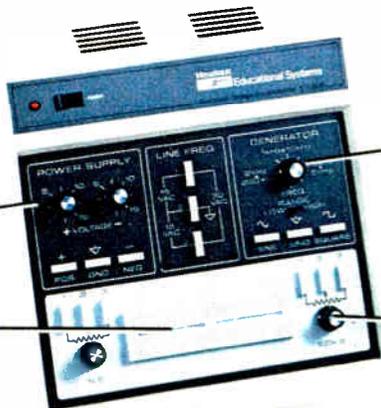
- EE-3101A**, Shpg. wt. 6 lbs. **49.95**
- SAVER! EES-3101B**, includes EE-3101A and ET-3100B Kit Trainer, Shpg. wt. 23 lbs. **ONLY 129.90**
- EEA-3101A**, Audio-Visual Accessory (two tapes and illustration book enhance DC Electronics Course), Shpg. wt. 2 lbs. **19.95**
- EE-3101S**, Spanish-Language DC Electronics Course (less EB-6101-30 Parts for experiments, see page 43), Shpg. wt. 7 lbs. **54.95**

Experimenter/Trainer adds to your knowledge

Used for seven Heathkit/Zenith electronics courses

Improved dual-variable 1.2 to 15 volt DC power supplies

Solderless bread-boarding sockets simplify circuit construction



High- and low-range variable sine and square wave, 200 Hz to 20 kHz signal generator

15 and 30 volt, 60 Hz sine wave signal sources

1K and 100K linear potentiometers

- Develop practical electronics experience as you learn with Heathkit/Zenith Electronics Courses

\$99⁹⁵
Kit

- After you've completed your training, use the ET-3100B for breadboarding your own circuits

The ET-3100B Experimenter/Trainer is easy to use and provides you with the practical experience that really helps drive home important points. Designed for use with the Heathkit/

Zenith DC, AC, Semiconductor, Electronic Circuits, Electronic Communications, Electronics for Hobbyists and Test Instruments Courses.

You can save money by ordering your ET-3100B Experimenter/Trainer in kit form, or by buying it along with a Heathkit/Zenith Electronics Course. Either way, you pay less.

Kit ET-3100B, Heathkit/Zenith Electronic Experimenter/Trainer, Shpg. wt. 6 lbs. . . **99.95**
ETW-3100B, Assembled Experimenter/Trainer, Shpg. wt. 6 lbs. **169.95**

MONEY BACK GUARANTEE:

All self-instruction courses carry a complete money-back guarantee. If you are dissatisfied for any reason, return all course materials (except trainer) and your receipt for a full refund of purchase price.

Electronics Dictionary



Sixteen topic outlines make this dictionary more than just a book of definitions. It's actually a low-cost electronics "short-course." This 832-page Learning Dictionary, from Heathkit/Zenith, should be a part of your professional reference library.

EB-1010, Shpg. wt. 3 lbs. **14.95**

Buy several courses for BIG SAVINGS!

Includes five courses: DC Electronics, AC Electronics, Semiconductor Devices, Electronic Circuits and Electronic Test Equipment — along with the ET-3100B Experimenter/Trainer Kit. If components purchased separately, \$379.70 — you save \$50!

SAVER! EES-3115B, 56 lbs. **ONLY 329.70**



Optional Audio-Visual Accessory Package enhances learning

Easy-to-understand text

Successful passage of optional final exam worth 1.5 CEUs

All components for experiments included with your course

Optional Audio-Visual Accessory Package available

Text leads from concept to concept

Earn 3.0 CEUs if you score better than 70% on optional final exam

Course includes electronic components for experiments

AC Course expands your electronics education

\$54⁹⁵

- Advance your knowledge of electronics with a complete understanding of alternating current
- Picks up your education where the Heathkit/Zenith DC Electronics Course leaves off
- Completely updated to bring you the latest, most accurate information on the subject

Easy-to-understand self instruction course advances your knowledge of electronics theory. The Heathkit/Zenith AC Electronics Course provides complete and comprehensive coverage of all the principles of alternating current. Completely updated to bring you more detailed theory.

Programmed learning makes it easy: As with all the other Heathkit/Zenith self-instruction courses, you begin with basic theory and you continue adding to your store of

information until you are ready for the next concept. You work at your own pace, then complete reviews to measure your progress. The concepts you study will come to life as you conduct nine experiments that turn theory into practical experience.

The Heathkit/Zenith AC Electronics Course provides you with a detailed understanding of alternating current. Your text covers such topics as; Alternating Current, what is it and where is it used? Generating AC, AC values and waveforms, AC measurements — meters, oscilloscopes, resistance and calculations. Capacitive circuits including a review of capacitors and capacitance, capacitors in AC circuits, RC circuits and a complete discussion of the various applications of capacitive circuits. You'll continue on to Inductive Circuits. The text discusses inductors and inductance, the use of inductors in AC circuits along with a section on RL circuits. A detailed section of the AC Electronics Course is devoted to tuned circuits — the RLC circuit, resonance, series resonance, Q and bandwidth in series, parallel resonance and LC filters. You'll complete your study of AC Electronics with a look at transformers, including transformer ratios, losses and applications.

In short, you'll vastly expand your knowledge of electronics in a fairly short time. With Heathkit/Zenith courses, you work at your own speed in the comfort of your home, amassing page after page of valuable knowledge.

Earn Continuing Education Units: Pass the optional final exam to receive 1.5 CEUs, a nationally-recognized method of acknowledging adult continuing education. It is suggested that you complete DC Electronics Course EE-3101A, or have equivalent knowledge, before beginning this course. The optional Audio-Visual Accessory Package, which includes cassettes and printed visuals, helps speed learning. An ET-3100B Trainer and Volt-Ohm Meter (VOM) are suggested to complete experiments.

EE-3102A, Shpg. wt. 7 lbs. **54.95**
 EEA-3102A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. **19.95**

SAVER! EES-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 13 lbs. **ONLY 134.90**

Spanish Language AC Electronics Course: Translation of this course, less EB-6102-30 Parts for experiments (see page 43).

EE-3102S, Shpg. wt. 7 lbs. **59.95**

Semiconductor Devices Course — the third step

\$54⁹⁵

- Completely updated with the most recent information from the fast-moving world of solid-state electronics
- Continues your electronic studies with complete coverage of solid-state devices and how they are used
- More hands-on experiments for practical experience

The Heathkit/Zenith Semiconductor Devices Course introduces you to the exciting world of solid-state electronics with its coverage of transistors and integrated circuits. These devices have revolutionized the world of electronics, making possible the development of credit card-sized radios, calculators and other electronic appliances.

As always, you learn step-by-step, building upon fact after fact until you've developed a complete understanding of a concept or theory. Regular reviews reinforce your education and point out your strong areas — and those that need more work. A total of eleven experiments add to your understanding of these important concepts.

Proven self-instruction design: This effective Heathkit/Zenith course uses an integrated teaching approach to help assure maximum learning — and maximum retention. Self-instruction lets you learn at your own pace, while an optional Audio-Visual Accessory Package is available to help learning even more. Hands-on experiments, using the optional ET-3100B Trainer, give you first-hand experience with semiconductor devices.

Your Heathkit/Zenith Semiconductor Devices Course will provide you with in-depth knowledge of semiconductor fundamentals including the importance of semiconductors, semiconductor materials, germanium and silicon and conduction in doped germanium and silicon. You will learn about semiconductor diodes and their characteristics, construction and applications. You'll also learn in detail the characteristics and usage of the zener diode.

A unit on diodes includes a discussion of the tunnel diode, the varactor diode and high-frequency diodes. Other topics covered include bipolar transistor operation, bipolar transistor characteristics, field-effect transistors, thyristors, integrated circuits and optoelectronic devices, including LEDs.

We suggest the ET-3100B Trainer, a volt-ohm meter and, optionally an oscilloscope to complete the experiments included in the course. It is suggested that you complete EE-3101A DC Electronics Course and the EE-3102A AC Electronics Course as prerequisites, or have equivalent knowledge, before beginning this course.

Earn 3.0 Continuing Education Units (CEUs) and a Certificate of Achievement from Heathkit/Zenith Educational Systems — score 70 percent or better on the optional final examination.

EE-3103A, Shpg. wt. 6 lbs. **54.95**
 EEA-3103A, Optional Audio-Visual Accessory package, 2 lbs. **19.95**

SAVER! EES-3103B, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 11 lbs. **ONLY 134.90**

Spanish Language Semiconductor Devices Course: Translation of this course, less EB-6103-30 Parts for experiments (see page 43).

EE-3103S, Shpg. wt. 6 lbs. **59.95**



Look for the store manager's special — at your nearby Heathkit Electronic Center.

Learn about microprocessors, microcomputers and programming at your own pace with this award-winning Heathkit/Zenith Course



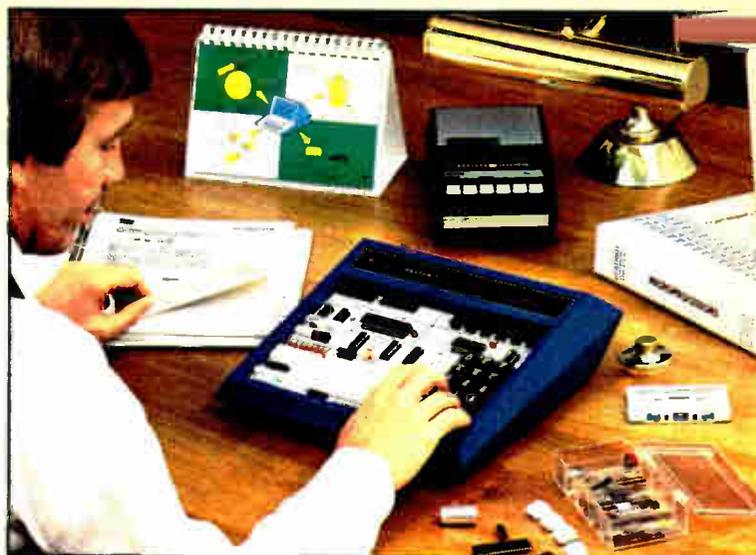
- **COMPLETE:** Covers all the basics of microprocessors, microcomputers and programming – even includes hands-on hardware/memory interfacing and programming experiments
- **EFFICIENT:** Programmed-learning design and audio visual aids, combined with 19 hands-on experiments, mean you learn about microprocessors faster and more effectively
- **PROVEN:** The Heathkit/Zenith Microprocessor Self-Instruction Course has introduced thousands of people like you to microprocessors, microcomputers, interfacing and programming
- **ECONOMICAL:** Learn effectively for less – with our complete guarantee of satisfaction

As soon as you begin the **Microprocessor Self-Instruction Course** from Heathkit/Zenith Educational Systems, you will start learning about microprocessors, microcomputers and computer programming in a complete, efficient and well-organized way. You'll understand microprocessor basics, computer arithmetic, programming and interfacing – everything you need to know to get a headstart in the exciting world of computers.

No previous background? The Heathkit/Zenith Microprocessor Course has adopted the finest models of successful self-instruction technique. Concise, steady-paced textbooks,

colorful audio-visual presentations and hardware experiments make important microprocessor theory, application and design easier for you to understand.

You start by learning or reviewing the basics of computer number systems and codes. Next, 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 you can put to use immediately.

The Heathkit/Zenith Microprocessor Course is organized into ten learning units:

Unit 1, Number Systems/Codes, covers decimal, binary, octal and hexadecimal numbering systems; conversions, binary codes and positional notation. **Microcomputer Basics, Unit 2,** teaches you terms and conventions, introduces you to several instructions and shows how programs are written and executed. **Unit 3, Computer Arithmetic,** covers binary addition, subtraction, multiplication and division, two's complement arithmetic and Boolean logical operations like NOT, AND, OR, Exclusive-OR and INVERT.

The fourth unit of the Course is an Introduction to Programming, including branching, conditional branching, algorithms and programming instructions. **The 6800 Microprocessor is covered in Units 5 and 6,** and includes a study of architecture, instruction set, addressing modes, stack operations, subroutines, input/output operations and interrupts. **Units 7 and 8 teach the important concept of interfacing.** You'll learn the fundamentals of interfacing, interfacing

SAVER! Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$329.90. ETS-3400A, Shpg. wt. 19 lbs. **ONLY 304.90**

Our Microprocessor Trainer helps you learn about computers, interfacing and programming procedures the hands-on way

Functioning as a miniature digital computer, the ET-3400A Trainer is used with the experiments in the EE-3401 and EE-3402 courses. It features a built-in 1K ROM monitor program for controlling unit operation. It also has a six-digit hexadecimal 7-segment LED display for address and data read-outs, and monitoring internal logic states.

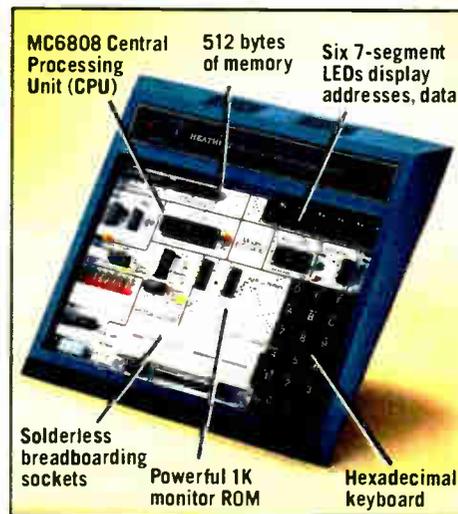
The 17-key hexadecimal keyboard permits you to access memory location to examine contents, then step forward or backward to examine other memory locations, change the contents of memory locations, examine and/or alter any of the MC6808 microprocessor's internal registers, set break points for program debugging, or reset the MPU. The flexible instruction set of the MC6808 permits five addressing modes, and uses two accumulators, an index register and stack pointer.

The ET-3400A has 512 bytes of Random Access Memory (RAM) built-in. It also features 8 buffered binary Light-Emitting Diodes (LEDs) for display of breadboard logic states, 8 SPST DIP switches for binary input to breadboarding circuits, and a breadboarding socket for prototyping, memory and

interfacing circuits.

All microprocessor address, control and data busses are terminated on the front panel for ease of connection to prototyped circuits. There's also provision for a 40-pin external connector to expand memory and I/O capacity. Built-in +5, +12 and -12 VDC power supplies provide internal power needs. The ET-3400A requires 120 VAC, 60 Hz power. Draws 30 watts. Dimensions of the Heathkit ET-3400A Microprocessor Trainer are 3½" H x 12½" W x 11¾" D (8.89 x 30.99 x 29.85 cm), without the ETA-3400 Trainer Accessory.

The programming and interfacing experiments supplied with the EE-3401 and EE-3402 courses are implemented on the ET-3400A. The Trainer is a flexible general-purpose training unit and microprocessor breadboard. Use it in other applications that require a low-cost, microprocessor-based software development system, or as a design aid for developing special interfaces. Team it up with the ETA-3400 Microprocessor Trainer Accessory (opposite page) for increased personal micro-computing power and versatility.



For serious students, the ET-3400A Microprocessor Trainer and ETA-3400 Microprocessor Trainer Accessory are a superior pair of educational tools.

Kit ET-3400A, Shpg. wt. 7 lbs. 239.95

ETW-3400A, Assembled, 6 lbs. 339.95

Kit ET-3400-AE, Trainer for 240 VAC, 50 Hz power, Shpg. wt. 6 lbs. 249.95



Programmed-instruction Course, with audio-visual aids and hands-on experiments, teaches effectively.

Worth
8.0 CEUs

Includes 62 components for experiments.

Random Access Memory (RAM), interfacing with displays, interfacing with switches, the Peripheral Interface Adapter (PIA) and using the PIA.

Programming experiments are the subject of Unit 9. You will write and experiment with a wide variety of increasingly complex programs. In an early experiment you will actually turn the ET-3400A Trainer (described below) into a teaching machine that will give you drills and practice in computer numbering systems. In later experiments in the Course, you will use all instructions and addressing modes. You experiment with subroutines, stack operations, and more.

In the final unit of the Heathkit/Zenith Microprocessor Course, Interfacing Experiments, you put into practice everything you have learned about programming and interfacing. Using the electronic components supplied with the Course, you convert the ET-3400A 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.

Units 1-6 and Unit 9 assume no prior knowledge of electronics. Units 7, 8 and 10 assume knowledge equivalent to the Heathkit/Zenith EE-3201 Digital Techniques Course (described on page 35).

This course comes with 62 electronic components – everything you need to complete the course experiments. These components include RAMs, a Peripheral Interface Adapter (PIA) chip, a digital-to-analog converter, op-amps and a variety of other microprocessor-oriented devices. The ET-3400A Microprocessor Trainer (below, left) is required to perform the experiments.

Passing the optional final exam, with a 70% or better score, will earn you a full 8.0 CEUs. A classroom version of this course is available on page 43.

With the computer age upon us, now is the time to begin your education in microprocessors, microcomputers, and programming by ordering the tried and proven Heathkit/Zenith EE-3401 Microprocessor Course today.

To continue your microprocessor education after completing this course, take the **EE-3402 Microprocessor Interfacing Course** on page 39. It picks up where this course left off – and uses the same ET-3400A Trainer.

EE-3401, Shpg. wt. 12 lbs. 99.95

Optional Film Slides duplicate the audio-visual flip charts. 60.00
EE-3401-1, Shpg. wt. 2 lbs. 20.00

Optional 35mm Filmstrip duplicates audio-visual flip charts in filmstrip form.

EE-3401-2, Shpg. wt. 1 lb. 20.00

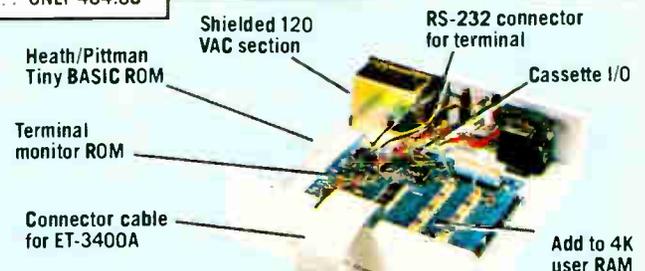
SAVER! Order EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together. Save \$70; \$554.85 separately.
ETS-3401A, Shpg. wt. 28 lbs. . . ONLY 484.85

ETA-3400 Accessory turns Microprocessor Trainer into a complete microcomputer system

When you add this Accessory, you turn your ET-3400A Trainer into a computer system. It provides you with more computing power – so you can run longer, more sophisticated programs through your ET-3400A Trainer. The Accessory's memory can even be expanded to 4K bytes of RAM by adding the optional ET-3400-1 3K Chip Set (order from the listing below).

A serial interface with EIA and 20 mA loop formats in the Accessory allows you to hook up a smart video terminal, such as the Heathkit H-19, or a 20 mA ASCII teletype machine. It also provides a cassette interface, enabling you to store programs on convenient cassettes. 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 can be 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 learn in the EE-3401 Microprocessor Course.

The ETA-3400 connects to the ET-3400A Trainer by means of a 40-pin ribbon cable (supplied). Parts required to modify the trainer are included. Since this modification changes the clock frequency of the Trainer, experiments in the EE-3401 and EE-3402 courses which use timing loops will be changed. It is recommended that all EE-3401 and EE-3402 experiments be completed before adding the Accessory. An H-19 (or equivalent) Video Terminal is required to use BASIC and monitor software features of the ETA-3400.



The ETA-3400 Microprocessor Trainer Accessory converts the ET-3400A into a full personal microcomputer system.

For 120/240 VAC, 50/60 Hz. The ETA-3400 measures 3" H x 11" W x 12" D.

Kit ETA-3400, Shpg. wt. 8 lbs. 175.00

EWA-3400, Factory assembled and tested, Shpg. wt. 8 lbs. 275.00

ETA-3400-1, Optional 3K Chip Set. Shpg. wt. 1 lb. 49.95



At Heath, we still believe that the customer comes first.

EDUCATION/37

The 6809 Microprocessor Course: Learn to program and interface this popular family

\$99⁹⁵



- Includes an assembled module which converts your ET-3400 or ET-3400A into an advanced 6809 microprocessor trainer
- This advanced microprocessor has a flexible instruction set with over 1400 different commands available
- Text has 10 programming experiments which give you hands-on experience with the 6809 family

Advanced – and effective – learning: Progress to programming and interfacing this extremely fast logic

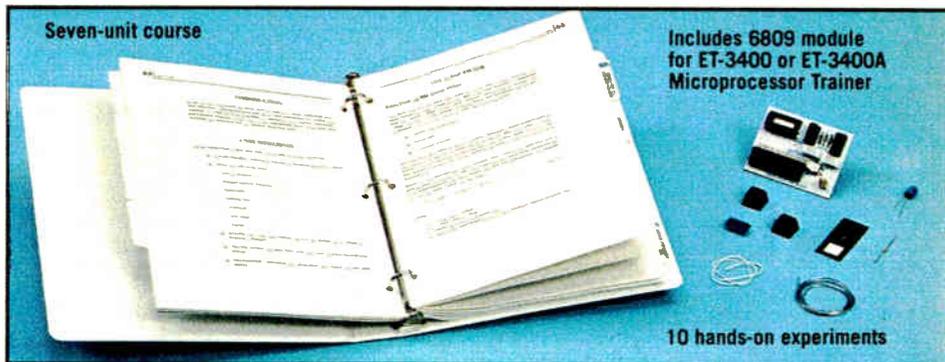
processor with the Heathkit/Zenith EE-3404 6809 Microprocessor Course.

The seven-unit text covers 6809 programming and interfacing completely: In Unit 1, you learn Fundamental 6809 Concepts and Chip Structure—including the 6809 design philosophy, evolution and improvements. 6809 Addressing Modes are discussed in Unit 2. Unit 3 covers 6809 Registers and Data Movement Instructions, while Arithmetic, Logic and Test Instructions for the 6809 are taught in the fourth unit.

Branch and Miscellaneous Instructions are covered in Unit 5. The sixth unit covers 6809/6809E Input and Output Signals—while 6809/6809E Interfacing and Applications are the subjects of the final unit.

Adapter module included: The course includes a special adapter module 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 2 KB ROM monitor program. NOTE: This module is compatible with the ETA-3400's 4K RAM expansion feature only.

Four appendices are included with the text: They include listings for the 6809/6809E Instruction Set and the 6820/6821 Peripheral Interface Adapter (PIA), specification sheets for the MC6809/MC68A09/MC68B09,



MC6809E/MC68A09E/MC68B09E, MC6829, MC6839 and MC6842, microprocessors and peripheral devices, and a summary of the MC6809 instruction set.

Hands-on programming experiments enhance your understanding of the subject: Ten optional programming exercises, which use the ET-3400 or ET-3400A Microprocessor Trainer (not included), reinforce the concepts presented in the text for maximum retention and educational benefit.

Prerequisite: The prerequisite for taking the EE-3404 6809 Microprocessor Course is successful completion of the EE-3401 Microprocessor Course or equivalent knowledge.

Earn 3 Continuing Education Units and a Certificate of Achievement: Pass the optional final examination, with a score of 70 percent or better, to receive these items of recognition from Heathkit/Zenith Educational Systems.

Fully guaranteed: If you're not completely satisfied, return all course materials (less trainer) for a refund of the purchase price.

EE-3404, Shpg. wt. 6 lbs. 99.95

Complete Voice Synthesis Course explains the latest fundamentals and techniques



- Covers voice synthesis hardware and software
- Includes complete chip sets for digitized and phoneme voice synthesis
- Experiments in the text give hands-on experience

Get on speaking terms with your computer: The Heathkit/Zenith EE-3403 Voice Synthesis Course teaches you this state-of-the-art technique in an 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. This five-unit course consists of a 250-page text filled with experiments in voice synthesis, along with the chip sets and other electronic components necessary to complete the experiments.

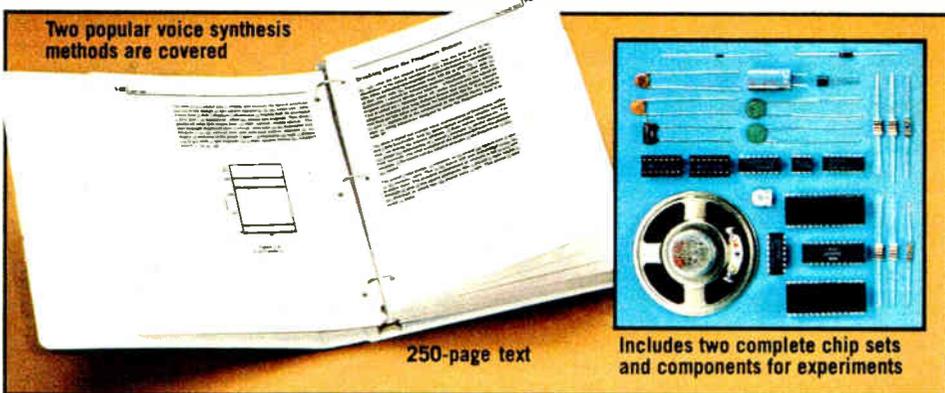
Covers two voice synthesis methods: The course teaches both digitized voice synthesis (fixed vocabulary with human voice qualities) and phoneme voice synthesis (which allows you to reproduce any English word and almost all pronounceable sounds).

Practical course features a great deal of experimentation: EE-3403 cuts through the technical fog and gets right down to how to program and interface the two most popular voice synthesis methods. The course is also valuable in helping you understand the alternatives available in speech synthesis. It can be a real money-saver to a design engineer, for example, who wants to explore the wide range of capabilities and problems of various synthesizers.

Complete chip sets for digitized and phoneme voice synthesis are included:

1. The digitized chip set contains both a ROM chip and a synthesizer chip – featuring a vocabulary totaling more than 200 words.
2. The phoneme synthesizer is self-contained on a single chip.

If purchased separately, the chip sets alone would cost over \$150.



Course covers subject completely: The five-unit text covers voice synthesis in a clear, concise manner. You'll also learn the basic hardware and software necessary for breadboarding computer-synthesized speech – and the programming and interfacing you'll need for both digitized and phoneme voice synthesis. And it prepares you to write machine code programs tailored for the ET-3400 and ET-3400A Microprocessor Trainers.

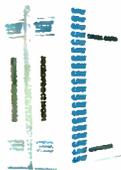
When you complete this course, you'll be able to make your Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer (necessary for the course – see page 36) talk. Prerequisites for Voice Synthesis are the EC-6800 Introduction to Microprocessors Course (page 42), or the EE-3401 Microprocessors Course (page 36), or equivalent knowledge.

Earn 3 Continuing Education Units and a Certificate of Achievement: Pass the optional final examination with a 70% or better score.

EE-3403, Shpg. wt. 4 lbs. 129.95



Low-cost Heathkit/Zenith Educational Course demonstrates Microprocessor Interfacing



- Add to your microprocessor knowledge with this course, which details interfacing techniques and concepts
- Begins where the EE-3401 Microprocessor Course ends – a logical continuation to your studies
- Provides in-depth coverage of the 6800 microprocessor family and introduces the powerful 6809 and 68000
- Money-back guarantee – if you are not satisfied, return your course materials for a refund of the purchase price

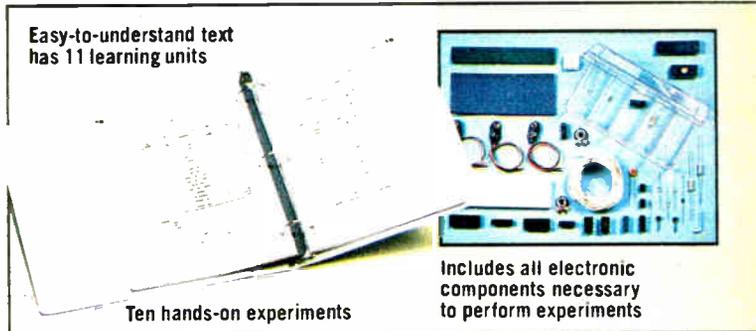
\$99⁹⁵

You can afford to continue your study of microprocessors with this low-cost course from Heathkit/Zenith. It's a natural follow-up to the EE-3401 Microprocessor Course.

Complete and detailed text: As with all Heathkit Zenith courses, the EE-3402 Microprocessor Interfacing Course is written in a unique, programmed, self-instructional format. Its 750-page text will lead you step-by-step until you've mastered the concepts presented. Unit examinations check your progress and show where you need further study.

Topics covered: A total of 11 learning units and 10 optional hands-on experiments teach you microprocessor interfacing fundamentals. Individual topics covered include Advanced Peripheral Interfacing Adapter (PIA) and analog conversion, serial data communications, peripheral devices, memory devices, programmable timers, an in-depth discussion of the 6809 Advanced Microprocessor, and three sections on the 68000 Advanced Microprocessor. Four detailed appendices contain useful listings, data sheets and a summary of the 6800 family of microprocessors for quick reference.

Ten hands-on experiments: With these optional experiments, you can reinforce



Easy-to-understand text has 11 learning units

Ten hands-on experiments

Includes all electronic components necessary to perform experiments

the knowledge you've already learned. A variety of components required for the experiments are included with the course. To perform the experiments, you'll also need the ET-3400 or the ET-3400A Microprocessor Trainer.

Pass the optional final exam with a score of 70% or better and earn 7.0 Continuing Education Units and another Certificate of Achievement.

Prerequisite: You should complete the EE-3401 Microprocessor Course, or have equivalent knowledge, before attempting this follow-up course.

Money-back guarantee: If you're not satisfied, return the course materials to Heathkit/Zenith for a refund of the purchase price (not applicable to trainer).

EE-3402, Shpg. wt. 11 lbs. **99.95**

SAVE \$30⁰⁰ on your microprocessor education!

Purchase the complete microprocessor educational package and save \$30.00. Everything you need to know about microprocessors and microprocessor interfacing is included in the EES-3402 package.

Includes both courses and a trainer: Both the popular EE-3401 Microprocessor Course and the EE-3402 Microprocessor Interfacing Course. Also included is the Heathkit/Zenith ET-3400A Trainer, required to perform the experiments in the courses. If purchased separately, you would spend \$429.85.

SAVER! EES-3402, Shpg. wt. 49 lbs. **399.85**



Includes both EE-3401 and EE-3402 Courses plus the ET-3400A Trainer.



Learn all about state-of-the-art Fiber Optics Technology with this new course!

- Covers theory, systems, and components of fiber optics in detail – along with hands-on practice applications
- Learn at your own pace, retain more with Heathkit/Zenith's proven, programmed self-instructional text format
- Earn 3.0 Continuing Education Units and a Certificate of Achievement – proof of your new technical knowledge!

Managers, engineers, students and hobbyists will benefit from this broad, in-depth introduction to the challenging science of lightwave technology. Fiber optics are an important, future-shaping breakthrough in rapid signal transmission, with cost/performance benefits that promise to revolutionize the data communication world. Be prepared.

This five-unit course covers the basics of fiber optics. Beginning with Unit 1, you'll study Optical Energy, the nature of light and optical radiation; Optical Fibers and how they transmit light; Fiber Optic Light sources – light-emitting diodes and laser diodes. In Unit 4, you'll learn about fiber optic receivers and in Unit 5, you'll put it all together as you study complete fiber optics systems.

Get valuable design experience by developing a two-way fiber optics link and related circuitry. Four optional hands-on experiments are included in the



Effective, 450-page text

Appendices include glossary of terms



All components for experiments included except 9V battery

course to enhance your understanding of the text. To perform them, you will need either a Heathkit/Zenith ET-3400 or ET-3200A Digital Techniques Trainer, an oscilloscope, a multimeter and common hand tools (not included).

Earn 3 Continuing Education Units and a Certificate of Achievement by passing the enclosed optional final exam with a score of 70% or better.

Prerequisites: The EE-3101 DC Electronics and EE-3102 AC Electronics courses are prerequisites for this course. EE-3201 Digital Techniques is recommended, but not required. Our money-back guarantee: return course materials for a refund of the purchase price if you are not satisfied.

EE-4201, Shpg. wt. 6 lbs. **99.95**



For our FULL-LINE of computerware order your Heathkit Computer Catalog! See page 74



Advanced Electronics Series conveys specialized information in an easy-to-learn, hands-on format

Whether you're an electronics professional, student or hobbyist, the Heathkit/Zenith Electronics Technology Series is a rewarding way to get the latest information. Discover the easy, fast, fun way to learn — with our Self-Instruction Courses.

They're economical and flexible, too. Experiments follow concise text presentation — components included — and the ET-3300B Trainer gets you working. Classroom versions of these Heathkit/Zenith courses are on p. 43.

Get the latest on Optoelectronics with this thorough course

Basic optical terms and concepts are presented here in their most current contexts. Course covers the types of available light sources and optoelectronic displays — including driving and multiplexing. Acquaints you with light-sensitive components such as photodiodes, phototransistors, solar cells and optocouplers — their design and applications. Laser and fiber optics theory and operation are also discussed.

Parts for experiments included. Required for experiments: ET-3300B. Recommended: milli-

ameter and voltmeter — or a VOM like the IM-5217 (p. 51) and a scope like the IO-4105 (p. 63). Prerequisites: DC and AC (EE-3101A and -3102A, pgs. 32-33) or equivalent; some experience in optics or electronics. 3 CEUs.

EE-105, Shpg. wt. 5 lbs. **59.95**

Kit ET-3300B, Breadboard, 6 lbs. **99.95**

ETW-3300B, Assem. Breadboard, 6 lbs. . . **179.95**

SAVER! — Buy Course and Breadboard Kit together.
EES-105B, Shpg. wt. 11 lbs. **ONLY 149.90**

Op Amps and ICs: presented in easy-to-digest units

Comprehensive 358-page text details measurements of common op amp parameters, basic op amp linear circuits, integrator and differential circuits, and design and performance of op amp constant current sources. Also discusses current/voltage and voltage/current converters, Norton and BIFET op amps.

Components for experiments included: ET-3300B required for experiments. Recommended: an oscilloscope like IO-4105 (p. 63), a multimeter

like IM-2260 (p. 58), and a frequency generator like IG-1271 (p. 52). Prerequisite: Basic Electronics (EE-3101A through 3104A, pgs. 31-34) or equivalent knowledge. 3 CEUs.

EE-101, Shpg. wt. 5 lbs. **44.95**

Kit ET-3300B, Breadboard, 6 lbs. **99.95**

ETW-3300B, Assem. Breadboard, 6 lbs. . . **179.95**

SAVER! — Buy Course and Breadboard Kit together.
EES-101B, Shpg. wt. 11 lbs. **ONLY 129.90**

Gain know-how of Active Filters at a reasonable price

Course teaches proficiency in designing active filters with op amps, plotting and predicting frequency responses, designing and breadboarding first-order low- and high-pass filters, and designing second- and higher-order filters, bandpass and state variable filters.

ET-3300B or **ET-3100B** Breadboard required for experiments (NOTE: ET-3100B, p. 32, cannot be used with other courses in Advanced Series). An oscilloscope like the IO-4105 (p. 63) and a

frequency generator like the IG-1271 (p. 52) are helpful. Prerequisite: EE-101 Op Amps or equivalent. 3 CEUs.

EE-102, Shpg. wt. 5 lbs. **39.95**

Kit ET-3300B, Breadboard, 6 lbs. **99.95**

ETW-3300B, Assembled Breadboard, Shpg. wt. 6 lbs. **179.95**

SAVER! — Buy Course and Breadboard Kit together.
EES-102B, Shpg. wt. 11 lbs. **ONLY 124.90**

Understanding and using the versatile IC Timer

Understand the workings, functions, and applications of common IC timers — in output drive circuits, time-delay relay circuits, wide-range pulse generators, voltage/frequency converters, freewheeling power-fail oscillators, timers, and alarms. 348-page text is well-written; also serves as a helpful electronics reference.

Durable vinyl binder housing; components for experiments included. Requires ET-3300B for experiments. Recommended: IO-4105 Oscillo-

scope (p. 63), IM-2260 Multimeter (p. 58) or similar. Prerequisite: EE-3201 Digital Techniques Course (p. 35) or equivalent knowledge. 3 Continuing Education Units and certificate.

EE-103, Shpg. wt. 5 lbs. **44.95**

Kit ET-3300B, Breadboard, 6 lbs. **99.95**

ETW-3300B, Assem. Breadboard, 6 lbs. . . **179.95**

SAVER! — Buy Course and Breadboard Kit together.
EES-103B, Shpg. wt. 11 lbs. **ONLY 129.90**

Learn about Phase-Locked Loops — and how to build them

Phase-Locked Loops and their ingredients — the phase detector, loop filter and voltage-controlled oscillator — are presented the simple, easy Heathkit/Zenith way. Learn about this integral aspect of radio and TV communications at your own pace. The 268-page text is thorough, and the reviews and tests are helpful checkpoints.

Components for experiments included. ET-3300B Trainer required for experiments. We also suggest a DC voltmeter like the IM-5284 (p. 54) and

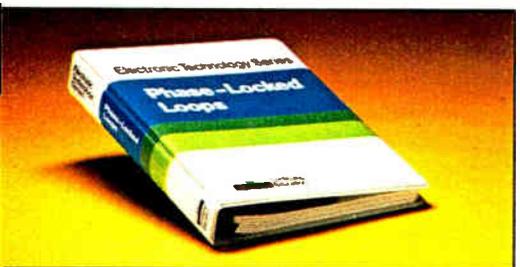
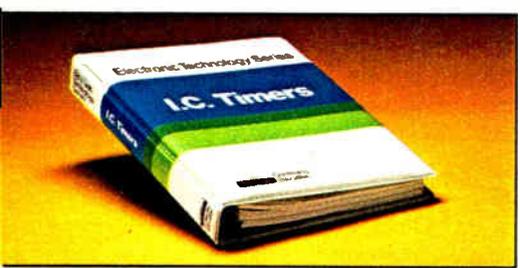
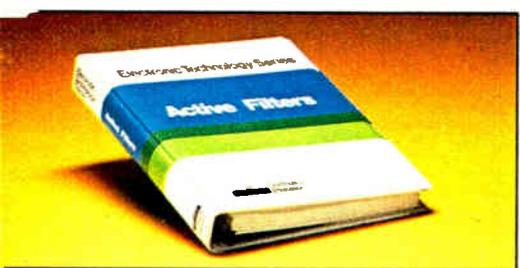
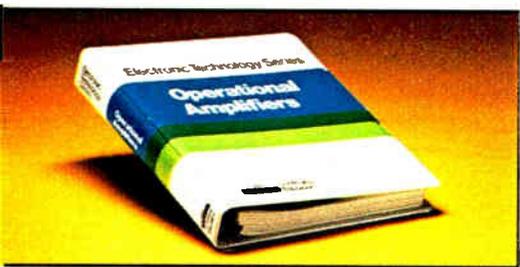
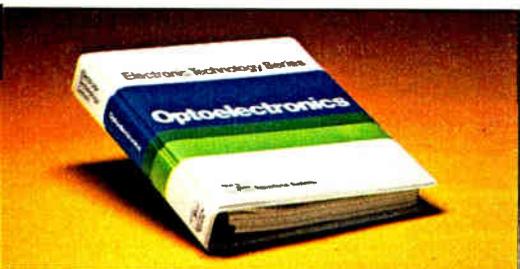
a single-trace oscilloscope like the IO-4105 (p. 63). To learn more efficiently, use an oscilloscope like the IO-4205 (p. 63) and an audio signal generator like the IG-5218 (p. 52). Earn 3.0 CEUs.

EE-104, Shpg. wt. 5 lbs. **49.95**

Kit ET-3300B, Breadboard, 6 lbs. **99.95**

ETW-3300B, Assem. Breadboard, 6 lbs. . . **179.95**

SAVER! — Buy Course and Breadboard Kit together.
EES-104B, Shpg. wt. 14 lbs. **ONLY 139.90**



Breadboard for advanced experiments, circuit design



\$99⁹⁵
Kit

- Redesigned to match our updated courses
- Hefty built-in power supply
- Current limited for short circuit protection
- Build yourself and save \$80

Master advanced electronics skills: Use the redesigned ET-3300B Laboratory Electronic Breadboard from Heathkit/Zenith Educational Systems. Solderless sockets make it quick and easy to perform experiments, test components and design circuits – and they're flexible enough to accommodate any size dual in-line integrated circuit package.

Suggested to complete experiments: Use the ET-3300B Laboratory Electronic Breadboard to complete the experiments in the following Heathkit/Zenith Advanced Electronics Courses: the EE-101 Op-Amps Course, the EE-102 Active Filters Course, the EE-103 IC Timers Course, the EE-104 Phase-Locked Loops Course and the EE-105 Optoelectronics Course. Also, the EH-701 Linear Circuits Course and the EH-702 TTL and CMOS Circuits Course.

Built-in safety: The ET-3300B's built-in power supply is current-limited at rated amperage to protect against short circuits. It also cuts down set-up time and does away with tangling, intrusive wires. The power supply provides +5 VDC ($\pm 4\%$) current at 1.5 amps, +12 VDC current at 100 milliamps or -12 VDC current ($\pm 2\%$) at 100 milliamps.

Build the versatile ET-3300B Laboratory Electronic Breadboard yourself – and save a big \$80. Or purchase the completely assembled and tested ETW-3300B Laboratory Electronic Breadboard. Requires 120 VAC, 60 Hz power. Listed by Underwriters' Laboratories. Overall dimensions of the ET-3300B are 3½" H x 12" W x 12" D (8.89 x 30.48 x 30.48 cm).

Kit ET-3300B, Shpg. wt. 6 lbs. 99.95

ETW-3300B, Assembled, Shpg. wt. 6 lbs. 179.95

SAVE \$60 on skills package

Discount offer on Heathkit/Zenith Advanced Electronic Series and ET-3300B Laboratory Circuit Breadboard Kit (EE-101 Op Amps Course, EE-102 Active Filters Course, EE-103 IC Timers Course, EE-104 Phase-Locked Loops Course and EE-105 Optoelectronics Course). Purchased separately, \$339.70. Order this system now, and start expanding your electronics skills.

SAVER! EES-1015A, 34 lbs. . . 279.70

Learn Linear Circuits the hands-on Heathkit/Zenith way

\$49⁹⁵

- Build each circuit as you learn
- Deals with basic circuits and many modifications
- Includes 86 parts (worth over \$45) for building over 30 linear circuits

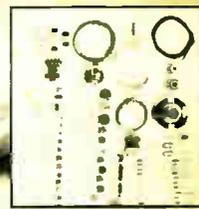


Study and build a circuit "file" series. The concisely arranged explanations and diagrams in this course move smoothly into the hands-on experience you require, in logical progressive order. The course describes a circuit and how it operates, presents a complete schematic, and details several modifications. Bipolar transistors, field-effect transistors, the 555 timer and 741 op amp linear circuits are covered.

All the parts you'll need to build various amplifiers, oscillators, astable and monostable multivibrators, pulse position and pulse width modulators, active filters and more are provided.

The Linear Circuits Course is time-efficient, economical. Because it's a Heathkit/Zenith Self-Instruction Course, you set your own study hours, save money on equivalent college or technical school courses. Move quickly through concepts

Circuit "file" format speeds successful learning



Contains 86 electronic parts for building over 30 circuits

you understand right away; spend more time on those you have difficulty with.

We recommend using our ET-3300B Trainer, but all circuits can be constructed and tested on your own breadboards. To observe circuit operation, you'll need a voltmeter like the IM-5217 (page 51) and an oscilloscope like the IO-4205 (page 63). DC and AC Electronics, and Semiconductor Devices Courses (EE-3101A to -3103A, pgs. 32-33) or equivalent knowledge is a prerequisite.

Earn 4.0 Continuing Education Units with a 70% grade on the optional final exam.

EH-701, Shpg. wt. 2 lbs. 49.95

Learn TTL and CMOS circuits by doing with this course

\$59⁹⁵

- Completely covers subject
- Circuit "file" format
- Components provided worth over \$70
- Uses the natural, effective learn-by-doing approach



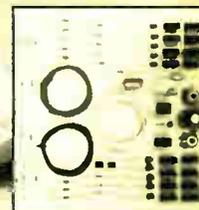
You'll be building circuits right away: Simply study the concise text and diagrams, then begin constructing circuits yourself.

You'll develop your skills when it's convenient for you, at a comfortable pace. The modular format progresses logically through over 50 circuit types, including the 7447 BCD to seven-segment decoder, the D- and J-K-type edge-triggered flip-flops, the four bit adder, the CMOS 100-kHz crystal oscillator, and the quad bilateral switch.

This course is also an economical way to learn – you'll save the cost of a college or tech-school course, use parts with a retail value of more than the \$59.95 cost of the course!

These state-of-the-art circuits can be built with your own breadboard and power supplies, or use the ET-3300B Trainer. To observe circuit opera-

Circuit "files" arranged in a logical progression



Includes 65 electronic parts for building over 50 circuits

tion, you'll need a voltmeter like the IM-5217 (p. 51) or equivalent, and an oscilloscope like the IO-4205 (p. 63). Courses in AC and DC Electronics, and Semiconductor Devices (or other experience) are prerequisites – EE-3101A through -3103A on pages 32-33.

Earn 6 CEUs: Score 70% on optional final exam.

EH-702, Shpg. wt. 3 lbs. 59.95

SAVER! Purchase the EH-701 Linear Circuits and EH-702, TTL/CMOS Circuits Courses together. If purchased separately, \$109.90.

EHS-712, Shpg. wt. 6 lbs. 79.90

Practical, fun soldering course

\$17⁹⁵

- Equipment hints provided
- Useful for amateur or pro

Proper soldering techniques mean quality; this course teaches professional soldering skills in a highly-detailed, easy-to-follow format. Circuit board, components and solder are provided for construction of a two-transistor light oscillator. Requires a soldering iron and small hand tools (described on page 50).

EL-3133, Shpg. wt. 3 lbs. 17.95



Discover the fun of kitbuilding.

Learn to plan, design and assemble Printed Circuits

\$64⁹⁵

- Learn pattern and photographic circuit design techniques
- Design and build PC boards for two electronic kits

Learn to make your own printed circuit boards, or copy those in magazines, with our fun, easy course. Get to know the properties of PC board materials; learn how to design, layout and prepare artwork — and how to transfer drawings. You'll design PC boards using the pattern and photographic circuit layout techniques; study different etching techniques and conformal coating; and learn automatic assembly.

You'll build two popular and useful kits from PC boards you make. Construct

Hobbyists — learn basic electronics

\$64⁹⁵

- Build and experiment with 26 different electronic circuits
- Easy-to-digest units guide you

Hobbyists interested in any of several fields of electronics will find this course useful. Seven units of text and 26 corresponding experiments assure your understanding of do-it-yourself electronic projects, let you emphasize the skills you want.

Learn the basic principles of direct current, alternating current, active devices, electronic circuits, digital electronics and digital computers. And take a look at the range of electronic hobbies. Experiments (parts included) let you put ideas presented in the course to work — using the ET-3100B Trainer (p. 32), a multimeter like the IM-5284 (p. 54), and oscilloscope like the IO-4105 (p. 63). 4 CEUs.

EE-3140, Shpg. wt. 11 lbs. 64.95

Easy introduction to microprocessors with this effective Heathkit/Zenith course

\$29⁹⁵

- No knowledge or experience required
- Trainer gets you programming

Instruct yourself in an increasingly important technology — save time and money in the process. The Introduction to Microprocessors Course shows you how microprocessors operate, number systems and codes, and computer arithmetic and microprocessor programming, in six concise self-instruction units with detailed illustrations.

A typical microprocessor is described in the final units. Programming experiments placed throughout the text (optional ET-6800 Microprocessor Trainer at right) assist your understanding of the microprocessor. Earn 4 CEUs.

EC-6800, Shpg. wt. 9 lbs. 29.95

SAVER! Buy EC-6800 Course and ET-6800 Trainer Kit together.

ETS-6800, Shpg. wt. 29 lbs. **ONLY 109.90**

Audio-tutorial math courses are low-cost way to learn quickly

Comprehensive texts combined with audio cassettes present math concepts clearly, aid retention. Reviews and tests (included) are valuable knowledge checkpoints.

Algebra Course: Learn algebra basics quickly with well-written text, workbook and 10 audio cassettes. Eight units cover polynomial arithmetic, factoring, algebraic functions, exponents and radicals, linear equations, inequalities and more. Earn 3 CEUs and a Certificate of Achievement.

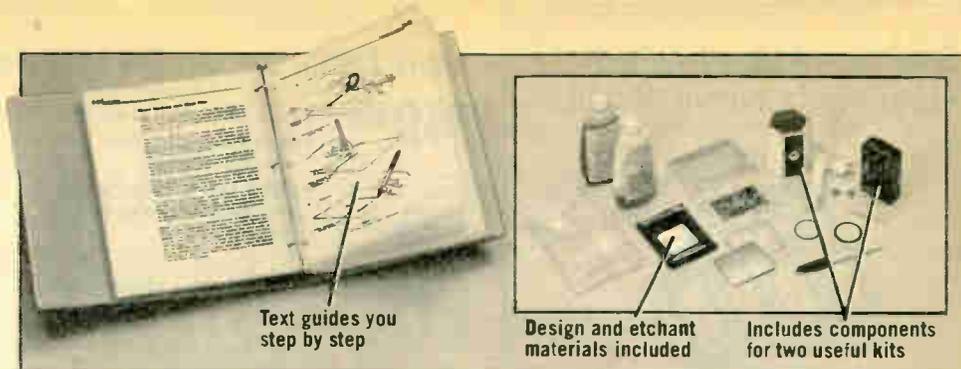
EM-4, Shpg. wt. 7 lbs. 24.95

Intermediate Algebra Course: Text and nine cassettes. Covers functions, relations and inverses, graphs and variations, linear relations, quadratic relations, system of equations and inequalities, determinants, logarithms, sequences and series. Earn 3.5 CEUs and a Certificate of Achievement.

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

Think Metric, U.S.A. Course: Learn the international system of weights and measures in a fun and easy way. A self-instruction text and audio cassette acquaint you with metric measurements, and shows you how to convert from English to metric. Earn 1 CEU and a Certificate of Achievement.

EM-2, Shpg. wt. 4 lbs. 5.00



Text guides you step by step

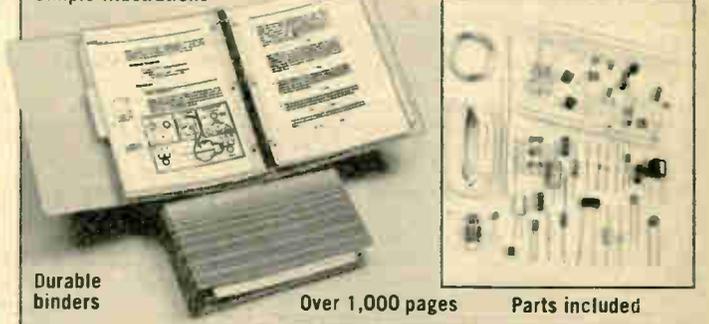
Design and etchant materials included

Includes components for two useful kits

the GD-600 Photoelectric Lamp Switch and GD-1287 Touch Switch to get complete design-to-building skills — a sound basis for electronics competence. Course comes complete with materials for designing, layout and etching of PC boards. 2.0 CEUs. Course not available outside continental U.S.

EI-3134, Shpg. wt. 7 lbs. 64.95

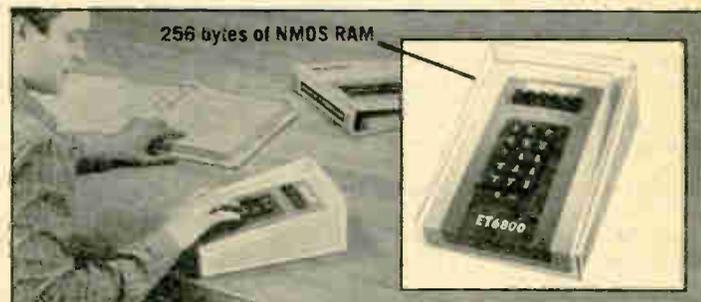
Simple illustrations



Durable binders

Over 1,000 pages

Parts included



256 bytes of NMOS RAM

Trainer is mini digital computer: The ET-6800 Trainer has an 8 bit parallel, NMOS, bus-oriented central processing unit. You can access memory locations, enter programs, single-step through programs, alter memory.

Kit ET-6800, Shpg. wt. 17 lbs. 99.95

Cassette Recorder/Player



We recommend the ECP-3801A Cassette Tape Recorder/Player for use with audio-tutorial courses. Built-in microphone; play, rewind, fast forward, stop, eject and record functions. Counter and reset button. This quality product is assembled and tested; not a kit.

ECP-3801A, Assembled, 4 lbs. 60.00

Premium 30-minute cassette tapes.

ECP-3802, Three cassettes, 1 lb. ... 6.00





Teachers, training directors: Heathkit/Zenith Classroom Courses are designed to fit your custom training needs

Now you, as a training director or teacher, can apply famous Heathkit/Zenith learning courses to meet your own training needs: Application-oriented with just the right amount of theory and a maximum emphasis on real-world application of the theories learned, Heathkit/Zenith Classroom Courses incorporate the latest technical material available.

Classroom Courses are available in these areas:

- **Exploratory Courses** – Concepts of Electronics, Printed Circuit Boards
- **Fundamental Electronics Series** – DC Electronics, AC Electronics, Semiconductor Devices, Test Equipment, Electronic Communications
- **Advanced Electronics Series** – Operational Amplifiers, Active Filters, Integrated Circuit (IC) Timers, Phase-Locked Loops, Optoelectronics
- **Digital Techniques**
- **Microprocessor Technology**
- **Computer Programming Series** – BASIC and Assembly Language Programming

- **Automotive Courses** – Automotive Tune-Up, Automotive Electrical Systems

Organized in three separate publications: Each course is designed for greater student and teacher convenience. The student text is the core of the learning material, supported by a workbook with exams and experiments keyed to the text. The instructor's guide lets the teacher add his or her experience and guidance – providing each student with a fully rounded learning experience.

Separate parts packs contain all components for implementing the workbook experiments: To complete experiments, assembled Heathkit/Zenith trainers are required (see list below)

Heathkit/Zenith Classroom Courses are the answer for industries, governments and schools who want to teach technical subjects efficiently at minimum cost. Many of these multi-media courses employ the latest techniques in programmed instruction for fast, thorough mastery by students.

Review the extensive list of Heathkit/Zenith Classroom Courses below: Then, contact us for more information on these courses.

Slides and filmstrips available

Color slides or 35 mm filmstrips (as listed below) duplicate the flip charts included in the self-instruction versions of the Heathkit/Zenith Microprocessor Course (pgs. 36-37), Automotive Tune-Up and Automotive Electrical Courses (p. 22). Flip chart not included in classroom versions.

EE-3401-1, Microprocessor Slides, 2 lbs. . . . 60.00

EE-3401-2, Microprocessor Filmstrip, 1 lb. . . . 20.00

Filmstrip for Automotive Tune-up Course.

EB-20-70, Shpg. wt. 1 lb. 14.95

Filmstrip for Auto Electrical Systems Course.

EB-10-70, Shpg. wt. 1 lb. 29.95

Heathkit/Zenith Classroom Courses are on display at your nearby Heathkit Electronic Center

Free brochures, information and price schedules are available. See pgs. 16 and 48-49 for addresses, phone numbers

ARIZONA – Phoenix, Tucson

CALIFORNIA – Anaheim, El Cerrito, Los Angeles, Mission Viejo, Pomona, Redwood City, Sacramento, San Diego, San Jose and Woodland Hills

COLORADO – Denver

CONNECTICUT – Hartford

FLORIDA – Miami, Ft. Lauderdale, Jacksonville, Tampa

GEORGIA – Atlanta

HAWAII – Honolulu

ILLINOIS – Chicago, Downers Grove

INDIANA – Indianapolis

KANSAS – Kansas City (Mission)

KENTUCKY – Louisville

LOUISIANA – New Orleans

MARYLAND – Baltimore, Rockville

MASSACHUSETTS – Boston (Peabody and Wellesley)

MICHIGAN – Detroit, East Detroit, St. Joseph

MINNESOTA – Minneapolis, St. Paul

MISSOURI – St. Louis

NEBRASKA – Omaha

NEW JERSEY – Fair Lawn and Ocean (Asbury Park)

NEW YORK – Buffalo, Jericho, LI, Rochester, White Plains

NORTH CAROLINA – Greensboro

OHIO – Cincinnati, Cleveland, Columbus and Toledo

OKLAHOMA – Oklahoma City

OREGON – Portland (Vancouver, WA)

PENNSYLVANIA – Philadelphia, Frazer and Pittsburgh

RHODE ISLAND – Providence

TEXAS – Dallas, Fort Worth, Houston (2) and San Antonio

UTAH – Salt Lake City

VIRGINIA – Alexandria, Norfolk

WASHINGTON – Seattle, Tukwila, Vancouver

WISCONSIN – Milwaukee

Earn CEUs on certain Classroom Courses with these exams

A new opportunity: Now students and employees using classroom versions of certain Heathkit/Zenith courses can earn Continuing Education Units (CEUs) – a nationally recognized measurement of achievement in non-credit secondary education. Each package contains ten copies of that course's CEU examination, with full instructions.

CEU Exam for DC Electronics Classroom Course.

EB-6101-80, Shpg. wt. 2 lbs. 100.00

EB-6102-80, AC Electronics, 2 lbs. . . . 100.00

EB-6103-80, Semiconductors, 2 lbs. . . . 100.00

EB-6104-80, Elec. Circuits, 2 lbs. . . . 100.00

EB-6201-80, Dig. Techniques, 2 lbs. . . . 100.00

EB-6401-80, Microprocessors, 2 lbs. . . . 100.00

| Course | Text Shpg. wt. 2 lbs. | Price | Workbook Shpg. wt. 2 lbs. | Price | Instructor's Guide Shpg. wt. 1 lb. | Price | Assembled Trainer Wt. 8 lbs. | Price | Parts Shpg. wt. 1 lb. | Price | Cassettes Shpg. wt. 1 lb. | Price |
|----------------------------|-----------------------|-------|---------------------------|-------|------------------------------------|-------|------------------------------|--------|---------------------------|-------|---------------------------|-------|
| Concepts of Electronics | EB-6140 (3 lbs.) | 24 95 | EB-6140-40 (1 lb.) | 10 95 | EB-6140-50 | 9 95 | ETW-3100B | 169 95 | EB-6140-30 | 24 95 | NOT USED | |
| Printed Circuit Boards | EB-6134 (1 lb.) | 18 95 | EB-6134-40 (1 lb.) | 9 95 | FR-6134-50 | 9 95 | NOT USED | | EB-6134-30 (2 lbs.) | 19 95 | NOT USED | |
| DC Electronics | EB-6101 | 19 95 | EB-6101-40 | 10 95 | EB-6101-50 | 9 95 | ETW-3100B | 169 95 | EB-6101-30 | 19 95 | EEA-3101 | 12 95 |
| AC Electronics | EB-6102 | 19 95 | EB-6102-40 | 10 95 | EB-6102-50 | 9 95 | ETW-3100B | 169 95 | EB-6102-30 | 15 95 | EEA-3102 | 12 95 |
| Semiconductor Devices | EB-6103 | 19 95 | EB-6103-40 | 10 95 | EB-6103-50 | 9 95 | ETW-3100B | 169 95 | EB-6103-30 | 15 95 | EEA-3103 | 12 95 |
| Electronic Circuits | EB-6104 | 19 95 | EB-6104-40 | 10 95 | EB-6104-50 | 9 95 | ETW-3100B | 169 95 | EB-6104-30 | 29 95 | EEA-3104 | 12 95 |
| Test Instruments | EB-6105 (4 lbs.) | 19 95 | EB-6105-40 | 10 95 | EB-6105-50 | 9 95 | ETW-3100B | 169 95 | EB-6105-30 | 24 95 | NOT USED | |
| Electronic Communications | EB-6106 | 17 95 | EB-6106-40 (1 lb.) | 10 95 | EB-6106-50 | 9 95 | ETW-3100B | 169 95 | EB-6106-30 | 29 95 | NOT USED | |
| Operational Amplifiers | EB-601 | 18 95 | EXPERIMENTS IN TEXT | | EB-601-50 | 9 95 | ETW-3300B | 179 95 | EB-601-30 | 24 95 | NOT USED | |
| Active Filters | EB-602 | 18 95 | EXPERIMENTS IN TEXT | | EB-602-50 | 9 95 | ETW-3300B | 179 95 | EB-602-30 | 14 95 | NOT USED | |
| IC Timers | EB-603 | 18 95 | EXPERIMENTS IN TEXT | | EB-603-50 | 9 95 | ETW-3300B | 179 95 | EB-603-30 | 29 95 | NOT USED | |
| Phase-Locked Loops | EB-604 | 18 95 | EXPERIMENTS IN TEXT | | EB-604-50 | 9 95 | ETW-3300B | 179 95 | EB-604-30 | 29 95 | NOT USED | |
| Optoelectronics | EB-605 | 14 95 | EB-605-40 (1 lb.) | 9 95 | EB-605-50 | 9 95 | ETW-3300B | 179 95 | EB-605-30 | 29 95 | NOT USED | |
| Digital Techniques | EB-6201 (3 lbs.) | 24 95 | EB-6201-40 | 11 95 | EB-6201-50 | 9 95 | ETW-3200B | 179 95 | EB-6201-30 | 29 95 | EEA-3201 | 12 95 |
| Microprocessors | EB-6401 (4 lbs.) | 24 95 | EB-6401-40 (1 lb.) | 11 95 | EB-6401-50 | 9 95 | ETW-3400A | 339 95 | EB-6401-30 | 59 95 | EB-6401-60 | 12 95 |
| Microprocessor interfacing | EB-6402 (5 lbs.) | 24 95 | EB-6402-40 (1 lb.) | 10 95 | EB-6402-50 | 9 95 | ETW-3400A | 339 95 | EB-6402-30 | 59 95 | NOT USED | |
| 5809 Microprocessors | EB-6404 (1 lb.) | 24 95 | EXPERIMENTS IN TEXT | | EB-6404-50 (2 lbs.) | 9 95 | ETW-3400A | 339 95 | EB-6404-30 | 69 95 | | |
| BASIC Programming | EB-6100 (4 lbs.) | 19 95 | EB-6100-40 | 10 95 | EB-6100-50 | 9 95 | NOT USED | | PARTS, CASSETTES NOT USED | | | |
| Assembly Programming | EB-6108 (4 lbs.) | 19 95 | EB-6108-40 | 9 95 | EB-6108-50 | 9 95 | NOT USED | | PARTS, CASSETTES NOT USED | | | |
| Auto Tune-Up | EB-20 (4 lbs.) | 19 95 | EB-20-40 | 9 95 | EB-20-50 | 9 95 | NOT USED | | EB-20-30 (2 lbs.) | 17 95 | EB-20-60 | 9 95 |
| Auto Electrical | EB-10 (3 lbs.) | 19 95 | EB-10-40 | 9 95 | EB-10-50 | 9 95 | NOT USED | | EB-10-30 (2 lbs.) | 17 95 | EB-10-60 | 17 95 |



Discover the fun of kitbuilding at your Heathkit Electronic Center.



Ultra-efficient Ultrasonic Cleaner purges dirt

\$119⁹⁵

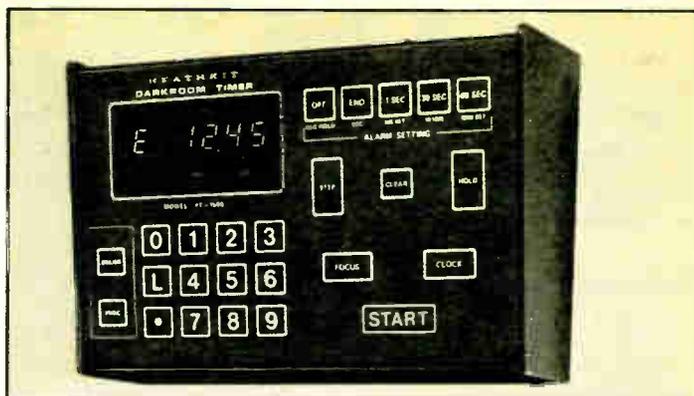
- For those almost-impossible special cleaning chores
- Cleans and sanitizes most precious items that might be damaged by abrasive scrubbing or harsh cleansers

This scientific method is the fastest, most effective way to deep clean dirt, stains and undissolved solids from hard-to-clean watch parts, glass, coins, components, dentures, paint brushes, etc. *Fine jewelry sparkles like new!*

Simply fill the stainless steel tank with a safe cleaning solution, place dirtied objects in the tank, set the timer — and the efficient Ultrasonic Cleaner does the rest! You'll be amazed how quickly and easily your possessions come clean. How does it work? The 41 kiloHertz mechanical motion of the tank creates microscopic bubbles within the contaminants. These grow and collapse rapidly, forcing cleaning solution through the impurities so they can be completely dissolved and rinsed away. 4 $\frac{1}{2}$ " H x 11" W x 5 $\frac{3}{4}$ " D, 120 VAC.

Professional artisans, jewelers and watchmakers have used the ultrasonic method for years; now this low-cost kit lets you take advantage of the process!

Kit GD-1151, Shpg. wt. 5 lbs. 119.95



Start getting consistent film developing quality

\$139⁹⁵

- Programmable memory recalls up to 10 steps; precise auto-step sequencing and microprocessor accuracy offers more versatility than standard dial timers
- Waterproof front panel with selectable backlighting

Great photos will result with the Programmable Darkroom Timer! It features a 4-digit, 12-hour LED clock to sync all developing and enlarging steps. Alarm settings are available at 1, 30 or 60 second intervals in any combination, or once at the end of a cycle. Ten-second end-of-cycle alarm tells you when to begin pouring from the tank. Enlarger and safelight outlets toggled so one turns on when the other goes off. Optional Auxiliary Outlet turns on external device (such as a color drum) during countdown in Process mode. Optional foot switches make operation even easier. Metal case. 120/240 VAC.

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

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

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



Communicate conveniently with a Heathkit FM Wireless Intercom

\$49⁹⁵

- No wiring between units
- PLL circuitry gives you low-noise, clearly heard voice transmissions

Here's an intercom you can use anywhere indoors. Simply plug each unit into an outlet and you're ready. Monitor baby's room from the laundry, or stay in contact between kitchen and garage or workshop; basement to bedroom! Best of all, they can move from room to room with you.

Your voice is transmitted over the AC wiring in your home, which also supplies the operating voltages. Has a pleasant calling tone alert. Dictate switch locks intercom in Talk mode for hands-free telecontact. Large, 3" speaker broadcasts every message clearly. Minimum two stations required. Cabinets are 8 $\frac{5}{8}$ " H x 3" W x 5 $\frac{3}{4}$ " D.

Kit GD-1114, 3 lbs. each station 49.95

44/HOME PRODUCTS

Digital Thermometer fulfills all temperature needs accurately

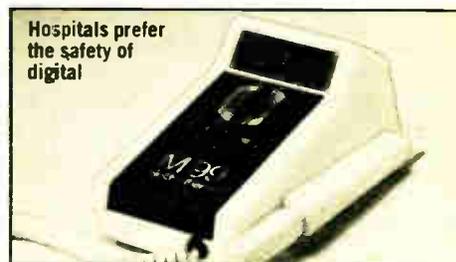
\$49⁹⁵

- Highly accurate and super dependable — has dozens of everyday applications

Got a cold? Developing pictures? Fixing baby's bath?

This reliable, battery powered electronic thermometer will deliver perfect readings every time — wherever you need temperatures in a hurry!

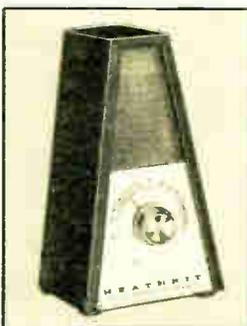
No more squinting or guessing! Solid-state circuitry assures easy-to-read 4-digit temperature in less than ten seconds. The bright red LED display never needs calibration or mercury "shakedown." Wand senses from 32° to 230°F (0° to 110°C) with $\pm 0.2^\circ\text{F}$ ($\pm 0.1^\circ\text{C}$) biomedical accuracy and 0.5% overall accuracy with 0.1°F or C resolution. A flashing decimal warns of low battery. Operates on one 9V battery up to a year under normal use. This



Hospitals prefer the safety of digital

micro-marvel weighs only 5.5 ounces and fits comfortably in the palm of your hand, protected from damage by a high-impact polyduralene case.

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



Electronic Metronome aids practice precision



\$24⁹⁵

- Variable between 40 and 210 beats per minute for efficient tempo-teaching
- Housed in handsome cherry-finish birch cabinet with non-marring felt feet
- Reliable performance year after year

Whatever the instrument, the Heathkit Electronic Metronome will maintain a steady beat so you can practice confidently at the correct tempo. Rear panel control adjusts the volume from soft tapping to a loud, conventional "tick-tock" rhythm. Includes handy label so musician can relate number of beats per minute to tempos in different time signatures. Batteries not included. Measures 6 $\frac{3}{4}$ " H x 3 $\frac{3}{4}$ " W x 4" D.

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



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

Use a Digital Scale to accurately monitor weight loss and progress to a more compelling figure

\$109⁹⁵

- Battery operated for accuracy and safety anywhere
- No-wear electronic strain-gauge mechanism sensitive to weight change as small as $\frac{1}{10}$ of a pound or kg.

The Heathkit Digital Scale is a multi-purpose balance 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 $\frac{1}{2}$ " 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.

A manual zero adjustment makes it easy to weigh small items. This special offset feature means you can weigh the baby without weighing the blanket. Safe to use after the shower. Requires 6 'C' cell batteries (not included).

Kit GD-1186, Shpg. wt. 9 lbs. **109.95**

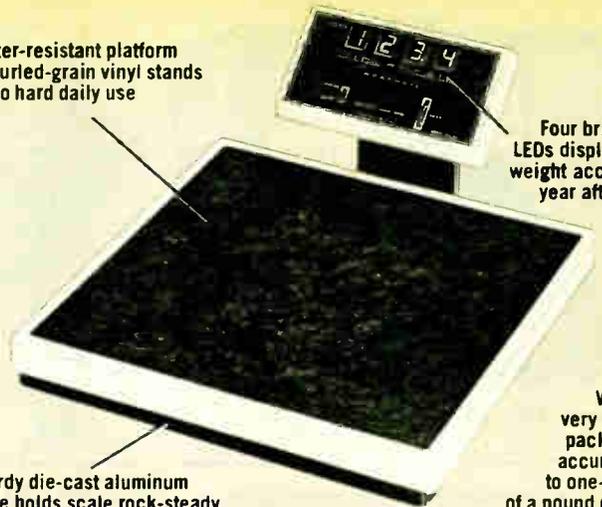
GDW-1186, Assembled and tested Digital Scale with non-detachable readout wired to display in pounds only. Shpg. wt. 9 lbs. **149.95**

Water-resistant platform of buried-grain vinyl stands up to hard daily use

Four bright $\frac{1}{2}$ " LEDs display your weight accurately year after year

Sturdy die-cast aluminum base holds scale rock-steady

Weigh very small packages accurately to one-tenth of a pound or kg.



Guests love the Programmable Musical Doorbell

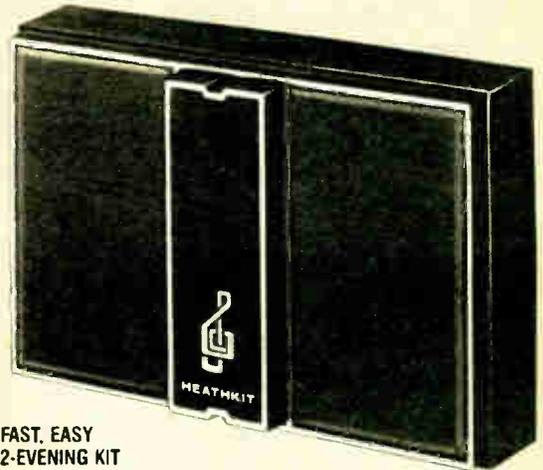
\$49⁹⁵

- 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

Bring a little music into your everyday life with the touch of a button. Greet your friends with a tune by building this Electronic Doorbell for your home. It's a versatile and ingenious replacement for the conventional doorbell, buzzer or simple chime. Imagine the pleasant reaction and smiles on visitor's faces when they're greeted with a friendly song you've selected to fit any circumstance. It's a very uniquely warm way to say "welcome" to all who call.

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. Extend a musical hello — and own the neighborhood's most unique chimes! Install it in your home, then surprise and greet every caller with an infinitely - imaginable, new kind of musical merriment.

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



FAST, EASY
2-EVENING KIT

3-Tune Doorbell greets with beautiful music

\$19⁹⁵

- 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 with one that plays a tune or two, the Electronic Doorbell is a kit you'll be proud to install new, or switch with your old-fashioned ringer. The TD-2089 plays three diverse selections: an upbeat 4-note ring, a short tune (Beethoven's *Für Elise*) and a long tune (*Romance*). Each tune is reproduced polyphonically by an IC synthesizer.

Quickly select different tunes for front and back door by jumping wires to small sockets. Assembly requires almost no hardware, as the circuit board snaps firmly into the attractive case and spring clips hold the speaker. For extra sound, remote speakers can be added to extend music throughout your home. Hidden connections are made through plug-in jacks and a 10-foot extension ribbon lets you change tunes or service the unit at table level rather than on the wall. Two "C" cell batteries (not included) power the low-drain electronics while your present 10 to 16 volt doorbell transformer supplies your pushbutton circuits. Case size is $4\frac{3}{4}$ " H x $5\frac{7}{8}$ " W x $1\frac{1}{4}$ " D. Spread the joy of music by putting a warm and classical spirit of welcome in your home... and open the door to a friendly smile every time!

Kit TD-2089, Shpg. wt. 1 lb. **WAS \$24.95, NOW ONLY 19.95**



FAST, EASY
1-EVENING KIT



Look for the store manager's special — at your nearby Heathkit Electronic Center.

HOME



All three Sounders feature noise rejection circuitry.



Through-the-hull Transducer



Transom-mount Transducer



HEATH HAS A BETTER MARINE VALUE!

Bottom contours and deepwater fish can't hide from the Seeker™

- Get permanent record of best spots and depths
- One chart can last for 13 continuous hours

The Heathkit Seeker Chart Recording Depth Sounder is a super-sensitive fish-finder with greater accuracy than conventional units, so you can return again and again to where the fish concentrate. It's bottom-recording accuracy makes it a valuable navigation aid for following coast lines and mapping lake bottoms. *Best of all, it's priced at about 1/2 the cost of comparable recording depth sounders.*

You get a wider picture of what's below: An extra-wide beam 50 kHz transducer, three depth ranges (5 to 200', 200-400' or 400-600'), sensitivity and special "white line" controls allow you to mark more fish and set your line accordingly. Switch-controlled marker puts vertical line on chart for reference. Rugged, water-tight housing has locking hinged panel for quick chart roll replacement, and lighted front panel for night reading. Gimbal mount lets you install the Seeker anywhere, and remove it for theft protection or storage. Includes one roll of chart paper. Operates on boat's 12 VDC system.

Kit MI-2910-1, with thru-hull transducer & 30' cable, 17 lbs. . . . **Was \$349.95, NOW ONLY 299.95**

Kit MI-2910-2, with transom-mount transducer & 30' cable, Shpg. wt. 17 lbs. . . . **299.95**

MIA-2910-1, two rolls of chart paper, 2 lbs. . . **10.95**
Save \$15.75! MIS-2910-1, 12 rolls, 12 lbs. . . **49.95**

Dual Range Fish Spotter always delivers professional results

- All solid-state circuitry for improved sensitivity and dependable readings every time

A Heathkit Deluxe Fish Spotter should be standard tackle for any serious angler. It can help increase the size and weight of your catches by detecting fish swimming between the surface and any preset depth you choose. Two ranges, 0-60 or 0-240 feet, insure the high accuracy and definition so important in an instrument of this type. Fish entering the transducer's ultrasonic range will trigger an audible alarm as a bright neon indicator shows the exact depth. Relatively small variations in fish location can be observed while your boat is in motion.

Two precision instruments in one portable package: MI-2901 will stand duty as a dependable depth sounder for navigation through unknown waters, and search underwater areas to determine the best fishing spots. 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). Take it with you in any boat and come home with more fish in your cooler!

Kit MI-2901, Shpg. wt. 8 lbs. . . . **129.95**

Scanning Transducer Bracket: (Not shown) For use with MI-2901. C-clamp mounting, scans 360° locks in any position. Accepts 1 3/8" transducer.

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

Dual-Range Depth Sounder can double as a thermocline finder

- Navigate safely; find one or a school of fish
- Protect your hull from scrapes or puncture

Whether you're fishing, cruising or scuba diving, this Dual Range Depth Sounder adds extra safety measure 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. Underwater objects located above a preset depth 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. Water-resistant, black Cyclac case has a glare-free bezel with sun shield and super bright neon indicator to make depth reading easy day or night. Gimbal mount and quick-disconnect power and transducer leads allow for easy removal when your boat is not in use. Powered by your boat's 12 VDC battery.

Kit MI-1031-1, with thru-hull transducer & 25' cable, Shpg. wt. 8 lbs. . . . **119.95**

Kit MI-1031-2, with transom transducer & 25' cable, Shpg. wt. 8 lbs. . . . **119.95**

YES, I'd like my friends to know I handcraft my kits with special care and pride.

I'd like to have _____ solid brass name plate(s) with my name engraved on them. I understand the price of \$2.00 for one plate, and the price of \$1.60 each for two or more plates covers first-class postage and handling. I've enclosed \$_____ with my regular kit purchase for my personalized GDP-1225 Brass Name Plate(s).

Please print your name plainly in capital letters using a maximum of 14 characters (including spaces) in the boxes provided below.

| | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
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|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

Name: _____

Address: _____

City: _____ State: _____

GDP-1225 _____ Zip: _____

Brass Name Plate adds prestige to your kit

\$200 for one plate

\$160 each, 2 or more

Be proud of your kitbuilding skill! Hand-made quality and the pride of craftsmanship helped make our nation great. Adding your name to a kit product reflects the painstaking care you've invested in it. The Heathkit Name Plate is made of solid brass, brushed to a jeweler's finish and has a self-adhesive backing for easy, no-mess application. Fill out the adjacent coupon and give it to your nearest Heathkit Electronic Center sales clerk or mail it along with your kit purchase from this catalog.



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

Sailboaters! Powerboaters! The low-cost Heathkit Speedometer/Trip Log gives you outstanding speed and log accuracy

\$99⁹⁵

- Keeps track of your boat's speed and distance with $\pm 5\%$ accuracy, updated 30 times per minute
- Designed to be used on all types of hulls
- Save \$30 on these kits — both were \$129.95

Upgrade your boat by installing the low-cost, but highly accurate Heathkit Digital Speedometer/Trip Log. For sailors, it allows you to trim sails for maximum racing speed. For fishermen, it lets you control boat speed for the best lure action, and mark distances 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 speedometer/log of its kind! The Heathkit Digital Speedometer/Log features integrated circuits for precise speed and readouts. These circuits, which include 3 active filters, constantly compute and update your average speed every 2 seconds with $\pm 5\%$ accuracy. In addition, the circuits and filters also keep track of distance traveled with the same accuracy. And, you get this accuracy no matter what type of boat hull you have, because the Speedometer/Trip Log also features a special adjustment control that enables you to fine-tune the circuits to the shape of your hull.

It features an easy-to-read display that shows speed and distance: Our Speedometer/Trip Log's readout is an automatic backlighted display with three $\frac{1}{2}$ " digits. With the flip of a switch, it will show speed in mph (or knots), from 0.1 to 40 mph; or tell you distance traveled from 0 to 99 miles (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 Speedometer/Trip Log for your sailboat or the MI-2956 Speedometer/Trip Log for power boat. What's more, you have a choice of transducers to correctly match the necessary transmitting unit to your individual hull. Just pick the MIA-2950-1 thru-hull transducer or the MIA-2950-2 transom-mount transducer.

1 Kit MI-2958, Sailboat Speedometer/Trip Log, Shpg. wt. 4 lbs. 99.95

Automatic, dual-range Digital Depth Sounder has five selectable alarm depths for added safety

as low as
\$179⁹⁵

- Detects changes in depth from 2 to 499 feet
- Alerts you to depth changes audibly & 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 a 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 auto night light shows depth in 0.1' increments from 2' to 9.9', tells depth 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 Thru-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. External Control: On-off switch. Operating Temperature Range: 32°F to 122°F. (0°C to 50°C). Power Requirements: 10 to 17.7 VDC. Dimensions: 2 $\frac{1}{2}$ " H x 7.0" W x 5 $\frac{1}{2}$ " D. (6.4 x 17.8 x 14.0 cm).

3 SAVE! on these Digital Remote repeater stations

Works off the MI-2916 above. Features same display, sealed cabinet, independent alarm settings, keel-offset capability; includes 25-ft connector cable. **SAVE \$55.00!** Was \$124.95, now reduced to \$69.95. Same overall dimensions as MI-2916, with tilt-view mount bracket.

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

4 SAVE! on Flush-mount Digital Readout for Sailboats

5" diameter, operates like MI-2917. **SAVE \$30.00!** 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. 1 lb. 12.95

Discover the fun of kitbuilding at your Heathkit Electronic Center.



2 Kit MI-2956, Powerboat Speedometer/Trip Log, Shpg. wt. 4 lbs. 99.95

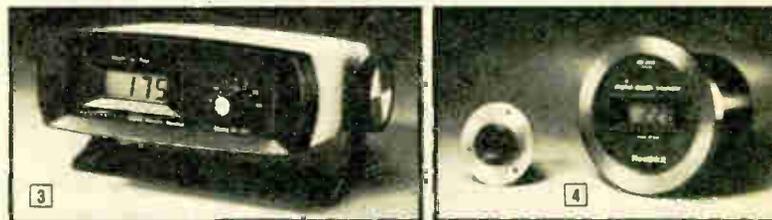
MIA-2950-1, Thru-Hull Transducer, Shpg. wt. 2 lbs. 39.95

MIA-2950-2, Transom-Mount Transducer, Shpg. wt. 2 lbs. 29.95

MI-2958 & MI-2956 SPECIFICATIONS: Speed Range: 0.1 to 45 mph or knots. Log Range: 0 to 99.9 miles or nautical miles, auto reset @ 100. Speed and log accuracy: 15%. Display: 3 digit LCD, non-blinking with automatic backlighting. Display Update: 2 seconds. Power Req: 11 to 16 VDC (from boat's system or 2-6 VDC lantern battery), reverse polarity protected. Dim: MI-2958: 5" diam. by 4 $\frac{1}{2}$ " deep. Requires a 4 $\frac{1}{2}$ " hole for mounting. MI-2956: 2 $\frac{1}{2}$ " H x 7.0" W x 5 $\frac{1}{2}$ " D.



Delivers depth reading and proximity alarms to the helmsman via remote repeaters below



MARINE/47

We challenge you...



HERO 1
Personal/Training Robot
A technical triumph! He walks, talks and has made our name famous throughout the world.



An exciting message from Joe Schulte

Dear Heathkit Customer,

We challenge you to be your best...by building the best! And the best in electronic kits comes from your Heathkit Electronic Center.

Whether you're new to us or an established customer, we want you to know there are great rewards in accepting the challenge. Thousands have expanded their technical knowledge through our education courses. Others are proud to build our unexcelled audio components. Every kit in our catalog gives the satisfaction of building and understanding a superior product.

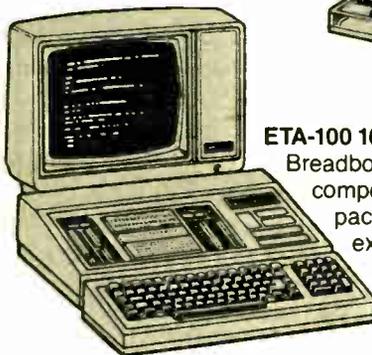
We support our challenge with Partnership. "We Won't Let You Fail" - that's a promise we back up with free technical consultation and the world's finest manuals. Partnership helps us, too, because you learn our products inside and out and tell us what you want in "perfect" kits of the future. Thanks to your partnership, the kits of the future are here today.

We'll reward you by continuing to offer the most advanced technology available. So browse through this catalog and take the exciting step into kit building now. Be your best...by building the best! Take the Heathkit Challenge and join our HIGH-TECH revolution!

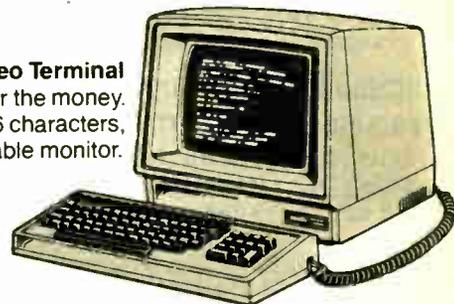
Happy kit building!

Joseph M. Schulte

Joseph M. Schulte, President,
Veritechnology Electronics Corporation



H-29 Video Terminal
This kit gives more features for the money. Sculptured keyboard with 126 characters, tiltable monitor.



ETA-100 16-bit Trainer
Breadboard access to internal components. With accessory package, it becomes our least expensive 16-bit computer.

HD-8999 CW Keyboard
Newest advance in Ham radio! Shown with the hot HW-5400, this keyboard sends up to 100 WPM CW, letter perfect.



See page 95 for **THE CLEARANCE CORNER...**

Big discounts on discontinued kits, demo models and overstocked products.

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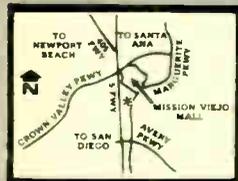
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*New store now open in
Mission Viejo*



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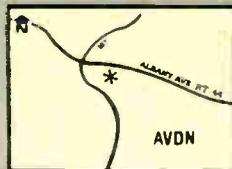
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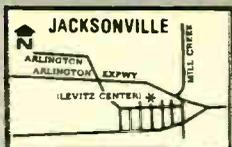
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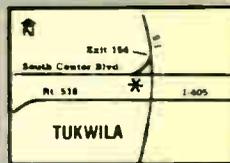
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Charge it with Visa, MasterCard...
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*Units of Veritechnology Electronics Corporation



Quality-tested tools to make your kitbuilding hours more enjoyable, and go easier



Aids for safe, clear vision

1 Easy-on-the-eyes lighting and big 5" distortion-free polished glass lens with 2 to 1 magnification combine to take the strain out of close-up work. Preferred by professional craftsman for its exceptional view. Up to one foot diameter focal field. Energy-sungy 22-watt Circline tube (included) gives glare-free, cool illumination. 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**

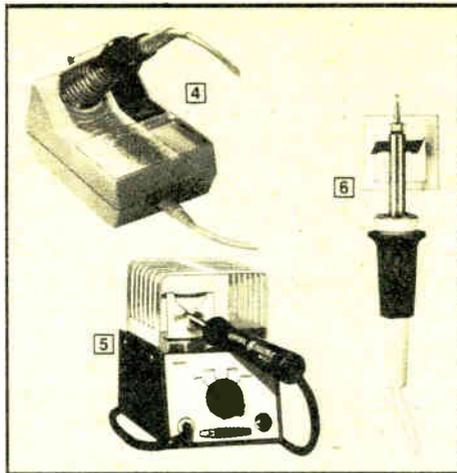
2 This lightweight headband magnifier has three finely ground lenses to enlarge miniature work 2½ times while keeping hands free to position and solder components. Eliminates squinting by concentrating your vision on tiny details while providing greater depth of field. Lens holder flips up out of the way; works well with eyeglasses, too. Focus view area is 8" to 14" below shatter- and scratch-resistant optical-quality acrylic lens combo. Headband has adjustable comfort cushion.

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

3 All-angle Extension Lamp is fully mobile, and has a conical shade to direct more light right where you need it most. Counterbalanced steel arm on spring expansion reaches 32"; swings 360° to illuminate workspace. Uses incandescent bulb (not included). Ruggedly constructed and quickly portable; clamps horizontally or vertically.

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

Complete, 11-piece Kitbuilders Tool Set is a portable workmate



Professional soldering tools

4 Weller WTCPN Soldering Station features a temperature-controlled 60-watt element in a pencil iron. Exclusive transformer-powered, closed loop system automatically controls output and iron temperature to keep 1/16" screwdriver tip consistently hot. Low-voltage design provides maximum safety and longer tip life. Balanced handle has cool grip for sure comfort. Station includes detachable plug-in iron, heat-shielded holder on sturdy base (transformer inside), 700°F tip, 6' power cord, tip storage tray and removable cleaning sponge. 120 VAC. Assembled and ready to help build dozens of kits!

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

Set of five 700°F assorted tips for above.

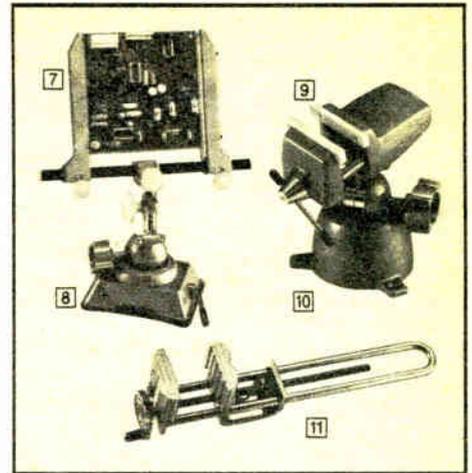
GDP-1109, Shpg. wt. 1 lb. **17.95**

5 Three-Heat Soldering Station Kit features safety stand with metal heatshield to protect from burns or breakage. Off/low/medium/high heat settings with pilot lamp provide temps for all requirements. Has 25W element with 3/16" chisel tip and 3-wire, 6' power cord. Ideal for heat-sensitive components where a precision touch is essential.

Kit GH-17A, Shpg. wt. 5 lbs. **49.95**

6 Weller 860°F, 25-Watt Soldering Iron has a slim, iron-clad 1/8" chisel tip for close point-to-point wiring and integrated circuit work. Our best selling iron — one that's perfect for all your kits and construction projects! 120 VAC

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



PanaVise System lends a hand

7 PC Board Holder — grips and positions almost any size or shape circuit board up to 12" wide super-steady for easy soldering. Arms move independently along support bar. Spring loaded for quick change. Tilts 220° and locks in place.

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

8 Vacuum Base — Attaches securely for temporary mounting on smooth, non-porous surfaces. Powerful rubber suction pad holds without marring tabletop. Perfect where permanent mounting is not practical. Accepts all three heads.

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

9 Standard Vise Head — Nylon jaw pads open 2¼" and provide a firm grip without marring.

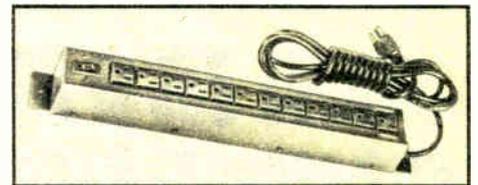
GDP-1253, Shpg. wt. 2 lbs. **17.95**

10 Standard Height Base — Designed for permanent installation. Three mounting lugs let you attach it securely to the workplace. As with GDP-1252, special ball-joint base with control lock knob tilts, turns and rotates work.

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

11 Wide Vertical Vise — Holds bulkier items like large model parts, chassis, etc. Jaws open to a full 9". Jaw pads are reversible and replaceable.

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



A real handyman's problem solver

No shop, garage or work area should be without a multi-outlet electrical bar. Eliminates the tangle of overloaded, potentially dangerous extension cords. Has 12 3-prong outlets (11 switched, plus one unswitched for clock or memory save) and 16-gauge, 12' cord. Fused for absolute protection. 10 amp maximum load rating. Metal housing mounts to a wall or bench with built-on ears.

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



For workshop projects or home repairs, here are three Heathkit instruments to help you out



IM-5228 bench VTVM is ideal for service and bench repairs

Perfect for around-the-house electrical repairs and even the electrical system in your car



NEW



Faster testing of power and lighting circuits

Accurately measures \pm DC and AC voltages and resistances

\$79⁹⁵

- Includes a dB scale for direct amplifier output measurements
- All calibration controls are located on the front panel

A high 11-megohm meter input impedance enables the IM-5228 to precisely measure voltages from 0-1500 VDC/rms VAC with an accuracy of $\pm 3\%$ DC and $\pm 5\%$ AC. Low AC voltage readings are especially easy with the meter's separate 1.5 and 5 VAC ranges. Resistances are measured in seven ranges from 0.1 ohm to 1000 megohms. A gimbal bracket allows various meter viewing positions. It is powered by 120/240 VAC, 50/60 Hz and requires one 1.5 VDC "C" battery which is not supplied. Measures 5" H x 12¹/₁₆" W x 4³/₄" D.

Kit IM-5228, Shpg. wt. 6 lbs. **79.95**

PKW-4, Wired Replacement Probe for IM-5228 VTVM, Shpg. wt. 1 lb. **19.95**

IM-5228 SPECIFICATIONS: Accuracy: DC Voltage: $\pm 3\%$ full scale. Input Resistance: 11 megohms (1 megohm in probe) on all ranges. AC Voltage: $\pm 5\%$ full scale. AC Voltage: Frequency Response: 25 Hz - 1 MHz, ± 1 dB (800 ohm source, referred to 60 Hz). Resistance: R x1, x10, x100, x1000, x10k, x100k, x1 Meg.

A rugged, portable electronic volt-ohm meter

\$44⁹⁵

- Four voltage and resistance ranges for every-day repairs
- Impact resistant case protects meter in use and storage

Compact and battery-powered, the IM-5217 is an ideal general-purpose volt-ohm meter. It measures AC and DC voltages from 0 to 500 volts and resistances from 1 ohm to 1 megohm. A high input impedance minimizes circuit loading for accurate voltage measurements. A wide 10 Hz to 1 MHz frequency response covers the full audio range and more. Low-voltage ohmmeter allows safe semiconductor checking. All measurements are made with a single pair of test leads that conveniently store inside the case. The meter requires two 9 volt batteries and one 1.5 volt "C" battery which are not included. Measures 5³/₈" H x 9³/₈" W x 9" D.

Kit IM-5217, Shpg. wt. 4 lbs. **44.95**

IM-5217 SPECIFICATIONS: DC Voltage Ranges: 1.5, 15, 150, 500 volts, full scale. AC Voltage Ranges: 1.7, 15, 150, 500 volts full scale. Accuracy: DC Volts, $\pm 3\%$ of full scale. AC Volts, $\pm 5\%$ of full scale. Ohmmeter: Rx1, Rx100, Rx10k, Rx1M (10 ohms center scale). Input Resistance: DC: 1M Ω ; AC: 10M Ω . Input Capacitance: Approx. 100 pF (50 pF on 500 volt range).

Convenient clamp-on meter measures AC current

\$49⁹⁵

- Helps electricians to quickly check electrical circuits
- Allows energy-saving homeowners to check current usage

Simple operation: To measure 50/60 Hz AC current, you just snap the inductive pickup of the SM-2206 around a conducting AC wire. For AC voltage and resistance checks, use the three-foot test leads that are included with each meter. When a check must be made in the dark or in a hard-to-reach place, a special finger-operated switch lets you lock the meter's pointer in place for reading after removing the meter.

Wide measuring range: A six-position range switch allows easy selection of five current ranges — 6A, 15A, 60A, 150A, and 300A. Turn the switch to the volt/ohm position and measure AC voltages in three ranges — 150V, 300V, and 600V — using separate voltage test terminals. Also checks resistances from 0 to 5 kilohms.

Easy to read: Three color-coded scales — black for AC amps, red for AC volts, and green for ohms — readily identifies each measurement range. The uncluttered meter scales are simple to read allowing fast and accurate measurements. The range switch, probe jacks, pointer lock switch, and zero ohm adjuster are plainly labeled for quicker measurement setups.

Solid construction: A rugged housing protects the SM-2206 from knocks and bumps while it's in use. The meter movement is also protected by a shock-absorbing meter bearing spring. Further meter protection is provided by its own pointer lock switch which locks the pointer down when the meter is carried. Additional meter protection is provided by a fused resistance range.

Further features: The SM-2206 comes with a wrist-strap, carrying case, test leads, a 1.5V AA battery and spare 0.1A fuse.

SM-2206, Assembled and tested, 2 lbs. . . **49.95**

SM-2206 SPECIFICATIONS: Measurement Ranges: AC Amperage: 0 to 6, 15, 60, 150, 300A. AC Voltage: 0 to 150, 300, 600V. Resistance: 0 to 5 kilohms (200 ohm mid-scale). Accuracy: AC Amps and Volts, $\pm 3\%$ of full scale; Resistance, $\pm 3\%$ of arc.

Identify "GOOD" and "BAD" TV yokes



Designed for TV use, this portable meter easily checks yoke windings, flybacks, horizontal coils, and 10 kHz to 100 kHz general purpose coils. Good/bad ring test with ± 1 ring accuracy at 10 mark on highest range. Also measures TV voltages up to 300 V peak-to-peak (up to 40 kV

with optional IMA-100-10 High Voltage Probe).

Kit IT-5235, Shpg. wt. 8 lbs. **99.95**

ST-5235, Assembled, Shpg. wt. 7 lbs. **140.00**

Kit IMA-100-10, 30 kV Probe, 1 lb. **14.95**

SMA-100-10, Assembled Probe, 1 lb. **19.95**

High-voltage test probe/built-in meter



Quickly and easily measures DC voltages up to 40,000 volts. Besides TV tube voltages, the lightweight IM-5210 can check high-voltage power supplies used in oscilloscopes. All you do is connect the meter's ground clip to a negative ground chassis and place the tip of the probe against the high voltage connector. Turn on the meter at the handle-mounted on-off switch and read the voltage within $\pm 3\%$ accuracy. This easy-to-assemble kit can be completed in one evening. The IM-5210 measures 1¹/₂" H x 1⁷/₈" W x 15" D.

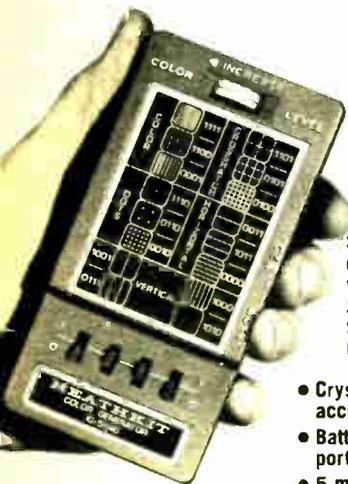
Kit IM-5210, Shpg. wt. 2 lbs. **29.95**



Open a Heath Revolving Charge with a purchase as little as \$100.

Hand-Held Color Generator provides sixteen television alignment signals

\$74⁹⁵



Compact, light-weight — easily slips into a shirt pocket

Supplies color bar, bar, dot, crosshatch, and vertical and horizontal line patterns for testing B/W and Color TV sets

- Crystal-controlled accuracy
- Battery-powered portability
- 5-minute turn-off timer

The IG-5240 Color Generator supplies RF signals (50% modulated) for television alignment.

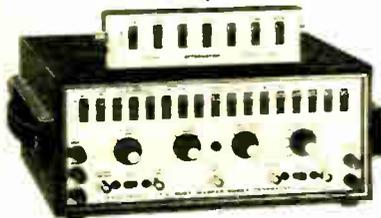
Accurate and stable: The IG-5240's RF channel carrier, and color and timing oscillators are controlled by three separate crystals. These crystals provide signal stability and a frequency accuracy within $\pm 0.005\%$.

Simple operation: Just connect the output cable to the VHF terminals of any TV. The RF carrier frequency is calibrated to TV Channel 4 (optional Channel 3). Then select any of the 16 available test patterns using the four front-panel program slide switches. A color level control adjusts the intensity of the three color patterns. A battery saver circuit automatically turns the Generator off after operating for five minutes.

Portable: The IG-5240 is powered by two 9 VDC transistor batteries and provides eight or more hours of continuous operation. It weighs 0.5 lbs. and measures $5\frac{3}{8}''$ L x $2\frac{3}{4}''$ W x $1\frac{1}{8}''$ H.

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

Post-Marker/Sweep Generator



The IG-5257 TV Post-Marker/Sweep Generator is a fifteen-crystal marker generator and a three-range linear sweep generator. The Post-Marker section enables you to use as many as six markers to adjust TV and FM IF circuits for proper wave-shape and bandwidth. Markers are provided for both TV and FM alignments. Modulation at 400 Hz is also provided for trap FM tuner alignments. The Sweep Generator covers the frequency ranges necessary for correct alignment of FM receivers and TV tuned circuits. Features: blanking switch, trace reversing switch, and a phase control.

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

Function Generator produces sine, square, and triangle waves



\$159⁹⁵

- Frequency range extends from 0.1 Hz to 1 MHz
- Signal output is 10 volts P-P

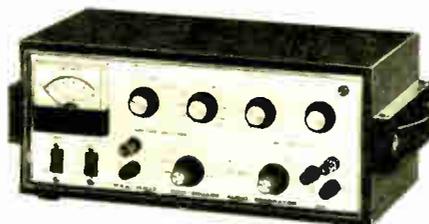
Simple frequency selecting: Set the function switch to the desired waveform and then set the six-position multiplier to the required range. Next, tune the variable control to the desired frequency. Using both frequency controls, you can select any frequency between 0.1 Hz to 1 MHz.

Variable output: At its conveniently located front panel BNC connector, the IG-1271 supplies 10 V P-P into a 50 ohm circuit or 20 V P-P into an open circuit. The output is adjusted by a six-step, 0 to 50 dB, switch that adds 10 dB of attenuation per step. A variable control adds another 0 to 20 dB for a total of 70 dB attenuation at ± 1 dB accuracy. Uses 120/240 VAC at 50/60 Hz and draws 15 watts maximum. Measures $8\frac{7}{8}''$ D x $7\frac{1}{4}''$ W x $2''$ H without handle.

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

SG-1271, Assembled/Calibrated, 6 lbs. ... 225.00

Sine/Square Wave Audio Generator



Designed for service and testing, the IG-5218 generates sine waves from 1 Hz — 100 kHz and square waves from 5 Hz — 100 kHz. The sine wave output, with less than 0.1% distortion, is adjustable through eight ranges from 0.003 to 10 volts. A convenient front panel meter monitors the sine wave output. The square wave output has a rise time less than 50-nanoseconds with an output level available in three ranges up to 10 volts peak-to-peak. **Dimensions:** $5\frac{1}{8}''$ H x $13\frac{1}{4}''$ W x $7''$ D.

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

Accurate FET/Transistor Tester



Portable IT-3120 tests devices in- and out-of-circuit. Checks transistors, diodes, FET's, SCR's, triacs, and UJT's. Shows gain, transconductance, and leakage current.

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

FM Deviation Meter measures frequency modulation



\$169⁹⁵

- Checks peak FM deviation of signals between 25-1000 MHz
- Two scope monitoring jacks

Measures the peak deviation (frequency modulation) of transmitters and signal generators with carrier frequencies between 25 and 1000 MHz. A BNC jack allows the connection of an optional antenna or a direct line for monitoring signals. Front panel controls include four pushbuttons to select deviation modulation ranges from 2 to 75 kHz, coarse and fine-tuning controls for locking in difficult UHF FM signals, a level control to adjust the meter's sensitivity, and an audio output adjustment. Runs on 10 "AA" batteries or optional Battery Charger/Eliminator. A speaker jack allows speaker or headphone listening. Easily transports to any remote operating location.

Kit IM-4180, Shpg. wt. 7 lbs. 169.95

Kit IMA-4180-1, Charger/Eliminator, 2 lbs. ... 32.95

Swiveling Telescopic Antenna for use with IM-4180

SMA-2400-1, Assembled, Shpg. wt. 1 lb. ... 9.95

Low-cost CRT Tester and Rejuvenator extends the life of picture tubes



\$139⁹⁵

Test, clean, and restore almost any color or B/W picture tube

Separate testing, cleaning, and rejuvenation can be done on almost all current color and black-and-white CRT's — even in-line-gun tubes. All tests and operations are controlled by separate push-buttons. Each color gun is individually controlled and monitored on its own grid current meter. A separate heater voltage meter allows precise setting of the heater voltage on the CRT. The IT-5230 has a front panel lamp to indicate shorts in the CRT, heater voltage and cutoff controls. A restore indicator glows brighter as a guns current level is increased for an easy visual indication of rejuvenation. A separate cleaning process is applied after rejuvenation to assure proper tube operation. A special push-button provides a good indication of the life expectancy of the CRT. Included is a 4' test cable and four adapter sockets with instructions for assembling optional adapter sockets.

Kit IT-5230, Shpg. wt. 9 lbs. 139.95



Accurate Heathkit Strip Chart Recorder provides reliable, wide-range measurements

- Less than 0.5% full-scale error, 0.3% typical
- Highly accurate, 10-speed digital chart drive
- English or metric measurements available
- Rear panel connector for total control from a remote location using TTL logic levels
- Built-in switchable input attenuation filter

Belongs in your lab: The IR-5204 offers standard features that are extra-cost options with many competitive products – such as digital chart drive, a built-in filter and remote control capability.

Digital chart drive: Provided by a precision stepper motor with no backlash, as is common in gear train designs. To prevent damage to the recorder, the pen servo shuts off when the charted signal exceeds full scale deflection.

Has 10 chart speeds: Available in either inches or centimeters per minute, via the IR-5204's stepper motor. All chart speeds are instantly selectable with the front panel rotary switch – and are accurate to better than 0.5% ($\pm 0.3\%$ typical).

Four calibrated input spans are available at the touch of a pushbutton: 10 mV, 100 mV, 1 V and 10 V full scale. Variable span capacity is built in, enabling you to extend the range to 100 V (12.5 mV to 125 V metric), full scale.

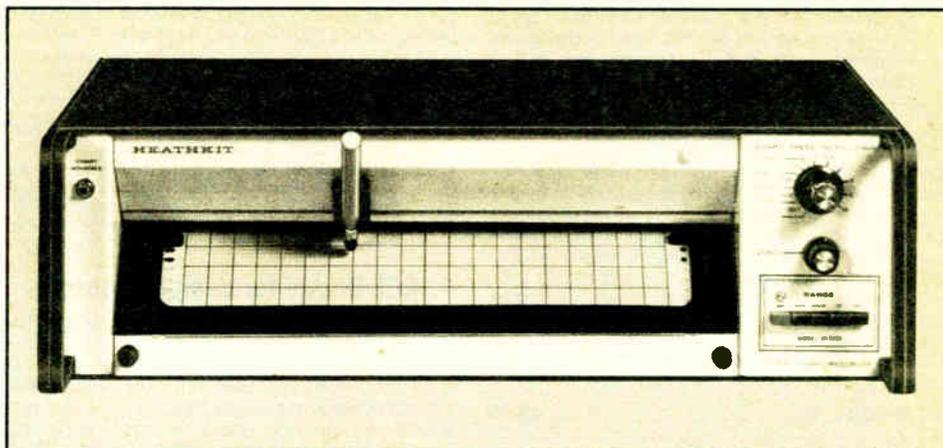
Many noise problems are eliminated by a built-in selectable input filter: When switched into the circuit, both normal and common mode rejection are increased by 20 dB. Noise rejection is even greater at higher frequencies.

Allows total TTL-compatible recorder control from a remote location: Just plug into the IR-5204's rear panel connector with polarized connector supplied.

Pushbutton chart advance is standard: As are external chart drive input capability, electric pen lift with disposable nylon-tipped pens and metric conversion. Rack handles and the necessary hardware for rack mounting optional. 120/240 VAC, 50/60 Hz. Measures 5 $\frac{1}{8}$ " H x 17 $\frac{1}{8}$ " W x 12 $\frac{1}{2}$ " D.

Kit IR-5204, Shpg. wt. 22 lbs. **349.95**
SR-204, Assembled and tested Strip Chart Recorder, 22 lbs. **495.00**

IR-5204/SR-204 SPECIFICATIONS: Chart Width: 10 inches (25 cm with optional metric drive). Chart Speeds: 10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01 inches/minute (cm/min with metric conversion installed). **Balance Time:** 0.5 second for full scale (filter out). **Overshoot:** Less than 1% of full scale



Nylon-Tip Pens for IR-5204/SR-204 Strip Chart Recorder:

SU-406-92, Red Pen, Shpg. wt. 1 lb. **3.95**
SU-406-93, Blue Pen, Shpg. wt. 1 lb. **3.95**

Chart Paper for IR-5204/SR-204/SR-205 Chart Recorders: All 120" long.

Inch-calibrated: Has 0.1" divisions. 0-100 right-to-left.
SU-445-17, Shpg. wt. 2 lbs. **6.95**

Centimeter-calibrated: Offset 4 cm on right, 0-100 right-to-left.
SU-445-18, Shpg. wt. 2 lbs. **6.95**

Disposable Nylon Pens for IR-5207/SR-207/SR-206 Chart Recorders:

Pens for chart recording speeds under 1 inch per minute:
SU-205-3, Long Red Pen, Shpg. wt. 1 lb. **3.95**

SU-205-6, Short Red Pen, Shpg. wt. 1 lb. **3.95**
SU-205-4, Long Blue Pen, Shpg. wt. 1 lb. **3.95**

Pens for chart recording speeds over 1 inch per minute:

SU-205-5, Long Red Pen, Shpg. wt. 1 lb. **3.95**
SU-205-7, Short Blue Pen, Shpg. wt. 1 lb. **3.95**

Laboratory-type Decade Resistance Box

Invaluable as a variable multiplier or shunt, a variable substitution resistor, or as a leg for AC and DC bridges: The IN-3117 helps solve complex resistance problems, where a large range of measurement values is necessary. Covers 1 ohm to 999,999 ohms in 1-ohm steps. 0.5% tolerance, 1 watt resistors. Features rugged case and binding posts for easy test set-ups. 5" H x 7 $\frac{1}{2}$ " W x 6 $\frac{3}{4}$ " D (12.7 x 19.1 x 16.8 cm).

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



Distortion Analyzer for amplifiers and receivers

Outstanding sensitivity and bandwidth: The IM-5258 measures total harmonic distortion (THD) down to 0.3% from 5 Hz to 100 kHz, with $\pm 5\%$ accuracy. Six ranges cover 0.3 to 100% harmonic distortion. The wide frequency range of the IM-5258 allows you to check and service audio amplifiers and receivers which claim the finest specifications.

Residual distortion in the IM-5258 is a very low 0.03% or less: The front panel meter is accurate to within 0.5% of full scale.

Features auto-null control: Simply rough-tune the analyzer and flip the auto mode switch. The analyzer automatically balances the incoming signal, eliminating the need for delicate and time-consuming manual fine tuning.

Also functions as a 1 mV to 300 VAC RMS voltmeter: Features $\pm 5\%$ accuracy in this function as well. Maximum input impedance is one megohm, shunted by 70 pF. Not for use in strong RF fields. For 120/240 VAC, 50/60 Hz power. Attractive, sturdy instrument-blue and white metal case measures 5 $\frac{3}{8}$ " H x 15" W x 11 $\frac{1}{2}$ " D (13.7 x 38.1 x 29.2 cm).

Kit IM-5258, Shpg. wt. 17 lbs. **239.95**



IM-5258 SPECIFICATIONS: Frequency Range: 5 Hz to 100 kHz in five ranges: 5-10 Hz, 10-100 Hz, 100-1000 Hz, 1-10 kHz, 10-100 kHz. **Distortion Measurement Ranges:** 0.3 to 100%, full scale, in six ranges with a 1-3-10 sequence. **Residual Distortion:** 0.03% or less. **Input Impedance:** 1 megohm, shunted by 70 pF maximum. **Required Input Level:** 316 mV RMS for distortion measurements

Low-priced Logic Probe for easy tests

Test TTL/CMOS digital circuits, other ICs: Detects and indicates high and low logic levels, indicates polarity and presence of signal pulses as short as 10 ns duration, and shows intermediate of "bad" logic levels, even at high frequencies. Two indicator lights for clear readings. Has 34" power leads with strain relief and color-coded mini-clips, detachable high-frequency ground clip. Powered by circuit under test or separate regulated DC power supply. Measures 3 $\frac{1}{4}$ " H x 1" W x 9 $\frac{1}{4}$ " L.

Kit IT-7400, Shpg. wt. 1 lb. **39.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center.

The 5280-Series – All the basics for the beginner

No matter if you're a seasoned electronics pro or if you're just starting out, the 5280-Series of test equipment from Heathkit provides you with a dollar-saving way to equip your own test

bench. Each of the high-quality test instruments is priced under \$50.00, so you don't have to spend a lot of money. And, they represent the Heathkit lifetime of quality you've come to expect.

1 Four-function Multimeter

Versatile: The IM-5284 high-performance Solid-State Multimeter allows you to quickly measure volts, ohms and DC current. A large, easy-to-read panel meter makes measurements a snap. Measures AC/DC Voltage to 1000 volts with 3% DC and 5% AC accuracy. Measure DC current to 100 mA, with 4% accuracy. A total of four resistance ranges up to X1 megohm. Includes necessary test probes. Requires one "C" cell, and two 9 VDC cells or IPA-5280-1 Power Supply (below, right). Measures 5 3/4" H x 11" W x 7 3/4" D (14.6 x 27.9 x 19.7 cm).

Kit IM-5284, Shpg. wt. 5 lbs. 49.95

IM-5284 SPECIFICATIONS: DC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 3\%$ of full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 5\%$ of full scale. DC Milliammeter: Ranges: 0-1, 0-10, 0-100, 0-1000 mA full scale. Accuracy: 4% of full scale. DC Input Resistance: 10 megohms AC Input Resistance: 1 megohm.

2 RF Oscillator for alignment of AM-FM radio and TV equipment

A necessary service aid: The IG-5280 RF Oscillator is ideal for use in aligning tuned stages of AM, FM, and television receivers. Provides output in five separate bands; 310 kHz to 110 MHz and up to 220 MHz using calibrated harmonics. A 1 kHz audio output, available at a front panel jack, can be used to isolate circuit defects in receiver audio stages. The IG-5280 is supplied with all required probes and test leads. It requires two 9 VDC cells or the IPA-5280-1 Power Supply (below, right). Measures 5 3/4" H x 11" W x 7 3/4" D (14.6 x 27.9 x 19.7 cm).

Kit IG-5280, Shpg. wt. 5 lbs. 49.95

IG-5280 SPECIFICATIONS: RF Output: Frequency Range: 310 to 110 MHz, in five bands; 100 MHz to 220 MHz on harmonics. Output Voltage: Approx. 100 mV. Internal Modulation: 1 kHz. Audio-Frequency Output: Frequency: 1 kHz. Output Voltage: 2.0 volts RMS, open circuit.

3 Versatile, wide-range Sine and Square Wave Audio Oscillator

Multi-function versatility: You'll wonder how you managed to get along without the IG-5282 Sine/Square Wave Audio Oscillator. It counts as necessary equipment in a wide variety of audio testing situations. Since all components mount on a single circuit board, kit-building time is greatly reduced. Provides frequency output in four ranges — from 10 to 100 kHz, in both sine and square wave modes. During signal tracing, you can use the IG-5282 as an audio signal source. With the necessary additional equipment, you can use the sine wave output for audio stage gain and distortion analysis. The square wave output, along with appropriate associated equipment, can be used to determine frequency response and harmonic distortion figures. Requires two 9 VDC cells or the IPA-5280-1 Power Supply (listed below, right). Measures 5 3/4" H x 11" W x 7 3/4" D (14.6 x 27.9 x 19.7 cm).

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: 0-3 volts rms. Square Wave Output Voltage: 0-3 volts peak. Power Requirements: two nine volt batteries or the optional IPA-5280-1 Power Supply.

4 RCL Bridge for design, testing

Another quality-engineered Heathkit value: The IB-5281 RCL Bridge is the answer to your needs in testing and design. With the IB-5281, you can easily determine unknown values of capacitance, inductance and resistance. You are provided with the versatility of three separate ranges in each function. Indicates capacitance from 10 pF to 10 μ F, inductance from 10 μ H to 10 H and resistance from 10 ohms to 10 megohms. As always, the step-by-step Heathkit manual makes this instrument easy to build. Only one circuit board needs wiring. Provided with a rugged molded cabinet and component clips. Needs two 9 VDC batteries or IPA-5280-1 Power Supply (below, right). Measures 5 3/4" H x 11" W x 7 3/4" D (14.6 x 27.9 x 19.7 cm).

Kit IB-5281, Shpg. wt. 5 lbs. 49.95

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 ohms to 10 megohms, in three ranges. Inductance Ranges: 10 microhenries to 10 henries, in three ranges. Capacitance Ranges: 10 picofarads to 10 microfarads, in three ranges. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1

5 Audio circuit Signal Tracer

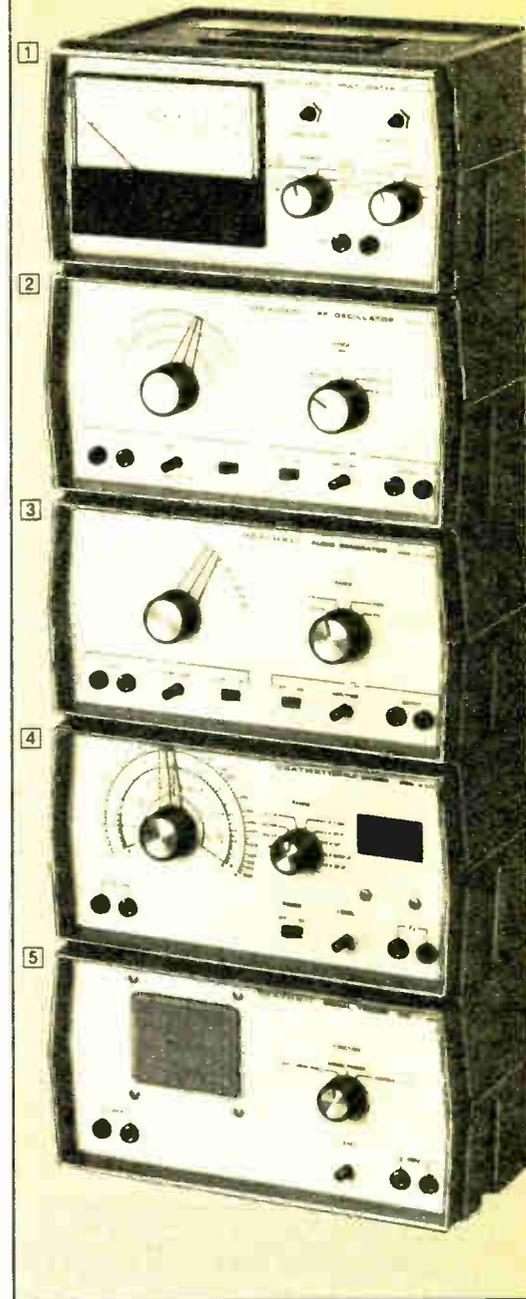
Track down problem circuits: A diode-equipped RF probe pinpoints failing components and stages. The IT-5283 Signal Tracer will be a welcome addition to your test bench arsenal when it's time to troubleshoot defective equipment. By using the straight-through DC position you can use the IT-5283 to track down and identify failing audio components and systems. In the audible mode, the IT-5283 Signal Tracer emits a tone which changes in frequency, dependent upon the test point voltage or resistance. That allows you to quickly and simply isolate problems by tracing signal flow through logic circuits. Requires two 9 Volt DC cells, or the IPA-5280-1 Power Supply (below, right). Measures 5 3/4" H x 11" W x 7 3/4" D (14.6 x 27.9 x 19.7 cm).

Kit IT-5283, Shpg. wt. 5 lbs. 49.95

IT-5283 SPECIFICATIONS: Functions: Speaker substitution (16 ohms impedance, audio or RF signal tracing, audible VOM (volt ohmmeter). Speaker: 3" permanent magnet type, 16 ohms impedance. Power Requirement: Two 9 VDC transistor-type batteries (not included) or IPA-5280-1 Power Supply below. Overall Dimensions: 5 3/4" H x 11" W x 7 3/4" D (14.61 x 27.94 x 19.69 cm) Net Weight: 3 lbs. (1.4 kg).

120/240 VAC Power Supply features added convenience

Power for the 5280-series: The Heathkit name stands for value — and the IPA-5280 Power Supply provides it. Powers all five instruments at the



same time. Can be connected to 120 or 240 VAC without rewiring. Features include half-wave rectification, capacitor filtering and dual-integrated circuits. For 120/240 VAC, 50/60 Hz power. Draws 7 Watts maximum. Measures 6" H x 3 3/4" W x 3" D (15.2 x 9.5 x 7.6 cm).

Kit IPA-5280-1, Shpg. wt. 3 lbs. 34.95

IPA-5280-1 SPECIFICATIONS: Output Voltage: -9 and -5 VDC $\pm 3\%$. Maximum Output Current: 100 millamps. Fuse: 1/2-Amp 3 AG. Slow-blow type



Convenient Hand-held Capacitance Meter with leakage detector and auto-ranging

Equipped with special circuitry to detect leaky capacitors

\$159⁹⁵

- Measures all types of capacitors to 199.9 mF with $\pm 0.2\%$ basic accuracy — automatically selects proper measuring range
- Features a large, easy-to-read liquid crystal display (LCD)
- Built-in polarized "Kelvin" terminals allow for direct measurement
- Remote extension cable for hard-to-reach spots
- Convenient zero offset control equalizes the display level to compensate for stray capacitance within the Meter and assure repeatable accuracy

Compact size allows for use in the shop or the field: Measures all types of capacitors within a range of 0.1 pF to 199.9 mF. Special auto-ranging feature selects the proper range from ten alternatives. A large, 3½ digit LCD displays the correct measurement while one of four LED's lights to show the unit of measurement. Protection from excessive current is provided by clamp diodes and a ¼-amp fuse when the IT-2250 is turned on, and by a 2.2 ohm, 2 watt resistor across the input jacks when the instrument is turned off.

Accurate and versatile: The IT-2250 is equipped with "Kelvin" terminals and a zero-control for accuracy. Tests capacitors with low operating voltage. Detects leaky capacitors. Remote cable provided. Uses 9 VDC cell or 120 VAC with optional PS-2350 below. Standard-value capacitors supplied for calibration.

Kit IT-2250, Shpg. wt. 3 lbs. **159.95**

IMA-2215-1, Leather carrying case for IT-2250, Shpg. wt. 1 lb. **14.95**

PS-2350, 120 VAC battery eliminator, Shpg. wt. 1 lb. **7.95**

IT-2250 SPECIFICATIONS: Ranges: 199.9 pF, 1999 pF, 19.99 nF, 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ F, 19.99 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges $\pm (0.2\%$ of reading + count + 0.5 pF); 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ 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, + (0.75% of reading + 1 count + 0.5 pF); 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ F 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 μ 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 7½" L (5.0 x 8.3 x 19.1 cm). **Net Weight:** 16 ounces.

3½-digit LCD Display with ½-inch tall digits

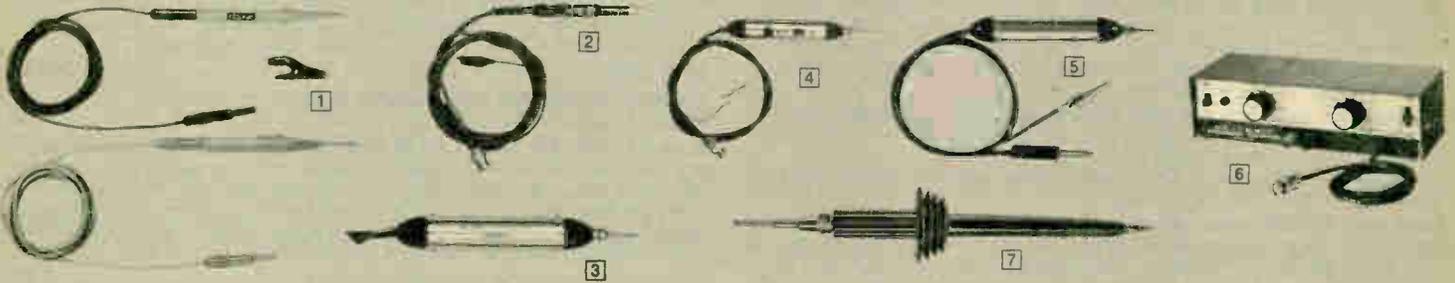
LED's instantly show you which of four ranges is in use

Optional carrying case

Zero-control compensates for stray capacitance, so only the capacitor under test will be measured

"Kelvin" terminals for highly accurate measurements

Finest quality instrument accessories



1 Handy, many-purpose Test Lead Set

2000 VRMS, 20 maximum, 4 mm banana plugs, red sprung hook, red prod and black shielded alligator clip. Set includes two very flexible cables, 1.5 meters long. Use with volt meters, other instruments which have banana jacks.

PKW-200, Shpg. wt. 1 lb. **15.95**

2 Combination X1/X10 Scope Probe

Covers DC to 15 MHz (X1) and DC to 80 MHz (X10) bandwidths. X10 rise time, 4.0 ns. Compensation range of 15 - 50 pF. Cable and probe, 4.5 feet long. Assembled; recommended for all Heath oscilloscopes, frequency counters.

PKW-105, Shpg. wt. 1 lb. **32.95**

3 Demodulator probe for oscilloscopes

Use it to check IF/RF distortion. Max. input: 500 VDC, 30 VAC RMS, Banana plug/BNC wires. Kit 337-C Shpg. wt. 1 lb. **12.95**

4 Low-capacitance Scope Probe

Direct or X10 operation. Recommended for low bandwidth scopes; presents little circuit load. Banana plug/BNC. 10M Ω input impedance.

Kit PK-1, Shpg. wt. 1 lb. **14.95**

5 RF test probe for DC Voltmeters

Convenient lead for use with your DC Voltmeter. PK-3A, Shpg. wt. 1 lb. **12.95**

6 Deluxe Oscilloscope Calibrator

A crystal-controlled square wave generator with a rise time less than 4 ns. Has an output cable with its own built-in termination to prevent ringing and assures a good frequency response. Used to adjust sweep speeds, vertical calibration, delay line terminations, high frequency compensation and attenuator compensation to 35 MHz.

Kit IG-4505, Shpg. wt. 4 lbs. **59.95**

7 30 kV DC Probe, X100, 10M Ω in

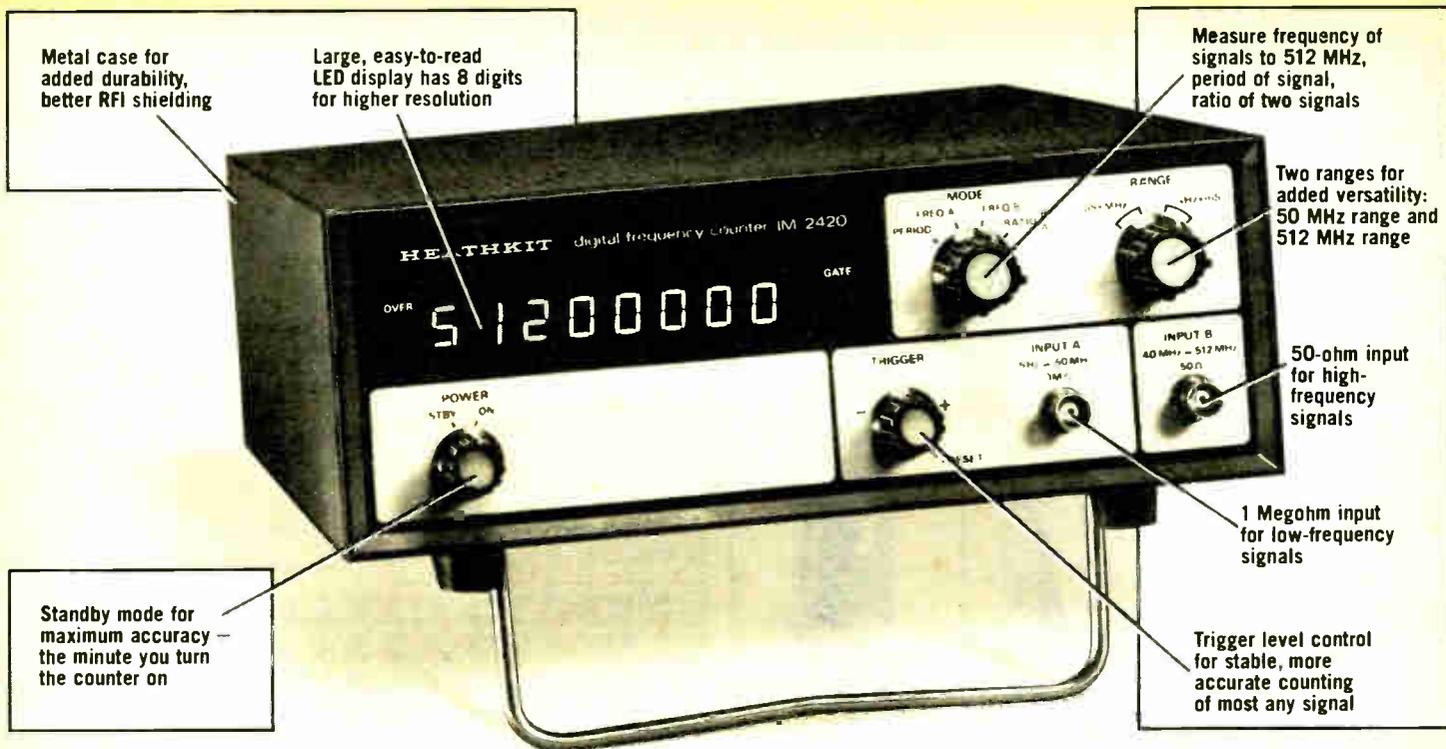
Kit IMA-100-10, w/banana plug, 1 lb. **14.95**

SMA-100-10, Assem. w/phone plug, 1 lb. **19.95**

Kit IMA-100-11, for 11 M Ω meters, 1 lb. **14.95**



Discover the fun of kitbuilding at your Heathkit Electronic Center.



Metal case for added durability, better RFI shielding

Large, easy-to-read LED display has 8 digits for higher resolution

Measure frequency of signals to 512 MHz, period of signal, ratio of two signals

Two ranges for added versatility: 50 MHz range and 512 MHz range

50-ohm input for high-frequency signals

1 Megohm input for low-frequency signals

Trigger level control for stable, more accurate counting of most any signal

Standby mode for maximum accuracy — the minute you turn the counter on

Low-priced Heathkit Portable 512 MHz Frequency Counter gives you digital measuring accuracy!

\$269⁹⁵
Kit

- Extra-wide frequency range to accommodate maintenance of both UHF and VHF radios and transceivers
- Crystal-controlled time base assures you of excellent long-term measuring stability and accuracy

UHF capability up to 512 MHz, low-frequency capacity down to 5 Hz and a budget-pleasing price are all yours when you choose the Heathkit IM-2420 Portable Digital Frequency Counter. Service technicians and do-it-yourselfers will find its extended frequency range ideal for servicing UHF two-way radios now used by many police and fire departments — as well as most other radio communications equipment.

Our engineers have designed more features and added capabilities into this laboratory-quality Heathkit instrument. For example, the IM-2420 can do more than measure the frequencies of input signals — its period function can give cycle time in seconds, while the frequency ratio function provides the ratio between two input frequencies.

Make more accurate measurements: A standby power switch can keep the crystal oven warm, giving you maximum frequency measuring accuracy as soon as the IM-2420 is turned on. Proportionally-controlled crystal oven keeps the internal time base extremely accurate — within 0.1 part per million (PPM) — over a wide ambient temperature range. And the external time base jack allows the use of an external time base signal.

Four gate times and a large, 0.43" (1.09 cm) high, eight-digit LED display provide the resolution you need to measure UHF signals. The pivoting stand places the IM-2420 at a comfortable, convenient viewing angle.

The IM-2420's excellent 4-15 mV typical sensitivity, over the entire 5 Hz-512 MHz range, allows counting of weak signals. Trigger level control assures stable counting when noise is present, and provides more accurate measurement of complicated waveforms. Effective limiting circuits at both inputs (5 Hz-50 MHz and 40 MHz-512 MHz) make sure counting is stable, even when the input signal level varies by as much as 60 dB.

Measure signals with a direct connection — or, for frequency counts without direct connection, order the SMA-2400-1 Telescopic Antenna (right).

Extra protection is built into the IM-2420: Its rugged, compact metal cabinet provides improved shielding from radio-frequency interference (RFI). Full input voltage protection assures worry-free counting.

- Features four gate times and eight-digit resolution to give you more precise readings
- Provides you with two separate inputs and an adjustable trigger level control for more versatility

Kitbuilding is easy: The IM-2420 takes as little as four evenings to build, with a fully detailed Heathkit manual to guide you along the way, step-by-step. ICs are standard and easily available, for faster servicing. For 120/240 VAC, 50/60 Hz. 4 1/4" H x 10" W x 1 1/2" D (10.8 x 25.4 x 31.8 cm).

Kit IM-2420, Shpg. wt. 9 lbs. 269.95

Assembled Portable 512 MHz Frequency Counter. SM-2420, Assembled and tested, Shpg. wt. 9 lbs. 320.00

Swiveling Telescopic Antenna for IM-2400, IM-2410, IM-2420 Frequency Counters: Also use on many two-meter transceivers. Chrome-plated brass antenna provides significant performance improvements over similar antennas. Enhance counter sensitivity by tuning to the proper frequency — by extending or retracting the telescoping sections. Right angle version. Includes BNC connector for easy hookup to frequency counter.

SMA-2400-1, Assembled and tested, Shpg. wt. 1 lb. 9.95

IM/SM-2400 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 range, 5 V RMS. Period Measurement Mode: Input: 5 Hz to 50 MHz only. Range: 5 Hz to 10 MHz. Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical. 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 10⁸ guaranteed. Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical. Time Base: Frequency: 10 MHz. Setability: to within 0.2 part per million (PPM). Temperature Stability: 0.2 PPM from 32° F to 104° F (0° C to 40° C). Crystal Aging Rate: Less than 1 PPM per year. Oven Operating Temperature: 167° F, ±9° F (75° C ±5° C). Warm-up Time From Cold Oven (unplugged) Start: 10 minutes to within 1.0 PPM, 20 minutes to within 0.1 PPM. External Input: TTL or 2.5 V RMS from 50 ohm source (10 MHz). Input Protection: Any voltage with peak-to-peak limits between -3.5 and +10 Volts. Output: Will drive two standard TTL (i.e., 7400) loads. Short circuit protected. General Gate Times: 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. LED Display: Eight digits.



Measure with the low-cost, high-accuracy IM-2410 Digital Frequency Counter

\$129⁹⁵
Kit

- Exceptional accuracy and simplified operation
- Switchable 10 Hz-50 MHz and 20 MHz-225 MHz ranges for high-resolution frequency readouts
- Excellent 10 mV typical sensitivity
- Big, easy-to-read eight-digit LED display with automatic decimal point placement

If you're looking for an inexpensive, yet highly accurate frequency counter for your bench, then check out the easy-to-build Heathkit IM-2410 Digital Frequency Counter. And see for yourself the value it represents.

Accuracy and stability unmatched at its low price: The IM-2410 features two frequency ranges – from 10 Hz to 50 MHz, and from 20 MHz to 225 MHz – for increased accuracy and better resolution. A single input covers the entire frequency range, making the IM-2410 more convenient to use.

Two-position time gate: You can choose either 0.1 second or 1.0 second gate times for even better resolution. And the crystal-controlled time base gives you the good long-term stability and accuracy you would expect to find on much more expensive counters, ± 1 parts per million.

Front panel operation for easy bench use: For fast and efficient frequency measurements, all controls are located on the IM-2410's front panel. One BNC input is provided for fast, direct frequency counts. For non-direct counts, attach the optional SMA-2400-1 Swiveling Telescopic Antenna.

Easy-to-read display: The eight-digit LED display shows all frequencies in MHz for higher resolution (as fine as 1 Hz at 50 MHz, 10 Hz at 225 MHz). A cabinet stand props the IM-2410's display at a comfortable viewing angle.

Interference-free cabinet construction: The IM-2410's housing is made of metal for greater durability and better radio-frequency interference (RFI) shielding. Operates on 120/240 VAC. Measures 3 $\frac{3}{8}$ " H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D.



Kit IM-2410, Shpg. wt. 6 lbs. 129.95

Assembled and tested Digital Frequency Counter.

SM-2410, Assembled. Shpg. wt. 6 lbs. 170.00

IM-2410 SPECIFICATIONS: Display: Eight-digit LED display. Frequency Ranges: 10 Hz to 50 MHz, and 20 MHz to 225 MHz. Sensitivity: 10 Hz-50 MHz range, 25 mV RMS maximum, 10 mV typical from 10 Hz-30 MHz; 50 mV RMS maximum from 30-50 MHz; 20 MHz-225 MHz range, 25 mV RMS maximum, 10 mV typical from 20-150 MHz; 50 mV RMS maximum from 150-225 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 MHz to 225 MHz. Time Base Frequency: 3.58 MHz. Stability: ± 1 ppm. Temperature Stability: ± 10 ppm, from 0 to 40 degrees C. Gate Times: 0.1 or 1.0 second switch-selectable. Frequency Resolution: 10 Hz to 50 MHz range, ± 1 Hz with gate time set at 1.0 second and ± 10 Hz with gate time set at 0.1 second; 20 MHz to 225 MHz range, ± 10 Hz with gate time set at 1.0 second, ± 100 Hz with gate time set at 0.1 second. Power Requirement: 120/240 VAC, 50/60 Hz, 25 Watts maximum. Overall Dimensions: 3 $\frac{3}{8}$ " H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D. (8.6 x 18.4 x 24.1 cm).

Test and align anywhere with the hand-held IM-2400 DFC

\$139⁹⁵
Kit

- Battery-operated for in-field frequency testing
- Batteries mount internally for true portability
- Two switch-selected frequency ranges and time bases

Now you can accurately test and align anywhere: Test mobile radio equipment in cars, trucks, aircraft, boats – anywhere you want, with the IM-2400. Technicians and amateur radio enthusiasts will find it ideal for servicing mobile gear.

Using rechargeable batteries, this compact counter measures just 1 $\frac{1}{8}$ " H x 3 $\frac{3}{8}$ " W x 8 $\frac{3}{8}$ " D.

The IM-2400 features a 10 MHz crystal oscillator that insures stable and accurate frequency monitoring through both the 50 Hz-50 MHz and 40 MHz-512 MHz ranges. With a typical sensitivity of 10 millivolts RMS and a guaranteed sensitivity of 25 millivolts RMS, the IM-2400 lets you measure even very weak signals.

The big seven-digit LED display has automatic decimal point placement to help ensure mistake-free readings on every count you take.

Completely portable: The IM-2400 has rechargeable nickel-cadmium batteries that provide hours of measurements on a single charge – and the batteries can be recharged hundreds of times to save on battery replacement cost. The batteries are located inside the instrument to eliminate awkward external battery packs.

Also for bench use: A pivoting stand (included) supports the IM-2400 at a convenient viewing angle for work at your test bench. Add the optional PS-2404 120 VAC Battery Eliminator/Charger to operate the IM-2400 directly from line current to conserve battery power.

Take testing and alignment convenience with you anywhere, when you buy the Heathkit IM-2400 Hand-Held Frequency Counter. Uses five rechargeable 1.2 VDC nickel-cadmium "AA" cells (included) or 120/240 VAC power with the optional PS-2404 or PS-2405 Battery Eliminator/Chargers below. Measures 1 $\frac{1}{8}$ " H x 3 $\frac{3}{8}$ " W x 8 $\frac{3}{8}$ " D (4.1 x 8.6 x 21.3 cm).

Kit IM-2400, Shpg. Wt. 3 lbs. 139.95

Swiveling Telescopic Antenna for the IM-2400, IM-2420 and IM-2410 Frequency Counters. Can also be used on two-meter amateur radio transceivers. This chrome-plated brass antenna, with its right-angle design and telescoping capability, gives you improved performance and better signal sensitivity. Includes BNC connector.

SMA-2400-1, Assembled, Shpg. wt. 1 lb. ... 9.95

120 VAC Battery Eliminator/Charger for IM-2400.

Permits use while charging; cannot overcharge.

PS-2404, Shpg. wt. 1 lb. 7.95

240 VAC Battery Eliminator/Charger for IM-2400.

Permits use while charging; cannot overcharge.

PS-2405, Shpg. wt. 1 lb. 12.95

IM-2400 SPECIFICATIONS: Input Impedance: 50 Hz to 50 MHz range, 1 megohm shunted by less than 20 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. Stability: ± 1 ppm. Temperature Stability: ± 10 ppm from 0 to 40 degrees C. Gate Time: 0.1 or 1.0 second, switchable. Resolution: 50 Hz to 50 MHz range, ± 10 Hz with time base set at 0.1 second; ± 100 Hz with time base set at 1.0 second; 40 MHz to 512 MHz range, ± 100 Hz with time base set at 0.1 second; ± 1 kHz with time base set at 1.0 second. Power Requirement: Five 1.5 VDC rechargeable nickel-cadmium cells (included), or 120 VAC, 60 Hz line current with optional PS-2404 Battery Eliminator/Charger (above). Dimensions: 1 $\frac{1}{8}$ " H x 3 $\frac{3}{8}$ " W x 8 $\frac{3}{8}$ " D (4.1 x 8.6 x 21.3 cm).



Discover the fun of kitbuilding at your Heathkit Electronic Center.

Two high-performance Digital Multimeters designed for both bench and field use



Deluxe IM-2264 features true RMS readings

\$249⁹⁵

- Analog meter follows null and peak measurements
- Switched alarm permits audible circuit checking
- Flashing LED warns of inaccurate AC meter reading

Pushbutton function and range switching: The IM-2264 measures DC and AC voltages from 0.1 mV up to 1000 VDC and 750 VAC, DC and AC current from 0.1 μ A to 10 A, and resistance from 0.1 ohm to 20 megohms. A diode test function checks forward voltage and reverse leakage resistance to help determine if a semiconductor is good or bad. Also, a battery test button directly checks the internal battery voltage.

True RMS readings: Using a special circuit, the IM-2264 electronically converts AC signals into a true RMS value. With this circuit, all AC voltages and currents are accurately measured including: distorted sine waves, square waves, sawtooths, noise, and even pulse trains.

Innovative and accurate: One MOS/LSI integrated circuit contains all the dual-slope, analog-to-digital conversion circuitry required for an accurate and stable display. Calibrated to laboratory standards, the IM-2264 has a basic DC accuracy of $\pm 0.25\%$ and a basic AC accuracy of $\pm 0.5\%$ up to 20 kHz. Using its built-in references, a basic full-scale accuracy of $\pm 0.5\%$ for DC and $\pm 1.0\%$ up to 10 kHz for AC can be obtained. Resistance accuracy is $\pm 0.25\%$ for lab and $\pm 0.5\%$ for built-in references.

Deluxe features: A flashing crest warn LED alerts the user that an AC volts or AC amps reading is in error because of an excessively high crest factor which could lead to possible measurement error for non-sine wave inputs. A switch-enabled alarm function allows quick testing of voltage, current, and continuity, without having to view the LCD display. The alarm sounds for voltage or current displays above 200 counts on any range, and for resistance measurements less than 200 counts on any range. An auto-polarity analog meter deflects from 0 to full scale, to supplement the digital display – making nulls, peaks, and trends easier to follow.

Input protected: All measurement circuits, except the 10 ampere range, are protected by diode, circuit breaker, and fuse circuits.

Battery or AC operated: The IM-2264 operates on six 1.5 VDC carbon-zinc, alkaline, or nickel-cadmium batteries (not included). It can also use the optional Heathkit PS-2404 120 VAC Battery Eliminator (see page 57).

Kit IM-2264, Shpg. wt. 7 lbs. 249.95

IM-2264 SPECIFICATIONS: Voltage: Ranges: 200mV, 2V, 20V, 200V, and 1000VDC; 200mV, 2V, 20V, 200V, and 750 VAC. Input Impedance: 10 megohms shunted by approximately 100 pF on all ranges. Frequency Response: 40Hz to 20kHz ($\pm 0.5\%$ + 2 counts using lab standards). Current: DC and AC Ranges: 200 μ A, 2mA, 20mA, 200mA, 2000mA, 10A. Resistance: Ranges: 200, 2k, 20k, 200k, 2000k, and 20M ohms. Meter: Continuous operation. Dimensions: 3" H x 8 1/2" W x 11" D.

Economical IM-2260 features basic functions

\$119⁹⁵

- Four voltage, five current and resistance ranges
- Bright 3 1/2 digit display uses easy-to-read LEDs
- Special diode test function checks semiconductors

Measurement features: The IM-2260 DMM measures DC voltages in four ranges from 1 mV to 1000 V, AC voltages in four ranges from 1 mV to 750 V, DC and AC current in five ranges from 1 mA to 10 A, and resistances in five ranges from 1 ohm to 20 megohms. The 2 kilohm to 2000 kilohm resistance ranges use a low 0.2 V test voltage that allows accurate in-circuit resistance measurements. A diode test checks forward voltage and reverse leakage resistance to help determine whether a semiconductor is good or bad. Built-in references allow calibration to a basic full-scale DC accuracy of $\pm 0.5\%$ and a basic AC accuracy of $\pm 1.0\%$.

State-of-the-art circuitry: An advanced and reliable MOS/LSI integrated circuit contains all of the dual-slope, analog-to-digital circuitry that provides extremely stable and accurate readings. Pushbutton switching automatically places the decimal point at the correct display location.

Input protection: All DC and AC voltage ranges are protected up to ± 1000 volts (peak). The DC and AC current ranges, except for the 10 amp range, are protected by diode and fuse circuits. Also, the resistance ranges are electrically protected up to ± 350 volts (peak). In addition, fully isolated circuitry allows floating measurements across individual resistors, capacitors, etc. up to 500 volts (peak) from earth ground.

Battery and AC operation: The IM-2260 uses six 1.5 VDC carbon-zinc, alkaline, or nickel-cadmium "C" size batteries when DC operation is desired. A battery test function monitors the internal batteries for easy voltage checking. For AC operation, the optional Heathkit PS-2404 120 VAC Battery Eliminator or the PS-2405 240 VAC Battery Eliminator (see page 57) can be used to power the IM-2260. The meter can be continuously operated from the Eliminator without depleting the batteries. A built-in battery charging circuit charges nickel-cadmium batteries in about 24 hours when the meter is off and still connected to an AC outlet.

Kit IM-2260, Shpg. wt. 5 lbs. 119.95

SM-2260, Assembled and calibrated, Shpg. wt. 4 lbs. 189.95

IM/SM-2260 SPECIFICATIONS: Voltage: Ranges: 2, 20, 200, and 1000VDC; 2, 20, 200, and 750 VAC. Accuracy: DC, $\pm 0.5\%$, ± 1 count; AC (50 and 60 Hz), $\pm 1.0\%$, ± 1 count (referred to 60 Hz reading). Frequency Response: 40 Hz to 1 kHz, $\pm 0.5\%$. Input Impedance: 10 megohms (for AC, shunted by approximately 100 pF). Current Ranges: 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Accuracy: DC, $\pm 1.5\%$, ± 1 count (except $\pm 3.5\%$ on 10 A range); AC, $\pm 2.0\%$, ± 1 count (except $\pm 4.0\%$ on 10 A range), 40 Hz to 1 kHz. Resistance: Ranges: 2k, 20k, 200k, 2000k, 20 megohms. Accuracy: $\pm 0.25\%$, ± 1 count, except $\pm 0.5\%$ on 20 megohm range. Dimensions: 3" H x 8 1/2" W x 11" D



3½ digit LCD shows readings, overrange, low battery

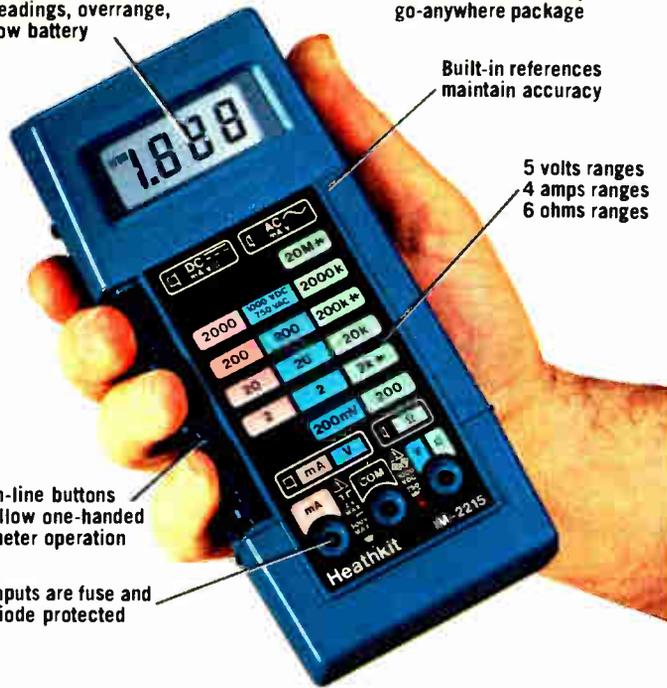
Bench meter accuracy in a go-anywhere package

Built-in references maintain accuracy

5 volts ranges
4 amps ranges
6 ohms ranges

In-line buttons allow one-handed meter operation

Inputs are fuse and diode protected



Handheld Digital Multimeter ideal for field work

\$99⁹⁵

- Automatically indicates a negative measurement
- Shows an overrange by blanking digits
- Warns of low batteries with LCD display

High resolution: Able to make measurements to 100 μ V, 1 μ A, and 1 ohm, the IM-2215 takes the high resolution of a bench instrument into the field. Providing the accuracy and stability required for this capability is a MOS/LSI integrated circuit. It contains all the active analog, digital, timing, and display circuits. The IM-2215's 3½ digit liquid crystal display shows DC voltages up to 1000 V, AC voltages up to 750 V, DC and AC current up to 2000 mA, and resistance up to 20 megohms. An extremely stable internal reference voltage is included for calibration.

Input protection: All functions are protected by fuse and diode against overloads and transients. All DC and AC voltage ranges are protected up to 1000 VDC and 750 VAC. DC and AC current ranges are protected up to a maximum of 2000 mA in circuits with open circuit voltage less than 250 volts. Resistance ranges are protected to 300 volts DC or AC.

Easy one-handed operation: Side pushbuttons allow quick range switching while the meter is held in one hand and test leads are held in the other.

DC or AC operation: A 9 VDC alkaline transistor battery powers the IM-2215 for approximately 200 hours. Carbon-zinc batteries supply from 100 to 150 hours of operating power. The meter can also be operated from an AC outlet by using a Heathkit PS-2350 120 VAC Battery Eliminator.

Kit IM-2215, Shpg. wt. 2 lbs. **99.95**

SM-2215, Assembled and tested, Shpg. wt. 2 lbs. **129.95**

IMA-2215-1, Rugged Leather Carrying Case with belt loop, 1 lb. **14.95**

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

IM/SM-2215 SPECIFICATIONS: Voltage: Ranges: DC and AC, 200 mV, 2 V, 20 V, 200 V, 1000 VDC and 750 VAC (rms). Accuracy: Lab Standards: DC, $\pm 0.25\%$ of reading + 1 count (SM-2215, $\pm 0.1\%$); AC, $\pm 0.5\%$ of reading + 3 counts. Input Impedance: 10 megohms (shunted on AC by about 100 pF). Current Ranges: DC and AC, 2 mA, 20 mA, 200 mA, 2000 mA. Accuracy: DC, $\pm 0.75\%$ of reading + 1 count (SM-2215, $\pm 0.35\%$); AC, 2 mA range $\pm 1.5\%$ of reading + 3 counts, 40-200 Hz; other AC ranges, $\pm 1.5\%$ of reading + 3 counts, 40 Hz to 1 kHz. Resistance Ranges: 200, 2k, 20k, 200k, 2M, 20M, $\pm 0.25\%$ of reading + 1 count (SM-2215, 2k-2M: $\pm 0.15\%$). 20M range, $\pm 2\%$ of reading + 1 count. Frequency Response for AC Measurements (25 deg. C, ± 10 deg. C): On 200 mV, 20 V and 200 V ranges, 40 Hz-1 kHz ($\pm 1\%$ of reading - 3 counts); on 2 V and 750 V ranges, 40 Hz-400 Hz ($\pm 1.5\%$ of reading - 3 counts). Dimensions: 2" H x 3½" W x 7½" L.

NEW

Precision Oscilloscope Calibrator generates laboratory-accurate square waves



\$149⁹⁵

- Rise time less than 1 nanosecond
- 24 speeds from 0.5 seconds to 10 nanoseconds
- 1 kHz square wave in 16 voltages
- 1 kHz sine wave at 1 volt peak-to-peak

Oscilloscope calibrator: The IG-4244 provides you with accurate time and amplitude signals for making those critical scope adjustments and calibrations. Fast-rise square waves are supplied for adjusting sweep speeds, delay line terminations, and high frequency compensation. Precise voltage signals are used for vertical calibration and attenuator compensation.

Bench standard: In addition, you can use the IG-4244 to calibrate other test equipment or act as a signal source when you build and test experimental projects. Front-panel BNC connectors ensure solid cable connections for all applications. Two BNC to BNC cables are included with kit. One BNC output cable is terminated in 50 ohms which assures good frequency response.

Crystal-controlled: Two crystal oscillators supply twenty-four square-wave signals with very accurate times from 0.5 seconds (2 Hz) to 10 nanoseconds (100 MHz) in a 1-2-5 sequence. The risetime of these signals is less than 1 nanosecond (with less than 2% or 10 mV aberrations, whichever is greater) which is well suited for making high frequency compensation adjustments on oscilloscope vertical amplifiers with bandwidths greater than 100 MHz. Being crystal-controlled, the time signals are accurate to 0.015%. The Time connector is terminated in a 50 ohm load which prevents ringing and overshoot and minimizes cable reflections.

Accurate square-wave voltages: Electrically separated from the time circuits, the voltage output supplies sixteen voltages at about a 1 kHz square wave. These voltages are in a 1-2-5 sequence from 1 millivolt to 100 volts peak. This low square wave signal is best for oscilloscope vertical input attenuator and probe compensation adjustments. Also conveniently available on the front panel is a sine wave output of approximately 1 kHz at about 1 volt peak-to-peak used to adjust trigger circuits.

An excellent source of alignment signals for oscilloscopes above a 100 MHz bandwidth, the IG-4244 can be assembled in about 8 hours. All output connectors, switches and controls are located on the front panel for efficient calibrator use. It uses either 120 VAC or 240 VAC (50/60 Hz) and measures 3" H x 7¼" W x 9½" D (7.6 x 18.4 x 24.1 cm).

Kit IG-4244, Shpg. wt. 6 lbs. **149.95**

SG-4244, Assembled and tested, Shpg. wt. 6 lbs. **249.95**

IG/SG-4244 SPECIFICATIONS: Time: Range: 0.5 s to 10 ns. Accuracy: 0.015%. Amplitude: 0.5 s to 20 ns: 100 mV to 1 V peak. 10 ns: 100 mV to 0.5 V peak. Rise Time: < 1 ns. Leading Edge Aberrations: $< 2\%$ of peak-to-peak amplitude or 10 mV, whichever is greater. Output: 50 ohms, nominal. Voltage: Range: 1 mV to 100 V peak in a 1-2-5 sequence. Accuracy: $\pm 1\%$. Rise Time: $< 5 \mu$ s. Frequency: Approx. 1 kHz. Sine Wave: Frequency: Approx. 1 kHz. Amplitude: Approx. 1 V p-p. Power Requirement: 120/240 VAC, 50/60 Hz, 25 watts maximum. Operating Temperature: 10 to 40 degrees C.



Discover the fun of kitbuilding at your Heathkit Electronic Center.

Here's the finest Heathkit Oscilloscope — featuring a wide frequency range, dual-trace capability, versatility-adding features and a low price

- Dual-trace capability lets you monitor two input signals simultaneously
- Also has delayed-sweep capability
- Capable of triggering to two times the specified vertical bandwidth
- Vertical delay lines let you observe leading edges of input signals
- Rise time of less than 10 ns handles complex, fast-rising input signals
- Sweep speeds from 50 ns/cm to 0.2 seconds/cm, plus up to 5X expansion, for an effective sweep speed of 10 ns/cm.
- Smooth rolloff lets you observe input signals above 50 MHz
- Algebraic add inverts either channel to observe differential signals
- Unique TV coupling feature triggers alternate fields for VITS display
- 8 x 10 cm mesh CRT, with internal graticule, helps assure parallax-free measurements
- 10 kV post acceleration voltage for fast writing and bright, easy-to-read display
- Easy to assemble, using the step-by-step Heathkit assembly and operation manual



The deluxe Heathkit IO-4235 is one of the most versatile oscilloscopes available — compare and see! **\$999⁹⁵**

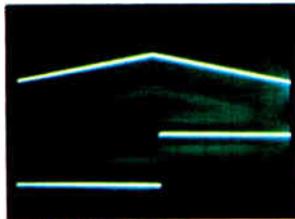
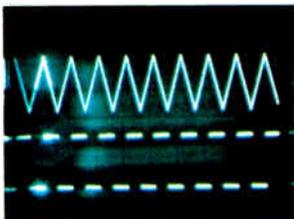
The IO-4235, with its DC-35 MHz range, is the most advanced oscilloscope our engineers have ever developed! Compare this top-of-the-line Heathkit oscilloscope with others in its price range. You'll find that the IO-4235 is unmatched in performance, features and quality. Compare the sophistication and versatility of the IO-4235 with other scopes costing hundreds more.

This laboratory-quality oscilloscope is a perfect addition to anyone's service bench, at an affordable price. The IO-4235 fulfills the requirement of the service technician, electronics designer and serious hobbyist.

The IO-4235, which has a wide DC to 35 MHz bandwidth, features a delayed-sweep circuit which uses a separate time base to display a selected portion of the normal waveform for closer, more accurate examination. The start and length of the delayed sweep are user-controlled, so any given portion of the normal waveform can be displayed at a much higher rate.

An 8 x 10 cm mesh CRT has 10 kV post acceleration voltage — 2½ times greater than any scope we've ever offered — for faster writing speeds and brighter displays. An internal graticule offers parallax-free readings.

The IO-4235 also features fully regulated power supplies for reliable and stable readings, the capability to operate accurately on low line voltages, a 1-Volt square-wave signal output available at the front panel for easier probe compensation, a variable hold-off control and a special Z-axis function for additional versatility.



The delayed sweep takes the user-selected portion of the desired waveform (intensified portion in left photo) and magnifies it the desired number of times, to allow for closer examination (as seen in photo at right).

An attractively-styled, functional cabinet houses the IO-4235. It features a convenient, easy-to-grip carrying handle. For 120/240 VAC, 50/60 Hz power. Draws just 85 Watts (at 120 VAC). This scope measures 7¾" H x 13¾" W x 24" D, with handle folded. Calibrating the IO-4235 requires a precise square wave source such as the IG-4505 Deluxe Oscilloscope Calibrator on pg. 55 or the new IG-4244 Precision Calibrator on pg. 59, and a DC voltmeter.

Top-of-the-line Heathkit IO-4235 35 MHz Oscilloscope.
Kit IO-4235, Shpg. wt. 52 lbs. 999.95
Factory assembled and tested version of IO-4235.
SO-4235, Assembled and tested, Shpg. wt. 38 lbs. 1370.00

IO/SO-4235 SPECIFICATIONS: VERTICAL: Sensitivity: 2 mV/cm to 10 V/cm. Positions: 12 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3% (20 to 30 degrees C); Within 5% (10 to 40 degrees C), referred to 1 V/cm. Vertical Response: DC Coupling: DC to 35 MHz (-3 dB). AC Coupling: 1 Hz to 35 MHz. Rise Time: 10 ns. Overshoot: Less than 3%. Delay Line: Allows display of at least 20 ns of pre-triggered waveform. Vertical Input Impedance: 1 megohm, shunted by 30 pF (Capacitance depends on probe used for calibration). Maximum Input: 400 Volts peak, combined AC and DC. Connector: BNC. Vertical Modes: Y1, Y2, Y1 and Y2 chopped. Y1 and Y2 alternate, algebraically add (-Y1 plus -Y2). HORIZONTAL: Time Bases: Ranges: 0.2 s/cm to 50 ns/cm. Positions: 21 steps in 1-2-5 sequence. Variable: Continuous between ranges to approximately 600 ms/cm. Accuracy: Within 3% (20 to 30 degrees C), 5% (10 to 40 degrees C), referenced to 1 ms/cm. Magnifier: X5 (Accurate to within 5%, 20 to 30 degrees C, Within 7%, 10 to 40 degrees C). External Horizontal: Sensitivity: Approximately 0.1 V/cm. Impedance: 1 megohm. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to greater than 2 MHz (-3 dB). Connector: BNC. X-Y: Y Channel: Same as vertical. X Channel: Same as vertical, except response is limited to 2 MHz and has no delay line. Phase Shift: Less than 8 degrees at 100 kHz. TRIGGER: Source: Y1, Y2, External or Line. Coupling: AC, DC, AC Fast, TV. Modes: Automatic baseline, normal, single sweep. Hold Off: Variable, including a "B ends A" position. Sensitivity/Bandwidth: 0.5 cm Mode: DC, DC to greater than 50 MHz, AC, 15 Hz to greater than 50 MHz, AC Fast, 40 kHz to greater than 50 MHz; TV, 40 Hz to 1.5 kHz. 1 and 1.5 cm Modes: DC, DC to greater than 70 MHz; AC, Less than 1 Hz to greater than 70 MHz, AC Fast, 30 kHz to greater than 70 MHz; TV, 20 Hz to 3 kHz (NOTE: In TV Coupling, the Oscilloscope triggers on alternate frames for steady display.) External Trigger Sensitivity: 100 mV at 50 MHz. Input Impedance: 1 megohm, shunted by 30 pF. GENERAL: CRT: Type: 8 x 10 cm mesh with internal graticule. Phosphor: P31. CRT Acceleration Potential: 10 kV, regulated. Z Axis: Full On to Full Off: 0 to 5 Volts. Positive Input Impedance: 5 kilohms. Operating Temperature Range: 50 to 104 degrees F (10 to 40 degrees C). Power Supplies: Fully regulated. Power Requirement: 120 240 VAC, 50 60 Hz, 85 Watts (at 120 VAC). Overall Dimensions: 7.75"H x 13.75"W x 24"D (19.69 x 34.93 x 50.17 cm), with handle folded. Net Weight: 30 lbs. (13.6 kg).



This dual-trace, portable 20 MHz Oscilloscope features many extra-value capabilities!

The IO-3220 fits under an airplane seat, yet has many bench scope features



The first portable Heathkit oscilloscope features dual-trace capability, wide bandwidth, algebraic add, up to 5X sweep magnification, invert display function and a bright CRT

- Very sensitive vertical input accepts signals as low as 2 mV
- Measures a signal's leading edge in as fast as 18 ns
- Z-axis input to apply timing marks on a displayed waveform
- Lightweight – weighs only 16 lbs. (less optional battery pack)
- Includes cover to protect front panel controls from dust, easy-grip carrying handle for maximum portability

The first portable Heathkit oscilloscope: Smaller than regular bench oscilloscopes, the Heathkit IO-3220 20 MHz Portable Oscilloscope is designed for field service troubleshooters who need a light, portable, battery-operated scope for use in remote areas where AC power is not available. It measures and displays time as a product of frequency, displays complex waveforms, measures DC and AC voltages, and performs many other measurement functions.

Dual-trace versatility: The IO-3220 Oscilloscope allows you to compare two different signals, simultaneously – to make input/output comparisons, check phase relationships and accomplish other complex measurements. Its invert display function enables you to compare two different waveforms that are nearly 180 degrees out of phase.

Full X-Y operation for making phase and frequency measurements: The signal from the Y2 input can be applied to the horizontal amplifier.

Algebraic add displays the sums of both traces as a single trace: This function of the IO-3220 allows you to make differential measurements.

Wide bandwidth: The IO-3220 can measure signals from DC to 20 MHz.

Outstanding sensitivity: Vertical signals as low as 2 millivolts can be accurately measured by the very sensitive IO-3220. Accuracy is as high as 3 percent (from 20-30 deg. C), when performing both vertical and horizontal measurements. Push-to-invert switch reverses Y2 input.

Easy-to-read CRT: The 3-inch (diagonal), 8 x 10-division CRT screen has an extra-bright trace that can even be read in high ambient light conditions.

Easy scope compensation: A 1 Volt peak-to-peak square wave calibration signal is provided at the IO-3220's front panel.

Easy kit assembly: The IO-3220 comes with a comprehensive, easy-to-follow Heathkit manual that guides you through the kitbuilding process.

Use anywhere – runs on external or internal power: For 120/240 VAC 50/60 Hz power. Also runs on optional IOA-3220-2 Rechargeable Battery Pack (not included), or on 11-24 VDC (user-selectable) at approximately 34 VA. Includes cover to protect front panel from dust contamination. The compact, rugged cabinet measures 5½" H x 13" W x 18" D. Calibration of the IO-3220 requires a precise source of square waves, such as the IG-4244 (page 59). To add to the IO-3220's versatility, use the IOA-3220-1 Probe Set with Pouch below.

Kit IO-3220, Shpg. wt. 24 lbs. 699.95

IO-3220, Assembled, tested and calibrated, Shpg. wt. 22 lbs. 995.00

Probe Set with Pouch for IO/SO-3220 Portable Oscilloscope: Includes two PKW-105 X1/X10 Oscilloscope Probes with two-position multiplier for X1 and X10 probe tip and 4.5-foot cable.

IOA-3220-1, Shpg. wt. 1 lb. 59.95

Rechargeable Nickel-Cadmium Battery Pack for IO/SO-3220 Portable Oscilloscope: Provides minimum of two hours continuous operation on full charge. Recharged by IO/SO-3220 when oscilloscope is in charging mode.

IOA-3220-2, Shpg. wt. 7 lbs. 44.95

IO/SO-3220 SPECIFICATIONS: Vertical: Frequency: DC, DC TO 20 MHz (± 3 dB), AC, 3Hz 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 to 10 V/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 (±), External (±), Line (±). 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 to Full Off: 0 to 5 Volts Maximum Input: 50 Volts peak



Carrying handle makes the lightweight IO-3220 highly portable



At Heath, we still believe that the customer comes first.

Heathkit provides power for your workbench with three different supplies



1 Heavy-Duty Power Supply/Battery Eliminator

\$169⁹⁵

- Regulated variable output from 9 to 15 volts
- Current output 12A continuous or 20A intermittent
- Front panel voltage and current monitoring meters

For any high-current usage between 9 and 15 volts DC, as for Ham and CB radio servicing, the IP-2715 reliably supplies all that's required. When a lot of current is needed, the Power Supply/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-2715 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 while a similar current meter indicates the current drawn by the connected load. Also on the front panel is a switch to temporarily remove the output voltage from the load. Housing is painted in instrument blue.

Kit IP-2715, Shpg. wt. 31 lbs. 169.95

IP-2715 SPECIFICATIONS: Output Voltage: Variable from 9-15 VDC. Output Current: 12 A continuous, 20 A 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, 3 AG slow-blow primary; 20A, 3 AG output. Power Requirement: 120/240 VAC, 50/60 Hz, 840 watts. Dimensions: 5¼" H x 11" W x 11" D.

2 Tri-Power Supply functions as three supplies

\$109⁹⁵

- Fixed 5 VDC output at 1.5 amps plus two separate adjustable 20 VDC outputs at 0.5 A
- All outputs short-circuit proof with current limiting
- Independent outputs can be connected together

Ideal for design or experimentation: The 5 VDC output is rated at 1.5 amps which is enough to power most digital devices. The two variable 20 VDC outputs provide 0.5 amps each and feature a special "tracking" mode. In this mode, one 20 volt supply can be set at a certain voltage and as the second 20 volt supply is adjusted, the voltage difference between the two will remain the same. This feature is ideal for providing + and - voltages for operational amplifier circuits. All three outputs can be operated independently from each other with either floating or referenced grounds. The three outputs can also be connected in series to provide up to 45 VDC or connected in parallel to supply higher current through a load. Each supply is overload protected with their output currents fixed slightly above rated current to provide short-circuit protection. A front panel meter allows you to monitor any of the voltage or current outputs. All outputs and controls are readily accessible on the front panel, and clearly marked for easy operation. Metal housing is painted in instrument blue.

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 1.5 A; 0-20 VDC at 0.5 A. 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; <0.15% variation on 5V supply. Power Requirement: 120/240 VAC, 50/60 Hz, 100 watts full load. Dimensions: 4½" H x 10¾" W x 9" D.

3 Regulated High Voltage Power Supply

\$189⁹⁵

- Separate 0 to 400 VDC at 100 mA high voltage output and 0 to -100 at 1 mA bias voltage output
- Separate 6.3 VAC and 12.6 VAC filament outputs

High voltage and bias voltage applications: The IP-2717A is a compact, convenient source of variable regulated high voltage, variable bias voltage, and filament voltage for workshops and experimenters. The high voltage (B+) output provides 0 to 400 volts of regulated DC at a continuous 100 mA or an intermittent 125 mA. The B+ has less than 10 mV (RMS) ripple and varies less than 1% from a no load to full load condition. The bias (C-) output provides negative voltages from 0 to -100 volts DC up to 1 mA. All high voltage and bias voltage output binding posts are insulated from the chassis allowing high B+ and C- voltages to be used as either negative or positive voltage sources. Also available are two filament voltages, 6.3 VAC and 12.6 VAC at 2 amps, which may be used at the same time as long as the total combined power doesn't exceed 25 volt-amperes. A separate transformer is used for filament voltages allowing tube filaments to be left on while the high voltage circuit is shut off. A front panel meter monitors either high voltage or bias voltage as determined by the setting of the meter switch. High voltage DC current is also monitored by a 0 to 150 mA meter. A special taper control allows fine adjusting of low values of bias voltages. Kit and assembled versions measure 13¾" W x 11¼" D x 5½" H.

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: 0-400 VDC. Bias Voltage: 0-100 VDC. Filament Voltage: 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 Requirement: 120/240 VAC, 50/60 Hz.

Regulated DC Power Supply for low-voltage

\$44⁹⁵

- Floating ground permits positive or negative outputs
- Output voltages can be AC- or DC-voltage controlled



Regulated low DC voltage source: Furnishing between 1 and 15 volts up to 500 milliamps, the IP-2728 is ideal as a power source for transistor radios, portable tape recorders, etc. It has a continuously variable 1-15 VDC output with less than 50 mV line and load regulation. The IP-2728 has fully adjustable current limiting from 10 mA to over 500 mA. A three-terminal "floating" output enables the Supply to furnish either positive or negative voltages. Programming terminals on the rear of the cabinet allow the use of AC or DC voltages from another source to control the output voltage of the IP-2728. Binding-post terminals allow easy and fast banana-plug and wire connections. Measures 4¾" H x 5½" W x 5¾" D.

Kit IP-2728, Shpg. wt. 5 lbs. 44.95



The right choice now, and in the future — the 16/8-bit H/Z-100, in kit form or assembled

As low as
\$2349⁰⁰ Kit
 for All-In-One
 model

Our most powerful desktop computer is a 16-bit/8-bit model with everything you need to compute today — and tomorrow, too!

The H/Z-100 includes two sophisticated microprocessors, super-high 768 KB memory capacity, industry standard S-100 expansion bus, a 5.25-inch floppy disk drive with expandability, easy-touch keyboard and low-maintenance design — all in a durable earthtone-color cabinet! Look at everything the H/Z-100 Series offers:

- Both serial and parallel I/O ports for telecommunications extendability
- Features excellent color and monochrome video capabilities
- Includes 320 KB 5.25" floppy disk drive; you can add a second 5.25" drive, an internal 11-megabyte Winchester drive or up to 2.5 megabytes of external 8" floppy disk storage
- High-efficiency power supply saves energy, runs cooler

Offers outstanding performance for everyone: Those with little or no computer experience will appreciate the H/Z-100's ease of operation and the time-saving, money-saving advantages it provides. Those with programming experience and the need to use more advanced languages will enjoy this computer's power and versatility.

Dual microprocessors to run more advanced software: To run today's higher-speed; higher-performance 16-bit software programs, you need a H/Z-100 Series Computer. Its advanced 8088 microprocessor makes a significant difference by processing information in great detail with astonishing speed.

Most existing programs won't become obsolete, either: The H/Z-100 Computer also handles 8-bit software programs with an 8085 microprocessor — including many current Heath/Zenith software programs.

Many software programs now available from Heath/Zenith: You can obtain both 16-bit and 8-bit software programs to run on your H/Z-100 Series Computer. The 16-bit programs, including the Z-DOS Operating System, Z-BASIC Color Language and Microsoft Multiplan Electronic Spreadsheet, is shown on page 78. Software for the H/Z-100's 8-bit side is described on pages 74-78.

Has 128K bytes of Random Access Memory to handle larger software programs: With the H/Z-100 Series Computers, you get real power to answer those bigger, more comprehensive questions. Its standard 128K RAM complement is expandable to over three-fourths of a megabyte (768K bytes) — compared to a 64K RAM standard for many desktop computers.

Supports video graphics for beautiful presentations: The H/Z-100 gives you everything needed to support the high-impact graphics capability that many business presentations demand. On the H/Z-100's 640 x 225 pixel video screen you can create extensive charts, graphs and symbols for reports and other documents.

Designed to grow as your computing needs grow: There are four card slots available internally in the H/Z-100, allowing the system to support memory expansion and additional peripheral devices as your needs change. This allows your investment to grow, decreases the chance of obsolescence and increases future upgradability of the system.

Three input/output ports for total communications flexibility: The H/Z-100 lets you access a world of information. Two RS-232C Serial I/O ports and one parallel port provide almost limitless communications capabilities. You can plug in dot matrix and letter-quality printers; using a modem and a telephone, you can communicate with other computers, work processors, data banks, printers and other data communications devices.

High-capacity disk drives: A 5.25-inch floppy disk drive, with 320K bytes of data storage capacity, eliminates the need for an external disk drive. You get faster access speed and real portability. For additional capacity, add a second 5.25" drive; many assembled models come with two drives standard.

Up to 2.5 megabytes of 8-inch floppy disk storage now available: The Z-207 Floppy Disk System, available with one or two 1.25 megabyte drives, uses soft-sectored disks recorded in the standard IBM 3740 format.

1
 HSG-120-21
 shown with
 optional
 second disk
 drive



Fully-configured computer with more memory and built-in 11 megabyte Winchester disk drive now available: All-In-One and Low-Profile models (page 67) include 192K bytes of RAM on their main memory board, and a built-in Winchester disk drive. Both include a back-up 5.25-inch disk drive. Add a Winchester Upgrade Kit (also on page 67) to your present H/Z-100 Computer or purchase a completely assembled system.

High-efficiency power supply saves energy and provides quieter operation: Lower power consumption keeps the H/Z-100 reliably cool, and allows you to add more accessories to the computer.

New kit versions are easy to build! Step-by-step Heathkit manuals show you the way. And many components are pre-assembled for faster kitbuilding.

1 **All-In-One H/Z-100 Series Computer:** Features dual microprocessors to run both new and most existing Heathkit/ZDS software, five-slot S-100 expansion chassis (disk controller in one slot), disk drive, high-resolution 12" diagonal monochrome video display, monochrome graphics and keyboard — all in a single housing! Add Z-219-1 Color Video RAM (p. 66), Color Monitor (p. 72) for color graphics. 120/240 VAC. 13½" H x 19½" W x 19½" D.

Heathkit NEW! Kit HSA-120-31, non-glare amber CRT, 133 lbs. . . . 2349.00

Heathkit NEW! Kit HSG-120-31, non-glare green CRT, 133 lbs. . . . 2349.00

Heathkit NEW! Kit HSW-120-31, non-glare white CRT, 133 lbs. . . . 2349.00

Z-120-22, Assembled and tested Computer with non-glare green CRT and two 320 KB 5.25" disk drives, 68 lbs. Mtr. Frt. 3599.00

Z-120-32, Assembled and tested Computer with non-glare green CRT, 192 KB RAM, one 320 KB 5.25" disk drive and an internal 11 MB Winchester disk drive, 70 lbs., Mtr. Frt. 5599.00

Z-207-3, Second 320 KB 5.25" Disk Drive, 5 lbs. 395.00

SAVE \$95! When purchased with computer ONLY 300.00

HDC-120, Dust Cover for All-In-One H/Z-100, 1 lb. 16.00

H/Z-100 SERIES SPECIFICATIONS: **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 320 KB 5.25" floppy disk drives 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. 67) is also available. **EXPANSION:** Five IEEE-696 (S-100) standard card slots available for expansion. Disk controller occupies one S-100 slot. **DISPLAY:** Display Format: 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 video. **Cursor Addressing:** Relative and direct. **Tab:** Eight columns, software-addressable. **Video:** Normal or reverse video, by character. **Video Output:** Z-110, RGB; Z-120, monochrome std. **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.



Kits sold under the Heathkit name meet FCC residential use requirements. Zenith Data Systems makes assembled computer products.



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

Select what you need in an H/Z-100 Desktop Computer, then add more capability as your needs grow

H/Z-100 Desktop Computer Series features power and versatility with the ability to expand. The H/Z-100 also offers a choice of either an All-In-One or Low-Profile model.

H-100 with Winchester drive and ZVM-122

Low-Profile model of the H/Z-100 Computer features:

As low as
\$2199⁰⁰
for Low-Profile
model

- Optional monochrome or color video display
- Dual microprocessors run 16- and 8-bit software
- 192K bytes of RAM memory is expandable to 768K
- Four industry-standard S-100 expansion slots
- Individually controlled pixels for highly detailed 640 x 225 pixel graphics
- Multiple disk drive capability allows additional 5.25" and 8" disk drives
- Full-function typewriter-style keyboard with separate numeric keypad
- Highly efficient power supply runs cool even with added accessories

Easy to use: An outstanding performer, the H/Z-100 offers benefits for everyone. For those with little or no computer experience, the Low-Profile H/Z-100 is easy to operate. For those with programming experience, it is powerful and versatile.

Dual microprocessors, in the H/Z-100 Computer, use both advanced 16-bit software and many current 8-bit software programs. With 16-bit software, you can run programs faster, and handle more information in greater detail. By also using 8-bit software, you can run those original 8-bit programs that were developed for personal applications. And many other programs.

A working tool: Using Heath/Zenith 16- and 8-bit software (pages 75-78), the H/Z-100 Computer can work with numbers, names, words, addresses, and stock numbers. It can evaluate information, act on its findings, and store volumes of data for use, reference, and updating. Other software allows the H/Z-100 Computer to do word processing, mailing lists, data analysis, book-keeping, billing, and inventory. It will even entertain with games.

Expandable: All H/Z-100 Computers provide a standard amount of memory, 128 kilobytes (KB) in some and 192 KB in others. However, for larger and more comprehensive business programs such as accounting or inventory control, 704 KB of memory can be added. This is done by installing two memory boards (two Z-205s) into S-100 expansion slots. There are four open expansion slots (disk drive board uses one slot) in the H/Z-100 and, besides adding memory, they can be used for adding other devices such as a hard disk drive, modems, or game-playing accessories. The disk drive circuit board that occupies the S-100 slot supports a 320K byte 5.25" disk drive already in the Computer. It can also support a second 5.25-inch drive (Z-207-3) and two 8" disk drives. With added disk drives, you get faster operational speed and gain real convenience when you can quickly and easily copy disks from one drive to another.

Increased flexibility: With its two serial ports and one parallel port, the H/Z-100 can be connected to a matrix or letter quality printer, modem, or plotter without requiring the use of an internal expansion slot.

User designed: You can work faster and more accurately than ever before with the H/Z-100's sculptured keyboard. Sloped and slightly curved for an efficient yet relaxed hand position during use, the keyboard lets you work faster and easier with less fatigue. The 77-key typewriter-style keyboard includes 16 special control and function keys that'll save you time and effort. To the right of the keyboard, a separate 18-key numeric keypad with cursor keys is used for fast data entries and easy cursor control.

Excellent documentation: Documentation reflects the quality of a system and Heathkit/Zenith hardware and software manuals are among the best available. All kits include a comprehensive step-by-step assembly manual. And both kit and assembled products have fully detailed and accurate operating manuals. The same is true for all Heathkit/Zenith peripherals and accessories. Software is also well documented with programming manuals that include clearly referenced commands and statements.



Low-Profile H/Z-100 Series Computers have all the advantages of the All-In-One Computer while providing you with the option of selecting a versatile modular computer system. Being low-profile, the height of the Computer cabinet is reduced to a compact 7½ inches.

Monochrome graphics: All H/Z-100 Computers, including Low-Profile models, have a standard monochrome graphics capability. Just connect a ZVM-121, ZVM-122, or ZVM-123 Monochrome Video Display (page 72) to the Low-Profile's composite video connector for a 25 line by 80 character display.

Color Graphics: With the addition of two Color Video RAM Chip Sets (Z-219-1), the Low-Profile Computer can display highly detailed color graphics on the ZVM-135 Color Video Display (page 72). A nine-pin connector on the rear of the Low-Profile supplies red, green, and blue video signals to a color monitor. You can create highly detailed graphs, drawings, or special effects in eight colors and use any of the thirty-three special graphic characters that are available from the keyboard.

- Heathkit** Kit **HS-100-31**, Low-Profile Computer, Monochrome graphics, 192K RAM, 320K byte storage, Shpg. wt. 98 lbs. **2199.00**
- ZF-100-21**, Assembled Low-Profile Computer, Monochrome, 128K RAM, 320K byte storage, Shpg. wt. 49 lbs. **2899.00**
- ZF-110-22**, Assembled Low-Profile Computer, Color graphics, 128K RAM, 640K byte storage, Shpg. wt. 62 lbs. **3499.00**

Z-205-1, 128KB to 192KB RAM Upgrade Kit. Expands RAM of ZF-100/110 Series Computers from 128KB to 192KB, Shpg. wt. 1 lb. **165.00**

Z-219-1, Color Video RAM Chip Set, Two sets are needed to upgrade a monochrome computer to color capability, Shpg. wt. 1 lb. **145.00**

HDC-100, Dust Cover for Low-Profile H/Z-100 Series Computers, Shpg. wt. 1 lb. **16.00**

TM-100, Technical Manuals for the H/Z-100 Computer (included with kits) Shpg. wt. 14 lbs. **55.00**

Z-207-3, Second 320 kilobyte 5.25-inch disk drive to expand storage in H-100 Computer Kits, Shpg. wt. 5 lbs. **395.00**

SAVE \$95! When purchased with Kit Computer **ONLY 300.00**

Z-205, 256K RAM Upgrade Circuit Board, Installs into S-100 slot to expand memory by 256KB. Requires 192KB RAM. Shpg. wt. 2 lbs. **799.00**



Hard disk drive provides capacity for big jobs



1 Internal Winchester disk drive provides mass storage, speed, and convenience

ZW-110-32 with 11 MB Winchester

1 **Winchester disk drive:** Conveniently store data that would require several dozen floppy diskettes. And access it ten to twenty times faster. With a massive 11 megabyte storage capacity, the Winchester drive in an H/Z-100 Computer provides more on-line storage for those large accounting, inventory, data base, or technical jobs that once required an expensive mainframe or minicomputer system.

Fast: Rotating at 3600 rpm, the Winchester drive can find a specific data entry point on its disk in a super-fast 85 milliseconds. This speed, coupled with the Winchester's increased disk recording density, means that data can be transferred to and from the Winchester at five megabytes per second. This extremely high rate greatly increases the H/Z-100's efficiency when you are involved in a great many disk operations.

Convenient: The Winchester drive eliminates the shelf full of floppy disks that always seems to accumulate around a busy computer. By storing all your programs on its sealed disks, the Winchester prevents the constant back and forth swapping of disks. For those jobs that require very large amounts of data, the Winchester replaces multiple floppy disk drives which can become very expensive. And, the Winchester drive is virtually error free. It averages only one read error every trillion (10^{12}) bits it reads.

ZW-110-32 Low-Profile Computer: The ZW-110-32 is a Z-100 Low-Profile Computer that has a built-in Winchester disk drive. The ZW-110-32 also has a 5.25-inch disk drive that stores up to 320K bytes of data. It is used to make back-up copies of all important programs and data for protection against fire or damage. This Low-Profile Computer comes with 192K bytes of RAM memory to handle large software programs. It also has color graphics capability and can be connected to the ZVM-135 Color Video Display (page 72). Connected to a ZVM-121 or ZVM-122, the ZW-110-32 (page 72) can display graphics in eight levels of gray.

ZW-120-32 All-In-One Computer: Also a Z-100 Computer, the ZW-120-32 has a built-in Winchester and a back-up 5.25-inch disk drive like the above Low-Profile model. The ZW-120-32 also comes equipped with 192 kilobytes of RAM memory. However, the All-In-One's high-resolution graphics is displayed on its own non-glare green display. For an eight-color graphics display, simply add the optional video memory and separate video monitor. As with the Low-Profile, the ZW-120-32 has all the basic features of all Z-100 Computers. These features include: dual microprocessors to run 8- and 16-bit software, four open S-100 expansion slots along with one parallel and two serial ports, and memory can be expanded up to 704 kilobytes by installing two Z-205 memory boards (page 66).

ZW-110-32, Assembled and tested Low-Profile Computer with internal 11MB Winchester disk drive, one 320 kilobyte 5.25-inch floppy disk drive, 192 kilobytes of RAM, color graphics capability, Shpg. wt. 63 lbs. 5499.00

ZW-120-32, Assembled and tested All-In-One Computer with internal 11 megabyte 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! ZS-217, Winchester Upgrade Kit for your H/Z-100 Computer. It contains the controller and data separator boards, an assembled Winchester disk drive, and all the required documentation. You install the hard disk controller board by plugging it into an IEEE-696 (S-100) expansion slot. To install the Winchester, you follow the step-by-step instructions and place the drive into one of the 5.25" disk drive positions. All the hardware needed to install the drive is included with the Kit. When connected to the computer's power supply, the drive draws only 23 watts. Included with the Upgrade Kit is a diskette containing four utility programs to format the Winchester's two disks.

ZS-217, Winchester Upgrade Kit, Available in October, call for price

2 Eight-inch floppy disk system stores up to 1.25 megabytes per disk



Plug-in compatibility with H/Z-100 Computers

2 **Available with one or two high-capacity eight-inch drives,** the H-207 Eight-Inch Floppy Disk System adds up to 2.5 megabytes of additional storage space to your H/Z-100 Computer. If you start with one drive, you can easily add a second drive at any time in the future. Each double-sided, double-density disk stores up to 1.25 megabytes of your important data on one transportable disk. To attach the H-207, simply connect the supplied cable between it and your H/Z-100 Computer. The H-207 Disk System has its own power supply and is styled to match the H/Z-100 Computer's earthtone colors. All information is stored on the 8" disks using soft-sectoring and formatted in the industry-standard IBM 3740 style.

Half-height 8" disk drives use the latest technology to conserve space and reduce the bulk of the System. This makes it easier to organize a convenient work station. Each disk drive has a crystal referenced motor speed control for an accurate 360 RPM motor drive speed. Power dissipation for a drive in use is a low 28 watts (typical) with a 50 watt maximum. Head wear, in the 8" disk drive, is minimized due to the low mass of the read/write head. For reading data quickly, the 8" drive has a 90 ms average access time with a 3 ms track-to-track move speed. To insure disk write protection, a transducer in each drive detects the presence or absence of a notch in the disk. Further protection is provided by a front panel locking lever that locks each disk inside the drive. This maintains data security by preventing a disk from being removed while the spindle is turning or until two seconds after the drive has stopped. The Kit includes an easy-to-follow Heathkit assembly manual. The System is a compact 7 $\frac{3}{4}$ " H x 13 $\frac{3}{4}$ " W x 20 $\frac{1}{2}$ " D and is powered by 120 VAC, 60 Hz. An optional dust cover is available separately.

Heathkit HS-207-41, Eight-Inch Floppy Disk System with one disk drive, 1.25MB storage, Shpg. wt. 57 lbs. 999.00

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

Z-207-41, Assembled and tested Eight-inch Floppy Disk System, one drive, 1.25MB storage, Shpg. wt. 53 lbs. 1599.00

Z-207-42, Assembled and tested Eight-Inch Floppy Disk System, two drives, 2.5MB storage, Shpg. wt. 60 lbs. 2299.00

Z-207-6, Assembled and tested Second 8" Half-Height Disk Drive, 1.25MB double-sided, double-density storage, Shpg. wt. 8 lbs. 699.00

HDC-207, Dust Cover for H/Z-207, Shpg. wt. 1 lb. 16.00

H-100 Computers are FCC Class B Certified for home and business use. Z-100 Computers are Class A Certified for commercial use. Z-100 use in residential areas may require correction of radio/TV interference.



For our FULL-LINE of computerware order your Heathkit Computer Catalog! See page 74.

Choose the H-89 Computer — now with high-capacity on-board data storage!

A complete microcomputer system in one convenient package, the H-89 All-In-One Computer includes two powerful microprocessors, a professional video terminal, a built-in 5.25-inch floppy disk drive for convenient data storage and three RS-232C Serial Interface Ports for telecommunications extensibility!

NOW AS LOW AS

\$1399⁰⁰
Kit

- 48K bytes RAM standard — expand to 64K
- Up to 640K bytes of on-board disk storage (with optional drive, installation kit)
- CP/M-capable — without modifications

Two separate Z-80 microprocessors are built into the H-89: Separate microprocessors for the computer and video terminal mean they never have to share processing power — enabling the computer to process information at higher speeds.

Three RS-232C Serial Interface Ports are standard: The built-in EIA Standard Three-Port Serial Interface lets you add more peripherals (such as printers and modems) to your All-In-One Computer.

Optional disk controller increases storage capacity: The H-89's built-in 5.25" disk drive can store up to 100K bytes (hard-sectored) of data on a single disk. With the optional Z-89-37 Soft-Sectored Disk Controller Board (page 69), you can expand the built-in storage capacity to 160K bytes per disk.

If you need more data storage, we have what you need: To expand to 640K bytes of on-board disk storage, install the H-17-4 Soft-Sectored Disk Drive (p. 69 — requires Z-89-37 and H-88-9 Installation Kit below, right). The soft-sectored H-37 Floppy Disk System, which also uses the Z-89-37, can provide significantly more data storage — up to 1.28 megabytes (640K per drive, using one standard H-17-4 Drive and one optional drive). Combined with the optional on-board H-17-4 Drive, you can access up to 1.92 megabytes of on-line data!

The H-77, which uses the H-89's standard disk controller board or the Z-89-37, is also available. It can provide up to 200K additional hard-sectored or 320K more soft-sectored bytes (using one standard, one optional drive).

Use the All-In-One as a professional video terminal (with appropriate software): Make corrections or edit anywhere on the screen using direct or relative addressing. Up to twenty-four 80-character lines can be displayed on the 12" diagonal CRT screen, as well as a software-controlled 25th line.

Typewriter-format professional keyboard: Controls all terminal functions. The keyboard can display the entire ASCII character set, both upper and lower case — along with 33 graphics symbols.

Select baud rates up to 9600 through the keyboard: Control 32 functions from keyboard or computer. Direct cursor addressing lets you insert or delete characters anywhere. Use reverse video to add emphasis to displays by reversing white on black.

H-89A SPECIFICATIONS: CPU AND MEMORY: Clock: 2.048 MHz. Memory: 8K bytes used by system for ROM and RAM; 8K reserved. **VIDEO TERMINAL: CRT: Display Size:** 6½" H x 8½" W (16.51 x 21.59 cm). **Character Size:** Approximately ⅛" H x ⅛" W (0.51 x 0.25 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:** 8-linking, 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. **ACCESSORIES:** Interfacing: Three EIA Standard RS-232C Serial Interface Ports are provided. **GENERAL: Operating Temperature Range:** 50-95° F (10-35° C). **Power Requirement:** 120/240 VAC, 50/60 Hz, 90 Watts. **Dimensions:** 13" H x 17" W x 20" D (33.02 x 43.18 x 50.8 cm).



Calculator-format 12-key numeric pad: Makes entering arithmetic programs faster. Shifted functions give you control to make insertions or deletions.

Save when you buy the H-89 All-In-One Computer: And if you plan to use the computer for business purposes, ask your tax advisor about possible tax credits which could provide additional savings.

H-89 All-In-One Desktop Computer Kits: Include 48K bytes of RAM, one 100KB capacity disk drive, hard-sectored disk controller and up to \$985 in software at no extra charge (see offer below).

| | | |
|-----------------|--|---------|
| Heathkit | Kit HS-89-2, with anti-glare green CRT, Shpg. wt. 96 lbs. | 1429.00 |
| Heathkit | Kit HS-89-3, with standard white CRT, Shpg. wt. 96 lbs. | 1399.00 |

Get software at no extra charge!

Choose three of these programs when you buy an H-89; HDOS or CP/M; Microsoft BASIC Interpreter; Compiler: FORTRAN; COBOL; Magic Wand; SuperCalc. (Applies only to single-quantity purchases.)

Accessories for H/Z-89 and Z-90 Computers

| | |
|--|---------------|
| Assembled 64K RAM Expansion Kit: Expands 48K H/Z-89s to 64K. | |
| WH-88-16, Assembled, Shpg. wt. 1 lb. | 115.00 |
| 16K RAM Expansion: Bring converted H-19s, older H89s to 48K. | |
| H-88-2, Shpg. wt. 1 lb. | 29.00 |
| High-Capacity Drive Installation Kit: To install H-17-4s into H-89s. | |
| H-88-9, Shpg. wt. 4 lbs. | 50.00 |
| HA-88-3, 3-Port Serial Interface for older H-89s, 2 lbs. | 150.00 |
| H-88-5, Cassette Interface, (not used with CP/M), 2 lbs. | 49.00 |
| Wire Wrapping Board w/bus connectors: Make custom circuits. Takes 48# 16-pin sockets (54# 14-pin, others). Uses HCA-6, HCA-7 below. | |
| Kit H-88-10, Shpg. wt. 1 lb. | 30.00 |
| Wire Wrapping Kit: Wire wrapping tool, 50' wire, 200 pre-cut, pre-stripped wires (50 each in 1", 2", 3" and 4" lengths). | |
| Kit HCA-6, Shpg. wt. 1 lb. | 13.95 |
| Wire Wrapping Socket Kit: 36# 3-level sockets (14- to 40-pin). | |
| Kit HCA-7, Shpg. wt. 1 lb. | 29.95 |
| Dust Cover: Protects H/Z-89s, H/Z-19s from airborne contaminants. | |
| HCA-5-89, Shpg. wt. 1 lb. | 14.00 |

Kit and assembled products are available



Kit computer products are sold under the Heathkit name, and meet Federal Communications Commission requirements for use in residential areas.



Most of the fully assembled and tested computer products shown in the pages of this catalog are offered to you under the Zenith Data Systems name.



Increase the disk storage capacity of your H/Z-89 or Z-90 Computer

Add up to 1.28 megabytes of on-line disk storage: Designed especially for use with the H/Z-89 and Z-90 Computers, these external floppy disk systems give you even more flexibility in configuring the amount of disk storage you need for your computer system applications.

Your choice of data storage capacity: The H-37 provides up to 1.28 megabytes of additional data storage – while the H-77/Z-87 provides up to 320K bytes.

Use up to three drives in your system: When you use one of these systems with your H/Z-89 or Z-90, you have room for up to three 5.25-inch disk drives on a single controller board. With multiple drives, you can mount operating system and program disks at the same time. And because these peripherals work with the H/Z-89 and Z-90, your system will work harmoniously.

Space-saving design: Each 5.25" floppy disk drive installs vertically into the durable metal cabinet, so the H-37 and H-77/Z-87 systems take up less space than units with horizontally-mounted disk drives.

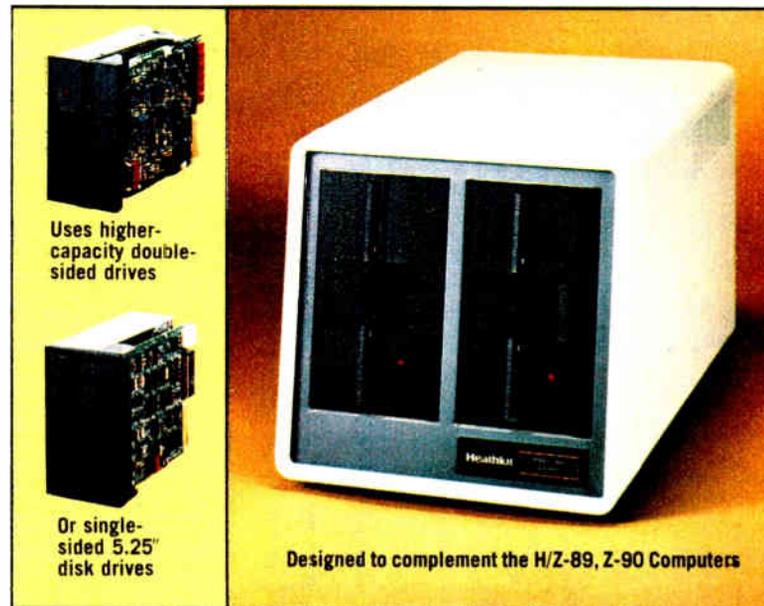
The H-37 features high-capacity disk drives: Its double-sided 96 tpi disk drives provide up to 6.4 times the storage capacity of our single-sided 5.25-inch drive: Store up to 640K bytes per drive – for a total capacity of up to 1.28 megabytes! For easier kitbuilding, the disk drives are assembled and tested.

Enhanced software capabilities: With the double-sided H-37's greater data storage ability (double the capacity of single-sided 5.25-inch disk drives), you can more fully utilize most of our software programs. Many software packages are available on soft-sectored 5.25-inch floppy disks, compatible with the H-37. See pages 74-78 for more details.

Field-proven H-77/Z-87 available: Using single-sided 5.25" disk drives, this reliable data storage system is available with one or two drives – to provide up to 200K bytes of data storage (up to 320K bytes of data storage when the Z-89-37 Soft-Sectored Disk Controller Board is used).

Compatible disk controller boards: The H-77/Z-87 Floppy Disk System can run from either the H-88-1 Single-Density Disk Controller Board (standard with H/Z-89 Computers) or the Z-89-37 Double-Density Disk Controller Board (standard with Z-90 Computers; with H/Z-89s, see below). The H-37 Floppy Disk System requires the Z-89-37 Controller Board.

Easy ordering method: Use the configuration and ordering charts (below, right) to order the H-37 or H-77/Z-87 Floppy Disk System that's right for you.



Uses higher-capacity double-sided drives

Or single-sided 5.25" disk drives

Designed to complement the H/Z-89, Z-90 Computers

Designed for 120/240 VAC, 50/60 Hz power, the H-77/Z-87 and H-37 Floppy Disk Systems are housed in a damage-resistant, steel cabinet that matches the outside decor of the H/Z-89 and Z-90, and measures 8⁵/₈" H x 8-7/₈" W x 15" D (21.92 x 22.56 x 38.1 cm).

The Heath H-37, H-77 and Zenith Data Systems Z-87 Floppy Disk Systems are FCC Class B Certified for normal use in homes or businesses.

Disk storage accessories

Soft-Sectored Disk Controller Board for H/Z-89 Computers: Increases data storage capacity of disk drives below.

Z-89-37, Assem., 4 lbs. 299.00

Hard-Sectored Disk Controller Board for H/Z-89 Computers: Use only with H-17-1 Single-Sided Floppy Disk Drives below.

H-88-1, Assem., 3 lbs. 150.00

Double-Sided Floppy Disk Drive for H/Z-37 Disk Systems: Stores up to 640K bytes on a compatible disk. Requires Z-89-37 above.

H-17-4, Assem., 5 lbs. 550.00

Single-Sided Floppy Disk Drive for H-77/Z-87 Disk Systems: Stores up to 160K bytes per disk when used with Z-89-37, 100K when used with H-88-1 Controller Board. Also for H-88, H/Z-89 and Z-90 Computers.

H-17-1, Assem., 5 lbs. 295.00

Dust Cover: Protects H/Z-37 and H-77/Z-87 Disk Systems from airborne contaminants.

HCA-5-77, Shpg. wt. 1 lb. 14.00

H/Z-89 Computer/5.25" Disk System Configuration Chart

| System Components | Hard-Sectored Disk Storage | Soft-Sectored Disk Storage | Total Disk Storage Capacity |
|--|--|---|-----------------------------|
| H/Z-89 (Note 1) | One 100 KB internal drive | — | 100 KB |
| H/Z-89 (Note 1) H-77/Z-87 (Note 2) | One 100 KB internal drive, one or two 100 KB external drives | — | 200 or 300 KB |
| H/Z-89 (Note 1) Z-89-37 | — | One 160 KB, single-density internal drive | 160 KB |
| H/Z-89 (Note 1) Z-89-37 H-77/Z-87 (Notes 2, 3) | One 100 KB or 160 KB internal drive | One (or two) 160 KB, single-density external drive | 260 or 420 KB |
| H/Z-89 (Note 1) Z-89-37 H-37 (Notes 2, 3) | One 100 KB internal drive | One (or two) 640 KB, double-density external drives | 740 KB or 1.38 MB |

NOTES: (1) When ordering an HS-89, use -2 or -3 for desired CRT. (2) When ordering an HS-77 or HS-37, use -1 or -2 for desired number of drives. (3) H-37s require Z-89-37 Disk Controller.

How to order external 5.25" disk storage for H/Z-89s, Z-90s

| Drives | Storage Capacity | | Order Model | | Shpg. wt. | Price |
|---------------------------|------------------|----------------|-------------|-----------------------------|-----------|---------|
| | With H-88-1 | With Z-89-37 | | | | |
| One H-17-1 (Single-Sided) | 100K bytes | 160K bytes | Kit HS-77-1 | — | 34 lbs. | 499.00 |
| | | | Kit HS-77-2 | — | 47 lbs. | 769.00 |
| Two H-17-1 (Single-Sided) | 200K bytes | 320K bytes | — | Z-87-89, Assem., for H/Z-89 | 28 lbs. | 999.00 |
| | | | — | Z-87-90, Assem., for Z-90 | 28 lbs. | 999.00 |
| One H-17-4 (Double-Sided) | — | 640K bytes | Kit HS-37-1 | — | 34 lbs. | 795.00 |
| Two H-17-4 (Double-Sided) | — | 1.28 megabytes | Kit HS-37-2 | — | 47 lbs. | 1295.00 |

Software compatibility:

Heath/Zenith software programs are available in 5.25-inch hard-sectored, 5.25-inch soft-sectored floppy disk or 8-inch soft-sectored floppy disk formats – for use with most Heath/Zenith disk systems.



For our FULL-LINE of computerware order your Heathkit Computer Catalog! See page 74.

NEW

The user-comfortable H/Z-29 – much more video display terminal for your money!

ONLY
\$599⁰⁰

- Emulates functions of many popular video display terminals – and does even more!
- Detached keyboard design provides greater user flexibility
- Communicates at speeds from 75-19,200 baud, in half or full duplex
- A non-glare 12" diagonal CRT featuring greatly-improved video attributes

Affordable, state-of-the-art terminal: Here's what you get when you choose the H/Z-29:

Full, sculptured 91-key typewriter-style keyboard: Features std. 128-character ASCII set and alternate character set is available with super/subscripts, Greek symbols, VT-100 graphics and more. Convenient, separate 14-key pad for easier entry of numeric data. Connects to tiltable video monitor with 8' coiled cable (included).

N-key rollover to keep up with fast typists: With this feature, many keys can be depressed in rapid succession – and the terminal will still process all keystrokes in the correct order.

Auto-repeat capability: All keys except BREAK, CAPS LOCK, CONTROL, SHIFT and SETUP automatically repeat when held down for a second or more. With this time-saving feature, there's no need to press two keys to repeat the same keystroke.

Improved video quality: The H/Z-29 features an easy-on-the-eyes 25 line x 80 character 12" diagonal non-glare green display – in normal or reverse video, at half or full intensity. You get easy-to-read characters as large as 8 x 10 dots – even on-screen underlining is provided on a per-character basis!

The H/Z-29's cursor can be a blinking or non-blinking block or underline. It can also be removed from the video display screen.

LED status panel: Conveniently shows the terminal's "power on," "keyboard lock," "off line" and "caps lock" status.

Easy-to-use, English-language set-up mode: This means you don't have to open the H/Z-29's cabinet to configure the terminal. Replacing hard-to-access internal DIP switches, the set-up mode allows the user to configure the H/Z-29 to his unique performance parameters. Set-up parameters can be stored in non-volatile memory for permanent use, or the terminal can be temporarily configured (default parameters return on the next power-up).

Serial port connects the H/Z-29 to other peripheral devices: A built-in EIA Industry Standard RS-232C Serial Interface Port allows you to enhance the video terminal's versatility by connecting another compatible serial device. Communicate at data transfer speeds ranging from 75-19,200 baud (certain applications may require handshaking at 9,600 and 19,200 baud).

Keep track of time: A 24-hour clock operates when power is supplied to the H/Z-29, allowing the user to keep track of real time – or elapsed time when accessing a mainframe computer or time-sharing system.

Can also emulate: The Lear Siegler ADM-3A and Hazeltine 1500A Video Display Terminals for greater versatility in educational and office environments. The H/Z-29 is also compatible with ANSI X3.64 and DEC VT-52



terminal protocol – and has many attributes of the popular DEC VT-100 Video Display Terminal, including graphics.

Meets Federal Communications Commission Class B Radio-Frequency Interference (RFI) requirements for home and business use: The H/Z-29 also meets applicable Underwriters' Laboratories (UL) and CSA requirements.

Available in easy-build, money-saving kit form: All necessary components are included with the kit, and an illustrated step-by-step Heathkit assembly and operating manual shows you the way.

Heathkit Easy-to-build Professional Video Display Terminal Kit. Kit H-29, Shpg. wt. 41 lbs. 599.00

Assembled and tested Professional Video Display Terminal. Z-29, Assembled and tested, Shpg. wt. 38 lbs. 849.00

Palm Rest for the H/Z-29 Professional Video Display Terminal: Helps reduce user fatigue by making operation more comfortable. Easily installs in front of the H/Z-29 Terminal's detached keyboard component.

Z-29-1, Shpg. wt. 1 lb. 15.00
Z-29-2, ROM Source Listing, Shpg. wt. 4 lbs. 25.00

H/Z-29 SPECIFICATIONS: **Microprocessor:** 8051 eight-bit microprocessor **Set-Up:** Set-up mode can allow custom parameters to be stored in non-volatile memory for permanent use, or temporarily stored (default parameters return on the next power-up). Set-up mode can be locked by the user, preventing others from changing often-used parameters. **Cursor:** Blinking or non-blinking block or underline. Cursor may also be eliminated from video display. **Tabs:** Adjustable. **Self-Testing:** Automatically performed on each power-up or reset. **Audible Feedback:** Provided for the self-test "OK" function, improper operation warning, key clicks and the ASCII bell function. **Acceptable Temperature Ranges:** Operating, 32 to 104 degrees F (0 to 40 degrees C); storage, -40 to -150 degrees F (-40 to -66 degrees C). **Acceptable Humidity Ranges:** Operating, 10 to 90 percent. Storage, 0 to 95 percent. **Acceptable Altitude Ranges (above sea level):** Operating, Up to 8,000 feet (2.4 kilometers); Storage, Up to 30,000 feet (9.1 kilometers). **Power Requirement:** 120 VAC, 60 Hz

Interfacing and accessories for Heathkit H-8 Computer

Z-80 Central Processing Unit (CPU) Card: Includes a powerful H/Z-89-type Z-80 CPU, extended configuration with single-button bootup which enables H-8 to access CP/M-80 Operating System and high-capacity H/Z-47 8" Disk System. NOTE: Not exchangeable with the H-8's standard 8080A CPU Card; trade-ins not accepted.

HA-8-6, Assembled, Shpg. wt. 5 lbs. 199.00

NEW! Z-80 Replacement ROM and Front Panel Keycaps: Allow access to all Z-80 Central Processing Unit (CPU) registers without adding WH-8-37.

H-8-19, Shpg. wt. 2 lbs. 20.00

Soft-Sector Floppy Disk Controller Board: Allows H-8 to use high-capacity H-37 Soft-Sector Disk System (p. 69), or expands storage capacity of H-17. Requires HA-8-6 Z-80 CPU Card, above left. Includes H-8-19.

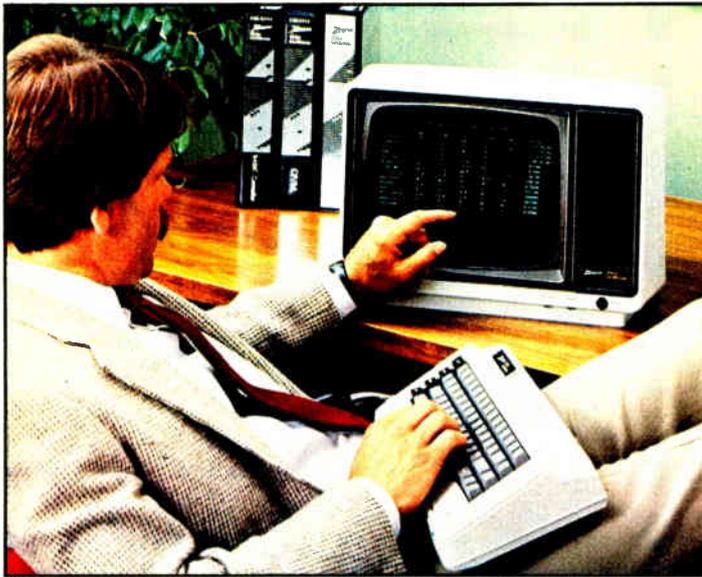
WH-8-37, Assembled, Shpg. wt. 4 lbs. Was \$395, NOW ONLY 249.00

Color Graphics Board: Uses GDZ-1320 Color Monitor (p. 72), other devices accepting NTSC composite video. Three color display modes, 256 x 192 pixel resolution. Sound generator, arithmetic chip, joystick inputs included. Software on 5.25" disk. Use with Heath memory boards only.

HA-8-3, Assembled, Shpg. wt. 3 lbs. 295.00



Bring a world of information into your home/office with a Heathkit/Zenith Personal Information Terminal



Terminal easily accesses information services

- Built-in direct-connect modem with automatic dialing
- Automatically logs on to time-sharing services

Information Window: When the ZT-1 is connected to a standard modular phone line jack, you can communicate with information services or data banks.

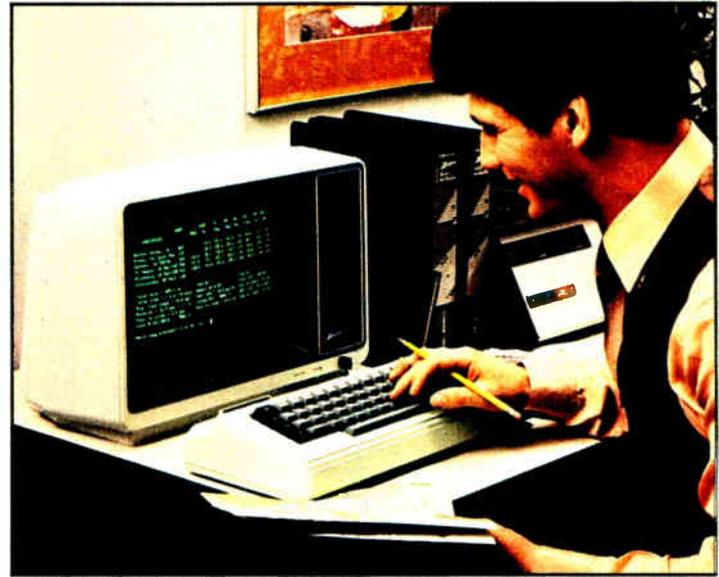
User-Friendly: Plain English cues and prompts are built-in to assist you every step of the way. A special HELP key displays further explanations.

Features: Bell 103-compatible modem, clock keeps track of real or elapsed time, different models available with choice of options. See chart below.

ZT-1-2, Terminal Carrying Case, Shpg. wt. 2 lbs. 24.99

ZTA-1-1, Parallel Cable, Shpg. wt. 2 lbs. 25.00

TM-1, Terminal Technical Manual, Shpg. wt. 1 lb. 50.00



Hooks up to large computers and peripherals

- Programmable one-key access to information services
- Connects to optional Centronics-compatible printers

Printing capabilities: The ZT-1 can print a line as you type it or print a full screen at a time. It also prints out displayed information.

Additional features: RS-232 serial port, kit and assembled versions, FCC approved for home and office use.

ZVM-121, Optional Monochrome Video Display: For use with HTX/ZTX's (see chart below). Features: 25 lines of 80 characters, green phosphor, and a high-resolution 12" diagonal screen. Shpg. wt. 18 lbs. 139.95

HTX-10-1, Auto-dial and auto-answer 300 baud modem for HTX-10 and ZTX-10 Personal Information Terminals, Shpg. wt. 1 lb. 69.95

SAVE \$20—buy the Personal Information Terminal and a ZVM-121 Monochrome Video Display at the same time.

| Model | Video Monitor? | Parallel Printer Port? | 9600 baud RS-232C Serial Port? | 300 baud Modem? | One-key Source access? | One-key CompuServe access? | Programmable one-key access? | Shpg. wt. | SAVER PRICE |
|--|----------------|------------------------|--------------------------------|-----------------|------------------------|----------------------------|------------------------------|-----------|-------------|
| Heathkit Kit HT-10 | YES | YES | YES | NO | NO | NO | YES | 36 lbs. | \$399.00 |
| Heathkit Kit HTX-10 | NO | YES | YES | NO | NO | NO | YES | 10 lbs. | 279.00 |
| Heathkit Kit HT-1011 | YES | YES | YES | YES | NO | NO | YES | 44 lbs. | 449.00 |
|  ZT-1, Assem. | YES | YES | NO | YES | NO | YES | NO | 32 lbs. | 569.00 |
|  ZTX-1 Assem. | NO | YES | NO | YES | NO | YES | NO | 6 lbs. | 449.00 |
|  ZT-1A, Assem. | YES | YES | NO | YES | YES | NO | NO | 32 lbs. | 569.00 |
|  ZTX-1A, Assem. | NO | YES | NO | YES | YES | NO | NO | 6 lbs. | 449.00 |
|  ZT-10, Assem. | YES | YES | YES | NO | NO | NO | NO | 32 lbs. | 499.00 |
|  ZTX-10, Assem. | NO | YES | YES | NO | NO | NO | NO | 6 lbs. | 399.00 |
|  ZT-11, Assem. | YES | YES | YES | YES | NO | NO | YES | 32 lbs. | 579.00 |
|  ZTX-11, Assem. | NO | YES | YES | YES | NO | NO | YES | 6 lbs. | 479.00 |



Look for the store manager's special — at your nearby Heathkit Electronic Center.

Enhance your computer's output by adding one of these economical monitors to your system

NEW High-Resolution 12" Display

Unmatched Value: Receive performance found in units costing much more. Like: a special deflection system and green or amber CRT for a remarkably easy-to-read display, a 12-inch diagonal screen that displays up to 25 lines of 80 characters, 17 MHz bandwidth and 50 ns rise time for improved character definition, and a switchable 40- or 80-character display width. Accepts direct EIA monochrome video. See ZVM-121 Cables (below, right) for use with other computers.

- ZVM-122, Assembled, amber CRT, Shpg. wt. 18 lbs. 169.95
 ZVM-123, Assembled, green CRT, Shpg. wt. 18 lbs. 139.95
 ZVM-123-2, Tilt Base for ZVM-122/123. Shpg. wt. 4 lbs. 15.00



NEW Medium-Resolution Color Video

Exceptional performer: The ZVM-131 is an economical color monitor that also contains an audio amplifier. With its composite and RGB video inputs, the ZVM-131 is ideal to use with many popular computers. It also accepts horizontal and vertical sync inputs. The ZVM-131's 13-inch screen displays a large 25 lines by 80 characters. In addition, the display size can be customized using internal size controls. As the room lighting changes, the ZVM-131 automatically adjusts the display brightness for comfortable viewing. The video is adjusted from conveniently located front panel picture, black level, color level, tint, and sharpness controls.

- ZVM-131, Assembled and tested, Shpg. wt. 36 lbs. 379.00



NEW High-Resolution 13" Color Video

Outstanding features: Black matrix CRT for a sharp and bright 25 line by 80 character display. Composite and RGB direct drive inputs and H/V sync inputs. 100% modular.

- ZVM-135, Assembled and tested, 36 lbs. 649.00

- ZVM-135-1, ZVM-135 to H/Z-100 Cable, Shpg. wt. 1 lb. 25.00

- ZVM-135-2, ZVM-135 to IBM Cable, Shpg. wt. 1 lb. 25.00

- ZVM-135-3, ZVM-135 to Apple III Cable, Shpg. wt. 1 lb. 25.00

- ZVM-135-4, ZVM-135 to T.I., Commodore, Atari Cable, Shpg. wt. 1 lb. 25.00



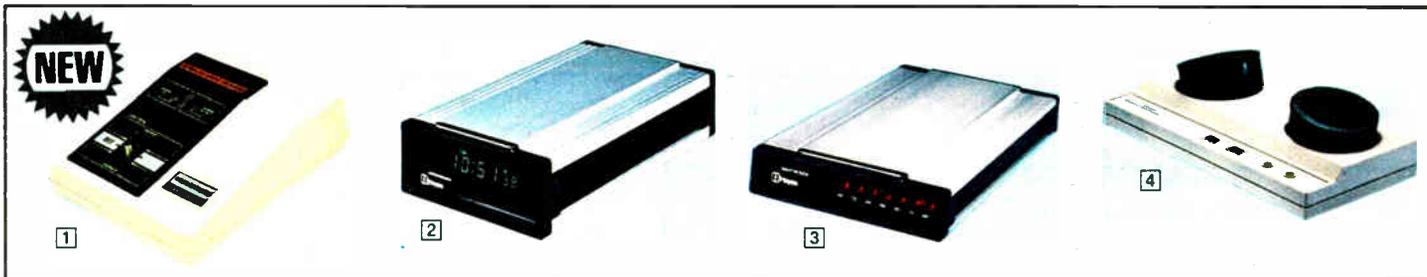
High-Quality 12" Video Display

High resolution: Easy-to-read 25-line by 80 character green display. Accepts EIA monochrome video displays for use with many popular microcomputers. Has excellent character definition with selectable 40- or 80-character lines. Conveniently located external controls. Uses 120 VAC and measures 11 3/4" H x 16 1/4" W x 12" D.

- ZVM-121, Assembled and tested, Shpg. wt. 18 lbs. 139.95

- ZVM-121-1, ZVM-121/122/123 to IBM Cable, Shpg. wt. 1 lb. 5.00

- ZVM-121-2, ZVM-121 to T.I., Commodore, Atari Cable, Shpg. wt. 1 lb. 15.00



Connect your computer to a printer across town, a terminal in another city, or a data bank in another state

1 Quality and value in a Modem

Lowest-cost direct-connect modem: The Mura-phone MM-100 connects directly into a standard single-line phone line to eliminate data errors caused by acoustic coupled modems. An originate or answer mode is selectable for remote or host operation. The WH-63 is a full-duplex modem with a 300 baud data-transmission speed. Included is a phone-modem cable and an AC Adapter. Requires an HCA-11 cable and CPS.

- WH-63, Assembled and tested, 3 lbs. 99.00

- HCA-11, RS-232 Male/Female Cable, 1 lb. 20.00

2 Hayes Chronograph keeps time

Accurate time keeper: The WH-42 uses crystal-controlled accuracy to keep any RS-232 com-

puter system updated of the day, date, and time to the second. With the Chronograph, all computer system activities can be logged... reports dated and times recorded automatically. The Chronograph operates on 120 VAC and is protected from power failures by three back-up batteries (not included). NOTE: For custom applications only; not supported by current software.

- WH-42, Assembled and tested, 4 lbs. 199.00

3 A communications system

High-performance: Available in 300- or 1200-baud models. Automatically dials and receives calls. Program-controlled in any language by ASCII strings. Uses dial or touch-tone phones. Includes phone-modem cable and power transformer. Re-

quires HCA-11 cable for terminals. CPS is recommended for computers.

- WH-43, Assm. 300 Baud, 3 lbs. 279.00

- WH-53, Assm. 1200 Baud, 4 lbs. 695.00

- HCA-11, RS-232 Male/Female Cable, 1 lb. 20.00

4 Acoustic Modem for data transfer

Versatile: The LEX-11 is a stand-alone system that has selectable originate and remote modes. It can operate at full- or half-duplex. The LEX-11 is compatible with Bell System's 103 modems and can operate up to 300 baud. Included is a 120 VAC adapter and an RS-232 cable. It requires an HCA-11 cable. CPS software is suggested.

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

- HCA-11, RS-232 Male/Female Cable, 1 lb. 20.00



The Heath/Zenith 125 Dot Matrix Line Printer features uncommon speed and quiet — available in colors to match H/Z-100 Computer

\$899⁰⁰
Kit

- Our fastest printer — over 150 characters/second
- 33 graphics characters — compatible with most Heath/Zenith computers and terminals

We've packed the latest state-of-the-art features into the 125: You get faster speed, versatile paper handling facilities, quiet operation and rugged construction — all at an affordable cost. This bi-directional printer can output over 150 characters per second — translating into up to 300 lines per minute (with 10-column lines), or 65 lines per minute (with 132-column lines).

Quiet printing: A specially-designed cabinet completely encloses the 125's printing mechanisms, reducing home or office sound levels.

Full printing capability: The 125 can print the full 96-character ASCII set (upper and lower case, with descenders and underlining). It can also print the block graphics characters (except reverse video) provided with most Heath/Zenith computers and terminals.

Has quad tractor feeds with adjustable width: This allows the printer to handle standard edge-punched, single or multiple forms (up to six parts thick) or fan-fold paper. The 125's extended-life ribbon cartridges "plug-in" for fast and easy no-mess replacement.

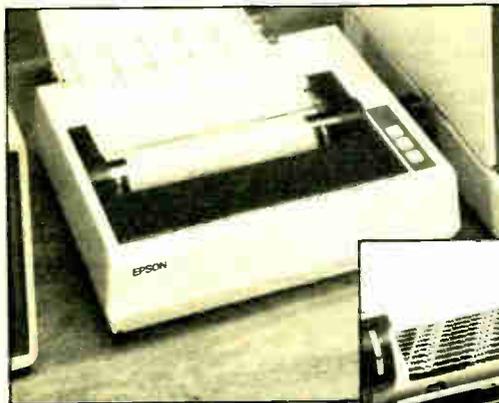
Features variable pitch (10, 12, 13.2, or 16.5 characters per inch): This allows the 125 to print up to 222 characters per line (at 16.5 cpi on a 13.5-inch wide line). Six or eight lines per inch vertical spacing is available. Horizontal and vertical tabs are adjustable.

Interfaces to most computers and terminals: Communication occurs via an RS-232C Serial Interface or a 20 mA current loop, with handshaking adjustable by reverse channel and busy control signals. Communication speeds are adjustable from 110 to 9600 baud.



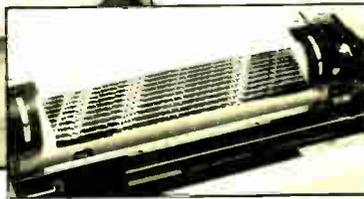
More extra-value features: A "paper out" indicator, "jammed" indicator and self-testing capabilities are included with the 125 Dot Matrix Line Printer. For 120/240 VAC, 50/60 Hz power. Measures 8¼" H x 26½" W x 18½" D.

Kit H-125, Printer in H/Z-100 colors, Shpg. wt. 85 lbs. **899.00**
Z-125, Assembled Printer in H/Z-100 colors, 82 lbs., Mtr. Frt. **1499.00**
HDC-125, Protective Dust Cover for above printers, 1 lb. **16.00**



Affordable MX-80A Dot Matrix Printer with graphics

Bi-directional printer has advanced features for maximized throughput



Now printing an expanded cast of graphics characters: Including subscripts, superscripts, italics, underlining and 54 other block graphics characters. The MX-80A can also reproduce the full 96-character ASCII set.

Throughputs a fast 46 lines per minute (using 80-character lines): Pick 40-, 66-, 80- or 132-character lines for up to 12 different printing combinations.

Includes paper tray, ribbon: Communicates with computer via MX-80-3 Interface below (needs HCA-10 Cable below), or H/Z-100's (needs HCA-20 Cable below). Has Centronics-style interface for ZT-1 Terminal on page 72. (ZTA 1-1 needed). 120 VAC. Measures 4¼" H x 14¾" W x 12" D.

MX-80A, Assembled Printer, Shpg. wt. 17 lbs. **499.00**
MX-80-3, Buffered RS-232C Serial Interface, Shpg. wt. 1 lb. **135.00**
MX-80-4, Extended Graphics ROM for MX-80s (not MX-80-2), 2 lbs. **60.00**
HCA-10, Male-to-Male RS-232C Cable, Shpg. wt. 1 lb. **20.00**
ZTA-1-1, Printer Cable, Shpg. wt. 2 lbs. **25.00**
HCA-20, H/Z-100 to MX-80 Cable, 1 lb. **25.00**
HCA-5-80, Protective Dust Cover for MX-80/MX-80A, 1 lb. **14.00**

Diablo Printer for word processing systems

When letter-quality printing is a must, the WH-54 Diablo Printer combines the latest in microelectronic control technology with a field-proven daisy-wheel printing mechanism. State-of-the-art simplicity and reliability afford you maximum flexibility while maintaining the highest print quality. Complete interchangeability allows use of Diablo plastic or durable metal wheels for high production word processing or multiple forms handling applications.

Bi-directional printing for faster throughput efficiency: Prints at speeds up to 35-40 cps. RS-232C Serial interface (compatible with Bell 102, 113, 212 and equivalent modems) and 768-character buffer run at 110-1200 baud.

Versatile: Prints the entire 96-character ASCII set (upper and lower case) on forms up to 15.5" (39.3 cm) wide. Forms up to 27 1000" (0.0686 cm) thick can be accommodated with a single adjustment.

Includes: Friction platen power supply, operator control panel, HCS-22 Print Wheel (Elite 12 with unslashed zero) and HCS-51 Film Ribbon. For 120/240 VAC, 50/60 Hz power. 9¼" H x 23½" W x 15¾" D. (23.5 x 59.7 x 40 cm).

WH-54, Assembled Printer, Shpg. wt. 70 lbs., Motor Freight **2295.00**



At Heath, we still believe that the customer comes first.

HUG makes your Heathkit computer even more powerful with its 700-program software library



- Access to the HUG Software Library's over 700 low-cost programs
- A one-year subscription to HUG's information-packed REMark magazine
- Participate in REMark's interactive forum with other HUG members
- On-line bulletin board available

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 microcomputer developments, while I increase my utility and applications software library.

I've enclosed \$_____ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Name _____ 862R

Address _____

City _____ State _____ Zip _____

Country _____

Signature _____

1. Access to the HUG Software Library: A constantly updated and expanded collection of programs, subroutines and procedures written by members.
2. The HUG Software Library Catalog: Listing each program by name, description, language, version, hardware and software required.
3. A one-year subscription to REMark Magazine (mailed monthly): This exclusive periodical contains reviews of new Heath/Zenith computer products – and also serves as an open forum, where members of HUG can share new hardware modifications, software enhancements, applications programs and other ideas.
4. One of the top users' group bulletin boards in the world: The HUG Bulletin Board has the latest news on Heath/Zenith computers and HUG activities. All you need is a HUG membership, a modem program and a MicroNet time-sharing membership.
5. A vinyl-covered, three-ring HUG binder: Contains the HUG Handbook, with hints on how to make the most of your membership (some local users' groups have been formed to increase membership benefits). Use this binder to store software documentation, REMark and other materials.
6. The official HUG Identification Card: Your ticket to HUG benefits.

You'll find a HUG application enclosed with each Heath computer; Z-89 computers come with a one-year HUG membership at no extra charge! If you don't own a Heath/Zenith computer, fill out and return the form below.

| | HUG Membership Rates (per year, in U.S. Funds) | | |
|--------------|--|---------------|---------------|
| | U.S. | Canada/Mexico | International |
| New Members: | \$18 | \$20 | \$28 |
| Renewal: | \$15 | \$17 | \$22 |

HEATHKIT COMPUTER CATALOG COUPON!

MAIL TO: Heath Company, Dept. 300-862R
Benton Harbor, MI 49022

FREE

Name _____

Address _____ Apt. No. _____

City _____ State _____ Zip _____



36 full-color,
full-size pages

New Heathkit Computer Catalog!

The complete line of computer products from your strong partner: Our complete line of reliable, low-cost 8- and 16-bit microcomputers is led by the new Z Machine! And an outstanding selection of easy-to-use, problem-solving software solutions is available.

Get your copy today: The free Heath/Zenith Computer Catalog is available at your nearby Heathkit Electronic Center (See the store list on page 16) – or mail the coupon at left.

SOFTWARE SUBLICENSE GRANT FOR MICROSOFT PRODUCTS

(Check all boxes which apply, sign and return to VERITECHNOLOGY ELECTRONICS CORPORATION (VEC). Another Sublicense Grant form must be used with each future SOFTWARE order.)

- Microsoft BASIC Compiler
- Microsoft BASIC Interpreter
- Microsoft COBOL
- Microsoft FORTRAN
- Microsoft MACRO-80

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Choose an easy-to-use software solution for your business and home needs

Heathkit offers quality software: Everyone promises to fill your needs – but you know to be certain things are right, you have to be involved. No one knows your needs as well as you. And no one else truly understands your problems. That's why Heathkit offers many software packages – versatile, easy-to-use solutions.

For greatest ease of use, many of these solutions are menu-driven – and utilize easy-to-understand English-like commands.

A wide variety of software solutions are listed here – including operating systems, programming languages, utility and applications programs, and the Heath User's Group software library. H/Z-100 software is described on page 78. For an even greater selection of problem-solvers, fill out the coupon on page 74 and send for the FREE Heathkit computer catalog.

To order the correct Heathkit/Zenith software for your H-8/H-19, H/Z-89 or Z-90, or H/Z-100 computers, you must know:

1. The model number of your computer,
2. The disk operating system (DOS) software your computer system operates under, and
3. Whether the disk drives in your computer system uses hard- or soft-sectoring.

If you have any questions about any of the above required information about your computer system, call our TOLL-FREE number – 800-253-7057 – for prompt answers to your questions.



PLANNING/MODELING SOFTWARE

Outstanding Multiplan 16- and 8-Bit Electronic Spreadsheets



- Helps you do corporate budgeting, make product planning and sales decisions, plan investments, formulate a family budget...and more

An aid for both business and personal needs: Multiplan is one of the most powerful modeling and planning tools ever invented.

Easy to learn: You'll be surprised at how quickly and efficiently you'll accomplish various tasks with Multiplan. The two-volume manual consists of a tutorial, giving an overview of the system's features – and a detailed reference guide to those features. Working together with an on-line "Help" key, they'll teach you Multiplan's concepts and uses.

Versatile capabilities: With Multiplan, you can formulate worksheets up to 63 columns wide by 255 rows deep. Cells, rows and columns can be inserted, deleted or moved at another location on the spreadsheet. Enter numbers, formulas or text – numbers from 0.1 x 10⁻⁶³ to 9.999999999999 x 10⁽⁺⁶²⁾, and text up to 150 characters per cell.

To help answer those "what if?" and "now what" questions, Multiplan displays proposed responses to commands and formulas you enter – you decide whether to proceed. Data can also be sorted by column or row – handy when you want to arrange figures from highest to lowest, or in alphabetical order.

You get full file management capabilities: You can even make one or several spreadsheets dependent on a master spreadsheet – perfect for corporate/departmental budgets. And you can exchange information between spreadsheets and other applications programs.

Minimum hardware, software requirements: H-8/H-19 or H/Z-89 or Z-90 with 64K RAM or H/Z-100, two high-capacity disk drives and CP/M-80 or Z-DOS (see below). Printer also needed if hard copy is desired.

HMS-837-7, on soft-sectored 5.25" disk for H-8/H-19, H/Z-89 or Z-90 with CP/M-80, 6 lbs. **250.00**

MS-463-7, on soft-sectored 5.25" disk for H/Z-100 with Z-DOS, 6 lbs. **250.00**

Turn your computer into a versatile electronic spreadsheet with SuperCalc

- Helps planners make better use of time and energy
- Easy-to-read, easy-to-use spreadsheet format

Pencils, paper and a calculator have been replaced: Use SuperCalc to help answer those "what if" questions and "now what" questions. Examine and alter numbers and text within a 63-column by 254-row matrix. Requires H-8/H-19, H/Z-89 or Z-90 with 48K RAM or H/Z-100, one disk drive and CP/M-80 or -85 (see below). If printouts are desired, a printer is also required.

HSC-817-1, HS 5.25" disk for H-8, H/Z-89 or Z-90 with CP/M-80, 2 lbs. **195.00**

HSC-837-1, SS 5.25" disk for H-8, H/Z-89 or Z-90 with CP/M-80, 2 lbs. **195.00**

SuperCalc for H/Z-100 Computers: Uses exciting color graphics displays.

SC-463-1, on soft-sectored 5.25" disk for H/Z-100 with CP/M-85, 4 lbs. **195.00**

OPERATING SYSTEMS SOFTWARE

Industry standard CP/M-80 Operating System

- Over 200,000 microcomputer owners use CP/M-80
- Provides common hardware interface with flexibility

Features: Eight-bit CP/M-80 2.2 opens the door to more languages, utilities and applications software than any other 8-bit disk operating system (DOS).

File, disk management: Fully dynamic named-file allocation, program/peripheral output control, random/sequential data access. BIOS accesses disk drives, accesses peripherals. BDOS minimizes head movement, wear, CCP controls input/output of programs.

Utilities: Two-pass assembler, general-purpose editor, advanced 8080 debugger, file dump/copy, system generation/relocation, file size/usage displays.

Requires: H-8/H-19, H/Z-89 or Z-90 with 48K RAM one disk drive (two recommended). H-8 systems also require HA-8-6 or HA-8-8 Cards (p. 80).

Related educational course: EC-1120 CP/M-80 Course on page 78.

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

HOS-8937-2, on soft-sectored 5.25" disk, Shpg. wt. 5 lbs. **150.00**

HDOS has many functions of larger systems

- Sophisticated system controls your H-8 or H/Z-89
- Designed for efficient use of memory and disk space

Complete operating environment: Heath Disk Operating System (HDOS) 2.0 is a sophisticated system allowing program writing, editing and storage.

Built-in languages: Extended Benton Harbor BASIC 6.0 Programming Language uses simple English statements, familiar math equations to perform operations, solve problems. ASM 8080 Assembly Language with cross-reference feature assembles source programs into listings/object programs.

Built-in utilities: 17 commands manipulate files, select device drivers, debug and run programs, edit text, test disk drives/media and much more.

Requires: H-8/H-19 or H/Z-89 with 48K RAM and one disk drive (system supports all Heath/Zenith disk systems except Z-67; two drives recommended, and may be required to use some other software programs).

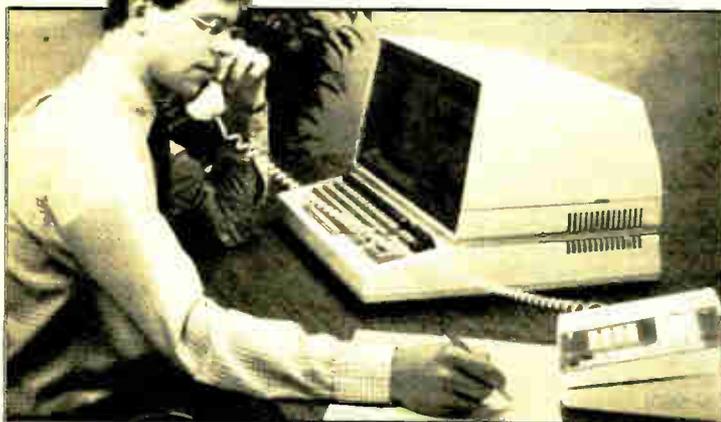
HOS-817-1, on hard-sectored 5.25" disk, Shpg. wt. 9 lbs. **150.00**



Open a Heath Revolving Charge with a purchase of as little as \$100.

Heathkit/Zenith software packages – both 16-bit and 8-bit – can solve your NOW problems

Choose from among these H/Z-100 16-bit and 8-bit software packages to improve your efficiency and productivity with fast and extensively tested software programs.



Advanced 16-bit Z-DOS and standard 8-bit CP/M

- Efficiently handle disk files and run literally hundreds of software programs



Advanced 16-bit Z-DOS: Compatible with Microsoft MS-DOS, incredibly fast Z-DOS has device-independent input/output, advanced error recovery, variable-length records, and full program relocatability. Supplied on a 5.25-inch soft-sectored floppy diskette, Z-DOS lets you run fast 16-bit programs like Multiplan, Microsoft BASIC, and Z-BASIC. Written in easy-to-

understand language, the operating manual begins with a section for beginners which can be skipped by the experienced user.

OS-63-4, Version 1.25, Shpg. wt. 5 lbs. 150.00

Industry-standard CP/M: An 8-bit operating system, CP/M allows access to the largest base of available software programs to date. It is supplied on 5.25" soft-sectored floppy and has most CP/M-80 (p. 75) features.

OS-53-2, Version 2.2, Shpg. wt. 5 lbs. 150.00

BASIC languages for both 16-bit and 8-bit systems

- High-level computer programming languages designed for users with little or a lot of experience



Z-BASIC: A 16-bit Interpreter, Z-BASIC is an extended version of Microsoft BASIC below. With Z-BASIC, beautiful color graphics can be displayed on compatible H/Z-100s or other capable systems. It requires the above Z-DOS Operating System and comes with a clearly written manual.

MS-463-1, Version 1.0, Shpg. wt. 5 lbs. 175.00

Microsoft BASIC: One of the most extensive implementations of 8-bit BASIC available, Microsoft BASIC provides for more highly-structured programming. It features direct access to CPU ports and memory locations, string and numeric constants, a full range of logical and mathematical capabilities, and many program editing functions. Requires CP/M Operating System.

MS-253-1, Version 5.22, Shpg. wt. 3 lbs. 175.00

SAVE \$350 on Software Starter Package!

Save once: You get a big \$350 off the separate prices of the above Z-DOS, CP/M, Z-BASIC, and Microsoft BASIC software.

Save twice: Save another \$200. Receive two coupons, each worth \$100 off any Heathkit/Zenith software costing \$150 or more.

SAVER! HSS-100-1, 20 lbs. \$650.00 separately, **ONLY 300.00**

Save dollars and time with PeachText 5000

- New Peachtree software combines word-processing, financial planning, and simple data base management into a low-price package
- Five business applications programs from Peachtree Software Inc. to get you down to business with your H/Z-100 Computer.

PeachText 5000 Software Package: Saves you time and money by increasing your efficiency and productivity. Available for use with the H/Z-100 and others, PeachText 5000 is a complete and versatile word processing-based software package. It consists of the PeachText word-processor, Spelling Proofreader, the PeachCalc electronic spreadsheet, and List Manager which are all available from a main menu. A Random House Electronic Thesaurus is also part of PeachText 5000 and becomes available by touching one of the H/Z-100's special function keys.

PeachText: A 16-bit word processing program, PeachText features sophisticated print and editing capabilities for creating and manipulating a variety of documents. While it's easy to learn, PeachText is also easy to use, powerful, and versatile. It supports many specialty printers and includes file merging and mail list management.

Spelling Proofreader: Checks for spelling and typographical errors in documents prepared with PeachText. Proofreader comes with a standard 20,000-word English dictionary or specialized dictionaries can be created. It quickly identifies and highlights misspelled words. Typically, a 10,000-word document can be checked in under two minutes.

Random House Thesaurus: Used with PeachText, the Thesaurus provides a handy reference and instant access to more than 4400 indexed words and a dictionary of 26,000 synonyms.

PeachCalc: A powerful electronic spreadsheet, PeachCalc can be used as a financial modeling and planning tool. It offers a large automated worksheet that includes up to 254 rows and 63 columns of text, numbers, and formulas. For quick and accurate financial and mathematical analysis, spreadsheets can be combined using PeachCalc's merge commands. Even material from PeachText or other files can be fed into PeachCalc. Also, blocks of cells can be changed at once instead of a cell, row, or block at a time. PeachCalc can be used for many financial and business applications.

List Manager: A data-base management system, List Manager permits the user to define and create records with up to 14 line items. It provides complete control over the design and use of data files or reference aids such as parts lists and bibliographies. Any file may be presorted and can contain up to 32,765 records depending on disk space limitations. Files can be combined or changed to meet the user's needs. Presorting also allows for faster sorting through its electronic card files.

Extras: One box of ten floppy disks are included FREE with the PeachText 5000 package—a \$50.00 value. Also included is a coupon for four free utility programs worth \$525.00. Send it to Peachtree for a free Access Pak. It includes a program to remove information from Peachtree Series 5 Business Accounting files for use with PeachText 5000. Also included are three file programs to convert Wordstar and EasyWriter files to PeachText format, and VisiCalc to PeachCalc.

Documentation: PeachText 5000 is packaged with a two-volume operating manual that includes a Lesson Plan and a Reference Guide. In addition, instructions are included to get you started right away into PeachText which allows you to immediately benefit from word processing. Peachtree 5000 needs the Z-DOS (left) operating system when used on the H/Z-100.

RS-463-75, PeachText 5000 Package, Shpg. wt. 3 lbs. 395.00

SAVER! Verifiable H-100 kit owners can save \$120 **ONLY 275.00**

SAVE 40% – when you buy both Z-DOS and the PeachText 5000 Software Package with an H-100 Computer

Outstanding value: PeachText, Spelling Proofer, PeachCalc, List Manager, Thesaurus, 10 free floppy disks, information transfer and conversion utilities coupon – plus Z-DOS.

H-100 purchase only: Z-DOS and the Peachtree 5000 software package is only available on the same order with a kit H-100.

SAVER! HSS-100-2, 18 lbs. \$545.00 separately, **ONLY 325.00**

Many more software programs for the H/Z-100 Series Computers are available – including utilities and word processing packages. See pages 74-77 for complete details on these problem solving programs.



Program your computer more efficiently with this Assembly Language Self-Instruction Course



\$49⁹⁵

- Learn to communicate with your computer in a convenient low-level language
- Learn to write faster, more efficient computer programs with Assembly Language

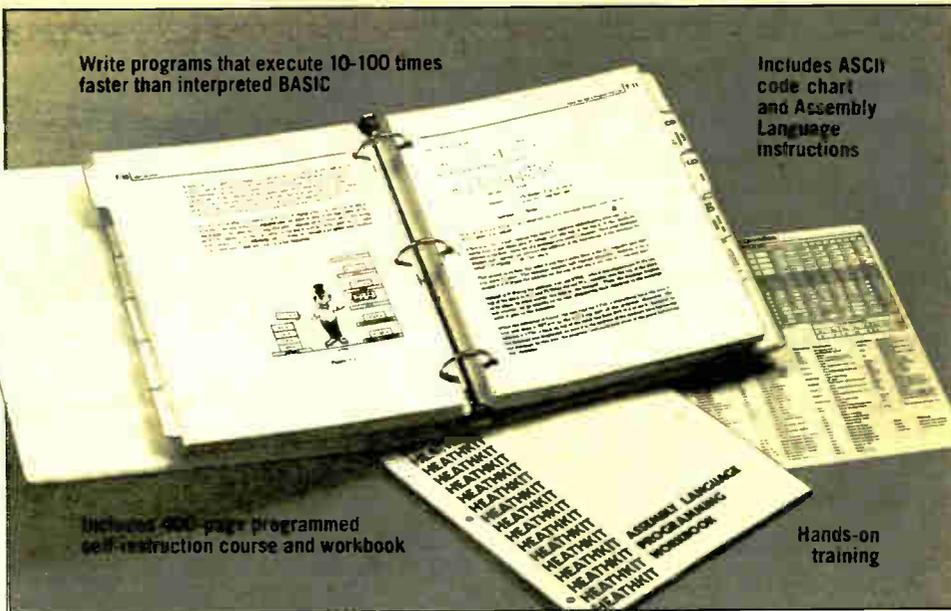
- Clear text illustrates Assembly programming for better understanding of material
- Self-instruction course allows you to learn material at your own speed

Assembly Language lets you do anything on a computer that can be done in other languages.

Low-level language: Assembly language lies between the high-level languages like BASIC and FORTRAN and machine language which is the basic 1's and 0's that a computer understands. It uses labels, operands, comments, and assembler directives. This allows you to create a source code that is easily read and adapted to your computer system. Using a mnemonic for every machine operation, Assembly Language programs require less memory space and run faster because time isn't wasted in interpreting commands.

Efficient memory use: Assembly Language's shorter, more clearly defined codes allow you to store more data in less space. And, execute programs faster—10 to 100 times faster than if the same program were written in the popular interpreted BASIC. Symbolic notation (memory locations represented by figures) and easy to carry out documentation methods make program listings easy to understand.

Course contents: In the Assembly Language Course, you'll learn about flow-charting, device polling, code conversions, masking, subroutines, the 8080 instruction set, input/output routines, and precision math. Reinforcing the programmed-instruction text is a well-illustrated workbook. The workbook provides hands-on experience in Assembly Language programming which requires you to use a computer. In addition, the course includes a special Reference Chart that lists all 244 Assembly Language instructions as well as a complete ASCII code chart.



Includes 400-page programmed self-instruction course and workbook

Includes ASCII code chart and Assembly Language instructions

Hands-on training

Course objectives: After completing this course and its workbook, you'll be able to program your own computer in Assembly Language.

Recommended hardware: To perform the optional experiments in the course workbook, you must have access to a computer.

Computer compatibility: The Assembly Language Course is specifically designed for 8080/8085-based microcomputers that use standard Intel mnemonics. The Assembly Language learned in this course can be used with the Heathkit/Zenith H-8, H-88, HZ-89, Z-89, Z-90, and Z-100 computers. The H-88, H/Z-89, and Z-90 computers use the 8080 subset of the Z-80 microprocessor.

Exam and credit: To earn 6.0 Continuing Education Units (CEUs) and receive a Certificate of Achievement from Heathkit/Zenith Educational Systems, you must pass the optional final examination with a 70% or higher score.

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

Variable-Speed Cassette Recorder speeds learning



\$199⁹⁵

Listen to tapes at up to twice their normal speed

Speed learning: While most people can talk at between 150-175 words per minute, you can hear and comprehend anything said at twice that speed (250-300 words per minute). With the ECP-3803 Variable-Speed Cassette Recorder, you can take advantage of this phenomenon and play cassette tapes faster than normal. This decreases your listening time and actually allows you to concentrate better. Normal high-speed pitch distortion is eliminated electronically. The ECP-3803's speed is adjustable between twice and 80% of normal.

ECP-3803, Shpg. wt. 4 lbs. **199.95**

Microcomputing Course for learning the basics of computers



\$44⁹⁵

- Understand how a computer can be used to solve your problems
- Learn to evaluate computer systems to make the right purchase
- Know how to choose the right software for your needs

Basic computers: Heathkit/Zenith's Microcomputing Course is the ideal starting point for anyone wanting to learn about computers.

This course doesn't require any previous knowledge about computers, electronics, or extensive mathematics. In easy and simple terms, the course begins with what a computer can do. Then the self-instruction textbook and two audio cassettes takes you inside a computer.

Course: In five easy-to-understand units, the different parts of a computer system are fully explained. First, you'll find out how to apply the capabilities of a computer to your specific problems. Then you'll learn about computer hardware to judge how the computer will perform. Next you'll find out how computer system components work to better help you to evaluate a system. Also, you'll see how to choose the right software that will help to solve your problems. The accompanying audio cassettes help to increase your understanding of the course material.

Programming: In the last unit of the course, BASIC Language Programming, you'll learn how to write short software programs. To do this, you'll use the popular programming language, BASIC.

Benefit: These five units make personal computing understandable. It puts the various types of computer systems into perspective so that the beginner can make informed decisions about purchasing his or her own computer system.

Requirements: All that's required is an interest in understanding the many facets of personal computing. All the skills needed to understand the course material are provided. A conventional audio cassette recorder is needed to play the two audio cassette tapes.

Credit: By passing the optional final examination with a score of 70 percent or better, you'll earn 1.0 Continuing Education Unit (CEU). In addition, you'll receive an attractive Certificate of Achievement from Heathkit/Zenith Educational Systems.

EC-1000, Shpg. wt. 5 lbs. **44.95**



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

Learn the industry-standard disk operating system – CP/M-80 – with this course



- Use with an H-8, H/Z-89 or Z-90 – or with any 8080, 8085 or Z-80 microcomputer which runs the CP/M-80 Disk Operating System
- Self-instructional course covers all aspects of the CP/M-80 Operating System in complete detail
- Effective audio-visual teaching method
- Earn valuable Continuing Education Units

CP/M-80 is the industry standard disk operating system: And now, with the Heathkit/Zenith CP/M-80 Operating System Course, even first-time computer users can quickly and easily learn it.

With the CP/M-80 Course, you learn at your own pace: No prior background, or knowledge of Assembly Language, is assumed or required. You start with the basics, and then build upon fact after fact until you're an expert. You'll think you have your very own tutor, right in the room with you.

The Heathkit/Zenith CP/M-80 Course consists of a 500-page self-instructional text and five audio cassettes. In ten units, it covers CP/M-80 2.2 and earlier versions, including built-in and transient commands.

You begin with an introduction to the CP/M-80 Operating System, Unit 1. In Unit 2, Typing CP/M Commands, you'll cover the writing of basic CP/M commands – including the operating system's major control functions – and diagnosing problems from CP/M's error messages. In Unit 3 you learn Built-In Commands, while Unit 4 discusses CP/M's Transient Programs. STAT and CONFIGUR Commands are covered in Unit 5.

In Unit 6 you learn how to use PIP, CP/M's versatile file transfer program, while Unit 7 introduces you to the operating system's resident text editor, ED. Units 8 and 9 expand on ED's capabilities, with the Editing of Existing Files covered in Unit 8 and Advanced ED Functions outlined in Unit 9. The last unit of the course discusses Submitting Command Files.

Upon completion, you'll be able to operate CP/M-80-based applications

Learn the business language – COBOL



- Covers both ANS-74 and ANS-68 versions of COBOL

COBOL is the language of business, today and in the future: Because of its increased efficiency in manipulating large structural data files and greater productivity capabilities, it's widely used in accounting, inventory and other business applications.

With audio-tutorial instructional methods, you'll learn COBOL quickly. Your self-instructional text is full of diagrams, tables, programs and unit tests. A set of nine audio cassettes reinforces each concept as you learn it. You'll cover the basics of encoding, input characteristics, program hierarchy, identification, environment, data and procedure divisions. Both ANS-74 and ANS-68 versions of COBOL are presented in the course.

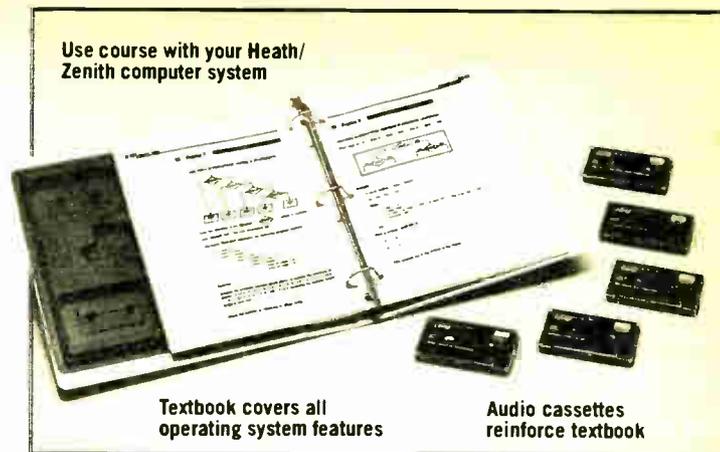
In addition, six practice COBOL programs are included in the accompanying workbook. You can write and run these programs at specified points in the course to help expand your understanding of the language, or wait to perform these exercises until you've completed the entire course. Either way, these practice programs provide valuable hands-on assistance in learning.

Your COBOL Course from Heathkit/Zenith Educational Systems also details program variations, structure and syntax, simple arithmetic statements, comments and diagnostics, advanced arithmetic and control statements, additional data concepts, magnetic tape and disk concepts, and much more.

Learn the language of business: To receive the greatest possible benefit from the Heathkit/Zenith COBOL Educational Course, we suggest that you use an H-8 Computer/H-19 Video Terminal System, an H/Z-89 Computer or a Z-90 Computer. The system should be equipped with 48K bytes of RAM, two disk drives, the CP/M-80 Operating System (page 75) and the Microsoft COBOL Programming System (page 76).

Earn 3 Continuing Education Units (CEUs): To gain valuable recognition of your achievement through this nationally-known method of honoring the successful completion of non-credit adult education courses, pass the optional final examination with a 70% or better score.

EC-1105, Shpg. wt. 7 lbs. 149.95



Use course with your Heath/
Zenith computer system

Textbook covers all
operating system features

Audio cassettes
reinforce textbook

programs – as well as use ED to create and manipulate text files.

Compatible hardware and software: The CP/M-80 Course is designed for use with an H-8/H-19, H/Z-89 or Z-90 computer system with 48K bytes of RAM and the CP/M-80 Operating System (page 75). To gain full benefits, we also recommend using a printer.

Earn 2.5 Continuing Educational Units (CEUs): Pass the course's optional final examination with a 70% or better score to earn this nationally-recognized award of achievement in non-credit adult education.

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

MONEY-BACK GUARANTEE: If you're not satisfied with any Heathkit/Zenith Educational Systems Course, return the course materials and your proof of purchase for a refund of the purchase price.

Learn BASIC – the easy-to-use language



- Learn one of the most popular programming languages for any microcomputer – BASIC
- Heathkit/Zenith makes it easy to learn, while earning valuable Continuing Educational Units
- Easily write your own BASIC Language computer programs for home or business use

Because it's so easy to use, BASIC (Beginner's All-Purpose Symbolic Instructional Code) is one of the most popular programming languages available for microcomputer systems. And now, through the effective, inexpensive self-instructional methods of Heathkit/Zenith Educational Systems, you can learn how to use this versatile language to your maximum benefit.

As always, you proceed at your own pace, step-by-step until you're familiar with all aspects of the subject at hand. You'll learn the standardized words and commands of BASIC, along with the tools of the language – numbers, statements, functions, loops, lists, arrays and strings. Learn to define and plan a program, format and write it, and adapt programs to suit your needs. Experiments give you hands-on experience in writing and running BASIC programs – for full benefits, use of a computer is recommended.

In addition to your programmed-instruction text and workbook, you'll receive handy reference cards with Benton Harbor BASIC statements, ASCII number codes, BASIC direct command statements and a reference chart for math and Boolean algebra operations. When you're done with the course, you'll be able to write BASIC Language computer programs.

Earn 3 Continuing Education Units (CEUs): Pass the BASIC Language Programming Course's optional final examination with a score of 70 percent.

Classroom version also available: See the classroom version of this course, specially designed for instructor-led teaching environments, on page 43.

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

College-Level Examination: Earn highly-valuable college credit for successful completion of this course. For more information see page 31.

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



Microsoft BASIC Programming Course teaches how to write powerful, effective programs



- Learn to write and modify computer programs, using this popular version of BASIC
- Audio-tutorial course uses experiments to give you hands-on programming experience

Microsoft BASIC is one of the most versatile languages available for microcomputers. If you use MBASIC on your H-8, H/Z-89, TRS-80 or Apple computer, this 800-page course will show you how to get the most from this language.

The 12-unit course covers every aspect of Microsoft BASIC programming:

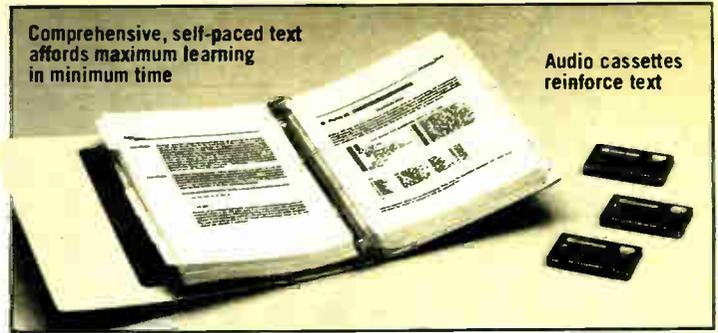
Unit 1 is an Introduction to Computers and Programming — covering computers, programs, data, the computer system and programming languages. **Immediate Mode**, **Unit 2**, discusses arithmetic in BASIC, numeric variables, intrinsic functions and strings. Sequences, branching and loops are covered in **Unit 3, Program Structures**. **Unit 4 has More about Decisions and Loops** — including relational operators, counter-driven loops and nested loops.

Data Structures — including one-dimensional arrays, N-dimensional loops and strings records — are taught in **Unit 5**. User-defined functions and subroutines are covered in **Unit 6, Subprograms**. **Unit 7 discusses Complex Structures** — such as logical operators, multiple branching and structured programming.

The last five units cover operations and extensions available on disk versions of MBASIC. **Major Language Extensions, Unit 8**, teaches program editing; data type extensions; extended functions, operators and statements. **Sequential Disk Operations, Unit 9**, covers program storage, program retrieval and sequential data files. **Unit 10, Random Access Disk Operation**, covers random access buffers and fields — as well as storage and retrieval of numeric data. **Error Trapping and**

Comprehensive, self-paced text affords maximum learning in minimum time

Audio cassettes reinforce text



Memory Conservation are the topics of **Unit 11. Optimization and Machine Interfacing** are covered in the final unit.

This audio-tutorial course utilizes a specially-written text and three audio cassettes, which work together for effective learning and greater retention. Experiments provide extensive hands-on programming practice.

Self-test reviews let you check progress at specified points in the course.

The features of the **Microsoft BASIC Interpreter** (described on page 76) are included, except for the TRON/TROFF debugging utility.

Upon completion, you will be able to write MBASIC programs that instruct a computer to perform specific tasks (sorting, organizing and more).

For full benefit from the course, you must have access to a computer.

To earn 5 CEUs, pass the optional final exam with a 70% or better score.

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

Learn to program in modular Pascal Language



- Pascal is the ideal language for both beginning and experienced program writers
- Our audio-tutorial format shows you how to program in this powerful, modular language with quick results

If you've been around programming languages — or even if you're new to computers — you can learn how to write programs in popular Pascal Language.

The 11-unit self-instruction text completely covers Pascal:

The introduction shows how to identify and write simple Pascal programs. **Unit 2** covers identifying and writing **Self-Contained Procedures**. **Unit 3, Making Decisions**, teaches how and when to incorporate IF...THEN...ELSE and CASE statements in Pascal programs, and how to use Boolean variables. **Unit 4** covers REPEAT...UNTIL, WHILE...DO and FOR loops.

Unit 5 discusses Pascal Data Types and teaches you how to declare your own data types. **Unit 6, Arrays and Character Strings**, shows how to use arrays in solving problems. **More About Procedures, Unit 7**, covers the writing of complete Pascal procedures to perform desired tasks. **Records and Sets** are covered in **Unit 8, Unit 9, Pointers**, covers the difference between pointers, linked lists, stacks, queues, binary trees and statements. **The last unit covers sequential files and standard Pascal files**, showing how to store Pascal data files on floppy diskettes.

This effective audio-tutorial course uses a professionally-written, 500-page self-instruction text and five audio cassettes that work together for an integrated, effective learning experience.

When you complete this course, you'll be able to write modular Pascal programs that instruct a computer to perform specific directed tasks.

Earn 4 CEUs — pass the optional final exam with a 70% or better score.

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

FORTRAN Course teaches science/math language



- Interested in FORTRAN programming? Learn the economical, effective Heathkit/Zenith way
- Audio-tutorial presentation, hands-on programming experiments reinforce learning three ways

FORTRAN Language simplifies complicated scientific and mathematical problem-solving. Using this Heathkit/Zenith course, you'll learn FORTRAN programming fundamentals.

The 11-unit text includes a special **Introduction to Computers**.

Unit 1, Getting Started, shows you how to analyze a FORTRAN program, introduces you to statement types, elements and the character set. **Unit 2** covers **Arithmetic Operations**. **Elementary Input/Output (I/O)** is discussed in **Unit 3**. **Unit 4** covers **Library Functions**. **Other Control Statements** are taught in **Unit 5**. **Unit 6** introduces you to **Arrays**. **Programming Practices** are taught in **Unit 7**. **Unit 8** teaches other **Variables**. **Unit 9** teaches **Advanced Input/Output (I/O)**. **Unit 10** covers **Subprograms**. **Special Input/Output (I/O)** is discussed in **Unit 11**.

This course uses the effective audio-tutorial teaching method, with a 500-page text and six cassettes working together to provide more complete learning.

Interactive hands-on experiments give you actual experience in writing FORTRAN programs — coding forms are included. The text also offers extensive practice in writing FORTRAN programs and using the character set. Self-test reviews let you check your progress at specified points throughout the course.

When you complete this course, you'll be able to write FORTRAN programs that instruct a computer to perform specific tasks.

To get the most from the course, we recommend an H-8 or H/Z-89 with 48K RAM and two disk drives. HDOS or Heath/Zenith CP/M (see page 75) and the Microsoft FORTRAN Programming System (page 76) are also recommended.

Earn 5 CEUs — pass the optional final exam with a 70% or better score.

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

Computer Dictionary is a complete reference source of up-to-date computer terminology

Need a dictionary to understand computer terms? Here's a handy reference book for hobbyists, technicians, engineers, programmers and other professionals who deal with computer-related terms. The EB-1020 Computer Dictionary, from Heathkit/Zenith Educational Systems, is a complete sourcebook of computer terms.

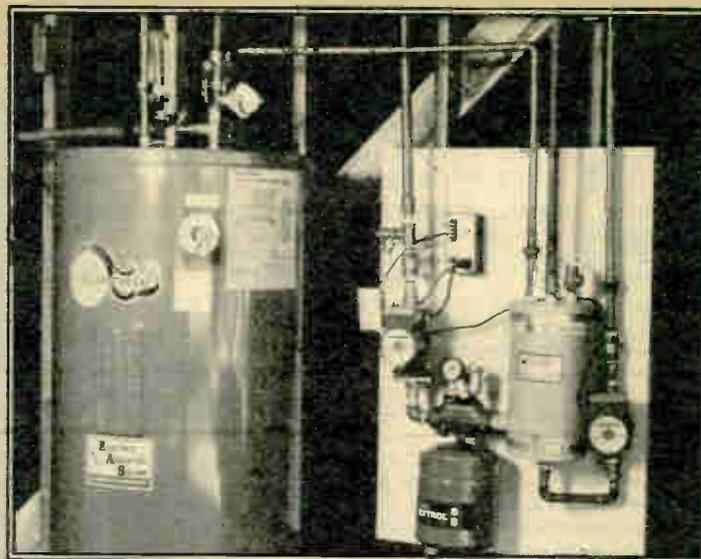
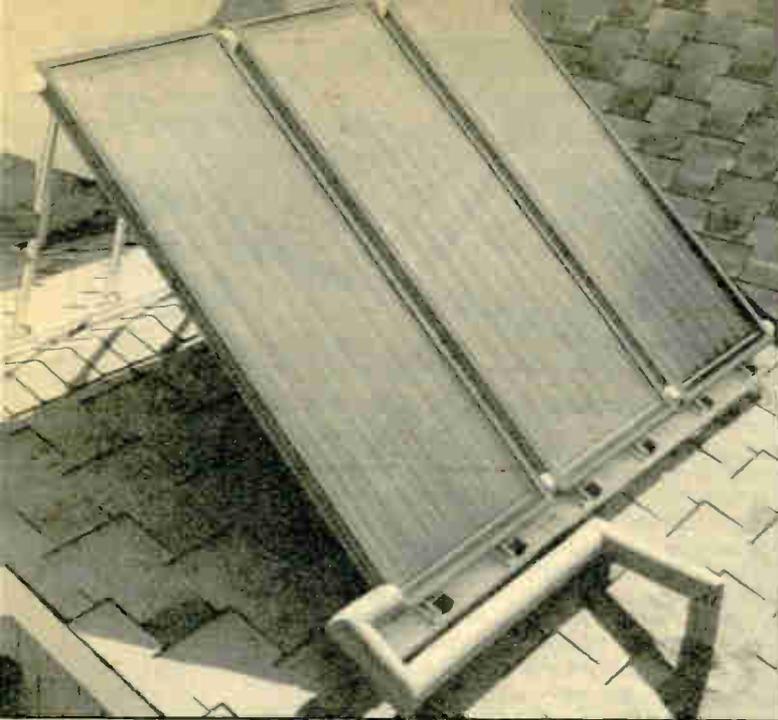
Thousands of definitions: This dictionary contains thousands of com-

puter-related words and phrases, along with complete definitions. Definitions are made clear and explicit throughout the text.

Full of information: Browse through this dictionary and you can learn significant details about the products, procedures, problems and proliferating applications of the microcomputer revolution.

EB-1020, Shpg. wt. 2 lbs. 14.95





SOLAR ENERGY IS ECONOMICAL: Adds more \$\$ value to your home and saves significantly more than other alternate-energy products, with a faster payback than solar heating, photovoltaics or wind-powered generators.

Fight soaring energy costs — install the NS-1100 Solar Water Heater yourself, using Heath quality, Heath expertise and the thorough, step-by-step Heathkit manual!

As low as
\$2339⁸⁵
 for 2-collector system
 (before tax credits)

- New solar panel absorbs even MORE totally cost-free energy
- Current Federal Tax Credits will pay for 40% of the invoice amount; many states, localities offer additional incentives
- Thirty-eight states offer additional tax incentives for solar
- Sized for your family, your home, your U.S. location by Heath
- Designed to save from 50-80% of hot water bill for typical home

- No other Heathkit product pays for itself like the NS-1100!
- Save up to 40% over a comparable dealer-installed system
- Top quality components are carefully matched to work together
- The Heathkit NS-1100-3 Manual Set answers all your questions about locations, installation and operation
- Be recognized as the Solar Authority in your neighborhood

Fight back against soaring energy bills: Hot water makes up a significant part of the average home energy bill. And now, you can cut those energy costs — with the Heathkit Solar Water Heater. This closed-loop system, is designed to save from 50% to 80% of the hot water bill for a typical home.

Solar energy, made economical: Here are two typical examples of how the NS-1100 can save energy and money for you:

City: Charleston, SC. Family Size: Four persons.

A properly-sized NS-1100 system will satisfy 78% of this family's hot water needs.

| | |
|--|-----------|
| Purchase price of two-collector Heathkit Solar Water Heater System | \$2339.85 |
| Less 40% Fed., 25% State tax credits | \$1520.90 |
| Net investment in system | \$ 818.95 |
| Estimated 1st year savings | \$ 394.58 |

City: Portland, OR. Family Size: Five persons.

A properly-sized NS-1100 system will satisfy 74% of this family's hot water needs.

| | |
|--|-----------|
| Purchase price of three-collector Heathkit Solar Water Heater System | \$3154.85 |
| Less 40% Fed., 25% State tax credits | \$2050.65 |
| Net investment in system | \$1104.20 |
| Estimated 1st year savings | \$ 459.26 |

(Consult the IRS, your state tax department and/or an informed tax preparer to learn about tax credits applicable to your state.)



Considering active and passive solar space heating, solar electricity, solar domestic water heaters and wind-generated electricity, the Heathkit Solar Water Heater is the most energy-conscious product for the 80's. As the cost of fossil fuels continues to rise, all forms of alternative energy will become even more promising. A good economic case can be made for the Heathkit Solar Water Heater anywhere in the United States, as available tax credits make payback on the system reasonably short.

Designed as a complement to your existing water heating system: The NS-1100 is designed for use with your conventional water heater.

Customized for your home: Each Heathkit Solar Water Heater can be properly sized for your climate, home size, family and hot water requirements — by a computer program run at your nearby Heathkit Electronic Center (also available by calling Heath's Marketing Services Dept. at 616-982-3411).

We offer the highest quality solar energy components on the market: They're designed to meet our exacting standards. And you can be sure we'll be around after the sale for service and replacement parts — no worry about dealing with a small, under-capitalized company.

Quality, priced to save you money: Because we've selected the best solar energy components available for the NS-1100. You probably cannot hire a contractor to install a system as good. In addition, when you choose the NS-1100 for installation in your home, you can save up to 40% in purchase price over the cost of a comparable dealer-installed system.

Preheats cold water: The NS-100 preheats water going to your conventional water heater — so instead of cold water, the conventional system receives solar-heated water. Solar preheating dramatically lowers the energy requirement of the conventional water heater, allowing it to become a holding tank to keep water at the desired temperature. The conventional system also serves as a back-up to the solar system during long periods of minimum sunshine.



It's a game. We changed our collector.

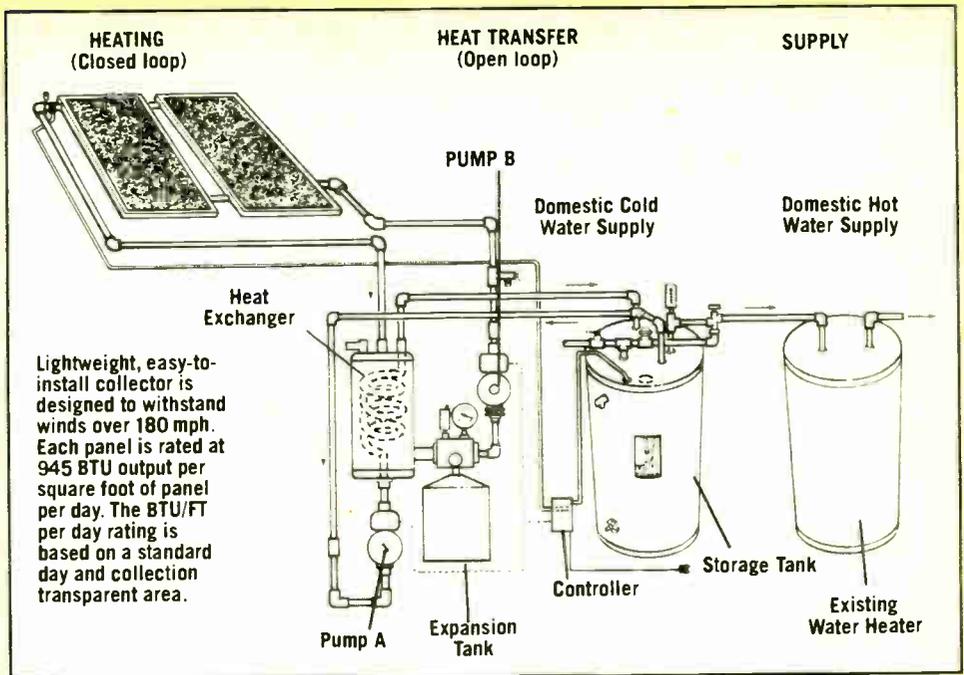
Something for us...

We've changed the glass. It's *Solatex I*, which exhibits a heat transmissivity factor greater than 90% - the home solar industry's highest. We believe this will keep us far ahead of the ratings game and assure us of a certification level equal to or greater than the very best collectors now available. The absorber plate is solid copper. Fins are high-frequency welded to their tubes for a copper-to-copper bond, resulting in the most efficient and greatest possible heat transfer to your system.

Something for you...

The lighted aperture area is now 17% bigger. With only a 3.6% increase in price, we've added 3 square feet to the size of your new NS-1100-12 collector, and upped the total to a generous 22.2 square feet of sun-catching aperture overall - making this collector the best dollar value we've ever offered.

It's even prettier... The natural aluminum framing of our previous collector has been replaced by an attractive bronze acrylic finish on the frame and backsheet. It blends in better with most roofing for a more aesthetic, eye-pleasing appearance.



Lightweight, easy-to-install collector is designed to withstand winds over 180 mph. Each panel is rated at 945 BTU output per square foot of panel per day. The BTU/FT per day rating is based on a standard day and collection transparent area.

Designed for maximum water heating efficiency: In the NS-1100's custom-designed heat exchanger, both fluids (water and the heating fluid) are moved through the exchanger by separate pumps. The active flow of both fluids increases the system's water heating efficiency.

The Heathkit NS-1100 Solar Water Heater includes the components you need for kitbuilding and installation - except 3/4" copper pipe, insulation and solar fluid: The illustrated Heathkit manual lets you build the NS-1100 system in an easy-to-follow, step-by-step manner. The kit even permits you to practice soldering copper pipe, to help you gain confidence - even if you've never worked with copper pipe before.

This is a carefully integrated system, designed by the kit experts - not just a collection of components from many different sources. All of the NS-1100's components are among the best in performance quality offered by the solar energy industry. They're engineered for easy installation and designed to work together for many years of trouble-free service.

The NS-1100 meets or exceeds applicable regulations of these organizations:

1. International Association of Plumbing and Mechanical Officials
2. California Energy Commission
3. Southern building codes
4. Dade and Broward Counties, FL 180 mph Live Wind Load Requirement
5. The Florida Solar Energy Center

Build in as little as three weekends: Only common carpentry and plumbing tools are required to build and install the NS-1100 Solar Water Heater in your home. The complete, step-by-step Heathkit manual allows you to plan the kitbuilding and installation of the NS-1100 ahead of time.

The manual tells you everything you need to know to accomplish kitbuilding and installation of the NS-1100 Solar Water Heater System, including plumbing - which enables you to build and install it in as little as three weekends. Even if you've never worked with copper pipe before, you'll master the soldering of copper elbows and pipe in no time - with the help of the Heathkit manual's clear, concise instructions.

Technical consultants are available to answer questions: Our unique personal consultation service (available at your Heathkit Electronic Center, by telephone or by mail), plus the thorough, detailed kitbuilding and installation manual, assure you of the Heathkit pledge - "We won't let you fail."

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 available - and the payback timetable you can expect - from the system.

Heathkit Solar Water Heater Components

SAVE 40% on NS-1100-3 Manual Set for Heathkit NS-1100 Solar Water Heater System: Written for people with little or no previous experience. Has everything you need to know to install a customized NS-1100 Solar Water Heater System - including complete site evaluation, installation and operation information. Solar shade finder (included with the Manual Set) helps you find a site where no trees, buildings or other obstructions will block your solar panel from full sunlight. The price of this Manual Set is deductible from the system price when you purchase an NS-1100 Solar Water Heater System.

| | |
|--|------------------------------------|
| SAVER! NS-1100-3 , Shpg. wt. 3 lbs. | Was \$25.00, NOW ONLY 15.00 |
| NS-1100-1 , Plumbing Hardware Pack for NS-1100 systems, 65 lbs., Motor Freight Collect | 589.95 |
| NS-1100-12 , 3' x 8' Solar Collector Panel and Mounting Hardware, 136 lbs., Motor Freight Collect | 575.00 |
| NS-1100-4 , 80-Gallon Capacity Solar Tank, 350 lbs., Shipped Motor Freight Prepaid | 429.95 |
| NS-1100-5 , 120-Gallon Capacity Solar Tank, 447 lbs., Shipped Motor Freight Prepaid | 599.95 |
| NS-1100-6 , 5 Sq. Ft. Heat Exchanger, 18 lbs. | 169.95 |
| NS-1100-7 , 8 Sq. Ft. Heat Exchanger, 20 lbs. | 189.95 |
| NS-1100-8 , 8 Sq. Ft. Double-Walled Exch. (reg. in Oregon, Los Angeles, Memphis area), 24 lbs. | 239.95 |

Tax credits can help pay for your NS-1100 system. Don't delay - federal incentives are still in place!

A Federal income tax credit of 40%, plus state tax credits (if available), will also help you pay for your NS-1100 Solar Water Heater Kit. (This credit is not a deduction - it means you receive back 40% of the system cost.) Refer to IRS Form 5695 and Publication 903 (latest available revisions) - included with the NS-1100-3 Manual Set - and consult IRS or an informed tax preparer.



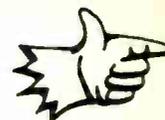
Open a Heath Revolving Charge with a purchase of as little as \$100!

Don't miss out on these fine heirloom furniture savings and values during the Heath Craft Woodworks' **FALL INVENTORY REDUCTION SALE!**

SATISFACTION GUARANTEED: If you are not completely happy with everything that comes in your kit, return it in original condition within 30 days for a full refund. Remember our pledge: "We won't let you fail!"



Now's the best time to buy the furniture you've been waiting to afford! Classic beauty, rich hues, delicate grain — the highest quality hardwood kits from the world's most respected name in build-it-yourself products ...Heath Craft Woodworks. Don't miss out!



ALL QUANTITIES LIMITED! FIRST COME, FIRST SERVED!

1 A spectacular value when you consider the elegance of our Grandfather Clock

Stands 76½" tall. Solid ¾" red oak case with Carpathian elm burl overlays, polished brass pendulum and German clockworks, moon dial, beveled glass key-lock door and selectable Westminster, St. Michael or Whittington chimes.

Kit F-2530, Shpg. wt. 203 lbs. **895.00**

2 SAVE 30% and more on three-instrument Oesktop Weather set with choice of dials

German-made, brass-faced barometer and fahrenheit/celsius thermometer included in each, plus choice of either hygrometer (measures and displays humidity) or quartz-accurate clock.

Kit F-2534-C, with clock, 6 lbs. **NOW 69.95**

Kit F-2534-H, with hygrometer, 6 lbs. **NOW 59.95**

3 SAVE 45% on secure Oak Gun Cabinet

Stores eight shotguns or rifles safely in locking display case with felt-covered stockrests. Lower area stores ammunition, cleaning kits, etc.

Kit F-2526R, 182 lbs. . . **Was \$549.95, NOW 300.00**

4 Value-priced Oak Schoolhouse Clock makes a nostalgic addition to any room

Has 8-day German brass keywound movement, resonant spiral gong chime for hour and half-hour. "Regulator" base comes preassembled. Features oak cabinet, octagonal dial ring, polished convex dial glass and enameled metal dial face.

Kit F-2531, Shpg. wt. 25 lbs. **129.95**

5 Explorer's Globe reveals the world

Bold Federalist design has fluted columns, ring and sunburst base of solid oak. Rolls easily on casters. Detailed mapping, reflects recent boundaries.

Kit F-2529, Shpg. wt. 38 lbs. **189.95**

6 SAVE 50% on 18th-Century Bachelor Chest in mahogany Chippendale style

Sturdy dovetailed oak drawers and finely detailed decorative pieceery with bead moulding, authentic pulls. Practical beauty for dining room or den.

Kit F-2544, 124 lbs. . . **Was \$599.95, NOW 300.00**

7 SAVE 50% on Queen Anne Tea Table and serve refreshments gracefully

Has preassembled top of rare book-matched crotch mahogany, traditional pull-out sides, cabriole legs ending in art nouveau 'spoon' feet.

Kit F-2555, 39 lbs. **Was \$379.95, NOW 189.95**

8 SAVE 45% on this Oak Curio Cabinet and display your fine collectibles

Has durable ¼" plate glass shelves with plate groove. Solid oak construction with end frames, cornice and door muntin preassembled. Lockable.

Kit F-2526C, 212 lbs. **Was \$599.95, NOW 325.00**

9 SAVE 50% on charming Hobby Horse for a playful child or grandchild

All solid maple with padded saddle, flowing mane, plush tail and gentle rockers. Makes a happy gift.

Kit F-2560, 29 lbs. **Was \$199.95, NOW 99.95**

SAVE EVEN MORE on these Heath Craft Woodworks furniture kits from the Heath Craft Catalog No. 403...**NOW MARKED BELOW COST FOR INVENTORY CLEARANCE!** Limited Quantities!

Solid Oak Arm Chair has smooth steam-bent arms, lumbar support, with a deep pressback pattern.
Kit F-2503, 29 lbs. **149.95**

Solid Oak Side Chair has full saddle-carved seat, pressback pattern and comfortable lumbar support, too.
Kit F-2504, 26 lbs. **129.95**

Mahogany & Brass Butler Table has graceful fold-up leaves, crotch-wood book-and-butt preassembled top.
F-2540, 40 lbs. **149.95**

Oak Octagonal Dining Table is 48" wide with 16" leaf extension to 64." Has octagonal center column, claw-and-ball legs and floor-adjust level.
F-2502, 131 lbs. mtr. frt. . . **295.00**

Oak Hall Mirror has beveled plate glass, brass-railed shelf and two coat hooks. 17" H x 36" W x 3" D.
F-2506, 19 lbs. **59.95**

Oak Book Rest supports large tome at comfortable viewing angle on four winding rope-turn legs.
F-2507, 13 lbs. **39.95**

Solid Oak Rolltop Desk Chair has swivel-tilt, four-legged base, brass casters, wrap-around arms and extra deep saddle seat.
F-2510, 46 lbs. **149.95**

Solid Oak Oval Mirror mounts horizontally or vertically. 20" x 30".
F-2514, 25 lbs. **49.95**

Honduras Mahogany Serving Tray is a replica of 18th-century classic. Easy, enjoyable 1-evening kit.
F-2551, 4 lbs. **24.95**

Cherry Shaker Trustee's Desk with walnut accents has brass-hinged lid, underside drawer, spacious interior with removable shelf.
F-2570, 48 lbs. **89.95**

Shaker Desk Stool has 12 dowel-jointed cherry rails, woven seat.
F-2572, 11 lbs. **29.95**

Shaker Message Board has tack board, slate blackboard, tray for holding chalk and tacks.
F-2573, 6 lbs. **19.95**

Shaker Wall Shelf completes this authentic cherry group; has three pegs, two shelves. Very useful.
F-2574, 6 lbs. **19.95**

Brass & Glass Square Cocktail Table with ¾" plate glass measures 16" x 38" x 38" H, W, L.
F-2525, 125 lbs. mtr. frt. . . **149.95**

Brass & Glass Rectangular Cocktail Table has same hand-buffed brass, legs ending in graceful cabriole foot. Measures 16" x 24" x 48".
F-2521, 103 lbs. mtr. frt. . . **149.95**

Brass & Glass Console Table is ideal behind a couch, in an entryway or dining room. Measures 25" H x 16" W x 48" L. Elegant and versatile.
F-2522, 77 lbs. mtr. frt. . . **149.95**

Fanback Windsor Arm Chair is made of three wood species: ash upper, pine seat and maple legs. Full of authentic touches of detail.
F-2511, 25 lbs. **69.95**

Early American Oak Candlesticks accepts standard size candles; makes a perfect gift all year.
F-2587-K, 2 lbs. **9.95**

Imported Mahogany Candlesticks of same Early American design.
F-2587-M, 2 lbs. **9.95**

Oak Treasure Box has hundreds of imaginative uses in a home. Has adjustable dividers, two-position accessory tray in a 2½" H x 10" W x 8" D enclosure. Nice gift, too!
F-2588, 10 lbs. **19.95**

All kits include everything you need: manual, precut parts, hardware, glue and sandpaper!

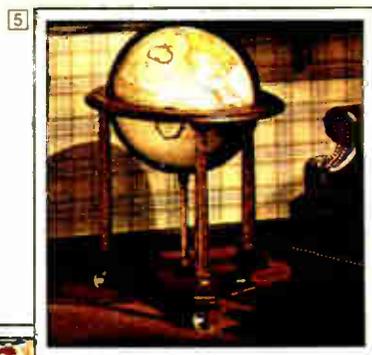




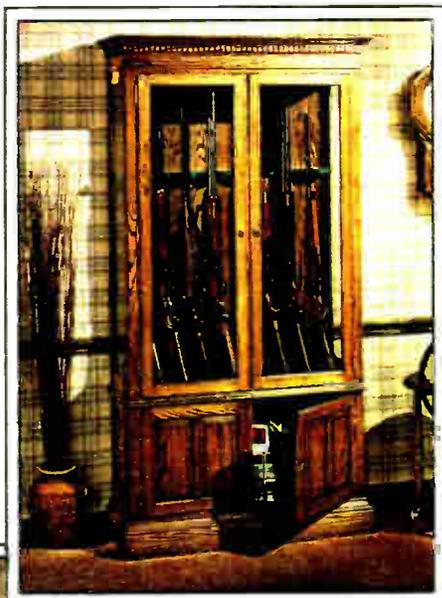
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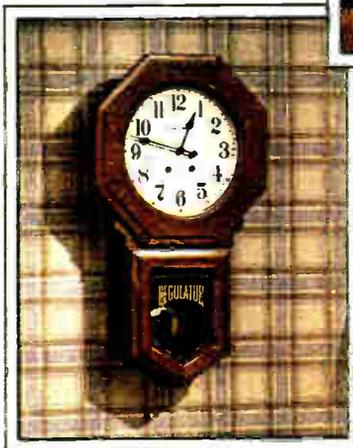
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8



Natural Finish (on Oak)
Kit F-2599-2, Medium,
Shpg. wt. 2 lbs. \$7.95



Walnut Finish (on Oak)
Kit F-2599-7 Medium,
Shpg. wt. 4 lbs. \$12.95



Golden Oak (on Oak)
Kit F-2599-4 Medium,
Shpg. wt. 4 lbs. \$12.95



Colonial Cherry (on Cherry)
Kit F-2599-11 Medium,
Shpg. wt. 2 lbs. \$12.95



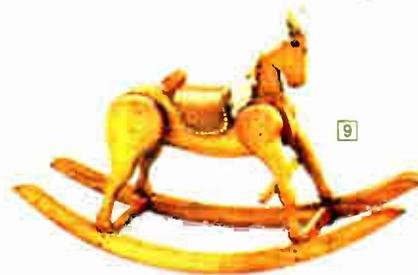
Mahogany (on Mahogany)
Kit F-2599-5 Medium,
Shpg. wt. 4 lbs. \$12.95



Dark Antique (on Oak)
Kit F-2599-10 Medium,
Shpg. wt. 2 lbs. \$12.95

WE MAKE OUR KITS SO EASY TO FINISH!

Our specially-formulated paste stains and varnishes go on so beautifully with just a soft cloth—no mess or mistakes! Each finishing kit is complete with paste stain, varnish (dries dust-free in 2 hours) and a detailed instruction book with helpful hints and tips. We won't let you fail!



9



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

Pro-Series Super High-Fidelity Components. They stand at the summit of audio technology — designed for those who insist upon studio-quality sound reproduction.

The Pro-Series is Heath's finest audio line, with exceptional design features unheard of in system components at this price. Absolutely state-of-the-art electronics and our 'listening awareness' ingenuity deliver a rich, authentic sound that will turn your room into a concert hall, and reflect your quest for excellence in musical-appreciation engineering.

1 NEW! Nikko ND-1000C Cassette Deck with Dolby C noise reduction is a studio-quality performer

Electromagnetic properties differ from tape to tape. This is true not only for different types of tape but also for different brands of the same type. The microcomputer-based Tape Evaluation and Control System of the ND-1000C optimizes bias and sensitivity for any tape you elect to use. At the touch of a button, each recording parameter is automatically adjusted to extract the optimum level of playback performance from any tape formulation. Your new recordings will yield extended flat high-frequency response without compromising their distortion or dynamic range specifications.

Feather-touch, IC-logic tape transport controls allow 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 noise reduction, two mic inputs, headphone jack and bargraph LED peak level meters. In all, a fully compatible tape recording system worthy of the audio artist hidden in all of us! Manufacturer's suggested retail: \$630.

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 'heart' of a powerfully-endowed stereo music system, the AJ-1600 AM/FM Stereo Tuner boasts a set of outstanding specifications and performance characteristics. For prime reception, it has digital frequency display and center-tune meter for the most exact tuning and a selectable wide/narrow IF bandwidth for extremely low interference distortion in normally congested station areas. An RF input attenuator reduces overload and cross modulation, while a mute switch can eliminate interstation hiss. A switchable signal strength/multipath meter assures precise antenna orientation and maximum reception of the broadcast signal. Music comes through with brilliant clarity.

The Tuner's significant specifications include a sensitivity of 1.8 μ V (mono) and 3.5 μ V (stereo) for clean, crisp realization of weak or 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 test will convince you of its worth.

Kit AJ-1600, Shpg. wt. 25 lbs. 449.95

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 Preamplifier 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 Preamplifier gives you absolute mastery over a multitude of source inputs without the introduction of audible 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 ability to listen to any source while copying; separate bass and treble controls for each channel, with dual turnover points for precise tone adjustment and bypass. With two-level high and low filter switches, a continuously variable loudness control, 0/20/40 dB switchable muting, four speaker capability and a six-position mode selector, 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



Handsome optional oak-finished cabinets and solid oak end panels for Heathkit Pro-Series Audio Components (except the AA-1800) are listed and sold separately for each unit.

4 10-Band Octave Equalizer alters tonal parameters

Engineer records, tapes and FM broadcasts to your creative taste by adding the Pro-Series Equalizer to your rack. It's the only system accessory that can dramatically enhance every other component's performance and improve your environmental acoustics (without contributing noise) for less than the cost of a good set of speakers.

Ten ISO centered frequency-band slide controls for each channel give you octave-by-octave adjustability over the entire audio spectrum. They let you eliminate 'live' and 'dead' room spots for smooth, flat-graph characteristics. You'll notice right away it 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 sophisticated mode/monitor switching combination allows you to equalize, monitor, record or bypass without rearranging any connections. 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

5 Active Audio Processor increases your dynamic range

Dynamic range is to music what perspective is to painting or photography. It gives music 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. Music comes through with added realism, better definition and lower background noise while maintaining full response and ultralow distortion — even at high volume levels. A noise reduction circuit sifts out up to 10 dB of noise from records and hiss from tapes, effectively increasing your system's total dynamic range by up to 18 dB. A switchable 7 kHz linear-phase filter reduces high frequency noise.

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

Kit AD-1706, Shpg. wt. 18 lbs. 299.95

AEA-1800-2, Shpg. wt. 6 lbs. 34.95

6 Variable Electronic Crossover extends bass response

Add a separate bass channel to your system! Used with a Subwoofer such as the AS-1320 (pg. 89), this component gives more accurate crossover alignments 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 superior imaging. Outputs for stereo, monaural and bridged hookup let you 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 with lower distortion. Has bass level control, crossover bypass switch and a 15 Hz 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, 177 lbs. Motor Freight Collect 319.95

7 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 readout 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 blow your tweeters. When the 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 restricted meters.

Kit AD-1701A, Shpg. wt. 15 lbs. 199.95

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



Onkyo direct-drive fully automatic turntable

Now, a high-quality turntable is within anyone's reach. 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 cartridges (described below), you can enjoy peerless audio playback pleasure. See page 90 for a better look, and a sound audio improvement.



Build the finest high-level Stereo Power Amplifier

250 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.025% T.H.D. FROM 20 HZ TO 20,000 HZ

The phenomenal dynamic range of new audio sources requires more power and headroom to faithfully reproduce the full 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 the speaker to dissipate twice the normal heat.

The Pro-Series AA-1800 Amplifier has the necessary power to scrupulously reproduce all of your music from tape, disc, or FM dial, with sound peaks that would ordinarily be crushed by less capable amplifiers. It'll give you more power and transient 3 dB dynamic headroom to carefully duplicate every detail and multiply your listening pleasure without introducing noise into the experience. Hum and noise is a full 85 dB down, with a T.I.M. of less than 0.03%. Audiophiles will find accurate, clearly-defined music in every play.

A patented protection system double-safeguards your speakers from damaging input signals. Special overload and high-frequency cut-off circuits, a thermal circuit breaker and a turn-on/turn-off delay circuit also protect your speakers from destructive voltages. Massive heat sinks cool the electrical network while twin front panel 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. Inputs, level controls, speaker outputs and line fuse are mounted 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, it's price is a bargain."

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

One of the world's very finest audio pickup devices

Dynavector Ruby Moving-Coil Cartridge has a square 2.3 mm ruby cantilever for maximum rigidity and unsurpassed groove-to-coil signal transmission. Requires AP-1800-type Preamp (pg. 86). Engineered to match ultra low mass tonearms.

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



Pro-Series Rack combines beauty and convenience

Put your Pro-Series audio equipment together in a portable, space-saving rack, so all components are within easy reach! Comes with dividers for storing records and top shelf for turntable. Has 4 locking swivel casters for quick mobility. Handsome walnut veneer side panels will add contemporary taste to any room and a unified look to a set of components that mirror your exceptional taste. EIA standard rack is 43½" H x 21½" W x 18" D.

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

SAVER! Turntable & Cartridge Systems

SAVE \$40! Onkyo CP-1130F turntable with Dynavector Ruby cartridge (above, p. 90).

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

SAVE \$20! CP-1130F with Shure V-15 Type V.

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



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

Versatile Mono Amplifier Kit



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 source (ceramic phono, mono AM or FM tuner, tape player, microphone, etc.) and amplifies it cleanly for fuller sound. Features rear speaker terminals and input jack; front panel has tone, volume control and headphone jack. Fused 120/240 VAC. 2 3/8" H x 7 3/8" W x 5 1/2" D.

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



Onkyo memory turntable

- Audiophile specs and features
- Straight, low-mass tubular tonearm
- Anti-resonant, four layer cabinet with triple-insulated suspension



Sleek Onkyo CP-1130F

turntable features two-speed, microcomputer-controlled direct drive with fully automatic operation. Soft-touch solenoids control Search, Cue, Memory Repeat and Play modes with $\pm 3\%$ variable pitch. Has 0.025% WRMS wow & flutter. >72 dB DIN-B s/n ratio and anti-skating. Separate DC electronic servo motors drive tonearm and diamond-polished, diecast aluminum platter. SAVE \$40! Buy the ACS-1130 Turntable/Dynavector System (cartridge described below, and offered with system on p. 87). ACP-1130, Assembled, Shpg. wt. 15 lbs. 249.95

Highly-refined cartridges

Dynavector Karat Ruby

moving-coil cartridge is acknowledged as one of the world's very finest with wide 20-50,000 Hz response and superior tracking ability. Has 0.2 mV output, >20 dB separation at 1 kHz. **SAVE** — buy this renowned cartridge with Onkyo CP-1130F memory turntable (above) as a money-saving system (p. 87).

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

NEW! Shure V-15 Type V with Dynamic Stabilizer has 10-28,000 Hz response, 3.2 mV output, >25 dB separation and 1.0-1.25 gm tracking force on a hyperelliptical diamond. Mfg's price: \$250.

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

AUDIOPHILES: Take valuable advantage of our cost-saving turntable and cartridge systems on page 87. Attain the highest fidelity possible with either of these performance-matched pairs and hear new artistry in the grooves of every record you play!

90/VIDEO AND STEREO HIGH FIDELITY

Home/Remote Video Recording System makes you the director

Producing the professional look and feel of high-quality home movies has never been so easy. With a Color Video Sound Camera, you can personalize your TV viewing by making video tapes with audio added simultaneously. Record it all on reusable cassettes that require no processing time or money. See what you're shooting by monitoring TV or the electronic viewfinder. If you don't like what you see, rewind the tape and try it again! At home or away, video is the way to capture more fun.

This compact, easy-to-use format gives faithful color reproduction and extremely high resolution. Automatic exposure and gain controls yield stable operation over a wide lighting range. Low power consumption prolongs battery life when used with a portable VCR. Includes multi-function electronic viewfinder, lens cap, earphone, input for external mic and 15-pin cable.

GRZ-1600, 9 lbs. Was \$975.00, NOW ONLY 799.95

AC Power Supply Adapter provides 12 VDC to camera if not used with GDZ-9800. 33-ft. cable.

GRZ-1600-1, Shpg. wt. 8 lbs. 99.95

Optional AC Power Adapter

Camera and viewfinder weigh 5.4 pounds



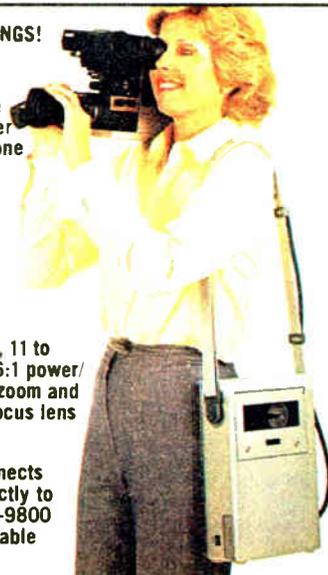
BIG SAVINGS!

Sensitive condenser microphone

Auto/manual iris control

Has f1.4, 11 to 70 mm 6:1 power/manual zoom and macro-focus lens

Connects directly to GDZ-9800 Portable VCR



Save \$100 on a complete Beta system! Includes the GDZ-9800 Portable Video Director Tape Deck, Matching GDZ-9850 AC Tuner/Timer and GRZ-1600 Deluxe Color Video Camera. Costs \$1849.85 separately.

SAVER! GDS-9800-1, 49 lbs. 1749.85

Dual-purpose Portable Video Director frees you to create at will



Zenith's brilliant new portable VCR system is rated 'one of the very best' by several independent testing laboratories. At 11.5 pounds, including cassette and optional battery pack, the recording deck will travel anywhere you can to deliver flawless and fatigue-free Beta performance.

CLEAR frame-by-frame and multi-speed playback features let you study every aspect of a professional golfer's swing or the nuances of acting expression, virtually interference-free in Beta III.

Teamed with the optional Tuner/Timer, it will automatically record from TV and put a multitude of exciting special effects for playback and editing at your fingertips. A 14-day, 4-event programmer gathers your favorite shows for later viewing. Tuner/Timer powers the GDZ-9800 at home and

will charge the Battery Pack, OR use the 9852 to power your 9800 and recharge the batteries.

GDZ-9800, 13 lbs. Was \$989.95, NOW ONLY 774.95

GDZ-9850, AC Tuner/Timer and wireless Remote. (needed if not purchasing GDZ-9852).

Shpg. wt. 10 lbs. 274.95

GDZ-9851, NiCad Battery Pack, 2 lbs. 49.95

GDZ-9852, AC Power Supply. (needed if not purchasing GDZ-9850), Shpg. wt. 7 lbs. 139.95

Zenith Video tapes

| Video tapes | Beta II | Beta III | Wt. | Price |
|--------------------|------------|------------|-------|-------|
| GDZ-9700-5 (L-830) | 3 1/2 hrs. | 5 hrs. | 1 lb. | 15.50 |
| GDZ-9700-4 (L-750) | 3 hrs. | 4 1/2 hrs. | 1 lb. | 13.00 |
| GDZ-9700-3 (L-500) | 2 hrs. | 3 hrs. | 1 lb. | 10.00 |



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

The telephone in a TV — a System 3 exclusive with quality 25" family-sized color picture

- Custom installable, or with your choice of three beautifully styled cabinets. Best savings on kit/cabinet systems, like the Large Classic, at right
- All the amazing picture-improving benefits of System 3 technology, plus an inexpensive option of Advanced Space Phone convenience, too
- Time Control Programmer can be set to turn the TV on and off at any pre-determined time once in every 24-hour period, and remotely activated

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 vibrating, spurious color and makes picture detail 'pop out' sharp and clear with a lifelike degree of clarity found previously in only the most expensive, professional-quality video monitors. Our Tri-Focus picture tube has three focusing actions — one more than ordinary tubes for a cleaner, more brilliant image. The 100% modular chassis design of the GR-2501 guarantees outstanding reliability by using fewer interconnections, with all modules 100% pre-tested and aligned before you unpack the kit.

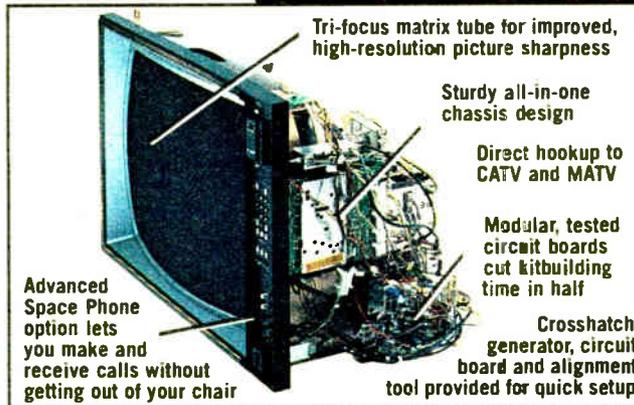
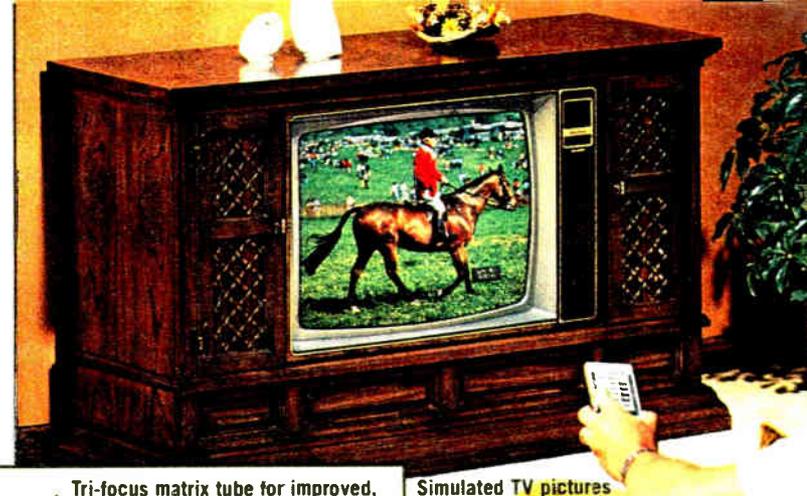
Like a chromatic control center in your TV set, the sophisticated *Color Sentry* combines 8 automatic picture and color sub-systems for magnificent viewing pleasure. It maintains accurate color level, tint and contrast — even adjusts the picture brightness as room lighting changes. One button does it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

A sharpness control lets you adjust the GR-2501's level of picture definition. Advanced digital circuits scan and lock the broadcast signal, eliminating any kind of vertical and horizontal hold controls. A no-wear, quartz electronic tuning system seeks out and fine tunes the exact frequency. Solid-state automatic fringe-lock circuitry provides unshakable picture stability on fringe area reception, while a phase-locked AFC switch 'pulls in' off-frequency signals from cable or master antenna systems and TV games. Altogether, the most impressive picture you can build!

Your GR-2501 comes with Computer Space Command Remote Control for scanned or direct access channel selection, on/off and variable volume, display of channel with current time, plus check or activation of the preset Time Control Programmer and using the Advanced Space Phone. An easy-to-read, on-screen channel/time display appears briefly when channels are changed, or keyed from set or remote control. Expanded 112-channel tuning capability lets you select from 42 cable stations 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 re-program the remote to redial automatically. The set itself works like a speaker phone so the whole family may participate in conversation. And if you don't want the other party to hear what's being said in the room, there's even

As low as
\$649⁹⁵



Tri-focus matrix tube for improved, high-resolution picture sharpness

Sturdy all-in-one chassis design

Direct hookup to CATV and MATV

Modular, tested circuit boards cut kitbuilding time in half

Crosshatch generator, circuit board and alignment tool provided for quick setup

Advanced Space Phone option lets you make and receive calls without getting out of your chair

Simulated TV pictures

Easy-to-use control panel gives you the ultimate in TV viewing convenience

Switch mutes the ring of Advanced Space Phone

Blinking light quietly signals incoming call

Set channel scan to bypass any unwanted channels

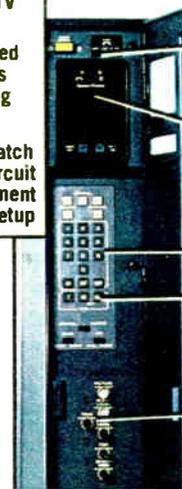
Setting on-screen digital clock to display correct time is easy, too

Picture, color adjustments



Remote Control operates Advanced Space Phone option

Display time, change channels and mute sound



a Mute/Privacy button you can touch for complete discretion.

Two 9" oval mid-range woofers and two 2½" tweeters provide rich, four-speaker FM sound to every channel. It surrounds and enhances the picture with 'you are there' presence and thrilling aural detail. An audio output jack with tone control interfaces the TV soundtrack to your personal stereo system for the most realistic experience. Add an extra dimension to your television viewing. Build a GR-2501 yourself, and share the reward with all!

Kit GR-2501, Shpg. wt. 113 lbs. Motor Freight 649.95
GRA-2501-1, Advanced Space Phone, Shpg. wt. 2 lbs. 49.95

Large Classic Console Cabinet of majestic design

For the GR-2501 (above), or our new GR-3000 Television Computer System on pages 92-3. Decorator-design has elegant oak veneer parquet top and sides with antique brass-finished hardware and latticework. Solidly constructed, select hardwood framing. Size: 32½" H x 50½" W x 20" D with casters and tube cap.

GRA-715-25, 136 lbs. Frt., 199.95
\$100 SAVER on Cabinet with GR-2501.
GRS-2501-5, 249 lbs. Frt., 749.90



Compact Classic Cabinet is a space-saving value

For the GR-2501 (above), or our new GR-3000 Television Computer System on pages 92-3. Affords maximum efficiency in size and price. Antique brass-finish latticework and decorative hardware accent the beautiful, distressed-finish oak veneer top and sides. Overall dimensions: 33" H x 43" W x 20" D with casters and tube cap.

GRA-705-25, 112 lbs. Frt., 149.95
\$100 SAVER on Cabinet with GR-2501.
GRS-2501-4, 225 lbs. Frt., 699.90



Open a Heath Revolving Charge with a purchase of as little as \$100!

It's time for Heath's GR-3000 Deluxe 25" dia. Television Computer System. For the age of personal

A milestone in expandable, future-thinking technology for everyday life

The GR-3000 alone is one of the finest, state-of-the-art television sets available. But it also offers several amazing features (both built-in and optional) that make it an exclusive *new kind of receiver*. A special cage on the chassis lets you mount up to eight microprocessor-controlled modules which can extend the capabilities of your GR-3000 far beyond those of any other television. In the coming months, Heath will offer modules and accessories to complete its array of computerized interfacing and put the most powerful Television in the world at your fingertips. In the end, a highly sophisticated system capable of meeting your needs for the multiple-source programming available today... as well as the advanced communications requirements of tomorrow.

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 hand-held 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.

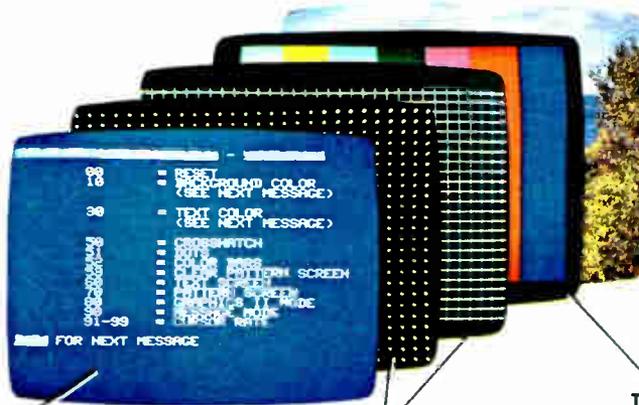
The GRA-3000-2 Auto-Rotor Accessory Module: Available now, it's micro-guided 'brain' will seek maximum signal when you select any of the 82 addressable channels, memorize their antenna bearing and return to each one's exact orientation whenever tuned. No ghosts will haunt this picture! You can modify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

Powerful, 58-key infrared Remote Control provides full-featured command of the world's most advanced color TV and its 'smart' functions



All programmed functions are accessed by 2- and 3-digit codes via remote control. In addition to the Help screen messages, we supply a handy User's Guide.



HELP key (shown being pressed) generates six screens of usable commands for easy, armchair reference

Purity, color bar, crosshatch and dot patterns built in for testing and adjustment after the kit is assembled

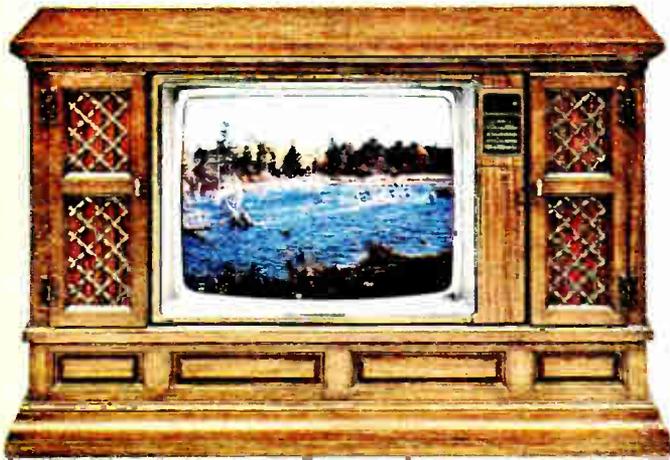
Sixteen colors available for Backdrop and Text in any combination include: transparent, black, light/medium/dark green, light/dark blue, light/medium/dark red, light/dark yellow, cyan, magenta, gray and white

Subscribers to CompuServe (the nation's largest public database) can now access the world of kitbuilding through the Heathkit On-Line Catalog — available for review by typing "GO HTH" at any ! prompt.



For our full-line of computerware, order your Heathkit Computer Catalog! See page 74.

video — a new kind of TV kit with versatile, programmable power!



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.

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 install any of the 42 cable channels that are not normally tuned (midband, superband and hyperband) to convenient UHF positions, so their push-button 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



Rear panel auxiliary connections and controls. Slots will accept I/O ports used with future accessories.

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.

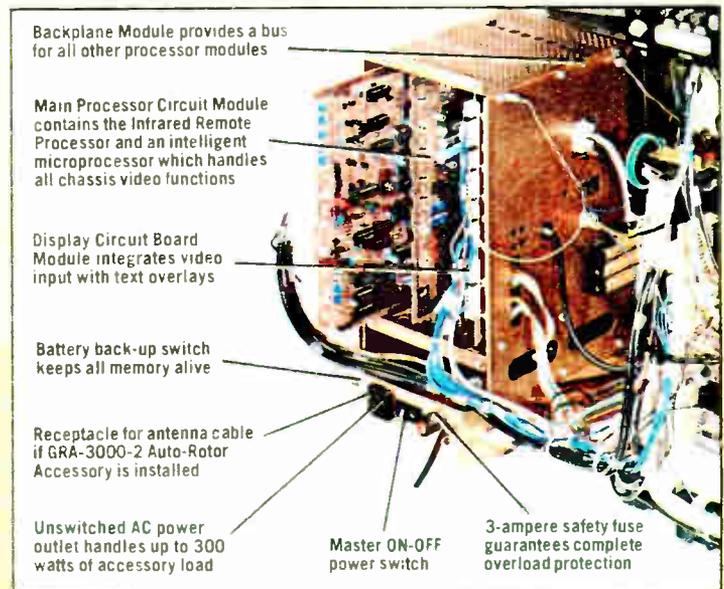
As your needs expand, so can your GR-3000 TV system: Three new modules in the 3000 series are currently under development.

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.

Programmer Module — Extensive memory stores data to activate repeatable weekly viewing schedules, special events up to a year away, and exclusion scheduling to inhibit viewing for a specific interval of time. It also provides protocol to control an external computer, device or modular accessory.

Other modules are being planned to take full advantage of emerging life-service technologies which carry the greatest promise of future benefit.



Backplane Module provides a bus for all other processor modules

Main Processor Circuit Module contains the Infrared Remote Processor and an intelligent microprocessor which handles all chassis video functions

Display Circuit Board Module integrates video input with text overlays

Battery back-up switch keeps all memory alive

Receptacle for antenna cable if GRA-3000-2 Auto-Rotor Accessory is installed

Unswitched AC power outlet handles up to 300 watts of accessory load

Master ON-OFF power switch

3-ampere safety fuse guarantees complete overload protection

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.

Teleplexing is the technetronic key to keeping pace with progress. Who knows? Within a very short time, you'll probably be able to turn on your GR-3000 and view the On-Line Heathkit Catalog! *It wouldn't surprise us.*

Kit GR-3000, Shpg. wt. 129 lbs. Motor Freight 1099.95

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

The GR-3000 can be custom-installed with recommendations found in the Heathkit Assembly Manual, or you may order one of two cabinets on page 91.



Open a Heath Revolving Charge with a purchase of as little as \$100!

By popular demand — Heath System 3 video realism in a 19" dia. Color Television Kit

\$499⁹⁵

- The quality difference in TV — System 3 engineering yields a sharper color image and greatly improved convenience
- Astonishing, true-to-life picture fidelity and chroma detail will heighten your viewing satisfaction on every channel

Improve TV? Yes. Expand the sense of reality you experience and enjoy it more. This space-saving table-top model unites 19" size and spectacular System 3 technology in a meticulous kit design you'll take great pleasure in building. *And watching!* It's the perfect TV to add drama to any room where color lovers gather to watch the wide, wide world of video.

Inside the GR-1901, you'll find circuit improvements that offer enviable advantages over other color TVs. First, the Triple-Plus Chassis. Cool-running and 100% modular in design, it consists of a clean, uncluttered arrangement of modules with a minimum of interconnections. Every "complete system" 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-gun sets. This precise horizontal alignment brings you an increased image crispness, better high-light 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-1901 gives you 112 UHF/VHF/CATV channel capability without a converter (except for scrambled programs). Connect cable directly to the set, and you're in touch with 42 easily-selected cable channels.

No fine tuning adjustments needed — ever! In every System 3 television, a quartz controlled, synthesized channel tuner provides super accurate reception every time. Access a telecast and the computer selector instantly seeks out and phase-locks onto the exact broadcast frequency to keep the picture exceptionally fine all the time.

A handy 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, check or activation of the pre-set Time Control Programmer and on/off power control from anywhere in the room.

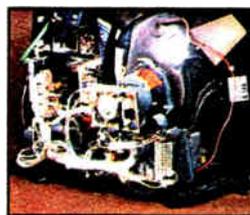
The elegantly finished pedestal cabinet measures 17 $\frac{1}{2}$ " H x 26 $\frac{1}{8}$ " W x 17 $\frac{1}{8}$ " D



Remote unit provides full-featured function control



Heath System 3 gives you the highest quality video



Self-serviceable modular chassis saves money, too

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 5" acoustically optimized speaker send out warm, full-bodied sound. For truly room-filling response, the GR-1901 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.

Put a GR-1901 together. Savor the hours of leisure achievement. *Turn it on.* Behold the overwhelming clarity and real-as-life picture it shows off. *Touch the remote control.* Then settle back for *improved* visual entertainment!

Kit GR-1901, Shpg. wt. 107 lbs. 499.95
GRA-1901-1, Mobile TV Cart (shown), Shpg. wt. 10 lbs. 24.95

Heath Home Video Organizer kit switches multi-source RF

\$69⁹⁵

- It's the versatile 'control center' for your home video system
- Now switch from one program source to another without ever changing cable connections

Tired of tangling with a messy maze of cables behind your TV set? *Don't touch that connection* — the new Heathkit Video Organizer ends cable-juggling forever! Eight separate input and output jacks allow complete interconnection of your TV and UHF/VHF antenna, Cable, subscription TV decoder, VCR, videodisc player, game unit and home computer, or other auxiliary video equipment such as a satellite receiver or 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 any other.* 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 75 Ω 48" coax cables with F-connectors and an AC Power Adapter. Order it for more hours of uninterrupted video enjoyment!

Kit GS-4500, Shpg. wt. 7 lbs. 69.95
GSZ-4500, Assembled, Shpg. wt. 8 lbs. 89.95



The Heathkit Explorer 5" B/W TV with AM/FM radio-alarm clock is a portable playmate

- Indoors or out, this mini-marvel of modern design can provide fun for one and all — because it operates on 4 types of power: AC house current, 12-volt DC negative ground battery systems, six alkaline 'D' batteries or an optional rechargeable battery pack. It's all-in-one for on-the-go!

After two or three nights of kitbuilding fun, your GR-5005 will prove itself a versatile investment by offering all you need to stay thoroughly entertained and informed on campouts, cartrips and in every room of the house.

All 82 UHF and VHF TV channels are at your fingertips, plus the entire AM and FM (with AFC) radio spectrum. The solid-state MICROMAX chassis provides high performance with extremely low energy usage, and consistent picture quality on every station. A no-wear electronic tuner and calibrated cylinder dial permit easy selection without annoying drift. The quick-on Sunshine Picture Tube brings you a full, bright picture with sharp detail in seconds.

A telescopic UHF/VHF/FM swivel antenna and internal Wavemagnet AM rod antenna pull in desirable signals for clear audio and video reception.

The LCO quartz digital clock is your 24-hour wake-up call. Switches set the correct AM or PM time and preset the alarm so you can wake to a pleasant electronic tone, auto-on TV or music. A Sleep Switch/Auto-off control programs the Explorer to turn itself off after 59 minutes. When the 12-minute alarm rouses you, a Snooze button can pause each reminder for 10 minutes. Accessories included with the GR-5005 are a detachable AC Power Cube, private earphone and a DC Car Cord for use in almost any vehicle.

Other features include a dial light, 3½" hi-fidelity speaker, provision for 300-ohm external antenna, a built-in carrying handle and durable, dent-resistant cabinet with satin finish. The 7¼" H x 6" W x 11" D case weighs just 6 pounds without the optional batteries — small enough to carry almost anywhere, yet you can enjoy its crisp, brilliant picture from several feet away. Traveling?



Overnight in a remote area? Going to the beach, on a picnic or to the stadium? Take along the Explorer and catch the action you'd otherwise miss!

Kit GR-5005, 14 lbs. 149.95

GRZ-5005, Assembled, 9 lbs. 179.95

Rechargeable Nickel-Cadmium Battery Pack, for up to 4 hrs. of TV or 40 hrs. of radio, with overcharge safety circuit.

GRZ-5005-1, Assembled, 3 lbs. 19.95



Pre-aligned boards speed assembly

Vivid, realistic picture quality in a 13" Color Portable TV



Zenith 1984 model has superb picture plus American Walnut finish, nickel-gold trim, pedestal base. Features quartz-electronic tuning, remote control, 157 channel capability, new Z-1 LSI chassis with Redi-Plug for stereo TV adapter or Teletext decoder, Tri-Focus tube. LED channel display, foldaway carry handle.

GRZ-1327, Assembled and tested, Shpg. wt. 44 lbs. 379.95



Portable 9" dia. B/W TV plays on AC/DC/battery power



Simulated pictures

New energy-conscious technology uses just 28 watts. Watch it indoors or out using AC line, 12 VDC car battery or optional NiCad Battery Pack below. Quick-on picture tube provides bright, sharply detailed image in seconds, with Perma-Set VHF fine tuning. Has DC Car Cord, earphone and detachable sunshield.

GRZ-93, Assembled, 14 lbs. 99.95

GRZ-93-1, Rechargeable Battery Pack, Assembled, Shpg. wt. 9 lbs. 39.95

Low-stock clearances on many high-value kit items

Famous-quality Heathkit merchandise in limited quantities at reduced-to-sell clearance prices. There's never been a better time to save! Don't delay, as most of these are "last call" items and are available on a strictly first-come first-served basis. **SAVE NOW.** All models may not be available at all stores.

Key Largo 52" Ceiling Fan. Circulates warm air in winter, cool in summer. Chain-pull or wall switch operation. 120 VAC. Not for ceilings under 8 ft. Variable speed from 100-140 rpm. Distinctive umber-bronze and woodgrain finishing. Includes FREE slow-speed, 50-100 rpm accessory for small rooms.

Kit GO-1238A, Shpg. wt. 24 lbs. Originally \$134.95, NOW ONLY 69.95

Computerized Programmer and keyboard module for GR-2001 TV owners. Mounted up front, eight pushbuttons allow you to program the set to make up to 16 automatic channel changes in each of two 12/24 periods, at times you select. No more forgetting your favorite shows! Requires GR-2001, has clock option.

GO-1185, Shpg. wt. 8 lbs. Originally \$174.95, NOW ONLY 99.95

Programmable Telephone Dialer/Directory. Stores sixteen 15-digit numbers. Fast, one-button dialing, automatic redial, and erasable label. 120 VAC.

Kit GT-1217, Shpg. wt. 3 lbs. Originally \$79.95, NOW ONLY 49.95

Multi-purpose AC Power Supply for HW-101 Transceivers. Not just for hams, but a versatile output with 700/300/240 VAC taps, fixed bias and 12.6 volt

filament source. Extensive filtering and fine regulation. 120/240 VAC.

Kit PS-23, Shpg. wt. 17 lbs. 89.95

Dual HF Wattmeter with SWR bridge. Reads 1.8 to 30 MHz PEP or average power up to 200 and 2000 watts PEP forward ($\pm 5\%$) and to 500 watts reflected. Factory calibrated sensor mounts in-cabinet or up to 4 ft. away.

Kit HM-2140, Shpg. wt. 3 lbs. Originally \$94.94, NOW ONLY 89.95

The Original 'Cantenna' Dummy Load. Handles 1 kW RF or 2 kW PEP sideband tune-up power with 1.5 SWR to 400 MHz. Prevents QRM, saves finals, portable! Isolated SO-239 circuit; DC voltage for monitoring relative output power.

HN-31, Shpg. wt. 3 lbs. Originally \$24.95, NOW ONLY 19.95

Receiver Battery Pack for R/C modelers. Money-saving 9.6 VDC nickel-cadmium set lets you fly with full power and performance. Includes recharger.

Kit GDA-1205-3, Shpg. wt. 1 lb. 12.95

Smart Video Terminal with hi-res white CRT. Full H-19A terminal with exceptionally professional capabilities for its price. Has 25 80-character lines, 72-key ASCII keyboard, calculator keypad, graphics symbols, reverse video by character and MORE. Last chance at this, our standard very low price!

Kit HS-19-3, Shpg. wt. 52 lbs. Originally \$595.00, NOW ONLY 499.00



For more bargains in FURNITURE kits, see page 84.

TELEVISION AND SPECIAL OFFERS/95

See how the Heathkit High Tech family gets more out of living

With over 450 different ideas for making your home, hobby, leisure and business life better - Heathkit has something very special - high tech for the whole family!

Distinguished products for your home

- 1 GD-1297 Air Cleaner
- 2 GD-1186 Digital Scale

16-bit Learning Computer System teaches advanced microprocessor technology

- 3 NEW ET-100 16-bit Microprocessor Trainer and EE-8088 Course

Challenge every one's imagination and fancy with a robot teacher and playmate

- 4 ET-18 Hero-1 robot

Technical and hobby instruments for more fun in your leisure hours

- 5 NEW IG-4244 Scope Calibrator

Entertainment kits of superb performance

- 6 NEW HD-8999 Amateur Radio Morse Code Keyboard
- 7 MI-2916 Digital Depth Sounder
- 8 ID-4001 Digital Weather Computer
- 9 AJ-1200 FM Stereo Tuner
- 10 GR-5005 Portable B W TV

Starter kits that bring the excitement of self-accomplishment

- 11 GC-1107 Digital Clock

Low-cost personal instruction courses and related trainers

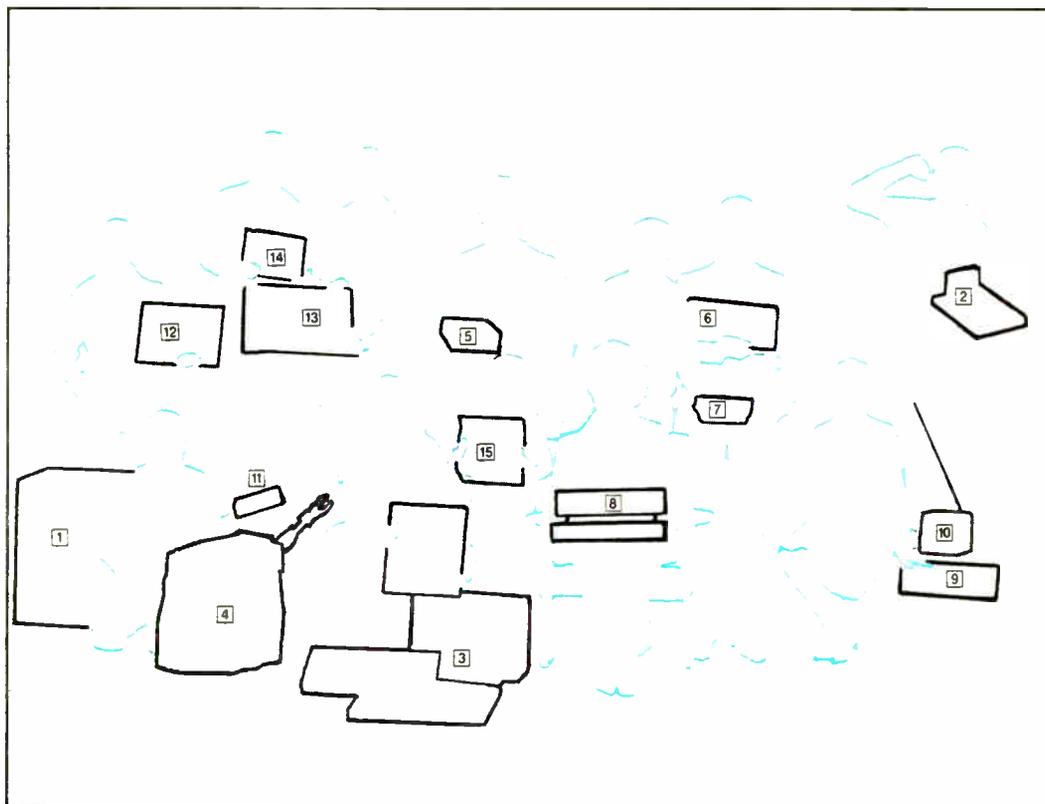
- 12 NEW ET-1000 Trainer & Courses

State-of-the-art 16-bit computers

- 13 H-100 8 & 16-bit computers
- 14 NEW 8 & 16-bit software

We're always thinking ahead!

- 15 Exciting new kits for new generations of kit builders



The Heathkit Handy Index

AMATEUR RADIO: accessories, antennas, antenna tuners, courses, keys, novice aids, super-tech transceivers 9-18

AUTOMOTIVE: programmable musical horn, courses, garage door opener, speedometer, tachometer, tune-up equipment 19-22

CLOCKS: perfect timekeepers 2

COMPUTERS: accessories, courses, hardware, peripherals and software 65-81

EDUCATION: amateur radio, 14-15; automotive, 22, classroom courses, 43, computers, 79-81, electronics, 27-43, fiber optics, 39, microprocessors, 37-39, advanced 16-bit microprocessors, 28-29, engineering circuit design, 27; robotics and industrial electronics, 30-31

ENERGY: log splitter, power factor controller, smart thermostat, 3-speed ceiling fan 24-25

FURNITURE: easy-to-build Heath Craft Woodworks heirloom-quality kits 84-85

GENERAL INFORMATION: 48-49

HEATHKIT ELECTRONIC CENTERS*: addresses, phone numbers 16

HOME PRODUCTS: air cleaners, 25, BSR X-10 home controller, 4, digital scale, 45; garage door opener, 21, intercom, 44; light switches, 3; radio, 3; telephone, 26, setback thermostat, 25; solar domestic water heating system, 82-83; programmable doorbell, 45

INSTRUMENTS: chart recorder, frequency counters, generators, meters, probes, oscilloscopes, handheld testers, precision calibrator 51-64

MARINE: fish locators, speedometers, digital and charted depth sounders 46-47

METAL LOCATORS: right and left handed 23

NAME PLATE: solid brass engraving 46

NEW PRODUCTS: HD 1418 Turnable Audio Filter, 11, HD-8999 CW Keyboard, 18, HFT-9 QRP Antenna Tuner and HM-9 QRP Wattmeter, 12, GD 2800 RF Security System, GD-1701 Flood Alarm, 5; EE-1001 Passive Circuit, EE-1002 Transistor Circuit Design Courses and ET-1000 Trainer, 27, GDP-1519 BSR X 10 Burglar Alarm Interface Module, 4, IG 4244 Precision Oscilloscope Calibrator, 59, GRZ 1327 Assembled 13" Zenith Color TV, 95, EE-8088 Advanced 16-bit Microprocessors Course and ET-100 Computer Trainer, 28-29, ZVM-122 and ZVM-123 12" hi-resolution, ZVM-135 13" hi-res Color and ZVM-131 13" medium-res Color Monitors, 72.

ORDERING INFORMATION: 48-49

PHOTOGRAPHY: darkroom timer 44

PRESIDENT'S LETTER: 48

SOLAR: home water heating 82-83

SECURITY: alarms, timers 4-5

STARTER KITS: light alarm, 3, ceiling fan, 24, clocks, 2, doorbells, 45, freezer alarm, 3; frequency counter, 59; lamp switches, 3 and 24; log splitter, portable light, 3, ultrasonic cleaner, 44; timing light, 21; radio, 3

STEREO HIGH FIDELITY: amplifiers, tuners, receive-s, speakers, turntables 86-90

TELEPHONE: dialer, ringe., portable 26

TV/VIDEO: remote control and portable b&w and color TVs, computerized telelink system, video organizer, color videotape recorder and camera, cabinets 90-95

TOOLS: kitbuilding aids, lamps 50

WEATHER: computerized weather station, barometer, barograph, humidity meter, thermometer, five-function analog station 6-8

*In the U.S., units of Veritechnology Electronic Corporation

For the Heathkit Electronic Center* nearest you, see pgs 16 and 48-49. Retail prices, special offers herein are effective July 18, 1983 through October 16, 1983. Prices, product availability, specifications subject to change without notice. Veritechnology Electronics Corporation cannot be responsible for typographical, pictorial errors. Printed in U.S.A.



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P.O. Box 167
St. Joseph, MI 49085

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please deliver to current resident.

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