



Remember your first

Heathkit®

Mail Order Catalog No. 863

Christmas • 1983

The unique products we create may change to stay ahead of the times, but some things remain the same. Quality. And value. Helping you make our kits some of the most cherished gifts to share in any season.



A Heathkit gift is a truly satisfying way to celebrate the holiday season. Besides giving a fine piece of electronic equipment that will perform beautifully for years to come, you also add the pride, satisfaction and sense of accomplishment that come with building it yourself.

Helping you make things better



Credit Card Orders Call TOLL-FREE: 800-253-0570

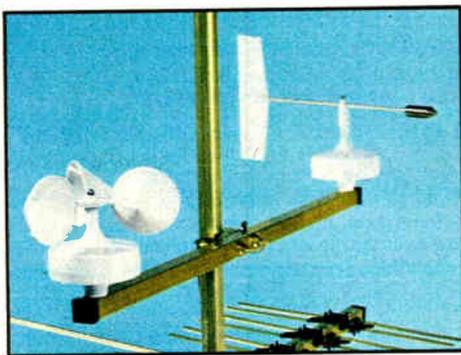
©1983 Heath Company. "Heath" and "Heathkit" are registered trademarks of Heath Company. "Zenith" is a registered trademark of Zenith Radio Corporation. "Z-DOS," "M-DOS" and "Z-100" are registered trademarks of Zenith Data Systems Corporation.

World Radio History

CLOCKS/3

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 unequalled 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

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

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

ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: $\pm 5\%$ or better. **Direction Display:** Accuracy: $\pm 11.26\%$ degrees. **THERMOMETER:** Temperature Range: -40° to 70°C ; -40° to 158°F . Accuracy: $\pm 1^{\circ}$ on Celsius readings; $\pm 2^{\circ}$ 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/ $^{\circ}\text{C}$. **Operating Temperatures:** Outdoor assemblies, -40°C to $+70^{\circ}\text{C}$ (-40°F to 158°F). Unit, 10° to 35°C (59° to 95°F). **Power Requirement:** 120/240 VAC. Provision for external battery connection for memory backup during power failures. **Dimensions:** 7¼" H x 16" W x 6" D.

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!

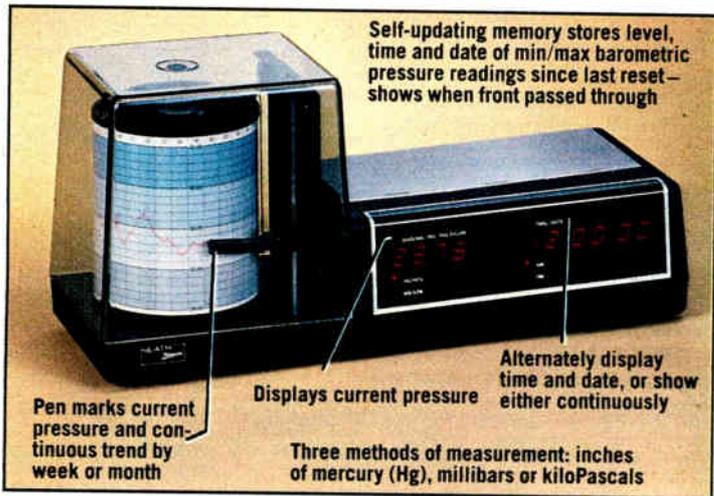
Increase everyone's comfort and save on fuel: During the heating season, low indoor humidity can cause skin irritation, sore throats, and annoying static discharge. Woods can lose luster, crack and peel. By correcting low levels of humidity, you can avoid such frequent ills, plus conserve energy, reduce 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, 1/2"-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: 2 1/2" H x 7" W x 5" D. Sensors: 1 1/2" 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 MB, 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**



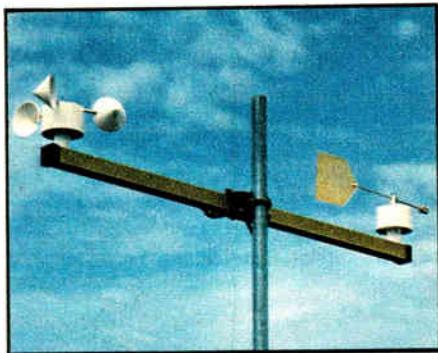
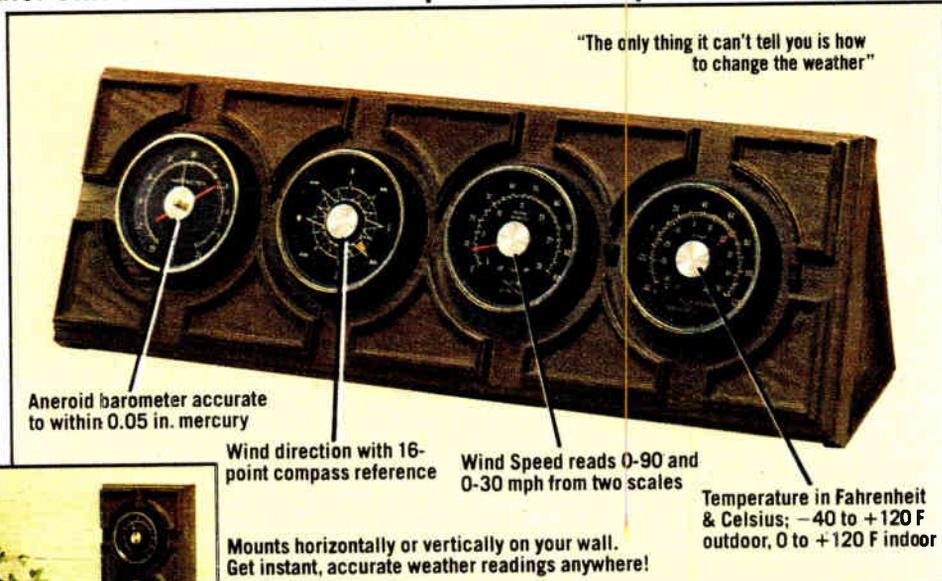
ID-1990 SPECIFICATIONS: Barometer Display: 4-digit readout. Separate indicators show whether the pressure is rising or falling, and whether the display is in inches of mercury, millibars or kiloPascals. Pressure Ranges: 28.00 to 32.00 inches Hg (mercury), 981 to 1050 millibars or 98.1 to 105 kiloPascals.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



Credit Card Orders Call TOLL-FREE: 800-253-0570

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



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.

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. Uses same transmitter boom assembly as ID-1290 (shown above). 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 Cyclac 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



The Heathkit® Pledge

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

"We won't let you fail!"

Rechargeable Portable Light makes it easy to see



ONLY
\$39.95

- Disperses much more illumination than harsh, narrow-beam flashlights
- Recharges overnight – just plug it into AC outlet



Indoors or out, the Heathkit Rechargeable Portable Light will bathe your working area with a bright, yet soft-on-the-eyes fluorescent light for a multitude of uses. Helps you to clearly see a wider area without sharp, eye-straining shadows. Safer to use than fire-hazardous candles and kerosene lamps in a power outage or while camping. And it saves money by recharging over and over for just pennies. "Soft-start" feature extends tube life. 120 VAC and car lighter socket chargers included. A single charge lasts for several hours. Heavy-duty metal case with handle is 10 5/8" H x 3 1/2" W x 5" D. Made to survive rugged use—perfect for camping or latenight work, home and automotive emergencies—it's always ready when you need light!

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



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

Year 'round musical fun in this AM Portable Radio

- Heath's most popular kit for beginners
- Improved circuitry will prolong battery life – up to 60 hours!
- Includes earphone



A perfect kit to thrill a youngster! Excellent AM sensitivity gives sensational audio reproduction of voice and music with a clear tone.

High-gain ferrite rod antenna delivers long-distance reception. Uses 9-volt battery or PS-2350 Adapter on page 16. Measures 3 1/4" H x 6 3/8" W x 1 1/4" D.

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

Freezer Alarm prevents costly food loss

Protect your meats and other frozen foods from spoilage by installing an instant alarm that warns of a failure in your freezer's cooling system or door left ajar. Two-speed alarm beeps and red light flashes if inside temperature rises above +20°F. Requires 2 "C" batteries. Includes 20' of wire.

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

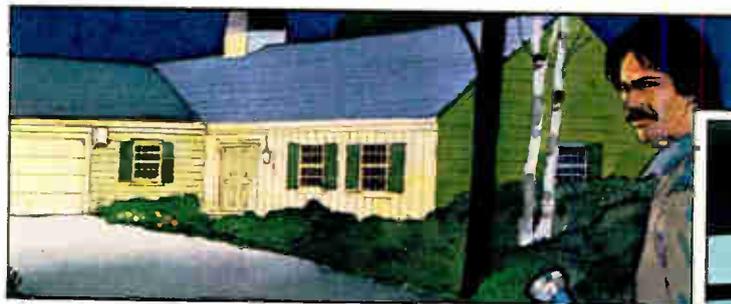


Infra-red Security Light Control detects movement invisibly and deters criminal intruders

- Makes your home safer at night by "seeing" invisible infra-red waves and movement
- Automatically turns on lights, or a light/alarm combination (up to 500 watts), making a burglar think he has been observed
- Replaces expensive all-night floodlights with dependable, automatic lighting



This year, one out of twenty homes will be robbed, and even more will be invaded with intruders turned away before committing an actual crime. Vandalism and missing possessions will account for over a \$9 billion loss, of which less than 30% will ever be fully recovered. *Is your home vulnerable?*



Security and enforcement experts agree. The most powerful deterrent to crime is LIGHT. Now you can have one of the strongest and most effective safeguards against criminal home violation yet devised—immediate surprise lighting!

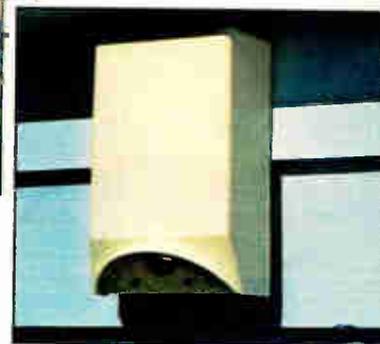
The Heathkit Security Light Control uses a cluster of six foolproof, passive infra-red sensors to monitor an 875-square-foot area near your dwelling and keep it safe from dangerous intrusion. The relay elements are extremely sensitive to 'black body' radiation in the form of invisible waves of infrared heat energy. The SLC will react instantly to changes in temperature with movement—activating up to 500 watts of inside-outside lighting and/or an alarm system to destroy the cover of darkness—before a predatory thief gets near your home.

Lights remain on until four minutes after all movement has ceased, then go off as the Security Light Control resumes silent protection. Sensitivity is adjustable so pets or small animals won't cause accidental alarms. In cold weather, the infrared rays from a person's exposed hand or face are enough to trigger it—and false alarms are virtually impossible. A built-in phototransistor will deactivate the device during daylight hours. And when the surrounding light dims, it will sense darkness approaching and reactivate the silent detection field.

There are dozens of imaginative ways your GD-3510 can be put to use. An SLC could easily provide automatic switching to illuminate dark stairways, walkways

and driveways safely. No more stumbling over unseen hazards in garage or basement, tripping on dark stairs, or fumbling with keys! It greets you when returning home after dark, and welcomes your friends. Wire it yourself or consult an electrician when connecting it to your 120 VAC, 60 Hz lighting system. It's a simple procedure for any do-it-yourselfer and a rewarding, one-evening kit that offers high security value. Compact and easy to conceal, it measures only 8 1/8" H x 5 1/4" W x 2 5/8" D. Advertised elsewhere for \$199.

Kit GD-3510, Shpg. wt. 3 lbs. **149.95**



Photoelectric Light Switch fools prowlers

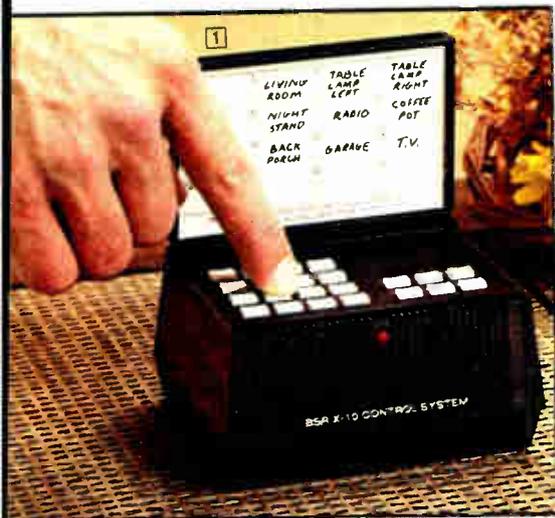
Great low-cost insurance against break-ins. Turns lights on in the evening, off at dawn—automatically. Gives your home a "lived-in" look while you're away. Plug it into any outlet, adjust sensitivity and it controls lamps up to 150 watts. 3 1/2" H x 2 5/8" W x 2 5/8" D. A practical and beneficial, get-acquainted security kit.

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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



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. 3 lbs. **79.95**

5 The dream of a computer-operated home or office is now a reality thanks to Heath's new 'universal' RS-232C 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. 110 to 2400 baud. Programming syntax and simple BASIC program examples included. Requires 120 VAC.

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

6 **New Burglar Alarm Interface Module** increases the effectiveness of your security system by controlling other BSR modules on your circuit. Has selectable low-voltage or contact closure trigger inputs. If alarm is triggered, module can turn on either selected lights and appliances (such as siren), or selected lights can flash on and off, or only selected lights can turn on. Lights will remain on after alarm system resets to indicate there has been an alarm



condition. Test button verifies your setup.

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



FAST, EASY
2-EVENING KIT

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

ONLY
\$69⁹⁵

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 in garage, basement or attic. Solid-state circuitry. Requires 120/240 VAC.

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





Heathkit RF Security System offers total, dependable home protection without wires

Heath leads the way in wireless RF convenience and innovation!

- Alarm Processor receives signals from wireless transmitters and handheld command unit
- The flexible power of an 8-channel receiver lets you design a unique system customized especially for your needs that won't compromise your lifestyle
- One of the most advanced and trustworthy, microprocessor-controlled systems available

The GD-2800 system is easy to operate... installs in a day... protects interior/perimeter zones, entrances and 'high risk' variables... provides 24-hour security equal to systems installed by professionals which cost \$2000 or more... and is virtually immune to false triggering. Controlled by a handheld transmitter, it abolishes the hassle, the worry and the drawbacks of less-capable systems.



1 RF Security Receiver/Processor Kit with Outdoor Alarm Horn and Annunciator Speaker processes all signals to provide appropriate alarm warning action. Four modes (Off, Home, Away and Panic) control entire system operation. 'Home' monitors doors and windows while you're inside. 'Away' additionally arms indoor motion detectors. Five coded channels give separate alarms for door, windows, indoor motion, fire and emergency situations. Distinctly-patterned Auxiliary and Panic alarm channels alert you to special concerns like fire, breach of computer room, safe or gun cabinet, etc. — *even if the system is OFF*. Unique annunciator tone sounds from indoor speaker (top center, photo) whenever a protected door opens, telling you when a youngster left to play or your daughter returns from her date; also sounds to confirm receipt of mode-change signal from Control Transmitters. **Other sophisticated features:** time-delayed entry/exit, power to drive two alarm horns, internal 12-hour failsafe battery, highly visible security-installed warning labels for house exterior, system test mode, key-locking master power switch, 32 user-selectable house codes, seven output triggering options for annunciator, alarms, automatic dialing devices and more. Permits security enforcement to be extended to nearby buildings, shed or garage within 200' receiving range. Mode operations controlled remotely by GDA-2800-4 or -9 Transmitters (one required). All transmitters (except handheld) have positive audio and visual low battery indication. Attractive walnut Receiver/Processor measures 3¾" H x 11½" W x 8¾" D. Order accessory transmitters below.

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

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

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

3 Wired-Circuit Transmitter. Easy to install. Uses magnetic/reed switches or 'window bug' glass-breakage sensors to protect doors and windows against entry. Inside mounting prevents tampering or disconnection. Includes one magnetic/

reed switch set (7). Also connects to GD-1701 Flood Alert below.

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

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

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

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

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

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

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

7 Magnetic/Reed Switch Set. Package of four (one 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 Ultrasonic Security System group. Requires 6-18 VDC.

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

9 12-Button Digital Keypad Controller (not shown). Operates in addition to or in place of 2800-4 command unit. Mounts near door for instant entry/exit control. Operates identically to 2800-4 after entry of user-secret access code.

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

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

Eye-Spy Photobeam Alarm Relay detects intruders, customers



A multi-purpose system, easy to install. Kit consists of a light source, mirror assembly and photocell-controlled relay which is activated whenever the reflected beam is broken. Uses a narrow, invisible-in-the-dark beam to catch intruders instantly, activating any 120 VAC warning

devices up to 300 watts total you have plugged in. Works up to 25 feet away from reflecting mirror.

Businessmen! — use it to activate intrusion alarms, signal the entrance of persons into a shop or room, or count objects passing a given point. At home, a versatile sentry — it can protect belongings in your garage or toolshed, alert you to a child wandering out of bed, etc. Includes all mounting hardware.

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



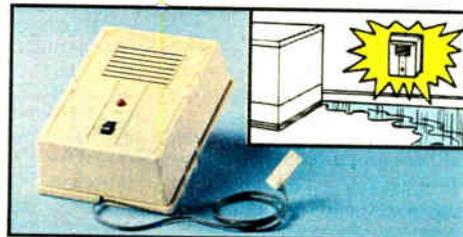
Flood Alarm detects water, saves you extensive cleanup

- Monitors 24 hours a day in any location — very easy to install
- Prevents costly water damage by alerting you instantly to leaks

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

Use it in a hundred places: The water sensor sticks anywhere. When liquid touches the sensor foil, the Flood Alarm produces a loud, insistent beeping in time with a flashing red LED to get fast attention! Safeguard against water seepage in cellar, kitchen, bathroom, computer room; near dehumidifier, dish or clothes washer, leaky plumbing, sump pump, — even place sensor on the edge of a windowsill to wake you if rain comes in an open breezeway.

Compact and quick to relocate, the GD-1701 runs over a year on one 9V alkaline battery (not sup-



plied), and has audible low-battery indication. Includes 25' of thin wire and two sensors. Connect many units or sensors in parallel for broader coverage; all units sound their high-pitched warning alarm if any one senses moisture. Ideal for hard-to-reach places and nautical applications. Has adjustable sensitivity and logic output to trigger GDA-2800-3 RF Transmitter above. Fast, easy one-evening kit. Measures 1¾" H x 3⅝" W x 4⅞" D.

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



Credit Card Orders Call TOLL-FREE: 800-253-0570

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 extraordinary 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" controller circuit assists a serial interface in maintaining communications protocol between external requests, via front panel controls or terminal guidance, and the internal circuits on the synthesizer, T/R and audio circuit boards. It allows two-way control/monitor communication between the Transceiver and a video terminal (such as the H-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

10/AMATEUR RADIO



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. DUAL CLOCK: Display: Two independent readouts with four digits and a colon. Clock Format: 12- or 24-hour display. Accuracy: Determined by the line frequency (no cumulative error). Power Requirements: 120 or 240 VAC, 50 or 60 Hz., 3.5 watts. Cabinet Dimensions: 6½" 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. RIT: = 250 Hz. Available Accessories: PS-9000 AC Power Supply/Speaker with built-in dual 12/24-hour clock and Customer Service Manual. Cabinet Dimensions: 6½" H x 14" W x 13¾" D (15.6 x 35.6 x 34.9 cm). Weight: 35 lbs. (15.9 kg).



HAMS! Kitbuilding is far more economical with a new low price on this 'spec' tacular rig!



The Heathkit HW-5400 Synthesized HF SSB/CW Transceiver gives you high-tech advantage

NOW ONLY
\$649⁹⁵

- Save \$100 now on the world's most fascinating radio and experience performance others only dream of
- PLL-synthesized stability with crystal accuracy
- Patented 2-speed tuning knob with 50 Hz resolution
- Digital display with direct keypad frequency entry, two memories per band and mode/status symbols

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

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

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

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

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

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

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

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

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

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

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

With the knowledge you gain to keep it performing at peak efficiency, the HW-5400 is the only rig to make real the dream of every amateur — a greater, more worthwhile return in pleasurable, year-to-year results on a premium investment. The new

HW-5400. If you've got the time, *this is the transceiver.*

Kit HW-5400, Transceiver, 24 lbs. Was \$749.95, NOW ONLY 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: Stores two frequencies per band. Frequency Stability: Less than 50 PPM drift from turn on. Modes: SSB Normal and Reverse; CW, Wide or Narrow. Operating Temperature: 0° to 40° C. Power Requirements: 11 to 16 VDC, 120/240 VAC with optional AC power supply. All specifications referenced to 13.8 VDC. RECEIVER: Sensitivity: Less than 0.35 μV for 10 dB, S = N/N. Selectivity: With standard filter, 2.0 kHz minimum at 6 dB to 6 kHz maximum at 60 dB; With HWA-5400-2 optional filter, 1.8 kHz minimum at 6 dB; CW active audio filter, 250 Hz minimum at 6 dB centered at 700 Hz. Overall Gain: Less than 1 μV for 0.25 watt audio output. Audio Output: 2 watts minimum into 4 ohms; less than 10% THD. AGC: Selectable Fast or Slow (no more than 8 dB audio change for a 100 dB or greater input signal range). Intermodulation Distortion: 70 dB minimum at 25 kHz. Image Rejection: 80 dB minimum. IF Rejection: 100 dB minimum. IF Shift Tuning: ± 600 Hz in Receive only. Internally Generated Spurious Noise: All below 1.0 μV. Audio Hum and Noise: Greater than 40 dB below maximum output. Receiver Incremental Tuning: ± 350 Hz. TRANSMITTER: RF Output: High SSB, 100 watts PEP power minimum, except 80 watts on 10 meters. CW, 100 watts minimum, except 80 watts on 10 meters. Duty Cycle: Continuous SSB (voice), 50% receive-transmit ratio on CW; 5 min. on, 5 min. off. Load Impedance: At least 90% rated power with less than 2:1 SWR. Protected against high VSWR. Carrier Suppression: – 50 dB minimum from a 100 watt, single-tone (1000 Hz). Unwanted Sideband Suppression: – 50 dB minimum from a 100 watt, single-tone (1000 Hz). Spurious Radiation: – 60 dB minimum, referenced to 100-watt output. Third Order Distortion: – 30 dB minimum from a 100 watt PEP two-tone output. T/R Operation: SSB = PTT or VOX, CW = full break-in (simplex only). CW Sidetone: 700 Hz to speaker or headphones. Microphone Input: High impedance (25k ohm) with – 55 dBm rating. Operation with External Linear Amplifier: Linear relay, linear ALC rear panel connections. Front Panel Meter: Automatically-switched S-units in Receive, ALC in Transmit. Available Accessories: HWA-5400-1 AC Power Supply with 12/24-hour clock and speaker; HWA-5400-2 2.1 kHz SSB Filter; HWA-5400-3 Frequency Entry Keypad kit. Cabinet 4 1/4" H x 11 1/4" W x 14" D (10.8 x 28.6 x 35.6 cm). Weight: 24 lbs. (10.9 kg).

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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 you 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. It can tune 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, 5kΩ minimum. Nominal Gain: Unity. Audio Amplifier Output: 1.0 watt into 4Ω. Input/Output Connection: 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 7/8" H x 8 7/8" W x 6 5/8" D. Net Weight: 1.5 lbs. Optional Supply: PS-5012 120 VAC power cube (see p. 14).



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 many new convenience features and a trusted reputation

\$849⁹⁵

- The ham world's most reputable high-power amp has the lowest price-per-watt in 2 kilowatt Linear
- 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 1/4" H x 14 7/8" W x 14 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

\$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-2060A 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: 50Ω 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 3/4" H x 14 1/2" W x 13 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



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. 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 $\frac{1}{4}$ " H x 9 $\frac{1}{4}$ " W x 8 $\frac{1}{2}$ " 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.

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

HM-9 SPECIFICATIONS: Accuracy: $\pm 1\%$ of scale reading. Ranges: 0.5 and 0-50 watts SWR Sensitivity: < 1.5 watts. Connectors: DIN type SO-239. Dimensions: 2 $\frac{1}{2}$ " H x 5 $\frac{1}{2}$ " W x 7" D.

NEW

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

- Ideal for QRP station operators who want a perfect match

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 allows precise transmitter matching to a wide variety of output impedances. A 4:1 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 adjustment easy. The back panel has in/out SO-239 coax connectors, a terminal strip for balanced line and long wire antennas and separate wing nut 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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



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 HD-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.

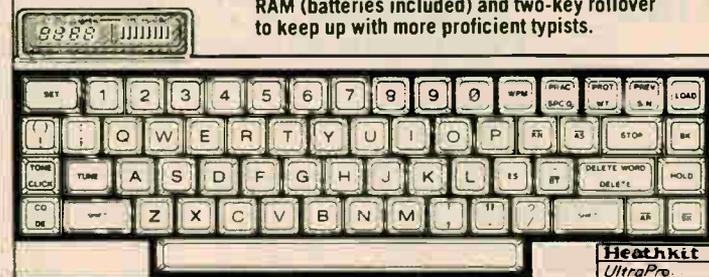
Build the *UltraPro* yourself with one of our world-famous assembly manuals and you can pocket the savings, while enjoying one of our most fascinating kits. The *UltraPro* is a professional-action keyboard with many features and innovations not to be found on units at up to twice the price.

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

HD-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. Input for PS-5012 Adapter, below. **Dimensions:** 2 7/8" H x 15 1/2" W x 8" D.



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



Read the HD-8999 review in the September, 1983 issue of "73" Magazine

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 base is evenly weighted to reduce



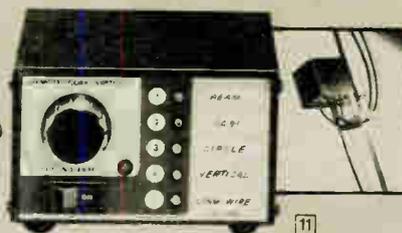
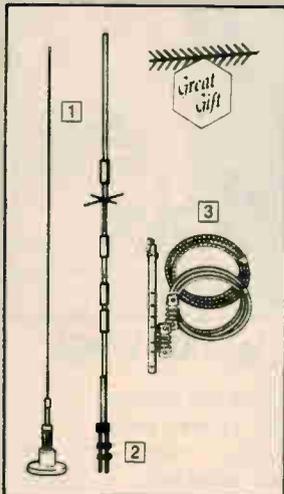
movement during keying. Requires only the 120 VAC power transformer cube below for full operation. Discover the newest phase of CW fun!

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

SA-5010 SPECIFICATIONS: Speed Range: 1 to 99 WPM. Character/Word Spacing: Less than or equal to speed setting. Number of Buffers: 1 to 10. May be used to store text or commands. Buffer Size: 240 characters plus commands, total. Weighting: Normal plus 5 light and 5 heavy settings. Auto Message Repeat: 0 to 9 (sent 1 to 10 times). **Keyer Output:** Solid state: +250 volts @100 mA; -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 plugable transformer (optional) or 11 to 16 volts DC @200 mA. **Dimensions (excluding paddles):** 15 7/8" H x 4 1/8" W x 6" D.



Reliable, money-saving accessories to improve your hamshack efficiency



1 146-148 MHz Mobile Antenna

Cushcraft AMS-147 3/8-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 connector and coax.

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

2 Cushcraft AV5 has long DX reach

Vertically-polarized omni-directional antenna designed to provide complete CW and SSB coverage on 80-40-20-15-10 meters. Especially effective high-Q stabilized traps give wide bandwidth. SWR always 1.5:1 or less at resonance on each band. Self-supporting height is 25 ft. (7.4m). Use it confidently with any transmitter or transceiver having 50 ohm output at full legal power. Built-in coax connector accepts PL-259 on your station feedline.

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

3 75-ft. Long-wire SWL Antenna

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

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

4 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 intelligibility. Up to 30 mV 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 tones. LED verifies tone transmission. Includes 6' coiled cord.

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

5 Low-Pass Filter ends TVI trouble

Solve emissive RF interference problems with this fine low-pass Barker & Williamson filter. Provides a minimum of 70 dB attenuation. Cut-off frequency is

34 MHz. Less than 0.3 dB insertion loss. For 160-10 meters. 50Ω. Rated for full legal power.

HDP-3700, Assembled, 2 lbs. 34.95

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

6 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 signal-to-noise ratio. 150 Hz to 15 kHz response. Switch-selected high/low impedance and VOX or lockable PTT. Beige Cycolac case with 6' coiled cord adds new style and bonafide class to your shack.

HDP-242, Assembled, Shpg. wt. 2 lbs. 59.95

7 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 (2kW 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. Helps prolong life of your finals. Light enough for easy field portability. Holds one gallon of transformer oil (not supplied). Should be standard equipment in every hamshack. *Protect your gear* – get a Cantenna!

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

HDZ-63-3, 3-ft. RG-8/U with PL-295s, 1 lb. ... 4.95

8 Twelve-socket Outlet Strip

Multiplies convenience by providing extra electrical outlets for your equipment in hamshack, workshop, office, basement or garage. Has eleven switched and one unswitched (for clock or memory save), fused 3-hole outlets with 10A maximum load. Portable or permanent. Has 12-foot cord; for 120 VAC.

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

9 NEW! Heathkit Smart Outlet Box

The perfect work-saver! Has ten switched sockets, one unswitched and one current-sensing "control socket." Lets you power up all gear plugged into switched sockets by turning on the one piece of equipment acting as "controller." MOV device protects from line surge and transient spikes to maximum 325 volts @ 6500 amps (70 joules one time, 35 joules repeated). Great for hamshack or computer room. Maximum "control" power is 250 watts @ 2 A; max all other outlets is 1200 watts @ 10 A.

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

10 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.

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

11 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 transmission 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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

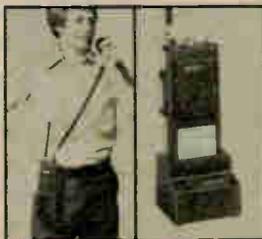
Easy-to-access top controls and BNC connector

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 μV quietens 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-2031-3, 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 measures up to 2000 W PEP

\$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 ±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 2000/2000 watts PEP in the forward direction, and up to 50/500 watts (±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

ARIZONA – Phoenix, 85017
2727 W Indian School Rd 602-279-6247

Tucson, 85710
7109 E Broadway 602-885-6773
At the corner of Broadway and Kold

CALIFORNIA – Anaheim, 92805
330 E Ball Rd 714-776-9420

Campbell, 95008
2350 S Bascom Ave 408-377-8920

El Cerrito, 94530
6000 Potrero Ave 415-236-8870

La Mesa, 92041
8363 Center Dr 619-461-0110

Los Angeles, 90007
2309 S Flower St 213-749-0261

Mission Viejo, 92692
28201 Marguerite Pkwy 714-495-9382

Pomona, 91767
1555 N Orange Grove Ave 714-623-3543

Redwood City, 94063
2001 Middlefield Rd 415-365-8155

Sacramento, 95825
1860 Fulton Ave 916-486-1575

Woodland Hills, 91364
22504 Ventura Blvd 213-883-0531

COLORADO – Denver, 80212
5940 W 38th Ave 303-422-3408

CONNECTICUT – Avon, 06001
395 W Main St (Rt 44) 203-678-0323

16/AMATEUR RADIO

FLORIDA – Mialeah, 33012
4705 W 16th Ave 305-823-2280

Jacksonville, 32211
8262 Arlington Expressway
904-725-4554

Plantation, 33317
7173 W Broward Blvd 305-791-7300

Tampa, 33614
4019 W Hillsborough Ave 813-886 2541

GEORGIA – Atlanta 30342
5285 Roswell Rd 404-252-4341

HAWAII – Honolulu (Pearl City), 96782
98-1254 Kaahumanu St 808-487-0029

ILLINOIS – Chicago, 60645
3462 66 W Devon Ave 312 583-3920

Downers Grove, 60615
224 Ogden Ave 312-852-1304

INDIANA – Indianapolis, 46220
2112 E 62nd St 317 257-4321

KANSAS – Mission, 66202
5960 Lamar Ave 913-362 4486

KENTUCKY – Louisville, 40243
12401 Shelbyville Rd 502-245-7811

LOUISIANA – Kenner, 70062
1900 Veterans Memorial Hwy
504-467 6321

MARYLAND – Baltimore, 21234
1713 E Joppa Rd 301-661-4446

Rockville, 20852
5542 Nicholson Lane 301 881-5420

MASSACHUSETTS – Peabody, 01960
242 Andover St (Rt 114) 617-531 9330

Wellesley, 02181
165 Worcester Ave (Rt 9) 617-237-1510

MICHIGAN – Detroit, 48219
18645 W Eight Mile Rd 313-535-6480

East Detroit, 48021
18149 E Eight Mile Rd 313-772-0416

St. Joseph, 49085
Lakeshore Drive near
Hilltop Road 616-982-3215

MINNESOTA – Hopkins, 55343
101 Shady Oak Rd 612-938-6371

St. Paul, 55106
1645 White Bear Ave 612 778-1211

MISSOURI – Bridgeton, 63044
3794 McKelvey Rd 314-291-1850

NEBRASKA – Omaha, 68134
9207 Maple St 402-391-2071

NEW JERSEY – Asbury Park, 07712
1013 State Hwy 35 201-775-1231

Fair Lawn, 07410
35-07 Broadway (Rt 4) 201-791-6935

NEW YORK – Amherst, 14226
3476 Sheridan Dr 716-835 3090

Jericho, LI, 11753
15 Jericho Turnpike 516-334-8181

Rochester, 14623
937 Jefferson Rd 716-424-2560

N. White Plains, 10603
7 Reservoir Rd 914-761-7690

NORTH CAROLINA – Greensboro, 27407
4620-C W Market St
919-299 5390

OHIO – Cleveland, 44122
28100 Chagrin Blvd 216-292-7553

Columbus, 43229
2500 Morse Rd 614-475-7200

Toledo, 43615
48 S Byrne Rd 419-537-1887

Cincinnati, 45215
10133 Springfield Pike 513-771-8850

OKLAHOMA – Oklahoma City, 73112
2727 N W Expressway 405-848-7593

PENNSYLVANIA – Frazer, 19355
630 Lancaster Pike (Rt 30)
215-647-5555

Philadelphia, 19149
6318 Roosevelt Blvd 215-288-0180

Pittsburgh, 15235
3482 Wm Penn Hwy 412-824-3564

RHODE ISLAND – Warwick, 02886
558 Greenview Ave 401-738-5150

TEXAS – Dallas, 75201
2715 Ross Ave 214-626-4053

Fort Worth, 76116
6825-A Green Oaks Rd 817-737-8822

Houston, 77008
1704 W Loop N 713-869-5263

North Houston, 77069
5050 FM 1960 W 713-583-1163

San Antonio, 78216
7111 Blanco Rd 512-341-8876

UTAH – Midvale, 84047
58 East 7200 South 801 566-4626

VIRGINIA – Alexandria, 22303
6201 Richmond Hwy 703-765-5515

Virginia Beach, 23455
1055 Independence Blvd
804-460-0997

WASHINGTON – Seattle, 98109
505 8th Ave N 206-682-2172

Tulwila, 98188
15439 53rd Ave S 206-246-5357

Vancouver, 98664
516 S E Chalkov Dr #1 206-254-4441

WISCONSIN – Milwaukee, 53216
5215 W Fond du Lac 414-873-8250

NEW STORE OPEN:
CALIFORNIA – Mission Viejo, 92692
Marguerite Plaza
28201 Marguerite Pkwy 714-495-9382



Credit Card Orders Call TOLL-FREE: 800-253-7057

Highly accurate Dip Meter covers 1.6 to 250 MHz

- Another fine Amateur Radio value in kit form for the well-equipped hamshack

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

For a delicate instrument of this type, only exceptional-grade components are used for the most exact metering indications and injection signal fidelity. In the balanced Colpitts RF oscillator, silver mica coupling capacitors provide improved frequency stability. The detector uses a broadband MOSFET amplifier, hot-carrier diodes and a Q-multiplier for closer sensitivity and a better dip action. A responsive 150 μ A movement yields sharper resonance indications. Includes a headphone jack for positive modulation monitoring. Operates on one 9V battery (not included) and goes anywhere you do. Once built, the rugged aluminum Meter and its accessories store handily in a molded gray carrying case for easy portability. Manual has detailed section on applications to Amateur Radio.

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



Heathkit 75-watt VHF All-Mode Base Amplifier adds power at home or in your club repeater

\$279⁹⁵

- Work the ones you can only hear – nominal ten watts of drive produces more than 75 watts of output power
- A great repeater amp with lasting solid-state design
- Runs four modes: FM, RTTY, single sideband and CW
- No appreciable insertion loss in receiver sensitivity

If your 2-meter base station transceiver needs a bigger, more capable amplifier to reach out to where you want to be heard, consider these undisputed facts:

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

The VL-2280 is a rugged, no-nonsense amplifier that was designed for station operators who expect dependable results from their gear. They can call upon it to perform for long periods of time under rigorous conditions. At home beside your favorite exciter or in the wild on Field Day, it'll stand up to any challenge.

Reviewers and owners have praised it for including the time-saving features of simple operation and easy self-servicability they appreciate and recommend. A built-in power supply operates from 120/240 VAC, portable generator, or even a 12 VDC backup battery while running remote or in an emergency. And the VL-2280 has plenty of reserve to power most exciters directly from an accessory socket on the back panel, providing a 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, to give you a 50% duty cycle and more "on" time. An extremely clean signal results from low IMD products, with a special circuit design that gives *ultra-low distortion SSB performance* and switchable VOX delay. A built-in antenna changeover relay enables transmit mode automatically with either RF-sensed or manual keying.

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 hams active on 2.

More features: A convenient Standby/On switch lets your exciter run barefoot. The meter monitors drive or output power and relative internal DC voltage.

Who builds the best all-mode amplifier? *You do!* When the outstanding high performance of the VL-2280 is assembled and installed in your station, there's a personal measure of state-of-the-art quality workmanship added as well.

Whether you want to increase your range away from the repeater, or get in on the excitement of 2-meter DX, Heath makes it easy to save money and have fun at the same time. An enjoyable three-evening kit. Build and install the best!

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

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

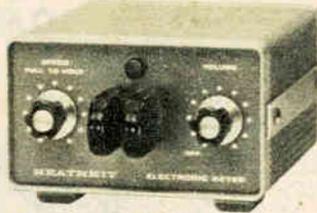
Electronic Keyer offers a choice of speed ranges

- Sends code so smooth you'll think it's part of your hand
- Compact base/portable keyer

Operating CW becomes an even greater pleasure when you use the Heathkit HD-1410 solid-state Electronic Code Keyer. You select between two ranges as the kit goes together: 10-35 or 10-60 wpm, with a knob to set the sending speed.

Travel and tension of the paddles are adjustable so you get the exact "feel" you like. True iambic operation means your CW signal is accurate and precise. The HD-1410 works on 120/240 VAC or 12 VDC for mobile-remote QSOs. It has adjustable volume and sidetone frequency, a built-in speaker, weighted cabinet, removable line cord, headphone jack, 96" of shielded cable, connection for an external keyer, tune-up 'hold' switch, receiver audio input and 'power on' lamp. Three phono and one phone plug are supplied with the kit for your use as needed. Attractive, two-tone emerald cabinet measures 3" H x 5" W x 7 3/8" D.

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



Deluxe 50-Watt 2-Meter Amplifier adds clout

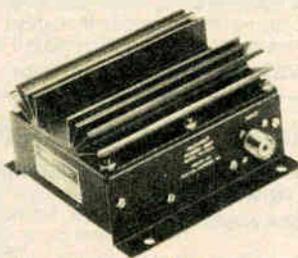
- Tuned input/output circuits reduce spurs and harmonics to -60 dB or better
- Easy 4-hour assembly time

Tied to one repeater? Missing the fun of 2-meter DX because of a weak signal, or having trouble establishing a link from the fringe? Increase your VHF fun with 20 for 5, 40 for 10 or a solid 50 watts out for just 15 in!

The HA-202A puts extra clout behind your signal and draws less than 7 amps from your car battery (1 mA standby). Has antenna changeover relay and sensing circuitry for completely automatic T/R switching. Emitter-ballasted configuration withstands VSWR up to 3:1, yet remains cool and continues to run. Covers any 1.5 MHz portion of 143-149 MHz band. Final alignment requires only a VTVM, wattmeter or SWR bridge. Rugged chassis mounts anywhere for a better signal from your mobile QTH. Includes SO-239 connectors for direct hookup.

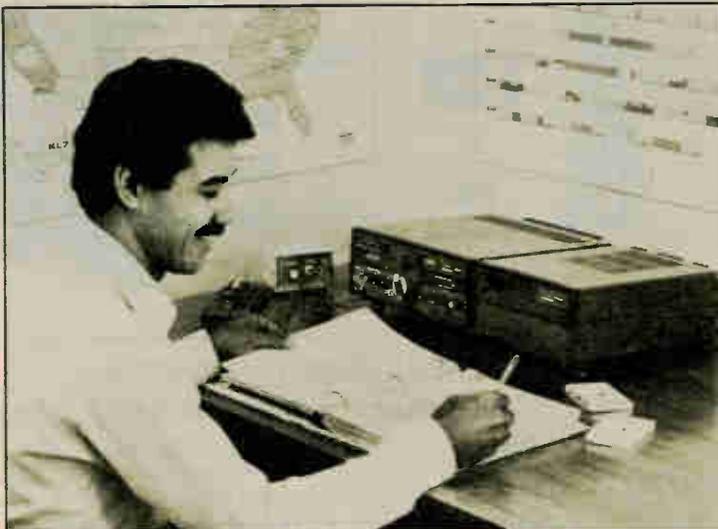
Kit HA-202A, Shpg. wt. 4 lbs. 64.95

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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!



\$39.95

**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



\$199.95

- 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.

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**

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 to hear from 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



\$24.95

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 3/8" H x 4 1/8" W x 4 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

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 growing numbers 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 callsign.

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.

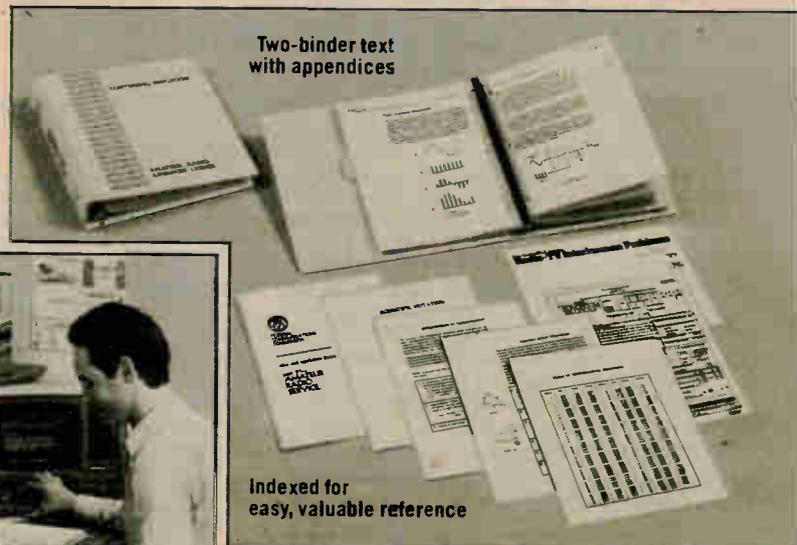
The FCC Element 4(a) written examination deals with the following subjects: Rules and Regulations, Radio Phenomena, Operating Procedures, Emission Characteristics, Electrical Principles, Practical Circuits, Circuit Components, Antennas and Transmission Lines, and Radio Communication Practices. ER-3703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

The Heathkit Pledge extends beyond the fun of kitbuilding, to license acquisition as well: "We won't let you fail!"



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.

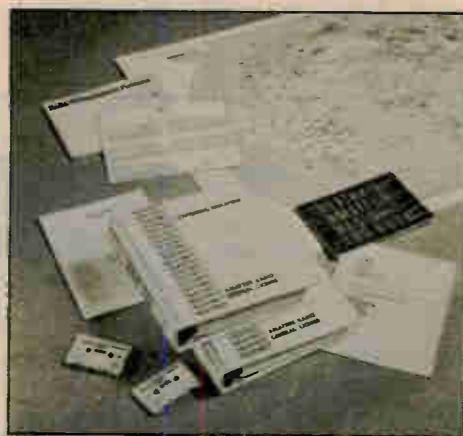
The General Course is arranged in 11 units:

- 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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Attention-getting mobile service Siren/PA

\$109⁹⁵

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

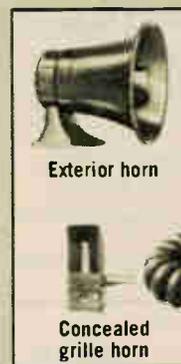
If your community's volunteer emergency unit or rescue squad is trying to make its dollars stretch as far as possible, the GD-1810 Electronic Siren/PA will meet your requirements for high quality, professional features at low cost.

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



FAST. EASY
1-EVENING KIT

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

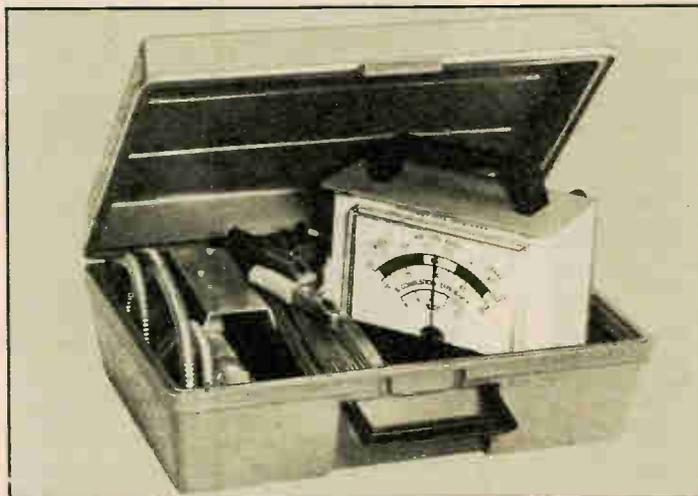
- Squeeze more performance power from gasoline
- Includes all you need for total exhaust vapor analysis

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



Perform auto tune-ups with professional ease using a Heathkit 12" Deluxe 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
- Includes illustrated, 75-page Operation Handbook

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 CRT parade patterns are made possible by the latest design in inductive pickup circuitry and switch selection of 4, 6 or 8 cylinders. Dwell, RPM and voltage measurements are indicated on the large 8-inch d'Arsonval meter.

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 capability for easier reading.

With only four simple connections to an operating engine, you can test for: shorted, resistive or open plugs and wires, incorrect plug gap, fouled plugs, a defective distributor, coil or condenser, bad or misadjusted points, cam wobble, poor power balance, imprecise voltages, timing and degrees advance (with optional timing light) plus faulty alternator diodes, windings or stator (with optional Alternator Test Adapter) and many other electrical problems.

Rugged high temperature-, oil- and gas-resistant insulated cables provide quick engine connections. Includes adapter for GM HEI systems. With Heath's excellent manuals to guide you, assembly and operation of the CO-2600 is a simple matter. Together with the optional alternator test adapter (at right) and companion timing light, you own a complete, economical home tune-up center. Kit includes all necessary cables, clamps and inductive pickup for full setup.

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

Heathkit Timing Light with Advance Meter plugs directly into CO-2600 Deluxe Ignition Analyzer and provides a bright flash that registers clearly at up to 2 feet, even in daylight. Built-in meter measures distributor advance from 0 to 60 degrees at 1500 to 4500 RPM. Includes 10 foot cable with connector.

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



Manual includes complete introduction to ignition analysis

COA-2600-2, Alternator Test Adapter, Shpg. wt. 1 lb. **14.95**

CO-2600 SPECIFICATIONS: For Use With: Standard, transistorized or C-D ignition systems on 4, 6 or 8 cylinder (4-cycle) or 2-rotor Wankel engines. **Voltage Ranges:** 0-2V for corroded connections or points measurements and 0-20V for battery condition and general distribution checks. **Signal Pickup:** Direct for primary, inductive for parade trigger, and capacitive for secondary. **Tachometer and Voltmeter Accuracy:** ± 3% of full scale on any range. **Tachometer Ranges:** 1000, 3000 and 6000 RPM. **Operating Range:** 32 to 122 degrees F (0 to 50 degrees C). **Power Requirement:** 120-240 VAC, 50-60 Hz. **Dimensions:** 12" H x 25 1/2" W x 14 3/8" D (32.72 x 64.14 x 35.89 cm) **Weight:** 53 lbs.



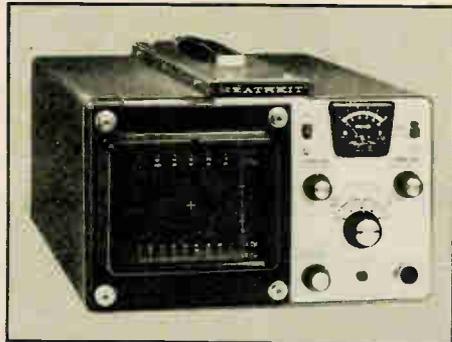
Scope Cart adds mobile visibility

Keep your Analyzer at just the right viewing height while working under the hood with this sturdy, easy to build scope cart. Rolls from place to place on smooth casters for maximum working convenience.

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

Portable Ignition Analyzer tunes economically

- One of the most useful car care tools to own
- Ideal test instrument for garage mechanics, service stations and automotive hobbyists
- Clamp-on, inductive pulse pickup method
- Built-in tachometer
- Reduces the cost of repeated maintenance
- Easy troubleshooting, with positive results
- Manual has intro to ignition analysis



Diagnose and solve most any ignition problems fast — before they escalate and cause major electromechanical failure. Following the tune-up specifications for any auto and utilizing the 24-page Analyzer Operation Handbook, you can detect shorted spark plugs, bad points, defective wiring, worn distributor parts, incorrect dwell angle, cam wobble, coil/condenser defects and more.

Select one of four different patterns — primary or secondary, in parade or superimposed displays. For a detailed analysis of waveform components, horizontal can be expanded 10 to 1, and vertical sweep can be expanded 2 to 1.

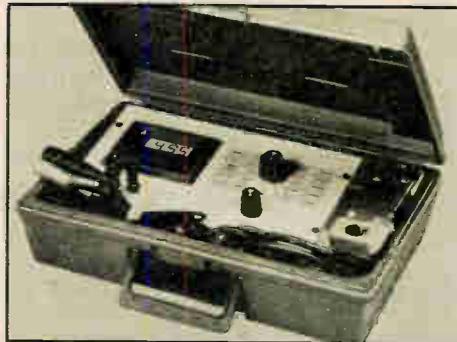
Use it with any standard, transistorized or C-D ignition on 3, 4, 6 or 8-cylinder engines with distributors. Includes adapter for GM HEI systems. Optional 12-volt inverter mounts to unit's rear panel for portable or "on the road" tests, making it possible to monitor the engine while the car is moving! Handbook illustrates dozens of detailed cause-and-effect waveforms. Operates on 120-240 VAC.

Kit CO-1015, Shpg. wt. 22 lbs. **279.95**

Kit COA-1015-1, 12 VDC lighter-socket Power Inverter, 3 lbs. **39.95**

Portable Engine Analyzer has digital accuracy

- Measures dwell angle, engine speed, plus DC voltage, resistance and current in any auto
- Battery-operated power
- Meets GM specs for use with 1981 and later models with Computer Command Control



The Heathkit CM-1551 is a versatile Engine Analyzer at an affordable price. Only Heath puts so much capability, performance and value into a self-powered portable digital engine analyzer! You get all these critical tune-up measurement abilities: Dwell on four scales (0 to 90°) ± 0.2%, tach in two ranges to 10,000 RPM ± 0.1%, DC voltage in two ranges to 200 volts ± 1.5%, current to 20 amps ± 3% for 400 amps ± 5% with Shunt Accessory) and resistance to 2.0 megohms, ± 1.5%.

A 3 1/2 digit liquid crystal display — easy to read even in bright sun — provides the resolution you need to precisely adjust idle speed, rapidly test battery, generator, alternator, spark plug wires or diodes, voltage regulator (requires COA-2600-2 above), 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 CM-1551 is one of the few Analyzers that can measure starting current and battery charge/discharge currents safely. Power is supplied by a 9-volt battery (not included), so there are fewer wires under the hood plus it has circuit polarity, low battery and overrange indication.

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

COA-1550-1, 400-Ampere Shunt Accessory, Shpg. wt. 1 lb. **15.95**



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Quiet, dependable Moore-O-Matic Deluxe Garage Door Opener ends heavy 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

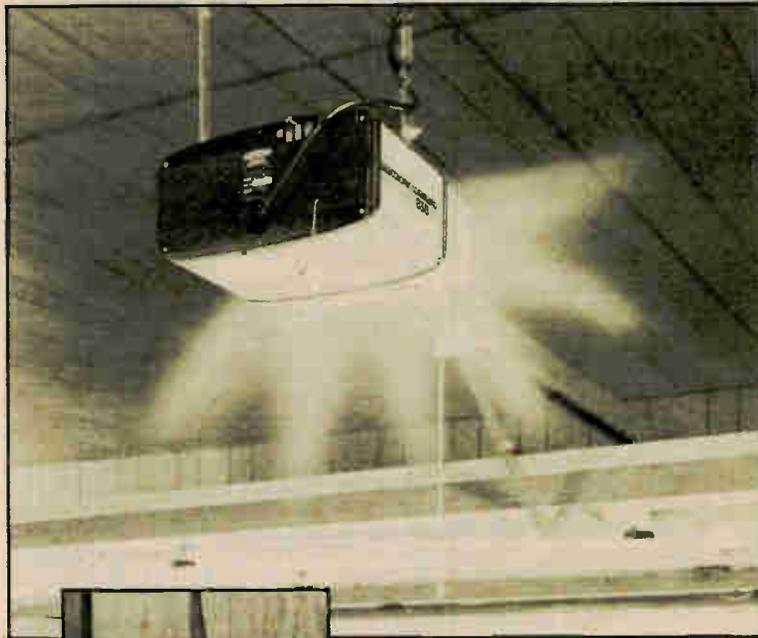
The Electronic Command Garage Door Opener is a smart investment that pays off immediately in convenience and security. Is the weather bad? Or is it dark as you pull into the driveway late at night? Touch the button on a remote transmitter in your car and watch the door open automatically, to greet you with 80 watts of clear illumination as the car rolls into 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 will see you safely inside and shut off about five minutes after the opening-closing cycle is complete.

Designed for garage doors up to 18 feet wide and 7 feet high, the powerful ½ horsepower motor opens even the most reluctant doors effortlessly. A shock absorber cushions vibrations and allows for up to two inches of ice buildup and other impediments. Up-limit, down-limit and obstruction pressures are adjustable. In case of difficulty, the quick-release trolley disengages with a simple string tug. And reset is just as easy, as another tug snaps it back.

Transmitters and receivers are all solid-state and digitally encoded. There are 256 possible signal combinations, with the ability 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. The 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 for years to come.

The last word in convenience and safety: No longer a luxury, but an important improvement that belongs in every garage, to reduce the chance hazard of back-paining physical labor. Your spouse will appreciate the thoughtfulness! Isn't it time to do away with the time-consuming stress of unnecessary lifting and move up to instant, automated ease? Provide added protection for your family, an extra measure of 'be safe' 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.
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



Two-button safety wall switch prevents accidental door movement. Both buttons must be pressed together to initiate door action.



Small, single-button portable transmitter activates the microprocessor-controlled electronics remotely and may be carried in purse or clipped to vehicle's overhead visor for easiest accessibility.

Digital Clock/Trip Timer has quartz precision



- A reliable 24-hour timepiece for car, van, camper or boat
- Time-set pushbuttons located behind snap-on front bezel
- 10-minute min/sec stopwatch

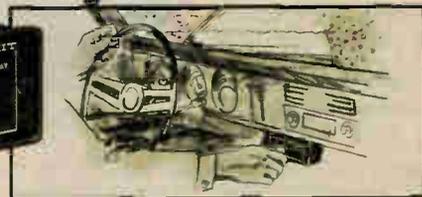


\$34⁹⁵

Displays 4-digit time to the minute in 12-hour format and switches freely back and forth to 24-hour trip timer without affecting the accumulation or accuracy of either function. Also acts as a 10-minute stopwatch. Front panel 'hold' button allows elapsed calculation without including pauses for rests, stoplights, etc. Uses a crystal timebase for highly dependable timekeeping. Pleasing, easy-to-read blue fluorescent readout turns off to conserve battery when ignition is shut off, but timing circuit continues to operate; correct time appears again when you start the car! Automatic dimming feature adjusts display brightness to ambient light conditions for less nighttime driving distraction. Works in any 12 VDC negative ground vehicle. Kit includes gimbal bracket for mounting unit on or below dash plus complete hardware and hookup info. Elegant black cabinet measures a slim 1 3/4" H x 4 5/8" W x 3 1/2" D. Makes a handsome addition in any car.

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

Wiper Delay makes driving safer in wet weather



Are you annoyed by fog, sleet and drizzle? Fine mist falling, causing your wipers to streak at normal speeds? The Heathkit Windshield Wiper Delay can eliminate constant wiper arm movement when an occasional sweep is sufficient. A front panel knob selects 'normal' or 'delay' modes, and sets the continuously variable timing between sweeps from 30 seconds for mists and roadspray to 0.5 seconds for heavy downpours. Keeps your vision ahead safe, clean and clear.

The inexpensive **CH-1068** makes a perfect stocking-stuffer, and it really makes a thankful difference to have one while you drive! Designed to fit most single and 2-speed systems. Incompatible with motor-reversing hidden wipers; contact your auto dealer for specifics. Unit mounts quickly and easily using gimbal bracket or double-sided tape strip from the kit. Build one for every car you drive!

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

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

\$49⁹⁵

- Choose from 16 pre-programmed tunes, enter one from our music book of 50 tunes, or add your own
- Select songs instantly with 3-button in-car keypad
- Five inch diameter horn mounts neatly and easily



Pre-programmed Musical Auto Horn tunes:

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

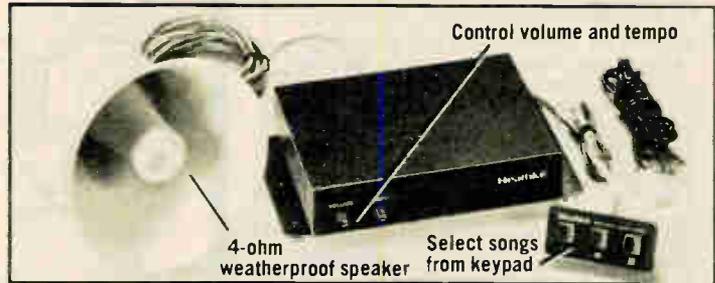
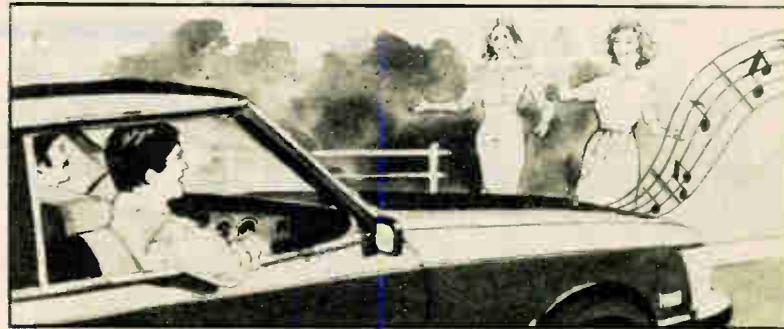
Enjoy driving more than before! The easy-to-build Heathkit Programmable Auto Horn installs in any car, truck, boat or RV with a 12 VDC negative ground electrical system so you can amuse and entertain at weddings, parties, sports events, rallies, parades, festivals and holidays — anytime the music moves you!

Inside the CH-1276 is a microprocessor with 16 permanent tunes, varying from the brief but exciting "Charge!" to a full 46-beat presentation of the "William Tell Overture." A full keyboard within the main chassis uses a 13-note octave, plus rest and hold keys for programming any tune you want into two open memory cells. You may change tunes as often as you wish. An external control lets you adjust the tempo to produce the quickness of a marching tune, or slow down to the relaxed timing of "Swanee River." The three-button remote keypad mounts at any convenient location on the steering column or dashboard and lets you select any of three different tunes. Complete programming guide included.

The small, weatherproof horn speaker mounts under your vehicle's hood, behind the grille, or at any other outside location. A unique power-saver circuit in the Musical Horn relieves prolonged battery drain after eight days without use.

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

Kit CH-1276, Shpg. wt. 3 lbs. 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: 14" H x 7 3/4" W x 4 1/8" D

Study this Electrical Systems Course to repair your car at home



\$39⁹⁵ for EAC-1

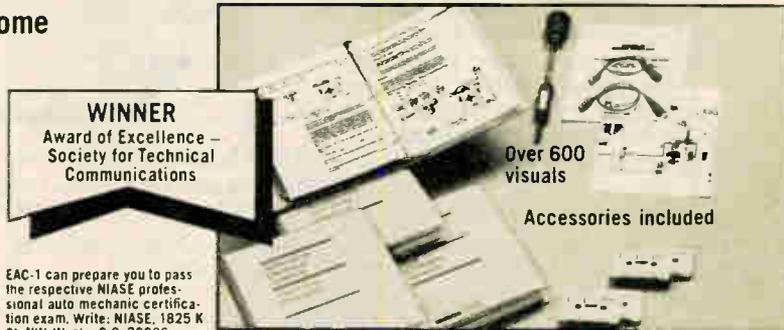
- Course can pay for itself with only one use
- Features hands-on experiments to show you the exact procedures for repair

This effective audio-visual teaching program consists of four modules. Each covers a separate section of the electrical system in-depth, in a profusely illustrated learn-at-your-own-pace format for maximum recall. Modules, in order: Automotive Electrical Principles, The Charging System, The Starting System, Accessory and Body Electrical Systems. Earn 4 CEUs — score 70% or better on each optional final exam.

SAVER! EAC-1, Four-module Electrical Systems Course, 23 lbs. 39.95

EA-11, Module One, 5 lbs. 14.95 EA-12, Module Two, 5 lbs. 14.95

EA-13, Module Three, 5 lbs. 14.95 EA-14, Module Four, 5 lbs. 14.95



EAC-1 can prepare you to pass the respective NIASE professional auto mechanic certification exam. Write: NIASE, 1825 K St. NW, Wash., D.C. 20006

1 Reliable Electronic Ignition Tester

\$19⁹⁵

- Takes the guesswork out of pinpointing defective components in modern electronic ignitions
- Inexpensive, requires no power

Performs four tests that quickly tell you: if battery is sufficiently charged, if reluctor and pickup coil are providing an input to the ignition module, if ignition module is properly switching the coil primary, and the location of a faulty component in the ignition primary circuit. Requires some ignition knowledge. Pickup coil test won't work on '78 and newer Omnis, Horizons, K-cars, etc. with Hall-effect ignitions. Keep one handy in every family vehicle for troubleshooting unexpected breakdowns on the road. A natural for any automotive tool collection.

Kit CI-2055, Shpg. wt. 2 lbs. 19.95

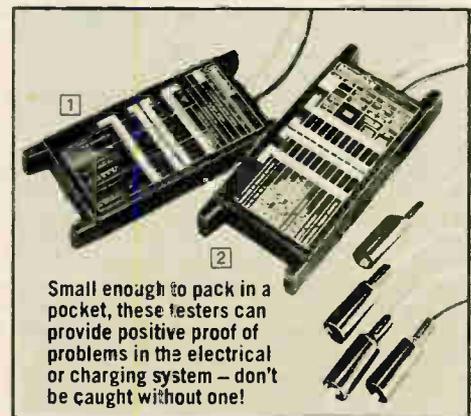
2 Low-cost Charging System Tester

\$19⁹⁵

- Easy-to-use instrument lets you diagnose faulty components in your vehicle's charging system
- Reliable results at a low cost

Two-wire setup and three quick tests tell you: if the battery has sufficient charge to reliably start the engine, if the battery is being charged by the alternator, if the voltage regulator is faulty (causing the battery to become overcharged), and if the alternator stator windings and rectifier diodes are functioning properly. Lightweight and portable like the Ignition Tester, it uses digital ICs to evaluate performance characteristics and cause LEDs indicative of the problem to light. No external power or battery required. Measures 3/4" H x 2 3/4" W x 5 1/2" L. Be prepared in case of trouble!

Kit CI-2065, Shpg. wt. 2 lbs. 19.95



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

New high-efficiency collector panel is now A.R.I.-approved for California and Arizona!!!

Solar energy is economical for do-it-yourselfers

As the cost of fossil fuel continues to rise, and ecological debates increase the national awareness of our environmental responsibility, all forms of alternate energy will become even more promising. But as the demand for highly efficient energy solutions goes up, so should the price. Considering active and passive solar heating, solar photovoltaic or wind-generated electricity, the Heathkit Solar Water Heater is the most energy-conscious product you can buy. It adds significantly more value to your home — quickly — by offering a faster payback. Now is the very best time to go solar.

We offer the highest quality solar components on the market. They're designed to meet our exacting standards as a reliable system. You probably cannot hire a contractor to install a system this good. Plus, you can save up to 40% over a comparable dealer-installed system.

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

Solar gives you the most for your money

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

Invest against soaring energy costs: Hot water makes up a significant portion of the average home energy bill. And now, you can cut those energy costs — with the Heathkit NS-1100 Home Solar Water Heater. It's a high quality closed-loop system for maximum water heating efficiency, designed to save from 50% to 80% of the hot water bill for a typical home.

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

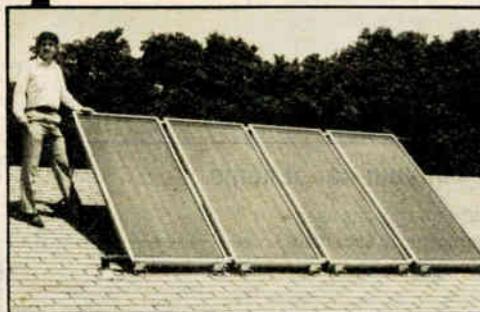
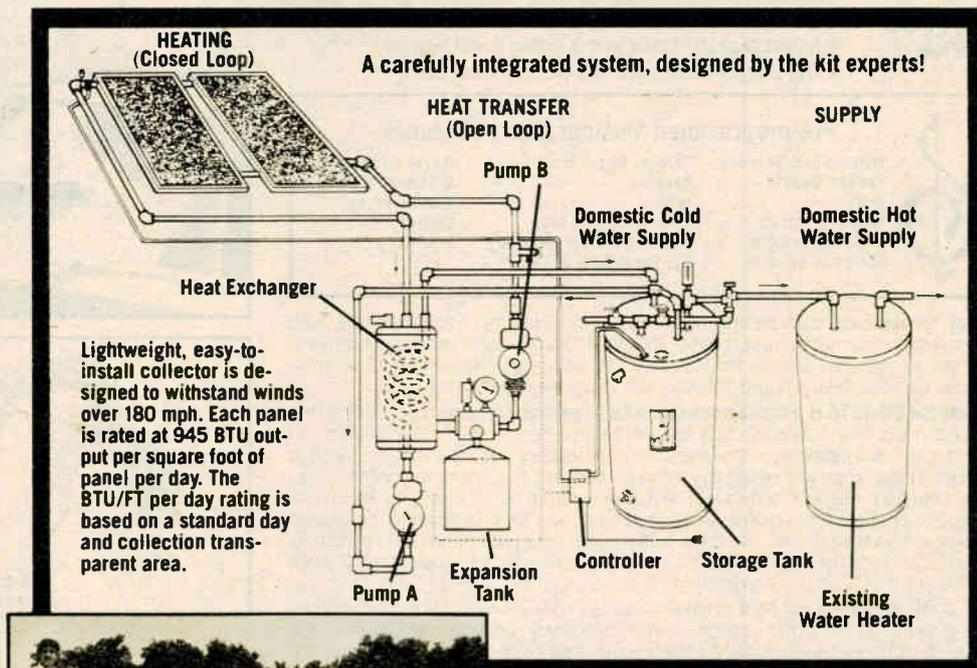
The NS-1100 meets or exceeds applicable regulations of these organizations:

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 it in as little as three weekends: Only common carpentry and plumbing tools are required to assemble and install the NS-1100 Solar Water Heater in your home. The profusely illustrated, step-by-step Heathkit manual allows you to plan the complete kitbuilding and installation operation ahead of time. The NS-1100 Water Heater System includes all the components you need for kitbuilding and installation except 3/4" copper pipe, insulation and solar fluid.

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 thoroughly 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



No other Heathkit pays for itself like the NS-1100 Solar Water Heater System...and then starts paying you more!

unique computer program will show you the tax incentives that are available — and the payback timetable you can expect — from the system.

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

Think about the savings. Think about playing a major role in the energy conservation effort. Be recognized as the Solar Authority in your neighborhood, and take pride in the fact that your solar investment will *always* continue to grow in value!

Tax credits can help pay for your NS-1100 system!

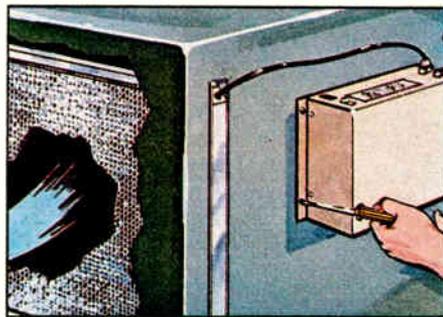
A federal income tax credit of 40%, plus state tax credits (if available), will also help you pay for your NS-1100 Solar Water Heater Kit. This credit is not a deduction. It means you receive back 40% of the system cost. Refer to IRS Form 5695 and Publication 903 (their latest available revisions) — which are included with the NS-1100-3 Manual Set — and consult the IRS or an informed tax preparer for additional details.

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, Shpg. wt. 18 lbs.	169.95
NS-1100-7, 8 Sq. Ft. Heat Exchanger, Shpg. wt. 20 lbs.	189.95
NS-1100-8, 8 Sq. Ft. Double-Walled Heat Exchanger (required in Oregon, Los Angeles and Memphis areas), Shpg. wt. 24 lbs.	239.95



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:

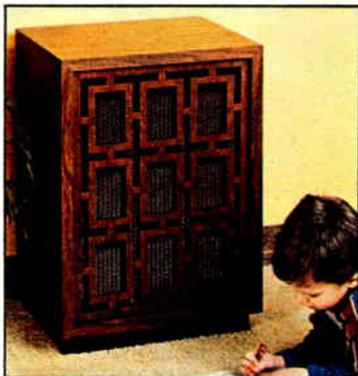
Kit GD-2196 (needs Filter Accessory below), Shpg. wt. 5 lbs. **149.95**

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 purify the air in any room of your home



- Remove dust, dirt, smoke and other contaminants from any room
- Filtering eliminates 99% of pollen and 94% of particles in the air
- 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**



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Stop expensive home 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.

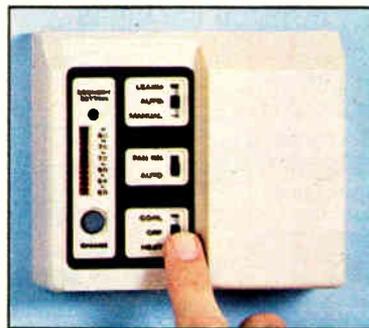
The Heat Sniffer is easy-to-use: Locate drafts with pin-point, electronic accuracy. Turn unit on and adjust knob to silence unit at present room temperature. Then move the Heat Sniffer's sensor along door frames, window sills or any other place where infiltration of cold air might occur. Any change in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

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.

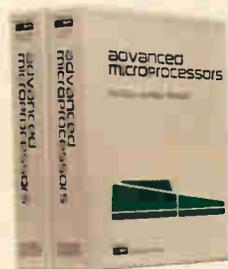
Patented feature turns furnace on later on warm mornings; earlier on cold mornings – so your home always reaches the temperature you specify, at the time you specify. "Econo-Save" lets you dial-down to 54°F (heat) or 84°F (cooling) while you are away for long periods. "Slow-Cycle" increases furnace efficiency 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**

NEW

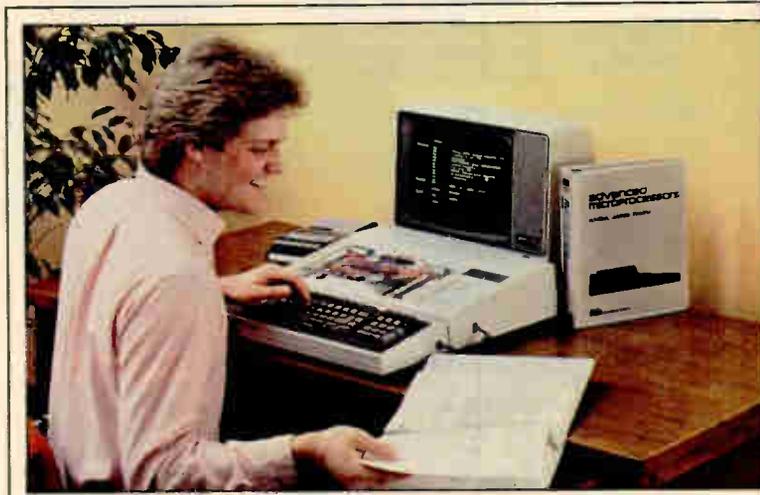
Master the fundamentals of high-performance 16-bit microprocessors with the Advanced

\$99⁹⁵

- Learn to program and interface powerful and incredibly fast 16-bit microprocessors
- Gain an indepth 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 indepth study of 16-bit microprocessors and covers terms, architecture, and programming. In addition, thorough coverage is given to interfacing the microprocessor to its support devices and to the outside world. The second half is a one-of-a-kind 16-bit training computer, the ET-100 (see below). Available separately, the ET-100 supports the EE-8088 as a working computer-trainer. When the course is completed, the ET-100 can be used as a valuable learning tool, a low-cost engineering proto-typing fixture, or a very powerful computer.

Future technology: Already being used to control some personal and small-business computers, 16-bit microprocessors are expected to dominate the marketplace in the very-near future. To help you keep up with this trend, the Advanced Microprocessors Course eases you into the world of 16-bit computing. It begins by acquainting you with microprocessor terms and then introduces assembly language. Progressing at your own speed, you then proceed through program writing, addressing modes, memory, logic and control lines, and 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 most advanced computer trainer is also the world's lowest priced 16-bit computer

- 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

- 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



Advanced Trainer: For engineers, the ET-100 is ideal for breadboarding computer circuits that interface to the 8088 microprocessor. All control, data, and address lines are readily available around the three solderless breadboards. Even the programmable parallel interface (PPI) is accessible. All access lines are buffered to protect the microprocessor from damage. The ET-100 allows experimenters and technicians to easily and conveniently modify circuits, build interfaces, or simply experiment with the 8088. Four power supply voltages, independently regulated from the logic board supply for protection, are also available on the breadboard to power your projects. For moving your circuit to another location for testing or safekeeping, the top breadboard is removable so you can move the entire circuit without disassembling it. And to those students using the EE-8088 Course, the ET-100 teaches 16-bit microprocessor fundamentals through course experiments.

16-bit computer: The ET-100 Learning Computer uses the same sophisticated 8088 microprocessor that's found in our H/Z-100 Desktop Computer. A powerful editor, assembler and debugger are permanently stored in ROM for your program writing and editing convenience. The ET-100 has its own cassette port for loading and storing programs and data. And, it's 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-122 or ZVM-123 (p. 72). Or, display twenty 40-character lines on either channel 3 or 4 of a TV using a TV modulator (p. 29).

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

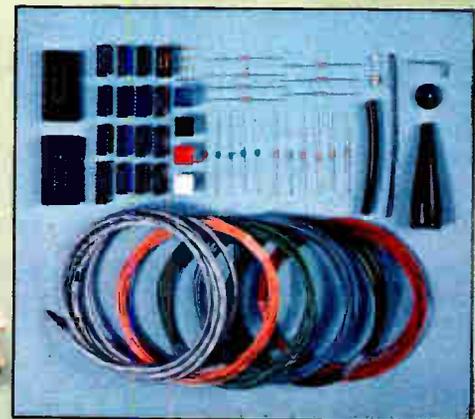
Microprocessor training system and our most powerful and versatile 16-bit computer

Teaches fundamentals of 16-bit microprocessors and interfacing

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

As an experiment, build and use a light pen

Course includes thorough self-testing and a final exam



Experiments using these components clearly show concepts learned in each Unit

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 disk-based 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 5 1/4" 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, 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-122 or ZVM-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. 64). 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. 64), 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. 65).

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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.

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



On-board computer provides Intelligence

Includes rechargeable batteries and charger

Programmed from keyboard, teaching pendant, or cassette port

Senses light, sound, motion and distance

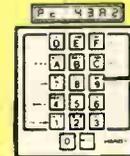
Speaks with optional phoneme synthesized voice

Three-wheeled base drives and steers HERO

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

Side panels snap off for easy access to circuit boards

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



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

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

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

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

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 keypad 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.

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

NEW! 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

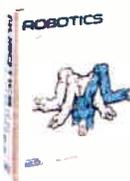
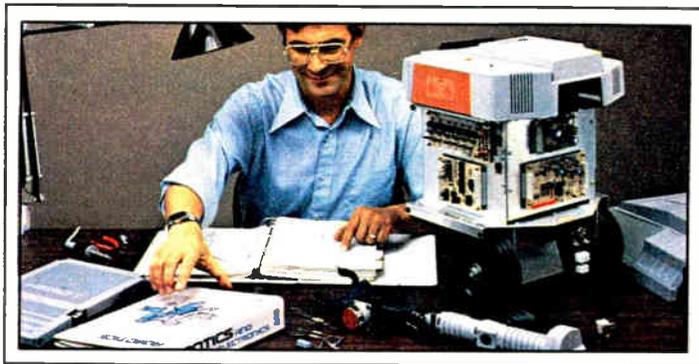
ET-18-5, Monitor ROM Listing, Shpg. wt. 1 lb. 39.95

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.

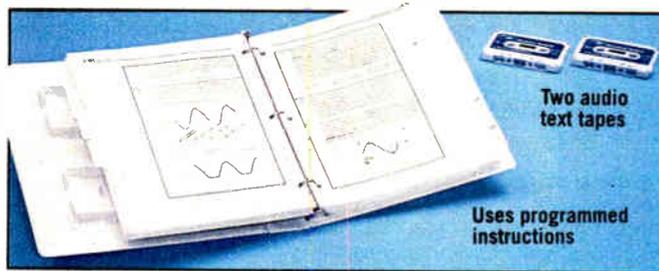
EE-1800, Robotics Course, Shpg. wt. 12 lbs. **99.95**



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

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 36 (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

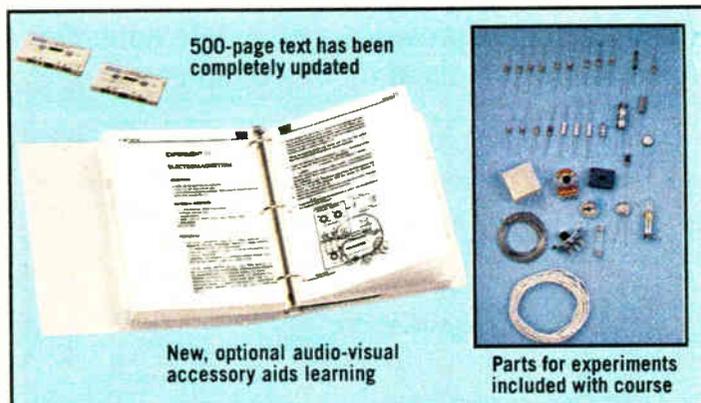
- An excellent starting point for the person just beginning to learn the theory and applications of electronics
- Course updated; new audio-visual accessory available
- Develop a detailed knowledge of electronics rapidly



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.



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. 59). 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 ET3100B Kit Trainer, Shpg. wt. 17 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 44), 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

- Develops practical experience as you learn with many 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



Almost 20,000 clearly explained, vocabulary-building technical terms make this illustrated dictionary more than just a book of definitions. It also includes a compendium of 16 topic outlines, creating 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, \$389.70 — you save \$60!

SAVER! EES-3115B, 66 lbs. **ONLY 329.70**

Optional Audio-Visual Accessory Package enhances learning

485-page text

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

450-page text

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. You "learn by doing" — and remember more.

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 Milliammeter (VOM) are suggested to complete the 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. 19 lbs. **ONLY 134.90**

Spanish Language AC Electronics Course: Translation of this course, less EB-6102-30 Parts for experiments (see page 44).

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 micro-miniaturized 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 milliammeter 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. 18 lbs. **ONLY 134.90**

Spanish Language Semiconductor Devices Course: Translation of this course, less EB-6103-30 Parts for experiments (see page 44).

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Electronic Circuits – from theory to practice

\$64⁹⁵

- Updated to include the latest in available information
- Put the knowledge you've learned in previous Heathkit/Zenith courses to work for you, building more skills
- "Hands-on" experiments add to enjoyment, and explain technical concepts presented in the course
- Optional audio-visual accessory package available



With the Heathkit/Zenith Electronic Circuits Course you go directly from theory into practice. Like all Heathkit/Zenith courses, your text carefully and completely explains all concepts presented. You build fact upon fact, leading to complete mastery of a subject. Clear illustrations explain difficult points and add to your understanding of the information presented within the easy-to-understand text.

The Heathkit/Zenith Electronic Circuits Course exposes you to the circuits you'll find in everyday electronics – and explains them fully.

The proven self-instruction format lets you learn at your own pace: Professionally-prepared text, backed up by easy-to-understand visuals, let you learn more now – and retain more knowledge for years to come.

The Electronic Circuits Course will teach you how to identify power supply rectifiers, filters and regulation circuits – and explain how they work. You'll develop an understanding of amplitude and frequency modulation along with the heterodyne principle and modulation and detection circuits. You will be able to construct transistor and integrated circuit amplifiers, oscillators, active filters and pulse-shaping circuits; power supplies and power supply regulation circuits – even a basic amplitude modulation and demodulation system.

Like all Heathkit/Zenith Courses, the Electronic Circuits Course leads you step by step through this challenging subject. Contained within the clear and easy to understand text are sections on basic amplifiers; including the importance of amplifiers, amplifier configurations, biasing and coupling. The next section brings you a discussion of typical amplifiers. Details are provided on audio amplifiers and push-pull, power, video, RF and IF amplifiers. Then on to operational amplifiers, power supplies, oscillators, pulse circuits and finally the various types of modulation.

Test Equipment Course covers applications

- Learn to use a wide variety of test equipment, oscilloscopes and meters
- Practical experience is stressed by experimentation

\$64⁹⁵

Course includes two texts, each one full of helpful illustrations

Earn 6.0 CEUs

Components for experiments included

This course gives you the knowledge you need to make measurements with digital and analog meters; explain the operation of, and use, the oscilloscope in electronic testing and servicing. You'll also learn to use frequency generators and frequency counters. A section on special measuring instruments covers bridge circuits, transistor testers, curve tracers, spectrum analyzers and logic probes. The optional Audio-Visual Accessory Package enhances the effective teaching process.

The Fundamental Electronics Courses, (EE-3101A-3104A) and the Heathkit/Zenith Course on Digital Techniques, EE-3201A or equivalent knowledge, are suggested as background information. In addition to the textbook and electronic components, we suggest the following materials to complete the experiments: A digital meter, analog meter, oscilloscope, frequency generator and frequency counter and the ET-3100B Trainer.

Pass the optional final exam with a score of 70% or more and earn 6.0 CEUs.

EE-3105A, Shpg. wt. 9 lbs. 64.95

SAVER! EES-3105B, EE-3105A and ET-3100B Kit Trainer 21 lbs. **ONLY 144.90**

EEA-3105A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. 19.95

34/EDUCATION

Optional audio-visual presentation available

Clear and precise text

For full value from this accredited course, pass the optional final exam and earn 4.0 CEUs plus certificate

All necessary components are included

Included with your Electronic Circuits Course is a well-illustrated and concise text, complete with an attractive and durable vinyl binder. You are also supplied with over 100 electronic components for use in the 18 experiments outlined in the text. The optional Audio-Visual Accessory Package aids your understanding. You should complete DC and AC Electronics and Semiconductor Devices Courses (EE-3101A-3103A) or have equivalent knowledge. We suggest an oscilloscope like the Heathkit IO-4105 (p. 63), a VOM and the ET-3100B Trainer to complete the experiments.

Earn 4 Continuing Education Units (CEUs) and a Certificate of Achievement from Heathkit/Zenith Educational Systems: Pass the optional final exam with a 70% or better score.

EE-3104A, Shpg. wt. 7 lbs. 64.95

SAVER! EES-3104B, EE-3104A and ET-3100B Kit Trainer, 19 lbs. **ONLY 144.90**

EEA-3104A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. 19.95

Detailed Electronic Communications Course

- Develop expertise in electronic communications techniques
- Components for seven experiments included; ET-3100B Trainer required

\$59⁹⁵

Text covers each section in detail

Hands-on experiments

The Electronics Communications Course from Heathkit/Zenith allows you to develop an understanding of broadcast and data communications fundamentals.

It covers a wide variety of information including communication fundamentals – amplitude and angle modulation and the communications system. You'll learn about amplitude modulation circuits, suppressed carrier AM and single-sideband. A section on AM receivers includes AM detectors and superheterodyne receivers. Sections on angle modulation, pulse modulation, antennas and communications systems are also included.

Seven hands-on experiments will add to your understanding. Build an AM transmitter, a balanced modulator, FM transmitter, receiver, pulse modulator, time division multiplex transmitter and a communications modem.

Course suggested as a follow-up to EE-3101A-3104A. Successful passage of final exam worth 2.0 CEUs, and a personalized Certificate of Achievement.

EE-3106, Shpg. wt. 7 lbs. 59.95

EEA-3106A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. 19.95

Kit ET-3100B, Trainer, 6 lbs. 99.95



Credit Card Orders Call TOLL-FREE: 800-253-0570

Prepare for microprocessors with the Heathkit/Zenith Digital Techniques Course

\$89⁹⁵

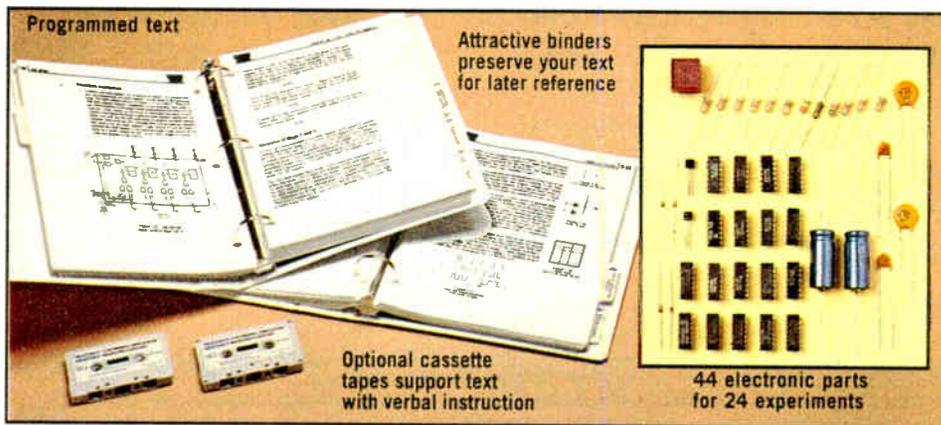
- Learn to design and apply modern digital circuitry
- Costs less than college or tech school courses
- Loaded with 24 practical, hands-on experiments to reinforce the learning experience

Study what you want, when you want: The course begins with fundamentals and theory of digital techniques, and familiarizes you with digital logic circuits, Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design — a wealth of knowledge at a low price. After completing the course, you'll know how to design digital circuitry for virtually any modern electronic application.

A money-back guarantee ensures your satisfaction with this and all the Heathkit/Zenith Self-Instruction Courses. Because we're that sure that we've put together the information you need in the clear, comprehensive format you expect. If the course doesn't meet your expectations, simply return all course materials (excluding Trainer) and your receipt for a full refund of the purchase price.

Profuse illustrations, audio aids and experiments speed comprehension of concepts and practical applications presented in the text. You learn three ways — by reading, listening and doing — a method that helps you understand complex subject matter easily and naturally. Programmed reviews, included with each unit of the Digital Techniques Course, aid retention of important points and help you check yourself before moving on to the next concept. Unit exams further summarize material and test your understanding of the course material.

The Course includes text in two heavy-duty vinyl binders, a pair of optional audio



Programmed text

Attractive binders preserve your text for later reference

Optional cassette tapes support text with verbal instruction

44 electronic parts for 24 experiments

cassettes, and 44 electronic components for performing 24 useful experiments. A prior knowledge of electronics is assumed (Heathkit/Zenith DC, AC, Semiconductors and Electronic Circuits Courses on pages 32-34 of this catalog, or equivalent). The ET-3200B Trainer is required for experiments; recommended instruments are a multimeter like the IM-5284 (page 55) and a single-trace oscilloscope like the IO-4105 (page 63).

Earn 4.0 Continuing Education Units with a grade of 70 percent or above on the final examination, and receive a Certificate of Achievement from Heathkit/Zenith Educational Systems.

EE-3201A, Shpg. wt. 7 lbs. **89.95**

SAVE \$15.00 — buy the Digital Techniques Course and the ET-3200B Trainer Kit together. \$189.90 if purchased separately.

SAVER! EES-3201A, Shpg. wt. 14 lbs. **ONLY 174.90**

EE-3201A, Optional Learning Cassettes, Shpg. wt. 1 lb. **19.95**

Trainer ensures easy mastery of digital techniques

\$99⁹⁵
Kit

- Perform a wide range of digital experiments
- Increase your understanding of digital techniques
- Test your own digital circuits

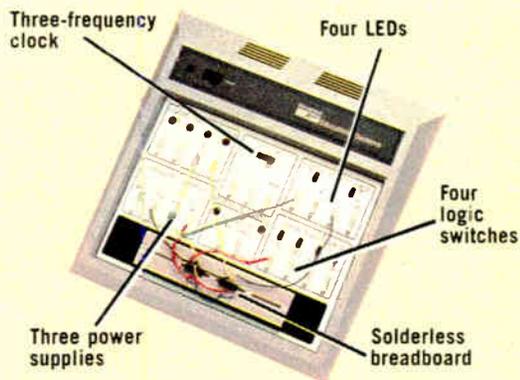
Put your digital knowledge to work with the high-quality ET-3200B Electronic Trainer. Designed for the experiments in both the Digital Techniques and CMOS Digital Techniques programs, the ET-3200B Trainer is a useful tool which speeds comprehension and practical application of course material. This versatile trainer also allows you to build and test prototypes, confirm circuit operation, and test digital ICs. Solderless breadboard sockets make experimenting and de-

sign easier and faster, with a flexible capacity for eight 14-pin or 16-pin dual in-line ICs, and 24-28-, or 40-pin DIPs. Has four binary data switches, two no-bounce switches to pulse logic circuits, a three-frequency pulse clock generator and four LEDs for logic-state indication.

Built-in regulated power supplies furnish +12 VDC at 500 mA, -12 VDC at 100 mA and +5 VDC at 500 mA. The Trainer is compatible with RTL, TTL, CMOS, ECL, NMOS, PMOS and Linear. 120/240 VAC. Build it yourself and save \$80 over our assembled price.

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

Factory Assembled and Tested Trainer.
ETW-3200B, Shpg. wt. 6 lbs. **179.95**



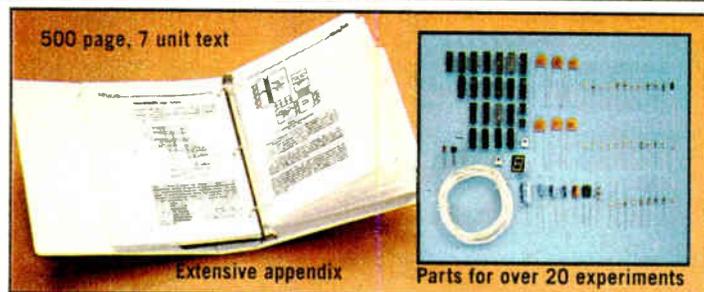
CMOS Techniques Course brings you up-to-date

\$79⁹⁵

- Stresses practical applications and in-circuit advantages
- Learn to interface between CMOS and other logic families
- Learn by doing with proven teaching methods

Practicality makes CMOS (complementary metal-oxide-semiconductor) devices desirable; our practical course uses a learn-by-doing approach, with experiments that illustrate course topics — components included.

Basic CMOS concepts through advanced applications are covered, including interfacing, logic blocks, multivibrators, counters and registers, and analog applications. EE-3201 or equivalent knowledge is a prerequisite. The ET-3200B Trainer (described above) is required to perform the experiments; we also suggest using an oscilloscope like the IO-4105 (page 63), and a multimeter like the IM-5284 (page 55). Earn 3 CEUs.



500 page, 7 unit text

Extensive appendix

Parts for over 20 experiments

EE-3202, Shpg. wt. 6 lbs. **79.95**



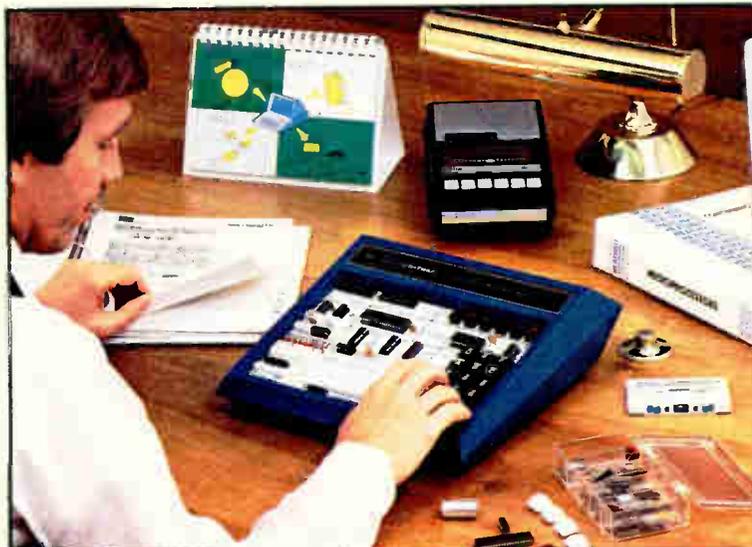
Alaska, Hawaii and Michigan Residents: Call 616-982-3411

EDUCATION/35

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,

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

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

\$SAVER! Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$339.90. **ETS-3400A**, Shpg. wt. 19 lbs. **ONLY 314.90**

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.

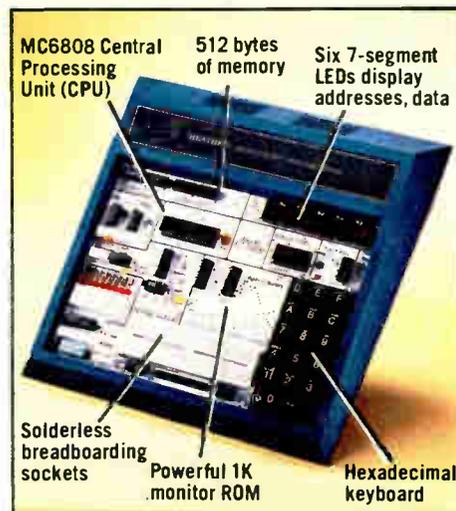
The **17-key hexadecimal keyboard** permits you to access memory location to examine contents, then step forward or backward to examine other memory locations, change the contents of memory locations, examine and/or alter any of the MC6808 microprocessor's internal registers, set break points for program 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-3201A 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 44.

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.

EE-3401-1, Shpg. wt. 2 lbs. 60.00

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

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

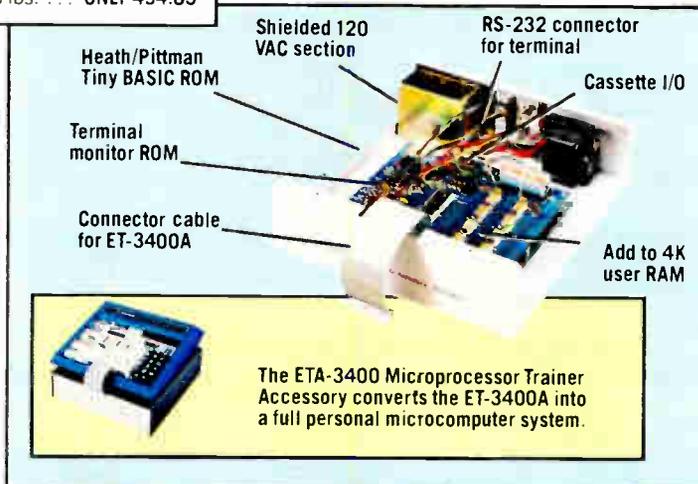
SAVER! Order EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together. Save \$70; \$564.85 separately.
ETA-3401A, Shpg. wt. 28 lbs. ... ONLY 494.85

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, new H-Z-29 on page 70, or a 20 mA ASCII teletypewriter 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.



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, Assembled and tested, Shpg. wt. 8 lbs. 275.00

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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

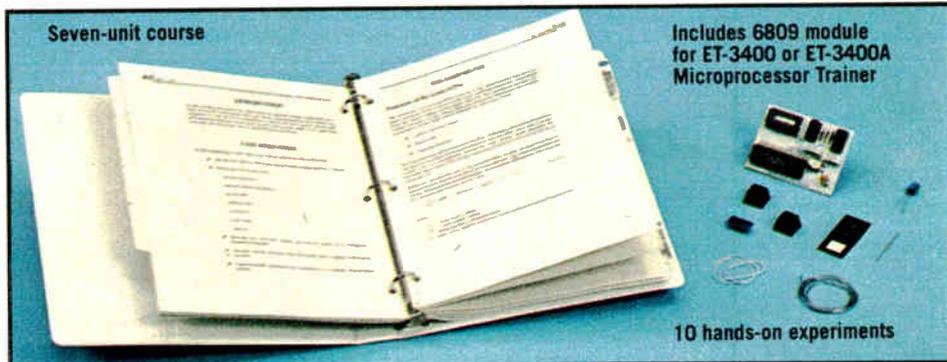
processor with the Heathkit/Zenith EE-3404 6809 Microprocessor Course.

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 applications
- 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).

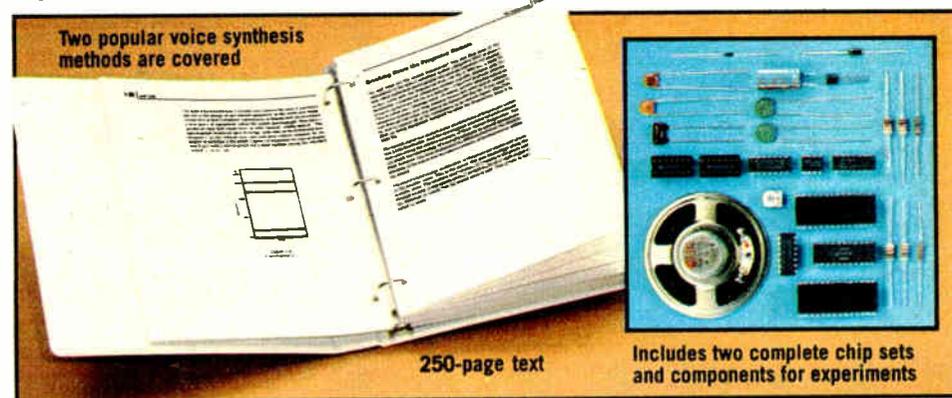
Practical course features a great deal of experimentation: EE-3403 cuts through the technical fog and gets right down to how to program and interface the two most popular voice synthesis methods. The course is also valuable in helping you understand the alternatives available in speech synthesis. It 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 41), 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

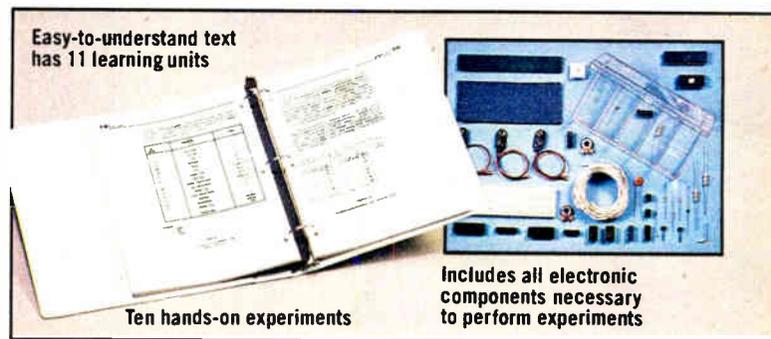
\$99⁹⁵

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 texts: As with all Heathkit/Zenith courses, the EE-3402 Microprocessor Interfacing Course is written in a unique, programmed, self-instructional format. 750 pages of 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 revolutionary, state-of-the-art Fiber Optics Technology with this new course!



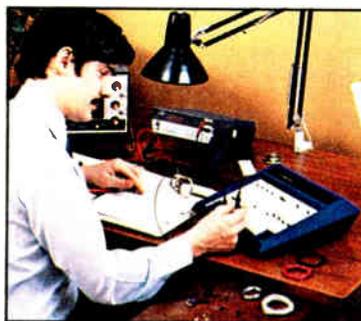
\$99⁹⁵

- 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 by educating yourself now.

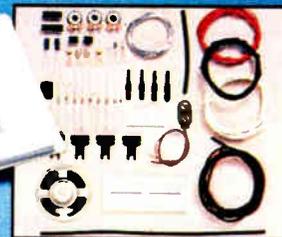
This five-unit course covers the basics of fiber optics. Beginning with Unit 1, you'll study Optical Energy, the nature of light and optical radiation; Optical Fibers and how they transmit light; Fiber Optic Light sources – light-emitting diodes and laser diodes. In Unit 4, you'll learn about fiber optic 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/A or ET-3200B 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-3201A 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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



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

\$49⁹⁵



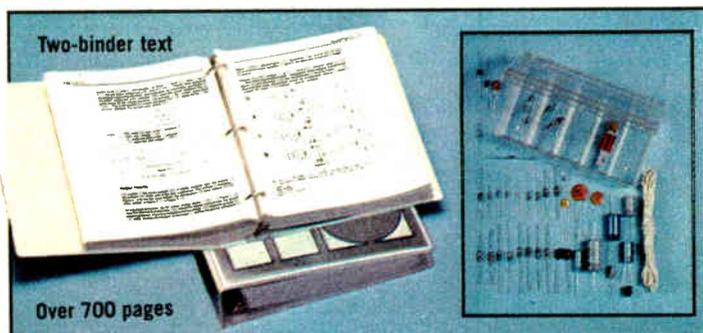
- This new course, first in a series, teaches the fundamentals of successful passive-component circuit design
- Step-by-step programmed learning maximizes retention, with unit exams to summarize material and verify progress
- Earn 4.0 Continuing Education Units by passing the enclosed optional final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

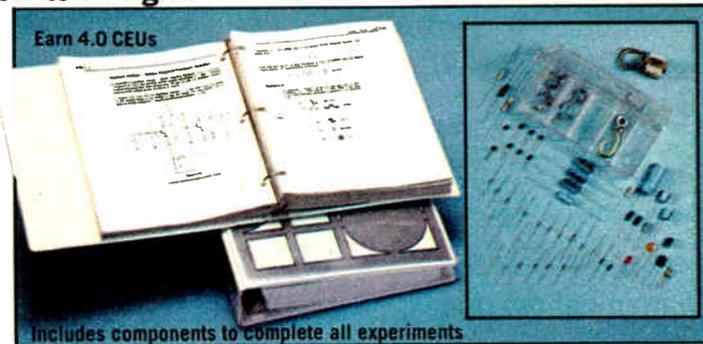
\$59⁹⁵



- 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

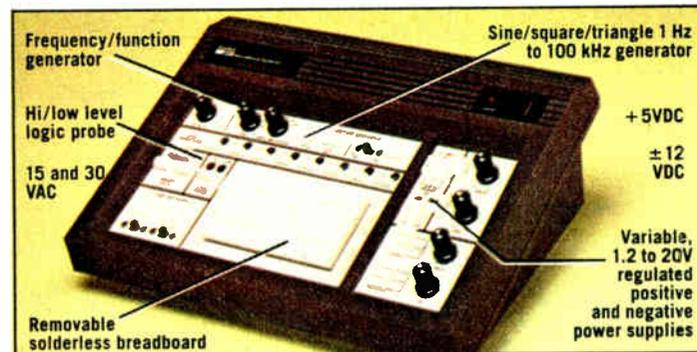
- Quickly build and test circuits for experimentation
- All power supplies protected against short circuit

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



Credit Card Orders Call TOLL-FREE: 800-253-0570

Printed Circuits Course helps you learn how to design and build your own PC boards

\$64⁹⁵

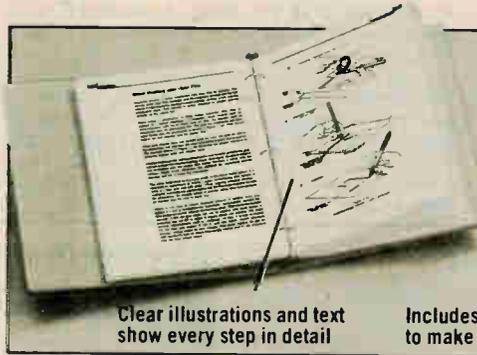


- Learn both the direct pattern and photographic etching techniques
- Copy PC board layouts from books and magazines or fabricate your own, from almost any schematic

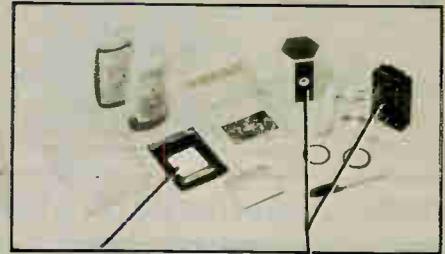
Fascinating course teaches you how to make printed circuit boards from scratch using both the direct pattern and photographic transfer techniques.

You'll learn the properties of different types of PC board materials, plus the processes used in manufacturing them. In the experiments you'll learn how to design a circuit, prepare the artwork, and transfer clean art images to the board. You'll also learn how printed circuit boards are assembled using automated insertion machines and wave soldering techniques.

The experiments guide you to design, layout and etch circuit boards for the GD-600 Photoelectric Lamp Switch and GD-1287 Touch Switch kits, which you will build as you study the course. All necessary materials, components and hardware to complete the kits and experiments are included. An etch-resist pen,



Clear illustrations and text show every step in detail



Includes everything you need to make your own PC boards

You'll actually build two useful kits

rub-on transfers, art tape, etchant, solvent, a positive pattern, clear acetate, photographic developer and sensitized PC boards are provided.

Pass the optional final exam with a 70% or better score to earn 2.0 CEUs and a Certificate of Achievement. Course NOT available outside the continental U.S.

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



Programming experiments impart valuable experience

ET-6800 Trainer has 256 bytes of NMOS RAM

Earn 4.0 CEUs



Illustrations aid your comprehension

Course is in two binders

Over 1,000 pages



All parts included

Enjoy an easy Introduction to Microprocessors

\$29⁹⁵ • No previous knowledge is required
• I/O keyboard Trainer starts you programming

Instruct yourself in this increasingly important technology — our low-cost course explains how microprocessors operate, number systems, codes, computer math and the 6808 microprocessor. Programming experiments use optional ET-6800 Trainer above.

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

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

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

17-key hexadecimal Trainer for EC-6800 programming experiments lets you enter programs, single-step, alter and access memory. Built-in 1K ROM monitor program controls operation. Address and data readout on six-digit LED display.

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

Cassette Recorder/Player

Highly recommended GE model is ideal with courses containing audio tapes. Push-button eject, play, rewind, fast forward, record & stop functions. 3-digit counter with reset button helps you find pertinent information quickly.



ECP-3801A, Assembled and tested, Shpg. wt. 4 lbs. 60.00

Premium quality 30-minute cassette tapes.
ECP-3802, Three cassettes, 1 lb. 6.00

Audio-tutorial math courses are a low-cost way to learn with confidence



Comprehensive tutorial texts combined with problem-solving audio cassettes, printed visuals and practice exercises present math concepts clearly and maximize your retention of the material.

Algebra Course: Learn algebra basics quickly with well-written text, workbook and ten audio cassettes. Eight units cover polynomial arithmetic, algebraic functions, exponents, radicals, linear equations, inequalities, factoring, quadratics, sets and more. Earn 3.0 CEUs and a Certificate of Achievement.
EM-4, Shpg. wt. 7 lbs. 24.95

Intermediate Algebra Course: Text and nine cassettes. Covers function, 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 standard system of weights and measures in a fun, easy way. Self-instructional text and audio cassette acquaint you with all aspects of measurement and simple rules for conversion. Earn 1.0 CEU.
EM-2, Shpg. wt. 4 lbs. 5.00

Hobbyists — learn basic knowledge in many fields

\$64⁹⁵ • Build and experiment with 26 different circuits
• Gain an overview of electronics for many hobbies

You'll understand more of those do-it-yourself projects in popular magazines when you finish the Electronics for Hobbyists course. Seven units of easy-to-understand text and 26 experiments develop your understanding and experience.

Learn the practical principles of direct and alternating current, active devices, integrated circuits, digital logic, number systems, microprocessors, programming, computers, software and more. The last unit is a survey of electronic hobbies — experimentation, R/C modeling, computers, audio, shortwave and amateur (ham) radio. Experiments require the ET-3100B Trainer (p. 32), a multimeter and oscilloscope. Earn 4.0 CEUs.
EE-3140, Shpg. wt. 11 lbs. 64.95



Advanced Electronics Series conveys specialized information

Whether you're an electronics professional, part-time student or curious hobbyist, the Heathkit/Zenith Advanced Technology Series is a rewarding way to gain the latest, state-of-the-art information on these important subjects. It's the fast, easy, low cost way to gain new knowledge and maintain a competitive edge through self-study. They're economical and flexible, too, in that all five courses use the same Trainer. Classroom versions of these courses are found on page 44. All courses worth 3.0 CEUs.

Every course is comprehensive in its coverage, yet totally self-contained. The text presents material in easy-to-understand terms, using a programmed instruction format to quickly reinforce new concepts as they are learned. You proceed at your own pace. Hands-on experiments, designed to strengthen the practical skills stressed in each course, improve your comprehension and retention. All components required to complete the experiments are included — see below and page 43 for the ET-3300B Trainer.

Optoelectronics covers the latest light-reactive devices



Course concentrates on light sources and optoelectronic displays available — including how to drive and multiplex them. Also acquaints you with the theory, design and applications of light-sensitive components such as photodiodes, phototransistors, solar cells, optocouplers, lasers and fiber optics. Recommended: a VOM like the IM-5217 (p. 51) and a

scope like the IO-4105 (p. 63). Prerequisites: EE-3101A and -3201A.

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

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

ETW-3300B, Assembled and tested Circuit Breadboard, Shpg. wt. 6 lbs. 179.95

SAVER! Buy EE-105 and ET-3300B together. EES-105B, 11 lbs. ... **ONLY 149.90**

Gain proficient know-how of Active Filters at low cost



Teaches proficiency in designing active filters with op amps, plotting and predicting frequency responses, breadboarding first-order low- and high-pass, second- and higher-order, plus bandpass and state variable filters. Recommended: a scope like IO-4105 (p. 63) and a frequency generator like IG-1271 (p. 52). NOTE: An ET-3100B Experimenter

Trainer may also be used for this, but no other course in the Advanced Series.

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

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

ETW-3300B, Assembled and tested Circuit Breadboard, Shpg. wt. 6 lbs. 179.95

SAVER! Buy EE-102 and ET-3300B together. EES-102B, 11 lbs. ... **ONLY 124.90**

Learn about Phase-Locked Loops — and build them, too



PLLs and their ingredients — the phase detector, loop filter and voltage-controlled oscillator — are presented in the thorough, easy-to-follow Heathkit/Zenith way. The 268-page text involves you deeply in this new aspect of radio and TV communications. Recommended: a DC voltmeter like the IM-5284 (p. 55), dual-trace oscilloscope like IO-4205 (p. 63) and audio signal generator like IG-5218

(p. 52). Prerequisites: EE-3101A through -3104A and -3201A.

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

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

ETW-3300B, Assembled and tested Circuit Breadboard, Shpg. wt. 6 lbs. 179.95

SAVER! Buy EE-104 and ET-3300B together. EES-104B, 14 lbs. **ONLY 139.90**

Integrated Op-Amps: the universal, idealized amplifier



A comprehensive 358-page text details the measurement of common op-amp parameters, basic op-amp linear circuits, integrator and differential circuits and performance of op-amp constant current sources. Also discusses current voltage and voltage/current converters, Norton and Bi-FET op amps. Recommended: a scope like the IO-4105 (p. 63), multimeter like IM-2260 (p. 59)

and frequency generator like IG-1271. Prerequisites: EE-3101A -3104A.

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

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

ETW-3300B, Assembled and tested Circuit Breadboard, Shpg. wt. 6 lbs. 179.95

SAVER! Buy EE-101 and ET-3300B together. EES-101B, 11 lbs. ... **ONLY 129.90**

Discover the many, useful ways to implement IC Timers



Understand applications of common IC timers for logic functions, in output drive and time delay relay circuits, as wide-range pulse generators, voltage/frequency converters, freewheeling power-fail and sin/sq wave oscillators, universal timers, speed alarms and precise clock sources in this 348-page text. Recommended: a scope like the IO-4105 (p. 63), IM-2260 multimeter (p. 59) or

similar. Prerequisite: EE-3201A Digital Techniques Course (p. 35).

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

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

ETW-3300B, Assembled and tested Circuit Breadboard, Shpg. wt. 6 lbs. 179.95

SAVER! Buy EE-103 and ET-3300B together. EES-103B, 11 lbs. ... **ONLY 129.90**

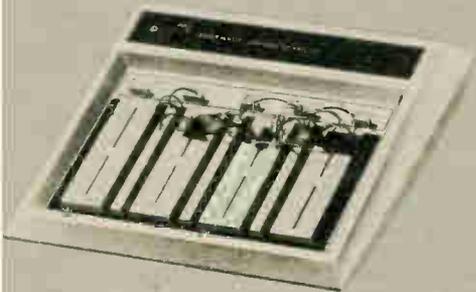
SAVE \$60 on multi-skill package for a fully advanced education



Take valuable advantage of this cost-cutting discount offer and move ahead faster — order all five courses in the Advanced Electronics Series and the ET-3300B Breadboard Trainer together! Includes the EE-101 Op Amps Course, EE-102 Active Filters Course, EE-103 IC Timers Course, EE-104 Phase-Locked Loops Course, EE-105 Optoelectronics Course and the ET-3300B Laboratory Circuit Breadboard. Purchased separately the six-part package totals \$339.70. Order the entire group now, (get Optoelectronics free) and start expanding your specialized electronics skills!

SAVER! EES-1015A, Shpg. wt. 34 lbs. **279.70**

ET-3300B Course Trainer



Versatile Lab Circuit Breadboard makes doing experiments easier

- Redesigned to match our fully updated electronics courses
- Three-output power supply
- Fused and current limited for best short circuit protection
- Build the kit and save \$80

\$99⁹⁵
Kit

Master more advanced electronics skills: We believe that students learn best by doing. That's why our entire line of professionally-recognized courses include hands-on experiments that firmly reinforce the most important concepts and practical applications presented in each text. Students actually observe, measure and *experience* the empirical and theoretical dynamics of circuit operation.

Suggested to complete experiments: If you're planning to educate yourself with one of the hardware-intensive courses in the Heathkit/Zenith Advanced Electronics Series, the multi-purpose ET-3300B Laboratory Circuit Breadboard is specifically designed for use with the specialized experiments you'll be performing in each course on page 42, and the EH-701 and -702 "file" courses at right.

Made from rugged quality materials, the Breadboard is a great convenience tool and will make learning easier. It features seven solderless socket areas plus five power/ground sockets for quick and easy circuit construction. The sockets will accept any size dual inline integrated circuit package, and almost all other standard electronic components.

Reliable safety: The ET-3300B's built-in power supplies are designed to be completely immune to shock and hazard, with fixed current-limiting of each supply to protect against short circuit. Convenient, self-contained power sources also save setup time and eliminate the mess of running long, tangling hookup wires. The power supplies provide +5 VDC ($\pm 4\%$ at 1.5A), +12 VDC at 100mA, -12 VDC ($\pm 2\%$ at 100mA) and two ground connections.

Build the versatile ET-3300B yourself from a money-saving kit and save \$80. Overall assembly time is about two evenings. Or purchase the completely assembled and factory-tested ETW-3300B Circuit Breadboard and save time for your studies. Requires 120 VAC, 60 Hz power. UL listed. Beige cabinet measures 3½" H x 12" W x 12" D.

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

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

SAVER! Buy all five courses in the Advanced Electronics Series (see box, pg. 42) and ET-3300B Laboratory Circuit Breadboard kit together.

EES-1015A, Shpg. wt. 34 lbs. 279.70

VISA MasterCard AK, HI, MI: Call 616-982-3411.

Linear Circuits Course brings solid-state electronics to life

\$49⁹⁵

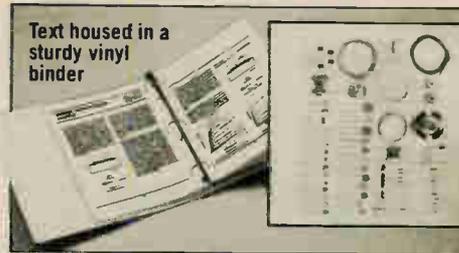
- Build each circuit as you learn
- Covers dozens of basic circuits and their many modifications
- Includes 86 components (worth over \$45) for building more than 30 linear circuits



The Linear Circuits Course is an easy-to-understand integration of text, diagrams and experiments that move smoothly into the hands-on experience you require to make learning more meaningful and expand your skills faster.

EH-701 is a hardware-oriented program consisting of a series of circuit "files" arranged in progressive order. Each file gives a concise description of the basic circuit and its operation, presents a complete schematic and details several modifications to alter the useful parameters. The course emphasizes the value of "doing" rather than reading.

Circuits covered include bipolar transistors, field effect transistors, the 555 timer and 741 op amp linear circuits. You construct various amplifiers, astable and monostable multivibrators, pulse position and width modulators, active filters and more



using the complete parts inventory supplied.

For maximum convenience, we recommend using the ET-3300B Laboratory Circuit Breadboard. However, all circuits can be constructed and tested using your own breadboards. To observe circuit operation, you'll need a voltmeter like the IM-5217 on page 51, and an oscilloscope such as the IO-4205 on page 63. DC and AC Electronics, and the Semiconductor Devices Course (EE-3101A to -3103A, pgs. 32-33) or equivalent knowledge is a prerequisite.

Earn 4.0 Continuing Education Units by passing with a grade of at least 70% on the optional final exam.

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

TTL and CMOS Circuits Course instructs in advanced digital logic

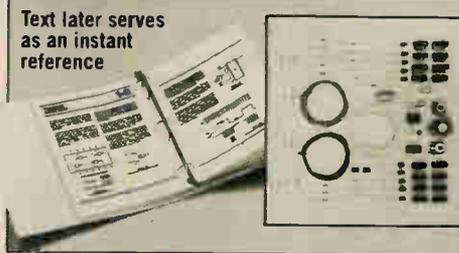
\$59⁹⁵

- Examines TTL and CMOS in depth as you learn-by-doing
- A new series of circuit "files" arranged in logical sequence
- Includes 65 electronic parts for building over 50 circuits



Build circuits immediately: In the EH-702 TTL and CMOS Circuits Course, you develop hands-on skills right away, building new knowledge at your own pace. You learn interactively, turning theory into practical experience.

The modular "file" format of this course places major emphasis on practical digital logic design and IC applications. Little reading is required - you put the essential technical theory to work fast by constructing over 50 circuits including the 7447 BCD to seven-segment decoder, D- and J-K-type edge-triggered flip-flops, four-bit adder, CMOS 100 kHz crystal oscillator, the AND, NAND, OR, NOR and XOR logic gates, data selectors, distributors, comparators, a quad-bilateral switch and more. All components needed to conduct the experiments are supplied.



Construct these state-of-the-art circuits with the ET-3300B Laboratory Circuit Breadboard featured at left, or use your own breadboard and power supplies. To better observe circuit operation, you'll need a voltmeter like the IM-5217 (p. 51) and a dual-trace scope like IO-4205 (p. 63). AC, DC and Semiconductor Devices Courses are prerequisites. Earn 4.0 CEUs if you score 70% on the 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.

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

An outstanding Soldering Course for new or experienced kitbuilders

\$17⁹⁵

- Six experiments lead you through the construction of a two-transistor light oscillator



The EI-3133 Soldering Course is a fun, easy way to perfect your soldering skills for quality success. It teaches professional facts and techniques in a detailed way, using a proven "hands on" approach. Topics covered include the chemistry of solder, proper iron size, tinning and cleaning, the characteristics of good solder connections, solder bridges, visual troubleshooting for repair and the best methods of desoldering. The handy practice kit comes complete with circuit board, components and solder. Ideal for individuals, industry or schools. Requires a soldering iron and small hand tools. See page 50.

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

Heathkit/Zenith Classroom Courses are carefully designed to fit your custom training needs



Success-oriented with just the right amount of theory and a maximum emphasis on real-world applications, Heathkit/Zenith Classroom Courses incorporate the latest technical material available.

Four New High-Technology Courses



Teachers, training directors: Add these new learning courses to your classroom curriculum: Passive, and Transistor Circuit Design, Advanced 16-bit Microprocessors, Robotics and Industrial Electronics. See box in chart below for more information.

Call for free information and price schedules on the full line of Classroom Courses

Alabama	205-822-1326
Alaska	907-338-3347
Arizona	602-945-6605
Arkansas	205-822-1326
California (No.)	415-651-6720
California (So.)	714-493-8040
Colorado	303-795-1450
Connecticut	617-285-9028
Delaware	717-533-4038
Dist. of Columbia	804-741-2580
Florida	305-647-5373
Georgia	404-447-5231
Hawaii	503-640-1729
Idaho	503-640-1729
Illinois (No.)	312-960-0363
Illinois (So.)	309-343-6135
Indiana	219-482-2609
Iowa	515-733-4162
Kansas	913-722-4713
Kentucky	205-822-1326
Louisiana	601-327-4757
Maine	207-397-2902
Maryland	804-741-2580
Massachusetts	617-285-9028
Michigan	313-585-2300
Minnesota	612-533-0000
Mississippi	601-327-4757
Missouri	314-724-9584
Montana	503-640-1729
Nebraska	316-342-5236
Nevada	702-358-0829
New Hampshire	617-285-9028
New Jersey	609-767-1399
New Mexico	602-945-6605
New York	516-922-6590
North Carolina	919-776-8161
North Dakota	612-533-0000
Ohio	419-435-6517
Oklahoma	918-664-9015
Oregon	503-640-1729
Pennsylvania	717-533-4038
Rhode Island	617-285-9028
South Carolina	919-776-8161
South Dakota	612-533-0000
Tennessee	615-361-8744
Texas	214-361-8665
Utah	702-358-0829
Vermont	617-285-9028
Virginia	804-741-2580
Washington	206-821-4523
West Virginia	804-741-2580
Wisconsin	414-784-8075
Wyoming	303-795-1450

- **Exploratory Courses** — Concepts of Electronics, Printed Circuit Boards
- **Fundamental Electronic Series** — DC Electronics, AC Electronics, Semiconductor Devices, Test Equipment, Electronic Communications, Electronic Circuits
- **Advanced Electronic Series** — Operational Amplifiers, Active Filters, IC Timers, Phase-Locked Loops, Optoelectronics, Robotics and Industrial Electronics, Passive Circuit Design, Transistor Circuit Design
- **Digital Techniques**
- **Microprocessor Technology** — Microprocessors, Microprocessor Interfacing, 6809 Microprocessor, 16-bit Advanced Microprocessors
- **Computers** — BASIC 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 challenge 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 chart list below).

Heathkit/Zenith Classroom Courses are the answer for industries, governments, and schools who want to teach technical subjects efficiently at minimum cost.

Slides and filmstrips available

Color slides or 35 mm filmstrips duplicate the flip charts that are included only in the self-instruction versions of these courses.

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



Earn CEUs on Classroom Courses with these exams

Classroom students can earn Continuing Education Units. 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. 6 lbs.	Price	Parts Shpg. wt. 1 lb.	Price	Cassettes Shpg. wt. 1 lb.	Price
Passive Circuit Design	EB-6001 (3 lbs.)	17 95	EB-6001-40	10 95	EB-6001-50	9 95	ETW-1000 (13 lbs.)	349 95	EB-6001-30	10 95	NDT USED	
Transistor Circuit Design	EB-6002 (3 lbs.)	19 95	EB-6002-40	10 95	EB-6002-50	9 95	ETW-1000 (13 lbs.)	349 95	EB-6002-30 (2 lbs.)	19 95	NDT USED	
Robotics & Ind. Electronics	EB-1801 (4 lbs.)	29 95	EB-1801-40	14 95	EB-1801-50	9 95	ETW-18 (70 lbs.)	2499 95	EB-1801-30 (2 lbs.)	44 95	NDT USED	
Advanced 16-bit Microprocessors	EB-8088 (5 lbs.)	24 95	EB-8088-40	11 95	EB-8088-50	9 95	ETW-100 (33 lbs.)	1499 95	EB-8088-30	59 95	NDT USED	
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	NDT USED	
Printed Circuit Boards	EB-6134 (1 lb.)	18 95	EB-6134-40 (1 lb.)	9 95	EB-6134-50	9 95	NDT USED		EB-6134-30 (2 lbs.)	19 95	NDT 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-6102A	19 95	EB-6102-40	10 95	EB-6102-50	9 95	ETW-3100B	169 95	EB-6102-30	15 95	EEA-3102A	19 95
Semiconductor Devices	EB-6103	19 95	EB-6103-40	10 95	EB-6103-50	9 95	ETW-3100B	169 95	EB-6103-30	15 95	EEA-3103A	19 95
Electronic Circuits	EB-6104	19 95	EB-6104-40	10 95	EB-6104-50	9 95	ETW-3100B	169 95	EB-6104-30	29 95	EEA-3104A	19 95
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	EEA-3105A	19 95
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	EEA-3106A	19 95
Operational Amplifiers	EB-601	18 95	EXPERIMENTS IN TEXT		EB-601-50	9 95	ETW-3300B	179 95	EB-601-30	24 95	NDT USED	
Active Filters	EB-602	18 95	EXPERIMENTS IN TEXT		EB-602-50	9 95	ETW-3300B	179 95	EB-602-30	14 95	NDT USED	
IC Timers	EB-603	18 95	EXPERIMENTS IN TEXT		EB-603-50	9 95	ETW-3300B	179 95	EB-603-30	29 95	NDT 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	NDT 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	NDT 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-3201A	19 95
Microprocessors	EB-6401 (4 lbs.)	24 95	EB-6401-40 (1 lb.)	11 95	EB-6401-50	9 95	ETW-340DA	339 95	EB-6401-30	59 95	EB-6401-6D	12 95
Microprocessor Interfacing	EB-6402 (5 lbs.)	24 95	EB-6402-40 (1 lb.)	10 95	EB-6402-50	9 95	ETW-340DA	339 95	EB-6402-30	59 95	NDT USED	
6809 Microprocessors	EB-6404 (1 lb.)	24 95	EXPERIMENTS IN TEXT		EB-6404-5D (2 lbs.)	9 95	ETW-340DA	339 95	EB-6404-3D	69 95		
BASIC Programming	EB-610D (4 lbs.)	19 95	EB-610D-40	10 95	EB-610D-50	9 95	NDT USED		PARTS, CASSETTES NDT USED			
Auto Tune-Up	EB-2D (4 lbs.)	19 95	EB-2D-4D	9 95	EB-2D-5D	9 95	NDT USED		EB-20-30 (2 lbs.)	17 95	EB-20-6D	9 95



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

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)

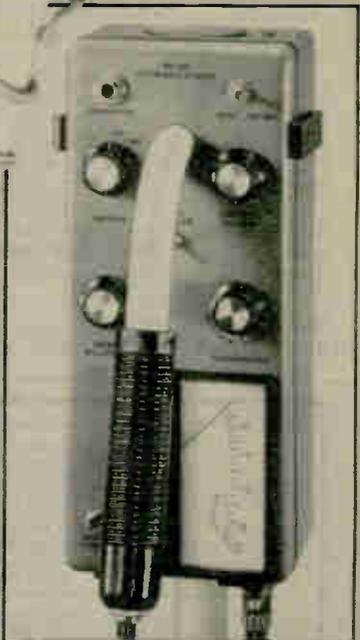
Easy-Grip handle for fatigue-free use

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

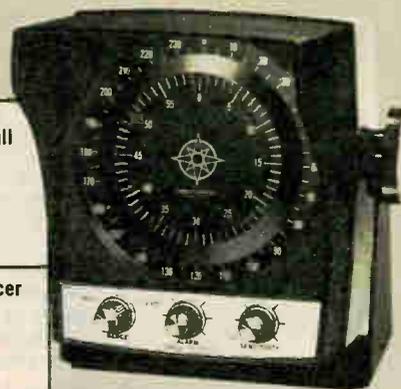
METAL LOCATORS/45



HEATH HAS A BETTER MARINE VALUE!



All three Sounders feature noise rejection circuitry.



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 1/3 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 Cyclocac 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.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Name: _____

Address: _____

City: _____ State: _____

GDP-1225 Zip: _____

Brass Name Plate adds prestige to your kit

\$2.00 for one plate
\$1.60 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.



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 backlit 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 preference. 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: 2½" H x 7.0" W x 5½" D. (6.4 x 17.8 x 14.0 cm).

3 Digital Remote Depth Sounder repeater station

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

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

4 Flush-mount Digital Remote Readout for sailboats

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

Kit MI-2918, Remote with visual warning only, Shpg. wt. 4 lbs. 89.95

Kit MIA-2918-1, Audible warning alarm for MI-2918, Shpg. 1 lb. 12.95



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



- 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 batteries), reverse polarity protected. Dim: MI-2958: 5" diam. by 4½" deep. Requires a 4½" hole for mounting. MI-2956: 2½" H x 7.0" W x 5½" D.



Delivers depth reading and proximity alarms to the helmsman via remote repeaters below



MARINE/47

The President's Corner

Dear Friends,

A few years ago, while visiting MIT, the head of their Computer Services Department asked me to quickly estimate the number of electric motors in my home. My quick answer was "about 15." Well, after learning that the average number of electric motors in a U.S. home was 43, I had to rethink my answer. Sure enough, I had missed a whole bunch of them including ceiling fans, clocks, oven timers, tape recorders, the air cleaner, humidifier, trash masher, garage door opener, antenna rotor, can opener, oven hood exhaust and sump pump — to name just a few. In all, I finally came up with 47. Try counting yours — you'll be amazed.

The point of this exercise was to demonstrate a parallel situation destined to occur with microprocessors. And it's happening. They're getting "buried" into all kinds of products in our homes. We don't see them, but they're there. In smart thermostats, our TV sets, TV games, microwave ovens, washer/dryer timers, security systems, VCR's and, of course, home computers.

It's no coincidence that our Heathkit product line continues to grow with new microprocessor-based products in all areas... amateur radio, TV, weather instruments, home control systems, computers, robots, educational trainers, service/test equipment and telephone products. With more coming.

Digital electronics dominated our product designs for the 70's. It's certain that microprocessors will do the same throughout the 80's. What's next? Products that talk (voice synthesis)... artificial intelligence... satellite communications? Others? Definitely all of this, and more.

At Heath we're committed to bringing you products that apply cutting-edge technology to interesting, educational and/or practical products for your home or business. This month's entry is the "Most Accurate Clock." Its model number is GC-1000 and you'll find it on Page 2. You won't find one like it anywhere else. If you're really into time, you'll quickly understand its value. You'll also find it technically fascinating and impeccably accurate.

Among other new products in this catalog, you'll find the GD-1295 Smart Outlet Box... a \$49.95 multiple AC-outlet strip that has a mind of its own. A very practical and useful addition to your home that provides one-button on-off switching of your stereo system, computer system or any other cluster of devices. You simply select which device is to be the "master."

We hope you'll put some extra sparkle under your Christmas tree this year with the gift of a Heathkit. There's something for everyone in this Holiday Season issue... over 300 Heathkits in all. And in all price ranges, too. More than 100 items under \$100.00... and 50 choices under \$50.00

Our family at Heath wishes you and yours a Very Merry Christmas. Seasons Greetings and the best of everything in the coming new year.

Merry Christmas,

William F. Johnson President



The Heathkit Catalog is now on-line through CompuServe.
See page 74.

HEATH PHONE DIRECTORY FOR ASSISTANCE AND INFORMATION

Product Orders (TOLL-FREE except Alaska, Hawaii and Michigan) (8:00 A.M. - 8:00 P.M. Eastern Time)	800-253-0570
Product Orders for Alaska, Hawaii and Michigan (24-hour number — sorry, toll-free service not available)	616-982-3411
Replacement Parts Orders: (please have Heath part number available when you call)	616-982-3571
Order information, delayed shipments, etc.	616-982-3275
Overseas Orders: International Division	616-982-3512
Computer Sales Information (8:00 A.M. - 4:30 P.M. EST)	616-982-3285
General Office (non-order calls)	616-982-3200
Technical Assistance:	
• Stereo, Electronic Organs, R/C	616-982-3310
• Amateur Radio	616-982-3296
• Test Equipment, Weather Instruments, Home Clocks	616-982-3315
• Television	616-982-3307
• Home Products, Aircraft, Appliances, Marine.	
• Automotive, Scanners, Security	616-982-3496
• Computers — Hardware	616-982-3309
• Computers — Software (8 A.M. - 4:30 P.M., ET, Weekdays)	
• Operating Systems, Languages, Utilities	616-982-3860
• Applications Programs	616-982-3884
8 A.M. - Noon and 1-4:30 P.M., Eastern Time, Weekdays only.	

EASY ORDERING INFORMATION



BY PHONE: 800-253-0570
CALL TOLL FREE!

ORDER TOLL-FREE: 800-253-0570, using your Heath Revolving Charge or Visa or MasterCard credit cards (min. purchase \$10). Call toll-free between 8:00 A.M. and 8:00 P.M. Eastern Time Monday through Friday, Alaska, Hawaii, and Michigan orders, or after 8:00 P.M. and weekends, call 616-982-3411. For quick handling and prompt service, please fill out the order form at the right before calling. Have credit card handy. For parts orders, please call Customer Service, 616-982-3571. For technical service, consult the phone directory below.



BY MAIL: Please follow these simple steps so we can handle your order quickly:

- Use the handy order form at the right.
- Write your name exactly the same way, each time you order.
- Give your complete address with full details. Include your ZIP Code and daytime phone number in case we have to call you about your order.
- For UPS deliveries to rural route or P.O. Box addresses, please give complete delivery information.
- When you fill out the form, include: 1) quantity, 2) model number, 3) description, 4) price, and 5) shipping weight. Figure out and write down the shipping and handling charges for each item from the rate chart on page 49.
- Please use separate sheet to order parts, manuals or for any correspondence.

TERMS:

- Heath Revolving Charge Plan. New accounts may be opened with purchases as small as \$100 with 10% down. Write to Heath Company for Heath Revolving Charge application. "Add-ons" to your account (except parts orders — see credit card plans below) require no minimum at all. Be sure to sign the charge agreement. Use credit cards for parts orders.
- MasterCard and Visa credit plans. Use the MasterCard or Visa credit cards to charge Heathkit products. Just fill in your credit card number in the space provided on the order form. Include card expiration date and sign the order form. NOTE: We now accept credit card orders for replacement parts.
- Commercial Accounts: Net 30-day terms available to companies with rated credit.
- Educational Accounts: Net 30-day terms available to Patterson-listed educational institutions. Authorized purchase order is required.

Note: All credit orders subject to Heath Credit Department approval.

COMMERCIAL, EDUCATIONAL, AND INDUSTRIAL SALES:

For quotations or quantity discount information on any Heath product, kit or wired, write or call Marketing Services Department, 616-982-3454. For quantities of 250 or more of any Heath product, kit or wired, write or call Contract Sales Department, 616-982-3519. Private labeling, custom packaging, or design modifications can be made to meet your specific needs.

Note: Quantity discounts apply to single models only, not combination orders, special orders, or systems.

MONEY-BACK HEATHKIT MANUAL PREVIEW

All kits come with manuals, but if you'd like to see how easy kit building is, order the manual first. We'll deduct the price of the manual when you buy the kit. Simply include a copy of your manual invoice with your order.

The typical kit assembly manual sells for \$8.00 depending on the nature of the product. Should the manual for the kit you are interested in be less than \$8.00 we'll refund the overpayment, if it is over \$8.00 we'll bill you for the balance. Add 10% for shipping and handling for each manual ordered.

Manuals are not available for the EE series of Educational courses.

Send orders for manuals on a separate sheet of paper to Heath Co., Parts Department, Benton Harbor, MI 49022.

Copies of the warranty for any customer product in this catalog costing more than \$15 may be obtained free of charge by writing the Manager of Marketing Services, Heath Company, Benton Harbor, MI 49022.

HOW TO FIGURE YOUR SHIPPING AND HANDLING CHARGES

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

ZONE CHART

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

Zip Code Prefixes	Zone										
006-009	8	260-261	3	363-369	5	476-477	4	598-599	7	820-822	5
010-069	5	262-278	4	370-386	4	478	3	600-609	2	823-826	6
070-089	4	279	5	387	5	479-489	2	610-619	3	827	5
090-099	5	280-283	4	388	4	490-491	1	620-623	4	828-832	6
		284-285	5	389-397	5	492	2	624-628	3	833	7
100-108	5	286-293	4			493-495	1	629-668	4	834	6
109	4	294-295	5	400-406	3	496-499	3	669-679	5	835-838	7
110-119	5	296-297	4	407-409	4			680-687	4	840-847	6
120-123	4	298-299	5	410-412	3	500-516	4	688-693	5	850-864	7
124-126	5			413-422	4	520-524	3			865-884	6
127-128	4	300-303	4	423	3	525	4	700-722	5	890-898	7
129	5	304	5	424-426	4	526-528	3	723-727	4		
130-152	4	305-307	4	427-432	3	530-534	2	728-768	5	900-921	8
153	3	308-329	5	433-436	2	535-539	3	769	6	922-928	7
154-160	4	330-334	6	437-457	3	540	4	770-778	5	930-934	8
161	3	335-338	5	458	2	541-546	3	779-789	6	935	7
162-163	4	339	6	460-462	3	547-548	4	790-792	5	936-960	8
164-165	3	340	6	463-464	2	549	3	793-799	6	961	7
166-199	4	350-352	4	465-466	1	550-566	4			962-976	8
		354	5	467-469	2	567	5	800-803	5	977-979	7
200-232	4	355-359	4	470-472	3	570-572	4	804-805	6	980-987	8
233-237	5	360-361	5	473	2	573-588	5	806-807	5	988-994	7
238-259	4	362	4	474-475	3	590-597	6	808-816	6	995-999	8

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

IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL

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

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

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

- Your name and account number (if any).
 - A description of the error and an explanation (to the extent you can explain) why you believe it is in error.
- If you only need more information, explain the item you are not sure about and, if you wish, ask for evidence of the charge such as a copy of the charge slip. Do not send in your copy of a sales slip or other document unless you have a duplicate copy for your records.
- iii. The dollar amount of the suspected error.
- iv. Any other information (such as your address) which you think will help the creditor to identify you or the reason for your complaint or inquiry.

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

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

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

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

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

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

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

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

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

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

RATE CHART

Shpg. wt.	Zone								UPS 2nd DAY AIR SERVICE	
	Zone 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone A	Zone D	
1	\$1.29	\$1.32	\$1.36	\$1.40	\$1.45	\$1.52	\$1.59	\$3.00	\$4.53	
2	1.37	1.44	1.51	1.59	1.71	1.83	1.97	4.00	5.71	
3	1.46	1.55	1.66	1.79	1.96	2.15	2.36	5.00	6.89	
4	1.54	1.67	1.82	1.98	2.22	2.46	2.74	6.00	8.07	
5	1.63	1.78	1.97	2.18	2.47	2.78	3.13	6.50	9.25	
6	1.71	1.90	2.12	2.37	2.72	3.09	3.51	7.50	10.43	
7	1.80	2.02	2.28	2.57	2.98	3.41	3.90	8.50	11.61	
8	1.88	2.13	2.42	2.76	3.22	3.72	4.27	9.50	12.79	
9	1.97	2.25	2.58	2.96	3.48	4.04	4.67	10.50	13.97	
10	2.05	2.36	2.73	3.15	3.73	4.35	5.05	11.50	15.15	
11	2.14	2.48	2.89	3.35	3.99	4.67	5.44	12.50	16.33	
12	2.22	2.60	3.05	3.54	4.28	4.98	5.82	13.50	17.51	
13	2.31	2.71	3.19	3.74	4.49	5.30	6.21	14.50	18.69	
14	2.39	2.83	3.35	3.93	4.75	5.61	6.59	15.50	19.87	
15	2.48	2.94	3.50	4.13	5.00	5.93	6.98	16.50	21.05	
16	2.56	3.06	3.65	4.32	5.25	6.24	7.36	17.50	22.23	
17	2.65	3.18	3.81	4.52	5.51	6.56	7.75	18.50	23.41	
18	2.73	3.29	3.96	4.71	5.76	6.87	8.13	19.50	24.59	
19	2.82	3.41	4.11	4.91	6.01	7.19	8.52	20.00	25.77	
20	2.90	3.52	4.26	5.10	6.26	7.50	8.90	21.00	26.95	
21	2.99	3.64	4.42	5.30	6.52	7.82	9.29	22.00	28.13	
22	3.07	3.76	4.57	5.49	6.77	8.13	9.67	23.00	29.31	
23	3.16	3.87	4.72	5.69	7.02	8.45	10.06	24.00	30.49	
24	3.24	3.99	4.88	5.88	7.28	8.76	10.44	25.00	31.67	
25	3.33	4.10	5.03	6.08	7.53	9.08	10.83	26.00	32.85	
26	3.41	4.22	5.18	6.27	7.78	9.39	11.21	27.00	34.03	
27	3.50	4.34	5.34	6.47	8.04	9.71	11.60	28.00	35.21	
28	3.58	4.45	5.49	6.66	8.29	10.02	11.98	29.00	36.39	
29	3.67	4.57	5.64	6.86	8.54	10.34	12.37	30.00	37.57	
30	3.75	4.68	5.79	7.05	8.79	10.65	12.75	31.00	38.75	
31	3.84	4.80	5.95	7.25	9.05	10.97	13.14	32.00	39.93	
32	3.92	4.92	6.10	7.44	9.30	11.28	13.52	33.00	41.11	
33	4.01	5.03	6.25	7.64	9.55	11.60	13.91	34.00	42.29	
34	4.09	5.15	6.41	7.83	9.81	11.91	14.29	35.00	43.47	
35	4.18	5.26	6.56	8.03	10.06	12.23	14.68	36.00	44.65	
36	4.26	5.38	6.71	8.22	10.31	12.54	15.06	36.50	45.83	
37	4.35	5.50	6.87	8.42	10.57	12.86	15.45	37.00	47.01	
38	4.43	5.61	7.02	8.61	10.82	13.17	15.83	38.50	48.19	
39	4.52	5.73	7.17	8.81	11.07	13.49	16.22	39.50	49.37	
40	4.60	5.84	7.32	9.00	11.32	13.80	16.60	40.50	50.55	
41	4.69	5.96	7.48	9.20	11.58	14.12	16.99	41.50	51.73	
42	4.77	6.08	7.63	9.39	11.83	14.43	17.37	42.50	52.91	
43	4.86	6.19	7.78	9.59	12.08	14.75	17.76	43.50	54.09	
44	4.94	6.31	7.94	9.78	12.34	15.06	18.14	44.50	55.27	
45	5.03	6.42	8.09	9.98	12.59	15.38	18.53	45.50	56.45	
46	5.11	6.54	8.24	10.17	12.84	15.69	18.91	46.50	57.63	
47	5.20	6.66	8.40	10.37	13.10	16.00	19.30	47.50	58.81	
48	5.28	6.77	8.55	10.56	13.35	16.32	19.68	48.50	59.99	
49	5.37	6.89	8.70	10.75	13.60	16.64	20.07	49.50	61.17	
50	5.45	7.00	8.85	10.95	13.85	16.95	20.45	50.50	62.35	
Add'l lbs.	11	14	19	24	32	39	48	1.25	1.48	

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

SPECIAL SHIPPING AND HANDLING:

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

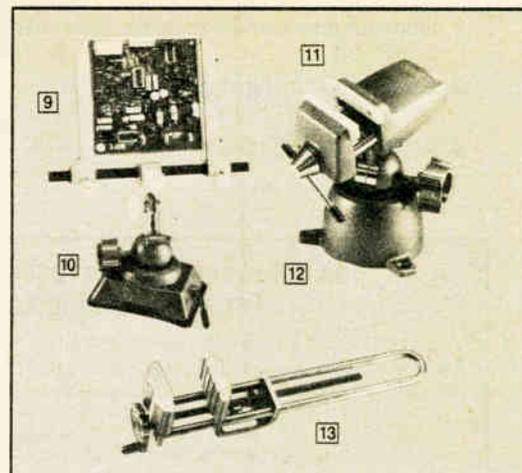
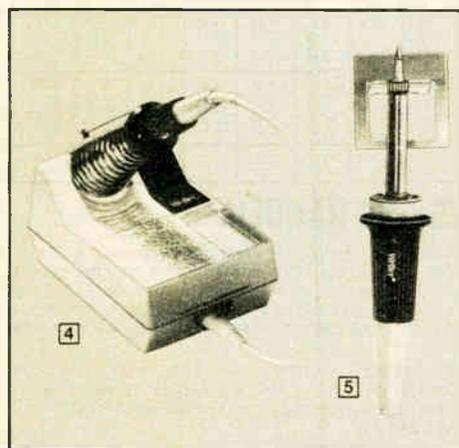
ORDERING INFORMATION/49

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

Great Gifts

Here are several ideal Christmas gifts to delight the Heathkit builder in your family. Or, a well deserved present for yourself. All are under \$100 and many are under \$50.

NEW



1 NEW Handy Smart Outlet Box

Senses current flow in a control outlet. When a device plugged into this socket is turned on, power is automatically turned on to ten other sockets. Great for work benches, ham stations, computer or audio systems. For further information, see page 15.

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

2 Multiple outlet junction box

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

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

3 Low-cost kitbuilder's tool set

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

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

4 Weller soldering station

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

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

Set of five 700 degree F assorted tips for above.

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

5 Weller 25-watt soldering iron

With its 860-degree F 1/8-inch screwdriver tip, this professional pencil iron makes close soldering jobs cleaner and easier. The GDP-207 is lightweight, has a rugged stainless steel barrel and uses long-life soldering tips. An excellent kitbuilding soldering iron.

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

SAVE \$700

6 See better, clearer, easier

Illuminated magnifier provides bright, cool light with an energy-conserving 22-watt circulator fluorescent. Eye strain is relieved by a distortion-free 2 to 1 magnifier with a 5" polished lens.

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

7 Magnify small detailed circuits

Headband magnifier enlarges 2 1/2 times while it frees both your hands. Finely ground lenses are shatter- and scratch-resistant.

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

8 Flexible extension lamp

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

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

9 PanaVise circuit board holder

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

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

10 PanaVise vacuum base

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

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

11 PanaVise standard vise head

Nylon jaws open to a full 2 1/2". Vise firmly grips larger and heavier objects.

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

12 PanaVise standard height base

Base can be permanently mounted and used with any 3/8" shaft PanaVise fixture. A special ball-joint base fixture allows versatile positioning.

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

13 PanaVise wide-opening holder

Vertical-opening vise positions and holds large items up to 9". Holds bulkier items like chassis and has replaceable jaw pads.

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

Three rugged and economical instruments for making accurate measurements



1

IM-5228 workbench VTVM



2

Portable IM-5217 is ideal for home and shop repairs



3

Rugged SM-2206 gives clamp-on current readings

1 Simply designed, yet rugged and accurate

\$79.95

- Measures \pm DC and AC voltages, resistances and dB
- 6-inch meter movement allows accurate scale readings

Accurate measurements: The IM-5228 provides servicemen, engineers and maintenance workers with a \pm 3% full scale accuracy when measuring DC voltages in seven ranges up to \pm 1500 volts. With an accuracy of \pm 5%, AC voltages are measured in seven ranges up to 1500 VRMS. Resistances are measured from 0.1 ohm to 1000 megohms, also in seven ranges.

Features: Separate 1.5 and 5 volt ranges allow low AC-voltage readings. A single jack input and an AC/OHMS/DC switching test probe eliminates the tangle of front panel test leads. The IM-5228 has a high 11-megohm input resistance and uses a pivoting gimbal for better meter viewing. Requires one "C" battery.

Kit IM-5228, 120/240, 50/60 Hz, Shpg. wt. 6 lbs. 79.95

PKW-4, Assembled Replacement Probe for IM-5228, Shpg. wt. 1 lb. 19.95

2 Compact, battery-powered IM-5217 voltmeter

\$44.95

- Accurate and easy-to-operate meter goes anywhere
- Protected by an impact-resistant carrying case

Versatile: A general-purpose volt-ohm meter, the IM-5217 is perfect for home repairs or service calls. It has four \pm DC and AC voltage ranges: 1.5 V (1.7 VAC), 15 V, 150 V, and 500 V. Resistances are measured in four ranges from 1 ohm to 1 megohm. The low-voltage ohmmeter allows safe semi-conductor checking and a high input impedance minimizes circuit loading.

Battery powered: To operate, the IM-5217's solid-state circuitry requires two 9-volt batteries and one 1.5 volt "C" battery which are not included.

Kit IM-5217, Shpg. wt. 4 lbs. 44.95

High voltage test probe allows kilovolt readings



- IMA-100-10 30 KV accessory probe

Plug-in test probe: Plug the IMA-100-10 into any VTVM with an input impedance of 10 megohms and measure DC voltages up to 30,000 volts. With your extended VTVM measuring range, you can measure high voltages commonly encountered in the flyback power supplies of TV receivers.

Quality constructed: The IMA-100-10 probe consists of a red molded housing with a black molded handle. It contains a 2% precision 1090 megohm resistor and provides a DC range multiplication factor of 100 for 10 megohm input VTVMs.

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

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

3 Quick and easy clamp-on AC current readings

\$49.95

- Allows homeowners to check appliances in use
- Helps electricians to balance current loads

Measurement ranges: This compact snap-on meter measures AC current in five ranges: 6 A, 15 A, 60 A, 150 A, and 300 A. AC voltages can be measured using three ranges: 150 V, 100 V, and 600 V. Resistances can also be checked using the SM-2206's 0 to 5 kilohm range.

Easy to operate: To measure AC current in a conducting circuit or in an operating appliance, just snap the meter's clamp-on inductive pickup around a conducting AC wire. The SM-2206 measures both 50 Hz or 60 Hz current. To measure AC voltages, turn the six-position range switch to the volts/ohms position and use the three-foot test leads that are included with the meter. Separate test terminals are used for different voltage ranges and resistance range.

Convenient features: For making AC current measurements in the dark or in hard to reach places, a convenient finger-operated switch is provided. With this special switch, you can lock the meter's pointer in place during a measurement. Then you can remove the meter from the circuit and read the current. Press the switch again to release the pointer. Another convenient feature is the SM-2206's color coded scales. The black AC amps, red AC volts, and green ohms scales let you quickly identify the correct scale for your reading. All switches and jacks are clearly labeled for easy identification.

More features: Whether its the homeowner checking the current usage of appliances for possible energy savings or the electrician in his work, the SM-2206 is built to take constant use. Besides a rugged housing, the meter is protected by the pointer lock-down switch and a fused resistance range. The SM-2206 comes with a wrist-strap, a carrying case with shoulder strap, test leads, a 1.5 VAA battery and a spare 0.1 A fuse. An instruction leaflet is included.

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

Make fast and easy TV high-voltage measurements



- High-voltage probe with built-in meter

Convenient all-in-one probe: For checking the positive DC high voltages found in TV receivers and oscilloscopes, the IM-5210 is an ideal instrument. It is a self-contained probe that measures DC voltages up to 40,000 volts with an accuracy of \pm 3%. An on-off switch protects the meter during transport and hookup.

Easy to assemble: The IM-5210 kit can be completed in one evening. It measures 1 1/2" H x 1 7/8" W x 15" L and weighs only 8 ounces.

Kit IM-5210, Shpg. wt. 2 lbs. 29.95



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

INSTRUMENTS/51

Hand-Held Color Generator provides sixteen television alignment signals

\$74⁹⁵

Compact, light-weight – easily slips into a shirt pocket

Supplies color 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.

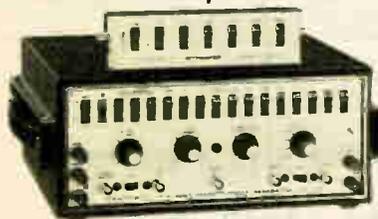
Accurate and stable: The IG-5240's RF channel carrier, and color and timing oscillators are controlled by three separate crystals. These crystals provide signal stability and a frequency accuracy within $\pm 0.005\%$.

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

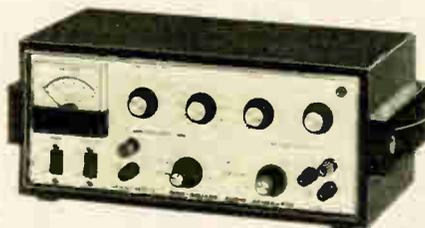
Simple frequency selecting: Set the function switch to the desired waveform and then set the six-position multiplier to the required range. Next, tune the variable control to the desired frequency. Using both frequency controls, you can select any frequency between 0.1 Hz to 1 MHz.

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

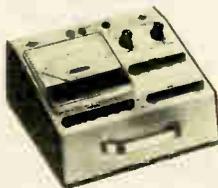
Sine/Square Wave Audio Generator



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:** $5\frac{1}{2}''$ 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 pushbuttons. 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 gun's 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.

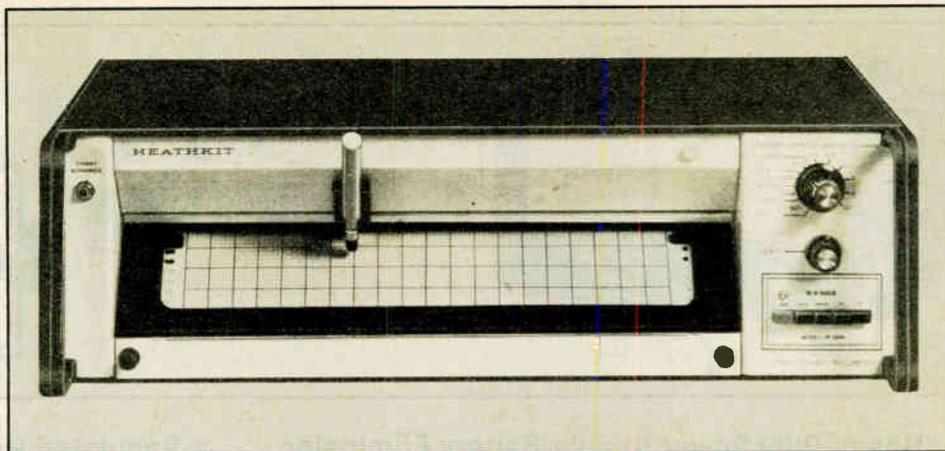
Many noise problems are eliminated by a built-in selectable input filter: When switched into the circuit, both normal and common mode rejection are increased by 20 dB. Noise rejection is even greater at higher frequencies.

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 $5\frac{3}{8}$ " H x $17\frac{1}{8}$ " W x $12\frac{3}{8}$ " 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 $6\frac{1}{8}$ " 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

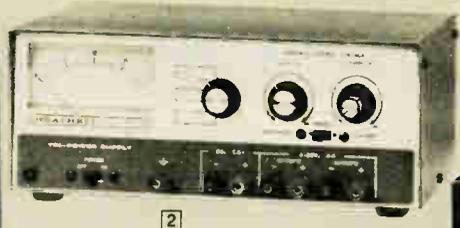
Test TTL/CMOS digital circuits, other ICs: Detects and indicates high and low logic levels, indicates polarity and presence of signal pulses as short as 10 ns duration, and shows intermediate of "bad" logic levels, even at high frequencies. Two indicator lights for clear readings. Has 34" power leads 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-7410, Shpg. wt. 1 lb. **39.95**



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Heathkit provides adjustable 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 amps
- 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 VDC 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**

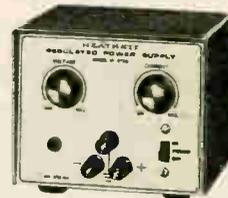
SP-2717A, Assembled and tested, Shpg. wt. 20 lbs. **239.95**

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 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 5¾" H x 11" W x 7¾" 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, 1-10, 0-100, 0-1000 volts full scale. Accuracy: ± 3% of full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: ± 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. Ohmmeter: Ranges: x1, x100, x10K, x1M.

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 5¾" H x 11" W x 7¾" D (14.6 x 27.9 x 19.7 cm). Stackable with other 5280 Series.

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. Net Weight: 3¼ lbs. (1.5 kg).

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 5¾" D x 11" W x 7¾" D (14.6 x 27.9 x 19.7 cm). Convenient storage compartment.

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 µF, inductance from 10 µH 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 5¾" H x 11" W x 7¾" 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. Net Weight: 3½ lbs. (1.6 kg).

5 Audio circuit Signal Tracer

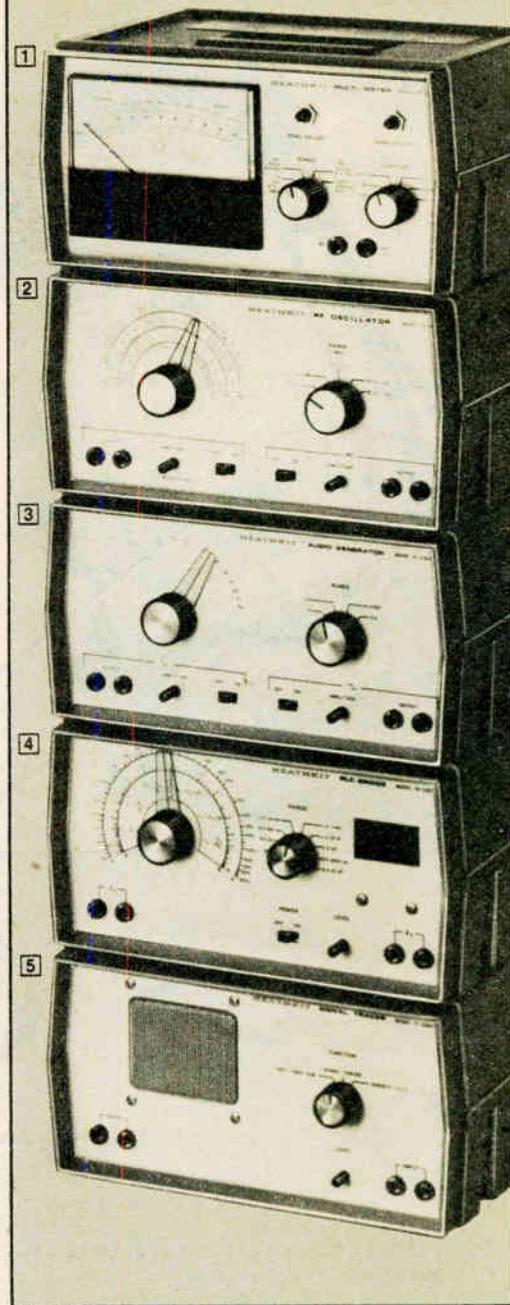
Track down problem circuits: A diode-equipped RF probe pinpoints failing components and stages. The IT-5283 Signal Tracer will be a welcome addition to your test bench arsenal when it's time to troubleshoot defective equipment. By using the straight-through DC position you can use the IT-5283 to track 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 5¾" H x 11" W x 7¾" 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: 5¾" H x 11" W x 7¾" D (14.6 x 27.9 x 19.7 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 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 3¾" 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 +9 VDC, ± 9%. Maximum Output Current: 100 milliamps. Fuse: ¼-Amp, 3 AG, Slow-blow type. Net Weight: 1¾ lbs. (0.8 kg).



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

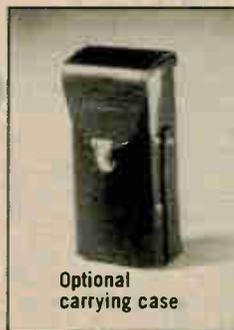
Convenient Hand-held Capacitance Meter with leakage detector and auto-ranging display

Equipped with special circuitry to detect leaky capacitors

\$159⁹⁵

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

- 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.

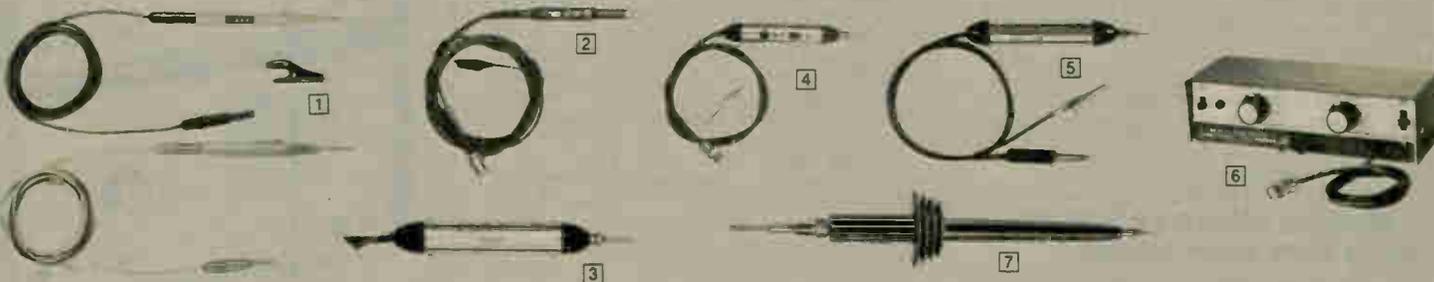
Kit IT-2250, Shpg. wt. 3 lbs. **159.95**

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, 1.999 F. 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, $\pm (0.75\%$ of reading + 1 count + 0.5 pF), 1.999 F, 19.99 F, 199.9 F, 19.99 mF and 199.9 mF ranges, $\pm (6\%$ of reading + 1 count). **NOTE:** The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply to a temperature range of 67 to 77 degrees F (19 to 25 degrees C). **Conversion and Display Rate:** For values up to 1999 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 7¼" L (5.0 x 8.3 x 19.1 cm). **Net Weight:** 16 ounces.

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**



Versatile, laboratory-quality instrument for making highly accurate frequency measurements

- Extra-wide 5 Hz to 512 MHz frequency range for measuring frequency, period, and the ratio between two frequencies
- Proportionally-controlled crystal oven controls crystal temperature for greater frequency measuring stability

\$269⁹⁵

Extra-wide frequency range: For engineers, technicians and hobbyists requiring a frequency counter that extends into the UHF range, the IM-2420 is made to order. Low frequency signals, 5 Hz to 50 MHz, are measured at the 1-megohm A input and high frequency signals, 40 MHz to 512 MHz, are measured at the 50-ohm B input.

Accurate measurements: A proportionally-controlled crystal oven keeps the internal time base extremely accurate, to within 0.2 part per million (PPM) over a wide environmental temperature range. Plus a high-quality precision crystal in the time base oscillator, give this Counter excellent long-term stability.

Added accuracy: For an even more accurate time base, an external high-precision frequency standard can be connected to a rear panel BNC connector of the IM-2420. Or conversely, the internal time base of the Counter can be used as a semi-precision standard for some other test-bench equipment.

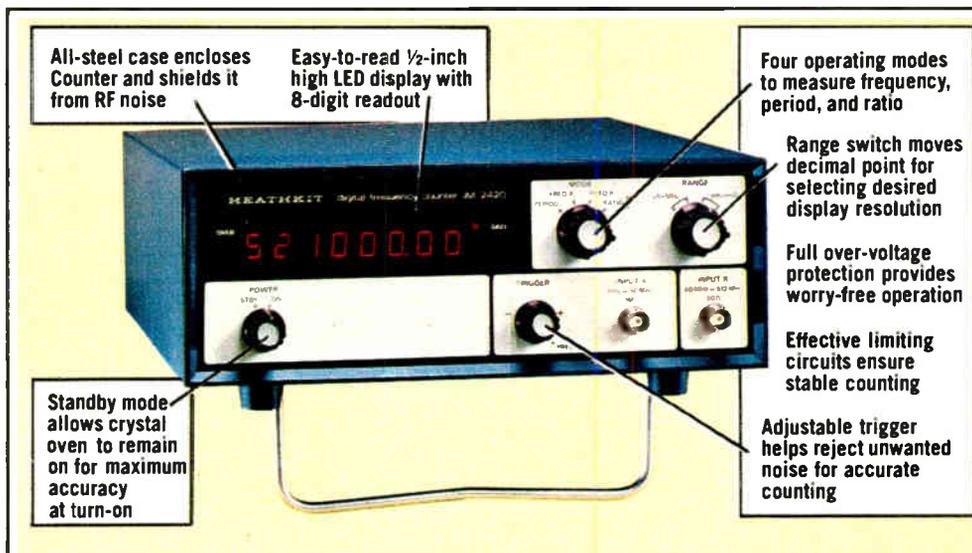
Excellent sensitivity: While the IM-2420's guaranteed sensitivity is 25 mV, its typical sensitivity is a much lower 4 to 15 mV. This means you can accurately measure low-level signals, like those found in oscillator circuits, as well as high-level transmitter output frequencies. For measuring complicated or noisy waveforms, a trigger level control ensures stable counting. Even indirect frequency readings of transmitter outputs are possible using the optional SMA-2400-1, a swiveling antenna that can be tuned with its telescoping sections.

High resolution: With frequency and period readouts down to 0.1 Hz and 100 ns.

Kit IM-2420, Shpg. wt. 9 lbs. 269.95

SM-2420, Assembled and tested, Shpg. wt. 9 lbs. 320.00

SMA-2400-1, Right Angle Telescopic Antenna for IM-2400, IM-2410, IM-2420 Frequency Counters; Includes BNC connector, Assembled, 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, 5 V RMS. **Period Measurement Mode:** Input: 5 Hz to 50 MHz only. Range: 5 Hz to 10 MHz. **Display Resolution (Least Significant Digit):** 100 ns to 0.1 ms, in decade steps. **Ratio B/A Measurement Mode:** Input Frequency Limits: 5 Hz to 25 MHz and 40 MHz to 512 MHz. **Effective Measurement Range:** From 1.6 to 1.024 x 10⁸, guaranteed. **Time Base:** Frequency: 10 MHz. **Stability:** To within 0.2 parts per million (PPM). **Temperature Stability:** 0.2 PPM from 32°F to 104°F (0°C to 40°C). **Crystal Aging Rate:** Less than 1 PPM per year. **Oven Operating Temperature:** 167 F. + 9°F (75°C + 5°C). **Warm-up Time From Cold Oven (unplugged) Start:** 10 minutes to within 1.0 PPM. 20 minutes to within 0.1 PPM. **External Input:** TTL or 2.5 V RMS from 50 ohm source (10 MHz). **Input Protection:** Any voltage with peak-to-peak limits between -3.5 and +10 volts. **Output:** Will drive one standard TTL (i.e. 7400) load. Short circuit protected. **General Gate Time:** 0.01 second, 0.1 second, 1 second, and 10 seconds (switch selectable). **Sampling Rate:** Every 0.1 second, 0.33 second, 1 second or 10 seconds. **Dimensions:** 4 1/4" H x 10" W x 12 1/2" D (10.8 x 25.4 x 31.8 cm). **Power:** 120 240 VAC, 50/60 Hz.

Easy-to-use IM-2410 Frequency Counter accurately measures frequencies from 10 Hz to 225 MHz

\$129⁹⁵

- High-resolution frequency measurements in both 10 Hz to 50 MHz and 20 MHz to 225 MHz ranges
- Switchable dual time gate provides 0.1 second and 1.0 second count periods

Exceptional accuracy and stability for its price: A highly accurate frequency counter, the IM-2410 measures frequencies down to 1 Hz in the 10 Hz to 50 MHz range and 10 Hz in the 20 MHz to 225 MHz range. And, its crystal-controlled time base supplies an excellent ± 10 PPM long-term stability. You'd expect features like these only on more expensive counters.

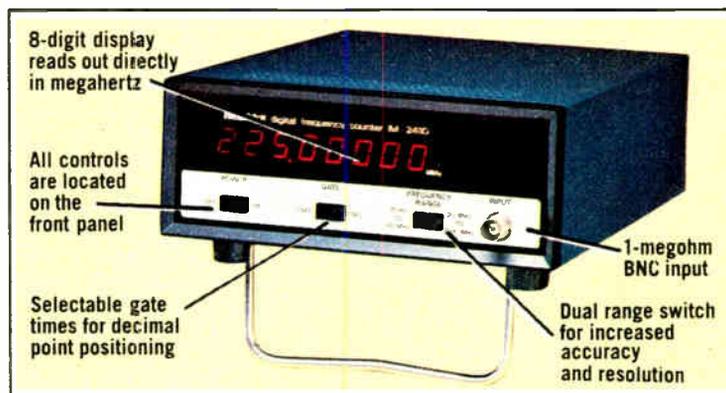
Simple to operate: One BNC input is provided for fast, direct frequency measurements. Just slide the range switch to the correct frequency coverage. Then, set the gate switch for the desired decimal point location. The frequency is displayed on eight large LEDs and is read directly in megahertz. For indirect frequency measurements, the optional SMA-2400-1 Telescopic Antenna (see above) can be connected to the counter.

RFI protected: The IM-2410 is enclosed in a rugged and compact metal cabinet which shields it from radio-frequency interference that can cause measurement errors. The IM-2410's input is protected to 150 VAC up to 100 kHz and derated to 5 VAC between 160 MHz to 225 MHz for those high-frequency at low voltage measurements. Complete voltage protection ensures worry-free operation.

Additional features: Included with the IM-2410 Frequency Counter is a locking swing-down stand to elevate the front of the Counter for a comfortable viewing angle. The IM-2410 can be assembled to operate either on 120 VAC or 240 VAC at 50 Hz or 60 Hz and at a maximum of 25 watts.

Kit IM-2410, Shpg. wt. 6 lbs. 129.95

SM-2410, Assembled and tested, Shpg. wt. 6 lbs. 170.00



IM/SM-2410 SPECIFICATIONS: Sensitivity: 10 Hz to 50 MHz range, 25 mV RMS maximum, 10 mV typical from 10 Hz to 30 MHz, 50 mV RMS maximum from 30 to 50 MHz; 20 MHz to 225 MHz range, 25 mV RMS maximum, 10 mV typical from 20 to 150 MHz, 50 mV RMS maximum from 150 to 225 MHz. **Input Impedance:** 1 megohm, shunted by less than 24 pF. **Input Protection:** 150 VAC, up to 100 kHz - derating to 5 VAC from 160 to 225 MHz. **Time Base Frequency:** 3.58 MHz. **Stability:** ± 1 PPM. **Temperature Stability:** ± 10 PPM, from 0 to 40 degrees C. **Gate Time:** 0.1 or 1.0 second, switch selectable. **Frequency Resolution:** 10 Hz to 50 MHz range, ± 1 Hz with gate time set at 1.0 second and ± 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. **Display:** Eight-digit LED display. **Overall Dimensions:** 3 3/8" H x 7 1/4" W x 9 1/2" D. (8.6 x 18.4 x 24.1 cm). **Net Weight:** 5 lbs. (2.3 kg).



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

Rugged and compact case includes a pivoting stand

Hand-held battery-powered Counter is ideal in the field and on the bench



FAST, EASY
2-EVENING KIT

Large LCD display with autozero, autodecimal, and autopolarity

Rugged reliability in a light and compact case

Inputs are fuse and diode protected

Includes a pivoting stand

Pushbutton switches allow easy one-handed operation of all functions

Built-in references for do-it-yourself calibrating

Bench-standard accuracy reduced to hand size

\$139⁹⁵

- 50 Hz to 512 MHz range covers mobile radio gear
- Typical 10 millivolt RMS sensitivity picks up weak signals
- Includes rechargeable batteries for complete portability

Accurately align and test radio equipment anywhere: Check the output frequencies of mobile transmitters while they are still installed in cars, trucks, airplanes, and boats. The IM-2400 quickly and easily measures these and all frequencies between 50 Hz and 512 MHz. Using its big seven-digit LED display, the IM-2400 can show frequencies down to 10 Hz in the 50 Hz to 50 MHz range and 100 Hz in the 40 to 512 MHz range. A crystal-controlled oscillator ensures accuracy.

High sensitivity: With a typical 10 mV RMS sensitivity (25 mV RMS guaranteed sensitivity), the IM-2400 lets you directly monitor low level signals as easily as high transmitter outputs. To make indirect frequency measurements, connect the optional SMA-2400-1 Swiveling Telescopic Antenna (see below) to the Counter. The decimal point in the display is automatically positioned for your reading.

Completely portable: The IM-2400 comes with "five rechargeable 1.2 VDC nickel-cadmium "AA" size batteries that provide hours of measurements on a single charge. These internal batteries are easily recharged with either optional PS-2404 120 VAC or PS-2405 240 VAC Battery Eliminator/Charger.

Kit IM-2400, Shpg. wt. 3 lbs. 139.95

SMA-2400-1, Telescopic Antenna, Assembled/BNC connector, 1 lb. 9.95

PS-2404, 120 VAC Battery Eliminator/Charger for IM-2400, Permits counter use while charging; cannot overcharge, Assembled, Shpg. wt. 1 lb. 7.95

PS-2405, 240 VAC Battery Eliminator/Charger for IM-2400, Permits counter use while charging; cannot overcharge, Assembled, Shpg. wt. 1 lb. 12.95

IM-2400 SPECIFICATIONS: Frequency Range: 50 Hz to 50 MHz and 40 MHz to 512 MHz. Sensitivity: 25 mV RMS guaranteed. 10 mV typical. Input Impedance: 50 Hz to 50 MHz range, 1 megohm shunted by less than 24 pF; 40 MHz to 512 MHz range, 50 ohms. Input Protection: 50 Hz to 50 MHz range, 150 volts RMS to 100 kHz derating to 10 volts RMS at 50 MHz; 40 MHz to 512 MHz range, 5 volts. RMS. Time Base: Frequency: 10 MHz. Setability: = 1 part per million (PPM). Temperature Stability: = 10 PPM from 0 degrees C to 40 degrees C. General: Gate Time: 1.0 second or 0.1 second, switch selectable. Resolution: 50 Hz to 50 MHz range, 10 Hz with time base set at 1.0 second or 100 Hz with time base set at 0.1 second; 40 MHz to 512 MHz range, 100 Hz with time base set at 1.0 second or 1 kHz with time base set at 0.1 second. Dimensions: 1 5/8" H x 3 3/8" W x 8 3/8" L (4.1 x 8.6 x 21.3 cm).

DMM meets the demands of bench/service techs

\$99⁹⁵

- Measures AC and DC voltage and current, and resistance
- Tests semiconductors and checks in-circuit resistances
- Low-current usage provides for long-life battery operation

Top performance at a great low price: The IM-2215 Portable Digital Multimeter measures positive and negative DC voltages in five ranges from 100 microvolts up to 1000 volts and AC voltages also in five ranges up to 750 volts RMS. DC and AC current is measured in four ranges from 1 microamp to 2000 milliamps. And resistance is measured from 1 ohm up to 20 megohms.

Continuous displayed status: The IM-2215's large 3 1/2 digit LCD readout provides a continuous indication of the Meter's operating condition. The LCD display shows an overload or overrange condition and also warns of low battery voltage.

Added troubleshooting aid: To help troubleshoot to the circuit component, the IM-2215 uses a special "full-scale" resistance test voltage. This voltage alternates from high to low over the six resistance ranges to allow both semiconductor testing and in-circuit resistance measurements.

Double input protection: All functions are diode and fuse protected from voltage and current overloads. Further protection by separate voltage and current inputs.

Battery and AC powered: Designed for low-current use, a 9 VDC alkaline battery can power the IM-2215 for approximately 200 hours. Or, the Meter can be powered using an optional 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 Range Accuracy: Lab Standards: DC $\pm 0.25\%$ of reading + 1 count (SM-2215, $\pm 0.1\%$); AC, $\pm 0.5\%$ of reading + 3 counts. Built-in Standards: DC, $\pm 0.35\%$ of reading + 1 count; AC, $\pm 0.6\%$ of reading + 3 counts. Input Impedance: 10 megohms, shunted on AC by approximately 100 pF. Current Range 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 to 200 Hz; other AC ranges, $\pm 1.5\%$ of reading + 3 counts, 40 Hz to 1 kHz. Resistance Range Accuracy: IM-2215: 200 ohm range, $\pm (0.3\%$ of reading + 3 counts); 2K, 20K, 200K, 2000K ranges $\pm (0.25\%$ of reading + 1 count); 20M range, $\pm (2.0\%$ of reading + 1 count). SM-2215: 200 ohm range, $\pm (0.2\%$ of reading + 3 counts); 2K, 20K, 200K, 2000K ranges, $\pm (0.15\%$ of reading + 1 count); 20M range, $\pm (1.5\%$ of reading + 1 count).



Heathkit multimeters with digital precision and advanced capabilities at an affordable price



IM-2264 accurately measures complex signals

\$249⁹⁵

- True RMS readings of all AC voltages and currents
- Special diode test function checks semiconductors
- Features analog meter, alarm, and crest warning LED

True RMS measurements: Easily and accurately measures complex waveforms and those signals with a high harmonic content. Confidently, measure switching power supply voltages, capacitor ripple currents and other distorted AC signals.

Vast measurement flexibility: Pushbutton selectable, the IM-2264 has five DC and AC voltage ranges available with a range from 0.1 mV to 1000 VDC and 750 VAC. DC and AC currents are measured in six ranges from 0.1 μ A to 10 A without the cost or inconvenience of a range-increasing resistive shunt. Resistance is measured in six ranges from 0.1 ohm to 20 megohms.

Added features: Auxiliary analog meter, crest warn indicator, switchable audio alarm, input protection, circuit breaker, battery and AC operated.

Kit IM-2264, Shpg. wt. 7 lbs. 249.95

IM-2264 SPECIFICATIONS: Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V and 1000 VDC (750 VAC). Input Impedance: 10 megohms shunted by approximately 100 pF on all ranges. Current: DC and AC Ranges: 200 μ A, 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Resistance: Ranges: 200, 2k, 20k, 200k, 2000k, and 20M ohms. Crest Warn: Operation: Front panel LED flashes for excessive crest factor condition on AC voltage and current, or excessive normal mode signal on DC voltage and current. Alarm: Operation: Audible tone sounds on voltage, current and resistance ranges.

Rugged and portable for general purpose use

\$119⁹⁵

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

Full capability: Bright, easy-to-read LEDs in a 3½ digit display shows DC and AC voltages in four ranges up to 1000 VDC (750 VAC). Pushbutton switches select all functions including DC and AC current in five ranges up to 10 amps and resistance in five ranges to 20 megohms.

Special measuring features: To help determine the condition of a diode or transistor, the IM-2260 measures forward conducting voltage and reverse leakage resistance. For in-circuit resistance checks, the IM-2260's 2K to 2000K ranges uses a low 0.2 volt resistance test voltage.

AC or battery powered: Six "C" batteries or a PS-2404 Battery Eliminator (p. 58).

Kit IM-2260, Shpg. wt. 5 lbs. 119.95

SM-2260. Assembled and tested, Shpg. wt. 4 lbs. 189.95

IM/SM-2260 SPECIFICATIONS: Voltage: Ranges: 2, 20, 200, and 1000 VDC (750 VAC). Accuracy: DC: \pm (0.5% of reading + 1 count) except + 2 counts on 2V range. AC: \pm (1.0% of reading + 3 counts) except + 5 counts on 2V range. Input Impedance: 10 megohms shunted by approximately 100 pF on all ranges. Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Accuracy: DC: \pm (1.5% of reading + 1 count) except 3.5% on 10A range. AC: \pm (2.0% of reading + 1 count) except \pm 4.0% on 10A range. Ohms: Ranges: 2k, 20k, 200k, 2000k, and 20M ohms. Dimensions: 3"H x 8½"W x 11"D.



Use the IG-4244 Precision Oscilloscope Calibrator to accurately calibrate oscilloscopes

\$149⁹⁵

- Crystal-controlled oscillators for precise time signals
- Square wave output with less than 1 nanosecond rise time
- Accurate voltage signals plus sine wave signal output
- Doubles as a bench standard or experimental signal source

Precise time signals: The IG-4244 uses two crystal-controlled oscillators to generate square waves from 0.5s to 10ns with an accuracy of 0.015%. Because the leading edge of its square waves has less than a 1 ns rise time and less than 2% or 10 mV aberration (whichever is greater), the IG-4244 is exceptionally equipped for calibrating scopes above 100 MHz.

Accurate amplitude signals: For vertical scope calibrations and attenuator compensation adjustments, the Calibrator has an accurate and wide range of output voltages. In a 1-2-5 sequence, a 1 kHz square wave output is available from 1 mV to 100 V peak and are accurate to within 1% into a 1 megohm load.

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 20 ns. Amplitude: 0.5 s to 20 ns, 100 mV to 1 V peak; 10 ns, 100 mV to 0.5 V peak. Rise Time: <1 ns. Leading Edge Aberrations: <2% of peak-to-peak amplitude or 10 mV, whichever is greater. Output Impedance: 50 ohms, nominal. Voltage: Range: 1 mV to 100 V peak in a 1-2-5 sequence. Accuracy: \pm 1%. Rise Time: <5 μ s. Frequency: Approx. 1 kHz. Sine Wave Frequency: Approx. 1 kHz. Amplitude: Approx. 1 V P-P. Power Requirements: 120/240 VAC, 50/60 Hz, 25 watts maximum. Dimensions: 3" H x 7¼" W x 9½" D.



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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**

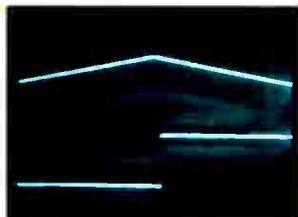
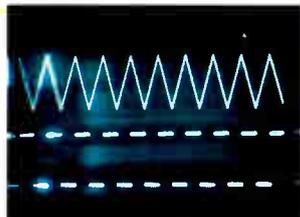
The IO-4235, with its DC-35 MHz range, is the most advanced oscilloscope our engineers have ever developed! Compare this top-of-the-line Heathkit oscilloscope with others in its price range. You'll find that the IO-4235 is unmatched in performance, features and quality. Compare the sophistication and 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. 56 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 ($\pm Y1$ plus $\pm Y2$). HORIZONTAL: Time Bases: Ranges: 0.2 s/cm to 50 ns/cm. Positions: 21 steps in 1-2-5 sequence. Variable: Continuous between ranges to approximately 600 ms/cm. Accuracy: Within 3% (20 to 30 degrees C); 5% (10 to 40 degrees C), referred 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: 7¾" H x 13¾" W x 24" D (19.7 x 34.9 x 50.2 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

SO-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, 3 Hz to 20 MHz (–3 dB). Rise Time: Less than or equal to 18 ns. Overshoot: Less than or equal to 5%. Deflection Factor: 2 mV/division 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.

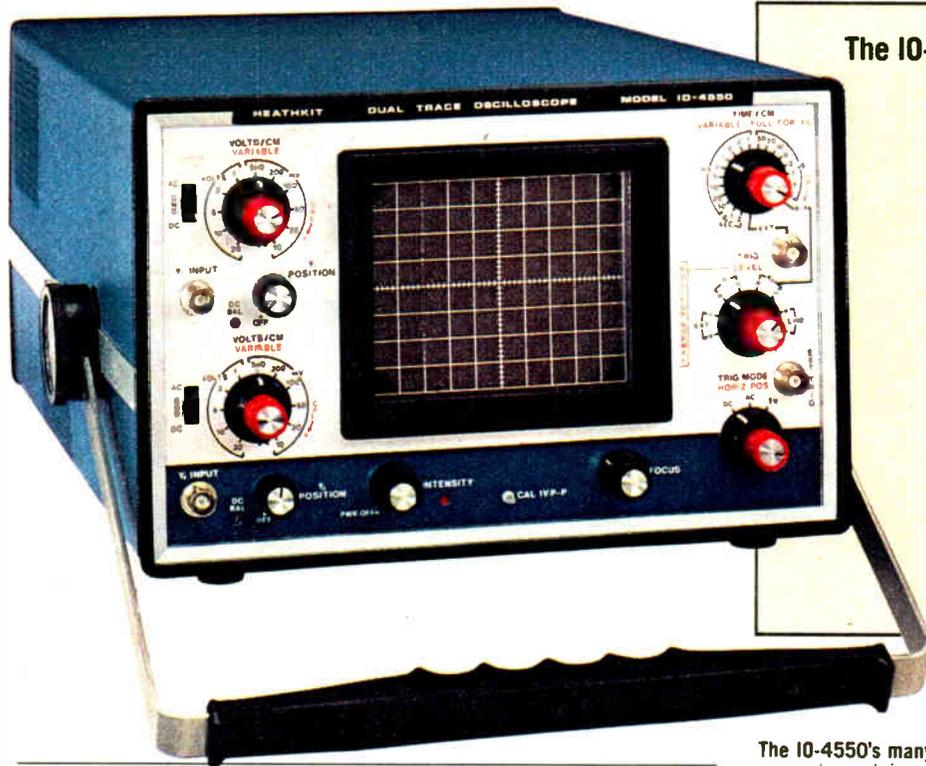


Carrying handle makes the lightweight IO-3220 highly portable



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

The Heathkit IO-4550 Dual-Trace 10 MHz Oscilloscope is ideal for your service and design work



The IO-4550 – High Performance and High Value

- Save \$226 for other accessories if you buy the kit
- Features an extra-bright CRT trace for sharp, easy-to-read displays, even in high ambient light
- A trigger select switch and level control allow the time base to be precisely triggered at any point along positive or negative slope of signal on display
- Sensitivity adjustable from 10 mV/cm to 20 V/cm with 1-2-5 attenuator through eleven calibrated ranges
- 19 switch-selected time base steps – 200 ns/cm to 0.2 s/cm in a 1-2-5 step sequence
- Expand any sweep speed five times to a maximum 40 ns/cm; variable between switch positions
- Probe compensation is easier with the front-panel available 1 volt (peak-to-peak) square-wave signal
- Mu-metal shielding helps eliminate errors caused by stray electromagnetic signal interference
- Four printed circuit boards for easier assembly
- Like all Heathkit scopes, IO-4550 includes complete operation, calibration and service documentation

With all these features, the IO-4550 will be a welcome addition to your lab or test bench!

IO/SO-4550 SPECIFICATIONS: **VERTICAL:** Deflection Factor: Sensitivity: 10 mV/cm-20 V/cm, 11 steps in 1-2-5 sequence Variable: Continuous between steps to approximately 60 V/cm. Accuracy: 3%. **Vertical Response:** DC Coupling: DC-10 MHz. AC Coupling: 2 Hz-10 MHz. Rise Time: 35 ns. **Overshoot:** Less than 5%. **Attenuator:** Vertical Input: Impedance: 1 megohm, shunted by 38 pF. **Maximum Input:** 400 volts peak, combined AC and DC. **Connector:** BNC. **Modes:** Single, Y1 or Y2 selected by position control; Dual, Chopped (200 kHz) or alternate automatically selected by time/cm switch. **HORIZONTAL:** **Time Base:** Ramp: 200 ns/cm to 0.2 s/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 s/cm. Accuracy: 3%. **Magnifier:** X5 (adds additional 2% to sweep accuracy). **EXTERNAL:** Sensitivity: Approximately 0.1 V/cm. Impedance: Approximately 100 kilohms. **Polarity:** Positive input causes right-hand deflection. **Frequency Response:** DC to 1 MHz. **Connector:** BNC. **Trigger:** Internal: Automatic; Adjustable over 10 divisions. **Normal:** Adjustable over 10 divisions. **Slope Selection:** + or - **Impedance:** 1 megohm, shunted by 40 pF. **Connector:** BNC. **X-Y:** Y Channel: Same as vertical. X-Channel: Same as vertical, except response is limited to 1 MHz. **GENERAL:** Operating Temperature Range: 50-104 degrees F (10-40 degrees C). **Power Requirement:** 120/240 VAC, 50/60 Hz, 70 watts. **Overall Dimensions:** 67/8" H x 127/8" W x 193/4" D (17.6 x 32.7 x 48.9 cm) without handle.

The IO-4550's many versatile features make it the scope of choice for TV and general servicing, digital experimentation and design work of all types. Ultraprecise measurements are assured from two vertical input channels with an excellent, stable sensitivity of 10 mV/cm. Variations in line and load conditions are no problem with the fully-regulated, high-voltage power supply. Lab-grade reliability, with fast vertical rise time and writing speed.

For ease of operation, input channels are automatically displayed, chopped or alternated as you select. Exact X-Y operation assures accuracy in all phase measurements, with facilities to help determine wave frequency.

The 4550's digitally-controlled time base provides automatic triggering so no stability control is necessary and fewer adjustments are required. Calibration requires a precise source of square waves, such as the Heathkit IG-4505 on page 56, or the new IG-4244 Precision Calibrator on page 59.

Kit IO-4550, Shpg. wt. 27 lbs. 469.95
 SO-4550, Assembled and tested, Shpg. wt. 25 lbs. 695.95

Select the right Heathkit oscilloscope for you from this chart:

Model(s)	Number of Traces	Bandwidth Rise Time	Sensitivity	Time Base Ranges	Delayed Sweep	Vertical Add	Delay Line	X-Y	Z Axis	External Horizontal Input	Battery Operation	CRT
IO/SO-4235	2	DC-35 MHz 10 ns	2 mV/cm to 10 V/cm	0.2 s/cm to 50 ns/cm	✓	✓	✓	✓	✓	✓		8 x 10 cm, mesh-expanded internal graticule
IO/SO-3220	2	DC-20 MHz 18 ns	2 mV/div to 10 V/div	0.1 s/div to 100 ns/div		✓		✓	✓		✓	8 x 10 div 0.6 cm/div internal graticule
IO/SO-4550	2	DC-10 MHz 35 ns	10 mV/cm to 20 V/cm	0.2 s/cm to 200 ns/cm				✓		✓		8 x 10 cm
IO/SO-4205	2	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 ms/cm to 200 ns/cm						✓		8 x 10 cm
IO-4105	1	DC-5 MHz 70 ns	10 mV/cm to 20 V/cm	0.2 ms/cm to 200 ns/cm						✓		8 x 10 cm

NOTE: All Heathkit oscilloscopes feature mu-metal shielding for protection from interfering signals, and regulated power supplies for highly-reliable operation and measurements.



Get dual-trace, DC to 5 MHz performance at an economical kit price with the IO-4205

- Valuable dual-trace capability at a single-trace price
- High-brightness CRT for easy reading, even on complex signals
- 10 mV/cm vertical input sensitivity makes it an excellent choice for applications in laboratory, service shop, hobby or hamshack

With its dual-trace capabilities, you can use the IO-4205 Oscilloscope for your most sophisticated electronic measurement needs. It lets you directly compare two signals for input-output relativity, check phase and other timing functions, measure AC and DC voltages, determine frequency, trace circuit conditions from point-to-point, and aid in alignment or troubleshooting. Added together, the IO-4205's dual-trace feature, excellent 10 mV/cm vertical input sensitivity and a DC to 5 MHz bandwidth, makes it an excellent choice for most simultaneous analysis.

A stable triggering circuit, not a recurrent-type sweep found on many scopes in this price range, adds to the IO-4205's solid waveform displays. You can select one of seven triggered internal time bases, from 200 milliseconds/centimeter to 0.2 microseconds/centimeter, or an external time base. A variable control allows precise settings between steps. The special TV position lets low frequencies pass while blocking high ones, making it easier to trigger on the vertical component of a complex video signal. A bright CRT screen with adjustable astigmatism makes reading measurements a quick and accurate job. An 8 x 10 centimeter screen graticule is included.

Eleven calibrated attenuator positions, up to 20 V/cm, means the Heathkit IO-4205 can accept a wide range of inputs. A 10 to 1 attenuation circuit can be used for signals applied to the external horizontal input. For stable and accurate measurements, a fully-regulated, low-voltage power supply provides you with precise, ripple-free voltage and current, even when line and load conditions are unstable. Partial mu-metal shielding helps eliminate possible display errors created by magnetic fields and other interference.

The IO-4205 is equipped with value-packed features you've come to expect from Heathkit. Easy-to-operate controls and front panel inputs make it one of the most convenient oscilloscopes you'll find on the market. You'll enjoy the economy offered by build-it-yourself prices — only from Heathkit — or, if you prefer, purchase the IO-4205 already assembled and tested. The IG-4505 Deluxe Oscilloscope Calibrator (p. 56) or other source of fast square waves is required to calibrate the kit-form IO-4205. Both versions operate on 120/240 VAC, 50/60 Hz power, drawing only 50 watts.

The DC to 5 MHz bandwidth and excellent input sensitivity of the vertical amplifiers allow you to use the IO-4205 for nearly all types of waveform applications. The triggered horizontal sweep circuit and the many other



See page 55 for recommended probes and accessories.

outstanding features provide accuracy and capabilities that are usually found only in higher priced oscilloscopes. Shop and compare. You won't find an oscilloscope value like the IO-4205.

Kit IO-4205, Shpg. wt. 25 lbs. 359.95
 SO-4205, Assembled and tested, Shpg. wt. 20 lbs. 495.95

IO/SO-4205 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, ± 3 dB. Sensitivity: 10 millivolts/centimeter. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nanoseconds. Overshoot: Less than or equal to 5 percent at 1 kilohertz. Impedance: 1 megohm, shunted by 38 picofarads. Sweep: Type: Triggered. Range: 200 milliseconds to 0.2 microseconds in seven steps, plus variable. Trigger Source: Y1, Y2, External, Line. Trigger Modes: AC, DC or TV; plus or minus slope; automatic or normal. HORIZONTAL: Sensitivity: 0.1 volt/centimeter. Bandwidth: DC to 1 megahertz. Impedance: 1 megohm, shunted by 50 picofarads. External Horizontal Input: X1 and X10 attenuator, as well as variable. GENERAL: CRT: 5DEP31F, 8 x 10 centimeters viewing area, blue-green medium-persistence phosphor, 5-inch round flat-face tube. Accelerating Potential: Approximately 1.6 kilovolts. Graticule: Screened, 8 x 10 centimeters. Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 8" H x 13" W x 17" D (20.3 x 33 x 43.2 cm).

IO-4105 is the low-priced choice for hobbyists

- Use external or one of seven internal time bases for versatility
- The 10 mV/cm vertical input sensitivity is ideal for most uses
- Regulated low-voltage power supply and mu-metal shielding give errorless stability for accurate measurements on any input

An excellent choice for single-trace oscilloscope applications: The IO-4105 is a low-priced alternative for situations where only single-trace capability is needed. As with our more expensive models, a stable triggering circuit gives you solid waveform displays. Trigger controls include selection of normal or automatic modes, switch controlled AC or DC coupling and front panel input of external triggering signals. The IO-4105 can trigger on the vertical component of a TV signal, with a special trigger control that lets low frequencies pass while rejecting high frequencies.

With its excellent 10 mV/cm vertical input sensitivity and attenuation to 20 mV/cm in eleven calibrated steps, the 4105 accepts a wide variety of inputs. A variable gain control provides accurate vertical adjustments between settings. Use external triggering or internal time base from 0.2 μ s/cm to 200 ms/cm. A variable control allows fine sweep adjustments. External inputs from DC to 1 MHz are accepted by the horizontal amplifier.

Versatile and affordable, the IO-4105 is housed in a lightweight, durable cabinet which combines professional appearance with quick-carry portability. Bright, easy-to-read displays make measurements fast and accurate on the 8 x 10 cm CRT. Also equipped with a fully-regulated power supply and mu-metal shielding for interference-free accuracy. Operates on either 120 or 240 VAC. Calibration is required (see IG-4244 on p. 59).

Kit IO-4105, Shpg. wt. 25 lbs. 279.95



See page 55 for recommended probes and accessories.

IO-4105 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, ± 3 dB. Sensitivity: 10 mV/cm, adjustable to 20 mV/cm in 11 ranges. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 ns. Overshoot: less than or equal to 5% at 1 kHz. Impedance: 1 megohm, shunted by 38 pF. SWEEP: Type: Triggered. Range: 200 ms to 0.2 μ s in 7 steps, plus variable. Trigger Source: INT, Ext and Line. Trigger Modes: AC, DC, or TV; + or - slope; automatic or normal. HORIZONTAL: Sensitivity: 0.1 V/cm. Bandwidth: DC to 1 MHz. Impedance: 1 megohm, shunted by 50 pF. External Horizontal Input: X1 and X10 attenuator and variable. Dimensions: 13" W x 8" H x 17" D.



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

For your present needs and future goals, get a kit or an assembled H/Z-100 Desktop Computer

1 HSA-1120-21 All-In-One kit computer shown with amber CRT and second 5.25-inch drive installed



2 ZW-110-32 with ZVM-123 and second drive installed



All-In-One, a complete computer package

As low as
\$2149⁰⁰ Kit
for All-In-One
model

The H/Z-100 All-In-One Desktop Computer is a powerful and complete system with everything you need to compute, today and tomorrow. High-resolution 12" video display, 5.25-inch floppy disk drive, keyboard and a dual 8/16-bit computer are brought together in one self-contained, compact unit. And, it can expand with extra memory, data storage, accessories and peripherals. Look at these H/Z-100 items:

- Dual microprocessors to run both 8/16-bit software
- RAM memory that can be expanded to 768 kilobytes
- Highly detailed graphics in monochrome or color
- High-capacity 5.25" and Winchester storage
- Serial and parallel ports for quick, easy add on

Increased data processing speed: With its advanced 16-bit 8088 microprocessor, the H/Z-100 runs high-speed and sophisticated 16-bit software. This higher-performance software provides for significantly accelerated performance, up to ten times faster than 8-bit software. Meaning, you can run programs faster and manipulate more information. And, with an 8-bit 8085 companion microprocessor, the H/Z-100 allows you to run most of today's 8-bit CP/M and many Heathkit/Zenith software programs.

Handle larger programs: The H/Z-100 Computer comes with a standard 128 kilobytes (KB), 192 KB in the Winchester model. This capacity lets you handle your larger business programs, such as accounting or inventory control with ease. For even larger programs, you can expand the H/Z-100's memory to three-fourths of a megabyte (768 KB). An optional Z-205 256K RAM Update Board (pg. 65) lets you add 256 KB to your H/Z-100 for those long Assembly Language programs or an application program like SuperCalc.

Higher resolution graphics: Beautifully detailed bit-mapped graphics is part of the H/Z-100. It gives you individual dot (pixel) control of a 640 by 225 pixel area.



Need help? Call TOLL-FREE: 800-253-7057. For ordering assistance or information, call toll-free between 8:00 A.M. and 8:00 P.M. EST, Monday through Friday. In Alaska, Hawaii and Michigan, call 616-982-3411

With this control, you can create highly detailed drawings, graphs, etc. Thirty-three special graphic characters are already available from the H/Z-100's keyboard to be arranged and grouped for less detailed graphics. Add eight colors to your monochrome graphics with two Z-219-1 Color Video RAM Chip sets (p. 65).

High-capacity disk drive storage: The H/Z-100 includes a built-in 5.25-inch floppy disk drive that can store up to 320K bytes of data. For faster operational speeds and more on-line storage, you can install a second Z-207-3 320K-byte 5.25-inch drive (below). Still greater storage is achieved by connecting the 8-inch Floppy Disk System (pg. 66). For the storage capacity necessary for large accounting, inventory or technical jobs, an internal 11-megabyte Winchester (pg. 65) could be your solution.

Convenient expansion capability: Two RS-232C serial ports and one parallel port combine to give you extensive communications access to the outside world. Two serial connectors, one DTE and one DCE, connect to printers, modems, speech synthesizers, terminals and plotters for transferring information. The parallel port, with its Centronics-type connector, connects the H/Z-100 to industry standard printers such as the MX-80A (pg. 73).

Software solutions for everyone: With either Z-DOS (included with H-100s) or CP/M operating system (pg. 66), the H/Z-100 has available a wide variety of 16-bit and 8-bit software programs to accomplish what you have in mind. See 16-bit software programs for the H/Z-100, including operating systems, languages, word processing and financial applications, on pages 66-67 and page 78. For the H/Z-100's 8-bit side, see software on pages 74-78.

HSA-1120-21 Kit HSA-1120-21, Monochrome graphics, non-glare amber CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. **2149.00**

HSG-1120-21 Kit HSG-1120-21, Monochrome graphics, non-glare green CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. . . . **2149.00**

HSW-1120-21 Kit HSW-1120-21, Monochrome graphics, non-glare white CRT, 128 KB RAM, one 320 KB 5.25" drive, Z-DOS, 109 lbs. . . . **2149.00**

ZF-120-22 Assembled, All-In-One H/Z-100, 12" green CRT, 128KB RAM, two 320KB 5.25" drives, 68 lbs., Mtr. Frt. **3599.00**

Z-207-3, Second 320 kilobyte 5.25" floppy disk drive to expand storage in H-100 Computer Kits, Shpg. wt. 5 lbs. **395.00**

SAVE \$95! When purchased with H-100 Computer. **ONLY 300.00**

ZA-100-4, S-100 Extender Board, Shpg. wt. 1 lb. **79.00**

HDC-120, Dust Cover for All-In-One H/Z-100, Shpg. wt. 1 lb. **16.00**



Credit Card Orders Call TOLL-FREE: 800-253-7057

Low-Profile, a versatile and modular system

As low as
\$1999⁰⁰
for Low-Profile
model

The H/Z-100 Low-Profile Desktop Computer offers you the advantages of the All-In-One plus the option of a choice of video monitors. Select either a monochrome or color video monitor and add it to these other H/Z-100 features:

- S-100 bus for future growth and increased capability
- Typewriter-style keyboard is intelligently designed
- Excellent documentation provides for easier operation
- Experienced hardware and software help always available
- Assembled and kit computers to fit a particular need and budget

Designed to grow: While one slot is filled by a floppy disk controller card, four industry-standard IEEE-696 (S-100) card slots still remain for internal expansion within the H/Z-100. These slots can be filled at any time to increase memory or add peripherals as you find more uses for your Computer. With its add-on capability, the H/Z-100 will protect your computer investment by being able to make use of improving future technology.

Comfortable keyboard: Work can be done faster and more accurately on the H/Z-100's sculptured keyboard because it is geared for speed, ease of use, and efficiency. With its typewriter-style layout, touch-typists easily switch to the H/Z-100's keyboard without missing a keystroke. The keyboard also features 13 user-programmable special function keys for added convenience. An 18-key numeric keypad (including cursor and control keys) is located to the right of the keyboard. This convenient keypad allows a user to quickly enter numbers and perform calculations faster and easier.

Clearly written documentation: For a better understanding of how the H/Z-100 works and to quickly get you started into computing, all Desktop Computers come with a complete set of plainly written manuals. Each H-100 kit includes a fully detailed and illustrated assembly manual. And both kit and assembled (Z-100) computers have operating manuals written with the user in mind. Eye-saving large type, common-sense glossaries, and plenty of illustrations (on-screen illustrations also) make for an easier and faster road to the benefits of owning an H/Z-100.

Coast-to-coast support: More than 65 Heathkit Electronic Centers, located in major metropolitan areas, are available to you. Each offers assistance in selecting the right H/Z-100 and software to fit your needs. After your purchase, they continue with support and service. Factory hardware and software assistance is also available by phone (see page 48).

Hardware



HS-1100-21, Low-Profile Computer, Monochrome graphics, 128KB RAM, one 320K byte 5.25" drive storage, 78 lbs. **1999.00**



ZF-100-21, Assembled Low-Profile, Monochrome graphics, 128KB RAM, one 320KB 5.25" drive, 49 lbs. **2899.00**



ZF-110-22, Assembled Low-Profile Computer, Color graphics, 128KB RAM, two 5.25" drives for 640KB storage, 54 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 an H/Z-100 monochrome computer to color, Shpg. wt. 1 lb. **145.00**

Z-207-3, Second 320KB 5.25-inch floppy 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**

HDC-100, Dust Cover for Low-Profile Computers, 1 lb. **16.00**

TM-100, H/Z-100 Technical Manuals, Shpg. wt. 14 lbs. **55.00**

H/Z-100 SPECIFICATIONS: PROCESSORS: 16-bit: Intel 8088. 8-bit: Intel 8085. Clock: 5 MHz. **DATA STORAGE:** Disk Controller: Standard Z-207 controller, supporting both 5.25" and 8" drives simultaneously. One soft-sectored, double-sided, double-density, 48 TPI 320KB 5.25" floppy disk drive standard in kits; Two drives standard in assembled units. **Disk Storage Expansion:** 11 megabyte 5.25 Winchester disk drive, which installs in second internal drive slot of H/Z-100, optional; up to 2.5 on-line megabytes of external 8" floppy disk storage (Z-207-41, 42, p. 66) 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. **Cursor Addressing:** Relative and direct. **Tab:** Eight columns, software addressable. **Video:** Normal or reverse video by character. **Video Output:** Z-110, RGB; H/Z-120, monochrome standard. **KEYBOARD: General:** Sculptured, typewriter-style keyboard with 95 keys. **Numeric Keypad:** 18 keys (including cursor-control keys). **Special Function Keys:** 13. **INPUT/OUTPUT PORTS:** Serial I/O: Two EIA RS-232C serial interface ports, at 110 to 38,400 baud. Accessible from rear of unit. **Modes:** Asynchronous full- or half-duplex; synchronous. **Parallel I/O:** Centronics-compatible printer port with a 25-pin D connector.



3 Winchester disk drive provides built-in big job capacity with 11 megabytes of data storage

ZW-110-32 with 5.25" back-up drive

3 Powerful Winchester disk drive data storage

Huge on-line storage capacity: With an 11 megabyte storage capacity, Winchester drive conveniently stores data that would require several dozen floppy diskettes. This allows your H/Z-100 to handle very large amounts of data, such as lists of accounts or large inventories.

Economical alternative: For serious computer users, a Winchester disk drive can be an inexpensive data storage substitute for a 5.25-inch floppy disk drive in some situations. Especially when many disk drives, costing more than a Winchester drive, are required to put all information "on-line" at the same time.

High-speed access: Dramatically decreasing seek time over floppy disk drives, a Winchester drive can be finished retrieving information while a 5.25-inch disk system is just getting started. The H/Z-100's Winchester disk drive can access information ten to twenty times faster than a 5.25-inch floppy disk system.

Increased data-handling efficiency: Coupled with high-speed access, an increased data packing technique allows the Winchester to transfer data at five megabytes per second. With an internal Winchester drive, this extremely high transfer rate greatly increases the H/Z-100's efficiency in applications requiring a great many disk operations.

Convenient: With its huge storage capacity, the Winchester allows you to store all your programs on its sealed disks instead of several dozen floppy diskettes. It eliminates annoying and time consuming disk swapping and keeps your computer area uncluttered by piles of diskettes.

ZW-110-32, Assembled and tested Low-Profile Desktop Computer with internal 11 MB Winchester disk drive, one 320 kilobyte 5.25-inch floppy disk drive, 192 kilobytes of RAM, color graphics capability, 55 lbs. **5499.00**

ZW-120-32, Assembled and tested All-In-One Desktop Computer with internal 11 MB Winchester disk drive, one 320 kilobyte 5.25-inch floppy disk drive, 192 kilobytes of RAM, non-glare green CRT, Shpg. wt. 70 lbs. **5599.00**

NEW! HS-217, Winchester Upgrade Kit: Kit contains the controller and data separator boards, and an assembled and tested Winchester disk drive. The hard disk controller board installs in one of the H/Z-100's S-100 expansion slots and the Winchester drive fits in one of the 5.25" disk drive locations. Kit includes all mounting hardware, complete documentation, and step-by-step installation instructions. Shpg. wt. 30 lbs. **Available 1st Quarter 1984**

SAVER Save 50% on any or all of the items listed below when you purchase an H-100

Get a big 50% discount on any or all of the following items when you buy them within 90 days of your H-100 purchase.

Any three individual Heath/Zenith software packages. This also applies to the powerful PeachText 5000 and LOTUS 1-2-3™ business packages described on page 67.

Two Z-219-1 Color Chip Sets: Adds color video (left) to your H-100. Regularly \$145.00 each **Discount price 72.50 each**

One Z-205-1 RAM Chip Set: Increases the RAM memory capacity of your H-100 from 128 kilobytes to 192 kilobytes as described at the left. Regularly \$165.00 **Discount price 82.50**

One Set of TM-100 Technical Manuals: Details the inner workings of your kit H-100 Computer. Regularly \$55.00 **Discount price 27.50**



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

HS-217-42 Floppy Disk System shown with two 8-inch disk drives for up to 2.5 megabytes of storage

Half-height drives conserve space and weigh less



Styled to match H/Z-100 Computer



External Floppy Disk System stores data on transportable 8-inch disks

As low as
\$999⁰⁰
for one drive system

- Attaches to H/Z-100 Desktop Computer with one cable
- Stores up to 1.25 megabytes on each 8-inch double-sided, double-density diskette
- Operates under an independent, self-contained power supply without requiring an external power source

More data storage: Available with one or two 8-inch disk drives, the H/Z-207 Floppy Disk System offers up to 2.5 megabytes of additional data storage for your H/Z-100 Computer. And, your data is stored on transportable 8-inch disks which can be put away for safekeeping or taken to be used at another location. All information is stored on soft-sectored disks. The H/Z-207 System supports the standard IBM 3740 format.

H/Z-100 plug-in compatibility: To attach the H/Z-207 Disk System, simply connect the supplied cable between it and your H/Z-100 Desktop Computer. This interconnecting cable only carries information since the H/Z-207 has its own power supply. The H/Z-207 also matches the H/Z-100's styling with its soft and pleasant earthtone colors.

High-performance data storage: For reading data very quickly, the 8-inch disk drive has a 90 millisecond (ms) average access time with a 3 millisecond track-to-track move speed. Head move time is a short 20 milliseconds with an average latency time of 83 milliseconds.

Improved data protection: Besides a transducer in the 8-inch drive to detect the presence or absence of a read/write notch in the disk, data is also protected by the H/Z-207's programmable door lock. This latching lever locks each disk inside the drive. It prevents a disk from being removed while the disk drive spindle is still turning. The lever remains locked until two seconds after the spindle has stopped.

Kit and assembled: One or two drives, the H/Z-207 is available in kit form with an easy-to-follow assembly manual or fully assembled.

Healthkit

HS-207-41, Eight-Inch Floppy Disk System with one disk drive, 1.25MB storage, Shpg. wt. 57 lbs. **999.00**

Healthkit

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

Zenith data systems

Z-207-41, Assembled and tested Eight-Inch Floppy Disk System, one drive, 1.25MB disk storage, Shpg. wt. 53 lbs. **1599.00**

Zenith data systems

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 Half-Height Eight-Inch 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.

Powerful and easy-to-use software for the H/Z-100

In addition to quality hardware and peripherals, we support your H/Z-100 Series Desktop Computer purchase with ready-to-run software. On this page you'll find operating systems for the H/Z-100 plus a new 16-bit CP/M operating system. On the following page (pg. 67) and page 78, you'll find 8- and 16-bit programming languages plus new 16-bit applications packages. You'll find even more software for the H/Z-100's 8-bit side on pages 74 through 77. All H/Z-100 software is supplied on soft-sectored 5.25" diskettes and includes easy-to-read operating manuals, written to be understood by the beginner and the experienced user.

Incredibly fast 16-bit Z-DOS™ Operating System



- Meets the needs of the experienced user and the beginner
- Expands to meet your growth requirements
- Offers full range of necessary utility tools

Flexible: The Z-DOS operating system allows, and the H/Z-100 hardware supports, a multitude of alternatives that you may select as the need arises. Z-DOS supports device independent input/outputs which treats files and devices alike by referring to either by filenames. And the easy-reading manual is divided so that information may be used to your utmost advantage, whatever your level of experience is with computers.

Comprehensive utilities: Z-DOS enables you to create, analyze, and manipulate files with extensive utility tools. One software tool is DEBUG which provides a controlled testing environment to load, examine, and change a program. Another tool is a line text editor, EDLIN. FILCOM compares one file to another to see if they are identical and creates a third file containing the differences between the two files. MACRO-86, LINK, LIB, and CREF are also included for speedy editing and searching of files.

OS-63-4, Z-DOS, Vers. 1.25, Included with H/Z-100 purchase, 5 lbs. ... **150.00**

Industry-standard CP/M® 8-bit operating system



- Opens the door to more applications software programs
- Supports many different disk drives and peripherals
- Includes fast and easy-to-use software development tools

Industry standard: CP/M opens the door to more languages, utilities and applications software than any other microcomputer disk operating system. That's because CP/M is used by so many businesses, manufacturers, over 100,000 com-

puter users, plus many software developers. And in hardware, CP/M supports one or two 5.25-inch, two 8-inch floppy disk drives, a Winchester drive, and a printer and a terminal.

CP/M includes: Utility tools like a fast 8080 assembler, a general-purpose text editor, an advanced 8080 debugger with traced execution and disassembly, file dump, plus system generation/relocation and file size/disk usage displays. Also included is an easy-to-read operating manual that fully explains all utility procedures, commands, and operations. To learn more about CP/M and how to use it, see the EC-1120 CP/M course on page 80.

OS-53-2, CP/M Operating System, Vers. 2.2, Shpg. wt. 5 lbs. **150.00**

CP/M* 86 16-bit operating system designed for 8088



- Efficient and powerful 16-bit operating system
- Compatible with file structure of popular CP/M
- Manages H/Z-100's full 768 kilobytes of memory

CP/M-86: Designed specially for microcomputers using the 8086/8088 microprocessor, CP/M-86 is a 16-bit version of the industry-standard CP/M operating system. With its time-tested modular design, CP/M-86 can support simple to complex application programs. And its complete file compatibility allows you to easily convert programs from 8-bit CP/M to the efficient and powerful CP/M-86 system.

Support features: CP/M-86 supports all of the H/Z-100's random access memory (RAM) with its one megabyte (1,048,576 bytes) maximum limit. It also supports the different 5.25-inch, 8-inch or Winchester disk drives that can be used with the H/Z-100. A comprehensive manual is included.

OS-63-2, CP/M-86 Operating System, Vers. 1.2, Shpg. wt. 3 lbs. **250.00**

Z-DOS is a trademark of Zenith Data Systems Corp.
CP/M and CP/M* 86 are trademarks of Digital Research, inc.

High-level 16-bit Z-BASIC Color Interpreter



- Fully utilizes outstanding color graphics of H/Z-100
- Features many more commands than Microsoft BASIC
- Easy to learn and easy to use

Create superior color graphics: On H/Z-100's equipped with color video RAM. And use advanced graphic techniques such as LINE, CIRCLE, GET, PUT, and DRAW statements. Z-BASIC includes enhanced features like trace facilities for easier program debugging and automatic line number generation and renumbering with automatic changing of referenced line numbers. Also part of Z-BASIC is the powerful self-modifying PEEK and POKE statements to read from and write to any memory location.

More features: Z-BASIC assists you in writing useful programs with error trapping, Boolean operators, formatted outputs, a Full Screen Editor, event trapping, and nested IF/THEN/ELSE AND WHILE/WEND control structure. Z-BASIC requires Z-DOS operating system on page 66.

MS-463-1, Z-BASIC, Version 1.0, Shpg. wt. 5 lbs. 175.00

Z-BASIC is a trademark of Zenith Data Systems Corp.

Versatile 8-bit Microsoft BASIC Interpreter



- Allows for more highly-structured programming
- Supplies a full set of intrinsic functions
- Provides programmers with a special function group

An excellent 8-bit interpreter: Microsoft BASIC features many programming advantages. One is an IF/THEN/ELSE control structure that provides a highly-structured programming format. Another is direct access to CPU ports and memory locations. Still others

include a full range of logical and mathematical capabilities plus extended commands and statements. Basic is designed to run under the CP/M Operating System. It comes with a Reference Manual that is simply organized for easy referrals. Included is a handy reference card.

Requirements: The hardware required to run the BASIC interpreter is an H/Z-100. The Interpreter runs under CP/M.

MS-253-1, Microsoft BASIC, Vers. 5.22, Shpg. wt. 3 lbs. 175.00

Microsoft is a trademark of Microsoft, Inc.

LOTUS 1-2-3™ business software takes full advantage of H/Z-100 16-bit and graphics capability

- A remarkable new business software package makes increased office productivity as easy as 1-2-3
- 1-2-3 package includes spreadsheet, data base, graphics, and provides an extensive file and disk management system
- Sophisticated, yet easy-to-use, software quickly graphs business data



NEW

LOTUS 1-2-3: Combines the largest electronic worksheet currently available with today's most versatile graphics and a complete information management capacity. While it's the most sophisticated business software available, 1-2-3 is still easy to use. Easy, because of over 200 possible "help" screens that are available at the touch of a key and a hands-on tutorial disk that includes step-by-step instructions.

Quick answers: Because 1-2-3 is an integrated (or interactive) software program, you can move quickly through spreadsheet analysis with any "what if" stops along the way. And, go directly to a visual presentation in the form of a graph. All this on a single program where you use one set of commands instead of several.

Graphics: Excelling at graphics, 1-2-3 helps you effectively communicate what your numeric files represent. You see relationships and trends that might be missed otherwise. 1-2-3 draws graphs in monochrome and can add up to two colors when color capability is available. Five graphs are possible: line, bar, stacked-bar, pie, and XY. Unless changed, 1-2-3 automatically selects the proper scale and spacing of the graph. A different type of graph can be redrawn using the same information by simply selecting another graph type from the 1-2-3 menu.

Requirements: H/Z-100 requires 192K bytes of RAM and two floppy disk drives. For printouts, a serial printer is needed. Available on soft-sectored 5.25" diskettes, the 16-bit 1-2-3 package is also useable on Winchester versions.

LS-463-1, LOTUS 1-2-3 Software Package, Shpg. wt. 4 lbs. 495.00

LOTUS 1-2-3 is a trademark of Lotus Development Corp.

PeachText is a registered trademark of Peachtree Software, Inc.

NEW

Create informative business charts with your H/Z-100 and Z-Chart software



- Charts your company's data to help make business decisions
- Create graphs with data entered from different sources
- Design your own bar, pie, side bar, line, multiple pie, trend, and three-dimensional charts
- Display charts on-screen or on an optional printer or plotter

Z-Chart: Written in Z-BASIC and 8086 assembly language, Z-Chart is a series of programs for producing business graphs. Taking full advantage of the H/Z-100's keyboard, screen, and versatile design, Z-Chart offers many options and is easily used by either a novice or expert computer user.

Use data from different sources: Z-Chart allows you to create graphs with information that you enter from the H/Z-100's keyboard and other applications programs. These programs include: Condor™ rDBMS or FMS data bases, Multiplan™ spreadsheets, SuperCalc™ spreadsheets, WordStar™ documents, and the Z-100 Customer Demo Version 1.0.

Special Presentations: Individual or groups of graphs can be easily displayed on your H/Z-100 Computer as part of a "slide show" presentation. Z-Chart allows you to put together a number of graphs ahead of time for a later showing. Then at appropriate time you simply press a key and show your graphs one at a time.

Requirements: To run Z-Chart, you must have a copy of Z-DOS (p. 66) and a copy of Z-basic (p. 67). An H/Z-100 Series Computer is required with a minimum of 128 kilobytes of RAM memory and at least one 5.25-inch floppy disk drive. Color video memory is optional for running Z-Chart. Uses MX-80A printer.

CB-463-11, Z-Chart Graphics Package, Shpg. wt. 3 lbs. 150.00



Word-processing, financial modeling, mailing lists and simple data-base management

- Powerful applications with menu-driven features
- Complete interaction between all parts of system
- On-screen help and easy-to-use documentation

Personal productivity system: PeachText® 5000 is a complete 16-bit software package designed to decrease your office workload by increasing personnel efficiency. This package combines word processing, financial planning, and basic data-base management features to help office personnel use their working time more productively. PeachText 5000 is fully integrated with all parts available from a main menu. PeachText 5000 will meet anyone's business productivity needs.

Word processing: The heart of the PeachText 5000 package is the PeachText word processor. It features highly developed print and editing capabilities for creating and handling a variety of documents. File merging and mail list management are also part of PeachText, making it even more versatile. PeachText also supports many specialty printers. An added Random House Thesaurus enhances the use of the word processor. It provides instant access to more than 4400 indexed words and 26,000 synonyms. And to check for spelling and typographical errors, a Spelling Proofreader with 20,000 words completes the word processing portion.

Financial planning: Part of PeachText 5000 is PeachCalc. A large automated worksheet, PeachCalc can be used as a financial modeling and planning tool. It can include up to 254 rows and 63 columns of text, numbers, and formulas. PeachCalc reports can be easily merged with PeachText documents for business reports and other applications.

Data Management: This part of PeachText 5000, List Manager, provides complete control over the design and use of mailing lists, labels and other files. Used with the word processor, List Manager can be used to print individualized letters.

RS-463-75, PeachText 5000 Package, also includes 10 free floppy disks and a coupon for extra utility programs, Shpg. wt. 3 lbs. 395.00

SAVER! Verifiable H-100 owners can save \$120 **ONLY 275.00**

Software for the H/Z-100 is featured on p. 66-67; more H/Z-100 software can be found on pages 74-78.

1 A versatile 8-bit computer and a professional video terminal built into a desktop computer

The H-89 All-In-One Computer is an outstanding single-component system that's ready to work for you. Use it to increase your office's efficiency with business applications and word processing. Create your own programs with versatile operating systems and languages. And, manage your home easier with financial programs and information services.

As low as
\$1399⁰⁰
 for kit H-89

- Dual 8-bit microprocessors for faster computing
- 48K byte RAM memory that expands to 64K bytes
- Internal 5.25" disk drive stores up to 100K bytes
- High-Quality, professional typewriter keyboard
- Uses both HDOS and CP/M operating systems
- Easily add peripherals or increase data storage

1 Separate microprocessors: The H-89 uses two Z-80 microprocessors, one for video and keyboard functions and the other for just powerful computing. With the terminal using its own microprocessor, the computer can concentrate on high-speed processing. This allows the H-89 to be more versatile than other 8-bit desktop computers and computer systems.

Expandable memory: At 48 kilobytes of RAM, the H-89's memory is large enough to run most 8-bit software. And for larger programs, memory can be increased up to 64 kilobytes. To add the extra 16 kilobytes of RAM, you simply install the wired WH-88-16 RAM Expansion Kit (p. 69).

Increased data storage: For most of your data storage needs, the H-89 comes with an internal 5.25-inch floppy disk drive (H-17-1 on page 69) and an H-88-1 hard-sectored disk controller board (p. 69). This standard equipment allows you to store up to 100K bytes of data on a single floppy diskette. When you need more storage space, the H-89 answers with many add-on storage capacities in a number of different ways. You can increase the amount of disk storage by connecting an H-77/Z-87 external floppy disk system (p. 69) with its one or two disk drives to your H-89. This now brings the total storage capacity up to 300K bytes (100K bytes per drive). Storage capacity can be further increased by replacing the H-88-1 controller board with a Z-89-37 soft-sectored disk controller board (p. 69). With the Z-89-37 board installed in your H-89, total storage (with H-77/Z-87 connected to the H-89) becomes 480 kilobytes. Still more storage is gained by replacing the internal disk drive with a double-sided double-density disk drive (H-17-5 on page 69) and replacing the H-77/Z-87 with an H-37 external floppy disk system. This arrangement increases storage capacity to a massive 1.92 megabytes. For more information on these and other storage capacities for the H-89, see page 69.

Professional keyboard: With its standard typewriter keyboard, the H-89 allows touch-typists to immediately take advantage of word processing. Typists easily move from their electric typewriters to the keyboard of the H-89 without losing time in retraining. And, the rugged, highly-reliable keyboard is built to take the constant use found in the office environment. For programmers, the keyboard can display the entire ASCII character set, both upper and lower case, along with 33 graphic symbols. A 12-key keypad beside the keyboard allows accountants to rapidly enter numbers while using bookkeeping and other spreadsheet programs.

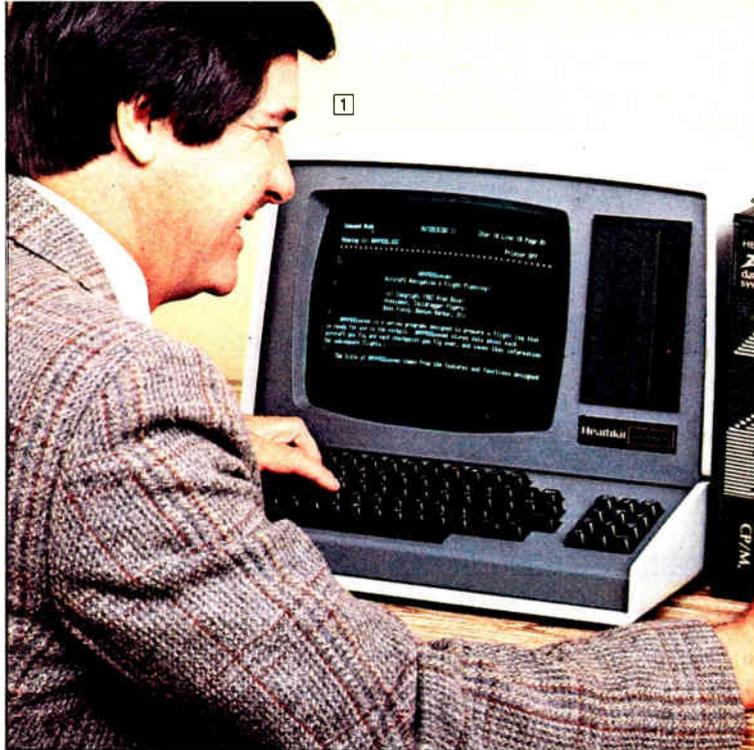
Quality video terminal: All information is shown on a 12-inch high-quality video display tube (or CRT) that provides highly detailed characters. The optional white or green CRT displays 24 rows of 80 characters each as well as a software-controlled 25th line. The display is always bright even when the maximum 200 characters fill the screen. On the screen, upper-case characters are formed by a 5 x 7 dot matrix while lower-case characters use a 5 x 9 dot matrix.

Add on the peripherals: For your convenience and the H-89's versatility, three EIA standard RS-232C serial interface ports are part of the H-89. These three standard serial ports let you connect peripherals that make the H-89 more useful to you. Connect a printer such as the H/Z-125 or the WH-54A on page 73 for printed copies. Or, connect a modem (page 72) and use the H-89 to talk to other computers or access information services with their wealth of useful and profitable information, and services.



Need help? Call TOLL-FREE: 800-253-7057

For ordering assistance or information, call toll-free between 8:00 A.M. and 4:30 P.M. EST. Monday through Friday. In Alaska, Hawaii and Michigan, call 616-982-3411.



H-89 software: Choose from either HDOS or CP/M (both on p. 75) as your disk operating system, or use both. Each operating system features sophisticated system control and both supports all Heath/Zenith disk systems. Software that can be used with either HDOS or CP/M can be found on pages 74 through 77. This includes: programming languages, financial modeling and planning software, utilities, word processing software, learning software and games. By joining HUG (p. 74) you can gain access to its library of over 700 software programs for your H-89 which are constantly being updated.

User oriented manuals: A step-by-step assembly manual shows you exactly how to assemble your own H-89 computer. Each step is clearly written and well illustrated to ensure a properly built kit. After assembly, the operation manual takes you through all the workings of your H-89 to let you become entirely familiar with it. Like the assembly manual, the operation manual explains all steps in plain language for easier understanding.

	Kit HS-89-2, All-In-One Computer with anti-glare green CRT. Shpg. wt. 96 lbs.	1429.00
	Kit HS-89-3, All-In-One Computer with standard white CRT, Shpg. wt. 96 lbs.	1399.00

H-89A SPECIFICATIONS: CPU AND MEMORY: Processor: Z80. **Clock:** 2.048 MHz. **Memory:** 8K bytes used by system for ROM and RAM: 48K bytes user RAM (expandable to 64K). **VIDEO TERMINAL: CRT:** 12-inch Diagonal. **Display Size:** 6 1/2" H x 8 1/2" W (16.5 x 21.6 cm). **Character Size:** Approximately 1/5" H x 1/10" W (0.5 x 0.3 cm). **Character Type:** Upper case and lower case without descenders. 5 x 7 dot matrix; Lower case with descenders. 5 x 9 dot matrix; Graphics. 8 x 10 dot matrix. **Keyboard:** 84 keys (60 alphanumeric keys and 12 function/control keys) — plus a 12-key numeric control pad. **Cursor:** Blinking, non-destructive underline or block. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space and tab. **Cursor Addressing:** Relative and direct. **Tab:** Standard eight-column tab. **Refresh Rate:** 60 Hz at 60 Hz line frequency. 50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line or page, from beginning of line or page, to end of line or page. **Bell:** Audible alarm or receipt of ASCII BEL. **Video:** Normal and reverse, by character. **FLDPPY DISK (H-88-4):** Tracks: 40 **Sectors:** 10. **Formatted Bytes Per Sector:** 256. **Spindle Motor Speed:** 300 RPM ± 1%. **Data Transfer Rate:** 128 kHz. **Motor Start Time:** 1 second. **ACCESSORIES:** Interfacing; Three EIA standard RS-232C Serial Interface ports are provided. **Cassette interface included.** **GENERAL: Operating Temperature Range:** 50-95 degrees F (10-35 degrees C). **Power Requirements:** 120/240 VAC, 50/60 Hz, 90 watts. **Dimensions:** 13" H x 17" W x 20" D (33 x 43.2 x 50.8 cm). **Weight:** 46 lbs. (20.7 kg).

**Get software
at no extra
charge!**

Choose three of these programs when you buy an H-89; H-DOS or CP/M; Microsoft BASIC interpreter; Compiler; FORTRAN; COBOL; Magic Wand; SuperCalc. (Applies only to single-quantity purchases.)



2 Add more data storage capacity to your H/Z-89 or Z-90

Different versions available: The kit HS-77 is available in one and two drive versions. A kit one-drive system is available under model number HS-77-1 and a kit two-drive system is available under model number HS-77-2. The model number for an assembled two-drive disk storage system for the H/Z-89 is Z-87-89. An assembled two-drive system for the Z-90 Computer is ordered by using the Z-87-90 model number. Refer to the chart below for a summary of these storage systems.

Available separately: Besides the Floppy Disk Systems themselves, each component of these systems is available separately. See the list of disk storage accessories listed below. Anytime you wish, you can upgrade your Computer system to handle more data. With multiple drives, you can mount operating system and program disks at the same time. All disk drives are factory assembled and tested to make the kit versions of the disk systems faster and easier to build. It ensures worry-free operation.

Quality designed: The H-17-1 disk drive mounts vertically into its cabinet. Mounted this way the drive takes up less space than units which mount their units horizontally. Inside the tough metal cabinet of both disk storage systems is a special heavy-duty power supply. It provides enough power for each system with enough extra capacity to stay cool, even under the heaviest use. For other quality disk storage and H/Z-89 and Z-90 Computer accessories, check over both lists below.

Increased drive storage: Replace the H-88-1 hard-sectored controller board in your H-89 with the Z-89-37 soft-sectored disk controller board and increase data storage 1.6 times. The Z-89-37 allows the single-sided H-17-1 disk drive to store up to 160K bytes of data. Used with an H/Z-77 or Z-87 Floppy Disk System, the Z-89-37 increases their capacity to 320K bytes. Added to the Computer's internal drive storage and you get a total of 480K bytes.

Used together: Both the H-88-1 and the Z-89-37 controller boards can be used in an H/Z-89 or Z-90 at the same time. This allows you to choose the amounts of data storage you wish with different disk systems. The H-88-1 controller board can only be used with a single-sided H-17-1 disk drive such as the one that comes standard with the H/Z-89. However, the Z-89-37 controller board can be used with either the H-17-1 or H-17-5 (double-sided) drive.

H-37 Floppy Disk System: With a Z-89-37 controller board and the two-drive H-37 System, up to 1.28 megabytes of additional data storage is provided. The high-capacity double-sided 96 TPI H-17-5 disk drive, used in the H-37, makes this possible with its large 640K bytes per drive storage capability. By replacing the internal H/Z-89 single-sided drive (H-17-1) with an H-17-5 drive, a huge 1.92 megabytes of total disk storage becomes available.

Two versions available: The kit H-37 Disk System can be ordered with one (HS-37-1) or two (HS-37-2) double-sided floppy disk drives. And, the H-17-5 double-sided 96 TPI disk drive can be obtained separately for expanding your system as desired. See the chart below and the accessories list at the right for model numbers and prices. The H-37 uses the same cabinet and power supply as the H/Z-77 and Z-87. It is a damage-resistant steel cabinet that includes its own power supply.

Power: The H-37, H-77, and Z-87 Disk Systems use 120/240 VAC at 50/60 Hz. All cabinets measure 8 $\frac{3}{8}$ " H x 8 $\frac{7}{8}$ " W x 15" D.

Disk Storage Accessories

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, Assembled, 3 lbs. 150.00

Soft-Sectored Disk Controller Board for H/Z-89 Computers: Increases data storage capacity of disk drives below.

Z-89-37, Assembled, 4 lbs. 299.00

Single-Sided Floppy Disk Drive for H-77/Z-87 Disk Systems: Stores up to 100K bytes per disk when used with H-88-1 Controller Board, 640K bytes when used with Z-89-37. Also for H-88, H/Z-89 and Z-90 Computers.

H-17-1, Assembled, 5 lbs. 295.00

Double-Sided Floppy Disk Drive for H-37 Disk Systems: Stores up to 640K bytes on a compatible disk. Requires Z-89-37 above.

H-17-5, Assembled, 5 lbs. 550.00

Dust Cover: Protects H-37 and H-77/Z-87 Disk Systems from dust and contaminants.

HCA-5-77, Shpg. wt. 1 lb. 14.00

Accessories for H/Z-89 and Z-90

WH-88-16, Assembled 64K RAM Expansion Kit: Expands 48K H/Z-89s to 64K, Assembled, Shpg. wt. 1 lb. 115.00

H-88-2, 16K RAM Expansion: Brings converted H-89s and H-89s to 48K, 1 lb. 29.00

H-88-9, High Capacity Drive Installation Kit: To install H-17-4s into H-89s, 4 lbs. 50.00

HA-88-3, 3-Port Serial Interface: For older H-89s, Shpg. wt. 2 lbs. 150.00

H-88-5, Cassette Interface, (not used with CP/M), Shpg. wt. 2 lbs. 49.00

Kit H-88-10, Wire Wrapping Board with Bus Connectors: Make custom circuits. Takes 48# 16-pin 54# 14-pin and other sockets. Uses HCA-7 below. 1 lb. 30.00

Kit HCA-7, Wire Wrapping Socket Kit: Includes 36 Three-level wire wrapping sockets ranging from 14-pin to 40-pin. Used with above H-88-10. Shpg. wt. 1 lb. 29.95

HCA-5-89, Dust Cover: Protects H/Z-89s, Z-90s and H/Z-19s from dust. 1 lb. 14.00

2 Increased data storage: As your need for more disk storage space increases, the H/Z-89 or Z-90 Computer easily expands to supply the storage capacity you need. There are several different ways storage capacity can be increased. You can use the standard internal H-88-1 hard-sectored disk controller board of the H/Z-89 and externally add more single-sided 5.25-inch floppy disk drives to your Computer. Or, replace the H-88-1 with a Z-89-37 soft-sectored disk controller board and use either single-sided or high-capacity double-sided 5.25-inch floppy disk drives. **HS-77/Z-87:** Triple the data storage of your H/Z-89 with a kit HS-77 or assembled Z-87 Floppy Disk System. Each single-sided disk drive (model number H-17-1) of either system is capable of storing 100K bytes (kilobytes) on a diskette for an added 200K bytes of storage capacity. That's a total capacity of 300K bytes, counting the 100K byte capacity of the Computer's internal drive.

The Heath H-37, H-77 and Zenith Data Systems Z-87 Floppy Disk Systems are FCC Class B Certified for use in homes or businesses.

How to order external 5.25" disk storage for H/Z-89s, Z-90s

Storage Capacity Using Controller Boards:		Order Model		Includes Cabinet Power Supply And:	Shpg. Wt.	Price
H-88-1	Z-89-37	Kit	Assem.			
100K bytes	160K bytes	HS-77-1	-	One H-17-1 (Single-Sided)	34 lbs.	499.00
		HS-77-2	-		47 lbs.	769.00
200K bytes	320K bytes	-	Z-87-89 for H/Z-89	Two H-17-1 (Single-Sided)	30 lbs.	999.00
		-	Z-87-90 for Z-90		30 lbs.	999.00
-	640K bytes	HS-37-1	-	One H-17-5 (Double-Sided)	34 lbs.	795.00
-	1.28 megabytes	HS-37-2	-	Two H-17-5 (Double-Sided)	47 lbs.	1295.00

Heathkit computer products meet FCC requirements for use in residential areas.

Zenith Data Systems computer products in this catalog are fully assembled and tested.



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



The user-comfortable H/Z-29 – much more video display terminal for your money!

ONLY
\$599⁰⁰

- Features 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.

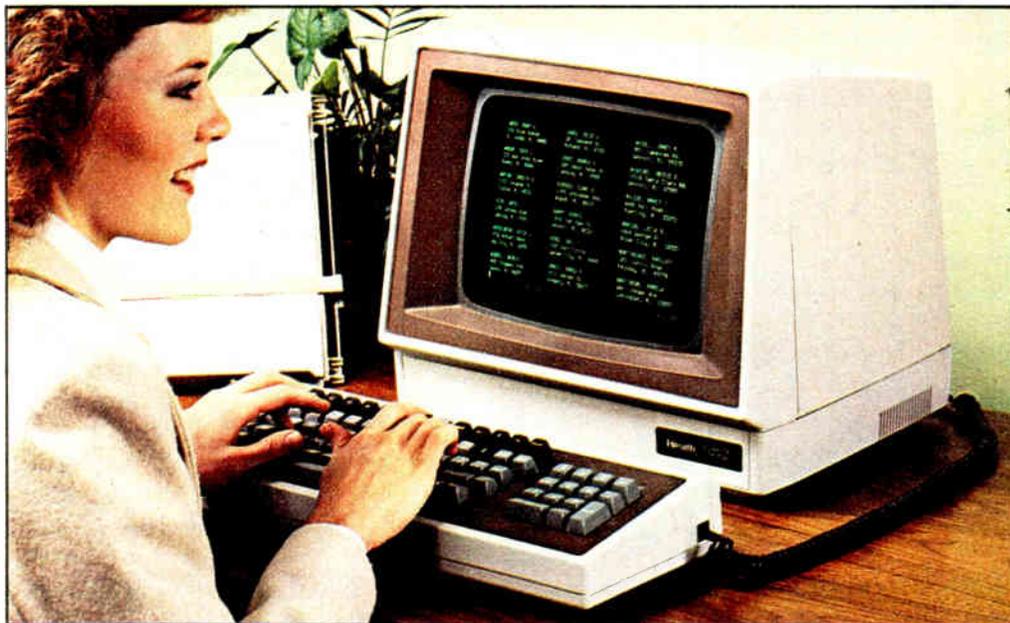
LED status panel: Conveniently shows the terminal's "power on," "keyboard lock," "off line" and "caps lock" status.

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.

Also models: 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) 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.

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 **Tab:** 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 bootstrap 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. **No Longer Available**

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. **No Longer Available**

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. **No Longer Available**

Color Graphics Board: Uses ZVM-131 Color Monitor (p. 72) and 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. **250.00**



Personal Information Terminals access information sources and hook up to computers

- Automatically dials information services and enters codes and passwords
- Telephone-directory memory stores up to 27 phone numbers
- Plain English menu makes for easy set-up and use of Terminal
- Printout on-screen data or use as an electronic typewriter

Personal Information Terminal Series: Heathkit's HT-1011 lets you communicate ("talk" back and forth) with many devices using the telephone line in your home or office. Connect an HT-1011 to your phone line and gain access to information services or data banks, or "talk" with another terminal or computer that has a compatible Bell-103 modem (modulator/demodulator).

Accessible services: Information available from time-sharing services includes a wide variety of subjects ranging from news, sports, weather, business and financial news, to catalog shopping, education and career planning, science, technology, and computing. All this and more is available through your Personal Information Terminal and information services such as THE SOURCE, Dow Jones, CompuServe, and Comp*U*Star.

Single keystroke phone dialing: Following the simple English menu, you program in as many as 27 phone numbers into an alphabetic directory. To dial, all you do is press the letter opposite the desired phone number as listed on the directory menu. With a single keystroke, a phone number is automatically dialed for a data call to a computer, a time-sharing service, or another HT-1011. Or, you can make a voice call to anyone, even your favorite uncle.

Battery protected: Items such as phone numbers, account numbers, escape codes and passwords are entered just one time into the HT-1011's memory. This information will be retained in memory, even during a power loss, because it is protected by a battery-powered back-up system. With proper recharging, information can be retained in memory for years.

Built-in cues and prompts, in plain and simple English, make it easy to communicate with and use the HT-1011. Even those without typing skill or computer training will find the HT-1011 easy to use. Programmed to be self-prompting, the HT-1011 has an easy-to-follow display menu.



Electronic typewriter: The HT-1011's keyboard is already familiar to typists. That's because it features a standard typewriter layout. The keyboard has 63 individual keys including a 108-character ASCII set with CTRL, ESC, BREAK, TAB, and RETURN keys. You can type a full screen (page) of text, edit or correct it, and then output the screen to a printer. Or, you can print a line at a time as you compose it on the screen. A printer such as the MX-80A (p. 73) connects to the HT-1011's Centronic compatible parallel interface for all printouts off of the screen.

Video monitor: The HT-1011 uses a ZVM-121 Monochrome Video Display which features a high-resolution 12-inch diagonal screen with an easy-on-the-eyes green phosphor. It has excellent character definition with constant brightness, even when the display is filled to its capacity of 25 lines of 80 characters each. The ZVM-121 Video Display can also be used as a monitor for high-resolution microcomputer systems.

Connect directly to mainframe computers: With the RS-232 interface port, the Terminal makes it possible to communicate directly with other personal, business and other computers. Take the Terminal to school and connect to the school's computer when the proper cabling is provided. Or, take the HT-1011 to work and access your company's mainframe computer.

Additional features: Compact 7" by 15" Terminal fits into large briefcases and weighs less than 4½ lbs.

ZT-1-2, Terminal Carrying Case, Shpg. wt. 2 lbs. 24.99

ZTA-1-1, Parallel Cable, for MX-80A printer, 1 lb. 25.00

ZVM-121, Optional Monochrome Video Display, for use with HTXs and ZTXs (see chart at left). Features: 25 lines by 80 characters, green phosphor CRT, high-resolution 12" screen, 18 lbs. 139.95

HTX-10-1, Auto-dial and auto-answer 300 baud modem for models HTX-10 and ZTX-10 Terminals, Shpg. wt. 1 lb. 69.95

SAVE \$20 – purchase a ZVM-121 with a ZT-1

Model	Video Monitor?	Parallel Printer Port?	9600 Baud RS-232C Serial Port	300 Baud Modem?	Programmable One-Key Access?	Shpg. Wt.	SAVER PRICE
Heathkit Kit HT-10	YES	YES	YES	NO	YES	36 lbs.	\$399.00
Heathkit Kit HTX-10	NO	YES	YES	NO	YES	10 lbs.	\$279.00
Heathkit Kit HT-1011	YES	YES	YES	YES	YES	44 lbs.	\$449.00
ZVM-121 ZT-1-U, Assem.	YES	YES	NO	YES	YES	32 lbs.	\$549.00
ZVM-121 ZTX-1-U, Assem.	NO	YES	NO	YES	YES	6 lbs.	\$449.00
ZVM-121 ZT-10, Assem.	YES	YES	YES	NO	YES	32 lbs.	\$499.00
ZVM-121 ZTX-10, Assem.	NO	YES	YES	NO	YES	6 lbs.	\$399.00
ZVM-121 ZT-11, Assem.	YES	YES	YES	YES	YES	32 lbs.	\$579.00
ZVM-121 ZTX-11, Assem.	NO	YES	YES	YES	YES	6 lbs.	\$479.00

ATTENTION H/Z-19 OWNERS: Convert your Smart Video Terminal into an H-89 All-In-One Computer

HS-19-10 Conversion System: Gain the advantages of a complete computer system by expanding your H- or Z-19 into a disk-based H-89 All-In-One Microcomputer. Instead of accessing a computer system, turn your Terminal into a powerful Computer capable of running all Heath/Zenith 8-bit software (p. 74-77). The System includes all of the following components.

H-19-3 Conversion Kit: Includes a wired Z-80 CPU circuit board with 16K bytes of RAM, a wired cassette interface board, and a power supply board. Also includes hardware and mounting brackets for the remaining additions.

HA-88-3 3-Port Serial Interface: Allows you to add a printer, modem, or other peripherals to your converted H/Z-19.

Two H-88-2 16K RAM Expansion Sets: Brings RAM of the converted H/Z-19 up to 48K bytes. This extra RAM is required to support the disk-based operating systems and other software the Computer will be using.

H-88-1 Hard-Sectored Floppy Disk Controller Board: Controls the H-17-1 disk drive which is part of the H/Z-19 expansion and controls data storage.

H-17-1 Single-Sided 5.25" Floppy Disk Drive: Stores up to 100 kilobytes of data on a hard-sectored, single-sided floppy diskette.

Free software: Choose any three of these programs; HDOS or CP/M; Microsoft BASIC Interpreter; Compiler: FORTRAN; COBOL; Magic Wand; or SuperCalc.

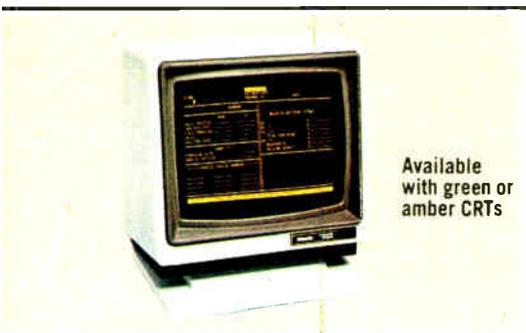
HS-19-10, H/Z-19 Conversion System, Shpg. wt. 62 lbs. 995.00



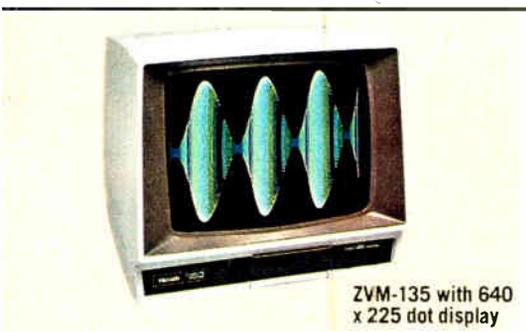
Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

Add outstanding video performance with these new monitors to just about any personal computer



Available
with green or
amber CRTs



ZVM-135 with 640
x 225 dot display



High-quality and high-resolution Monochrome Video Display

• Receive performance comparable with monitors selling for much more

Sharp display: A special deflection system and a green or amber CRT, provides this monitor with a display that is very easy to read and very easy on your eyes. A 12-inch diagonal screen shows up to 25 lines containing 80 characters each.

Improved character detail: Designed with a 15 MHz bandwidth, the ZVM-122 has a rise time of 40 nanoseconds for improved character definition.

Easily adjustable: Conveniently, all screen adjustments are externally located. An external 40 80

switch permits you to select a desired 40- or 80-character display width.

ZVM-122, Assembled and tested with amber CRT, Shpg. wt. 18 lbs. **169.95**

ZVM-123, Assembled and tested with green CRT, Shpg. wt. 18 lbs. **139.95**

ZVM-123-2, Tilt Base for both ZVM-122 and ZVM-123, Shpg. wt. 2 'lbs. **15.00**

ZVM-121-1, Cable to connect ZVM-121/122/123 to IBM Computer, 1 lb. **5.00**

ZVM-121-2, Cable to connect ZVM-121/122/123 with Commodore, TI, and Atari, 1 lb. **15.00**



Two quality 13" color monitors for your personal computer

• Both monitors have sound circuits with externally adjustable volume controls

The **ZVM-131** and the **ZVM-135**; have a composite video and RGB direct drive inputs, a custom composite video processing IC that provides true color reproduction, and have a switch that changes the display to green for a more legible text display. The ZVM-131 has a medium resolution 25 line by 40 character display (390 x 250 pixel resolution) which is very good for computer systems with medium resolution video outputs. The ZVM-135 has a 25 line by 80 character display (640 x 250). Perfect for use with your H Z-100 series computer. And with the purchase of a ZVM-135, choose any one of the listed cables free.

ZVM-131, Assembled, medium-resolution monitor, Shpg. wt. 38 lbs. **379.00**

ZVM-135, Assembled high-resolution monitor, Shpg. wt. 39 lbs. **599.00**

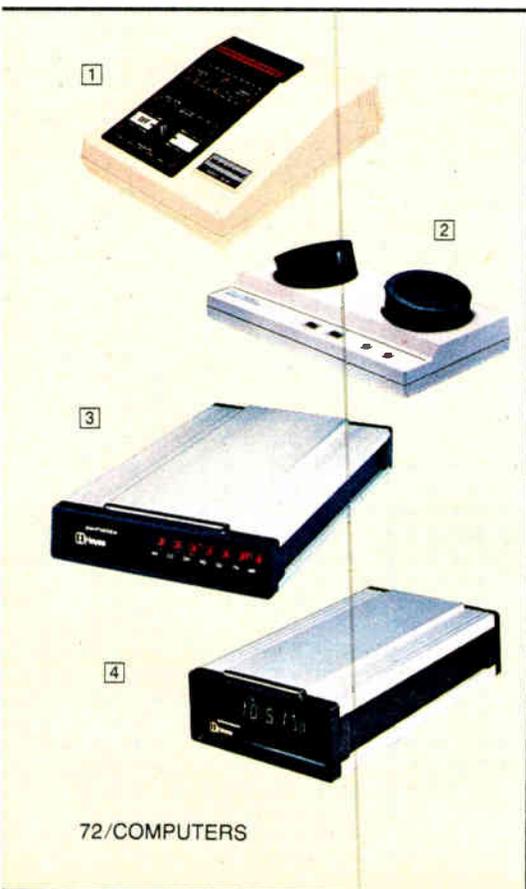
ZVM-135-1, Cable for ZVM-135 to H/Z-100 Series Computer, Shpg. wt. 1 lb. **25.00**

ZVM-135-2, Cable for ZVM-135 to IBM Personal Computer, Shpg. wt. 1 lb. **25.00**

ZVM-135-3, Cable for ZVM-131/135 to Apple III Computer, Shpg. wt. 1 lb. **25.00**

ZVM-135-4, Cable for ZVM-131/135 to TI 99/4, Commodore 64 and Vic-20, and Atari 400 1200 1400, Shpg. wt. 1 lb. **25.00**

Use these convenient accessories and peripherals to expand the capabilities of your computer



1 Direct-connect modem

Quality and value: The Muraphone MM-100 is our lowest-cost direct-connect modem. It's a full-duplex modem that sends and receives at 300 baud which is compatible with most time-share systems. And, it can operate as a remote or host by selecting either the originate or answer mode from a front panel switch.

A phone-to-modem cable and an AC adapter is included with the WH-63. To connect the modem to RS-232 interfaces to terminals and computers, an HCA-11 Cable is required. CPS software is also recommended for use with computers.

WH-63, Assembled and tested, 3 lbs. **99.00**

HCA-11, RS-232 Male to Female Cable for connecting WH-63 to computers, 1 lb. **20.00**

2 Convenient data communications

Ideal for any phone: The Lexicon LEX-11 is an economical, stand-alone acoustic modem. This FSK (frequency shift keying) device can operate in half-duplex and full-duplex modes and is compatible with the Bell System 103A modem.

Self-test features: An originate test and an answer test verifies that the LEX-11 is operating correctly. Power and Ready LEDs also show that modem is ready to send and receive data.

Included with the WH-23 is a UL and CSA approved AC Adapter which provides power for the modem. The modem does require an HCA-11 Cable and CPS software is recommended for use with a computer.

WH-23, Assembled and tested, 3 lbs. **139.00**

HCA-11, RS-232 Cable, 1 lb. **20.00**

3 Telecomputing systems by Hayes

300- and 1200-baud models: Both Hayes Smartmodems dial, answer, and disconnect calls automatically. The lower-priced 300-baud model is ideal for low-volume data transfers while the 1200-baud model readily handles longer distance and larger volumes of data. Both work with any computer that has an RS-232 I/O port.

Each Smartmodem comes with a 120 VAC adapter and a modem-phone line. An HCA-11 is needed for connecting modems to a computer. Computerized Phone System software is recommended.

WH-43, Assembled 300-baud modem, 3 lbs. **279.00**

WH-53, Assembled 1200-baud, 4 lbs. **695.00**

HCA-11, RS-232 Male to Female Cable for WH-43/53 to computer, Shpg. wt. 1 lb. **20.00**

4 Accurate computer time-keeper

Calendar/clock system: Now you can add accurate time-keeping capability to your computer system. The Hayes Chronograph connects to any RS-232 compatible computer system and automatically reports the year, month, day, day of the week, hours, minutes, and seconds.

Other features: Large, easy-to-read display shows time in 12- or 24-hour format plus the day of the week. And the time, which is quartz-crystal controlled for accuracy, is available immediately when your computer is turned on. That's because the Chronograph is independently powered and backed up by three "AA" batteries (not included) to prevent loss of time during a power failure.

WH-42, Assembled and tested, 4 lbs. **199.00**



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.

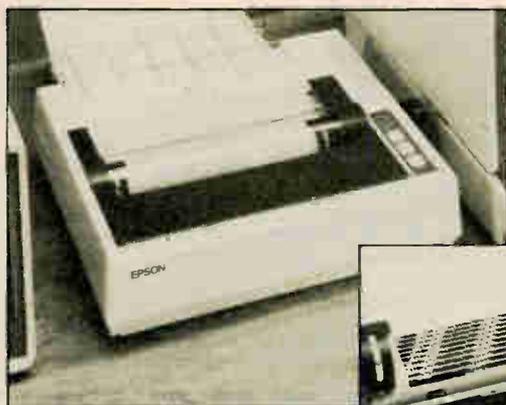
Features variable pitch (10, 12, 13.2, or 16.5 characters per inch): This allows the 125 to print up to 222 characters per line (at 16.5 cpi on a 13.5-inch wide line). Six or eight lines per inch vertical spacing is available. Horizontal and vertical tabs are adjustable.

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.



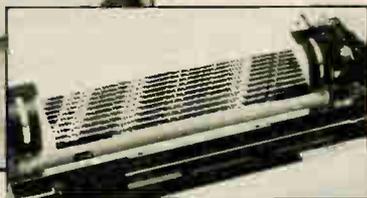
Features "Paper-out" indicator, "jammed" indicator and self-testing capabilities. For 120/240 VAC, 50/60 Hz power. Measures 8½" H x 26½" W x 18½" D.

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
HCA-9, Printer Stand for H-125, Shpg. wt. 21 lbs.	99.00



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 12 additional line graphics.

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 serially with H/Z-89 or H/Z-100 via MX-80-3 4 (needs HCA-10 Cable below). Standard Centronics style interface for H/Z-100 parallel use (needs HCA-20 below or HT-10 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
HCA-14, 10-Foot Parallel Cable, Shpg. wt. 1 lb.	25.00
ZTA-1-1, Printer Cable, Shpg. wt. 2 lbs.	25.00
HCA-20, H/Z-100 to MX-80 Parallel 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-54A 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-54A, Assembled Printer, Shpg. wt. 70 lbs., Motor Freight 1999.00



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

The Heathkit Online Catalog

The Heathkit Online Catalog is now available through CompuServe™ one of the largest consumer timesharing systems in the country.

The CompuServe Information System allows users across the country to access a wide variety of services using a terminal or computer modem over ordinary phone lines. In most cases with a local call. CompuServe also offers many areas of service, interest, information and fun.

The Heathkit Online Catalog is a menu-driven system that allows you to browse our 17 major product categories that make up the over 400 kits in the Heathkit line. While not intended to replace the printed catalog you're holding, you have instant electronic access bargains, specials and new products without waiting on the postman. You can even place your order online using your Visa, MasterCard or Heath Revolving Charge.

If you already subscribe to the CompuServe system, you can access the Heathkit Online Catalog by typing **GO HTH** at any '!' prompt or 'OK' prompt on the system.

If you're a member of the Heath Users' Group (see below), HUG has a starter package for CP/M or HDOS systems that includes a CompuServe ID password and terminal software to get you online immediately.

Or call CompuServe at 800-848-8199 (in Ohio, 614-457-0802).

The Heathkit Online Catalog brings American high-tech home. It's like your own direct line to Benton Harbor!

CompuServe is a registered trademark of CompuServe Inc. An H&R Block Company.



Join HUG and a nation-wide network of Huggies

With a HUG membership, you join thousands of other Heath computer owners who are kept informed of new products and of more uses for your computer. You gain access to over 700 low-cost pro-

grams. You receive a one-year subscription to the monthly REMark magazine. You can participate in REMark's interactive forum with other members and use an on-line bulletin board via CompuServe.



Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085.

Yes, I want to become a member of HUG and keep up to date on the latest Heath/Zenith computer developments, while I expand my software library.

I've enclosed \$_____ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Annual Rates:	U.S.	Canada/Mexico	International
New Members:	\$18	\$20	\$28
Renewal:	\$15	\$17	\$22

Name _____ 863

Address _____

City _____ State _____ Zip _____

Country _____

Signature _____

A HUG membership gives you access to over 700 low-cost programs in its software library. The constantly expanding library consists of user-submitted utility and applications programs which are continually updated. Some program examples include HDOS to CP/M utility, home budget and checkbook, inventory, vocabulary practice, weather forecasting, music, and games. You receive a HUG software library catalog that describes the complete library by name, description, language, version, hardware and software required to run the program and the HUG author.

Included with your membership is the exclusive REMark magazine which you'll receive monthly. In it you'll be kept informed of new Heath Zenith computer products. You'll be kept in touch with other members through REMark's open forum. Here members share hardware modifications, improvements to software programs and ideas on other computer topics.

Another exclusive is access to the HUG Bulletin Board. With a HUG membership, a modem program and a CompuServe time-sharing membership, you can receive the latest news on Heath Zenith computer developments and HUG activities seven days a week.

Also receive a HUG Handbook and an official HUG identification Card.

You'll find a HUG application enclosed with each Heath computer. A fully-assembled Z-89 comes with a free one-year HUG membership application.

MICROSOFT SOFTWARE SUBLICENSE GRANT FORM

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

- Microsoft BASIC Compiler Microsoft BASIC Interpreter
 Microsoft COBOL Microsoft FORTRAN
 Microsoft MACRO-80

HEATH of Benton Harbor, MI, for itself and on behalf of the licensors listed above (referred to individually or together as LICENSOR) grants to CUSTOMER a non-transferrable and non-exclusive Sublicense to use the software programs checked by CUSTOMER above (referred to individually or together as SOFTWARE), under the terms and conditions stated in this Sublicense Grant.

CUSTOMER hereby agrees to either accept, sign and return the license agreements enclosed with each software product; or, if those terms are not accepted, to return the product for a full refund with the sealed media packets unopened.

SOFTWARE is furnished to CUSTOMER for use only on a single CPU, and may be modified or copied (with the inclusion of LICENSOR'S copyright notice) only for use on said CPU. CUSTOMERS shall not provide or otherwise make SOFTWARE, or any portion thereof, available in any form to any third party without the prior

written approval of LICENSOR. LICENSOR retains title to the ownership of SOFTWARE at all times. LICENSOR AND HEATH JOINTLY AND SEVERALLY DISCLAIM ALL IMPLIED WARRANTIES WITH REGARD TO THE SOFTWARE LICENSED HEREUNDER, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Any stated express warranties are in lieu of all obligations or liability on the part of either LICENSOR or HEATH for damages, including but not limited to: special, indirect or consequential damages arising out of or in connection with the use or performance of SOFTWARE licensed hereunder.

This Sublicense Grant, the Licenses granted hereunder and the SOFTWARE may not be assigned by the CUSTOMER without prior written consent from LICENSOR. No right to reprint or copy SOFTWARE, in whole or in part, is granted hereby, except as otherwise provided herein, or in the license agreement enclosed with the product.

HEATH COMPANY
BY _____

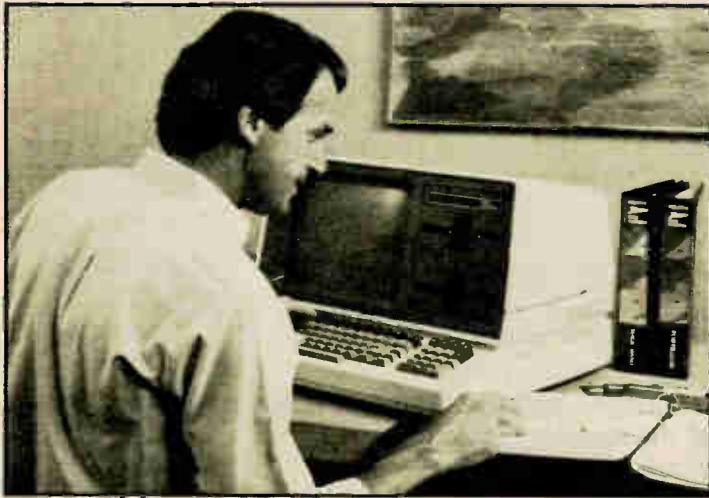
Jay H. Janett

863

ACCEPTED AND AGREED:
CUSTOMER'S SIGNATURE _____

DATE _____

Heath's wide range of software meets a variety of needs at home and in the office



OPERATING SYSTEMS SOFTWARE

Industry-standard CP/M®-80 2.2 8-bit Operating System – the world's most popular operating system

- Allows access to the largest collection and assortment of applications software in existence
- Provides common hardware interfacing with flexible manipulation of software programming

Universal: CP/M is a control program for microcomputers that ties together many computers with a wide range of peripherals. It is used by businesses, manufacturers, distributors and over 100,000 computer users plus many software developers and authors. Because of its popularity, there are more languages, utilities and applications software available under CP/M than any other disk operating system.

File and disk management: With computer systems using an Intel 8080 or Zilog Z-80 CPUs, CP/M provides a general environment for program construction, storage, and editing, along with assembly and checkout facilities. CP/M provides rapid access to programs through a comprehensive file management system package. Under CP/M, all files are named for easier location and can be accessed randomly or sequentially without the loss of disk space. Using CP/M file systems, distinct programs can be stored in both source and machine executable form.

Alterable: CP/M can be easily tailored to use any peripherals in an 8080 or Z-80 based computer system. The BIOS, or Basic Input/Output System, provides the operations necessary to access disk drives and interface standard peripherals. The BDOS, or Basic Disk Operating System, has the entry points which includes operations such as SEARCH, OPEN, CLOSE, RENAME, READ, WRITE and SELECT which can be accessed through programs.

CP/M utilities: Included with CP/M is a two-pass 8080 assembler, a general-purpose editor, an advanced 8080 debugger with traced execution and disassembly, file dump, system generation/relocation and file size/disk usage displays. With CP/M, you can also set file attribution (read only and or systems), assign physical/logical devices, display system parameters, copy files and convert Intel HEX files into memory images.

Hardware requirements and support: An H/Z-89 or Z-90 with 48K of random access memory (RAM) is required. One disk drive is also required, but, two drives are recommended. CP/M-80 supports the H/WH-17, H/Z-37, H/Z-47, Z-67 and the H-77/Z-87 Disk Systems.

Documentation: Included with the CP/M operating system is a 300-page operating manual. It details the implementation of the operating system, explains its operation, and shows how to adapt it to your computer system.

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

CP/M is a registered trademark of Digital Research, Inc.

Heath offers many software solutions to your everyday problems. And, since there's never a single answer to all problems, Heath has a wide variety of software solutions. There's a choice of operating systems, CP/M, Z-00S, and HDOS, all of which meet the needs of the sophisticated and the beginning user. Also available are interpreters, compilers and programming languages for home, hobby, scientific and business-oriented computer users.

Other solutions include a variety of business software programs, like electronic spreadsheets designed to save time and increase efficiency. Then there is word processing to increase office productivity. And, since different office requirements vary, several word processing packages are offered to help remove errors and relieve frustrations. By becoming a member of HUG (page 74), many personalized programs are available through its 700 program software library to take care of specific problems.

Whether for the H/Z-100, H/Z-89, or the Z-90, these software solutions are easy to use and many are menu-driven with plain-English commands. And easy-to-understand documentation comes with the software. Fully indexed texts make it easy to locate specific information and many include glossaries and appendices of useful information.

All software packages are subjected to a series of stringent tests and are fully tested under real conditions to ensure user satisfaction. Should a problem occur, there's a nationwide network of Heathkit Electronic Centers (see page 16) with help that's only a phone call away. Factory assistance is also available, see page 48 for the Heath Assistance Phone Directory.

HDOS – Heath Disk Operating System – a sophisticated library of programs for microcomputer control

- Designed to control the versatile H/Z-89 All-in-One Computer
- Includes many functions found in larger operating systems
- Efficiently uses memory and disk space

Sophisticated system: HDOS provides everything required for program construction, editing and storage. With its ability to recognize and report all command and reference errors, HDOS saves programmer time and reduces mistakes while helping to prevent unintentional loss of valuable data.

Efficient file and disk management: Using a named-file structure that allows random and sequential access, HDOS optimizes allocation and file management to efficiently use memory and disk space. To conserve program space and reduce repetitive instructions, drivers for directory devices reside on disk. To conserve memory space, HDOS utilizes an overlaying capability which amounts to using available memory for more than one purpose. HDOS automatically transfers unused program segments on a temporary basis and then brings them back when the space is no longer required.

Built-in languages: Included with HDOS is Extended Benton Harbor BASIC. It is an easy-to-use BASIC programming language that uses simple, conversational statements and familiar math equations. It features strings and files, six digit accuracy, logic operations, and conditional statements. Also built-in is ASM Assembly Language. It is a two-pass 8080 assembler with a cross-reference feature. This feature assembles source programs into listings and object programs, in an executable binary format.

Utilities: Seventeen built-in commands list the contents, boot and dismount disks; copy, rename and delete files; run programs, set dates, select drive options, execute PIP, and display status reports. Other built-in utilities test disk drives and disk media; initialize disks and generate system images onto disks; copy programs on single drive systems; and allow you to debug programs and edit text.

Hardware requirements and support: HDOS requires an H/Z-89 Computer with a minimum of 48K RAM and one disk drive. Two disk drives are recommended which makes for easier file copying. HDOS supports all Heath/Zenith disk systems except the Z-67 Winchester Disk System.

Documentation: Accompanying HDOS is a comprehensive operating systems manual, an excellent programmer's guide and diagnostic software.

HOS-817-1, on hard-sectored 5.25" disk, Shpg. wt. 9 lbs. 150.00

H/Z-100 operating systems are described in detail on page 66. Other 16-bit software for the H/Z-100 as well as the expanded ETA-100 Learning Computer is found on page 66. New 16-bit business software can be found on page 78.

PLANNING/MODELING SOFTWARE

Multiplan—a personal productivity tool that will help you analyze data for business and personal uses

- A sophisticated electronic spreadsheet, Multiplan offers multiple and linked worksheets, extensive formatting and sorting capabilities, on-line reference guide and plain-English prompts.

An electronic worksheet: Replacing pen, paper and calculator, Multiplan allows your H/Z-100 to do all your calculations for you. Multiplan remembers the relationship between entries (which can be words, numbers, or formulas) and automatically performs calculations across your worksheet. Change a number and watch the effects. With this powerful modeling and planning tool, you can budget a small company, make major sales decisions, analyze product planning, plan personal investments, put together a family budget and do much, much more.

Impressive features: Overcoming the limitations of paper worksheets, Multiplan displays a worksheet 255 rows long and 60 columns wide. Connect several worksheets into a chain that will transfer information to each other. With ease, move, insert, or remove data. Eliminate costly and tiresome reworking by instantly widening or shrinking columns, or inserting or deleting a space.

Other flexible features: A sort command lets you arrange entries either alphabetically or numerically with multiple sorts possible. The worksheet can be formatted with titles centered, or right- or left-justified. And, text can be aligned to the left and numbers on the right.

Documentation: Multiplan comes with a two-volume set of manuals. Volume 1 gives an overview of Multiplan and uses a tutorial format with simple steps and practical examples. Volume 2 is a detailed reference guide to all Multiplan features. A comprehensive glossary, index and quick reference guide can be found at the end of the volumes.

Hardware and software requirements: When using Multiplan, your H/Z-100, requires two high-capacity disk drives and the Z-DOS operating system (p. 66). If a hard copy printout is desired, a printer is also needed.

MS-463-7, on soft-sectored 5.25" disk, Shpg. wt. 6 lbs. 250.00

SuperCalc—a powerful electronic spreadsheet for budgeting, estimating and financial forecasting

Time and energy saver: Manipulate data quicker for in-depth analysis and modeling. Examine and alter numbers and text on a worksheet that covers 63 columns and 254 rows. Designed for maximum power with minimum command use.

Hardware and software requirements: With an H/Z-89 or Z-90, 48K of RAM is required along with one disk drive and CP/M[®]-80 (p. 75). Used on H/Z-100 series computers, one disk drive and Z-DOS (p. 66) is required.

HSC-817-1, on hard-sectored 5.25" disk for H/Z-89, uses CP/M, 2 lbs. . . 195.00

HSC-837-1, on soft-sectored 5.25" disk for Z-90, uses CP/M, 2 lbs. 195.00

SuperCalc is a trademark of Sorcim Corp.
CP/M is a registered trademark of Digital Research, Inc.

WORD PROCESSING SOFTWARE

Word processing allows you to create perfect documents and letters in a fraction of the time it would take with a typewriter. However, writing requirements vary and call for different solutions. Heath/Zenith offers two solutions, WordStar and Magic Wand, for your office or home needs.

WordStar—a sophisticated yet simple to use word processor that's very easy for beginners

Versatile word processing system: WordStar permits you to create and format text any way you desire. Move paragraphs around and merge them with paragraphs from other documents. What you create on the screen is exactly what you will get printed. Most formatting functions take place immediately on the screen before your eyes. Additional formatting is done as your document is printed out. WordStar features powerful editing commands, word wrap, dynamic page break display, and decimal tab among other text formatting capabilities.

User friendly: User-selectable help screens in four levels gives you the amount of help you desire when you want it. Additional help is provided by a reference card that quickly reminds you of all WordStar commands.

Enhanced WordStar for the H/Z-100: Version 3.2 (below) of WordStar uses color: text in green, help messages in yellow and spelling errors in red.

Documentation: WordStar's one-volume manual fully explains all commands and screen displays plus printing functions and error messages. Printer installation is outlined along with specific printer examples.

Hardware and software requirements: When used on an H/Z-89 or Z-90, WordStar requires 48K of RAM and two disk drives. The CP/M-80 operating system (p. 75) is used. The H/Z-100 also uses two disk drives but requires Z-DOS on page 66. For printouts, a WH-54A printer (p. 73) is recommended.

HMP-817-2, Version 2.26 on hard-sectored 5.25" disk for H/Z-89 using CP/M-80, Shpg. wt. 2 lbs. 395.00

HMP-837-2, Version 2.26 on soft-sectored 5.25" disk for Z-90 using CP/M-80, Shpg. wt. 4 lbs. 395.00

MP-463-7, Version 3.21 on soft-sectored 5.25" disk for H/Z-100 Series Computers using Z-DOS, Shpg. wt. 5 lbs. 399.00

MailMerge—enhance WordStar with mailing list and file merging capabilities

Personalized letters from form letters: Combine data from one file into a second file, even in mid paragraph, and create form letters containing personal salutations, information and closings. The result—a personalized letter. Paragraphs are automatically reformed as data is merged.

Added capability: Merge personalized letters with mailing lists. Print multiples of the same file or one file after the other. Print a file residing within a file for up to eight levels. And, printout raw data.

Hardware and software requirements: The H/Z-89 and Z-90 computers require 48K RAM and CP/M (p. 75). The H/Z-100 requires Z-DOS (p. 66). All computers need two disk drives, an appropriate WordStar disk and a printer. A letter quality printer, like the WH-54A (p. 73), is recommended.

HMP-817-3, Version 2.26 on hard-sectored 5.25" disk for H/Z-89 using CP/M-80, Shpg. wt. 4 lbs. 135.00

HMP-837-3, Version 2.26 on soft-sectored 5.25" disk for Z-90 using CP/M-80, Shpg. wt. 4 lbs. 135.00

MP-463-8, Version 3.21 on soft-sectored 5.25" disk for H/Z-100 Series Computers with Z-DOS, Shpg. wt. 5 lbs. 139.00

Magic Wand—turns your computer into a powerful and flexible word processor

Versatile and powerful: A comprehensive range of text handling functions and easy-to-use single-stroke key commands make Magic Wand an excellent word-processor choice. And, its low price also makes it attractive. To handle your word processing, Magic Wand uses two modes. The creating and editing of documents is done in the EDIT mode, while outputs are taken care of in the PRINT mode.

EDIT mode: In addition to forward and reverse scrolling, one-key commands send the cursor to the beginning of the line being edited, top of the screen, or the top or bottom of the entire text being edited. For more convenient editing, deletions can be made by character, line or block. While additions are made using either character or full insertion. Search and repeat-search commands quickly locate desired points in the text. To speed up the correction of misspelled words or the creation of personalized documents, a search and replace command is available.

PRINT mode: Set your print requirements with commands from the keyboard when you want a printout or put them in when you are creating or editing a document. You have complete control over margins, page length, indentations, left- or right justification, hyphens and line spacing. Depending on your printer, you can add an underscore, overstrikes and more.

Documentation: Included with a master Magic Wand disk is an extensive user's manual. It takes users through a step-by-step instructional program of the word processor at their own speed. Set-up and operating instructions and a glossary are also found in the manual.

Hardware and software requirements: Magic Wand can be run on an H/Z-89 Computer equipped with 48K of RAM (random access memory) and one 5.25" disk drive. CP/M-80 Operating System (p. 75) is also required. For letter quality printouts, a printer like the WH-54A (p. 73) is needed.

HRS-817-9, hard-sectored 5.25" disk for H/Z-89 with CP/M-80, 3 lbs. . . 295.00

HRS-837-9, soft-sectored 5.25" disk for Z-90 with CP/M-80, 4 lbs. 295.00



Magic Spell – isolates spelling and typographical errors in Magic Wand Documents

Spelling checker: Magic Spell looks through documents and compares each word to an internal dictionary to verify their correctness. Each page of a document takes only seconds to check and to inform you of an incorrectly spelled word. Typically, a 20-page document takes less than a minute.

Dictionary: Besides its standard 20,000 word English-usage dictionary, Magic Spell can contain other dictionaries of your choice. This allows you to customize a dictionary for your particular needs. The size of a dictionary (or dictionaries) is limited only by your available disk space. A dictionary can contain foreign words, specialized words, or words associated with a particular profession such as law, medicine, science, and so on. Dictionaries can also be easily added and deleted.

Easy-to-use: All Magic Spell features can be requested from a simple menu. And many help displays are available at any time with one keystroke.

Documentation: The accompanying Magic Spell manual presents an overview of the proofreaders features and teaches its use in a series of step-by-step lessons. Detailed explanations of each function are included in the manual along with appendices, glossary and index.

Hardware and software requirements: Magic Spell can be used on an H/Z-89 or a Z-90 equipped for double-density, double-sided disk storage. Both computers must have at least 48K of RAM and one disk drive (more than one drive is desirable). Hard copy printouts require a printer. Uses CP/M[®].

HIS-837-1, on soft-sectored 5.25" disk, used with CP/M-80, 4 lbs. **295.00**



PROGRAMMING LANGUAGES

Heath/Zenith offers a number of programming languages that allows you to write your own specialized programs to fit your particular needs. Easy-to-read documentation supplied with each language makes the writing and the running of your program go easier than you might think.

Microsoft BASIC Interpreter – a versatile language

- Many enhancements make this general-purpose BASIC more powerful and versatile than many other BASIC languages

Popular and powerful: Scores of utility and applications programs are written in BASIC-80 because it's easy to use and has features that make a micro perform like a mainframe computer. An IF-THEN-ELSE control structure allows highly-structured programming. Plus, access to CPU ports and memory locations.

Hardware and software requirements: The appropriate versions of the Microsoft BASIC Interpreter listed below can be used with either an H/Z-89 or a Z-90. HDOS or CP/M is required (indicated below) as is 48K of RAM and one disk drive. The Sublicense Grant on page 74 is also required.

For further study: See Microsoft BASIC programming course EC-1110 (p. 81).

HMS-817-1, Vers. 5.21 on hard-sectored 5.25" disk for CP/M, 5 lbs. **175.00**

HMS-837-1, Vers. 5.21 on soft-sectored 5.25" disk for CP/M, 4 lbs. **175.00**

H-8-21, Version 4.82 on hard-sectored 5.25" disk for HDOS, 3 lbs. **150.00**

Microsoft FORTRAN – scientific programming power

- Allows users to execute powerful scientific, mathematical, and engineering problem-solving programs

Popular science programming language: This language includes all the features of ANSI FORTRAN X3.9-1966, except for the COMPLEX data type. It features the popular FORTRAN-80 Compiler, a MACRO-80 Relocating Assembler, Cross-Reference Generator for sorting, and a LINK-80 Linkage Editor.

Hardware and software requirements: An H/Z-89 or Z-90 with 48K RAM, two disk drives, and HDOS or CP/M as indicated below. With an H/Z-100, two drives and Z-DOS. Sublicense Grant (p. 74) is required for all models except for H/Z-100.

For further study: See EC-1101 FORTRAN Language Course on page 81.

HMS-817-2, Version 3.4 on hard-sectored 5.25" disk for CP/M, 5 lbs. ... **195.00**

HMS-837-2, Version 3.4 on soft-sectored 5.25" disk for CP/M, 4 lbs. **195.00**

H-8-20, Version 3.35 on hard-sectored 5.25" disk for HDOS, 4 lbs. **175.00**

MS-463-2, FORTRAN-86 on soft-sectored 5.25" disk using Z-DOS for use on H/Z-100 Series Computers, Shpg. wt. 4 lbs. **195.00**

COBOL-80 – powerful, business-oriented language

Ideal for processing business data: COBOL provides the tools to meet the rising challenge of information processing. Like, the powerful use of disk files, CRT screen handling, long variable names and readable programs.

Hardware and software requirements: The H/Z-89 and Z-90 requires 48K RAM, two disk drives and HDOS or CP/M as listed below. The H/Z-100 needs two disk drives and Z-DOS. Sublicense Grant on page 74 is required for 8-bit versions.

For further study: See EC-1105 COBOL Language Programming Course (p. 80).

HMS-817-31, Vers. 4.0 on hard-sectored 5.25" disk for HDOS, 4 lbs. ... **395.00**

HMS-837-31, Vers. 4.0 on soft-sectored 5.25" disk for HDOS, 4 lbs. ... **395.00**

HMS-817-3, Vers. 4.0 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. ... **395.00**

HMS-837-3, Vers. 4.0 on soft-sectored 5.25" disk for CP/M-80, 4 lbs. ... **395.00**

MS-463-3, COBOL-86 on soft-sectored 5.25" disk for H/Z-100 Series Computers using Z-DOS, Shpg. wt. 3 lbs. **395.00**

Microsoft BASIC Compiler – executes programs faster

Single-pass compiler: Increases the execution speed of your programs by converting BASIC programs into machine code...the language of your computer.

Hardware and software requirements: H/Z-89 and Z-90 needs 48K RAM, two disk drives and HDOS or CP/M as listed below. H/Z-100 Computers also require two drives and Z-DOS. A Sublicense Grant on page 74 is required for 8-bit versions.

HMS-817-41, Vers. 5.23 on hard-sectored 5.25" disk for HDOS, 5 lbs. ... **250.00**

HMS-837-41, Vers. 5.23 on soft-sectored 5.25" disk for HDOS, 5 lbs. ... **250.00**

HMS-817-4, Vers. 5.23 on hard-sectored 5.25" disk for CP/M, 4 lbs. ... **250.00**

HMS-837-4, Vers. 5.23 on soft-sectored 5.25" disk for CP/M, 4 lbs. ... **250.00**

MS-463-4, BASIC Compiler-86 on soft-sectored 5.25" disk using Z-DOS on H/Z-100 Series Computers, Shpg. wt. 3 lbs. **250.00**

MACRO-80 Assembly Language – fast-running programs

Complete Assembly Language programming package: Has big computer features without sacrificing speed or memory space. Built-in utility LINK-80 converts relocatable libraries or modules into runnable load modules for direct execution or disk storage. CREF supplies an alphabetic list of all program variable names. LIB-80 lets you build libraries of relocatable modules.

Hardware and software requirements: Needs H/Z-89 or Z-90 with 48K of RAM, or H/Z-100, one disk drive (two drives are recommended). HDOS or CP/M Operating System and the Sublicense Grant on page 74.

For further study: See EC-1108 Assembly Language Course on page 79.

HMS-817-51, on hard-sectored 5.25" disk for HDOS, Shpg. wt. 2 lbs. ... **65.00**

HMS-817-52, on soft-sectored 5.25" disk for HDOS, Shpg. wt. 2 lbs. **65.00**

HMS-837-51, on hard-sectored 5.25" disk for CP/M, Shpg. wt. 4 lbs. **65.00**

HMS-837-52, on soft-sectored 5.25" disk for CP/M, Shpg. wt. 3 lbs. **65.00**

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

HCS-70, Hard-sectored, single-sided, 100KB 5.25" Disks for H-17-1 Drives/H-88-1 Controller, Shpg. wt. 1 lb. **Package of ten, 40.00**

HCS-66, SS, single-sided, double-density, 48 TPI, 160KB 5.25" Disk for H-17-1/H-17-5 Drives/Z-89-37 Controller, 1 lb. ... **Package of ten, 45.00**

HCS-71, Soft-sectored double-sided, double-density, 48 TPI, 320KB 5.25" Disks for HZ-100, H/Z-89 with Z-89-37 Controller and H-17-5 Drives, and WH-8-37, Shpg. wt. 1 lb. **Package of ten, 50.00**

HCS-68, Soft-sectored, double-sided, double-density, 96 TPI, 640KB 5.25" Disks for H/Z-89 with H-17-5 Drives and Z-89-37 Controller or H-8/WH-8-37 and H-17-5 Drives, 1 lb. **Package of ten, 55.00**

HCS-69, Soft-sectored, single-sided, single-density, IBM 3740 format, 250KB 8" Disks for 8" Drives, 2 lbs. **Package of ten, 55.00**

HCS-64, Soft-sectored, single-sided, double-density, 500KB 8" Disks for Heath/Zenith 8" Drives, 2 lbs. **Package of ten, 60.00**

HCS-65, Soft-sectored, double-sided, double-density, 1MB 8" Disks for Heath/Zenith 8" Drives, 2 lbs. **Package of ten, 70.00**

New problem-solving business software that's ready to run on your H/Z-100 Series Computer

Take a firmer control of your business and run it more efficiently and effectively with seven new H/Z-100 software programs.



Two Condor® electronic filing systems for your needs



Both the Condor Relational Data Base Management and File Manager systems enable you to design and create data bases for keeping records on any subjects you choose. With Condor, you can quickly search, sort, merge, analyze, and print out records. Both Condor Systems use a relational data base concept allowing unrelated information to be interactively related. As an introduction to Condor, tutorial lessons are included with each program that tells you what to do and how to do it. A handy reference guide details all Condor commands. Each System is supplied on two H/Z-100 compatible disks.

Condor Relational Data Base Management (rDBMS)

Powerful yet easy to use: Condor rDBMS can process up to 32,767 records per data base with up to 1023 bytes in a record. Still, a new user can achieve results in several hours with Condor's easy-to-use program.

Special features: Besides the features found in Condor's FMS System below, rDBMS can create unique records through its COMPARE and INDEX commands. It can quickly access information and efficiently update transactions to a master file. Condor's rDBMS can produce sophisticated reports in your own format and produce multi-data base relationships for easy comparisons.

Hardware and software requirements: To use the rDBMS System, an H/Z-100 Series Computer is required with two disk drives and a minimum of 128K RAM. The Z-DOS Operating System (p. 66) is used. A printer, preferably with form feed and form length control, is needed for hard copy printouts.

CD-463-1, on soft-sectored, double-sided, double-density, 5.25" disks using the Z-DOS Operating System, Shpg. wt. 4 lbs. **650.00**

Condor File Manager – traditional file management

Simplified information processing: The Condor File Management System (FMS) is a series of assembly language programs written to provide you with one of the fastest, easiest-to-use, and most powerful file data base management systems available. Great flexibility also allows FMS to offer many options.

Features: Create new data files in minutes without previous programming experience. Enter and change data files. Then sort, merge, analyze and print that data using English-like commands. With the STAX feature, display or printout the computed statistics of values within a data base. Maximize program efficiency and ease-of-use by creating your own Help menus and command files that speed up the processing and execution of tasks. When your business outgrows FMS, just step up to the more powerful rDBMS System (above).

Hardware and software requirements: Condor FMS requires an H/Z-100 Series Computer with two disk drives, at least 128K of RAM and the Z-DOS Operating System (p. 66). If a printout is desired, a line or character printer, preferably with form feed and form length control, is needed.

CD-463-2, on soft-sectored, double-sided, double-density, 5.25" disks using the Z-DOS Operating System, Shpg. wt. 4 lbs. **299.00**

Five Peachtree™ business programs for the H/Z-100



All of the Peachtree business programs below are easy to operate, produce broad-coverage reports, and are easily configured to meet your company's specific requirements. Each program displays easy-to-understand instructions and messages. This allows even the inexperienced user to use all of Peachtree's features in a minimum amount of instruction time. (Consultation with an accountant or data processing professional may be desirable.) And, less time is spent on rechecking procedures in the manual. The following five Peachtree business programs require an H/Z-100 Series Computer with a minimum of 192 K of RAM (random access memory), two disk drives and the Z-DOS Operating System (p. 66). Hard copy printouts require a printer having 132 print positions per line and at least 66 lines per page.

General Ledger System records financial transactions

Business application package: Allows you to maintain a complete picture of your company's business. It records all your accounts and transactions, limited only by your available disk storage space (approximately 500 accounts and 2,000 transactions per period). General Ledger can be used independently and together with other Peachtree accounting packages.

Available report printouts: Income statement, balance sheet, depreciation amortization schedule, accounts list, accounts report list and many more.

RS-463-1, Shpg. wt. 5 lbs. **399.00**

Accounts Receivable System keeps customer accounts

Complete invoicing system: Maintains a complete record for each of your customers. Each record includes customer's name, address, phone number, current balance, sales tax rate, credit limit, and other relevant information. Handles approximately 200 accounts and 800 transactions per month. Can be used with Peachtree General Ledger and Sales Invoicing.

Report printouts: Aged receivables, invoices, customer statements, sales tax summary, service charges, transactions, list customer, and others.

RS-463-2, Shpg. wt. 4 lbs. **399.00**

Accounts Payable System supplies instant information

Helps control outgoing cash flow: Maintains a complete file for each vendor and helps determine which invoices to pay by due date, specified discount data or according to certain cash requirements. Prints checks with a detailed check stub listing all paid invoices. The Accounts Payable System can be used by itself or with the Peachtree General Ledger.

Reports provided: Cash requirements, ageing, open invoice, transaction register, check register, examine vendor status, list vendor and others.

RS-463-3, Shpg. wt. 4 lbs. **399.00**

Inventory Control for better inventory recordkeeping

Speeds and simplifies inventory management: Provides a straightforward method of updating inventory records for detailed control over all aspects of your inventory operations. You benefit from improved inventory control, reduced dollar investment in inventory management and decreased response time to your customers. Works with Accounts Receivable and Sales Invoicing.

Reports generated: Inventory status, reorder, physical inventory, inventory price list, sales by inventory, sales per period/year and more.

RS-463-5, Shpg. wt. 4 lbs. **499.00**

Sales Invoicing bridges Peachtree accounts packages

Subsystem bridge: The Sales Invoicing System provides you with the capability to access and update both the Accounts Receivable and Inventory Control data files at the same time. Sales Invoicing allows you to update customer accounts with sale or return information, update your inventory with the sold or returned stock items, and keeps this data for printing invoices or credit memos. Displays warning messages when an order exceeds the inventory stock or when an invoice exceeds a customer's credit limits.

Report printouts: A report on back-ordered items broken down by invoice and an activity report that lists quantities shipped and back-ordered.

RS-463-6, Shpg. wt. 4 lbs. **299.00**

Condor is a registered trademark of Condor Computer Corp.
Peachtree is a trademark of Peachtree Software Inc.

Program your computer more efficiently with this Assembly Language Self-Instruction Course

\$49⁹⁵



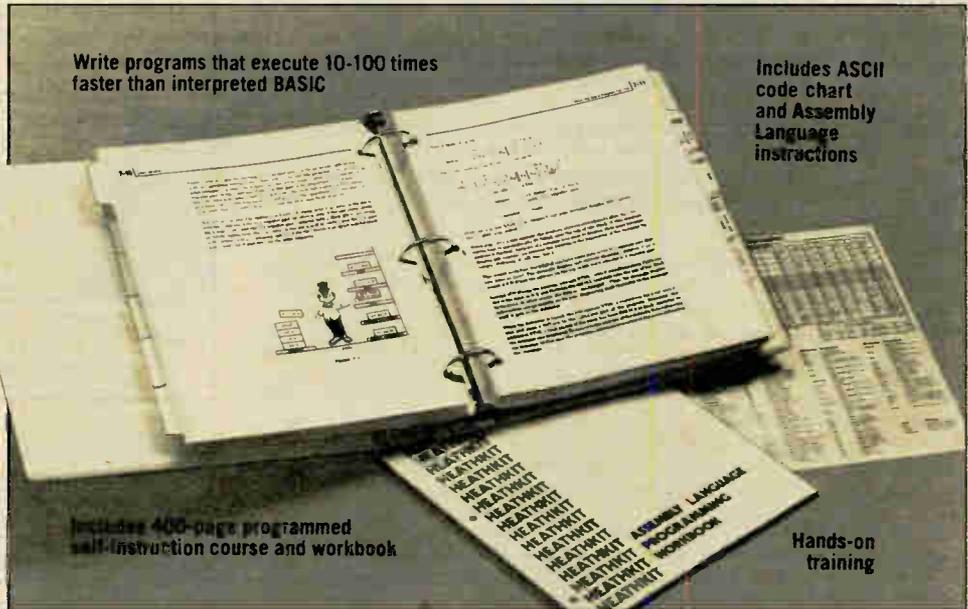
- Learn to communicate with your computer in a convenient low-level language
- Learn to write faster, more efficient computer programs with Assembly Language
- Clear text illustrates Assembly programming for better understanding of material
- Self-instruction course allows you to learn material at your 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.



Write programs that execute 10-100 times faster than interpreted BASIC

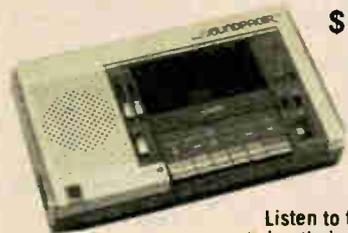
Includes ASCII code chart and Assembly Language instructions

Includes 400-page programmed self-instruction course and workbook

Hands-on training

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 speed of playback is adjustable between 80% and 200% 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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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.

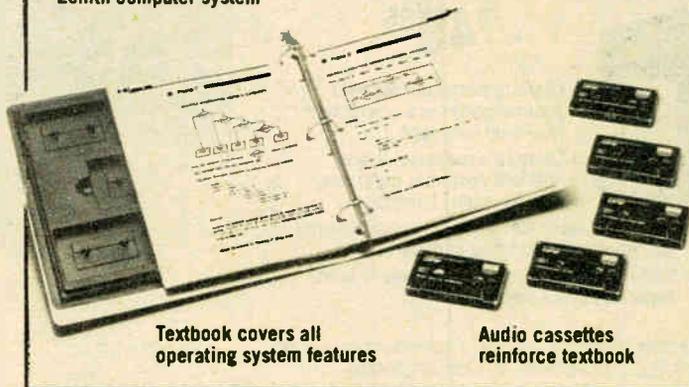
Learn the language of business: To receive the greatest possible benefit from the Heathkit/Zenith COBOL Educational Course, we suggest that you use an H-8 Computer/H-19 Video Terminal System, an H/Z-89 Computer or a Z-90 Computer. The system should be equipped with 48K bytes of RAM, two disk drives, the CP/M-80 Operating System (page 75) and the Microsoft COBOL Programming System (page 77). COBOL can also be used with the H/Z-100 (p. 77).

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

80/COMPUTER EDUCATION

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 44.

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:

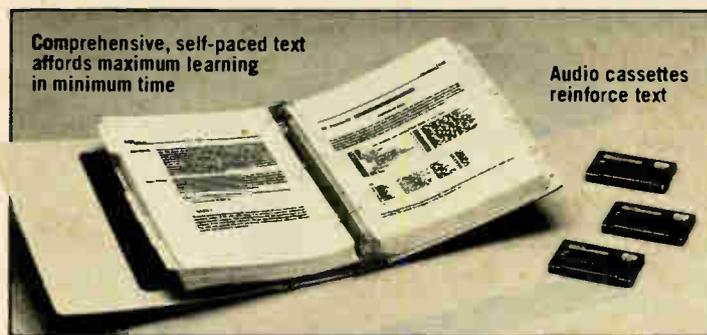
Unit 1 is an Introduction to Computers and Programming — covering computers, programs, data, the computer system and programming languages. **Immediate Mode, Unit 2, discusses arithmetic in BASIC, numeric variables, intrinsic functions and strings.** Sequences, branching and loops are covered in **Unit 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 77) 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-

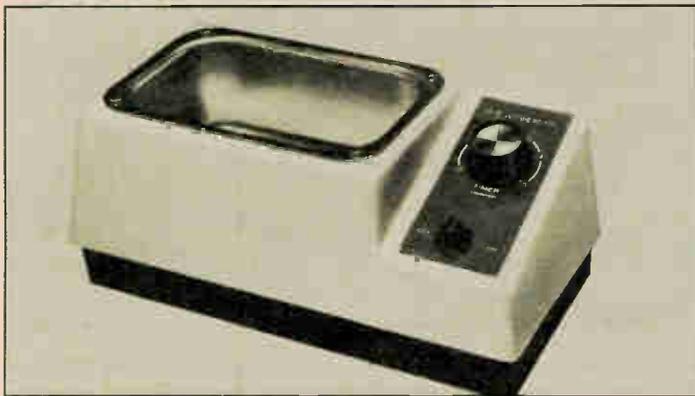
puter-related words and phrases, along with complete definitions. Definitions are made clear and explicit throughout the text.

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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



Ultra-efficient Ultrasonic Cleaner purges dirt

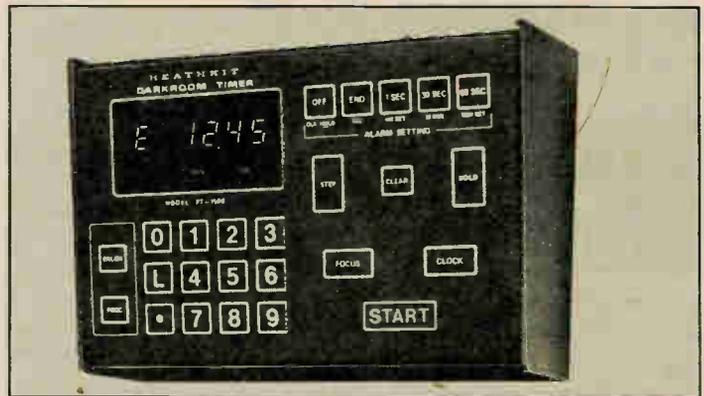
\$119⁹⁵

- 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 $\frac{1}{8}$ " 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**



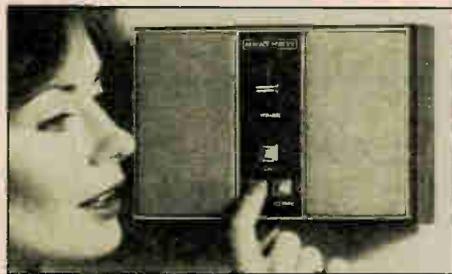
Start getting consistent film developing quality

\$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 $\frac{3}{8}$ " H x 3" W x 5 $\frac{3}{4}$ " D.

Kit GD-1114, 3 lbs. each station **49.95**

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



FAST, EASY
1-EVENING KIT

\$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**

82/HOME PRODUCTS



Credit Card Orders Call TOLL-FREE: 800-253-0570

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 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 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**

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**

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 3/4" H x 5 7/8" W x 1 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!

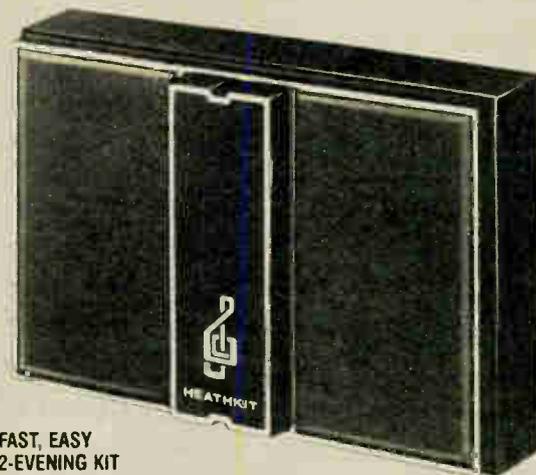
Kit TD-2089, Shpg. wt. 1 lb. **WAS \$24.95, NOW ONLY 19.95**

Water-resistant platform of burled-grain vinyl stands up to hard daily use

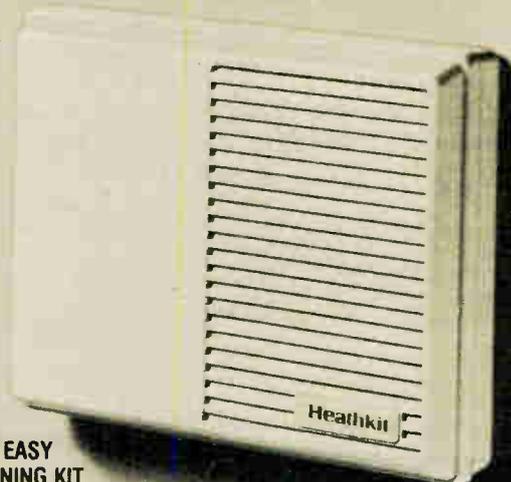
Four bright 1/2" LEDs display your weight accurately year after year

Sturdy die-cast aluminum base holds scale rock-steady

Weigh very small packages accurately to one-tenth of a pound or kg.



FAST, EASY
2-EVENING KIT



FAST, EASY
1-EVENING KIT



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

LAST CALL — these heirloom-quality fine furniture values won't last long during the Heath Craft Woodworks' INVENTORY CLOSE-OUT 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. Many favorites — 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. *Magnificent!*

Kit F-2530, 203 lbs. Was \$895, NOW 795.00

2 SAVE 50% and more on three-instrument Desktop 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 49.95

Kit F-2534-H, with hygrometer, 6 lbs. NOW 39.95

3 SAVE 50% 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. Measures 77½" H x 40" W x 15" D (same as China Cabinet).

Kit F-2526-R, 182 lbs. Was \$549.95, NOW 275.00

4 Value-priced Oak Schoolhouse Clock makes a nostalgic addition to any room

This antique beauty takes you back in time to turn-of-the-century schoolrooms. Has an eight-day West German brass keywound clock movement with adjustable brass pendulum bob, plus resonant spiral gong chime for hour and half-hour. Features oak cabinet, octagonal dial ring, polished convex dial glass and enameled metal dial face with Arabic numerals. Preassembled dial frame and pendulum box door with "Regulator"-inscribed glass window make this an easy, one weekend kit.

Kit F-2531, 25 lbs. Was \$129.95, NOW 99.95

5 SAVE 65% on 18th-Century Bachelor's Chest in mahogany Chippendale style

Warm mahogany exterior woods with dove-tailed oak drawers, finely-detailed decorative bead moulding and authentic drawer pulls. A practical beauty for display in dining room or den — stores table linens, silverware, personal possessions — even has a pull-out serving or writing surface.

Kit F-2544, 124 lbs. Was \$599.95, NOW 199.95

6 SAVE 60% on Queen Anne Tea Table and serve refreshments gracefully

Features preassembled four-piece top made of rare book-matched crotch mahogany. Has traditional pull-out sides and cabriole legs ending in art nouveau 'spoon' feet. Perfect height for gracious serving to guests and family. 28" H x 16¼" W x 34" L.

Kit F-2555, 39 lbs. Was \$379.95, NOW 149.95

7 SAVE 45% on this Oak China Cabinet and display your fine collectibles

Has durable ¼" plate glass shelves with plate grooves. Solid oak construction with end frames, cornice and muntin door preassembled. Lockable.

Kit F-2526-C No longer available

8 SAVE 65% 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 69.95

SAVE EVEN MORE on these Heath Craft Woodworks furniture kits from the Heath Craft Catalog No. 403...NOW MARKED BELOW COST FOR INVENTORY CLEARANCE!

Call now — quantities are limited!

Solid Oak Arm Chair has smooth steam-bent arms, lumbar support, with a deep pressback pattern.
Kit F-2503, 29 lbs. 129.95

Solid Oak Side Chair has full saddle-carved seat, pressback pattern and comfortable lumbar support, too.
Kit F-2504, 26 lbs. 99.95

Mahogany & Brass Butler Table has graceful fold-up leaves, crotch-wood book-and-butt preassembled top.
Kit F-2540 No longer available

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.
Kit F-2502 No longer available

Oak Hall Mirror has beveled plate glass, brass-railed shelf and two coat hooks. 17" H x 36" W x 3" D.
Kit F-2506, 19 lbs. 59.95

Oak Book Rest supports large tome at comfortable viewing angle on four winding rope-turn legs.
Kit 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 contoured saddle seat.
Kit F-2510. No longer available

Solid Oak Oval Mirror mounts horizontally or vertically. 20" x 30"
Kit F-2514, 25 lbs. 29.95

Honduras Mahogany Serving Tray is a replica of 18th-century classic. Easy, enjoyable 1-evening kit.
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.
Kit F-2570, 48 lbs. 79.95

Shaker Desk Stool has 12 dowel-jointed cherry rails, woven seat.
Kit F-2572, 11 lbs. 29.95

Shaker Message Board has a cork tackboard, slate blackboard, plus tray for holding chalk and tacks.
Kit F-2573, 6 lbs. 19.95

Shaker Wall Shelf completes this authentic cherry group; has three pegs, two shelves. Very useful.
Kit F-2574, 6 lbs. 19.95

Brass & Glass Square Cocktail Table with ¾" plate glass measures perfect 16" H x 38" W x 38" L.
Kit F-2525, 125 lbs. mtr. frt. 149.95

Brass & Glass Rectangular Cocktail Table has same hand-buffed brass, and legs ending in graceful cabriole foot. Measures 16" H x 24" W x 48" L.
Kit F-2521. No longer available

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.
Kit 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.
Kit F-2511, 25 lbs. 69.95

Early American Oak Candlesticks accepts all standard size candles; makes a perfect gift at Christmas.
Kit F-2587-K, 2 lbs. 9.95

Imported Mahogany Candlesticks of same Early American design.
Kit 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!
Kit F-2588 No longer available

All kits include everything you need: manual, precut parts, hardware, glue and sandpaper!

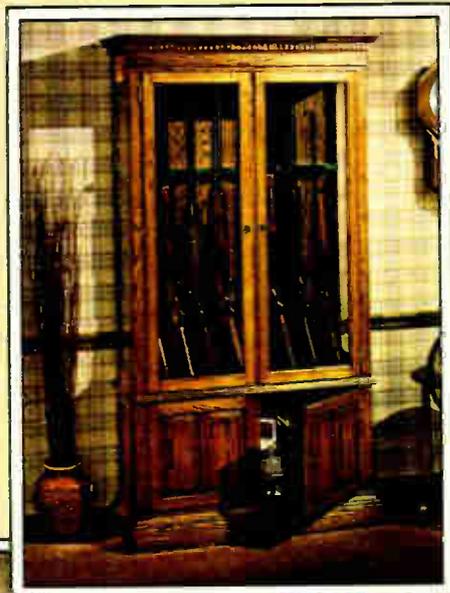




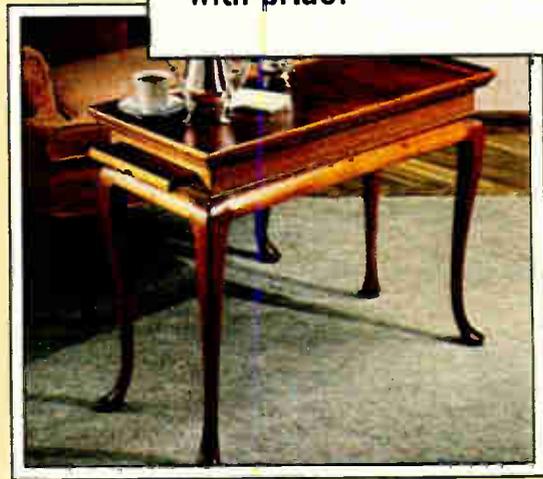
1



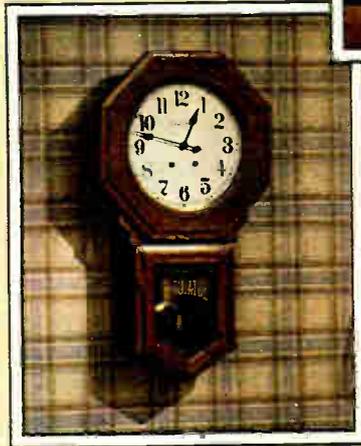
2



3



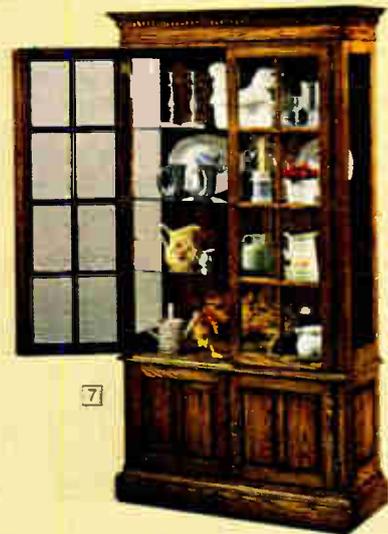
6



4



5



7

This Christmas, give
a hand-built heirloom
of treasured beauty...



you can craft
with pride!



Natural Finish (on Oak)
Kit F-2599-2, Medium,
No longer available.



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

LIMITED QUANTITIES/ORDER NOW!

Our specially-formulated paste stains and varnishes go on 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!



8



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

HEATH CRAFT WOODWORKS/85

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 Preamp provides complete audio signal control

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

Our infinitely versatile Deluxe Preamp provides 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, Oak-finished Cabinet, 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.



**8 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

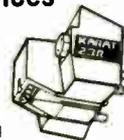


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

One of the world's very finest audio pickup devices

Dynavecator 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 Dynavecator 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



AR-1250 Digital FM Stereo Receiver has the virtuosity to create great musical moments

30 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.009% T.H.D. FROM 20-20,000 HZ

\$349⁹⁵

- An array of exceptional specifications; more watts per dollar, with high 2.5 dB (53 watt) dynamic headroom
- The advanced technology of our separates (below) in a single slim chassis, with a multitude of versatile features
- A four-evening kit of uncompromising value and design

Bring the joy of stereo music appreciation into someone's life this Christmas. Introduce them to endless hours of self-enrichment with a gift of audio art in kit form from you and Heath. Like the AR-1250 FM Stereo Receiver. It offers the source fidelity, stereo control and clean power for listening ingenuity that every audio enthusiast wants for maximum musical pleasure.

Our veteran Pro-Series division designed this medium-power Receiver to include all the most-desired features which improve total reproduction quality. Their encyclopedic background produced a sound investment to build with pride. A beauty to behold, its *performance* will impress everyone who listens to enjoy.

The action starts with a bright green digital readout, bargraph displays of instantaneous signal strength and power output level, exact LED center-tune and stereo locking indication. You have a wealth of signal control: High- and Low-cut Filters as well as Bass and Treble controls shape the sound; adjustable FM Muting silences interstation hiss; Tone Flat yields smooth response and uncolored recordings; Loudness boosts the low frequencies; Mono narrows perspective, while Volume and Balance vary with your mood. Three source switches route signal input for infinitely creative output.

What emerges is proof that our precision design has met its goal. Like excellent FM sensitivity and vast 45 dB separation. Delayed turn-on speaker protection from deadly transient 'thumps.' Tympanic bass and crisp, ethereal highs that deliver an uncanny new reality in musical presence and stereo dimensionality. Almost unlimited system potential. Plus an ultra-low distortion spec and plenty of pulse-pounding power to excite your airspace.

AR-1250 provides the versatility to expand with up to four speakers, AM and Dolby FM Noise Reduction Modules, two tape decks with full monitor capability, auxiliary sources (like TV), headphones, a turntable, power amp,



equalizer, etc. You're invited to press the power switch at a nearby Heathkit Electronic Center and experience instant aural gratification. Take one home and share the exclusive pride of handcrafted achievement. With such an extraordinary Receiver value available to the kitbuilder - why settle for anything less? Get yours now! And hear *more* of what you listen for.

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

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

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

SPECIFICATIONS: FM SECTION: Mono/Stereo: Usable Sensitivity: 1.9 (10.8)/3.5(16.1) μ V (dBf). 50 dB Sensitivity: 3.5 (16.1)/38 (36.8) μ V (dBf). S/N Ratio: 70/65 dB. Hum and Noise: 65 dB. Harmonic Distortion: 0.15/0.3%. Frequency Response: 30 to 15 kHz @ \pm 1.5 dB. PREAMPLIFIER: Frequency Response: 20-20 kHz @ \pm 0.5 dB Phono, 20-20 kHz @ \pm 0.3 dB Aux. THD and IMD (2 V out): 0.009%. Input Sensitivity (0.5 V out): 1.25 mV Phono, 100 mV Aux. Input Overload: 150 mV Phono, 10 V Aux. S/N: 75 dB Phono, 85 dB Aux. AMPLIFIER IMD: 0.012%. TIM: <0.02%. Frequency Response: 20-20 kHz @ \pm 0.2 dB. 1 kHz Separation: 50 dB. A-Weighted S/N: 95 dB. Power: 120 VAC/60 Hz. Antenna Connections: 300 & 75 ohm. Convenience Outlets: 1 switched, 1 unswitched (200 W max.). Dimensions: 17" W x 4.5" H x 15.25" D. *TM Dolby Labs, Inc.



Integrated Amplifier combines fidelity with ability

\$249⁹⁵

30 WATTS, MIN. RMS, PER CHANNEL INTO 8 OHMS WITH < 0.009% T.H.D. FROM 20-20,000 HZ

- The most adaptable amplifier in its class, with design features of a high-power amp at a mid-power price

There's no need to sacrifice important, audio-improving ingredients if you buy performance-matched 'separates' for stereo listening. This efficient amplifier has same AMP/PREAMP specifications as the AR-1250 Receiver, and many more advanced pre-amp features to please the discerning audio architect. These include a continuously variable loudness control, high and low filters with dual turnover points, switchable tone controls at 2.5 or 5 kHz treble and 250 or 500 Hz bass, LED bargraphs for left and right channel output indication, plus inputs for one tuner, two phono, two tape and two auxiliary sources. These matched separates each measure 4 3/8" H x 14 7/8" W x 13" D.

Kit AA-1205, Shpg. wt. 18 lbs. **249.95**



Matching Stereo FM Tuner has far-reaching sensitivity

\$199⁹⁵

- Sharp 36.8 dBf stereo (50 dB Quieting, IHF 1975) sensitivity pulls in weak and distant stations
- Dual ceramic filters give 52 dB selectivity for picking out desirable signals in the crowded FM band

Critical listeners agree that a dependable Tuner can dramatically improve your world of music. In the AJ-1200, you get the high-performance, low-cost Tuner you want. All frequencies are displayed digitally. Mute-actuated AFC makes tuning quick and crisp. Three LEDs indicate center-tune clearly, and a five-LED bargraph shows signal strength. A front panel Multipath pushbutton helps set the best antenna orientation. These elements and specifications spell outstanding separation, negligible noise and inaudible distortion. Expand your aural horizons to new heights - these kits make beautiful music better!

Kit AJ-1200, Shpg. wt. 14 lbs. **199.95**

Kit AJA-1600-2, Dolby FM Module, Shpg. wt. 1 lb. **54.95**

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



Hear all the audio detail in your collection with this unparalleled Four-Way Speaker System

- Capable of reproducing the vastly improved dynamic range of today's finest audiophile recordings; subwoofer extends deep-bass response down to 20 Hz auditory limit

If you want to enjoy the full impact of digitally-mastered and compact disc wide range recording breakthroughs, then Heath's nerve-tingling 4-Way Speaker Combination System will deliver amazingly high quality sound and pay back the utmost in listening pleasure for your money.

1 The AS-1321 3-Way Speaker Module features a 6.5" polypropylene midbass in a special sub-enclosure, a 2" soft dome Ferro-Fluid midrange and a planar leaf tweeter with super high frequency linearity. A new computer-aided, combined 4th order crossover design in the Module utilizes the low frequency rolloff of each driver and a matched 2nd order LC filter to eliminate distortion-causing phase error 'dropouts' to produce a silky smooth, natural response. Depth and lateral imaging will expand to enhance the realism and illusion of actually 'being there.' The rear panel has provisions for full range or bi-amplification, with drivers protected by an automatic circuit breaker which prevents thermal, excessive power input or transient signal damage.

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

SAVER! Kit AS-1324, 4-Way Speaker System. Includes AS-1321 3-Way Module and AS-1320 Subwoofer described below.

Shpg. wt. 208 lbs., Motor Freight 599.90

SAVER! Purchase a pair of AS-1324 Systems.

Kit AS-1324-2, 416 lbs., Motor Freight . . . 1149.80

2 The AS-1320 non-directional Subwoofer can be used singly or in pairs — and the cabinet can be expanded to a crowd-pleasing 4-Way System with the AS-1321 3-Way Module above. Heath's beautifully efficient Subwoofer vastly extends the low frequency range of your system. Its big 15" long-throw driver has a 2" four-layer aluminum voice coil to maintain a prolonged, *ultralow linear response*. The black cabinet — with a tuned, 6" floor-loaded vent and walnut stained decorative ash rails — uses high density materials to prevent annoying coloration of bass notes. Requires ASA-1320-1 Passive Crossover for optimum performance without a separate amplifier, or the Pro-Series AD-1702 Electronic Crossover when using a separate amp (see p. 86).

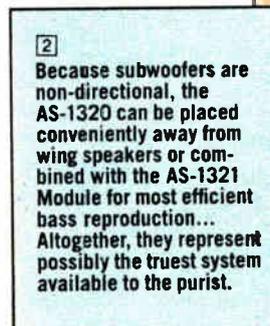
Kit AS-1320, Shpg. wt. 177 lbs., Motor Freight 319.95

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

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



1 The AS-1321 3-Way speaker module uses complimentary drivers to deliver coloration-free audio from 100-20,000 Hz for flat-spectrum sound reproduction, comparable in specifications to the very finest stereo music components available.



2 Because subwoofers are non-directional, the AS-1320 can be placed conveniently away from wing speakers or combined with the AS-1321 Module for most efficient bass reproduction... Altogether, they represent possibly the truest system available to the purist.



AS-1320 SPECIFICATIONS: Freq. Range (-10 dB anechoic): 15-750 Hz. Freq. Response (± 3 dB): 22-500 Hz. Impedance: 8 Ω . Minimum Amplifier Power: 30 W. Maximum Power: 250 W. Driver: High compliance, 15" long-throw design. Cabinet Type: Nine-cubic-foot vented box, tuned to 22 Hz using computer-aided modeling techniques. Cabinet Dimensions: 64½" H x 21½" W x 17" D.

AS-1321 SPECIFICATIONS: Frequency Range (-10 dB): 70 Hz to beyond 25,000 Hz; with AS-1320, 15 Hz to beyond 25,000 Hz. Frequency Response (-3 dB): 100-20,000 Hz; with AS-1320, 22-20,000 Hz. Midbass: Sealed in a baffle board sub-enclosure aligned at 100 Hz. Midrange: Ferro-Fluid damped voice coil for optimum transient response. Tweeter: Advanced-design planar leaf, optimally-damped for 4000 Hz resonance. Tweeter and Midrange Controls: Dual 2-position switches to provide -2 dB output boost or normal (flat) operation. Impedance: 6 Ω (4 ohms minimum). Recommended Amplifier Power: 30-250 watts per channel. Crossover Frequencies (-6 dB): 100, 600 and 4000 Hz. Sensitivity: 90 dB SPL. Module Dimensions: 17" H x 17½" W x 9" D.

A 3-Way System to please the most critical ear

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

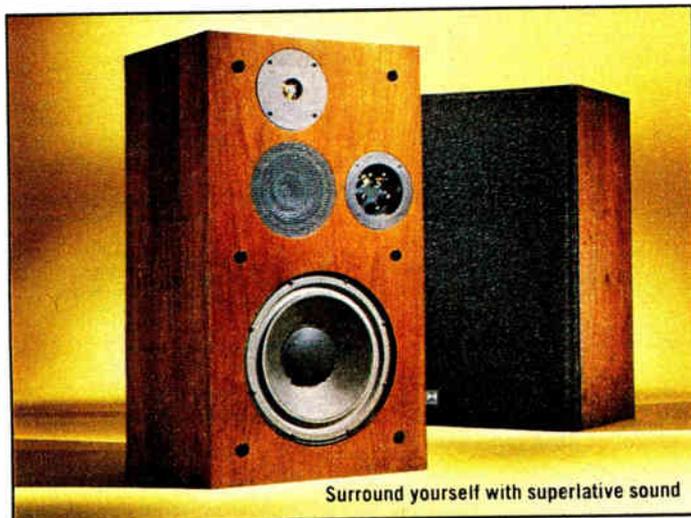
Compare the specs, and price of this outstanding floor/shelf system with any other — you'll see why this is our best selling pair. When you hear them you'll agree the stereo listening pleasure they offer is worth twice the price!

Designed for use with the best audio components, the 10" woofer provides gutsy, well-defined bass response, with a 500 Hz woofer/midrange crossover frequency to ensure smoothness and minimize intermodulation distortion. The 4½" midrange driver has a polyester-damped subenclosure to prevent woofer reflections, while a 1" dome tweeter exhibits excellent power handling.

Driven to sensational sound by as little as 10 watts, a higher-powered amplifier like the AA-1800 (p. 87) reveals their awesome dynamic range and three-dimensional clarity. Music will take on a new feeling. Two frequency controls optimize response for your listening area. Individual driver fuses provide full overload protection. Comes with assembled walnut veneer cabinet.

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

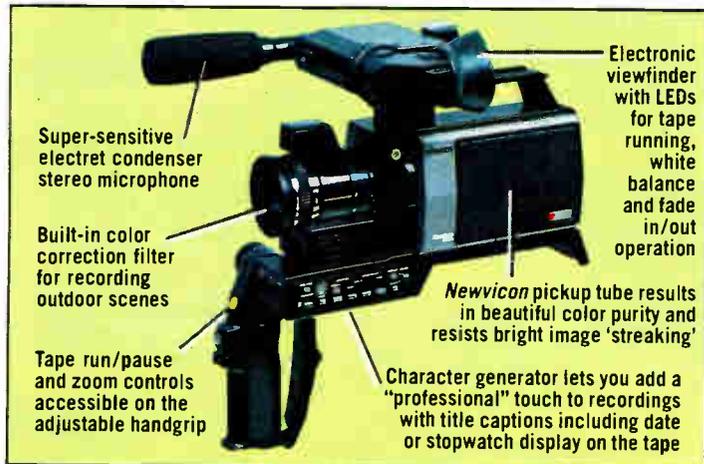
AS-1373 SPECIFICATIONS: Frequency Response (± 3 dB): 40-20,000 Hz. Maximum Power: 250 watts per channel. Crossover: 500 Hz (12 dB/octave) and 3000 Hz (12 dB/octave). Controls: 3 kHz switch, flat or 2.5 dB attenuation; 10 kHz switch, rolloff or flat. Dimensions: 26" H x 14½" W x 11½" D.



Surround yourself with superlative sound



Alaska, Hawaii and Michigan Residents: Call 616-982-3411



NEW Zenith auto-focus Color Video Camera is so advanced, directing is easy!

ONLY **\$1049⁹⁵**

- Infrared auto-focusing system eliminates guessing
- f1.6 lens with 8:1 variable-speed power/manual zoom adds excitement
- Superb low-light sensitivity down to 10 lux
- Connects directly to GDZ-9800 Portable VCR



Zenith's top-of-the-line Color Video Camera lets you be the best you can be! Producing the sophisticated look and feel of colorful quality home videomovies has never been so easy! Once you master all the features of this camera, you'll be able to achieve videotaped results that truly rival professional effects.

Surprisingly easy to use: The many features on the brand new GRZ-1810 only serve to make it more versatile—*not complicated*. Everything comes naturally thanks to the intelligent control layout. Many controls can be automatic...like iris control for proper exposure, white balance, color temperature and smooth fade in/fade out.

Full-featured (and then some): You also get brilliant color reproduction with excellent resolution, reversible-mount 1" electronic viewfinder, record/review for instant replay and in-camera editing, a backlight compensation switch, two color preference controls, left and right channel microphone inputs for remote audio recording, cursor-controlled 60-character computerized titling as you shoot, plus a power-saving standby mode for maximum battery conservation with a portable VCR and much, much more. When you consider the incredible number of high performance features built into this top-flight videocamera and its companion recorder-tuner pair at right, you can enjoy total flexibility in a fully integrated package that makes the new art of home video a *pleasure* to explore!

GRZ-1810, Shpg. wt. 8 lbs. 1049.95

GRZ-1810-1, Carry-all Camera Accessory Case, Shpg. wt. 2 lbs. 49.95



Two-in-one Home/Portable Video Director frees you to playback unlimited TV entertainment

- Quality performance in state-of-the-art Zenith Beta-video technology
- With the GRZ-1810 Newicon Camera at left, the lightweight, portable GDZ-9800 recording unit captures all your action indoors and out
- Matching Tuner/Timer converts portable to full-featured table model
- Infrared Remote Control operates all functions and effects wirelessly

Zenith's brilliant little portable VCR system is rated 'one of, if not the very best' by several independent testing laboratories and videophile magazines. At 11½ pounds, including cassette and optional battery pack, the versatile GDZ-9800 recording deck will travel anywhere you can to deliver flawless and fatigue-free Beta performance. Perfectly CLEAR frame-by-frame, stop action and multi-speed playback features let you study every aspect of a golf or tennis swing, the details of cinematic editing and the finest nuances of acting expression, virtually without interference. Teamed with the optional Tuner/Timer, it will automatically record from TV and put a multitude of exciting special effects at your fingertips. A 14-day, 4-event programmer gathers your favorite shows for later viewing.

GDZ-9800, Portable Video Recorder, 13 lbs. ... Was \$989.95, NOW ONLY 774.95

GDZ-9850, AC Tuner Timer and Remote (needed; or GDZ-9852), 10 lbs. ... 274.95

GDZ-9851, Rechargeable Battery Pack for 1 hr. of remote recording, 2 lbs. ... 49.95

GDZ-9852, AC Power Supply (needed if not using GDZ-9850), 7 lbs. ... 139.95

SAVER! Complete System — Includes GDZ-9800 Portable VCR, GDZ-9850 AC Tuner Timer and GRZ-1810 Color Camera. \$2099.85 separately.

GDZ-9800-2, 49 lbs. 1999.85

Zenith Video Tapes	Beta II	Beta III	Wt.	Price
GDZ-9700-5 (L-830)	3½ hrs.	5 hrs.	1 lb.	14.00
GDZ-9700-4 (L-750)	3 hrs.	4½ hrs.	1 lb.	12.00
GDZ-9700-3 (L-500)	2 hrs.	3 hrs.	1 lb.	10.00

Multi-purpose Mono Amplifier



3.25 WATTS, MINIMUM RMS INTO 8 OHMS WITH 1.5% T.H.D. 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, etc.) and amplifies it cleanly. Drives 8Ω speakers to surprising sound levels! Has speaker terminals, input jack, power switch, headphone jack, volume and tone controls in a walnut metal case. Fuse-protected for 120 or 240 VAC.

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

High-efficiency phono 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 memory turntable (right) at a system price.

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

Shure V-15 Type V with Dynamic Stabilizer has 10-28,000 Hz response, 3.2 mV output, >25 dB separation and 1.0-1.25 gm tracking force on a hyperelliptical nude diamond. Mfr's price: \$250.

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

AUDIOPHILES: Cash in on our valuable turntable/cartridge systems (at right, and on page 87).



Anti-resonant direct drive memorymatic turntable

- Straight, low-mass tubular tonearm

The Pro Series-compatible Onkyo CP-1130F turntable features two-speed, microcomputer-controlled fully automatic direct drive. Enjoy soft-touch control of Search, Cue, Memory Repeat and Play modes with ±3% variable pitch. Has 0.025% WRMS wow & flutter, >72 dB DIN-B s/n ratio and anti-skating.

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

SAVER! Onkyo CP-1130F turntable with Dynavector Ruby Cartridge described at left and on page 87.

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

SAVER! CP-1130F with Shure V-15 Type V, at left. ACS-1130B, Shpg. wt. 24 lbs. 429.90



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.

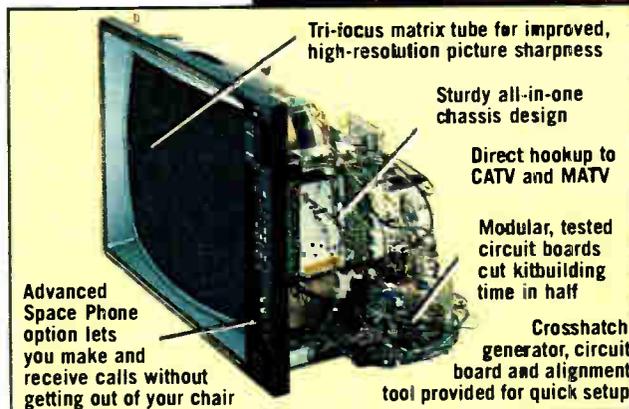
Like a chromatic control center in your TV set, the sophisticated *Color Sentry* combines 8 automatic picture and color sub-systems for magnificent viewing pleasure. It maintains accurate color level, tint and contrast — even adjusts the picture brightness as room lighting changes. One button does it 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

Remote Control operates Advanced Space Phone option



Display time, change channels and mute sound

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



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



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

TELEVISION/91

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 GR-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, 56-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.



Credit Card Orders Call TOLL-FREE: 800-253-0570

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

The GR-3000 has a multi-level video display: Think of it as five different, overlapping screens that can eclipse each other electronically. First is the standard Video Screen, containing whatever has been selected for typical family viewing. Second is the Backdrop Screen, which can be set to any of 16 colors including transparent, the only color which will not opaque the Video Screen. Third is the Pattern/Text Screen which displays the numerous graphic patterns built into the TV for alignment and test purposes, or the built-in Help messages and any messages you may create. Next is the 40-character Display Screen which functions with the Pattern Mode to configure the on-screen

information display and your own messages. The fifth, Computer-Generated Screen (not represented) will display text and graphics that are created on an external computer when tied to the forthcoming Serial Interface Module.

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

As your needs expand, so can your GR-3000 TV system: 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.

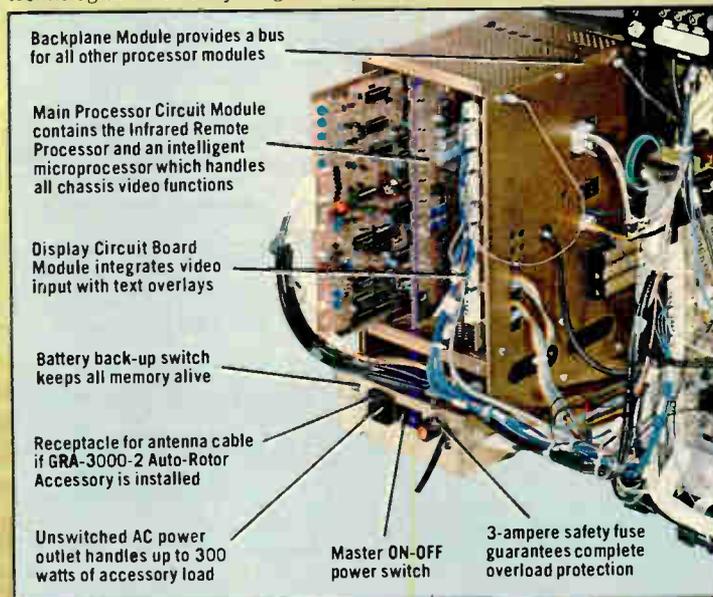
Directory Dialer & Modem Phone Interface Module — Enables the TV to act as a two-way speaker phone with multi-number memory capacity using the GR-3000 Remote Control. It provides auto-dial of frequently called numbers, plus auto-dial and modem connection for the Serial Interface.

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.



Rear panel auxiliary connections and controls. Slots will accept I/O ports used with future accessories.



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.

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

Kit GR-3000, 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.



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

World Radio History

TELEVISION/93

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



Simulated reception



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

\$59⁹⁵

- 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. 59.95
GSZ-4500, Assembled, Shpg. wt. 8 lbs. 69.95



NEW

Personal 13" color TV has a vivid, realistic picture and remote control!



It's the little TV with everything... even remote control! This Zenith 1984 model has a dynamic and life-like picture, plus American Walnut finish, polished nickel-gold color trim & pedestal base. Features quartz-electronic PLL tuning with AFC switch, remote control with mute, 157-channel cable-direct capability, LED channel display, Tri-Focus picture tube, foldaway handle and more! GRZ-1327, Assembled, 44 lbs. 379.95

Portable 9" TV has 3-way power



• Perma-Set VHF fine tuning

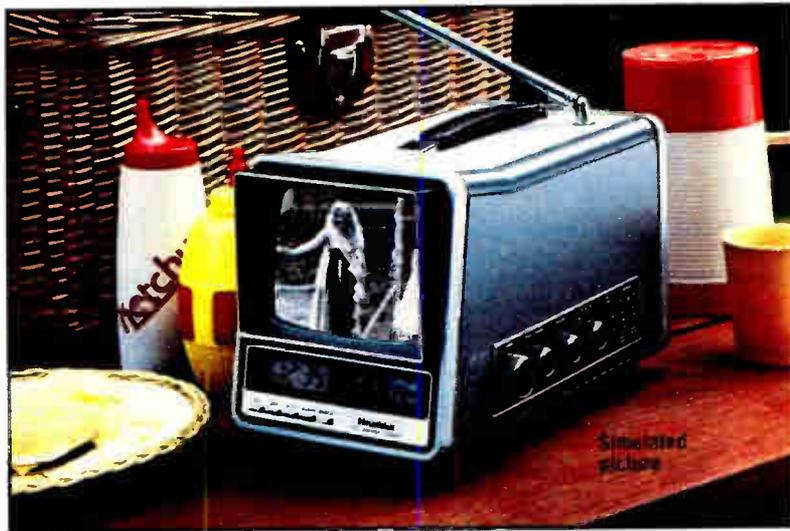
The *Jet Set* is a perfect take-along TV with a bright, sharply detailed black and white picture! Plays on 120 VAC, vehicle's 12 VDC power or optional NiCad Battery Pack below. Includes car adapter cord, earphone and detachable sunshield.

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



Entertain anywhere with the all-in-one media Explorer

Indoors or out, the fun-loving Explorer is your lightweight playmate! At home or on the go, it makes the good times last longer...



• Operates on four different types of power: AC house current, 12-volt DC battery systems, six 'D' batteries or a rechargeable battery pack

This go-anywhere, do-anything portable will keep you thoroughly entertained and informed on camp-outs, car trips and in every room of the house. It combines a 5" black and white TV, AM/FM radio and a programmable alarm clock together in one unit.

All 82 UHF and VHF channels are at your fingertips, plus the entire AM and FM (with AFC) radio spectrum. A no-wear electronic tuner and calibrated cylinder dial permits easy selection without drift.

A telescopic UHF/VHF/FM swivel antenna and internal Wavemagnet AM rod antenna pull in desirable signals for extremely clear audio and video reception.

With the LCD quartz digital clock, you can preset the alarm and 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 alarm rouses you, a Snooze button can pause each reminder for an extra 10 minutes.

Accessories included are a detachable AC power cube, private listening earphone and a DC car cord adapter for ease of use in almost any vehicle.

Other features: a dial light, 3½" hi-fidelity speaker, provision for 300-ohm external antenna, a built-in carrying handle and durable cabinet. The 7¼"H x 6"W x 11"D case weighs just 6 pounds without 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 turn on the fun!

Kit GR-5005, Shpg. wt. 14 lbs. 149.95

GRZ-5005, Assembled and tested, 9 lbs. ... 179.95

Rechargeable Battery Pack, for up to 4 hrs. of TV or 40 hrs. of radio enjoyment. Built-in safety circuit.

GRZ-5005-1, Assembled, 3 lbs. 19.95

SAVE as never before on these "last call" and clearance items if you act now!

LIMITED QUANTITIES

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.

Midland Cord-Free Portable Telephone. Excellent buy! Model 80-250 Long Range Duplex has up to 700 ft. working radius, two-way intercom, last number redial, touch-pulse operation, standby switch, branch jack and easy hookup. Includes 120 VAC recharging base unit, handsome dial-out & receive handset.

GDP-1340, Assembled, Shpg. wt. 6 lbs. Was \$149.95, NOW ONLY 99.95

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-hour periods, at times you select. Ideal for videotaping...No more forgetting your favorite shows! Requires that your GR-2001 has the GRA-601 on-screen digital clock option installed.

Kit GD-1185, Shpg. wt. 8 lbs. Originally \$174.95, NOW ONLY 99.95

Programmable Telephone Dialer/Directory. Microprocessor stores sixteen 15-digit numbers for fast, one-button dialing. Erasable label for programmed numbers. Touchtone keypad converts dial phones to easy pushbutton convenience.

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 VDC taps, fixed bias and 12.6 volt filament source. Extensive filtering and fine regulation.

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 up to 500 watts reflected. Factory calibrated sensor mounts in-cabinet or up to 4 feet away.

Kit HM-2140, Shpg. wt. 3 lbs. Originally 94.95, NOW ONLY 89.95

The original 'Cantenna' Dummy Load. Handles 1kW RF or 2kW PEP sideband tuneup power with less than 1.5 SWR to 400 MHz. Prevents QRM, safeguards your finals, and it's instantly portable! Isolated SO-239 coupling circuit provides DC voltage for monitoring relative output power. Oil not supplied.

Kit HN-31, Shpg. wt. 3 lbs. Originally \$24.95, NOW ONLY 19.95

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, 33 graphic symbols, reverse video by character and much MORE. Powerful capability — a real bargain at this 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.

More precise than quartz— the

Synchronized to the world atomic time standard, it's the one clock your friends will set *their* watches to!

Heathkit GC-1000 Most Accurate Clock



A fascinating new way to watch time unfold

If continuously accurate time of day is your requirement, the GC-1000 will provide it with no effort on your part. For scientific and everyday purposes, you won't find a more precise method of measuring time to 1/10 of a second ($\pm 10\text{mS}$)!

- The only clock under \$2,000 guaranteed to exhibit zero cumulative error
- Automatically sets itself by receipt of and synchronization to WWV time signal
- Has microprocessor-based correction factors for propagation distance delay
- Switchable Daylight Savings Time
- Optional RS-232C output for computer timekeeping (standard on wired unit)
- Displays local or Universal Coordinated Time in 12 or 24 hr. format and MORE!

Stay on the leading edge with Heath high technology...learn more about the space-age chronometer *you can build* on page 2!

The Heathkit Handy Index

AMATEUR RADIO: accessories, antennas, antenna tuners, license courses, novice aids, super-tech transceivers 10-19

AUTOMOTIVE: programmable musical horn, courses, garage door opener, wiper delay, car clock, tune-up equipment 20-23

CLOCKS: perfect timekeepers 2-3

COMPUTERS: accessories, courses, hardware, peripherals and 8 16-bit software 64-81

EDUCATION: amateur radio, 18-19; automotive, 23; classroom courses, 44; computers, 79-81; electronics, 28-44; fiber optics, 39; microprocessors, 36-89; advanced 16-bit microprocessors, 28-29; engineering circuit design, 40; robotics, 30-31

ENERGY: log splitter, power factor controller, heat sniffer, 3-speed ceiling fan 24-26

FURNITURE: easy-to-build Heath Craft Woodworks heirloom-quality kits 84-85

GENERAL INFORMATION: 48-49

HEATHKIT ELECTRONIC CENTERS*: addresses, phone numbers, new store opening 16

HOME PRODUCTS: air cleaners, 25; BSR X-10 home controller, 8; digital scale, 83; garage door opener, 22; intercom, 82; light switches, 7 and 26; radio, 7; telephone, 27; setback thermostat, 25; solar water heating system, 24; programmable doorbells, 83

INSTRUMENTS: chart recorder, frequency counters, generators, meters, probes, oscilloscopes, handheld testers, precision oscilloscope calibrator 51-63

MARINE: fish locators, speedometers, digital and chart recording depth sounders 46-47

METAL LOCATORS: right and left handed 45

NAME PLATE: solid brass engraving 46

NEW PRODUCTS: GC-1000 Most Accurate Clock, 2; GD-1295 Smart Outlet Box, 15 and 50; GDP 1270 Sound-Activated Switch, 26; GDP-1341 Cordless Freedom Phone, 27; GRZ-1810 Color Video Stereo Sound Camera and Carry-all Case, 90. 16-bit software for the H Z-100 Series Computers CP M-86, 66; Lotus 1-2-3 and Z-Chart Business Graphics, 67; Condor DBMS, Condor File Manager and the Peachtree Group (General Ledger, Accounts Receivable, Accounts Payable, Inventory Management and Sales Invoicing) 78.

ORDERING INFORMATION: 48-49

PHOTOGRAPHY: darkroom timer 82

PRESIDENT'S LETTER: 48

SOLAR: domestic water heating system 24

SECURITY: home and business alarms 7-9

STARTER KITS: light alarm, 7; heat sniffer, 25; clocks, 2-3; doorbells, 83; freezer alarm, 7; frequency counter, 57; lamp switches, 7 and 26; portable light, 7; test equipment, 55; ultrasonic cleaner, 82; AM portable radio, 7.

STEREO HIGH FIDELITY: amplifiers, tuners, receivers, speakers, turntables 86-90

TELEPHONE: dialer, ringer, cordless 27

TV-VIDEO: remote control, portable b&w and color 5", 13", 19" and 25" TVs, television computerlink system, video organizer, color videocape recorder and camera, cabinets 90-95

TOOLS: quality kitbuilding aids, lamps 50

WEATHER: computerized weather station, barometer, barograph, humidity meter, thermometer, five-function analog station 5-6

*Units of Veritechnology Electronics Corporation in the U.S.

All prices quoted are mail order. Net FOB Benton Harbor, MI and apply only in the United States and Possessions. Prices, special offers herein are effective October 17, 1983 through January 1, 1984. Prices, product availability and specifications are subject to change without notice. Heath Company cannot be responsible for typographical and pictorial errors. Printed in U.S.A.



96/INDEX AND SPECIAL PREVIEW

Products featured for the first time:



16-bit Software for the H/Z-100 Series Computer:

CP M-86 Operating System, p. 66

Lotus 1-2-3, p. 67

Z-Chart Business Graphics, p. 67

Peachtree Business Group, p. 78

Condor DBMS and File Mgr., p. 78

Kit and assembled products that make Christmas giving easier:

Smart Outlet Box, pgs. 15, 50

Cordless Freedom Phone, p. 27

Sound-Activated Switch, p. 26

Color Video Camera, p. 90

Most Accurate Clock, p. 2



**CHARGE ORDERS
CALL OUR TOLL-FREE
KITLINE!**



800-253-0570

Order from 8 AM to 8 PM, Eastern Time. In Alaska, Hawaii or Michigan call 616-982-3411 24 hours a day. To save time, please fill out the order blank between pages 48 and 49 and have your credit card handy before calling.

THREE WAYS TO CHARGE: Use your Visa or MasterCard credit cards to purchase the Heath products you need for your home or business from this catalog, and receive your selections faster. See the insert for full details and more information on how to make application for a Heath account.