

Mail Order Catalog No. 864 WINTER 1983-84

Helping you make things better

the most accurate clock



Many exclusive features not found on ordinary clocks

- It's the clock that sets itself — *automatically* — by synchronizing display with National Bureau of Standards broadcasts from Ft. Collins, Colorado
 - Accurate ASCII time for computer applications provided by optional RS-232C Output Accessory — hours, minutes, seconds, month, day and year
 - Automatically adjusts for leap seconds and year
 - Useful for celestial navigation — also displays UTC1 time which compensates for earth wobble
 - Operates on 120/240 VAC or 12 VDC battery power for use on land, sea, or in the air
 - 3.6 MHz oscillator signal available at a rear panel BNC output as frequency standard
 - Almost any other time reference which differs from the GC-1000 readout* will be wrong!
 - User-programmable for any one of the standard 24 world time zones, and propagation delay up to 18.75 milliseconds (3600 mi. from WWV)
 - Includes seven feet of RG-174 lead-in wire for connection to an external antenna, and manual has illustrated instructions on how to build an antenna to optimize reception of WWV
 - Easily modified to receive WWVH (for Hawaii)
- * When unit is receiving WWV and "Hi Spec" LED is on



Own the clock whose perfect time is synchronized to the heartbeat of an atom... a Heath GC-1000 Most Accurate Clock

ONLY
\$249⁹⁵

Time does not stand still. It moves forward at inexorable speed, and we are caught up in its current. Unfortunately, most clocks — even those regulated by crystal quartz — are imprecise, need batteries or must be reset periodically.

But the Most Accurate Clock is different. Your space-age GC-1000 will tell the time with a method unlike any other clock commercially available for under \$2,000!

Technology has created the need for both the exact time and the hardware with which to keep it. Ultra-high time resolution is crucial to the work of laboratories, astronomers, TV and radio stations, physicists, navigators at sea, airlines, researchers and all types of industry for the evaluation of scientific data. For them and for you, knowing the "correct time" is always important. Now you can use the same standard of timekeeping in your daily life — and have the most unique clock ever designed to insure real-time accuracy 24 hours a day.

It's the first affordable, microprocessor-based time machine to exhibit zero accumulative error, guaranteed accurate to within ± 10 milliseconds because it bases its display on the absolute world standard of a cesium-atomic chronometer located at the National Bureau of Standards (NBS) in Fort Collins, Colorado. Radio station WWV transmits a one-minute stream of time-code data containing the day of the year, hours, minutes and seconds in Coordinated Universal Time (UTC) and a correction factor for deriving UTC1, or "celestial" time.

While other clocks depend on the power company's line frequency, the GC-1000 monitors WWV's atomic clock broadcasts for unparalleled accuracy. It even sets itself to the correct time when first plugged in, or after a power failure!

A super-sensitive receiver circuit board, which is preassembled and aligned at the factory, continuously scans the 5, 10 and 15 MHz beacon frequencies of WWV until it locks onto the strongest signal. A mutable audio monitor permits you to listen to the accompanying vocal time announcement. An outdoor antenna is recommended, although it may not be required in your area.

Ultimate accuracy: The front panel provides a bright digital readout in hours, minutes, seconds and tenths-of-seconds. Amber, green and red LEDs show which WWV frequency is being sampled, when positive "capture" of the time-encoded NBS carrier occurs, when new comparative data is being received, and when the clock is within specified accuracy. During noisy reception conditions, the GC-1000 keeps running on its own inboard oscillator. A special microprocessor circuit under internal software control trims the crystal oscillator to maintain ultra-stable frequency accuracy over time to within a few parts per million.

2/CLOCKS

Capture, Data and Hi Spec LEDs confirm the receipt and processing of time-sync signal — and ultimate accuracy of GC-1000 display

Removable 54" telescopic antenna

AM and PM indicators

5, 10 and 15 MHz WWV frequency LEDs



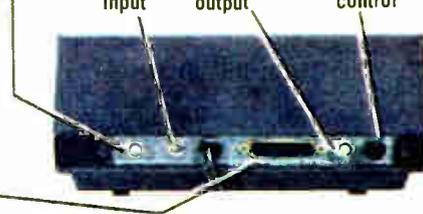
Dip switches on the chassis bottom set preferred time zone, propagation delay, 12 or 24 hour mode, activate Daylight Savings function, GMT display, UTC1 correction, and can lock out any channel in the frequency scan which experiences heavy interference

BNC connector for external antenna

12 VDC input

3.6 MHz output

Volume control



RS-232C port for chronograph output at 110 to 9600 baud

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

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

Assembled and tested Most Accurate Clock with RS-232C Output Accessory.

GCW-1000, Shpg. wt. 6 lbs. 389.95

GC/GCW-1000 SPECIFICATIONS: Receiver: AM heterodyne, single conversion with tuned RF amplifier
Sensitivity: $1\mu\text{V}$ or less for 10 dB S - n n. Audio Output: 250 mW into 8 ohms. Clock Accuracy: Within ± 10 mS when Hi Spec LED is on. Reference Frequency Output: 3.6 MHz (trimmed by inboard intelligence) Power Requirements: 120 240 = 15 VAC, 50 60 Hz @ 100 mA or 11 to 16 VDC @ 750 mA (150 mA with display turned off) Dimensions: 3 1/8" H x 9" W x 6 1/2" D (9.8 x 22.9 x 15.9 cm) less antenna
Operating Temperature: 32 to 100 F (0 to 38°C) Storage Temperature: 0 to 130 F (-18 to 55°C)



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



Heathkit Digital Alarm Clock is fun, practical

ONLY
\$29⁹⁵

- Wire it to display time in either 12- or 24-hour format
- Alarm delay feature lets you catnap up to an hour
- Flashing display alerts you to power failures

Start your kitbuilding career with this budget-priced Digital Alarm Clock and know what a thrill it is to say "I built it myself!" The GC-1107 makes a great starter kit, a super-reliable instrument for accurate timekeeping, and you'll really have a great time putting it together! It makes a perfect gift, too.

The pleasing blue-green display automatically adjusts its brightness to ambient light conditions. In addition to hours and minutes, the GC-1107 indicates AM or PM, pulses the colon every second, tells you when the alarm is set, synchronizes the alarm if in 24-hour format and alerts you if the clock has been shut off during power interruptions. The alarm on/off switch is easily accessible at the rear of the cabinet. If you're the type who likes to postpone their waking moment, another button will delay the gentle electronic alarm for 9 more minutes of pleasant dreams, up to one hour total.

Separate rear panel Slow and Fast setting switches let you advance the digits for easy, accurate setting of the correct display and alarm times. Space-age digital accuracy is provided by a metal-oxide semiconductor (MOS) large-scale integrated circuit. *What makes it tick?* You'll know its innermost secrets when you finish this relaxing one-evening-to-build, years-to-enjoy clock. Attractive modern styling, small size and solid-state dependability make it ideally suited for use in home, office or cottage — anywhere you need accurate time or a reliable, friendly wake-up. Requires 120/240 VAC. Measures 2 1/4" H x 7" W x 4 3/4" D. Get started in kitbuilding today — and have the time of your life!

Kit GC-1107, Shpg. wt. 3 lbs. 29.95



Digital Floor Clock is a lustrous, modern-looking timepiece

Add an elegant touch to any room in your home with this distinctive decor-builder. Housed in five feet of handsome simulated walnut veneer cabinet with anodized aluminum corner pieces, the bright, 3 3/4"-high digital readout adjusts to surrounding light for a charming, golden-toned effect. Four 1/4"-thick smoked glass shelves are great places to put books, plants or knick-knacks. An excellent first-time project, it displays hours and minutes, with the center colon pulsing once for each second. Set the correct time with two easy-to-use time advance switches on the bottom of the clock chassis. Add the "Big Ben" Electronic Chimes (at right) for Old World ambiance. Operates on 120/240 VAC. 60 1/2" H x 14" W x 9 1/2" D.

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



Build the cordless Heathkit Digital Wall Clock for exact, quartz-precision time anywhere

ONLY
\$49⁹⁵

- Quartz-true accuracy within ± 1 minute per year
- Runs up to two years on a single 1.5V AA alkaline cell
- Big 1" high LCD digits for across-the-room reading
- Displays time in either 12- or 24-hour format with "set it and forget it" convenience; it's portable, too

It's attractive. It's accurate. And it's fun to build. The Heathkit Digital Wall Clock is one of our most fully enjoyable beginner kits and makes an impressive addition to any office, family room, hamshack or vacation retreat.

Like the accuracy you expect from an expensive quartz watch, the GC-1720 can keep time with split-second precision. It uses a crystal timebase and one large-scale integrated circuit to guarantee the all-important reliability appreciated by pilots, amateur radio operators, or anyone else who likes to keep a punctual schedule. And the dual-format wiring option is a valuable feature we find to be increasingly popular among our customers.

Long-life, battery powered operation lets you put this handsome clock in your cabin, RV, mobile home or similar place where outlets are limited. You can hang it on any wall, at any height, regardless of outlet location. And it's immune to power outages caused by storms, generator failures or accidental cord disconnections. Big, one-inch liquid crystal digits form the time display and can easily be seen from thirty feet away. It's the ideal timepiece for any area where you need the exact time, and don't want a cord dangling in view.

The decorative, lightweight polyurethane case gives this Clock the look and genuine feel of real wood, with a simulated oak-grain finish that complements the style of any room. And since the case measures a slim 5 1/4" high x 7 1/8" wide x 1 1/2" deep, it fits in places where some wall clocks can't — like between kitchen cupboards or in the tight quarters of a sailboat.

Above all, the GC-1720 takes just one leisurely evening to assemble. Be sure to see our full line of tested kitbuilding tools on page 50 of this catalog.

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

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

Shelf-top version of Digital Clock

In walnut veneer cabinet. Add chimes below. 120/240 VAC. Size: 6 1/2" H x 12 1/2" W x 6 1/4" D.

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

Add these Westminster Chimes

Create an electronically-synthesized "Big Ben"! Sounds 4 notes on 1/4-hour, 8 on 1/2-hour, 12 on 3/4-hour, 16-note passage and hour on hour. Volume, pitch and sound delay controls; tick-tock and speaker. Builds into GC-1195 or -1197.

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



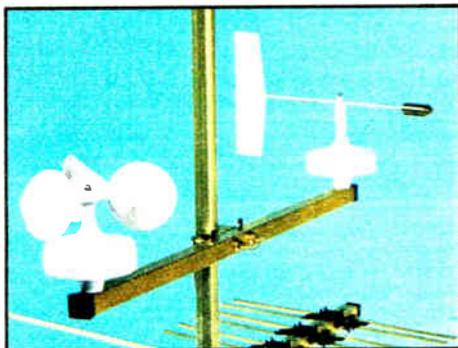
Credit Card Orders Call TOLL-FREE: 800-253-0570

© 1984 Heath Company. "Heath" and "Heathkit" are registered trademarks of Heath Company. "Zenith" is a registered trademark of Zenith Radio Corporation. "Z-DOS", "H-DCS" and "Z-100" are registered trademarks of Zenith Data Systems Corporation.

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 unequaled at this low price: The ID-4001 uses a remote transmitter with anemometer and weathervane that have been designed in an aerospace wind tunnel. A compact boom assembly relays data to the computerized console indoors. Rather than relying on friction-causing mechanical devices, they use solid-state infra-red sensors and transmissive optical encoding technology for higher accuracy than conventional indicators. The wind speed sensor is sensitive to within one-tenth of a mile per hour!

In addition, the barometer readings are derived from a newly-developed piezo-resistive silicon bridge transducer that senses the most minute changes in pressure. It's the first and only, truly digital barometer! And, there's even an output so it can be interfaced to the Heath H-8 computer for more sophisticated weather charting, research and pattern forecasting.

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

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

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

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

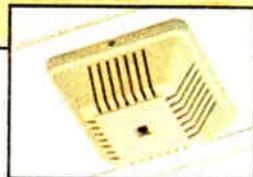
ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: ± 5% or better. **Direction Display:** Accuracy: ± 11.26% degrees. **THERMOMETER:** Temperature Range: -40° to 70°C; -40° to 158°F. Accuracy: ± 1° on Celsius readings; ± 2° on Fahrenheit readings. **BAROMETER:** Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury), 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg plus ± 0.01 in. Hg°C. **Operating Temperatures:** Outdoor assemblies. -40°C to +70°C (-40°F to 158°F). Unit. 10° to 35°C (59° to 95°F). **Power Requirement:** 120/240 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!

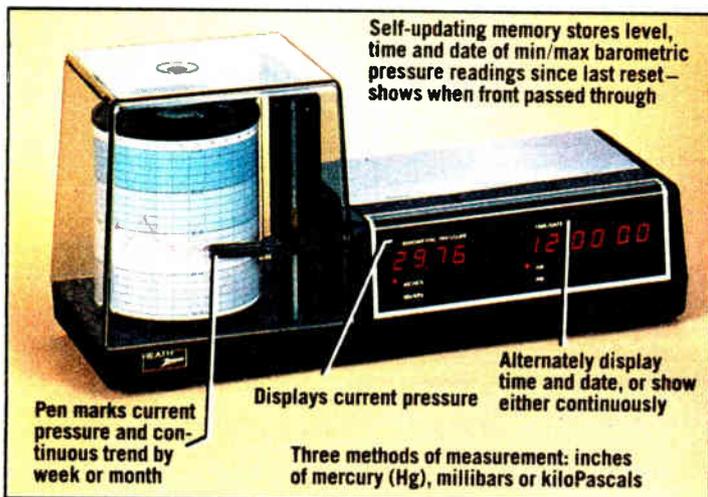
Increase everyone's comfort and save on fuel: During the heating season, low indoor humidity can cause skin irritation, sore throats, and annoying static discharge. Woods can lose luster, crack and peel. By correcting low levels of humidity, you can avoid such frequent ills, plus conserve energy, reduce 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, ½"-high digits indicate the humidity by percentage from 0 to 99 and LEDs denote the sensor being displayed. For 120/240 VAC.

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

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

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



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

\$199⁹⁵
Kit

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

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

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

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

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

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

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

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

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

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

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

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



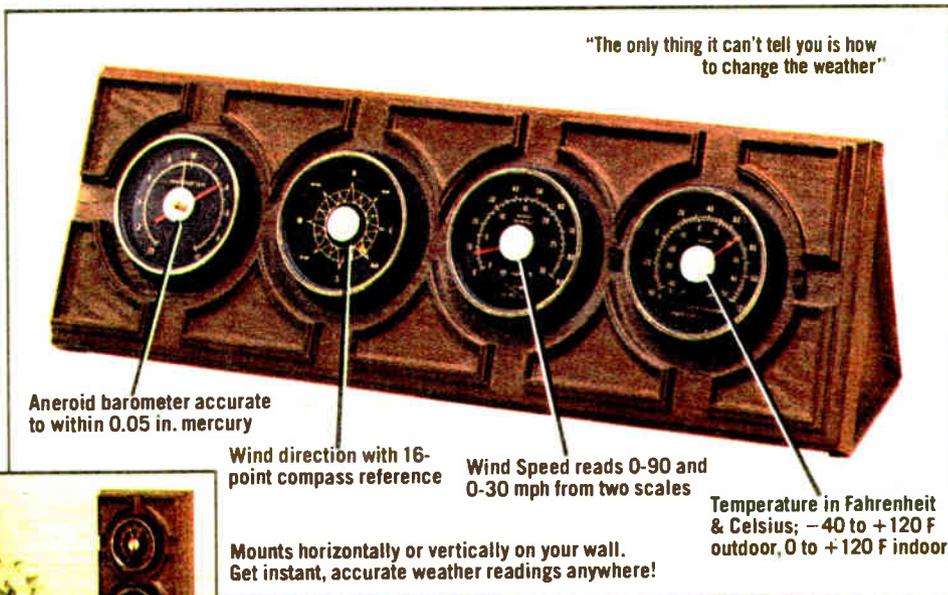
ID-1990 SPECIFICATIONS: Barometer Display: 4-digit readout. Separate indicators show whether the pressure is rising or falling, and whether the display is in inches of mercury, millibars or kiloPascals. Pressure Range: 28.00 to 32.00 inches Hg (mercury), 981 to 1050 millibars or 98.1 to 105 kiloPascals. 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



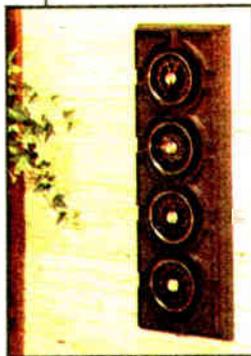
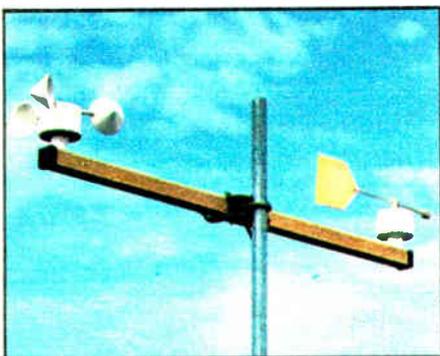
Aneroid barometer accurate to within 0.05 in. mercury

Wind direction with 16-point compass reference

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

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

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



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

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

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 Cyclocac cabinet of teakwood trim, as ID-1590. Displayed together, a great set you'll come to rely on daily!

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



Rechargeable Portable Light makes it easy to see



\$39⁹⁵

- Disperses greater illumination than harsh, narrow flashlights
- Recharges overnight — just plug it into AC outlet or car lighter

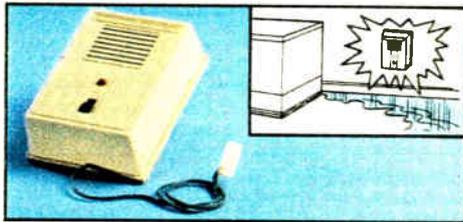
Indoors or out, the Heathkit Rechargeable Portable Light will bathe your working area with a bright, yet soft-on-the-eyes fluorescent light for a multitude of uses. Helps you to clearly see a wider area without sharp, eye-straining shadows. Safer to use than fire-hazardous candles and kerosene lamps 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 $\frac{1}{2}$ " H x 3 $\frac{1}{8}$ " W x 5" D. It's designed to survive rugged use — perfect for camping or night work, home and automotive emergencies — *always ready when you need light!*

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

Flood Alarm detects water, sounds loud warning

- Easy to install — monitors 24 hours a day in any location
- Prevents costly water damage

\$24⁹⁵



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

Use it in a hundred places: The water sensor sticks anywhere. When 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. Size: 1 $\frac{3}{4}$ " H x 3 $\frac{5}{8}$ " W x 4 $\frac{7}{8}$ " D.

Compact and quick to relocate, the GD-1701 runs over a year on one 9V alkaline battery (not supplied), and has audible low-battery indication. Includes 25' of thin wire and two sensors. Ideal for hard-to-reach places and nautical applications. Has adjustable sensitivity and logic output to trigger GDA-2800-3 RF Security Transmitter on page 9.

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

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 a door left ajar. Two-speed alarm beeps and red LED flashes at a slow rate if inside temperature rises above +20°F; faster if door stays open too long. Requires 2 "C" batteries (not supplied). Slide switch shuts off alarm. Includes 20' of thin hookup wire, plus mechanical, temp and water sensors — with application ideas.

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



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 to discourage unauthorized entry while you're away. Plug it into any outlet, adjust sensitivity and it controls lamps or other AC-operated devices up to 150 watts. Practical and beneficial security kit, 3 $\frac{1}{2}$ " H x 2 $\frac{5}{8}$ " W.

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



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!"



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

Battery Life Tester saves on replacement

\$14⁹⁵

- Ideal for hams with handi-talkies and plenty of portable accessories
- Includes adapter to test freshness of 9V batteries prior to purchase

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

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



Year 'round musical fun in this AM Portable Radio

- Heath's most popular kit for beginners — especially designed as an intro for the first-time builder
- Improved circuitry will prolong battery life — up to 60 hours!

\$18⁹⁵

A perfect kit that will thrill any youngster! Excellent AM sensitivity gives sensational reproduction of voice and music with a clear, even tone. Take this great little performer with you anywhere for extra fun. High-gain ferrite rod antenna delivers long-distance reception. Uses 9V battery (not included) or PS-2350 Battery Eliminator on page 24. Includes earphone for private listening.

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



Eye-Spy™ Photobeam Alarm Relay detects all



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

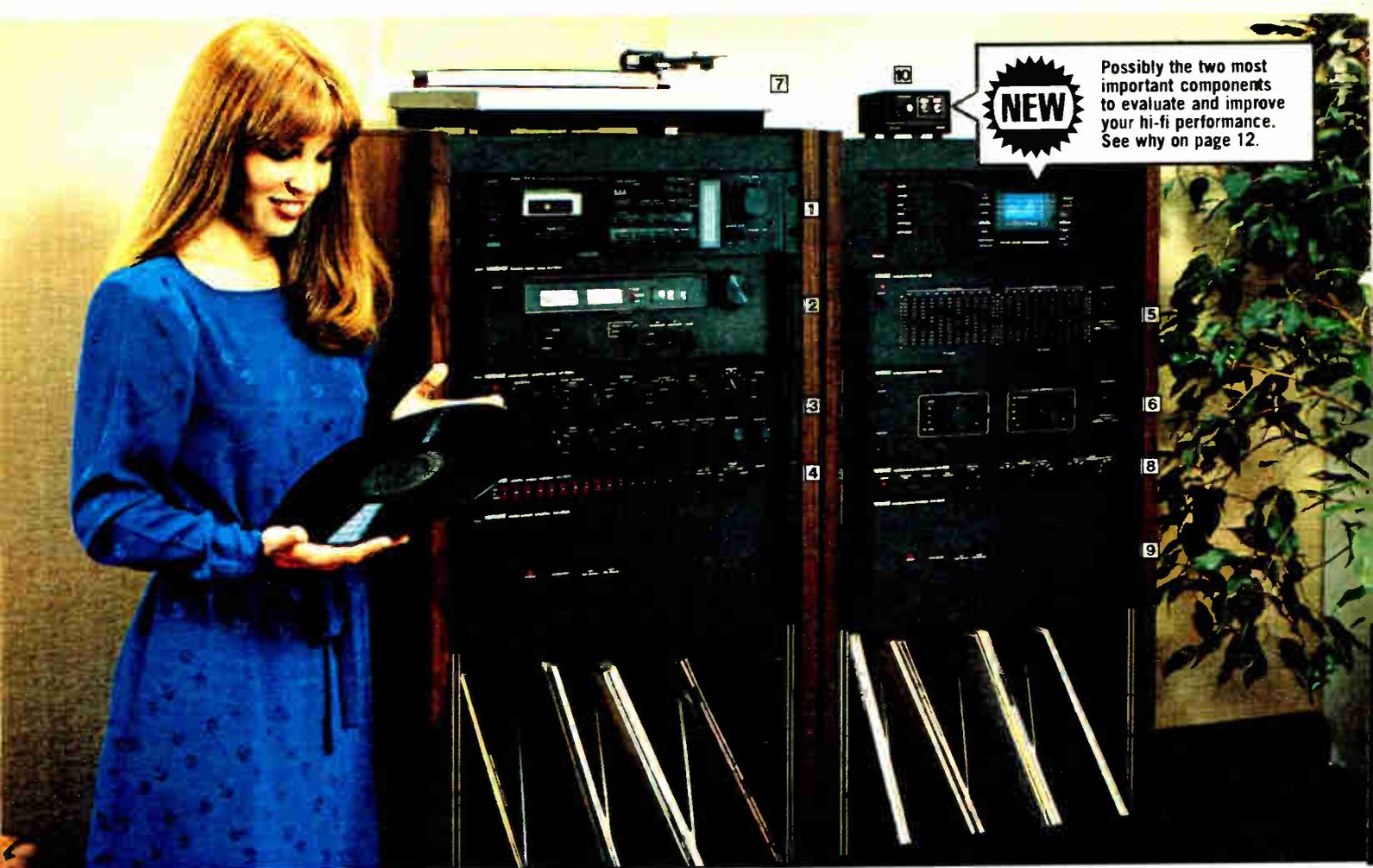
Businessmen! — use it to activate intrusion alarms, signal the entrance of persons into a shop or room, or count objects passing a point. At home, a versatile sentry!

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



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

STARTER KITS/7



Heath Pro-Series Audio has studio-quality capability and performance for the home

Superlative by any standard, Heath's highly-acclaimed Pro-Series components are engineered so they can be used by professional studios, sound engineers or recording artists. And by creative, discriminating audiophiles.

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

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

Feather-touch, IC-logic tape transport control allows direct change of operating mode with built-in delay and "flying start" recording. The accurate 2 motor, 3-head design has off-the-tape monitor capability, memory play, auto repeat, Dolby C noise reduction, two mic inputs, headphone jack and bargraph LED peak level meters. In all, a fully-compatible tape recording system with a remarkable style of improving playback performance. 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 center of a powerfully-endowed stereo music system, the AJ-1600 AM/FM Stereo Tuner carries a set of outstanding specifications and performance characteristics. For prime reception, it has a digital frequency display plus center-tune

meter for the most exact tuning with selectable wide/narrow IF bandwidth for the lowest interference distortion and a high capture ratio in all station areas. An RF input attenuator reduces overload and cross modulation, while a mute switch can improve threshold tuning. A switchable signal strength/multipath meter will assure precise antenna orientation and maximum reception of a broadcast, so music comes through with spacious separation and brilliant clarity.

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

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

3 Preamplifier provides complete audio signal control

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

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

nience outlets and many other high quality features, you're capable of tailoring raw source material with an incredible degree of artful finesse.

Kit AP-1800, Shpg. wt. 27 lbs. **399.95**

AEA-1800-2, Oak-finished Cabinet, Shpg. wt 6 lbs. **34.95**

4 Graphic Output Indicator monitors peak power levels

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

Kit AD-1701A, Shpg. wt. 15 lbs. **199.95**

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

5 10-Band Octave Equalizer alters tonal parameters

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

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

Kit AD-1703, Shpg. wt. 17 lbs. **274.95**

AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. **34.95**

6 Active Audio Processor increases your dynamic range

Dynamic range is to music what perspective is to painting or photography. It gives audio depth and feeling. Some of the dynamic range in most music is lost in the recording or broadcast process, but the expansion circuit in the AD-1706 can restore up to 8 dB of this loss. You'll discover your music has even more realism,

7 Specially-priced turntable-and-cartridge systems

The Onkyo CP-1130F (see also pg. 13) is a high quality, direct drive fully automatic turntable. One with streamlined cabinet design, repeat capability, soft-touch controls, better tracking, vibration isolation — and freedom from the irritating effects of rumble, noise, wow and flutter. In tandem with one of our two professional-status cartridges described below and on page 13, you'll enjoy pristine audio playback pleasure.

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

SAVER! CP-1130F turntable with world-renowned Dynavector Ruby moving-coil cartridge. Has a square, 2.3 mm ruby cantilever for maximum rigidity and groove-to-coil signal transmission.

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

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

ACS-1130B, Shpg. wt. 24 lbs. **429.00**



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



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

better definition and lower background noise while maintaining full response and ultralow distortion — even at high volume levels. The superb noise reduction circuitry sifts out up to 10 dB of noise from records and hiss from tapes, to effectively increase your system's total dynamic range by up to 18 dB. A 7 kHz linear-phase filter can be switched in to reduce ultrasonic noise.

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

Kit AD-1706, Shpg. wt. 18 lbs. **299.95**

AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. **34.95**

8 Variable Electronic Crossover extends bass response

Add a separate bass channel to your system! Used with a Subwoofer like the AS-1320 on page 14, this component will give a more accurate crossover alignment for lower distortion and clearly-improved low end response down to as low as 20 Hz! Crossover points at 40, 60, 80, 100, 125 and 150 Hz can be frequency scaled up to 6 kHz. Switches select 6 dB/octave or 18 dB/octave slopes for flat frequency response at crossover points and well-defined imaging. Outputs for stereo, monaural and bridged hookup give you the provisions to connect another amplifier and subwoofer to your system. Better control of drivers is possible in bi-amp and tri-amp applications, so you can play music at live performance levels without the slightest distortion. Has bass level control, crossover bypass switch and a 15 kHz infrasonic filter to remove annoying record warp noise.

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

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

Kit AS-1320, Subwoofer, 177 lbs., Motor Freight Collect **319.95**

9 Build the finest high-level Stereo Power Amplifier

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

The Pro-Series AA-1800 Amplifier has the 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 will give you more power and transient 3 dB dynamic headroom to carefully duplicate every detail of the essential waveform 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 it exquisitely faithful to the source.

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

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

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

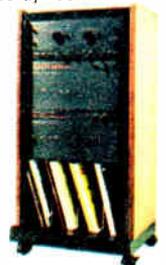
Kit AA-1800, Shpg. wt. 75 lbs. **649.95**

10 NEW! The latest Pro-Series member: Heath's AD-1308 Portable Real-Time Spectrum Analyzer, plus optional ADA-1308-1 Power Supply/Rack-Mount Accessory and AD-1309 Pink/White Noise Generator can be seen on page 12. And be sure to see page 104 for a close-up look.

Pro-Series Rack combines beauty and functional convenience

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

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





2



1



3



1 Lab-grade Portable Real-Time Spectrum Analyzer is a professional audio tool

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

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

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



Integrated Amplifier combines fidelity with versatility

\$249⁹⁵ 30 WATTS, MIN. RMS, PER CHANNEL INTO 8 OHMS WITH <0.009% T.H.O. 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 the same AMP/PREAMP specifications as the AR-1250 Receiver, plus many more advanced preamp features to please the serious 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, a dual tape monitor function, LED bargraphs for left and right channel power output, 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

12/STEREO HIGH FIDELITY

Five memories let you store and recall responses for instant comparison, plus an exclusive Difference mode displays the difference between any two sources. A thumbwheel attenuator selects the scaling in 10 dB steps from 50 to 120 dB SPL, with standard ANSI fast, slow or peak response modes and A or C weighting for precise SPL or "noise exposure" measurements (see closeup, page 104).

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

Kit AD-1308, Shpg. wt. 5 lbs. 279.95

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

AD-1308 SPECIFICATIONS: SPL and Spectrum Analyzer Display Range: 23-126 dB SPL SPL Accuracy: ± 1 dB A-weighted. Microphone Self-Noise Level: -36 dB SPL A and C Weighting Filters per ANSI: S1: 4-1971 (Rev. 1976); Fast and Slow SPL Response per ANSI: S1: 4-1971 (Rev. 1976). Flatness on Direct Input: ± 1 dB. Input Impedance: >10k ohms. Input Sensitivity, 90 dBspl Range: 0 dB = 350 mV rms ± 10%. Power Requirements: 10 5 V, ± 10% @ 425 mA. Low Battery Indication: 6 V ± 5%.

2 Power Supply/Rack-Mount Accessory

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

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

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

3 Accurate Pink/White Noise Generator

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

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

AD-1309 SPECIFICATIONS: PINK NOISE: Frequency Response: ± 1 dB from 20 Hz to 20 kHz. Output Level: rms average is -350 mV; peak is -1.5 V. WHITE NOISE: Frequency Response: ± 3 dB from 20 Hz to 20 kHz. Output Level: rms average is -350 mV; peak is -1.5 V. Dimensions: 2 1/2" H x 4 1/8" W x 4" D.



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 filter elements give 52 dB selectivity for isolating 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 you set the best antenna orientation. These elements and specifications spell outstanding separation, negligible noise and inaudible distortion. Together with the AA-1205, a top notch system you can display with pride and use with lasting pleasure.

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



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

Quality creates its own image in a 30-Watt Receiver of superb musical value and design

30 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.009% T.H.D FROM 20-20,000 HZ

\$349⁹⁵

- Superb all-in-one audio quality — designed for high fidelity first, then high style
- An array of exceptional specifications; more performance for your dollar, with high 2.5 dB (53 watt) dynamic headroom
- The new technology from our audiophile separates (at left) in one slim chassis, with a multitude of versatile features

For the college student, apartment dweller or budget-minded audiophile who desires a high quality, medium-power source of infinite entertainment variety, the Heathkit AR-1250 Digital FM Stereo Receiver is a considerable value. Endowed with equal qualities from its sister 'separates' (the AA-1205 and AJ-1200 combo at left) the AR-1250 design fuses the best in sound technology and the most in versatile features for a new realism in response to your listening tastes. A fun, four-evening kit, it has the source fidelity, stereo control and clean, undistorted power that every audio enthusiast wants to build around for maximum musical pleasure.

No sacrifice at this price: Heath's award-winning Pro-Series engineers designed the AR-1250 to meet the highest standards of accurate reproduction and elegant styling for absolute satisfaction. An investment to build with pride, and a beauty to behold, its *performance* will impress everyone who looks and listens for quality.

The action starts with a bright green digital frequency readout, bargraph displays of instantaneous signal strength and power output level, exact LED center-tune and stereo locking indication. You're given a wealth of capability: High- and Low-cut Filters plus Bass and Treble controls shape the sound; adjustable FM Muting silences interstation hiss while mute-actuated AFC tuning helps you zero in with ease; Tone Flat yields smooth response and uncolored recordings; Loudness boosts the low frequencies; Mono narrows audio perspective while Volume and Balance may vary with your mood. Three source switches route signal input for creative output, with full monitor or dub from deck-to-deck, and choice of what source you listen to while recording from another source.

What emerges is proof that our precision design has met its goal. Like excellent FM sensitivity and vast 45 dB separation. Radically clear FM reception for pure musical appreciation. Delayed turn-on speaker protection from deadly transient 'thumps.' True-to-the-source fidelity. A tympanic bass quality and crisp, ethereal highs that delivery 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, optional AM and Dolby FM Noise Reduction modules, two tape decks, headphones, power amp, auxiliary sources like TV or turntable, and more. Dual pre-amp-out/power-amp-in adapter loops make inserting an equalizer, audio processor or electronic crossover easy. You're invited to press the power switch at a nearby Heathkit Electronic Center, hook up the source and speakers of your choice, and experience instant aural gratification. Take one home and share the exclusive pride of hand-crafted achievement. With such an extraordinary Receiver of outstanding specifications and value available to the kitbuilder, why settle for anything less? Build one with pride and satisfaction for yourself and hear the quality!

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

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

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

SPECIFICATIONS: FM SECTION: Mono/Stereo Usable Sensitivity: 1.9 (10.8)/3.5 (16.1) 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: 4 1/2" H x 17" W x 15 1/4" D.

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 8 Ω speakers to surprising sound levels! Has rear panel speaker terminals and input jack; front panel power switch with 'on' lamp, headphone jack, volume and tone controls in a 2 1/4" H x 7 1/4" W x 5 1/2" D metal case. Fuse-protected for 120 and 240 VAC.

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

High-efficiency phono cartridges

Dynavecort 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. Requires AP-1800-type preamp.

AOP-1370, Shpg. wt. 1 lb. **310.00**

Shure V-15 Type V with Dynamic Stabilizer has 10-28,000 Hz response, 3.2 mV output, >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 11).



Anti-resonant direct drive memorymatic Onkyo 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 \pm 3% variable pitch. Has 0.025% WRMS wow and 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 Dynavecort Ruby moving-coil cartridge described at left.

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**



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

STEREO HIGH FIDELITY 13

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 speaker element in a special subenclosure, a 2" soft dome Ferro-Fluid midrange driver 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' for the very finest and most natural response. Depth and lateral imaging will expand to enhance the realism, and an 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.

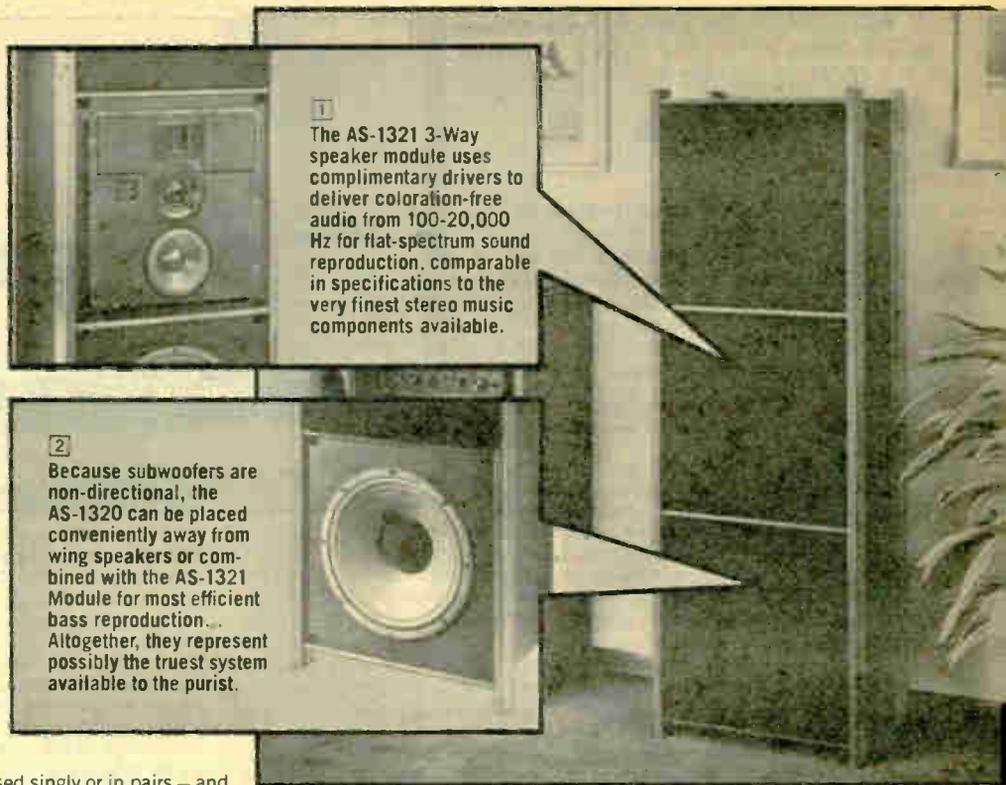
Kit AS-1324-2, 416 lbs., Motor Freight . . . 1149.80

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. 11).

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: 64 $\frac{1}{2}$ " H x 21 $\frac{1}{2}$ " 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 17 $\frac{3}{8}$ " 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 4 $\frac{1}{2}$ " 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. 11) reveals their awesome dynamic range and three-dimensional clarity. Music will take on a new feeling. Two frequency controls optimize response for your listening area. Individual driver fuses provide full overload protection. Comes with assembled walnut veneer cabinet.

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

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



Surround yourself with superlative sound





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

With the Groundtrack Metal Locator you can punch through ground clutter to uncover rare coins, artifacts, old trinkets and treasure. The Groundtrack is a professional model — able to pinpoint even tiny metal objects in any kind of soil type, and can comb ground submerged in up to two feet of water!

- Detects valuable objects even in highly mineralized soil where conventional locators are useless
- Has on/off with volume, meter, speaker, phonejack, discrimination, ground balance, tuning controls, battery test switch, charging jack and mode switch
- Runs on 6 AA cells or rechargeable battery pack
- One of the best hobby models — engineered with VLF Ground Balance Mode and VLP — a very low price

\$219⁹⁵

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...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. With sensitive pushbutton tuning, it filters background signals, screening out pulltabs, metal foil, bottlecaps, ferrous and alloyed items. 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-moded, induction balance system. You hear nothing until that ring, coin or antique artifact enters the 6-inch diameter search head's field of detection. Then a clear tone sounds, growing louder as you approach vertical center over the buried valuable.

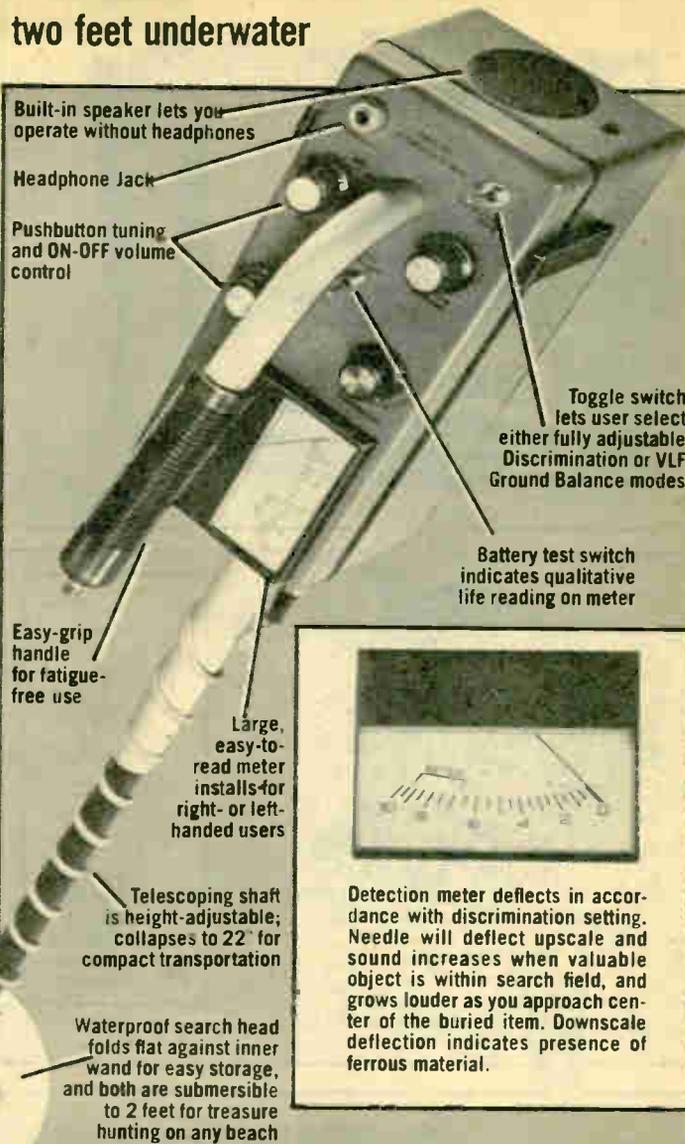
Use the Groundtrack anywhere. It's lightweight and portable, with a telescoping shaft that collapses for storage. Runs on six AA cells (not included) or the optional Rechargeable Battery Pack, which includes AC outlet and DC lighter socket chargers for use at home or in-the-field. It's rewarding fun — order one!

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

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

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

GD-1290 SPECIFICATIONS: **Sensitivity:** Locates dime at 4" to 6" typical, may be less depending on soil conditions, mode of operation and amount of discrimination selected. **Method of Detection:** Induction-balance circuit. **Detector Output:** Meter, speaker, phone jack. **Dimensions:** Extended Height: 45 1/2". **Power Requirement:** Six AA dry cells or alkaline, or rechargeable Battery Pack. **Net Weight:** 3.4 lbs.



Built-in speaker lets you operate without headphones

Headphone Jack

Pushbutton tuning and ON-OFF volume control

Toggle switch lets user select either fully adjustable Discrimination or VLF Ground Balance modes

Battery test switch indicates qualitative life reading on meter

Easy-grip handle for fatigue-free use

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

Telescoping shaft is height-adjustable; collapses to 22" for compact transportation

Waterproof search head folds flat against inner wand for easy storage, and both are submersible to 2 feet for treasure hunting on any beach



Detection meter deflects in accordance with discrimination setting. Needle will deflect upscale and sound increases when valuable object is within search field, and grows louder as you approach center of the buried item. Downscale deflection indicates presence of ferrous material.

Brass Name Plate adds prestige to your kit

Be proud of your kitbuilding skills! Handmade 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 the sales clerk at your nearest Heathkit Electronic Center, or mail it along with your kit purchase from this catalog.

\$200 for one plate

\$160 each, 2 or more

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 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: _____

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

METAL LOCATOR/15



Bottom contours and deepwater fish can't hide from the chart-recording Heathkit Seeker™

- Record of best spots and their depths helps you return again and again
- One roll of paper lasts approximately 13 hours for continuous charting

The Heathkit Seeker Chart Recording Depth Sounder is one of the most useful boating and fishing accessories you can own. Use it to find schools of small fish as well as individual large fish. It's bottom recording accuracy makes it a valuable navigation aid for following coast line depths and mapping lakes.

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. A switch-controlled marker puts a vertical line on the chart for easy reference. Rugged, water-tight housing has locking hinged panel for quick chart roll replacement, and is lighted for easy night reading. Includes one roll of chart paper.

Depth Sounder with through-hull transducer and 30 feet of connector cable.
Kit MI-2910-1, Shpg. wt. 17 lbs. 299.95

Depth Sounder with transom-mount transducer and 30 feet of connector cable.
Kit MI-2910-2, Shpg. wt. 17 lbs. 299.95

MIA-2910-1, Two rolls of chart paper, Shpg. wt. 2 lbs. 10.95

SAVER! MIS-2910-1, Twelve rolls of chart paper, Shpg. wt. 12 lbs. 49.95

Sensitive and accurate Deluxe Dual-Range Fish Spotter delivers professional results

A Heathkit Deluxe Fish Spotter should be standard tackle for any serious angler. It can help you increase the size and weight of your catches by detecting single or schools of fish swimming, and submerged objects between the surface and any preset depth you choose. Two sounding ranges, 0-60 or 0-240 feet, insure the high accuracy and sharp definition so important in an instrument of this type.

Fish entering the transducer's ultrasonic range will trigger an audible alarm (if selected) 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: The MI-2901 will locate the best fishing habitats and stand duty as a dependable depth sounder for navigation through unknown waters. Has sensitivity control, corrosion-resistant aluminum case, sun-shielded dial and watertight ceramic transducer element with suction cup mount. Powered by two 6-volt lantern batteries (not included). 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 for use with MI-2901. Has C-clamp mounting, scans 360° and locks in any position. Accepts 1 3/8" transducer element.

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

Deluxe Dual-Range Depth Sounder marks hazard areas and doubles as a thermocline finder

- Protect your hull from scrapes or puncture; find one or a school of fish

Whether you're fishing, cruising or scuba diving, this Dual-Range Depth Sounder will add an extra measure of safety to your boating season pleasure. When selected, a high-pitched beeping alarm alerts you to shoals or submerged objects projecting above any preset depth from 5 to 240 feet, thus eliminating the need for continuous visual monitoring. Two ranges, one for depths to 60 feet and one for depths to 240 feet, provide extremely accurate readings instantly.

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

Housed in a water-resistant, black Cylolac case, the MI-1031 has a glare-free bezel with sunshield and a super-bright neon indicator to make accurate depth readings easy day or night. The gimbal mount bracket and quick-disconnect power and transducer leads allow for easy removal when your boat is not in use.

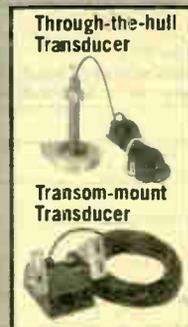
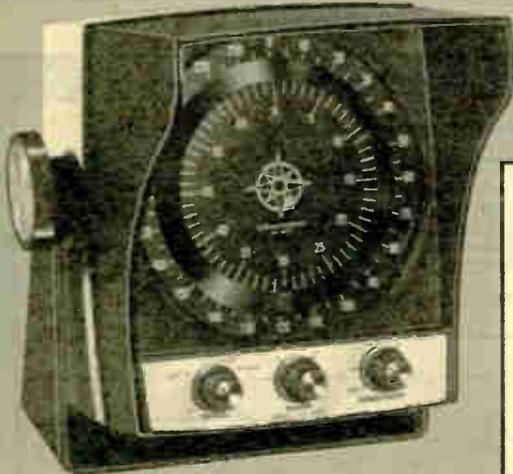
Depth Sounder with through-hull transducer and 25 feet of connector cable.
Kit MI-1031-1, Shpg. wt. 8 lbs. 119.95

Depth Sounder with transom-mount transducer and 25 feet of connector cable.
Kit MI-1031-2, Shpg. wt. 8 lbs. 119.95



Scanning transducer bracket aids with wide-field detection

HEATH HAS A BETTER MARINE VALUE!



Through-the-hull Transducer

Transom-mount Transducer

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

As low as **\$179⁹⁵**

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

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

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

Kit MI-2916-1, Depth Sounder with Through-Hull Transducer, 8 lbs. 189.95

Kit MI-2916-2, Depth Sounder with Transom-Mount Transducer, 7 lbs. 179.95

Kit MI-2916-3, Depth Sounder with Flush-Mount Transducer, 8 lbs. 199.95

MI-2916 SPECIFICATIONS: Frequency: 200 Hz. Accuracy: $\pm 5\%$. - 1 count. Power: 10 to 17.7 VDC.

2 Digital Remote Depth Sounder repeater station

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

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

3 Flush-mount Digital Remote Readout for sailboats

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

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

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

4 Sailboaters! Powerboaters! The low-cost Heathkit Digital Knotmeter/Trip Log gives you outstanding speed and log accuracy

\$99⁹⁵

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

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

The most accurate knotmeter/log of its kind! The Heathkit digital Knotmeter/Trip Log features integrated circuits for precise speed and readouts. These circuits, using three active filters, constantly compute and update your average speed and distance every two seconds with $\pm 5\%$ accuracy. And you enjoy this accuracy no matter what type of boat hull you have, because the transducers for the MI-2956 and -2958 both feature a special optimizing speed calibration that enables you to fine-tune the circuits to the shape of your individual hull.

Each has an easy-to-read LCD display that shows speed or distance. The readout is in three $\frac{1}{2}$ " digits, with automatic backlighting for night outings. With the flip of a switch, it will tell you speed in mph (or knots), from 0.1 to 40 mph; or tell you distance traveled from 0 to 99 miles (or nautical miles).

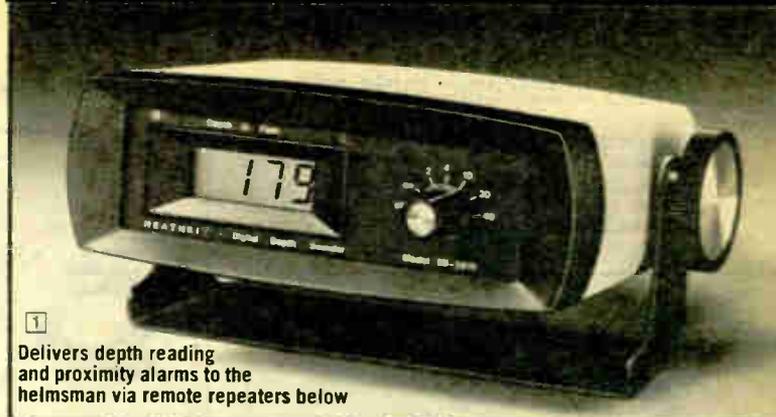
It's tough and durable: The housing, including the on/off and speed/distance switches, is completely sealed for protection against salt spray and corrosion.

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

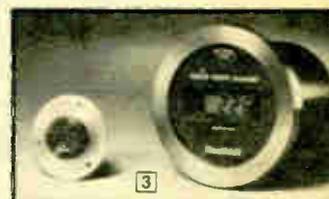
Kit MI-2958, Sailboat Knotmeter/Trip Log, Shpg. wt. 4 lbs. 99.95

Kit MI-2956, Powerboat Knotmeter/Trip Log, Shpg. wt. 4 lbs. 99.95

MIA-2950-1, Through-Hull Transducer, Shpg. wt. 2 lbs. 39.95



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



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 4 1/2" deep. Requires a 4 1/8" hole for mounting. MI-2956: 2 1/2" H x 7.0" W x 5 1/2" D.

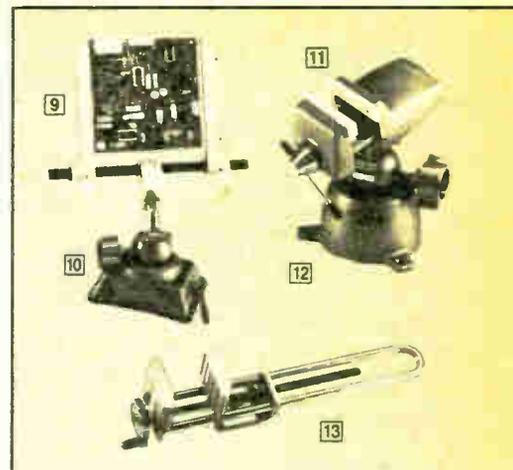
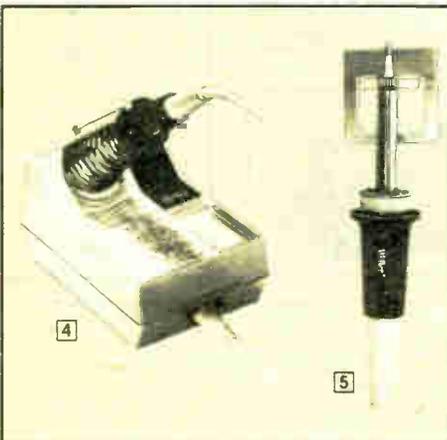


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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

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

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

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, NOW 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 5/8" 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 IM-5217 Portable VOM is ideal for home and shop repairs



3 Rugged SM-2206 gives clamp-on current readings

1 Simply designed, yet rugged and accurate

\$79⁹⁵

- Measures \pm DC, AC voltages and resistance
- 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 ± 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

\$44⁹⁵

- 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. Test leads included.

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**



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

3 Quick and easy clamp-on AC current readings

\$49⁹⁵

- 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.

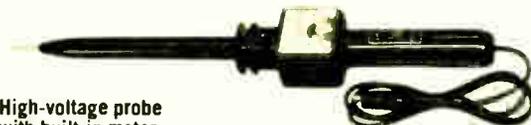
Easy to operate: To measure AC current in a conducting circuit or in an operating appliance, just snap the meter's clamp-on inductive pickup around a conducting AC wire. The SM-2206 measures both 50 Hz or 60 Hz current. To measure AC voltages, turn the six-position range switch to the volts/ohms position 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

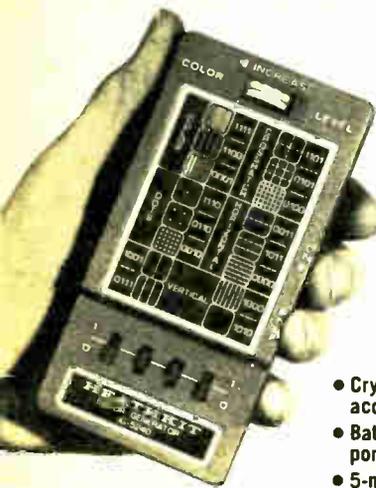
Convenient all-in-one probe: For checking the positive DC high voltages found in TV receivers and oscilloscopes, the IM-5210 is an ideal instrument. It is a self-contained probe that measures DC voltages up to 40,000 volts with an accuracy of $\pm 3\%$. An on-off switch protects the meter during transport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

Easy to assemble: The IM-5210 Probe Meter kit can be completed in one evening. It measures $1\frac{1}{2}''$ H x $1\frac{1}{8}''$ W x 15" L and weighs only 8 ounces.

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

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.

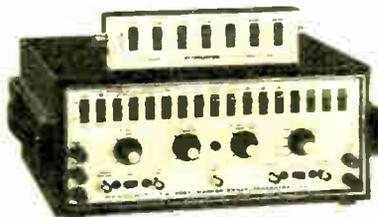
Accurate and stable: The IG-5240's RF channel carrier, and color and timing oscillators are controlled by three separate crystals. These crystals provide signal stability and a frequency accuracy within $\pm 0.005\%$.

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

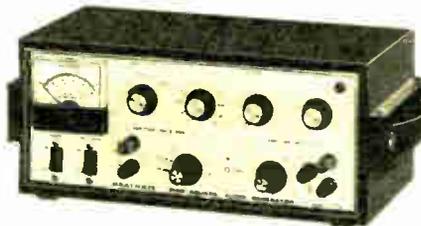
Simple frequency selecting: Set the function switch to the desired waveform and then set the six-position multiplier to the required range. Next, tune the variable control to the desired frequency. Using both frequency controls, you can select any frequency between 0.1 Hz to 1 MHz.

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

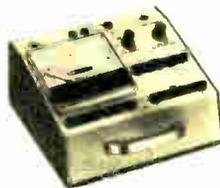
Sine/Square Wave Audio Generator



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 $\frac{1}{8}$ " H x 13 $\frac{1}{4}$ " W x 7" D.

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

Accurate FET/Transistor Tester



Portable IT-3120 tests devices in- and out-of-circuit. Checks transistors, diodes, FET's, SCR's, triacs, and UJT's. Shows gain, transconductance, and leakage current.

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

FM Deviation Meter measures frequency modulation



\$169⁹⁵

- Checks peak FM deviation of signals between 25-1000 MHz
- Two scope monitoring jacks

Measures the peak deviation (frequency modulation) of transmitters and signal generators with carrier frequencies between 25 and 1000 MHz. A BNC jack allows the connection of an optional antenna or a direct line for monitoring signals. Front panel controls include four pushbuttons to select deviation modulation ranges from 2 to 75 kHz, coarse and fine-tuning controls for locking in difficult UHF FM signals, a level control to adjust the meter's sensitivity, and an audio output adjustment. Runs on 10 "AA" batteries or optional Battery Charger/Eliminator. A speaker jack allows speaker or headphone listening. Easily transports to any remote operating location.

Kit IM-4180, Shpg. wt. 7 lbs. 169.95

Kit IMA-4180-1, Charger/Eliminator, 2 lbs. 32.95

Swiveling Telescopic Antenna for use with IM-4180
SMA-2400-1, Assembled, Shpg. wt. 1 lb. 9.95

Low-cost CRT Tester and Rejuvenator extends the life of picture tubes



\$139⁹⁵

Test, clean, and restore almost any color or B/W picture tube

Separate testing, cleaning, and rejuvenation can be done on almost all current color and black-and-white CRT's – even in-line-gun tubes. All tests and operations are controlled by separate 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 guns current level is increased for an easy visual indication of rejuvenation. A separate cleaning process is applied after rejuvenation to assure proper tube operation. A special push-button provides a good indication of the life expectancy of the CRT. Included is a 4' test cable and four adapter sockets with instructions for assembling optional adapter sockets.

Kit IT-5230, Shpg. wt. 9 lbs. 139.95



Accurate Heathkit Strip Chart Recorder provides reliable, wide-range measurements

- Less than 0.5% full-scale error, 0.3% typical
- Highly accurate, 10-speed digital chart drive
- English or metric measurements available
- Rear panel connector for total control from a remote location using TTL logic levels
- Built-in switchable input attenuation filter

Belongs in your lab: The IR-5204 offers standard features that are extra-cost options with many competitive products — such as digital chart drive, a built-in filter and remote control capability.

Digital chart drive: Provided by a precision stepper motor with no backlash, as is common in gear train designs. To prevent damage to the recorder, the pen servo shuts off when the charted signal exceeds full scale deflection.

Has 10 chart speeds: Available in either inches or centimeters per minute, via the IR-5204's stepper motor. All chart speeds are instantly selectable with the front panel rotary switch — and are accurate to better than 0.5% ($\pm 0.3\%$ typical).

Four calibrated input spans are available at the touch of a pushbutton: 10 mV, 100 mV, 1 V and 10 V full scale. Variable span capacity is built in, enabling you to extend the range to 100 V (12.5 mV to 125 V metric), full scale.

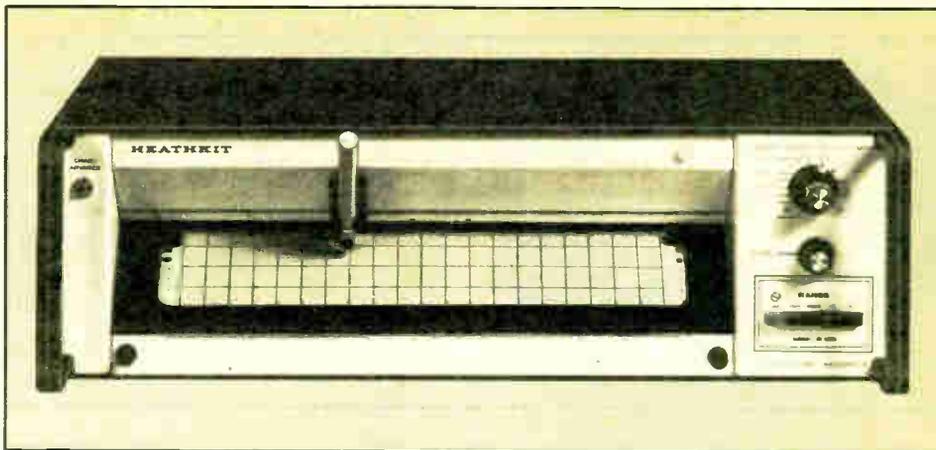
Many noise problems are eliminated by a built-in selectable input filter: When switched into the circuit, both normal and common mode rejection are increased by 20 dB. Noise rejection is even greater at higher frequencies.

Allows total TTL-compatible recorder control from a remote location: Just plug into the IR-5204's rear panel connector with polarized connector supplied.

Pushbutton chart advance is standard: As are external chart drive input capability, electric pen lift with disposable nylon-tipped pens and metric conversion. Rack handles and the necessary hardware for rack mounting optional. 120/240 VAC, 50/60 Hz. Measures $5\frac{3}{8}$ " H x $17\frac{1}{16}$ " 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 $6\frac{5}{8}$ " 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

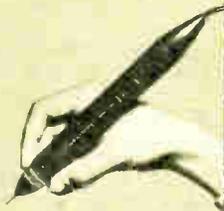


IM-5258 SPECIFICATIONS: Frequency Range: 5 Hz to 100 kHz in five ranges: 5-10 Hz, 10-100 Hz, 100-1000 Hz, 1-10 kHz, 10-100 kHz. Distortion Measurement Ranges: 0.3 to 100%, full scale, in six ranges with a 1-3-10 sequence. Residual Distortion: 0.03% or less. Input Impedance: 1 megohm, shunted by 70 pF 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 or "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 $\frac{3}{4}$ " H x 1" W x $9\frac{1}{4}$ " L.

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



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: 4¼" 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.

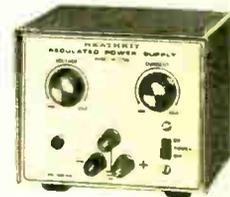
Kit IP-2717A, Shpg. wt. 19 lbs. 189.95
SP-2717A, Assembled and tested, Shpg. wt. 20 lbs. 239.95

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



Value-priced Heathkit 5280 Series Test Equipment makes a perfect 'starter' bench set

The Heathkit 5280 Series of test instruments is intended for the beginning hobbyist, serviceperson and student. Designed to work together, they're an excellent way to assemble a truly versatile test bench, without spending a lot of money. Each of the high-quality instruments is priced under \$50, with build-it-yourself reliability as an added benefit. Whether you're doing television repair, hi-fi servicing or circuit experimentation, the 5280 Series represents real value for your dollar.

Your
choice
only
\$49⁹⁵
each

1 RCL Bridge for experimentation and design work

- Front panel meter indicates null (balanced bridge condition) accurately
- Read unknown values of resistance, inductance and capacitance directly

The Heathkit IB-5281 RCL Bridge is priced right for your pocketbook, and has the features you'll really appreciate for testing and design work. A tough 5280 Series cabinet houses the solid-state circuitry that lets you easily determine unknown values of resistance, inductance and capacitance. Resistance is indicated in three ranges from 10 Ω to 10M Ω ; inductance in three ranges from 10 μ H to 10 H; and capacitance, also in three ranges, from 10 pF to 10 μ F. As always, the step-by-step Heathkit Manual makes this instrument easy to build—single circuit board construction speeds assembly. Terminals are provided on the front panel for the component under test, and an external standard. With component clips. Handy snap-tight compartment in top of cabinet stores leads and accessories. Needs two 9V batteries or IPA-5280-1 Power Supply (below, right).

Kit IB-5281, Shpg. wt. 5 lbs. 49.95

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 Ω to 10M Ω in three ranges. Inductance Ranges: 10 μ H to 10H in three ranges. Capacitance Ranges: 10 pF to 10 μ F in three ranges. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1. Cabinet Dimensions: 11" W x 5 $\frac{3}{4}$ " H x 7 $\frac{3}{4}$ " D. Weight: 3 $\frac{1}{2}$ lbs.

2 Wide-range Sine and Square Wave Audio Oscillator

- 10 Hz to 100 kHz frequency range with sine and square wave output
- Both 0-3 volt signals may be used simultaneously or independently

The IG-5282 Audio Oscillator is an instrument that you'll find useful in many audio test applications. Frequency output is in four ranges, from 10 Hz to 100 kHz, in either sine or square wave modes. Use the IG-5282 as an audio signal source during signal tracing or, with the appropriate associated test equipment, use the sine wave output for audio stage gain and distortion analysis. If you're interested in determining frequency response and harmonic distortion figures, you'll find the IG-5282's square wave output ideal for your purposes, with the necessary additional equipment. Construction is rugged and assembly time is greatly reduced by single circuit board assembly. Requires two 9V batteries for portable use or the IPA-5280-1 Power Supply below. With the multi-function versatility of this precise service aid, you'll wonder how you managed to get along without the IG-5282 until now. A great value and an important addition to your test bench. Has 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. Dimensions: 11" H x 5 $\frac{3}{4}$ " W x 7 $\frac{3}{4}$ " D. Net Weight: 3 $\frac{1}{4}$ lbs.

3 Quality RF Oscillator for radio/TV alignment work

- 1000 Hz audio output also provides source of internal AM modulation
- Includes test leads, banana plugs and alligator clips to build probes

The IG-5280 Portable RF Oscillator provides an accurate source of amplitude-modulated and un-modulated RF signals for alignment of tuned stages in AM, FM and television receivers. Output is divided into five overlapping bands from 310 kHz to 110 MHz, covering AM, FM, TV, longwave and shortwave broadcasting. RF frequency is indicated on a large, easy-to-read dial scale. Features extra 100 to 220 MHz band of calibrated harmonics. Front panel 1000 Hz AF output is ideal for tracing and isolation of circuit defects and serves as a source of internal modulation, with continuously variable output attenuators. To insure greater RF accuracy, the bandswitch and coil assembly is factory adjusted. Calibration requires only a voltmeter and an AM-FM receiver.

Kit IG-5280, Shpg. wt. 5 lbs. 49.95

IG-5280 SPECIFICATIONS: RF output: Frequency Range: 310 kHz to 110 MHz in five bands. 100 MHz to 220 MHz on harmonics. Output Voltage: 100 mV approx. Internal Modulation: 1000 Hz. AF Output: Frequency: 1000 Hz. Output Voltage: 2.0 volts rms (open circuit). Power Requirements: Two 9-volt batteries or IPA-5280-1 power supply.



4 Signal Tracer for radio and TV audio circuits

- Compact, service-oriented instrument for troubleshooting AM, FM and TV
- Use it to check microphones, musical instruments, pickups and speakers
- Audible ohmmeter/voltmeter function works usefully as logic tracer

A great addition to your test bench arsenal when troubleshooting defective equipment. A diode-equipped RF probe (furnished with kit) lets you quickly trace receiver and transmitter circuits to reveal component and RF or IF stage failures. Flip the probe to its straight-through DC position so you can track down and pinpoint failing or defective circuitry in all types of audio components. In the audible volt/ohmmeter mode, the IT-5283 changes tone depending on the test point voltage or resistance which allows you to simply and easily isolate problems by following signal flow through logic circuits. Two front panel jacks permit you to use 16 Ω internal speaker for substitution tests.

Kit IT-5283, Shpg. wt. 5 lbs. 49.95

IT-5283 SPECIFICATIONS: Functions: Substitute speaker. AF signal tracing. RF signal tracing. Audible volt/ohmmeter. Speaker: 3" permanent magnet. Power: Two 9-volt batteries and/or IPA-5280 power supply. Dimensions: 11" W x 5 $\frac{3}{4}$ " H x 7 $\frac{3}{4}$ " D.

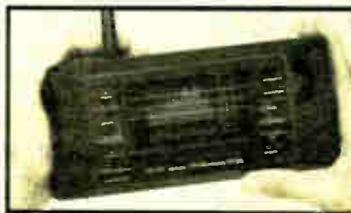
AC Power Supply for all 5280 Series instruments

- Five output cables with connectors supplied for quick, easy bench setup

Power for the 5280 Series: The Heathkit name stands for value—and the IPA-5280 (not shown) confirms it. Provides a well-regulated, + and - 9 volts on your bench, from either 120 or 240 VAC, switchable. Features full wave rectification, capacitor filtering and dual integrated circuit regulators to insure correct voltage output. Powers all 5280 Series equipment on your bench simultaneously. Maximum output current is 100 mA. Size is 3" H x 6" W x 3 $\frac{3}{4}$ " D.

Kit IPA-5280-1, Shpg. wt. 3 lbs. 34.95

NEW Spectrum Analyzer featured in this catalog



Professional test instruments: The new AD-1308 Real-Time Spectrum Analyzer ($\frac{1}{2}$ and 1-octave) and optional AD-1309 Pink/White Noise Generator are two of the finest diagnostic tools available to the serious audio technician or sound engineer. See page 12.

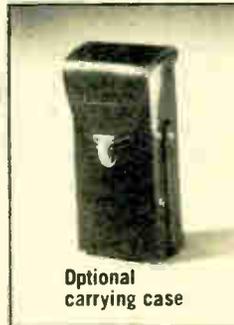
Convenient Hand-held Capacitance Meter with leakage detector and auto-ranging display

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.

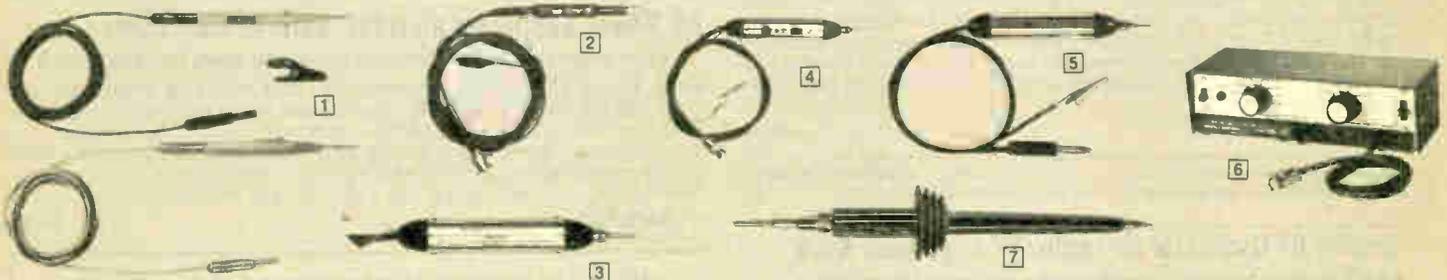
Kit IT-2250, Shpg. wt. 3 lbs. **159.95**

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, 199.9 nF, 19.99 nF, 1.999 μ F, 19.99 μ F, 199.9 μ F, 199.9 mF, 199.9 mF Accuracy: Using Laboratory Standards: 199.9 pF, 199.9 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, 199.9 mF and 199.9 mF ranges $\pm (5\%$ of reading - 1 count) Using Heath Supplied Standards: 199.9 pF, 199.9 nF, 19.99 nF, and 199.9 nF ranges, $\pm (0.75\%$ of reading - 1 count + 0.5 pF); 1.999 μ F, 19.99 μ F, 199.9 μ F and 199.9 mF ranges, $\pm (6\%$ of reading - 1 count). **NOTE:** The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply to a temperature range of 67 to 77 degrees F (19 to 25 degrees C). **Conversion and Display Rate:** For values up to 1999 μ F, less than 1.5 seconds; For values up to 199.9 mF, less than 10 seconds. **Display:** 3½ digit (maximum count, 1999) liquid crystal. **Testing Voltage:** 2.00 VDC maximum; typically varying from 0.6 to 1.4 VDC. **Operating Temperature Range:** 32 to 104 degrees F (0 to 40 degrees C). **Storage Temperature Range:** -4 to -140 degrees F (-20 to -60 degrees C). **Battery Life:** Approximately four to ten hours, in continuous operation. **Battery Indicator:** Displays "LO BAT" warning when battery is down to approximately 5 VDC. **Overall Dimensions:** 2" H x 3¼" W x 7½" L (5.0 x 8.3 x 19.1 cm). **Net Weight:** 16 ounces.

Finest quality instrument accessories



1 Handy, many-purpose Test Lead Set

Includes 2000 VRMS, 20A max, 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, 1 lb. **No longer available**

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.

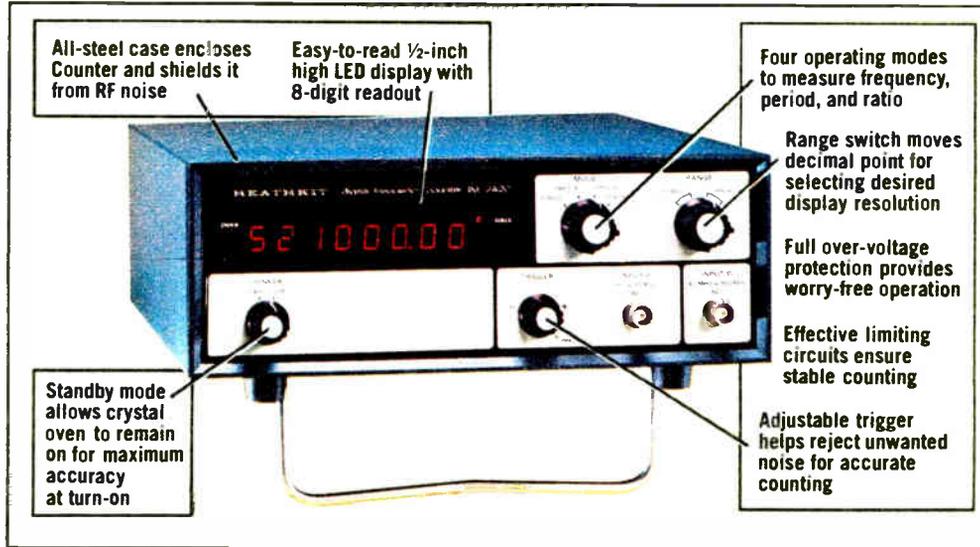
Accurate measurements: A proportionally-controlled crystal oven keeps the internal time base extremely accurate, to within 0.2 part per million (PPM) over a wide environmental temperature range. Plus a high-quality precision crystal in the time base oscillator, give this Counter excellent long-term stability.

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

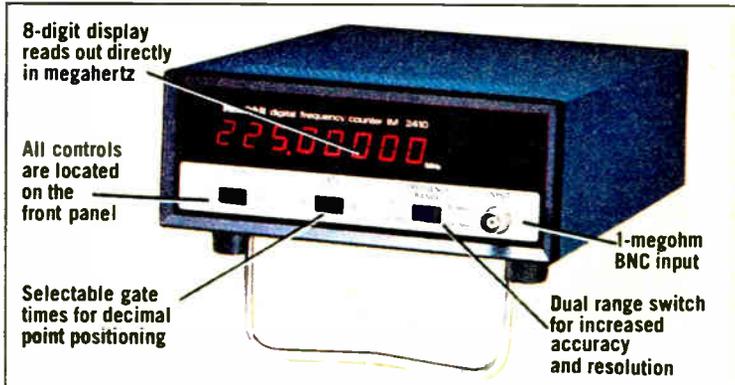
Exceptional accuracy and stability for its price: A highly accurate frequency counter, the IM-2410 measures frequencies down to 1 Hz in the 10 Hz to 50 MHz range and 10 Hz in the 20 MHz to 225 MHz range. And, its crystal-controlled time base supplies an excellent ± 10 PPM long-term stability. You'd expect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

Full-featured
multimeter



Rugged
handheld
design

Includes exclusive
"touch hold" lock-
in function

Deluxe handheld analog and digital multimeter from Fluke®

\$119⁹⁵

- Power-up self-test checks all functions and chirps audible OK
- Manual or autoringing with 0.3% basic DC accuracy
- "Touch-hold" function locks in meter reading when stable

Fluke excellence: Created for design, industrial, service and hobby applications by Fluke, the SM-77 features quality and dependability in an easy-to-use and low-cost multimeter. Its 3¾ digit display measures DC and AC volts in five ranges up to 1000 VDC and 750 VAC, resistance in six ranges up to 32 megohms, and DC and AC current up to 10 amps.

Advanced features: Besides a large and easily readable digital display, this multimeter features an analog bar graph display. It indicates the magnitude of the meter's input which is ideal for readings that change, like, peaking, nulling, and observing trends. An exclusive "touch hold" function lets you lock in readings while you concentrate on your test points. An internal beeper gives you an audible signal while in the diode test and continuity modes. The SM-77

also features manual and autoranging range selection. This allows you to lock into a range or let the meter automatically select its own range.

Further features: The SM-77 uses an LCD display that shows an overload condition, a low battery, and a standby condition in which the display blanks when the meter is unused after an hour.

SM-77, Assembled and tested, 3 lbs. 119.95
SMA-77-1, Soft Carrying Case, 1 lb. 9.95

Fluke is a registered trademark of John Fluke Mfg. Co., Inc.

SM-77 SPECIFICATIONS: DC Volts: Ranges: 320 mV, 3.2 V, 32 V, 320 V, 1000 V. Sensitivity: 0.1 mV (320 mV range). Accuracy: 320 mV-320 V Range: $\pm (0.3\% \text{ of reading} + 1 \text{ digit})$. 1000 V Range: $\pm (0.4\% \text{ of reading} + 1 \text{ digit})$. Input Resistance: 10 megohms. Overload Protection: 1000 V (500 V on 320 mV range only). AC Volts: Ranges: 3.2 V, 32 V, 320 V, 750 V. Sensitivity: 1 mV (3.2 V range). Accuracy: 3.2 V Range (45 Hz - 500 Hz): $\pm (2.0\% \text{ of reading} + 2 \text{ digits})$. Input Impedance: 10 megohms shunted by approx. 50 pF. Overload Protection: 750 VAC. Ohms: Ranges: 320, 3200, 32K, 320K, 3.2M, 32M. Sensitivity: 0.1 ohm (320 range). Accuracy: 320 Range: $\pm (0.5\% \text{ of reading} + 2 \text{ digits})$. 32M Range: $\pm (2.0\% \text{ of reading} + 1 \text{ digit})$. Power Supply: Single standard 9V battery.

Rugged and
compact case

Easy one-handed
operation



Extremely
accurate
performance

Inputs are fuse and
diode protected

Economical IM-2215 provides bench-meter features and accuracy

\$99⁹⁵

- Easy, fingertip control of ranges and functions
- Checks semiconductors and in-circuit resistances
- Basic 0.25% DC accuracy when set to lab standards

Digital multimeter: The IM-2215 supplies you with all the advantages of a DMM: a large and easily read display, high accuracy and resolution, and superior overload protection. It features auto zero, auto-polarity, and automatic decimal point placement. It has DC/AC volts and amps, and resistance measurement ranges with superior overload protection on all ranges. Plus, the IM-2215 maintains a high 10 megohm input resistance on DC/AC volts ranges to eliminate circuit loading when measuring in-circuit values.

Status indicators: The large 3½ digit liquid crystal display continuously keeps you informed of the meter's operational status by showing overload, low battery, or normal operation.

More features: Built-in references enable you to cali-

brate the IM-2215 and maintain its accuracy.

DC or AC operated: For portable operation, the IM-2215 can be powered by an ordinary 9-volt transistor battery (NEDA #1604, not supplied). A typical alkaline battery provides approximately 200 hours of operation. For bench operation, you can also operate the multimeter from line voltage using an optional PS-2350 120 VAC converter listed below.

Kit IM-2215, Shpg. wt. 2 lbs. 99.95
SM-2215, Assembled and tested, 2 lbs. 129.95
IMA-2215-1, Rugged leather Carrying Case with belt loop, Shpg. wt. 1 lb. 14.95
PS-2350 Battery Eliminator: Allows IM/SM-2215 to operate from 120 VAC, Shpg. wt. 1 lb. 7.95

IM/SM-2215 SPECIFICATIONS: DC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 1000 V. Accuracy: Lab Standards: $\pm 0.25\% \text{ of reading} + 1 \text{ count}$ (SM-2215, $\pm 0.1\%$). Built-in Standards: $\pm 0.35\% \text{ of reading} + 1 \text{ count}$. AC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 750 V. Accuracy: Lab Standards: $\pm 0.5\% \text{ of reading} + 3 \text{ counts}$. Built-in Standards: $\pm 0.6\% \text{ of reading} + 3 \text{ counts}$. DC and AC Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA. Basic Current Accuracy: 0.75% (DC), 1.5% (AC). Resistance: Ranges: 200, 2 K, 20 K, 200 K, 2000 K, 20 M. Basic Resistance Accuracy: 0.25%. Dimensions: 2" H x 3¾" W x 7¼" L.

IM-2400 Counter easily checks installed mobile transmitters

\$139⁹⁵

- High sensitivity allows very low signal pickup
- Crystal oscillator maintains excellent counter accuracy
- Rechargeable batteries are included for true portability

Wide range: The IM-2400 quickly and easily measures frequencies between 50 Hz and 512 MHz in two ranges. This makes it ideal for checking the output frequencies of mobile car, boat, and plane transmitters. And, the seven digit LED display of the counter gives an excellent resolution of 10 Hz in the low 50 Hz to 50 MHz range and 100 Hz in the counter's upper 40 to 512 MHz frequency range.

High sensitivity: The IM-2400's guaranteed sensitivity is 25 mV RMS (10 mV RMS, typical).

DC/AC powered: Five rechargeable 1.2 VDC nickel-cadmium "AA" size batteries are included with the counter to provide hours of operation on a single charge. To recharge these batteries or use AC power, the PS-2404 or PS-2405 Eliminator is used.

Kit IM-2400, Shpg. wt. 3 lbs. 139.95
SMA-2400-1, Telescopic Antenna: Assembled and includes BNC connector, Shpg. wt. 1 lb. 9.95
Battery Eliminator/Charger for IM-2400: For 120 VAC meter operation and charging of batteries.
PS-2404, Assembled, Shpg. wt. 1 lb. 7.95
Battery Eliminator/Charger for IM-2400: For 240 VAC meter operation and charging of batteries.
PS-2405, 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: $\pm 1 \text{ part per million (PPM)}$. Temperature Stability: $\pm 10 \text{ PPM}$ from 0 degrees C to 40 degrees C. General: Gate Time: 1.0 second or 0.1 second, switch selectable. Resolution: 50 Hz to 50 MHz, 10 Hz with time base set at 1.0 second or 100 Hz at 0.1 second, 40 MHz to 512 MHz range, 100 Hz with time base set at 1.0 second or 1 kHz at 0.1 second. Dimensions: 198" H x 338" W x 838" L.

Handheld counter
goes anywhere

Excellent
sensitivity



Rugged and
compact case
is ideal for
field checks



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

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 3 1/2 digit display show 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 use a low 0.2 volt resistance test voltage.

AC or battery powered: Six "C" batteries or a PS-2404 Battery Eliminator (p. 26).

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 8 1/2" W x 11" D.

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

ONLY
\$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 0.5 s to 10 ns 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 7 1/4" W x 9 1/2" D.



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

INSTRUMENTS/27

A high performance 60 MHz scope with digital display accessory

- Hook up one oscilloscope scope probe to view a waveform, then at the same time read on the digital display its frequency, period, pulse width or the averaged \pm DC voltage at that point
- Mark any portion of a displayed waveform on the oscilloscope for an instant direct readout of its period, frequency or pulse width
- Measure up to \pm 1000 volts OC using separate isolated inputs on the module
- An external, viewable, triggered input adds versatile triple trace viewing capability
- A 60 MHz bandwidth and fast 7 ns vertical rise time allows waveform viewing above 90 MHz
- Dual input channels with 2 mV/cm sensitivity, inverting switch and algebraic add function
- Internal vertical delay lines ensure waveforms will be completely displayed
- A sync separator for stable viewing of composite video TV signals

IO-4360 Scope with optional IOA-4200 Module

NEW IO-4360 60 MHz Triple Trace Oscilloscope and optional IOA-4200 Time-Voltage Module

\$999⁹⁵

Compare the 'all in one probe' measurement capability of Heath's new top-of-the-line scope and companion voltage-frequency module with the competition, and see our value. Yes, you can pay more for a 60 MHz scope somewhere else, but you won't buy any more features, versatility or money-saving self-servicability than is found in the IO-4360.

Multi-trace oscilloscope: Two of the IO-4360's channels are controlled by an attenuator network of 12 calibrated ranges from 2 millivolts/cm to 10 volts/cm. This provides you with the needed sensitivity to make low signal measurements within an accuracy of 3% using AC or DC coupling. The IO-4360's third trace, available at the external input, can be viewed by simply pressing the TRIPLE trace button. For added versatility, Channel 2's input signal can be inverted and "added" to Channel 1's signal for making differential measurements.

Extra wide DC to 60 MHz bandwidth: The IO-4360 provides you with the bandwidth needed to view waveforms in both digital and analog circuits. Even though this multi-trace scope has a specified bandwidth of 60 MHz, signals up to and beyond 90 MHz can be displayed on its 8 x 10 cm screen.

Sweep control: Besides providing the sweep speeds to observe fast logic pulses, the IO-4360 also supplies a delayed sweep for fast and accurate timing measurements. Internal vertical delay lines ensure that the horizontal sweep starts at the beginning of the input signal. This permits you to view a complete vertical waveform. With its very fast 7 ns rise time, rapid rise-time signals are faithfully reproduced. Also providing sweep control is the calibrated time base. It ranges from 0.1 second/cm to 100 ns/cm in a 1-2-5 stepped sequence. And, any sweep speed can be expanded 10 times by simply pulling a switch. A delayed sweep allows you to see the leading edge of a waveform as well as select the exact portion of a waveform for expansion by any factor you desire.

Complete trigger system: The oscilloscope can be triggered from either one of the vertical input channels, line voltage, or from an external trigger which is also the input for the third trace. A filter network allows you to choose the AC, DC, low or high frequency component of a signal to be used for triggering the scope. This filter network also allows you to reject either the horizontal or vertical sync pulses of TV signals when using them for triggering on video waveforms. Fine trigger adjusting is done with a precise level control. When a trigger signal isn't used, the baseline can be automatically displayed by using the scope's automatic mode.

Kit IO-4360, Shpg. wt. 41 lbs. 999.95
Save \$50.00 and purchase both the IO-4360 Scope and IOA-4200 Module.

IO-4360, Shpg. wt. 48 lbs. Separately 1349.90 ONLY 1299.90

IO-4360 SPECIFICATIONS: Display Modes: Y1, Y2, Add (Y1 \pm Y2), Dual trace, Triple trace, Alt/Chop. **VERTICAL:** (CH. Y1 and Y2): Deflection Factors: 2 mV/cm to 10 V/cm, 12 steps in a 1-2-5 sequence; continuously variable to approx. 30 V/cm. Accuracy: Within 3%. Bandwidth: DC to 60 MHz (5 mV to 10 V/cm); DC to 50 MHz (2 mV/cm). Rise Time: 7 ns or less. Delay Line: Allows at least 20 ns of pretriggered waveform display. CH. Y3: Sensitivity: 200 mV/cm or 2V/cm. Response: DC to 25 MHz. Rise Time: <14 ns. Accuracy: Within 3%. **HORIZONTAL: Display Modes:** A, A int, B, and B. **Time Base Ranges:** 100 mS/cm to 0.1 μ S/cm, 19 steps in 1-2-5 sequence; continuously variable to approx. 300 mS/cm. Accuracy: Within 3%. **Magnifier:** Times ten. **TRIGGERING: Sources:** Y1, Y2, EXT. Line. Coupling: AC, DC, AC-HF, AC-LF, TV-V, TV-H. **Modes:** Automatic baseline, Normal, Single Sweep. **Hold Off:** Variable, including 'B-ends-A' position. **GENERAL: Internal Calibrator Accuracy:** 1v p-p. within 2%. **CRT:** Mesh-expanded with 8 x 10 cm internal graticule. **Accelerating Potential:** 10 kV regulated. **External Z Axis:** continuous y adjustable. **Power Requirements:** 108-132 or 216-264 VAC, 50/60 Hz. **Dimensions:** 6" H x 11 1/2" W x 18" D, with handle folded. Complete specifications are available by calling the Heath Co. at 800-253-0570 or requesting ONLY the IO-4360 specifications on catalog order form.

Auto-ranging Time-Voltage Module increases capability



Add-on Time-Voltage Module: Used only with the IO-4360 Oscilloscope, the versatile IOA-4200 provides a 3 1/2 digit display of time, frequency or DC voltage measurements made with the scope's probe. Inputs are also provided on the IOA-4200 for making external voltage measurements up to \pm 1000 volts DC. Bright LEDs are used to show all measurements with an automatic "-" being displayed for negative DC voltages. Low-profile cabinet mounts easily to scope.

Kit IOA-4200, Shpg. wt. 7 lbs. 349.95

IOA-4200 SPECIFICATIONS: TIME: Ranges: \pm 1.0 S to \pm 2.0 μ S (1, 2, 5 fullscale sequence). **Basic Accuracy:** \pm 2% reading, \pm 1 count. **FREQ: Ranges:** \pm 1.0 Hz to \pm 0.5 MHz (1, 5, 2 f.s. sequence). **Maximum Display:** 19.99 Hz on 100 mS to 19.99 MHz on 0.2 μ S. **Accuracy:** \pm 3%, \pm 1 cnt. **VDC (internal): Ranges:** \pm 0.2V, 2V on 2 mV to 50 mV; \pm 2V, 20V on 100 mV to 0.5V; \pm 20V, 200V on 1V to 10V; auto-ranging. **Accuracy:** \pm 1.0% (.75)%, \pm 2 cnts. **EXT VDC: Ranges:** 2V to 2000V; auto-ranging. **Basic Accuracy:** \pm 0.5 (.25)%, \pm 1 cnt. **GENERAL: Display:** 3 1/2 digit, LED. Automatic minus for negative, positive implied. **Dimensions:** 1 1/2" H x 10 3/4" W x 9 3/4" D. *Time and Frequency functions require calibration. Accuracy specs are for built-in calibration. Numbers in parentheses are for laboratory standards calibration.



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

Heathkit's IO-4235 laboratory-grade oscilloscope with outstanding features at a very low price

\$899⁹⁵
Kit

- Wide 35 MHz frequency range with practical observation of frequencies above 50 MHz
- Dual trace capability with individual amplitude control
- Delayed sweep for examining an expanded waveform
- Precisely trigger at any point on the slope of a signal
- Fast 10 nanosecond vertical rise time for observing complex and short duration signals

Dual-trace oscilloscope: The IO-4235 is a top performer that can monitor two inputs simultaneously. Each channel has a 12-step calibrated attenuator ranging from 2 mV/cm to 10 V/cm. Either or both inputs can be inverted which allows both signals to be algebraically added for observing differential signals.

Wide bandwidth: Although the IO-4235 has a specified bandwidth of DC to 35 MHz, you can still observe signals above 50 MHz because of the oscilloscope's smooth rolloff. And, the IO-4235's very fast 10 nanosecond rise time ensures faithful signal reproduction. Also, internal vertical delay lines make sure that the horizontal sweep always starts from the beginning of the waveform to allow you to see a complete waveform as well as its critical leading edge.

Calibrated time base: The IO-4235 features a 21-position time/cm switch that allows selection of sweep speeds from 0.2 s/cm to 50 ns/cm in a 1-2-5- setp sequence. In addition, any sweep speed can be expanded 5 times for closer waveform observation. And, using the oscilloscope's delayed sweep, any portion of a waveform can be selected and expanded by any factor you desire.

Triggered control: Beside featuring precise trigger control, the IO-4235 also offers several different triggering options including: line frequency, channels 1 or 2, or a signal from an external source. Other trigger control switches affect the input bandpass, cutting off unwanted low frequencies for triggering on only fast AC signals. A unique TV coupling feature rejects high frequency signals and triggers on alternate field signals when you are viewing vertical field TV signals. Also, an automatic or normal baseline can be displayed.

Kit IO-4235, Shpg. wt. 52 lbs. 899.95

LAST CALL: Limited quantities of the assembled and tested SO-4235 35 MHz Dual Trace Oscilloscopes are available. Shpg. wt. 38 lbs. 1370.00

Portable IO-3220 20 MHz Dual-Trace Oscilloscope takes bench scope features into the field

\$699⁹⁵
Kit

- Dual-trace ability for monitoring or comparing signals
- Wide 20 MHz bandwidth and fast 18 ns vertical rise time
- Full X-Y operation with external signal Z-axis input
- Triggered sweep for controlling the displayed signal
- Full portable operation with optional battery pack which is recharged by an internal battery charger

Laboratory-grade instrument: The IO-3220 packs into its small case all the features of oscilloscopes used in laboratories and service shops. Its two channel input lets you control trace size and position. A 1-2-5 stepped attenuator for each channel has 12 calibrated ranges from 2 mV/division to 10 V/division. The inverting second channel allows algebraic addition of two signals in the scope's ADD function. This portable scope also features calibrated time-base ranges from 0.1 s/division to 100 ns/division, also in a 1-2-5 step sequence. In addition, a calibrated 1 V P-P square wave signal is available through a front panel connector.

Versatile triggering: To precisely stop a signal at any point along its positive or negative slope, you use the IO-3220's trigger switch and level control. Also use auto baseline, and different low or high frequency triggering. Even select external triggering to trigger the trace from any waveform. A X5 magnifier is available to expand your trace for closer examination.

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: Attaches to scope and includes two 4.5 foot PKW-105 X1/X10 Oscilloscope Probes.

IOA-3220-1, Shpg. wt. 1 lb. 59.95

Rechargeable Gel-Type Cell Battery Pack for IO/SO-3220 Portable Oscilloscope: Provides a minimum of two hours continuous operation from a full charge. Batteries are recharged when the scope is in the charging mode or automatically recharged while the scope is operating from AC line voltage.

IOA-3220-2, Shpg. wt. 7 lbs. 44.95

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

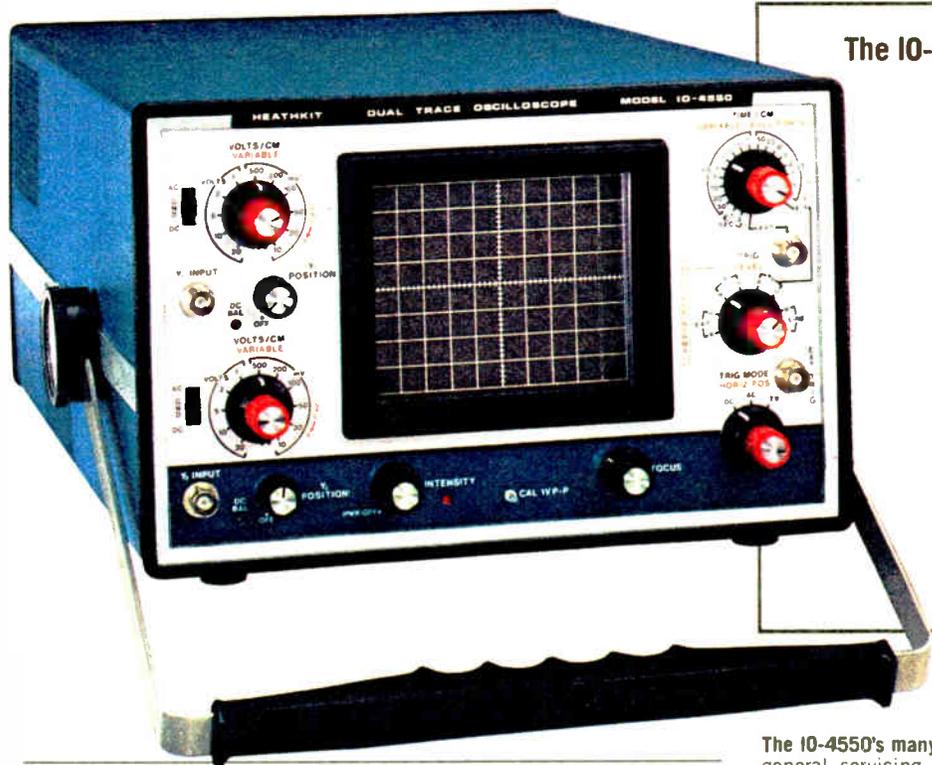


IO/SO-4235 SPECIFICATIONS: VERTICAL: Sensitivity: 2 mV/cm to 10 V/cm. Positions: 12 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3% (20 to 30 degrees C); Within 5% (10 to 40 degrees C), referred to 1 V/cm. Vertical Response: DC Coupling: DC 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) referenced to 1 ms/cm. Magnifier: X5 (Accurate to within 5%, 20 to 30 degrees C; Within 7%, 10 to 40 degrees C). External Horizontal: Sensitivity: Approximately 0.1 V/cm Impedance: 1 megohm. TRIGGER: Source: Y1, Y2, External or line. Coupling: AC, DC, AC Fast, TV. Modes: Automatic baseline, normal, single sweep. Hold Off: Variable, including a "B ends A" position. External Trigger Sensitivity: 100 mV at 50 MHz. Input Impedance: 1 megohm, shunted by 30 pF. GENERAL: CRT: TYPE: 8 x 10 cm mesh with internal graticule. Phosphor: P31. CRT Acceleration Potential: 10 kV, regulated. Z Axis: Full On to Full Off: 0 to 5 volts. Positive Input Impedance: 5 kilohms. Power Supplies: Fully Regulated. Power Requirements: 120/240 VAC, 50/60 Hz, 85 W (at 120 VAC). Overall Dimensions: 7 3/4" H x 13 3/4" W x 2 1/4" D with handle folded.



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 (\pm). External (\pm), Line (\pm). Modes: AC, DC, Low-Frequency Reject, High-Frequency Reject (Automatic baseline in absence of trigger when in auto mode). Sensitivity: Automatic. Adjustable over 10 divisions; Normal, Adjustable over 10 divisions; External, Adjustable over 0.8 volt in either auto or normal mode. Input Impedance (External): 1 megohm shunted by approximately 100 pF. Z Input: Full On to Full Off: 0 to 5 volts. Maximum Input: 5C volts peak.

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. **Overhoot:** Less than 5%. **Attenuator:** Vertical Input: Impedance: 1 megohm, shunted by 38 pF. **Maximum Input:** 400 volts peak, combined AC and DC. **Connector:** BNC. **Modes:** Single, Y1 or Y2 selected by position control; Dual, Chopped (200 kHz) or alternate automatically selected by time/cm switch. **HORIZONTAL:** Time Base: Ramp: 200 ns/cm to 0.2 s/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 s/cm. Accuracy: 3%. **Magnifier:** X5 (adds additional 2% to sweep accuracy). **EXTERNAL:** Sensitivity: Approximately 0.1 V/cm. Impedance: Approximately 100 kilohms. Polarity: Positive input causes right-hand deflection. **Frequency Response:** DC to 1 MHz. **Connector:** BNC. **Trigger:** Internal: Automatic; Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. **Slope Selection:** + or -. **Impedance:** 1 megohm, shunted by 40 pF. **Connector:** BNC. **X-Y: Y Channel:** Same as vertical. **X-Channel:** Same as vertical, except response is limited to 1 MHz. **GENERAL:** Operating Temperature Range: 50-104 degrees F (10-40 degrees C). **Power Requirement:** 120-240 VAC, 50-60 Hz, 70 watts. **Overall Dimensions:** 6 7/8" H x 12 7/8" W x 19 1/4" 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. Exacting 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 24, or the new IG-4244 Precision Calibrator on page 27.

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	Compatible with Time-Voltage Module	CRT
IO-4360	3	DC-60 MHz 7 ns	2 mV/cm to 10 V/cm	0.1 s/cm to 100 ns/cm	✓	✓	✓	✓	✓	✓		✓	8 x 10 cm, mesh-expanded internal graticule
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 aids in alignment or troubleshooting. Added together, the IO-4205's dual-trace feature, excellent 10 mV/cm vertical input sensitivity and 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. 24), the IG-4244 Precision Oscilloscope Calibrator (p. 27) or other source of fast square waves is required to calibrate the kit-form IO-4205. Both the kit and assembled 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



See page 24 for recommended probes and accessories.

applications. The triggered horizontal sweep circuit and the many other 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 the IG-4244 on p. 27).

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



See page 24 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 HSG-1120-21 All-In-One kit computer shown with green CRT and second 5.25-inch drive installed



2 ZW-110-32 with ZVM-123 Monochrome Video Display



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
- LOTUS 1-2-3 software included with all ZF and ZW models

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. 32) 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. 33)

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 operation, 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. 34). For the storage capacity necessary for large accounting, inventory or technical jobs, an internal 11-megabyte Winchester (pg. 33) 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 MPI-99 or the MPI-150 (pg. 43).

Software solutions for everyone: With either Z-DOS/MS-DOS (included with all H/Z-100's) or CP-M operating system (pg. 34), 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 34-36 and pages 45-47. For the H/Z-100's 8-bit side, see software on pages 48-55. To learn more about Z-DOS/MS-DOS, see page 57 for the EC-1121 MS-DOS Course.

- Heathkit 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**
- Heathkit 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**
- Heathkit 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**

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



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.

HeathKit

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

DATA SYSTEMS

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

DATA SYSTEMS

ZF-110-22, Assembled Low-Profile Computer, Color graphics, 128 KB 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**

Z-204, Multiport Serial Circuit Board, Shpg. wt. 3 lbs. **395.00**

Z-204-1, DTE Serial Cable, Shpg. wt. 1 lb. **12.00**

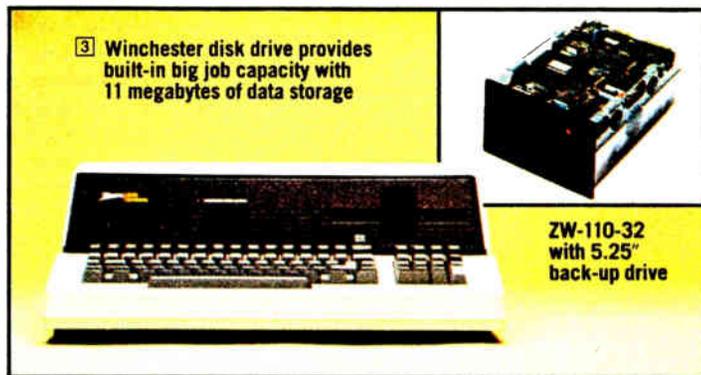
Z-204-2, DCE Serial Cable, Shpg. wt. 1 lb. **12.00**

Z-204-3, Parallel Cable, Shpg. wt. 1 lb. **12.00**

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 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. 68 lbs. **5599.00**

NEW! HS-217, Winchester Upgrade Kit: Kit contains the controller and data separator boards, and an assembled and tested Winchester disk drive. The hard disk controller board installs in one of the H-100's S-100 expansion slots and the Winchester drive fits in one of the 5.25" disk drive locations. Kit includes all mounting hardware, complete documentation, and step-by-step installation instructions. Also includes four utility programs on a diskette for formatting. Upgrade kit is for use with H-100 Computers only. For Z-100 Computer use, contact Heath Customer Service.

HS-217, Shpg. wt. 30 lbs. **1799.00**

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

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

Any three individual Heath/Zenith software packages. This also applies to the powerful PeachText 5000 and LOTUS 1-2-3™ business packages described on page 36.

Two Z-219-1 Color Chip Sets: Adds color video (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

Add up to 2.5 megabytes of extra data storage capacity with the external H-207 Disk System

As low as
\$999⁰⁰
for a one-drive
system

- Factory configured to operate with H/Z-100 Computers
- Expands on-line storage capability with one or two high-capacity 8-inch disk drives
- Self-contained Floppy Disk System provides its own power without burdening Computer power supply
- Uses the latest technology for reliable data storage

Increased on-line data storage: With the option of one or two eight-inch disk drives, the H-207 Floppy Disk System offers up to 2.5 megabytes of data storage for your H/Z-100 Computer. Each mass-storage disk drive stores up to 1.262 megabytes of information on the two sides of an 8-inch double-sided double-density diskette. If you purchase only one disk drive, you can easily add a second drive at any time in the future to increase your data storage capability.

Simple installation: To install the Eight-Inch Drive Accessory, just connect its 50-conductor flat cable to the host computer. The H-207 System is self-contained and requires no power from the computer. AC power is supplied through a detachable line cord. For more reliable operation, a built-in line filter attenuates line transients and reduces AC line noise.

High performance and reliability: The eight-inch drives used in the H-207 conserve space and provide exceptional performance. Because each drive is half the height of one industry-sized 8" drive, two drives easily occupy the Disk Drive Accessory. Average access time is a speedy 90 milliseconds (ms) with a 3 ms track-to-track access time. While data is read very fast, less than one hard read error occurs for every trillion (10¹²) bits read.

Best solution: For a compact and reliable maximum-storage capacity system, the H-207 Disk Accessory satisfies all needs. It provides quiet operation and a low heat dissipation. Improved data security is insured with a diskette notch-detecting transducer and a front-panel locking lever. Kit includes an easy-to-follow Heathkit assembly manual. The Floppy System (with two drives) requires 1.2 amps at 125 VAC and measures 13 3/4" W x 20 1/2" D x 7 3/4" H.

Matches styling of
H/Z-100 family of
desktop Computers

HS-207-42 with two 8" disk drives



Heathkit

HS-207-41, Eight-Inch Floppy Disk System with one disk drive and capable of storing 1.25 megabytes (MB) of data on a double-sided double-density diskette, Shpg. wt. 57 lbs. **999.00**

Heathkit

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

Data Systems

Z-207-41, Assembled and tested single drive Eight-Inch Floppy Disk System with 1.25MB storage, 53 lbs. **1599.00**

Data Systems

Z-207-42, Assembled and tested Eight-Inch Floppy Disk System with two disk drives and 2.5MB storage, 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**

Ready-to-run software for the H/Z-100 family of Computers that's both powerful and easy to use

Heath Company supports your H/Z-100 Series Computer with quality software as well as hardware and peripherals. On pages 34 through 36 and 44 through 47 you'll find operating systems, languages and application programs that are ready to run on your H/Z-100 Computer. All this software is supplied on soft-sectored, 48 TPI (tracks per inch) 5.25" floppy diskettes. And, each piece of software includes a comprehensive and easy-to-understand operating manual. Whether you're an experienced user or a first time user, you'll find that each manual is a useful tool in learning how to use the accompanying software.

General Purpose Operating System: Able to manage up to a full megabyte of memory, CP/M-86 allows software programs to take full advantage of the H/Z-100's 8088 address space. All H/Z-100 5.25," 8" and Winchester disk drives are supported under CP/M-86. Also, all necessary utility programs are included for creating and editing text and data files.

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

16-bit MS-DOS™/Z-DOS™ and standard 8-bit CP/M®

- Both MS-DOS/Z-DOS and CP/M operating systems efficiently handle disk files and support many peripherals

MS-00S/Z-00S, included with each H/Z-100 Computer purchase, is a fast and flexible operating system that expands to meet your growth requirements. It permits a multitude of alternatives as supported by the H/Z-100 System's hardware. It also has device-independent input/output, advanced error recovery, variable length records and full program relocatability. And, it enables you to create, analyze and manipulate files with extensive utility tools. With MS-DOS/Z-DOS, run fast 16-bit programs like Z-BASIC™ and Multiplan™

OS-63-4, MS-DOS/Z-DOS, Version 1.25, Shpg. wt. 5 lbs. **150.00**

CP/M, an 8-bit operating system for H/Z-100 Computers, allows access to the largest base of software programs now available. Includes necessary utility tools.

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

NEW CP/M-86™ an H/Z-100 16-bit operating system

- Efficient and powerful, CP/M-86 manages the full 768 kilobytes of the H/Z-100 Computer's memory

CP/M-86, designed for the 8086/8088 microprocessor, is an efficient and powerful operating system that supports small to complex application programs. It has a file structure compatible with that of 8-bit CP/M and allows application programs to be easily converted for running under CP/M-86.

Graph and analyze company data using the H/Z-100 and Z-Chart™ to help make proper business decisions

- Create graphs with data entered from a number of different sources
- Design and display bar, pie, side bar, line, multiple pie, trend line and three-dimensional bar charts
- Display individual graphs on-screen, or on an optional printer or plotter
- Create your own slide show in a presentation with a group of graphs



Easy to use: Z-Chart is a series of programs for producing graphs that requires little or no computer experience. In three steps you can create charts with your own data or data entered from several other applications programs.

Requirements: Running Z-Chart requires an H/Z-100 computer using Z-DOS (at the left) and Z-BASIC (p. 35), 128 KB of RAM and one 5.25" disk drive.

CB-463-11, Z-Chart Graphics Package, Shpg. wt 3 lbs. **150.00**

NEW! Software Directory, H/Z-100 Series, 2nd Edition, lists more than 475 programs that operate on the H/Z-100 Desktop Computer. All software is listed alphabetically in categories (Accounting, CAI/Education). Each listing contains a description of the product, vendor's name, address and phone number.

CB-463-15, H/Z-100 Software Directory, Shpg. wt. 3 lbs. **25.00**

Z-DOS, Z-BASIC and Z-Chart are trademarks of Zenith Data Systems Corp. MS-DOS and Multiplan are trademarks of Microsoft, Inc. CP/M and CP/M-86 are trademarks of Digital Research, Inc.



Microsoft™ BASIC-80 – an excellent 8-bit interpreter with IF-THEN-ELSE control structure



- Features a full set of built-in functions and a group of special functions including PEEK and POKE

Many programming advantages: Microsoft BASIC is a very extensive application of 8-bit BASIC. It has many enhancements including sequential and random file manipulation plus direct access to CPU ports and memory locations. Commands and statements include an IF-THEN-ELSE control structure which allows execution of conditional statements. String and numeric constants can be used while a full range of logical and mathematical operators are available for additional user convenience. Extensive editing and output capabilities are also available with this interpreter.

Hardware and software requirements: To run BASIC-80, the only hardware needed on an H/Z-100 is one 5.25-inch floppy disk drive. For printouts, a printer is required. BASIC-80 is designed to run under CP/M™ version 2.2.

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

Heath offers different programming languages and compilers to all H/Z-100 computer users



For home, hobby, scientific, mathematical or business-related uses, you'll find a programming language or compiler on this page to fit your specific needs. They meet the experience level and the needs of both the sophisticated and the entry level user. The software includes easy-to-read manuals with instructions on their use and operation.

Z-BASIC™ – a 16-bit color interpreter for the H/Z-100

High-level and easy-to-use language: With many more commands and features than previous versions of BASIC, Z-BASIC is designed for both users with little programming experience and experienced computer programmers. It accomplishes many functions with only a few ordinary English statements which are easy to learn and to use. An H/Z-100 and MS-DOS™/Z-DOS™ are required.

MS-463-1, Z-BASIC, Version 1.1, Shpg. wt. 5 lbs. 175.00

Microsoft FORTRAN – for scientists and engineers

FORTRAN Compiler accepts programs written according to the ANSI X3.1978 standard. Rigorous syntax rules permit the user to fully define the characteristics of the solution to a problem in a series of precise statements. Therefore, a general understanding of FORTRAN is recommended. FORTRAN uses one disk drive in an H/Z-100 (two are recommended), 192K RAM and MS-DOS/Z-DOS.

MS-463-2, Microsoft FORTRAN-86, Shpg. wt. 4 lbs. 195.00

Microsoft COBOL – powerful, business language

COBOL Compiler, certified to be in compliance with the ANSI X3.23-1974 standard, has many standard features plus extensions designed to make it more useful. Built-in utilities also extend the versatility of this language. Required is an H/Z-100 Computer with one disk drive (two are suggested) and MS-DOS/Z-DOS.

MS-463-3, Microsoft COBOL-86, Shpg. wt. 3 lbs. 395.00

Z-BASIC Compiler – increases program execution speed

Microsoft's Z-BASIC Compiler complements the Z-BASIC Interpreter (above) to provide an extremely powerful BASIC programming environment. Quickly run and debug a program with the Interpreter then compile the program to increase its execution speed and reduce its space in memory. The Compiler requires an H/Z-100 with one disk drive (two are recommended) and MS-DOS/Z-DOS.

MS-463-4, Microsoft Z-BASIC Compiler-86, Shpg. wt. 3 lbs. 250.00

Pascal Compiler – high-level programming advantages

Pascal Compiler is a highly extended version of the Pascal language. Some of these extensions are structured constants, variable length strings, super arrays, string reads, separate and conditional compilation, and more. These extensions make for easier systems programming as well as applications programming. The Compiler can be used on an H/Z-100 Computer using one disk drive (although two drives are recommended), 192KB of RAM and MS-DOS/Z-DOS.

MS-463-5, Microsoft Pascal-86, Shpg. wt. 4 lbs. 295.00

Multiplan™ – a 16-bit electronic spreadsheet program for the H/Z-100 Series Computer



- Powerful modeling and presentation capabilities for use in analysis, forecasting, and budgeting
- Easy to learn and to use with on-line reference guide and plain-English commands

Electronic worksheet: Multiplan is a giant worksheet grid of up to 255 rows long and 63 columns wide. It can be set up with titles and numbers and any entry can be a number, word, or formula. However, Multiplan's real power lies in its ability to automatically

perform calculations. Because Multiplan remembers the relationship between entries on the worksheet, "what if" questions can be easily answered to test out plans and to prepare forecasts. Alter a number and watch your figures change.

Interactive: With Multiplan, you can link several worksheets to allow an exchange of information. When one is changed, the others are also affected which permits sensitivity analyses, budget and resource planning, and more effective scheduling. Also, as many as eight parts of a worksheet can be displayed on-screen at the same time for an easier overview of your financial system.

Flexible: Among the many operations of Multiplan, you can change the screen display by widening or shrinking columns and using upper and lower case letters. As necessary, instantly move, insert, or erase data. Center titles or left and right justify them or choose to align text left and numbers right. Besides any arithmetic operation, you can use Boolean algebra, trigonometric functions, scientific notation, rounding off, and dollar and percent formats.

Support: While you're using Multiplan, a main menu is displayed at all times at the bottom of the screen. Further assistance is always available by accessing a special help menu which further explains about the commands. Multiplan's operation and instructions in its use are detailed in a well-written two-volume manual set which has an excellent table of contents. Volume 1 introduces Multiplan in a tutorial manner with simple steps and many practical examples. At the end is a comprehensive glossary and index for a quick means of referencing extra information on many subjects. Volume 2 explains in depth about worksheets, editing, and entering commands with a detailed description of all commands. Completing Volume 2 are appendices containing important additional information and a quick reference guide which summarizes Multiplan.

Hardware and software requirements: Running Multiplan on an H/Z-100 requires one disk drive and the MS-DOS/Z-DOS operating system (page 34). An optional printer is required for hard copy printouts of reports.

MS-463-7, Multiplan, Shpg. wt. 6 lbs. 250.00

SuperCalc™ – a powerful electronic spreadsheet for budgeting, estimating and financial forecasting



- A 16-bit problem-solving tool for all types of business and financial applications
- Program's simplicity and practicality complements the H/Z-100 Computer's features and flexibility

SuperCalc provides a superior worksheet with up to 254 rows and 63 columns where numbers and text can be examined and altered. This spreadsheet features numerous mathematical functions and the ability to protect any number of cells from being altered. Also available are additional formatting and printing options.

Support: Even though SuperCalc is simple and straightforward, a built-in help function can be called on at any time at the press of a key to display a summary of commands. SuperCalc's documentation contains a number of sections directed towards users with different levels of experience. The beginners section uses examples supplied on disk to explain most commands and functions.

Hardware and software requirements: SuperCalc for the H/Z-100 Computer requires one disk drive and the MS-DOS Z-DOS operating system (page 34).

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

MS-DOS, Microsoft and Multiplan are trademarks of Microsoft, Inc. CP/M is a registered trademark of Digital Research, Inc. Z-DOS and Z-BASIC are trademarks of Zenith Data Systems Corp. SuperCalc is a trademark of Sorcim Corporation.

More 16-bit software for the H/Z-100 Desktop Computer, and the expanded ETA-100 Learning Computer, can be found on page 36 and pages 45 through 47. For the H/Z-100's 8-bit side, see pages 48 through 55.



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

LOTUS 1-2-3™ – features a spreadsheet, database and graphics system within a single program

- One of the most powerful programs available for the H/Z-100
- The largest and most advanced electronic worksheet yet developed
- Powerful and flexible graphing tools for plotting data
- Over 200 on-screen help messages at the touch of a key



1-2-3 combines three important electronic aids to decision making in one fast, easy-to-use business package. These three functions perform interactively and instantly at the press of a key.

Spreadsheet: For analysis and forecasting, 1-2-3 uses an electronic worksheet 2048 rows by 256 columns, large enough to handle the most complex jobs. The spreadsheet is fast, up to 50 times faster than other spreadsheets. It allows complete control of formatting and uses plain-English formulas. And, it provides virtually every financial and statistical function you'll ever need.

Information management: 1-2-3's electronic filing system allows you to accumulate, organize and cross index up to 2047 records which can be queried according to 32 criteria. You can sort your material, then, if you like, run a secondary sort. The file manipulation system is completely menu driven and can instantly combine with information from the keyboard-accessible spreadsheet.

Graphics: 1-2-3's sophisticated graphing program enables you to produce bar, stacked bar, or pie charts; or line, or XY graphs according to your specifications. You can create graphs of up to six variables from a spreadsheet and manually choose the scales or have the program automatically do it. Graphs can be printed full-size, half-size, specified manually and even rotated.

Requirements: To run LOTUS 1-2-3, an H/Z-100 Computer needs two floppy disk drives and 192 kilobytes of RAM plus the MS-DOS™/Z-DOS™ operating system. Available in soft-sectored 5.25-inch diskettes for the 16-bit side of the H/Z-100. **LS-463-1**, LOTUS 1-2-3 Software Package, Shpg. wt. 4 lbs. **495.00**

PeachText 5000™ – five interrelated business programs designed to increase office productivity

- Efficient and standardized to meet business needs
- All programs are integrated using a central menu
- Detailed manuals clearly cover use and operation



PeachText:™ The center of PeachText 5000 is its word processing system. It allows users to write and revise documents without previous word processor experience. Built-in help screens make it very easy for all users. Editing features include character, word,

line or block deletions while insertions can be done by character or in blocks. Block movements, search functions, and multi-document and interdocument communication are among other features.

Spelling Proofreader: A high-performance program, it finds spelling and typographical errors in documents prepared using PeachText. It comes with a 21,000 word dictionary which can be added to or supplemented by a separate specialized dictionary that you create. It is accurate and easy to use.

Random House Thesaurus: Over 4,400 indexed words and 26,000 synonyms are placed at the fingertips of the PeachText user with this Thesaurus program.

PeachCalc:™ This data analysis system provides users with a flexible worksheet that can be merged with PeachText documents. This spreadsheet contains up to 254 rows and 64 columns of text, numbers and formulas. Among its features are worksheet merging, variable column width and protected blocks. PeachCalc shows remaining memory and always indicates the block you are currently working in.

List Manager: Screen and index file managers control the design and use of mailing lists, labels, files, and reference aids such as dictionaries and bibliographies. Any file can contain up to 32,765 records which can be changed to meet the user's needs. With PeachText, you can even individualize form letters.

Unmistakable quality: PeachText 5000 is a complete and proven productivity system. This interactive package includes powerful applications, menu-driven features, easy-to-use documentation and quick access to help messages.

Hardware and software requirements: An H/Z-100 Computer with two disk drives is required and the MS-DOS/Z-DOS operating system. A printer such as the MPI-99 or the MPI-150 on page 43 is needed for printing documents.

RS-463-75, PeachText 5000 Package, Shpg. wt. 3 lbs. **395.00**

SAVER! Verifiable H-100 owners can save \$120 **ONLY 275.00**

WordStar® – world's best selling word-processing system offers performance and flexibility



- See on-screen exactly what will be printed
- Comes complete with extensive help menus
- Two companion programs, MailMerge and SpellStar

Upgraded: Wordstar 3.3 offers a number of new capabilities, for H/Z-100s only, over features of previous versions. One is the increased support of the H/Z-100s function and numeric keypad keys. Another is an increase in the number of supported printers including the capability for user-defined printer drivers. Another major enhancement is the ability of Version 3.3 to use the H/Z-100's optional Z-205 256K RAM Upgrade Circuit Board (p. 32) as a Ramdisk. This version will also allow you to recover from a "disk full" error.

Familiar features: Version 3.3 still features simultaneous printing and editing, four selectable levels of help messages, powerful video editing commands, word-wrap, dynamic page break display, numerous print enhancements, flexible formatting and pagination, hyphen help, decimal tab and paragraph indenting. Color can even be specified for text and menu/prompts for color equipped units.

Hardware and software requirements: One disk drive is needed in an H/Z-100 along with MS-DOS/Z-DOS. A letter-quality printer is recommended.

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

MailMerge™ – combines names and addresses with letters in WordStar files



- Enables personalized letters from form letters
- Used to print mailing labels in any desired format
- Insert contents of any file into a printed document

Enhanced printing tool: MailMerge 3.3 is a powerful file merging tool for WordStar 3.3. It can combine a file containing names and addresses with a file containing a letter text and insert data where variables are specified, even in mid-paragraph. Insertion capabilities include automatic reforming of paragraphs containing additions to maintain margin alignment. Either justified or ragged right paragraphs are formed as desired to match the input despite varying lengths of inserted texts. Other features include multiple copy printing which allows the same file to be printed more than one time, automatically. And, with chain printing, you can print any number of files sequentially. Also, nested printing allows you to insert up to eight files in a document.

Hardware and software requirements: On H/Z-100, uses WordStar 3.3 (above), MS-DOS/Z-DOS (p. 34) and a printer (letter quality recommended).

MP-463-11, MailMerge Version 3.3, Shpg. wt. 3 lbs. **139.00**

SpellStar™ – checks for spelling and typographical errors in WordStar documents



- Dictionary consists of approximately 20,000 words
- Add more words to dictionary or create your own

Spelling checker: SpellStar 3.3 is a spelling checker program that works only with WordStar 3.3 to find spelling and typing errors in word-processing documents. At thousands of words per minute, SpellStar compares what you have written with its 20,000 word dictionary. When an incorrect or unfamiliar word is found, it is marked by a flashing cursor, three choices are then given: change the word, leave it as is, or add it to the basic dictionary. You can add to the basic 20,000 words or create additional word lists for such things as specialized terms (in law, medicine, etc.) or client names. SpellStar counts the number of words in your text file and corrects errors without leaving the program.

Hardware and software requirements: On an H/Z-100 Computer, WordStar 3.3 (above) and MS-DOS/Z-DOS (p. 34) are required for use with SpellStar 3.3

MP-463-6, SpellStar Version 3.3, Shpg. wt. 5 lbs. **249.00**

LOTUS 1-2-3 is a trademark of Lotus Development Corp. PeachText 5000, PeachText and PeachCalc are trademarks of Peachtree Software, Inc. WordStar, MailMerge and SpellStar are trademarks of MicroPro International Corp. MS-DOS is a trademark of Microsoft, Inc. Z-DOS is a trademark of Zenith Data Systems Corp.



High performance video monitors for high-resolution monochrome and brilliant color displays

High-resolution monochrome displays offer unmatched quality at an economical price

- Excellent character definition and intensity
- Easy-on-the-eyes 40 or 80 column display
- Compatible with most popular computer systems

High quality: Both the ZVM-122A Amber and the ZVM-123A Green displays offer crisp character definition because of a wide 15 MHz bandwidth and a fast 30 nanosecond rise time. Special DC-coupling circuitry permits the video to retain its brightness even when their screens are full of information. A special deflection system helps to provide a display that is easy to read and also very easy on the user's eyes. Front panel controls allow easy adjustment.

Versatile and compatible: Both monitors, with their 12-inch diagonal screens, offer a large 25 line by 80 character capacity with a switchable 40 or 80 character column display. Use with H/Z-100, Atari, IBM, and others.

ZVM-122A, Assembled and tested monitor with amber CRT, 18 lbs. **169.95**

ZVM-123A, Assembled and tested monitor with green CRT, 18 lbs. **139.95**

ZVM-124, Assembled monitor for use with IBM-PC and PC compatible computer systems, amber CRT needs monochrome printer adapter card, 18 lbs. . . **199.00**

ZVM-123-2, Tilt Base for ZVM-122/123, 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 to Atari 1200, 1 lb. **15.00**

ZVM-121-2, Cable to connect ZVM-121/122/123 to Atari 1200, 1 lb. **15.00**

NEW Build your own monochrome video display

Kit HVM-122A: Get all these features: non-glare amber CRT, excellent character definition and intensity, a 40/80 column display, versatile front exterior controls, contemporary styling, portability and compatibility with most popular computer systems. The HVM-122 uses the same cables as the ZVM-122/123 monitors which are listed above.

HVM-122A, Kit video display with amber CRT, 22 lbs. **109.95**

13-inch color monitors for home computers, VCRs, modular TV tuners, and video games

- Full-featured **ZVM-131** and **ZVM-135** Color Monitors with sound
- **ZVM-133** economical high-resolution monitor for RGB inputs only
- **ZVM-136** long-persistence monitor with features of **ZVM-133**

ZVM-131 and ZVM-135: Both feature composite video and analog RGB inputs and are capable of displaying a full range of colors and intensities. A unique feature of each is a switch that cancels all colors except green so that monochrome text material can be displayed for easier reading. Both adjust screen brightness automatically. The one difference between the two is that the ZVM-131 has a 25 line by 40 character display for use with home computers and the ZVM-135 has a 25 line by 80 character display which makes it ideal for use with the H/Z-100 Computer. The ZVM-135 displays 80 characters using the RGB input or 40 characters using the composite input. Easy-to-reach front-panel display and sound controls are other assets of these monitors. With the purchase of a ZVM-135 monitor, you receive a free computer cable of your choice from those listed below.

ZVM-133 and ZVM-136: Both of these Displays are special versions of the monitors above for use with RGB inputs only. User adjustments include a green-only switch and contrast control, and a front panel brightness control. The ZVM-136 uses a long persistence CRT to reduce flicker when the interlace mode is used. Both monitors support 16 colors including the IBM-PC's brown.

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-133, Assembled high-resolution RGB-only monitor, 39 lbs. **559.00**

ZVM-136, Assembled long-persistence RGB-only monitor, 39 lbs. **799.00**

Cables for use with the **ZVM-131/133/135/136** Color Video Displays:

ZVM-135-1, to the H/Z-100 Computer (ZVM-135/133/136 only), 1 lb. . . . **25.00**

ZVM-135-2, to the IBM Personal Computer, Shpg. wt. 1 lb. **25.00**

ZVM-135-3, to the Apple III Computer, Shpg. wt. 1 lb. **25.00**

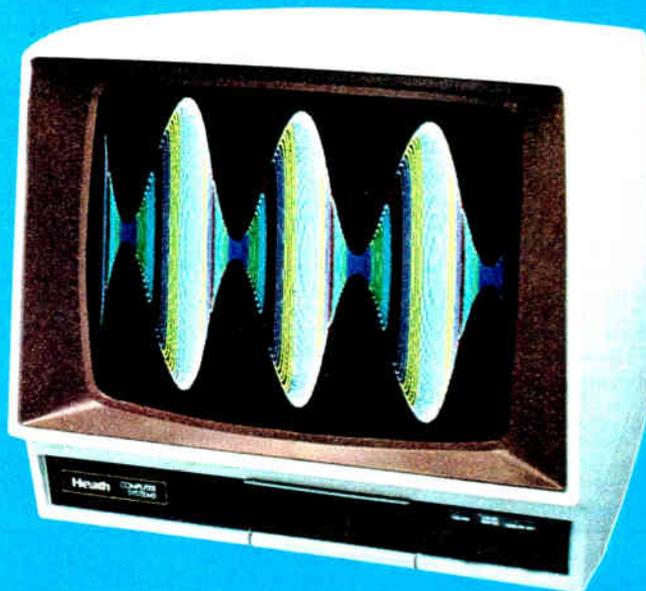
ZVM-135-4, to the Texas Instruments and Atari Computers, 1 lb. **25.00**

ZVM-122A shown with optional tilt base



Available in non-glare amber and green CRT displays

ZVM-135 Audio-Video Color Display Monitor



Includes a quality sound system for monitoring audio

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.

All New
Low Price of
\$1099⁰⁰
for kit H-89

FEATURING A SAVINGS OF UP TO \$300

- 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-8E-16 RAM Expansion Kit (p. 39).

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 39) and an H-88-1 hard-sectored disk controller board (p. 39). 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. 39) 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. 39). 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 39) 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 39.

Professional keyboard: With its standard typewriter keyboard, the H-89 allows touch-typists to immediately take advantage of word processing. Typists easily move from their electric typewriters to the keyboard of the H-89 without losing time in retraining. And, the rugged, highly-reliable keyboard is built to take the constant use found in the office environment. For programmers, the keyboard can display the entire ASCII character set, both upper and lower case, along with 33 graphic symbols. A 12-key keypad beside the keyboard allows accountants to rapidly enter numbers while using bookkeeping and other spreadsheet programs.

Quality video terminal: All information is shown on a 12-inch high-quality video display tube (or CRT) that provides highly detailed characters. The optional white or green CRT displays 24 rows of 80 characters each as well as a software-controlled 25th line. The display is always bright even when the maximum 2000 characters fill the screen. On the screen, upper-case characters are formed by a 5 x 7 dot matrix while lower-case characters use a 5 x 9 dot matrix.

Add on the peripherals: For your convenience and the H-89's versatility, three EIA standard RS-232C serial interface ports are part of the H-89. These three standard serial ports let you connect peripherals that make the H-89 more useful to you. Connect a printer such as the H/Z-125 or the WH-54B on page 43 for printed copies. Or, connect a modem (page 42) 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. 48) as your disk operating system, or use both. Each operating system features sophisticated system control and both support all Heath/Zenith disk systems. Software that can be used with either HDOS or CP/M can be found on pages 48 through 55. This includes: programming languages, financial modeling and planning software, utilities, word processing software, learning software and games. By joining HUG (p. 44) 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 and working kit.

Heathkit Kit HS-89-2, All-In-One Computer with anti-glare green CRT, Shpg. wt. 96 lbs. Was \$1429, NOW ONLY 1199.00

Heathkit Kit HS-89-3, All-In-One Computer with standard white CRT, Shpg. wt. 96 lbs. Was \$1399, NOW ONLY 1099.00

Z-90-90, Assembled and tested H-89 with Z-89-37 Controllor Board, 64K RAM, less disk drive, Shpg. wt. 53 lbs. 2499.00

Z-90-92, Assembled and tested H-89 with Z-89-37 Controllor Board, 64K RAM, 48 TPI disk drive, Shpg. wt. 55 lbs. 2799.00

H-89A SPECIFICATIONS: CPU AND MEMORY: Processor: Z80. **Clock:** 2.048 MHz. **Memory:** 8K bytes used by system for ROM and RAM; 48K bytes user RAM (expandable to 64K). **VIDEO TERMINAL: CRT:** 12-inch Diagonal. **Display Size:** 6½" H x 8½" W (16.5 x 21.6 cm). **Character Size:** Approximately ¼" H x ¼" W (0.5 x 0.3 cm). **Character Type:** Upper case and lower case without descenders, 5 x 7 dot matrix; Lower case with descenders, 5 x 9 dot matrix; Graphics, 8 x 10 dot matrix. **Keyboard:** 84 keys (60 alphanumeric keys and 12 function control keys) — plus a 12-key numeric control pad. **Cursor:** Blinking, non-destructive underline or block. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space and tab. **Cursor Addressing:** Relative and direct. **Tab:** Standard eight-column tab. **Refresh Rate:** 60 Hz at 60 Hz line frequency, 50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line or page, from beginning of line or page, to end of line or page. **Bell:** Audible alarm on receipt of ASCII BEL. **Video:** Normal and reverse, by character. **FLOPPY DISK (H-88-4): Tracks:** 40. **Sectors:** 10. **Formatted Bytes Per Sector:** 256. **Spindle Motor Speed:** 300 RPM ± 1%. **Data Transfer Rate:** 128 kHz. **Motor Start Time:** 1 second. **ACCESSORIES:** Interfacing: Three EIA standard RS-232C Serial Interface ports are provided. 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.

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.

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, 160K 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**

HCA-4, Black fabric anti-glare filter for 12" CRTs, Shpg. wt. 1 lb. 19.95

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**

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
200K bytes	320K bytes	HS-77-2	-	Two H-17-1 (Single-Sided)	47 lbs.	769.00
		-	Z-87-89 for H/Z-89		30 lbs.	769.00
		-	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
-	1.28 megabytes	-	ZC-37	Two H-17-5 (Doubled-Sided)	28 lbs.	1699.00

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 affordable H/Z-29 Terminal has the performance you want, and is reliable and easy to use



The H/Z-29 is a smarter video display terminal

The H/Z-29 Video Display Terminal uses its own microprocessor to provide looked-for qualities, such as, easier-to-use functions and increased versatility. Looking at the H/Z-29 Terminal, you can see these qualities in the variety of terminal parameters and the ease in which they are set up, volatile and non-volatile memories, regular and alternate character and graphics sets, and special function and editing keys. The H/Z-29 is a state-of-the-art terminal with a built-in flexibility and ease of operation that makes it one of the most versatile and user-friendly terminals available. Plainly speaking, the H/Z-29 will give you more video display terminal for your money. Whether used as an input/output device of a central system or as a remote unit, the H/Z-29 Terminal is certain to make a place for itself at the office, in the school, and at home.

ONLY

\$599⁰⁰

- Built-in flexibility provides you with the room to grow as your requirements expand
- Layout and operation designed to make each use of the Terminal a pleasant operating experience
- Communications compatible with many ANSI protocol terminals and host computers

Popular compatibility: A logical solution for most terminal needs, the H/Z-29 is compatible with many ANSI protocol terminals including the H/Z-19. For greater versatility in education and business, it models the Lear Siegler ADM-3A and the Hazeltine 1500A Display Terminals. And, it is also compatible with the DEC VT52 Terminal and has many attributes of the DEC VT100 Terminal.

User-oriented operation: Each time the H/Z-29 is turned on or reset, built-in diagnostics perform a series of tests on the Terminal to ensure proper operation and quickly pinpoint failures. On-screen configurations allow easy parameter setup including even/odd parity, baud rates, and handshaking. And, for keeping track of standard or elapsed time, the Terminal has an integral user-settable 24-hour clock. A special screen saver automatically shuts off the display after 15 minutes from the last entry to prolong screen life.

Sharp video display: A 12-inch anti-glare, green CRT reduces eye fatigue while using the H/Z-29 and allows you to read text easier while it is on the screen. Information is displayed in 25 lines of 80 characters each with characters as large as 8 x 10 dots. Select a block or underline and blinking or nonblinking cursor.

Many display capabilities: Usually, light characters are shown on a black background but they can be reversed for word processing or graphics applications. A brightness control permits adjustment of display brightness for best viewing. Sixteen different video displays (normal and reverse video and both underlined in either constant or blinking, and full or half intensity) are available to provide a wide variety of screen presentations. All attributes are menu selectable.

Very comfortable keyboard: The H/Z-29's detached keyboard features the user-friendly quality feel of a full sculptured typewriter style keyboard with 91 keys including 9 special function keys. All keys are a non-glare type to provide nonslip finger contact and reduce eye-fatiguing glare. The 77-key typewriter keyboard has stepped keys and deep-dish F and J keys to enable touch typists to quickly use the Terminal. Being user-friendly, the H/Z-29 provides a HELP key for an operator to use to recall help messages used by some software. There is also a separate 14-key numeric keypad with a dimpled 5 key for rapid touch-typing entry of mathematical data. Also located on the keyboard are four LED status indicators to brightly show power on, keyboard locked, off line, and caps locked condition.

Keyboard capabilities: Along with a 128-character ASCII set, the H/Z-29's keyboard can generate codes for an alternate character set of 33 special symbols in

an 8 x 10 dot matrix. Besides lowercase and uppercase letters, other characters include: superscript and subscript letters, Greek symbols, H/Z-19 graphics, VT-100 graphic symbols and other symbols. Each entry is confirmed by an audible key click and is automatically repeated when held down for over a half second, progressively becoming faster as the key is held down longer. And, for the typist who overlaps keystrokes, the H/Z-29 features 2-key rollover which allows a second entry while one key is still depressed.

Strong editing and erasing capabilities: The H/Z-29 can insert or delete characters and lines as well as erase a page, line, to the beginning or end of a line or a page. Other editing functions include tab set and removal, variable scrolling regions, protected fields and more.

Interfacing: Designed as an input/output device for a computer system, the H/Z-29 Terminal can be hooked either directly or through telephone lines, by means of a modem, to any computer. On the back of the monitor are two RS-232C standard connectors, a DTE connector for computers or modems and a DCE connector for an auxiliary device. All parameters for their use are set through simple keyboard selections and stored in nonvolatile memory until reset.

More features: To increase user comfort and afford a better viewing angle, the monitor can be adjusted for either a no-tilt or 10 degree back-tilt position. An eight-foot coiled cable connects the monitor and keyboard providing more flexibility in separating the two. The Z-29 is also available in models and languages for the United Kingdom, Spain, Denmark, Germany, and France.

Kit H-29, Shpg. wt. 41 lbs. 599.00

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 and makes long periods of typing more comfortable. The palm rest easily installs in front of the Terminal's detached keyboard.

Z-29-1, Palm Rest Accessory, Shpg. wt. 1 lb. 15.00

Z-29-2, ROM Source Listing, Shpg. wt. 4 lbs. 25.00

H/Z-29 SPECIFICATIONS: Display: CRT: 12" P31, green, non glare video screen. Display Format: 25 rows of 80 characters. Display Size: 6" H x 8 1/2" W. Character Type: 8 x 10 character cell. Character Size: 0.2" H x 0.1" W (approx.). Video Attributes: Normal or reverse character, normal or underline character, normal or half-intensity character, normal or blinking. Can be in any or all combinations. Refresh Rate: 60 Hz. Cursor: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Controls: Up, Down, Left, Right, Backspace, Tab, Back Tab, Back, Home, Carriage Return, and Line Feed. Addressing: Direct and relative. Communications: Type: EIA RS-232C. Baud Rates: 75-19200 baud. Mode: Half or full duplex. Code: ASCII. Format: Serial asynchronous. Word Length: 7-data bits, one parity bit. Stop Bits: 2 at 75 and 110 baud rates, 1 at all other baud rates. Sync: Auto XON and XOFF. Parity: Even, odd, mark, or space. Operating Temperature: 32 to 105 Fahrenheit (0-40° Centigrade). Operating Humidity: 10-90% (relative) noncondensing. Power: 105-127 VAC at 60 Hz and 45 watts.



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

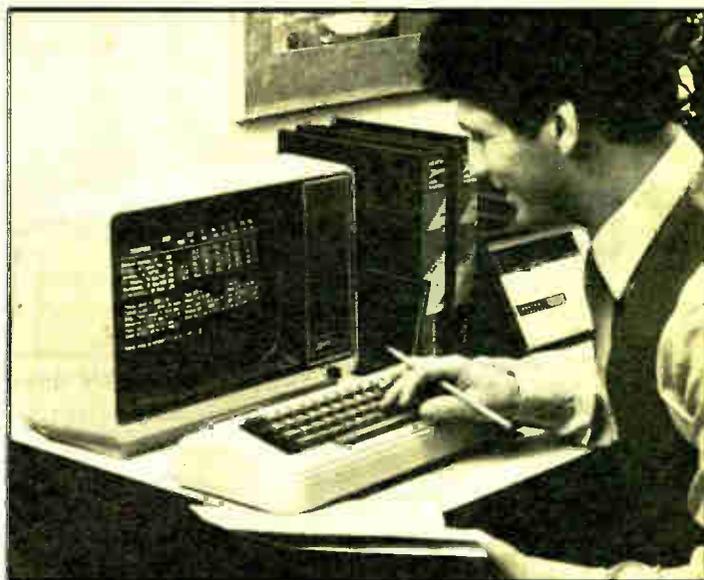
Personal Information Terminal Series: Heathkit's HT-10, and an optional HTX-10-1, lets you communicate ("talk" back and forth) with many devices using the telephone line in your home or office. Connect the Terminal to your phone line and gain access to information services or data banks, or "talk" with 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-10. 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 Terminal'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-10. Even those without typing skill or computer training will find the HT-10 easy to use. Programmed to be self-prompting, the Terminal has an easy-to-follow display menu.



page 53) for high-speed access to the data of your choice. And, add to the Terminal's use by taking advantage of its capabilities as an electronic printer.

Electronic typewriter: The HT-10'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 can be connected to the Terminal's Centronics compatible parallel interface for all printouts off of the screen.

Video monitor: The HT-10 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-10 to work and access your company's mainframe computer.

Additional features: Compact 7" by 15" Terminal fits into large brief-cases and weighs less than 4½ lbs.

ZT-1-2, Terminal Carrying Case, Shpg. wt. 2 lbs. 24.99

ZT-1-3, Universal ZT-1 ROM set, for older ZT-1s, 1 lb. 49.95

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

HT-10 SPECIFICATIONS: Keyboard/Terminal: Character Set: 95 ASCII, 33 graphics. Keyboard: 63 keys (26 alphabetic, 10 numeric, 4 cursor/special function, 12 control, 11 punctuation). Storage: Up to 26 names (to 12 characters) and telephone numbers (to 16 digits). Cursor: Blinking or steady block, or off. Cursor Controls: Up, down, left, right. Cursor Addressing: Direct (VT-52 compatible). Tab: Standard 8-column tab stops. Refresh Rate: 60 Hz. Edit Functions: Insert line, delete line. Erase Functions: Page, line, beginning of line to cursor; cursor to end of line. Beginning of page to cursor; cursor to end of page. Bell: Audible alarm on receipt of ASCII BEL. Video: Normal, reverse, half-intensity, blink. Interfaces: Telephone Connections (modem models only): Standard RJ-11, RJ-12, or RJ-13 telephone jack. Data Rate (modem models only): 110, 150, 300 baud Bell 103 compatible. Dial Method (modem models only): Pulse. Video: RS170 compatible. Serial Equipped I/O: RS-232 levels @ 110, 150, 300, 600, 1200, 2400, 4800, and 9600 baud. Printer: Parallel (Centronics-type). Video Monitor Requirements: Display Format: 25 lines, 80 characters/line. Bandwidth: Greater than 15 MHz. Video Rise Time: 50 nanoseconds.

SAVE \$20 – purchase a ZVM-121 with an HT-10

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
data systems ZT-1-U, Assem.	YES	YES	NO	YES	YES	30 lbs.	\$549.00
data systems ZTX-1-U, Assem.	NO	YES	NO	YES	YES	6 lbs.	\$449.00
data systems ZT-10, Assem.	YES	YES	YES	NO	YES	32 lbs.	\$499.00
data systems ZTX-10, Assem.	NO	YES	YES	NO	YES	6 lbs.	\$399.00
data systems ZT-11, Assem.	YES	YES	YES	YES	YES	32 lbs.	\$579.00
data systems ZTX-11, Assem.	NO	YES	YES	YES	YES	6 lbs.	\$479.00

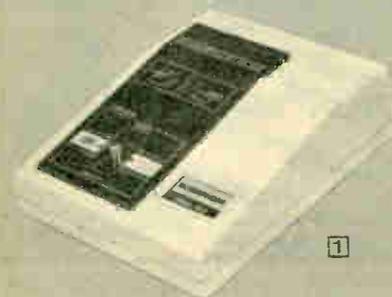
Economy-minded: The economical HT-10 Personal Information Terminal features many standard items and several options. In this manner, it offers you a choice of data terminals in your price range. For a low cost entry point data terminal, there's the HT-10 which comes without a modem. However, for the user who desires a built-in modem, the logical alternative is the HT-1011. The HT-10 is also available without a video monitor (HTX-10) for those who already have access to a video monitor. Anyone interested in instant access to mainframe computers, minicomputers, or microcomputers, the ZT-10 Terminal is available preassembled with all the options of the kit version.

Expandable: The HT-10 was designed to take into consideration a user's desire to add on peripheral equipment in the future. With its parallel printer port, the Terminal can add on a parallel-type printer for hard copies of displayed information. Also from its rear panel, connect it to a smart 1200 baud modem (WH-53 on



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

Use one of these top performers to expand the capabilities of your computer system



1 Reliable direct-connect modem

Telephone interface: A full-duplex modem, the Muraphone MM-100 sends and receives information at 300 baud between computers over a standard telephone line. It can operate as either a host or a remote unit by simply selecting an originate or answer mode from a front panel switch.

Other features: Included is a phone cable for connecting the Modem to a modular-type single phone line. To power the unit, an AC adapter is also included. For use with a computer, an HCA-11 RS-232 cable (below) is needed. 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, Shpg. wt. 1 lb. . . . 20.00

2 Smartmodems make connections

Two Hayes models: Both the 300- and 1200-baud Smartmodems connect to standard single-line modular phone systems and any computer with an RS-232 port. They can automatically answer calls coming in from other computers, automatically dial and receive data with a few simple commands. Both modems perform touch-tone and pulse dialing in combination for use with any phone system. Use the 300-baud modem for low-volume transfers and the 1200-baud model for moving large blocks of information. Each modem includes a 120 VAC adapter and phone cable. Needed is an HCA-11 cable and CPS software (p. 45 for H/Z-100 CPS and p. 48 for H/Z-89 and Z-90 CPS).

WH-43, Assem. 300-baud Modem, 3 lbs. 279.00

WH-53, Assem. 1200-baud Modem, 4 lbs. 695.00

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

3 Hayes high-tech calendar/clock

Precise time-keeper: Hayes Chronograph is a crystal controlled calendar/clock that plugs into any RS-232 compatible system. It monitors every second of your computer activity for accurate records of how time was spent. With the Chronograph, you can instruct your computer to execute programs unattended, which is especially helpful when used to transfer data at night when rates are lower.

Features: Time is displayed in large, easy-to-read numbers in either 12- or 24-hour format plus the day of the week. It uses 120 VAC. Loss of time is prevented by a battery back-up system (three "AA" batteries, not included) during a power failure.

WH-42, Assembled and tested, 4 lbs. 199.00

4 Economical acoustic modem

Lexicon modem: The LEX-11 is a FSK modem designed to operate at rates from 110 to 300 baud on dial-up telephone networks. It is compatible with the Bell System 103A modem and connects to terminals or computers through an RS-232C interface.

Versatile: The Modem may be operated full or half duplex and in an answer or an originate mode. It also has a test mode to allow you to verify its operation. The LEX-11 is powered by a UL and CSA listed AC adapter which is included along with a phone cable. HCA-11 cable and CPS software needed.

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

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

5 Text-to-speech synthesizer

Votrax® TYPE-'N-TALK'™: A completely self-contained text-to-speech synthesizer, Type-'N-Talk lets your computer speak. It is easy to program and is easily interfaced to a computer, modem or any RS-232C compatible serial device. It has selectable data modes for versatile interfacing with baud rates between 75 and 9600. Also has 750 character buffer.

Endless speech synthesis: Type-'N-Talk has an unlimited vocabulary which is user defined. All you do is enter English text and hear the verbal response through an audio speaker (not included). Includes its own one-watt audio amplifier. Needs HCA-13 interconnecting cable, found on page 56.

WH-12, Assembled and tested, 5 lbs. 299.00

Votrax and TYPE-'N-TALK are trademarks of Votrax Consumer Products Group.

6 TI LCD Programmer/Calculator

From Texas Instruments: This pocket programmer/calculator has special memory and logic functions for use in computer-related applications. Features fast octal, decimal and hexadecimal numbering system conversions and independent memory. Includes rechargeable battery and 120 VAC adapter.

PC-12, Assembled and tested, 1 lb. 79.95

7 RS-232C I/O Line Tester

Breakout box: Save yourself time and expense by locating signal problems before calling a repairman. A pocket sized self-contained test set, this Tester connects between data originating equipment and the communication line to monitor 12 signal lines. Contains 24 switches to interrupt interface signals. Has interface pins for easy monitoring or jumpering to each other for testing line conditions.

WH-15, Assembled and tested, 1 lb. 119.00



High-speed H-125 Dot Matrix Line Printer heads this page of top-quality printers

\$899⁰⁰
Kit

- Prints at over 45 characters per second with a possible 33 graphics characters
- Interfaces to most computers and terminals

Full-featured printer: The H-125 is a rugged and quiet dot matrix printer that has a high printout speed and versatile paper handling facilities. With bi-directional printing, it can output over 150 characters per second. The full 96-character ASCII set can be printed out and includes upper and lower case letters with descenders and underlining. Also available are block graphic characters provided by most Heathkit/Zenith computers. Other features include a quad tractor feed with adjustable width, variable pitch, quieting cabinet, self-test capabilities and failure indicators. An RS-232C port and a 20 mA current loop with handshaking allow the printer to interface with most computers and terminals. Communication speeds are adjustable from 110 to 9600 baud. For 120/240 VAC operation.

Kit H-125 , Dot Matrix Printer, 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 H/Z-125, Shpg. wt. 1 lb.	16.00
HCA-9 , Printer Stand for H/Z-125, Shpg. wt. 21 lbs.	99.00

Letter-quality documents from a Diablo Printer

Daisy-wheel printer: This proven printing mechanism produces the highest print quality for your word processing programs. A versatile printer, the WH-54B prints the entire 96-character ASCII set, including upper and lower case. It prints at speeds up to 35-40 characters per second in both directions. And, it accepts forms up to 15½ inches wide while being able to accommodate forms up to 27/1000 inch thick with a single adjustment.

Includes: The WH-54B printer has a parallel interface, plus a parallel cable, for connecting to computers and a printer buffer that holds 768 characters. Other features include a friction platen, LED condition indicators, and operator control panel. The WH-54B comes with an Elite 12 print wheel with an unslashed zero (HCS-22) and a film ribbon cartridge (HCS-51). Replacement print wheel and ribbons are found on page 56. The printer uses 120/240 VAC, 50/60 Hz and measures 9¼" H x 23½" W x 15¾" D (23.5 x 59.7 x 40 cm).

WH-54B, Assembled Diablo Printer, Shpg. wt. 70 lbs. Motor Freight .. **1999.00**

NEW More high-performance printers that excel at graphics and letter-quality printing

1 MPI™ -99 Impact Matrix Printer solves needs

Advanced: Speeds through data at 100 cps and connects to computers through either a serial RS-232C or parallel Centronics interface. Prints bi-directionally with a 7 x 9 or 11 x 9 dot matrix. Full upper and lower case 96-character ASCII set with descenders and high resolution dot-addressable graphics.

MPI-99, Impact Matrix Printer, Shpg. wt. 11 lbs. **599.00**

2 Advanced MPI-150 Impact Matrix Printer

Outstanding features: Allows printing of up to 6120 individually addressable dots per square inch for exceptional graphics and special character resolution. Features 150 cps logic seeking impact printing, wide carriage, 1K print buffer, large selection of print capabilities, and custom character set development.

MPI-150, Impact Matrix Printer, Shpg. wt. 35 lbs. **995.00**

MPI is a trademark of Micro Peripherals, Inc.

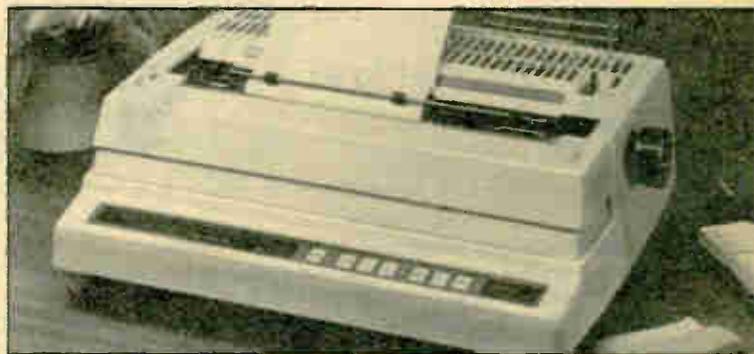
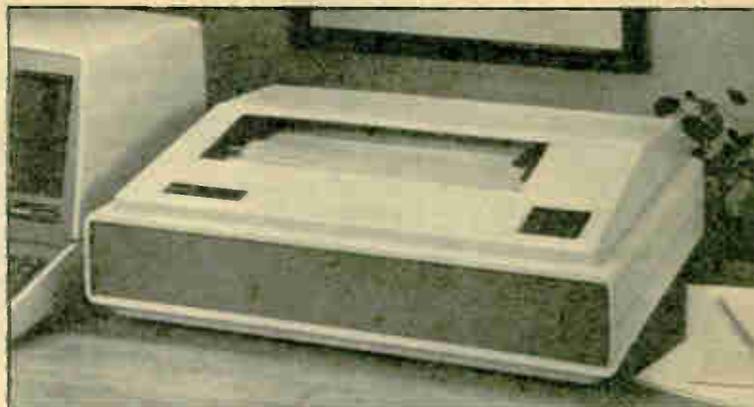
3 Economical Diablo printer with quality features

Daisy wheel printer: This Diablo printer produces letter-quality documents at a minimum speed of 20 characters per second. It has bi-directional printing using a 98 character print wheel that can be exchanged without removing the ribbon cartridge. The printer includes many features including: page formatting, graphics, horizontal/vertical tabbing, and proportional spacing. The Diablo 620 printer comes with a serial interface, 12 pitch printwheel, ribbon, and cover.

WH-55, Assembled printer, Shpg. wt. 48 lbs. **1199.00**

HCA-2, Printer Stand for WH-55, Shpg. wt. 28 lbs. **99.00**

More accessories for the MPI and WH-55 printers are located on page 56.



MPI-99 Printer with tractor feed accessory

MPI-150 Printer with optional front keypad

WH-55 includes operating features of more expensive printers



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 to 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.

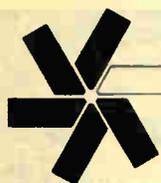
If you already subscribe to the CompuServe system, you can access the Heathkit Online Catalog by typing **GO HTH** at any '!' prompt or 'OK' prompt on the system.

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.



Heath User's
Group



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:	\$20	\$22	\$30
Renewal:	\$17	\$19	\$24

Name _____ 864

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. When you become a member, you receive a HUG Software Catalog that gives a detailed look at the software products in the library. Each product is described 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 REMark (Jan.) 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.)

- | | |
|---|--|
| <input type="checkbox"/> Microsoft BASIC Compiler | <input type="checkbox"/> Microsoft BASIC Interpreter |
| <input type="checkbox"/> Microsoft COBOL | <input type="checkbox"/> Microsoft FORTRAN |
| <input type="checkbox"/> Microsoft MACRO-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-transferable 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 packette 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. Jamett

864

ACCEPTED AND AGREED:
CUSTOMER'S SIGNATURE _____

DATE _____



Heath offers a wide range of software programs for home, office and educational use

In support of the many Heathkit/Zenith computers in homes, offices, and schools, there's a variety of versatile and easy-to-use software available that's ready to run. You'll find 16- and 8-bit software for the top-of-the-line H/Z-100 Computer on pages 34 to 36 and 45 to 47. Software for the All-In-One H/Z-89 and Z-90 is located on pages 48 to 55.

From this variety, you can choose from three operating systems MS-DOS / Z-DOS, CP/M and H.O.S. For each operating system, you'll find a number of interpreters, compilers, and languages to meet your requirements. Other software packages include electronic spreadsheets to help shape your future and word processing to aid in any type of writing and editing. There's accounting and inventory programs for balancing your books and keeping track of what you have and where it is located. Then, there's data management software to handle your names, facts and figures. And, new among all this software is a computer-aided instruction package for writing your own educational courses and training programs. With a HUG membership (opposite page), a library of over 700 programs become available to you.



NEW CPS-86: 16-bit Computer Phone System

- Copy an entire communications session into memory
- Flexible file transferring with or without protocol
- Use programmable keys for single-key operations

For use with the H/Z-100: CPS-86 simplifies and enhances the use of your H/Z-100 Computer as a data communications device. With it, your computer, and a modem, you can take advantage of the many telecommunications services that are available. You'll also be able to communicate with other computer users even though they aren't using this 16-bit phone system software. While CPS-86 will most often be used as a modem support program, it works equally well with other types of data communications devices.

Special features: Among many features, this software program allows an entire data communications session of up to 64K bytes to be copied into main memory and then saved in a standard text file. Save yourself some telephone costs by accepting an entire transmission without pauses. Another option allows you to receive files larger than 64K bytes when communicating with a system that uses XON/XOFF handshaking. Also, transfer files using the CompuServe™, XMODEM protocols or no protocol at all. Programmable keys are another feature of CPS-86. You can program certain keys to transmit up to 127 characters with a single keystroke, or change the modem baud rate, or delay transmitting for a certain number of seconds, or wait for a specific character from a remote system.

Hardware and software requirements: On an H/Z-100 Computer with 128K, CPS-86 must be run using the Z-DOS operating system, release 1.0 version 1.25.

CB-463-7, CPS-86 for the H/Z-100 Computer, Shpg. wt. 3 lbs. **40.00**



NEW CPS: H/Z-100 Computerized Phone System

- An H/Z-100 8-bit phone system software program
- Automatic log-in of MicroNET® password and account
- On-screen clock shows logged time of remote hookup

Information window: Through your H/Z-100 Computer and modem, CPS allows you access to many information networks, computerized bulletin boards, and time sharing systems. It'll also function with any type of data communications link that uses compatible baud rates and control codes.

Valuable features: If you are a MicroNET subscriber, you can automatically log-in your account number and password by pressing one key, after they are stored in the CPS directory. With its flexible file transfer options, you can transfer files using MicroNET protocol, the special CPS protocol, or no protocol. And using its memory image capability, an entire communications session of up to 46K bytes can be copied into memory. Then it can be saved in a standard text file. This feature also allows you to accept no-protocol transmissions without being at your terminal. An on-screen clock begins counting when the first character is received from a remote system and continuously displays the amount of time you are logged on. And, a sub-menu allows you to alter any of seven parameters that affect data handling within CPS.

Hardware and software requirements: To run CPS on the H/Z-100 Computer, CP/M (version 2.2) on page 34 is required for proper operation.

CB-253-7, CPS for the H/Z-100 Computer, Shpg. wt. 1 lb. **40.00**

MS-DOS is a trademark of Microsoft, Inc. Z/DOS is a trademark of Zenith Data Systems Corp. CP/M is a registered trademark of Digital Research, Inc. CompuServe and MicroNET are registered trademarks of CompuServe, Inc.



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

More powerful software for the H/Z-100 Computer

On this and the facing page are more software packages to use with your H/Z-100 Computer. Still more 16-bit H/Z-100 programs can be found on pages 34 through 36.



Three tools to help manage your business

Design and create your own data files using these two Condor® data base management programs. Or, transfer data from the Peachtree™ accounting series with the Pecon™ system.

Condor Relational Data Base Management

- A fast, easy-to-use and powerful filing system
- Allows a new user to achieve results in a short time

Information processor: With Condor, you can quickly and economically search, sort, merge, analyze, index, and print out your data base records. Condor can process up to 32,767 records per data base with up to 1023 bytes in a record. Under rDBMS, you can create your own help menus and produce sophisticated reports in your own format, then print them out using left or right justification.

Requirements: An H/Z-100 Computer, with two disk drives and a minimum of 128K RAM is needed. The MS-DOS™/Z-DOS™ operating system (p. 34) is required.

CO-463-1, Condor rDBMS, Shpg. wt. 4 lbs. 650.00

Condor File Management System – fast, easy to use

- Easily and quickly design and create data bases
- Effortlessly store, sort, and recall information

Manage data simply: Condor FMS is designed to provide you with a fast, easy-to-use, and powerful data base management system. Sort, merge files, analyze and print out information using plain and simple English commands. Create your own help menus to increase the programs ease of use. FMS can process up to 32,767 records per data base with up to 1023 bytes in a record.

Requirements: An H/Z-100 Computer with two disk drives and a minimum of 128K RAM is required. Also needed is the MS-DOS/Z-DOS operating system.

CO-463-2, Condor FMS, Shpg. wt. 4 lbs. 299.00

Pecon Peachtree to Condor Interface System

- Another tool to use in managing your business
- Creates data bases from Peachtree packages

Interface software: Pecon allows the transfer of data from master and transaction files in the Peachtree accounting series to data bases that can be processed using the Condor system. Pecon is easy to use with displayed instructions and simple messages that ensure successful first-time use.

Requirements: An H/Z-100 Computer with 192K and two disk drives are required to run this software. The MS-DOS/Z-DOS operating system (p. 34), a minimum of one Peachtree accounting package, and either the Condor rDBMS or Condor FMS software are also needed for proper operation.

CB-463-9, Pecon Interface System, Shpg. wt. 3 lbs. 99.00

46/COMPUTERS

NEW

Use these Peachtree™ accounting packages on your H/Z-100 to help your business grow

Maintain a complete financial picture of your business with these five Peachtree accounting packages below. They are easy to operate, using easy-to-understand on-screen messages, and produce a broad range of comprehensive reports. Consultation with an accountant or data processing professional may be desirable to take full advantage of these accounting programs. To run the Peachtree programs, you need an H/Z-100 with 192K of RAM, two disk drives, and the MS-DOS/Z-DOS™ operating system.

General Ledger System keeps financial records

- Security measures protect privacy of data
- Uses easy-to-follow prompts and instructions

Financial transaction record: The General Ledger System allows you to record the financial transactions of your company during a specified accounting period. Included are accurate and timely statements describing your company's current financial status as well as comparative data of a year ago to date. This simple and easy-to-operate system can be used with Accounts Receivable, Accounts Payable, and Sales Invoicing programs.

RS-463-1, General Ledger System, Shpg. wt. 5 lbs. 399.00

Accounts Receivable System for better control

- Maintains a complete record for each customer
- Password option prevents unauthorized access

Up-to-date activity: This accounting package is designed to help you obtain collections from your customers and assist in controlling your cash flow. Interfaces with General Ledger to provide automatic monthly journal entries.

RS-463-2, Shpg. wt. 4 lbs. 399.00

Accounts Payable System helps control your cash

- Stores financial transactions with each vendor

Payable information: Accounts Payable package maintains current and aged accounts. It keeps a complete file for each of your vendors, determines whether invoices should be paid by the due date or by the specified discount date, and automatically prints checks and a check register. Security measures are provided to protect the privacy of your data. This package is easy to operate and can also be used with the General Ledger system.

RS-463-3, Accounts Payable System, Shpg. wt. 4 lbs. 399.00

Inventory Management System controls effectively

- Straightforward updating of inventory records

Inventory control: This simple-to-operate and self-documenting package offers detailed control over all aspects of your inventory operations. By improving control, you reduce your dollar investment in managing your inventory and enjoy decreased response time to your customers. Can be used independently or in conjunction with Accounts Receivable and Sales Invoicing.

RS-463-5, Shpg. wt. 4 lbs. 499.00

Sales Invoicing System updates accounts packages

- Accesses and updates both Receivables and Inventory

Systems bridge: Actually a subsystem of the Accounts Receivable and Inventory Management systems. Provides the capability to access and update the data files of both systems. Update customer accounts with sale or return information. Update inventory with the stocked items returned or sold. Retains this data for printing invoices or credit memos. Displays warning messages when order exceeds inventory or customer credit.

RS-463-6, Sales Invoicing System, Shpg. wt. 4 lbs. 299.00

Condor is a registered trademark of Condor Computer Corp. Peachtree is a trademark of Peachtree Software, Inc. Pecon and Z-DOS are trademarks of Zenith Data Systems Corp. MS-DOS is a trademark of Microsoft, Inc.

For Computer Credit Card Orders or Information Call TOLL-FREE: 800-253-7057



An educational package that lets you write classroom courses or training programs

Turn your H/Z-100 Computer into a learning system with the ZDS Teacher and ZDS Student computer-assisted instruction package. This two-program package allows a student to study and be quizzed on topics which are written by the teacher.

Write courses and tests using ZDS Teacher program

- Write programs without programming knowledge
- Useful for any purpose involving written material



Authoring system: ZDS Teacher is one-half of a two-program educational package that lets you create and design an entire course of study for your students on the H/Z-100 Series Computer. It allows you (as teacher or instructor) to select the topic, decide how the course will be structured, write the text, and

create the quiz and the test questions. Your students then use the second half of the educational package, ZDS Student, to take the courses that have been created by you.

Multitude of uses: ZDS Teacher can be used for any instructional purpose that uses written material. For example, you can use this program to present grammar exercises which have your students identify parts of speech and word usages. Measure reading comprehension with stories and follow-up questions. Cover supplementary topics that you are unable to deal with in the allotted classroom time. Put together your own pre-exam reviews. Improve your students' performance on the verbal sections of standardized tests such as the PSAT, the ACT and other college entrance exams. However, these are only a few examples. As you work with both this program and your students, you'll discover many more areas in which the ZDS Teacher allows you to help your students to learn.

Versatile features: When writing a course using ZDS Teacher, you have control over the sequence in which the information is presented to the student. You decide whether or not to let the students interact with your program by allowing them to choose their own sequence of lessons or units. You can include fill-in or multiple-choice quiz and test questions at any point you desire. Also, you can modify the course, test and correct it, or print it out.

Hardware and software requirements: To use ZDS Teacher, your H/Z-100 Computer needs a minimum of 128K of RAM and one disk drive. The MS-DOS™/Z-DOS™ operating system is also required for this program to run properly.

TA-463-1, ZDS Teacher, Shpg. wt. 3 lbs. 299.00

3270 Emulator can provide a significant savings

- Permits H/Z-100's to emulate various IBM® terminals
- Allows all-in-one microprocessing and teleprocessing



Emulator software: The 3270 Emulator program allows you to use your H/Z-100 Computer both as a microcomputer and as the popular IBM 3270 display station. The emulator is compatible with a variety of IBM or IBM-like host computers using many IBM display station attributes. It runs on either leased lines or dial-up configurations and operates at the baud rate of the attached modem up to of 9600 baud. The emulator features a unique 25th-line status display which indicates the condition of certain system functions.

Hardware and software requirements: Needed is an H/Z-100 with one disk drive, 128K RAM, and a synchronous modem. The MS-DOS/Z-DOS operating system is required. To emulate an IBM 3276 Control Unit Display, a printer is also needed.

PO-463-1, 3270 Emulator, Shpg. wt. 2 lbs. 650.00

Microstat for statistical tests and procedures

- Performs common tests on statistical data files
- Features unique file orientation capabilities



Statistics analyzer: Microstat offers a wide range of statistical tests and a complete set of programs for data manipulations. It was developed for "real life" applications using fairly large data sets. The system has also been "human engineered" to be flexible and fail-safe in operation as well as easy to use. Data may be listed, verified, and edited prior to its use.

Hardware and software requirements: To use Microstat, an H Z-100 Computer must have a minimum of 128K RAM and two disk drives. It uses the MS-DOS/Z-DOS operating system. An optional printer is needed for hard copy printouts.

ES-463-1, Microstat, Version 2.3, Shpg. wt. 2 lbs. 249.00

MS-DOS is a trademark of Microsoft, Inc. Z-DOS is a trademark of Zenith Data Systems Corp. IBM is a registered trademark of International Business Machines Corp.



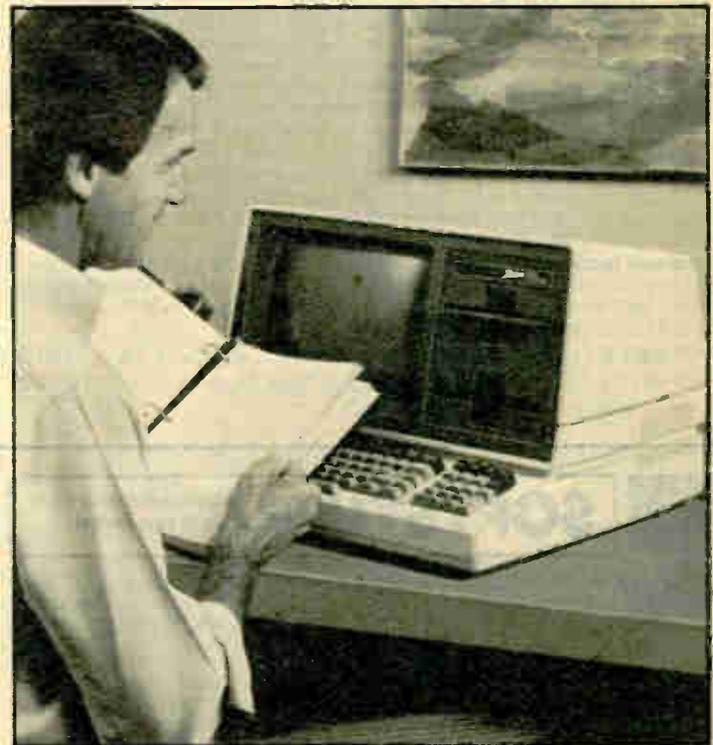
Take courses and tests using ZDS Student program

- Run customized programs developed by your teacher
- Includes on-disk instructions for the user

ZDS Student is the second half of Heathkit's new two-program educational package. It allows you, the student, to take courses or programs developed by your instructor using the ZDS Teacher programs. Once the Student program is loaded into your H/Z-100 Computer, it automatically begins a course that teaches you how to use the ZDS Student program. After completing the on-disk instruction course, you'll be ready to operate any of your instructor's programs. You'll even be able to take tests written by your teacher.

Hardware and software requirements: To run ZDS Student on an H/Z-100, one disk drive is needed along with the MS-DOS/Z-DOS operating system.

TA-463-2, ZDS Student, Shpg. wt. 2 lbs. 40.00



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

Heath offers a full line of software for your H/Z-89 or Z-90 All-In-One Computer



For use in the office or in the home, Heath has software solutions for your everyday needs that are ready to run on your Heathkit/Zenith computer. Many of these software programs are menu-driven and use easy-to-understand common English commands for easier use.

You'll find a wide variety of software programs on this and the following pages. They include: operating systems, programming languages, utility and applications programs. For an even greater selection of software programs, there's the Heath User's Group (HUG) on page 44 with its software library of over 700 programs.

All these software packages come with easy-to-understand instruction manuals and are fully indexed to make it easy to locate specific information. Many include glossaries of terms and appendices filled with useful information. All software is subjected to stringent tests to ensure quality and user satisfaction.

Software for the H/Z-100 Series computers and its dual microprocessors are found on pages 34 thru 36 and 45 thru 47.

World popular CP/M®-80 operating system provides a common hardware interface

- Most popular operating system available for microcomputers
- More applications software available than any other system

Industry standard: The CP/M operating system provides a common interface to a large variety of computer hardware. And, it provides a general environment for program development, editing, operation, and storage which frees the user from having to understand the details of underlying hardware. This has brought about a vast production of software programs... more languages, utilities and applications software programs than any other disk operating system.

Comprehensive file management: CP/M can accommodate files up to 8 megabytes and can access them both sequentially and randomly. In the CP/M operating system, files are named for easier location and are allocated dynamically. Distinct programs can be stored in both source and machine executable form.

Disk management: The Basic Input/Output System (BIOS) of CP/M provides the operations to access up to two disk drives, 5.25-inch and/or 8-inch, or a Winchester hard-disk system. The Basic Disk Operating System (BDOS) controls one or more disk drives containing independent file directories. BDOS implements disk allocation strategies which provide fully dynamic file construction while minimizing head movement across the disk during the access of a file. A Console Command Processor has five commands that control input and output of programs.

Utilities: CP/M includes standard programs like: an 8080 assembler, an editor, a debugger, a hardware configuration utility, a file copy program, a system and disk status utility, plus others. Special programs include, a disk duplication and verification utility, disk formatting utility and many more.

Hardware requirements: To run this version of CP/M on an H/Z-89 or Z-90 Computer, at least 48K or RAM is needed. Although one disk drive is also needed, two drives are highly recommended. In turn, CP/M supports the H/WH-17, H/Z-37, H/Z-47, Z-67 and the H-77/Z-87 Floppy Disk Systems.

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

HOS-8937-2, CP/M-80 on soft-sectored 5.25" disk, Shpg. wt. 5 lbs. ... 150.00

CP/M is a registered trademark of Digital Research Corp.

Heath Disk Operating System is user-oriented and simple to operate with built-in error reporting

- Offers many of the functions of large commercial computers
- Designed for the efficient use of memory and disk space
- Recognizes and reports many command and reference errors

Simplified system: HDOS provides a complete environment for program construction, storage, and editing. It also provides assembly and checkout facilities. The HDOS system has a high degree of flexibility and is structured to function with many commands executed on an internal basis. This relieves the user from having to consciously command each step of a program sequence. An easy-to-use Benton Harbor BASIC programming language is included along with ASM Assembly Language, a two-pass 8080 assembler. Also included are several utilities.

Hardware requirements: An H/Z-89 or Z-90 Computer using HDOS must have a minimum of 48K RAM and one disk drive. However, two disk drives are recommended. HDOS supports all Heathkit/Zenith disk systems except the Z-67.

HOS-817-1, HDOS on hard-sectored 5.25-inch disk, Shpg. wt. 5 lbs. ... 150.00

HOS-847-1, HDOS on 8-inch disk for H/Z-47 Disk System, 5 lbs. 150.00

UCSD P-System™ for program flexibility, clear readability, and reliable execution

The UCSD P-System, Version IV, is an operating system designed around a high-level programming language with a complete environment for easy program development and execution in small computers. With its built-in Pascal Compiler, large tasks can be divided into manageable smaller, easier tasks.

Hardware requirements: An H/Z-89 or Z-90 Computer requires a minimum of 48K RAM, but, 64K is highly recommended. Two soft-sectored disk drives are also needed to run the P-System and the Pascal Compiler.

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

HOS-8947-3, UCSD P-System on soft-sectored 8" disk, Shpg., wt. 7 lbs. 495.00

UCSD P-System is a trademark of the Regents of the University of California.



SOFTSTUFF

Quality software tools
to fit your budget

HDOS - CP/M®-80 File Converter: Easily transfers HDOS text files to CP/M-80 disks, and vice versa, to effectively double the information handling ability of your H/Z-89 Computer. Requires 48K RAM, two disk drives, and HDOS and CP/M.

SF-8512, on hard sectored 5.25" disk, Shpg. wt. 1 lb. 30.00

Typing Tutor: This educational program helps you learn faster and more efficient touch typing. Uses the H/Z-89's own typewriter-style keyboard. It requires an H/Z-89 Computer with 48K RAM and one hard-sectored disk drive.

SF-9018, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 40.00

PIE Full-Screen Text Editor: Access a file and then make changes anywhere on the H/Z-89's video screen. Special user-defined function keys are used to perform character, word and line insertions and deletions. Requires an H/Z-89 with 48K RAM and one disk drive with HDOS or CP/M-80.

SF-9200, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 50.00

HDOS, CP/M CPS: Computerized Phone System permits the transfer of data over a telephone between your H/Z-89 Computer and time-sharing services. H/Z-89 needs 48K RAM, one disk drive, HDOS or CP/M operating systems, and a modem.

SF-9503, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 40.00

CP/M Z-90 CPS: Computerized Phone System program for your Z-90 Computer. Z-90 needs 48K RAM, one soft-sectored disk drive, and a modem.

SFS-9103, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 40.00



SuperCalc™ — one of the most versatile and comprehensive electronic spreadsheets available

Decision-making tool: Quickly and easily calculate "what if" and "now what" questions on a spreadsheet covering 63 columns and 254 rows. Worksheet uses self-explanatory error messages and a help function key that lists choices. Other attractive features include powerful editing capabilities and cell protection.

Hardware and software requirements: This version of SuperCalc needs an H/Z-89 or Z-90 Computer with 48K of RAM, one disk drive, and the CP/M* operating system. For printouts, a printer is also needed.

HSC-817-1, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 195.00
HSC-837-1, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. 195.00

Powerful WordStar™ word processing system features versatility, convenience and multi-level help messages

Dynamic system: WordStar is a screen-oriented word processor that lets you create and format text in any form you desire. Powerful editing commands let you insert, delete and move text within a file as well as copy or read text from other files. Choose either a ragged or justified right margin, or mix them together. You control the page length, top and bottom margins, heading/footer/page number locations and other pagination directives. Most of these formatting functions take place immediately so that you see on the screen what will actually be printed. Four user-selectable help levels reduce manual references.

Advanced output capabilities: Additional enhancements can be added to your file as it is printed out. Some of these options are: boldface, double strike, underline, strikeout, subscripts, superscripts, variable character pitch and variable line height. And, alternate type style or ribbon color change are possible when using a daisy-wheel printer. WordStar also supports simultaneous printing and editing on systems with 64K RAM. Other utility and applications programs can even be executed during its use, with an automatic return to WordStar. Use MailMerge and extend the capabilities of your word processor.

Hardware and software requirements: To run WordStar on an H/Z-89 or Z-90 Computer, 48K RAM and two disk drives are needed. CP/M-80 is the required operating system. A letter quality printer is recommended for documents.

HMP-817-2, Vers. 3.0 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 395.00
HMP-837-2, Vers. 3.0 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 395.00

Use MailMerge™ to add mailing list and file merging capabilities to WordStar word processing

Powerful file merging: With MailMerge, you can combine a file containing names and addresses with a file in WordStar containing a letter text. Automatically, data can be inserted where variables are specified, even in mid-paragraph. In this way, personalized letters can be created with special salutations and closing for each letter. As data is merged, paragraphs are automatically reformed by the MailMerge program. This program supports multiple printing of the same file or automatic chain printing of many files. MailMerge also supports the printing of files nested within each other up to eight levels deep.

Hardware and software requirements: The MailMerge program can be run on an H/Z-89 or Z-90 Computer having 48K RAM and two disk drives. The CP/M operating system and WordStar software are needed.

HMP-817-3, Vers. 3.0 on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. 135.00
HMP-837-3, Vers. 3.0 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 135.00

Easy-to-use Magic Wand places excellent power and outstanding versatility at your fingertips

Comprehensive range of functions: Magic Wand combines the most-asked-for features in a word processor with a very easy to handle price. In creating and editing documents, you can move the cursor around the screen with single key-stroke commands. To replace characters, you can simply type over them. You can also delete text by characters, words, lines or blocks with checks in line and block deletions to prevent an accidental erasing. Other editing features include single and multiple search and replacements, block moves and copying, and two ways to insert text. Even examine the disk directory while editing. For your convenience, Magic Wand also features forward and reverse scrolling.

Smooth print control: You can set your print requirements with commands from the keyboard when its time to print your document or embed them while you are writing it. You control the margins, page length, paragraph indentation, text alignment (left or right justified, or ragged), hyphenation and line spacing (single-, double-, and 1½ spaced). On capable printers, you can underscore words or sentences, use boldface or overstrikes, and add superscripts and subscripts.

Additional features: With Magic Wand, you can define up to 128 variables of up to 55 characters each that can be used for repetitive jobs. Another feature allows you to set up data files to be used as variables in form letters. And merge with Magic Spell to automatically proof read your documents.

Hardware and software requirements: To run Magic Wand, an H/Z-89 or Z-90 computer requires 48K of RAM, one disk drive and the CP/M operating system. A letter quality printer is also recommended for printed documents.

HRS-817-9, on hard-sectored 5.25" disk, Shpg. wt. 3 lbs. 295.00
HRS-837-9, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 295.00

Magic Spell automatic proofreader checks spelling in documents written with Magic Wand

Automated proofreading: Magic Spell is designed to help you isolate spelling and typographical errors in Magic Wand documents. Its spelling system looks through documents of any size and compares each word to an internal 20,000 word standard usage dictionary. Amazingly fast, a typical floppy system using double-density disks can check a 10,000 word document in less than a minute.

Extensive capabilities: To its standard 20,000 word dictionary, you can add any number of additional words or you can build your own dictionaries. You can add, subtract or customize them to meet your needs. You may want to add foreign language terms in addition to the English words. You may even set up other dictionaries according to your specialized field. Some examples are data processing, engineering, law, medicine and science. The size of your dictionary is limited only by the available disk storage space.

Easy to use: One of Magic Spell's distinct advantages is that you can request all its features from a simple menu. This spelling checker also contains many reference displays that can be displayed on the screen at any time you desire. To aid in learning this automated system, four lessons are contained in the manual with detailed exercises and examples. In difficult word situations, Magic Spell allows for hyphenated words, hyphens at the end of lines, and apostrophes.

Hardware and software requirements: An H/Z-89 or Z-90 Computer requires 48K bytes of RAM, one double-density disk drive, CP/M-80, and Magic Wand.

HIS-837-1, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 295.00
SuperCalc is a trademark of Sorcim Corp. CP/M is a registered trademark of Digital Research, Inc. WordStar and MailMerge are trademarks of Micropro International Corp. Magic Wand is a trademark of Peachtree Software, Inc.



NEW

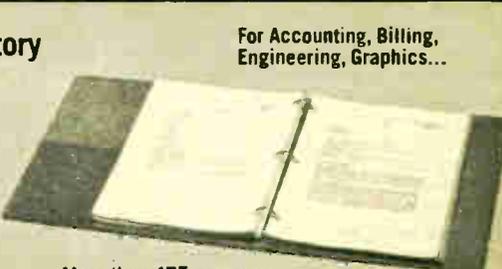
H/Z-100 Desktop Computer Series Software Directory

H/Z-100 software locator: The Software directory is designed to help H/Z-100 Computer users locate software products that meet their specific needs. It lists more than 475 programs that have been reported as available and able to run on the H/Z-100 family of computers.

Contents: This edition is divided into 21 chapters from Accounting to Word Processing. Within chapters, products are alphabetically categorized into specific product types. Each listing contains a description of the software product as provided by the vendor, vendor's name, address and phone number.

CB-463-15, H/Z-100 Software Directory, 2nd Ed. Shpg. wt. 3 lbs. 25.00

For Accounting, Billing, Engineering, Graphics...



More than 475 programs

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

COMPUTERS/49

Flexible C BASIC Version 2.0 programming language

- Includes a psuedo-code compiler and a run-time interpreter with extremely versatile disk file accessing facilities

Structure: C BASIC consists of three programs. The first is a psuedo-compiler that converts your source code into a series of coded operations and then places them in an intermediate disk file. The second, a run-time monitor, directly carries out the operations included in the intermediate file. The third and final program, called XREF.COM, produces a cross-reference listing of all variables used in a C BASIC source program. Files can also be directed to a printer.

Expressions available: C BASIC statements and commands include string constants, integers and real numbers, identifiers, variable and assign statements. Some extended features include the IF, THEN, ELSE and WHILE constructs, integer variables, multiple line functions, chaining with common variables, additional pre-defined functions and a cross-reference listing generator. To increase its versatility, C BASIC uses machine language linkage statements and functions...like PEEK, POKE, CALL, and SAVEMEM. Also, several control and I/O statements allow more sophisticated programming.

Hardware and software requirements: To run C BASIC, an H/Z-89 or X-90 Computer needs 48K or RAM, one floppy disk drive and the CP/M operating system.

HCM-817-1, Vers. 5.2 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 115.00

HCM-837-1, Vers. 5.2 on soft-sectored 5.25" disk, Shpg. wt. 1 lb. 115.00

HCM-847-1, Vers. 5.2 on soft-sectored 8" disk, Shpg. wt. 2 lbs. 115.00

Microsoft BASIC Interpreter provides many features

- Includes many enhancements that make it more powerful and versatile than most other BASIC languages

Complete programming system: An extensive implementation of BASIC, this general-purpose programming language has become one of the standards for micro-computers. This is because it provides ease of use plus features that make a microcomputer perform like a minicomputer or large mainframe.

Interpreter's features: An IF-THEN-ELSE control structure allows for highly structured programming including editing during programming and random or sequential filing capabilities. You get direct access to CPU ports and memory locations. And, you are provided with a wide range of logical and mathematical operators.

Extended features: Extensive program editing facilities include insertion and deletion along with character change and search capabilities. This version of BASIC has file management facilities that include random and sequential files plus file manipulation. Powerful string processing functions are provided plus operators, functions and commands which aren't available in most other BASICs.

Hardware and software requirements: To use this language, an H/Z-89 or Z-90 requires 48K RAM, one disk drive, and the HDOS or CP/M operating system.

HMS-817-1, Vers. 5.2 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. 175.00

HMS-837-1, Vers. 5.3 on soft-sectored 5.25" disk for CP/M-80, 4 lbs. 175.00

H-8-21, Vers. 4.8 on hard-sectored 5.25" disk for HDOS, 4 lbs. 150.00

FORTRAN for scientific and engineering programs

- Provides more power to meet your heavier mathematical and scientific programming needs

Powerful compiler: The many extended features of this system make it comparable to FORTRAN compilers used on large mainframes and minicomputers. It includes all the features of ANSI FORTRAN X3.9-1966, except COMPLEX data type. This means you can take advantage of the many utility and applications programs already written in the FORTRAN language.

Many enhancements: This version of FORTRAN features a popular compiler that can produce machine language routines at up to 1200 lines per minute in a single pass and needs less than 25K bytes of memory to compile most programs. Also featured is a relocating assembler, a cross-reference generator for sorting, and a linkage editor to generate runnable load modules.

Additional features: This programming language uses an extensive library of single and double precision scientific functions. With FORTRAN, you can create your own library of subroutines and easily interface with machine language subroutines. Descriptive error messages showing addresses assigned to labels, variables, and constants is another feature. FORTRAN supports an I/O device and includes sample source programs for the user's convenience.

Hardware and software requirements: To run FORTRAN, an H/Z-89 or Z-90 Computer needs 48K of RAM, two drives, and either HDOS or CP/M-80.

HMS-817-2, Vers. 3.4 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. 195.00

HMS-837-2, Vers. 3.4 on soft-sectored 5.25" disk for CP/M-80, 4 lbs. 195.00

H-8-20, Vers. 3.3 on hard-sectored 5.25" disk for HDOS, 4 lbs. 175.00

50/COMPUTERS

Microsoft BASIC Compiler speeds program execution

- Compile your programs with this MBASIC Compiler, Version 5.2, and eliminate time-consuming interpretation

Increased execution speed: Compiled programs are fast because the BASIC Compiler produces highly optimized machine code which is directly executed. During the compiling of a program, expressions are reordered to minimize temporary storage and, whenever possible, to transform floating point division into multiplication. Also, constant multiplications are optimally distributed to allow for a more complete and constant folding.

To use: Simply enter and debug your program using a BASIC Interpreter. Then enter a single command line telling the compiler what to compile and which options to use. The compiler then produces optimized machine code as a relocatable binary file. This object code is then loaded and linked with MBASIC's run-time library. Included in this library is a relocating assembler, a linkage generator, a cross-reference generator, and a library manager.

Hardware and software requirements: To run this compiler, an H/Z-89 or Z-90 Computer needs 48K RAM, two disk drives, and either HDOS or CP/M-80.

HMS-817-41, on hard-sectored 5.25" disk for HDOS, 4 lbs. 250.00

HMS-837-41, on soft-sectored 5.25" disk for HDOS, 5 lbs. 250.00

HMS-817-4, on hard-sectored 5.25" disk for CP/M-80, 4 lbs. 250.00

HMS-837-4, on soft-sectored 5.25" disk for CP/M-80, 4 lbs. 250.00

Powerful and versatile MACRO-80 Assembly Language

- Provides most "big computer" assembler features without sacrificing speed or memory space

Features: MACRO-80 supports a complete, Intel-standard macro facility which accepts Intel 8080 and Zilog 80 mnemonics. Nesting of macros is limited only by the amount of memory and conditionals, up to 255 levels, can be nested. Code is assembled in relocatable modules that are handled by a link editor.

Utilities: After a source program has been written, it must be assembled using the Macro Assembler. This results in a relocatable module which is loaded using the Linking Loader, LINK-80. The Loader also links these modules to any internal routines that may be needed for execution of the relocatable module. A library manager, LIB-80, is used to create and modify libraries which are then linked with compiled programs. A cross-reference facility, CREF-80, is used to generate a special listing that can be used as an important diagnostic tool. Each source statement is numbered with a Cross Reference number.

Hardware and software requirements: An H/Z-89 or Z-90 Computer needs 48K of RAM, one disk drive (two drives are recommended) and either HDOS or CP/M-80.

HMS-817-51, on hard-sectored 5.25" disk for HDOS, 2 lbs. 65.00

HMS-837-51, on soft-sectored 5.25" disk for HDOS, 4 lbs. 65.00

HMS-817-52, on hard-sectored 5.25" disk for CP/M-80, 2 lbs. 65.00

HMS-837-52, on soft-sectored 5.25" disk for CP/M-80, 3 lbs. 65.00

Microsoft's business-oriented COBOL Compiler

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

Powerful business programming language: COBOL is designed for inventory, personnel, payroll, order entry, accounting, and forecasting applications. It supplies the tools to meet the rising challenge of information processing. These tools consist of a powerful use of disk files, easy-to-use syntax, long variable names, and readable programs. Large programs are effectively managed because data and procedures can be hierarchically structured.

Features: COBOL's many features include built-in utilities consisting of a compiler, linking loader, macro assembler, a library manager in CP/M, and a cross reference assembler. It has an efficient program structure that makes COBOL's programs faster to write and easier to maintain. Also, information is stored in a logical structure with direct interconnection between related pieces of data. And, a special syntax is available for versatile screen handling capability. In addition, menu-driven applications allow smooth transfer of control between programs.

Hardware and software requirements: To run this COBOL Compiler, an H/Z-89 or Z-90 Computer requires a minimum of 48K RAM and two disk drives. Also required is either the HDOS or CP/M-80 operating system.

HMS-817-31, on hard-sectored 5.25" disk for HDOS, 4 lbs. 395.00

HMS-837-31, on soft-sectored 5.25" disk for HDOS, 4 lbs. 395.00

HMS-817-3, on hard-sectored 5.25" disk for CP/M-80, 5 lbs. 395.00

HMS-837-3, on soft-sectored 5.25" disk for CP/M-80, 4 lbs. 395.00

Microsoft is a trademark of Microsoft, Inc. CP/M is a registered trademark of Digital Research, Inc.

For Computer Credit Card Orders or Information Call TOLL-FREE: 800-253-7057



SUPERSORT™ sorts about any kind of existing record

SuperSort™ can be used with WordStar™, Magic Wand™ or by itself to sort, merge and select information from your data files. SuperSort offers superior power with greater convenience for the user.



Simple sorting: SuperSort can sort and merge 32 input files (up to 512 kilobytes) into a single master file in one simple and efficient operation at an unmatched speed of 560 records a minute. This sorter accepts a wide variety of records in which data can be justified, or include floating decimals, exponential notation, or upper and lower case letters. Data can also be in several standard formats; such as, binary, EBCDIC, BCD, ASCII, and others. With SuperSort, you can sort fixed and variable length records and fields. And, you can even have a different number of fields in each record. In using this program, you can specify up to 32 different sorting criteria; equal to, less than and others.

More features: To aid the user, SuperSort provides help messages that appear automatically. If an illegal instruction is entered, you get a plain English help message. Another feature lets you change record lengths by adding or subtracting fields, or rearrange fields in a record. This program also lets you convert files to a different record type. And, all files are indexed.

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

Software compatibility: SuperSort works with BASIC, Assembly Language, Microsoft™ FORTRAN, and Microsoft COBOL programs as well as with text editors. It may also be linked to Magic Wand, WordStar and other MicroPro programs.

Hardware and software requirements: An H/Z-89 requires 48K bytes of RAM and one disk drive to run SuperSort. The CP/M® operating system is also required.

HMP-817-1, on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. 195.00
 HMP-837-1, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 195.00
 HMP-847-1, on soft-sectored 8" disk, Shpg. wt. 4 lbs. 195.00

MAC® Assembler for easier Assembly Language writing

MAC features a SID-compatible symbol table file for debugging use and has full Intel-compatible macro libraries on diskette with full documentation.

Features: Designed for the sophisticated Assembly Language programmer, MAC supplies many features that make your program writing easier. Some of these are: additional conditional assembly operators, title and page pseudo-operands, full Intel-compatible macro definitions, including repeating macro calls and disk macro libraries. And, MAC has the ability to generate a SID-compatible symbol table file.

Includes: MAC is fully compatible with CP/M's Assembly language and comes with a manual that provides a textbook study of macro assemblers. An accompanying diskette contains a variety of macro libraries for performing useful tasks.

Hardware and software requirements: To run this Assembler, an H/Z-89 needs 48K of RAM, one disk drive, and the CP/M operating system.

HDR-817-1, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 85.00
 HDR-837-1, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. 85.00
 HDR-847-1, on soft-sectored 8" disk, Shpg. wt. 2 lbs. 85.00

SuperSort and WordStar are trademarks of MicroPro International Corp. Magic Wand is a trademark of Peachtree Software, Inc. Microsoft is a trademark of Microsoft, Inc. MAC, DESPOOL, SID/ZSID, CP/M are trademarks of Digital Research, Inc.



DESPOOL – a multi-tasking printer utility

• Improve your computer system's efficiency by being able to print out a file while working on another

Time saver: Print files while you are performing other computing operations. DESPOOL improves your computer's efficiency by allowing it to perform two tasks at the same time. Print one program through your line printer and continue to use the Assembler, Editor, BASIC, or an applications program.

To use: Since DESPOOL takes up very little memory space, it can be loaded and stored until needed. When you're ready to use the multi-tasking option, just type in a Control-F. When the spooler prompt appears, type in the file name, DESPOOL. The terminal instantly returns to the previous program while the specified program prints out on your line printer. As you can see, this spooler is very easy to use.

Hardware and software requirements: An H/Z-89 needs a minimum of 48K of RAM, one disk drive and the CP/M operating system to run DESPOOL.

HDR-817-3, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 50.00
 HDR-837-3, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 50.00
 HDR-847-3, on soft-sectored 8" disk, Shpg. wt. 2 lbs. 50.00

SID/ZSID™ : upgraded version of CP/M's DDT Debugger

SID/ZSID Debugging Utility includes both 8080-compatible SID and Z-80-compatible ZSID at substantial savings over separate prices. Use with Digital Research and Microsoft products.



Features: While maintaining all CP/M's DDT features, SID/ZSID allows the use of source-level names for easier program modification. You use these names instead of addresses in dumping and modifying memory, setting breakpoints and making patches to your program using symbolic Assembly Language. SID/ZSID can draw histograms of program and subroutine execution frequencies, maintain pass counts and provide a traceback of the execution path to selected breakpoints. This utility functions in a non-symbolic mode without symbol file.

Hardware and software requirements: SID/ZSID requires an H/Z-89 to have a minimum of 48K RAM, one disk drive, and the CP/M operating system. MAC Macro Assembler is recommended for the full use of SID/ZSID's capabilities.

HDR-817-2, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 125.00
 HDR-837-2, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 125.00
 HDR-847-2, on soft-sectored 8" disk, Shpg. wt. 2 lbs. 125.00

SOFTWARE LISTING CONTINUES ON PAGE 54



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

The President's Corner

Dear Friends,

There's nothing quite like the feeling you get when you've finished a kit and turn it on for the first time. For me, it's a time of apprehension, anticipation and excitement... followed immediately by either sheer delight or extreme disappointment.

Statistically, the odds are better than 90% for success at the first turn-on. Another 7% of us get the product going by following the troubleshooting directions found in our manuals under the section entitled, "In Case of Difficulty." The other 3% usually give Heath Company an opportunity to prove its advertising claim, "We Won't Let You Fail." We mean it, and we'll do our level best to fix your problem cheerfully, quickly, fairly and permanently.

Almost three-fourths of all service repairs and parts replacements are now handled by Heathkit Electronic Center retail stores. There are sixty-four of them, located from coast to coast (plus Hawaii), and our customers find them a convenient and friendly place to go for help. Each one has qualified technicians and a stock of factory-recommended replacement parts.

All Heathkit Centers and the factory are interconnected through computers. This network makes technical information and product support data quickly and easily available throughout the system.

Of course, the factory also provides service and parts replacement direct to our customers anywhere in the world. And, our staff of technical consultants is truly unique in their ability to solve problems by phone or by correspondence. They've been doing it very successfully for better than 35 years.

Most of this is not news to many of you. But, I think it's worth saying once in a while because there just aren't too many places any more where you can buy quality products and know you're going to get quality service, from friendly people. We're proud to be one of those places and it's our pledge to you that we'll continue to work very hard to earn your continued confidence, friendship and patronage.

Sincerely,



President



EASY ORDERING INFORMATION



BY PHONE:
CALL TOLL FREE!

800-253-0570

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.

The Heathkit Catalog is now on-line through CompuServe.
See page 44.

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	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 8 A.M. - Noon and 1-4:30 P.M., Eastern Time, Weekdays only.	616-982-3884

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
010-069	5	262-278	4	370-386	4	478	3	600-609	2
070-089	4	279	5	387	5	479-489	2	610-619	3
090-099	5	280-283	4	388	4	490-491	1	620-623	4
		284-285	5	389-397	5	492	2	624-628	3
		286-293	4			493-495	1	629-668	4
100-108	5	294-295	5	400-406	3	496-499	3	669-679	5
109	4	296-297	4	407-409	4			680-687	4
110-119	5	298-299	5	410-412	3	500-516	4	688-693	5
120-123	4			413-422	4	520-524	3		
124-126	5			423	3	525	4	700-722	5
127-128	4	300-303	4	424-426	4	526-528	3	723-727	4
129	5	304	5	427-432	3	530-534	2	728-768	5
130-152	4	305-307	4	433-436	2	535-539	3	769	6
153	3	308-329	5	437-457	3	540	4	770-778	5
154-160	4	330-334	6	458	2	541-546	3	779-789	6
161	3	335-338	5	460-462	3	547-548	4	790-792	5
162-163	4	339	6	463-464	2	549	3	793-799	6
164-165	3	340	6	465-466	1	550-566	4		
166-199	4	350-352	4	467-469	2	567	5	800-803	5
		354	5	470-472	3	570-572	4	804-805	6
200-232	4	355-359	4	473	2	573-588	5	806-807	5
233-237	5	360-361	5	474-475	3	590-597	6	808-816	6
238-259	4	362	4					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 *do 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

Heat Shipping and Handling Charges. Mailable items only. See special shipping and handling information for Motor Freight items

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

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

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

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

Shipp. wt	Zone 1 & 2		Zone 3		Zone 4		Zone 5		Zone 6		Zone 7		Zone 8		UPS 2nd DAY AIR SERVICE	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Zone A	Zone D
1	\$1	\$2	\$1	\$2	\$1	\$2	\$1	\$2	\$1	\$2	\$1	\$2	\$1	\$2	\$3	\$4
2	1.37	1.44	1.51	1.59	1.71	1.83	1.97	2.15	2.36	2.60	2.87	3.17	3.50	4.00	5.71	7.10
3	1.46	1.55	1.66	1.79	1.96	2.15	2.36	2.60	2.87	3.17	3.50	3.86	4.24	4.80	6.89	8.69
4	1.54	1.67	1.82	1.98	2.22	2.46	2.74	3.06	3.42	3.81	4.21	4.64	5.09	5.70	8.07	10.15
5	1.63	1.78	1.97	2.18	2.47	2.78	3.13	3.50	3.90	4.33	4.78	5.25	5.75	6.50	9.25	11.75
6	1.71	1.90	2.12	2.37	2.72	3.09	3.51	3.90	4.33	4.78	5.25	5.75	6.30	7.00	10.43	13.43
7	1.80	2.02	2.28	2.57	2.98	3.41	3.90	4.33	4.80	5.29	5.80	6.33	6.89	7.50	11.61	15.11
8	1.89	2.13	2.43	2.76	3.23	3.72	4.24	4.78	5.33	5.90	6.48	7.09	7.73	8.40	12.79	16.79
9	1.97	2.25	2.58	2.96	3.48	4.04	4.67	5.30	5.96	6.63	7.31	8.01	8.73	9.48	14.50	19.89
10	2.05	2.36	2.73	3.15	3.73	4.35	5.05	5.73	6.48	7.25	8.04	8.85	9.68	10.50	16.50	21.05
11	2.14	2.48	2.89	3.35	3.99	4.67	5.44	6.21	7.00	7.81	8.64	9.49	10.35	11.25	17.50	23.13
12	2.22	2.60	3.04	3.54	4.24	4.98	5.82	6.63	7.50	8.39	9.30	10.23	11.18	12.15	18.50	24.75
13	2.31	2.71	3.19	3.74	4.49	5.30	6.21	7.15	8.10	9.07	10.05	11.05	12.07	13.10	19.50	26.69
14	2.39	2.83	3.35	3.93	4.75	5.61	6.59	7.50	8.50	9.50	10.50	11.50	12.50	13.50	20.50	28.50
15	2.48	2.94	3.50	4.13	5.00	5.93	6.98	8.00	9.00	10.00	11.00	12.00	13.00	14.00	21.50	29.50
16	2.56	3.06	3.65	4.32	5.25	6.24	7.36	8.50	9.60	10.75	11.90	13.00	14.15	15.30	22.50	30.50
17	2.65	3.18	3.81	4.52	5.51	6.56	7.75	8.90	10.10	11.30	12.50	13.75	15.00	16.25	23.50	31.50
18	2.73	3.29	3.96	4.71	5.76	6.87	8.13	9.40	10.70	12.00	13.30	14.60	15.90	17.25	24.50	32.50
19	2.82	3.41	4.11	4.91	6.01	7.19	8.52	9.80	11.10	12.40	13.70	15.00	16.30	17.60	25.50	33.50
20	2.90	3.52	4.26	5.10	6.26	7.50	8.80	10.10	11.40	12.70	14.00	15.30	16.60	17.90	26.50	34.50
21	2.99	3.64	4.42	5.30	6.52	7.82	9.20	10.50	11.80	13.10	14.40	15.70	17.00	18.30	27.50	35.50
22	3.07	3.76	4.57	5.49	6.77	8.13	9.50	10.80	12.10	13.40	14.70	16.00	17.30	18.60	28.50	36.50
23	3.16	3.87	4.72	5.69	7.02	8.45	10.06	11.40	12.70	14.00	15.30	16.60	17.90	19.20	29.50	37.50
24	3.24	3.99	4.88	5.88	7.28	8.76	10.44	11.80	13.10	14.40	15.70	17.00	18.30	19.60	30.50	38.50
25	3.33	4.10	5.03	6.08	7.53	9.08	10.40	11.70	13.00	14.30	15.60	16.90	18.20	19.50	31.50	39.50
26	3.41	4.22	5.18	6.27	7.78	9.39	11.21	12.50	13.80	15.10	16.40	17.70	19.00	20.30	32.50	40.50
27	3.50	4.34	5.34	6.47	8.04	9.71	11.61	12.90	14.20	15.50	16.80	18.10	19.40	20.70	33.50	41.50
28	3.58	4.45	5.49	6.66	8.29	10.02	11.98	13.20	14.50	15.80	17.10	18.40	19.70	21.00	34.50	42.50
29	3.67	4.57	5.64	6.86	8.54	10.32	12.10	13.40	14.70	16.00	17.30	18.60	19.90	21.20	35.50	43.50
30	3.75	4.68	5.79	7.05	8.79	10.65	12.35	13.70	15.00	16.30	17.60	18.90	20.20	21.50	36.50	44.50
31	3.84	4.80	5.95	7.25	9.05	10.97	13.14	14.50	15.80	17.10	18.40	19.70	21.00	22.30	37.50	45.50
32	3.92	4.92	6.10	7.44	9.30	11.28	13.52	14.80	16.10	17.40	18.70	20.00	21.30	22.60	38.50	46.50
33	4.01	5.03	6.25	7.64	9.55	11.63	13.91	15.20	16.50	17.80	19.10	20.40	21.70	23.00	39.50	47.50
34	4.09	5.15	6.41	7.83	9.81	11.91	14.29	15.50	16.80	18.10	19.40	20.70	22.00	23.30	40.50	48.50
35	4.18	5.26	6.56	8.03	10.06	12.23	14.66	15.80	17.10	18.40	19.70	21.00	22.30	23.60	41.50	49.50
36	4.26	5.38	6.71	8.22	10.31	12.54	15.06	16.30	17.60	18.90	20.20	21.50	22.80	24.10	42.50	50.50
37	4.35	5.50	6.87	8.42	10.57	12.86	15.45	16.70	18.00	19.30	20.60	21.90	23.20	24.50	43.50	51.50
38	4.43	5.61	7.02	8.61	10.82	13.17	15.83	17.10	18.40	19.70	21.00	22.30	23.60	24.90	44.50	52.50
39	4.52	5.73	7.17	8.81	11.07	13.49	16.20	17.50	18.80	20.10	21.40	22.70	24.00	25.30	45.50	53.50
40	4.60	5.84	7.32	9.00	11.32	13.80	16.50	17.80	19.10	20.40	21.70	23.00	24.30	25.60	46.50	54.50
41	4.69	5.96	7.48	9.20	11.58	14.12	16.99	18.30	19.60	20.90	22.20	23.50	24.80	25.90	47.50	55.50
42	4.77	6.08	7.63	9.39	11.83	14.43	17.37	18.60	19.90	21.20	22.50	23.80	25.10	26.20	48.50	56.50
43	4.86	6.19	7.78	9.59	12.08	14.75	17.76	18.90	20.20	21.50	22.80	24.10	25.40	26.50	49.50	57.50
44	4.94	6.31	7.94	9.78	12.34	15.06	18.14	19.40	20.70	22.00	23.30	24.60	25.90	26.80	50.50	58.50
45	5.03	6.42	8.09	9.98	12.59	15.38	18.53	19.80	21.10	22.40	23.70	25.00	26.30	27.10	51.50	59.50
46	5.11	6.54	8.24	10.17	12.84	15.69	18.91	19.90	21.20	22.50	23.80	25.10	26.40	27.20	52.50	60.50
47	5.20	6.66	8.40													



Condor® Relational Data Base Management lets you design your own data base programs

- Simplifies information processing for inventory control, sales forecasting, accounting and many other business applications
- Designed so that you can create your own data base programs even if you have little or no programming experience
- Create your own help menus that use simple, English-type commands
- Well-documented user's manual includes tutorial lessons to help you understand and learn about Condor's great flexibility

Information processing power: Condor rDBMS, a series of assembly language programs, brings incredible speed and simplicity to information storage and filing. Condor enables you to design and create files of information, or data bases, for keeping records on whatever subjects you choose. With this system, you can quickly and economically search, sort, merge, analyze, index and print out those records. Once your data is organized, simple English-type commands allow unrelated information to become dynamically related.

Exceptionally fast: To get your work done fast, Condor's application programs are written in Assembly Language, the computer-oriented programming language. This allows commands and operations to be quickly carried out since time spent interpreting is eliminated. With its exceptional speed, you spend less time handling your information files within Condor's impressive data base capacity that includes: up to 32,767 records per file, up to 1023 bytes in a record, up to 127 fields per record and up to 127 characters per field.

Easy-to-use versatility: To obtain the most efficiency from these application programs and make them easier to use, Condor allows you to create your own command files and help menus. A command file eliminates the need to use many different commands for a simple task. It is a file that consists of a number of commands needed to perform an operation. Once the file is created, you enter only one command statement to perform the operation. For example, RUN plus a filename, to run a certain program. You can further simplify the operation of Condor by creating different "help" menus of command files. A help menu is a screen display that lists tasks that are performed by a number of command files. To use a help menu, you assign a number to each command file listed. Then, to do a certain task, you only need to enter the number assigned to that task. Therefore, instead of entering "RUN," you just enter the number for that command as listed in your menu. In this way, you can perform a complex task with a single menu selection. These help menus save you time and simplify Condor's operation, especially if the same tasks are often repeated.

Special features: Although it is fast and easy to use, Condor rDBMS is also one of the most powerful relational data base management systems available. Condor's power lies in its self-contained command language, a product of years of research, development, and field testing. Two of these powerful commands include FORMAT and DEFINE which allow you to create new data bases within minutes. FORMAT also provides powerful screen editing capabilities for both data base development and report writing. A STAX command lets you calculate statistics for field values within a data base. With COMPARE and INDEX you can enter unique records. A POST feature permits you to efficiently transfer transactions to a master file. Using INDEX, you can gain quick access to information. With the REPORT feature, you'll be able to produce sophisticated reports.

Other rDBMS features: Condor uses a relational structure that eliminates the need for a professional computer programmer. It lets you develop a menu-driven ap-

plications system without additional software and programming. It even has extensive error checking and error message facilities. Condor can perform addition, subtraction, multiplication and division operations. Other arithmetic operations can be performed on Julian calendar dates and dollar amounts. You can quickly and easily select records by specifying up to 32 logical conditions including the AND, OR and NOT Boolean operations. Also, the self-contained and English-like data language allows for easier operation while eliminating the need for a host computer language, such as BASIC.

Instructive user's manual: One of the exceptional features of Condor rDBMS is its easily readable and highly instructive user's manual. It begins with an introduction to the system, explains the data base concept, and presents procedures for starting it up. Several chapters are devoted to tutorial lessons in the use of the system. Rounding out the manual is a description of all commands and system features with appendices, glossary of terms, and index.

Tutorial lessons: While Condor rDBMS is an easy program to use, it does offer a great amount of flexibility. It provides many different types of operations with many associated options from which you need to choose. For this reason, Condor supplies a series of lessons that help you to understand and learn how to use this system as quickly as possible. Included in the lessons are explanations of what you are doing as well as explanatory illustrations. One of the two disks supplied with this relational data base management system is used with the lessons and sample data bases contained in the manual. Working through these lessons will provide you with a basic experience in using this sophisticated system.

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

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

HCD-8947-1, on soft-sectored 8" disk, Shpg. wt. 4 lbs. 650.00

Remote IBM® Terminal Emulator software permits your H/Z-89 or Z-90 to emulate various IBM data communications terminals

Emulates IBM 3780, 2780, 3741, and 2770 Terminals

Remote Batch Terminal Emulator: Allows your H/Z-89 or Z-90 Computers to emulate an IBM batch terminal and still function as a microcomputer. A few applications of this type of system are: remote job entry, down-line loading, and distributed processing. To run this software program, your H/Z-89 or Z-90 needs 48K RAM, one disk drive, a Z-89-11 I/O board (below) and CP/M-80.

HWI-8917-1, on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. 895.00

HWI-8947-1, on soft-sectored 8" disk, Shpg. wt. 4 lbs. 895.00

Save \$50 — buy Z-89-11 with above RBTE software

Separately they total \$1045, but when you purchase the Remote Batch Terminal Emulator software and the Z-89-11 Input/Output Board you save \$50.

HWI-8917-2, both HWI-8917-1 and Z-89-11 I/O Board, 12 lbs. ... **ONLY 995.00**

HWI-8947-2, both HWI-8947-1 and Z-89-11 I/O Board, 12 lbs. ... **ONLY 995.00**

3270 Emulator for microprocessing and teleprocessing

IBM Emulator: This program allows you to use your H/Z-89 or Z-90 Computer to work as a microcomputer or as the popular IBM 3270 display station. Both computers need 64K of RAM, one disk drive, Z-89-11 I/O Board, and CP/M.

HPO-8917-1, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 650.00

HPO-8937-1, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. 650.00

Save \$51 — buy Z-89-11 with above Emulator software

Separately they total \$1045, but purchased together you can save \$51.

HPO-8917-2, both HPO-8917-1 and Z-89-11 I/O Board, 3 lbs. ... **ONLY 749.00**

HPO-8937-2, both HPO-8937-1 and Z-89-11 I/O Board, 3 lbs. ... **ONLY 749.00**

Z-89-11 Multi-Mode Interface for H/Z-89 and Z-90

Input/Output Board: Use with the above Remote Batch Terminal and 3270 Emulator software programs and a H/Z-89 or Z-90 to emulate various IBM data terminals. This interface board also has a Centronics-style input/output port for use with parallel printers. Interface requires the CP/M operating system.

Z-89-11, Assembled Interface Board, Shpg. wt. 1 lb. 150.00

Condor is a registered trademark of Condor Computer Corp. CP/M is a registered trademark of Digital Research, Inc. IBM is a registered trademark of International Business Machines Corp.





ZDS Teacher and Student programs help teach through computer-assisted instruction

Use your H/Z-89 or Z-90 Computer and this educational package to improve, increase and enhance student learning

Use ZDS Teacher program to write courses and tests

- Features creating, updating, and printing course material as well as quizzes and tests for the courses you develop

General purpose program: ZDS Teacher is an applications program designed for the development and presentation of written information, including educational materials and courses, training programs, and newsletters. You, as teacher or instructor, solely determine the format and the content of the course. As you develop the course, ZDS Teacher lets you create the content and format of each page, select the page to be displayed, and determine the sequence in which pages are displayed. And, you can insert quiz and test pages anywhere in a course. As the student takes the course, test pages are recorded and tabulated.

Features: To help you create your course, the ZDS Teacher program includes a built-in, full screen editor. During data page editing, the cursor is in a 16-line by 64-column area centered on your screen. To the left and right of this centered area, you'll see the editor commands listed as a guide to you. This program also enables you to manipulate pages of information through copy, insert, and delete options. For your convenience, ZDS Teacher features many helpful and informative messages at the bottom of the screen during its use.

Hardware and software requirements: To execute ZDS Teacher properly, an H/Z-89 or Z-90 Computer requires a minimum of 48K of RAM and one disk drive. This program runs under the CP/M operating system, version 2.2 or higher.

HTA-817-1, ZDS Teacher on hard-sectored 5.25" disk, 2 lbs. 295.00
HTA-837-1, ZDS Teacher on soft-sectored 5.25" disk, 2 lbs. 295.00

Use ZDS Student program for computer-assisted study

- Enables a student to independently view, study, and be tested on customized courses written with the ZDS Teacher program

Easy-to-use learning tool: The ZDS Student program allows you, as the student, to run programs created by your teacher or instructor. You proceed at your own pace through a course by following basic instructions and prompts displayed on the video screen. You start by simply inserting your ZDS Student program disk into an available disk drive in your H/Z-89 or Z-90 Computer.

Step-by-step guidance: As you go through the course, the ZDS Student program displays helpful messages at the bottom of your video screen in an area called a response window. Up to five response windows can be displayed containing self-explanatory messages about valid responses to the program. These helpful messages eliminate your need to memorize correct responses and allow you to concentrate wholly on the material in the course program.

Video screen pages: Besides encountering data pages which contain only course material, index pages may appear at any point throughout a course. These pages offer on-screen options of course material. And, quiz and test pages may also appear at any point throughout the course. Only test pages are tabulated.

Hardware and software requirements: This educational program requires the use of a H/Z-89 or Z-90 Computer with 48K RAM and one disk drive. ZDS Student has no authoring capabilities and must be used in conjunction with the ZDS Teacher program. ZDS Student must use CP/M version 2.2 or higher.

HTA-817-2, ZDS Student on hard-sectored 5.25" disk, 1 lb. 40.00
HTA-837-2, ZDS Student on soft-sectored 5.25" disk, 1 lb. 40.00

CP/M is a registered trademark of Digital Research Inc.

Tough Electronic Environment™ computer furniture provides good looks and user comfort

Complement your computer system and workspace with this attractive and precisely designed computer workstation. It features superior strength and rigid construction for supporting heavy loads. Among other features are non-glare tabletops with rounded corners and soft edges for safety and comfort. Each contemporary piece is made with quality and features user convenience.

1 Rigid computer desk

- Non-tipping, non-flexing cantilever table for maximum strength and user comfort

User-oriented features: This stylish table stands at a conventional desk height of 29 inches and provides a generous 30- by 40-inch work area. Double-wall steel L-shaped leg uprights bolt to heavy gauge top and bottom supports for maximum strength. This cantilever design provides superior load bearing capability and gives an operator full knee clearance.

Other user features: The high-pressure laminate top has a non-glare matte finish that is stain and burn resistant. The top is ringed by a thick, soft molding that provides a rounded shock-absorbing safety edge. To keep cables and cords safely out of the way, openings are provided through the top and modesty panel to a convenience shelf. Leg scuff protectors and levelers are also provided.

FP-4830, Shpg. wt. 100 lbs. Mtr. frt. 275.00

2 Printer or terminal stand

Versatile table: Use this stand as part of your computer workstation or alone as a terminal, video game or TV table. It has all the outstanding features of the computer desk above. It stands at the ideal keyboard height of 27 inches and provides an ample work-top area of 30 inches wide and 24 inches deep. And, it comes partially assembled.

FP-3024, Shpg. wt. 62 lbs. Mtr. Frt. 195.00



3 Add on a useful storage module

For equipment or supplies: This storage module easily attaches under your computer desk for just about any use you can find. The module has side vents and is open in the rear for any computer equipment you would like to store out of the way. It also has access to the desk's wire management system for convenient cable placement. In addition, the module has a three-position adjustable shelf that provides extra storage space. This 19" H x 21" w x 18" D module comes partially assembled.

FP-4819, Shpg. wt. 27 lbs. Mtr. Frt. 75.00

4 Spacious upper storage shelf

Added storage: This full-length bookshelf added to the top of your computer desk is deep enough to hold 3-ring notebooks and full sized manuals. It is an ideal place to keep your hardware and software manuals. They are up and out of your way, yet close enough to quickly consult. The four-position shelf and tack board (for notes, etc.) attaches directly to the desk. This storage shelf comes partially assembled and measures 48" wide by 12" deep.

FP-4812, Shpg. wt. 30 lbs. Mtr. Frt. 150.00

Electronic Environment is a trademark of Marvel Metal Products Co.



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

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

Pre-wired, 10-foot RS-232 cables (connects pins 1-8, 20):

HCA-10, Male-to-Male Cable, Shpg. wt. 1 lb.	20.00
HCA-11, Male-to-Female Cable, Shpg. wt. 1 lb.	20.00
HCA-12, Female-to-Female Cable, Shpg. wt. 1 lb.	20.00

Pre-wired, 10-foot special application cables:

Votrax Cable. Connects H/Z-89 to WH-12 Type-N-Talk Speech Synthesizer.	
HCA-13, Shpg. wt. 1 lb.	20.00
Parallel Cable. Connects H/Z-89 with Z-89-11 Input/Output Board to MX-80.	
HCA-14, Shpg. wt. 1 lb.	25.00
Bisynchronous Modem Cable. For use with Z-89-11 Multi-Mode I/O Board.	
HCA-19, Shpg. wt. 1 lb.	20.00
Parallel Cable. Connects H/Z-100 Series Computers to MX-80A Printer.	
HCA-20, Shpg. wt. 1 lb.	25.00

Helpful accessories for your computer system:

Bi-directional Tractor Feed Assembly. For WH-54B and WH-44 Printers.	
HCA-1, Shpg. wt. 9 lbs.	259.00
5.25" Floppy Disk Storage Cabinet. Plastic cabinet protects 50 disks. Includes smoked glass cover.	
HCA-15, Shpg. wt. 2 lbs.	24.00
Surge Suppressor. Protects computer equipment from damage by transient voltage surges and power spikes.	
HCA-16, Shpg. wt. 1 lb.	65.00
Paper Tractor. Turns tractor feed printer into a friction feed system.	
HCA-17, Shpg. wt. 1 lb.	12.00
8" Floppy Disk Storage Cabinet. Plastic cabinet protects 50 8" disks. Includes smoked glass cover.	
HCA-18, Shpg. wt. 5 lbs.	30.00

Durable printwheels for Diablo 1640 and 630 printers:

Courier 10 (Diablo 38100). Pica typeface with slashed zero.	
HCS-20, Shpg. wt. 1 lb.	8.00
Courier 12 (Diablo 38107). Elite typeface with unslashed zero.	
HCS-21, Shpg. wt. 1 lb.	8.00
Elite 12 (Diablo 38102). Pica typeface with unslashed zero.	
HCS-22, Shpg. wt. 1 lb.	8.00
General Scientific (Diablo 38141). Includes Greek symbols, superscripts and mathematical symbols.	
HCS-23, Shpg. wt. 1 lb.	8.00
APL-10 Computer Language Font (Diablo 38150).	
HCS-24, Shpg. wt. 1 lb.	8.00
Prestige Elite Legal 12A (Diablo 38105). Legal symbols with c , d , tm .	
HCS-26, Shpg. wt. 1 lb.	8.00
Courier Legal 10 (Diablo 38104). Pica typeface with legal symbols.	
HCS-27, Shpg. wt. 1 lb.	8.00

High-quality, long-life printer ribbons:

Plug-In Cloth Ribbon Cartridges for Diablo 1640 and 630 Printers.	
HCS-50, Shpg. wt. 1 lb.	Package of three, 18.00
Plug-In Film Ribbon Cartridges for Diablo 1640 and 630 Printers.	
HCS-51, Shpg. wt. 1 lb.	Package of three, 18.00
Ribbons for H/WH-14 and ASR-33 Dot Matrix Printers.	
HCS-52, Shpg. wt. 1 lb.	Package of three, 8.00
Ribbons for WH-24 (TI 810) and H-36 (LA-36) Printers.	
HCS-53, Shpg. wt. 1 lb.	Package of three, 18.00
Plug-In Ribbon Cartridges for WH-34 DECWriter Printer.	
HCS-54, Shpg. wt. 1 lb.	Package of three, 29.00
Plug-In, No-Mess Ribbon Cartridge for MX-80 Printer.	
HCS-55, Shpg. wt. 1 lb.	Each, 14.00
Plug-In, Ribbon Cartridge for H/Z-25, H/Z-125 High-Speed Dot Matrix Printers.	
HCS-56, Shpg. wt. 3 lbs.	Package of two, 20.00

Quality printer paper at economical prices

Premium 8.5" x 11" One-Part, Fan-Fold Paper. Continuous 2700 sheets.	
HCS-1, Shpg. wt. 28 lbs.	32.00
Standard 8.5" x 11" One-Part, Fan-Fold Paper. Continuous 3200 sheets.	
HCS-2, Shpg. wt. 31 lbs.	32.00
Standard 14.875" x 11" One-Part, Fan-Fold Paper. Continuous 3200 sheets.	
HCS-3, Shpg. wt. 47 lbs.	42.00
Bond Form-Feed 8.5" x 11" One-Part, Fan-Fold Paper. Continuous 1000 sheets.	
HCS-4, Shpg. wt. 13 lbs.	25.00

Accessories for your MPI-99 Impact Matrix Printer:

Ribbon Cartridge. Replacement cartridge replaces easily without opening case.	
MPI-99-1, Shpg. wt. 1 lb.	12.00
Single-Sheet Feeder Attachment. For inserting paper from the front of printer.	
MPI-99-2, Shpg. wt. 2 lbs.	35.00
Sound Cover Attachment. For a quieter operating printer.	
MPI-99-3, Shpg. wt. 3 lbs.	35.00

Accessories for the MPI-150 Impact Matrix Printer:

Ribbon Cartridge. Replacement ribbon snaps into printer with disassembling.	
MPI-150-1, Shpg. wt. 1 lb.	20.00
Serial Adapter. Allows asynchronous serial data transfer up to 9600 baud.	
MPI-150-2, Shpg. wt. 1 lb.	110.00
Status Keypad. For front panel programming of font and pitch changes.	
MPI-150-3, Shpg. wt. 2 lbs.	130.00
64K Buffer Memory. Expands print buffer to 68K for high-speed printing tasks.	
MPI-150-4, Shpg. wt. 1 lb.	259.00

Graphics Applications Package for the MPI-99/150:

H/Z-100 AP-PAK. Allows printing of any H/Z-100 character. Includes cable.	
MPA-1, Shpg. wt. 1 lb.	75.00
H/Z-89 AP-PAK. Allows printing of any H/Z-89 character. Includes cable.	
MPA-3, Shpg. wt. 1 lb.	75.00
Z-90 AP-PAK. Allows printing of any Z-90 character. Includes interface cable.	
MPA-4, Shpg. wt. 1 lb.	75.00

Accessories for the WH-55 Diablo 620 Printer:

Tractor Feed. Improves registration in word processing, graphics, and others.	
WH-55-1, Shpg. wt. 6 lbs.	149.00
Courier 12 Printwheel. Elite typeface with unslashed zero.	
WH-55-2, Shpg. wt. 1 lb.	8.00
Elite 12 Printwheel. Pica typeface with unslashed zero.	
WH-55-3, Shpg. wt. 1 lb.	8.00
Courier 10 Printwheel. Pica typeface with slashed zero.	
WH-55-4, Shpg. wt. 1 lb.	8.00
Plug-In Ribbon Cartridge. Simply snap in and out for easy replacement.	
WH-55-5, Shpg. wt. 2 lbs.	Package of three, 25.00

Reliable, high-capacity 5.25" and 8" floppy disks:

5.25" Hard-Sectored, Floppy Disks. 48 TPI. 100 kilobyte capacity.	
HCS-70, Shpg. wt. 1 lb.	Package of ten, 40.00
5.25" Soft-Sectored, Single-Sided, Double-Density Floppy Disks. 48TPI. 160KB.	
HCS-66, Shpg. wt. 1 lb.	Package of ten, 45.00
5.25" Soft-Sectored, Double-Sided, Double-Density Floppy Disks. 48TPI. 320KB.	
HCS-71, Shpg. wt. 1 lb.	Package of ten, 50.00
5.25" Soft-Sectored, Double-Sided, Double-Density Floppy Disks. 96TPI. 640KB.	
HCS-68, Shpg. wt. 1 lb.	Package of ten, 55.00
8" Soft-Sectored, Single-Sided, Single-Density Floppy Disks. 250KB capacity.	
HCS-69, Shpg. wt. 2 lbs.	Package of ten, 55.00
8" Soft-Sectored, Single-Sided, Double-Density Floppy Disks. 500KB capacity.	
HCS-64, Shpg. wt. 2 lbs.	Package of ten, 60.00
8" Soft-Sectored, Double-Sided, Double-Density Floppy Disks. 1 MB capacity.	
HCS-65, Shpg. wt. 2 lbs.	Package of ten, 70.00





Comprehensive MS-DOS™ course teaches the A B C's of the Z-DOS™ operating system

\$99⁹⁵



- Covers the fundamentals of MS-DOS's operation and how to do console input/output and work with disk files
- A new audio-tutorial method with full section narration guides you through the Course
- Uses exercises specifically written for the H/Z-100 Series Computer operating under Z/DOS

Complete course: This seven-unit course teaches how MS-DOS is organized and all about how to use it. It is directed toward computer novices who don't fully understand the fundamentals of the equipment they have purchased.

Detailed study: About MS-DOS in general, and Z-DOS specifically, this course begins with a disk operating system background and explains how the disk is organized. Next, the most frequently used commands are discussed along with how to enter and edit command lines. In the next unit, the less frequently used commands (CHKDSK, FILCOM, RDCPM, and MAP) are discussed.

Following is a study of the file editor, EDLIN, including all its current features. The next unit teaches all about the batch processor and how to write simple files that'll make your system work almost automatically. This is followed with DEBUG, the program debugger. The last unit discusses the use of system routines by assembly language programs. You learn to input and output characters and strings, to read and write disk files, and to use directory entries within your programs.

Exercises: To provide you with experience in using MS/DOS features and commands, fifteen computer exercises are located throughout the course. Although this course can be used with either the H/Z-100 Series Computer or the IBM Personal Computer, the exercises are specifically written for the H/Z-100 while running under the Z-DOS operating system. These exercises work with the command line, built-in commands, fundamental utilities, status commands and other utilities. Other exercises work with creating and examining files along with debugging and file manipulation. You use what you learn as the course progresses.

Learn to write programs that execute 10 – 100 times faster than interpreted BASIC

\$49⁹⁵



- Learn to increase the efficiency of your computer
- Learn to use less memory space and run faster programs without wasting time interpreting
- Learn to use your computer's entire memory space

True programming language: More than a convenient notation for machine code, Assembly Language allows programmers to create a source code that is easily read and adapted to your computer system. It does this by using labels, operands, comments, and assembler directives. Assembly Language uses a mnemonic for every machine operation so that there isn't any time lost to interpreting commands. As a result, your programs use less memory space and run much faster.

Memory efficient: Shorter, more explicit codes allow you to store more data in less space and execute programs at speeds 10 to 100 times faster than if written in interpreted BASIC. Numeric memory locations and easily carried out documentation methods make these program listings easy to understand.

Course objectives: After completing this self-instruction course, you'll be able to program your own computer in Assembly Language.

Course materials: This course includes a 400-page text filled with interesting illustrations. A companion workbook provides hands-on training with computer programming exercises. To perform these exercises, you need access to an 8080/8085-based microcomputer that uses standard Intel 8080 mnemonics.

Speed up your listening and improve your learning with the Variable Speed Recorder

\$199⁹⁵



Comprehend better and retain more information

Learn at your own pace: While most people talk at 150 words-per-minute, research has shown that you can listen and understand up to 350 words-per-minute. While this is two to three times faster than normal speech, it's close to the comfortable reading speed of most people. This means that you can listen to cassette tapes at faster speeds and still effectively comprehend and retain information.

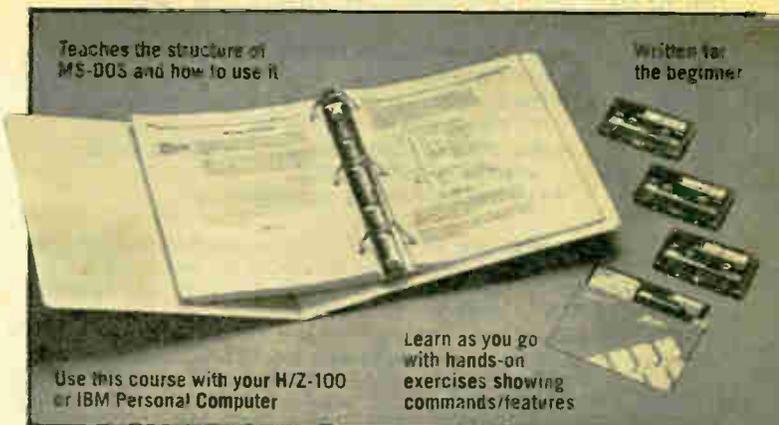
Compressed speech: Unlike other recorders that sound like a mouse when speeded up, the Variable Speed Cassette Recorder produces a normal sound-

ing voice...only it's talking faster. The output is clear and doesn't produce any clipped noises.

Sampled Speech: Electronically, the sound from the tape is sampled. So, what you hear are actually millisecond pieces of words. A variable slide switch allows easy speed adjustment from normal to 200%.

Power: The Recorder comes with an AC adapter that plugs into any 120 VAC outlet. For portable operation, it uses four "C" batteries (not included).

ECP-3803, Shpg. wt. 4 lbs. 199.95



Teaches the structure of MS-DOS and how to use it

Written for the beginner

Use this course with your H/Z-100 or IBM Personal Computer

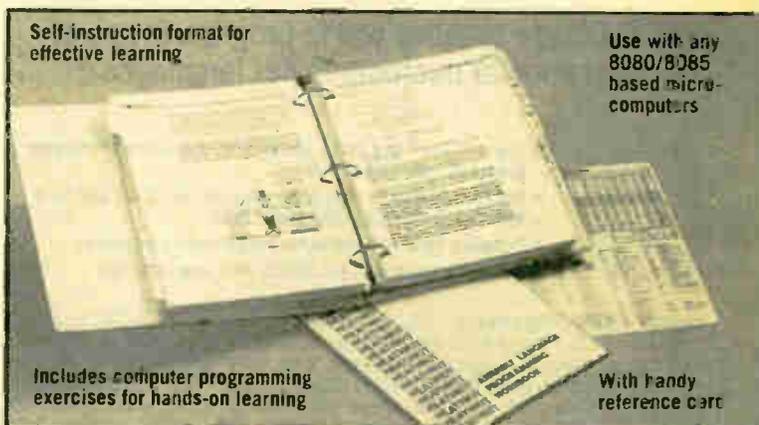
Learn as you go with hands-on exercises showing commands/features

Individual learning program: A self-study course, MS-DOS lets you proceed at your own speed for more effective and relaxed learning. In addition, three accompanying audio cassettes introduce each section and guide you through the Course for a fuller understanding of how your computer operates.

Rewards: Pass the optional final examination with a 70% or better score and you'll receive a Certificate of Achievement plus you'll be awarded 3.0 CEUs.

EC-1121, MS-DOS Course, Shpg. wt. 6 lbs. 99.95

MS-DOS is a trademark of Microsoft, Inc. Z-DOS is a trademark of Zenith Data Systems Corp.



Self-instruction format for effective learning

Use with any 8080/8085 based micro-computer

Includes computer programming exercises for hands-on learning

With handy reference card

Credit: Pass the optional final examination with a 70% or higher score and you'll earn 6.0 CEUs and be awarded a Certificate of Achievement.

EC-1108, Assembly Language Course, Shpg. wt. 7 lbs. 49.95



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

Learn how to use CP/M® and how to get the most out of this industry-standard operating system



- Use with any Heathkit/Zenith or 8080/Z-80/8085 based microcomputer that runs the CP/M operating system
- Starts with the basics of CP/M and builds up knowledge in a step-by-step learning process
- Uses a proven audio-visual tutorial method for greater comprehension and retention
- Earn credit and receive recognition

Beginner-oriented course: Now, with this CP/M Course, even first-time computer users can easily learn about the operating system that has become an industry standard. It begins with the very basics, so elementary that a previous background in CP/M or Assembly Language isn't necessary.

CP/M Course: Consisting of a 500-page text and five audio tapes, this self-instruction course makes it very easy to learn about CP/M. It begins with an introduction to the operating system and then covers the writing of basic CP/M commands. This includes the operating system's major control functions and diagnosing problems from error messages. In the next unit, built-in commands of the command control processor are discussed followed by a coverage of transient programs. Then, you are taught how to use the STAT and CONFIGUR commands. This is followed by how to transfer files using PIP, CP/M's versatile file transfer program. The next unit introduces the operating system's resident text editor, ED. ED's capabilities are further expanded upon with the course showing how to edit existing files plus explaining about more advanced ED functions. Finishing out the course is a discussion about submitting command files.

Compatible: CP/M is designed for use with all Heathkit/Zenith computers having a minimum of 48K RAM and using the CP/M operating system.

Credit: Pass the optional final exam with a 70% or higher score and earn 2.5 CEUs. You'll also receive a handsome Certificate of Achievement.

EC-1120, CP/M-80 Course, Shpg. wt. 6 lbs. 99.95

BASIC Course teaches you to program in one of the most popular microcomputer languages



- Learn to write and make corrections to powerful computer programs with versatile BASIC
- Set your own pace with self-instructional format and earn valuable Continuing Education Units
- Includes hands-on computer programming exercises
- Self-test reviews let you check your own progress

Popular BASIC programming: This course teaches you to write BASIC programs that instruct a computer to perform specific tasks. In fourteen programmed instruction segments, you proceed at your own speed and learn the standard words and commands of BASIC. In this course, many BASIC versions, formats, commands, statements and procedures are covered. You'll learn about the tools of the language and learn to define and plan a program. Then you'll format and write a program as well as adapt programs to suit your needs. Related exercises reinforce text material and give you hands-on experience.

Course includes: The BASIC Programming Course includes a self-instructional textbook and a workbook filled with exercises in writing and running BASIC programs. Access to a computer is recommended for maximum benefit of this course. In addition, handy reference cards with Benton Harbor BASIC statements, ASCII number codes, BASIC direct command statements and a reference chart with math and Boolean algebra operations are included.

Credit: After completing the course and passing the optional final examination with a 70% or higher score, you'll be awarded 3.0 Continuing Education Units. You'll also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems that's suitable for framing.

EC-1100, BASIC Programming Course, Shpg. wt. 7 lbs. 44.95

College-Level Examination: Earn valuable college credit for successful completion of this course. For more information see page 71.

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

58/COMPUTER EDUCATION

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



- Learn the primary language used in accounting, inventory, and other business applications
- Introduces the programming language that handles large, structured data files
- Covers the basics of COBOL for beginning programmers and others interested in commercial data processing
- Uses both the ANS-74 and ANS-68 versions of COBOL

Business language: COBOL is especially useful in applications involving manipulation of large, highly structured data files like those found in accounting functions, inventory control and other business applications. In these areas, it's more efficient than BASIC and gives you far greater productivity than Assembly Language. It's also more self-documenting, letting you see each step of an operation.

Comprehensive Course: This self-instructional course covers the basics of encoding, input characteristics, program hierarchy, identification, environment, data and procedure divisions. The text is filled with diagrams, tables, illustrative programs and unit tests. Nine audio cassette tapes allow you to hear and see each concept as it's presented. In this business language programming course, both ANS-74 and ANS-68 versions of COBOL are presented.

Programming exercises: Located at the end of the workbook are six COBOL practice programs. To get the most from these exercises, we recommend that you do them on a computer system. A system like the H/Z-89 or Z-90 Computer equipped with 48K bytes of RAM, two disk drives, the CP/M operating system (p. 48) and the COBOL-80 programming language (p. 50). For use with the H/Z-100 (using MS-DOS™/Z-DOS™ on page 34) family of computers, see page 35.

Credit: To earn 3.0 Continuing Education Units, a nationally recognized method of honoring non-credit adult education courses, you must pass the optional final examination with a 70% or higher score. After passing the final, you'll also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems.

EC-1105, COBOL Programming Course, Shpg. wt. 7 lbs. 149.95

Microcomputing Course teaches you the basics of computers plus what they can do for you



- Learn about microcomputer fundamentals and the elements of BASIC language programming
- See how a computer can be used to solve your problems and then choose the right computer system for you
- Learn how to choose the kind of software you need
- Written in simple and easy-to-understand terms

A basic introduction to computers: For those who want to know what a computer can do for them, this Microcomputing Course is an ideal place to start. In easy and simple terms, you are shown what a computer can do for you. The self-instruction text fully explains the different parts of a computer and shows you how to apply its capabilities to your specific needs. With the text and two accompanying audio cassette tapes, you'll learn about computer hardware and how it works to better evaluate what extras you'll need along with your computer. You'll learn about software and how to choose the best programs for your use. In this course, you'll even write short programs using the popular BASIC programming language.

Objective: The purpose of this course is to make personal computing understandable to you. It puts the various types of computer systems into perspective so that you can make informed decisions about a computer purchase.

Credit: After passing the optional final exam, you'll be awarded 1.0 Continuing Education Unit (CEU) and receive a handsome Certificate of Achievement.

EC-1000, Microcomputing Course, Shpg. wt. 5 lbs. 44.95

CP/M is a registered trademark of Digital Research, Inc. MS-DOS and Microsoft are trademarks of Microsoft, Inc. Z-DOS is a trademark of Zenith Data Systems Corp.

MONEY-BACK GUARANTEE: If you're not satisfied with any Heathkit/Zenith Educational System Course, return the course materials and your proof of purchase for a refund of the purchase price.



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

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

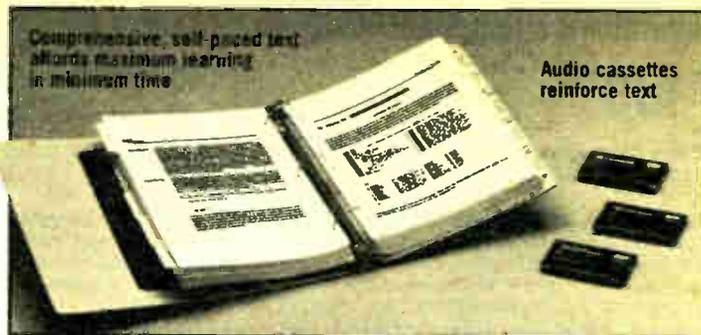
Microsoft BASIC is one of the most versatile languages available for microcomputers. If you use MBASIC on your H-8, H/Z-89, TRS-80 or Apple computer, this 800-page course will show you how to get the most from this language.

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 50) 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 48) and the Microsoft FORTRAN Programming System (page 50) 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 NO LONGER AVAILABLE



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

COMPUTER EDUCATION/55

Attention-getting Siren/PA for mobile services

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

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

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

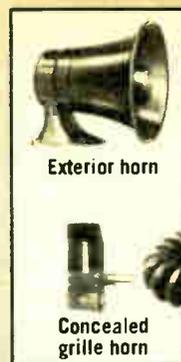
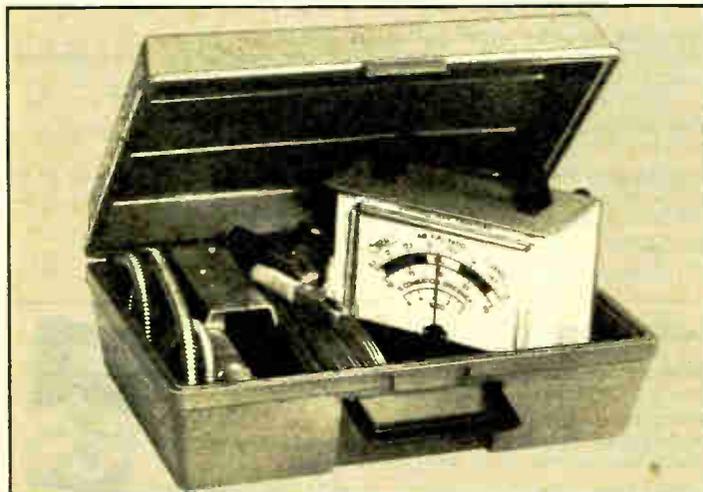
This kit can pay for itself in two uses at today's tune-up prices. It enables you to do simple but important dwell angle, engine speed and battery voltage tests which you normally pay a mechanic to do. It combines a distributor cam dwell meter (with scales for 3, 4, 6 and 8-cylinder engines), an electronic 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



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.

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 gases, it can show the air-to-fuel ratio, overall combustion efficiency and percentage of carbon monoxide present. From these you can determine if an auto's fuel mixture is unnecessarily too rich or lean for best economy. It's essential when tuning up engines to meet a specific rating for clean air standards in many states. Not intended for use with Chrysler "lean burn" engines.

To facilitate setup, the easy-to-read, 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.

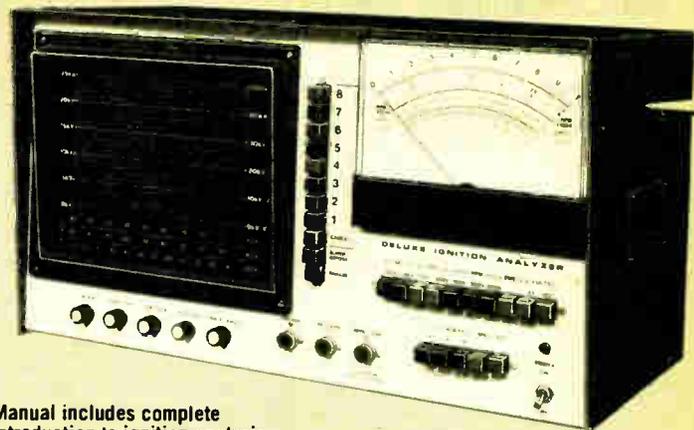
With only four simple connections to an operating engine, you can test for: shorted, resistive or open plugs and wires, incorrect plug gap, fouled plugs, a defective distributor, coil or condenser, bad or misadjusted points, cam wobble, poor power balance, imprecise voltages, timing and degrees advance (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 7/8" H x 25 1/4" W x 14 3/8" D (32.72 x 64.14 x 35.89 cm). **Weight:** 53 lbs.



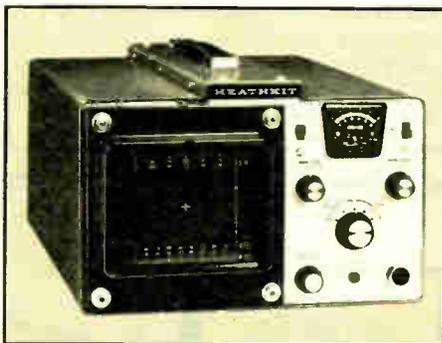
Scope Cart adds mobile visibility

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% (or 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**

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

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.

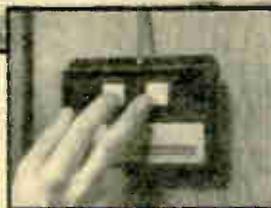
Equipped with a very important feature that maximizes reliability: Exclusive triple-thread design of the ¾" aluminum screw results in a smooth, balanced rotation and greater mechanical integrity — enough so that the GD-3509 can be installed on some sectional-type industrial doors and municipal garages.

Transmitters and receivers are all solid-state and digitally encoded. You have 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-pain physical labor. Your spouse will appreciate the thoughtfulness! Isn't it right 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**



Two-button safety wall switch prevents accidental door movement. Both buttons must be pressed at the same time to initiate door action.

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

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

Study this Electrical Systems Course to repair your car at home

\$39⁹⁵
for EAC-1

- Avoid costly repairs and save both time and money — learn to spot and fix electrical problems yourself
- Hands-on experiments show you the exact procedures
- Money-back guarantee if you're not 100% satisfied

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.

You'll learn how to care for your battery, how to test each part in your starting and charging systems, how to trace the circuitry throughout your car and repair all lights and accessories.

You'll learn how to read schematics, how to use a multimeter and engine analyzer, and how to perform year-round preventive maintenance that keeps your electrical system in peak condition for miles of trouble-free driving.

Clear, color visuals are combined with a set of audio cassette tapes, so you see and hear each step. These are reinforced by a professionally-written text, test questions plus optional experiments and projects you perform on your own car. After completing EAC-1, you should have a thorough understanding of your car's electrical system, plus the experience and confidence to correct almost any problem that arises. Pass the optional final exam by scoring 70% or better to earn 4.0 Continuing Education Units and a Certificate of Achievement.

WINNER
Award of Excellence —
Society for Technical
Communications

Over 600
visuals

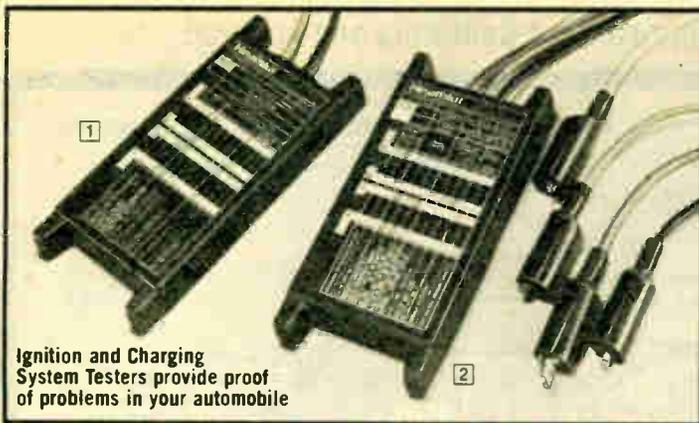
Accessories included

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

The Automotive Electrical Systems Course includes all four modules, cassettes, charts, clip leads, parts for experiments and a professional hydrometer.

EAC-1, Complete 4-Module Course and Accessories, Shpg. wt. 23 lbs.	39.95
EA-11, Module One/Electrical Principles, Shpg. wt. 5 lbs.	14.95
EA-12, Module Two/The Starting System, Shpg. wt. 5 lbs.	14.95
EA-13, Module Three/The Charging System, Shpg. wt. 5 lbs.	14.95
EA-14, Module Four/Body and Accessory Circuits, Shpg. wt 5 lbs.	14.95





Ignition and Charging System Testers provide proof of problems in your automobile

1 Reliable Electronic Ignition Tester saves time

\$19⁹⁵

- Quick and easy to use — takes the guesswork out of pinpointing defective components in modern electronic ignitions
- Inexpensive, and small enough to pack in a pocket or purse

Performs four tests that quickly tell you: if your battery is sufficiently charged, if the reluctor and pickup coil are providing an input to the ignition module, if the ignition module is properly switching the coil primary, and the location of a faulty component in the ignition primary circuit. Requires some ignition knowledge; pickup coil test won't work on new Hall-effect ignitions. Keep one handy in every family vehicle for troubleshooting unexpected breakdowns on the road.

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

2 Low-cost Charging System Tester finds trouble

\$19⁹⁵

- Portable and reliable — lets you diagnose faulty components in your vehicle's charging system with foolproof ease
- A 'natural' for any good auto mechanic's tool collection

Two-wire setup and three quick tests tell you: if the battery has sufficient charge to reliably start the engine, if the battery is being charged by the alternator, if the voltage regulator is at fault (causing the battery to become overcharged), and if the alternator stator windings and rectifier diodes are functioning properly. Lightweight and portable like the Ignition Tester, it also uses digital ICs to evaluate performance characteristics and cause LEDs indicative of the problem to light. No external power or battery required. Measures ¾" H x 2¾" W x 5½" L. Be prepared in case of trouble—don't be stranded without the help these Testers provide!

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

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 is a fun, one-evening project, and it really makes a thankful difference to have one while you drive! Kit includes test lamp with special instructions to locate and identify hookup leads in your auto system. 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. End fumbling and distraction forever — build one for every car you drive.

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



Knobs control volume and tempo of song you select to play

4-ohm weatherproof speaker has a clear, pleasant tone

Select songs from inside vehicle using 3-button keypad

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

\$49⁹⁵

- Choose from 16 internally pre-programmed tunes, enter one from enclosed music book of 50 tunes, or be creative and add your own...it's easy!
- Five-inch diameter speaker horn mounts neatly

Enjoy driving more than before! The easy-to-build Heathkit Programmable Musical Auto Horn installs in any vehicle 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-1278 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. Change tunes as often as you wish. External controls let 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 and lets you pick and play any of the tunes stored in memory. An illustrated programming guide is included.

The small, weatherproof horn speaker mounts under your vehicle's hood, behind the grille, on a boat's deck or any other convenient outside location. A unique power-saver circuit in the Musical Horn relieves prolonged battery load after eight days without use. A uniquely interesting, three-evening kit, including all necessary hookup and mounting hardware.

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: 1½" H x 7¾" W x 4⅞" D.

Pre-programmed Musical Auto Horn repertoire:

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



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.*

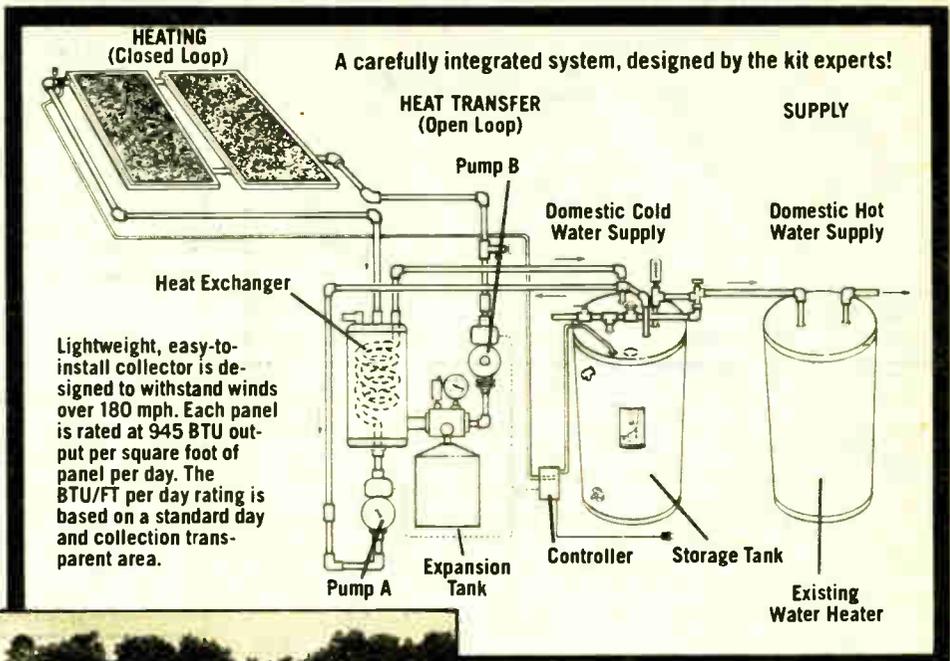
The NS-1100 meets or exceeds applicable regulations of these organizations:

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 ¾" 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



Lightweight, easy-to-install collector is designed to withstand winds over 180 mph. Each panel is rated at 945 BTU output per square foot of panel per day. The BTU/FT per day rating is based on a standard day and collection transparent area.



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.

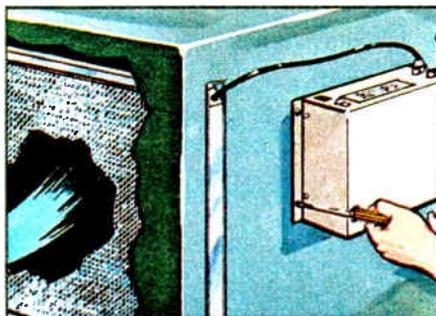
SAVER! NS-1100-3, Manual Set, 3 lbs.	Was \$25.00, NOW ONLY 15.00
Kit NS-1100-1, Plumbing Hardware Pack for NS-1100 systems, 65 lbs., Motor Freight Collect	589.95
NS-1100-12, 3' x 8' Solar Collector Panel and Mounting Hardware, 136 lbs., Motor Freight Collect	575.00
NS-1100-4, 80-Gallon Capacity Solar 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 removing 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.

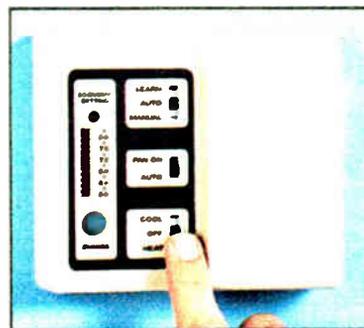
The Heat Sniffer is easy-to-use: Locate drafts with pin-point, electronic accuracy. Turn unit on and adjust knob to silence unit at present room temperature. Then move the Heat Sniffer's sensor along door frames, window sills or any other place where infiltration of cold air might occur. Any change in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

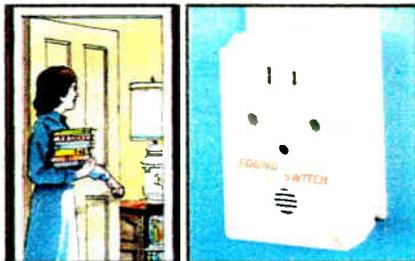
Patented feature turns furnace on later on warm mornings; earlier on cold mornings – so your home always reaches the temperature you specify, at the time you specify. "Econo-Save" lets you dial-down to 54°F (heat) or 84°F (cooling) while you are away for long periods. "Slow-Cycle" increases furnace efficiency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

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

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

NEW Sound-Activated Switch lights your way

- Instantly turns lights on when it "hears" you
- Improves home security
- LED helps you set audio sensitivity level



Need an extra hand once in awhile? The Sound-activated Switch can provide an automatic source of light as you enter a room, and save lots of energy by remembering to turn off expensive lights after you're gone! Operates up to 300 watts of 120 VAC lights around your home for added safety and security.

Only two controls: a sensitivity adjustment sets the sound level necessary to trigger the switch, and a timing adjustment sets the delay – from five seconds to ten minutes – before the switch turns itself off due to the absence of noise. Perfect for entry halls, stairways, nightlights, attics, basement, nursery and sick rooms. No more fumbling...it's the light switch you never have to touch!

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

Watt Wizard saves energy money three ways

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



Triple savings: Gain a federal tax credit amounting to 15% of the purchase price – save up to 60% of the cost of running motorized electrical devices (drills, refrigerators, saws, freezers, air conditioners, washers, dryers, pool filters) – and prolong the life expectancy of appliances using a Watt Wizard Power Factor Controller. *Proven efficient.* Applies only the exact amount of voltage necessary to run motors at a constant, quieter speed. Payback for most uses is less than a year. Think of the savings!

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

A fingertip touch magically turns on the lights



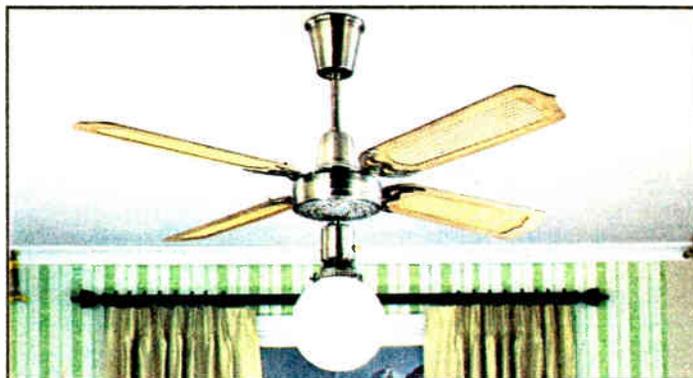
- Can also be used conveniently for small appliances, TVs, fans, etc.

\$19⁹⁵



Tap the sensor plate and the remarkable Touch Control Switch turns appliances or lights on instantly. No need to go to the expense and bother of installing new outlets or rewiring – the silver touch plate mounts anywhere and connects to the plug-in controller unit with easily-concealed fine white wire (20 feet included). Avoid trips and falls caused by fumbling in the dark for a light switch – install a sensor next to your bed. Two touch plates are included with each kit, or use any ungrounded metal such as railing or doorknob as a sensor. Try burying plate in potted plant soil and touching one of its leaves for a unique effect. Instant on/off control at your fingertips, *without the problems* of other switches! Maximum 300 watt load per unit; 150 watts per lamp. Use with TVs to 225 watts, fans to 180 watts and stereo, heaters etc. to 300 watts max also. Not for AM radios. Install several in your home for space-age luxury and convenience.

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



Stay comfortable all the time, in any clime

\$149⁹⁵

- Circulates seasonal air to keep you cool – or warm
- Stylish versatility compliments any home interior
- Decorative light kit included at no extra charge

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

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

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



Stack wood quicker with a Heathkit Log Splitter

\$629⁹⁵

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

Finally you can enjoy your fireplace or woodstove and put an end to the back-breaking drudgery of splitting timber by hand. With the Heathkit Log Splitter you can split more wood in less time, and with far less physical labor!

No more wobbling logs or strenuous stooping: A three-position one-hand lever has non-locking forward, neutral and detented reverse with 24-second full cycle automatic return to ready the next log at a comfortable 15-inch work level. The GU-1810 is equipped with a five horsepower Tecumseh gas engine and a pressure relief-protected hydraulic pump. Together, they generate 1550 p.s.i. to ram up to a 21" log into the steel wedge with an irresistible *ten tons* of force. Build it all in one night, split a cord of wood the very next day! At only 31" H x 31" W x 54" L, it fits neatly into a car trunk, station wagon or pickup truck.

Kit GU-1810, Shpg. wt. 210 lbs. Motor Freight 629.95



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

\$99⁹⁵

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

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

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

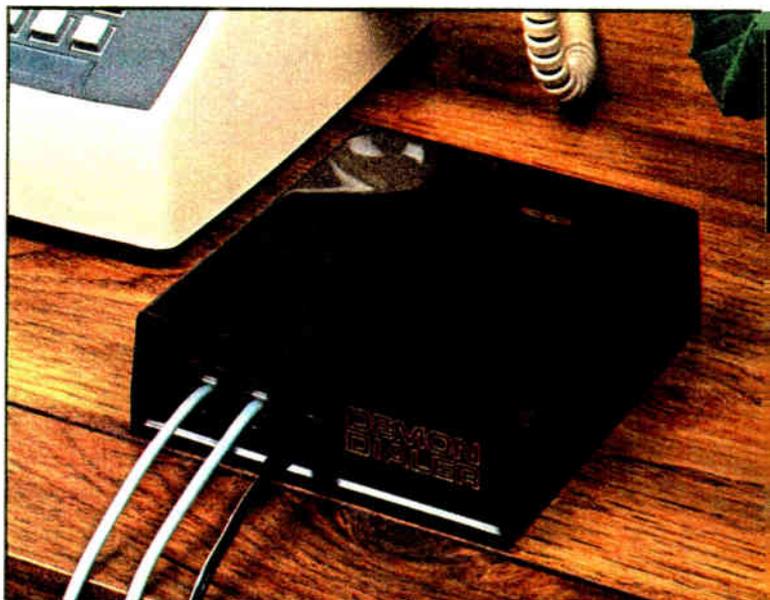
The microcomputer 'directory' can be doubled in size quickly with one Memory Accessory to accept the equivalent of 176 seven-digit numbers. Dial a call normally or use the *Demon*'s mnemonic memory — it works either way!

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

After you program the numbers from an ordinary touchtone phone, the GT-2217 can do some truly extraordinary things. Using the pound and star keys, six simple commands are all you need to perform its telemagic tricks. For those who rely heavily on telephone contacts to do their daily job, the *Demon Dialer* is a convenient way to save precious time and money. Its whole purpose is to make using your telephone easier, and you can master the commands for speedy operation in just a few minutes. This incredibly versatile instrument operates with any telephone branch equipped and billed for tone-dialing service.

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

For Alternate Long Distance systems such as MCI, Sprint or ITT, the *Demon* can



dramatically improve your dialing speed and reliability. It's even portable — with built-in battery backup, memory is good for up to a year if unplugged from AC.

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

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



Cordless Portable Telephone extends freedom of mobility

- Powerful 1000-foot talk range
- Excellent immunity from noise

Why run to answer the phone? Take it along with you! The lightweight, comfortable Freedom Phone 4000 is a ready companion, indoors or out. The remote handset works up to 1000 feet from the base unit with a strong, clean voice quality that's virtually indistinguishable from a conventional phone. With a full duplex 49 MHz transmit- and- receive circuit, every call is clear—even in troubled reception areas.

Brimming with easy-to-use conveniences, the Freedom 4000 system features two-speed pulse or true tone dialing, A/B/C buttons to store three frequently-

used numbers for instant dialing, private six-digit security code, one button auto-redial of last number called, low battery light, step-saving call button to page the handset from base, hi/low volume, memory backup (battery not included), option to use modern telephone company services like Call Forwarding and Call Waiting, and an advanced charging system that reaches full charge in only four hours.

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

The GDP-1341 was mistakenly referred to in the 1983 Christmas catalog by the phrase Extend-A-Phone which is a registered trademark of Uniden Corporation of America who has no connection with this product.

GDP-1341, Assembled, Shpg. wt. 5 lbs. ... 249.95



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

Tune-filled Pleasant Phone Ringer puts the bell out of business

\$29⁹⁵

- Gives your phone a personality
- Your choice of tunes or tones
- Test button verifies selection

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

A pushbutton switch lets you choose either the conventional telephone bell, or in place of its strident

jangle, one of the four pleasant synthesized signals from the Phone Ringer. Inside, a variable volume control and two speaker terminals are provided so you can spread the melody to other rooms. Keyhole slots in the caseback make wall mounting simple, if you prefer. Two alkaline "C" cells (not included) can power it for over a year. Simply installs between your telephone and its wall outlet. Kit includes modular phone plugs and 6' of cable. The attractive two-piece beige case quickly snaps open when you wish to select a new tune or adjust the volume. Measures 1¼" H x 5⅞" W x 4¾" D. Compatible with both touchtone or rotary phones. Styled to complement all modern decors, the GT-1218 makes a harmonious addition to any home or office. Build one for each!



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



Alaska, Hawaii and Michigan Residents: Call 616-9B2-3411

TELEPHONES/67

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

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

On-board computer provides intelligence

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

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

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

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

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

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

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

Side panels snap off for easy access to circuit boards

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

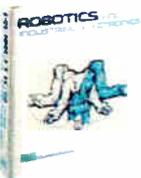
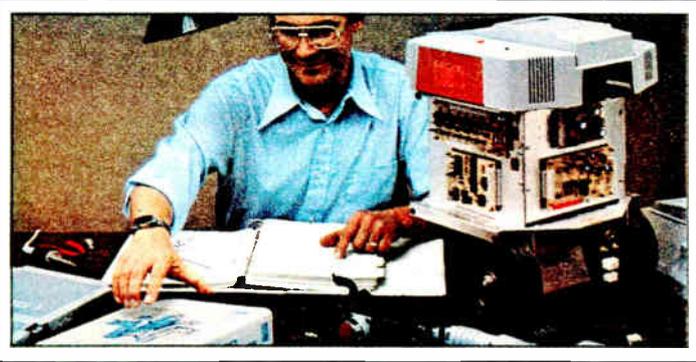
ET-18-5, Monitor ROM Listing, Shpg. wt. 1 lb. 39.95

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



Learn all the fundamentals of robotics with this comprehensive course in robot technology



\$99⁹⁵

- Step-by-step self-study approach covers the entire field of robotics
- Two volumes filled with illustrations, charts and diagrams to enhance your learning
- Hands-on experience is provided by optional experiments performed on the teaching robot — HERO 1
- Receive credit by passing final exam

Comprehensive course: The Robotics and Industrial Electronics course is an A to Z look at how robots work. It reviews elementary electronic principles used in robotics and introduces new concepts associated with robots.

Course objectives: In this self-study course, you master each concept before proceeding to the next. You start with the terminology used with low, medium, and high-technology robots. Progressing at your own speed, you become acquainted with the operation of various AC and DC motors and generators, industrial hydraulic and pneumatic systems, and DC stepper motors. Microprocessors are introduced and how to write robot control programs. Then sensing systems are covered along with voice synthesis, which allows a robot to talk, and the skills required to make a robot perform tasks.

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

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

Programmed reviews: During your studies, you'll find many self-test reviews. Each review is designed to reinforce the material presented. You use these short quizzes to test your understanding of the material. Also, these quizzes can be used as a guide to determine what areas may require further study.

Hands-on experiments: Accompanying this course are optional experiments which are performed on the unique robotics and industrial electronics trainer, HERO 1 (opposite page). Together, the Robot and course provides you with a tremendous learning opportunity. A chance to learn, practice, and apply the basic principles of industrial electronics, computers, automated equipment, sensors, servos, stepper motors, controllers, and other basic elements of industrial robots. While working with HERO 1, you gain practical and hands-on experience with the basic elements of robotics: programming, electronically-controlled movement and positioning, interfacing and data acquisition.

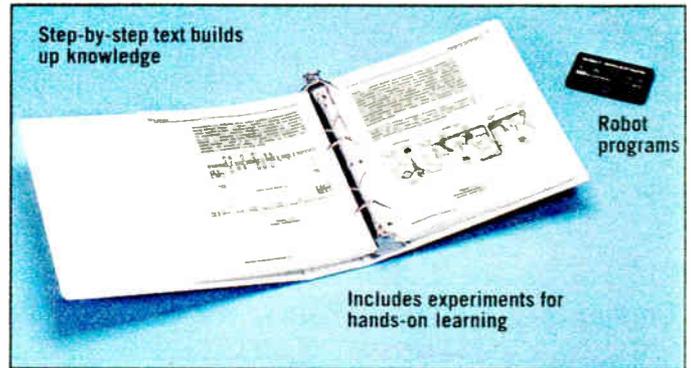
Recognition and credit: Pass the optional final examination with a 70 percent or better score and receive a handsome Certificate of Achievement that's suitable for framing from Heathkit/Zenith Educational Systems. Also, you'll earn 8 Continuing Education Units (CEUs) which is a nationally-used method of recognizing achievement in non-credit adult education.

Prerequisites: To better understand the material covered in the Robotics and Industrial Electronics Course, you should complete the following subjects or have a basic knowledge about them: EE-3101A DC Electronics (p. 70), EE-3102A AC Electronics (p. 71), EE-3201A Digital Techniques (p. 73), and EE-3401 Basic Microprocessors (p. 74).

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



Continue your education in robot technology with a course in Robot Applications



Step-by-step text builds up knowledge

Robot programs

Includes experiments for hands-on learning



\$99⁹⁵

- Course briefly reviews basics of robotics and introduces new concepts
- Provides a knowledge base to keep you abreast of changing robotics field
- Uses HERO 1 to perform experiments including the construction and use of an EPROM burner
- Gain recognition and earn credit

Course objectives: In the Robot Applications Course, you'll learn the concepts and technologies that make advanced industrial robots a reality. You'll learn many of the factors that govern the selection of an industrial robot based on management and workplace environment conditions. Signal conditioning, the process of getting the signal from the sensor to the microprocessor controller, is covered in depth. A detailed study of sensor systems is reinforced by a number of experiments designed to give you hands-on experience with sensor systems. You'll construct vision, tactile, and environmental feedback types of sensors. With the programs provided with this course, you'll be able to produce a variety of sensor systems. When you have finished this course, you'll be able to understand both the capabilities as well as the limitations of today's robots.

These subjects are covered in the Robot Applications Course:

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

Programmed reviews: As with other Heathkit/Zenith courses, you'll find many self-test reviews during your studies. They are there to reinforce the material in the lessons. Use these short quizzes to test your understanding of the material you've covered and as a guide to determine what areas, if any, in which you may need further study.

Hands-on experiments: Along with the Robot Applications Course are ten experiments that are conducted on the versatile robotics and industrial electronics trainer, HERO 1 (opposite page). An audio tape supplied with the course contains several programs for HERO 1 which are used in doing the experiments. These experiments are a hands-on opportunity to become acquainted with the concepts and technologies you have studied in the text. Experiments covered in the course include: a smoke detection/vocal warning system, a heat sensor, color discrimination, object identification, vision-aided positioning, array tactile sensor, a controller memories/EPROM burner, stationary home security robot, mobile intrusion alarm, and a mobile home security robot. All components needed to successfully complete the experiments (including a programmable ROM) are included with the course.

Recognition and credit: Upon completion of the optional final examination and with a passing grade of 70% or better, you receive from Heathkit/Zenith Educational Systems a Certificate of Achievement that's suitable for framing. You'll also earn 4 Continuing Education Units (CEUs). This is a nationally recognized method of awarding achievement in non-credit adult education.

Prerequisites: For a fuller understanding of the material in this course, the completion of the EE-1800 at the left is highly recommended.

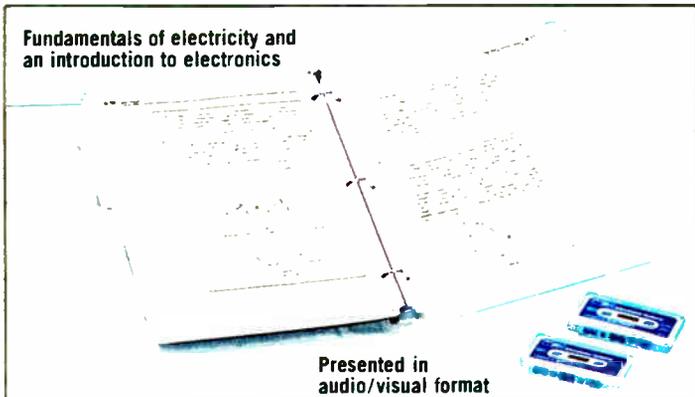
EE-1812, Robot Applications Course, Shpg. wt. 6 lbs. 99.95



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

EDUCATION/69

Fundamentals of electricity and an introduction to electronics



Presented in audio/visual format

Concepts of Electricity Course for the beginner

\$29⁹⁵

- Provides a working knowledge in the fundamentals and concepts of electricity
- Incorporates a unique audio/visual learning method
- Expands into the areas of circuit theory and associated electromechanical systems

From the very beginning: For those without previous knowledge or experience in the field of electronics, the Concepts of Electricity Course is designed to examine the subject at a beginner's level. At the same time, this Course acts as an introduction to other electronics courses on the following pages. You begin by learning with an audio/visual presentation of the fundamental concepts of direct current. Accompanying sound is included on audio tapes clipped to the Course's binder. This DC background is then expanded into the areas of circuit theory and associated electromechanical systems such as motors, generators and meters.

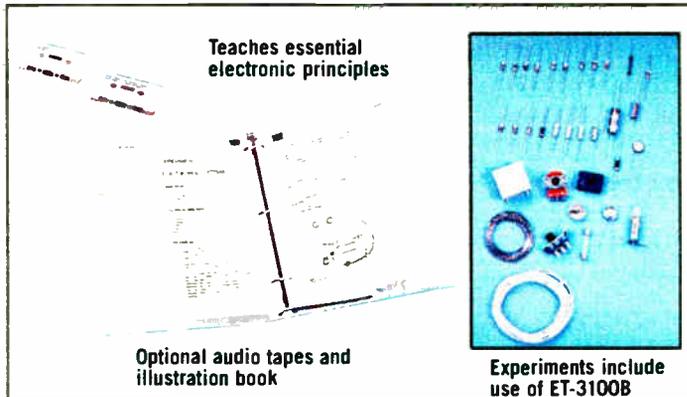
Reviews: Each audio visual section is followed by a programmed instruction section designed to reinforce what you have just covered. And, a unit review at the end of each unit tests your understanding of the material.

Course Goals: When you complete this Course, you'll be able to explain the difference between DC and AC, and be able to explain the operation of DC and AC generators and motors. After completing the Course in your own step-at-a-time pace, you'll know the difference between resistors, capacitors, diodes and other electronic components. Beside being able to solve basic problems involving current, voltage, and resistance, you'll know how to measure them.

Final Examination: After completing the Course, you can take a Final Examination. Besides being an excellent learning activity, it provides a comprehensive review of the material you've covered. With a passing grade on the Exam, you are awarded an attractive certificate and 1.0 Continuing Education Unit.

EE-3100, Concepts of Electricity Course, Shpg. wt. 5 lbs. 29.95

Teaches essential electronic principles



Optional audio tapes and illustration book

Experiments include use of ET-3100B

Electronics Course stresses DC principles

\$49⁹⁵

- Contains a comprehensive and complete background coverage of basic DC electronics
- Uses an optional audio-visual accessory package to enhance the learning process
- Provides positive reinforcement with experiments

DC electronics coverage: An ideal point at which to begin your electronics training, the EE-3101A Course teaches the necessary principles needed for an understanding of DC electronics. The subjects covered include: current, voltage, resistance, Ohm's Law, magnetism, electrical measurements, DC circuits, inductance and capacitance. This course also contains instructions on the use of a multimeter to check current, voltage, and resistance. For your convenience, a list of objectives previews each unit.

Self-instructional learning: Heathkit Zenith's programmed learning allows you to work at your own pace. Review tests are provided so that you can check your progress while reinforcing what you learned. An optional audio/visual package contains two audio tapes and a 123-page illustration booklet with over 230 illustrations to enhance your learning experience. Also included are experiments to help you see concepts as they are put into use. These experiments use the ET-3100B Experimenter Trainer (below) and a multimeter, like the IM-2260 (p. 27). By taking the final exam and passing with a score of 70% or better, you can earn 2.0 Continuing Education Units and be awarded a handsome certificate from Heathkit Zenith Educational Systems.

EE-3101A, DC Electronics Course, Shpg. wt. 6 lbs. 49.95

EEA-3101A, Optional Audio-Visual Accessory, Shpg. wt. 2 lbs. 19.95

SAVER! Save \$20 with the purchase of both the DC Electronics Course and the ET-3100B Kit Experimenter Trainer. Separately they cost \$149.90.

EES-3101B, Includes EE-3101A and ET-3100B, Shpg. wt. 17 lbs. **ONLY 129.90**

Increase your learning success with hands-on experience

Experimenter and designing tool in one unit



Compact, rugged, reliable, and versatile tool

Variable power supplies and 200 to 200 kHz generator

Solderless breadboard sockets for circuits

\$99⁹⁵

- Used to complete experiments in all electronic courses
- A versatile design tool for experimental circuits
- Handy built-in test features

ET-3100B Electronic Design Experimenter: Provides a greater understanding of electronics by allowing circuits to be quickly constructed, modified, and tested. Designed for hands-on use with experiments in the DC, AC, Semiconductor, Electronic Circuits, Electronic Communications, Electronics for Hobbyists and Test Equipment Courses. Also, doubles as an excellent prototyping tool for the design and testing of circuits.

ET-3100B, Trainer, 6 lbs. 99.95

ETW-3100B, Assembled, 6 lbs. 169.95

Tutorial Electronics Dictionary



Tutorial Dictionary: More than clearly defined meanings are found in this 832-page source of technical terms. Besides fully illustrated pages, this Dictionary contains a summary of 16 electronic-related topics.

These outlines allow this informative Dictionary to become a low-cost self-instructional course in electronics. Each topic outline lists related terms, making your Dictionary an effective learning tool. Approximately 20,000 terms are covered in a clear and concise manner.

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

AC Electronics Course takes over from DC Course

Self-study format

485-page text enhances understanding of AC

Optional Audio-Visual Package

All parts included for completing experiments

Covers the solid-state technology of semiconductors

450 page text

Updated with the latest information

Audio-Visual Accessory Package available as an option

All parts are included for the Course's 11 experiments

AC Electronics Course teaches principles of AC

\$54⁹⁵

- Designed to give a firm foundation in the principles of AC electronics through text and experiments
- Shows how various components react in AC circuits
- Demonstrates the application and use of different components in many AC circuits

Complete coverage: The self-instruction AC Electronics Course advances your knowledge of electronics with a comprehensive coverage of all the principles of alternating current. Proven programmed-instruction format presents AC theory, measurement, and circuit behavior. Your studies are reinforced with programmed reviews and hands-on experiments. To perform these

experiments, you'll need the ET-3100B Electronic Design Experimenter on page 70. A multimeter (like the IM-2260 Digital Multimeter on page 27) and an oscilloscope (IO-4105 Oscilloscope on page 31), or their equivalents, are also recommended for the experiments. After completing and passing the optional final exam with a 70% or better score, you earn 1.5 Continuing Education Units and receive a Certificate of Achievement. Completion of the EE-3101A DC Course, or an equivalent knowledge, is recommended before starting this Course. In addition, an optional audio-visual presentation is available with added lesson reinforcement and a different slant of the material in the text.

EE-3102A, AC Electronics Course, Shpg. wt. 7 lbs. 54.95

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

SAVER! Purchase the AC Course and the ET-3100B Trainer together and save \$20 from the cost of separate purchases.

EE-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 19 lbs. ONLY 134.90

Spanish Language AC Electronics Course: Spanish translation of this course, less EB-6102-30 Parts for the experiments (see page 85).

EE-3102S, AC Electronics Course in Spanish, Shpg. wt. 7 lbs. 59.95

Solid-state Semiconductor Devices Course

\$54⁹⁵

- Examines semiconductor materials and their electrical properties to form a basic foundation of study
- Completely covers diodes, transistors, and integrated circuits and how they are used
- Increases understanding of concepts with experiments

Self-instructed semiconductor education: Step-by-step you learn about the micro-sized world of diodes, transistors, and integrated circuits. At your own speed, you build concept on concept until you've developed a complete understanding of semiconductor theory. Then you examine zeners, bipolar transistors, FETs, thyristors, UJTs, and others to see how they are made, how they

operate, and how they are used. Programmed reviews check your progress and optional experiments reinforce your understanding of important concepts. To perform the experiments, you'll need the ET-3100B Experimenter on page 70. A multimeter, (like the IM-2260 Digital Multimeter (p. 27) or an equivalent is recommended for these experiments. After scoring 70% or better on the optional final exam, you receive a certificate for framing and earn 3.0 CEUs. Before starting this Course, you should have completed the EE-3101A DC Course and EE-3102A AC Course or have an equivalent knowledge. An optional audio-visual package is available to help make your learning even easier.

EE-3103A, Semiconductor Devices Course, Shpg. wt. 6 lbs. 54.95

EEA-3103A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. . . 19.95

SAVER! Save \$20 when you purchase both the EE-3103A Semiconductor Course and ET-3100B Trainer at the same time.

EE-3103B, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 18 lbs. ONLY 134.90

Spanish Language Semiconductor Devices Course: Spanish translation of this course, less EB-6103-30 Parts Package for experiments (see page 85).

EE-3103S, Semiconductor Devices Course in Spanish, Shpg. wt. 6 lbs. . . 59.95

MONEY-BACK GUARANTEE

If you are dissatisfied with any self-instruction course for any reason return all course materials (except trainer) and your receipt for a full refund of purchase price.

Save \$60 on entire Fundamental Electronic Series

Purchase the DC and AC Electronics, Semiconductor Devices, Electronic Circuits and Test Equipment Courses along with the ET-3100B Kit Trainer.

SAVER! EES-3115B, Above Courses and Trainer, 66 lbs. 329.70



Accredited by the NHSC



Licensed school - State of Michigan

Approved by nationally recognized organizations

Heathkit/Zenith Continuing Education is accredited by the National Home Study Council and licensed as a school by the State of Michigan. These acknowledgements are your assurance that all Heathkit Self-Instruction Programs are quality self-study programs.



Earn College credit for many Heathkit/Zenith courses

The American Council on Education recommends that member colleges grant credit for several of our courses. Consult "The National

Guide" for course recommendations. If you have taken and passed the examinations on pages 70 to 74 (EE-3101, -3102, -3103, -3104, -3105, -3201, -3401) or EC-1100 on page 58, 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



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

EDUCATION/71

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.

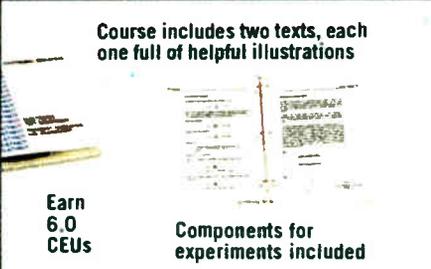
The Electronic Circuits Course will teach you how to identify power supply rectifiers, filters and regulation circuits – and explain how they work. You'll develop an understanding of amplitude and frequency modulation along with the heterodyne principle and modulation and detection circuits. You will 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.

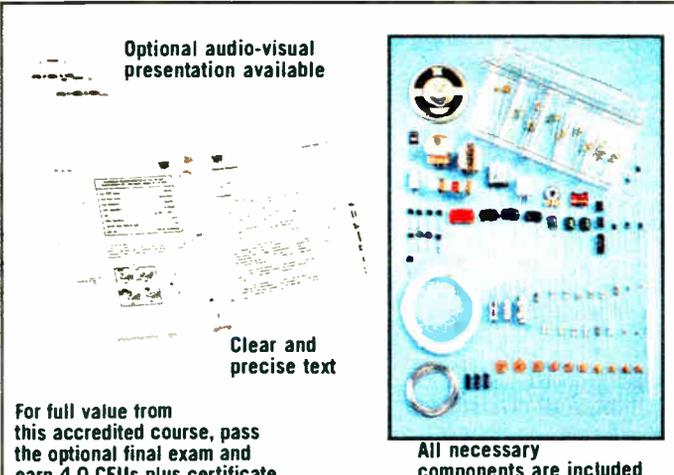
The Fundamental Electronics Courses, (EE-3101A-3104A) and the Heathkit/Zenith Course on Digital Techniques, EE-3201A or equivalent knowledge, are suggested as background information. In addition to the textbook and electronic components, we suggest access to the following materials to complete the experiments: 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**



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. 31), 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**

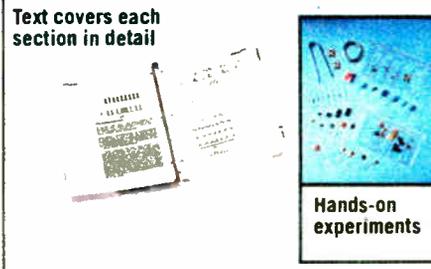
SAVER! EES-3104B, EE-3104A and ET-3100B Kit Trainer, 19 lbs. **ONLY 144.90**

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 ampli-

tude 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-3106A, Shpg. wt. 7 lbs. **59.95**

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

Kit ET-3100B, Trainer, Shpg. wt. 6 lbs. **99.95**



Prepare for microprocessors with the Heathkit/Zenith Digital Techniques Course

\$89⁹⁵

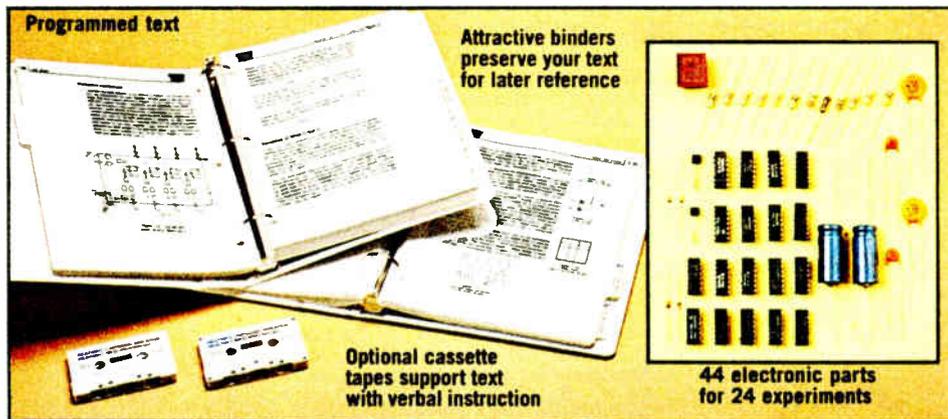
- Learn to design and apply modern digital circuitry
- Costs less than college or tech school courses
- Loaded with 24 practical, hands-on experiments to reinforce the learning experience

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



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 Course on pages 70-72 of this catalog, or equivalent). The ET-3200B Trainer is required for experiments; recommended instruments are a multimeter like the IM-2260 (page 27) and a single-trace oscilloscope like the IO-4105 (page 31).

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. **B9.95**

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

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

EEA-3201A, Optional Learning Cassettes, Shpg. wt. 2 lbs. **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

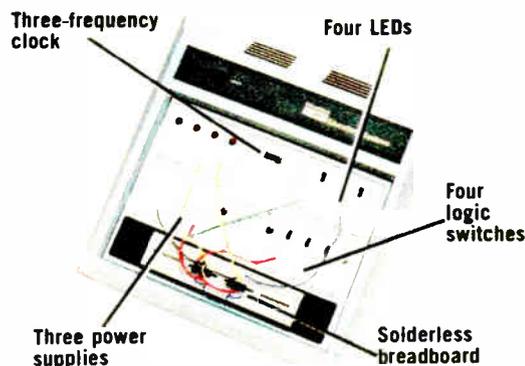
Put your digital knowledge to work with the high-quality ET-3200B Electronic Trainer. Designed for the experiments in both the Digital Techniques and CMOS Digital Techniques programs, the ET-3200B Trainer is a useful tool which speeds comprehension and practical application of course material. This versatile 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**



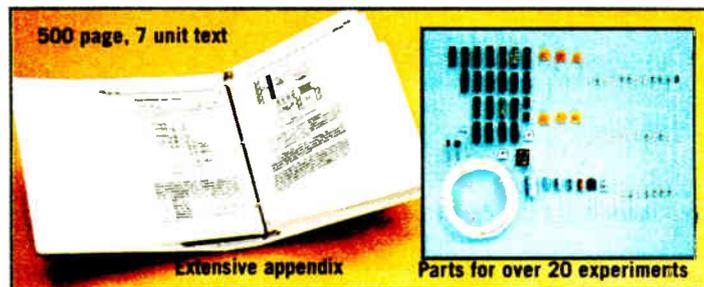
CMOS Techniques Course brings you up-to-date

\$79⁹⁵

- Stresses practical applications and in-circuit advantages
- Learn to interface between CMOS and other logic families
- Learn more by doing, with our 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-3201A 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 31), and a multimeter like the IM-2260 (page 27). Earn 3 CEUs.



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



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

EDUCATION/73

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



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



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

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

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

You start by learning or reviewing the basics of computer number systems and codes. Next, you apply that knowledge as our prize-winning Microprocessor Course takes you step-by-step through

computer arithmetic, programming, examination of popular microprocessors, interfacing and input/output operations you can put to use immediately.

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

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

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

SAVER! Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$339.90. ET-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.

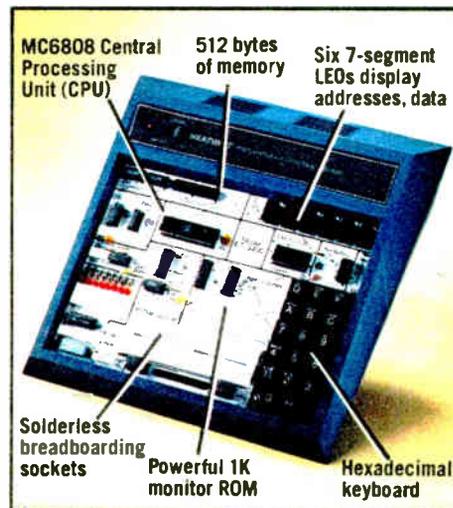
The 17-key hexadecimal keyboard permits you to access memory location to examine contents, then step forward or backward to examine other memory locations, change the contents of memory locations, examine and/or alter any of the MC6808 microprocessor's internal registers, set break points for program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

CONTINUING EDUCATION

HEATHKIT

MICROPROCESSORS

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 73).

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 85.

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 77. It picks up where this course left off -- and uses the same ET-3400A Trainer.

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

Optional Film Slides duplicate the audio-visual flip charts. 60.00

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

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

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

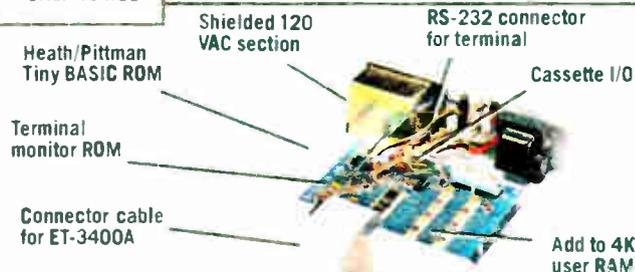
SAVER! Order EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together. Save \$70; \$564.85 separately.
ETS-3401A, Shpg. wt. 28 lbs . . . ONLY 494.85

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 40, 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



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

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

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

EWA-3400, 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

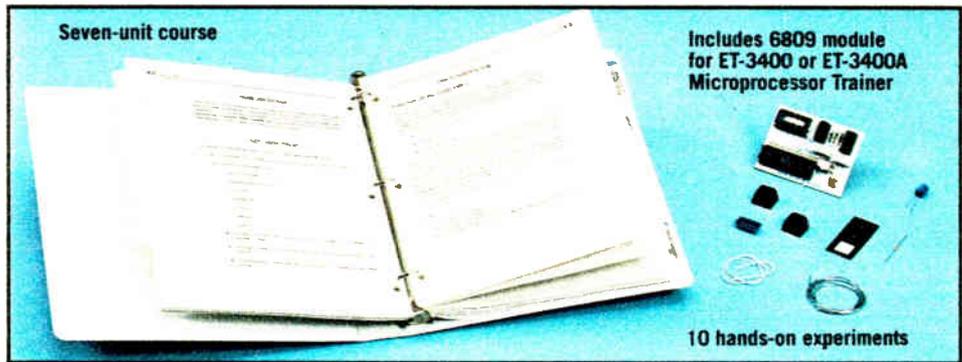
processor with the Heathkit/Zenith EE-3404 6809 Microprocessor Course.

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.

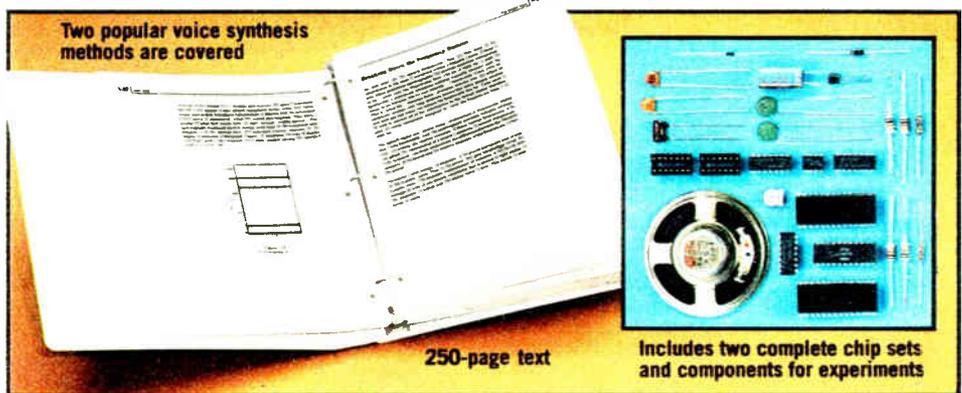
Covers two voice synthesis methods: The course teaches both digitized voice synthesis (fixed vocabulary with human voice qualities) and phoneme voice synthesis (which allows you to reproduce any English word and almost all pronounceable sounds).

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.

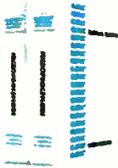
When you complete this course, you'll be able to make your Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer (necessary for the course – see page 74) talk. Prerequisites for Voice Synthesis are the EC-6800 Introduction to Microprocessors Course (page 81), or the EE-3401 Microprocessors Course (page 74) 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 – and offers 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

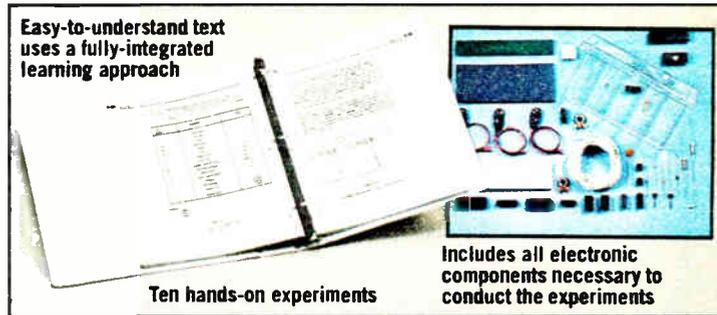
You can afford to continue your study of microprocessors with this low-cost course from Heathkit/Zenith. It's a natural follow-up to the EE-3401 Microprocessor Course.

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. Carefully and expertly prepared, 750 pages of text lead you step-by-step until you've mastered each concept. Unit examinations check your progress and can show where you need further study.

A total of eleven in-depth learning units and ten optional hands-on experiments teach the necessary fundamentals and practical skills for proper interfacing of microprocessor-controlled components. Individual topics you explore include the Advanced Peripheral Interfacing Adapter (PIA), analog conversion, serial data communications, peripheral and 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 for quick reference.

Ten experiments: With these focused experiments to expand your experience, you

Easy-to-understand text uses a fully-integrated learning approach



Ten hands-on experiments

Includes all electronic components necessary to conduct the experiments

can reinforce the knowledge gained through the texts. All components required for the experiments are included with the course. To perform the experiments, you'll also need the ET-3400 or ET-3400A Microprocessor Trainer. **Pass the optional enclosed 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 Microprocessors Course, or have equivalent working knowledge, before attempting this follow-up course.

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

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

SAVE \$30⁰⁰ on your microprocessor education!

Purchase the complete microprocessor set (shown at right) and save \$30 to apply elsewhere. Everything you want to know about microprocessors and how to successfully interface them is included.

You get both courses and a powerful trainer: The award-winning EE-3401 Microprocessors Course and popular Microprocessor Interfacing follow-up course are yours, plus the ET-3400A Trainer kit, which is required to perform the 29 course-related experiments. If purchased separately, you would spend \$429.85.

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



Includes both the Microprocessors Course and Microprocessor Interfacing Course along with the ET-3400A Trainer for experimentation

Microprocessor Applications Course teaches practical ways to adapt and utilize μ P power



- Puts previous knowledge of microprocessors to work quickly, as you apply them in "real world" situations
- 55 components, including IO, ICs are supplied for use with Trainer to complete 13 high-level experiments
- Written in the educator-preferred, Heathkit/Zenith style with unit reviews and a final exam worth 8.0 CEUs

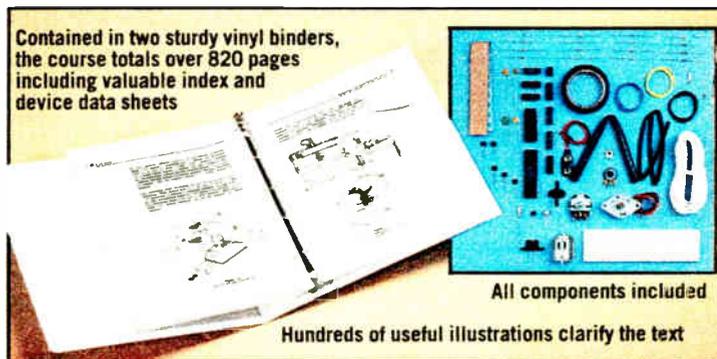
The possible applications of microprocessors are almost endless and only limited by the imagination. Dedicated computer intelligence in such everyday items as automobiles, appliances and toys is becoming commonplace – yet it is only a beginning. Because of the microprocessor, just about any electromechanical device is a candidate for computer control. The next few

years will see increasingly widespread application of this technology.

EE-3405 was written to help students bridge the gap between their daily analog world and the digital world of the microprocessor. The fundamental methods of microprocessor programming and interfacing (presented in EE-3401 and -3402) to perform simple I/O tasks, are prerequisite to having a microprocessor actually sense, control and quantify "real world" events, as outlined in this course. When you master these various techniques, you will be well on the way to joining and taking an active part in the microprocessor applications revolution.

The Course begins with a two-unit discussion of Digital-to-Analog and Analog-to-Digital Conversion. Units 3 and 4 cover Sensors, Transducers and Detectors. Unit 5 teaches the interfacing of electronic/electrical Control Devices and Stepper Motors, such as those used in robotics. The application principles and microprocessor control of Phase-Locked Loops are presented in Unit 6.

Contained in two sturdy vinyl binders, the course totals over 820 pages including valuable index and device data sheets



Hundreds of useful illustrations clarify the text

All components included

The last text unit is titled **Microprocessor Applications – Present and Future**, and was written to stimulate your imagination by examining several actual and possible microprocessor applications. Following that, 13 interesting experiments will demonstrate and reinforce the most important text concepts in a clear, effective way. You'll build and apply microprocessor control to a thermometer, photometer, programmable digital frequency synthesizer, position and velocity sensors, optical counters, stepper motor, voltage/frequency converters and more.

To perform the experiments, you'll need the ET-3400 or ET-3400A Microprocessor Trainer featured on page 74, plus a VOM and an oscilloscope.

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



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



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

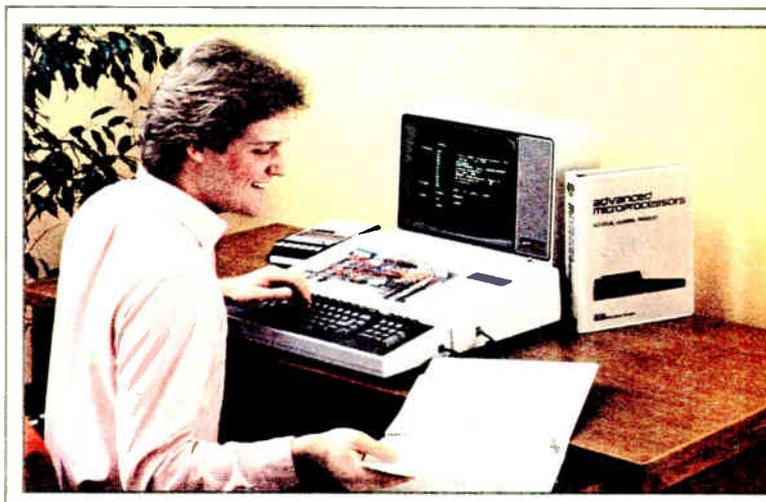
\$99⁹⁵



- 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, the world's lowest priced 16-bit computer, is now priced even *lower*

- 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. 37). Or, display twenty 40-character lines on either channel 3 or 4 of a TV using a TV modulator (p. 79).

Kit ET-100, Basic Learning Computer, Shpg. wt. 33 lbs. **799.95**
 ETW-100, Assembled and tested, Shpg. wt. 33 lbs. **1095.00**

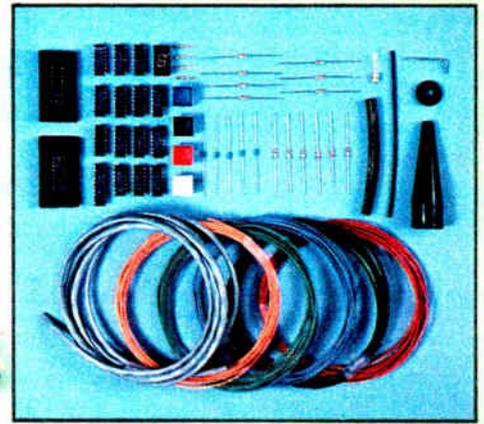


For Computer Credit Card Orders Or Information Call TOLL-FREE: 800-253-7057

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. 73) 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 5¼" drives

- Provides bit-mapped video capabilities that upgrades to color
- Includes a 48 TPI disk drive with 320 kilobyte storage
- Includes MS-DDS/Z-DDS and Z-BASIC software
- 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. 37) 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. 32). 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. 32), 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. 33).

- Kit ETA-100**, Expansion Accessory, Shpg. wt. 70 lbs. 1299.95
ETS-100, Kit ET-100 and ETA-100, Shpg. wt. 102 lbs. 1999.90
EWA-100, Assembled Expansion Accessory, plus software, 70 lbs. 1650.00
EWS-100, Assembled ET-100 and ETA-100, plus software, 96 lbs. 2750.00
ETA-100-1, Extra Removable Breadboard, Shpg. wt. 1 lb. 29.95
ETA-100-2, Channel 4 Modulator, use with TVs, Shpg. wt. 1 lb. 39.95
ETA-100-3, Channel 3 Modulator, use with TVs, Shpg. wt. 1 lb. 39.95



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

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

\$49⁹⁵



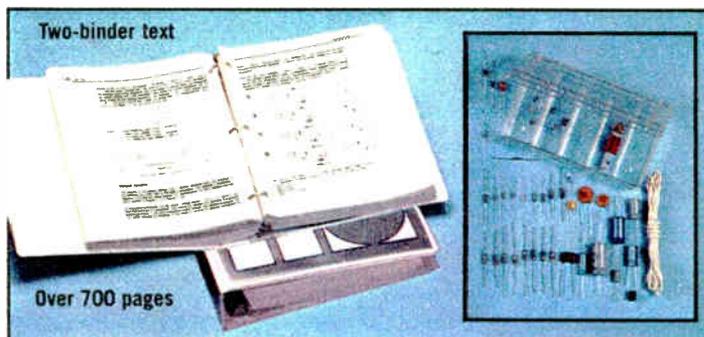
- This new course, first in a series, teaches the fundamentals of successful passive-component circuit design
- Step-by-step programmed learning maximizes retention, with unit exams to summarize material and verify progress
- Earn 4.0 Continuing Education Units by passing the enclosed optional final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

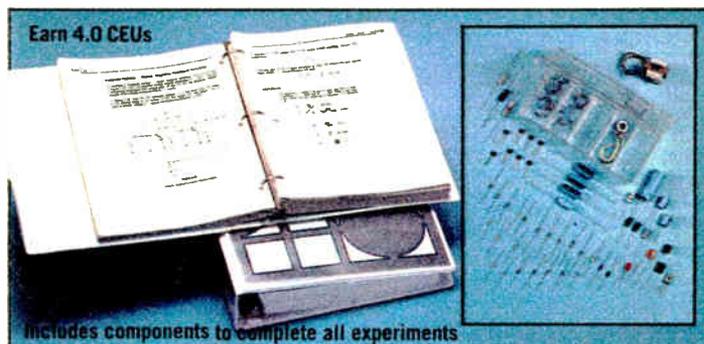
\$59⁹⁵



- 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

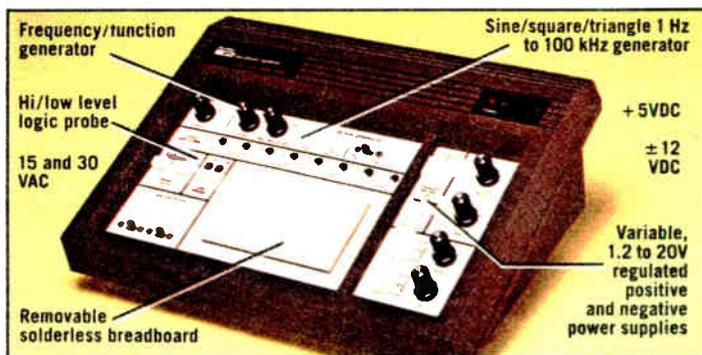
- Quickly build and test circuits for experimentation
- All power supplies protected against short circuit

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 k Ω and 100 k Ω linear potentiometers and more. 120/240 VAC. 15 $\frac{3}{4}$ " H x 10 $\frac{3}{4}$ " W x 4 $\frac{3}{4}$ " 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**



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

\$64⁹⁵

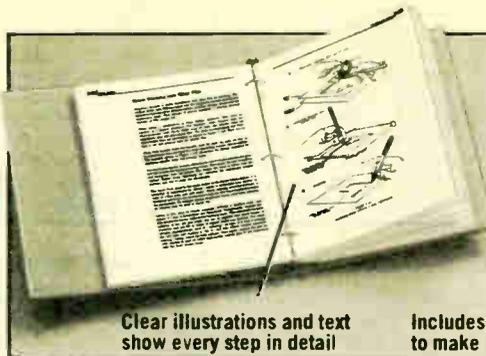


- Learn both the direct pattern and photographic etching techniques
- Copy PC board layouts from books and magazines or fabricate your own, from almost any schematic

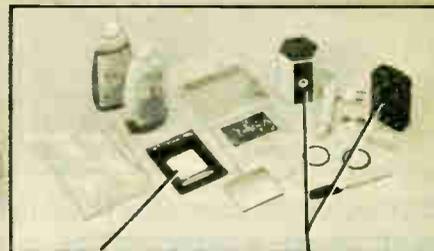
Fascinating course teaches you how to make printed circuit boards from scratch using both the direct pattern and photographic transfer techniques.

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.

ET-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 in is 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, *No longer available*

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. 70), a multimeter and oscilloscope. Earn 4.0 CEUs.

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



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

EDUCATION/81

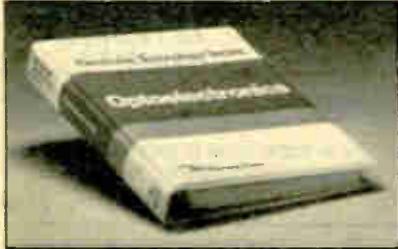


Advanced Electronics Series conveys specialized information

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 83 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. 19) and a scope like

the IO-4105 (p. 31). 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. 31) and a frequency generator like IG-1271 (p. 20). 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-5217 (p. 22), dual-trace oscilloscope like IO-4205 (p. 31) and audio signal generator like IG-5218 (p. 20). Pre-

requisites: 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

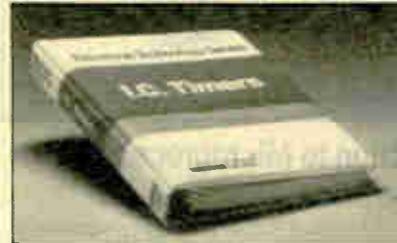


A comprehensive 358-page text details the measurement of common op-amp parameters, basic op-amp linear circuits, integrator and differential circuits and performance of op-amp constant current sources. Also discusses current voltage and voltage/current converters, Norton and Bi-FET op amps. Recommended: a scope like the IO-4105 (p. 31), multimeter like IM-2260 (p. 27)

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. 31), IM-2260 multimeter (p. 27) or

similar. Prerequisite: EE-3201A Digital Techniques Course (p. 73).

- 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

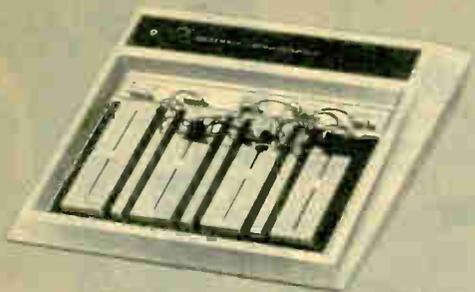


Take valuable advantage of this cost-cutting discount offer and move ahead faster — order all five courses in the Advanced Electronics Series and the ET-3300B Breadboard Trainer together! Includes the EE-101 Op Amps Course, EE-102 Active Filters Course, EE-103 IC Timers Course, EE-104 Phase-Locked Loops 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

\$99⁹⁵
Kit

- 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

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 82, 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 in line 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. 82) and ET-3300B Laboratory Circuit Breadboard kit together.

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



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

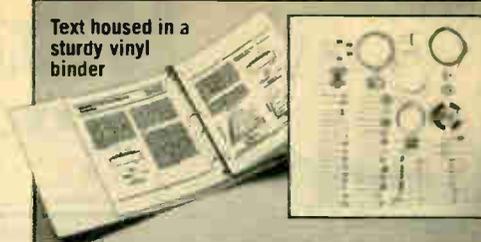


The **Linear Circuits Course** is an easy-to-understand integration of text, diagrams and experiments that move smoothly into the hands-on experience you require to make learning more meaningful and expand your skills faster.

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

Text housed in a sturdy vinyl binder



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 19, and an oscilloscope such as the IO-4205 on page 31. DC and AC Electronics, and the Semiconductor Devices Course (EE-3101A to -3103A, pgs. 70-71) 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

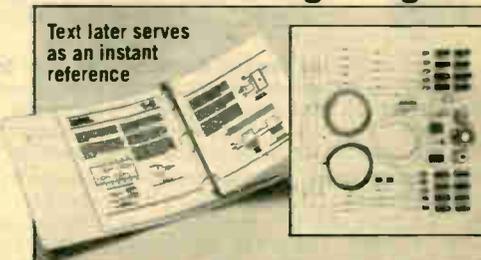
- A new series of circuit "files" arranged in logical sequence
- Examines TTL and CMOS in depth as you learn-by-doing
- Includes 65 electronic parts for building over 50 circuits



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.

Text later serves as an instant reference



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. 19) and a dual-trace scope like IO-4205 (p. 31). AC, DC and Semiconductor Devices Courses are prerequisites. Earn 4.0 CEUs if you score 70% on the optional final exam.

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

SAVER! Purchase the EH-701 Linear Circuits and EH-702 TTL & CMOS Circuits Courses together.

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

An outstanding Soldering Course for new or experienced kitbuilders

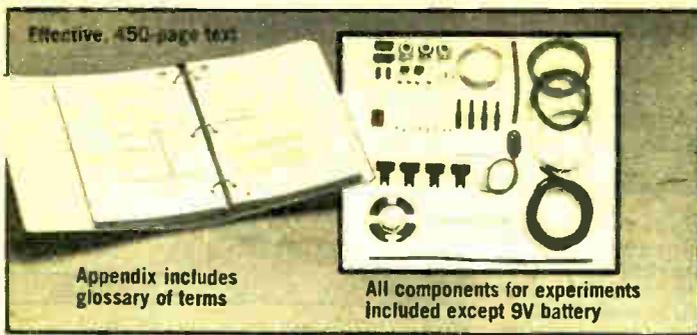
\$17⁹⁵

- 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 18.

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



Learn all about revolutionary, state-of-the-art Fiber Optics technology with this exciting new course

\$99⁹⁵

- Covers theory, components and fiber optic systems in detail
- Course includes components and instruction to develop a two-way fiber optic link plus four hands-on experiments
- Learn at your own pace and retain more with Heathkit/Zenith's proven, self-instructional text format and unit reviews

Managers, engineers, students and hobbyists will benefit from this broad, in-depth introduction to the interesting and 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 world of data communication. Be prepared for the future by educating yourself now.

The five-unit Heathkit/Zenith Fiber Optics Course covers the fundamentals of fiber optics. Unit 1, Optical Energy, deals with the nature of light. Just as electronics students need a basic understanding of atomic structure and the nature of electrons, so does the student of fiber optics need an understanding of optical radiation. Once this is established, you will move on.

Unit 2, Optical Fibers, describes the principles of the transmission medium. You will learn the various fiber types and their construction, how they propagate light, the importance of such characteristics as numerical aperture, source area and radiation pattern in the energy launch, and loss factors.

Units 3 and 4 deal with the active devices used to generate and detect the light used in fiber optic transmission. As you progress through the study of Fiber Optic Light Sources, you will learn much about light-emitting diodes. This unit covers their physical construction, theoretical operation, biasing characteristics and several types of fiber optic LED design considerations. A detailed discussion of laser emission and principles associated with the use of injection laser diodes in fiber optic circuits concludes the unit.

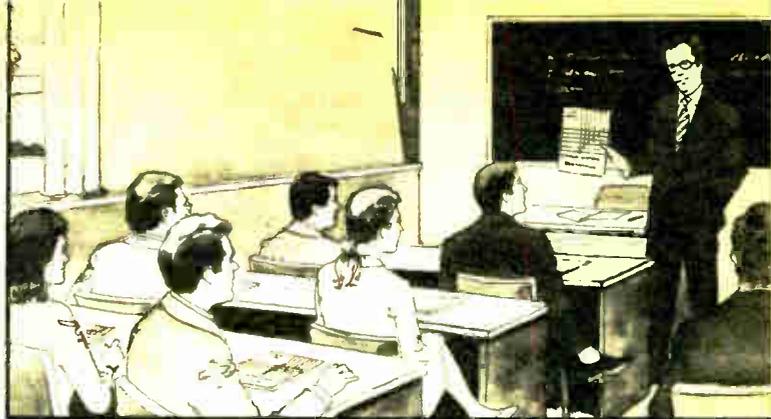
Finally in Unit 5, Fiber Optic Systems, you will tie all of the component parts together into an operational fiber optic link. You will examine the requirements of the various types of links and learn which components best fulfill certain requirements. Four optional hands-on experiments are also included in the course to enhance your understanding of the text. You will construct a modulated source driver circuit, a fiber optic receiver circuit, and fabricate actual fiber optic links. These experiments will allow you to gain valuable design experience, and let you observe the parameters of a fiber optic link directly. To perform them, you will need either a Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer or the ET-3200B Digital Techniques Trainer, an oscilloscope, a multimeter and common hand tools (not included). All other necessary parts such as ICs, transistors, resistors, capacitors, emitters, detectors, fiber, and connectors are furnished with the course.

In addition to the text, two supplemental appendices support the learning program. A listing of standard resistor values will come in handy when the student is building actual circuits from mathematically-derived schematics. Typical data sheets for several fiber optic devices will help in evaluating your newly acquired knowledge. A 25-page glossary of terms serves for quick reference.

Earn 3.0 Continuing Education Units and a Certificate of Achievement by passing the enclosed optional final exam with a score of 70% correct or better.

Prerequisites: It is recommended that a student pass the Heathkit/Zenith EE-3101 DC Electronics and EE-3102 AC Electronics courses (or have equivalent knowledge) before taking the Fiber Optics Course. EE-3201A Digital Techniques is also recommended, but not required. Our money-back guarantee: if not completely satisfied, return course materials for a refund of the purchase price.

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



Color 35mm slides and filmstrips available

Intended to duplicate the flip charts that are included only in self-instruction version of Microprocessors and Automotive Systems courses. Flip charts not included in classroom versions.

EE-3401-1, Microprocessors Slides, 2 lbs.	60.00
EE-3401-2, Microprocessors Filmstrip, 1 lb.	20.00
EB-10-70, Auto Electrical Systems Filmstrip, 1 lb.	29.95
EB-20-70, Automotive Tune-Up Filmstrip, 1 lb.	14.95



CEU exams for Classroom Courses

A new opportunity: Students and employees using classroom versions can earn Continuing Education Units. Each package contains ten copies of that course's CEU exam, with full instructions.

CEU exam for DC Electronics Classroom Course.	
EB-6101-80, Shpg. wt. 2 lbs.	100.00
EB-6102-80, AC Electronics, 2 lbs.	100.00
EB-6103-80, Semiconductors, 2 lbs.	100.00
EB-6104-80, Electronic Circuits, 2 lbs.	100.00
EB-6201-80, Digital Techniques, 2 lbs.	100.00
EB-6401-80, Microprocessors, 2 lbs.	100.00

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

Alabama	205-822-1326	Missouri	314-724-9584
Alaska	907-349-6180	Montana	503-640-1729
Arizona	602-945-6605	Nebraska	316-342-5236
Arkansas	205-822-1326	Nevada	702-358-0829
California (No.)	415-651-6720	New Hampshire	617-285-9028
California (So.)	714-493-8040	New Jersey	609-767-1399
Colorado	303-795-1450	New Mexico	602-945-6605
Connecticut	617-285-9028	New York	516-922-6590
Delaware	717-533-4038	North Carolina	919-776-8161
Dist. of Columbia	804-741-2580	North Dakota	612-533-0000
Florida	305-647-5373	Ohio	419-382-2724
Georgia	404-447-5231	Oklahoma	918-664-9015
Hawaii	503-640-1729	Oregon	503-640-1729
Idaho	503-640-1729	Pennsylvania	717-566-6767
Illinois (No.)	312-960-0363	Rhode Island	617-285-9028
Illinois (So.)	309-343-6135	South Carolina	919-776-8161
Indiana	219-482-2609	South Dakota	612-533-0000
Iowa	515-733-4162	Tennessee	615-361-8744
Kansas	913-722-4713	Texas	214-361-8665
Kentucky	205-822-1326	Utah	702-358-0829
Louisiana	601-327-4757	Vermont	617-285-9028
Maine	207-397-2902	Virginia	804-741-2580
Maryland	804-741-2580	Washington	206-821-4523
Massachusetts	617-285-9028	West Virginia	804-741-2580
Michigan	313-585-2300	Wisconsin	414-784-8075
Minnesota	612-533-0000	Wyoming	303-795-1450
Mississippi	601-327-4757		



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

Now you can apply famous Heathkit/Zenith learning courses to meet your special training needs. Success-oriented with just the right amount of technical theory and a maximum emphasis on real-world applications, Heathkit/Zenith Classroom Courses incorporate the very latest methods and materials that are available. Specify them with confidence, because our pledge prevails:

"We won't let you fail."

Classroom courses are available in these areas:

- **Exploratory Courses:** Concepts of Electronics, Printed Circuit Boards.
- **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
- **Microprocessor Technology:** Digital Techniques, Microprocessors, Microprocessor Interfacing, 6809 Microprocessors, Advanced 16-bit Microprocessors
- **Computers:** BASIC Language Programming
- **Automotive Maintenance:** Auto Electrical Systems, Auto Tune-Up

FOUR NEW HIGH-TECHNOLOGY COURSES: Teachers and industrial training directors can add new learning programs to their classroom curriculums for the future ... courses in Passive Circuit Design, Transistor Circuit Design, Advanced 16-bit Microprocessors, plus Robotics and Industrial Electronics. See box in chart.

Heathkit/Zenith Classroom Courses are the complete answer for all types of industries, government agencies, and forward-thinking schools who want to teach technical subjects with maximum efficiency at minimum cost. Courses start at the entry level of electronics and move into new state-of-the-art technology, branch into the use of instruments or teach computer literacy. All of these multimedia courses employ the latest learning enhancement techniques. Text material is presented in concise, fast-paced units of study, with major topic areas highlighted in modular subsections. "Hands-on" experiments provide positive reinforcement through interactivity. Illustrations are used profusely for fast, thorough mastery by students of all ages and previous technical experience.

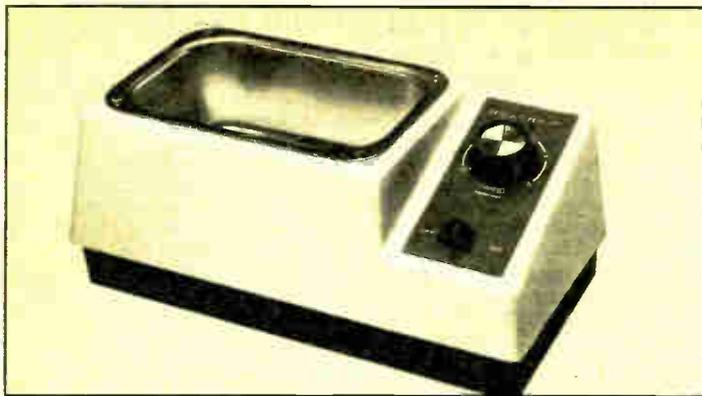
Organized in three separate publications: Each course is designed for greater student and teacher convenience. The student text is the core of the learning material, supported by a workbook with exams and experiments keyed to the text presentation. All courses are written in a logical learning sequence that first explains concepts and then builds upon them for a thorough understanding of each topic. The instructor's guide lets the teacher add his or her own parameters for challenge and guidance—providing each student with a fully rounded learning experience. At a fraction of the cost of institutional options.

Separate parts packs for each student or group of students contain all the electrical and accessory components necessary for implementing the workbook experiments. To complete the full range of experiments integrated within each program, assembled Heathkit/Zenith trainers are required (see chart list).

If rapid advances in technology are leaving your employees or students behind, they can catch up quickly and comprehensively. Review the extensive list of courses below, and contact us for more information regarding your needs.

Course	Text Shpg. wt. 2 lbs.	Price	Workbook Shpg. wt. 2 lbs.	Price	Instructor's Guide Shpg. wt. 1 lb.	Price	Assembled Trainer Wt. 6 lbs.	Price	Parts Shpg. wt. 1 lb.	Price	Cassettes Shpg. wt. 1 lb.	Price	
NEW Four new Classroom Courses in higher technology	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	19 95	NDT USED	
	Robotics & Ind. Electronics	EB 1801 (4 lbs.)	29 95	EB 1801 40	14 95	EB 1801 50	9 95	ETW 1B (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.)	1095 00	EB 8088 30	59 95	NDT USED	
Fundamental Electronics Series	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			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 3101A	19 95
	AC Electronics	EB 6102	19 95	EB 6102 40	10 95	EB 6102 50	9 95	ETW 3100B	169 95	EB 6102 30	15 95	EEA 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	
Introduction to micro-processors	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 3400A	339 95	EB 6401 30	59 95	EB 6401 60	12 95
	Microprocessor Interfacing	EB 6402 (5 lbs.)	24 95	EB 6402 40 (1 lb.)	10 95	EB 6402 50	9 95	ETW 3400A	339 95	EB 6402 30	59 95	NDT USED	
	6809 Microprocessors	EB 6404 (1 lb.)	24 95	EXPERIMENTS IN TEXT		EB 6404 50 (2 lbs.)	9 95	ETW 3400A	339 95	EB 6404 30	69 95	NDT USED	
	BASIC Programming	EB 6100 (4 lbs.)	19 95	EB 6100 40	10 95	EB 6100 50	9 95	NDT USED		PARTS, CASSETTES NDT USED			
	Auto Tune-Up	EB 20 (4 lbs.)	19 95	EB 20 40	9 95	EB 20 50	9 95	NDT USED		EB 20 30 (2 lbs.)	17 95	EB 20 60	9 95
Auto Electrical	EB 10 (3 lbs.)	19 95	EB 10 40	9 95	EB 10 50	9 95	NDT USED		EB 10 30 (2 lbs.)	17 95	NDT USED		





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 3/4" H x 11" W x 5 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 5/8" H x 3" W x 5 3/4" D.

Kit GD-1114, 3 lbs. each station 49.95

86/HOME PRODUCTS

Digital Thermometer fulfills all temperature needs accurately

\$49⁹⁵

- Highly accurate and super dependable – has dozens of everyday applications

Got a cold? Developing pictures? Fixing baby's bath? This reliable, battery powered electronic thermometer will deliver perfect readings every time – wherever you need temperatures in a hurry!

No more squinting or guessing! Solid-state circuitry assures easy-to-read 4-digit temperature in less than ten seconds. The bright red LED display never needs calibration or mercury "shakedown." Wand senses from 32° to 230°F (0° to 110°C) with ±0.2°F (±0.1°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 3/4" H x 3 3/4" W x 4" D.

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



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 $\frac{1}{10}$ of a pound or kg.

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

Don't sacrifice quality for a few less dollars — GD-1186 is no ordinary bathroom scale with digital readout attached, but a true resistive strain gauge!

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

A manual zero adjustment makes it easy to weigh small items. This special offset feature means you can weigh the baby without weighing the blanket. Safe to use after the shower. Requires 6 'C' cell batteries (not included).

Kit GD-1186, Shpg. wt. 9 lbs. **109.95**

Water-resistant platform of burled-grain vinyl stands up to hard daily use

Four bright $\frac{1}{2}$ " LEDs display your weight accurately year after year

Sturdy die-cast aluminum base holds scale rock-steady

Weigh very small packages accurately to one-tenth of a pound or kg.



Guests love the Programmable Musical Doorbell

\$49⁹⁵

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

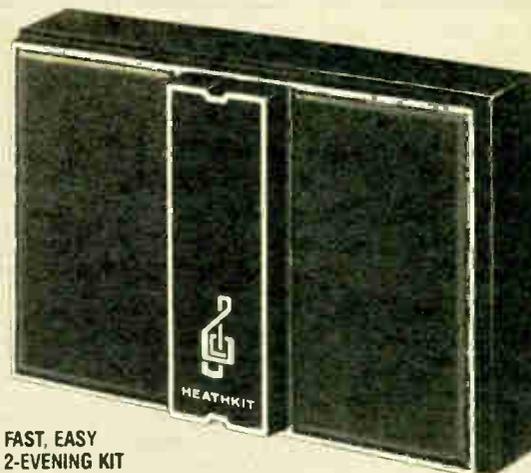
Bring a little music into your everyday life with the touch of a button. Greet your friends with a tune by building this Electronic Doorbell for your home. It's a versatile and ingenious replacement for the conventional doorbell, buzzer or simple chime. Imagine the pleasant reaction and smiles on visitor's faces when they're greeted with a friendly song you've selected to fit any circumstance. It's a very uniquely warm way to say "welcome" to all who call.

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

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



FAST, EASY
2-EVENING KIT



3-Tune Doorbell greets with beautiful music

\$19⁹⁵

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

If you want to replace your ho-hum doorbell with one that plays a tune or two, the Electronic Doorbell is a kit you'll be proud to install new, or switch with your old-fashioned ringer. The TD-2089 plays three diverse selections: an upbeat 4-note ring, a short tune (Beethoven's *Für Elise*) and a long tune (*Romance*). Each tune is reproduced polyphonically by an IC synthesizer.

Quickly select different tunes for front and back door by jumping wires to small sockets. Assembly requires almost no hardware, as the circuit board snaps firmly into the attractive case and spring clips hold the speaker. For extra sound, remote speakers can be added to extend music throughout your home. Hidden connections are made through plug-in jacks and a 10-foot extension ribbon lets you change tunes or service the unit at table level rather than on the wall. Two "C" cell batteries (not included) power the low-drain electronics while your present 10 to 16 volt doorbell transformer supplies your pushbutton circuits. Case size is $4\frac{3}{4}$ " H x $5\frac{7}{8}$ " W x $1\frac{1}{4}$ " D. Spread the joy of music by putting a warm and classical spirit of welcome in your home...and open the door to a friendly smile every time!

Kit TD-2089, Shpg. wt. 1 lb. **WAS \$24.95, NOW ONLY 19.95**



FAST, EASY
1-EVENING KIT



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

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



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



\$39⁹⁵

Achievement Guaranteed

- Communicate with nearly a million other hams all around the world...right from your own home or car...transmitting and receiving CW on a variety of frequencies
- Take the Novice FCC test and ride the airwaves! You can't fail – Heath guarantees that you will pass – or we'll refund the full purchase price of the Course!

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

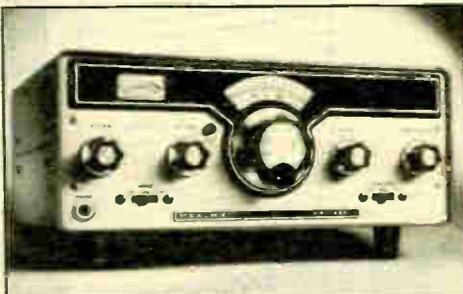
become a part of a privileged fraternity is in this comprehensive, well-organized study aid, including information on how you apply to take the latest FCC exam. Also, it provides helpful guidelines for setting up and operating a good station when your license and personal call sign arrive...

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

The Course is organized in nine separate modules corresponding to the subject areas you'll find covered in the Novice exam. Each subject is presented in a clear, step-by-step manner for upward progress at your own pace.

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

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



\$199⁹⁵

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

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

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

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



\$24⁹⁵

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

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

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

We'll help you get started in Amateur Radio

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

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

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.

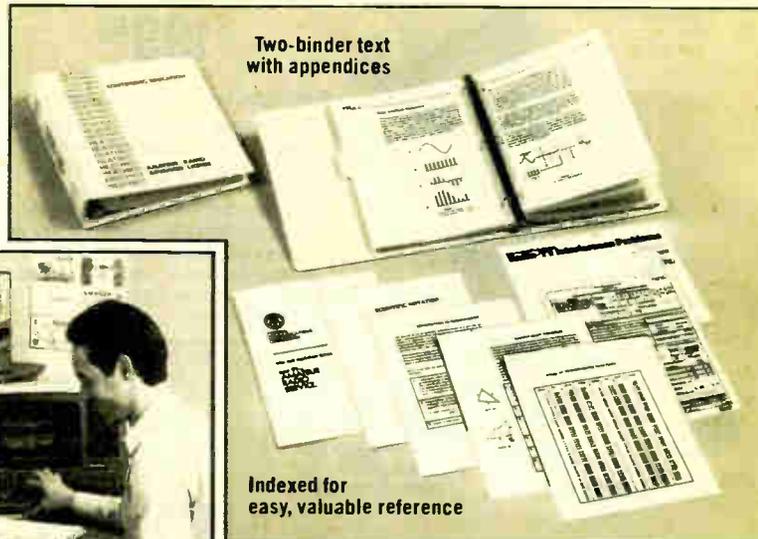
The FCC Element 4(a) written examination deals with the following subjects: Rules and Regulations, Radio Phenomena, Operating Procedures, Emission Characteristics, Electrical Principles, Practical Circuits, Circuit Components, Antennas and Transmission Lines, and Radio Communication Practices. ER-3703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

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

AMATEUR RADIO/89

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 μ V quiets the 2031's hot receiver section a full 20 dB. Careful design and plenty of internal shielding holds spur 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 $\pm 5\%$ forward power accuracy
- Enjoyable, easy-to-build two-evening kit

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

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

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

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

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

Kit HM-2140A, 5 lbs. 99.95

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

HOZ-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 Kolb

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

Campbell, 95008
2330 S Bascom Ave 408-377-8920

El Cerrito, 94530
6000 Polero 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. 441 203-678-0323

FLORIDA – Hialeah, 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 Oveon 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 – Farmington Hills, 48018
29433 Orchard Lake 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 Greenwich Ave 401-738-5150

TEXAS – Dallas, 75201
2715 Ross Ave 214-826-4053

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 512-341-8875

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

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

Vancouver, 98864
516 S E Chaklov 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 Parkway 714-495-9382



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 healthy repeater: When your club wants to update its declining vacuum tube amplifier and replace it with solid-state reliability, the VL-2280 is an outstanding choice that's sure to win applause from active hams 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/P 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 $\frac{1}{2}$ " H x 13 $\frac{1}{2}$ " W x 12 $\frac{1}{4}$ " 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 $\frac{3}{8}$ " D.

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



Deluxe 50-Watt 2-Meter Amplifier adds DX clout

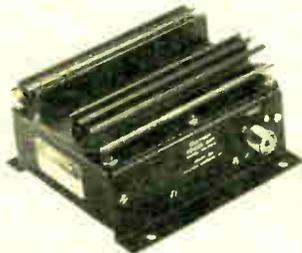
- Tuned input/output circuits reduce spurs and harmonics to -60 dB or better
- Easy 4-hour assembly time

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

AMATEUR RADIO/91



BUILD A HEATHKIT HIGH-TECH HAMSHACK!

Reliable, money-saving accessories you can build which will improve your station efficiency

1 Low-cost, quieting headphones

Copy more traffic: Mura SP-104 Stereo Headphone has isolating ear cups, wide 40-15,000 Hz frequency response, individual volume controls and 2 1/4" dynamic speakers for clear comprehension. 8-ohm impedance. Ten foot coiled cord with plug. **HDP-1396**, Assembled, Shpg. wt. 2 lbs. **19.95**

2 Low-noise ProCom 200 headset

Fully adjustable Telex headset for the amateur and professional offers almost hands-free operation. Boom-mounted, pivotal electret mic has selectable high or low impedance, 100-8000 Hz receiver/mic response. In-line on/off VOX control. Built for maximum comfort over long hours of operation. **HDP-1496**, Assembled, Shpg. wt. 2 lbs. **99.95**

3 Lightweight ProCom 300 headset

High-quality performance in a featherweight headset with exceptional audio performance. 100-3500 Hz receiver/100-8000 Hz mic response. On/off VOX. Aviation-style, single-side eartip receiver is ideal for listening to environmental sounds while monitoring the radio. Great for mobile operation. **HDP-1497**, Assembled, Shpg. wt. 1 lb. **99.95**

4 Twelve-socket power 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. For 120 VAC. **Kit HD-1274**, Shpg. wt. 4 lbs. **24.95**

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 impedance. Rated for full legal power. **HDP-3700**, Assembled, Shpg. wt. 2 lbs. **34.95**
HDZ-63-3, 3-ft. RG-8/U with PL-259s, 1 lb. . . . **4.95**

6 Heath 'Cantenna' dissipates RF

We've made the original 'Cantenna' even better! Now this important device has improved specifications, better components and our famous low, build-it-yourself kit price. HN-31A now handles 1 kW of RF energy (2kW PEP) with VSWRs always less than 1.5:1 for frequencies up to 450 MHz. Provides ideal 50-ohm non-inductive load to your setup, and eliminates unnecessary QRM during tune-up, maintenance or alignment. Prolongs life of your finals. Holds one gallon of transformer oil (not supplied). Should be standard in every hamshack! **Kit HN-31A**, Shpg. wt. 3 lbs. **24.95**

7 Ultra-modern Desk Microphone

Cardioid pattern of the Heathkit Dynamic Microphone produces 20 dB front-to-back ratio for higher signal-to-noise level. 150 Hz to 15 kHz response. Switch-selected high/low impedance and VOX or lockable PTT. Beige case with 6' coiled cord adds new style and bonafide class to your shack. **HDP-242**, Assembled, Shpg. wt. 2 lbs. **59.95**

8 Coaxial Switch routes input RF

Choose from up to five 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 up to 250 MHz. **Kit HD-1234**, Shpg. wt. 1 lb. **19.95**

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 @2A; max all other outlets is 1200 watts @10A. **Kit GD-1295**, Shpg. wt. 4 lbs. **49.95**

10 Change antennas in seconds with a convenient Remote Coax Switch

Saves money! — replaces five expensive coax feedlines with just one; LEDs show which antenna is connected. Erasable front panel lets you label antenna positions. Accepts signals to 150 MHz; rated for full legal power. VSWR under 30 MHz is 1.05:1 or less; better than 1.2:1 under 150 MHz. Sixth LED position grounds all antennas at once for lightning protection. Almost no insertion loss — silver-plated switch contacts reduce attenuation to less than 0.2 dB at 100 MHz. 50-70 ohm impedance; SO-239 connectors. Requires 8-wire cable below. Shielded, weatherproof U-mount solenoid housing. **Kit SA-1480**, Shpg. wt. 8 lbs. **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**

11 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**

12 146-148 MHz Mobile Antenna

Cushcraft AMS-147 1/4-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**

13 Cushcraft AV5 has long DX reach

Vertically-polarized omni-directional antenna designed to provide complete CW and SSB coverage on 80-10 meters. Especially effective high-Q stabilized traps give wider bandwidth. SWR always 1.5:1 or less at resonance on each band. Self-supporting height is 25 ft. (7.4m). Full legal power. Built-in coax connector accepts PL-259 on your station feedline. **HDP-1473**, Shpg. wt. 10 lbs. **119.95**

HAMS! You've never seen a price this low on a rig so advanced...only from Heath!



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

NOW ONLY
\$499⁹⁵

- Save \$150 more on the world's most fascinating rig and experience performance others only dream of
- PLL-synthesized stability with crystal accuracy
- Patented 2-speed tuning knob with 50 Hz resolution
- Digital display with direct keypad frequency entry, two memories per band and mode/status symbols

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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:** 4¼" H x 8¼" 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 0.35µV 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 1µV 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 1.0µV. **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** 4¼" H x 11 ¼" 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

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

NEW LOW PRICES!

SAVE \$996 on the SS-9000,
\$96 on the PS-9000 now!

- 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. Consume mate 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 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 page 40), hard-copy ASCII teletypewriter, or computer (such as the H-89 All-In-One on pg. 38).

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

94/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, 35 lbs. **Was \$2795, NOW ONLY 1799.00**
PS-9000, Assembled and tested, 33 lbs. **Was \$295, NOW ONLY 199.00**

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: 6¼" H x 9¾" W x 13¾" D (15.6 x 24.4 x 34.9 cm) Weight: 33 lbs. (15 kg). Specifications apply when the Power Supply is used with the SS-9000.

SS-9000 SPECIFICATIONS – GENERAL: Tuning: 100 Hz per step, 5 kHz per knob rotation with pushbutton up and down scan (rate is internally adjustable). Operation: Split transmit receive or transceiver 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. RTT: = 250 Hz. Available Accessories: PS-9000 AC Power Supply/Speaker with built-in dual 12/24-hour clock and Customer Service Manual. Cabinet Dimensions: 6¼" H x 14" W x 13¾" D (15.6 x 35.6 x 34.9 cm). Weight: 35 lbs. (15.9 kg).



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

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

\$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, 5k Ω minimum. Nominal Gain: Unity. Audio Amplifier Output: 1.0 watt into 4 Ω . 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: 1 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. 97).



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: 50 Ω at match. Impedance Transformation: 4:1 balun. Output Impedance: Wide range. Insertion SWR: Less than 1.1:1. Power Input Capacity: Full legal limit. Dimensions: 5 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



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

AMATEUR RADIO/95

The telephone in a TV—a System 3 exclusive with quality 25" family-sized color picture

- Custom installable, or with your choice of two beautifully styled cabinets. Best savings on Kit/cabinet systems, like the Large Classic shown 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 or off at any predetermined time once in every 24-hour period

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 for a lifelike degree of clarity found previously in only the most expensive, professional-quality video monitors. Our Tri-Focus picture tube has three concentrated focusing actions instead of just one—for cleaner, brighter image. The 100% modular chassis design of the GR-2501 guarantees outstanding reliability by using fewer interconnections, with all modules factory pretested and aligned before you unpack the kit.

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

A sharpness control lets you adjust the GR-2501's level of picture definition. Advanced digital circuits scan and lock on the broadcast signal, eliminating any kind of vertical and horizontal hold controls. A no-wear, quartz PLL Varactor electronic tuning system seeks out and fine tunes the exact station frequency. Because the tuners are electronic, they have no moving parts to corrode, erode or cause noisy picture problems. A power-sensing voltage regulator helps conserve energy by supplying only the power needed by the TV and maintaining a stable chassis voltage. Electronically self-regulating, it virtually eliminates the effects of household line variations and provides a more constant voltage for improved component and picture tube life. Solid-state automatic fringe-lock circuitry provides unshakable picture stability on fringe area reception, while a phase-locked AFC switch 'pulls in' off-frequency signals from cable or master antenna systems and video games. For optimum clarity, a picture control permits you to adjust the contrast and color levels, which maintain proper balance for varying room light conditions. Altogether, the most impressive picture you can build!

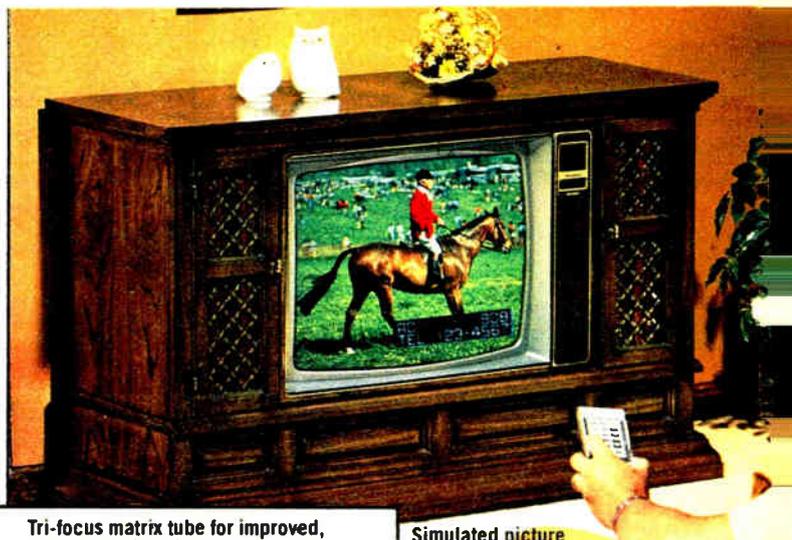
Heath System 3 means greater value. Together, the EFL Tri-Focus picture tube, cool-running Triple-Plus chassis, and advanced Color Sentry combine to create the sharpest, most realistic picture in Heath/Zenith history! You're assured of fewer service calls, greater reliability and ease of operation.

To maintain the GR-2501's outstanding picture fidelity over time, an automatic Color Clarifier circuit removes any magnetism in the picture tube that may cause noticeable color impurity each time the TV is turned on from a cold start.

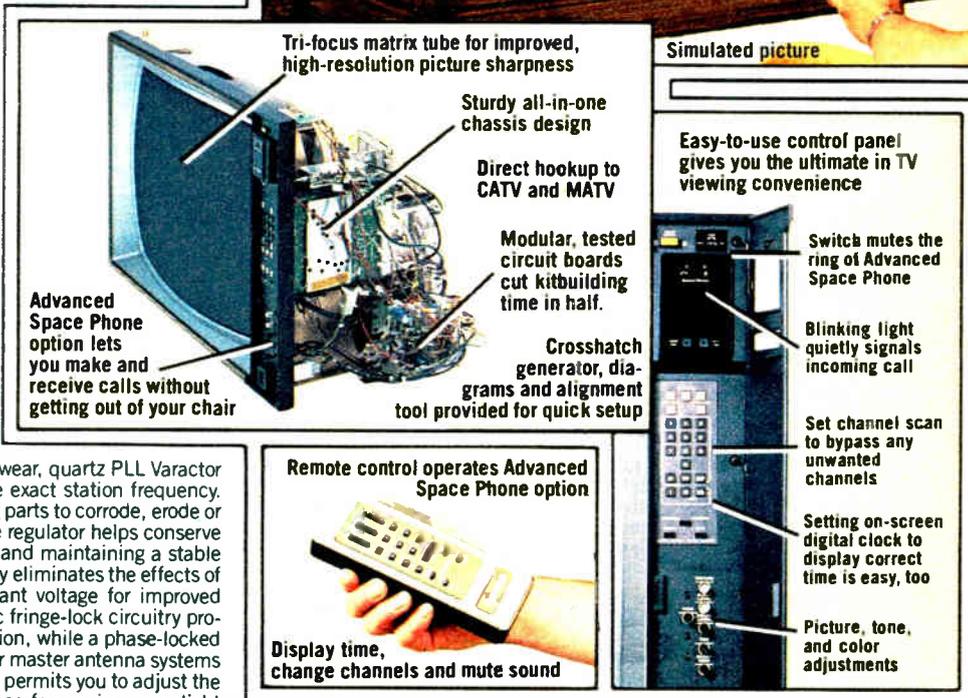
Your new GR-2501 comes with our Computer Space Command Remote Control for scanned or direct access channel selection, on/off with variable volume, on-screen display of channel with current time, plus on-screen check or activation of the preset Time Control Programmer feature and using the Advanced Space Phone. An easy-to-read, on-screen channel/time display appears briefly when channels are changed, or recalled from set or remote control. Expanded 112-channel tuning capability lets you select from up to 42 cable offerings as easily as VHF and UHF, except scrambled premium services.

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

As low as
\$649⁹⁵



Simulated picture



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, diagrams and alignment tool provided for quick setup

Advanced Space Phone option lets you make and receive calls without getting out of your chair

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, tone, and color adjustments

Remote control operates Advanced Space Phone option

Display time, change channels and mute sound

button on the remote control you can touch for complete privacy.

Two 9" oval midrange-woofers and two 2½" tweeters provide rich, four-speaker sound to every program. A front panel tone control lets you balance bass and treble to your individual listening taste for enhanced wide-range presence that will surround you with a clear, natural sound and never-before-heard audio detail.

A convenient audio output jack can interface the TV soundtrack to an auxiliary input of your personal stereo system for clearly-amplified sound reproduction.

Put the GR-2501's custom-installable chassis behind a wall, mount it in a cabinet of your own custom design or save when purchasing your kit with one of the fine furniture cabinets featured on page 99. Clearly written and fully illustrated, the step-by-step assembly manual has all directions, dimensions and templates necessary to install the TV successfully. No instrument alignment is required. The kit includes a crosshatch generator which you build and use to perform the convergence and color purity setup. After just 15 hours average build time, you can touch the Power button on your GR-2501 and begin to admire a beautiful, lifelike parade of pictures you'll be proud to show off always.

The commanding 25" Heathkit GR-2501 has a lot more of what you're looking for—top-of-the-line features and performance plus the utmost in service simplicity at an affordable kit price! Add an extra dimension of pride to your television viewing this year. Build a GR-2501 and share the beautiful rewards with everyone.

Kit GR-2501, Shpg. wt. 113 lbs., Motor Freight **649.95**
Kit GRA-2501-1, Advanced Space Phone, Shpg. wt. 2 lbs. **49.95**





Two-in-one Home/Portable Video Director frees you to enjoy unlimited TV entertainment

- Zenith quality performance in state-of-the-art Beta video technology
- With the GRZ-1810 Newvicon Camera, the lightweight and portable GDZ-9800 recording deck captures all your action indoors or 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. CLEAR frame-by-frame, stop action and multi-speed playback features let you study every aspect of a professional golf or tennis swing, the details of cinematic editing or 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 for playback and editing at your fingertips. The two-week, 4-event tuner lets you tape one telecast while you're watching another or program the deck for unattended recording. You won't miss a show again! The Tuner/Timer powers your GDZ-9800 at home and will charge the optional Battery Pack, OR use the -9852 to power the -9800 and recharge the Battery. Either way, it's instantly portable – designed with the video camera in mind. For those who take home video seriously.

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.

GDS-9800-2, Shpg. wt. 43 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

Large Classic Console Cabinet of majestic design

For the GR-2501 (left), or our new **GR-3000 Television Computer System** on pgs. 100-101. Decorator-design has elegant oak veneer parquet top and sides with antique-finished metal hardware and latticework. Solidly constructed, select hardwood framing. Accepts four wide-range speakers included in kit, mounted two on each side of screen. Size: 32½" H x 50½" W x 20" D with casters and tube cap.

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

\$100 SAVER on Cabinet with a GR-2501.

GRS-2501-5, Shpg. wt. 249 lbs., Mtr. Frt. **749.90**



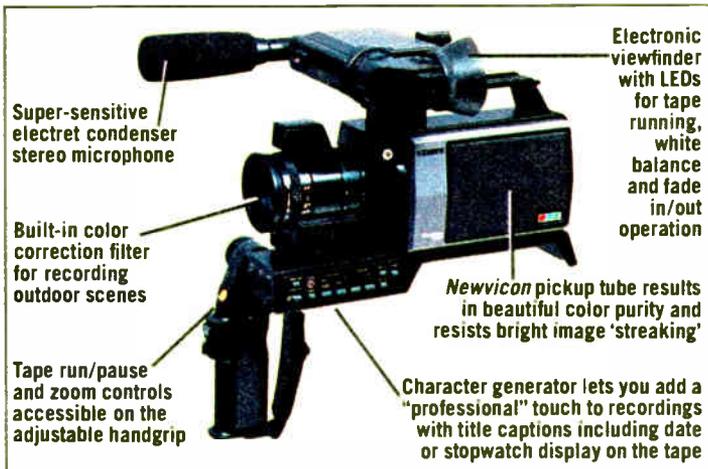
Compact Classic Cabinet is a space-saving value

For the GR-2501 (left), or our new **GR-3000 Television Computer System** on pgs. 100-101. Affords maximum efficiency in size and price. Antique brass-rubbed 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. Accepts four speakers from kit, mounted up front, below TV screen.

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

\$100 SAVER on Cabinet with a GR-2501.

GRS-2501-4, Shpg. wt. 225 lbs., Mtr. Frt. **699.90**



Zenith auto-focus Color Video Camera is so advanced, directing is easy!

NEW
ONLY
\$1049⁹⁵

- Infrared auto-focusing system eliminates guessing
- Has f1.6 lens with 8:1 variable-speed power/manual (12-96 mm) zoom and macro focus capability
- Superb low-light sensitivity down to 10 lux (candlelight)
- Connects directly to GDZ-9800 Portable VCR at left

Zenith's top-of-the-line Color Video Camera lets you be the best you can be! Producing the sophisticated look and feel of quality home videomovies has never been so easy! Once you master all the features of this camera, you'll be able to achieve do-it-yourself results that truly rival professional effects.

Surprisingly easy to use: The many features on the lightweight GRZ-1810 only serve to make it more versatile – *not complicated*. Everything comes naturally thanks to the intelligent and effortless control layout. Many controls can be automatic...like iris control for proper exposure, white balance to adjust color levels electronically, color 'temperature' and smooth fade in/fade out. The foolproof Infrared Automatic Focus System (with manual and momentary adjustments) zeroes into your subject's center-of-field-of-view and brings you a continuously clear, sharp picture on every shot. Includes 14-pin, K-type camera-to-recorder cable.

Full-featured (and then some): You also get accurate 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 left, you can enjoy total flexibility in a fully integrated package that makes the new art of home video a *pleasure* to explore!

GRZ-1810, Assembled, Shpg. wt. 8 lbs. **1049.95**

GRZ-1810-1, Carry-all Camera & Accessories Case, Shpg. wt. 4 lbs. **49.95**

SAVE \$100 now on Heath's GR-3000 Deluxe 25" dia. Television Computer System. For the age of

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 interfactivity and put the most powerful Television in the world at your fingertips. In the end, a highly sophisticated system capable of meeting your needs for the multiple-source programming available today...as well as the advanced communications requirements of tomorrow.

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

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

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

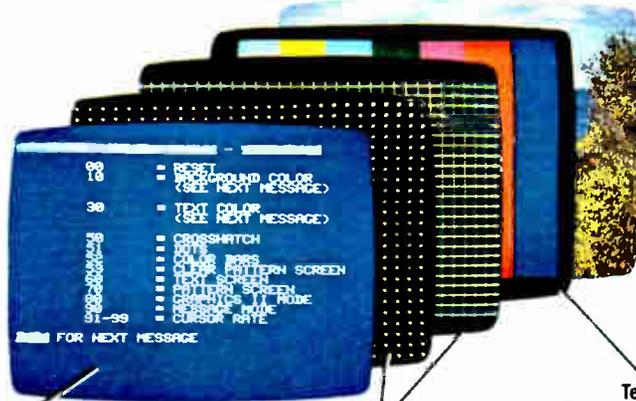
A special 3-line information display can appear anywhere on the screen for a brief interval when channels change or by direct recall. It contains the tuned station (CHANNEL 2), current AM/PM time in 12 or 24-hour format (P 10:06:29), and current date (SAT 20-FEB). A fourth 'accessory' line shows a function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

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

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

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.

Powerful, 56-line infrared Remote Control provides full-featured command of the world's most advanced color TV and its 'smart' functions.



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 NTH" at any ! prompt.



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

personal video — a new kind of TV kit with versatile, programmable, expandable 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



Rear panel auxiliary connections and controls. Slots will accept I/O ports used with future accessories.

information display and your own messages. The fifth, Computer-Generated Screen (not represented) will display text and graphics that are created on an external computer when tied to the forthcoming Serial Interface Module.

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

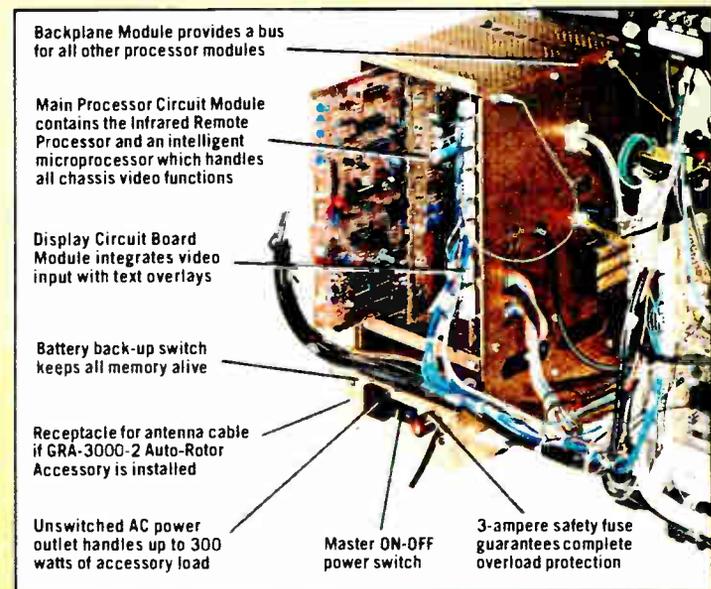
As your needs expand, so can your GR-3000 TV system: Three new modules in the 3000 series are currently under development:

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

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

Programmer Module — Extensive memory stores data to activate repeatable weekly viewing schedules, special events up to a year away, and exclusion scheduling to inhibit viewing for a specific interval of time. It also provides protocol to control an external computer, device or modular accessory.

Other modules are being planned to take full advantage of emerging life-service technologies which carry the greatest promise of future benefit.



Backplane Module provides a bus for all other processor modules

Main Processor Circuit Module contains the Infrared Remote Processor and an intelligent microprocessor which handles all chassis video functions

Display Circuit Board Module integrates video input with text overlays

Battery back-up switch keeps all memory alive

Receptacle for antenna cable if GRA-3000-2 Auto-Rotor Accessory is installed

Unswitched AC power outlet handles up to 300 watts of accessory load

Master ON-OFF power switch

3-ampere safety fuse guarantees complete overload protection

Trouble-saving hookups: The GR-3000 is cable-compatible for immediate installation in equipped areas. Direct audio and video input and output jacks on the rear panel permit you to connect and switch between a video recorder/disc player or standard channel reception. A separate input labeled Channel 1 Audio lets you pre-empt program sound (during a commercial, for example) with that from an external source like FM radio, which can be enabled by selecting channel 1 on the remote as usual.

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

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

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

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

GOA-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.



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 $\frac{5}{8}$ " H x 26 $\frac{1}{2}$ " W x 17 $\frac{7}{8}$ " D



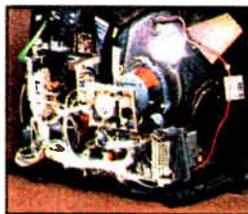
Remote unit provides full-featured function control



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 Rechargeable Battery Pack below. Has 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.



Simulated picture

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 d.a! 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.

Three-instrument Desktop Weather Set has a German-made, polished brass-faced barometer, fahrenheit/celsius thermometer and quartz-accurate clock. Trimmed with and seated in solid walnut moulding, contrasting with rich overlays of Carpathian elm burl on front and reverse. Boldly attractive.

Kit F-2534-C, Shpg. wt. 6 lbs. Originally \$99.95, NOW ONLY 49.95

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 (± 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

Early American Mahogany Candlestick Holders make an enjoyable, one-evening experience in woodworking. Stain and varnish included.

Kit F-2587-M, Shpg. wt. 2 lbs. Originally \$19.95, NOW ONLY 9.95

Shaker Message Board has 'self-healing' cork tack board, blackboard of simulated slate, chalk and chalk tray. Solid cherry construction with handsome box-joint corners and preassembled frame. Patterned after 19th-century originals.

Kit F-2573, Shpg. wt. 6 lbs. Originally \$49.95, NOW ONLY 19.95

Solid Oak Arm Chair has smooth steam-bent arms for graceful relaxation, strong double back with an embossed pressback pattern plus comfortable lumbar support, deep saddle-carved seat, seven stretchers for sturdy leg support. A classic!

Kit F-2503, Shpg. wt. 29 lbs. 129.95



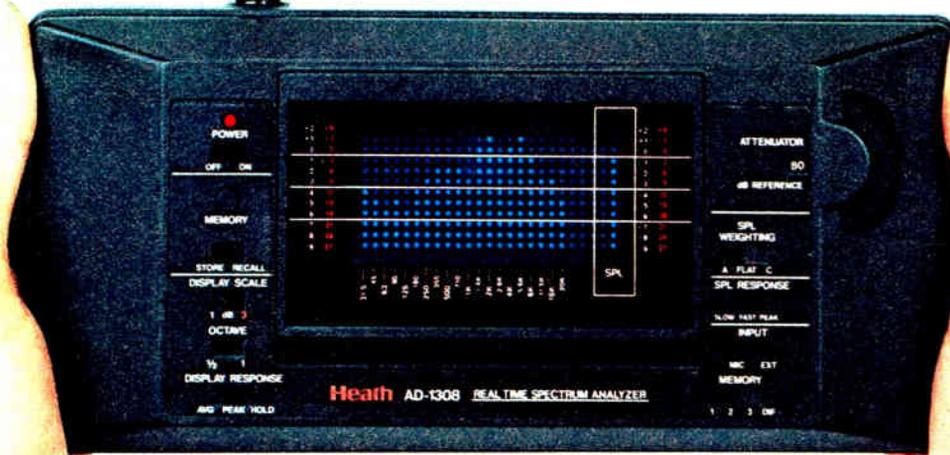
For more bargains in FURNITURE kits, see page 84.

TELEVISION AND SPECIAL OFFERS/103

NEW!

The Heathkit Real-Time Spectrum Analyzer...a handful of portable, audio-diagnostic power

Vacuum fluorescent panel provides a vivid display of audio frequency response and sound pressure level, so you can more easily evaluate and optimize the performance of every contributing variable – from cartridge resonance and recording bias to loudspeaker output and complete room equalization – for the most rewarding listening experience.



Exclusively from Heath!

- The world's first handheld, microprocessor-controlled RTA for precise measurement of spectral response and SPL
- Operates on six "C" batteries or recharges from AC current
- Exceptional capabilities, comparable to high-quality professional units costing thousands of dollars
- Includes calibrated microphone with compensated ROM
- Switchable 1/2-octave display offers twice the resolution of one-octave 'hobbyist' Analyzers
- Five display memories and unique 'difference' mode let you compare two sources simultaneously

Stay on the leading edge with Heathkit high technology... learn more about the newest Pro-Series audio component you can build on page 12!

New ADA-1308-1 Power Supply/Recharger/Rack-Mount Accessory and AD-1309 Pink/White Noise Generator also available as options

The Heathkit Handy Index

AMATEUR RADIO: accessories, antennas, antenna tuners, license courses, novice aids, super-tech transceivers 88-97

AUTOMOTIVE: programmable musical horn, courses, garage door opener, wiper delay, siren PA, precision tune-up equipment 60-63

CLOCKS: perfect timekeepers 2-3

COMPUTERS: accessories, courses, hardware, peripherals and 16/8-bit software 32-59

EDUCATION: amateur radio, 88-89; automotive, 62; classroom courses, 84-85; computers, 57-59; electronics, 70-84; fiber optics, 84; microprocessors, 74-77; advanced 16-bit microprocessors, 78-79; engineering circuit design, 80; robotics, 68-69.

ENERGY: log splitter, power factor controller, heat sniffer 3-speed ceiling fan 65-66

GENERAL INFORMATION: 52-53

HEATHKIT ELECTRONIC CENTERS:** addresses, phone numbers, new store opening 90

HOME PRODUCTS: air cleaners, 65; BSR X-10 home controller, 8; digital scale, 87; garage door opener, 62; intercom, 86; night switches, 7-9 and 66; cordless telephone, 67; setback thermostat, 65; solar water heating system, 64; programmable doorbells, 87.

INSTRUMENTS: chart recorder, frequency counters, generators, meters, probes, oscilloscopes, handheld testers, precision oscilloscope calibrator 19-31

MARINE: fish locators, speedometers, digital and chart-recording depth sounders 16-17

METAL LOCATORS: right and left handed 15

NAME PLATE: solid brass engraving 15

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 January 2, 1984 through April 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.

NEW PRODUCTS: Battery Life Tester, 7; Spectrum Analyzer, Power Supply/Rack-Mount Accessory and Pink/White Noise Generator, 12; RTTY/CW Terminal Interface and Software, 96; 60 MHz Oscilloscope and Time-Voltage Module, 28; Amber Video Monitor Kit, 37; MS-DOS Operating System Course, 57; Robot Applications Course, 69; 16/8-bit Software for H/Z-100 Computers; Computerized Phone System, 45; Condor & Peachtree Business, 46; CAI Authoring, 47 and 55; Software Directory, 49; Computer Furniture, 55.

ORDERING INFORMATION: 52-53

PHOTOGRAPHY: darkroom timer 86

PRESIDENT'S LETTER: 52

SOLAR: domestic water heating system 64

SECURITY: home and business alarms 7-9

STARTER KITS: flood alarm, 7; heat sniffer, 65; clocks, 2-3; doorbells, 87; freezer alarm, 7; frequency counter, 25; lamp switches, 7, 9 and 26; portable light, 7; test equipment, 23; ultrasonic cleaner, 86; AM portable radio, 7.

STEREO HIGH FIDELITY: Pro-Series equipment, amplifiers, speakers, cartridges, receivers, turntable, audio rack 10-14

TELEPHONE: dialer, ringer, cordless 67

TV-VIDEO: remote control, portable b&w and color 5", 13", 19" and 25" TVs, television computerlink system, video organizer, video-tape recorder and camera, cabinets 98-103

TOOLS: quality kitbuilding aids, lamps 18

WEATHER: computerized weather station, barometer, barograph, humidity meter, thermometer, five-function analog station 4-6

*Units of Veritechnology Electronics Corporation in the U.S.



You'll get your kits faster when you phone the order TOLL-FREE!

800-253-0570

Order from 8 AM to 8 PM, Eastern Time. In Alaska, Hawaii and Michigan call 24 hours a day, 616-982-3411. To save time, please fill out the order blank between pages 52 and 53 and have your credit card handy before calling.



THREE WAYS TO SIMPLY SAY—

CHARGE IT!



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 charge account.