

Heathkit®

Christmas - 1981

New
New
New

Solar Water Heater cuts fuel bill - qualifies for 40% Federal tax credit on purchase price

Competitively-priced state-of-the-art Color TV with Remote Control and optional Space Phone

Low-cost Heath/Zenith Printer has an exceptional combination of speed and versatility

MAIL ORDER CATALOG NO. 855

CREDIT CARD ORDERS CALL TOLL-FREE: 800-253-0570

In Alaska, Hawaii and Michigan call 616-982-3411



Use Visa,
MasterCard or
Heath Revolving
Charge



The heat exchanger of the Heathkit Solar Water Heater features our own custom design — one of the first to mount the exchanger outside the tank to increase the efficiency of the unit while reducing weight at the same time.



Fight soaring energy costs — install your own Solar Water Heater using Heath quality

- Eligible for 40% federal tax credit plus state, local credits
- Thirty-eight states offer additional tax incentives for solar
- Sized for your family, your home, your U.S. location by Heath
- Designed to save from 50-80% of hot water bill for typical home

- Save up to 40% over a comparable dealer-installed system
- A true kit — all components are matched to work together
- The Heathkit NS-1100 Manual Set answers all your questions about location, installation and operation

Hot water makes up about 15 percent of the average energy bill. And now, you can fight those soaring energy costs — with the Heathkit Solar Water Heater. This closed-loop system, designed to save 50% to 80% of the hot water cost for a typical home, combines Heathkit credibility, engineering ability and manual expertise in a system you can install.

Lightweight, easy-to-install 3' x 7' Solar Panels weigh just 87 lbs.

The NS-1100 is designed to be installed as a complement to your existing water heating system. It achieves its highest efficiency when used along with a conventional water heater.

Each Solar Water Heater can be properly sized for your climate, home size, family size and hot water requirements — by a computer program run at your nearby Heathkit Electronic Center.

We offer the highest quality solar components on the market, designed to meet our exacting standards. And you can be sure we'll be around after the sale for service and replacement parts — no worry about dealing with a small, under-capitalized company.

Because of our Solar Water Heater's quality, you probably cannot hire a contractor to install a system as good. In addition, when you choose the Heathkit NS-1100 for installation in your home, you can save up to 40% in purchase price over the cost of a comparable dealer-installed system.

The NS-1100 preheats water going to your conventional water heater. Instead of cold water, the conventional system receives solar-heated water.

The solar preheating dramatically lowers the energy requirement of the conventional water heater, allowing it to become a holding tank to keep hot water at the desired temperature. The conventional water



heater also serves as a back-up to the solar water heater during periods of minimum sunshine.

Designed for maximum water heating efficiency, the custom-designed heat exchanger transfers solar heat from the closed loop to your water. It mounts outside the tank — which increases the efficiency of the unit, while reducing its weight. The NS-1100 is one of the first solar water heaters to mount the heat exchanger outside the tank.

The Heathkit NS-1100 Solar Water Heater includes the components you need for kitbuilding and installation, except $\frac{3}{4}$ " copper pipe and insulation. The kit even includes a procedure for practicing sweat soldering.

Custom Heat Exchanger

This is a true kit from the kit experts, not just a collection of components from many different sources. All of the components in the Heathkit NS-1100 Solar Water Heater are engineered for easy installation and matched to work together.

The complete, step-by-step Heathkit installation manual allows you to plan the kitbuilding and installation of the NS-1100 Solar Water Heater ahead of time. This enables you to build and install the NS-1100 in as little as three weekends.

Our unique, personal technical consultation service plus the thorough, detailed kitbuilding and installation manual — assure you of the Heathkit pledge: "We won't let you fail."

Order the NS-1100-3 Manual Set at right to see how easy and inexpensive it can be to declare your energy independence with the Heathkit NS-1100 Solar Water Heater you install yourself.



Thorough instructions guide you step-by-step



Even includes procedure for practice soldering

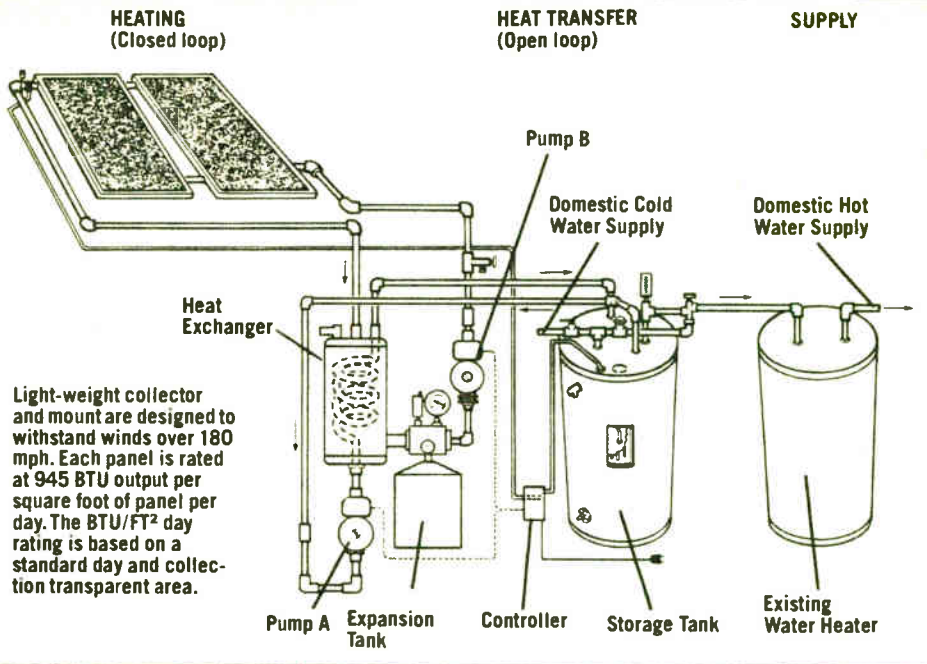


Your Heathkit Solar Water System will soon pay for itself at today's high energy costs

You'll save money by using the NS-1100 Solar Water Heater. How much you save depends on federal and state tax credits, local energy costs, family size and hot water usage. If your energy costs are higher than average – or if you use more hot water than average, an earlier payback will result. As the inflation rate continues to spiral, your purchase will become an even better bargain.

A closed-loop system allows your NS-1100 system to continue working as long as the sun is shining, even when the outside temperature is below freezing. Also, hard water is not circulated through the collectors as in open-loop systems. Even in colder, heavily-clouded areas the NS-1100 will save you money because the controller operates proportionally for maximum thermodynamic heat transfer and efficiency.

A computer program which can calculate your payback, state tax credits, etc. for your particular area is on display at your nearest Heathkit Electronic Center (units of Veritechnology Electronics Corporation). See the list on page 25 for the store nearest you.



Heath expertise and the thorough, step-by-step Heathkit manual!

Tax credits can help pay for your system

A Federal tax credit of 40%, plus state credits (if available), will also help you pay for your 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 IRS Publication 903 (Rev. Nov. 1980) in the NS-1100-3 Manual Set – and consult IRS or an informed tax preparer.

Three ways to view the NS-1100's value

Depending on local energy costs and your hot water usage:

1. You may expect the solar unit to pay off its initial costs with energy savings within a few years;
2. You may expect the Heathkit Solar Water Heater to add marketability and resale value to your home.
3. Or you may want an annual profit – expecting energy savings to pay a better return on the money invested than another investment would.

Learn how easy it can be to install your own Heathkit Solar Hot Water Heater System

\$25⁰⁰

- Price is refundable when you purchase your system
- Written for the person with little or no experience
- Complete information on installation, operation

The Manual Set has all you need to know to install a system. Written for the person with little or no previous experience, it includes complete information on installation, operation and site evaluation. Includes a Solar Shade Finder for surveying your location to find a site where no trees, buildings, etc. will block your solar panel from full sunlight. The price of the NS-1100-3 Manual Set is deductible from the system price when you purchase your customized Heathkit NS-1100 Solar Hot Water Heater System.

NS-1100-3, Shpg. wt. 3 lbs. **25.00**

Save energy dollars with Auto Set-Back Thermostat

It makes good sense to replace your perfectly good thermostat with the assembled Robertshaw Convertible Automatic Set-Back Thermostat. It controls heating or cooling when you're sleeping, or away from home, automatically. Choose 1 or 2 energy-saving periods in a 24-hour time span. Self-charging, battery-powered timing device changes temperature from 1 to 10 degrees F at times you select. Uses same wiring as your old thermostat. Easy installation on 4 or 5-wire 24 VAC systems. Not for heat pumps.

3.38" H x 5.5" W x 2.13" D. Fully assembled, not a kit.
GDP-1369, Assembled, Shpg. wt. 2 lbs. **54.95**



An energy-saver for all seasons – assembled Intelligent 7-Day Thermostat



First truly intelligent setback continuously monitors current temp – turns furnace on earlier in AM if it was colder evening before. Brings home to prescribed temperature at prescribed time 7 days a week. Saves significantly more energy than others. Awarded two patents for intelligence control, another for "power-stealing," easy-to-install design. Uses present 4 or 5-wire, 24 VAC. Not for dual-stage heat pumps. 4.5" H x 5.5" W x 1.5" D.

NEW-1210, Assembled, Shpg. wt. 2 lbs. **99.95**

Alaska, Hawaii and Michigan Residents: Call 616-882-3411

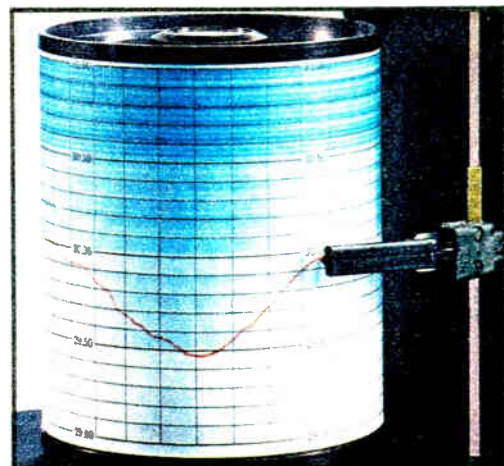
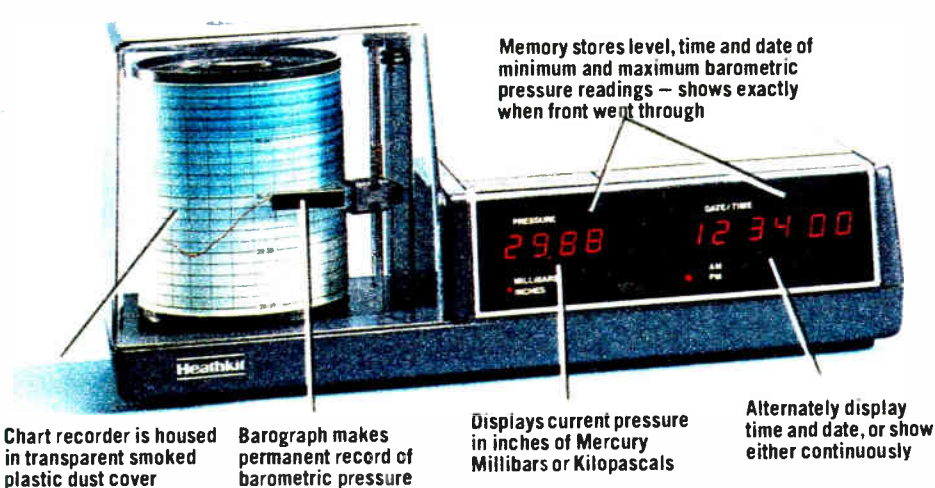


Chart recorder is housed in transparent smoked plastic dust cover

Barograph makes permanent record of barometric pressure

Displays current pressure in inches of Mercury Millibars or Kilopascals

Alternately display time and date, or show either continuously



Get a permanent record of barometric pressure changes — and current readings

\$295⁹⁵
Kit

- Most important parameter which influences the weather is barometric pressure change. Barograph charts changes so you can see rate of most recent change
- Microprocessor-based instrument displays current pressure and time; remembers dates, times and levels of maximum and minimum barometric pressure
- An elegant addition for the Digital Weather Computer

Here's a unique, super-accurate instrument for reading barometric pressure. The ID-2090 Digital Barograph permanently records pressure changes — in inches of Mercury (Hg), millibars or kilopascals — on its drum chart. You can adjust the chart to record at 7-day or 31-day speeds (with appropriate chart paper). You can even make written notations on the chart, during or after recording.

In addition, a four-digit LED display shows the current pressure at the same time it's recorded on the chart. An LED indicates the unit of measurement currently in use (inches of Hg, Millibars or KiloPascals). Cabinet switches allow you to recall maximum and minimum barometric pressure readings (since last cleared), with the time and date they occurred, from the ID-2090's memory.

The ID-2090 features a temperature-controlled oven, which minimizes the effects of changing temperatures to maintain a high (± 0.03 in. Hg) level of accuracy — comparable to a mercury column barometer.

Learn about weather and how to predict it with the Heathkit/Zenith Weather Course

\$79⁹⁵

- Teaches you how to predict upcoming weather conditions
- Gives you necessary knowledge to start a home weather station

Why do clouds have different forms? Why they are called the sign posts of the skies? What atmospheric conditions breed tornadoes or hurricanes? Take the mystery out of weather with our complete award-winning Weather Course. It explains how nature's invisible forces change your weather.

You'll understand weather — and learn how to predict it. A small barometer, rain gauge and 4 thermometers help you learn how to read and use weather instruments. A workbook with map reading and forecasting exercises, a log book for documenting day-to-day conditions, and a step-by-step textbook that takes you from basic definitions to predicting storms are also included.

When you complete our Weather Course, you'll be able to:

1. Explain how the sun and earth's atmosphere affects our weather.
2. Understand how clouds form and why they precipitate.
3. Identify different types of clouds by their shapes.
4. Know what type of weather is coming by reading the clouds.
5. Learn how weather instruments operate and how to read them.
6. Identify air masses, using temperature/pressure characteristics.

A separate 6-digit display alternately shows the current time (in 12 or 24-hour formats) and a 4-year calendar — or continuously display time or date.

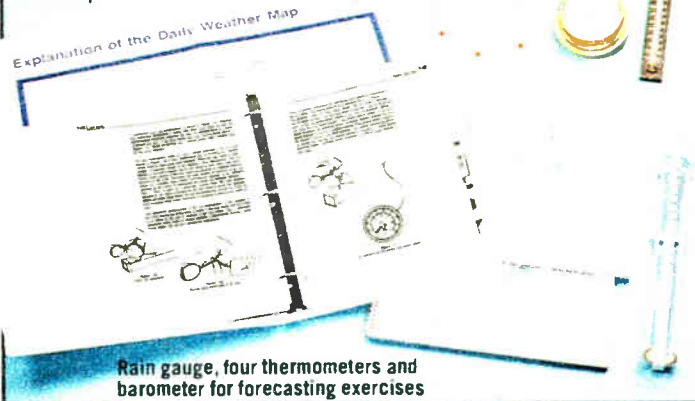
When linked to the ID-4001 Weather Computer, the Digital Barograph produces a tremendous amount of useful information. Together, they enhance each other perfectly and keep you updated continuously.

Kit ID-2090, Shpg. wt. 11 lbs. 295.95
IDW-2090, Assembled and tested, Shpg. wt. 7 lbs. 395.95

ID/IDW-2090 Digital Barograph includes one-year supply of chart paper. Additional chart paper and replacement pen available separately. See manual.

ID-2090 SPECIFICATIONS: Digital Clock-4-Year Calendar: 6-digit time readout in 12-hr. format, with AM/PM indicators. Accuracy: Determined by line frequency accuracy. No cumulative error. Barometer: Display: 4-digit readout with inches of Mercury (in. Hg), Millibars (MB) or KiloPascals (KPA) indicators. Pressure Range: 28-32 in. Hg (948-1083 MB, 94.8-108.3 KPA). Accuracy of Reading: ± 0.03 in. Hg; between 29-31 in. Hg, 59-95 deg. F (15-35 deg. C). Memory: Date, time, magnitude of max. and min. pressure readings. Chart Recorder: Chart Width: 4 inches. Range: 29-31 in. Hg. Balance Time: 6 sec. for 2 in. of travel. Overshoot: 0.5% of full scale. Overall Error: 0.04 in. Hg. Chart Speed: 1 revolution per 7 or 31 days (user-selectable). Chart Speed Error: 0.5% max. Controls: Min. or max. pressure select clear, MB KPA or in. Hg gain, coarse adjust, fine adjust. Power Requirements: 120-240 VAC, 50-60 Hz, 14 Watts. One 9 VDC battery (not included) prevents memory loss during momentary power failures. Dimensions: 7" H x 15.25" W x 5.50" D.

670-page text explains weather phenomena



Rain gauge, four thermometers and barometer for forecasting exercises

7. Understand how fronts develop, and the types of weather they bring.
8. Forecast weather by reading instruments and surface weather maps.

Earn 2 CEUs — score 70% on the optional final exam. (Also see our Electronics (pgs. 31-42), Automotive (p. 47) and Computer Courses (p. 90-92).)

EW-4100, Shpg. wt. 10 lbs. 79.95





Let the Heathkit ID-1790 Automatic Rain Gauge measure the rainfall while you stay dry indoors

\$149⁹⁵
Kit

- Accurate readings within $\pm 2\%$ in inches or centimeters
- Keeps track of both short- and long-term rainfall with two separate, bright digital LED displays

Measure both short- and long-term rainfall quickly and accurately with the Heathkit ID-1790 Automatic Rain Gauge. It features an indoor display unit and an outdoor collector that automatically brings you up-to-date, precise rainfall measurements in your choice of either centimeters or inches.

With the ID-1790, you don't have to go outdoors to read the rainfall! The outdoor collector catches and measures it for you. Included is a 100' water-proof cable for sending all measurements to the indoor display. You stay warm and dry, and get up-to-the-minute rainfall measurements. Because the tipping bucket automatically empties when full, you don't have to go outside.

The ID-1790's outdoor collector is sturdy and fully-protected from the elements. It's housed in a weather-resistant 14½" H x 10" W x 10" D assembly that can be installed on a fence post or other convenient open location for accurate readings. A protective screen over the plastic tipping bucket keeps out dirt, leaves and other natural debris that could cause errors in your readings.

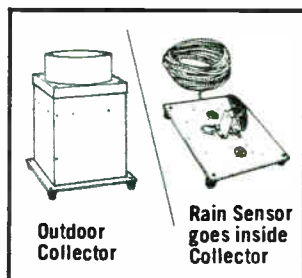
The ID-1790's indoor digital display takes the guesswork out of rainfall readings. Two sets of bright, red ½" LEDs on a glareless flat black background constantly tell you the short- and long-term rainfall amounts. The first set of LEDs reads out the long-term rainfall in either centimeters or inches, whichever you choose. The second set shows short-term moisture.

The indoor unit is designed to match the other instruments in the Heathkit weather series. It measures 5¾" H x 12½" W x 4¾" D and comes in a handsome plastic case with a walnut grain front panel and runs on household current (120/240 VAC, 50/60 Hz). A 9-volt back-up battery (not included) keeps the unit's memory and measuring circuits operating in the event of power failures.

Take the "guess and wet" out of measuring rainfall – order your Heathkit Automatic Rain Gauge today.

Kit ID-1790, Shpg. wt. 14 lbs. **149.95**
IDW-1790, Assembled Automatic Rain Gauge, Shpg. wt. 12 lbs. **199.95**

ID-1790 SPECIFICATIONS: Displays: Short Term Display: 3 digits, up to 9.99. Long Term Display: 3 digits, up to 9.99 or 99.9 – depending on wiring. Units of Measurement: Inches or centimeters of rainfall, depending on wiring. Repeatability: ± 2.0 percent for ½ inch per hour rate of rainfall. Operating Temperatures: Rain Collection Unit, 32 degrees F to 120 degrees F (0 degrees C to 50 degrees C); Digital Readout Unit, 32 degrees F to 120 degrees F (0 degrees C to 50 degrees C). Power Requirements: 120/240 Volts AC, 50/60 Hertz, 5 Watts; 9 Volts DC, transistor battery keeps the ID-1790's measuring and memory circuits operating during power interruptions. Dimensions: Rain Collection Unit, 14.5" H x 10" W x 10" D (36.8 x 25.4 x 25.4 cm); Digital Readout Unit, 5.38" H x 12.5" W x 4.75" D (13.65 x 31.75 x 12.06 cm). Net Weight: Rain Collection Unit, 5.0 pounds (2.27 kilograms); Digital Display Unit, 3.5 pounds (1.6 kilograms)



Outdoor Collector

Rain Sensor goes inside Collector

Save \$30 on Digital Wind Computer

\$164⁹⁵
Kit

- Displays both average and instantaneous wind velocity readings.
- Recalls day and time of peak wind gusts from computer memory



Pilots, sailors, even professional meteorologists – anyone who needs up-to-date information – will like the accuracy of the Heathkit Digital Wind Computer. 16-Point compass dial shows wind direction. Two LEDs tell wind speed. Switchable mph, kph or knots, 12/24-hour time displays. Stores peak gusts by speed, date and time. Clock/calendar for logging. Rugged wind vane and anemometer. Assembled IDW-1890 includes 99' cable.

SAVE \$30! Kit ID-1890, Shpg. wt. 10 lbs. **Was \$194.95, NOW ONLY 164.95**
SAVE \$55.05! IDW-1890,

Assembled Wind Computer, wt. 14 lbs. **Was \$250.00, NOW ONLY 194.95**
IDA-1290-3, 150' 8-Wire Cable, wt. 6 lbs. **23.95**
IDA-1290-2, 100' 8-Wire Cable, wt. 4 lbs. **16.95**
IDA-1290-1, 50' 8-Wire Cable, wt. 2 lbs. **9.95**

ID-1890 SPECIFICATIONS: Rear panel controls: Clock Start Stop, Hours Month Advance, Minutes Days Advance, 10 Minutes Advance, Time Date Hold, 12/24 Hour Time, Memory: Date, time maximum gust. Accuracy: $\pm 5\%$ or better. 120/240 VAC, 5.5" H x 12.5" W x 4.8" D.

Save \$60 on Computerized Barometer

\$174⁹⁵
Kit

- Remembers minimum/maximum readings for tracking
- Accurate to $\pm 3\%$
- Two sets of LEDs display pressure/date information



Enter the computer age of weather forecasting – put the Heathkit ID-1990 Computerized Barometer in your home.

It gives you current pressure, rate of change, direction of change, maximum and minimum pressures... even the date and time. All information is displayed on two sets of ½" H LED readouts, and available at the push of a button. Reads pressure in inches or millibars, or in kiloPascals with a slight wiring modification. All pressure information is sent by a sensing mechanism protected against ambient temperatures. Runs on 120/240 VAC. Memory save requires 6.2 to 14 volt external power source. Measures 5¼" H x 11½" W x 5" D.

SAVE \$60! Kit ID-1990, Shpg. wt. 10 lbs. **Was \$234.95, NOW ONLY 174.95**

SAVE \$80.05! IDW-1990, Assembled Barometer, 8 lbs. **Was \$275.00, NOW ONLY 194.95**

ID-1990 SPECIFICATIONS: Pressure Ranges: 28.00 to 32.00 inches of mercury; 981 to 1050 Millibars; or 98.1 to 105 kiloPascals. Memory: Date, time and magnitude of maximum and minimum pressure. Operating Temperature: 59-95 degrees F

Radio gives severe weather reports automatically

Never miss a severe weather forecast when you have the Storm Alarm Radio. It gives you up-to-the-minute weather forecasts when you want them. And sounds a severe weather alarm – day or night – when triggered by local National Weather Service transmissions. Excellent reception, both indoors and out. Uses 120 VAC, or with a standard 9 volt battery (not included) becomes portable. Measures 1¼" H x 5" W x 3" D. Comes to you fully assembled.



EWA-4100, Shpg. wt. 2 lbs. **44.95**



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

This Digital Weather Computer does more than any other single weather instrument

- Displays time/date, indoor/outdoor temperatures, wind speed & direction, pressure
- Microprocessor accuracy and memory – stores past and present weather data and trends
- Instantly recalls past weather statistics with the push of a button
- Professional-looking walnut cabinet

No weather station manufactured today can give you the number of functions, the computer accuracy and memory, or the convenience of the Heathkit ID-4001 Digital Weather Computer.

More weather information at your fingertips: Go ahead, compare the ID-4001 with any other desktop weather station. Does it give you the time in 12/24 hour format, plus the date for exact log entries? Does it tell you both the indoor and outdoor temperature, whether it's above zero or below, or in Fahrenheit or Celsius? Does it tell you the minimum and maximum temperatures – even the wind chill? Can you get instantaneous wind velocity with digital accuracy and 16 point compass resolution? And if you want to know the average wind speed and direction or peak gust, will it tell you? And how about that wind speed? Can it tell you in mph? In kph? Or in knots? What about the barometric pressure? Does it give it with four digit accuracy? In inches or millibars? Even tell you if it is rising and falling? Well, the ID-4001 does!

Styled with convenience: Not only do you get more weather data with the ID-4001, but you also get functional design. All the digits are red ½" LED segment displays on a black background for easy reading. In addition, the front panel buttons are clearly marked for mistake-free logging. And the indoor unit features a professional-looking, solid walnut wood cabinet, with brushed aluminum trim. Add the ability of the ID-4001 to interface with our H-8 computer, and you have a unique blend of versatility and convenience unmatched by any weather station available today.



Comes with full transmitter assembly: The ID-4001 includes a weather-proof anemometer and wind vane, sealed temperature sensors, and mast hardware. Order your ID-4001 today with the correct cable (see box right).

Kit ID-4001, Shpg. wt. 15 lbs. 399.95
Assembled and Tested ID-4001, Incl. 100' cable.
IDW-4001, Shpg. wt. 22 lbs. 569.95

ID/IDW-4001 SPECIFICATIONS: Digital Clock/4-Year Calendar: Time Accuracy: Determined by accuracy of AC line. No cumulative error. Wind Vector Accuracy: 5 percent or better. Direction Display Accuracy: ±1.26 percent (in degrees). Thermometer: Temperature Range: -40 deg. F to 158 deg. F (-40 deg. C to 70 deg. C). Accuracy: ±2 deg. F (±1 deg. C). Barometer: Pressure Range: 28.00 to 32.00 in. Hg. Inches of mercury (981.9 to 1050 millibars). Accuracy: ±0.075 in. Hg. inches of mercury. ±0.01 in. Hg. deg. C. Operating Temperatures: Outdoor Assemblies: -40 deg. F to 158 deg. F (-40 deg. C to 70 deg. C); Unit: 59 deg. F to 95 deg. F (15 deg. C to 35 deg. C). Power Req.: 120 240 VAC. External battery connection for memory backup. Dimensions: 7¼" H x 16" W x 6" D.



The ID-4001 also comes with this transmitter assembly (mast not included).

8-wire Cable for the Heathkit ID-4001, ID-1290 and ID-1590 Weather Instruments.

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

Digital weather instruments priced for your wallet

1 Low-cost Digital Wind Indicator

This ID-1590 Digital Wind Indicator may skimp on price, but certainly not on accuracy or reliability.

For instance, the outdoor transmitting unit is one of the best around. It's designed to give you precise wind speed and direction year after year. Both the anemometer and wind vane are constructed with materials that won't cake up with corrosion to obstruct the readings. The bearings for the anemometer and vane are made of durable, lubrication-free Teflon™ for no-maintenance operation and error-free readings in hot and cold weather. Even the reed switches are hermetically sealed to prevent weathering that could cause inaccurate readings.

You get the same attention to accuracy and quality in the indoor display unit as well. All the transmitted data appears on a sensitive, easy-to-read, seven-segment digital readout. The readout can be wired to display two out of three scales: mph, kph,

or knots. Readout digits mark speeds in these scales from 0-99. The 8-compass-point wind direction indicator has 16 point resolution capability 120 VAC. Requires 8-wire cable above.

Kit ID-1590, Shpg. wt. 7 lbs. 84.95

ID-1590 SPECIFICATIONS: Wind Speed: 0-99 in miles per hour, kilometers per hour or knots (choice of two). Response Threshold: 3 miles per hour. Accuracy: ±1 digit or ±10 percent, whichever is greater. Direction Response Threshold: Approximately 2 miles per hour. Operating Temperatures: Transmitter, -40°F to 120°F (-40°C to 49°C); Receiver, 0°F to 150°F (-18°C to 65°C).

2 Digital Indoor/Outdoor Thermometer

When you compare the advantages this Digital Indoor/Outdoor Thermometer has over a conventional mercury bulb or aneroid thermometer, you'll wonder how you did without one for so long.

One big advantage is that you don't have to squint to read the ID-1390. It features big, easy-to-read, ½" segmented displays that can be seen in broad daylight, as well as at night. Try doing that with one of those mercury bulb thermometers!

Another advantage is that the ID-1390 monitors two temperatures instead of one. It has two sensors for

monitoring the temperature outdoors and indoors. And, the ID-1390 will display these temperatures within an accuracy of 2 degrees or less. Furthermore, the ID-1390 can tell you the temperature in Fahrenheit or in Celsius. That's not only convenient for amateur meteorologists, but it also lets you get ready for the metric system – which is coming to the U.S.

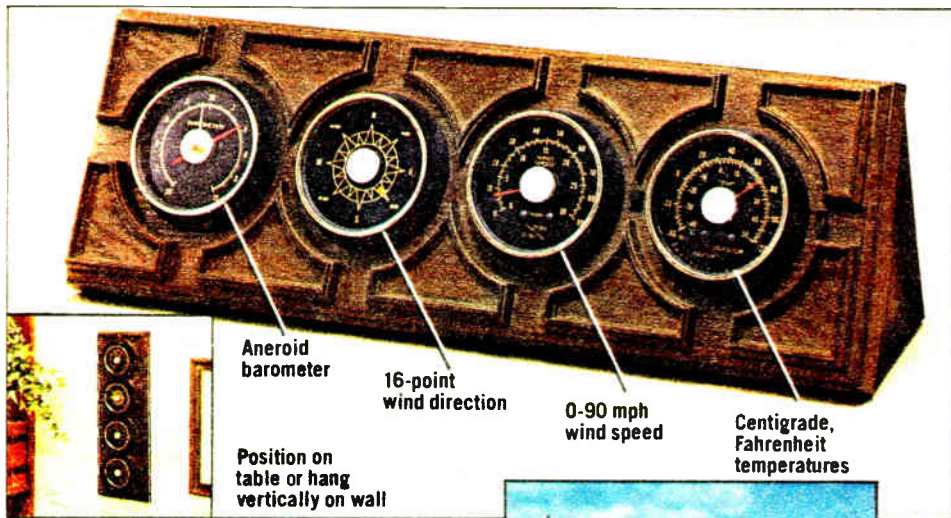
And finally, this Thermometer offers styling and eye appeal lacking in conventional thermometers. The red display on the black Cycolac™ cabinet and teakwood trim just add a touch of class to any room. And the Thermometer goes with any decor, too. It measures 2.5" H x 7" W x 5" D. Kit includes 10' indoor cable and 75' outdoor cable. Runs on 120 VAC, 50/60 Hz.

Step-by-step instructions make the Digital Indoor/Outdoor Thermometer an easy-to-build as well as practical kit for your family.

Kit ID-1390B, Shpg. wt. 4 lbs. 74.95

ID-1390B SPECIFICATIONS: Temperature Accuracy: -30°F to 20°F, ±2°F; 20° to 120°F, ±1°F; -30°C to 15°C, ±2°C; 15°C to 50°C, ±1°C. Display: 2½-digit planar gas discharge with plus and minus signs. Power Requirement: 120 VAC, 50/60 Hz.





Aneroid
barometer

16-point
wind direction

0-90 mph
wind speed

Centigrade,
Fahrenheit
temperatures

Position on
table or hang
vertically on wall



Transmitter Unit clamps to any 1-1.5" mast

Low-cost weather station gives accurate weather information

For the price, you won't find the features or the accuracy of the ID-1290. It contains professional grade instruments, plus a remote transmitter assembly - all for less than \$140.

The indoor instrument unit features a barometer, thermometer, and wind speed and direction indicators. The barometer is sensitive, showing changes in pressure as small as 0.05 inches of mercury. The thermometer is also precise. It records temperatures in Celsius and Fahrenheit with $\pm 2^\circ\text{C}$ ($\pm 2^\circ\text{F}$) accuracy. The wind speed indicator displays wind speed in two switchable scales: 0-90 mph, and 0-30 mph. And the wind indicator shows wind direction with 16 point resolution.

Besides the indoor unit, the ID-1290 also comes with a complete outdoor transmitter assembly. It features an anemometer and wind vane made from non-corroding materials that provide accurate readings year after year. (Select the right cable for your station below.) Order your ID-1290 today!

- Heathkit Five-Function Weather Station.**
 Kit ID-1290, Shpg. wt. 8 lbs. 139.95
Transmission Cable for ID-1290 Weather Station.
 IOA-1290-2, 100', Shpg. wt. 4 lbs. 16.95
 IOA-1290-3, 150', Shpg. wt. 6 lbs. 23.95

ID-1290 SPECIFICATIONS: Wind Speed: 0-30 mph, ± 2 mph; 0-90 mph, ± 5 mph Wind Direction: 16-point readout over 360° Temperature: Typ. outdoor: 0°F to 120°F , $\pm 2^\circ\text{F}$ (-18°C to $+50^\circ\text{C}$, $\pm 2^\circ\text{C}$) Typ. outdoor: -40°F to $+120^\circ\text{F}$, $\pm 2^\circ\text{F}$ (-40°C to $+50^\circ\text{C}$, $\pm 2^\circ\text{C}$) Barometric Pressure: 28 to 31 inches of mercury ± 0.1 inch, accurate to 10,000 feet Power Requirement: 120 VAC, 50/60 Hz, 3.5 watts. Dimensions: Wall Mount: 7" H x 20 $\frac{1}{2}$ " W x 2" D; Desk: 7" H x 20 $\frac{1}{2}$ " W x 6 $\frac{1}{4}$ " D



1
Heathkit Wind and
Speed Indicator

2
Heathkit Digital Indoor/
Outdoor Thermometer

This handsomely-crafted pair of meteorological instruments make a perfect complement to each other in function and design. Display them proudly together in any decor!



Has red display for
night flying

Accepts
preflight data
for up to 9 legs

Makes navigating
much easier

Available with
handy
carrying
case

Cut 28%! Pilot's computer saves fuel, time

The Heathkit Air Navigation Computer has the power and versatility of an expensive on-board navigation computer! It accepts preflight data and vectors for up to nine separate flight legs. One-keystroke action instantly computes your magnetic heading, ground speed, true air speed, time to next checkpoint/destination, and estimated time of arrival (ETA). It even computes in-flight wind speed and updates your ETAs in-flight. Includes rechargeable batteries. 1.75 H x 3.13" W x 6.38" D.

Kit OC-1401, 3 lbs. . . Was \$139.95, NOW 99.95
Save 25% on Assembled Heathkit Portable Air Navigation Computer.
 OCW-1401, 4 lbs. . . Was \$199.95, NOW 149.95

Save 25% on Custom Carrying Case for your Air Navigation Computer (see inset). Provides additional power supply for OC-1401. Recharges in 15 hours. Handy pocket for instruction guide. 120 VAC. 3.13" H x 12.25" W x 8" D.

Kit OCA-1401-1, 5 lbs. Was \$39.95, NOW 29.95

Save 9% on Assembled Custom Carrying Case.
 OCW-1401-1, 5 lbs. . . Was \$54.95, NOW 49.95

Save 20% on Leatherette Carrying Case for OC-1401.

OCA-1401-2, 1 lb. . . . Was \$4.95, NOW \$3.95

Aircraft Clock/Timer marked down 20%!

- Tells time in GMT/Zulu or local time
- Low fuel/check-point alarm
- Quartz crystal controlled for accuracy
- Fits in standard 3 $\frac{1}{2}$ " dash mount



Features two 4-digit time displays with red LED segments for easy night-viewing. Top display shows Zulu time, while bottom shows local time and acts as a 24 hr/minute timer. 14 or 28 VDC. Draws .5 A max. Meets FAA Reg. No. DO-160. Must return for DMIR inspection.

Kit OI-1154, 3 lbs. . . . Was \$99.95, NOW 79.95



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

Here's a timely project for office or den — the attractive, accurate Heathkit Digital Wall Clock

ONLY
\$49⁹⁵

- Quartz accuracy to within ± 1 minute per year
- Runs for up to two years on a single 1.5 VDC AA alkaline cell
- Big (one-inch-high) LCD digits for easy reading — even across the room
- Wire this clock to display the exact time in 12-hour or 24-hour formats

It's fun to build the attractive, accurate Heathkit GC-1720 Digital Wall Clock. This popular wall clock, which features easy kitbuilding, uses a single integrated circuit and a quartz crystal — just like a digital quartz watch — to give you on-the-dot accuracy. In fact, our GC-1720 Digital Wall Clock is so accurate — it tells time to within one minute a year. And once you set it, the GC-1720 will give you the correct time for up to two years on a single 1.5 VDC, AA size alkaline cell (not included).

Battery operation lets you put this clock in your sailboat, cabin, mobile home or any other place where wall outlets or power sources are limited. You can put it on any wall, at any height, regardless of outlet location. And it's immune to power failures caused by storms or generator failures.

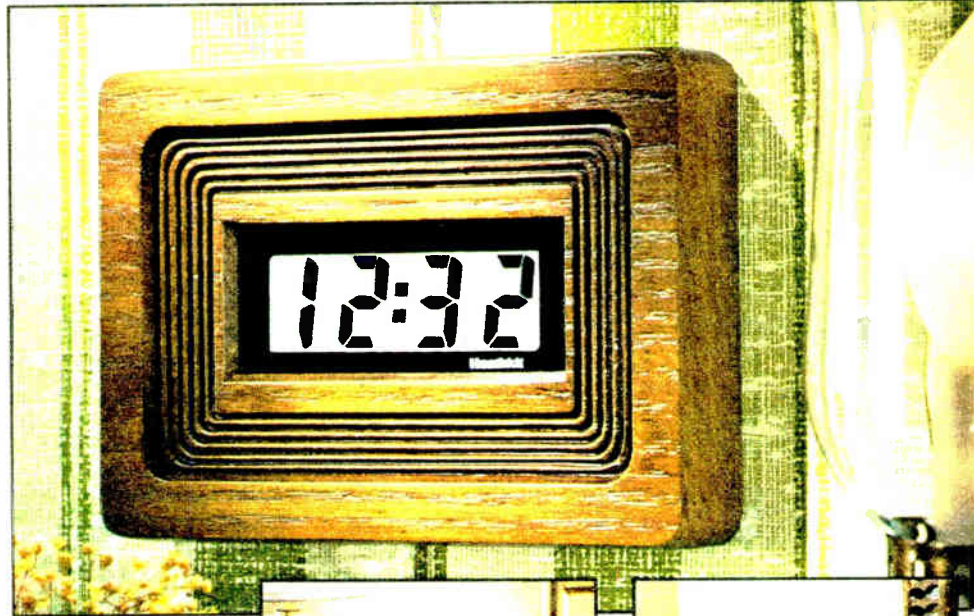
Big one-inch-high digits make the Digital Wall Clock easy to see from 30 feet away. It's the ideal timepiece for kitchen, recreation room, or any other large room where you need to know the exact time.

And you can wire your Digital Wall Clock for either 12- or 24-hour time formats. That's a valuable feature for amateur radio operators, sailors, pilots or anyone who wants a 24-hour format for logging sign-on times, navigation, or filing flight plans.

An attractive, lightweight polyurethane case gives the Digital Wall Clock the look and feel of real wood. The simulated oak grain matches the decor of almost any room. And since the case measures just 5.25" H x 7.13" W x 1.50" D, it fits in places where some wall clocks can't — between kitchen cupboards or in a sailboat's tight quarters.

The Digital Wall Clock is an easy, enjoyable one-evening kit, with all parts mounted on a single circuit board. Since this is an ideal starter kit, be sure to see our line of selected kitbuilding tools on page 51.

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



Perfect in den, living room



Or use in kitchen

GC-1720 SPECIFICATIONS: Display: Four-digit Liquid Crystal Display (LCD) with colon. Display Height: 1" Time Format Options: 12-hour format or 24-hour format. Accuracy: ± 1 minute per year at normal room temperatures, after adjustment according to instructions. Power Requirement: One 1.5 VDC, AA-size cell (not included). Battery Life: Approximately 1 year with carbon-zinc cell; approximately 2 years with alkaline cell. Dimensions: 5.25" H x 7.13" W x 1.50" D (13.33 x 18.11 x 3.81 cm). Net Weight: 10.9 oz. (300 g).



The "Space-Age Grandfather Clock" adds a touch of elegance

- Digital readout adjusts to room light for a pleasant, easy-to-read display
- Smoked glass shelves provide ideal display for flowers, knick-knacks

Add elegance to any room in your home with the Heathkit Super-Clock. This space-age product is housed in a handsome simulated walnut veneer cabinet with anodized aluminum corner pieces.

Four 1/4"-thick smoked glass shelves are great places to put books, plants or knick-knacks. The bright



B/CLOCKS

3.25"-high digits can be easily read — even in daylight. Brightness is automatically adjusted to ambient lighting for a charming, subtle effect you and your friends will admire.

An excellent first-time project, the Super-Clock displays hours and minutes — with the center colon pulsing once each second. Indicator alerts you to power outages. Add Westminster Electronic Chimes (below) for Old World charm. 120/240 VAC, 50/60 Hz. 60.5" H x 14" W x 9.5" D.

Kit GC-1195, Shpg. wt. 58 lbs. **219.95**

Shelf Version of "Super-Clock"

In walnut veneer cabinet. Add chimes below. 120/240 VAC. 6.5" H x 12.5" W x 6.25" D.

Kit GC-1197, Shpg. wt. 8 lbs. **119.95**

Add these Westminster Chimes

Sounds 4 notes on 1/4-hour, 8 notes on 1/2-hour, 16-note passage and hour on hour. Volume, pitch and sound delay controls: built-in tick-tock and speaker. Builds into GC-1195 or GC-1197.

Kit GCA-1195-1, Shpg. wt. 3 lbs. **84.95**



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

Start your kitbuilding hobby — and each day — right, with the Heathkit Digital Alarm Clock



**FAST, EASY
1-EVENING KIT**

\$29⁹⁵



- Low-cost, practical starter kit
- Features a 9-minute Alarm Delay for catnaps
- Displays time in 12- or 24-hour formats
- Visual power failure alert circuit
- Can be wired for either 120 or 240 VAC
- Has handsome simulated wood-grain cabinet

Here's an excellent gift idea which will provide you — or a friend — with a practical introduction into the wonderful world of kitbuilding fun. The Heathkit GC-1107 Digital Alarm Clock offers you extra convenience features — along with space-age digital accuracy.

A four-digit blue-green fluorescent readout, mounted at an easy-to-read angle, clearly displays the correct time. If a power failure interferes with the GC-1107's accuracy, a flashing display will alert you to the electrical power interruption so you can reset it.

The Heathkit Alarm Clock's digital accuracy is provided by a Metal Oxide Semiconductor (MOS) large-scale integrated (LSI) circuit, which performs all the logic functions of keeping time. Time can be displayed in either 12-hour or 24-hour formats, with a simple wiring change.

Ham radio operators will want to buy two Heathkit Digital Alarm Clocks — one to display local, 12-hour time while another shows UTC, 24-hour time — then

stack one clock on top of the other clock in the station.

Alarm knows the difference between AM and PM. So you can reset the GC-1107's alarm for the next day — immediately after you get up.

The Heathkit Digital Alarm Clock starts your day out right with a pleasant electronic tone. And if you're not quite ready to take on the world, push the Alarm Delay button for 9 more minutes of sleep. You can take up to an hour of catnaps with the GC-1107's convenient Alarm Delay.

Start a kitbuilding hobby today — and have the time of your life! The Digital Alarm Clock Kit includes a handsome simulated wood-grain cabinet, build-in speaker, complete assembly/operation manual and more than enough solder to finish the project. Operates on 120/240 VAC, 50/60 Hz power.

Overall Dimensions of the Heathkit Digital Alarm Clock are 2.25" H x 7" W x 4.75" D (5.72 x 17.78 x 12.07 cm). Net Weight, 1.75 lbs. (0.79 kg).

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

Search for fun, fortune with our Metal Locators

As low as
\$129⁹⁵

- Heathkit Metal Locators discriminate between junk and valuables, before you dig!
- Search ground submerged in up to 2' of water
- Telescoping shaft adjusts to your height — for hours of use, without fatigue
- Use built-in speaker or optional headphones

Discover the excitement of treasure hunting and finding lost objects — by building one of these Heathkit Metal Locators. They feature 6-inch diameter search heads and pushbutton tuning for maximum sensitivity over different kinds of conditions. Fulcrum balancing and lightweight design add up to maximum ease of use. Either unit offers a discriminate mode which discerns valuable objects from junk. Both operate on six 1.5 VDC AA-size batteries (not included). Or use the optional GDA-1190-1 Nickel-Cadmium Battery Pack (below) — which you can recharge at home, or from your car's cigarette lighter socket. Heathkit Metal Locators measure 45.50" extended, 22.50" collapsed.

Our GD-1290 Groundtrack™ features a balance circuit that detects objects, even in highly mineralized soils. The Groundtrack's fully shielded search coil sifts out the false signals so prudently, it can detect a dime buried 6" deep in the ground. You hear nothing until the valuable object enters the Locator's field. Then a tone grows louder as you approach the buried item.

Our GD-1190 Cointrack™ uses an off resonance type detector to find coins buried in sand or other low-metallized soils. Same sensitivity as GD-1290.

Top-of-the-Line Heathkit Groundtrack Metal Detector.

Kit GD-1290, Shpg. wt. 5 lbs. 199.95

High-performance Heathkit Cointrack Metal Detector.

Kit GD-1190, Shpg. wt. 5 lbs. 129.95

Rechargeable Battery Pack for the Heathkit GD-1190 or GD-1290 Metal Detectors.

GOA-1190-1, Shpg. wt. 2 lbs. 21.95

GDA-1190-2, Headphones for GD-1190 or GD-1290, 2 lbs. 12.95

GOA-1190-3, Carrying Case for GD-1190 or GD-1290, 1 lb. 12.95

GDA-48-1, 9 VDC Battery for GD-348 Metal Detector, 1 lb. 5.95



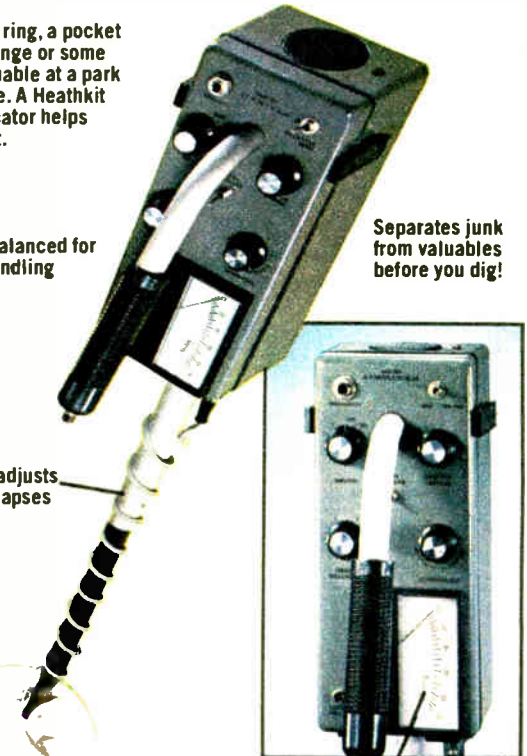
You lost a ring, a pocket full of change or some other valuable at a park or at home. A Heathkit Metal Locator helps you find it.

Weight-balanced for easier handling

Separates junk from valuables before you dig!

Telescoping shaft adjusts to your height, collapses for easy storage

Waterproof search head also folds



Meter mounts for right- or left-handers



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

CLOCKS-METAL LOCATORS 9



Allergies? Clear any room of 99% of airborne pollen, 94% of airborne particles

\$229⁹⁵

- Defend yourself against smokers in home or office
- Eliminates 99% of all airborne pollen and 94% of all airborne particles in any room
- Removable charcoal filter, easy-to-clean electro-static filter assure fresh, pollen-free air
- Runs for pennies a day, helps cut cleaning costs

If the misery of pollen and dust allergies affects you or any member of your family, the Heathkit GD-1297 Electronic Air Cleaner will bring a real breath of fresh air into your life. It's the ideal way to keep any room's air fresh and clean all year long – especially in today's tighter, better-insulated homes.

Use this Air Cleaner in any room up to 25' x 30'. When you add the optional Deluxe Casters (below), you can wheel it into the family room to clear away smoke...or into the kitchen to clean the air after a cooking disaster.

A three-speed squirrel cage fan means the GD-1297 can quick-clean a room by moving 250 cubic feet of air per minute. Or it can maintain a constant supply of fresh air at as little as 100 cfm. A removable charcoal filter (below) permits periodic replacement, so the Air Cleaner maintains top efficiency. And the electrostatic filter cleans easily in your dishwasher or bathtub.

Simplified assembly makes the Heathkit Electronic Air Cleaner a one-evening kit. No soldering required – power supply, variable-speed fan control and filter are pre-built. Southern Pecan vinyl finish. 120 VAC. Dimensions, 26.50" H x 17.25" W x 13.50" D. (67.31 x 43.82 x 34.29 cm).

Kit GD-1297, Shpg. wt. 59 lbs.	229.95
GDA-1297-1, 4 Deluxe Casters, Shpg. wt. 2 lbs.	13.95
GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297, 2 lbs.	6.95

The Heathkit Pledge

Our instruction manuals are written with you, the kitbuilder, in mind. They begin with a soldering guide for the first-time builder, and step-by-step instructions to guide you through every detail of construction. In case of difficulty, there's a troubleshooting guide. You can even call or write Heath's Technical Consultants for prompt answers to any special questions. We provide more support for you – because our ever-growing, world-wide popularity is based on this simple pledge: "We won't let you fail."

Easy One-Evening Kits



All of the kits on this page are practical, fun introductions to the world of kitbuilding. They feature easy-to-follow assembly manuals and all necessary parts. Average building time is just one evening.

1 Give kitbuilding satisfaction with Portable Radio

- We've made this popular Heathkit product easier to build!
- Now includes earphone for private listening
- Improved circuitry for increased battery life

High-gain ferrite rod antenna for excellent reception of AM band. Two-inch speaker with ½ ounce magnet and an 8-ohm voice coil for good, clean sound. Requires only soldering iron, screwdriver, pliers and diagonal side cutters to build. Uses 9 VDC battery (not included), or PS-2350 120 VAC Battery Eliminator (not included – see p. 21). Plastic case measures 3.25" H x 6.31" W x 1.25" D (8.26 x 16.03 x 3.18 cm).

Kit GR-1009, Shpg. wt. 2 lbs. **16.95**

2 Take this wide-beam Rechargeable Light anywhere

For camping, after-dark work, home-car emergencies. Charge from 120 VAC outlet. 10.63" H x 3.13" W x 5" D. Kit GD-1246A, 6 lbs. **37.95**

3 Freezer Alarm warns you when freezer loses its cool

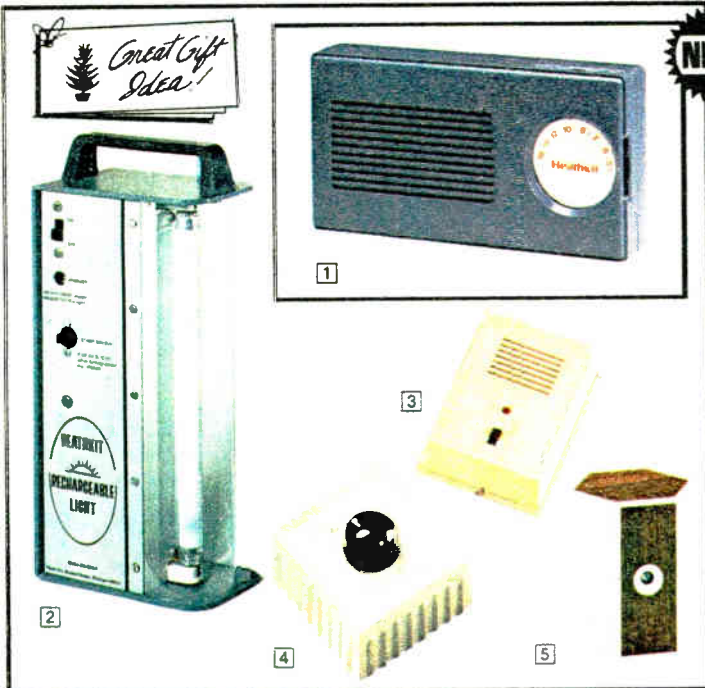
Warns if door is ajar, or if inside temperature rises above +20 F. 20" cable. Uses two "C" cells (not included). Kit GD-1183, 2 lbs. **16.95**

4 Save electricity, light bulbs with Tabletop Dimmer

Controls brightness, helps extend bulb life of lamps for reading, watching TV or personal moments. 3.25" H x 3.25" W x 3.25" D. Kit GD-1018, 2 lbs. **9.95**

5 Photo Switch gives your home that lived-in look

Reduce chances of night burglaries. Turns lamps (up to 150 Watts) on at dark, off at dawn. 3.25" H x 2.68" W x 2.68" D. Kit GD-600, 2 lbs. **9.95**



Programmable Doorbell greets your visitors

\$49⁹⁵

- Program it to play up to 16 beats of your favorite tune
- Easy programming procedure lets you change tunes to fit your mood or any season of the year

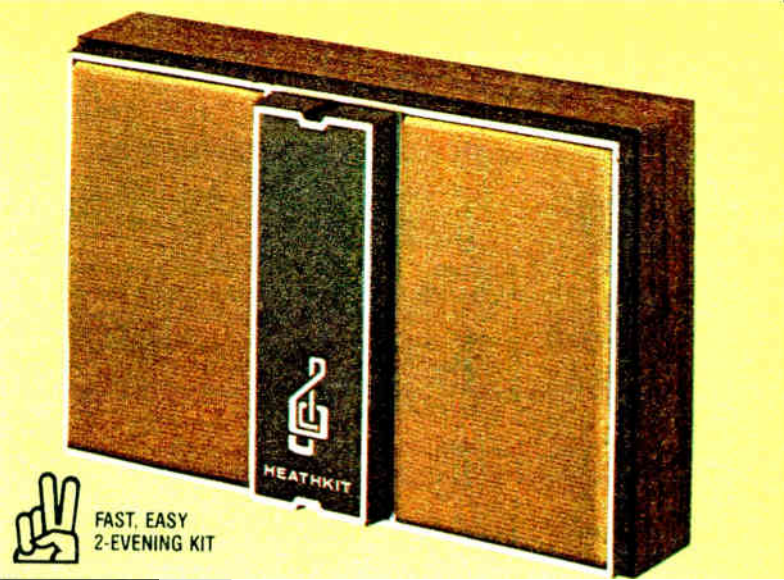
Put some variety in your doorbell and greet friends with a tune – build the Programmable Doorbell for your home. What a unique and warm way to say “welcome.” What a great way to break the ice for conversation – be it a new neighbor, a guest, or an old friend of the family.

Greet them with our preselected songs, or with one of your own. Our songbook (included) lets you program over 50 tunes, including 15 college songs to reflect your loyalty, 7 seasonal songs plus 9 Christmas songs, 5 songs to commemorate special occasions, and many more to celebrate your mood. Even create your own using the piano-style programming section.

Programming songs is easy. A front panel wire keyboard lets you arrange the wires to play up to 16 notes. Special speed and delay controls allow you to set the tune’s tempo. Other controls adjust volume and tone to your taste.

The TD-1089 takes just two evenings to assemble with our step-by-step instructions. Its rugged housing measures 5¾” H x 8¾” W x 2¾” D. Attaches easily to your existing doorbell transformer. For more fun, see our new Programmable Auto Horn featured on page 47.

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



**FAST, EASY
2-EVENING KIT**

You can build an accurate, precise Digital Scale

\$99⁹⁵

- Electronic mechanism delivers weights accurate to 2/10 pound
- Battery-operated-weight with space-age digital accuracy anywhere, displayed by 4½” tall LEDs

Weigh items, large or small, with accuracy when you have the Heathkit Digital Scale. Because it’s battery powered, you can use it safely after a shower. The platform is water-resistant, too, to stand up to constant use in the bathroom and maintain the attractive look of its beige and walnut display cabinet. An electronic strain-gauge mechanism eliminates the mechanical springs and weights that can go out of adjustment in conventional scales.

Four bright, easy-to-read ½” LEDs display your weight. You can mount the display cabinet either on the matching platform assembly, or at some other suitable location such as at eye level on a bathroom wall.

The Heathkit Digital Scale features both manual and automatic operation. In manual operation, the display is on constantly, and the scale will measure weight as small as 1/10 pound. In automatic operation, the display conserves battery power by remaining off until weight is placed on the platform.

Electronic tare adjustment means you can weigh the baby, without weighing the blanket. And manual adjustment lets you weigh small items accurately. Water-resistant platform. Requires 6 “C” cells (not supplied).

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

Factory Assembled and Adjusted Digital Scale. Non-detachable readout. Reads in pounds only, increments of 2/10 pound.

GDW-1186, Shpg. wt. 9 lbs. **139.95**

GD-1186 SPECIFICATIONS: Display: Readout in pounds or kilograms (jumper config.) 5” character LED Low battery indicator LED Display Update Rate: Approximately 1 sec Full Scale: 300 pounds Resolution: 1 part in 3000 Accuracy: ±1% or ±1 count, whichever is greater Repeatability: ±5% of reading or ±1 count Operating Temperature Range: 32° to 122° F Power Requirement: Six “C” type dry cell or alkaline batteries Current Drain: 250 mA (approx.) Platform dimensions: 1¾” H x 11½” W x 11½” L Cabinet dimensions: 1½” H x 3½” W x 6” L



Sturdy aluminum base holds scale rock-steady

Four bright ½ LEDs display your weight accurately

Water-resistant platform stands up to hard use



Weigh small packages accurately to 2/10 lb.



Weigh the baby without weighing the blanket

This space-age Digital Thermometer fills all your home needs

\$49⁹⁵

- Ideal for medical, photography and other home applications
- Gives reading in 10 seconds

Got a cold? Developing pictures? Fixing baby's bath?

This space-age Digital Thermometer will perform well in the darkroom, kitchen, nursery or any other part of the house where you need accurate temperatures in a hurry. It reads temperatures from 32° to 230° F (0° to 110°C) and features ± 0.2°F (± 0.1°C) accuracy in the biomedical range, and 0.5% accuracy overall with 0.1° F or C resolution.

It never needs calibration either. No more squinting, waiting and guessing – solid-state circuitry assures accurate, easy-to-read 4-digit temperature displays in as little as 10 seconds. It’s convenient, too. This digital marvel weighs just 5.5 ounces, and fits comfortably in your hand for maximum versatility. An attractive, shock-resistant high-impact plastic case protects it from damage. The Digital Thermometer operates on one 9 VDC battery (not included) for up to one year under normal use. Even features a flashing decimal low battery warning. Measures a compact 2” H x 2.5” W x 5” L.

GD-1226, Assembled and tested, 2 lbs. **49.95**



NEW

The SA-5010 μ Matic™ Memory Keyer — best buy in ham radio — has features so unique we've applied for a patent!



**FAST, EASY
2-EVENING KIT**

\$97⁹⁵

- Includes removable capacitive touch iambic paddles
- Up to 10 buffers are available for the storage of text or "command strings"
- Features a speed range of 1 to 99 words per minute
- Four-level random practice mode allows 6,400 different, repeatable practice sessions
- Rear panel jack allows use of a mechanical paddle with the SA-510 μ Matic Memory Keyer
- Easy to build and easy to use, the Heathkit SA-5010 is your best value in a memory keyer

The Hams at Heath have done it again! They proudly introduce the exciting new SA-5010 μ Matic (Micro-matic) Memory Keyer — designed to bring more fun and enjoyment to your CW activities. You'll like the compact, modern styling of the SA-5010, made possible by the use of a custom microprocessor. The μ Matic provides up to 10 buffers for storing up to 240 characters of text or commands. Because the buffers are of variable length, they eliminate wasted memory space. Available memory is also effectively increased by use of "command strings" that let you store text in several buffers and then string them together in whatever sequence you desire. Command strings can also select the speed, weight, spacing and auto-repeat count for each of the messages so selected. This unique feature makes the μ Matic so versatile that we've applied for a patent on it. An editing feature allows easy recovery from any errors you make when loading a message buffer.

Use the SA-5010's thin, 20-position keypad to select character formation speed,

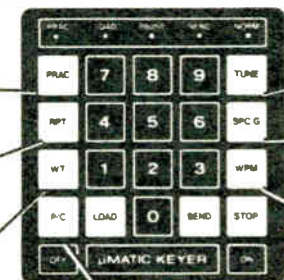


The μ Matic Keyer's easy-to-learn keyboard

PRAC key for 6,400 practice sequences

RPT key repeats message from one to 10 times

WT key lets you change dot/dash/space ratio



"P/C" programs pause, continue after inserting special text

"Tune" accesses auto tune mode

"SPC'G" changes your character and word spacing

"WPM" sets both your load and send speeds

character spacing, character weighting, message repeat count, buffer number and mode with ease. The sidetone "clicks" to verify keypad entries, and "warbles" to warn you of illegal entries or error conditions.

The SA-5010 features easy-to-use integral capacitive "touch" paddles. The paddles unplug and store in their own compartment inside the Keyer when not in use. The removable compartment cover is silk screened with the Morse Code for easy reference. A rear panel jack is provided should you prefer to use a mechanical paddle with your SA-5010.

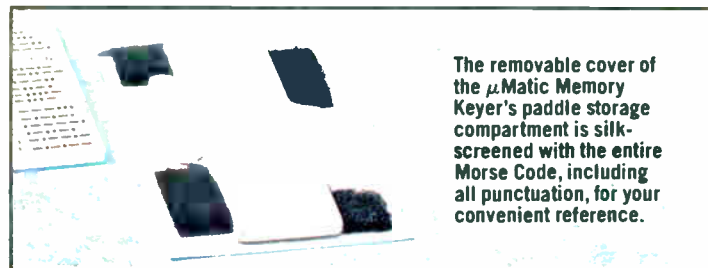
A "practice" mode allows you to send random code groups of random length and selectable types (alpha, alphanumeric, and alphanumeric plus common or all punctuation). The 100 different random sequences are repeatable, so you can check your copy for accuracy. But all 100 sequences are altered every time you turn on the Keyer, giving you a total of 6,400 different practice sessions. Each sequence sends approximately 3,000 characters before repeating. Answers for 10 of the sequences are included in the manual. And, of course, you can choose any speed between 1 and 99 words per minute, and any of 11 weight settings for your practice session.

Text may be manually inserted into a buffer message being sent. You can also store a pause into text or command strings to cause the Keyer to pause automatically for manual insertion of, for example, a station's RST report. The SA-5010 lets you enter text at whatever speed and weight are comfortable for you, then send it with any other settings you desire.

CMOS memory with battery backup retains the buffer contents, as well as the last-selected speed, spacing, weight, and repeat count whenever the Keyer is turned off or unplugged. Built-in diagnostics check the microprocessor each time the Keyer is turned on, and also test buffer memory whenever your μ Matic Memory Keyer is reset.

The SA-5010 features built-in side tone oscillator and speaker with variable pitch and volume controls. Phone jack and ear phone are included for private listening. Five bright LEDs indicate the current mode of the Keyer. Left-handed? A special two-key function reverses the paddles. And the Keyer even remembers to turn itself off if you forget. The attractive plastic case covers a die-cast zinc base weighted to reduce movement during keying. Requires 120 VAC Power Supply below. Get your μ Matic Memory Keyer now — get in on all the CW fun you've been missing.

SA-5010, Shpg. wt. 3 lbs. 97.95
PS-5012, 120 VAC Power Supply, Shpg. wt. 1 lb. 11.95



The removable cover of the μ Matic Memory Keyer's paddle storage compartment is silk-screened with the entire Morse Code, including all punctuation, for your convenient reference.

SA-5010 SPECIFICATIONS: Speed Range: 1 to 99 WPM. Character/Word Spacing: Less than or equal to speed setting. Number of Buffers: 1 to 10. May be used to store text or commands. Buffer Size: 240 characters plus commands, total. Weighting: Normal plus 5 light and 5 heavy settings. Auto Message Repeat: 0 to 9 (sent 1 to 10 times). Keyer Output: Solid state — 250 volts @ 100 mA; — 200 volts @ 40 mA (separate, protected, output jacks). Memory Backup: 3 watch batteries (supplied) — 1 year typical life. (There's no battery drain unless the Keyer is removed from the AC power source). Paddles: Built-in (removable) capacitive "touch" type, with provision for external mechanical paddles. Sidetone: Approximately 300 to 1500 Hz, adjustable. Power Requirement: External pluggable transformer (optional) or 11 to 16 volts DC @ 200 mA. Dimensions (Excluding paddles): 1 7/8" H x 4 1/4" W x 6" D (4.13 x 10.48 x 15.24 cm).



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

The VF-7401 2-Meter FM Digital Scanning Transceiver brings fun back to 2-meter activity

\$339⁹⁵

with
PTT mike

- Continuously adjustable, 10-15-watt output, 143.5 to 148.5 MHz
- Front panel selectable band scan capability — 1 MHz at a time
- Preprogrammed power-up on your favorite 2-meter frequency
- Features detachable microphone

The VF-7401 2-Meter FM Digital Scanning Transceiver finds all the activity for you, scanning the band in 1 MHz segments. Every time you turn your VF-7401 on, before it begins to scan, it powers up on your favorite simplex or repeater frequency first. In Scan/Lock mode it stays on any active channel until reset, or in Scan/Latch, scans again when transmission ends. Adjust the receiver to stop scanning for "full-quieting" signals only, or open the squelch for 2-meter "DX." Besides simplex, choose ±600 kHz, ±600 kHz and 1 MHz offsets. It can accommodate most 2-meter offset combinations, even MARS and CAP.

The VF-7401 is a continuously adjustable, 15-watt (10-15 nominal), solid-state, narrow-band FM transceiver. Its hot receiver has a double-tuned front end with MOSFET RF amplification, dual-conversion, 8-pole crystal IF filtering for perfect bandpass shaping and outstanding adjacent channel selectivity, IC limiting, Quad detection and excellent audio quality. Detachable microphone. Optional Micoder TM II Microphone/Auto Patch Encoder (page 20), draws power directly from the VF-7401. Includes gimbal-mount bracket for mobile installation. Requires a 13.8 V, 3 amp continuous, 4 amp intermittent, power source such as a charging auto electrical system, or VFA-7401 AC Power Supply, right.

kit VFS-7401-1, Transceiver and Micoder II. Shpg. wt. 12 lbs. **359.95**

Squelch control also functions as scanning sensitivity control to skip weak signals, scan only to "full-quieting" ones.

LED indicates 5 kHz position.

The 0 kHz/5 kHz button gives you 800 channels in 5 kHz steps.

Dim/Bright button — bright for daytime meter and frequency readout, subdued for safe nighttime moiling.

Manual/Scan button lets you find a frequency, or lets the 7401 find one for you.

Lock/Latch button. In Scan/Lock, receiver scans to a signal and remains until reset. In Scan/Latch, resumes scanning 4-8 seconds after received transmission ends.

10 kHz button advances readout in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes 100 kHz readout to advance one digit.

Sturdy 4-pin DIN connector allows you to detach the microphone from the 7401.

1 MHz button allows you to select any 1 MHz segment of the 2-meter band.

100 kHz button controls tuning in 100 kHz increments, to let you change frequencies when 7401 is in manual mode.

Kit VFS-7401-2, Transceiver and PTT Microphone, Shpg. wt. 12 lbs. **339.95**

VF-7401 SPECIFICATIONS: Receiver: Sensitivity: 0.5 μ V for 12 dB SINAD (or 15 dB of quieting). Squelch Threshold: 0.3 μ V or less. Audio Output: 1.5 watts at less than 10% THD. 2 watts max. output (typical). Image Rejection: -50 dB or greater. IF Rejection: -80 dB or greater. Internally Generated Spurious Signals: Below 1 μ V equivalent. Bandwidth: 6 dB at 15 kHz min. and 60 dB at 15 kHz min. and 60 dB at 30 kHz max. Modulation Acceptance: 6.0 kHz min. Transmitter: Power Output: 10-15 watts nominal to a 50 Ω (resistive) load at 25 C and 13.8 VDC. Harmonic and Spurious Output: -60 dB. Modulation: FM, 0-7 kHz, adjustable. Duty Cycle: 100% with VSWR of less than 10:1. Tone Encoder: 3 tones 70 to 200 Hz approx. 700 Hz deviation. Transmitter Offset: -600 kHz, ±600 kHz, ±1 MHz, Aux. General: Frequency Coverage: Any 4 MHz segment from 143.5 to 148.5 MHz. Frequency Increments: 5 kHz. Frequency Stability: ±.0015%. Operating Temperature Range: +15 F to -125 F (-10 C to -50 C). Operating Voltage Range: 12.6 to 16 VDC (13.8 VDC, nominal). Current Consumption: Receive Mode: 550 mA max., squelched: 750 mA max., full rated audio. Transmit Mode: 4A max. at 13.8 VDC. Dimensions: 2 3/4" H x 7 1/2" W x 10 1/4" D (7.0 x 18.4 x 26.0 cm)

AC Power Supply gives you double duty from your VF-7401

\$43⁹⁵



Designed to provide the 13.8 VDC required by the VF-7401, the VFA-7401-1 AC Power Supply may also be used with most other equipment requiring ±13.8 VDC at a maximum of 3A continuous, 4A intermittent. Easy-to-build kit can be wired for either 120 or 240 VAC, 50/60 Hz. Output regulation within 1.5%. 3 1/16" H x 7 1/4" W x 9 7/8" D.

Kit VFA-7401-1, Shpg. wt. 7 lbs. **43.95**

Easy to access top controls and BNC connector



Carrying case and external mike are handy accessories

Your VF-2031's always ready with a Drop-in Charger & rechargeable batteries

Optional Auto Patch Encoder lets you make phone calls through repeaters equipped with auto-patch inputs

Hand-Held lets you take 2-meter fun with you

\$199⁹⁵

- Includes everything you need — even 146.94 MHz crystal
- Rechargeable nickel-cadmium Battery Pack & AC Charger
- "Rubber duckie" antenna, phone jack and earphone
- Single crystal duplex or simplex capability

The Heathkit VF-2031 gives you a minimum of 2 watts out for great 2-meter fun. Single crystal transmit and receive circuitry covers 8 of your favorite channels — simplex, or duplex with a ±600 kHz split. Features separate built-in microphone and speaker, adjustable deviation, volume and squelch. Less than 0.5 μ V quiets the VF-2031's hot receiver section a full 20 dB. Covers 143.5 to 148.5 MHz. Includes "rubber duckie" antenna, universal BNC connector, 146.94 crystal, built-in phone jack with earphone, rechargeable nickel-cadmium battery pack and Drop-in Charger. Dimensions of the VF-2031 Transceiver are 9 1/2" H x 3 5/16" W x 1 7/8" D.

Kit VF-2031, Shpg. wt. 5 lbs. **199.95**

Fitted Holster-style Carrying Case, VFA-2031-2, Wt. 1 lb. **18.95**

Crystal Certificates. Specify frequency, send to mfr. Crystal returned postpaid. Order one for each crystal needed. VFA-2031-4, Postpaid **6.95**

SAVE \$10. Auto Patch Encoder. Make phone calls through repeaters with auto-patch inputs. VFA-2031-3, Shpg. wt. 1 lb. **Was \$34.95, NOW 24.95**

SAVE 40%. Continuous Tone Encoder. Lets you access most repeaters using your VF-2031. VFA-2031-5, Shpg. wt. 1 lb. **Was \$24.95, NOW 14.95**

External Microphone. PTT Mike with coiled cord; plugs into VF-2031 so you can transmit without removing unit from holster. Kit VFA-2031-6, 1 lb. **39.95**

10-Watt Amplifier. (Description on next page.) Kit HA-201A, Wt. 2 lbs. **42.95**



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

1 This Heathkit 75-Watt All-mode VHF Base Amplifier is great for use at home or for your repeater station

\$274⁹⁵

- Work the ones you hear – 10 watts input produces a hefty 75 watts (nominal) out
- Makes a great repeater amp
- Rugged solid-state design
- Operates FM, SSB and CW

If your 2-meter transceiver has a hot receiver like the one on the VF-7401 (on page 13), you probably hear stations who can't hear you. The new Heathkit VL-2280 All-mode Base Amplifier will solve that problem for you, giving you a hefty 75-watt (nominal) signal for just 10 watts in. The VL-2280 even has a plug in the back to power your VF-7401 or other make transceiver, so you don't need a separate power supply. And if your club needs to update its old vacuum tube amplifier and replace it with solid state reliability the VL-2280 is an excellent choice for a repeater amplifier. It can be operated on 120 VAC, 240 VAC or even 12 VDC back-up battery power.

The Hams at Heath have engineered the new VL-2280 to operate in all modes, too – SSB, FM or CW. IMD products, incidentally, are very low when the amplifier is used on sideband. The VL-2280 operates across the entire 144 to 148 MHz amateur 2-meter band. Broad-band circuitry maintains a stable power output across the entire band, too. This big amplifier has extra-large heat sinks to provide more-than-adequate cooling, giving you a 50% duty cycle and more "on" time. And the VL-2280 has a convenient standby/on switch so the exciter can be operated barefoot!

The illuminated front-panel meter allows you to monitor drive power, power output or relative DC voltage. The VL-2280 is DC voltage regulated, by the way. This rugged amplifier features excellent harmonic rejection and RF-sensed or remote keying. To give you maximum receiver sensitivity, insertion loss has been kept to less than 0.6 dB. The extremely rugged design is housed in a military style cabinet measuring 5½" H x 13¾" W x 16½" D. Alignment is simple, requiring only an exciter such as the VF-7401, and a wattmeter that reads forward and reflected power, like the HM-2141 on page 21. Building the VL-2280 75-Watt All-mode Base Amplifier is an enjoyable three-evening project.

40-Watt Amplifier increases your range on 2-Meters

\$57⁹⁵



The HA-202A 40-Watt Amplifier increases 2-meter fun with a minimum 40 watts for just 10 watts in. Automatic T/R switching. Tuned input/output keeps spurs low. Special emitter ballasted configuration withstands VSWRs of up to 3:1. Internally adjustable for any 1.5 MHz portion of 143-149 MHz band. Alignment requires VTVM, wattmeter or SWR bridge. Requires 12-16 VDC power source like PS-1175 (right).

Kit HA-202A, Shpg. wt. 4 lbs. 57.95
 HDZ-63-3, 3 ft. Coax. w/conns., 1 lb. 4.95



Kit VL-2280, Shpg. wt. 30 lbs. 274.95
 HDZ-63-3, 3 ft. Coax. w/conns., 1 lb. 4.95

VL-2280 SPECIFICATIONS: Band coverage: 144 to 148 MHz Power Input: 1 to 10 watts SSB, FM or CW Impedance: 50Ω Input VSWR: @ 10 watts drive: 2.0:1 or less Power Output: 75 watts @ 10 watts drive Duty Cycle: 50%, 10 minutes on, 10 minutes off Insertion Loss: (Antenna to Receiver) less than 0.6 dB IM Distortion: 24 dB Power Requirement: 120 VAC at 4 amperes, 240 VAC at 2 amperes, 12 VDC at 11 amperes Dimensions: 5½" H x 13¾" W x 16½" D (13.97 x 11.75 x 26.67 cm)

2 The Heathkit VL-1180 75-watt 2-Meter Amplifier puts your mobile station in range of more repeater fun

\$137⁹⁵

- 10 watts in gives 75 watts out on FM, SSB or CW
- Features rugged, solid-state design for mobile use

You're driving down the highway and can hear a 2-meter station, but you can't work him. Then you switch on your Heathkit VL-1180 All-Mode, 75-Watt Mobile Amplifier. Your 10 watts in is trans-

formed into 75 watts of QSO-grabbing power... and you're in business!

The VL-1180 Mobile Amplifier, like the VL-2280 described left, has been engineered to operate in all modes – single sideband, FM or CW – across the entire 144 to 148 MHz 2-meter band. Power output is stable across the entire band, thanks to broad-band circuitry. And you get a 50% duty cycle for more "on" time because extra-large heat sinks provide more than adequate cooling. Insertion loss is less than 0.6 dB, and the VL-1180 boasts excellent harmonic rejection, plus RF sensed or remote keying. The Amplifier's rugged design means you can install it in your car's trunk or other out-of-the-way location without worry. The easy-to-build VL-1180 is a two-evening kit, and alignment is simple, too, requiring only an exciter and a dual wattmeter like the HM-2141. Get your VL-1180 today for more 2-meter mobiling fun.

Kit VL-1180, Shpg. wt. 5 lbs. 137.95

VL-1180 SPECIFICATIONS: Band Coverage: 144 to 148 MHz Power Input: 1 to 10 watts SSB, FM or CW Impedance: 50Ω Input VSWR: (at 10 watts drive) 2.0:1 or less Power Output: 75 watts (typical) @ 10 watts drive Duty Cycle: 50%, 10 minutes on, 10 minutes off Insertion Loss: (Antenna to Receiver) less than 0.6 dB IM Distortion: 24 dB Power Requirement: 12 VDC operates at 5 to 16 VDC @ 11 amperes Dimensions: 2½" H x 4¾" W x 10¾" D (6.35 x 11.8 x 26.7 cm)

AC Supply for your 2-Meter transceiver/amp combo

\$79⁹⁵



The PS-1175 supplies the necessary voltage and current to power the Heathkit VF-7401 Transceiver/HA-202A Amplifier combination (or most other makes) from 120/240 VAC. Output voltage internally adjustable between approx. 12 and 14.5 VDC. Output current is 10 amps, intermittent, 10 minutes max. (5 amps continuous). Darlington circuit gives exceptionally high gain for excellent regulation. Fused for overload protection. Comes with 3-wire line cord. 5¼" H x 5¾" W x 11" D. As with all our kits, this one even includes solder.

Kit PS-1175, Shpg. wt. 15 lbs. 79.95

10-Watt Amplifier gives your hand-held clout!

\$42⁹⁵



The HA-201A 2-Meter Amp will get your hand-held into your favorite repeater full-quieting every time, delivering up to 10 watts for a mere 1½-watt in. Or 8 watts out for just 1-watt in. Great with the VF-2031, p. 12. Fully automatic operation with solid-state T/R switching. Tuned input and output for maximum efficiency, reduced spurs. Withstands infinite VSWR. Includes dummy load, RF detector. VTVM needed for tune-up. Requires 12-16 VDC power source. 2¾" H x 5¾" W x 5½" D.

Kit HA-201A, Shpg. wt. 2 lbs. 42.95



You get both 100 watts power out and QRP when you choose the solid-state, no-tune SB-104A

Get the best of both worlds – 100 watts of solid-state power and digital readout, plus the world's most sophisticated QRP transceiver at the push of a button. The Heathkit SB-104A has all the features you've been looking for in a solid-state transceiver – a clean 100 watts out on all bands or one watt out in QRP position, instant QSY, digital readout... even a display of your own call sign on the front panel. The moment you power up your SB-104A, six digits display your operating frequency to within ± 200 Hz. Pushbutton select CW, upper or lower sideband transmission, opt for high or low power – plug in your key, or choose PTT or VOX operation, and you're ready to experience broadband solid-state excitement.

The receiver front end of the 104A is factory assembled and tested, incorporating individual preselector filters for each band. That, along with balanced first and second mixers, gives you sensitivity of less than $0.5 \mu\text{V}$.

The "Sugar Baker" 104A's transmitter circuitry features quad op-amp audio processing, crystal filter sideband generation, crystal-controlled heterodyne oscillators for maximum frequency stability, and a unique ALC system to eliminate distortion-producing overdrive. Most importantly, the 104A utilizes driver and PA transistors in a broadband, no-tune push-pull configuration, diode biasing to prevent PA thermal runaway, and power regulating control circuitry to prevent damage under high SWR.

For extra performance, add 400 Hz CW selectivity with the optional SBA-104-3 Crystal Filter, or cut ignition noise by installing the SBA-104-1 Noise Blunker. The SB-104A operates from a charging 12 VDC auto electrical system or the PS-1144 Power Supply. Accessories like the SB-644A Remote VFO, SB-614 Station Monitor, and SB-634 Station Console will increase your operating pleasure even more. Move up to the digital age with the easy-to-build, fun-to-operate Heathkit SB-104A.

Kit SB-104A, Shpg. wt. 32 lbs. 694.95

Now's the time to replace your old tube-type transceiver with the completely solid-state Heathkit SB-104A HF Transceiver.



The SB-104A lets you choose QRP (low power) or 100 watts out for barefoot operation, or is the perfect exciter for either our popular SB-221 or SB-201 linear amplifiers.

Kit SBA-104-1, Noise Blunker, Wt. 1 lb. 32.95
Kit SBA-104-3, 400 Hz Crystal Filter, 1 lb. 44.95

Frequency Coverage: 3.5 MHz through 29.7 MHz Amateur bands (80 through 10 meters); 15 MHz WWV receive only. Frequency Stability: Less than 100 Hz/30 min. drift after 30-min. warmup; less than 100 Hz drift for $\pm 10\%$ change in primary voltage. Readout Accuracy: Within ± 200 Hz ± 1 count. TRANSMITTER: RF Power Output: High Power (50-ohm non-reactive load): SSB: 100 watts PEP ± 1 dB; CW: 100 watts ± 1 dB. Low Power SSB: 1 watt PEP (minimum); CW: 1 watt (min.). Output Impedance: 50 ohms, less than 2:1 SWR. Carrier Suppression and Unwanted Sideband Suppression: -50 dB down from 100 watt single-tone output at 1000 Hz reference. RECEIVER: Sensitivity: 0.5 for 10 dB S+N/N for SSB. Selectivity: 2.1 kHz minimum at -6 dB, 5 kHz max. at -60 dB. (2:1 nominal shape factor.) CW Selectivity: (with accessory CW filter) Selectable 2.1 kHz/400 Hz. IM Distortion: -65 dB min.; -57 dB typ. with noise blunker. Image Rejection: -60 dB min. Dimensions: $5\frac{1}{4}''$ H x $14\frac{1}{2}''$ W x $13\frac{3}{8}''$ D.

Matching SB-104A accessories give you more operating convenience



1 Matching Speaker



2 Remote VFO



3 Station Monitor



4 Station Console

1 Speaker and Power Supply

SSB response-tailored 5" x 7" oval Speaker. 300-3000 Hz. Connector plug, cable included. $7\frac{1}{8}''$ H x $10\frac{1}{8}''$ W x $14''$ D. Houses PS-1144 Power Supply.

Kit SB-604, Shpg. wt. 8 lbs. 59.95

120/240 VAC Power Supply (not shown) provides 13.8 VDC required by SB-104A. Full-wave bridge circuit has triple Darlington voltage regulation.

Kit PS-1144, Shpg. wt. 27 lbs. 129.95

2 Remote VFO for added capability

Provides split transmit/receive capability for DX, net

operation. Multi-mode capability allows transceiver operation with either VFO or SB-104A. Two crystal positions for fixed-frequency control. VFO reference tuning scale; SB-104A displays exact frequency. Metal cabinet. $7\frac{1}{4}''$ H x $10\frac{1}{4}''$ W x $15\frac{1}{4}''$ D.

Kit SB-644A, Shpg. wt. 10 lbs. 134.95

3 Station Monitor shows signals

Monitors SSB, CW & AM signals to 1 kW from 80-6 meters. Shows nonlinearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration parasitics, key clicks. Manual shows 40 CRT displays. 120/240 VAC. Metal cabinet measures $7\frac{1}{4}''$ H x $10\frac{1}{4}''$ W x $15\frac{1}{4}''$ D.

Kit SB-614, Shpg. wt. 17 lbs. 194.95

HDZ-63-3, 3-ft. Coax. w/conns., Wt. 1 lb. 4.95

4 Station Console adds convenience

Five-function Console features 24-hour, 6-digit clock; 10-minute ID timer w/auto reset; RF wattmeter w/200/2000 watt ranges; SWR bridge w/sensitivity control; manual/VOX-controlled phone patch. Phone patch provides at least 30 dB isolation. Input impedance is 600 ohm, 1.8 to 30 MHz. 120/240 VAC. $7\frac{1}{4}''$ H x $10\frac{1}{4}''$ W x $15\frac{1}{4}''$ D.

Kit SB-634, Shpg. wt. 13 lbs. 194.95

HDZ-63-3, 3-ft. Coax. w/conns., Wt. 1 lb. 4.95



The Heathkit HW-101 — with over 30,000 throughout the world, it's the best buy in Amateur Radio

\$439⁹⁵

- Full 80 through 10 meter Amateur band coverage
- USB, LSB, CW, PTT and VOX operation on all bands
- 0.35 μ V receiver sensitivity digs out weak signals
- Gives you a full 180 watts PEP input, 170 watts CW

The Heathkit HW-101 is the Transceiver to start with and stay with. You can work CW with your Novice License, and go to phone when you upgrade to General. The performance this Transceiver has to offer makes it hard to believe you're operating on a budget. Full coverage on 80 through 10 meters lets you get more enjoyment from your ham radio operation. Operate PTT or VOX on upper or lower sideband, or select CW transceiver — all the options you'd expect to find on a Transceiver that's top-notch all the way.

You get outstanding receiver performance because the HW-101's 0.35 μ V sensitivity on SSB brings in weak stations loud and clear. A high quality crystal IF filter keeps signals separate. Image and IF rejection of better than 50 dB help bring you world-wide receiving that's clean, clear and crisp. And when you add the optional 400 Hz CW Crystal Filter to your HW-101, your copy will be arm chair all the way.

Other features include a fast acting AGC circuit to prevent fading and blasting. And front panel metering shows you signal strength, plate current and relative power out. To make sure you're always right on frequency and inside the band, the HW-101's built-in 100 kHz calibrator is always ready for reference.

The HW-101's transmitter section is a top performer, too. Triple action level control prevents distortion-producing overdrive to keep your signal clean. And power? A rugged pair of reliable 6146 finals punch 180 watts PEP in on phone and 170 watts in on CW.

Frequency stability is better than 100 Hz per hour after 45 minutes warmup, with less than 100 Hz variation for a 10% line voltage variation. An FET VFO

provides excellent thermal stability for heavy-duty operating without excessive heat buildup.

Easy-to-assemble circuit boards and color coded wiring harnesses speed assembly. And when it comes time for alignment, you'll really appreciate the wide-open layout of the HW-101's rugged chassis design. It's easy to see the Heathkit HW-101 is ham radio's best buy. Requires Heathkit Model PS-23 Power Supply and HS-1661 Speaker (below). Also be sure to see our line of Amateur Radio Accessories on page 20 for the Microphone, Wattmeter/SWR Bridge and coaxial cable to complete your HW-101 station.

Kit HW-101, Shpg. wt. 22 lbs.	439.95
SBA-301-2, 400 Hz CW Crystal Filter, Shpg. wt. 1 lb.	47.95
Fixed Station AC Power Supply (described below)	
Kit PS-23, Shpg. wt. 17 lbs.	79.95
Kit HS-1661, Matching Speaker, Shpg. wt. 5 lbs.	29.95

HW-101 SPECIFICATIONS: RECEIVER: Sensitivity: < 0.35 μ V for 10 dB S+N/N for SSB operation. SSB Selectivity: 2.1 kHz min. @ 6 dB down, 7 kHz min. @ 60 dB down. CW Selectivity: (optional SBA-301-2 CW filter); 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. Spurious Response: Image and IF rejection > 50 dB. TRANSMITTER: DC Power Input: SSB 180 W PEP (normal voice, cont. duty cycle). CW 170 W (50% duty cycle). RF Power Output: 100 W on 80 thru 15 M; 80 W on 10 M (50% non-reactive load). Output Imped.: 50 to 75 Ω with < 2:1 SWR. Harmonic Radiation: 40 dB below rated output. Mike Input: High impedance. Carrier Suppression: 45 dB down from single-tone output. Unwanted Sideband Suppression: 45 dB Third Order Distortion: 30 dB from two-tone output. GENERAL: Frequency Coverage: 80-10 M amateur bands. Frequency Stability: < 100 Hz per hour drift after 45 minutes warmup from normal ambient conditions. < 100 Hz for \pm 10% line voltage variations. Modes of Op: USB, LSB, CW, tune. Dial Calibration: 5 kHz. Calibration: 100 kHz crystal. Power Requirements: 700 to 850 V at 250 mA with 1% maximum ripple; 300 V at 150 mA with 0.05% maximum ripple; -115 V at 10 mA with 0.5% maximum ripple; 12 V AC/DC at 5.76 amps. (See PS-23 Power Supply below.) Dimensions: 6 $\frac{1}{2}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{1}{2}$ " D.

Here's the ideal Power Supply for your HF equipment



Provides the operating voltages for the HW-101 and other Amateur equipment. High voltage output is 700 VDC @ 250 mA; 300 VDC @ 150 mA and 250 VDC @ 100 mA low voltage taps. Also fixed bias and 12.6 filament voltage. Excellent bias supply filtering. Overload protected. 120/240 VAC, 60/50 Hz, 350 watts max. 6 $\frac{1}{2}$ " H x 4 $\frac{1}{4}$ " W x 9" D.

Kit PS-23, Shpg. wt. 17 lbs. 79.95

For best performance — speaker for HW-101, HR-1680

\$29⁹⁵

- 5" x 7" oval speaker is SSB and CW response-tailored
- Rugged, but attractive, lightweight aluminum cabinet
- Easy-to-build kit includes necessary cable and solder

The Heathkit HS-1661 Speaker is designed to match the HW-101 Transceiver (above) and the HR-1680 Receiver on page 16, as well as many older Heathkit transceivers and receivers. It features a big 5" x 7" oval speaker with a 3.16 oz. magnet offering 300 to 3000 Hz frequency response for best SSB and CW reception. The green spatter-finish cabinet is constructed of rugged, light-weight aluminum, and measures 6 $\frac{1}{2}$ " H x 9" W x 5 $\frac{1}{2}$ " D.

Kit HS-1661, Shpg. wt. 5 lbs. 29.95





For real CW fun, you can't do better than the popular Heathkit HW-8 QRP Transceiver

\$164⁹⁵

- 80,40,20 and 15 meters CW
- 0.2 μ V receiver sensitivity
- Adjustable T/R delay and semi break-in
- 2-Position active audio filter
- Front panel meter to show relative power

The rugged portability of this great little CW transceiver means that now you can take your Amateur Radio hobby with you wherever you go, whether it's on a camping expedition or a business trip. The Heathkit HW-8 CW Transceiver is small enough to fit in a suitcase, and not too bulky to back pack. A trail bike's battery will power it. Or join the growing number of hams experimenting with solar-powered QRP (low power) operation. You can even run it off of your automobile's lighter socket. And, of course, you can also operate your HW-8 at home on 120 or 240 VAC power with the HWA-7-1 Power Supply (right).

No matter where you operate or how you power yours, the HW-8 is a great performer — you can be sure of that. Performance begins with a quiet, super-sensitive receiver section. Hum and noise figures are minimal, and as little as 0.2 μ V in at the antenna terminal gives you a usable signal. Couple that with a tunable preselector, direct conversion with RF amplification, a balanced product detector followed by active audio processing, and you have a hot little receiver that's going to dig in and dig out the stations you're chasing to assure you of a wall covered with QSL cards from all over the globe.

The transmit section's the same story... performance. You'll get a minimum of 3.5 watts in on 80 meters, 3.0 watts in on 40 and 20, and 2.5 watts in on 15. Each band is individually selected, and crystal controlled heterodyne circuitry insures accurate frequency mixing. The HW-8's VFO features an MPF-105 FET in a temperature compensated Hartley configuration. This design approach provides overall stability and covers the Transceiver's 3.5-3.75, 7.0-7.25, 14.0-14.25 and 21.0-21.25 MHz operating ranges with excellent accuracy. Operating convenience hasn't been forgotten either. The HW-8 features an RF and AF gain control, solid-state band switching, pushbutton band selection, and semi break-in CW operation, including adjustable T/R delay. The clean, modern front panel includes a relative power meter.

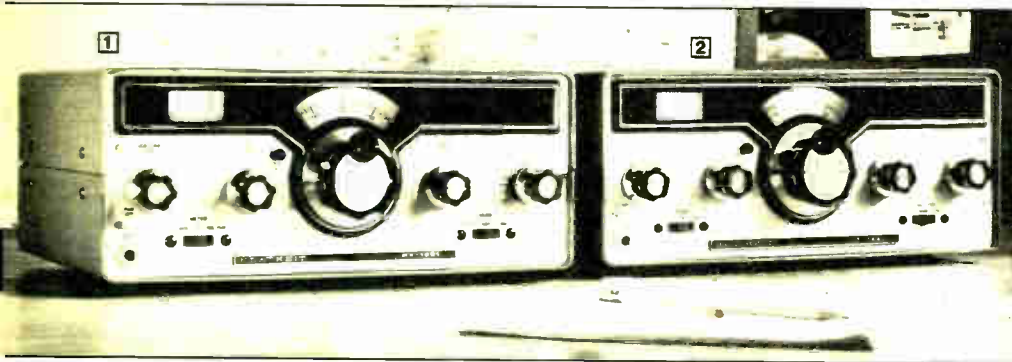
The HW-8 is an easy and enjoyable kit to build, too, with most parts mounting on a single printed circuit board. There's a minimum of point-to-point wiring. And, of course, the thorough Heathkit assembly manual guides you every step of the way. The manual for the HW-8, incidentally, even includes hints to help you make more contacts once the fun of construction is finished and it's time for you to get your Transceiver on the air.

Just imagine all the fun you're going to have, transmitting your HW-8's signal into a dipole stretched between two towering pines out in the wilderness... or strung from corner to corner of your hotel room, high in a metropolitan skyscraper. Reading articles on QRP operation in the national Amateur Radio magazines will give you more ideas on using your HW-8. And, by the way, these articles may surprise you when you discover the number of DX and domestic contacts that Hams are making with this quality-engineered CW Transceiver, using ordinary antenna configurations you can build and erect.

A great performer that's going to give you hours of fun — that's the Heathkit HW-8. Order yours now and join the growing fraternity of QRP operation with the Heathkit HW-8 QRP Transceiver. Requires headphones (Assembled GD-396 Suporex Headphones listed below).

- Kit HW-8, Shpg. wt. 6 lbs. **164.95**
 Kit HWA-7-1, AC Power Supply. Designed to operate your HW-8 from standard 120/240 VAC house current. Shpg. wt. 4 lbs. **22.95**
 GO-396, Suporex Headphones, Fully assembled, 2 lbs. **7.95**

HW-8 SPECIFICATIONS: TRANSMITTER — DC Power Input: 3.5 watts (80 meters), 3.0 watts (40 meters), 3.0 watts (20 meters), 2.5 watts (15 meters). Frequency Control: built-in VFO. Frequency Stability: Less than 150 Hz hour drift after 60 minute warm-up. Output Impedance: 50 Ω , unbalanced. Spurious and Harmonic Levels: 35 dB or better. Offset Frequency: approximately 750 Hz, fixed on all bands. **RECEIVER** — Sensitivity: 0.2 μ V for readable signal, 1 μ V or less for 10 dB S. N. N. Selectivity: wide, 750 Hz @ -6 dB narrow, 375 Hz @ -dB. Audio Output Impedance: 1000 Ω , nominal. **GENERAL** — Frequency Coverage: 3.5-3.75 MHz (80 meters), 7.0-7.25 MHz (40 meters), 14.0-14.25 MHz (20 meters), 21.0-21.25 MHz (15 meters). Frequency Stability: less than 100 Hz hour drift after 30 minute warmup. Power Requirement: 12-16 VDC, 90 mA, receive; 430 mA, transmit. Dimensions: 4 $\frac{1}{2}$ " H x 9 $\frac{1}{2}$ " W x 8 $\frac{1}{2}$ " D (10.8 x 23.5 x 21.6 cm). Net Weight: 2 lbs.



This Receiver/Transmitter combo adds up to enjoyment, value

1 Full break-in (QSK) CW Transmitter
\$199⁹⁵ • 100 watts out on 80-15,
 75 watts out on 10

Whether you're a veteran brass-pounder or have just earned your Novice ticket, the HX-1681 Transmitter is ideal for use with virtually any solid-state or tube-type receiver. It's an unbeatable value, too! Full break-in capability means you can hear other

stations whenever your key is up... even between individual dits and dahs of your own transmission. A pair of rugged 6146A finals combine with solid-state design to give you a clean 100 watts minimum on 80-15, and 75 watts out on 10. The HX-1681 features built-in T/R switching, adjustable sidetone output, and receiver muting. Keying is provided for adding an external power amplifier. Harmonic radiation is 50 dB down at rated output, and spurs are down 60 dB. Covers 3.5-4.0, 7.0-

7.5, 14.0-14.5, 21.0-21.5 and 28.0-28.5 MHz. Requires the PS-23 Power Supply described on page 16. 6 $\frac{3}{4}$ " H x 12 $\frac{3}{4}$ " W x 12" D.

- Kit HX-1681, Shpg. wt. 16 lbs. **199.95**
 Kit PS-23, Power Supply, 17 lbs. **79.95**

2 HR-1680 Ham Bands Receiver

\$224⁹⁵ • Dual conversion front end works 70 through 10 meters

Looking for your first receiver? The solid-state HR-1680 is the right choice. It combines high performance and low cost for serious Ham band listening. A perfect companion for the HX-1681 QSK CW Transmitter (described at left), the HR-1680 Receiver is both fun to build and enjoyable for Ham band operation. A hot dual-conversion front end and 0.5 μ V sensitivity cover 80 through 10 meters: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-28.5, and 28.5-29.0 MHz. Selectivity is outstanding. With a matched 4-pole crystal filter in the IF, you can count on your 1680 to be razor sharp. A tunable preselector filters out unwanted signals. Includes built-in 100 kHz calibrator. Align without instruments. 120/240 VAC or 11.5-15 VDC. 6 $\frac{3}{4}$ " H x 12 $\frac{3}{4}$ " W x 12" D.

- Kit HR-1680, Shpg. wt. 14 lbs. **224.95**
 Kit HS-1661, Matching Speaker, 5 lbs. **29.95**



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



Get more QSO's, get the DX and recognition you want when you build the SB-221 2 kW Linear

\$589⁹⁵

- A pair of Eimac 3-500Z's deliver top power for you
- 2 kW PEP input on phone, 1 kW input on CW and RTTY
- Heavy duty power supply for reliable operation
- You can wire it easily for either 120 or 240 VAC

Haven't you lost contacts long enough because you can't punch your signal through the QRM? The Heathkit SB-221 Linear Amplifier packs a wallop that will get you 20 over 9 reports when the others are down in the noise. And the SB-221 does it at a price that's hard to beat. Now that you're ready to move up to 2 kW power, see why this workhorse amplifier is the most important piece of equipment for your Amateur Station.

A pair of rugged, world-famous 3-500Z's deliver 2000 watts PEP input on phone, and can be loaded to 1 kW input on both CW and RTTY. A broad-band pre-tuned pi-input delivers maximum efficiency with extremely low distortion over the entire 80-15 meter Amateur bands. And just 100 watts of exciter drive is all that's required to drive this amplifier to full output. No alignment is necessary either, once you've finished the easy-to-follow, step-by-step Heathkit building instructions that come with the kit.

If you've never used an amplifier before, you'll find that with an SB-221 in your Ham Shack, tune-up couldn't be easier. Just select the band you wish to operate, set the CW-tune/SSB rocker switch to the CW-tune position, adjust both tune and load controls for maximum relative power out – and you're ready to transmit. Ready with the kind of signal that always catches the new DX, gets your traffic through, and provides reliable year-after-year communications performance. You'll wish you had gotten it sooner.

You can easily wire the SB-221's power supply for either 120 or 240 VAC operation. Zener diode-regulated operating bias reduces idling current for cooler running and extended tube life. The Amplifier incorporates built-in circuit breaker protection, and a large, quiet-running fan provides maximum cooling of the finals. Other features include ALC to prevent distortion-producing overdrive, plus front-panel switch-selected monitoring of grid current, relative power, and high voltage. The SB-221 also features a separate meter for measuring final amplifier plate current. A great Amplifier, with full FCC acceptance, the '221 is going to bring a lot of enjoyment back into your HF operation... so order yours today.

Kit SB-221, Shpg. wt. 66 lbs. **589.95**
 HDZ-63-3, 3 ft RG8/U Jumper with PL-259 Connectors. Shpg. wt. 1 lb. ... **4.95**

SB-221 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. Input impedance: 52 Ω unbal. Output impedance: 50 Ω unbal. SWR 2:1 or less. Front panel controls: Tune, Load, Band, Sensitivity Meter Switch, Power, CW Tune, SSB, Plate meter, Multi-meter (Grid-Rel. Power, High Voltage). Rear panel: Line cord, circuit breakers (two 10A), Antenna relay (phone), ALC (phone), RF Input (SO-239), Ground post, RF Output (SO-239). Tubes: Two 3-500Z. Power requirement: 120 VAC, 50-60 Hz, @ 20 amp max. 240 VAC, 50-60 Hz @ 10 amp maximum. Cabinet dimensions: 8 1/4" H x 14 1/2" W x 14 1/2" D (20.96 x 37.78 x 36.83 cm)



Don't sit on the sidelines during DX pileups! Put the SB-201 1 kW Linear in your station

\$439⁹⁵

- A rugged pair of 572B finals need just 100-watt exciter
- The SB-201's forced air cooling is ideal for contesting
- Switchable multifunctional metering puts you in control
- Features pre-aligned cathode-input tank circuits

You can call all day during a pile-up. But if your signal doesn't measure up, that rare DX won't hear you. So... make yourself heard – put the Heathkit SB-201 1 kW Linear Amplifier in your station. It will punch holes in the QRM without putting a hole in your Ham-equipment budget.

Just 100 watts is all it takes to drive the 201's heavy-duty pair of forced air-cooled 572B's to a full 1200 watts PEP input on phone, and 1000 watts input on CW. So it's ideal for use with most popular transmitters or transceivers such as the HW-101 and the SB-104A. And you have no fear of TVI, because those finals are completely shielded to insure excellent TVI protection.

The SB-201 sports an ALC output to prevent distortion-producing overdrive. And for maximum efficiency, the 201's cathode-input tank circuits come pre-aligned and ready to go on the air as soon as you've finished building your kit. There's no alignment necessary.

The SB-201 has a built-in solid-state power supply which features full circuit breaker protection. A switchable multi-function panel meter shows SWR, grid current, plate current, relative power and plate voltage. For extra operating convenience, an antenna relay automatically switches the antenna to the exciter input when the SB-201 is off.

The sturdy yet lightweight construction of the SB-201 is achieved by using a heavy gauge one-piece aluminum chassis that is partitioned for extra strength and component isolation. The Amplifier's clean open chassis layout assures easy assembly and provides maximum efficiency for year-after-year dependability. And the thorough, illustrated, step-by-step Heathkit instruction manual will guide you every step of the way from unpacking to final plug in to assure you of an enjoyable kitbuilding experience.

From its front panel right on back to the rear apron, the FCC-approved Heathkit SB-201 1 kW Linear Amplifier is packed with features that will make you wonder how you got along without it.

Kit SB-201, Shpg. wt. 47 lbs. **439.95**
 HDZ-63-3, RG8/U Jumper with PL-259 Connectors. Wt. 1 lb. **4.95**

SB-201 SPECIFICATIONS: Band coverage: 80, 40, 20 & 15 meters. Maximum power input: 1200 watts PEP, SSB, 1000 watts CW. Driving power required: 100 watts. Duty cycle: SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). Third order distortion: -30 dB or better at 1000 watts PEP. Output impedance: 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. Input impedance: 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. Meter functions: 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. Front panel controls: Load, Tune, Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. Tube complement: Two 572B T-160-L (in parallel). Power requirement: 120 volts AC @ 16 amperes (maximum), 240 volts AC @ 8 amperes (maximum). Cabinet dimensions: 6 3/4" H x 14 1/2" W x 13 3/4" D.



Deluxe Antenna Tuner with wattmeter/SWR bridge matches 1.8-30 MHz — even new WARC bands

\$254⁹⁵

- Covers 160 through 10 meters with continuous tuning
- Built-in dual wattmeter/SWR bridge makes tuning easy
- Bypass switch disconnects Tuner when not required
- Two coax outputs allow you to use either of two antennas with just the flick of a switch

Are touchy solid-state finals robbing you of precious bandwidth. The SA-2060 Deluxe Antenna Tuner can solve that problem. It features built-in wattmeter/SWR bridge with $\pm 5\%$ forward accuracy, a bypass switch for your tri-band beam or dummy load, and two coax outputs for choosing between two antennas. This exciting 2 kW Tuner will match your antenna to any frequency in the 160-10 meter HF spectrum — 1.8 through 30 MHz — including MARS frequencies and the recently approved new band allocations.

The SA-2060 Antenna Tuner will allow you to increase the operating range of your antennas by reducing the SWR your transmitter "sees" at frequencies where the antenna normally is not resonant. The SA-2060 will help you radiate more of your signal by maximizing power transfer from your transmitter to your antenna. In addition, it will help you reduce TVI and out of band emissions.

This handsome addition to your Amateur Station features a heavy-duty continuously variable inductor to give you an infinite number of impedance settings, assuring precise antenna matching. It gives you the versatility of using a built-in 4:1 balun for balanced feedlines, or of choosing unbalanced feedlines or long wire antennas. A convenient counter on the front panel indicates inductor settings for easy retuning, and the Heathkit manual includes a chart giving typical high-, mid- and low-range settings on each HF band, plus a full page logging scale that you will find helpful in recording intermediate settings for each one of your individual antennas.

The SA-2060 Antenna Tuner features silver-plated straps and roller contact assembly for minimal RF loss under high frequency operating conditions. Its large ceramic feed-through insulators are designed to withstand high RF voltage. The heavy duty capacitors are easy to build and service. This tuner can handle power input of up to 2000 watts PEP on SSB, and 1000 watts CW. The sturdy SO-239 connectors on the back panel allow incorporation of the SA-2060 into your 50-ohm antenna system.

For operating ease, the dual meter wattmeter section of your SA-2060 reads both forward and reflected power simultaneously to help you operate your low band station more effectively. It measures output up to 200/2000 watts in the forward direction and up to 50/500 watts reflected. It features dual meters for forward and reflected power and SWR, with $\pm 5\%$ forward average power



accuracy for precision measurements. High and low power ranges and a factory-assembled and calibrated sensor insure accurate readings. It reads SWR directly from 1:1 to 3:1 scaled, and also indicates to infinite SWR.

It won't take long to get your SA-2060 on the air — the easy-to-build kit is an enjoyable three-evening project. And easy-to-follow, step-by-step Heathkit instructions help you from unpacking until your SA-2060 is on the air. The copper-plated steel chassis with "military styling" black aluminum cabinet measures $5\frac{3}{8}$ " H x $14\frac{1}{2}$ " W x $13\frac{3}{8}$ " D. Compare the great Heathkit SA-2060 2 kW Deluxe Antenna Tuner with all the competitors — match power handling capabilities, features and price. Then you'll see why the SA-2060 is one of the best buys in Amateur Radio today.

Kit SA-2060, Shpg. wt. 20 lbs. 254.95
 HDZ-63-3, 3-ft. RG8/U jumper with PL-259 connectors. Wt. 1 lb. 4.95

SA-2060 SPECIFICATIONS: Frequency Coverage (Continuous Tuning): 1.8 to 30 MHz Power Input Capability (Full legal limit): SSB: 2000 watts (peak); CW: 1000 watts Input Impedance: 50 ohms at match. Impedance Transformation: 4:1 (balanced-to-unbalanced) balun. Output Impedance: Wide Range. Meter Functions: Forward and reflected average power and SWR. Meter Ranges: Forward (two ranges): Low — 0-200 watts, High — 0-2000 watts Reflected (three scales): Low — 0-50 watts, High — 0-500 watts; SWR — 1:1 to 3:1. Wattmeter Accuracy (full scale): 200 W and 2000 W (FWD) and 500 W (REF): $\pm 5\%$ (AVG), 50 W (REF): $\pm 7.5\%$ (AVG). Insertion SWR: Less than 1.1:1 Cabinet Dimensions: $5\frac{3}{8}$ " H x $14\frac{1}{2}$ " W x $13\frac{3}{8}$ " D (36.8 x 14.6 x 35.2 cm)

Get more operating bandwidth from dipoles/long wires with the low-priced SA-2040 Tuner

\$154⁹⁵

- Handles up to 2000 watts PEP on SSB or 1000 watts CW
- Continuously variable inductor for a perfect match
- Write in band settings on the erasable front panel!
- An enjoyable, easy-to-build two-evening kit

Frustrated by a dipole that lacks sufficient bandwidth? Stymied by an antenna that only covers one or two bands? Then the SA-2040 Antenna Tuner is the one for you. With a continuously variable inductor to give you a perfect match every time — 80 through 10 meters — the SA-2040 can be used for MARS operation or the new Amateur band allocations. This low-cost Tuner includes the heavy duty capacitors, large ceramic insulators and many of the other features of its big brother, the SA-2060 (above), but without the 160 meters coverage or the built-in wattmeters/SWR bridge. That way, you get just the amount of tuner you need, without paying for station accessories you already own.

Of course, the SA-2040 can handle the full legal limit, just like its big brother. This easy-to-build Tuner is a two-evening kit. And when you've tightened the cover, personalize your SA-2040 with stick-on numerals and letters that let you add your own call sign to the front panel. $5\frac{3}{8}$ " H x $14\frac{13}{16}$ " W x $13\frac{15}{16}$ " D.

Kit SA-2040, Shpg. wt. 15 lbs. 154.95
 HDZ-63-3, 3-ft. RG8/U jumper with PL-259 connectors. Wt. 1 lb. 4.95

SA-2040 SPECIFICATIONS: Frequency Coverage: 3.5-30 MHz. Power Input Capability: Full legal limit Input Impedance: 50 ohm at match. Impedance Transformation: 4:1 (balance-to-unbalanced) balun Output Impedance: Wide Range. Cabinet Dimensions: $5\frac{3}{8}$ " H x $14\frac{13}{16}$ " W x $13\frac{15}{16}$ " D (36.8 x 14.6 x 35.2 cm)



- The large ceramic insulators handle 2000 watts PEP
- Easy-to-build, heavy-duty capacitors
- Continuously variable inductor assures a perfect match

NEW

Low-priced Cardioid Desk Mike reduces background noise

Only
\$49⁹⁵
fully
assembled

Cardioid pattern of the new Heathkit Dynamic Microphone produces 20 dB front-to-back ratio to reduce background noise. 150 Hz to 15 kHz frequency response. Switch-selectable high- or low-impedance adapts to any radio. Includes 6-foot cord. Molded beige Cyclocac case measures 9⁷/₁₆" H x 4¹/₃₂" W x 5²⁷/₃₂" D. Assembled.

HDP-242, Shpg. wt. 2 lbs. 49.95

1 Micoder™ II dials up repeaters

Micoder II Microphone Auto Patch Encoder's 300-3000 Hz response is tailored for clean voice transmission. Up to 30 mV rms maximum output for full modulation into a high impedance port. Push-to-talk bar for convenient one-hand use. Accurate and stable tones for phone calls. Uses 9V battery (not included). Includes 6' coiled cord, hanger clip. 3³/₄" H x 2⁵/₈" W x 1³/₄" D.

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

2 Dummy Load kills QRM

Helps you avoid unnecessary interference during tune ups. Handles up to 1 kW of RF with VSWRs of less than 1.5:1 up to 300 MHz, and less than 2:1 to 400 MHz. 50Ω. Oil filled (oil not included).

Kit HN-31, Shpg. wt. 3 lbs. 19.95

HDZ-63-3, 3' coax w/PL259 conns., 1 lb. 4.95

3 Add Phone Patch to your station

The HD-15 Phone Patch adds versatility to your station. Individual receiver/transmitter line gain controls simplify adjustment. The VU meter continuously monitors the unit's output and lets you adjust for maximum null depth to produce maximum isolation between the phone line and your station. Matches 3-16 Ω speakers, hi-Z or 600 Ω inputs. PTT operation. 2⁵/₈" H x 9¹/₄" W x 3⁵/₈" D.

Kit HD-15, Shpg. wt. 3 lbs. 47.95

4 Instant power at your fingertips

Twelve-Socket Multiple Outlet Box provides extra outlets for your station, workshop, basement, garage. Has 11 3-hole outlets for killing power to equipment. 1 unswitched for clock or memory-save. Includes fuse holder, fuse and 12' cord. Handles 10A maximum load. 120 VAC.

Kit HD-1274, Shpg. wt. 4 lbs. 19.95

5 VHF Wattmeter/SWR Bridge

Features dual power, SWR scales, easy calibration. Covers 50-160 MHz. Minimal insertion loss. 50 ohms. 5.06" H x 5.25" W x 6.5" D.

Kit HM-2102, Shpg. wt. 3 lbs. 49.95

HDZ-63-3, 3' coax w/PL259 conns., 1 lb. 4.95

6 Beam gets you out on Two Meters

Cushcraft 11-element 2-Meter Yagi features 11.3 dB forward gain, a 20 dB front-to-back ratio. Gamma match tuning for minimum SWR. Feeds directly with 52-ohm coax. 1000 watts. Designed for vertical polarization and cut for 146-148 MHz Amateur FM. Boom length, 144"; longest element, 40"; turning radius, 72". Assembly required.

HDP-1470, Wt. 6 lbs. 39.95

7 Cushcraft ATV-5 Vertical gets DX

A vertically-polarized, omni-directional antenna designed to provide complete CW and SSB coverage of 80 through 10 meters. SWR is 1.5:1 or less at resonance on each band. Use with any transmitter or transceiver employing nominal 50-ohm input. Full legal power. Built-in coax connector takes PL-259. Assembly required.

HDP-1473, Shpg. wt. 10 lbs. 104.95

8 Dual Speed Rotator for beam

Couple the Alliance HD73 with your beam to achieve real DX success. For antennas with up to 10.7 sq. ft. wind load area. For masts 1³/₈" to 2¹/₂" OD. For 120 VAC, 60 Hz. Uses 6-cond. cable or 8-cond. cable listed below.

HDP-1295, Shpg. wt. 19 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

9 Coax Switch takes four antennas

Choose from up to four antennas or interconnecting equipment. Handles 2 kW PEP to 250 MHz. 50 ohms. Grounds all outputs not in use.

Kit HD-1234, Shpg. wt. 1 lb. 15.95

10 "W2AU" Balun matches better

Reduces TVI, balance antenna current distribution for maximum gain. Protects your equipment from lightning. Use with dipoles, vees, quads, yagis. Rates for full legal power. Assembled. Includes instructions. Impedance ratio of 1:1.

HDP-3615, Shpg. wt. 1 lb. 17.95

11 Low-pass Filter reduces TVI

70 dB attenuation reduces TVI. Insertion loss less than 0.3 dB. 160-10 meters. 50 Ω. Full power.

HDP-3700, Shpg. wt. 2 lbs. 29.95

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

12 Change antennas in seconds with the Remote Coax Switch

LED shows which of up to five antennas you have selected. Saves money - replaces five expensive coax feedlines from station to antennas with just one. Accepts signals to 150 MHz. Rated for full power. 50-70 ohm input impedance. Shielded, weatherproof switch housing protects switch. Grounding position for lightning protection. Includes U-bolt mounting assembly. Control Box is 3³/₈" H x 5³/₁₆" W x 5¹/₄" D. Remote: 8¹/₄" H x 4⁵/₈" W x 7¹/₂" D. Use eight-wire cable listed below.

Kit SA-1480, Shpg. wt. 8 lbs. 97.95

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

Pre-cut Zenith Coax Cables

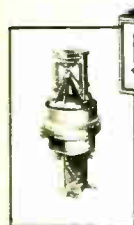
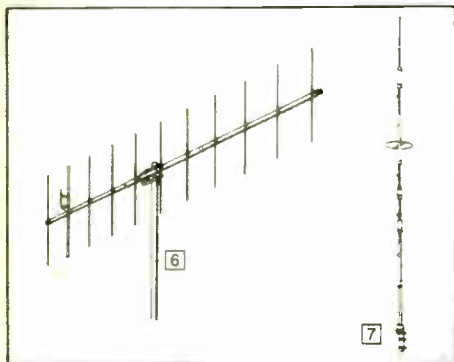
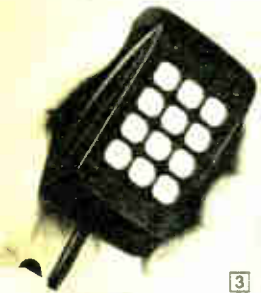
HDZ-63-3, 3' w/PL259 conns., 1 lb. 4.95

HDZ-63-10, 10' w/PL259 conns., 1 lb. 4.95

LAST CALL!

Full-color, graphic display of radio frequency spectrum. Measures 22¹/₄" H x 31" W.

HDP-1495, Shpg. wt. 1 lb. 4.95





Get accurate VHF readings with the Heathkit HM-2141 Dual Meter VHF Wattmeter

\$89⁹⁵

- Measures average forward power with $\pm 7.5\%$ accuracy up to 300 watts
- Direct reading SWR

Measures forward and reflected average power and PEP from 50 MHz to 175 MHz. Simultaneous readings of transmitted output up to 30/300 watts forward and 10/100 watts reflected power make antenna tuning a snap. Reads SWR directly from 1:1 to 3:1. Factory-assembled, calibrated sensor. Uses 9V cell (not included) or 120 VAC with optional Battery Eliminator below. The HM-2141 is housed in a sturdy aluminum cabinet.

Kit HM-2141, Shpg. wt. 5 lbs. **89.95**
PS-2350, AC Battery Eliminator, 1 lb. **7.95**
HDZ-63-3, 3-ft. Coax w/ connectors, 1 lb. **4.95**

HM-2141 SPECIFICATIONS: Frequency Range: 50 to 175 MHz. Insertion SWR: less than 1.05:1. Accuracy (full scale): 30 W and 300 W (FWD); 100 W (REF). $\pm 7.5\%$ (AVG). 10 W (REF). $\pm 10\%$ (AVG) Dimensions: 4 $\frac{1}{2}$ " H x 7 $\frac{1}{2}$ " W x 6 $\frac{3}{8}$ " D

Get more low band operating efficiency when you build the HM-2140 Dual HF Wattmeter for your Amateur station

\$89⁹⁵

- $\pm 5\%$ Forward power accuracy
- Reads PEP or Average power for any frequency between 1.8 and 30 MHz
- Features a factory-assembled and calibrated sensor
- Measures transmissions up to 200 and 2000 watts PEP forward and up to 500 watts reflected

Building the HM-2140 Dual HF Wattmeter is going to give your Amateur station greater operating efficiency. Installed in your transmission line, this high-accuracy Meter monitors both forward and reflected power for any frequency between 1.8 and 30 MHz. While designed primarily for the Amateur Radio bands within the high-frequency ranges on the 160, 80, 40, 20, 15 and 10 meter bands, the HM-2140 also can be used for other services which may lie in between the Amateur bands.

The more than 200 Hams at Heath have designed this Wattmeter to measure transmitter output up to 200/2000 watts PEP in the forward direction, and up to 50/500 watts reflected. It features dual meters for forward and reflected power and SWR, and boasts a $\pm 5\%$ forward power accuracy to give you precision measurements. High and low power ranges and a factory-assembled and calibrated sensor insure accurate readings. This Dual HF Wattmeter also reads SWR directly from 1:1 to 3:1, as well as readings PEP or Average power.

For complete portability in the field, the HM-2140 Dual HF Wattmeter can be operated on a 9-volt battery (not included). A special switching circuit permits you to observe the battery condition at any moment. Where AC power is available, you can use the Battery Eliminator below. The Wattmeter is housed in a rugged aluminum cabinet styled to



complement your other Amateur Radio equipment. For added convenience of operation, the remote sensor can be mounted into the cabinet, or up to four feet away from the metering cabinet and nearer to the transmitter's output cables. Spend an enjoyable evening or two building the handy HM-2140 HF Dual Wattmeter for your station. The easy-to-follow Heathkit assembly manual will guide you step-by-step from unpacking to final adjustment and operation. The manual even includes a section on operation and installation of your HM-2140 Dual HF Wattmeter, a circuit description, and a detailed schematic. Heathkit quality plus your care will assure you of an HF Wattmeter providing many years of service and value. And as with all Heathkit electronic kits, this one contains all necessary parts, and a generous supply of solder.

Kit HM-2140, Shpg. wt. 3 lbs. **89.95**
PS-2350, AC Battery Eliminator, 1 lb. **7.95**
HDZ-63-3, 3-ft. Coax w/ connectors, 1 lb. **4.95**

HM-2140 SPECIFICATIONS: Frequency Range: 1.8 to 30 MHz. Insertion SWR: less than 1.05:1. Accuracy (full scale): 200 Watts and 2000 Watts (FWD); 500 Watts (REF). $\pm 5\%$. Power requirement: 9 volts DC (Battery NEDA Type —1604) or optional PS-2350 AC Adapter. Dimensions: 4 $\frac{1}{2}$ " H x 7 $\frac{1}{2}$ " W x 6 $\frac{3}{8}$ " D (10 48 x 19 05 x 16 19 cm)

Electronic Keyer gives you selectable word speed



Your CW transmission will be 100% copy when you have the Heathkit HD-1410 Solid-state Electronic Code Keyer in your Amateur station. It makes sending code easy, whether you're operating base or portable. While you're building your Keyer, you select the speed range you want — 10 to 35 words per minute, or 10 to 60 words per minute. For ease of operation, the dot and dash paddles' travel and tension are adjustable. When the two

paddles are treated as one, the HD-1410 operates as a single-paddle keyer with dot and dash memory. Iambic operations forms most characters with reduced wrist movement. Dots and dashes are self-completing and always in the proper proportion. The HD-1410 operates on either 120 VAC or 12 VDC. It features adjustable side-tone frequency, a built-in speaker, and headphone jack. A special weighted cabinet helps keep the HD-1410 stable to prevent annoying sliding during operation. The aluminum cabinet's low-profile styling and compact size won't block your access to other operating controls, either. It measures just 3" H x 5" W x 7 $\frac{5}{8}$ " D. And it's an easy-to-build kit.

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

Value-packed Dip Meter covers 1.6 to 250 MHz



Here's a real Heathkit Amateur Radio value — a better Dip Meter at a lower cost. The HD-1250 can be used to determine the approximate resonant or operating frequency of either energized or de-energized circuits. The Colpitts oscillator covers 1.6 to 250 MHz in fundamentals with a MOSFET paraphase amplifier and hot-carrier diodes for more sensitivity and a better dip. It uses a Q-multiplier for greater detector sensitivity and a responsive 150 μ A meter movement for positive resonance indications. Your HD-1250 Dip Meter includes a

phone jack for modulation monitoring. It's smaller and lighter than other Dip Meters, too. Whether you're checking resonant frequencies, adjusting traps, looking for parasitics, or using it as a signal generator, the HD-1250 is designed to go anywhere you do. It fits your hand, and thanks to its solid-state design and 9-volt battery operation (battery not included), it's always ready to use. It's easy to build, too — usually just a single evening. Once completed, the rugged aluminum-construction Meter stores handily in a custom molded gray carrying case. 2" H x 2 $\frac{9}{16}$ " W x 5 $\frac{7}{8}$ " L. The manual includes section on operation.

Kit HD-1250, Shpg. wt. 4 lbs. **69.95**





Heathkit/Zenith Novice License Course gets you on the air fast

\$39⁹⁵

- This deluxe learning Course now contains new material to prepare you for the latest FCC Amateur Radio Novice exam. It's guaranteed to help you get your Novice ticket and start talking to the world!

You, too, can communicate with the world via Amateur Radio, and the Heathkit Novice License Course is the most complete way to get on the air. Not only does it give you the information you need to pass the FCC Novice License exam, but this thorough Course even provides you with helpful guidelines for setting up and operating your own Amateur station once you pass the exam.

The Course includes two audio cassette tapes to aid you. The first is an introduction to Amateur Radio, an explanation of RST signal reporting, a review of circuit components, and a study of practical circuits. The second tape teaches you the Morse Code in letter groups, and then helps you bring your code speed up to five words per minute so you can pass the FCC test.

An attractive vinyl binder houses nine modules covering the material found in the FCC Novice written exam. Each subject is covered in an easy-to-understand, step-by-step manner. And, at the

end of each module, a multiple choice exam checks your understanding and retention.

Following Module 9, two practice exams and a final exam styled after the new FCC exam give you test-taking experience to make the actual 20-question, multiple choice written test a breeze. And, by passing the optional final exam with a grade of 75% or better, you will earn 1.0 CEU and a Certificate of Achievement.

The Course also includes a set of Operating Aids, plus an attractive 31" x 22" Frequency Spectrum Chart and a matching U.S. Call Area Map for display on the walls of your Ham station.

We are so sure this Course will help you get your license, that if you fail to pass the new FCC Novice exam after completing the Course, we will REFUND your money. Simply return the Course materials, along with your receipt and a copy of your rejection notice from the FCC.

So... if you have been putting off getting your Novice ticket because of fear of the code test or the written exam, the Heathkit/Zenith Novice License Course is the answer. It contains everything you need.

ER-3701, Shpg. wt. 7 lbs. 39.95
Kit HD-1416, CW Oscillator (see below)
Shpg. wt. 2 lbs. 14.95

What do you need to do to get started in the exciting hobby of Amateur Radio? Everything you need to know is covered in the Heathkit/Zenith Novice License Course, even information on how to apply to take your license exam. This complete Course will get you started on the right track to real Amateur Radio enjoyment.



Build up your code speed with this handy kit

\$14⁹⁵

Get your code speed up and pass your FCC exam with this handy Practice CW Oscillator. It features a telegraph key, phone jack and built-in speaker, plus volume and tone controls. And once you get your license, it can serve as a side tone oscillator for any transmitter using grid block keying. The cabinet measures 2 $\frac{5}{8}$ " H x 4 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. The HD-1416 uses a 9 volt transistor battery (not included). This easy-to-build, first-time kit even includes necessary solder.

Kit HD-1416, Wt. 2 lbs. 14.95



Get a money-saving start in Amateur Radio!

**SAVE
\$9⁹⁵**

This money-saving package gets you started in the exciting world of Amateur Radio.

We help you get started in Amateur Radio with savings on the ER-3701 Novice Course (above) and the HD-1416 Oscillator (left) when purchased together. We even include a certificate good for 10% off your first purchase of up to \$100 of Heathkit Amateur equipment. Purchased separately, the Heathkit Oscillator and Novice License Course would cost \$54.90.

ERS-3701, Shpg. wt. 9 lbs. 44.95

General License Course moves you up to voice communications

\$49⁹⁵

- Leave the Novice or CB bands behind and open new doors to the full range of Amateur Radio experiences. Earn your Technician or General Class License with the Heathkit ER-3702 General Class Amateur Radio Course.

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

Move up to the General Class and get all the added privileges - more frequencies to operate on, plus voice transmission, RTTY, SSTV, satellites, and more that you're missing as a Novice or CBer.

This Course provides extra code practice to bring your code speed 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 the confidence to pass the exam with flying colors.

An informative text takes you through the subjects covered on the new FCC written test. Its in-depth coverage will give you more than enough information to pass the latest FCC Technician or General Class License examination, opening up a world of voice communications to you.

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 Completion.

The General Course is arranged in 11 units:

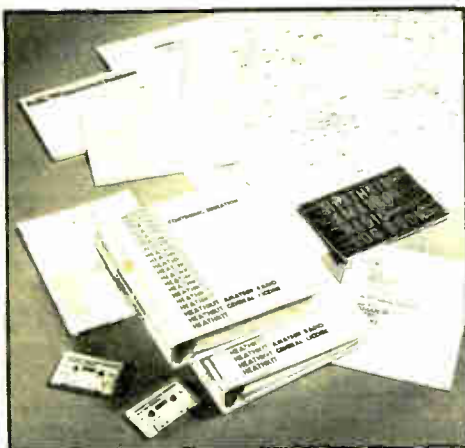
- Ham Radio Operation
- Direct Current
- Alternating Current
- Active Devices
- Electronic Circuits
- Measurements.
- Transmitters
- Receivers
- Antennas
- Practice Exams
- Getting on the Air

Your General License Course includes:

- Two vinyl binders
- Two 90-min. code tapes
- New FCC Form 610
- 4 Simulated exams
- Log Book
- T.V.I. Booklet
- Complete text
- Code workbook
- FCC exam schedule
- FCC rules and regulations
- World Call Map

The General Class License Course carries the same money-back guarantee as the Heathkit/Zenith ER-3701 Novice Course above. Don't delay any longer - get your Course now.

ER-3702, Shpg. wt. 24 lbs. 49.95



The Heathkit/Zenith General License Course leaves nothing to chance. It's designed to help you get your license in an organized, easy way. It's so good that we guarantee it!

See other popular Heathkit/Zenith courses in Weather, Automotive, Computers, Electronics, Math and more on pages 31-42, 47, 90, 91 and 92.



Have fun building and listening to this great 4-Band Shortwave Receiver — the ideal first kit

- Lets you cover 550 kHz through 30 MHz in four separate bands
- Built-in AM antenna plus connection for external antenna
- Built-in speaker plus headphone/external speaker jack
- Easy to build and easy to align without special instruments
- The perfect, practical introduction to the fun of kit building

If you're looking for a great first-time electronic kit — or simply a good low-priced shortwave receiver — the Heathkit SW-717 is your best buy. From the moment you tighten the final screw and turn this receiver on, you'll begin years of exciting shortwave listening enjoyment.

The SW-717 offers you complete coverage all the way from 550 kHz through 30 MHz in four bands. With it you can tune in foreign broadcasts from all over the globe — amateur CW (Morse code) and SSB (single sideband) transmissions, CB bands, local and marine weather reports, ships at sea, plus the standard AM broadcast band.

This 4-Band Shortwave Receiver is loaded with features that will help you snare the rare DX (distant) finds — features like a wide slide-rule tuning dial with logging scale; bandspread tuning for easy separation of crowded stations; variable BFO for CW reception; built-in speaker, and front panel jack for adding an external speaker or headphones like the GD-396 Superex Phones at right.

Your SW-717 also features switchable automatic noise limiting; a signal-strength tuning meter, and built-in AM rod antenna plus a connection for attaching an external shortwave listening antenna such as the GRA-72 at right.

Up-to-date solid-state circuitry is used throughout this fine Receiver. You will mount most components on a single printed circuit board for ease of assembly and reliability of performance. The built-in power supply is transformer-operated from either 120 or 240 VAC, and uses four silicon diodes in a full-wave bridge circuit. Once you finish construction, you can align your SW-717 without the need for instruments. However, the thorough Heathkit assembly manual includes complete instructions for performing instrument-alignment, should you prefer.

The comprehensive illustrated manual that comes with your SW-717 guides you step-by-step from unpacking your kit to final plug-in. It even contains a section on soldering to help the first-time builder. The manual also includes instructions for operating your Receiver, as well as a reception guide listing bands, frequencies, zones and times of best shortwave reception, and tips on antenna installation.

Mobile, fixed 2-meter antennas increase your operating range

1 Hustler 2-Meter Mobile Antenna

This low-cost $\frac{3}{8}$ -wave mobile rear deck whip features 3 dB gain over a $\frac{1}{4}$ -wave ground plane. And it does it with a low, low SWR of 1.1:1. It handles up to 100 watts, too. The radiator is 47" tall. Includes 17' coax connectors. Mounts on the trunk lip. The unique "Hustleoff" design assures you of a positive, solid electrical ground plus extreme mechanical integrity.

HWA-202-3, Shpg. wt. 2 lbs. 23.95

2 Cushcraft Ringo Fixed Antenna

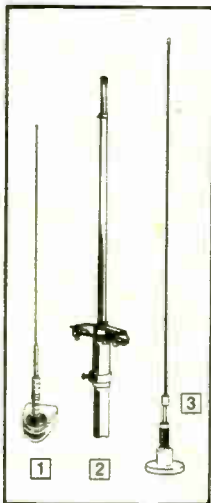
This popular fixed-location antenna covers 135-175 MHz in an omni-directional pattern for 3.75 dB gain over a $\frac{1}{4}$ -wave whip. It features direct grounding for lightning protection, a low angle of radiation, and wide operating bandwidth with low VSWR of 1.1:1. 52-n feed with PL-259. Less coax.

HWA-202-11, Shpg. wt. 2 lbs. 21.95

3 Cushcraft 2-Meter Magnetic Mount

$\frac{3}{8}$ -wave, 3 dB gain. Designed to cover 144-174 MHz with low SWR. Wind-tested in excess of 90 mph. Includes PL-259 connector and cable. 50 ohms. Comes to you preassembled.

HDP-1472, Shpg. wt. 3 lbs. 29.95



Not only is the SW-717 the ideal kit choice for the beginning electronics hobbyist, but it's especially recommended for use with the Heathkit ER-3701 Amateur Radio Novice License Course described on page 22. Order your Heathkit SW-717 now so you can begin the dual enjoyment of kit building and shortwave listening.

Kit SW-717, Shpg. wt. 10 lbs. 119.95

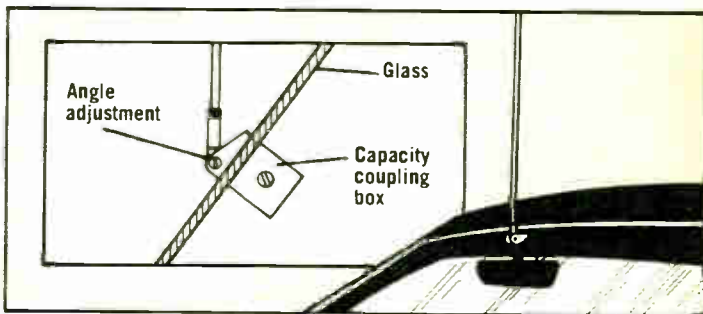
Long-wire SWL Antenna. Really helps pull in distant stations. 75-foot copper long wire with 30-foot lead-in, all insulators and hardware for easy setup. A must for the serious shortwave listener.

GRA-72, Shpg. wt. 2 lbs. 7.95

Superex Headphones. Ideal for use with the SW-717 and other shortwave receivers, as well as the HW-8 Transceiver on page 17. Shown in the photo above, the Superex Headphones feature dual coils for excellent sensitivity and a wide headband for comfortable listening. 600 ohms impedance.

GD-396, Fully assembled, Shpg. wt. 2 lbs. 7.95

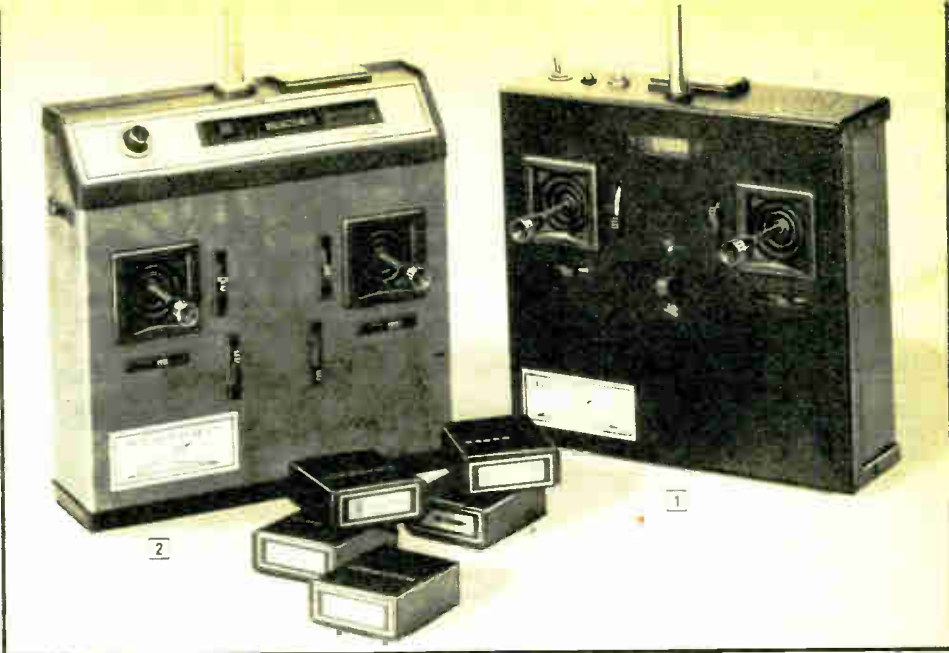
SW-717 SPECIFICATIONS: Frequency Coverage: Band A — 550 kHz-1500 kHz. Band B — 1.5-4 MHz. Band C — 4-10 MHz. Band D — 10-30 MHz. Meter: Indicates relative signal strength. Headphone Jack: Accepts low impedance headphones or external speaker. Loudspeaker: Built-in. Controls: Volume with on/off switch; Mode (AM, Standby & CW); BFO; Main Tuning; Bandspread Tuning; ANL on/off. Power Supply: Transformer operated; full-wave bridge rectifier. Power Requirement: 120/240 VAC, 60/50 Hz, 8 watts. Dimensions: 5 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 10" D.



This Avanti 2-Meter Mobile Antenna mounts on glass

There's no need for you to drill holes in the roof or fender of that new car: it's not necessary to fish a feedline up the wall of your Ham Shack into the attic. The amazing Avanti AH-151 3G 2-Meter On-Glass Mobile Antenna receives and transmits right through the window of your car or home. The Avanti attaches easily to car or home window with a special Duo Bond adhesive. The high-Q impedance coupling and tuning unit mounts inside the car window and is capacitively-coupled through the glass to the whip outside. Avanti's patented end-fed design provides 3 dB of gain in a true omnidirectional radiation pattern. With the Avanti no ground plane is needed, so this antenna can be used on fiberglass body cars, too. The Avanti exhibits 1.1:1 SWR and handles up to 150 watts. Whip length is 33". Designed for quick installation and instant driveaway, the Avanti also includes instructions for removal when you get ready to sell the car. Comes complete with 15 $\frac{1}{2}$ ' of coax feedline.

HOP-2402, Shpg. wt. 2 lbs. 29.95



Versatile Heathkit Pack-17™ R/C system grows along with your Radio Control hobby

The Heathkit Pack-17 R/C is a system you can live with — and grow with — as your interest and ability in radio control modeling grow. The unique, patented Heathkit Pack-17 Radio Control System gives you a choice of 17 different transmit and receive frequency modules. With this capability of instant frequency change, you don't have to wait when someone else is on your channel.

You get the performance and reliability every RC'er wants, plus build-it-yourself kit value. Heathkit Pack-17 Transmitters, Receivers and Servos have the quality and reliability you need for serious R/C competition. The easy-to-handle transmitters are compact and comfortable. The positive-action open-gimbal control sticks are smooth and responsive.

Leading the way in innovations, Heathkit Pack-17 was the first system of its kind to use ceramic filters to eliminate drift — and the first system to put eight channels in a single, convenient unit for added versatility.

With Heathkit Pack-17 R/C, you don't throw away expensive batteries after just a few hours. Rechargeable nickel-cadmium batteries are included with each transmitter to save you money. And Pack-17 R/C can be used with every kind of R/C model plane, boat, car or other application.

So if you are just getting started — or are upgrading — in the fascinating and exciting world of radio control modeling, you would be wise to put your money on a system that offers you real versatility and added value. That system, of course, is Heathkit Pack-17 R/C. It's a system loaded with convenience, and one that you can adapt to fit your expanding knowledge and requirements.

Start right, by starting with the system you can grow with — the Heathkit Pack-17 R/C! You'll be glad you did.

1 Put this top-flight value on the air — Heathkit 5-Channel Dual Open-Gimbal Stick Transmitter

Whether you're a beginner, weekender or experienced pro, here's an ideal transmitter for operating R/C planes, cars or boats.

The Heathkit 5-Channel Dual Open-Gimbal Stick R/C Transmitter gives you dual-stick control of four radio control channels (one with ratchet and three with spring return) plus a switch-activated auxiliary channel for retracts or other switched functions. Since you build it yourself, you can tailor stick to channel to suit your needs for interchanging throttle and elevator controls between right and left sticks. The latest design open-gimbal sticks provide you with smoothness and control you'll really appreciate as you run your models through their paces. Four trim tabs let you make fine adjustments.

Performance-proven circuitry provides years of trouble-free operation. Famous Heathkit plug-in module capability means you can change frequencies in an instant. The value-packed GDA-1919-1 Transmitter includes your choice of one

plug-in frequency module — specify the frequency you want from the list on the opposite page (no model number needed). Nickel-cadmium batteries and a battery charger (to charge both transmitter and receiver batteries at the same time) are included to save you money.

The comprehensive, step-by-step Heathkit instruction manual assures easy kitbuilding and do-it-yourself service, to save you more. For even greater savings, order your GDA-1919-1 Transmitter as part of a complete Heathkit R/C system from the next page. Transmitter dimensions: 6½" H x 7" W x 2" D (16.51 x 17.78 x 5.08 cm).

Kit GDA-1919-1, Shpg. wt. 4 lbs. 134.95

2 Get top versatility when you choose our top-of-the-line 8-Channel Dual Open-Gimbal Transmitter

Here are enough channels for all your flying, landing gear and auxiliary functions — plus open gimbal stick precision — all in our top-of-the-line Heathkit 8-Channel Radio Control Transmitter. Two control sticks and a retractable landing gear switch provide control of five servos. Three auxiliary controls allow control of three more servos. Four trim tabs allow you to make fine adjustments to the first four channels, without changing stick position.

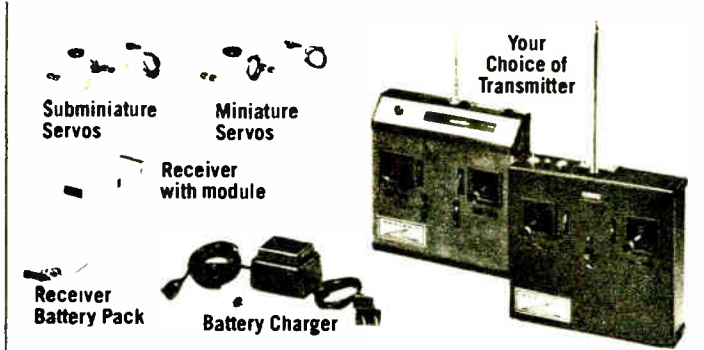
When you buy the GDA-1205-06 Radio Control Transmitter, indicate your choice of one plug-in transmit frequency module (at no extra charge) from the 17 available transmit frequencies listed on the opposite page (specify transmit frequency desired when ordering — no model number needed).

This kit includes a money-saving rechargeable 9.6 VDC nickel-cadmium battery pack and a recharger. To save even more, order your 8-Channel R/C Transmitter as part of a complete system package from the opposite page. This easy-to-build kit comes with a complete Heathkit instruction manual and all the solder you need. This is the one to order for real versatility. Transmitter dimensions: 7" H x 7" W x 2" D (17.78 x 17.78 x 5.08 cm).

Kit GDA-1205-06, Shpg. wt. 5 lbs. 154.95

GDA-1919-1 AND GDA-1205-06 TRANSMITTER SPECIFICATIONS: RF Frequency: Crystal-controlled on all bands. Frequency Stability: Within 0.005% on 27 MHz band; within 0.002% on 53 MHz and 72 MHz bands. RF Output Circuit: Pi Network. RF Input Power: 500 milliwatts. Modulation: On-off carrier keying. Controls: GDA-1205-06 channels: four with trim, on-off switch and trainer button; GDA-1919-1, 5 channels: four with trim and on-off switch. Operating Temperature Range: 0 to 160 F. — 37.77 to — 71.11 C. Power Requirement: Internal 9.6 VDC, 500 mA/h nickel-cadmium battery pack included. Rechargeable simultaneously with receiver battery, at 120 VAC, 60 Hz, 35-40 mA from recharger included. Overall Dimensions: GDA-1919-1, 6½" H x 7" W x 2" D (16.51 x 17.78 x 5.08 cm); GDA-1205-06, 7" H x 7" W x 2" D (17.78 x 17.78 x 5.08 cm). Net Weight: 2.75 lbs. with battery.

GDA-1205-2 RECEIVER SPECIFICATIONS: Local Oscillator Operating Frequency: Crystal-controlled on all bands. Sensitivity: 3 microvolts or better. Selectivity: 5 dB down at ±4 kHz, 30 dB down at ±9 kHz. Intermediate Frequency: 453 kHz. Power Requirement: Internal 4.8 VDC nickel-cadmium battery pack included. 20 mA drain. Controls: On-off switch. Operating Temperature Range: 0 to 160 F. — 37.77 to — 71.11 C. Overall Dimensions: 6.63" H x 7.75" W x 2.75" D (16.83 x 19.65 x 7.00 cm). Net Weight: 2 ounces.



Change frequencies in seconds, with plug-in ease

Pack-17 R/C provides unmatched in-the-field flexibility. If you encounter interference, change frequencies in seconds — with plug-in convenience. Seventeen transmit/receive modules are available, in three different bands.

NOTE: Amateur Radio License required for operation on 53 MHz band. Class C License required for operation on 27 MHz and 72 MHz bands. When ordering, specify the exact frequency desired (see list of available frequencies below).

Transmit Module, 1 lb. 24.95 Receive Module, 1 lb. 19.95

FREQUENCIES AVAILABLE (MHz): 27 MHz band — 26.995, 27.045, 27.095, 27.145, 27.195 MHz; 53 MHz band — 53.100, 53.200, 53.300, 53.400, 53.500 MHz; 72 MHz band — 72.080, 72.160, 72.240, 72.320, 72.400, 72.960, 75.640 MHz. (When ordering, specify transmit or receive module. No model number needed.)

SPECIAL OFFER — Save — buy 3 Transmit and 3 Receive Modules of your choice. \$134.70 separately.
SAVE \$34.75 Shpg. wt. 2 lbs. **ONLY 99.95**

High-quality Heathkit Servos, Receivers and Batteries

SERVO COMPARISON CHART	Miniature GDA 1205-4	Subminiature GDA-1205-5	High-Torque GDA-1205-8
No Load Current	80 mA	80 mA	150 mA
Stall Current (nom.)	450 mA	450 mA	1000 mA
Thrust	3 lbs.	3 lbs.	38 in. oz.
Travel Time	0.6 sec.	0.6 sec.	0.4 sec.
Rotary Travel	90	90°	90° or 180°
Dimensions (H x W x L)*	1 5/8 x 1 1/2 x 9/32"	1 11/16 x 3/4 x 2 5/32"	1 5/8 x 1 5/16 x 2 9/32"
Net Weight	1.75 oz.	1.25 oz.	1.75 oz.

SERVOs: Position Accuracy: 1%. Backlash: 0.002; Input Signal: Pulse, 1-2 ms, 4 V P-P Output: 1 rotary arm or 1 rotary wheel. **Temperature Range:** 0-160 deg F **Power Requirement:** 4-8 VDC *H includes outputs, L includes mounting ears.

Complete Pack-17 Systems — your best value

NEW

SAVE \$79.70 on complete system



Rugged R/C Airplane has 4' wingspan, Heathkit manual

Easy to build. Kit RP-1173, 17 lbs. **99.95**

SAVE \$79.70 on this Complete R/C Trainer System. RP-1173, GDA-1919-1 Transmitter, receiver/battery pack, transmit and receive modules, 3 servos. \$399.65 separately.

RPS-1173, 21 lbs. **ONLY 319.95**

SAVE \$89.70 on this 5-Channel R/C System

GDA-1919-1 Transmitter, receiver/battery pack, plug-in transmit and receive modules, four servos. GDS-1919, 9 lbs. **ONLY 239.95**

SAVE \$69.70 on this 8-Channel Stick R/C System

GDA-1205-OG Transmitter, receiver/battery pack, plug-in transmit and receive modules, four servos. GDS-1205-OG, 11 lbs. **ONLY 279.95**

- Subminiature Servo for Heathkit Pack-17 R/C Systems. Kit GDA-1205-5, Shpg. wt. 1 lb. **29.95**
- Miniature Servo for Heathkit Pack-17 R/C Systems. Kit GDA-1205-4, Shpg. wt. 1 lb. **29.95**
- High-Torque Servo for Heathkit Pack-17 R/C Systems. Kit GDA-1205-8, Shpg. wt. 1 lb. **34.95**
- Pack-17 R/C Receiver. Includes one frequency module (specify frequency). Kit GDA-1205-2, Shpg. wt. 1 lb. **59.95**
- Kit GDA-1205-3, Receiver Battery Pack, Shpg. wt. 1 lb. **14.95**



Be power-wise with Battery Monitor

Expanded scale voltmeter checks capacity of batteries (under load). Includes meter, connector for all Heathkit battery packs, clips and case.

Kit GD-1188, Shpg. wt. 1 lb. **15.95**

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- Adds convenience – saves both energy and money
- Control up to 16 groups of lights and appliances
- Can help deter intruders
- No special wiring needed

1 Standard Command Console – light the hall, turn on the news and start the morning coffee, from the comfort of your bed! Just plug Command Console modules into 120 VAC outlets – and plug appropriate lights, appliances into each module. Modules send signals via existing house wiring. Use as many modules – on the same code – as you wish. Use GDP-1511 Cordless Controller (below) to run this Command Console from up to 30' away. 4.75" H x 3.5" W x 3.5" D.

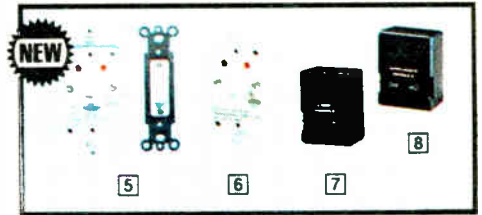
GDP-1510, Assembled. UL Listed, 2 lbs. . . . **34.95**

2 Cordless Controller. For GDP-1510 only.

GDP-1511, Assembled. UL Listed, 1 lb. . . . **19.95**

3 NEW! Assembled Telephone Responder Command Console with remote keyboard. Enjoy the convenience of controlling lights and appliances in your home, from any telephone! Call your home when you're away – and operate up to eight groups of 120 VAC lights and appliances. This BSR X-10 Command Console includes modular telephone plug and jack.

GDP-1515, Assembled and UL Listed, Shpg. wt. 6 lbs. . . . **89.95**



4 Timer Command Console creates "lived-in" look when you're away. Turns up to 8 groups of 120 VAC lights and appliances on/off, twice daily. Power failure clears memory, prevents accidental on/off cycles. No dim feature.

GDP-1520, Assembled, UL Listed, 2 lbs. . . . **64.95**

5 NEW! 3-Way Wall Switch Module. Control 3-way wall switches. Includes two switches with independent on/off buttons. 120 VAC, 500 Watts.

GDP-1516, Assembled, UL Listed, 1 lb. . . . **21.95**

6 Lamp Module turns on off, dims 120 VAC incandescent lamps. 300 W. 2.25" H x 2" W x 1.5" D.

GDP-1512, Assembled, UL Listed, 1 lb. . . . **15.95**

7 Wall Switch Module for 120 VAC lights. Dims lights when operated by GDP-1510. 500 Watts.

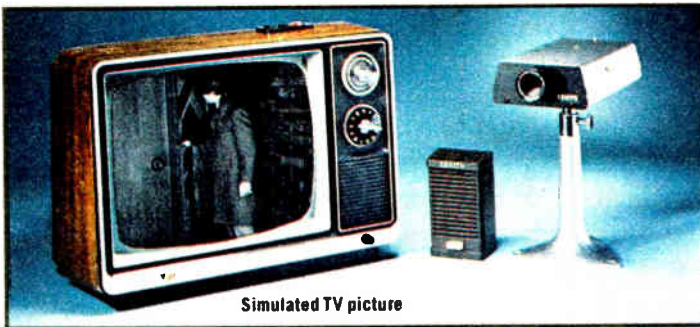
GDP-1513, Assembled, UL Listed, 1 lb. . . . **16.95**

8 Appliance Module for most 120 VAC devices/lights, including self-starting fluorescents (no dim feature). 15 Amps resistive or 1/2 hp motor.

GDP-1514, Assembled, UL Listed, 1 lb. . . . **15.95**



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NOW ONLY
\$349⁹⁵

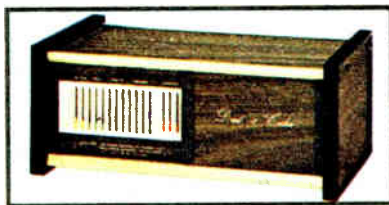
Use the Zenith Video Sentinel System to answer the door, view the caller and talk safely – or to monitor indoor or outdoor locations. Includes a fully operational 12" diagonal black-and-white VHF/UHF TV set, camera with stand, doorbell button (attaches to present doorbell), intercom, 60-foot camera-to-TV cable and 25-foot intercom-to-TV cable. TV Dimensions, 11.38" H x 16.25" W x 12" D.

GDZ-620, Assembled and tested, 28 lbs. . . . Was **\$399.00**, NOW ONLY **349.95**

Telephone Security Dialer calls for help

When an intruder trips your alarm, this solid-state device automatically calls a friend, relative, neighbor or the police. Separate microphone lets you listen to secured area. Automatic redialing if line is busy. Uses four 9 VDC batteries (included). 4.75" H x 11" W x 6" D.

Kit GD-1156, Shpg. wt. 7 lbs. . . . **179.95**



26/SECURITY

The ultrasonic Informer® protects an entire room



\$59⁹⁵

**FAST, EASY
2-EVENING KIT**

- Sound waves "see" to 25' away
- Delay lets you enter without setting off the alarm
- Use as automatic light switch for safer entries
- Book cover design conceals unit

Activates indoor buzzers, outdoor bells or lights when field is broken. Also use the informer to alert you to a child getting out of bed. Book-like styling fools intruders. NOTE: Since the GD-49 operates on the same frequencies as some ultrasonic TV remote controls, positioning to eliminate interference may be required. For 120/240 VAC power. 10.88" H x 2.38" W x 7.5" D.

Kit GD-49, Shpg. wt. 5 lbs. . . . **59.95**

GDA-39-1, Indoor Buzzer Alarm Accessory, Shpg. wt. 1 lb. . . . **10.95**

GDA-39-2, 120 VAC Alarm Bell Accessory, Shpg. wt. 5 lbs. . . . **29.95**

Timed Wall Switch

For 120 VAC, 40-300 Watt incandescent lights. Accepts 48 daily on/off settings. Randomness for lived-in look.

GDP-1236, Assembled, 1 lb. . . . **19.95**

Low-priced Eye Spy™ Alarm

Activates warning devices when beam is broken. Use 120 VAC devices to 300 W. Light source, mirror, relay. Relay, 5.38" H x 4.38" W x 5.25" D.

Kit GD-1021, 3 lbs. **17.95**



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

Minuteman II Alarm System keeps intruders out of your home or business, day or night

- Component system design offers total flexibility
- Famous Delta Minuteman II Alarm System – available in kit form

No house, apartment or business is immune from burglary or vandalism. So what can you do to protect yourself, your loved ones and your property? One way to assure protection is by using Delta's Minuteman II Ultrasonic Alarm System.

Minuteman II is a complete security system: This space protection system uses harmless ultrasonic sound. Strategically placed, it will effectively protect your home or business. Or, if you feel the need for more security, it's expandable – because Minuteman II acts as a master control for other units you want to add. For example, you can add up to three Minuteman Sentinel Detectors – along with indoor/outdoor speakers, key-operated on/off switches, magnetic door contacts, window foil or any other closed circuit switch.

Portable protection: If you move, you can take Minuteman II with you.

Dependable security: Exit (16 seconds) and selectable entry (none or 8 seconds) delays prevent false alarms. Ten rechargeable AA batteries (included) keep the system working after intruders cut 120 VAC line current (does not protect against blackouts). Self-testing circuits assure reliable operation.

Available in affordable, easy-to-build kit form: Heath brings you the Minuteman II alarm system, exclusively in kit form, at prices designed to fit your budget. Easy kit assembly, with step-by-step Heath-kit manuals. Separate components described below. Not for outdoor use.

1 Control Unit/Detector runs Minuteman II alarm system

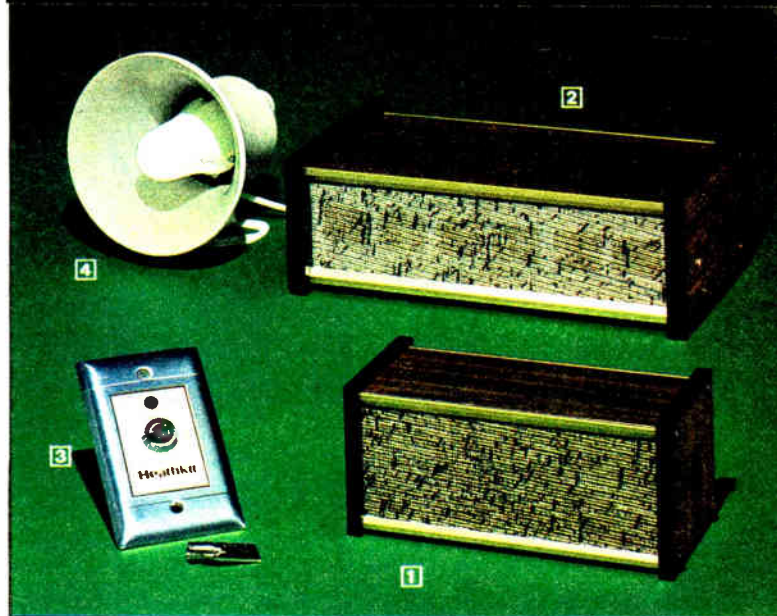
Master Control Unit/Detector protects up to 300 sq. ft. with ultrasonic sound. Controls on/off functions, entry/exit delays, alarm timer, test circuits. Powers external alarm speakers (GDA-1800-3, below right), can initiate a telephone call through the GD-1156 Telephone Security Dialer (opposite page). Includes plug-in power transformer and provisions for perimeter, supervised, closed circuit security (windows foils, magnetic door contacts). 120 VAC, 60 Hz. 3.75" H x 11" W x 6" D. May interfere with other ultrasonic equipment.

Kit GO-1800, Shpg. wt. 7 lbs. 189.95

2 Minuteman Sentinel gives you additional protection

Slave ultrasonic detector protects up to 300 sq. ft. Includes 50' of 4-cond. wire. Requires GD-1800 for power/control. 3.25" H x 7" W x 3.25" D.

Kit GOA-1800-1, Shpg. wt. 4 lbs. 64.95



3 Key Switch provides remote alarm system control

Arm or disarm your Minuteman II Alarm System with this professional-looking key switch accessory. Includes loop-secure LED, to positively indicate armed and secure status – along with a special pick-resistant key and lock set. Requires GD-1800 Master Control Unit/Detector for power. Overall dimensions, 4.5" H x 2.75" W x 2" D (11.43 x 6.99 x 5.08 cm).

GDA-1800-2, Shpg. wt. 3 lbs. 29.95

4 All-Weather Speaker sounds indoors or outdoors

Produces up to 108 dB of high/low siren noise (measured at 10'). Suitable for indoor or outdoor installation. Includes 50 feet of wire for connection to GD-1800 Control Unit/Detector. Impedance, 8 ohms. Up to 2 of these speakers may be driven from GD-1800. Dimensions, 5.75" H x 5.75" W x 6.75" D.

GDA-1800-3, Shpg. wt. 3 lbs. 24.95



Infra-red Security Light Control helps make your home safe during those long, dark nights

\$139⁹⁵

- Makes house safer at night, detects/deters intruders
- Automatically turns on lights when movement is detected

One of the most useful security devices you can buy – available exclusively in kit form from Heath! The GD-3510 Security Light Control, by Colorado Electro-Optics, uses a passive infra-red sensor to turn on lights at night, when motion is detected.

When an intruder is detected, the GD-3510 surprises him with the most recognized deterrent to crime – light. The unexpected lighting makes the intruder think that he has been observed.

You can adjust the GD-3510's 25' x 25' range to automatically light driveway, walkways and steps – to help prevent accidents and light a warm welcome for visitors – as well as for yourself.

How does this revolutionary device work? The passive infra-red sensor detects changes in temperature, when accompanied by motion. It will not

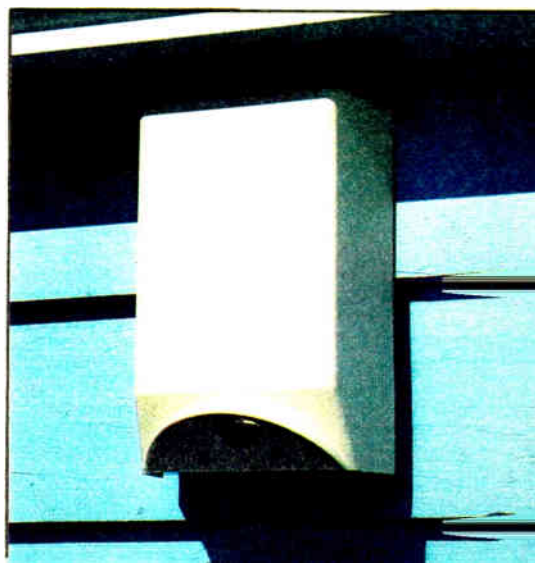
trigger on temperature changes without movement. When a warm-bodied object moves through the detection pattern, a relay turns on lights or devices (up to 500 watts). Unit automatically shuts off 4 minutes after all movement has ceased. Manual sensitivity control lets you adjust sensitivity to optimum level. Photo-transistor prevents unit from triggering during daylight.

Save energy, too. Night lighting is used only when needed – not all night long.

You'll enjoy this kitbuilding experience: The thorough Heathkit manual shows you how.

Wire yourself – or consult an electrician, when wiring to your 120 VAC, 60 Hz lighting system. Outdoor Sensor Unit: 8.06" H x 5.25" W x 3" D.

Kit GO-3510, Shpg. wt. 3 lbs. 139.95



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



Dual alarms
allow separate
wake-up times

NEW

FM/AM Clock Radio has 2 alarms, power reserve



- Set separate husband/wife wake-ups – or one for weekdays, other for weekends
- Clock Radio keeps operating up to 4 hours after blackout

Precise Zenith R-476 Clock Radio has two 24-hr. alarms. Use Touch n' Snooze to take 9-min. cat-naps for up to an hour. LEDs show time or date. Doze off to music – set radio to play for up to an hour, then shut off. AFC on FM. Connection for external FM antenna. Big 4" speaker.

If AC is off during the night – for up to 4 hrs. – alarm will still wake you up on time. Power Reserve battery recharges while radio is plugged in. 120 VAC. 4.25" H x 11.50" W x 6.50" D.

GRZ-476, Assembled, Shpg. wt. 5 lbs. **79.95**



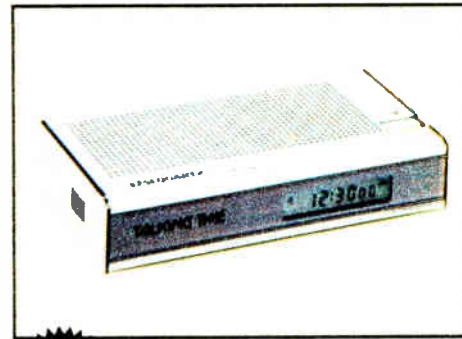
Enjoy good FM/AM sound from this Zenith AC/DC Portable Radio

- Automatic Gain Control (AGC) smooths sudden variations in signal, volume
- Sturdy 3.5" speaker and tone control for good sound from this portable radio
- Uses 3 "C" cells or built-in line cord

Here's a portable radio with a speaker big enough to give you enjoyable music and understandable news – the Zenith R-70. Tuned stages and ceramic filters provide excellent reception, while AGC prevents sudden variations in volume.

Solid-state circuit design reduces energy usage. Comes in Shadow Taupe/Black cabinet with bright aluminum and chrome trim. Uses 120 VAC, 60 Hz power or three 1.5 VDC "C" cell batteries (not included). 5.75" H x 9" W x 2.75" D.

GRZ-70, Assembled, Shpg. wt. 4 lbs. **37.95**



NEW

Talking Digital Clock with alarm and timing features

- Pleasant voice gently wakes you – can also make periodic time announcements
- Also functions as accurate digital timer
- Compact – fits easily in shirt pocket for maximum portability

Gentle voice wakes you, with reminders 5 and 10 minutes after alarm time if you don't wake up. Even says, "Please hurry." Can also pleasantly announce time every half-hour in office or den. Use as timer with pleasant voice announcements. Timer functions up to 9 hours, 59 minutes, 59 seconds. Multi-function LCD display. Sharp CT-660E fits almost anywhere – even in pocket. Uses two 1.5 VDC AA-size cells (included). 0.88" H x 4.50" W x 2.38" D (2.24 x 11.43 x 6.05 cm).

GDP-1660, Assembled, Shpg. wt. 2 lbs. **79.95**



Communicate conveniently with Heathkit Wireless Intercom

- No wiring between units – uses house wiring
- Add as many units (sold separately), as desired, to the system
- Phase-locked loop (PLL) circuit assures quiet operation

Here's an intercom you can use anywhere indoors – from baby's room to laundry, from garage/workshop to kitchen – anywhere you plug units into the same outdoor pole transformer. Just build, plug into AC outlet and communicate.

Pleasant call tone signals other units. Transmit indicator lights in talk mode. Dictate switch allows hands-free operation, monitoring baby's room. Automatic squelch helps reduce noise when not in use. 3-inch speaker.

For 120 VAC, 60 Hz power. Sturdy plastic cabinet measures 3" H x 8.63" W x 5.75" D. May be mounted on wall. Add as many stations as you wish, at any time; at least two stations (each station sold separately) are required to operate.

Kit GD-1114, 3 lbs. each station **49.95**



Ultrasonic Cleaner makes parts, jewelry, even dentures sparkle



FAST, EASY
2-EVENING KIT

- Cleans delicate items safer and faster than is possible with other cleaning methods
- Cleaning occurs at dirty areas, where it's needed

Brighter jewelry, clean parts that last longer and work better, even cleaner dentures are yours with the efficient GD-1151 Ultrasonic Cleaner.

Deep clean delicate items (except pearls, turquoise) that could be damaged by harsh cleaning agents. Fill the stainless steel tank with any safe cleaning solution – place the object(s) in the tank – set the timer for up to 5 minutes – and the GD-1151 Cleaner does the rest with gentle, yet effective ultrasonic sound waves.

For 120 VAC, 60 Hz. Durable plastic cabinet measures 4.6" H x 5.8" W x 11" D. Tank (including lid) measures 6" L x 4" W x 2.4" D.

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

Here's a great holiday gift for music students and teachers



- Keeps tempo from 40-210 beats/minute



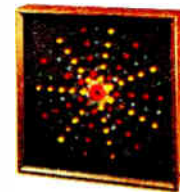
The Heathkit Electronic Metronome is the ideal way to practice music. It maintains a steady beat, so the student can practice at the correct tempo. Adjust tempo between 40-210 beats per minute with a front

panel control. True "tick-tock" is adjustable with a rear panel control. A handy chart on the cabinet helps the musician relate the number of beats per minute to tempos in different time signatures. Uses two 9 VDC batteries (not included). Cherry-finish birch cabinet measures 6.75" H x 3.34" W x 4" D (17.15 x 8.48 x 10.16 cm).

Kit TD-1257, Shpg. wt. 2 lbs. **22.95**

Light Show enlivens music

Add visual excitement to your sound system with our Light Show. Attaches easily to the speaker leads of any sound source. See your stereo pulse 140 lights (red for bass, blue for lower midrange, green for upper midrange and amber for treble), which appear to spin and flash with the music. For 120/240 VAC power. Measures 22.75" H x 22.75" W x 4.50" D (57.79 x 57.79 x 11.43 cm).



Kit TD-1006, Shpg. wt. 34 lbs. **109.95**



Zenith Trans-Oceanic Portable Radio covers world and local communications bands

\$379⁹⁵

- Receive 12 bands — AM, FM, CB, SW, LW, Air, PSB
- Use as a radio direction finder out at sea
- Designed with state-of-the-art electronic components
- Runs on battery power, 120 or 240 VAC house current

The Zenith R7000 Trans-Oceanic 12-Band Radio is a superior multiple-band portable receiver with many features formerly found only on commercial and military radios. It offers a wide variety of radio listening adventure on its 12 bands. Besides the standard AM and FM broadcast bands, you also get coverage of Citizen's Band (CB) frequencies, shortwave bands (both normal and single sideband transmissions) which are used by both commercial stations and amateur radio operators around the world, longwave AM, VHF aircraft and public service bands.

Use the Trans-Oceanic as a radio direction finder, to supplement primary navigation equipment. This is particularly useful to yachting enthusiasts when out of sight of land. Home in on a station to guide your craft to shore — or determine your position by finding two different signals and intersecting their vectors on a map.

Advanced engineering and communications technology give the Trans-Oceanic superior reception, sensitivity, selectivity and operating convenience. Sophisticated tuning circuitry offers easier, more precise tuning of SSB and other closely-spaced signals. Dual-gate MOS FET RF Amplifier circuitry handles signal overloads more effectively, eliminating distortion from nearby stations. Up-conversion mixing techniques offer superior image rejection. Double balanced IC mixers improve spurious signal rejection, keeping undesired stations locked out. Uses built-in or external antennas.

Operates on world-wide house current: Requires eight 1.5 VDC "D" cell batteries (not included) or 120/240 VAC, 50/60 Hz house current. Meets UL and CSA standards for fire and electrical shock. The Zenith Trans-Oceanic Radio is your best choice in a quality all-purpose receiver.

SWZ-7000, Assembled, Shpg. wt. 13 lbs. 379.95



SWZ-7000 SPECIFICATIONS: Frequency Ranges: LW Band, 170-450 kHz; AM Broadcast Band, 540-1600 kHz; SW 1 Band, 1.8-4.0 MHz; SW 2 Band, 4.0-7.4 MHz; SW 3 Band, 7.4-10.4 MHz; SW 4 Band, 11.0-15.5 MHz; SW 5 Band, 15.5-22.0 MHz; SW 6 Band, 22.0-30.0 MHz; SW 7 Band, 26.8-27.5 MHz (electronically spread to allow increased tuning range for the 40 CB channels); FM Broadcast Band, 88-108 MHz; VHF Aircraft Band, 108-138 MHz; VHF High Band, 144-172 MHz. **RF Amplifier Circuitry:** Dual-gate MOS FET. **BFO and SSB Product Detector:** Crystal-controlled. **Spurious Signal Rejection:** Provided by double balanced integrated circuit (IC) mixers. **Power Requirements:** Eight 1.5 VDC "D" cell batteries (not included) or 120/240 VAC, 50/60 Hz. **Overall Dimensions:** 9.38" H x 14.06" W x 6.56" D (23.82 x 35.71 x 16.66 cm), with handle folded down. **Net Weight:** 13.75 lbs. (without batteries).

Save a big \$110 on this action-packed Pinball Game and enjoy more stay-at-home family fun

\$389⁹⁵

- Eighteen scoring areas for high-point action
- Keeps score for 1-4 players
- Build yourself and save — takes only two evenings

Now save a big \$110.00. The Schussring high-action board keeps the ball lively and zippy between the thumper bumper, kickers and spin gates. Two independent flippers keep the regulation pinballs moving.

Play your friends: The GD-1210 Aspen Pinball Game has a microprocessor-based electronic memory that keeps score for up to four players during each five-ball game. It shows the player shooting and the number of the ball in play for greater fun and excitement.

High scoring action: Eighteen scoring areas give you the opportunity to score over a million points. The 19.50" x 33" (49.53 x 83.82 cm) lighted playing surface features a 1000-point thumper bumper, two 50-point jet kickers, three rollover switches, three 50-point spin gates, three 100-point target gates and six 50-point rubber band bumpers — plus bonus scoring areas.

This is no toy: The GD-1210 Aspen Pinball Game is solidly built, with seven musical melodies. The game is enclosed in a sky blue pre-painted wood cabinet. And it's easy to build — the playing field and all circuit boards are factory assembled and tested. Operates on 120 VAC, 60 Hz power. Overall Dimensions, 59.50" H x 25" W x 49.50" D (151.13 x 63.50 x 125.73 cm).

Kit GD-1210, Shpg. wt. 141 lbs., Motor Freight . . . Was \$499.95, NOW 389.95



The Programmable Heathkit Darkroom Timer gives you consistent developing quality for great photos

\$129⁹⁵

- Process with microprocessor-timed accuracy
- Program up to 9 steps, auto-step sequencing

Features 4-digit LED clock to time developing and enlarging steps. Memory holds up to 9 processing steps, one enlarging step. Auto-step sequencing automatically loads the timer, so you're ready for the next step. Alarm settings for developing steps are marked at 1, 30 or 60 second intervals (any combination), or once at the end. Ten-second end-of-cycle alarm tells you when to begin the pour from the tank. Optional Auxiliary Outlet turns on an external device (such as a color drum) during countdowns in Process Mode. Enlarger and safelight outlets are toggled so one goes on when the other turns off. Optional foot switches make operation even easier.

Darkroom chemicals won't hurt the backlit Litetouch™ front keyboard panel. Metal Case. 120/240 VAC. Dimensions, 3.13" H x 9.25" W x 5.88" D.

Kit PT-1500, Shpg. wt. 5 lbs. 129.95
PTA-1500-3, Optional Auxiliary Outlet, Shpg. wt. 1 lb. 14.95
PTA-1500-1, Optional Single Foot Switch, Shpg. wt. 1 lb. 10.95
PTA-1500-2, Optional Dual Foot Switch, Shpg. wt. 3 lbs. 26.95

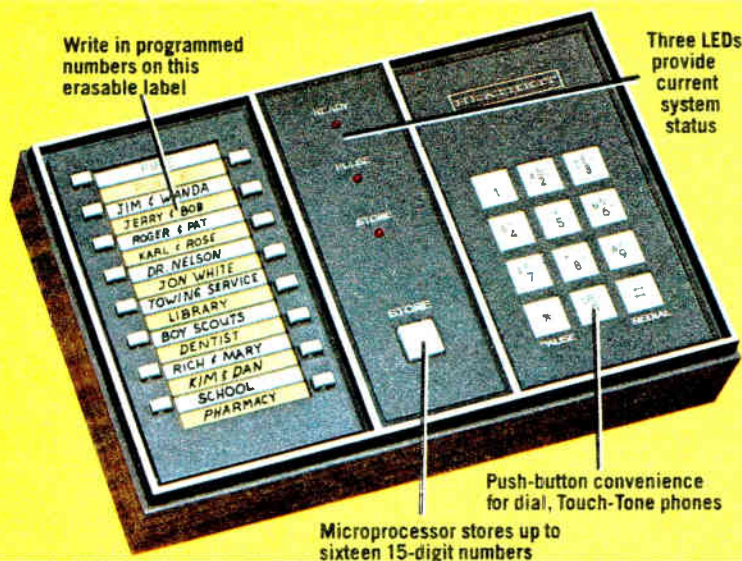
PT-1500 SPECIFICATIONS: Switched Outlets: Enlarger, 1000 W; Safelight, 100 W (Enlarger, Safelight outlets not for inductive loads); Optional Aux. Outlet, 100 W. **Timing Accuracy:** Determined by accuracy of AC line frequency.



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

Write in programmed numbers on this erasable label

Three LEDs provide current system status



Push-button convenience for dial, Touch-Tone phones

Microprocessor stores up to sixteen 15-digit numbers

Dial frequently-used telephone numbers with Heathkit one-button convenience

\$79⁹⁵

- Use just one button to call up to 16 separate phone numbers; pushbutton re-dial if line is busy
- Respond fast in any emergency situation — use memory to store police, fire, ambulance numbers
- Converts dial phones to push-button convenience

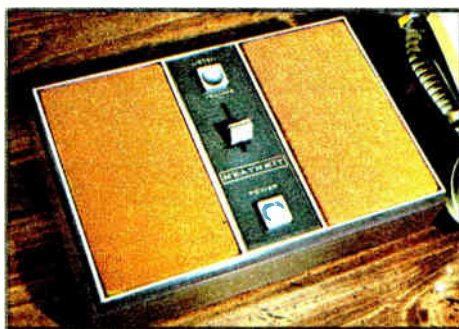
The Heathkit One-Button Telephone Dialer ends the inconvenience of looking up every number. Program emergency numbers — and the numbers of frequently-called neighbors, businesses, friends and relatives. It can store up to sixteen full 15-digit telephone numbers (enough for all access or area codes).

Easy programming lets you change numbers quickly. A memory-saver circuit maintains stored numbers during power failures (9 VDC battery not included).

The GT-1217 converts any telephone to pushbutton convenience. Compatible with both standard and Touch-Tone services, it complies with all FCC interconnection regulations. However, it cannot be used on party lines or pay telephones.

An ideal first-time kitbuilding experience, our Dialer is housed in a 2" H x 8.75" W x 5.75" D high-impact plastic case. It features an attractive two-color heavy-duty label that allows you to write in the numbers you have programmed. The label is easily erasable. FCC approved. 120 VAC.

Kit GT-1217, Shpg. wt. 3 lbs. **79.95**



Save time! Talk or listen with both hands free

\$49⁹⁵

- Talk without lifting receiver
- Talk from up to 10 feet away
- Easy assembly, installation

Our Phone Amp lets you work with both hands while talking on the phone. Press the power button to answer the phone; press it again to hang up.

Voice-activated switch changes instantly from talk to listen. Talk from up to 10 feet away.

Easy-to-build kit includes 1/4" phone plug, 1.75" square 4-pin phone plug and 6' of 4-conductor cable for fast installation. Uses one 9 VDC battery (not included) or AC power with battery eliminator below. FCC approved. Requires telephone to initiate calls. 2.50" H x 9.50" W x 5.75" D.

Kit GD-1112, Shpg. wt. 3 lbs. **49.95**

PS-2350, 120 VAC Batt. Eliminator, 1 lb. . . . **7.95**

Customer-owned equipment connected to telephone lines may be subject to a local tariff.



Call for your phone messages from anywhere in the world!

\$299⁹⁵

- Great when both husband and wife work, or for taking calls when you're not home

The Record-A-Call Remote 80A Telephone Answering System won't let you miss important messages. A remote control allows you to call the 80A from another phone and hear all your messages automatically. After listening, reset your tape to the beginning — or save all previous messages, while recording new calls. Twin-cassette system means you can play back messages without listening to your own pre-recorded message each time.

Voice-actuated, so callers won't be cut off in mid-sentence. Or choose fixed 30-second message time.

Use the 80A as a dictating machine, or record 2-way conversations using the beeper. FCC approved. 120 VAC. 3.88" H x 11.88" W x 9" D.

GDP-1237, Assembled and tested, 12 lbs. . **299.95**



Cordless extension phone goes with you

\$199⁹⁵

- Cordless unit works up to 600' away from telephone
- Includes battery recharger

Make or receive telephone calls up to 600 feet away from your phone — with no wiring to get in the way! The Muraphone MP-600/601 Cordless Extension Phone's duplex circuitry lets you talk and listen at the same time, with conventional phone quality. Handset is small enough to carry in your pocket. 12-button dial pad includes button which remembers last number dialed. AC adapter (included) keeps handset's batteries fully charged. Base unit draws power from phone line. Base, 7" H x 8" W x 2" D with 23.50" telescoping antenna; Handset, 2" H x 2.38" W x 8.63" L. Includes 4.5' phone cord. FCC approved. Minimum of 2 wall phone sockets required. Not for party lines, pay phones. Notify phone co. before installation.

GDP-1239, Assembled, 5 lbs. **199.95**

Turn on lights and appliances with just a touch

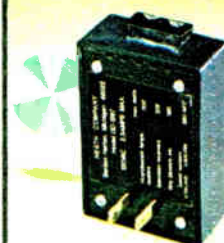
\$18⁹⁵

Tap the touch plate, and our Remote Control Kit turns lights or appliances on or off instantly. Place the touch plate right where you want it — in any location, at any height. Takes just one evening to install — assembly to set-up. No rewiring — plug into 120 VAC outlet; plug in lamp or appliance.

The main unit plugs between an outlet and a lamp or appliance cord.

Remote Kit for incandescent lamps to 150 Watts. Kit GD-1187, 1 lb. **18.95**

Remote Kit for TVs to 225 W, fans to 180 W. Not for AM radios. Kit GD-1287, 2 lbs. **19.95**



30/HOME PRODUCTS

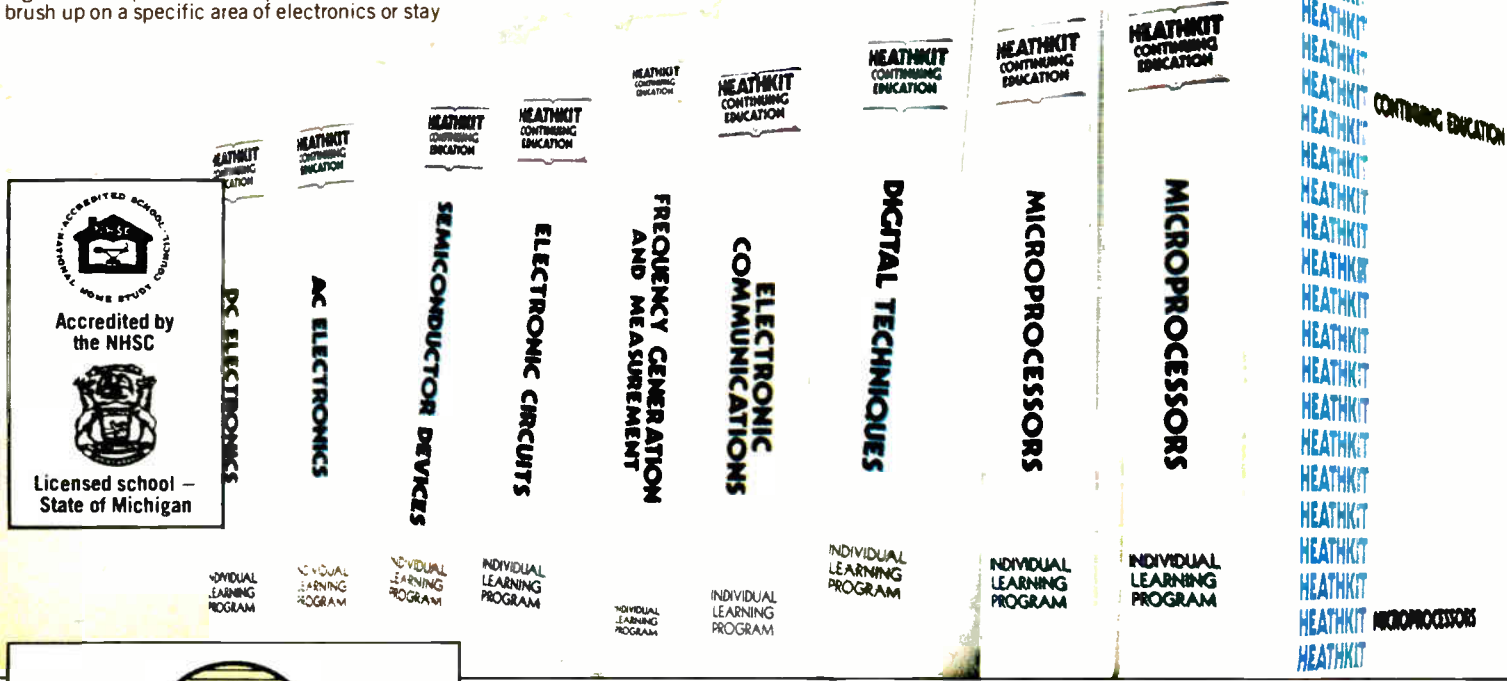


Credit Card Orders Call TOLL-FREE: 800-253-0570

Heathkit/Zenith Educational Courses save you time and money

Heathkit/Zenith Educational Courses are the low-cost, time-saving way to learn. The easy-to-follow format saves time, and you pay far less than for comparable adult education or vocational courses. Clearly-written, well-illustrated programmed-learning texts and audio/visual aids (used with most courses) speed learning, and experiments provide the hands-on ingredient so important for learning. Our Courses take you from DC all the way through digital techniques and microprocessors. You can brush up on a specific area of electronics or stay

abreast of new technological advances as they unfold. And you can study specialized courses in computer programming, amateur radio licensing and automotive repair to fit your training needs. You can earn Continuing Education Units by taking our Heathkit/Zenith Courses, and your course may qualify as a tax deduction - check with IRS.



ACCREDITED SCHOOL
NATIONAL HOME STUDY COUNCIL

Accredited by the NHSC

Licensed school - State of Michigan



Earn College Credit for taking many Heathkit/Zenith courses

The American Council on Education, a nationally recognized accrediting authority, recommends that member colleges grant credit for several of our courses. See "The National Guide" for course recommendations.

If you have taken the course and passed the examination for any of the courses on pages 32 through 35 (EE-3101, -3102, -3103, -3104, -3105, -3201, -3401) or EC-1100 on page 90, you may be eligible for college credit. Check with your college first.

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, EE-3105, ECC-3201, ECC-3401, ECC-1100, Shpg. wt. 1 lb. each each 25.00

\$24.95

- Programmed instruction text assures understanding
- A/V presentations aid retention, speed learning

Now save \$5.00 on non-technical Concepts of Electricity Course

Not sure you can grasp electronic principles? This award-winning Course will show you how easy it is. No technical background is required for this Course, which uses audio/visual teaching methods to introduce you to electricity. And the Concepts of Electricity Course can serve as a valuable introduction to rest of the Heathkit/Zenith Basic Electronics Series (EE-3101 through -3105, featured on pages 32 through 34.)

A programmed-instruction text, enhanced by clear visuals and two audio cassettes, teaches you each concept in an easy to follow sequence to build a

solid foundation. Review examinations throughout the Course check your knowledge to insure that you learned the required material.

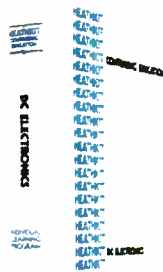
When you complete the Course, you will know the basics: Ohm's Law, series and parallel circuits, electromagnetism, direct and alternating current, generators, motors, and basic meter operation. Upon completion, pass the optional final examination with a score of 70% or better, and you will earn 1.0 Continuing Education Unit and an attractive Certificate of Achievement.

EE-3100, 5 lbs. Was \$29.95, NOW ONLY 24.95



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

DC Electronics Course — your starting point in learning electronics



\$49⁹⁵

- Your key to the fascinating world of electronics is this proven, complete DC Electronics Course
- Electronic components provided for all experiments
- Features 20 "Hands-on" experiments in DC electronics

This DC Electronics Self-Instruction Course will start you on your way to a complete understanding of the fascinating, expanding world of electronics knowledge.

You are introduced to the fundamentals of current, voltage, resistance, magnetism, Ohm's Law, electrical measurements, inductance and capacitance. This Course takes you through each new concept step by step to give you a solid foundation in electronics. This professionally designed course uses the specially-written self-instruction text, carefully placed programmed reviews, and records to reinforce the learning process. These advanced teaching methods mean you retain more of what you learn in the Course.

Hands-on experiments help you understand by giving you practical proof that the theory really works. You will acquire a detailed knowledge of DC electronics in a very short time. A knowledge of high school mathematics is assumed in the Course. However a math review is included in the text, should you require a refresher.

Should you choose to take the optional final examination for the Heathkit/Zenith DC Electronics Course, a passing grade of 70 percent or better will earn you 2.0 Continuing Education Units (a nationally-recognized way of acknowledging participation in non-credit adult education courses), plus a Certificate of Achievement from Heathkit/Zenith Educational Systems.

The DC Electronics Course includes a comprehensive text housed in its own attractive, sturdy vinyl binder, records containing the audio material, and the 56 electronic components necessary to perform the 20 experiments that are part of the Course. The optional ET-3100A Experimenter/Trainer is required to complete the Course experiments. Optional cassette tapes duplicate the records. VOM required to perform experiments.

EE-3101, Shpg. wt. 7 lbs. 49.95

Save \$10! EES-3101A, includes EE-3101 and ET-3100A Kit Trainer, 13 lbs. 119.90

EEA-3101, Optional Cassettes, Shpg. wt. 1 lb. 11.95

Spanish Language DC Electronics Learning Course. (Less EB-6101-30 Parts for experiments. See pg. 42 for more information.)

EE-3101S, Shpg. wt. 7 lbs. 54.95



Includes 56 components for 20 experiments.

Records introduce each topic

MONEY-BACK GUARANTEE

All Heathkit/Zenith self-instruction courses carry a complete guarantee of satisfaction. If you are dissatisfied with the course, return all materials (less trainer) and your receipt, for a full refund of the purchase price.

Learning Dictionary is electronics "short-course"



Includes compendium of 16 topic outlines that turns this Dictionary into a low-cost course in electronics. Put our learning Dictionary on your bookshelf today! 832 pages.

EB-1010, 3 lbs. 14.95



Sturdy, attractive plastic case

2-range variable sine & square wave signal generator

1 K and 100 K linear potentiometers

Dual-variable power supplies

Solderless breadboarding sockets

Experimenter/Trainer augments electronics courses

\$79⁹⁵

- Get hands-on experience building circuits, doing course experiments
- Use the ET-3100A later for breadboarding and experimenting

Seven of our popular electronics courses use this versatile Trainer. The ET-3100A Experimenter/Trainer is designed for use with the DC, AC, Semiconductor, Electronic circuits, Electronic Communications, Electronics for Hobbyists and Test Instruments Self-Instruction Courses. You'll get maximum benefit out of each of these Courses by doing the hands-on experiments on this Trainer.

The Experimenter/Trainer features solderless breadboarding sockets for ease of component substitution, a 2-range variable sine and square wave (200 - 20,000 Hz) signal source, dual-variable power supplies for positive and negative voltages-(1.2 to 16 volts, 120 mA), 1 k and 100 k linear potentiometers. A center tapped transformer provides 30 volts rms, 60 Hz for line experiments.

The Heathkit/Zenith ET-3100A Experimenter/Trainer can be wired for either 120 or 240 VAC, 50/60 Hz

operation. The instrument measures a compact 3½" H x 12½" W x 11¾" D (8.9 x 30.8 x 29.8 cm).

The ET-3100A has been designed to give you exactly the kind of invaluable, practical experience you need. It works side-by-side with text materials to drive home important points made in the Heathkit/Zenith Educational Courses which are designed for use with this trainer.

And your Heathkit/Zenith Experimenter/Trainer will continue to give you value, even after you've completed your basic electronics courses. It's ideal for putting your newly acquired knowledge to use in breadboarding your own circuits and experiments with circuit design.

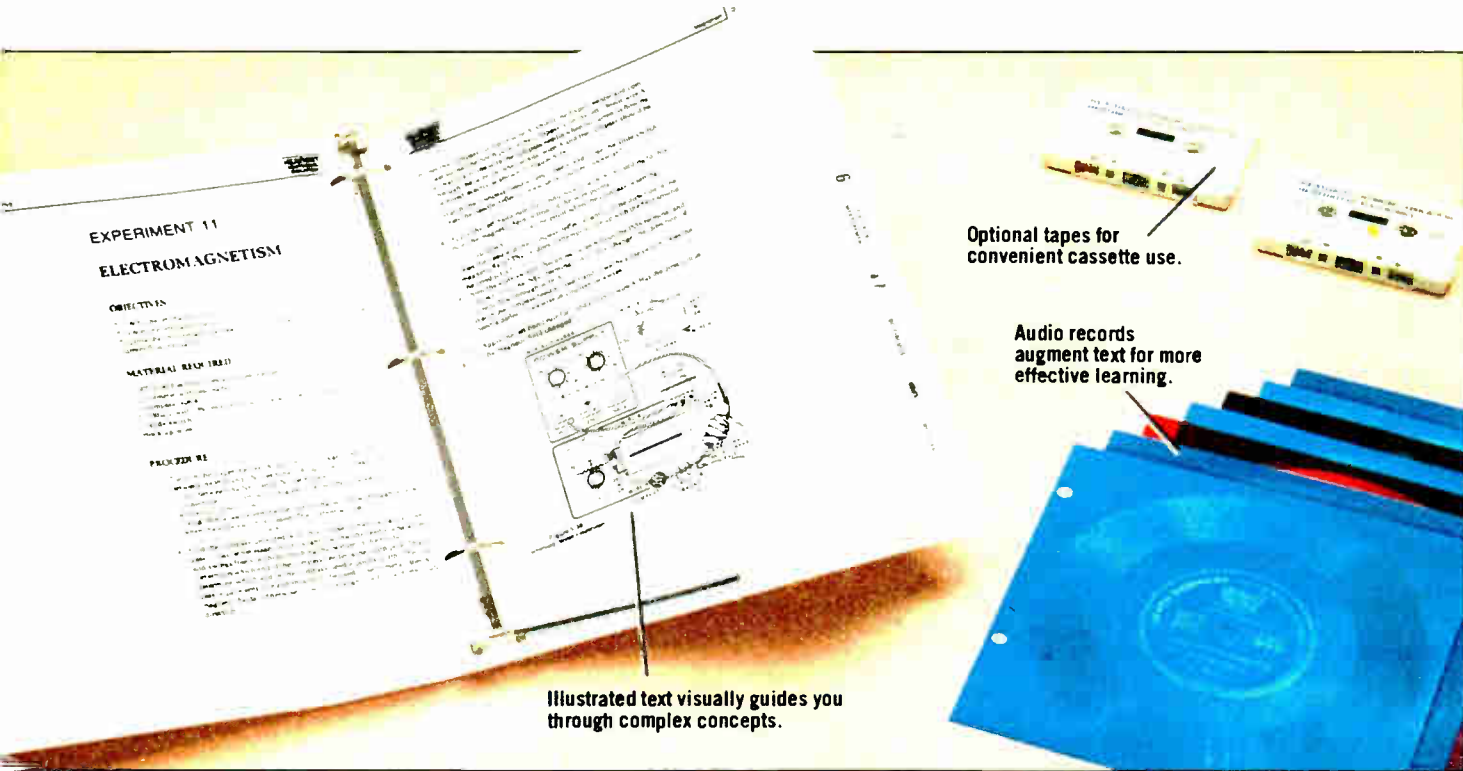
Save money by getting your Experimenter/Trainer with a course - or, for even bigger savings, as part of the basic electronics system.

Heathkit/Zenith ET-3100A Experimenter/Trainer. Kit ET-3100A, Shpg. wt. 6 lbs. 79.95

Kit ET-3100AS, ET-3100 with Spanish manual, Shpg. wt. 6 lbs. 80.00

ETW-3100A, Factory Assembled Trainer, Shpg. wt. 6 lbs. 139.95





Optional tapes for convenient cassette use.

Audio records augment text for more effective learning.

Illustrated text visually guides you through complex concepts.

AC Electronics Course enhances understanding

\$54⁹⁵

- Logical course arrangement for effective learning experience
- Audio/visual materials make learning easy and fun
- Leads to a thorough understanding of basic AC electronics

This outstanding and easy to understand self-instruction course in AC electronics, from Heathkit/Zenith Educational Systems, guides you through the theory of alternating current.

The programmed learning format presents instruction a little at a time for fast, effective learning. And reviews insure that you understand the material before you continue. You'll see these principles in action when you do the hands-on experiments.

When you complete the course, you will be able to explain the difference between AC and DC; describe the operation of AC generators; determine average, peak, peak-to-peak, and effective values of an AC sine wave, and analyze its frequency, period and phase, then measure these values.

You'll learn how to measure current, voltage and power; analyze AC circuits which contain resistance; understand and describe capacitance and capacitive reactance; analyze AC circuits with capacitance or capacitance and resistance; understand mutual inductance, self-inductance and inductive reactance; analyze series and parallel resonant circuits; analyze AC circuits with inductance or inductance and resistance.

You'll also be able to determine the current, voltage and power relationships at the inputs and outputs of both ideal and practical transformer circuits; analyze and design RC, RL and LC filters.

Earn 1.5 CEUs – score 70% on optional final exam. DC Course (EE-3101) or equivalent knowledge is desirable. Optional cassettes duplicate records. ET-3100A Trainer and VOM required to perform experiments.

EE-3102, Shpg. wt. 7 lbs. 54.95

Save \$10! EES-3102A, EE-3102 and ET-3100A Kit Trainer, 13 lbs. . . . 124.90

EEA-3102, Optional Cassettes, wt. 1 lb. 11.95

Spanish Language AC Electronics Course; (less EB-6102-30 Parts for experiments. See page 42). EE-3102-S, Shpg. wt. 7 lbs. 54.95

Semiconductor Devices – a solid-state course

\$54⁹⁵

- Brings you up to date on the field of solid-state electronics
- Teaches all about semiconductor devices, using effective teaching methods
- Provides you with hands-on experiments for practical experience

Your background in electronics would not be complete without this introduction to solid-state technology.

The Semiconductor Devices Course presents the fundamentals of solid-state electronics. Audio aids help emphasize the comprehensive text material. And you get hands-on experience with the interesting experiments that are part of the Course.

This comprehensive Course covers fundamentals of diodes, zeners, bi-polar transistors, FETs, thyristors, ICs and opto-electronic devices. Eleven different experiments give valuable hands-on experience.

When you complete this Course, you will be able to describe the electrical characteristics of semiconductors; name the primary advantages of semiconductor devices over vacuum tubes; explain how semiconductor devices operate; describe how semiconductors are constructed.

You will also learn how to use semiconductor components properly; recognize semiconductor packages and their schematic symbols; design your own circuits using semiconductors; and test various semiconductor devices.

ET-3100A Trainer and VOM required for experiments. To gain full benefit from this course, the DC and DC Electronics Courses (EE-3101, – 3102) – or equivalent knowledge – is recommended as a prerequisite.

Earn 3 CEUs – score 70% or better on the optional final exam. Optional cassettes duplicate the records included with the course.

EE-3103, Shpg. wt. 6 lbs. 54.95

SAVE \$10! EES-3103A, EE-3103 and ET-3100A Kit Trainer, 11 lbs. . . . 124.90

EEA-3103, Optional Cassettes, wt. 1 lb. 11.95

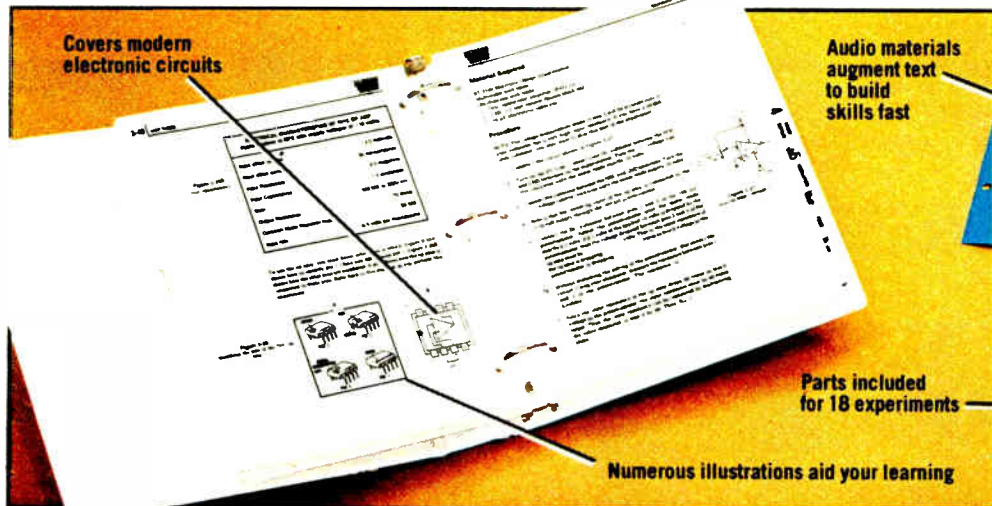
Spanish Language Semiconductor Devices Course. Direct translation of the famous course. (Less EB-6103-30 Parts for experiments. See page 42).

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



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

Electronic Circuits Course turns theory into practical experience



- Our proven instructional techniques help you grasp those difficult concepts
- Hands-on experiments reinforce those concepts for better retention
- Lets you apply knowledge learned in previous courses

Covers modern electronic circuits

Audio materials augment text to build skills fast

Parts included for 18 experiments

Numerous illustrations aid your learning

This Heathkit/Zenith Electronic Circuits Course ties all of the fundamentals you've learned in previous courses to practical circuits that you'll encounter in modern electronics.

Unit 1, Basic Amplifiers, introduces several configurations and their operation, coupling and biasing. **Unit 2, Typical Amplifiers**, focuses on five major types: Direct Current, audio, video, Radio Frequency and Intermediate Frequency amps. **Unit 3, Operational Amplifiers**, explains op-amps and their characteristics, closed-loops, active filters, comparators and differential amplifiers. **Unit 4, Power Supplies**, includes rectifiers, filters, voltage regulation and multipliers.

Unit 5, Oscillators, teaches you the fundamentals, RC, LC, and crystal oscillators, tank circuits and high-frequency oscillators. **Unit 6, Pulse Circuits**, includes waveshaping, wave generators, clippers and clammers. **Unit 7, Modulation**, covers the principles of Amplitude Modulation, Frequency Modulation, heterodynes and detection. You will experiment freely with transistor and IC circuits, and learn how to use a voltmeter and oscilloscope to analyze many of the circuits mentioned.

The **Electronics Circuits Course** includes an easy-to-follow text enhanced by clear visuals to assure your complete understanding. It is housed in an attractive vinyl binder, including records and over

100 electronic components for 18 experiments. Optional tapes duplicate the material on records in easy-to-use cassette format. Exam worth 4.0 CEUs. You should first complete DC and AC Electronics and Semiconductor Devices (EE-3101 - 3103), or have equivalent knowledge.

For the experiments, you must have an oscilloscope like the Heathkit IO-4105 on page 65, a VOM and the ET-3100A Trainer on page 32.

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

Save \$10! EES-3104A, EE-3104 and ET-3100A Kit Trainer, 13 lbs. 134.90

EEA-3104, Optional Cassettes, Shpg. wt. 1 lb. 11.95

Test Equipment Course stresses applications



- Covers a wide variety of modern test instruments
- Experiments provide insight to operation and practical applications of test equipment

Troubleshooting is a valuable skill. This Course will lead to a better understanding of the methods and application of test instruments in servicing electronic equipment.

In **Unit 1, Analog Meters**, we present the Ammeter, Voltmeter, Ohmmeter, VOM, plus decibels (dB) and logarithms. **Unit 2, Digital Meters**, explains analog-to-digital conversion, signal

processing, types of probes, displays and specifications. **Unit 3, Oscilloscopes**, teaches you about Cathode Ray Tubes, deflection circuits, single- and dual-trace scopes, and circuit troubleshooting methods.

Unit 4, Frequency Measurement, concentrates on both passive frequency and dip meters, electronic counters, heterodyne frequency meters, and transfer oscillators. **Unit 5, Frequency Generators**, takes you through vacuum tubes, as well as signal, Radio Frequency and function generators. **Unit 6, Special Measuring Instruments**, concentrates on bridge circuits, the transistor tester, curve tracer, spectrum analyzer and logic probes.

The **Fundamentals Electronic Courses** (EE-3101 to -3104) and Digital Techniques (EE-3201) or equivalent knowledge are the required background.

The **Test Instrument Course** includes four texts in attractive vinyl binders and all electronic components for the experiments. A digital meter, analog meter, oscilloscope, frequency generator, frequency counter and the ET-3100A Trainer are required to complete the experiments.

Take the optional final exam, pass with a grade of 70% and earn 6.0 CEUs.

EE-3105, Shpg. wt. 18 lbs. 64.95

Save \$10! EES-3105A, includes EE-3105 and ET-3100A Kit Trainer,

Shpg. wt. 24 lbs. 134.90

Learn Electronic Communication quickly, easily



- Detailed experiments provide hands-on learning
- Includes a comprehensive 400-page text and all components for conducting experiments

Here's your chance to learn the fascinating variety of new technologies involved in electronic communications, in your spare time and at your own pace!

Unit 1, Communications Fundamentals, defines electronic communications. This unit includes discussions of time/frequency relationships, linear mixing, a review of complex waveforms and modulation. **Unit 2, Amplitude Modulation**, discusses single-sideband, double-sideband and suppressed carrier AM as well as collector, series and progressive series modulation.

AM Receivers, **Unit 3**, discusses AM detectors and tuned RF receivers - covering AM receiver characteristics like sensitivity, selectivity, image frequency, and intermediate frequency selection. **Unit 4, Angle Modulation**, fully covers FM demodulators, the angle modulation transmitter, phase-locked loops, a schematic analysis of an FM transceiver and other modulation circuits. **Unit 5, Pulse Modulation**, covers both analog and digital pulse modulation, including quantization and multiplexing. **Antennas are presented in Unit 6** - discussing types, uses and installation. **Communication Systems**, **Unit 7**, introduces FM stereo, TV and data communications systems.

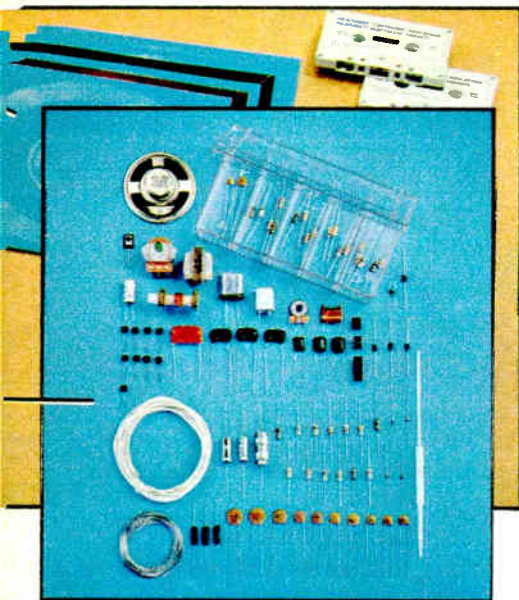
In **7 hands-on experiments** you'll build an AM transmitter, balanced modulator, AM detector, FM transmitter, receiver, pulse modulator, time division multiplex transmitter and data communications modem. All necessary parts included. ET-3100A Trainer (page 32) or equivalent required.

This course can follow up EE-3101 to -3104. Final exam is worth 2.0 CEUs.

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

Kit ET-3100A, Trainer, 6 lbs. 79.95





BIG SAVINGS on this 6-item group!

These five courses (EE-3101 - 3105): DC Electronics, AC Electronics, Semiconductor Devices, Electronic Circuits, Electronic Test Equipment (with four texts) and ET-3100A Experimenter/Trainer kit. \$369.70 separately.

EES-3115A, Shpg. wt. 56 lbs. **319.70**



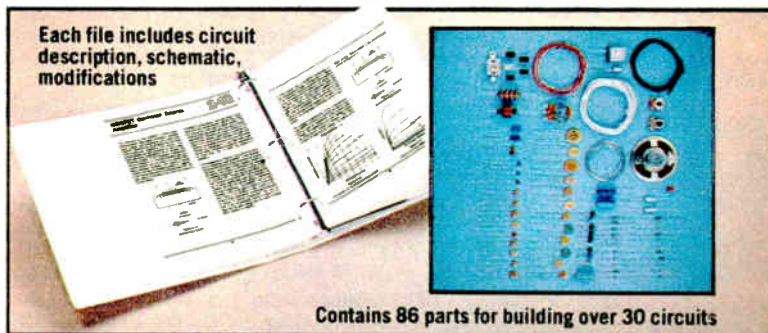
Two solid-state circuit courses give hands-on experience

These hardware-oriented courses are designed for the student experimenter, radio amateur or computer enthusiast. Text is to-the-point and you learn circuit operations by building and observing performance. When finished, you'll have a quick Reference File and save money.

Linear Circuits Course teaches advanced circuit techniques



- Study each circuit; build it yourself
- Has 86 components worth \$45 retail
- All new course material concentrates on practical ideas, using linear circuits



Each file includes circuit description, schematic, modifications

Contains 86 parts for building over 30 circuits

The **Linear Circuits Self-Instruction Course** is an easy-to-understand integration of text, diagrams and experiments to make learning faster.

This hardware-intensive Course consists of a series of circuit "files" arranged in progressive order. Each contains a brief description of a circuit, its operation, a complete schematic, and several interesting modifications of the basic circuit. The course emphasizes "doing" rather than reading. Circuit types covered include bipolar transistors, field-effect transistors, the 555 timer and 741 op-amp linear circuits. You construct various amplifiers, oscillators, astable and monostable multivibrators, pulse position and pulse width modulators, and

active filters, among others, using the complete parts inventory supplied for you.

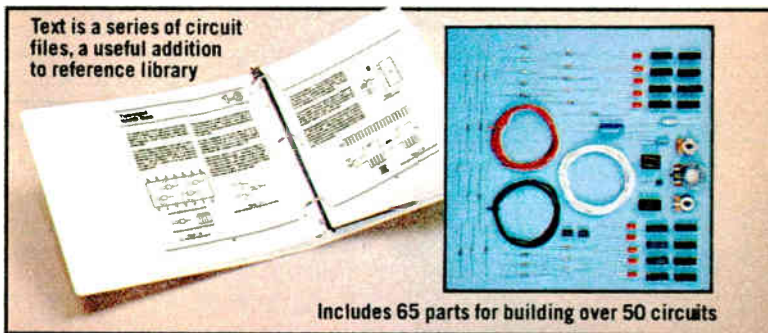
For your convenience use the ET-3300 Trainer (page 41). However, all circuits can be constructed and tested using your own breadboards. To observe circuit operation, you'll need a voltmeter like the IM-5218 on page 61, and an oscilloscope such as the IO-4205 on page 65. Prerequisites are DC and AC Electronics, and Semiconductor Devices (EE-3101 - 3103, see pgs. 32-33) or equivalent. The Course is housed in an attractive, durable vinyl binder, which will become a valuable reference file. Pass the optional final exam with a grade of 70% and earn 4.0 Continuing Education Units and a Certificate of Achievement.

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

TTL and CMOS Circuits instructs in basic logic circuits



- Use components worth over \$70 to construct over 50 advanced circuits
- Study each circuit, then build and experiment with it
- Clear, comprehensive text serves as handy reference



Text is a series of circuit files, a useful addition to reference library

Includes 65 parts for building over 50 circuits

The **EH-702 TTL and CMOS Circuits Course** will expand your knowledge quickly and give you practical experience with digital logic design and integrated circuitry.

The modular format of circuit "files" permits a logical progression so you study and develop at your own pace. All electronic components needed to build the projects are supplied, including 18 integrated circuits. Little reading is required, because the Course places emphasis on construction and application of digital circuits.

You learn by building such circuits as the 7447 BCD

to seven-segment decoder, the D- and J-K-type edge-triggered flip-flops, the four-bit adder, the CMOS 100-kHz crystal oscillator, and quad bilateral switch, as well as 47 other circuits. Construct these state-of-the-art circuits on the ET-3300 Trainer (page 41) or use your own breadboard and power supplies. To observe circuit operation, you'll need a voltmeter like the IM-5218 on page 61, and a scope like the IO-4205 on page 65. Courses EE-3101 - 3103 (pgs. 32-33) are prerequisites.

Housed in a sturdy vinyl binder, the CMOS Circuits Course will be a useful addition to your reference library. Score 70% on the final exam and you will earn 6.0 CEUs and a Certificate of Achievement.

EH-702, Shpg. wt. 2 lbs. **59.95**



Soldering Course is fun, easy

\$16⁹⁵

- Ideal soldering course, even for the professional

This practical Course includes circuit board, components and solder to build a two-transistor light oscillator. Ideal for individuals, industry or schools.

Requires a soldering iron and small hand tools (see page 51).

EL-3133, Shpg. wt. 2 lbs. **16.95**



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

EDUCATION/35

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



- **COMPLETE:** Covers all the basics of microprocessors, microcomputers and programming — even includes hands-on 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 Course has introduced thousands of people, just like you, to microprocessors, microcomputers, interfacing and programming
- **ECONOMICAL:** Learn effectively for less — and after completing the Microprocessor Self-Instruction Course, you can even use the Heathkit/Zenith ET-3400A Microprocessor Trainer as a low-cost microcomputer for further breadboarding and design experiments

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

The Heathkit/Zenith Microprocessor Course's concise self-study textbooks, colorful audio-visual presentations and hardware experiments make microprocessor theory, design and application simpler for you to understand — even if you have no previous background.

You start by learning or reviewing the basics of computer number systems and codes. Then apply that knowledge as our prize-winning Microprocessor

SAVE \$25

Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$324.90. ET-3400A, Shpg. wt. 19 lbs. **ONLY 299.90**

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 Microprocessor Trainer is used with the experiments in the EE-3401 Course. It features a built-in 1K ROM monitor program for controlling unit operation. It also has a 6-digit hexadecimal 7-segment LED display for address and data read-outs, and monitoring logic states.

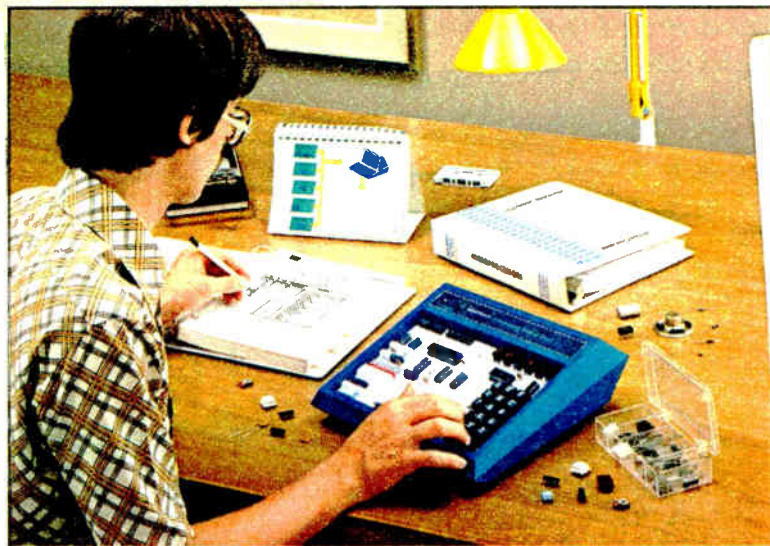
The 17-key hexadecimal keyboard permits you to access memory location to examine contents, then step forward or backward to examine other memory locations, change the contents of memory locations, examine and/or alter any of the MC6800 microprocessor's internal registers, set break points for program debugging, or reset the MPU. The flexible instruction set of the MC6800 permits five addressing modes, and uses two accumulators, an index register and stack pointer.

The ET-3400A has 256 bytes of Random Access Memory (RAM) built-in, and is expandable to 512 bytes with the RAMS supplied in EE-3401. It also features 8 buffered binary 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 buffered and 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 3.50" H x 12.13" W x 11.75" D.

The programming and interfacing experiments supplied with the EE-3401 Microprocessor Self-Instruction Course are implemented on the ET-3400A Trainer. While designed for use with EE-3401, 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-3400A Accessory for real computing power and versatility.



Course takes you step-by-step through computer arithmetic, programming, examination of popular microprocessors, and a study of interfacing and I/O operations you can put to use immediately.

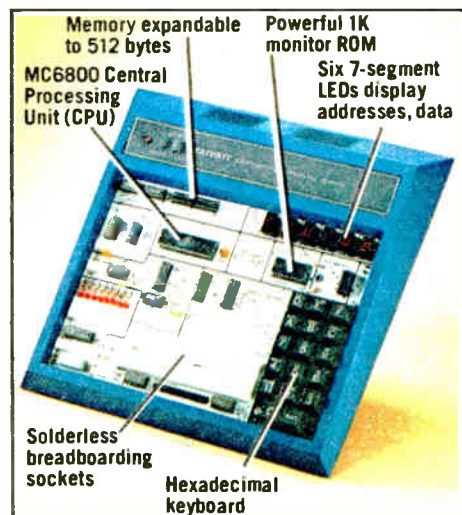
The Heathkit/Zenith Microprocessor Course is organized into ten learning units:

The first unit, **Number Systems and Codes**, covers decimal, binary, octal and hexadecimal numbering systems; conversions, binary codes and positional notation. **Microcomputer Basics**, the second unit, 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 operations — AND, OR, exclusive — OR and INVERT.

The fourth unit of this Course is an **Introduction to Programming**. It includes branching, conditional branching, algorithms and programming instructions.

The **6800 Microprocessor** is covered in **Units 5 and 6** of the Course, and includes architecture, instruction set, addressing modes, stack operations, subroutines, input/output (I/O) operations and interrupts.

The seventh and eighth units teach **Interfacing**. You'll learn interfacing fundamentals, interfacing with



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

Kit ET-3400A, Shpg. wt. 7 lbs. **224.95**
ETW-3400, Assembled, 6 lbs. **299.95**



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

Includes 62 components for experiments.

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

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

In the final unit of the Heathkit/Zenith Microprocessor Course, Interfacing Experiments, you put into practice everything you have learned about programming and interfacing. Using the electronic components supplied with the Course, you convert the ET-3400A into a digital clock, a musical instrument and a digital voltmeter. You experiment with address decoding, PIAs, input and output of data, parallel-to-serial conversion techniques, digital-to-analog and analog-to-digital conversion techniques, and interrupts.

Units 1-6 and Unit 9 assume no prior knowledge of electronics. Units 7, 8 and 10 assume knowledge equivalent to the Heathkit/Zenith EE-3201 Digital Techniques Course (described on page 39).

The EE-3401 Microprocessor Self-Instruction 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 Heathkit/Zenith ET-3400A Microprocessor Trainer (below, left) is required for the experiments.

If you choose to take the optional final examination, scoring a passing grade of 70 percent or better will earn you a full 8.0 Continuing Education Units (CEUs) and a Certificate of Achievement. A classroom version of this popular Course is also available – (see page 42).

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

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

Optional Film Slides duplicate the audio-visual flip charts.

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

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

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

SAVE \$70 Order EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together. \$546.90 separately.

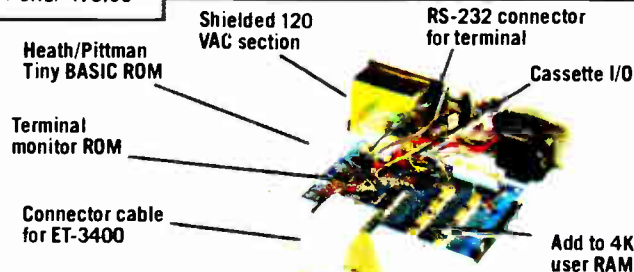
ETS-3401A, Shpg. wt. 28 lbs. ONLY 476.90

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 mA loop formats in the Accessory allows you to hook up a video terminal, such as the H-9 or the H-19 (page 73), or a 20 mA ASCII teletype machine. It also provides a cassette interface, enabling you to store programs on convenient cassettes. The ROM monitor/debugging program lets you implement the standard trainer monitor functions through the external terminal. Memory locations can be examined or changed, break points can be initiated, and program debugging can be accomplished with a single-instruction step feature. A Tiny BASIC Interpreter in ROM lets you program in easy-to-learn BASIC language. User function lets you run machine code routines from BASIC – the same machine code routines you learn in the EE-3401 Microprocessor Course.

The ETA-3400 connects to the Trainer by means of a 40-pin ribbon cable (supplied). Parts required to modify the Trainer are also included. Since this Modification changes the clock frequency of the Trainer, the experiments in the Microprocessor Course using timing loops will be changed. It is recommended that all of the EE-3401 experiments be completed before adding this Trainer Accessory. An H-9 or H-19 Video Terminal is required to use BASIC and monitor software features of the ETA-3400.



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

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

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

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

ETA-3400-1, Optional 3K Chip Set, Shpg. wt. 1 lb. 47.00



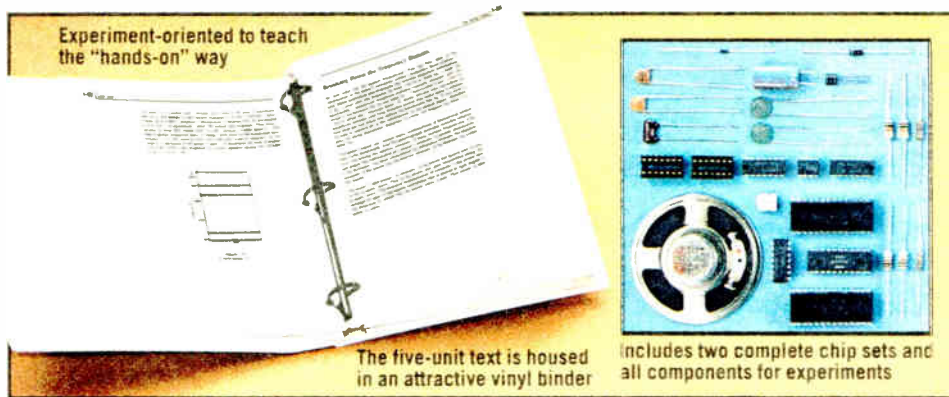
Alaska, Hawaii and Michigan Residents: Call 616-982-3411

EDUCATION/37

NEW

Voice Synthesis Course is the fast, economical way to teach your computer to talk

- Includes complete chip sets for digitized and phoneme voice synthesis
- Purchased separately, chip sets would cost nearly twice the price of the entire Course
- Experiments in the text give you hands-on experience



Experiment-oriented to teach the "hands-on" way

The five-unit text is housed in an attractive vinyl binder

Includes two complete chip sets and all components for experiments

Get on speaking terms with your computer — our new 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 computer talking to you in no time. This five-unit Heathkit Zenith Course consists of a 250-page text filled with experiments in voice synthesis, and the chip sets and other electronic components necessary to perform these experiments. It teaches you digitized voice synthesis (fixed vocabulary with human voice qualities), and phoneme voice synthesis (which allows you to reproduce any English word). A practical Course featuring a great deal of experimentation, it cuts through the technical fog and gets right down to how to program and interface the two most popular voice synthesis devices. This Course is valuable in helping you understand the alternatives available in speech synthesis. So it will 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.

The Voice Synthesis Course includes complete chip sets for both digitized and phoneme voice synthesis:

1. The digitized chip set contains both a ROM chip and a synthesizer chip — featuring a more than 200 word vocabulary.
2. The phoneme set is all on one chip. If bought on an individual basis, the two chip sets alone would cost more than \$200.

The five units of the Course cover the human voice, with an overview of voice production and voice patterns; digitized speech, including linear and logarithmic coding, delta modulation and variable slope delta modulation; speech synthesis by linear predictive coding; the phoneme speech synthesizer

(PSS), and advance programming for the phoneme speech synthesizer.

In the Heathkit/Zenith Speech Synthesis Course you will learn the basic software and hardware necessary for breadboarding computer synthesized speech. The Course teaches the programming and interfacing you will 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 Trainers (page 36).

When you complete this Course you will be able to make your ET-3400 or ET-3400A Trainer (necessary for the course — see page 36) talk. Prerequisites for taking EE-3403 are EC-6800 (Introduction to Microprocessors Course — see page 38) or EE-3401 (Microprocessor Self-Instruction Course — see page 37) or equivalent knowledge. Passing the optional final exam with a grade of 70% or above will earn you 3.0 CEUs and a Certificate of Achievement — As with all Heathkit Zenith Courses, this one carries our guarantee — you must be completely satisfied with the course, or we will refund your total purchase price for the course (less Trainer) when you return it along with your receipt. The Speech Synthesis Course text is housed in an attractive vinyl binder.

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

Learn math fast with audio/tutorial courses — some at special savings



Algebra Fundamentals Course Text and 7 cassettes cover subject. Pass optional final exam for 2.5 CEUs.

EM-3, 6 lbs. Was \$49.95, NOW ONLY 34.95

Algebra Course with text, 10 cassettes covers polynomial arithmetic, factoring, functions, exponents, etc. 3.0 CEUs.

EM-4, 7 lbs. Was \$49.95, NOW ONLY 34.95

Intermediate Algebra Course with 9 cassettes covers relations and inverses, graphs and variation, linear and quadratic relations, etc. Earn 3.5 CEUs when you pass the final exam with a grade of 70% or better.

EM-5, 7 lbs. Was \$49.95, NOW ONLY 34.95

SAVE \$10. Order all three Algebra Courses. \$104.85 separately.
EMS-345, Shpg. wt. 20 lbs. ONLY 94.85

Mathematics for Science and Technology Course covers arithmetic and signed numbers, powers and roots, scientific notation, units and rounding, graphs, ratios and proportions, algebra, equations, triangle trig, vectors, probability and statistics. 4.0 CEUs.

EM-1, Shpg. wt. 9 lbs. 39.95

Think Metric, U.S.A. Course covers all aspects of the metric system with the aid of an audio cassette tape. Gets you ready for the introduction of the metric system in the U.S. Passing optional final exam earns 1.0 CEU and Certificate.

EM-2, Shpg. wt. 4 lbs. Was \$19.95, NOW ONLY 14.95



Descriptive Statistics Course includes text and 7 audio cassettes. For the person with limited background in statistics. Precede with EM-3 Course or equivalent. 3.0 CEUs.

EM-7, 6 lbs. 49.95

Inferential Statistics Course; sampling, hypothesis testing, t, f, and chi square distribution, etc. 3.5 CEUs.

EM-8, 8 lbs. 59.95

SAVE \$10. Order EM-7 and EM-8 together. Reg. \$109.90
EMS-78, 14 lbs. 99.90



Trigonometry Course teaches first-year trig. Includes text and 9 cassettes. Requires completion of EM-4 or equivalent. Covers circular functions, graphs, identities and proofs, inverse functions, conditional equations, right triangle trigonometry, solution of right triangles, and complex numbers. 4.0 CEUs.

EM-6, Shpg. wt. 7 lbs. 49.95

Recorder/Player for audio/tutorial courses

The ECP-3801A Cassette Tape Recorder/Player is recommended for use with courses containing audio cassettes. Pushbutton control play, rewind, fast forward, stop, eject and record functions. Also features a built-in condenser microphone so you can record or give dictation. Three-digit counter with reset button. Assembled and tested; not a kit.

ECP-3801A, Shpg. wt. 4 lbs. 60.00

Heath-recommended premium-grade audio recording tape, on cassettes.

ECP-3802, Three 30-minute cassettes, 1 lb. 6.00



Digital Techniques Course covers logic-ROMs

\$79⁹⁵

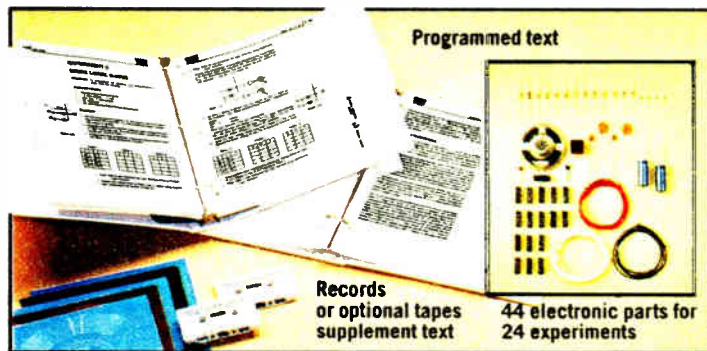
- Get the knowledge you need at a fraction of the cost of a comparable college or technical school course



Gain a working knowledge of Digital Techniques the fast, easy Heathkit/Zenith way. Learn at your own pace, with freedom to study what you want or need to study. Beginning with fundamentals and theory, it leads you through digital logic circuits, Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design.

This expertly-organized course shows you how to design digital circuitry for virtually any modern electronic application. It assumes a prior knowledge of electronics (the Heathkit/Zenith DC, AC, Semiconductors and Electronic Circuits Courses – see pages 32-34 – or equivalent knowledge).

The Course includes a comprehensive text in two vinyl binders, records (or optional cassettes), and 44 electronic components for performing the 24 experiments. The ET-3200A Trainer is required to perform the experiments. Also recommended are a multimeter like the IM-5284 (page 59) and single-trace oscilloscope like the IO-4105 (page 65). Pass the optional final examination with a grade of 70 percent or better to earn 4.0 CEUs. Begin your education in this important facet of electronics today.



Records
or optional tapes
supplement text

44 electronic parts for
24 experiments

EE-3201, Shpg. wt. 9 lbs. 79.95
SAVE \$15.00. Buy the Digital Techniques Course and the ET-3200A Trainer Kit together. \$169.90 if purchased separately.

EES-3201A, Shpg. wt. 14 lbs. 154.90

EEA-3201, Optional Cassettes, Shpg. wt. 1 lb. 11.95

Trainer gives maximum benefit from Digital Techniques Course

\$89⁹⁵

- Lets you perform all the Digital Techniques experiments
- Breadboard and test digital circuits of your own design

Get real hands-on experience when you use the ET-3200A Electronic Trainer to perform experiments in the Digital Techniques Course. Also build and test prototypes, verify circuit operation and check digital ICs. Solderless breadboard sockets aid experimenting and design. They take up to eight 14-pin or 16-pin dual in-line ICs; also 24-, 28- and 40-pin DIPs. Has four binary data

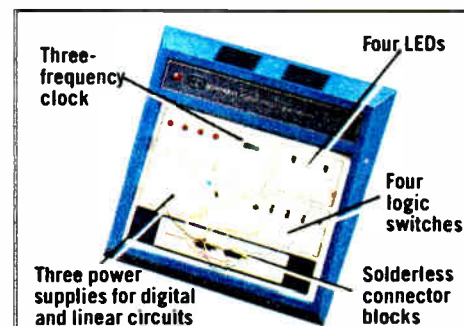
switches, two no-bounce switches to pulse logic circuits, three-frequency pulse clock generator and four LEDs for visual indication of logic states.

Regulated power supplies produce +12 VDC at 500 mA, -12 VDC at 100 mA and +5 VDC at 500 mA – all current-limited and overload-protected for greater safety. The ET-3200A Trainer is compatible with RTL, TTL, CMOS, ECL, NMOS, PMOS and Linear. 120/240 VAC.

Kit ET-3200A, Shpg. wt. 6 lbs. 89.95

Factory Assembled and Tested ET-3200A Trainer.

ETW-3200A, Shpg. wt. 6 lbs. 159.95



Three-frequency
clock

Four LEDs

Four logic
switches

Three power
supplies for digital
and linear circuits

Solderless
connector
blocks

CMOS Digital Techniques Course widens your horizons to include this popular IC family

NEW

\$69⁹⁵

- Includes more than 20 integrated circuits
- Learn by performing over 20 hands-on CMOS experiments
- Learn to interface between CMOS and other logic families

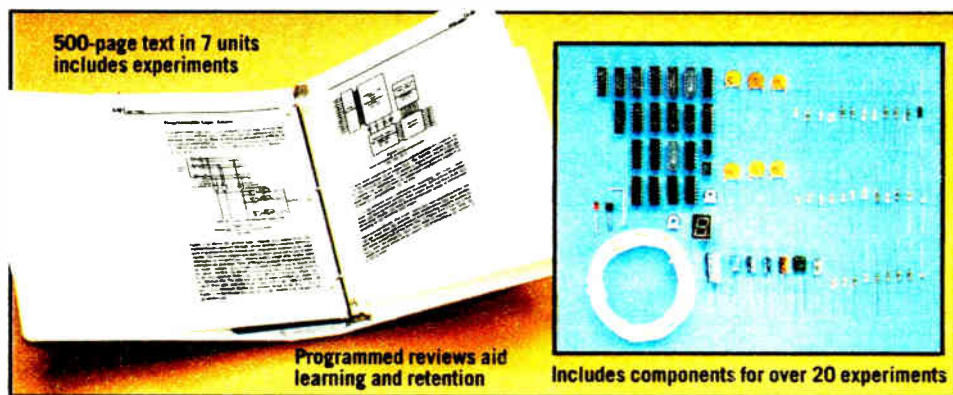
Are you up-to-date when it comes to knowledge of CMOS (complementary metal-oxide-semiconductor) devices? Because of their lower power consumption and wider range of operating voltages, CMOS devices have distinct advantages over TTL circuits in many applications. Now you can learn all about these state-of-the-art ICs in the new Heathkit/Zenith EE-3202 CMOS Digital Techniques Course. The emphasis is on practicality, not deep theory, and you learn by doing through hands-on experiments.

The Course will lead you from the basic concepts of CMOS technology to moderately complex CMOS circuits designed to acquire and process information. Units cover an introduction to CMOS, interfacing CMOS, CMOS logic blocks, CMOS multivibrators, counters and registers, CMOS analog applications and advanced applications.

Programmed reviews are inserted periodically throughout the text, and exams are provided at the end of each unit to test your understanding of the unit's key points. A Course appendix provides you with operational overviews and pin diagrams of most common CMOS integrated circuits.

The five-hundred page, seven-unit text, housed in a single vinyl binder, includes more than 20 experiments. More than 20 are supplied with the Course, including gates, counters and phase-locked loops. Also included are all other support components necessary for completing the experiments.

Upon completion of the EE-3202 CMOS Digital Techniques Course you will know why and when to use CMOS circuits, what devices are available, and how



500-page text in 7 units
includes experiments

Programmed reviews aid
learning and retention

Includes components for over 20 experiments

to use them to best advantage. You will also learn how to interface between CMOS and other logic families. The Course is designed with a great deal of flexibility in the experiments so that you can concentrate on the facets of the subject that interest you. You should first study EE-3201 or have equivalent knowledge. The ET-3200A Electronic Trainer (described above) is required to perform the experiments in the Course. Also required are an oscilloscope such as the IO-4105 (see page 65) and a multimeter like the IM-5284 (page 59).

Upon successful completion of the CMOS Digital Techniques Course, you will receive a certificate of achievement and 3.0 CEUs. Like all Heathkit/Zenith Self-Instruction Courses, this one carries our money-back guarantee of complete satisfaction. If not satisfied, return all course materials, less Trainer, and your receipt for a complete refund of the purchase price. Order your CMOS Digital Techniques Course now.

EE-3202, Shpg. wt. 6 lbs. 69.95



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

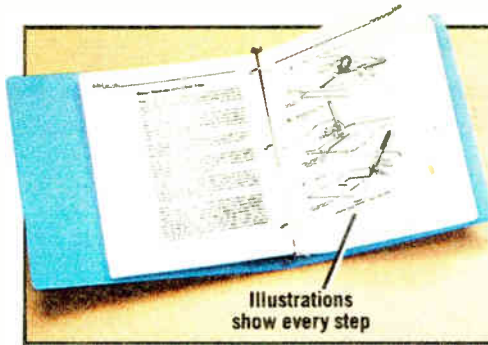
EDUCATION 39

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



\$64⁹⁵

- Copy printed circuit board designs from magazines or design and build your own
- Includes all materials and two useful kits



Illustrations show every step



Everything you need to make your own PC boards

You'll build two useful kits

This fascinating course teaches you how to make printed circuit boards using both the direct pattern and photographic techniques. In the experiments, you'll actually design, layout and etch the circuit boards for two popular electronic kits – the GD-600 Photoelectric Lamp Switch and the GD-1287 Touch Switch – which you'll build during the course. All materials necessary to complete the kits and experiments are included. An etch-resist pen, rub-on transfers, art tape, etchant and sensitized PC boards are provided. And you get a positive pattern, clear acetate and photographic developer to make circuit boards by the photographic method.

In this Course you'll learn the properties of different types of PC board materials,

Electronics for Hobbyists – made simple for you



\$59⁹⁵

- Understand do-it-yourself magazine projects
- Experiments offer practical hands-on experience with basic electronic devices

You'll understand those do-it-yourself electronic projects in popular magazines when you finish this course. Divided into seven units, the easy-to-understand text is backed up by 26 experiments, which provide hands-on experience.

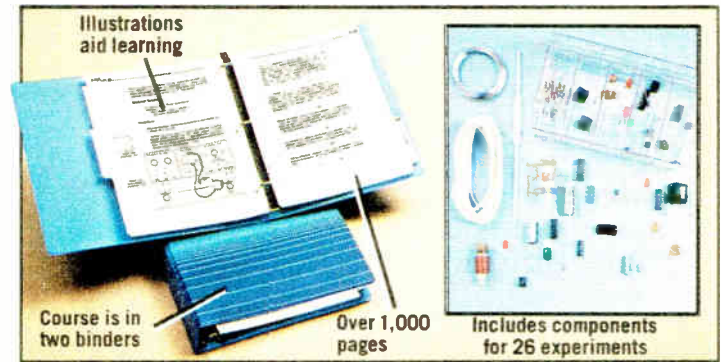
The first unit, **Direct Current**, covers the basics of electronics: current, voltage, resistance, Ohm's Law, power, magnetism and basic measurement devices. Alternating Current, Unit 2, discusses AC, waveform measurement, measuring AC, oscilloscopes, inductance, capacitance and RLC circuits. Diodes, transistors, optoelectronic devices and integrated circuits (ICs) are covered in Unit 3, Active Devices. You'll learn about power supplies, amplifiers and oscillators in the fourth unit, Electronic Circuits. Unit 5, Digital Electronics, teaches number systems, logic elements, flip-flops, counters, shift resistors, clocks and one-shots. Microprocessors, computers, programming and software are discussed in Unit 6, Digital Computers. The final unit is a survey of electronic hobbies – experimentation, R/C modeling, computers, audio, shortwave and ham radio.

Included with the Course are a comprehensive text in two binders, and electronic

the processes used in manufacturing PC boards, how to design a circuit board layout and prepare artwork. You will transfer images from artwork to the circuit board, and assemble PC boards using the manual assembly method, manual soldering and conformal coating. And you'll learn how PC boards are assembled, using automatic insertion machines and wave soldering. Expand your knowledge by starting this information-filled Course now.

Pass the optional final exam with a score of 70% or better and earn 2.0 CEUs and a Certificate of Achievement. The Printed Circuits Course is not available outside the Continental U.S.

EE-3134, Shpg. wt. 7 lbs. **64.95**



Illustrations aid learning

Course is in two binders

Over 1,000 pages

Includes components for 26 experiments

components for 26 experiments – which use the ET-3100A Trainer (page 32), a multimeter (like the IM-5284, page 59) and an oscilloscope (like the IO-4105 on page 65).

Earn 4 CEUs by scoring 70% or better on the optional final exam.

EE-3140, Shpg. wt. 11 lbs. **59.95**

Introduction to Microprocessors, Trainer make learning operation and programming easy



\$29⁹⁵

- No knowledge or prior experience required
- Low cost Trainer for hands-on experience

Microprocessors: An increasingly important part of our lives. Not only will you find microprocessors in computers – they can be found in many everyday products, from toys to typewriters. Here's your chance to learn this fascinating new technology in your spare time, at your own pace.

Here's a fast, economical way to learn how microprocessors operate and how to program common types of microprocessors. With this self-instruction course, you'll find all the information you need – without being swamped under with information you will never need. Six units and a host of programming exercises guide you through this complex subject. Units cover Number Systems and Codes, Microcomputer Basics, Computer Arithmetic, Introduction to Programming, and the 6808 Microprocessor. The programming experiments, which can be performed on the optional ET-6800 Microprocessor Trainer (described at right), give you valuable hands-on experience.

Passing the optional final exam with a score of 70% or better earns you 4.0 CEUs and a Certificate of Achievement.

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

Save \$10.00! Buy Course and ET-6800 Kit Trainer together.

ETS-6800, Shpg. wt. 29 lbs. **119.90**



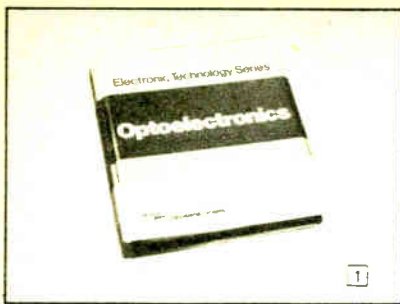
256 bytes of NMOS RAM

Hands-on machine-language programming

Everything you need to perform the programming experiments in the EC-6800 Course (left). A 17-key hexadecimal keyboard lets you access memory locations, enter programs, single-step through program and alter memory. The built-in 1K ROM monitor program controls Trainer operation.

Address and data readouts are a six-digit, hexadecimal 7-segment LED display. 120 VAC, 60 Hz, 12 watts. Dimensions are 3.75" H x 8" W x 10" D. Kit ET-6800, Shpg. wt. 17 lbs. **99.95**





Gain state-of-the-art knowledge with our Advanced Electronics Series

Advanced Electronics Courses eliminate the legwork. They come complete with components, so you can perform tried and tested experiments – based on an easy-to-understand text. Learning is faster, more fun and more economical, too.

The ET-3300A Trainer gives you hands-on experience. Whether you're a technician or engineer looking for self-improvement, a student seeking electronics knowledge, or a hobbyist interested in new developments, these courses meet your needs. Classroom versions on p. 42.

1 Learn about Optoelectronics

Now you can learn about the latest developments in this quickly-changing field. Our Optoelectronics Course teaches basic optical terms and concepts. It covers the types of available light sources, and provides an understanding of optoelectronic displays – including driving and multiplexing.

You'll get in-depth information on light-sensitive components such as photodiodes, photo-transistors, solar cells and optocouplers – including design and applications. You'll learn fiber optics theory and operation.

Includes parts for experiments. Experiments require ET-3300A. Recommended: milliammeter and voltmeter – or a VTVM like the IM-5218 (p. 61), and a scope like the IO-4105 (p. 65). Prerequisites: DC and AC (EE-3101 and EE-3102, pgs. 32-33) or equivalent knowledge; some experience in electronics or optics. 3 CEUs.

EE-105, Shpg. wt. 5 lbs. 59.95
Kit ET-3300A, Breadboard, 6 lbs. 94.95
 ETW-3300, Assembled Breadboard, 6 lbs. 159.95
SAVE \$10.00! Buy Course and Breadboard Kit
 EES-105, Shpg. wt. 11 lbs. 144.90

2 Op Amps – important ICs

A 385-page text covers measurements of common op amp parameters; basic op amp linear circuits, integrator and differential circuits; and the design and performance of op amp constant current sources, as well as current voltage and voltage current converters. Norton and BiFET op amps.

ET-3300A required for experiments. Components included. Recommended, an oscilloscope like the IO-4105 (p. 65), a multimeter like the IM-5225 (p. 61) and a frequency generator like the IG-1271 (p. 60). Prerequisite: Basic Electronics (EE-3101 through EE-3104, pgs. 32-34) or equivalent knowledge. 3 CEUs.

EE-101, Shpg. wt. 5 lbs. 39.95
Kit ET-3300A, Breadboard, 6 lbs. 94.95

ETW-3300, Assembled Breadboard, 6 lbs. 159.95
SAVE \$10.00! Buy Course and Breadboard Kit.
 EES-101, Shpg. wt. 11 lbs. 124.90

3 Learn to use Active Filters

Learn how to design active filters with op amps, to plot and predict frequency responses, to design and breadboard first-order low-pass and high-pass filters, design second-order and high-order filters, bandpass and state variable filters.

ET-3300A Breadboard or ET-3100A (p. 34) required for experiments. (NOTE: ET-3100A cannot be used with other Advanced Electronics Courses.) An oscilloscope like the IO-4105 (p. 65) and a frequency generator like the IG-1271 (p. 61) are also helpful. Prerequisite: EE-101 Op Amps, or equivalent. For 3 CEUs, score 70% on the final exam.

EE-102, Shpg. wt. 5 lbs. 34.95
Kit ET-3300A, Breadboard, 6 lbs. 94.95
 ETW-3300, Assembled Breadboard, 6 lbs. 159.95
SAVE \$10.00! Buy Course and Breadboard Kit.
 EES-102, Shpg. wt. 11 lbs. 119.90

4 Introduces you to the IC Timer

Learn about common IC timers, how each works, what they do and where to use them – for logic functions in output drive circuits, time-delay relay circuits, wide-range pulse generators, voltage frequency converters, freewheeling power-fail oscillators, timers, alarms.

Includes 348-page text and parts for experiments. Requires ET-3300A for experiments. Recommended: an oscilloscope like the IO-4105 (p. 65) and a multimeter like the IM-1210 (p. 61). Prerequisite: EE-3201 Digital Techniques (p. 39) or equivalent knowledge. 3 CEUs.

EE-103, Shpg. wt. 5 lbs. 39.95
Kit ET-3300A, Breadboard, 6 lbs. 94.95
 ETW-3300, Assembled Breadboard, 6 lbs. 159.95
SAVE \$10.00! Buy Course and Breadboard Kit.
 EES-103, Shpg. wt. 11 lbs. 124.90

5 Learn Phase-Locked Loops

Used in radio and TV communications, PLLs and their building blocks – the phase detector, loop filter and voltage-controlled oscillator – are covered in a 268-page self-instruction text.

Parts are included for experiments. For experiments, use the ET-3300A, a DC voltmeter like the IM-5284 (p. 59) and a single-trace oscilloscope like the IO-4105 (p. 65). To get more from the

Course, use a dual-trace oscilloscope like the IO-4205 (p. 65) and an audio signal generator like the IG-5218 (p. 60). 3 CEUs.

EE-104, Shpg. wt. 5 lbs. 49.95
Kit ET-3300A, Breadboard, 6 lbs. 94.95
 ETW-3300, Assembled Breadboard, 6 lbs. 159.95
SAVE \$10.00! Buy Course and Breadboard Kit.
 EES-104, Shpg. wt. 13 lbs. 134.90

SAVE \$50.00 on your education!

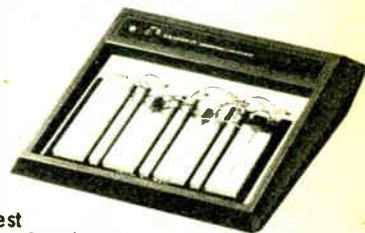
Order the Heathkit/Zenith Advanced Electronics Series (EE-101 Op Amps, EE-102 Active Filters, EE-103 IC Timers, EE-104 Phase-Locked Loops and EE-105 Optoelectronics) together with the Heathkit/Zenith ET-3300A Laboratory Circuit Breadboard Kit. If purchased separately, \$319.70.

EES-1015A, Shpg. wt. 34 lbs. 269.70

This Lab Breadboard makes advanced electronics easier

\$94⁹⁵
 Kit

For Advanced
 Electronics
 Courses



**Experiment, test
 components, design circuits**

The ET-3300A is a great convenience tool for electronics learning or circuit design.

Solderless sockets make breadboarding easier and simpler. Sockets are designed to accommodate any size dual in-line integrated circuit package. Reliable built-in power supply provides –5 VDC ($\pm 4\%$) @ 1.5A, +12 VDC @ 100 mA or –12 VDC ($\pm 2\%$) @ 100 mA to Breadboard, with fixed current limiting of each supply at rated current for short-circuit protection. Required with the following Heathkit/Zenith Advanced Electronics Courses: EE-101, EE-103, EE-104 and EE-105. Can be used with the EE-102 Active Filters Course. 120 VAC, 60 Hz, 3.5" H x 12" W x 12" D.

Kit ET-3300A, Shpg. wt. 6 lbs. 94.95
ETW-3300, Assembled and tested,
 6 lbs. 159.95

Teachers, training directors: Heathkit/Zenith Classroom Courses fit custom training needs



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

Our Classroom Courses are available in the following subject areas:

- **Exploratory Courses** –
Concepts of Electronics
Printed Circuit Boards
- **Fundamental Electronics Series** –
DC Electronics
AC Electronics
Semiconductor Devices
Electronic Circuits
Test Instruments
Electronic Communications
- **Advanced Electronics Series** –
Operational Amplifiers
Active Filters
IC (Integrated Circuit) Timers
Phase-Locked Loops
Optoelectronics
- **Digital Techniques**
- **Microprocessor Technology**
- **Computer Programming Series** –
BASIC Programming
Assembly Programming
- **Automotive Courses** –
Automotive Tune-Up
Automotive Electrical Systems

Organized in three separate publications, each course is designed for greater student and teacher convenience:

The student text is the core of the learning material, supported by a workbook with exams

and experiments keyed to the text.

The instructor's guide lets the teacher add his or her experience and guidance – providing each student with a fully rounded learning experience.

Separate parts packs contain all components for implementing the workbook experiments.

To complete experiments in the Fundamental Electronics Series, the assembled and factory tested ETW-3100A Trainer (see p. 32) is necessary. The Advanced Electronics Series experiments require the ETW-3300A Trainer on page 41. Experiments for the Digital Techniques Course require the assembled and factory tested ETW-3200A Trainer (p. 39). Page 36 describes the assembled ETW-3400A Trainer, required to complete the experiments in the Microprocessor Course.

Heathkit/Zenith Courses are the answer for industries, governments and schools who want to cover subject matter efficiently at minimum cost. Many of these multi-media courses employ the latest techniques in programmed instruction, audio-

visual presentations, self-test reviews and hands-on experiments – for fast, thorough mastery by your students. Review the extensive course list below, and then contact us for more information on how Heathkit/Zenith Courses can serve your educational needs.

Slides, filmstrips available

Color slides or 35 mm filmstrips duplicate the flip charts included in the individual Heathkit/Zenith Microprocessor Course (pgs. 36-37), Auto Tune-Up and Auto Electrical Courses (p. 47). Flip chart not included in classroom versions.

- * **Slides for Microprocessor Course.**
EE-3401-1, Shpg. wt. 2 lbs. 60.00
- * **Filmstrip for Microprocessor Course.**
EE-3401-2, Shpg. wt. 1 lb. 20.00
- Filmstrip for Automotive Tune-Up Course.**
EB-20-70, Shpg. wt. 1 lb. 14.95
- Filmstrip for Auto Electrical Systems Course.**
EB-10-70, Shpg. wt. 1 lb. 29.95

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
Concepts of Electronics	EB-6140 (3 lbs.)	19 95	EB-6140-40	9 95	EB-6140 50	8 95	ETW-3100A	139 95	EB-6140-30	24 95	NOT USED	
Printed Circuit Boards	EB-6134 (1 lb.)	18 95	EB-6134-40	9 95	EB-6134 50	8 95	NOT USED		EB-6134-30 (2 lbs.)	19 95	NOT USED	
DC Electronics	EB-6101	19 95	EB-6101-40	9 95	EB-6101 50	8 95	ETW-3100A	139 95	EB-6101-30	19 95	EEA-3101	11 95
AC Electronics	EB-6102	19 95	EB-6102-40	9 95	EB-6102 50	8 95	ETW-3100A	139 95	EB-6102-30	15 95	EEA-3102	11 95
Semiconductor Devices	EB-6103	19 95	EB-6103-40	9 95	EB-6103 50	8 95	ETW-3100A	139 95	EB-6103-30	15 95	EEA-3103	11 95
Electronic Circuits	EB-6104	19 95	EB-6104-40	9 95	EB-6104 50	8 95	ETW-3100A	139 95	EB-6104-30	29 95	EEA-3104	11 95
Test Instruments	EB-6105 (4 lbs.)	19 95	EB-6105-40	8 95	EB-6105 50	8 95	ETW-3100A	139 95	EB-6105-30	24 95	NOT USED	
Electronic Communications	EB-6106	17 95	EB-6106-40	9 95	EB-6106 50	8 95	NOT USED		EB-6106-30	29 95	NOT USED	
Operational Amplifiers	EB-601	18 95	EXPERIMENTS IN TEXT		EB-601 50	8 95	ETW-3300A	159 95	EB-601-30	24 95	NOT USED	
Active Filters	EB-602	18 95	EXPERIMENTS IN TEXT		EB-602 50	8 95	ETW-3300A	159 95	EB-602-30	14 95	NOT USED	
IC Timers	EB-603	18 95	EXPERIMENTS IN TEXT		EB-603 50	8 95	ETW-3300A	159 95	EB-603-30	29 95	NOT USED	
Phase Locked Loops	EB-604	18 95	EXPERIMENTS IN TEXT		EB-604 50	8 95	ETW-3300A	159 95	EB-604-30	29 95	NOT USED	
Optoelectronics	EB-605	14 95	EB-605-40 (1 lb.)	9 95	EB-605 50	8 95	ETW-3300A	159 95	EB-605-30	29 95	NOT USED	
Digital Techniques	EB-6201 (3 lbs.)	24 95	EB-6201-40	10 95	EB-6201 50	8 95	ETW-3200A	159 95	EB-6201-30	29 95	EEA-3201	11 95
Microprocessors*	EB-6401 (4 lbs.)	24 95	EB-6401-40 (1 lb.)	10 95	EB-6401 50	8 95	ETW-3400A	329 95	EB-6401-30	54 95	EB-6401-60	12 95
BASIC Programming	EB-6100 (4 lbs.)	15 95	EB-6100-40	8 95	EB-6100 50	8 95	NOT USED		PARTS CASSETTES NOT USED			
Assembly Programming	EB-6108 (4 lbs.)	19 95	EB-6108-40	9 95	EB-6108 50	8 95	NOT USED		PARTS CASSETTES NOT USED			
Auto Tune-Up	EB-20 (4 lbs.)	19 95	EB-20-40	9 95	EB-20 50	8 95	NOT USED		EB-20-30 (2 lbs.)	17 95	EB-20-60	9 95
Auto Electrical	EB-10 (3 lbs.)	19 95	EB-10-40	9 95	EB-10 50	8 95	NOT USED		EB-10-30 (2 lbs.)	17 95	EB-10-60	17 95

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

Free information and price schedules on Heathkit/Zenith Classroom Courses – and assembled educational products – are available from independent distributors representing Veritechnology Electronics Corporation. See the list at right for the representative nearest you. You can also call Heath's Contract Sales Department at 616-982-3519, or visit your local Heathkit Electronic Center (units of Veritechnology Electronics Corporation – see p. 25 for locations) for more information on our Classroom Courses.

Alabama	205-822-1326	Kansas	913-722-4713	North Dakota	612-533-2133
Alaska	907-456-1872	Kentucky	205-822-1326	Ohio	419-435-6517
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Connecticut	617-285-9028	Minnesota	612-533-2133	South Dakota	612-533-2133
Delaware	717-533-4038	Mississippi	205-822-1326	Tennessee	615-320-0339
Dist. of Columbia	804-741-2580	Missouri	314-837-8059	Texas	214-361-8665
Florida	305-647-5373	Montana	503-635-3544	Utah	702-358-0829
Georgia	305-647-5373	Nebraska	402-345-2797	Vermont	617-285-9028
Hawaii	503-640-1729	Nevada	702-358-0829	Virginia	804-741-2580
Idaho	503-635-3544	New Hampshire	617-285-9028	Washington	503-635-3544
Illinois (So.)	309-343-6135	New Jersey	717-533-4038	West Virginia	804-741-2580
Illinois (No.)	312-960-0363	New Mexico	602-945-6605	Wisconsin	612-533-2133
Indiana	317-293-5704	New York	516-922-6590	Wyoming	303-795-1450
Iowa	309-343-6135	North Carolina	919-776-8161		





Priced for holiday giving — this pro-quality Engine Analyzer tests batteries, too

\$107⁹⁵

- Use it on any 4, 6 or 8-cylinder engine — any voltage
- Includes all leads and accessories for complete tuneups
- Outstanding accuracy — $\pm 3\%$ for all settings

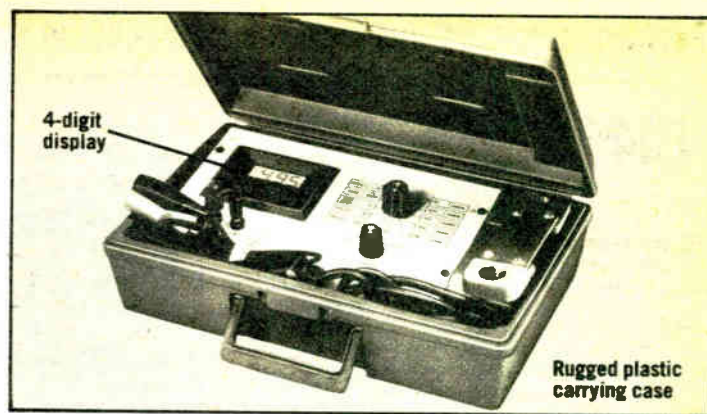
Here's a gifted idea for the do-it-yourselfer auto repairman on your shopping list. The Heathkit CM-1050 Engine Analyzer is a professional quality instrument that tests conventional, magneto, transistorized and most capacitive-discharge ignition systems — both positive and negative ground — on 4, 6, or 8-cylinder engines.

You can pinpoint troubles in the ignition, alternator or generator, voltage regulator, distributor, condenser, plugs and wires, starter, battery and auto accessories. And you'll detect those problems on a large, color-coded 6-inch meter that's easy to read.

Kit includes everything you need for complete tuneups including two 8-foot test cables, one 2-foot alligator/alligator lead, one 2-foot alligator push-on connector lead, one calibration cable, 90-amp shunt, 0.25-Ohm test resistor assembly, one alligator clip, and two #10 solder lugs. Requires three "C" cells (not supplied) for operation.

Kit CM-1050, Shpg. wt. 8 lbs. 107.95

CM-1050 SPECIFICATIONS: Dwell Ranges: 0-60°, $\pm 3\%$ of full scale. Tachometer Ranges: 0-1200 and 0-6000 RPM, $\pm 3\%$ of full scale. Voltmeter Ranges: 0-3.2, 0-16 and 0-32 VDC, $\pm 3\%$ of full scale. Current: 0-90 amps, $\pm 3\%$ of full scale. Ohmmeter Ranges: R x 1 (100 center scale), R x 100 (10 kilohms center scale), $\pm 3\%$ arc. Spark Output: 0-50 kV. Point Resistance: Good/Bad test. Alternator: Good/Bad test. Accessories: 0.25 ohm test resistor assembly and 90 amp shunt. Overall Dimensions: 7.50" H x 10.50" W x 8.75" D.



Digital Engine Analyzer offers professional accuracy, versatility and portability

\$117⁹⁵

- Allows you to check 1981 GM Computer Command Control
- Measures dwell, RPM, DC voltage, resistance and DC
- Even lets you tune up 5-cylinder engines

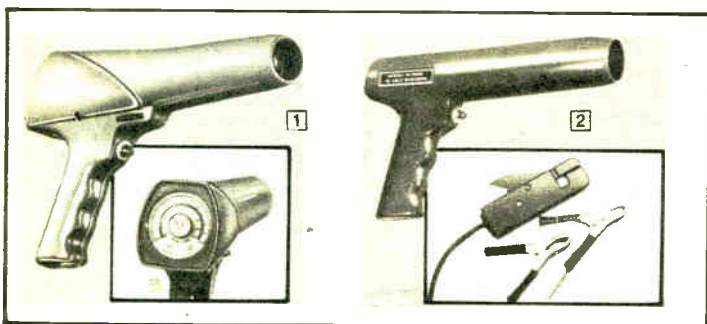
The new Heathkit CM-1551 is a versatile, precision instrument with 10 Megohm input impedance as specified by GM for 1981 and newer Computer Command Control checks. It is specifically designed for measuring dwell angle, engine RPM, voltage drop, current and resistance on automotive engines. A 3½-digit LC display — easy-to-read even in bright sun — provides the resolution you need to adjust idle speeds and read small voltages on 4, 5, 6, and 8-cylinder engines with outstanding accuracy. With the optional CMA-1550-1 Shunt Accessory, the CM-1551 can measure starting current, plus battery charging and discharging current — up to 400 amps with $\pm 5\%$ accuracy. Power is supplied by a 9 V transistor battery (not included), so there are fewer test leads under the hood. Thermal-quality wiring resists heat.

Kit CM-1551, Shpg. wt. 5 lbs. 117.95

Shunt Accessory enables the CM-1551 to measure current up to 400 amps.

CMA-1550-1, Shpg. wt. 1 lb. 14.95

CM-1551 SPECIFICATIONS: Dwell: 4-cyl., 0-90°; 5-cyl., 0-72°; 6-cyl., 0-60°; 8-cyl., 0-45°; all $\pm 0.2\%$. RPM: 0-1999, ± 10 ; 0-10000, $\pm 0.1\%$. Voltage: 0-19.99 and 0-199.9 VDC, $\pm 1.5\%$. Direct Current: 0-19.99 amps, $\pm 3\%$; 0-400 amps, $\pm 5\%$ (high range requires CMA-1550-1). Resistance: 0-199.9 ohms, 0-19.99 kilohms and 1.999 megohms, $\pm 1.5\%$. Operating Temperatures: 0-140°F (-18 to -60°C). Battery Life: To 200 hrs. Lo-bat indication during last 20% of life. Dimensions: 3.63" H x 12.25" W x 8" D (9.22 x 31.16 x 20.32 cm).



1 Timing Light/Advance Meter/Tach has bright flash

Combination Timing Light/Advance Meter/Tachometer measures mechanical, vacuum advance to 60° from 1500 to 4500 RPM. Inductive pickup. 12 VDC.

Kit CI-1096, Shpg. wt. 4 lbs. 79.95

2 Day-bright Timing Light makes for easy reading

Bright Xenon flash makes marks easy to read, even in direct sunlight. Inductive pickup attaches, detaches for fast setups. One-evening kit. 12 VDC.

Kit CI-1040, Shpg. wt. 3 lbs. 34.95

Economy three-in-one Heathkit Tune-up Meter

\$47⁹⁵

- Combines dwell meter, electronic tachometer and DC voltmeter
- Only 2 leads to connect
- Powered by car battery
- Easy 2-evening kit

This versatile instrument combines a dwell meter, an electronic tachometer and a DC voltmeter in a single, compact and functional unit. It enables you to do dwell, engine speed and battery voltage tests you normally pay a high price for a mechanic to do. Contains dwell scales for 3, 4, 6, and 8-cylinder engines, tachometer with 0-1500 and 0-4500 RPM ranges, and a 0-20 VDC voltmeter.

Use on 6 and 12-volt systems with positive or negative ground, and with solid-state and high-energy ignition systems. Easy, enjoyable kit.

Kit CM-1073, Shpg. wt. 4 lbs. 47.95



Perform auto tune-ups professionally with the Heathkit Pro-Quality Ignition Analyzer

\$514⁹⁵

- Displays primary or secondary waveforms on 12" CRT
- Measures RPM, dwell angle and DC voltage
- Performs ignition advance tests with optional timing light/meter

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 ignition analyzer of this quality. Rock-steady parade patterns are made possible by the latest design in inductive pickup circuitry and switch selection of cylinders — 4, 6, or 8. Dwell, RPM and voltage measurements are indicated on the big eight-inch meter.

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

Cylinder buttons can be pushed in multiple numbers, so that banks of cylinders can be shorted out for carburetor balance and for display of one or more cylinders. Both parade and superimposed displays of primary or secondary waveforms, at two different amplitudes, are available on the 12" diagonal CRT.

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

Compare with the others. Then you'll see why the Heathkit CO-2600 is your best choice in a professional-quality Ignition Analyzer.

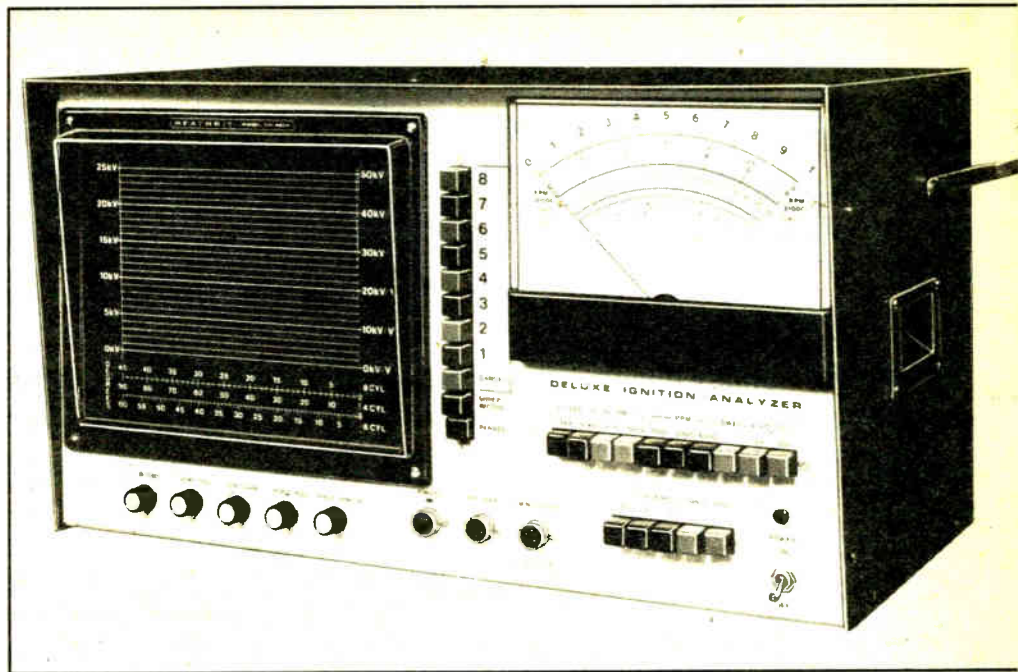
Kit CO-2600, Shpg. wt. 83 lbs. **514.95**

Timing Light/Advance Meter. Plugs directly into CO-2600 Analyzer, provides a bright flash that can be seen even in daylight. Built-in advance meter measures distributor advance to 60 degrees from 1500 to 4500 rpm. All cables included.

Kit COA-2600-4, Shpg. wt. 3 lbs. **57.95**

Alternator Test Adaptor for CO-2600 Analyzer.

COA-2600-2, Shpg. wt. 1 lb. **13.95**



CO-2600 SPECIFICATIONS: CRT Size: 12 inches (diagonal). Meter Size: 8 inches. Signal Pickup: Direct for primary, inductive for parade trigger and capacitive for secondary. Tachometer Ranges: 1000, 3000 and 6000 RPM. Voltmeter Ranges: 2, 20 VDC. Tachometer/Voltmeter Accuracy: ±3% of full scale on any range. Scope Vertical Expansion: 2 to 1 minimum. Operating Temperature Range: 32 to 122 degrees F (0 to 50 degrees C). Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 12.85" H x 25.25" W x 14.3" D (32.72 x 64.14 x 35.89 cm). Optional Accessories for the CO-2600 Ignition Analyzer: COA-2600-4 Timing Light/Advance Meter, COA-2600-2 Alternator Test Adaptor, COA-2600-3 Deluxe Scope Cart

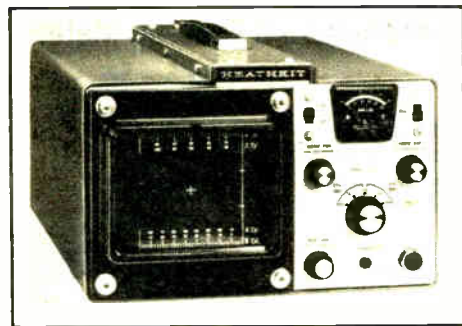
Deluxe, pro-quality Scope Cart



Keeps CO-2600 Pro-Quality Ignition Analyzer at the ideal viewing angle for easy reading. Rolls from place to place on casters for maximum convenience. Frees up valuable workbench space for other projects. Cart measures 35½" H x 24½" W x 20" D (90.17 x 62.23 x 50.8).

COA-2600-3, Shpg. wt. 25 lbs. **44.95**

Save time and money with budget-priced Ignition Analyzer



CO-1015 SPECIFICATIONS: For use with: 3, 4, 6 or 8-cylinder engines. Tachometer Ranges: 0-1000, 0-5000 RPM. Tachometer Accuracy: ±5% of full scale. Cables: 12' pick-up cable; ground, primary and secondary leads extend additional 2'. Trigger Method: Direct primary pickup for superimposed patterns. Secondary (clamp-on) inductive pickup for parade patterns. Secondary pattern pickup: capacitive for parade display of cylinders. Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 7¼" H x 10¾" W x 17½" D (18.42 x 95.25 x 44.45 cm).

\$229⁹⁵

- Use on three, four, six or eight-cylinder engines
- Easier to use than meter analyzers
- Built-in tachometer for convenient measurements

The cost-conscious Heathkit CO-1015 conserves your money and your auto care time, all at once. Detects shorted plugs, bad points, defective wiring, worn distributor parts, incorrect dwell angle, plus coil or condenser defects and transistor or capacitive discharge circuitry problems. Select one of four different patterns — primary or secondary, in parade or superimposed displays.

Use with any standard, transistorized or capacitive-discharge ignition on 3, 4, 6 or 8-cylinder engines with distributors. Horizontal sweep can be expanded 10 to 1; vertical sweep 2 to 1. Operation book (supplied) shows typical waveforms. Includes GM High-Energy Ignition adapter.

CO-1015, Shpg. wt. 22 lbs. **229.95**

12 VDC Inverter for lighter sockets, for on-the-road testing.

Kit COA-1015-1, Shpg. wt. 3 lbs. **37.95**

Heathkit Automatic 10-Amp Charger



\$57⁹⁵

- Patented safety circuit prevents sparking

Build this GP-21 Automatic Battery Charger in just two evenings with easy-to-follow manual. Charges 12-volt batteries at up to a 10-amp rate and turns off automatically when charge is complete. Front panel meter indicates rate of charge and full charge. Easy to use. Patented safety circuit prevents sparking. For 12 VDC batteries. Uses 120 VAC, 60 Hz house current.

Kit GP-21, Shpg. wt. 13 lbs. **57.95**



Heath/Dana Speed Control increases driving comfort, reduces fatigue on long car trips

\$99.95

- Maintains preset speed uphill, downhill, and on curves
- Save: Install it yourself with Heathkit instructions!

Accelerate car to desired speed, set the control, and the CS-2048 keeps car at preset speed. Tap the brake pedal, and the CS-2048 momentarily disengages for passing or slowing down. Then it returns to preset speed. For vehicles with manual and automatic transmissions. Includes our step-by-step instructions.

Kit CS-2048 Installation Kit. Shpg. wt. 7 lbs. **99.95**

CSA-2048-1 Installation Kit. For front-wheel-drive cars not listed below or replacement parts. Kit contains magnet pair, adhesive and filament tape, plus instructions for installation and parts replacement. Shpg. wt. 1 lb. **8.95**

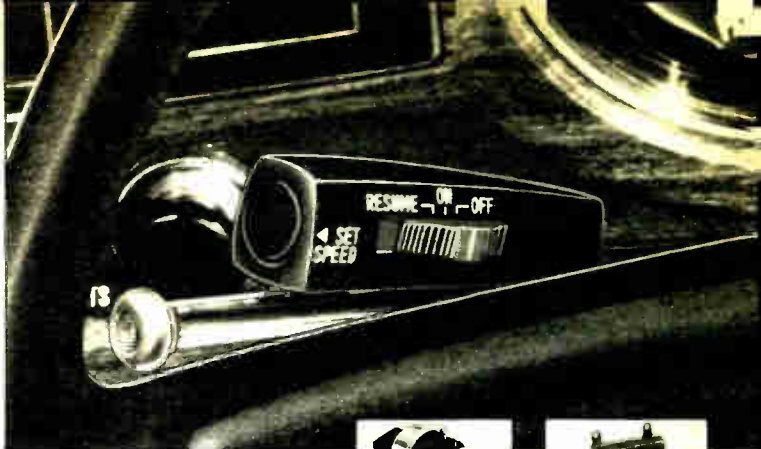
CSA-2048-2 Installation Kit. For '73-'75 Honda Civic, '75-'81 Honda CVCC or '77-'81 Honda Accord. Shpg. wt. 2 lbs. **18.95**

CSA-2048-3 Installation Kit. For '75-'81 Corollas. 2 lbs. **18.95**

CSA-2048-4 Installation Kit. For '73-'81 Toyota Corona, Celica, Crown, and Mark II, '75-'78 Toyota Pickup; '75-'77 Datsun 610/710, '77-'81 Datsun 810, '75-'81 Datsun 280-Z, ZX, '81 Datsun Pickup. Shpg. wt. 1 lb. **8.95**

CSA-2048-5 Installation Kit. For the following fuel-injected cars: '76-'81 Volkswagen Rabbit, Dasher, Scirocco; '76-'81 Audi Fox. Shpg. wt. 2 lbs. **18.95**

CSA-2048-6 Installation Kit. For '75-'81 Datsun B-210, '77-'80 Datsun F-10/310. Shpg. wt. 2 lbs. **18.95**



IMPORTANT NOTE: Installing the CS-2048 requires some mechanical proficiency. If you are uncertain of your abilities, you may wish to employ a qualified auto mechanic to install the CS-2048.



Vacuum Servo attaches to throttle



Electronic control

Siren/PA system for emergency vehicles

Here's a budget priced, but reliable Siren and Public Address system for your community's volunteer emergency unit or rescue squad – and it's available in either kit or factory-assembled and tested form. It features a 55 watt siren with automatic or manual wail to accommodate different traffic situations in your community. A 20 watt Public Address system amplifies your voice for emergency public announcements and your radio calls for times when you're away from your vehicle. Pushbutton low-noise microphone ensures clear voice reproduction at all normal levels of amplification.

Gimbal mount makes the GD-18 easy to install. Solid-state circuitry with temperature and voltage compensated stage provides years of reliable service. The GD-18 can be used with positive or negative ground vehicles.

GD-18 can be fitted with two kinds of horns: an exterior horn for your marked vehicles, and a concealed horn that hides behind your vehicle's grille. Concealed horn requires 4½" H x 4½" W x 13" D clearance. Note: please check standards for mobile sirens in your area.

Kit GD-18, Shpg. wt. 6 lbs. **79.95**

WD-5130, Siren, PA amp, assembled. Shpg. wt. 6 lbs. **134.95**

GDA-18-1, Exterior horn, assembled. Shpg. wt. 10 lbs. **99.95**

Kit GDA-18-2, Concealed horn. Shpg. wt. 10 lbs. **99.95**



SAVE \$20⁰⁰

On these Siren/PA systems! If purchased separately, \$179.90
GD-18A (Kit GD-18 & Exterior horn) Shpg. wt. 21 lbs. **159.90**
GD-188 (Kit GD-18 & Concealed horn) Shpg. wt. 21 lbs. **159.90**

Exhaust Analyzer checks efficiency of your car



You'll add great diagnostic capabilities to your automotive test equipment with the Heathkit CI-1080 Exhaust Analyzer. And easy-to-read meter measures air-to-fuel ratio and combustion efficiency to tell you instantly whether your car's air-to-fuel mixture is unnecessarily too rich or too lean to attain maximum performance, efficiency and fuel economy.

Besides measuring your automobile's air-to-fuel ratio and combustion efficiency, the CI-1080 Exhaust Analyzer also indicates the percentage of carbon

monoxide in your car's exhaust. This percentage gives you a relative figure you can use to compare your exhaust emissions with the manufacturer's specifications and the clean air standards applicable to your state of residence.

The CI-1080 is housed in a rugged, plastic case with foldaway handle for easy storage. The kit includes all necessary cables, tubing, and complete instructions. Powered by car's 6 or 12 VDC electrical system. Not for diesel engines. To use on cars with catalytic converters, you must remove the EGR valve.

Kit CI-1080, Shpg. wt. 6 lbs. **99.95**



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

Capacitive Discharge Ignition gives quick starts

Save wear and tear on your starter motor, battery, and nerves this winter with the CP-1060 Capacitive Discharge Ignition. It gives you faster starts in colder weather because your plugs get a stronger spark. Special solid-state circuits provide more voltage to heat and ignite your air-fuel mixture on cold mornings.

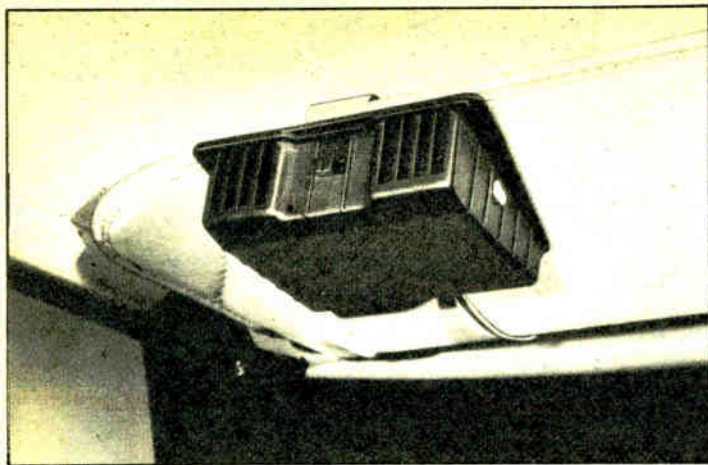
Besides giving you faster starts in cold weather, the CP-1060 helps your car's engine burn its fuel more efficiently. By increasing the voltage to the plugs, more of the air-fuel mixture explodes in the cylinder – giving you added power and better acceleration.

The CP-1060 also lets you drive more miles on a set of points. When connected to your ignition system, the CP-1060 relieves the points of heavy current demands, reducing high-current oxidation and pitting of point surfaces. Your points last longer – saving you point replacement costs, tune-up time, and your hard-earned money, too.

The CP-1060 is designed for conventional distributor ignition systems. It comes with our famous step-by-step instructions for assembly and installation.

Kit CP-1060, Shpg. wt. 3 lbs. **57.95**





Easy-to-install Heathkit Ultrasonic Intrusion Alarm System protects your car and valuables

\$57⁹⁵

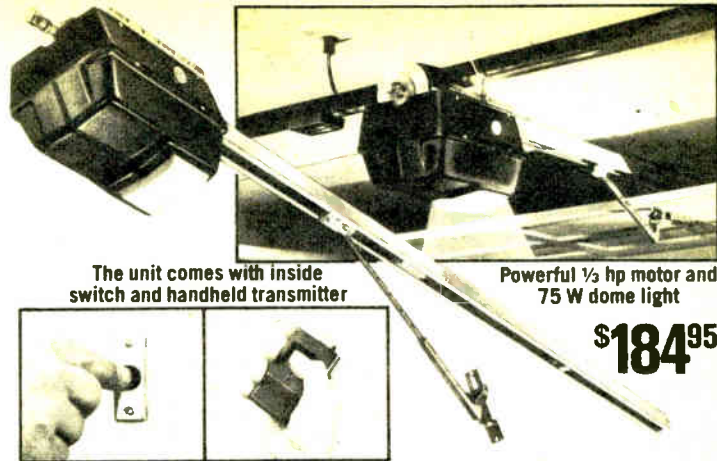
- Safeguards your valuables in your car, van, boat, or any other enclosed area
- Easy installation — just four wires to connect

Car speakers, Cassette decks, CB's, FM Stereo Portable Radios. They're all on a thief's shopping list. And if you own one of these devices in your car, van, boat, or camper, chances are they can become a thief's target this spring. But, if you build the new GD-1568 Intrusion Alarm now, you can deter that thief and save yourself a lot of money, time, and anguish later on.

The GD-1568 discourages potential thieves by using invisible ultra-sonic waves to monitor the area you want secured. Any movement inside, such as a hand reaching in to steal a valuable package, or to break into the glove compartment, will trigger the alarm circuit. This, in turn, sets off your vehicle's horn or other sound device with a constant or pulsating alarm for fifty seconds, alerting neighbors and the public that something's wrong. After triggering, the GD-1568 automatically resets and resumes protection.

And what's really nice about the GD-1568, is that it installs easily. It requires no drilling, or major switch installation. All you do is hook up four wires to any 12 VDC electrical system and sound device. Optional pin switches give you extra protection for compartments with hinged doors.

Kit GD-1568, Shpg. wt. 2 lbs.	57.95
GDA-1568-1, Trunk and hood pin switches for GD-1568. 1 lb.	6.95
Horn Relay Switch (for cars without built-in horn relay).	
GDA-1558-1, Shpg. wt. 1 lb.	4.95



The unit comes with inside switch and handheld transmitter

Powerful 1/3 hp motor and 75 W dome light

\$184⁹⁵

Provide for your spouse's safety and convenience with the Heathkit Automatic Garage Door Opener

In the dark, or in a storm, just a press of the transmitter button from the car, and the Heathkit Garage Door Opener automatically opens the door, and greets your spouse with an illuminating 75-watt dome light as the car rolls into the lighted safety and dry shelter of your garage. An inside garage switch securely closes the door and turns off the light after safe entry. And for extra security, you can program the FCC-approved transmitter with 256 codes. For doors to 7.5' H.

Transmitter, Receiver and Door-Opener Mechanism. Kit GD-3309C, Shpg. wt. 4.5 lbs., Mtr. Frt.	184.95
Two Transmitters, Receiver and Door-Opener Mechanism. Kit GD-3309D, Shpg. wt. 4.6 lbs., Mtr. Frt.	199.95
Kit GDA-3309-1, Door Opener Mechanism Only, 44 lbs., Mtr. Frt.	159.95
Kit GDA-3209-2, Adapter for jamb and pivot doors. 3 lbs.	10.95
GDP-3309A, Transmitter only, Shpg. wt. 1 lb.	26.95
GDP-3319A, One Transmitter, One Receiver for 3 wire systems. 1 lb.	54.95
GDP-3329A, Two Transmitters, One Receiver for 3 wire system. 2 lbs.	69.95
Power Transformer for adapting 2-wire opener to 3 wire system. GDA-3309-3, Shpg. wt. 1 lb.	9.95

GD-3309 SPECIFICATIONS: Overall Size: 12" H x 9" W x 120" L. Motor: 117 VAC 1/3 HP. Mounting Clearance: 3" above highest point of door travel. RF Frequency: 310 MHz. VHF Receiver: Powered by 24 VAC from opener mechanism. Usable on any 3-wire mechanism or 2-wire with addition of GDA-3309-3. For standard NEC wiring. Includes 20' cable.

Build the Wiper Delay for safe driving



\$19⁹⁵

End wiper switch fumbling and keep your eyes on the road with this Heathkit Windshield Wiper Delay. Its solid-state circuitry lets you delay multiple wiper sweeps up to 30 seconds for drizzle, or delay multiple sweeps down to 0.5 seconds for downpours.

It fits most single and 2-speed electric wiper systems on GM, AMC, Ford (except '72-'76 Montegos and Torinos, '74-'76 Cougars) and Chrysler (except those with motor reversing parking systems) vehicles. Auto wiring diagrams must be obtained from car manual or through local car dealership.

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

Handy Digital Speedometer/Tach



\$59⁹⁵

Unlike conventional speedometers, the CI-1265 is more accurate and easier to read. Its bright, illuminated, digital display shows your car's speed up to 199 mph or kph. And it will record speed changes down to 1 mph. With the push of a button, the CI-1265 changes to a tachometer, registering engine RPM in multiples of 100 for easy reading.

Measures 1 13/16" H x 4 1/16" W x 3 1/2" D. For 4, 6, or 8 cylinder, 4-cycle engines with spark ignitions & 12 VDC neg. gnd. Includes hardware, instructions.

Kit CI-1265-1, for cars w/o CS-2048, 3 lbs. . .	59.95
Kit CI-1265-2, for cars w/CS-2048, 3 lbs. . .	49.95
Kit CSA-2048-1, for front-wheel drive, 1 lb. . .	8.95

Accurate Digital Quartz Clock/Timer



\$39⁹⁵

Install a reliable, quartz clock in your car, van, camper, or boat by building the GC-1415. Clock/Timer. It features a quartz crystal circuit to give the exact time — so you can keep appointments.

Besides being an accurate clock, the GC-1415 is a Timer, too. It keeps track of hours and minutes up to 24 hours, or minutes and seconds up to 10 minutes. For convenience, you can switch back and forth from clock to timer or hold either one without affecting the other. 1.8" H x 4.71" x 3.12" D.

Kit GC-1415, Digital Clock w/Timer, 2 lbs. . . .	39.95
LAST CALL on Digital Clock without Timer. Kit GC-1406, Shpg. wt. 1 lb.	24.95





NEW

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

\$77⁹⁵

- Choose from 16 pre-programmed tunes from our music book of 50 tunes, or add your own tunes
- Select songs with 3-button in-car keyboard

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

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

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

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

A weatherproof, 4-ohm, 4-watt speaker (included) mounts behind your vehicle's grille – or at any other convenient outside location.

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

Kit CH-1276, Shpg. wt. 3 lbs. **77.95**

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: 1.50" H x 7.75" W x 4.88" D.



Control volume and tempo

Select songs on keypad

Weatherproof speaker

Pre-programmed Musical Car Horn tunes:

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

... you can also program your own tunes!

Use Electrical Systems Course to repair your car at home

\$79⁹⁵

for EAC-1

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

Effective audio-visual teaching method covers major sections of the auto electrical system. Four modules give you an education in automotive electrical systems – complete with hands-on projects. Learn about auto electrical principles, charging systems, starting systems, accessory and body electrical circuits. Earn 4 CEUs – score 70% on final exam.

SAVE \$19.85 on all Modules. EAC-1, 23 lbs. **79.95**

EA-11, Module 1: Elect. Principles, 5 lbs. **24.95**
 EA-12, Mod. 2: Starting System, 5 lbs. **24.95**
 EA-13, Mod. 3: Charging System, 5 lbs. **24.95**
 EA-14, Mod. 4: Acc. & Body Elec. Sys., 5 lbs. **24.95**

These courses can also prepare you for NIASE exams. Write NIASE, 1825 K St. NW, Wash., DC 20006.

Learn how to tune-up your own car – save time, money

\$79⁹⁵

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

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

Projects require engine and ignition analyzers, timing light, compression tester and vacuum pressure gauge. EA-2000, 12 lbs. **79.95**

Compression tester, vacuum pressure gauge and “T” fitting. EAC-2-1, 1 lb. **14.95**

SAVE \$25.00! Order EAC-1, EAC-2000 and EAC-2-1. \$174.85 separately. EAS-2000, 32 lbs. **149.85**

These courses can prepare you for NIASE exams. If you pass final exam and fail NIASE exam, return materials and receipt for purchase price refund.

1 Electronic Ignition Tester

\$19⁹⁵

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

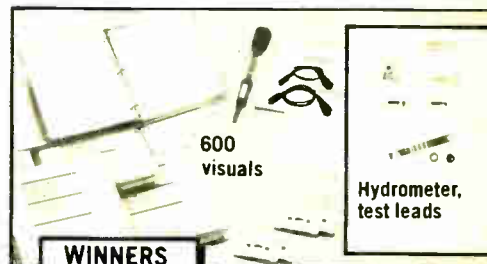
Tests battery condition, function of reluctor and pickup coil, switching of primary coil and location of faulty component in primary ignition circuit. 0.75" H x 2.50" W x 5.50" L. Requires some ignition knowledge. Pickup coil test won't work on '78 and newer Omnis, Horizons, K-cars with Hall-effect ignitions. Kit CI-2055, Shpg. wt. 2 lbs. **19.95**

2 Charging System Tester

\$19⁹⁵

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

Three quick tests tell you if battery is sufficiently charged, if alternator is charging battery, if voltage regulator is faulty and if alternator is functioning. Keep one in your car to save labor for road emergencies. For 12 VDC, negative ground systems. Enclosed in 0.75" H x 2.50" W x 5.50" L case. Kit CI-2065, Shpg. wt. 2 lbs. **19.95**

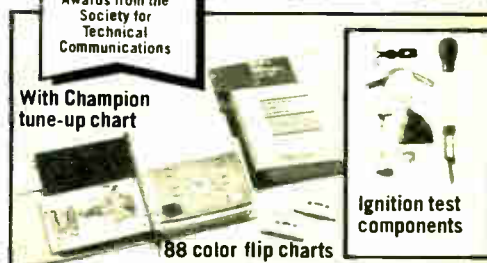


600 visuals

Hydrometer, test leads

WINNERS

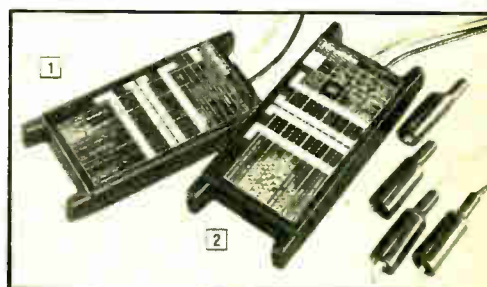
Awards from the Society for Technical Communications

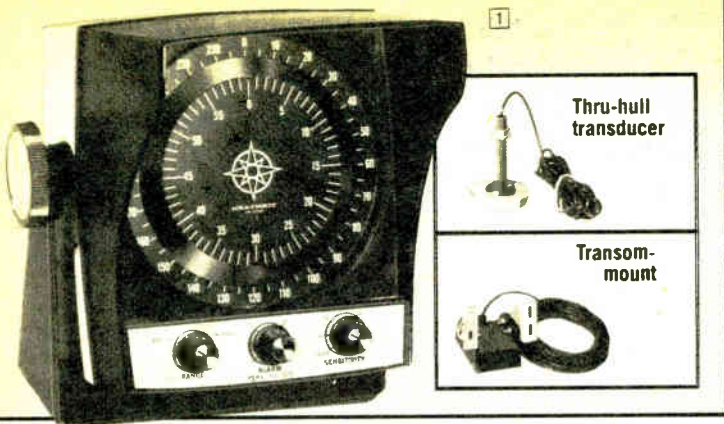


With Champion tune-up chart

88 color flip charts

Ignition test components





1

Thru-hull transducer

Transom-mount

Marine kits for the skipper on your gift list

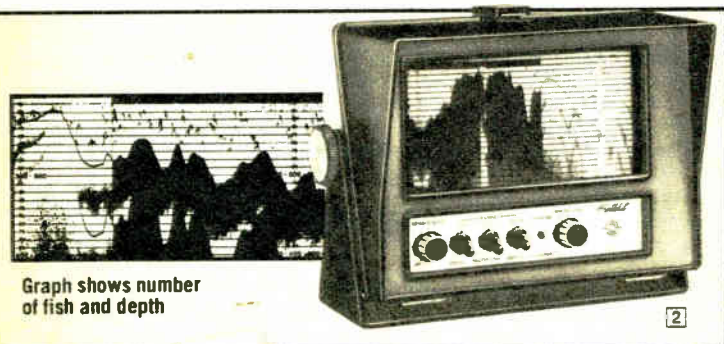
1 Dual Range Depth Sounder doubles as fish finder

\$114⁹⁵

- Navigate safely in unknown waters
- Spot fish and submerged objects
- Two selectable ranges for improved accuracy

Whether you're fishing, scuba diving or pleasure cruising, the MI-1031 Depth Sounder adds an extra measure of safety to your boating pleasure. It features a high-pitched audible alarm that alerts you to shoals or jagged projecting objects above any pre-selectable depth from 5' to 240'. It also has two selectable ranges: 0-60' and 0-240'; a noise rejection circuit to eliminate ignition interference. Comes in a non-corrosive Cyclac case with super-bright neon indicator. Runs off 12 VDC system. 6½" H x 5¾" W x 7¼" D.

Kit MI-1031-1, with thru-hull transducer & 25' coax cable, wt. 8 lbs. . . . 114.95
 Kit MI 1031-2, with transom-mount transducer & 25' coax cable, 8 lbs. 114.95



Graph shows number of fish and depth

2

2 Fish can't hide from the Heathkit Seeker™

The big ones can't hide from the Heathkit Seeker. It features an extra wide beam transducer that provides a bigger picture of what's below, allowing you to mark more fish. Three depth selections (5'-200'; 200'-400'; or 400'-600'), along with a white line control, let you accurately gauge the depth of the fish and set your line accordingly. In addition, the Seeker gives you a permanent record of your findings on a straight-line recorder roll chart. Rugged housing has a locking hinged panel for quick chart roll replacement. The front panel is water-tight and is lighted for night reading. Comes with easy-to-install gimbal mount and includes one chart roll that lasts 13 hours. Runs off 12 VDC system. Measures 8" H x 11" W x 7" D.

Kit MI-2910-1, with thru-hull transducer & 30' cable, Shpg. wt. 17 lbs. 314.95

Kit MI-2910-2, with transom-mount transducer & 30' cable, wt. 17 lbs. 314.95

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

Save \$15.75! MIS-2910-1, 12 rolls; if purchased sep. \$65.70, 12 lbs. . . 49.95

3 Visual, audible, portable Fish Spotter™

Easy to assemble, completely portable, this unit audibly detects fish between the transducer and any preset depth you choose up to 240'. It features two selectable ranges: 0-60'; and 0-240' for increased sensitivity. Also, there's a noise rejection circuit to block out ignition interference, plus a bright neon indicator and sunshade for easy reading. Comes with suction-type transducer, case. Uses two 6 V lantern batteries (not included). 7" H x 6" W x 11" D.

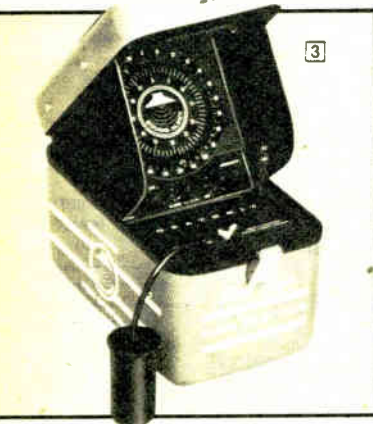
Kit MI-2901, Shpg. wt. 8 lbs. 119.95

Kit MIA-2900-1, Scanning Transducer Bracket for MI-2901, 4 lb. 34.95

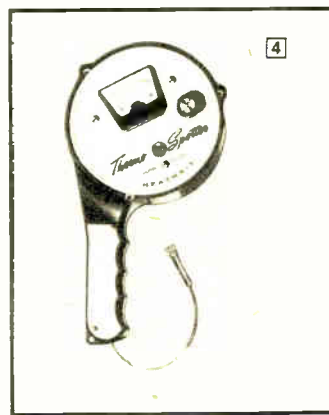
4 Pin point best fishing depth with Thermo-Spotter®

Thermo-Spotter — a great gift idea for the fisherman! It shows water temperature down to 100' so you can find the exact swimming level of your favorite aquatic dish. Features push-button operation and marked depth cable enclosed in a rugged take-up reel case. Includes fish temperature charts. Requires one 1.5V AA battery (not included). Measures 10¼" H x 5¾" W x 3¼" D.

Kit MI-104, Shpg. wt. 3 lbs. 49.95



3



4

Yes, I'd like my friends to know I handcraft my kits with special care and pride. Please send me _____ solid brass plate(s) with my name engraved on them. I understand the price of \$2.00 for one plate, and the price \$1.60 each for two or more plates covers first-class postage and handling. I've enclosed \$_____ with my regular kit order for my personalized brass name plate(s).

Please print your name plainly in capital letters using a maximum of 14 characters (including spaces) in the boxes provided below.

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

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

GDP-1225

Brass name plate adds prestige to your kit



Just **\$2⁰⁰** for one

\$1⁶⁰ each for two or more

Your friends will be impressed — when they see your own name, engraved in brass, on the Heathkit product you've built with your own hands. It reflects the painstaking quality and care you've invested in the product — with your kitbuilding craftsmanship. The Heathkit GDP-1225 Name Plate is made of solid brass, with a brushed jeweler's finish. It also features a self-adhesive backing for easy, no-mess application to your Heathkit product. To order your Heathkit GDP-1225 Name Plate(s), fill out the adjacent coupon and include it with your order of easy-to-build Heathkit products from this catalog.



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

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

\$147⁹⁵

- Keeps track of your boat's speed and distance with $\pm 5\%$ accuracy
- Designed to be used on all types of hulls
- Priced 50% lower than comparable models

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

The most accurate speedometer/log of its kind! The Heathkit Digital Speedometer/Log features integrated circuits for precise speed & log readouts. These circuits, which include 3 active filters, constantly compute and update your average speed every 2 seconds with $\pm 5\%$ accuracy. In addition, the circuits and filters also keep track of distance traveled with the same accuracy. And, you get this accuracy no matter what type of boat hull you have, because the Speedometer/Trip Log also features a special adjustment control that enables you to fine-tune the circuits to the shape of your hull.

It features an easy-to-read display that shows speed and distance: Our Speedometer/Trip Log's readout is an automatic backlighted display with three, 1" digits. With flip of a switch, it will readout speed in mph (or knots), from .1 to 40 mph; or it will 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 Speedometer/Trip Log for your sailboat or the MI-2956 Speedometer/Trip Log for power boat. What's more, you have a choice of transducers to correctly match the necessary transmitting unit to your individual hull. Just pick the the MIA-2950 thru-hull transducer or the MIA-2950-2 transom-mount transducer.

MI-2958, Sailboat Speedometer/Trip Log, Shpg. wt. 4 lbs. 147.95

Heathkit Digital Depth Sounder prevents costly hull repairs, avoids passenger injury

\$174⁹⁵

- Detects changes in depth from 2' to 499'
- Alerts you to depth changes audibly & visually
- Built-in, automatic displacement hull offset

Pays for itself if it sounds the alarm just once! A great aid for coastal navigation. Features self-adjusting range selection that monitors water's depth from 2' to 499'. Also has a self-adjusting gain for accurate depth readings in fresh or salt water. Crystal oscillator updates depth readings every .9 seconds. Big, easy-to-read LCD display with auto night light shows depth in .1' increments from 2' to 9.9'; tells depth in 1' intervals from 10' to 499'.

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

MI-2916-1, Digital Depth Sounder with Thru-Hull Transducer, 8 lbs. . . . 174.95

MI-2916-2, Digital Depth Sounder with Transom-Mount Transducer, 7 lbs. . . 164.95

MI-2916-3, Digital Depth Sounder with Flush-Mount Transducer, 8 lbs. . . 184.95

MI-2916 SPECIFICATIONS: Frequency: 200 Hz. Accuracy: $\pm 5\%$. - 1 count. External Control: On-off switch. Operating Temperature Range: 32°F to 122°F (0 C to 50 C) Power Requirements: 10 to 17.7 VDC Dim: 2½" H x 7.0" W x 5½" D

3 Digital Remote provides extra repeater station

Works off the MI-2916 above. Features same display, alarm settings, keel-offset, and all-weather construction. Independent alarm settings and keel offset capability. Includes 25' connector cable. Sealed cabinet measures: 2½" H x 7.0" W x 5½" D.

Kit MI-2917, Shpg. wt. 4 lbs. 119.95

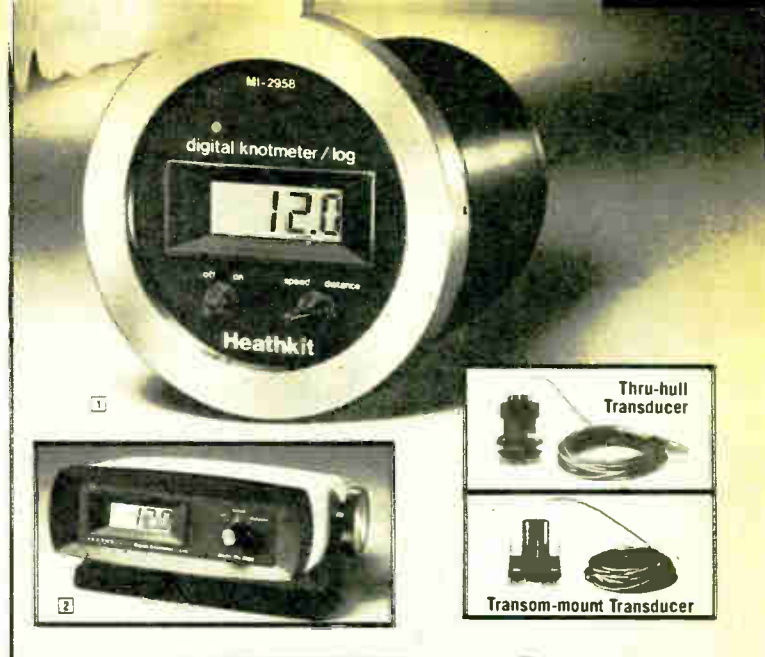
4 Flush-mount Digital Readout for Sailboats

Operates like MI-2917. Requires MI-2916. Dim.: 5" diam. x 4½" L.

Kit MI-2918, Remote with visual warning only, Wt. 4 lbs. 144.95

Kit MIA-2918-1, Audible warning alarm for MI-2918, Wt. 1 lb. 19.95

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

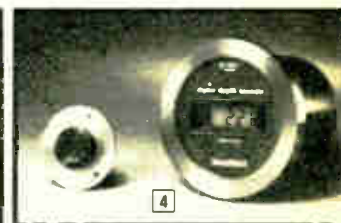


2 MI-2956, Powerboat Speedometer/Trip Log, Shpg. wt. 4 lbs. 137.95

MIA-2950-1, Thru-Hull Transducer, Shpg. wt. 2 lbs. 37.95

MIA-2950-2, Transom-Mount Transducer, Shpg. wt. 2 lbs. 27.95

MI-2958 & MI-2956 SPEC: Speed Range: 0 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: ± 1 to 16 VDC (from boat's system or 2-6 VDC lantern batteries), reverse polarity protected Dim: MI-2958: 5" diam. by 4½" deep Requires a 4½" hole for mounting. MI-2956: 2½" H x 7.0" W x 5½" D.





Beat the energy crisis — split wood quickly with low-cost, easy-to-build Heathkit Log Splitter

\$539⁹⁵

- Saves time — splits logs for even the largest fireplaces — splits logs faster than by hand, cuts worktime by hours
- Powerful 10-ton force-driven ram and triple-angle steel wedge do the wood-splitting for you
- Easy-to-build kit takes just one evening to assemble

Save your back and watch your woodpile grow when you have the easy-to-build GU-1810 Log Splitter. It splits logs up to 21" in length quickly and easily. High-torque, 4-cycle, 5 horsepower Tecumseh gas engine operates 4.5 gpm hydraulic pump. Engine and pump build up 1550 psi to drive ram with up to 10 tons of splitting force! Six-inch, triple-angle steel wedge splits most woods with ease. Twenty-four second, full-cycle automatic return frees hands to ready next log; easy-to-use 3-position lever.

No more standing around: 3-position, 1-hand lever features non-locking forward, neutral and detented reverse with automatic stop or return to ready ram for next log. Tubular log cradle firmly holds logs safely for you for splitting at a comfortable (15" above ground) work level — no more wobbling logs or strenuous stooping. Cradle and frame made from industrial-grade steel. Pump, cylinder use 7 quarts of automatic transmission fluid (not supplied).

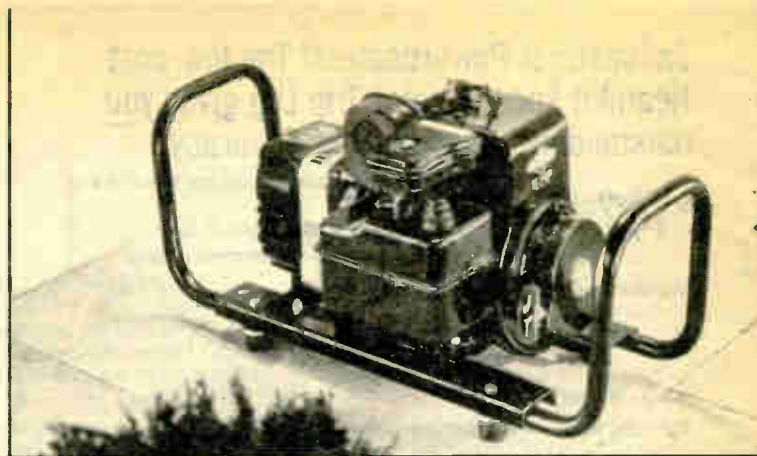
Weight-balanced design allows the Heathkit Log Splitter to be wheeled right to your worksite. Steel-base threaded stand unscrews for easy transportation to worksite (not road towable). Fits in car trunk, station wagon or pickup truck. One-gallon tank holds enough regular or unleaded gas for hour of splitting.

Assemble in just one evening: Kit includes hardware and complete instructions. Wedge, frame and cradle are pre-welded; engine, pump and cylinder are pre-assembled to speed kitbuilding. All components mount on frame with high-strength steel bolts. Hydraulic system is protected by pressure-relief valve; just 3 reinforced, high-pressure hoses to hook from pump to cylinder.

Priced to fight the energy crisis: much less than other, comparable units. Start splitting wood the easy, time-saving Heathkit way now.

Kit GU-1810, Shpg. wt. 206 lbs., Motor Freight **539.95**

GU-1810 SPECIFICATIONS: Log Length Capacity: 21" Log Cradle Length: 21" Splitting Wedge: 6" triple-angle wedge Cylinder Type: 4" diameter, 18" stroke Valve: 3-position, 4-way, 1550 psi relief valve with non-locking forward, neutral and detented reverse with automatic return and shut-off **Power Plant:** 4-cycle, 5 horsepower Tecumseh gas engine. **Fuel Type:** Regular or unleaded gasoline (not supplied) **Dimensions:** 31" H x 31.5" W x 52.75" D (78.74 x 80.01 x 133.99 cm) **Net Weight:** 196 lbs.



Instant emergency electrical power is yours with the Heathkit Portable Power System

\$479⁹⁵

- Emergency power for ham radio, home owners, civil defense, fire departments
- On-location power for construction, logging crews, campers, hunters, wood cutters
- Priced lower than most comparable models

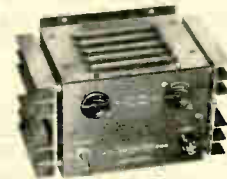
Don't be without electrical power in a blackout, emergency or remote location. The Heathkit Portable Power System's 120 VAC, 60 Hz alternator supplies the power you need. It's also useful for home, farm, business, vacations, or for ham radio clubs — when commercial AC power is not available. Up to 2200 watts (enough to operate a chain saw, or a refrigerator-freezer during a blackout) is available at a duplex 3-prong, 20 amp, breaker-protected outlet.

Economical, long-running: The 5 hp Briggs and Stratton gas engine can run up to 1 3/4 hours, at half load, on a tankful of regular gas, unleaded gas or gasohol.

High-quality power: Delivers more power in a lighter, smaller package than comparable generators. Voltage regulation is $\pm 5\%$, frequency variation only ± 4 Hz, from no load to full load at 3600 rpm. RFI is eliminated by a resistive spark plug. Noise is controlled by a low-tone muffler. To reduce sparking, add optional GUA-1820-1 Spark Arresting Muffler (required in Calif.; below).

Kit GU-1820, Shpg. wt. 112 lbs. **479.95**
GUA-1820-1, Optional Spark-Arresting Muffler, 1 lb. **3.95**

GU-1820 SPECIFICATIONS: Alternator: Type: Single-phase 2-pole revolving field, statically excited. Power Factor: 100% P.F. will withstand intermittent overloads. Government: Fixed speed at 3600 r.p.m. General: Dimensions: 16" H x 15" W x 31" L.



Power Inverter puts AC in your boat

For boaters, campers, or emergency use. Converts 12 VDC to 120 VAC to power TV or appliances up to 175 W. For high starting current motors see GU-1820 above. The convenient Heathkit Power Inverter measures just 4 3/4" H x 5 1/8" W x 7 3/8" L.

Kit MP-10, Shpg. wt. 8 lbs. **54.95**

Heating/cooling costs go down with Casablanca Fan



- Circulate dead air for better heating
- Adds a decorative touch to any room
- Save to \$100 over comparable fans

Casablanca Fan brings heat down from ceiling in heating season, cools in summer for pennies a day. 52" blades (tip-to-tip). Chain-pull or wall switch operation. 120 VAC, 60 Hz. Not for ceilings under 8'. Compare at \$100 more.



Kit GD-1238A, Wt. 24 lbs. **129.95**
GDA-1238-4, Slow-Speed Accessory 1 lb. **15.95**
GDA-1238-1, Swag-Chain Kit. 3 lb. **14.95**
Kit GDA-1238-2, Decorative Light Kit (left), 3 lbs. **16.95**

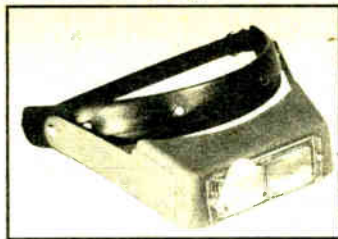


Around home...or for your next kit project...choose one or more of these handy aids

3-D Binocular Magnifiers

Three finely ground glass lenses enlarge small detailed circuits 2½ times for easy viewing, keeping hands free for positioning or soldering components. Headband adjusts to fit all hat sizes. Cushioned forehead. Focus viewing point: normally 8". Durable, washable plastic headframe.

GDP-201, Assembled, 1 lb. 18.95



Save \$7.00 on Extension Lamp

Don't let eye strain slow down your kitbuilding fun. This eye-saving Extension Lamp features a conical shade to direct light right where you need it. The steel extension arm, with spring suspension, spans a full 45" and swings 360° to accommodate any work angle. Uses incandescent bulb (not included). Assembled. You'll wonder how you ever got along without this great kitbuilding aid.

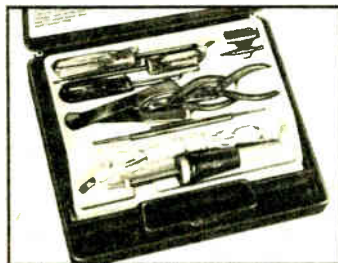
GDP-202, 4 lbs. Was \$26.95, NOW ONLY 19.95



Handy Heathkit Tool Kit

Features a Weller 25W Soldering Iron with two tips, wire strippers, a pair of diagonal cutters, 4" long-nose pliers, a ⅞" blade screwdriver, a phillips screwdriver, a ¼" nut driver, a soldering aid tool, and a spool of solder. Molded storage tray keeps each tool in place in the durable 3" H x 10¾" W x 10" D carrying case.

GHP-1270, Wt. 3 lbs. 37.95



Quality soldering irons

1 Seen elsewhere for \$30.00 more. Thermostatically-controlled. Includes 700° F tip. Assembled.

GDP-1108, Shpg. wt. 5 lbs. 69.95

Extra Tips for GDP-1108. ⅜", ⅝", 5/64" chisels, 1/32" conical.

GDP-1109, 1 lb. 15.95

2 Three-Heat Iron has 25W element. Includes 3/16" chisel tip, stand, heat shield. 5½" H x 3½" W x 5½" D. 120 VAC. 60 Hz.

Kit GH-17A, Shpg. wt. 5 lbs. 39.95

3 Weller 3-Heat Iron. Slim 1/8" tip for close point-to-point wiring. Develops 860° F heat. Our best-selling Iron. 120 VAC. Assembled.

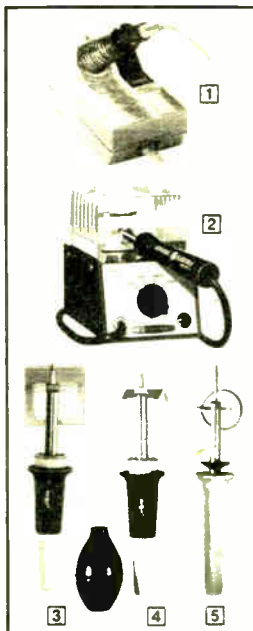
GDP-207, Shpg. wt. 1 lb. 14.95

4 This Weller Solder/De-solder Set includes the GDP-207 Iron (above) plus a de-soldering bulb for convenient solder removal. 120 VAC.

GDP-1009, Shpg. wt. 1 lb. 18.95

5 This Wahl 25-Watt Pencil Soldering Iron is ideal for close work on high-density circuit boards. 3-Wire cord. 120 VAC. Assembled

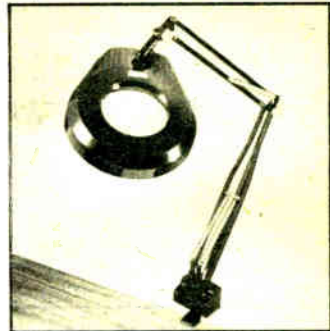
GDP-1231, Shpg. wt. 1 lb. 7.95



Magnifier/Lamp makes kitbuilding more fun

This GDP-200 Magnifier/Lamp, with its glass, 5" diameter, 3-diopter magnifying lens, is an outstanding kitbuilding aid. It features a professional-looking black housing, a safety diffuser for full bulb protection, and a quiet-running transformer. It even includes the fluorescent tube. The 45" extension steel arm and gimbal mount swing 180° for easy positioning close to your work area. 120 VAC, 60 Hz. Assembled.

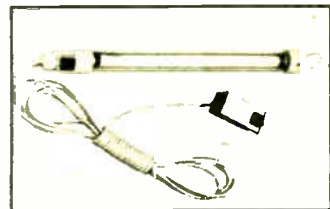
GDP-200, Shpg. wt. 7 lbs. 79.95



Handy plug-in Trouble Light goes almost anywhere

The GDP-206's 25-watt fluorescent tube throws a more illuminating light—without the usual eye-straining shadows of incandescent bulbs. It lets you move around more freely because it comes with a long-reaching 25' line cord. 26" L x 2.5" W x 2.5" D. Includes fluorescent tube. 120 VAC. Assembled.

GDP-206, Wt. 4 lbs. 19.95

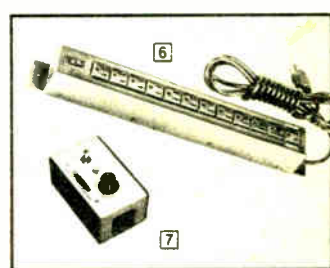


6 Twelve-Socket Multiple Outlet Box has 11 switched outlets, plus one unswitched outlet for clock or memory save. Fused for full protection. 10 A maximum load. 12' cord. 120 VAC. Easy-to-build kit is a great addition to workbench or Ham station.

Kit HD-1274, Wt. 4 lbs. 19.95

7 Motor Speed Control gives you control of power tools. For motor 15 amps or less. Not for Dremel tools.

Kit GD-973A, Wt. 2 lbs. 29.95



Vise or board holder lends a hand

8 PanaVise Circuit Board Holder accepts almost any shape or size circuit board. Spring loaded for quick, easy change. Tilts 220°.

GDP-1254, Wt. 2 lbs. 19.95

9 PanaVise Vacuum Base. For temporary mounting on smooth surfaces. Attaches securely. Powerful rubber suction pad holds without marring tabletop. For GDP-1253, -1254, -1255 Vise Heads. 3 3/16" H x 5" W x 4 1/4" D.

GDP-1252, Wt. 2 lbs. 19.95

10 PanaVise Vertical Jaw Vise Head. Ideal for most hobby applications. Nylon jaws open to 2 1/4" to grip parts without marring or scratching.

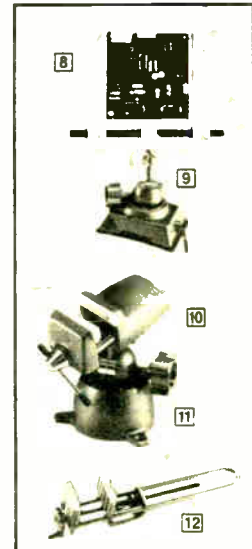
GDP-1253, Wt. 2 lbs. 16.95

11 PanaVise Standard Height Base. For GDP-1253, -1254 or -1255 heads listed in this column. Designed for permanent installation.

GDP-1251, Wt. 2 lbs. 13.95

12 PanaVise Vertical Vise Head. For holding bulkier items. Padded jaws open up to 6 1/2".

GDP-1255, Wt. 2 lbs. 15.95



Learn about the most advanced TTL ICs

The TTL Data Book. Important design and specification data on the broadest, most advanced families of TTL ICs. 832 pages. (See page 52 for book-ordering information)

EDP-220 7.50



Additional tools and aids are available at Heathkit Electronic Centers (units of Veritechnology Electronics Corporation in the U.S.). See the list on page 25 for the address of the Center nearest you.

EASY ORDERING INFORMATION



**BY PHONE: NOW YOU CAN CALL
TOLL-FREE! 800-253-0570**

NOW ORDER TOLL-FREE: 800-253-0570 using your Heathkit Revolving Charge or Visa or MasterCard credit cards. 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 right before calling. Have credit card handy. For parts orders, please call Customer Service, 616-982-3571. For technical service consult the phone directory on page 53.

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

- Use the handy order form at 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.
- 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 at right.
- Please use separate sheet to order parts, manuals or for any correspondence.

TERMS: Here are some credit options for your order

- **Heath Revolving Charge Plan.** No money down. Up to two years to pay. Two convenient monthly payment plans available. We encourage down payments to reduce monthly payments and finance charges. Follow the instructions on reverse side of order form. Be sure to sign charge agreement.
- **MasterCard and Visa plans.** Now you can use your MasterCard or Visa credit cards to charge Heathkit products. Just fill in your credit card number in the spaces provided on the order form. Include card expiration date. Sorry, we cannot accept credit cards for replacement parts orders.
- **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 offers, or systems.

SPECIAL SHIPPING AND HANDLING:

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

HOW TO FIGURE SHIPPING AND HANDLING CHARGES

Find your zone number using Zone Chart below. Locate shipping weight of item in the first column of Rate Chart. Determine the shipping charge for the corresponding area. Enter the shipping charge on order form.

RATE CHART

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

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

NOTE: Blue Label Service Area Zone A covers: AR, CT, LA, MA, ME, MS, NH, NJ, ND, OK, RI, SD, VT, PA (Philadelphia area only), NY (New York City and Long Island). Zone B covers: AZ, CA, CO, FL, ID, MT, NV, NM, OR, TX, UT, WA, WY. Zone D covers: HI (Honolulu). Zone E covers: AK (Anchorage).

Ship. Wt.	Zone 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	BLUE LABEL AIR SERVICE CHARGE					
								Zone A & B	Zone C	Zone D	Zone E		
1	\$1.47	\$1.49	\$1.54	\$1.60	\$1.68	\$1.75	\$1.91	\$2.38	\$4.15	\$4.22	9.88		
2	1.55	1.61	1.70	1.83	1.99	2.15	2.48	3.05	5.32	5.35			
3	1.63	1.73	1.86	2.06	2.30	2.55	3.05	3.42	6.49	6.48			
4	1.71	1.84	2.02	2.29	2.61	2.94	3.60	5.29	7.67	7.62			
5	1.79	1.96	2.18	2.52	2.92	3.32	4.07	6.26	8.84	8.75			
6	1.87	2.07	2.33	2.74	3.14	3.64	4.54	7.23	10.02	9.88			
7	1.95	2.18	2.49	2.89	3.34	3.95	5.02	8.20	11.19	11.02			
8	2.03	2.30	2.64	3.04	3.53	4.14	5.55	9.17	12.36	12.15			
9	2.11	2.41	2.75	3.25	3.93	4.63	6.08	10.14	13.54	13.28			
10	2.19	2.52	2.87	3.46	4.22	5.00	6.62	11.11	14.71	14.42			
11	2.28	2.60	3.00	3.68	4.51	5.38	7.15	12.09	15.90	15.55			
12	2.36	2.66	3.10	3.89	4.80	5.75	7.69	13.06	17.07	16.68			
13	2.41	2.72	3.19	4.02	4.96	5.95	7.94	14.03	18.25	17.82			
14	2.46	2.78	3.28	4.13	5.12	6.14	8.27	15.00	19.42	18.95			
15	2.51	2.87	3.39	4.25	5.26	6.32	8.48	15.97	20.59	20.08			
16	2.58	2.99	3.54	4.35	5.40	6.49	8.72	16.94	21.77	21.22			
17	2.68	3.11	3.70	4.45	5.53	6.65	8.94	17.91	22.94	22.35			
18	2.77	3.23	3.85	4.55	5.65	6.80	9.15	18.88	24.12	23.48			
19	2.86	3.35	4.00	4.73	5.77	6.94	9.35	19.85	25.29	24.62			
20	2.95	3.46	4.16	4.91	6.01	7.20	9.55	20.82	26.46	25.75			
21	3.05	3.58	4.31	5.11	6.27	7.50	9.73	21.80	27.65	26.88			
22	3.14	3.71	4.46	5.30	6.51	7.81	9.91	22.77	28.82	28.02			
23	3.24	3.82	4.61	5.49	6.76	8.12	10.08	23.74	30.00	29.15			
24	3.33	3.94	4.76	5.68	7.00	8.42	10.24	24.71	31.17	30.28			
25	3.42	4.05	4.92	5.87	7.25	8.73	10.41	25.68	32.35	31.42			
26	3.51	4.18	5.07	6.06	7.49	9.04	10.78	26.65	33.52	32.55			
27	3.60	4.30	5.23	6.25	7.74	9.34	11.16	27.62	34.69	33.68			
28	3.70	4.41	5.38	6.44	7.98	9.65	11.53	28.59	35.87	34.82			
29	3.79	4.53	5.53	6.64	8.23	9.95	11.90	29.56	37.04	35.95			
30	3.88	4.65	5.69	6.82	8.47	10.25	12.27	30.53	38.22	37.08			
31	3.98	4.77	5.84	7.01	8.73	10.56	12.65	31.51	39.40	38.22			
32	4.07	4.89	5.99	7.21	8.97	10.86	13.02	32.48	40.57	39.35			
33	4.17	5.00	6.15	7.40	9.22	11.17	13.40	33.45	41.75	40.48			
34	4.26	5.13	6.30	7.59	9.46	11.48	13.76	34.42	42.92	41.62			
35	4.35	5.24	6.45	7.78	9.71	11.78	14.14	35.39	44.10	42.75			
36	4.44	5.36	6.61	7.97	9.95	12.09	14.51	36.36	45.27	43.88			
37	4.53	5.48	6.76	8.16	10.20	12.39	14.89	37.33	46.45	45.02			
38	4.63	5.60	6.91	8.35	10.44	12.70	15.25	38.30	47.62	46.15			
39	4.72	5.72	7.07	8.55	10.69	13.01	15.63	39.27	48.79	47.28			
40	4.81	5.83	7.22	8.73	10.93	13.30	16.00	40.24	49.95	48.42			
41	4.91	5.95	7.37	8.92	11.19	13.61	16.38	41.22	51.13	49.55			
42	5.00	6.07	7.52	9.12	11.44	13.92	16.74	42.19	52.33	50.68			
43	5.09	6.19	7.68	9.31	11.68	14.22	17.12	43.16	53.50	51.82			
44	5.19	6.31	7.83	9.50	11.93	14.53	17.49	44.13	54.67	52.95			
45	5.28	6.42	7.98	9.69	12.17	14.84	17.87	45.10	55.85	54.08			
46	5.37	6.54	8.14	9.88	12.42	15.14	18.24	46.07	57.02	55.22			
47	5.46	6.67	8.29	10.07	12.66	15.45	18.61	47.04	58.20	56.35			
48	5.55	6.78	8.44	10.26	12.91	15.75	18.98	48.01	59.37	57.48			
49	5.65	6.90	8.59	10.46	13.15	16.06	19.36	48.98	60.55	58.62			
50	5.74	7.01	8.75	10.64	13.40	16.36	19.73	49.95	61.72	59.75			
Add'l lbs	09 lb	12 lb	15 lb	18 lb	25 lb	30 lb	37 lb	97 lb	1.17 lb	1.13 lb			

ZONE CHART

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

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

Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone
006-009	8	260-261	3	363-369	5	476-477	4	598-599	7	820-822	5
010-069	5	262-278	4	370-386	5	478	4	600-609	2	823-826	6
070-089	4	279	5	387	5	479-489	3	610-619	3	828-832	6
090-099	5	280-283	4	388	5	490-491	1	620-623	4	833	7
		284-285	5	389-397	5	492	2	624-628	3	834	6
100-108	5	286-293	4	393-495	1	493-495	1	629-668	4	835-838	7
109	4	294-295	5	400-406	6	496-499	3	669-679	5	840-847	6
110-119	5	296-297	4	407-409	4	499-499	3	680-687	4	855-864	7
124-128	5	298-299	5	410-412	3	500-516	4	688-693	5	865-884	6
127-126	4	300-303	4	413-422	4	520-524	3	700-722	5	980-998	7
129	5	304	5	423	3	525	3	723-727	4		
130-152	4	305-307	4	424-426	4	526-528	3	728-768	5	900-921	8
153	3	308-329	5	427-432	3	530-534	2	779	5	922-928	7
154-160	4	330-334	6	433-436	2	535-539	3	470-778	5	930-934	8
161	3	335-338	5	437-457	3	540	4	779-788	6	935	5
162-163	4	339	6	458	5	541-546	3	790-792	5	936-960	8
164-185	3	340	6	460-462	3	547-548	4	793-799	8	961	7
166-199	4	350-352	4	463-464	2	549	6			962-976	8
		354	5	465-466	1	550-566	4			977-979	7
200-232	4	355-359	4	467-469	2	567	5	800-803	5	980-987	8
233-237	5	360-361	5	470-472	3	570-572	4	804-805	6	988-987	7
238-259	4	362	4	473-475	3	573-588	5	806-807	5	989-994	7
						590-597	6	808-816	6	995-999	8

BOOK ORDERING INFORMATION — There is a \$10 MINIMUM for a book-only purchase. No minimum if books are ordered with kits. Do not calculate shipping on books, simply add 50¢ for each book to the shipping charges column on the order blank.

MONEY-BACK MANUAL PREVIEW

All kits come with manuals, but if you'd like to see how easy kitbuilding 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.

Send manual orders on a separate sheet of paper. Manuals are \$5 each except for the following: color TV's, organ, HX-1681, H-8-18, HW-101, AJ-1600, AP-1800, AR-1650, SB-104A, SB-614, IG-1275, IG-5257, WH-17, SO-4235, VF-7401, and ET series which are \$8 each. Assembly and operations manuals for the following are \$15 each: GR-4000, AR-1650, GR-2001, H-88/89. Manuals for HCM-817-1 and HCM-847-1 are \$20 each. Manuals not available for Educational Courses. Add 10% shipping/handling for each manual you order. Write Heath Company, Parts Dept., Benton Harbor, MI 49022.

HEATH PHONE DIRECTORY FOR ASSISTANCE AND INFORMATION

Product Orders (TOLL FREE except Alaska, Hawaii & Michigan) (8:00 A.M. - 8:00 P.M. Eastern Time)	800-253-0570
Product Orders for Alaska, Hawaii & 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	616-982-3860
8:00 A.M. - Noon and 1:00-4:30 P.M., Eastern Time, Weekdays only.	

HEATH CAREER OPPORTUNITIES: We have positions available for qualified engineers, technicians, technical customer service representatives and technical writers. If your expertise is in computer hardware or software, instrumentation or communications and you're interested in a career with Heath, send resume and salary history to:

Heath Company, Personnel Department, Benton Harbor, MI 49022
We are an Equal Opportunity Employer M/F

NOTE: From time to time we make our mailing lists available to reputable businesses with offers we think would be of interest to you. If you do not wish to receive such offers, please send us the address label from your catalog with your request to: Heath Company, Dept. 597-999, Benton Harbor, MI 49022.

Copies of the Heathkit warranty for any other consumer 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 President's Corner

Dear friend,

Nothing's quite so unique as a Heathkit gift. Whether you give the kit yourself, or build it for someone special, it's very personalized and unique because something of you, or of the recipient, becomes an important part of it.

This catalog is packed with new products from our Heath engineers. Among them, a new state-of-the-art 25" Color TV - our best value even in console TV - (GR-2500 on page 100), a new low-cost portable radio (GR-1009 on page 10), a

complete solar water heating system (NS-1100 on pages 2 and 3), and numerous other gift ideas ranging from musical doorbells and car horns, Casablanca fans; log splitters, security devices, cordless telephones, automatic phone dialers, pinball machines, and even a complete home Satellite TV Earth Station.

For our computer friends the list is also large, including two exciting new printers (H-25 and MX-80 on pages 75 and 76), a new double-density controller for the H/Z-89 (Z-89-37 on page 67), new quad-density 5 1/4" disk drives (H-37 on page 69), hard disk mass storage (Z-67 on page 78), a new full-featured smart modem (WH-43 on page 73), and many software products, including Peachtree business packages, SuperCalc and Condor Data Base Management. Write or stop in at your nearest Heathkit Electronic Center* for our new software catalog.

Then there's HeathCraft Woodworks - our new line of fine furniture kits. Heirloom designs. Top quality materials. And Heathkit construction manuals par excellence.

We hope to serve you this holiday season with unique gifts from the broad Heathkit menu of fine quality products... and I would like to take this opportunity on behalf of the Heath family to send our warmest wishes to you and your family for the best of everything in the coming year.

William F. Johnson

*units of Veritechnology Electronics Corporation

President, Heath Company

FREE New Heath Craft Woodworks Catalog

Now with many new kits, all easy to build and priced to save you money. For your free copy, write:

Heath Co., Dept. 404-855,
Benton Harbor, MI 49022.

Name _____
Address _____
City _____ State _____
Zip _____

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

IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL

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

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

- a. Do not write on the bill. On a separate sheet of paper write (you may telephone your inquiry but doing so will not preserve your rights under this law) the following:
 - i. Your name and account number (if any).
 - ii. A description of the error and an explanation (to the extent you can explain) why you believe it is in error.
 - iii. The dollar amount of the suspected 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.

- 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 his explanation that you still refuse to pay the disputed amount, the creditor may report you to credit bureaus and other creditors and may pursue regular collection procedures, but the creditor must also report that you think you do not owe the money, and the creditor must let you know to whom such reports were made. Once the matter has been settled between you and the creditor, the creditor must notify those to whom the creditor reported you as delinquent of the subsequent resolution.
6. If the creditor does not follow these rules, the creditor is not allowed to collect the first \$50 of the disputed amount and FINANCE CHARGES, even if the bill turns out to be correct.
7. If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them, if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:
 - a. You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
 - b. The purchase price must have been more than \$50.

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

Hand-Held Heathkit Capacitance Meter uses advanced design for faster, more accurate digital readings — even detects leakage from capacitors

3½-digit (LCD) features large, easy-to-read ½"-tall digits.

Four LEDs indicate the correct unit of measurement (pF, nF, μF or mF)

Two leakage switches and nomogram (included) allow measurement of leaky capacitors

Polarized "Kelvin" terminals, combined with special test cable (included), allow more accurate capacitance measurements

Fuse and other circuitry protect meter from damaging overloads

Capacitance Meter features compact, lightweight hand-held design



Optional Leather Carrying Case (IMA-2215-1, order above right) protects meter during outdoor use

\$157⁹⁵

- Measures up to 199.9 mF with $\pm 0.2\%$ basic accuracy, automatically selects proper measuring range
- Built-in polarized "Kelvin" test sockets for more accurate capacitance measurements
- Detects leaky capacitors with special circuitry
- 3½ digit Liquid Crystal Display (LCD)
- Hand-held meter uses standard 9 VDC battery

The compact Heathkit IT-2250 Hand-Held Digital Capacitance Meter automatically measures any capacitance from 0 pF to 199.9 mF (0.1999 Farad). The IT-2250's auto-ranging feature automatically selects the correct range of measurement from a choice of ten ranges. The capacitance measurement is then shown on its 3½ digit liquid crystal display (LCD). Four light-emitting diodes (LEDs), built into the IT-2250, indicate the correct unit of measurement (pF, nF, μF or mF).

"Kelvin" terminal design is a big plus feature in the IT-2250 Hand-Held Digital Capacitance Meter. It permits measurement directly at the capacitor leads to minimize error. And a special zero control allows for the elimination of stray capacitance in the instrument.

For measuring capacitors that have a low operating voltage, the Heathkit IT-2250 Capacitance Meter supplies a low test voltage. This low test voltage is superimposed on a low bias voltage, for measuring electrolytic capacitors. A remote extension cable is also provided—so you can test capacitors that cannot be connected directly to the Capacitance Meter.

Another key feature of the Heathkit Capacitance Meter is its ability to detect a leaky capacitor. A nomogram is provided so you can translate the readings you obtain, using the two Leakage switches, into approximate values of shunt or internal capacitor leakage resistance.

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.

A set of standard capacitors, supplied with this kit, enables you to calibrate the Capacitance Meter to the accuracies listed in the Specifications below.

A typical 9 VDC (NEDA 1604) alkaline battery (not supplied) provides four to ten hours of continuous operation. Battery condition is continuously monitored, and a LO-BAT warning is displayed whenever the battery voltage drops to approximately 5 VDC. You can also operate the Heathkit IT-2250 Capacitance Meter continuously from line voltage, using one of the optional Heathkit Outlet Cords (Model PS-2350 for 120 VAC operation, PS-2450 for 240 VAC operation), listed below.

Bulldable in three evenings with the complete, step-by-step Heathkit manual, the electronic components of the IT-2250 are contained on three circuit boards. Housed in a compact and lightweight plastic case, the meter is supported at a convenient viewing angle by a built-in pivoting stand. Overall dimensions of the meter are 2" H x 3.25" W x 7.5" L (5.08 x 8.26 x 19.05 cm). Weighs just one pound, including battery.

Kit IT-2250, Shpg. wt. 3 lbs. 157.95

IMA-2215-1, Leather Carrying Case for IT-2250, Shpg. wt. 1 lb. 14.95

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

IT-2250 SPECIFICATIONS: Ranges: 199.9 pF, 1999 pF, 19.99 nF, 199.9 nF, 1.999 μF, 19.99 μF, 199.9 μF, 1.999 mF, 19.99 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges, $\pm(0.2\%$ of reading + 1 count + 0.5 pF); 1.999 μF, 19.99 μF, 199.9 μF, 1.999 mF, 19.99 mF and 199.9 mF ranges, $\pm(5\%$ of reading + 1 count). Using Heath-Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges, $\pm(0.5\%$ of reading + 1 count + 0.5 pF); 1.999 μF, 19.99 μF, 199.9 μF, 1.999 mF and 199.9 mF ranges, $\pm(5\%$ 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 for a temperature range of 67 to 77 degrees F (19 to 25 degrees C). Conversion and Display Rate: For values up to 1999 μF, 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). Power Requirements: One 9 VDC (NEDA 1604) battery (not included) or 120/240 VAC, using optional Heathkit Outlet Cords (Model PS-2350 for 120 VAC operation, PS-2450 for 240 VAC operation—both listed above). 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 3.25" W x 7.5" L (5.08 x 8.26 x 19.05 cm). Net Weight: 16 ounces (450 grams), including battery.



For the designer's or experimenter's workbench — the Heathkit DC Tri-Output Power Supply

\$99⁹⁵
Kit

- Versatile — use it for designing digital circuits
- One fixed 5 VDC output, and two variable VDC outputs
- 3 floating outputs can be connected in any combination for a variety of output voltage currents

Here's one of the lowest priced power supplies, yet one of the most versatile, too. It's the IP-2718 Tri-Output Power Supply, and it features one fixed 5 VDC output, plus two continuously variable 20 VDC outputs for all your circuit design work and experimentation.

All three voltage outputs can be connected in a wide variety of combinations to supply your DC circuits with the voltage they need. Each output operates independently, or can be "strapped" with another in series or parallel for all your circuit voltage and current needs — fixed or "float."

The 5 VDC output is handy in digital experimenting and design, and with a 1.5 amp rating, it has enough current to power many of today's logic devices. The two variable 20 VDC outputs provide 0.5 amps each, and feature a special clutch-couple control that allows you to "track" each output at specified voltage differences — a useful feature when designing analog circuits that require both positive and negative voltages.

The voltage outputs are short-circuit proof, with automatic current limiting for added protection. Each output's voltage and current can be monitored easily through the switchable front-panel meter. All the outputs and controls are readily accessible on the front panel, and clearly marked for easy operation. The housing is constructed of durable metal, and painted in instrument blue with beige trim.



Kit IP-2718, Shpg. wt. 12 lbs. 99.95

Factory assembled and tested IP-2718.

SP-2718, Shpg. wt. 12 lbs. 195.00

IP/SP-2718 SPECIFICATIONS: Outputs: 5 VDC 2 1.5A; A & B; 0-20 VDC @ 0.5 A. Regulation: Load: Less than 0.1% variation from no load to full load on 20V supplies; less than 3% variation from no load to full load on 5V supply. Line: Less than 0.2% variation for line voltage change of 10V on 20V supplies; less than 0.15% variation for line voltage change of 10V on 5V supply. Power Requirement: 120/240 VAC. 60/50 Hz. 100 W full load. Dimensions: 4½" H x 10¾" W x 9" D.



Handy Heavy-Duty Power Supply/Battery Eliminator

\$154⁹⁵

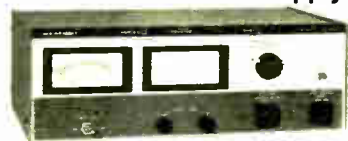
- Provides variable 9-15 VDC capable of 12 amps continuous, 20 amps intermittent
- Extra-large transformer for low ripple operation

For VDC applications where high-current capability is necessary. Provides continuous variable voltage from 9-15 V with fixed output regardless of load. Two easy-to-read meters let you monitor both current and voltage. Housing is painted in instrument blue and beige trim. The IP-2715 is the ideal Power Supply/Battery Eliminator to meet your service bench requirements.

Kit IP-2715, Shpg. wt. 31 lbs. 154.95

IP-2715 SPECIFICATIONS: Output Voltage: Variable from 9-15 VDC. Output Current: 12 amps continuous, 20 amps 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: 5½" H x 11" W x 11" D (13.3 x 27.9 x 27.9 cm).

Variable Isolated AC Supply adds more service versatility



360 volt-amps, AC, continuous output. Switch selected. Fused at 1A & 3A ranges. 120/240 VAC. Features instrument blue cabinet that measures 5.5" H x 15" W x 10.5 D.

Kit IP-5220, 28 lbs. 144.95

SP-5220, Assembled, 26 lbs. 190.00



Versatile low-cost Heathkit 0-400 VDC Power Supply

\$164⁹⁵
Kit

- Insulated binding posts for positive and negative high voltage & bias operation

Budget priced Power Supply provides 0-400 VDC output at 0-100 mA continuous, 125 mA intermittent. Line and load regulation is less than 1% from no load to full load. Ripple is less than 10 mV from DC to 1 MHz. Features two meters: two scale voltmeter measures from 0-400 or 0-150 volts, and an ammeter that measures from 0-150 mA.

Kit IP-2717, Shpg. wt. 19 lbs. 164.95

Factory assembled and tested IP-2717.

SP-2717, Shpg. wt. 19 lbs. 230.00

IP/SP-2717 SPECIFICATIONS: Additional Outputs: 0-100 VDC at 1 mA variable bias voltage. 6.3 VAC at 4 amps. 12.6 VAC at 2 amps. (25 VA max. AC load). Filament voltage. Regulation: Output variation less than 1% from no load to full load. Ripple: Less than 10 millivolts rms. Output Impedance: Less than 10 ohms. DC to 1 MHz. Power Req: 120/240 VAC. 50/60 Hz. Dimensions: 5½" H x 13¾" W x 11" D.

Continuously variable 1-15 VDC Regulated Power Supply

The IP-2728 Power Supply helps in servicing, testing or designing low-voltage solid-state equipment. Features a continuously adjustable 1-15 VDC at 500 mA output, with a 500 mV line, load regulation, and fully adjustable limiting current. AC or DC programming. 120/240 VAC. 4¾" H x 5½" W x 5¾" D.

Kit IP-2728, Shpg. wt. 5 lbs. 32.95



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

Metal case for added durability, better RFI shielding

Large, easy-to-read LED display has 8 digits for higher resolution

Measure frequency of signals up to 512 MHz, period of signal, ratio of two signals

Two ranges for added versatility: 50 MHz range and 512 MHz range

50 ohm input for high-frequency signals

1 Megohm input for low-frequency signals

Standby mode for maximum accuracy—the minute you turn the counter on

Trigger level control for stable, more accurate counting of most any signal



This low-priced Heathkit Portable 512 MHz Frequency Counter gives you digital accuracy!

\$249⁹⁵
Kit

- Extra-wide frequency range to accommodate maintenance of both UHF and VHF ranges
- Crystal-controlled time base assures you of excellent long-term stability and accuracy

UHF capability up to 512 MHz, low-frequency capacity down to 5 Hz and a budget-pleasing price are all yours when you choose the newest Heathkit Digital Frequency Counter. Service technicians and do-it-yourselfers will find its extended frequency range ideal for servicing UHF 2-way radios now used by police and fire departments – as well as most other communications equipment.

Our engineers have designed more features and added capabilities into this laboratory quality Heathkit instrument. For example, the IM-2420 can do more than measure the frequencies of input signals – its period function can give cycle time in seconds, while the frequency ratio function provides the ratio between two input frequencies.

Make more accurate measurements: A standby power switch can keep the crystal oven warm, giving you maximum frequency accuracy as soon as the IM-2420 is turned on. Proportionally-controlled crystal oven keeps the internal time base extremely accurate – within 0.1 part per million (ppm) – over a wide temperature range. The crystal-controlled time base provides excellent long-term stability, with drift controlled to less than 1 ppm per year. And the external time base jack allows the use of an external time base signal.

Four gate times and a large, 0.43" (1.09 cm)-high, 8-digit LED display provide the resolution you need to measure UHF signals. The pivoting stand places the IM-2420 at a comfortable, convenient viewing angle.

The IM-2420's excellent 4-15 mV typical sensitivity, over the entire 5 Hz-512 MHz range, allows counting of weak signals. Trigger level control assures stable counting when noise is present, and provides more accurate measurement of complicated waveforms. Effective limiting circuits at both inputs (5 Hz-50 MHz and 40 MHz-512 MHz) make sure counting is stable, even when the input signal level varies by as much as 60 dB.

Measure signals with a direct connection. Or, for frequency counts without a direct connection, order the SMA-2400-1 Telescopic Antenna (right).

Extra protection is built into the IM-2420, too. Its rugged, compact metal cabinet provides improved shielding from radio-frequency interference (RFI). Full voltage protection assures worry-free counting.

- Features four gate items and 8-digit resolution to give you more precise readings
- Provides you with two separate inputs and trigger level control for added versatility

 **FAST, EASY
4-EVENING KIT**

Kitbuilding is easy: the IM-2420 takes as little as four evenings to build, with a fully detailed Heathkit manual to guide you along the way, step-by-step. ICs are standard and easily available, for faster servicing. For 120-240 VAC, 50-60 Hz power. Dimensions, 4.25" H x 10" W x 12.5" D (10.8 x 25.4 x 31.8 cm).

Kit IM-2420, Shpg. wt. 9 lbs. **249.95**

SM-2420, Assembled 5 Hz-512 MHz Frequency Counter, Shpg. wt. 9 lbs. **320.00**

Swiveling Telescopic Antenna for IM-2400, IM-2410, IM-2420 Counters. Also use on many 2-meter transceivers. Chrome-plated brass antenna provides significant performance improvements over similar antennas. Enhance counter sensitivity by tuning to the proper frequency – by extending or retracting the telescoping sections. Right angle version, includes BNC connector.

SMA-2400-1, Assembled, Shpg. wt. 1 lb. **9.95**

IM, SM-2400 SPECIFICATIONS: Inputs: Frequency Ranges: 5 Hz to 50 MHz and 40 MHz to 512 MHz; Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical; Input Impedance: 5 Hz to 50 MHz range – 1 megohm shunted by less than 25 pF, 40 MHz to 512 MHz range – 50 ohms nominal; Input Protection: 5 Hz to 50 MHz range – 250 VRMS to 100 kHz derating to 25 VRMS at 50 MHz, 40 MHz to 512 MHz range – 5 VRMS; Period Measurement Mode: Input: 5 Hz to 50 MHz only, Range: 5 Hz to 10 MHz; Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical; Display Resolution (Least Significant Digit): 100 nS to 0.1 ms in decade steps; Ratio B/A Measurement Mode: Input Frequency Limits: 5 Hz to 25 MHz and 40 MHz to 512 MHz; Effective Measurement Range: From 1.6 to 1.024 x 10¹⁸, guaranteed; Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical; Time Base: Frequency: 10 MHz; Setability: to within 0.2 part per million, ppm; Temperature Stability: 0.2 ppm, from 32 deg F to 104 deg F; 0 deg C to 40 deg C; Crystal Aging Rate: Less than 1 ppm per year; Oven Operating Temperature: 167 deg F ± 9 deg; F 175 deg C ± 9 deg 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 volts RMS from 50 ohm source; 10 megahertz; Input Protection: Any voltage with peak-to-peak limits between -3.5 volts and + volts; Output: Will drive 2 standard TTL (ie 7400) loads; Short circuit protected; General Gate Times: 0.01 second, 0.1 second, 1 second and 10 seconds (switch-selectable); Sampling Rate: Every 0.1 second, 0.33 second, 1 second or 10 seconds; LED Display: Eight digits; Power Requirement: 120-240 VAC, 50-60 Hz, 6 watts maximum in STBY mode, 40 watts maximum in ON mode; Overall Dimensions: 4.25" H x 10" W x 12.5" D (10.8 x 25.4 x 31.8 cm); Net Weight: 6.5 pounds (2.8 kg)



Test and align anywhere with the IM-2400 Hand-Held Counter!

\$144⁹⁵
Kit

- Battery operated for in-field frequency testing
- Rechargeable batteries for low-cost operation
- Two frequency ranges and time bases

Now you can accurately test and align mobile radio equipment in cars, trucks, aircraft, boats—anywhere you want, with the portable IM-2400 Digital Frequency Counter. This compact Counter's take-along measurements are a mere 1.63" H x 3.38" W x 8.38" D, and it runs off rechargeable batteries.

It features a 10 MHz crystal-oscillator that insures stable and accurate frequency monitoring through both 50 Hz-50 MHz and 40 MHz-512 MHz ranges. With a typical sensitivity of 10 millivolts, RMS, and a guaranteed sensitivity of 25 millivolts, RMS, the IM-2400 lets you measure all types of signals.

The IM-2400 is completely portable. It has rechargeable, nickel-cadmium batteries for hours of readings on one charge. The batteries are located inside the housing to eliminate awkward external battery packs. For bench operation, you can get one of the optional Battery Eliminator Chargers (next column) to operate the IM-2400 Hand-Held Counter directly off line current.

Get this handy Hand-Held Counter and take test and alignment convenience with you everywhere.

Kit IM-2400, Shpg. wt. 3 lbs. 144.95

Assembled and tested IM-2400,

SM-2400, Shpg. wt. 2 lbs. 190.00

Swiveling Telescopic Antenna for the IM-2400. Also can be used on 2-meter transceivers. This chrome-plated brass antenna, with its right-angle and telescoping capability, gives you improved performance and better sensitivity. Antenna includes BNC connector.

SMA-2400-1, Assembled, Shpg. wt. 1 lb. 9.95

120 VAC Battery Eliminator/Charger for IM-2400,

PS-2404, Shpg. wt. 1 lb. 7.95

IM-2400 SPECIFICATIONS: Input Impedance: 50 Hz to 50 MHz—1 megohm shunted by less than 20 pF; 40 MHz to 512 MHz range—50 ohms. Input Protection: 50 Hz to 50 MHz range—15 volts RMS to 100 kHz—operating to 10 volts RMS at 50 MHz; 40 MHz to 512 MHz range—8 volts RMS. Sensitivity: ±1 ppm. Temperature Stability: ±10 parts per million 0°C to 40°C. Gate Time: 1.0 or 0.1 seconds (switchable). Resolution: 50 Hz to 50 MHz range—10 Hz at time base set at 0.1 second; ±100 Hz at time base set at 0.1 second; 40 MHz to 512 MHz range—±100 Hz at time base set at 1.0 second; 1 kHz at time base set at 0.1 seconds. Power Requirement: Five 1.5 VDC rechargeable nickel-cadmium cells included; or 120 VAC with optional PS-2404 or 240 VAC with optional PS-2405. Dimensions: 1.63" H x 3.38" W x 8.38" D.



**FAST, EASY
2-EVENING KIT**

Here's a low-cost, high-accuracy Digital Frequency Counter

\$124⁹⁵
Kit

- Switchable ranges for high-resolution readouts
- Excellent 10 mV sensitivity
- Big, easy-to-read, 8-digit LED display with automatic decimal placement

If you're looking for an inexpensive, but highly accurate frequency counter for your bench, then check out this IM-2410 Digital Frequency Counter.

Accuracy and stability unmatched for its low-price. The IM-2410 features two frequency ranges—from 10 Hz to 50 MHz, and from 20 MHz to 225 MHz—for increased accuracy and better resolution. A two-position time gate lets you choose either 0.1 sec or 1.0 seconds for even better resolution. And the crystal-controlled time base gives you good long-term stability and accuracy you would expect to find on more expensive counters: ±1 ppm.

Front-panel operation for easy bench use. The IM-2410 has one BNC input for fast, direct frequency

countings. For non-direct counts, you can attach the optional SMA-2400-1 Swivel Antenna (described above). In addition, all the IM-2410's operation switches are on the front panel for easy reach. The 8-digit display is easy-to-read, and shows all frequencies in MHz for higher resolution (as fine as 1 Hz at 50 MHz, 10 Hz at 225 MHz). A cabinet stand props the IM-2410 so that the display is positioned at a comfortable viewing angle.

Interference-free cabinet construction. The IM-2410's housing is made of metal for greater durability and better RFI (Radio Frequency Interference) shielding. All in all, the IM-2410's money-saving price, accuracy, and simplified operation make it a valuable instrument buy for engineer, technician, and hobbyist alike. Dimensions: 3.38" H x 7.25" W x 9.5" D.

Kit IM-2410, Shpg. wt. 6 lbs. 124.95

Factory assembled and tested IM-2410,

SM-2410, Shpg. wt. 6 lbs. 170.00



IM-2410 SPECS: Max. Sensitivity: 25 mV RMS. Input impedance: 1 MΩ shunted by less than 24 pF. Input Protection: 150 VAC up to 100 kHz—operating to 5 VAC from 160 MHz to 225 MHz. Time Base Frequency: 3.58 MHz. Temperature Stability: ±10 ppm, from 0 to 40°C. Power Req: 120-240 VAC 50-60 Hz. Dimensions: 3.38" H x 7.25" W x 9.5" D. 8.59" x 18.42" x 24.13 cm.

Heathkit FM Deviation Meter helps check transmitter performance

\$149⁹⁵

- Measures FM transmitters and signal generators
- Two front jacks for fast oscilloscope hookup

The IM-4180 lets you check transmitter and signal generator performance by measuring the peak FM deviation between 25 and 1000 megahertz. A BNC jack allows external and direct-line monitoring. An 8-ohm jack allows you to listen to deviation through a speaker or a pair of headphones.

All the jacks and controls of the IM-4180 are easily accessible from the front panel. The controls include: four push button switches for selecting deviation modulation ranges from 2 to 75 Hz; coarse and fine-tuning controls for locking in difficult UHF FM signals; a level control to adjust

the meter sensitivity, and an audio output adjustment control.

The IM-4180 features a blue and white 5" H x 10.31" W x 7.19" D cabinet, and runs on 10 AA batteries (carbon-zinc, alkaline or nickel-cadmium—not included) for remote-location monitoring. The optional 120-240 VAC IMA-4180-1 Battery Eliminator lets you use the IM-4180 without draining the batteries.

Kit IM-4180, Shpg. wt. 7 lbs. 149.95

Battery Charger/Eliminator for the IM-4180,

Kit IMA-4180-1, Shpg. wt. 2 lbs. 29.95

Swiveling Telescoping Antenna for use with IM-4180.

For monitoring transmitter and generator performance without connecting IM-4180 to equipment.

SMA-2400-1, Assembled, Shpg. wt. 1 lb. 9.95



IM-4180 SPECS: Carrier Freq. Ranges: Fundamenta: 25 to 50 MHz. Deviation Ranges: 0-2, 0-7.5, 0-20, & 0-75 kHz. Accuracy: ±3% full scale. Input Imped.: 50 Ω. Max. Input: 5 V. Scope Output: 10 mV/kHz peak.



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

Give your old, worn TV picture tubes new life with this low-cost Heathkit CRT Checker/Rejuvenator

\$124⁹⁵
Kit

- Use on almost all CRTs, including in-line-gun tubes
- Works on color and black-and-white picture tubes
- Separate testing, cleaning and rejuvenation

Test, clean and rejuvenate almost all current CRTs: Positive-action pushbuttons control all tests and processes for easier operation. Individual guns can be cleaned, tested and rejuvenated by using the front panel pushbuttons. And separate meters for each gun allow easy tracking of the individual grid circuits.

Easy to use: Main power control also sets control grid voltage level. Separate heater voltage meter allows monitoring of the heater voltage supplied to the CRT cathode. Indicator lamp visually confirms CRT shorts. Visual restoration indicator glows brighter as the rejuvenating current is increased. A separate cleaning process is applied after rejuvenation to assure proper tube operation. Molded plastic case. With 4-foot heavy-duty test cable. 120/240 VAC.

Kit IT-5230, Shpg. wt. 9 lbs. **124.95**

ST-5230, Assembled and tested, For 120 VAC only, 9 lbs. **170.00**

IT/ST-5230 SPECIFICATIONS: Sockets Supplied: 14-pin for 90-degree color tubes; 13-pin for in-line color tubes; 8-pin for black-and-white tubes; 7-pin for black-and-white tubes. Heater Supply Voltage: Variable from 2 Volts to 12 Volts, at 1 amp. Test Cable: 4 feet long, heavy-duty cable. Dimensions: 5.12" H x 13.5" W x 10" D.

Meter indicates heater voltage supplied to cathode of CRT

Individual meters are provided for each color gun

CRT cathode voltage can be set for more precise testing

On/Off Control also sets level of grid voltage

Pushbuttons control all tests and processes

Light indicates rejuvenation level of the CRT

Hand-Held Color Alignment Generator for TV field servicing

\$72⁹⁵
Kit

- Outstanding performance, shirt-pocket size
- 16 different displays, including 3 in color

Real precision, accuracy and stability: The IG-5240 features a crystal-controlled carrier and color oscillator. Its size makes it convenient to take along for in-the-field service. It's a versatile, low-cost service tool for hobbyists, too.

Easy to operate: Simply connect the output cable to the VHF terminals of any color TV. The RF carrier frequency is calibrated to NTSC Channel 4. Four program slide switches select any of the 16 displays available. A color level control adjusts the color intensity of the three color displays. A battery saver circuit turns the displays off automatically after a minimum of five minutes on. This feature conserves battery power, and lets you get the most efficient operation from your batteries.

Two 9 VDC batteries (not included) provide 8 or more hours of continuous operation. Housing made of strong molded plastic. The pocket-sized IG-5240 Color Alignment Generator measures 5.4" H x 2.75" W x 1.15" D. Get yours now for greater in-the-field versatility.

Kit IG-5240, Shpg. wt. 2 lbs. **72.95**

IG/SG-5240 SPECIFICATIONS: Display Patterns: Raster, blank; Horizontal Lines, 1-7-15; Vertical Lines, 1-11-21; Crosshatch or Dots, 1 x 1, 7 x 11 or 15 x 21 matrices; Rainbow, no luminance; Grated Rainbow, 3 or 10 bars with luminance. Chroma Carrier: 3563.795 kHz, $\pm 0.005\%$, crystal-controlled. Master Timer: 377.616 Hz, $\pm 0.005\%$, crystal-controlled. RF Carrier: NTSC Channels 3 or 4, $\pm 0.005\%$, crystal-controlled. RF Output: 5000 μ V minimum, into 300 ohms. Video Modulation: Approximately 50%. On-Time Interval: 5 minutes minimum. OFF pushbutton can override timed shutoff. Power Requirement: Two 9 VDC (NEDA 1604) batteries, with 180 mA hour capacity. Dimensions: 5.4" H x 2.75" W x 1.15" D (13.72 x 6.99 x 2.91 cm).

Take the inexpensive IG-5240 anywhere — fits in your shirt pocket

Adjust intensity of the 3 color displays with the IG-5240's Color Level Control

16 different display selections include rainbow, dots, cross-hatch, horizontal and vertical lines

High-accuracy Heathkit Yoke/Flyback Tester for TV service technicians

\$94⁹⁵
Kit

- Portable unit checks yokes, flybacks, coils with ring test

Checks windings of yokes, flybacks, coils and general mid-frequency (10 to 100 kHz) coils. Measure drive signals, focus and anode voltage with IMA-100-10 below. With test leads. 120/240 VAC.

Kit IT-5235, Shpg. wt. 8 lbs. **94.95**

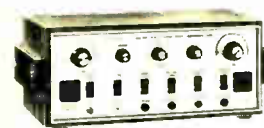
ST-5235, Assembled, 7 lbs. **140.00**

Kit IMA-100-10, 30 kV Probe, 1 lb. **12.95**

SMA-100-10, Assembled Probe, 1 lb. **19.95**

IT/ST-5235 SPECIFICATIONS: Yoke/Flyback Test: Applies exciting pulse to coil, detects # of rings at preset amplitude or higher. Amplitude: 25% of initial ring; adjustable from 10-50%. Scale: Bad, <9 rings, Good, >11 rings. Accuracy: ± 1 ring at 10 mark on highest range. Drive Voltage Scales: 0-30, 0-300 VAC, p-p. Accuracy: $\pm 5\%$ of full scale. 100 Hz-200 kHz. High-Voltage Scales: 0-10, 0-40 kVDC. Accuracy: $\pm 3\%$ of full scale (with optional IMA-100-11 Probe). Dimensions: 6.88" H x 5.75" W x 10.75" D (17.48 x 14.61 x 27.31 cm).

Color Bar/Dot Pattern Generator



12 patterns, clear raster for purity adjustment. Heath 3 x 3 or familiar 9 x 9, displays. RF output, Chs. 2-6; variable

going video; front panel sync output; 4.5 MHz sound carrier oscillator. 2# 500 W AC outlets. Metal case. 120 240 VAC. 5.25" H x 13.5" W x 8" D.

Kit IG-5228, Shpg. wt. 8 lbs. **147.95**

Post Marker/Sweep Generator



Helps align TV, FM receivers. Mixes 1 or more marker signals with demodulated signal from test circuit. 15 markers, carrier markers for

NTSC Chs. 4 and 10, diode modulator for video sweep modulation, 400 Hz tone for FM alignment. Metal case. 120 VAC. 5.5" H x 13.38" W x 12" D.

Kit IG-5257, Shpg. wt. 16 lbs. **254.95**

Lightweight 40 kV Probe Meter



40kV Probe Meter makes TV tube voltage measure-

ments fast and convenient. Just attach the ground clip to the TV chassis; place the probe against the tube's high voltage connector. On-off switch on handle. $\pm 3\%$ accuracy. You can finish this easy-to-build kit in just one evening. The IM-5210 Probe Meter measures 1.5" H x 1.88" W x 15" L (17.48 x 14.61 x 27.31 cm).

Kit IM-5210, Shpg. wt. 2 lbs. **24.95**

The 5280 Series — a low-cost way to build a test bench

Whether you're a beginning hobbyist, student, or service technician, our 5280 Series offers you a money-saving way to assemble a versatile test bench for your electronic needs.

Each instrument in the series is described below and is priced at just \$47.95. And for that kind of money, we don't think you'll find a better value on quality-engineered test instruments.

1 Four-function Multimeter

This multimeter lets you measure four functions on a large, easy-to-read panel meter. The meter measures AC and DC voltages up to 1000 volts and DC current up to 1000 milliamps. The ohm function has four ranges: X 1 ohm, X 100 ohm, X 10 kilohm, X 1 megohms. Requires one "C" cell plus two 9 VDC batteries or the IPA-5280-1 Power Supply described in lower right column. This budget-priced Heathkit instrument includes test probes.

Kit IM-5284, Shpg. wt. 5 lbs. 47.95

IM-5284 SPECIFICATIONS: Ranges: DC Voltmeter: 0-1, 0-10, 0-100, 0-1000 volts, full scale. Accuracy: $\pm 3\%$, full scale. AC Voltmeter: 0-1, 0-10, 0-100, 0-1000 volts, full scale. Accuracy: $\pm 5\%$, full scale. DC Milliammeter: 0-1, 0-10, 0-100, 0-1000 mA, full scale. Accuracy: $\pm 4\%$, full scale. Input Resistance: DC: 10 megohms. AC: 1 megohm. Dimensions: 5.75" H x 11" W x 7.75" D (14.61 x 27.94 x 19.69 cm).

2 RF Oscillator for precise alignments

For aligning tuned stages of AM, FM and television receivers. Features 5 band output, plus a band for calibrated harmonics, and a 1 kHz output jack for tracing circuit defects. Housed in high-impact molded case. Requires two 9 VDC batteries or IPA-5280 Power Supply for operation. This easy-to-build Heathkit instrument includes both probes and test leads.

Kit IG-5280, Shpg. wt. 5 lbs. 47.95

IG-5280 SPECIFICATIONS: RF Output: Frequency Range: 310 kHz to 110 MHz, in five bands: 100 MHz to 220 MHz on harmonics. Output Voltage: Approximately 100 mV. Internal Modulation: 1 kHz. AF Output: Frequency: 1 kHz. Output Voltage: 2.0 Volts RMS (open circuit). Dimensions: 5.75" H x 11" W x 7.75" D (14.61 x 27.94 x 19.69 cm).

3 Sine/Square Wave Oscillator

Here's an instrument that you'll find useful in troubleshooting and testing audio circuits. The IG-5282 features four output frequency ranges, from 10 Hz to 100 kHz, with both sine and square wave modes. The IG-5282 can be used as audio signal source for signal tracing. And, with the right equipment, the sine mode of the IG-5282 can be used for analyzing audio stage gain and distortion. The sine square wave mode, again with the right associated equipment, can be used for determining frequency response. Features rugged case construction for greater reliability.

Kit IG-5282, Shpg. wt. 5 lbs. 47.95

Versatile Heathkit Test Lead Set



For 2000 V rms, 20 amp maximum. Includes 1.5 meter black and red cables, each terminated by two 4mm shielded plugs, red spring hook, red prod, and black shrouded croc clip.

PKW-200, Shpg. wt. 1 lb. 15.95

4 RCL Bridge — for design work

Features solid-state circuitry that lets you find unknown values of resistance, inductance, and capacitance. This easy-to-build Heathkit instrument features one circuit board assembly, and comes in a molded cabinet. Kit includes clips.

Kit IB-5281, Shpg. wt. 5 lbs. 47.95

IB-5281 SPECIFICATIONS: Ranges: Resistance: 10 ohms to 10 megohms, in 3 ranges. Inductance: 10 microhenries to 10 Henries, in 3 ranges. Capacitance: 10 picofarads to 10 microfarads, in 3 ranges. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1 1 to 10 1. Power Req: Two 9 VDC batteries or IPA-5281-1 Power Supply. Dimensions: 5.75" H x 11" W x 7.75" D.

5 Signal Tracer for audio circuits

The IT-5283 Signal Tracer is the test instrument you need to trouble-shoot audio circuits. It comes with a diode-equipped RF probe that lets you quickly trace radio and television receiver and transmitter circuits and pin-point failing components and stages. A straight-through (DC) position allows you to identify defective audio components and systems instantly. The IT-5283 also features an audible tone that changes frequency depending on the test point voltage or resistance. This lets you easily trace signal flow through logic circuits and isolate problems.

Kit IT-5283, Shpg. wt. 5 lbs. 47.95

IT-5283 SPECIFICATIONS: Functions: Substitute speaker. AF signal tracing. RF signal tracing. Audible volt ohmmeter. Speaker: 3, permanent magnet type. Power Requirement: Two 9 VDC batteries or optional IPA-5280-1 Power Supply. Dimensions: 5.75" H x 11" W x 7.75" D.

120/240 VAC Power Supply

(Not shown) This handy power supply can simultaneously power all five 5280 Series Instruments without rewiring. Full wave rectification, capacitor, filtering and dual integrated circuit regulators to insure correct voltage output. Comes in a molded cabinet. Measures: 6" H x 3.75" W x 3" D.

Kit IPA-5280-1, Shpg. wt. 3 lbs. 26.95

RF Probe for your DC Voltmeter



Designed for any 10 or 11 megohm DC input voltmeter. Linear response: 1 kHz to 100 MHz. Includes 10 megohm banana & 11 megohm phone plugs. Features grounded probe body housing.

Kit PK-3A, Shpg. wt. 1 lb. 9.95

PKW-3A, Assembled and tested, wt. 1 lb. 14.95



High quality instrument Test Probes

30 kV DC Probe multiplies 10 megohm, meter range by 100, 1000 megohm input.

Kit IMA-100-10, w/banana plug, 1 lb. 12.95

SMA-100-10, Assembled 30 kV DC Probe w/phone plug, Shpg. wt. 1 lb. 19.95

30 kV HV Probe, x100 measurement for meters with 11 megohm input (including probe resistance).

Kit IMA-100-11, 1 lb. 12.95



Low-cost 1 Hz to 1 MHz Function Generator

\$147⁹⁵

- Generates sine, square, and triangle waveforms
- Controls and output are clearly marked and located on front panel for fast and easy operation
- Short-circuit proof amplifier for full instrument protection
- Easy to build — most parts mount on a single circuit board

For the price, you probably won't find the wide frequency range, the engineering quality, or the easy operation of the Heathkit IG-1271 Function Generator anywhere else.

Simple-to-set frequency generation. With just two controls, you can set the IG-1271 to generate a sine, square, or triangle wave over a frequency range from 1 Hz to 1 MHz. All you do is set the six-position frequency multiplier control to the desired function, and then use the precision tuning control to generate the exact frequency you want. The IG-1271's amplifier will supply the 50 ohm BNC output with a 10 volt peak-to-peak signal.

The IG-1271 features a front-panel variable calibrated attenuation control. This ganged control lets you step the signal from 0 to 50 dB (10 V p-p to 30 mV p-p) in 10 dB increments. It also allows you to "fine-tune" up to 20 dB of attenuation for each step, giving you a total attenuation of 70 dB! This is considerably more than you'll find on comparable function generators in the IG-1271's price range.

A precise signal for accurate testing. The frequency accuracy of the IG-1271 is $\pm 3\%$. Its attenuation accuracy is ± 1 dB. It produces a triangle waveform with a nonlinearity of 5% maximum, and a symmetry within 10%. The square wave rise and fall times are 100 nanoseconds maximum.

Easy-to-build circuitry. Most of the circuit components of the IG-1271 mount on one circuit board for a fast and enjoyable kitbuilding experience. A



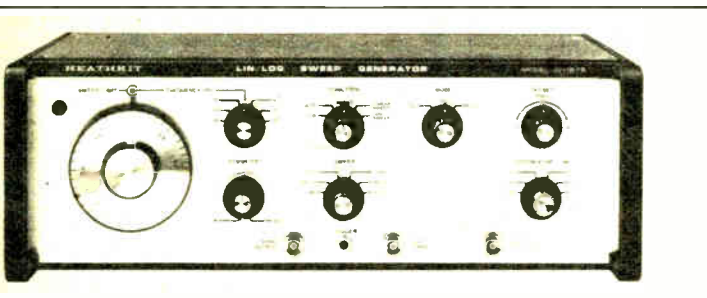
chassis-mounted switch lets you run the IG-1271 on 120 VAC or 240 VAC. For accurate calibration, a triggered oscilloscope is necessary. (See the complete line of Heathkit Oscilloscopes on pages 65-67.)

Kit IG-1271, Shpg. wt. 7 lbs. 147.95

Factory assembled and calibrated IG-1271 Function Generator.

SG-1271, Shpg. wt. 7 lbs. 195.00

IG/SG-1271 SPECIFICATIONS: Functions: Triangle Waveform. Nonlinearity: 5% maximum. Symmetry within 10% of 50% duty cycle. Square Waveform: 100 nanosecond maximum rise or fall time. Symmetry within 10% of 50% duty cycle. Sine wave: Harmonic Distortion: 3% maximum. Power Requirement: 120 240 VAC, 50 60 Hz, 15 watts maximum. Dimensions: 3" H x 7.25" W x 8.88" D. (7.62 x 18.42 x 22.56 cm) with handle removed. Net weight: 4.2 lbs



Deluxe Lin/Log Swept Function Generator

\$334⁹⁵

- Generates sine, square, and triangle waveforms
- Features CW, burst, linear, and log sweeps
- Front-panel control and output for simple operation
- VCG input for convenient external system control

Now you can get a lab-grade function generator with all the testing capability and accuracy you need in the Heathkit IG-1275 Lin/Log Swept Function Generator.

The IG-1275 produces sine, square, and triangle waveforms, as well as swept-

function waveforms for all types of frequency response tests. Two frequency controls and a six-position operational mode switch give you the test versatility of similar units costing much, much more. The six operational modes include Continuous Output (CW), gated CW, a burst mode that completes a variable integral number of output cycles, plus linear and log sweeps for wide 1000/1 sweep range.

For complete control, the start and stop frequencies of the IG-1275 can be set independently, and the sweep modes can be triggered one at a time from the front panel — or externally — and stopped at any given integral number of cycles. Other convenient features include: a 50 dB stepped attenuator with a variable ganged control for precise attenuation; a control that adjusts symmetry from 5% to 95%; a variable offset; a sync output for time-saving system control; and a VCG input for outside control of the main generator.

Besides these controls, the IG-1275 is also equipped with a pen lift and chart control signals that enable you to use a chart recorder, like the Heathkit IR-5207 X-Y Chart Recorder or the IR-5204 Strip Chart Recorder.

Kit IG-1275, Shpg. wt. 15 lbs. 334.95

IG-1275 SPECIFICATIONS: Output: 50-ohm source, short-circuit protected and ± 10 V open circuit protected. ± 10 V open circuit, ± 5 V into 50 ohms. Output Flatness: ± 0.1 dB to 300 kHz, 0.5 dB-3 MHz. Frequency Range: 0.003 Hz-3 MHz in 6 steps on each primary decade. Sine Distortion: Less than 1% (x10⁻²) less than 0.5% (x10⁰, x10², x10⁴), less than 0.75% (x10⁶). Harmonics: 30 dB down (x10⁰). Triangle Linearity: No greater than 1% deviation to 300 kHz. (top decade for each range only). Square Wave Rise/Fall: Less than 60 nS. Power Requirement: 120 240 VAC, 50 60 Hz. Dimensions: 5.38" H x 15" W x 11" D

Heathkit Versatile Sine/Square-Wave Audio Generator

\$119⁹⁵

- Low distortion 1 Hz to 100 kHz sine wave output
- 5 Hz to 100 kHz square wave output with fast rise time — great for response testing

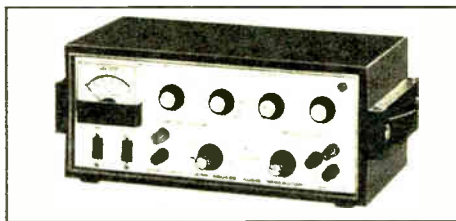
A must for any audio test bench. Provides you with a clean signal source for gain, frequency response, and harmonic distortion measurements; also acts as an external modulator for RF generators.

Has front panel meter for convenient monitoring of sine waves in volts and dB. Also features repeatable selection of any frequency, switchable internal and external load, and operation on either 120 or 240 VAC power.

Kit IG-5218, Shpg. wt. 10 lbs. 119.95

SG-5218, Assembled, 10 lbs. 195.00

60/INSTRUMENTS



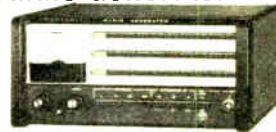
IG/SG-5218 SPECIFICATIONS: Frequency: 1 Hz to 100 kHz. Sine Wave Output: 0.003 to 1 VRMS, 600 ohm load; to 10 VRMS with 10 K ohm or higher external load. dB: -62 to -22 dB ± 1 dB (10-100 Hz). Square Wave Output: 0-1, 1.10 V p-p into 2 K ohms or higher load. Power Requirement: 120 240 VAC. Dimensions: 5.13" H x 13.25" W x 7" D

Sine-Wave Audio Generator

The Heathkit IG-1272 Sine-Wave Generator yields a low-distortion sine wave output over a frequency range from less than 5 Hz to 100 kHz.

It features push-button selection of the first 3 significant digits of desired frequency, plus a switch-controlled frequency multiplier. In addition, the IG-1272 can be operated in a continuously-variable frequency mode. The front panel meter allows accurate monitoring of signal output. Also has low-noise BNC output, plus a buffered BNC output for oscilloscope use. The IG-1272 measures 5½" H x 11" W x 12½" D.

Kit IG-1272, Shpg. wt. 11 lbs. 169.95



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

Low-cost, high-performance Digital Multimeter

\$79⁹⁵
Kit

- Measures DC voltage to 1000 Volts, AC voltage to 700 Volts, with overload protection
- Rugged unit also measures current, resistance

Loaded with full-function capabilities, the IM-1210 can measure AC voltage to 700 Volts. It has four overlapping AC/DC voltage, current ranges. Five resistance ranges cover 0 to 2 megohms. Full scale accuracy (± 1 digit) is $\pm 1\%$ for DC voltage measurements; $\pm 1.5\%$ for AC voltage, DC current and resistance measurements; and $\pm 2\%$ for AC current measurements.

Includes overload protection, universal banana jack inputs. 120/240 VAC. 50/60 Hz. 3" H x 8.69" W x 10.54" D.

Kit IM-1210, Shpg. wt. 5 lbs. **79.95**
SM-1210, Assembled and tested, Shpg. wt. 5 lbs. **130.00**

Versatile Test Lead Set. 2000 VRMS. 20 A max. With 1.5 meter black, red cables terminated by two 4 mm shielded plugs; red sprung hook; red prod; block shielded croc clip. PKW-200, Shpg. wt. 1 lb. **15.95**

Accurate, portable Auto-Ranging Multimeter

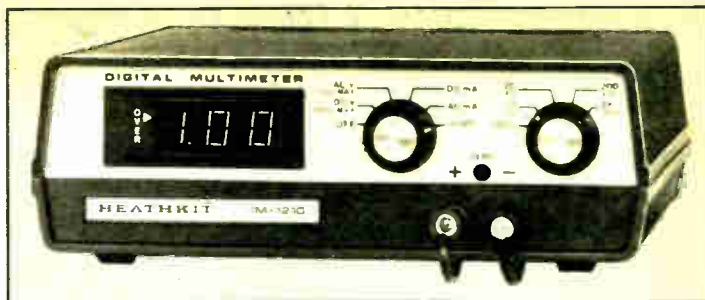
\$294⁹⁵

- Automatically selects proper voltage, current and resistance ranges for accurate measurements
- Built-in feature protects against overloads

The Heathkit IM-2212 is a laboratory-grade portable digital multimeter. It features excellent accuracy and an automatic range selection feature. It features five AC and DC voltage ranges up to 1000 Volts; five AC and DC current ranges up to 2000 milliamps (mA); and ten resistance ranges (high and low voltage) up to 20 megohms. DC accuracy, $\pm 0.2\%$; AC accuracy, $\pm 0.4\%$, when calibrated to laboratory standards.

Normal mode rejection of 80 dB assures highly stable DC readings. Automatic polarity indication. Hold switch inhibits the auto-ranging function when measuring one range. Compact low-profile cabinet with detent positions to hold the IM-2212 at the best viewing angle. Operates on 120/240 VAC, 50/60 Hz power, or with optional Rechargeable Battery pack (order below).

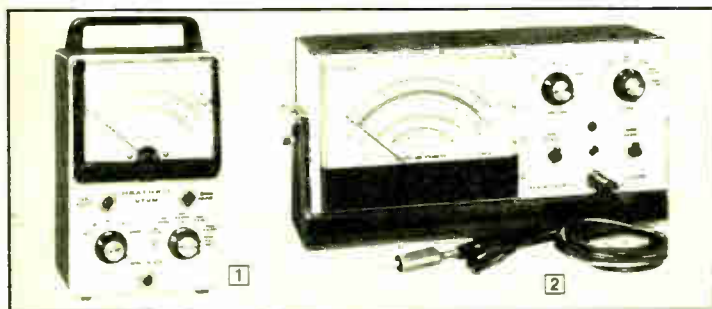
Kit IM-2212, Shpg. wt. 10 lbs. **294.95**
Optional Rechargeable Battery Pack for in-field use of IM-2212. IMA-2212-1, Shpg. wt. 4 lbs. **19.95**



IM/SM-1210 SPECIFICATIONS (Based on 30-min. warmup): Voltage Ranges: 0-1000 VDC, 0-700 VAC. Current Range: 0-2000 mA. Resistance Range: 0-2 megohms. Maximum Input: 700 VDC (except 350 VDC on 2 V range), 1000 VAC or 3 Amps. Input Resistance: 1 megohm. Dimensions: 3" H x 8.69" W x 10.54" D (7.62 x 22.07 x 26.77 cm).



IM-2212 SPECIFICATIONS: Voltage Ranges: 0-1000 VDC; 0-700 VAC. Maximum Input: 1000 VDC; 700 VAC (1000 volts peak) on any range. Input Impedance: 10 megohms (shunted by 90 pF during AC measurements). Current Range: 0-2000 mA. Resistance Ranges: Low Voltage, 0-2 megohms. High Voltage, 0-20 megohms. Display: 3 1/2-digit, 0.5" high LED display. Polarity Indication: Automatic - or - on VDC and DC mA ranges only. Power Requirements: 120/240 VAC, 50/60 Hz or optional IMA-2212-1 Rechargeable Battery Pack. Dimensions: 3 1/8" H x 7 5/8" W x 11" D (7.87 x 19.05 x 27.94 cm). Net Weight: 6 lbs (8 lbs. with optional battery pack).



AC/DC Multimeter for field or bench

Measures AC and DC voltage, current and resistance. Check semiconductors both in- and out-of-circuit. For 120/240 VAC. 6.88" H x 5.75" W x 11.25" D.

Kit IM-5225, Shpg. wt. 8 lbs. **139.95**
SM-5225, Assembled, Shpg. wt. 8 lbs. **185.00**

Save over 30% on Capacitance Box

Decade Capacitance Box makes calculations easier. Covers 100 pF to 0.111 μ F, in 100 pF increments. 400 VDC rating. 4" H x 7.13" W x 5" D.

Kit IN-3127, 2 lbs. **Was \$28.95, NOW ONLY 19.95**
RF Fuse in UHF BNC-BNC Connector. DC-500 MHz; 50 ohms; 1.2:1 max. SWR; 1.8 dB max. insertion loss at 500 MHz. SU-512-50, Shpg. wt. 1 lb. **60.00**

Save 30% on 50 Ω Termination. DC-1 GHz; 1 W VSWR at 250 MHz. 1.2:1. SU-511-50, 1 lb. **Was \$21.50, NOW 14.95**



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

1 Make your measurements with this accurate VTVM

For solid-state and digital equipment. Single probe for all measurements. Separate 1.5 and 5 V ranges make measuring low voltages easy. 1 MHz response. The IM-5218 measures 7.38" H x 4.69" W x 4.25" D.

Kit IM-5218, Shpg. wt. 5 lbs. **77.95**

2 Heathkit VTVM is loaded with professional features

Bench-type version of IM-5218. Measures 0-1500 VAC/VDC (to 30 kV with accessory probe), 0.1 ohm to 1000 megohms. Requires one 1.5 VDC "C" cell (not supplied) and 120/240 VAC. 5" H x 12.69" W x 4.75" D.

Kit IM-5228, Shpg. wt. 6 lbs. **72.95**

Wired Replacement Probe for the IM-5218 or IM-5228 VTVMs.

PKW-4, Shpg. wt. 1 lb. **10.95**

Solid-State Modification Kit converts IM-5218 or IM-5228 VTVM to instant-on, solid-state operation. IMA-18-1, Shpg. wt. 1 lb. **19.95**

Use Portable VOM - make fast checks

Solid-state VOM is ideal for in-the-field measurements. No changing connections to read AC, DC, 1.5 V ohmmeter. Build in just one evening. Uses two 9 VDC cells, one 1.5 VDC "C" cell (not included). Dimensions, 5.38" H x 9.38" W x 9" D.

Kit IM-5217, Shpg. wt. 4 lbs. **39.95**

Lab-type Decade Resistance Box

Variable multiplier/shunt, variable resistor, or arm with AC and DC bridges. Covers 1-999,999 ohms in 1-ohm steps. Use with IN-3127 at left to solve complex network problems. 0.5% tolerance. 1-Watt resistors. Metal case. 5" H x 7.5" W x 6.63" D.

Kit IN-3117, Shpg. wt. 3 lbs. **52.95**



Now here's a hand-held DMM you can afford!

\$97.95
Kit

- Measures AC & DC voltage, current and resistance
- Big, easy-to-read Liquid Crystal Display
- Low-drain circuitry for longer battery life

Here's everything you need in a hand-held portable digital multimeter at a great low price! The IM-2215's measurement functions include AC and DC voltage, AC and DC current and resistance. Highly sophisticated dual-slope, analog-to-digital conversion circuitry is contained in one MOS/LSI (metal-oxide, semi-conductor/large-scale integration) integrated circuit. This circuitry provides extremely accurate and stable performance in all measurement modes. All measurement functions are protected by fuse and diode against overloads and transients. Voltage and current inputs are separated to protect the instrument and the circuitry being tested. Special full-scale alternating high-to-low test voltage, available through all six ranges, makes the IM-2215 ideal for testing semiconductors and in-circuit resistance.

Easy one-hand operation (featuring pushbutton switching) and built-in calibration references make the IM-2215 ideal for in-the-field use. The 3½-digit liquid crystal display features large, easy-to-read digits, automatic decimal point placement and automatic polarity indication. Low current drain circuit provides long battery life (up to 200 hours on a single 9 VDC battery). A pivoting stand is included to place the display at a convenient angle for bench use. Operates on one NEDA 1604 9 VDC battery (not supplied) or 120/240 VAC, 50/60 Hz power (with optional AC Outlet cords below). Overall dimensions are 2.00" H x 3.50" W x 7.50" L (5.08 x 8.89 x 19.05 cm). Weighs just 14 ounces (including battery).

This enjoyable, easy-to-build kit goes together in just one evening, and will give you many years of versatile, reliable service in a convenient, portable package. Order yours now and get true portability in a digital hand-held multimeter — the low-cost Heathkit IM-2215.

Kit IM-2215, Shpg. wt. 2 lbs.	97.95
SM-2215, Assembled and tested Hand-Held Multimeter, 2 lbs.	129.95
Rugged Leather Carrying Case with belt loop:	
IMA-2215-1, Shpg. wt. 1 lb.	14.95



3½-digit LCD for easy reading in any light

Use built-in or external reference to maintain high accuracy

Single printed circuit board for easy assembly

Separate voltage and current inputs protect unit under test

Pushbutton range, function switches

Lightweight — just 14 oz. with battery

120 VAC Battery Eliminator.

PS-2350, Shpg. wt. 1 lb. 7.95

IM-2215 SPECIFICATIONS: DC VOLTAGE: Ranges: ± 200 mV, ± 2 V, ± 20 V, ± 200 V, ± 1000 V. Accuracy: Lab standards $\pm (1.25\%$ of reading plus 1 count). Built-in standards: $\pm (1.35\%$ of reading plus 1 count). Input impedance: 10 megohms on all DC voltage ranges. **Over-voltage Protection:** 1000 VDC, 750 VAC on all DC ranges. **AC VOLTAGE:** Ranges: 200 mV, 2 V, 20 V, 200 V, 750 Vrms. Accuracy (50 and 60 Hz): Lab standards $\pm (1.5\%$ of reading plus 3 counts). Built-in standards: $\pm (1.6\%$ of reading plus 3 counts). **Frequency Response** ($25^\circ\text{C} \pm 10^\circ\text{C}$): 200 mV, 2 V, 20 V, 200 V ranges $\pm (1\%$ of reading plus 3 counts), 40 Hz to 1 kHz; 750 V range, $\pm (1\%$ of reading plus 3 counts), 40 to 450 Hz. **Input Impedance:** 10 megohm shunted by approx 100 pF on all AC ranges. **Overvoltage Protection:** 2 V, 20 V, 200 V, 750 V ranges, 1000 VDC, 750 VAC, 200 mV range, 1000 VDC, 15 sec. max. over 300 VAC. **DC CURRENT:** Ranges: ± 2 mA, ± 20 mA, ± 200 mA. Accuracy: $\pm (1.75\%$ of reading plus 1 count) on all DC ranges. **Voltage Drop:** 2 mA, 20 mA, 200 mA ranges, ± 25 VDC max. at max. display; 2000 mA range: ± 7 VDC at max. display. **Overcurrent Protection:** 2000 mA max. on all ranges in circuits with open circuit voltage

less than 250 V. **AC CURRENT:** Ranges: 2 mA, 20 mA, 200 mA, 2000 mA. Accuracy: 20 mA, 200 mA, 2000 mA ranges, $\pm (1.5\%$ of reading plus 3 counts), 40 to 1 kHz; 2 mA range, $\pm (1.5\%$ of reading plus 3 counts), 40 to 200 Hz. **Voltage Drop:** 2 mA, 20 mA, 200 mA ranges, ± 25 VAC max. at max. display; 2000 mA range: ± 7 VAC max. at max. display. **Overcurrent Protection:** 2000 mA max. on all ranges in circuits with open circuit voltage less than 250 V. **RESISTANCE:** 200 ohms, 2 kilohms, 20 kilohms, 200 kilohms, 2 megohms, 20 megohms. Accuracy: 200 ohms range, $\pm (3\%$ of reading plus 3 counts); 2 kilohms, 20 kilohms, 200 kilohms ranges, $\pm (2.5\%$ of reading plus 1 count); 20 megohms range, $\pm (2\%$ of reading plus 1 count). **Voltage at max. display:** 200 ohms, 20 kilohms, 200 kilohms ranges, less than ± 25 VDC (low-test voltage); 2 kilohms, 20 kilohms and 200 kilohms ranges, greater than ± 7 VDC (high-test voltage). **Overvoltage Protection:** 300 volts DC or AC or all ranges. **Power Requirement:** 9-volt battery or battery eliminator. **Polarity Indication:** Automatic negative, implied positive



1 mV-100 V Strip Chart Recorder

120/240 VAC, 5.34" H x 17.41" W x 12.31" D.

Kit IR-5204, Shpg. wt. 22 lbs. 329.95

SR-204, Assembled, Shpg. wt. 22 lbs. 495.00

Qual-Pen Lab-Quality Chart Recorder. Uses ONLY pens listed with IR-5207 Recorder (at right).

SR-206, Assembled, Shpg. wt. 39 lbs. 1495.00

Pens for IR-5204/SR-204 Recorder. Nylon tip.

SU-406-92, Red Pen, Shpg. wt. 1 lb. 3.95

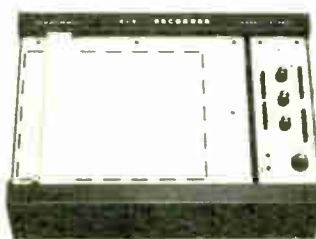
SU-406-93, Blue Pen, Shpg. wt. 1 lb. 3.95

Chart Paper for IR-5204/SR-204/SR-205. All 120" Inch-calibrated with 0.1" divisions, 0-100 R-L.

SU-445-17, Shpg. wt. 2 lbs. 5.95

Centimeter-calibrated, offset 4 cm on R, 0-100 R-L.

SU-445-18, Shpg. wt. 2 lbs. 5.95



1 mV-10 V X-Y Chart Recorder

120/240 VAC, 5.63" H x 17.63" W x 12.25" D.

Kit IR-5207, Shpg. wt. 28 lbs. 489.95

SR-207, Assembled, Shpg. wt. 30 lbs. 795.00

Disposable Nylon Pens for IR-5207/SR-207/SR-206.

Pens for chart recording speeds under 1 inch/minute.

SU-205-3, Long Red Pen, Shpg. wt. 1 lb. 3.95

SU-205-4, Long Blue Pen, Shpg. wt. 1 lb. 3.95

SU-205-6, Short Red Pen, Shpg. wt. 1 lb. 3.95

Pens for chart recording speeds over 1 inch/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



Pro-Quality Distortion Analyzer

Featuring outstanding sensitivity and bandwidth, the Heathkit IM-5258 Harmonic Distortion Analyzer measures total harmonic distortion (THD) down to 0.03% from 5 Hz to 100 kHz, with $\pm 5\%$ full scale accuracy. Six ranges cover 0.03 to 100% harmonic distortion.

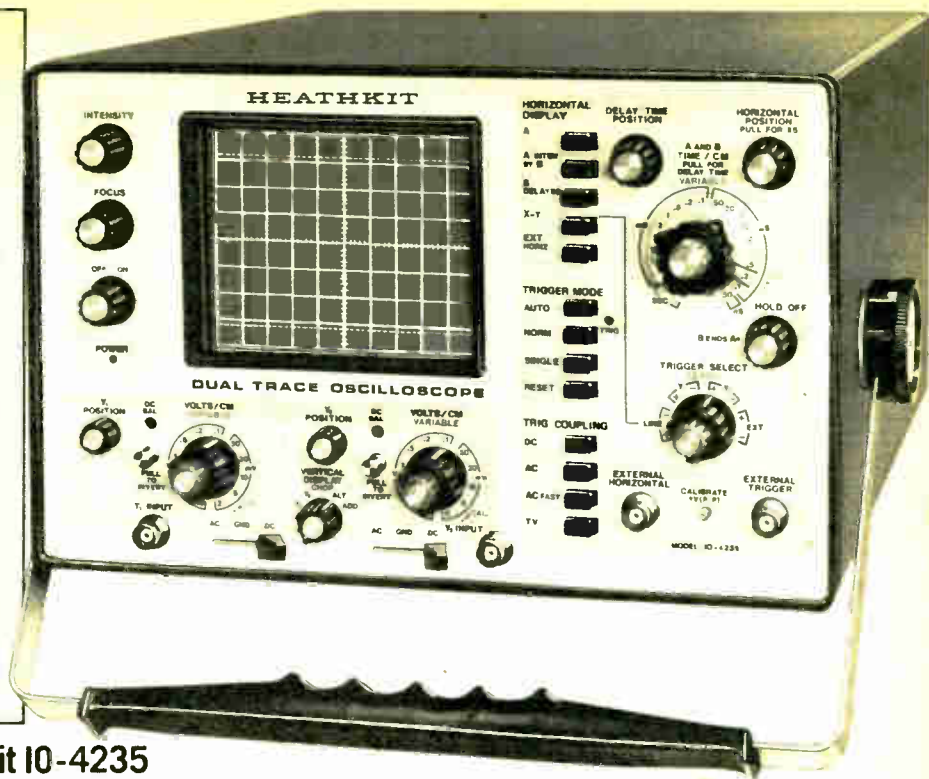
The IM-5258 can also function as an AC voltmeter with full-scale capability from 1 mV to 300 V. AC voltmeter accuracy is also $\pm 5\%$ of full scale. Maximum input impedance is 1 megohm shunted by 70 pF. Not for use in strong RF fields. For 120/240 VAC, 50/60 Hz. Dimensions: 5.38" H x 15" W x 11.5" D. Weighs just 12 lbs.

Kit IM-5258, Shpg. wt. 17 lbs. 234.95



Our finest scope — featuring 35 MHz range, dual-trace capability, traditional savings

- Dual-trace capability lets you monitor 2 signals simultaneously
- Single-sweep function for observing random signals
- Capable of triggering to 2 times the specified vertical bandwidth
- Vertical delay lines let you observe leading edges of input signals
- Rise time of less than 1 nS handles complex, fast-rising input signals
- Sweep speeds from 50 nS/cm to 0.2 seconds/cm, plus 5X expansion for an effective sweep speed of 10 nS/cm
- Smooth rolloff lets you observe input signals above 50 MHz
- Algebraic ADD inverts either channel to observe differential signals
- Unique TV coupling feature triggers alternate fields for steady VITS display
- 8 x 10 cm mesh CRT, with internal graticule for parallax-free measurements
- 10 kV post-acceleration voltage for fast writing & bright display



Versatility, quality, value, the Heathkit IO-4235 has it all — and a low price to boot!

\$969⁹⁵
Kit

- Perfect for measuring virtually any waveform, from simple sine wave signals of stereo components and TV to highly complex waveforms of state-of-the-art devices

The IO-4235, with its DC-35 MHz range, is the most advanced oscilloscope our engineers have ever developed! Compare the top-of-the-line Heathkit oscilloscope with others in its price range: you'll find that the IO-4235 is unmatched in performance, features and quality. Compare the sophistication and versatility of the IO-4235 with other scopes costing hundreds more.

This laboratory-quality oscilloscope is a perfect addition to anyone's service bench, at an affordable price. The Heathkit IO-4235 fulfills the requirements of the service technician, electronics designer and serious hobbyist.

The DC-35 MHz IO-4235's delayed-sweep circuit uses a separate time base to display a selected portion of the normal waveform. The start and length of the delayed sweep are user-controlled, so any given portion of the normal waveform can be displayed at a much higher rate. An 8 x 10 cm mesh CRT has 10 kV post acceleration voltage — 2½ times greater than any scope we've offered — for faster writing speeds and brighter displays. An internal graticule offers parallax-free measurements. Also features fully regulated power supplies, capabilities to operate on lower line voltages, front panel 1V square wave output, variable hold off control, Z-axis and carrying handle. Calibration of the

IO-4235 requires precise source of square waves, such as the IG-4505, and a DC voltmeter.

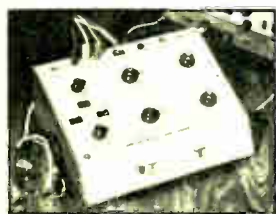
Kit IO-4235, Shpg. wt. 52 lbs. 969.95

Factory assembled and tested version.

SO-4235, Shpg. wt. 38 lbs. 1295.00

IO-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 approx. 30 V/cm. Accuracy: Within 3% (20°C to 30°C); Within 5% (10 to 40°C), referred to 1 V/cm. Vertical Response: OC 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. Vertical Modes: Y1, Y2, Y1 and Y2 chopped, Y1 and Y2 alternate, algebraically add (±Y1 plus ±Y2). HORIZONTAL: Time Bases: Ranges: 50 nS/cm to 5 cm. Positions: 21 steps in a 1-2-5 sequence. Variable: Continuous between ranges to approx. 600 mS/cm. Accuracy: within 3% (20°C to 30°C); within 5% (10°C to 40°C), referred to 1 mS/cm. External Horizontal: Sensitivity: approx. 0.1 V/cm. Impedance: 1 megohm. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to greater than 2 MHz — 3 dB. Connector: BNC. X-Y: X Channel: Same as vertical, except response is limited to 2 MHz and has no delay line. Y Channel: Same as vertical. Phase Shift: Less than 3° at 100 kHz. TRIGGER: Source: Y1, Y2, EXT. Line. Coupling: AC, DC, AC Fast. TV Modes: Automatic Baseline, Normal, Single Sweep. Hold Off: Variable, including "B ends A" position. External Trigger: Sensitivity 100 mV at 50 MHz. GENERAL: CRT Phosphor: P31. CRT Acceleration Potential: 10 kV, regulated. Z Axis: Full on to Full off, 0 to 5 V. Positive voltage decreases intensity. Power Requirement: 120-240 VAC, 50-60 Hz, 95 Watts (at 120 VAC). Dimensions: 7.75" H x 13.75" W x 19.75" D (19.69 x 34.93 x 50.17 cm), handle toroid. Net Weight: 30 lbs. (13.6 kg).

Curve Tracer tests semiconductors



Extensive manual tells how to interpret displays. Extra leads included. Requires DC-20 MHz oscilloscope for proper operation. For 120-240 VAC power. Dimensions: 4.5" H x 11.25" W x 10" D. Step-by-step instructions make it easy to build.

Kit IT-3121, Shpg. wt. 10 lbs. 124.95

Capacitor Substitution Box



This versatile Heathkit instrument can cut your math time way down! Switch-select capacitance from 100 pF to 0.22 μF, 600 Volt ratings, except three lowest (500 V) and two highest (400 V) values. ±5% accuracy, 0.0001 — 0.00047 μF; and ±10% for 0.01 to 0.22 μF. Dimensions are a compact 3" H x 3" W x 6" D. A must for every technician's tool box — order this easy-to-build kit for your test bench today.

Kit IN-3147, Shpg. wt. 2 lbs. 14.95

Logic Probe for TTL, CMOS circuits

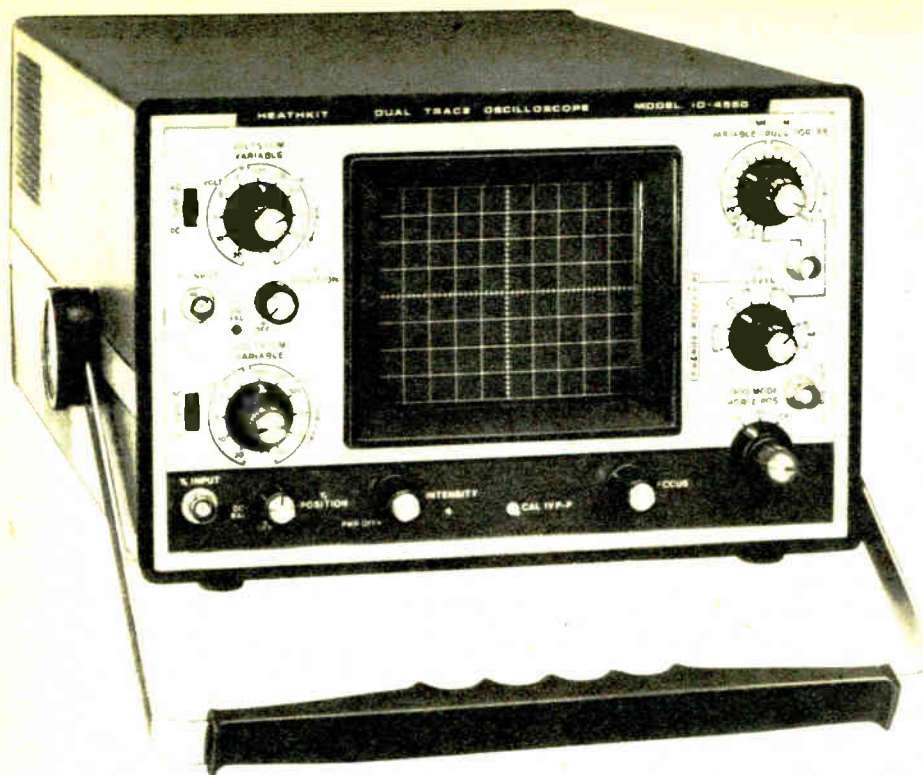
Detects and indicates high and low logic levels in TTL or CMOS circuitry. Detects logic signals to 100 MHz, polarity and presence of single pulses as short as 10 nS, and shows intermediate or "bad" logic levels. Includes 34" power leads, detachable high-frequency ground clip. Measures 0.75" H x 1" W x 9.25" L.

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



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

INSTRUMENTS 63



The Heathkit IO-4550 – a value-packed dual-trace oscilloscope with a full set of performance features

- Dual-Trace Oscilloscope is ideal for servicing, experimentation and design
- Two vertical input channels, each with maximum sensitivity of 10 mV/cm
- Sensitivity adjustable from 10 mV/cm to 20 V/cm with 1-2-5 attenuator
- Has 19 digitally-controlled, calibrated time base steps, ranging from 0.2 μ S/cm, in 1-2-5 sequence
- Expand any sweep speed five times, up to a maximum sweep speed of 40 NS/cm
- Trigger select switch and level control allow for precise triggering at any point on the positive or negative slopes of the trigger signal
- A calibrated 1 Volt peak-to-peak square wave is available at the front panel for easier probe compensation
- Features CRT with extra-bright trace
- Mu-metal shield eliminates errors caused by electromagnetic interference
- The IO-4550's fully-regulated high-voltage power supply provides more reliable, repeatable readings
- Just four printed circuit boards mean faster, easier kit assembly

The IO-4550 Dual-Trace DC to 10 MHz Oscilloscope is ideal for your servicing and design work

\$439⁹⁵
Kit

- Designed for TV servicing, electronic work – features brighter trace, faster writing speed

If you're looking for a dual-trace, DC-10 MHz oscilloscope to round out your test bench, look no further. The IO-4550's extra-bright trace allows easy reading, even in high ambient light. The two vertical input channels have a maximum sensitivity of 10 mV/cm to give you accurate measurements.

To maximize ease of operation, input channels are displayed, chopped or alternated, as selected by the time base switch – automatically! Facilities are included to help determine the frequency of a waveform. Exacting X-Y operation assures you of precise phase measurements.

The IO-4550's digitally-controlled time base provides automatic triggering, so no stability control is necessary and fewer adjustments are required. A trigger select switch and level control allow the time base to be precisely triggered at any point along the positive or negative slope of the signal.

A 1 Volt peak-to-peak square wave signal is available – at the IO-4550's front panel – for easier scope compensation.

Improved circuitry and just four printed circuit boards make kit assembly easy.

The IO-4550 will be a welcome addition to your test bench. Order it for your service work, experimentation or design work today. The IO-4550 can be wired

for either 120 or 240 VAC. Calibration of the IO-4550 requires a precise source of square waves, such as the IG-4505 or IOA-4510-1 Scope Calibrators (both on page 65). To add to this oscilloscope's versatility, see the assembled PKW-105 X1/X10 Scope Probe (also available on page 65).

Kit IO-4550, Shpg. wt. 27 lbs. 439.95
SO-4550, Assembled and calibrated, Shpg. wt. 25 lbs. 670.00

IO/SO-4550 SPECIFICATIONS: VERTICAL: Deflection Factor: Sensitivity: 10-20 mV/cm, 11 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: 3%. Vertical Response: DC-10 MHz. AC Coupling: 2 Hz-10 MHz. Rise Time: 35 nS. Overshoot: Less than 5%. Attenuator: Vertical Input: Impedance: 1 megohm, shunted by 38 pF. Maximum Input: 400 Volts peak, combined AC and DC. Connector: BNC. Modes: Single, Y1 or Y2 selected by position control; Dual, Chopped (200 kHz) or alternate automatically selected by time cm switch. HORIZONTAL: Time Base: Ramp: 200 nS/cm to 0.2 S/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 S/cm. Accuracy: 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). EXTERNAL: Sensitivity: Approximately 0.1 V/cm. Impedance: Approximately 100 kilohms. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to 1 MHz. Connector: BNC. TRIGGER: Internal: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: - or - Impedance: 1 megohm, shunted by 40 pF. Connector: BNC. X-Y: X Channel: Same as Vertical, except response is limited to 1 MHz. Y Channel: Same as Vertical. GENERAL: Operating Temperature Range: 50-104 degrees F (10-40 degrees C) Power Requirement: 120-240 VAC, 50-60 Hz 70 Watts. Internal power supplies are fully regulated. Dimensions: 6 93" H x 12 88" W x 19 25" D (17 60 x 32 71 x 48 89 cm), without handle.

Test with low-cost Tube Checker



Tests tubes on basis of total emission – for shorts, leakage, open elements and filament continuity. Also has good bad indicator to show relative quality, and a neon bulb indicator for detection

of filament continuity and leakage or shorts between elements. Metal cabinet. For 120 VAC, 60 Hz. Dimensions, 5.50" H x 13.88" W x 12" D (13.97 x 35.25 x 30.48 cm).

Kit IT-3117, Shpg. wt. 12 lbs. 179.95

Heavy-duty Bi-Directional Wattmeter



Aids in servicing communications equipment. Measures forward and reflected power in transmission lines (between 100-1000 MHz), measures 30/75/300 Watts forward and 3/7.5/30 Watts reflected

power without slugs or elements. $\pm 5\%$ forward accuracy. N-type coaxial connectors. N to PL-259 adapters. Easy kit assembly. Requires 9 VDC battery (not included). Dimensions, 4.50" H x 4.25" W x 4.63" D (11.43 x 10.79 x 11.76 cm).

Kit IM-4190, Shpg. wt. 3 lbs. 99.95

High-accuracy FET/Transistor Tester



Tests conventional (bi-polar) transistors, diodes, FETs, SCRs, triacs and unijunction transistors. Test in-circuit with color-coded leads supplied, or out-of-circuit with built-in tester. Shows

gain (DC beta), trans-conductance (Gm), leakage current on easy-to-read meter. Sturdy metal case. Uses two 1.5 VDC D-size cells (not supplied). 5" H x 9.44" W x 8.13" D.

Kit IT-3120, Shpg. wt. 5 lbs. 74.95





Put dual-trace capability on your bench for the price of a single-trace oscilloscope

- Seven switch-selected calibrated time bases from 200 mS/cm to 0.2 μ S/cm
- Stable triggering circuit is used for solid waveform displays
- Compare two signals simultaneously for added versatility
- Outstanding 10 mV/cm vertical sensitivity covers most applications
- Extra stability from a fully-regulated power supply

Put the dual-trace OC to 5 MHz IO-4205 to work for you handling the sophisticated needs of today's electronic technician!

This versatile scope lets you compare two signals simultaneously for input-output comparisons, checking phase relationships and many other functions.

Stable triggering circuit contributes to stable waveform displays. Special trigger selector allows easy triggering on the vertical components of a complex TV signal. Select external or one of 7 calibrated internal time bases.

Accurate measurements can be easily made on the 8 x 10 cm CRT screen. Fully regulated power supply provides accurate voltage and current. Partial mu-metal shielding helps eliminate possible display errors. Kit model requires IG-4505 or IOA-4510-1 (below) for calibration. 120/240 VAC. Measures 8" H x 13" W x 17" D.

Kit IO-4205, Shpg. wt. 29 lbs. 329.95
 SO-4205, Assembled and tested, Shpg. wt. 20 lbs. 480.00

IO/SO-4205 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, \pm 3 dB. Sensitivity: 10 mV/cm. 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: 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 pF. External Horizontal Input: X1 and X10 attenuator, as well as variable.

An outstanding oscilloscope for hobbyist or pro... at a price that's right – the IO-4105!

- 10 mV/cm vertical input sensitivity – ideal for most applications
- Fully-regulated low-voltage power supply for stability
- Versatile time bases – external, or 7 calibrated internal
- Easy reading with extra-bright 8 x 10 cm CRT screen
- Less display error through Mu-metal shielding

Here's your chance to put a professional DC-5 MHz single-trace scope on your test bench at traditional Heathkit savings.

The IO-4105's stable triggering circuit is used for solid waveform displays. And it can trigger on the vertical component of a television signal, thanks to a special feature of the trigger selector controls which allows low frequencies to pass, while high frequencies are rejected.

Internal time bases can either be variable, or in one of seven steps ranging from 0.2 μ S/cm to 200 mS/cm. External inputs from DC to 1 MHz are accepted by the horizontal amplifier. Vertical input sensitivity is an excellent 1 mV/cm. Combined with attenuation up to 20 V/cm, the IO-4105 accepts a wide range of input signals. Partial mu-metal shielding reduces interference. 120/240 VAC. Calibration required; use Heathkit IG-4505 or IOA-4510-1 Oscillator Calibrators, listed below.

Kit IO-4105, Shpg. wt. 31 lbs. 249.95

IO/SO-4105 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, \pm 3 dB. Sensitivity: 10 mV/cm adjustable to 20 mV/cm in 11 ranges. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nS. Overshoot: less than or equal to 5% at 1 kHz. Impedance: 1 megohm, shunted by 38 pF. SWEEP: Trigger Source: INT, Ext, and Line. Trigger Modes: AC, DC or TV, plus or minus 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: 8" H x 13" W x 17" D (20.32 x 33.02 x 43.18 cm).

Deluxe Oscilloscope Calibrator



A practical oscilloscope calibrator at a sensible price. Provides all of the waveforms necessary to adjust sweep

speeds, vertical calibration, delay line terminations, high-frequency compensation and attenuator compensation to 35 MHz. Round out your test bench today with an accurate source of square waves – order the IG-4505 Deluxe Calibrator.

Kit IG-4505, Shpg. wt. 4 lbs. 52.95

X1/X10 Scope Probe increases utility



Has 2-position multiplier for X1 and X10 probe tip. Includes 4.5-foot cable and probe.

PKW-105, Assembled and tested, 1 lb. 29.95

Oscilloscope Calibrator

Crystal-controlled time base. Calibrate scope to 15 MHz. Requires external power supply. For IO-4105, IO-4205 and IO-4550.

Kit IOA-4510-1, Shpg. wt. 1 lb. 17.95

Useful accessories for your scope



Low-Capacitance Probe for direct, X10 attenuated operation. Options for 3.3 or 1 megohm input resistance. Banana plug/BNC wiring option.

Kit PK-1, Shpg. wt. 1 lb. 11.95

Demodulator Probe



Use it to check distortion RF. IF. 30V rms maximum, 500 VDC maximum. Banana plug/BNC wiring.

Kit 337-C, 1 lb. 8.95



All-In-One Computer now has three times more standard RAM — built-in CP/M capability — three serial I/O ports — additional built-in disk storage and non-glare CRTs available

As low as
\$1895⁰⁰
Kit

- Now with 48,000 bytes of RAM standard — expandable to 64,000 bytes
- CP/M capable — without modifications
- Now can store up to 160,000 bytes of data internally (with optional Z-89-37 Double-Density Controller)
- Stores up to 12,160,000 bytes with new, optional external disk storage
- Built-in video terminal has full keyboard, 12-key numeric pad
- Choose from 12" anti-glare or std. 2000-character CRT screens

This is a commercial-quality microcomputer, not just an upgraded hobbyist machine: More standard computing power and more built-in peripherals mean our All-In-One Computer can better satisfy your general computing needs, in business or at home. And it's priced to fit your budget.

You get more standard memory than before! The All-In-One now comes with 48,000 bytes of Random Access Memory (RAM) — three times the previous standard RAM complement of 16,000 bytes. And built-in diagnostics are provided.

Expand memory capacity to 64,000 bytes of RAM with the WH-88-16 64K RAM Expansion Set (shown on page 67), to meet your advanced computing needs.

Two separate Z-80 microprocessors are built into the All-In-One — one for the computer, and one for the professional video terminal. The computer never has to share processing power with the video terminal, which enables the All-In-One to perform many high-speed tasks.

Now CP/M-capable, without modifications: All components necessary to run Heath/Zenith CP/M are built-in. There are no modification kits to buy or install.

Three RS-232C serial ports are now standard: The built-in EIA Standard Three-Port Serial Interface lets you add more peripherals (such as a printer) to your All-In-One Computer.

New, optional disk controller increases storage capacity: The H-89's built-in 5.25-inch floppy disk drive can store up to 100,000 bytes of data. With the optional Z-89-37 Double-Density Disk Controller Board, you can expand the built-in drive's storage capacity to 160,000 bytes.

If you need more on-line data storage, buy the external disk system that fits your needs:

The H-77 Floppy Disk System (shown on page 69, can provide 200,000 bytes of data storage (100,000 bytes per drive — using one standard H-17-1 drive and one optional drive). It stores data on field-proven hard-sectored, single-density 5.25-inch floppy disks.

The new H-37 Floppy Disk System (also shown on page 69), which uses the new Z-89-37 Double-Density Controller Board and new soft-sectored, double-density disks, can provide significantly more data storage — up to 1,280,000 bytes (640,000 bytes per drive — using one standard H-17-1 Drive and two high-capacity H-17-4 Disk Drives).

For maximum data storage in commercial applications — almost 11 megabytes — choose the Z-67 Winchester Disk System (shown on page 78; requires Z-89-67 Interface).

Use the All-In-One as a professional video terminal (with appropriate software). It has all display functions of our H-19 Professional Video Terminal (shown on page 74). Up to twenty-four 80-character lines can be displayed, as well as a 25th line (controlled by software).

The typewriter-format professional keyboard controls all terminal functions. The keyboard prints the entire ASCII set, upper and lower cases — along with 33 graphics symbols.

Select baud rates up to 9600 through the keyboard. Direct cursor addressing lets you insert or delete characters anywhere. Control 32 terminal functions from keyboard or computer. Reverse Video lets you emphasize any portion of the screen by reversing white on black.

Designed in calculator format, the 12-key numeric keypad makes entering arithmetic programs fast and easy. Shifted functions give you control to make insertions or deletions.

Save when you buy the All-In-One Computer — and if you plan to use it for business purposes, ask your tax adviser about possible tax credits which could provide additional savings.

Complete systems available: Complete All-In-One Computer Systems — with computer and peripherals — are being introduced in this catalog. Three systems are available — one for word processing/entry-level programming, one for small businesses and active programmers, and a third for medium business use. See page 68 for full details on these All-In-One Computer Systems.



Now there are more reasons than ever to choose a Heath computer system

- New savings on complete systems
- New, greatly expanded external data and program storage
- New peripherals and software to provide even more uses
- New, easier way to order

Save money: Look throughout this section for many money-saving specials on hardware, software and complete systems.

New, higher-capacity external disk storage for the H-Z-89: Up to 640K bytes per 5.25-inch drive with the new H-37.

Maximum data storage in commercial uses: The Z-67 Winchester Disk System (p. 78) provides 10.782 megabytes of disk storage for the commercial Z-89 Computer (p. 77).

New, versatile peripherals: Two printers, a new modem and more. See pages 73-81.

More new software programs: Peachtree business programs — two word processors — and more! See pages 80-89.

An easier way to order: We've packaged four complete systems to meet your specific needs. See page 68.

Choose from our expanding selection of software. New Peachtree Business Software — new WordStar and Magic Wand Word Processing Software — new Micropro utilities — the Heath Disk Operating System (HDOS 2.0), CP/M 2.2, UCSD P-System with PASCAL — SOFTSTUFF tools, other utility and applications programs — and the Heath Users' Group's over 500 programs (pgs. 80-89).

The All-In-One Computer requires either the Heath Disk Operating System (HDOS), the Heath/Zenith CP/M Operating System, the UCSD P-System with Pascal or similar operating system software for normal operation.

H-89A SPECIFICATIONS: CPU AND MEMORY: Clock: 2.048 MHz. Memory: 8K bytes user; by system for ROM and RAM; 8K reserved. **VIDEO TERMINAL: CRT: Display Size:** 6.5" H x 8.5" W (16.51 x 21.59 cm). **Character Size:** Approximately 0.2" H x 0.1" W (0.51 x 0.25 cm). **Character Type:** Upper Case and Lower Case without descenders, 5 x 7 dot matrix, Lower Case with descenders, 5 x 9 dot matrix; Graphics, R 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. **ACCESSORIES: Interfacing:** Three EIA Standard RS-232C Serial Interface Ports are provided. **GENERAL: Operating Temperature:** 50-95 degrees F (10-35 degrees C). **Storage Temperature:** 32-122 degrees F (0-50 degrees C). **Power Requirement:** 120-240 VAC, 50-60 Hz, 90 Watts. **Dimensions:** 13" H x 17" W x 20" D (33.02 x 43.18 x 50.80 cm)

The Heath All-In-One — more computer than the competition

BRAND	TWO MICRO-PROCESSORS?	PROFESSIONAL SCREEN SIZE?	COMPLETE KEYBOARD?	BUILT-IN VIDEO DISPLAY?	ALL-IN-ONE CONSTRUCTION?	BUILT-IN FLOPPY?	STANDARD CPU AVAILABLE?	SERIAL I/O PORTS?	RAM MEMORY CAPACITY?	PRICE*
Heath H-89	YES (Two Z-80's)	YES 25 lines x 80 char.	YES (80 keys, upper and lower cases, includes 12-key numeric pad)	YES (12" resolution CRT)	YES	YES (100KB capacity)	YES	YES (3)	YES (48K standard)	\$2045 Kit
Apple II Plus	NO (Single 6502)	NO (24 lines x 40 char.)	NO (48 keys, N-key rollover)	NO (External monitor)	NO (3 pieces)	NO (Extra)	NO	YES (1)	YES (128K language card)	\$2480
Apple III	NO (Single 6502A)	YES (24 lines x 80 char.)	YES (74 keys, upper and lower cases, includes 12-key numeric pad)	NO (External monitor)	NO (2 pieces)	YES (128KB capacity)	NO	YES (1)	YES (128K)	\$4190**
TRS-80 Model III	NO (Single Z-80)	NO (16 lines x 64 char.)	NO (65 keys, upper and lower cases, includes 12-key numeric pad, no control key)	YES (Medium resolution CRT)	YES	YES (178KB capacity)	NO	YES (1)	NO (48K)	\$2210

*For systems with B-A video display, one 5.25" floppy disk drive, 48K RAM (except 96K in Apple III) serial I/O standard DOS, BASIC, as of 8-17-81
**Apple III system (4PDD01) includes 96K RAM and \$250 VisiCalc software in minimum configuration
**160KB opt card

NOTE: The price shown for the Radio Shack TRS-80 Model III Computer in Catalog 854's comparison chart was incorrect. The correct price is shown in the chart at left. We regret the error.



New H-3 High-Capacity
Floppy Disk System (p. 60)



New H-25 Printer (p. 75)

Now it's easier than ever to order the All-In-One you need!

We've put it all together for you: more features, easier ordering and economical prices!

More memory now standard: All-In-One Computers come equipped with 48K RAM – expandable to 64K (see WH-88-16 at right).

Three Serial I/O Ports are now included: Interface with printers, modems and other peripherals.

Non-glare and standard CRTs are both available.

More External Disk Storage Choices: With our new peripherals, you can configure an All-In-One with up to 12,160,000 bytes of data storage.

All-In-One Computer Kits. CP/M-capable – with 48K RAM and single-density disk controller

Kit HS-89-1, with anti-glare white CRT.
Shpg. wt. 62 lbs. 1925.00

Kit HS-89-2, with anti-glare green CRT.
Shpg. wt. 62 lbs. 1925.00

Kit HS-89-3, with standard white CRT.
Shpg. wt. 62 lbs. 1895.00

An assembled commercial version of this product is available. See the Z-89 on page 77.

Save up to \$495 on Software Starter Package

Buy any two of ten specially-selected software programs on the same order with an H-89 All-In-One Computer, and pay only \$195.00! See page 68 for full details on this offer – and to see the full list of value-packed software programs available.

H-89 All-In-One Computer/5.25" Disk System Configuration Chart

System Components	Single-Density, Hard-Sectored Storage	Double-Density, Soft-Sectored Storage	Total disk storage capacity
HS-89 (Note 1)	One 100 KB internal Drive	—	100 KB
HS-89 (Note 1) HS-77 (Note 2)	One 100K internal drive and one (or two) 100K external drives	—	200 or 300 KB
HS-89 (Note 1) Z-89-37	—	One 160 KB internal drive	160 KB
HS-89 (Note 1) Z-89-37 HS-77 (Note 2)	One 100 KB internal drive	One (or two) 160 KB external drives ¹	260 or 420 KB
HS-89 (Note 1) Z-89-37 HS-37 (Note 2)	One 100 KB internal drive	Two 640 KB external drives	1.38 megabytes

NOTES: (1) When ordering an HS-89, use -1, -2, or -3 for desired CRT. (2) When ordering an HS-77 or HS-37, use -1 or -2 for desired number of drives. The use of H-17-4 640 KB drives within the computer will not be supported until early 1982; a retrofit kit will be available. H-17-4 640 KB Drives must be used with the Z-89-37 Double-Density Controller Board.

All-In-One Accessories

SAVE 35% on 16K Random Access Memory (RAM) Expansion Set. Retrofit your All-In-One Computer up to 32K or 48K RAM with one or two of these memory expansion sets.

H-88-2, 1 lb. **Was \$60.00, NOW 39.00**

64K Random Access Memory (RAM) Expansion Kit expands the RAM capacity of your All-In-One Computer to 64,000 bytes. Requires 48,000 bytes of RAM; also, H-88-7 ROM Kit in older All-In-One Computers.

WH-88-16, Assembled, 1 lb. 150.00

Three-Port RS-232C Serial interface provides printer and telecommunications extendability for older All-In-Ones.

HA-88-3, Shpg. wt. 2 lbs. 120.00

Cassette Interface for All-In-One.

H-88-5, Shpg. wt. 2 lbs. 100.00

Wire Wrapping Board with bus connectors. Design custom circuits. Accepts forty-eight 16-pin sockets (also fifty-four 14-pin sockets, other combinations). Uses HCA-6 Wire Wrapping Kit and HCA-7 Wire Wrapping Socket Kit (see page 76 for details on these accessories).

H-88-10, Shpg. wt. 1 lb. 30.00

Anti-Glare CRT Filters for All-In-One Computers without non-glare CRTs:

Clear Plastic Anti-Glare CRT Filter.

HCA-3, Shpg. wt. 1 lb. 12.95

Black Fabric Anti-Glare CRT Filter.

HCA-4, Shpg. wt. 1 lb. 19.95

Dust Cover for the All-In-One Computer and the H-19 Professional Video Terminal.

HCA-5-89, Shpg. wt. 1 lb. 14.00

Choose the Heath system that fits your needs

Choose from four compatible computer systems:

An H-8 Hobbyist/Word Processing System,
an H-89 Hobbyist/Word Processing System,
an H-89 system designed for small business use and program development,
and an H-89 Commercial/Business System.

SAVE UP TO \$495 on Software Starter Package

When you purchase one of the four complete Heath computer systems on this page – or when you buy any H-89 Computer – you can buy two programs from this specially-selected list of ten programs.

It's a value of up to \$690 – for only \$195!

Choose from these Heath/Zenith software programs!

HOS-817-1 Heath Disk Operating System (HDOS – described on page 83), and these HDOS languages:

H-8-20 Microsoft BASIC Interpreter (page 84);

H-8-21 Microsoft FORTRAN (page 84)

HOS-817-2 CP/M (page 83) – and these CP/M languages, utility and applications programs:

HMS-817-1 Microsoft BASIC Interpreter (page 84);

HMS-817-2 Microsoft FORTRAN (page 84);

HMS-817-3 Microsoft COBOL (page 85);

HMS-817-4 Microsoft BASIC Compiler (page 84);

HRS-817-9 Magic Wand Word Processor (page 88)

HSC-817-1 SuperCalc Electronic Spreadsheet Program (described on page 87)

Please specify model numbers when ordering.



H-8 Hobbyist/Word Processing System

SAVE UP TO
\$1327⁰⁰

This H-8 system has 48,000 bytes of Random Access Memory (RAM), 100,000 bytes of disk storage and four EIA Standard RS-232C serial ports.

Included are the H-8 Computer, three WH-8-16 16K Memory Boards, the H-8-4 Four-Port Serial Interface, the

HA-8-16 Extended Configuration Option, the 100,000-byte H-17 Floppy Disk System and the H-19 Professional Video Terminal.

SAVE UP TO \$495 ON SOFTWARE! This system qualifies you to buy two programs from the list above, for only \$195! Specify model numbers when ordering.

HKS-85, Shpg. wt. 196 lbs. **\$2827.00 separately. NOW ONLY 1995.00**



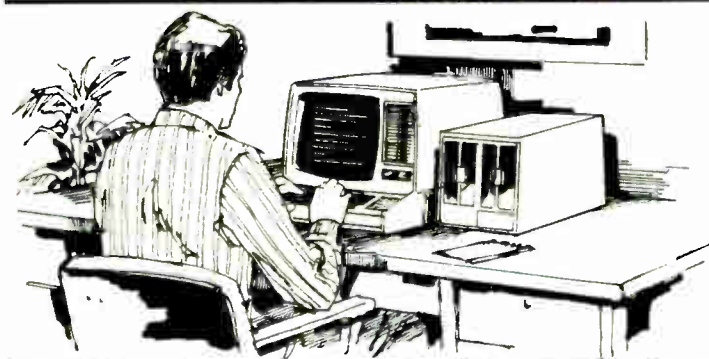
H-89 Hobbyist/Word Processing System

SAVE UP TO
\$495⁰⁰

Here's an H-89 computer system that's ideal for home and/or word processing use. It has 48,000 bytes of Random Access Memory (RAM), three EIA Standard RS-232C Serial Interface ports and 200,000 bytes of floppy disk storage on two 5.25-inch drives.

Order an H-89 All-In-One Computer (page 67) – now with 48,000 bytes of RAM and three serial I/O ports; and the HS-77-1 Floppy Disk System (page 69).

SAVE UP TO \$495 ON SOFTWARE! This system qualifies you to buy two software programs (from the list of ten programs above), with a value of up to \$690, for only \$195! Specify model numbers when ordering.



H-89 Small Business/Programming System

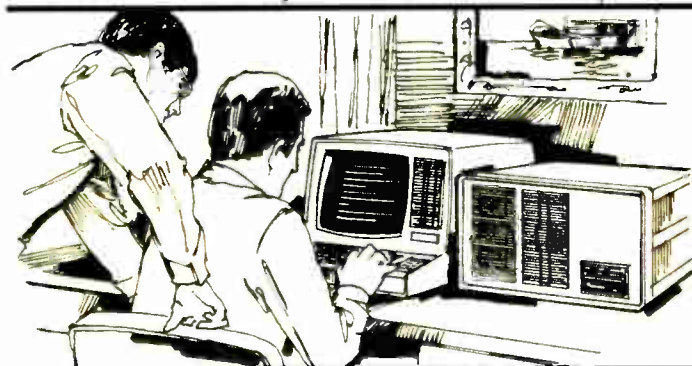
SAVE UP TO
\$595⁰⁰

This H-89 system has 64,000 bytes of Random Access Memory (RAM), 1,380,000 bytes of floppy disk storage on three 5.25-inch drives and three EIA Standard RS-232C Serial Interface ports.

Order the H-89 Computer (page 67) – now with three serial I/O ports; one WH-88-16 64K Wired Memory Expansion Board (page 67); the Z-89-37 Soft-Sector Disk Controller Board (page 67); and the new, high-capacity HS-37-2 Floppy Disk System (page 69).

SAVE \$100 ON THE NEW Z-89-37 DISK CONTROLLER BOARD! Just purchase as part of this system (on the same order form) – and deduct \$100 from the list price.

SAVE UP TO \$495 ON SOFTWARE! This system qualifies you to buy two programs from the list above, for only \$195! Specify model numbers when ordering.



H-89 Commercial Business System

SAVE UP TO
\$1245⁰⁰

This is our maximum capability H-89 system – designed for commercial applications which require large amounts of memory and disk storage. It has 64,000 bytes of Random Access Memory (RAM), three EIA Standard RS-232C serial ports and 10,882,000 bytes of disk storage.

Order the H-89 (page 67) – now with three serial I/O ports; a WH-88-16 64K Wired Memory Expansion Board (page 67); the Zenith Data Systems Z-67 Commercial Winchester Disk System (page 78); and the Z-89-67 Interface.

SAVE UP TO \$1245 ON SOFTWARE! This system qualifies you for maximum software savings. First, purchase two software programs from the list above – for only \$195! Then, buy an additional \$750 of software (choose any program offered by Heath/Zenith), at no extra charge. Specify model numbers when ordering.



NEW

Add up to 1.28 megabytes of on-line data storage to your All-In-One Computer!

More data storage options now available! Designed especially for the All-In-One Computer, these external floppy disk systems give you even more flexibility in configuring the amount of disk storage you need for your computer applications.

The new H-37 provides up to 1,280,000 bytes of additional data storage capacity — while the H-77 provides up to 320,000 bytes.

Use up to three drives in your system: When you use one of these systems with your All-In-One, you have room for up to three high-capacity 5.25-inch floppy disk drives. With multiple drives, you can mount operating system and program disks at the same time, for rapid access to programs and data. And because these systems are designed to work with the All-In-One, you'll have a harmonious system.

Space-saving design: Each floppy disk drive installs vertically into the system's tough metal cabinet, so the unit takes up less space than units with horizontally-mounted drives.

Built for heavy use: These systems have a special heavy-duty power supply, which provides enough power for the system — with enough extra capacity to stay cool, even under the heaviest use.

The H-37's double-density, double-sided, 96 tpi (tracks per inch) floppy disk drive provides up to 6.4 times the data storage capacity of our single-sided 5.25-inch floppy disk drive: Store up to 640,000 bytes per drive — for a total data storage capacity of up to 1,280,000 bytes! For easier kitbuilding, the disk drives are assembled and tested.

Enhanced software capabilities: With the H-37's ability to store a much greater amount of data on each disk, you can more fully utilize the capabilities of most Heath software programs.

Many of our software packages are now available on soft-sectored 5.25-inch floppy disks, written especially for the H-37. Software packages available on soft-sectored disks include the Heath Disk Operating System (HDOS) and Heath CP/M; Microsoft BASIC, FORTRAN and COBOL; the WordStar and Magic Wand Word Processing Systems; Peachtree Business Programs; and many more. See pages 80-89 for full details.

Field-proven H-77 available: We also offer the popular Heath H-77 Floppy Disk System. Using single-sided 5.25-inch floppy disk drives, this reliable data storage system is available with one or two drives — to provide up to 200,000 bytes of storage (up to 320,000 bytes when the new Z-89-37 Double-Density Controller Board is used).

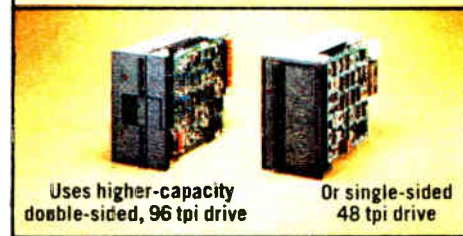
New, easier ordering method: Our ordering chart fully explains the different H-37/H-77 systems available. Data storage options range from 100,000 to 1,280,000 bytes. Order your H-37 or H-77 Disk System from the chart below.

For 120/240 VAC, 50/60 Hz power. Overall cabinet dimensions of the Heath H-37 and H-77 Floppy Disk Systems are 8.63" H x 8.88" W x 15" D.

Assembled commercial products of this type are also available. For details on the Z-37 and Z-87 5.25-inch Floppy Disk Systems, from Zenith Data Systems, see page 77.



Designed to match All-In-One styling



Uses higher-capacity double-sided, 96 tpi drive

Or single-sided 48 tpi drive

Add these disk storage accessories

NEW! Double-Density Floppy Disk Controller Board for the H/Z-89 Computer. Doubles on-line data storage capacity of double-sided 96 tpi (H-17-4) or single-sided 48 tpi (H-17-1) disk drives below. Deduct \$100 when you purchase this board on the same order form with an H-89!

Z-89-37, Assembled, Shpg. wt. 4 lbs. 395.00

Single-Density Floppy Disk Controller Board for the H/Z-89. Use only with H-17-1 Drives below.

H-88-1, Assembled, Shpg. wt. 3 lbs. 120.00

NEW! Double-Sided 96 TPI Floppy Disk Drive for the H/Z-37 Floppy Disk System. Requires Z-89-37 Double-Density Controller above.

H-17-4, Assembled, Shpg. wt. 5 lbs. 550.00

Single-Sided, 48 TPI Floppy Disk Drive. Uses either Z-89-37 Double-Density Controller or H-88-1 Single-Density Controller (both above).

H-17-1, Assembled, 5 lbs. 325.00

Backplate Modification Kit, Required to use the H-37, H-77 and H/Z-87 Floppy Disk Systems with non-current model All-In-One Computers (which don't have external brightness control).

H-88-6, Shpg. wt. 2 lbs. 50.00

Dust cover protects H/Z-37, H-77 and H/Z-87.

HCA-5-77, Shpg. wt. 1 lb. 14.00

Save 5% on a Printer!

Buy a complete All-In-One system from the opposite page. Then, choose any printer in this catalog and take 5% off the list price (excluding shipping/handling)!

How to order external disk storage for your All-In-One Computer

All disk systems below include case and power supply. All require H-88-1 Single-Density or Z-89-37 Double-Density Controller Board, as listed (order from left, or with computer).

Drives	On-Line Storage Capacity		Order Model	Weight	Price
	With H-88-1	With Z-89-37			
One H-17-1 (Single-Sided, 48 tpi)	100,000 bytes	160,000 bytes	HS-77-1	34 lbs.	\$625.00
Two H-17-1 (Single-Sided, 48 tpi)	200,000 bytes	320,000 bytes	HS-77-2	47 lbs.	\$895.00
One H-17-4 (Double-Sided, 96 tpi)	—	640,000 bytes	HS-37-1	34 lbs.	\$850.00
Two H-17-4 (Double-Sided, 96 tpi)	—	1,280,000 bytes	HS-37-2	47 lbs.	\$1345.00

Current H/Z-89 owners — upgrade for maximum storage!

H/Z-89 Computers sold prior to this Heathkit catalog use the following standard floppy disk storage equipment: An H-88-1 Single-Density Disk Controller Board and H-17-1 Single-Sided, 48 TPI Disk Drives.

You now have five options to upgrade your present H/Z-89 All-In-One Computer to gain additional floppy disk data storage capacity:

1. Replace your present disk controller board with the Z-89-37 Double-Density Disk Controller Board. This new board will increase the data storage capacity of your present disks — from 100,000 to 160,000 bytes.
2. Add the H-77 Floppy Disk System for up to 200,000 bytes (100,000 bytes per drive) of additional storage.

3. Replace your present controller with the Z-89-37; add the H-77 for up to 320,000 bytes (160,000 bytes per drive) more storage.

4. Replace your present disk controller board with the Z-89-37; then, add the H-37 Floppy Disk System, to increase storage capacity by as much as 1,280,000 bytes (up to 640,000 bytes per double-sided, 96 tpi drive).

5. Add the commercial Z-67 Winchester Disk System's 10,782,000 bytes of data storage capacity to your system (requires Z-89-67 Interface on page 78).

NOTES: Soft-sectored (Z-89-37-compatible) and hard-sectored (compatible with H-88-1) software cannot be used on the same system. H-17-4 Drive may be used only with Z-89-37.



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

COMPUTERS/69



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

Save a big \$1,225... and get a complete NEC

NEW

Get good performance and extra-value features, at a price you can afford, with the MX-80

\$545⁰⁰

- Bi-directional printing and advanced logic seeking circuitry maximize throughput rate
- Can interface with many different computers

Many printers, costing a lot more, can't touch the MX-80's performance. Using bi-directional printing and logically seeking the shortest lines, its throughput is a fast 46 lines per minute (using 80-character lines) – printing at speeds up to 80 characters per second.

Printing the full 96-character ASCII set and 64 block graphics characters, the MX-80 gives you a choice of 40-, 66-, 80- or 132-character lines – in as many as four distinct printing density modes. This provides a total of 12 different printing combinations, which can accommodate nearly any printing requirement. More than half of these printing combinations use multi-strike or multi-pass techniques to generate correspondence-quality printing.

An internal bell warns the user of paper out conditions or errors, with a periodic three-second tone that continues for 30 seconds. A self-testing mode prints all characters in ROM.

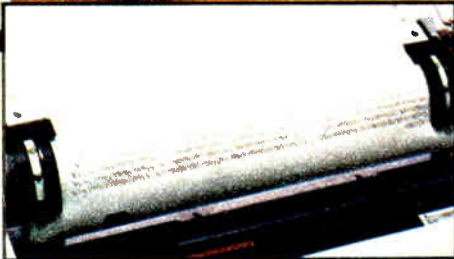
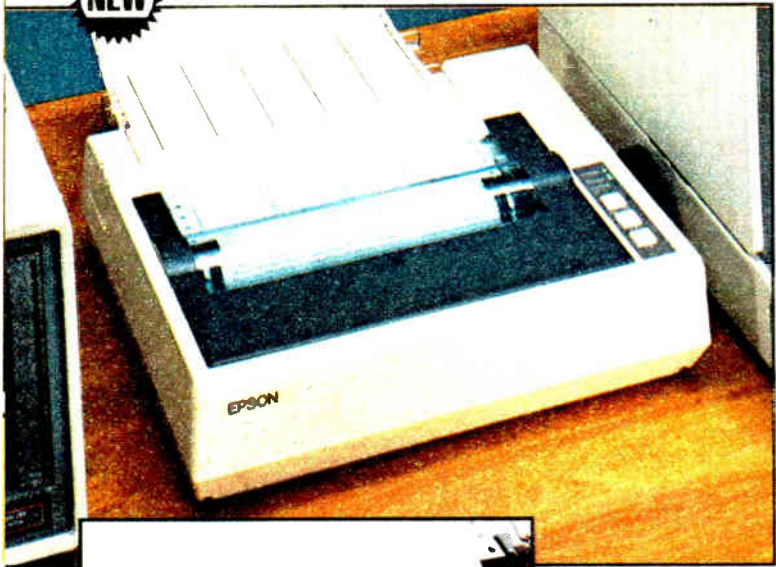
This printer communicates with Heath/Zenith computers with the optional MX-80-2 RS-232C Serial Interface (below). A Centronics-style 8-bit parallel interface is included with the MX-80 as standard equipment.

Includes paper tray and one ribbon. For 120 VAC, 60 Hz power. The MX-80 Printer measures 4.2" H x 14.7" W x 12" D.

MX-80, Assembled, Shpg. wt. 17 lbs. 545.00

RS-232C Serial Interface for MX-80 Printer. 65.00
MX-80-2, Shpg. wt. 1 lb. 65.00

MX-80 SPECIFICATIONS: Printhead: 9-pin, replaceable. **Printing Method:** Serial impact dot matrix. **Print Rate:** 80 cps. **Print Direction:** Bidirectional. **Line Spacing:** 18, 16, 14, 12 plus programmable. **Character Set:** Full 96-character ASCII set with descenders. **Graphics Characters:** 64 block characters. **Printing Modes:** Standard, double (advance paper 1/2 each page and repeat line), emphasized (shift right and double strike), double emphasized (combination of above). **Tabs:** Horizontal, 112 positions, Vertical, 64 positions. **Paper Feed:** Adjustable tractor-type pin feed. **Paper Width:** 4-10". **Forms:** 1-3. **Communications: Interfacing: Buffer Size:** 1 line. **Operating Temperature:** 41-95 deg. F (5-35 deg. C). **Operating Humidity:** 10-80%, non-condensing. **Net Weight:** 12 lbs.



Has advanced features for maximized throughput

Prints 96 ASCII characters in a tack-sharp 9 x 9 matrix



Priced at a big \$100 savings, the H-14 is one of the lowest-cost dot matrix line printers of its type available today

H-14 Line Printer features big \$100 savings, in kit and assembled forms!

NOW ONLY \$395⁰⁰ Kit

- Has extra features you won't find on comparably priced dot matrix line printers
- Use with most computers – communicates via RS-232C or 20 mA current loop interfacing

Here's an outstanding value in a microprocessor-based dot matrix line printer! Priced at a \$100 savings, the H-14 provides hard copy – for added convenience in reading, editing, debugging and modifying your programs. It can also print address lists or other data you need for almost any applications.

The H-14 prints the standard 96-character ASCII set (upper and lower case letters), using a 5 x 7 dot matrix print head. Maximum throughput rate is 75 characters per second, with selectable 80, 96 or 132 character line length. Vertical line spacing is 6 lines per inch, with a software-selectable option of 8 lines per inch.

Baud rates are user-selectable, from 110 to 4800. Adjustable width sprocket feed handles edge-punched, 2.5-9.5" wide fan-fold paper, up to 0.006" thick.

The H-14 connects to most computers with an RS-232C Serial Interface or 20 mA current loop. Includes 25-pin male EIA connector for fast, convenient hookup – and a matching paper catch which keeps printer output handy and organized. 120/240 VAC. 4.80" H x 18.33" W x 14.33" D. Requires HDOS or CP/M for H/Z-89; H-88-18 for H-88; any Heath-offered operating system for H-8.

SAVE \$100! Kit H-14, Shpg. wt. 30 lbs. Was \$495.00, NOW ONLY 395.00
SAVE \$100! WH-14, Assembled, 27 lbs. Was \$595.00, NOW ONLY 495.00
HCA-5-14, Dust Cover for H/WH-14, Shpg. wt. 1 lb. 14.00

H/WH-14 SPECIFICATIONS: **Printing Speed:** Initial time per full line is approx. 1.75 seconds on 60 Hz power line. 2.1 seconds on 50 Hz power line. Avg. throughput approx. 40 cps with 96 character lines. **Print head temperature** controlled by varying print speed. **Format:** 80, 96 or 132 cpi (96 cpi software selectable only). **Forms Handling:** Sprocket feed with adjustable (2.5-9.5") widths. **Ribbon System:** Standard typewriter ribbon with automatic reversing mechanism.



Now get \$490 of software, at no additional charge, with Z-89 Desktop Genius!

ZENITH data systems

Assembled commercial computer products for business applications

Get the CP/M Operating System and the new SuperCalc Spreadsheet Program when you buy the Desktop Genius from Zenith Data Systems!

Two Z-80 microprocessors – today's industry standard – control computing and terminal functions. Up to 64K bytes of RAM can be addressed by the operator.

Two Z-89 models come with convenient built-in floppy disk storage. External disk storage can increase on-line storage capacity to over 12 megabytes.

High-resolution video display, using a standard white CRT, can show up to 2,000 characters. Typewriter-style keyboard has 33 graphics characters for business presentations. RS-232 Serial I/O Ports for printer/telecommunications extendability. 120/240 VAC. 13" H x 17" W x 20" D.

Choose from three assembled Desktop Genius models. One configuration has 48K bytes of RAM and 100,000 bytes of built-in disk storage; a second configuration has 64K bytes of RAM and the Z-89-37 Double-Density Disk Controller Board to accommodate the Z-37 Floppy Disk System; and a third, more capable configuration has 64K bytes of RAM, the Z-89-37 Double-Density Disk Controller Board and 160,000 bytes of built-in disk storage.

Z-89-81, Assembled with 48K bytes of RAM, built-in floppy disk drive (100,000 bytes of storage) and three serial I/O ports, 55 lbs. **2895.00**

Z-90-80, Assembled with 64K bytes of RAM, Z-89-37 Double-Density Disk Controller Board, no internal disk storage (for disk storage, the Z-37 (below, right) is required) and three serial I/O ports, 52 lbs. **2895.00**

Z-90-82, Assembled with 64K bytes of RAM, Z-89-37 Controller Board, built-in floppy disk drive (160,000 bytes of storage) and three serial I/O ports, Shpg. wt. 56 lbs. **3195.00**



1 Z-19 Video Terminal has extra-value features

\$995⁰⁰

- Terminal interfaces with most standard systems
- ANSI and DEC VT-52 compatible

The low-priced Z-19's Z-80 microprocessor allows complete screen control for easier data entry and faster word processing. Its high-resolution video display shows twenty-five 80-character lines (2,000 characters) at any one time.

The high-performance typewriter-style keyboard has 72 keys and 12 special user-function keys (8 of which are user-programmable). A separate 12-key numeric pad is laid out like a calculator, providing excellent data entry and word processing capabilities in the same unit. Audible key click signaling confirms character or numerical entries. 33 graphics characters are also included.

Edit or erase by character or line. Address cursor on keyboard or host computer. Reverse video by character enables operator to view editing changes or corrections – before the change is transmitted to the host computer.

Compatible with most standard systems, the Z-19 Professional Video Terminal uses an EIA Standard RS-232C Serial Interface to communicate with the host computer at 110 to 9600 baud. Configure from keyboard, computer or interior switches. 120/240 VAC. The Z-19 measures 13" H x 17" W x 20" D.

Z-19, Assembled with std. white CRT, 43 lbs. **995.00**



2 Add up to 1.28 MB of disk storage with Z-37

\$1995⁰⁰

- Features two disk drives as standard equipment
- Plug-in adaptability to Z-89 Computer
- Easy-to-use read/write protection

The reliable Z-37's 5.25-inch floppy disk drives are mounted vertically to take up less space. Read/write gap-type recording heads. Photosensor in each drive detects presence or absence of notch in diskette, assuring proper read/write protection. 120/240 VAC. 50/60 Hz. 8.625" H x 8.875" W x 15" D.

Z-37 Dual-Sided Floppy Disk System. Provides 1,280,000 bytes of data storage. For use with Z-89 Computer. Z-89-37 Dual-Density Disk Controller Board must be installed in Z-89. Not compatible with H-88-1 Single-Density Disk Controller Board or H-17-1 Single-Sided Disk Drive.

Z-37, Assembled, with 2 drives, Shpg. wt. 28 lbs. **1995.00**

Z-89-37, Assembled Double-Density Disk Controller Board, 4 lbs. **295.00**

Z-87 Single-Sided Floppy Disk System. Provides 400,000 bytes of data storage when used with Z-89-37 Dual-Density Controller; 200,000 bytes when used with H-88-1 Single-Density Controller. Uses H-17-1 48 TPI Disk Drives. Not compatible with H-17-4 96 TPI Disk Drives.

Z-87, Assembled, with 2 drives, Shpg. wt. 28 lbs. **1195.00**

Zenith Data Systems Computers, which are factory assembled and tested, are designed for commercial use. Operation of these models in residential areas may cause unacceptable interference to radio and TV reception – requiring the operator, pursuant to FCC regulations, to take whatever steps are necessary to correct the interference.

The Zenith line of commercial computer products includes the Z-89 Desktop Genius All-in-One Computer, the Z-19 Professional Video Terminal and disk systems which store up to nearly 11 megabytes – as well as letter-quality and dot matrix printers.



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

NEW

**Zenith Z-67
Winchester Disk
System stores nearly
11 megabytes – comes
with \$750 software credit!**

\$5800⁰⁰

- With software, a \$6550 value!
- Features 10.782 megabytes of on-line data and program storage capacity
- 8-inch Winchester disk drive is permanently mounted, hermetically sealed for maximum reliability
- Winchester disk drive provides extremely fast 70 millisecond average data access
- 8-inch double-density, double-sided floppy disk drive allows easy transfer of data between compatible systems
- Floppy disk drive uses standard IBM 3740-formatted 8-inch floppy disks
- Compatible with most current software for the H/Z-89 All-In-One Computer
- Separate write-protect switches are provided for each disk drive

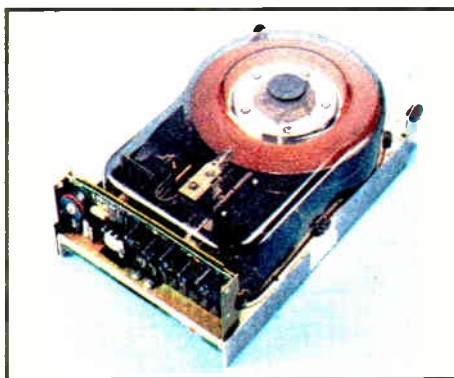
Do you need maximum on-line capacity to store large data bases? Or do you want the vastly better performance of a Winchester disk drive? The Z-67 Winchester Disk System will fill your needs. It represents another "quantum leap" in disk storage capacity – 12.961 megabytes unformatted, 10.782 megabytes formatted, on an 8" Winchester disk drive and an 8" floppy disk drive!

Get \$750 worth of software, at no extra charge, with this new peripheral. When you buy the Z-67, we'll automatically give you a big \$750 credit toward Heath/Zenith software of your choice. Just order as many software programs as you want, on the same order form with your Z-67 purchase, and deduct \$750 from the total price.

Field-proven, high-capacity Winchester disk drive: This permanently mounted, hermetically-sealed drive is designed to seal out contaminants, thereby reducing the chance of failure in this critical component. The Winchester disk has a track density of 195 tracks per inch, compared to only 48 tracks per inch on an 8-inch, double-sided, double-density floppy disk. The Winchester disk features 244 tracks per surface, x4 surfaces per disk, for a total of 976 tracks – compared to only 154 tracks per 8-inch, double-sided, double-density floppy disk. The Winchester disk has four recording surfaces – compared to two on a double-sided 8-inch floppy disk, and one on a single-sided 5.25-inch floppy disk (such as those used in the H-17-1 Single-Sided 5.25-Inch Disk Drive). The Winchester disk's data storage capacity is 9.76 megabytes. Average Latency Time for the Winchester disk drive is only 10.06 mS – compared to 83 mS for the floppy disk drive.

High-capacity, 8" floppy disk drive for data portability: You can copy data from the permanently-installed Winchester disk drive onto 8-inch floppy disks, which can be easily transported between compatible computers. You can store up to 1.022 megabytes (in double-density format).

More extra-value features: Front panel switches allow the operator to write-protect either the Winchester disk drive or the floppy disk drive. A front panel LED provides "power on" indication. A switching power supply minimizes



The Z-67 Disk System's Winchester disk drive is a field-proven, highly reliable state-of-the-art design

weight and heat generation. A fuse, EMI line filter and power switch are on the rear panel.

Compatible with most Heath/Zenith software: Most of the programs which presently run on the H/Z-89 Computer will run on systems using the Z-67 Winchester Disk System.

You'll be able to keep many more programs on-line: Imagine having HDOS and CP/M, along with several utility and applications programs, on-line (stored on the Winchester disk) – and still having tens of thousands of sectors available for other functions!

Designed for use with the H/Z-89 All-In-One Computer: It requires an H/Z-89 with 48K RAM and the Z-89-67 Interface (sold below).

The Z-67 Winchester Disk System operates on 120 VAC, 60 Hz power. Draws 190 Watts. Overall Dimensions of the Z-67 are 10.20" H x 18.90" W x 18.0" D (25.90 x 48.00 x 45.72 cm). Net weight is 65.8 pounds (29.9 kilograms).

Z-67 10.782-Megabyte Commercial Winchester Disk System, from Zenith Data Systems. Factory assembled. Includes \$750 of software, at no extra charge (choose from our selection on pages 80-89).

Z-67, Assembled, Shpg. wt. 67 lbs., Motor Freight Collect 5800.00

Z-89-67 Interface. Required to interface Z-67 to H/Z-89 All-In-One Computer. Factory assembled, installs inside H/Z-89 cabinet.

Z-89-67, Assembled, Shpg. wt. 3 lbs. 195.00

Z-67 SPECIFICATIONS: Disks: Capacity: Winchester Disk, 9760 kilobytes, .KB1, Floppy Disk 1022 kilobytes (in double density format) or 513 kilobytes (in single density format). Recording Surfaces Per Disk: Winchester Disk, 4 Floppy Disk, 2. Tracks Per Surface: Winchester Disk, 254, Floppy Disk, 154. Recording Density: Winchester Disk, 6100 bytes per inch (bpi); Floppy Disk, 6816 bytes per inch (in Double density format) or 3408 bytes per inch (in single density format). Track Density: Winchester Disk, 195 tracks per inch (tpi); Floppy Disk, 48 tracks per inch. Drives: Spindle Motor Speed: Winchester Disk Drive, 2983 rpm; Floppy Disk Drive, 360 rpm. Track-To-Track Move: Winchester Disk Drive, 19.0 milliseconds (mS); Floppy Disk Drive, 3.0 milliseconds. Average Track Access Time: Winchester Disk Drive, 70.0 milliseconds, Floppy Disk Drive, 91.0 milliseconds. Average Latency: Winchester Disk Drive, 10.06 milliseconds, Floppy Disk Drive, 83.0 milliseconds. General: Power Requirement: 120 VAC, 60 Hz. Power Consumption: 190 Watts. Overall Dimensions: 10.20" H x 18.90" W x 18.00" D (25.91 x 48.00 x 45.72 cm). Net Weight: 65.8 pounds (29.9 kilograms)





Value-packed Z-25 has speed, versatility, quiet operation and affordable price

\$1595⁰⁰

- Our fastest printer — over 150 characters/second
- 33 graphics characters — compatible with H/Z-19 Video Terminal, H-88 and H/Z-89 Computers

We've packed the latest state-of-the-art features into the Z-25! You get faster speed, versatile paper handling facilities, quiet operation, rugged construction and low cost. Prints full 96-character ASCII character set (upper/lower case, with descenders and underlining), at over 150 characters/second.

Quad tractor feed with adjustable width allows printer to handle standard edge-punched, single or multiple forms (up to six parts thick) or fan-fold paper. Ribbon cartridges "plug in" for no-mess replacement.

Variable pitch (10, 12, 13.2, 16.5 characters/inch) allows the Z-25 to print up to 222 characters/line (at 16.5 cpi on a 13.5"-wide line). 6 or 8 lines/inch vertical spacing. Horizontal, vertical tabs are adjustable.

Interfaces to most computers, terminals via RS-232C Serial Interface or 20 mA current loop at 110-9600 baud. Self-testing capabilities included. 120/240 VAC. 8.25" H x 26.50" W x 18.50" D (without paper tray).

Z-25, Assembled and tested, Shpg. wt. 82 lbs. **1595.00**
HCA-9, Stand and Paper Tray for Z-25, Shpg. wt. 28 lbs. **99.00**

Diablo Printer for word processing systems

\$2295⁰⁰

- Diablo 630 RO is factory assembled and tested
- Uses high-quality metal, plastic daisy wheels
- Fewer parts, adjustments for reliable operation

Here's a letter-quality daisy wheel printer that's ideal for word processing — or other applications which require high-quality printing.

Uses both metal and plastic print wheels for maximum printing flexibility. Prints full 96-character ASCII set, upper and lower case, at up to 35-40 cps. RS-232C Interface and 256-byte print buffer run at 110-1200 baud. Includes friction platen, power supply, operator control panel, HCS-22 Print Wheel (Elite 12 with unslashed zero) and HCS-51 Film Ribbon. For 120/240 VAC, 50/60 Hz power. 9.25" H x 23.50" W x 15.75" D (23.49 x 59.69 x 40.00 cm).

WH-54, Assembled, Shpg. wt. 65 lbs., Motor Freight **2295.00**

Bi-Directional Tractor Feed Accessory for WH-44K/Diablo 1640 KSR and WH-54 Printers. Dual tractors allow moving paper backward through printer for improved registration in word processing, forms preparation, graphics.

HCA-1, Shpg. wt. 9 lbs. **259.00**

We have a complete selection of print wheels, ribbons and paper for Diablo Letter-Quality Daisy Wheel Printers. Turn to page 81 for details.

Versatile DECwriter Teleprinter with keyboard

\$1095⁰⁰

- Designed for operator simplicity and convenience
- Reproduces full 128-character ASCII set
- Assembled unit prints at true speed of 30 cps

The typewriter-style WH-34/LA-34 DECwriter IV Teleprinter sets new standard for convenience in computer and data communications terminals. It prints 9 x 7 dot matrix letters at burst speeds to 45 cps. Includes RS-232C Serial Interface (with switch-selectable odd, even, mark or space parity), standard typewriter platen (optional WHA-34-2 Tractor Feed available). 120 VAC. 7" H x 22" W x 15.5" D. See our quality ribbons and printer paper on page 81.

WH-34, Assembled, 47 lbs. **1095.00**

WHA-34-2, Tractor Feed, Shpg. wt. 3 lbs. **179.00**



data systems

Assembled commercial computer products for business applications



Universal Floor Stand for printers

Raises WH-34, WH-44K/Diablo 1640 KSR, WH-54/Diablo 630 RO Printers to desk level. With paper rack. Use HCA-9 above for H/Z-25. HCA-2, 28 lbs. . . . **99.00**



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



Peachtree commercial programs save time, help you manage effectively

Enhanced for increased speed, capacity and security in business transactions. Programs include sample data for practicing, CP/M Operating System with Microsoft BASIC and utilities to provide backup disks. These programs require an H/Z-89 Computer with 64K bytes of RAM — as well as an H/Z-37 or 47-type high-capacity disk storage system.

To enjoy the full benefits of Peachtree Series 5 Business Applications Programs, you must have a basic knowledge of accounting and computers. Consultation with an accountant or data processing professional may be required for a smooth transition into business accounting — using the Peachtree General Ledger, Accounts Receivable, Accounts Payable, Inventory Management, Sales Invoicing and Property Management programs below.

General Ledger simplifies accounting functions

- Records transactions and their resulting balances
- Writes balance sheet and income statement
- Provides comparative (current vs. year-ago) financial data

Part of a total system designed to meet all of your accounting needs, the General Ledger System keeps your financial history — describing what has happened during a given accounting period.

Features include sample data for demonstration and training; self-instructing user documentation; interactive menu-driven programs; mandatory or optional control reports; master file maintenance; daily transaction processing and reporting; transaction deletions; master record protection; queries of account status; generation of trial balances, balance sheets, income statements, departmental income statements; and end-of-period processing (which updates accounts and readies system for the new month).

HRS-837-1 (Requires Sublicense Grant, p. 81), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 5 lbs. 495.00

HRS-847-1 (Requires Sublicense Grant, p. 81), on soft-sectored 8" disk, Shpg. wt. 5 lbs. 395.00

Automated Accounts Receivable System

- Complete invoicing and monthly statement generating system
- Tracks current and aged accounts receivable
- Eliminates tedious calculations to save time and effort

This Accounts Receivable System can interface with the General Ledger System or operate in a stand-alone mode. It provides detail posting and automatic monthly journal entries.

Customer files are maintained — with data stored including account type, balance, tax rate and other information.

Capabilities include open item or balance forward; consolidation for greater capacity; printing of statements and invoices, with sales or dun messages if desired; credit limit checking and tax record keeping; flexible open credit reconciliation procedures; summary detail aging reports; and automatic month-end file backup.

HRS-837-2 (Requires Sublicense Grant, p. 81), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 395.00

HRS-847-2 (Requires Sublicense Grant, p. 81), on soft-sectored, 8" disk, Shpg. wt. 4 lbs. 395.00

Compatible Accounts Payable Package

- Tracks current and aged accounts payable
- Maintains separate records for each of your vendors
- Automatically pays vendors (on command), maintains register

This Accounts Payable System helps determine which vouchers to pay by due date or discount date or within certain cash requirements, and automatically prints checks and a check register. It can interface with the General Ledger System, or can run independently.

This package includes maintenance of vendor files; protection of master records; voucher processing facilities, including selection of which vouchers to pay (either by due/discount date or by specific user selection); payments, credits and adjustments processing; reporting of cash requirements; open voucher reporting; and aging reports.

HRS-837-3 (Requires Sublicense Grant, p. 81), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 2 lbs. 395.00

HRS-847-3 (Requires Sublicense Grant, p. 81), on soft-sectored 8" disk, Shpg. wt. 2 lbs. 395.00

Effectively manage your inventory

- Provides better control of your merchandise
- Allows more efficient operation, reduced inventory investment
- Improves customer service and response time

Effectively supervise control of your inventory assets with the Peachtree Inventory Management System. It keeps information on each item — including part number, description, unit of measure, vendor and reorder data, activity, and complete information on current item costs/pricing/sales. Transactions may be applied at any time to insure up-to-date and accurate inventory data.

Features include departmentalizing of items; multiple pricing levels; on-line item query at any time; comprehensive reporting — including inventory, physical inventory worksheet, inventory price list, departmental summary, inventory status, reorder, period-to-date and year-to-date reports.

HRS-837-5 (Requires Sublicense Grant, p. 81), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 5 lbs. 395.00

HRS-847-5 (Requires Sublicense Grant, p. 81), on soft-sectored 8" disk, Shpg. wt. 5 lbs. 495.00

Full-featured Peachtree Sales Invoicing System

- Allows user to automatically check and verify credit limits, stock levels — before the invoice is printed
- Generates four useful invoicing, inventory and tax reports

The Peachtree Sales Invoicing System interacts with the Peachtree Series 5 General Ledger, Accounts Receivable and Inventory Systems. It accommodates up to 36 different sales accounts; automatically prints invoices; allows access to customer and inventory files for updates during invoicing; mixes taxable and non-taxable items on an invoice; provides for credit sales; and maintains tax files for complete sales tax reporting.

Major reports of the Sales Invoicing System include the invoice register, inventory activity, inventory backorder and sales activity reports.

Features include sample data for demonstration and training, self-instructing user documentation and easy-to-follow menu-driven programs.

HRS-837-6 (Requires Sublicense Grant, p. 81), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 295.00

HRS-847-6 (Requires Sublicense Grant, p. 81), on soft-sectored 8" disk, Shpg. wt. 4 lbs. 295.00

Manage rental properties effectively

- Versatile system helps track properties, leases and renters
- Maintains accounts receivable, prints statements and invoices
- Compatible with CPA General Ledger (available early 1982)

Do you own multiple rental properties (such as apartments, duplexes, homes and offices)? Do you want immediate on-line control of your holdings?

The Peachtree Property Management System helps you keep track of properties, leases and renters — even multiple leases per renter (examples — apartment, garage and maintenance agreements). It generates action reports (upcoming move-ins, move-outs and lease expirations). This system also prints statements and invoices for renters — and maintains accounts receivable from your properties, showing which renters have paid up to date.

Features include sample data for demonstration and training, self-instructing user documentation and easy-to-follow, menu-driven programs.

HRS-837-7 (Requires Sublicense Grant, p. 81) on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 3 lbs. 995.00

HRS-847-7 (Requires Sublicense Grant, p. 81) on soft-sectored 8" disk, Shpg. wt. 3 lbs. 995.00



Get the best performance with these computer supplies

10' Long RS-232 Cables

Connects pins 1-8. 20.
HCA-10, Male to Male. 1 lb. 20.00
HCA-11, Male to Female. 1 lb. 20.00
HCA-12, Female to Female. 1 lb. 20.00

Plastic Diablo Printwheels

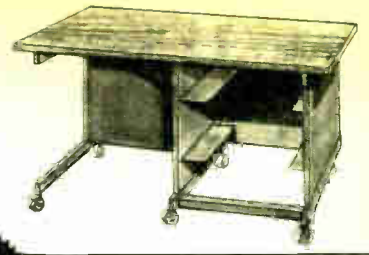
Courrier 10 (Diablo 38100). Pica with slashed zero. **HCS-20**, 1 lb. 8.00
Courrier 12 (D. 38107). Pica with unslashed zero. **HCS-21**, 1 lb. 8.00
Elite 12 (D. 38102). Pica with unslashed zero. **HCS-22**, 1 lb. 8.00
General Scientific (D. 38141). Greek letters, superscripts, math symbols. **HCS-23**, Shpg. wt. 1 lb. 8.00
APL-10.
HCS-24, 1 lb. 8.00
OCR-A (D. 38144). ANSI Std. OCR Type A font. **HCS-25**, 1 lb. 8.00
Prestige Elite Legal 12A (D. 38105). Elite w/legal symbols, including " and ". **HCS-26**, 1 lb. 8.00
Courrier Legal 10 (D. 38104). Pica w/legal symbols. **HCS-27**, 1 lb. 8.00

Ribbons for printers

NEW! Ribbon Cartridges for H/2-25.
HCS-56, 3 lbs. Package of 2. 20.00

NEW! Ribbon Cartridges for MX-80.
HCS-55, 1 lb. Package of 1, 14.00
Ribbons for H-14 and ASR-33 Printers.
HCS-52, 1 lb. Package of 3, 8.00
Cloth Ribbons for Diablo Printers.
HCS-50, 1 lb. Package of 3, 18.00
Film Ribbons for Diablo Printers.
HCS-51, 1 lb. Package of 3, 18.00
Ribbons for WH-24/TI-810, H-36/LA-36.
HCS-53, 1 lb. Package of 3, 18.00
Ribbon Cartridges for WH-34 DECwriters.
HCS-54, 1 lb. Package of 3, 29.00
Top-quality printer paper
Premium 8.5" x 11" One-Part, Fan-Fold Paper. 2700 sheets.
HCS-1, Shpg. wt. 28 lbs. 32.00
Standard 8.5" x 11" Paper. 3200 sheets. One-part, fan-fold.
HCS-2, Shpg. wt. 31 lbs. 32.00
14.875" x 11" Paper for WH-24, H/2-25, WH-34, H-36, WH-44.
WH-54. 3200 sheets.
HCS-3, Shpg. wt. 47 lbs. 42.00
5.25" and 8" floppy disks
Single-Density, Single-Sided 5.25" Floppy Disks. For H-17-1 Disk Drives.

Stores up to 100,000 bytes.
HCS-61, 1 lb. Package of 5, 20.00
Single-Density, Single-Sided 8" Disks.
IBM 3740 format for H-27, H-47, H-67, other systems. 77 tracks. Stores up to 250,000 bytes.
HCS-62, 2 lbs. Package of 5, 25.00
Double-Density, Single-Sided 8" Disks
for H-47, H-67, 77 tracks. Stores up to 500,000 bytes.
HCS-64, 2 lbs. Package of 10, 60.00
Double-Density, Double-Sided 8" Disks.
IBM 3740 format for H-47, H-67, other systems. 77 tracks. Stores up to 1,000,000 bytes.
HCS-65, 2 lbs. Package of 10, 70.00
NEW! Soft-sectored 5.25" disks
Require new Z-89-37 Controller.
Double-Density, Single-Sided, 48 TPI Disks. For H-17-1 and H-17-4 Drives. Stores up to 160,000 bytes.
HCS-66, 1 lb. Package of 10, 45.00
Double-Density, Double-Sided, 96 TPI Disks. For H-17-4 Drives. Stores up to 640,000 bytes.
HCS-68, 1 lb. Package of 10, 55.00



NEW

Computer Work Station

\$395⁰⁰

- Heath-designed furniture organizes in less space
- Easy access to components

Formica top. 27" H x 48" W x 30" D (including casters); rack enclosure 22.25" H x 19.06" W x 24" D (has 2 adjustable shelves).

PD-12, Assembled. Shpg. wt. 125 lbs.. Motor Freight. FOB Carson, CA 395.00

Multi-Function TI Calculator



Has memory and logic functions. Rechargeable battery. 120 VAC adapter. 5.5" H x 3" W x 1.25" D.

PC-11, Assembled, 2 lbs. 59.95

SOFTWARE SUBLICENSE GRANT FOR DIGITAL RESEARCH, MICROPRO, MICROSOFT, PEACHTREE AND SORCIM PRODUCTS

(Check all boxes which apply, sign and return to HEATH COMPANY (HEATH). Another Sublicense Grant form should be used with future SOFTWARE orders.)

- CP/M DESPOOL MAC SID/ZSID WordStar Mail/Merge WordMaster
 DataStar SuperSort Microsoft BASIC Compiler Microsoft BASIC Interpreter
 COBOL Microsoft FORTRAN Peachtree General Ledger Accounts Receivable
 Accounts Payable Peachtree Inventory Management Sales Invoicing
 Property Management Magic Wand Word Processor Sorcim SuperCalc

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FOR SID/ZSID, MAC AND DESPOOL PURCHASERS ONLY: The serial number of your Digital Research CP/M System must be supplied in advance. HEATH will supply the information if SID, MAC and/or DESPOOL are purchased on the same order with a DIGITAL RESEARCH Operating System.

CP/M SERIAL NUMBER _____

HEATH COMPANY
By _____

ACCEPTED AND AGREED:
CUSTOMER'S SIGNATURE _____

DATE _____

SOFTWARE SUBLICENSE GRANT FOR DIGITAL EQUIPMENT CORPORATION (DEC) SOFTWARE PRODUCTS

(Check all boxes which apply, sign and return to HEATH COMPANY (HEATH). Another Sublicense Grant form should be used with further orders for additional SOFTWARE products.)

- HT-11 Operating System HT-11-1 FORTRAN

Write in the blank below your CPU make, model and serial number.
(If CPU is purchased with this order, HEATH will fill in the blank.)

CPU _____

(Fill in blank)

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HEATH COMPANY
By _____

ACCEPTED AND AGREED:
CUSTOMER'S SIGNATURE _____

DATE _____



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

HUG makes your Heath computer even more powerful with its 500-program software library



Membership in the Heath Users' Group (HUG) keeps you up to date on the latest Heath/Zenith computer developments — while you expand your utility and applications software capabilities!

Here's what a membership in HUG gives you:

- 1. Special access to the HUG Software Library** — a constantly updated and expanded library which now has more than 500 low-cost, user-submitted utility and applications programs for your H-8, H-88 or H-89/Z-89 All-In-One Computer. The library includes a diversified collection of programs, sub-routines and procedures written by members of HUG. The programs are stored on cassettes and disks (see partial list below);
- 2. The HUG Software Library Catalog**, which describes the contents of the HUG Software Library — including utility and applications programs in computer-aided instruction, business applications, personal finance, amateur radio programs and more. The catalog lists each program in the library by program name, program description, program language, version, equipment required to run the program and HUG author;
- 3. A one-year subscription to REMark Magazine (10 issues)** — an exclusive periodical for HUG members. REMark provides these important services: It contains sneak previews of upcoming Heath computer products — and the magazine also serves as an open forum, where members of HUG can share new hardware modifications, software enhancements, applications programs and other ideas about their computers;
- 4. A vinyl-covered, three-ring binder** — with an inside pocket containing the HUG Handbook. It explains the Heath Users' Group in more detail: why it was started, how members participate (some HUG members have even formed local users' groups to increase the benefits of belonging to HUG), plus hints on making the most of your membership. Use this binder to store HUG membership information, software documentation, back issues of REMark and other materials you will receive as a HUG member;
- 5. A chance to win valuable prizes by competing in HUG Software Contests** — a great way to further your program-writing expertise and have fun at the same time. Besides receiving valuable gifts, the winners of these software contests have their names printed in REMark Magazine;
- 6. The official HUG Identification Card**, which entitles you to all of the special benefits which are available only to HUG members.

Some of the programs available from HUG include:

NEW FROM HUG — Small Business Package III! With Accounts Payable, Accounts Receivable, Expense Ledger, Profit/Loss Statement and Balance Sheet. Runs under HDOS and Microsoft BASIC. On three disks — all for under \$150!

- Memory Test Programs
- HUG Editor
- Page Editor
- Time for HDOS
- File Cruncher
- File Maintenance
- Create-a-Program
- Fixed and Floating Pt. Packages
- Cross-Reference Utility
- Disk Dump and DUP Utilities
- Loan Amortization
- Cash Flow
- Real Estate Programs
- Stock and Tax Programs
- Time Management
- Home Budget Maintenance
- Checkbook Programs
- Credit Card Management
- Investments
- Annuities

Get more from your computer

A membership in the Heath Users' Group allows you to get the most from your Heath/Zenith computer. With HUG's 500-program software library, you'll have access to many useful utility and applications programs. With the REMark Magazine subscription provided with your membership, you'll be among the first to learn about Heath/Zenith technological advances. And REMark's interactive forum, allows you to participate in an information exchange with other Heath/Zenith computer owners. Take a moment to fill out the application form (with your Heath/Zenith computer or at right), and join HUG.



- Mailing List
- Basic Letters
- Spelling Words
- Vocabulary Practice
- Antonyms
- Arithmetic Practice
- Calculator
- Metric Conversion
- Simultaneous Equations
- Graphs
- Programs for Printers
- HDOS Device Drivers
- Renumbering Programs
- Modern Packages
- Text Processors
- Sort Utilities
- Disk Recovery Utilities
- Assembly Language Routines
- Disassemblers
- Map of BASIC Symbols
- Pilot Language
- Small Business Packages
- Business Analysis
- Accounts Receivable
- Accounts Payable
- Payroll
- Inventory Package
- Expense Report
- Finance
- Plotting
- Chemistry Symbol Quiz
- Education Games
- Electronic Formulas
- Solar Domes
- Music
- Morse Code
- Antenna Design Programs
- Amateur Radio Log Book
- QSL Files
- OSCAR Locator
- Baudot Driver
- Teletype Driver
- AC Circuits
- Resonant Frequency Calculator
- Op-Amp Programs
- Power Supply Design
- Weather Forecasting
- Games and Graphic Games
- HDOS2CP/M Utility
- 11 Disks of CP/M Programs

When you purchase a Heath/Zenith computer, you'll find a HUG membership application enclosed. But if you don't own a Heath/Zenith computer — or don't have an application form — you can still join HUG. Just fill out the application form below and mail to HUG Membership, Hilltop Road, St. Joseph, MI 49085.

	HUG Membership Rates (per year, U.S. Funds)		
	U.S.	Canada & Mexico	International
New Members:	\$18	\$20	\$28
Renewal	\$15	\$17	\$22

Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085.

Yes, I want to become a member of HUG and take advantage of keeping up to date on the latest Heath/Zenith computer developments, while I increase my utility and applications software library.

I've enclosed \$ _____ (U.S. Funds only) to cover my membership. NOTE: No charge orders or billings are accepted.

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Country: _____

Signature: _____





OPERATING SYSTEMS

Heath Disk Operating System (HDOS 2.0) for all H-8, H/Z-89 All-In-One Computer Systems

- Versions available for most Heath/Zenith floppy disk systems
- Updates supplied free of charge for one year after purchase

The Heath Disk Operating System (HDOS), Version 2.0, includes:

Extended Benton Harbor BASIC, Version 6.0 – an easy-to-use, enhanced version of Dartmouth BASIC which includes strings and files. It provides fast operation and includes character strings, convenience commands, numeric data with over six digits of accuracy, math functions, Boolean values which permit logical operations, free format programs and conditional statements;

ASM Assembly Language, a 2-pass absolute 8080 assembler with cross-reference feature which assembles source program into listing and object program in executable binary format;

EDIT Text Editor converts your computer and terminal into a powerful typewriter for generating and editing text. It prepares source code for Assembly Language and can help prepare reports, write letters and edit manuscripts;

DEBUG Console Debugger for entry and debugging of machine language programs via an external terminal. Features single/multiple stepping through programs, breakpointing, load/dump from tape storage (user program required);

PIP to copy, concatenate or transfer files between devices; **INITIALIZATION** to format new or magnetically damaged diskettes; **SYSTEM GENERATION** to write HDOS onto a newly formatted diskette; and **TEST**, a diagnostic utility program which assists in checking out and maintaining your floppy disk system.

Requires 48K RAM, 1 disk drive (2 recommended). Supports all Heath/Zenith disk systems except H-27; many software products.

Heath Disk Operating System (HDOS), Ver. 2.0, on hard-sectored 5.25" diskette.
HOS-817-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 150.00

Heath Disk Operating System (HDOS), Ver. 2.0, on soft-sectored 5.25" diskette.
HOS-837-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 150.00

Heath Disk Operating System (HDOS), Ver. 2.0, on soft-sectored 8" diskette.
HOS-847-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 150.00

Take advantage of the powerful, easy-to-use UCSD P-System with Pascal Language

- Rapidly growing in popularity, system can run on many computers
- Modular design of this operating system makes programming easier

Take advantage of the easy and fun-to-use Pascal Language. Its clear readability, with powerful structure and data types, has meant increasing popularity and rapid software development. Modular design makes each Pascal program more accommodating to changing needs, and more reliable when run.

UCSD Pascal is more versatile. Programs written for one computer can run on another, often without recompilation. And UCSD Pascal can be used on many systems, not just one. Its programs are compiled into universal P-code, which can be run on any microcomputer with a resident interpreter.

Heath's P-System with UCSD Pascal Language includes these modules:

OPERATING SYSTEM, an interactive system with disk file handling capabilities, run-time support routines and block I/O service routines; a fast one-pass **PASCAL COMPILER** which produces universal P-code, runnable on most microcomputers; an efficient and compact **INTERPRETER** which runs universal P-code; **TWO EDITORS**, a powerful screen-oriented editor that runs in both programming and text editing modes, and a character-oriented editor with a wide variety of commands for context editing with hard-copy terminals;

FILER, to manipulate and keep track of disk files; **CONDITIONAL MACRO-ASSEMBLER**, which produces code that can be linked with your Pascal program; **LINKER**, a utility for link-editing Pascal object code and assembly code modules; and **SYSTEM LIBRARY**, with frequently used utilities.

Requires 48K RAM, 2 disk drives (HOS-817-3 requires 2 hard-sectored 5.25" drives). Includes manual, diskettes. For Heath computers only. Supported by Softech Microsystems; updates will be supplied for a nominal charge.

HOS-817-3, on 5.25" disks for H-8 and H/Z-89 Computers, 8 lbs. 295.00
HOS-1127-3, on 8" IBM disks for H-11A/H-27 systems, 8 lbs. 295.00

Program with industry standard CP/M – configured for H-8 and H/Z-89 Computers

- Available for either hard- or soft-sectored disk drives
- Especially configured for Heath/Zenith computer systems

CP/M by Digital Research opens the door to more languages, utilities and applications software than any other microcomputer disk operating system! Standard (ORG-0) CP/M supports the H-8 and H/Z-89 computers, their mass storage peripherals (allowing concurrent operation and automatic density selection, all Heath/Zenith printers and hard copy terminals).

Source code for hardware drivers, including disk drivers, allows customization to fit special requirements. IOBYTE allows device assignment, permits switching between hard copy and CRT terminals – or between printers – without rebooting. A configuration utility permits changes to ease operation.

Additional features, such as the implementation of BIOS as a disk-resident relocatable file, make this one of the best available implementations of CP/M.

CP/M includes three modules, plus utilities and an operating manual with almost 300 pages of detailed information. BIOS, supplied in source code and object code, contains all hardware-level I/O code, and is unique to Heath. BDOS is the resident nucleus, with all file level and logical I/O code. Its physical I/O is performed via calls to the BIOS. BDOS features fully dynamic allocation and de-allocation of physically non-contiguous files. CCP is the transient monitor, facilitating command-level communications between the operator and CP/M. Space used by CCP is available to user programs during normal operation.

Utilities include a 2-pass absolute 8080 assembler, a text editor, an 8080 debugger with traced execution and disassembly, file dump, system generation relocation and file size/disk usage displays. You can also set file attribution (read only and/or system), assign physical/logical devices, display system parameters, copy files and convert Intel HEX files into memory images.

Heath CP/M requires 48K RAM and one disk drive (two drives recommended). H-8 systems requires HA-8-8 Extended Configuration Option. For Heath computers only.

Heath CP/M Operating System, Ver. 2.202, on 5.25" hard-sectored diskette.
HOS-817-2 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 150.00

Heath CP/M Operating System, Ver. 2.202, on 5.25" soft-sectored diskette.
HOS-837-2 (Requires Sublicense Grant, p. 81) Shpg. wt. 5 lbs. 150.00

Heath CP/M Operating System, Ver. 2.202, on 8" soft-sectored diskette.
HOS-847-2 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 150.00

Useful H-8/H-88 Cassette Operating Software

- Helps form a solid base for future computer programming
- Supplied on audio cassettes, in convenient 1200 baud form

The Heath Cassette Operating system helps you program your H-8 or H-88 Computer quickly and easily. Convenience features (automatic command completion to simplify typing, dynamic syntax checking to alert you to errors and a special user configuration feature which lets you personalize the system) make it easier to use and more practical than similar systems. The system includes:

Extended Benton Harbor BASIC (Version 6.0), an enhanced Dartmouth BASIC which includes strings and files. You get faster operation, convenience commands, math functions, dynamic storage allocation, expanded error messages and recovery ability. Also has numeric data with over 6 digits of accuracy, Boolean values for logical operations, free format programs, math functions, enhanced expression and conditional statement facilities;

HASL-8 Assembly Language, a two-pass absolute assembler that lets you create source programs using letters, numbers and symbols to generate efficient machine language code;

TED-8 Text Editor for generating and editing text. It prepares the source code for HASL-8 Assembly Language – and can also be used to prepare reports, write letters and edit manuscripts;

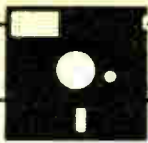
BUG-8 Console Debugger for entry/debugging of user machine language programs via external terminal. Features single/multiple stepping, insertion of breakpoints, loading/dumping of user programs to/from tape storage and display/alteration of contents of a memory location or any 8080 register.

Requires 16K RAM. H-8 systems also require H-8-5 Interface (p. 71). Cassette interfacing is standard with the H-88 and H-89 All-In-One Computers; H-88-5 Interface (p. 67) required for HS-89, WH-89 and Z-89 Computers.

H-8-18, for H-8 Computer, Shpg. wt. 11 lbs. 30.00
H-88-18, for H-88 Computer, Shpg. wt. 5 lbs. 30.00



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



PROGRAMMING LANGUAGES

Now available on both hard-sectored (5.25") and soft-sectored (5.25" and 8") diskettes, these languages let you write programs with surprising ease. Each language functions best in its unique programming environments. We'll supply free updates for one year — when you sign and return the registration card enclosed with each language.

Microsoft BASIC Interpreter for general use

As low as **\$150⁰⁰**

- Extra-value features make programming easier
- Has many math, algebraic and trigonometric functions
- Available for both HDOS and CP/M Operating Systems

Heath computer owners can use and enjoy Microsoft BASIC — one of the most versatile general-purpose programming languages available for microcomputer systems. Scores of practical utility and applications programs are written in this BASIC. This version of MBASIC is written especially for the H-8 Computer and the H/Z-89 All-in-One Computer.

Capabilities include direct access to CPU ports and memory locations; an IF-THEN-ELSE control structure which allows more highly-structured programming (including editing during programming and random or sequential filing capabilities); mathematical and logical operators; and a DEF statement, which allows user-defined functions which are not listed as intrinsic functions.

You also get many extended features: Program edit facilities, including insertion, deletion, character change and search capabilities; file management facilities which include random files, sequential files and file manipulation.

Powerful string processing functions are provided, including LEFT, RIGHT, MID, ASC, CHR and concatenation; extended statements, operators, functions and commands which are not available in most other BASICs (ERASE to eliminate arrays from a program, LINE INPUT to add lines to string variables without delimiters, SWAP to exchange the values of two variables, the TRON and TROFF debugging aids to help trace the execution of program instructions, and WIDTH to set the width of the terminal printing line).

Microsoft BASIC also includes automatic line numbering and renumbering features; branching, loops and subroutines; and more aids.

Math functions include algebraic and trigonometric capabilities, as well as double precision floating point number and double precision mathematics.

Requires H-8 or H/Z-89 with 48K RAM and HDOS or CP/M (as indicated below).

Microsoft BASIC, Ver. 4.82, on hard-sectored 5.25" disk for HDOS systems.
H-8-21 (Requires Sublicense Grant, p. 81), Shpg. wt. 3 lbs. 150.00

Microsoft BASIC, Ver. 5.21, on hard-sectored 5.25" disk for CP/M systems.
HMS-817-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 175.00

Microsoft BASIC, Ver. 5.21, on soft-sectored 5.25" disk for CP/M systems.
HMS-837-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 4 lbs. 175.00

Microsoft BASIC, Ver. 5.21, on soft-sectored 8" disk for CP/M systems.
HMS-847-1 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 175.00

BASIC Compiler speeds general programming

\$250⁰⁰

- Compiled computer programs run much faster
- Includes these useful utility programs — MACRO-80 Assembler, LINK-80 Editor and LIB-80 Library Manager

Eliminate time-consuming interpretation when you run a computer program, by using Microsoft's BASIC Compiler, Ver. 5.23. First, compile your program with this compiler. It converts each line of the program into machine code — the language your computer understands best. You'll find that a pre-compiled program runs much faster than a similar program run through an interpreter.

Many utility programs are included: MACRO-80 Relocating Assembler to convert Assembly Language programs into source code, LINK-80 Linkage Editor and LIB-80 Library Manager. Requires H-8 or H/Z-89 with 48K RAM, two disk drives and HDOS or Heath/Zenith CP/M (as indicated below).

Microsoft BASIC Compiler, for HDOS systems (available in December):
HMS-817-41 (Needs Sublicense, p. 81), hard-sectored 5.25" disk 4 lbs. 250.00

HMS-837-41 (Needs Sublicense, p. 81), soft-sectored 5.25" disk 4 lbs. 250.00

HMS-847-41 (Needs Sublicense, p. 81), soft-sectored 8" disk 4 lbs. 250.00

Microsoft BASIC Compiler, for the Heath/Zenith CP/M Operating System:
HMS-817-4 (Needs Sublicense, p. 81), hard-sectored 5.25" disk 5 lbs. 250.00

HMS-837-4 (Needs Sublicense, p. 81), soft-sectored 5.25" disk 4 lbs. 250.00

HMS-847-4 (Needs Sublicense, p. 81), soft-sectored 8" disk 5 lbs. 250.00

Science, math-oriented Microsoft FORTRAN

As low as **\$175⁰⁰**

- Includes powerful Microsoft ANSI-66 FORTRAN IV Compiler
- Also features Macro-Assembler, Linkage Editor and Cross-Reference Generator
- Linkable library of mathematical, I/O and utility routines

With more power to help you perform mathematical and scientific programs on your Heath computer, the Microsoft FORTRAN Programming System features:

1. The unique Microsoft FORTRAN-80 Compiler, which uses the powerful ANSI-66 FORTRAN IV Computer Language — so you can draw from a large base of utility and applications programs;
2. The MACRO-80 Relocating Assembler, for use with 8080 and Z-80 CPUs;
3. The CREF Cross-Reference Generator, for sorted cross-reference listings;
4. The LINK-80 Linkage Editor, which generates runnable load modules;
5. The Microsoft FORTRAN Library, filled with floating point mathematical routines — plus all FORTRAN I/O and utility routines;
6. Sample FORTRAN-80 and MACRO-80 Assembler source programs.

The Microsoft FORTRAN-80 Compiler is a true native-code compiler which supports the full ANSI-66 FORTRAN IV Language, except for complex numbers. This allows you to take advantage of the large base of utility and applications programs already written in the FORTRAN Language.

A microprocessor-based FORTRAN development package, which generates relocatable object modules, is included with the compiler. You can link these modules, using the loader in the LINK-80 Linkage Editor, and generate an absolute file.

This compiler also includes many extensions to increase system utility and efficiency — and it performs some object code optimization. An option to list generated object code in 8080 Assembly Language is available.

The Microsoft MACRO-80 Relocating Assembler is an assembler designed for use with both the 8080 and Z-80 microprocessors. It has complete facilities for macro development. The MACRO-80 Assembler generates relocatable object modules for use with the Microsoft LINK-80 Linkage Editor. It accepts Intel 8080 and Zilog Z-80 mnemonics, features macros and conditional assembly, and will generate a sorted cross-reference listing (when used with the CREF Cross-Reference Generator, included with this software package).

The LINK-80 Linkage Editor, included with this programming system, converts relocatable libraries or modules (such as those produced by Microsoft FORTRAN, BASIC, COBOL and Pascal language — as well as by the Microsoft MACRO-80 Relocating Assembler and Digital Research's PL 1 Compiler) into runnable load modules for direct execution or disk storage.

Capabilities of the Microsoft LINK-80 Linkage Editor include options to specify prommable code, and the ability to separately specify origin addresses for code and data segments. An absolute symbol table listing of the generated load module may be obtained.

Microsoft's FORTRAN Library includes all FORTRAN mathematical, I/O and utility functions. Using the FORTRAN Library, you can perform a multitude of functions — absolute values, truncation, remainders, maximum values, conversion, transfer of signs, positive differences, exponentials, logarithms, sines, cosines, hyperbolic tangents, arctangents and square roots.

The library contains arithmetic routines, conversion subroutines and subprogram linkages. Special functions (INP, CALL OUT, PEEK, CALL POKE and other subprogram linkages) allow sophisticated programming.

The versatile Microsoft LIB-80 Library Manager, included with CP/M versions of the Microsoft FORTRAN Programming System, allows the building of your own libraries of relocatable modules.

You receive an attractive three-ring binder with a fully detailed users' programming manual, as well as a master diskette, with this system.

The Microsoft FORTRAN Programming System requires a Heath H-8 (page 70), Heath H-89 (page 66) or Zenith Z-89 (page 77) Computer with 48K bytes of Random Access Memory (RAM). You must also have two or more floppy disk drives — and either HDOS or Heath CP/M (page 83). Microsoft FORTRAN is available on either hard-sectored 5.25" (for HDOS or CP/M), soft-sectored 5.25" (for CP/M) or soft-sectored 8" (for CP/M) floppy diskettes — as listed below.

Microsoft FORTRAN, Ver. 3.35, on hard-sectored 5.25" disk for HDOS systems.
H-8-20 (Requires Sublicense Grant, p. 81), Shpg. wt. 4 lbs. 175.00

Microsoft FORTRAN, Ver. 3.40, on hard-sectored 5.25" disk for CP/M systems.
HMS-817-2 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 195.00

Microsoft FORTRAN, Ver. 3.40, on soft-sectored 5.25" disk for CP/M systems.
HMS-837-2 (Requires Sublicense Grant, p. 81), Shpg. wt. 4 lbs. 195.00

Microsoft FORTRAN, Ver. 3.40, on soft-sectored 8" disk for CP/M systems.
HMS-847-2 (Requires Sublicense Grant, p. 81), Shpg. wt. 5 lbs. 195.00



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

Run powerful, business-oriented COBOL

\$395⁰⁰

- The business world's most popular computer language
- Includes most Level-I features and many Level-II extras
- Available in three disk formats, for H-8 or H/Z-89

Microsoft COBOL-80 far exceeds the minimum specifications of ANSI-74 COBOL, and has so many Level-II features and optional modules that you can easily use most COBOL programs written for large computer systems (Minimum required by ANSI Standard for COBOL Language is Nucleus, Table Handling and Sequential I/O modules only, at Level-I implementation):

MODULE TCOBOL 4.01 IMPLEMENTATION LEVEL

Nucleus Level-I plus these Level-II features:

CONDITIONS – Level 88 conditions with value series or range; use of logical AND/OR/NOT in conditional use of algebraic relational symbols (>, =); implied subject, or both subject and relation, in relational conditions; sign test; nested IF statements; parentheses in conditions.

VERBS – Extensions to ACCEPT and DISPLAY for formatted screen handling; ACCEPTance of data from DATE, DAY, TIME; STRING and UNSTRING statements; COMPUTE with multiple receiving fields; PERFORM VARYING.

IDENTIFIERS – Mnemonic names for ACCEPT or DISPLAY devices; procedure names consisting of digits only; qualification of names (in procedure division statements only)

Table Handling	Level-I, some Level-II features
Sequential I/O	Level-I, most Level-II features
Relative I/O	Level-I, some Level-II features
Interprogram Communication	Level-I
Library	Level-I
Communication	None
Debugging	Special extensions to ANSI-74 Standard providing convenient trace-style debugging
Report Writer	None
Segmentation	Level-I
Sort/Merge	None

The Microsoft COBOL Programming System includes the **MACRO-80 Assembler** – an 8080/Z-80 assembler which incorporates almost all "big computer" assembler features – without sacrificing speed or memory space. Featuring complete facilities for macro development, it generates relocatable object modules for use with the Microsoft LINK-80 Linkage Editor. MACRO-80 accepts Intel 8080 and Zilog Z-80 mnemonics, features macros and conditional assembly; the **LINK-80 Linkage Editor**, which converts relocatable libraries or modules into runnable load modules for direct execution or disk storage; the **LIB-80 Library Manager**, which allows you to build your own libraries of relocatable modules; the **special Microsoft COBOL Library**; and **run-time software** designed to make this system even more versatile.

This programming package also has important extensions which make the COBOL Language easier to use in a microcomputer environment – such as extended debugging facilities which feature special extensions to the ANSI-74 Standard for more convenient debugging, and advanced screen handling facilities which permit easy forms handling on CRT terminals with cursor control (like the Heath H-19A Professional Video Terminal, sold on page 74).

Microsoft COBOL can typically handle a 600-1,000 line program, in a H-8, H-89 or Z-89 Computer with 48K bytes of Random Access Memory (RAM).

Microsoft COBOL Programming System, for HDOS systems (available December):
HMS-817-31 (Needs Sublicense, p. 81), hard-sectored 5.25" disk, 4 lbs. **395.00**
HMS-837-31 (Needs Sublicense, p. 81), soft-sectored 5.25" disk, 4 lbs. **395.00**
HMS-847-31 (Needs Sublicense, p. 81), soft-sectored 8" disk, 4 lbs. **395.00**

Microsoft COBOL Programming System, for Heath/Zenith CP/M:
HMS-817-3 (Needs Sublicense, p. 81), hard-sectored 5.25" disk, 5 lbs. **395.00**
HMS-837-3 (Needs Sublicense, p. 81), soft-sectored 5.25" disk, 4 lbs. **395.00**
HMS-847-3 (Needs Sublicense, p. 81), soft-sectored 8" disk, 5 lbs. **395.00**

Write programs faster with Microsoft MACRO-80

\$65⁰⁰

- For sophisticated Assembly Language programmers
- Includes many extra-value features previously found only on large computer mainframes

Here's a complete Assembly Language programming package – including the MACRO-80 Assembler, LINK-80 Linkage Editor and CREF Cross-Reference Generator. CP/M versions also include the LIB-80 Library Manager.

Microsoft's **MACRO-80 Relocating Macro-Assembler** is designed for 8080 and Z-80 microcomputer systems – including the H-8 and H/Z-89. It assembles code, generating relocatable object modules for the LINK-80 Editor.

You get almost all "big computer" assembler features without sacrificing speed or memory space. Accepting both Intel 8080 and Zilog Z-80 mnemonics, MACRO-80 supports a complete, Intel-standard macro facility – including IRP, IRPC, REPEAT, local variables and EXITM. Nesting of macros is limited only by memory. Code is assembled in relocatable modules that are manipulated with the flexible LINK-80 Editor. Conditional assembly is enhanced by pseudo-operators which include testing of assembly pass, symbol definition and parameters to macros. Nest conditionals up to 255 levels.

MACRO-80 can generate a sorted cross-reference listing when used with CREF. **LINK-80** converts relocatable libraries or modules – produced by MACRO-80 or other languages and compilers – into runnable load modules for direct execution or disk storage. LINK-80 also perform library searches for system subroutines and generates a memory load map, showing main program and subroutine locations.

CREF supplies a convenient alphabetic list of all program variable names, along with the line numbers where they are referenced and defined.

LIB-80 (in CP/M versions) let you build libraries of relocatable modules.

MACRO-80 assembles at over 1000 lines per minute. It requires an H-8 or H/Z-89 with 48K RAM, one disk drive and HDOS or CP/M (as indicated below).

HMS-817-51, on hard-sectored 5.25" disk for HDOS systems, 2 lbs. **65.00**
HMS-837-51, on soft-sectored 5.25" disk for HDOS systems, 2 lbs. **65.00**
HMS-847-51, on soft-sectored 8" disk for HDOS systems, 2 lbs. **65.00**
HMS-817-52, on hard-sectored 5.25" disk for HDOS systems, 2 lbs. **65.00**
HMS-837-52, on soft-sectored 5.25" disk for HDOS systems, 2 lbs. **65.00**
HMS-847-52, on soft-sectored 8" disk for HDOS systems, 2 lbs. **65.00**

Gain more programming flexibility with C BASIC

\$115⁰⁰

- Widely used in CP/M applications systems
- Includes pseudo-code compiler, run-time interpreter
- Now available on hard- and soft-sectored floppy disks

C BASIC is widely used by many software houses and distributors of CP/M software as their language of choice. This non-interactive BASIC includes a pseudo-code compiler and run-time interpreter.

C BASIC has a variety of extended features, including the IF... THEN... ELSE and WHILE constructs and access to disk files. C BASIC also allows the use of 31-character variable names, and the free use of comments, spaces and tabs. These aid in creating programs that are self-documenting and maintainable.

This version of **C BASIC** also has integer variables, multiple line functions, chaining with common variables, additional pre-defined functions and more. A cross-reference lister is also provided with Version 2.0 of C BASIC.

The **C BASIC system consists of three programs**. The first program converts the user's source language program into a series of coded operations that are placed on the intermediate disk file. The second program, the run-time monitor, directly executes the operations included in the intermediate file. The third and final program, XREF.COM, will produce a cross-reference listing of all variables used in a C BASIC source program.

Expressions available include string constants, integers and real numbers, identifiers, variables and assignment statements. Machine language linkage statements and functions – include PEEK, POKE, CALL and SAVEMEM – increase C BASIC's versatility. Several control and I/O statements allow for more sophisticated programming. Output can be directed to disk or printer.

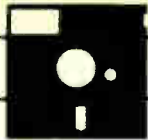
The facilities available to the user of the **C BASIC language for accessing disk files are extremely versatile** – providing for many different file organizations and accessing methods.

The C BASIC Programming Language requires a Heath H-8, Heath H-89 or Zenith Z-89 with 48K bytes of Random Access Memory (RAM), one floppy disk drive and the Heath CP/M Operating System.

HCM-817-1, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **115.00**
HCM-837-1, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. **115.00**
HCM-847-1, on soft-sectored 8" disk, Shpg. wt. 2 lbs. **115.00**



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UTILITY PROGRAMS



DataStar provides data entry, retrieval, update capabilities and updating

DataStar is a powerful and comprehensive data entry, update and retrieval system for Heath/Zenith microcomputers. Designed for use in order entry/invoicing, shipping/receiving, name/address lists and other applications, it has power and facilities usually found only in large key-to-disk systems.

Structure: FormGen is used to prepare forms for entering data. The use of forms exceeding the screen's length and width is allowed. Key field, form design, data field length, data entry order and field input parameters are graphically displayed for your information and approval. On request, a summary of the characteristics you have assigned to your forms will be printed.

Then, DataStar handles data entry and verification – according to FormGen's requirements. This protects data files from inadvertent changes.



Powerful program development capabilities are yours with WordMaster

WordMaster Video Text Editor, Ver. 1.07, provides everything needed for program development – and more. It's only 20% as large as WordStar and is much faster – without printer interface or formatting functions.

Structure: Video Mode allows you to see text as you make alterations – with the actual cursor position shown on the screen. You can move the cursor in any direction, insert and delete lines or parts of lines, and input or delete characters and words. Video mode speeds editing when using a CRT terminal (like the H/Z-19 or the H/Z-89's built-in terminal) or video display.

Command Mode permits search, global replacements, text moves and other functions. Command Mode has Video Mode's functions, but text changes are only displayed at your command. You can search for, substitute, loop, match and move blocks of text. You can also combine and/or separate text from/to different files on your diskettes.



Make large sorting tasks faster, easier with the SuperSort Utility Program

SuperSort (Ver. 1.5) makes sorting so simple, it's simply in a class by itself. It offers superior sorting, merging and selecting power with unmatched speed and convenience. It can sort and merge up to 32 input files into a single file, at the rate of 560 records per minute. And new records can be integrated into a master file in one simple and efficient operation.

Features: You won't waste time translating records – this utility accepts most any kind of record. The data can be justified, or include floating decimals, exponential notation, or upper and lower case letters. It can even be in several standard formats (binary, EBCDIC, BCD, ASCII and others). You can have fixed and variable length records and fields. You can even have a different number of fields in each record.

When you ask SuperSort to select or exclude records you can give it as many selection criteria as you like – such as between, not between, equal to, less than

Editing capabilities: DataStar simplifies form and file generation – and facilitates high-volume operations. Features include search capabilities, 255-character data field lengths, file access during data entry and the ability to use reference file data to fill in standard information on forms. Three ways to verify entered data help reduce errors. Reference files may be used in both verification and retrieval operations.

Mathematical capabilities: DataStar can perform arithmetic calculations on entered data, as well as retrieve reference data and automatically put the results into data fields. It can perform calculations across records as well as within records, carrying running totals through the entry process or automatically incrementing a field.

Software compatibility: DataStar interfaces with Mail/Merge (page 88) and SuperSort (below) – and can be used as the data entry portion of your inventory, accounting or employee applications programs – usually without modifications. DataStar is also compatible with any CP/M-supported language. DataStar files can be used with BASIC, FORTRAN and COBOL programs.

Min. hardware, software requirements: H-8 or H/Z-89 with 48K RAM, one disk drive and CP/M. If you desire printouts, you must have a printer.

HMP-817-4 (Needs Sublicense, p. 81), hard-sectored 5.25" disk, 2 lbs. **295.00**

HMP-837-4 (Needs Sublicense, p. 81), soft-sectored 5.25" disk, 4 lbs. **295.00**

HMP-847-4 (Needs Sublicense, p. 81), soft-sectored 8" disk, 2 lbs. **295.00**

Insert Mode is used to enter all original text, and for large insertions of text into a WordMaster file. In this mode, a backspace also erases the last character typed. Insert Mode is provided for use with hard copy terminals.

Features: You get automatic floppy disk I/O (for files too large to edit in RAM), a scratchpad memory to move text and store command strings, the ability to write/read text to/from files other than the file being edited – facilitating use of source libraries (as well as splitting/merging files), nestable loops, pattern matching abilities, macro facilities (loops, execute scratchpad, branch out of loop on search failure), and fast response to most commands.

Software compatibility: Command Mode has most of the commands of CP/M's ED Text Editor. And Insert Mode is also compatible with ED.

Minimum hardware and software requirements: An H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and Heath/Zenith CP/M.

HMP-817-5 (Needs Sublicense, p. 81), hard-sectored 5.25" disk, 4 lbs. **99.00**

HMP-837-5 (Needs Sublicense, p. 81), soft-sectored 5.25" disk, 4 lbs. **95.00**

HMP-847-5 (Needs Sublicense, p. 81), soft-sectored 8" disk, 4 lbs. **99.00**

or greater than, and others. You can apply up to 32 sorting keys.

Output capabilities: The Keys-Only Output Option permits building an index to a file – extracting fields in order to print a summary, or selecting and rearranging (positional) fields to form a new data base. The Record Number Output Option allows you to build multiple indices into a file, ordered on various keys, without duplicating the data – so that another program may retrieve the records by key value or in key order. The Pointer Output Option provides another method of building indices, whereby another program may retrieve the records from the original file.

Software compatibility: SuperSort sorts, merges, and selects records from data files compatible with BASIC. Assembly, Microsoft FORTRAN and Microsoft COBOL applications programs – and with text editors.

Minimum hardware and software requirements: An H-8 or H/Z-89 with 48K RAM, one disk drive and the Heath/Zenith CP/M Operating System.

HMP-817-1 (Needs Sublicense, p. 81) hard-sectored 5.25" disk, 4 lbs. **195.00**

HMP-837-1 (Needs Sublicense, p. 81) soft-sectored 5.25" disk, 4 lbs. **195.00**

HMP-847-1 (Needs Sublicense, p. 81) soft-sectored 8" disk, 4 lbs. **195.00**

Source listings for selected Heath products

NEW! Complete Listing for Heath H-8-18 and H-88-18 Cassette Operating Software. Includes these listings: H-8-52, H-8-53, H-8-54, and H-8-60. These listings would cost \$100.00 if purchased separately.

HKS-50, Shpg. wt. 8 lbs. **65.00**

Source Listing for Heath Disk Operating System (HDOS), Ver. 2.0. Has H-8-51 Listing for H-17 (below), all other utilities and device drivers. Purchasers eligible for updates when new releases are available (at nominal charge).

HOS-1-SL, Shpg. wt. 11 lbs. **195.00**

H-8-51, Source Listing for ROM of H-17 Disk System, 1 lb. **25.00**

H-19-1, Source Listing for ROM of H-19 Video Terminal, 1 lb. **25.00**

H-8-60, Listing for Cassette Extended Benton Harbor BASIC, 2 lbs. **25.00**

H-8-54, Source Listing for Cassette Assembler, 2 lbs. **25.00**

H-8-53, Source Listing for Cassette Text Editor, 2 lbs. **25.00**

H-8-52, Source Listing for Cassette Console Debugger, 1 lb. **25.00**

NOTE: All of these listings are copyrighted. Reproduction of these listings is expressly prohibited. Updates of source listings for HDOS are available for a nominal charge, as described at above left.



UTILITY/APPLICATIONS PROGRAMS

These products add new capabilities to the Heath/Zenith CP/M Operating System (page 83). They include full documentation, support and free updates for one year from the date of purchase. when the registration card enclosed with each program is signed and returned.

NEW Transform your computer into an electronic spreadsheet with SuperCalc

\$295⁰⁰

- Helps planners make better use of time and energy
- Easy-to-read, easy-to-use spreadsheet format
- Save — buy with an H/Z-89 (see pgs. 67, 68, 77)

Pencils, paper and a calculator have been replaced. SuperCalc and a Heath/Zenith computer are now the most effective tools available to decision-makers. You can manipulate numerical data quickly — setting up exactly what is necessary for in-depth analysis and modeling. You can examine and alter numbers and text within a matrix that can cover up to 63 columns and 254 rows of data.

Easy to use: Accountants, planners, engineers and business owners have found SuperCalc's easy-to-use spreadsheet format invaluable for day-to-day "what if" questions, as well as "now what?" for those times when the unexpected occurs. All it takes is a second to enter the new figure in the appropriate column — SuperCalc automatically calculates the rest of the spreadsheet.

NEW Condor Data Base Management System simplifies information processing

- Use for inventory control, accounting functions, personnel reporting and many other applications
- No language needed — functions as CP/M stand-alone

Now you can use your Heath/Zenith Computer to create useful data bases, using the Condor Series 20 Relational Data Base Management System — Level II. You can make data bases, with many information files, that work with one another to organize data. And once the data is organized, simple command procedures allow unrelated information to become dynamically related.

Commands: Level II offers 12 more commands than Level I, and a new built-in command line interpreter (making it independent of CP/M's Console Command Processor. Level II is upward compatible with Level I. All applications designed with Level I commands and data bases will work under Level II.

Enhanced capabilities: "If", "count", "min" and "max" statements make SuperCalc more powerful and convenient than many similar programs.

Self-explanatory messages: SuperCalc helps you figure out where you went wrong. Instead, down in the lower right corner of your screen, you'll see a message that lets you know where the error occurred — so you can immediately correct it and proceed with your analysis. With its complete menus, SuperCalc is self-explanatory.

Editing capabilities: SuperCalc's editing capabilities are more powerful than other electronic spreadsheet packages. Delete entire commands — not just one letter at a time. You can plug in a repeating formula simply by typing in a one letter command and telling SuperCalc which entries are to be affected. And to prevent unnecessary accidents, all data can be protected from new manipulations. This way, you can preserve specific data within a spreadsheet.

Output capabilities: Produce printed reports from spreadsheets by activating the output command sequence. And you can combine portions of other spreadsheets previously created, to build a new spreadsheet. All of this happens in seconds: SuperCalc is as fast as it is workable.

Hardware and software requirements: An H-8 or H/Z-89 with 48K RAM, one disk drive and Heath/Zenith CP/M. A printer is required if printouts are desired.

HSC-817-1 (Requires Sublicense Grant on page 81), on hard-sectored 5.25-inch floppy disk, Shpg. wt. 2 lbs. **295.00**

HSC-837-1 (Requires Sublicense Grant on page 81), on soft-sectored 5.25-inch floppy disk, Shpg. wt. 2 lbs. **295.00**

HSC-847-1 (Requires Sublicense Grant on page 81), on soft-sectored 8-inch floppy disk, Shpg. wt. 2 lbs. **295.00**

New, and powerful relational and set operations (JOIN, PROJECT, COMBINE) permit explicit manipulation of datasets (relations). The global update CHANGE command updates any data item in all records of a data base. DIC (tionary) lists the dictionary on any drive. SET permits special system function parameters to be set. LOGDISK permits disk resets to be done in batch. And the new report writer commands address themselves to two levels.

Built-in language: Condor's English-type language makes programming easier.

Hardware and software requirements: An H-8 or H/Z-89 with 64K RAM, one disk drive, Heath/Zenith CP/M and a printer.

HCD-8937-1, on soft-sectored, double-density, double-sided 5.25" disk (requires H-37 Floppy Disk System), Shpg. wt. 4 lbs. **899.00**

HCD-8947-1, on soft-sectored 8" disk, Shpg. wt. 4 lbs. **899.00**

Advanced, easy-to-use MAC Macro-Assembler

- Digital Research product has Intel-compatible macro definitions
- Full documentation, diskette with useful macro libraries
- Fully compatible with CP/M's ASM Assembly Language

Makes writing Assembly programs easier — and can generate a SID-compatible symbol table file for debugging use. 168-page manual is practically a macro textbook. Requires H-8, H-89 or Z-89 with one disk drive and CP/M.

HDR-817-1 (Requires Sublicense Grant, p. 81), on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **85.00**

HDR-837-1 (Requires Sublicense Grant, p. 81), on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. **85.00**

HDR-847-1 (Requires Sublicense Grant, p. 81), on 8" disk, 2 lbs. **85.00**

DESPOOL for simultaneous printer operation

- Perform two tasks at the same time on your computer
- Print one file while working on another file
- Quick set-up, easy to use on H-8, H-89, Z-89

Provides maximum efficiency by allowing your system to print one file through your printer — while you continue to use the assembler, editor, BASIC or an applications program. Requires H-8 or H/Z-89 with 1 disk drive and CP/M.

HDR-817-3 (Requires Sublicense Grant, p. 81), on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **50.00**

HDR-837-3 (Requires Sublicense Grant, p. 81), on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **50.00**

HDR-847-3 (Requires Sublicense Grant, p. 81), on 8" disk, 2 lbs. **50.00**

SID/ZSID upgrades the CP/M DDT Debugger

- Get both 8080-compatible SID and Z-80-compatible ZSID — save substantially over separate prices
- Allows use of source-level names for easier program modification

Can draw histograms of programs and subroutine execution frequencies. Functional in DDT-type mode without symbol file. Requires H-8 or H/Z-89 with 1 disk drive, CP/M and MAC (above), LINK-80 or D.R. Linkage Editor.

HDR-817-2 (Requires Sublicense Grant, p. 81), on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **125.00**

HDR-837-2 (Requires Sublicense Grant, p. 81), on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **125.00**

HDR-847-2 (Requires Sublicense Grant, p. 81), on 8" disk, 2 lbs. **125.00**

Get more from your computer with these books

Getting Acquainted With Micro-computers. 228-page guide.
EDP-275 **8.95**

101 Basic Computer Games. 250-page book describes family-oriented games. Has listing, sample run, description of each game.
EDP-237 **7.50**

8080 Software Gourmet Guide and Cookbook. 218 pages of ideas.
EDP-228 **12.95**

Basic Software Library, Volume III. This software book has advanced business programs which can help reduce clerical costs.
EDP-242 **39.95**

(Book ordering information on page 52.)



WordStar Word Processing Software is powerful, CP/M-compatible

WordStar is a CP/M-compatible, screen-oriented word processor with integrated printing capabilities. The entry, alteration and formatting of text are performed directly on your video screen, resulting in the display of a true print image; additional enhancements are performed during printout.

WordStar's edit function includes on-screen text formatting (with automatic margination, justification, and centering on command), powerful editing commands and flexible find/replace commands.

The unique "Help" System can be displayed during editing. User-selectable comprehensive prompting, at 4 levels, eliminates the need to refer to a manual.

Helpful hyphenation facilities speed editing. WordStar's Hyphen-Help feature stops when a hyphen is necessary, and lets you choose the hyphenation point – or decide not to hyphenate. Hyphens entered with this feature are "soft" – if not needed in later editing, "soft" hyphens will be automatically deleted.

Find and Replace is another WordStar feature you're sure to use. WordStar searches for specified character strings – replacing them with updated information quickly and automatically, throughout the document.

WordStar supports automatic page numbering, print enhancements (underlining, double striking, boldfacing, strikeouts, subscripts and superscripts) and several other operator options, on printers with appropriate capabilities.



Mail/Merge Mailing List Software adds new capabilities to WordStar

When you choose MailMerge, you add powerful file merging capabilities to WordStar. It can combine a names/addresses file with a letter text file, inserting data where variables are specified – even in mid-paragraph. Personalized form letters can be created with a specified salutation and/or closing. The same data file can be used for both form letters and mailing labels.

Features include merging of data from one file into another file (inserting data into text at user-designated places), multiple printing of the same file,

Save over 50% on Zenith Electronic Typing – our easy-to-learn word processing system

Now priced at a big \$200 savings, Zenith Electronic Typing makes word processing practical for both single-secretary offices and departmentalized secretarial-staffs. Anyone who can turn on a TV and type can increase their output by up to 50 percent, usually even on the first day. All you need are standard secretarial skills. A special self-instruction course shows you how – in as little as two hours.

Using Zenith Electronic Typing – which supports up to three 5.25" or 8" floppy disk drives – near-perfect documents can be produced in a fraction of the time required by conventional typing – with no white-outs, strike-overs or erasures.

Features include Upper/Lower Case Video Display; Creation, Addition or Revision on up to three 5.25" or 8" disk drives; Scrolling (moving through a document) and two Search Modes to quickly find area which need editing; Append Mode to create a new document by joining separate paragraphs; Automatic Replacement of any word, name or phrase throughout a document to speed production of customized form letters; Automatic Realignment to save hours of retyping; Automatic Centering and Justification – on command – to eliminate counting or guessing; and Block Move of words, sentences or paragraphs within a document.

Once the document is letter-perfect, the touch of another key automatically prints a clean copy of the document – on a separate printer (not included) – at an error-free rate of up to 450 words per minute.

Control the cost of paperwork, by using Zenith Electronic Typing. This complete word processing software system includes a detailed set-up and operating manual, easy-to-use training disk and master disk.

Zenith Electronic Typing requires an H-8/H-19 or H/Z-89 with 48K RAM, one floppy disk drive and a printer. Any Heath-offered printer will work; we recommend the WH-54 Letter-Quality Printer (see page 79).

H-8-40, on hard-sectored 5.25" disk, 6 lbs. . . Was \$395.00, NOW ONLY 195.00
HPG-847-1, on soft-sectored 8" disk, Shpg. wt. 4 lbs. 195.00

With the decimal tab feature of WordStar, columns of numerical data can be typed as easily as operating an adding machine. This feature automatically lines up the numbers.

Use WordStar as a CP/M text editor: Edit program source files, input files for other text formatters, enter data and accomplish other tasks – because the disk document files are standard CP/M text files, with minor additions. Other programs can even be executed during use – with automatic return to WordStar.

WordStar also features print spooling. For greater efficiency, one disk file can be printed – while you work on a second file (requires 64K RAM).

WordStar includes both a "plain vanilla" version for customer installation with any computer and printer – as well as a pre-installed version for immediate, hassle-free use on the Heath H-8, Heath H-89 or Zenith Z-89 Computers – and all Heath printers. For daisy wheel and other incremental printers, variable spacing (down to 1/48" line spacing and 1/120" character pitch) is supported by WordStar.

The WordStar Word Processing System includes a detailed set-up and operating manual, along with a master diskette. It requires an H-8/H-19, H-89 or Z-89 Computer System with 48K bytes of RAM, two or more floppy disk drives, Heath CP/M and a printer. Any Heath-offered printer works with the WordStar system; we recommend the WH-54 (Diablo 630 RO) Letter-Quality Printer (see page 79). Manufacturer's suggested list price, \$495.00.

HMP-817-2, on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. 395.00
HMP-837-2, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 395.00
HMP-847-2, on soft-sectored 5.25" disk, Shpg. wt. 2 lbs. 395.00

automatic chained printing of several files on a common disk, printing of a file "nesting" in another file (8 levels of nesting can be accommodated), and the ability to print raw data in an easy-to-read form.

As data is merged with text, paragraphs are reformed – for form letters that look as though each received special attention.

Requires H-8/H-19 or H/Z-89 with 48K RAM, 2 disk drives, Heath CP/M, WordStar and printer. Any Heath-offered printer works; we recommend the WH-54 (p. 79).

HMP-817-3, on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. 135.00
HMP-837-3, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. 135.00
HMP-847-3, on soft-sectored 8" disk, Shpg. wt. 4 lbs. 135.00



Magic Wand for Heath CP/M combines ease of use, versatility and power

Magic Wand Word Processing Software puts excellent versatility, ease of use, power and CP/M compatibility at your fingertips. More powerful than Zenith Electronic Typing (and easier to learn than WordStar), users will find Magic Wand easier to learn and use with its special set-up and operating manual.

Magic Wand consists of two modes: EDIT and PRINT.

EDIT features forward and backward scrolling, insertion by character (for editing) or full insertion (for creating files), deletion of characters/lines/blocks of copy, search/repeat search/search and replace/multiple search and replace commands, the ability to move blocks of copy from one spot to another within the same file (leaving or deleting the block in its original location), the ability to examine the disk directory without leaving EDIT, and the ability to display or include all or part of any pure ASCII file on disk into the text you are editing (without exiting EDIT or affecting any of the text).

You can even print one file while editing another – with Magic Wand's printing in background (print spooling) feature.

Features found in PRINT mode include the ability to enter commands directly from the keyboard – or to imbed commands in a text file, regular or paragraph indentation, justification and centering (on command), underscoring, kerning/strikeover, boldfacing, superscripting and subscripting (to make writing math and scientific papers easier). Automatic hyphenation (on command) at the ends of lines – when necessary – in the right places, the ability to print multiple copies of a single file, proportional printing, 1/120" horizontal spacing and 1/48" vertical spacing (on capable printers) are also supported.

Magic Wand requires H-8/H-19 or H/Z-89 with 48K RAM, Heath CP/M and a printer. Any Heath-offered printer will work; we recommend the WH-54 Letter-Quality Printer on page 79.

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. 3 lbs. 295.00
HRS-847-9, on soft-sectored 8" disk, Shpg. wt. 3 lbs. 295.00



SOFTSTUFF
Affordable Software Tools

SOFTSTUFF offers a full line of quality software tools, priced to fit your budget. All SOFTSTUFF programs have been tested on the Heath and Zenith hardware indicated. Documentation for each SOFTSTUFF product has also been improved. SOFTSTUFF products are supplied to you on 5.25-inch floppy diskettes (unless otherwise indicated), and are shipped to you postpaid. Specify your operating system (HDOS or Heath CP/M) when ordering.

NEW

New SOFTSTUFF products add versatility and fun to H-8 and H/Z-89 Computers

Mailpro 127.1 Mailing List Package. Random access files, user-selected fields, sorting and retrieval on any field (such as name or Zip Code), user-specified formats, selective printing (print all names and addresses or only selected ones), and form letters. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, HDOS and Microsoft BASIC Interpreter (p. 84).

SF-9009, for HDOS systems. Postpaid 40.00

Commsoft's Roots-89 Genealogy Software helps you track your roots. It's designed to store, retrieve and display thousands of facts about your family. Roots-89 will list family members, display and print family group sheets and pedigree charts, compute relationships and show important anniversaries for each day of the year. Includes 100-page illustrated course in genealogy and operation of the package. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and HDOS.

SF-9008, for HDOS systems. Postpaid 125.00

With the SOFTSTUFF HDOS to CP/M File Converter, you can transfer HDOS files to CP/M disks — and vice versa. Requires H-8/H-19 or H/Z-89 with 32K RAM and one disk drive. Also requires both HDOS and CP/M.

SF-8512, for HDOS and CP/M Systems. Postpaid 30.00

Sharpen your chess-playing skills by challenging Mychess. Winner at 1980 West Coast Computer Faire. Consistently beats Sargon. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and HDOS or CP/M (as indicated below).

SF-9010, for HDOS systems. Postpaid 40.00

SF-9110, for CP/M systems. Postpaid 40.00

SOFTSTUFF's Air Traffic Controller Game never goes on strike! With this realistic game, you control all air traffic around your own airport — with planes taking off, in the air and landing. Requires H-8/H-19 or H/Z-89 with 32K RAM, one disk drive and HDOS or CP/M (as indicated below).

SF-9014, for HDOS systems. Postpaid 30.00

SF-9114, for CP/M systems. Postpaid 30.00

Keep your books up-to-date with SOFTSTUFF's General Ledger II Accounting Software Package. This powerful software package includes versatile programs which facilitate the entry, maintenance, reporting and analysis of accounting data. Includes following features:

Custom Chart of Accounts, for determining account names and numbers. Use any numbering system, with or without decimal notation; Comprehensive Printouts upon request, in 96-column format; Double Entry and Automatic Entry Checking, which automatically checks the equality of debits and credits with each entry; Fast and Simple Data Entry, with one quick keystroke;

Account Verification, which prevents entries to non-existent accounts — and rejects account numbers already in use; New Account Facility, to open new accounts at any time with no disruption to the transaction being entered; Balance Reporting, to call up the balance of any account

during data entry. All balances are instantaneously updated with the entry of new transactions; Audit Trail, to provide source number and free-form description.

This is one of the easiest-to-use, most flexible systems of its type you'll find anywhere. Includes listings and sample printouts. Requires H-8/H-19 or H/Z-89 with 48K RAM, one floppy disk drive, HDOS or CP/M (see below) and Microsoft BASIC Interpreter (page 84).

SF-9004, for HDOS systems. Postpaid 125.00

SF-9104, for CP/M systems. Postpaid 125.00

General Ledger Software Manual. Purchase price of manual refunded when complete General Ledger Package is purchased.

595-2500, Postpaid 15.00

Keep track with our Small Business Inventory Package. Designed to facilitate a complete analysis of a small business' inventory. Accepts alpha-numeric part numbers up to 12 characters long. Descriptions of individual parts can be up to 18 characters long.

Provide up to 12 items of information on each part — including reorder level, usage history by month and year-to-date, and much more. Printouts include all information, part number/description/price, reorder list. Requires H-8/H-19 or H/Z-89 with 48K RAM, HDOS, or CP/M (see below) and Microsoft BASIC Interpreter (page 84).

SF-9005, for HDOS systems. Postpaid 90.00

SF-9105, for CP/M systems. Postpaid 90.00

Use our Full Screen Editor to program more efficiently. Uses the video display screen of the H-19 Video Terminal or the H/Z-89 Computer as a window into a file. Changes can be typed anywhere on the screen. Function keys perform character and line insertion/deletion functions.

Also features string search, the ability to move/copy single or multiple lines and scrolling of text in the window. Requires H-8 with H-19 Video Terminal — or H/Z-89 Computer — with 32K RAM, one disk drive and either the HDOS or Heath CP/M Operating Systems (as indicated below).

SF-9000, for HDOS systems. Postpaid 50.00

SF-9100, for CP/M systems. Postpaid 50.00

Use the SOFTSTUFF Text Formatter with your Text Editor. This Text Formatter performs fill and justification (straight right margin) functions on text prepared by your text editor. Features include page numbering, headers and footers, indents, hanging indents, centering and underlining. Inclusion feature allows the automatic insertion of up to 26 user-defined strings, as well as the merging of documents. Requires H-8/H-19 or H/Z-89 system with 32K RAM, one disk drive and HDOS or CP/M (as indicated below).

SF-9001, for HDOS systems. Postpaid 55.00

SF-9101, for CP/M systems. Postpaid 55.00

The Computerized Phone System (CPS) gives you and your Heath computer access to more information. This data communications interfacing utility program permits the transfer of data files between your computer and CompuServe's MicroNET Information Service.

MicroNET's large time-sharing computer provides features not available in a stand-alone microcomputer system. You can write and edit programs and data files, and store them on the system. You are able to run your own programs — and you can also access data files and programs in the large MicroNET library.

CPS features user-defined keys for auto log-in, mail check and more. Full error checking and an on-screen elapsed time clock are provided.

Easy to use on time-sharing systems, CPS gives your Heath computer system access to other computer systems. Requires H-8/H-19 or H/Z-89 system with 32K RAM and HDOS or CP/M (as listed below).

SF-9003, for HDOS systems. Postpaid 40.00

SF-9103, for CP/M systems. Postpaid 40.00

RTTY Communications Processor adds fun to your Ham radio hobby. Split screen means you can copy incoming messages — while editing outgoing messages. Complete system status (time, CW ID, ASCII or Baudot operation) is graphically displayed on screen. Disk-based autostart.

SF-9006, for HDOS systems. Postpaid 100.00



Now from Heathkit/Zenith — an effective Pascal Programming Self-Instruction Course

\$99⁹⁵

- Pascal...the ideal computer language for beginning programmers, as well as experienced computer users
- Our audio-tutorial self-instruction format simplifies Pascal programming



Now you can learn Pascal, a modular, sophisticated, powerful programming language. If you've been around programming languages or even if you're new to computers, you've probably heard about Pascal. It's the structured and adaptable programming language that has quickly swept into popularity.

Pascal incorporates these structured programming features: Top-Down Detail, where overall structure can be established before adding details; and Modular Organization, which makes fixing programming errors easier than with other programming languages. Segments of a Pascal program can be isolated and tested independently from the rest of the program.

Proven audio-tutorial methods make learning easier: Whether you're new to computer programming, or already accomplished in one or more languages, our approach makes Pascal easier to learn. Five audio cassettes guide you through the 500-page self-instruction text, letting you see AND hear each concept of the Heathkit/Zenith Pascal Language Programming Course as it is presented, so that learning is reinforced and made more effective. Our Pascal Course is the result of the combined talents of highly qualified programming instructors, with assistance from specialists in instructional design.

An introduction shows how to identify and write simple Pascal programs. In **Module 2**, students learn to identify and write self-contained procedures. **Module 3, Making Decisions** teaches students how and when to incorporate IF...THEN...ELSE and CASE statements in Pascal programs, as well as how to use Boolean variables. **Module 4** covers REPEAT...UNTIL, WHILE...DO and FOR loops. **Module 5** discusses Pascal data types and teaches how to declare your own data types. **Module 6, Arrays and Character Strings**, shows how to use

Learn COBOL, the business computer language

\$149⁹⁵

- Field-proven, audio-tutorial techniques make learning the COBOL Language easier than before
- Learn to write COBOL Language programs



Learn the language of business computers — COBOL — with this popular self-instruction course. The Heathkit/Zenith COBOL Course is the low-priced way to learn this important language. It covers the basics of encoding, input characteristics, program hierarchy, identification, environment, data and procedure divisions. Both the ANS 74 and ANS 68 versions of COBOL are covered in the course.

The Heathkit/Zenith COBOL Programming Course uses the effective audio-tutorial learning method. You get a clearly written self instruction textbook full of diagrams, tables, illustrative programs and unit tests.

A set of nine audio cassettes complements the student text, allowing you both to see and hear each concept as it is presented.

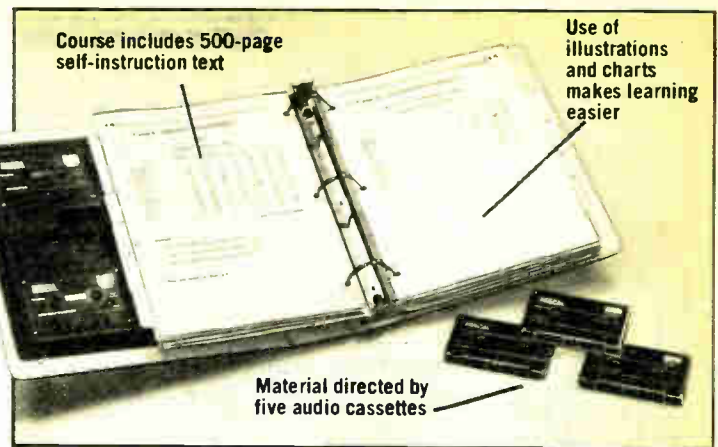
The student textbook covers these aspects of COBOL: a sample COBOL program; program variations; structure and syntax; simple arithmetic statements, comments and diagnostics; advanced arithmetic and control statements; additional data concepts; magnetic tape and disk concepts; and more.

A set of six practice COBOL programs is located at the end of the workbook. You can work on them at specified points in the course — or you may prefer to wait until the end of the text. A master COBOL coding sheet is also included. Use it as an aid in writing your COBOL programs.

If you pass the optional final examination with a score of 70 percent or better, you'll earn 3.0 CEUs and a Certificate of Achievement.

Learn the programming language that thousands of businesses use world-wide. Order the Heathkit/Zenith COBOL Programming Course today. To get the most out of COBOL Programming, we recommend that you use a H-8 (see page 70), H-89 (see page 66) or Z-89 (see page 77) computer system with floppy disk capability, the Heath CP/M Operating System (offered on page 83) and the Microsoft CP/M COBOL Programming System (sold on page 85).

EC-1105, Shpg. wt. 7 lbs. **149.95**



Course includes 500-page self-instruction text

Use of illustrations and charts makes learning easier

Material directed by five audio cassettes

arrays in solving problems. **More about Procedures, Module 7**, covers the writing of complete Pascal procedures to perform the desired tasks. **Students learn about Records and Sets in Module 8. Module 9, Pointers**, covers the difference between pointers, linked lists, stacks, queues, binary trees and other statements. **The last module** covers sequential files and standard Pascal files, so that you can store files or data on disks.

To earn **4.0 Continuing Education Units (CEUs)** and a Certificate of Achievement, pass the optional final examination with a 70% or better score after completing this Heathkit/Zenith Course.

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

MONEY-BACK GUARANTEE: If you're not satisfied with any Heathkit/Zenith Educational Systems Course, return course materials and proof of purchase for a refund of the purchase price.

Learn BASIC the fast, easy Heathkit/Zenith way

\$44⁹⁵

- BASIC is one of the easiest computer languages to use
- BASIC is easy to learn with this self-instructional course
- Use with any BASIC-programmable computer
- Programming experiments reinforce each concept



Here's the fast and easy way to learn BASIC Language. This course covers many BASIC Language versions, formats, commands, statements and procedures, plus special problem-solving tips you can use while writing your own programs. This course is divided into 14 easy-to-follow programmed-instruction segments which will teach you the standardized words of BASIC, and the operation that each standardized word causes the computer to perform. You'll get a grasp on the tools of BASIC Language programming — including numbers, statements, functions, loops, lists, arrays and strings.

You'll participate in the decision-making factors which are part of writing a meaningful BASIC program — as well as the creative aspect of program writing. Learn to define and plan a program, format and write it, and how to adapt programs to suit your specific needs. Interactive experiments give you hands-on experience in writing and running BASIC Language programs.

The course material includes a programmed-instruction textbook explaining BASIC, a special workbook of programming instructions, and experiments you can perform on your own computer. Also included are handy reference cards with Benton Harbor BASIC Statements, ASCII number codes, BASIC direct command statements and a reference chart for math and Boolean algebra operations.

To earn **3.0 Continuing Education Units (CEUs)** and a Certificate of Achievement, score 70 percent or better on the optional final examination after completing this Heathkit/Zenith Educational Systems Course.

See the classroom version of this Course on page 42.

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

College-Level Examination. See page 31 for more information.

ECC-1100, Shpg. wt. 1 lb. **25.00**



Microsoft BASIC Programming introduces you to this enhanced computer language

\$99⁹⁵



- Learn to write and modify powerful computer programs, using this popular version of BASIC Language
- Audio-tutorial course uses programming experiments to give you actual hands-on experience with MBASIC

Microsoft BASIC is one of the most versatile languages available for microcomputers – with scores of practical programs available. If you use MBASIC on your H-8, H/Z-89, All-In-One, TRS-80 or Apple computer, now you can get the most from this language with our new 800-page course.

Audio-tutorial learning means you'll read, hear AND perform specific directed functions to achieve maximum learning.

Unit 1 is an Introduction to Computers and Programming – covering computers, programs, data, the computer system and programming languages. **Immediate Mode, the second unit**, discusses arithmetic in BASIC, numeric variable, intrinsic functions and strings. Sequences, branching and loops are the topics covered in **Unit 3, Program Structures. Unit 4 has More about Decisions and Loops** – including relational operators, counter driven loops and nested loops.

One-dimensional arrays, N-dimensional arrays and strings records are taught in **Unit 5, Data Structures**. User-defined functions and subroutines are the topics covered in **Unit 6, Subprograms. Unit 7, Complex Structures**, discusses logical operators, multiple branching and structured programming.

The last five units are dedicated to disk operations and extensions available on disk versions of the language. In **Major Language Extensions, Unit 8**, you'll learn about program editing; data type extensions; extended functions, operators, and statements. **Sequential Disk Operations, Unit 9**, covers program storage, program retrieval and sequential data files.

FORTRAN Programming Course teaches you how to use this powerful language

\$99⁹⁵



- Interested in FORTRAN programming? Heathkit/Zenith offers an easy, effective way to learn the language
- Audio-tutorial presentation and interactive programming experiments reinforce learning three ways

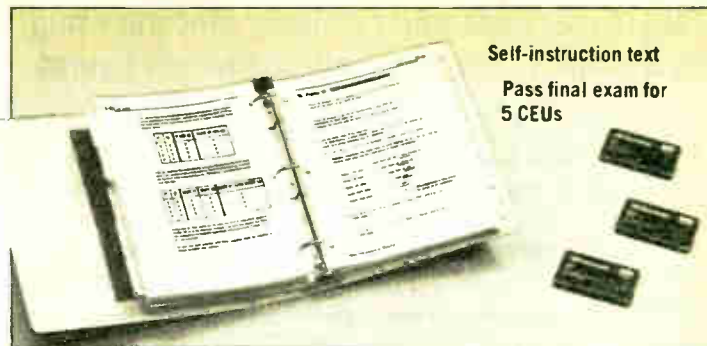
Are you ready for a language that takes on scientific tasks with ease? Our new course's effective audio-tutorial method teaches FORTRAN programming fundamentals. The 500-page text and 6 cassettes concentrate on programming – not on computers – for more complete learning.

Enclosed in an attractive three-ring binder, the 11-unit text includes a special Introduction to Computers:

Getting Started, Unit 1, shows you how to analyze a FORTRAN program, introduces you to statement types elements and the character set. **Unit 2 covers Arithmetic Operations**. You learn about integer operations, real number and alphanumeric input/output in **Unit 3, Elementary I/O**.

Unit 4, Library Functions, covers elementary control statements, flowcharting and conditional transfer of control. **Other Control Statements** are taught in **Unit 5. Unit 6** introduces you to **Arrays, Programming Practices, Unit 7**, covers different types of programming, coding considerations and debugging.

Other Variables, Unit 8, includes explicit type specification; logical and numeric data; and the implied DO statement. In **Unit 9**, you'll learn about **Advanced I/O. Unit 10** covers **Subprograms**, including statement functions and common storage. **Special I/O, Unit 11**, discusses block data subprogramming; object time format specification; tape and disk command; and unformatted input/output.



Self-instruction text

Pass final exam for
5 CEUs

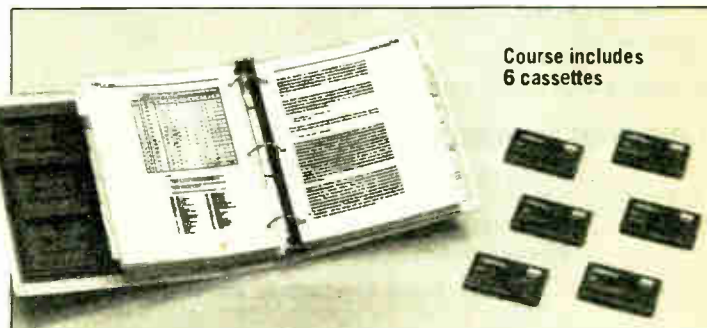
Unit 10, Random Access Disk Operation, covers random access buffers and fields – as well as storage and retrieval of numeric data. **Error Trapping and Memory Conservation** are the topics of **Unit 11. Optimization and Machine Interfacing** are covered in the final unit.

Self-test reviews let you check progress. Three cassettes reinforce the text. Experiments give you actual experience in writing programs.

The course emphasizes programming in Microsoft BASIC. It contains the features of our Microsoft BASIC software (p. 84), except for the TRON and TROFF debugging feature. To get full benefit, you must have a computer.

Upon completion, you will be able to write Microsoft BASIC programs that instruct a computer to perform specific tasks – such as sorting, plotting and organizing programs and data, and more.

To earn 5.0 CEUs, pass the optional final exam with a score of 70% or better.
EC-1110, Shpg. wt. 7 lbs. 99.95



Course includes
6 cassettes

Interactive hands-on experiments give you actual experience in writing FORTRAN programs – the necessary coding forms are included with the course. The text also offers extensive practice in writing FORTRAN programs and using the character set. Self-test reviews let you check your progress. And a comprehensive final examination is included.

When you complete this course, you will be able to write FORTRAN programs that instruct a computer to perform specific tasks – such as keeping track of student records, solving geometry problems and many more.

Earn 5.0 CEUs – pass the optional final exam with a 70% or better score. It's not necessary to have a math background – but a H-8 or All-In-One Computer with two floppy disk drives, HDOS or CP/M (p. 83) and Microsoft FORTRAN Language (p. 84) is highly recommended to get the most out of the Heathkit/Zenith FORTRAN Programming Course.

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



Computer Dictionary is a complete reference source of computer terms

Need a dictionary to understand computer jargon? The Heathkit/Zenith EB-1020 Computer Dictionary: A Sourcebook of Computer Terms fills your need for knowledge. It's a handy reference for hobbyists, technicians, engineers or professionals who deal with computer-related terms.

It contains thousands of computer-related words

and phrases, along with complete definitions. Browse through this dictionary and you can learn significant detail about the products, procedures problems and proliferating applications of the microcomputer revolution. Definitions are made clear and explicit throughout the text.

EB-1020, Shpg. wt. 2 lbs. 14.95



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

COMPUTER EDUCATION 91

Learn to maximize your computer efficiency with this Assembly Language Self-Instruction Course

\$49⁹⁵

- Self-instruction format for effective learning
- Programming exercises reinforce concepts
- Do more in less memory space than BASIC
- Write programs which execute 10 to 1000 times faster than interpreted BASIC

Assembly Language translates to greater computer efficiency! Anything you can do in any other language on a computer system you can do with Assembly Language.

Assembly is a true programming language, not just a convenient notation for machine code. The use of labels, computed operands, comments and assembler directives allows the Assembly Language programmer to create a source code that is adaptable to the system and easily read. Assembly language uses a mnemonic for every machine operation. There's no time wasted in interpreting – so your programs require less memory space and run much faster.

Assembly Language utilizes your computer system's memory more efficiently. Shorter, more explicit codes allow you to store more data in less space. Symbolic notation and easy to implement documentation methods make program listings easy to understand.

This unique Self-Instruction Course teaches you to program your computer in Assembly Language. You learn the details at your own pace, using a specially designed 400-page text. An exercise workbook provides hands-on experience with programming exercises – you perform each exercise on your own computer system. The programmed-instruction text and workbook are so thorough that you learn to program your computer by studying them. You'll study flowcharting, device polling, code conversions, masking, subroutines, 8080 instruction set, I/O routines, multi-precision arithmetic and much more. To perform the optional experiments in the Heathkit/Zenith EC-1108 Assembly Language Self-Instruction Course, you must have access to a computer (such as the H-8, H-88 or H/Z-89 Computers).

The Assembly Language Self-Instruction Course, from Heathkit/Zenith Educational

"Computer Concepts" aids business decisions

\$49⁹⁵

- Learn how to determine data processing requirements for your small business
- Uses field-proven self-instruction techniques
- Audio cassettes let you see and hear each concept

Thinking of buying a computer for your small business? This Course will help you select the system that fits your needs.

When you consider making a computer investment that can run into thousands of dollars, you need to know as much about computers as possible – before making the investment. The Heathkit/Zenith Computer Concepts Course is designed to give you the knowledge you need to evaluate the usefulness of a computer in your business.

Proven self-instruction methods – using an effective text and three audio cassettes – teach you how to evaluate the benefits that a computer offers your business. Three appendices to the text reinforce course material.

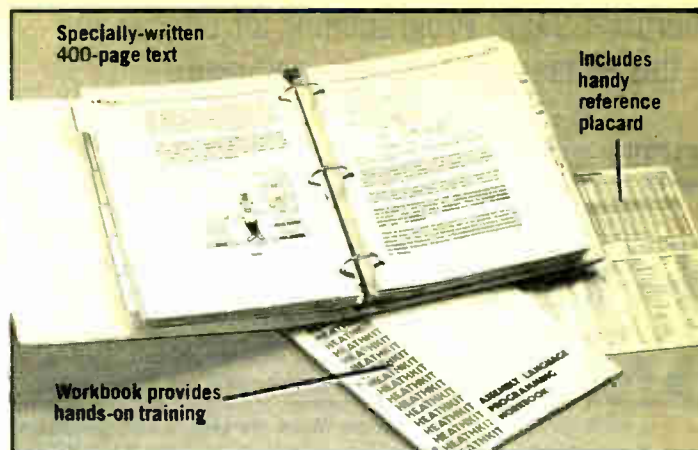
The course is divided into four concise, easy-to-understand units – which present computer concepts in business terms. **Unit 1 – The Computer and How It Works** – covers different types of memory, input/output devices, capabilities of different types of storage media and applications software. It explains what a computer can do in a small business environment.

The Data Processing Department and Personnel, Unit 2, teaches you how to organize a data processing (DP) department. It explains the roles of the DP manager, data processing engineer, systems analyst, operator and other personnel. **The third unit of this Course, Alternatives in Computer Services**, compares the advantages of owning your own computer system – versus a time-sharing arrangement or using a computer service bureau.

How to Select a Computer, the fourth and final unit, shows you how to define and fulfill your data processing requirements.

A passing score of 70 percent or better on the optional final examination will earn you 1 Continuing Education Unit (CEU) and a Certificate of Achievement from Heathkit/Zenith Educational Systems.

EC-1103, Shpg. wt. 5 lbs. **49.95**



Systems, is specifically designed for 8080/8085-based microcomputer systems which use standard Intel 8080 mnemonics. The Assembly Language taught in this course can be used with the Heath H-8, Heath H-88, Heath H-89 and Zenith Z-89 Computers. (The H-8, H-89 and Z-89 Computers use the 8080 subset of the Z-80 microprocessor).

In addition to the programmed instruction text and workbook, the Assembly Language Course includes a special Reference Placard which lists all 244 assembly instructions as well as an ASCII code chart. When you take the optional final examination for the course and achieve a score of 70 percent or better, you earn a Certificate of Achievement and 6.0 Continuing Education Credits (CEUs).

Now is the time to learn the computer language that puts you in command of your computer's full potential. Start your Heathkit/Zenith Assembly Language Self-Instruction Course...today!

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

Personal Computing explains computers

\$39⁹⁵

- Learn how a computer can help you
- Explains computers in everyday terms, so little technical knowledge is required
- Self-instruction text, cassettes for effective learning

Here's your chance to learn the basics of microcomputers and BASIC Language programming – even if you have no prior technical background. The award-winning Heathkit/Zenith Personal Computing Course shows you how to determine if your particular problem can be solved by a computer. You'll cut through technical terminology, and understand what a computer can do – in easy, simple terms.

No extensive math, electronics or computer background needed: The effective audio-tutorial teaching format – featuring a self-instruction textbook and two audio cassettes, lets you see and hear each concept in our Personal Computing Course.

Five easy-to-understand units explain different parts of the computer system:

In the first unit, Computers and Data: you'll find out how to apply the capabilities of a computer to your specific problems. You will see how computers "understand" electronic data – and how to convert written words into the electronic data computers understand.

Unit 2, Hardware, shows you how to compare computers – by understanding how each computer performs. **Systems and Interfacing, the third unit**, teaches how to evaluate small computer systems by understanding how different components perform. You'll find out how the computer communicates with other components – and how to distinguish between analog and digital data. **Software, Unit 4**, shows you how to choose software programs that help solve your problems.

In the last unit of this course, BASIC Language Programming, you'll actually learn to write short computer programs – using BASIC.

By passing the optional final examination with a score of 70 percent or better, you'll earn 1 Continuing Education Unit (CEU) and a Certificate of Achievement from Heathkit/Zenith Educational Systems.

EC-1000, Shpg. wt. 5 lbs. **39.95**





The AR-1650 gives you control of your music

\$769⁹⁵

Silver Panel

- 1.8 μ V sensitivity for clear FM reception
- Adjustable bandwidth for optimum FM selectivity
- 60 dB FM signal/noise ratio for wide dynamic range

125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.05% TOTAL HARMONIC DISTORTION FROM 20 TO 20,000 HZ

Clean FM reception: The AR-1650's 1.8 μ V sensitivity pulls in your favorite station loud and clear. Its five-gang FM tuning capacitor rejects unwanted signals, giving you cleaner FM reception and minimal interference. A special narrow band switch blocks unwanted neighboring station signals for cleaner station reception in cities with many radio stations.

Precise, on-the-nose tuning: There's no guessing or fidgeting when you tune in your favorite FM or AM station on the AR-1650. A blue vacuum fluorescent four-digit display lets you tune in to the exact frequency of your station. And you can change from one station to the next quickly and effortlessly with the flywheel tuning knob. A center-tune meter and signal strength meter allow you to home in on your FM station's signal for the best possible reception with the greatest stereo separation and lowest distortion and noise.

Complete control of your music: The AR-1650 lets you hear your music just the way you like. You can adjust the frequency response across the 20-20,000 Hz frequency range, with the bass, midrange, and treble controls. Or if you want to listen to a tape or record with the lowest frequency distortion, just flip the tone flat switch to bypass the tone control circuits.

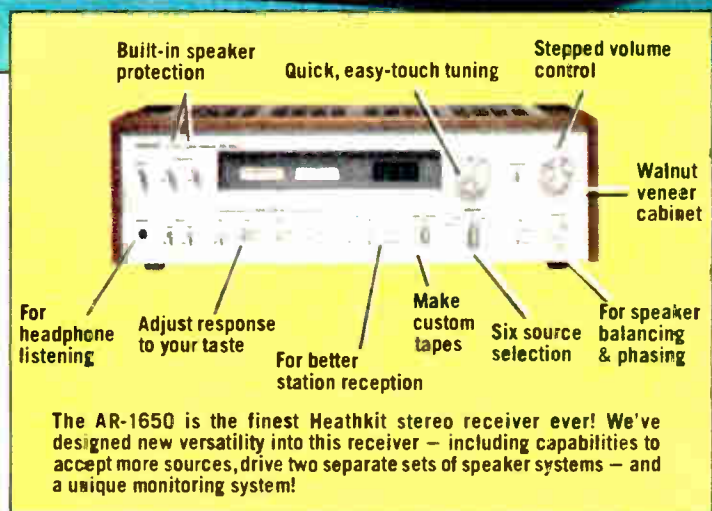
A receiver you can build on: The AR-1650's 125-watt power amplifier, with a -90 dB hum and noise rating, gives you more music and less noise from audio sources. You can plug in two turntables, two auxiliary sources, and two tape decks. The tape monitor control enables you to record from deck one to deck two, while monitoring deck two.

Built-in speaker protection: Fused B+ and B- power supply buses for each channel eliminate the need for dissipating limiters that can cause tweeter-damaging pops and clicks. Turn-on delay and thermal-circuit breakers further protect your speakers from damage and expensive repairs.

Choice of styles: You can choose between natural aluminum or black anodized aluminum front panel. Both feature walnut veneer cabinets.

Easy to assemble: Like all Heathkit projects, the AR-1650 comes with our famous easy-to-read, step-by-step instruction manual. To speed assembly and ensure top performance, the amplifier, tuner and IF multiplex circuit boards are factory assembled and tested. Takes about ten evenings to assemble.

Heathkit Tech Consultants assure your satisfaction: Should you ever run into a problem, however small, during the construction of your AR-1650 Kit, you receive complete service support from our experienced technicians, who are just a phone call away if you need them.



Absolute power pleases absolutely: POWER is more than just a number of watts. Every receiver has a particular quality in the power it delivers. That's why receivers of the same power rating, played with the same source and speakers, can sound so different. The new AR-1650 not only has all the raw power you'll ever need, it also delivers a sound quality unlike any you've ever heard before; one that's vibrant, clean and natural.

The designers of the AR-1650 were striving for more than just power numbers that would impress an audiophile. They were striving for a beautiful sound from precisely-defined musical peaks, tonally solid bass and fully-detailed midrange reproduction. Controlled power infused with exceptional clarity. The resulting design is one of the most remarkable stereo receivers to be seen and heard in a long time... the Heathkit AR-1650. We recommend two components that interface perfectly with the AR-1650: The Heathkit AS-1373 Three-Way Speaker Systems and the precision ACP-1608 Dual 608 Turntable, both on page 98.

Kit AR-1650S, Silver Front Panel, Shpg. wt. 66 lbs. **769.95**

Kit AR-1650B, Black Front Panel, Shpg. wt. 66 lbs. **789.95**

Kit AJA-1600-2, Optional Dolby NR Module, Shpg. wt. 1 lb. **49.95**

AR-1650 SPECIFICATIONS: FM Section: Mono/Stereo; Usable Sensitivity: 1.8 (10.3) 3.5 (16.1) μ V (dBf); 50 dB Sensitivity: 2.5 (13.2)/36 (36.1) μ V (dBf); S/N: 80/73; THD @ 65 dBf and 1 kHz: \pm 1%; Freq. Resp: 20 Hz to 15 kHz, \pm 0.5 dB; Selectivity: Wide, 40 dB; Narrow, 80 dB; AM Section: Ext. Ant.; Radiated Sensitivity: 30 μ V/250 μ V; M. S. N.: 50/40 dB; Amp. Section: Input Sensitivity: 0.67 mV phono, 67 mV Aux; Maximum Input Signal: 150 mV phono, 10V Aux; Freq. Resp: 20 Hz to 20 kHz + 0 to -02 dB; IM Distortion: 0.05%; TTM: 0.05%; Power Requirement: 120/240 VAC, 50/60 Hz; Dimensions: 7" H x 21.75" W x 16.88" D (17.78 x 32.39 x 42.88 cm)



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

You demand more from your equipment — and Pro-Series High-Fidelity Components deliver

You're serious about your music. You want to hear every last nuance in a broadcast or recording. The Pro-Series reflects your quest for excellence.

Get lower distortion with the AJ-1600 Digital AM/FM Stereo Tuner. The critically-acclaimed AP-1800 Preamp has the versatility to meet your reproduction requirements. Custom-engineer sound with the AO-1703 Ten-Band Equalizer. The AO-1706 Active Audio Processor boosts dynamic range. The AO-1701A Graphic Output Indicator monitors your system's output precisely. Choose from state-of-the-art 125-Watt or 250-Watt Amplifiers. And unify your system with the AE-1705 Pro-Series Rack.

Choose the Heathkit Pro-Series — the ultimate in stereo high fidelity.

1 Get lower distortion with this Digital AM/FM Tuner

For cleaner reception, the AJ-1600 Tuner features a digital display for exact tuning, and selectable wide/narrow IF bandwidth for low-distortion reception in normal station-density areas, as well as more listenable stations in congested multi-signal areas. An antenna input attenuator reduces cross modulation, while a switchable signal-strength/multipath meter and scope outputs assure precise antenna orientation and maximum signal reception. The Dolby option (below) offers increased dynamic range and reduced noise. The Tuner is encased in an EIA rack-compatible chassis measuring 5 $\frac{3}{4}$ " H x 19" W x 14" D (74.61 x 48.26 x 35.56 cm).

The AJ-1600's FM specifications assure better listening: Sensitivity is 1.8 μ V (10.3 dBf)/3.5 μ V (16.1 dBf), usable; 2.5 μ V (13.2 dBf)/35 μ V (36.1), @ 50 dB S/N, mono/stereo for receiving distant stations. S/N: 83/75 dB mono/stereo for dynamic range that surpasses most station transmissions. Hum and noise: 75 dB. Freq. Resp.: 20-15,000 Hz \pm 0.5 dB. THD: .1% at 1 kHz for authentic reproduction. IM Dist: .5%. Capture Ratio: 1.2 dB. Selectivity: 40/80 dB. AM Sensitivity: Ext. Antenna: 30 μ V; Radiated, 250 μ V/meter. For 120 VAC, 60 Hz power.

AJ-1600, Shpg. wt. 25 lbs. 439.95
AJA-1600-2, Dolby FM Noise Reduction Module, 1 lb. 49.95
AEA-1800-2, Oak-Finish Cabinet, Shpg. wt. 6 lbs. 33.95

2 The versatile Preamp with the great review

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

Versatility to meet your music reproduction requirements: One moving coil head amp, plus 2 moving magnet cartridge inputs with 3 cartridge sensitivities and capacitance selections to match any turntable cartridge. Tape monitoring for 2 decks, plus deck-to-deck dubbing with the ability to listen to any source. Separate bass and treble tone controls for each channel, with 2 turnover points (bass 250 or 500 Hz, treble 2.5 or 5 kHz) for precise tone control. Plus, tone bypass for pure listening. Continuous loudness compensation for good response at any volume level (designed with the latest psychoacoustical data). A 32-step precision attenuator for exact volume control. A unique L-R mode for system balancing, as well as L, R, L+R, stereo and stereo reversed channels. Plus an adapter loop for equalizers, noise processors, and other accessories. EIA rack-compatible chassis measures 5.22" H x 19" W x 11.25" D.

And with perfection: Frequency response: 20-20,000 Hz, \pm 0.2 dB, phono; 20-20,000 Hz, +0, - 2 dB, high level. THD: <0.03% phono; A-weighted S/N: 85 dB hi-level, 75 dB M.C. phono. IHF IM: <.01%. TIM: <.02%.

Kit AP-1800, Shpg. wt. 27 lbs. 369.95
AEA-1800-2, Oak-Finish Cabinet, Shpg. wt. 6 lbs. 33.95

3 Ten Band Equalizer is the low-cost way to upgrade

Engineer records, tapes and FM broadcasts to your creative taste with 10 ISO-centered controls. See a complete description on page 96.

4 Active Audio Processor boosts dynamic range

Your music loses dynamic range in recording or broadcast. The AD-1706 puts it back. For a complete description turn to page 96.

5 Electronic Crossover expands bass response

Used with a subwoofer such as the new AS-1320, the Variable Electronic Crossover dramatically expands bass response. This Pro-Series Crossover allows you to multiamp your stereo system for lower distortion and smoother frequency response at crossover points. It features six selectable crossover

points, plus outputs for stereo, monaural, and bridged hookup to let you connect another amplifier and subwoofer to your present system. And to insure good summed response at the six crossover points, the AD-1702 has switchable 6 dB/octave and 18 dB/octave slopes. The six selectable crossover points can be frequency scaled up to 6 kHz.

For a complete description of the new AS-1320 Subwoofer, refer to page 97.

Kit AD-1702, Shpg. wt. 15 lbs. 194.95
AEA-1800-3, Solid-Oak End Panels, Shpg. wt. 2 lbs. 14.95
Kit AS-1320, Subwoofer, Shpg. wt. 177 lbs. 299.95

6 Output Indicator gives precise monitoring

The Graphic Output Indicator gives precision monitoring to safeguard components and tapes. With its 30 LEDs (15 for each channel), it gives a visual readout of your amplifier or preamplifier output. It can warn you of dangerous peak loads that can cause distortion or blow your tweeters. What's more, the AD-1701A accurately monitors your system's output with a 53 dB dynamic range. A peak/average button allows you to supplement your tape deck's restricted meters, thus assuring more precise, low-distortion recordings. Fits standard 19" racks. Measures 2" H x 19" W x 13" D (5.08 x 48.26 x 33.02 cm). For 120/240 VAC, 50/60 Hz power.

Kit AO-1701A, Shpg. wt. 15 lbs. 164.95
AEA-1800-3, Solid-Oak Panels, Shpg. wt. 2 lbs. 14.95

7 Pro-Series Amp has power for wide dynamic range

Even driving inefficient speakers, the AA-1800 Pro-Series Amplifier has the power and dynamic headroom to give you more from your music. A speaker-protection system and massive heat sinks add to this 250 watt Amplifier's stature as the bulwark of the Pro-Series line. See a complete description of the AA-1800 on page 96.

8 The AA-1600 Amplifier — performance on a budget

125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN .05% TOTAL HARMONIC DISTORTION FROM 20-20,000 HERTZ

Choose a proven performer — the AA-1600. It has the power and dynamic headroom to reproduce your music at your speaker's maximum range without clipping. No matter what the source — tapes, records or broadcast — the AA-1600 amplifies your music with clarity. Transient intermodulation distortion is less than .05%, and hum and noise are a full 90 dB below 1 watt.

And with the AA-1600, your speakers are safely interfaced. It features rugged output devices and does away with dissipation limiters to eliminate tweeter-damaging pops and clicks. It also has a special 8-second turn-on delay to safeguard your speakers from thumps and pops.

Like all our Pro-Series high fidelity components, the AA-1600 is easy to assemble with our step-by-step instructions. Minimum point-to-point wiring, and a clean open chassis layout make building the AA-1600 a breeze. Looks handsome in our optional Oak-Finish Cabinet. Measures 7 $\frac{1}{8}$ " H x 19" W x 13" D.

Kit AA-1600, Shpg. wt. 51 lbs. 349.95
AEA-1800-1, Oak-Finish Cabinet, Shpg. wt. 5 lbs. 33.95

AA-1600 SPECIFICATIONS: Dynamic Headroom: 2.0 dB Frequency Response: \pm 1 dB, 7 Hz to 50 kHz, - 3 dB, 5 Hz to 100 Hz (1 watt) Input Sensitivity: 135 mV, Damping Factor: >50, IM Dist. (SMPT): <.05% from 125 mW to 125 Watts. Stereo Separation: 70 dB min Input Impedance: 30K ohms Power Requirement: 120 VAC, 60 Hz

9 Unify your system with the Pro-Series Rack

Sturdy, yet portable, the Pro-Series Rack gives your system semblance. It's compatible with Standard EIA panels in any height, and comes complete with record dividers and top shelf for a turntable. Features walnut veneer side panels and locking swivel casters. Measures 43 $\frac{1}{2}$ " H x 21 $\frac{1}{2}$ " W x 18" D.

Kit AE-1705, Shpg. wt. 74 lbs. 264.95



Optional oak-finish wood cabinets for Heathkit Pro-Series Audio Components (except AA-1800) are listed and sold separately for each Pro-Series Audio Component.



1

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SAVE \$25⁰⁰ on state-of-the-art turntable and cartridge

\$564⁹⁵

If purchased separately,
\$589⁹⁵



Buy these technologically-advanced audio products — and pocket the savings. System includes ACP-1608 Dual 608 Direct-Drive Semi-Automatic Turntable with ULM tonearm (described on p. 98). Also includes new Dynavector Ruby Moving Coil Cartridge — the best in our line (described at right).

ACS-1608, Assembled, 29 lbs. 564.95

NEW

\$290⁰⁰

High-technology Dynavector Ruby Moving Coil Cartridge

This moving coil cartridge is acknowledged as one of the world's finest. Its synthetic ruby cantilever is only 2.5 mm long for maximum rigidity and unsurpassed groove-to-coil signal transmission. Excellent tracking — even tracks Teiarc's 1812 Overture. Requires step-up transformer or AP-1800 Preamp (p. 96). Save when you order this cartridge as part of our ACS-1508 System at left.

ADP-1260, Assembled, 1 lb. 290.00



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

STEREO HIGH FIDELITY/95

NEW

Easy-to-build, 25" (diagonal) TV has remote control, optional Space Phone

Save on kit/cabinet system price for our newest Color TV, the magnificent GR-2500, with all the features you want in a quality 25" (diagonal measure) color set (see system prices at bottom of page).

GRS-2500-1
System only

\$679⁹⁰

- Great low system price when you buy kit and cabinet
- Just 15 hours average build time for this great set
- Price includes computer-controlled remote control
- Optional Space Phone lets you answer the phone through the TV without having to get up from your easy chair
- Two 6" x 9" woofers and two 2" tweeters provide rich, four-speaker sound

The outstanding value of this easy-to-build Heathkit GR-2500 TV can be yours in as little as five evenings. It features automatic control of 8 picture and color sub-systems for outstanding viewing.

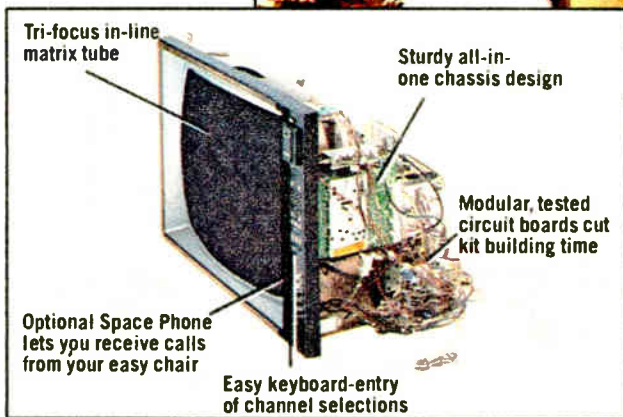
Maximum picture sharpness is yours with a comb filter circuit that reproduces up to 330 lines of resolution, greatly reducing spurious color in the black and white parts of a picture. An advanced electronic PLL Varactor tuning system eliminates noise and contact wear, for greater accuracy, reliability and ease of operation.

Your GR-2500 needs no channel to channel fine-tuning adjustments; in the special position, the tuner pulls in off-frequency signals that may be received from cable systems, master antenna systems or video games. An electronically self-regulating voltage regulator helps conserve energy and maintains voltage to the chassis at the receiver design level. And the digital picture hold locks the picture in, eliminating the need for vertical and horizontal hold controls.

A sharpness control lets you adjust the GR-2500's picture to the desired sharpness. And the picture control lets you adjust contrast and color level in proper balance for varying room light conditions. The solid-state automatic fringe-lock circuit provides superb picture stability and fringe area reception.

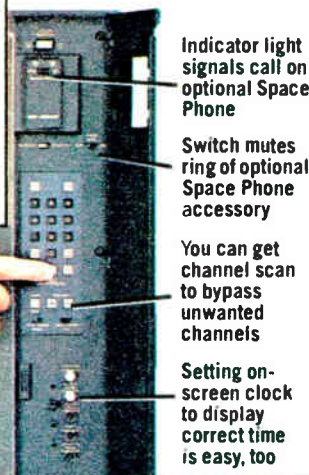
Your Heathkit GR-2500 kit comes complete with remote control unit for scanning entered channels, random channel selection, on/off, volume, channel/time display recall, and answering the phone (with optional Space Phone). A large, easy-to-read, on-screen channel/time display appears briefly when channel is changed, or recall display from set or remote control. The remote control unit requires a standard 9V battery (not included). You can even remote-access any of the 35 CATV service channels – as well as the 82 standard TV channels – no need for a separate channel selection/converter box if you have cable TV.

Optional Space Phone lets you receive phone calls and have phone conversations from your easy chair. Mute button on the GR-2500's Remote Control unit lets you have private conversations in the room without the telephone caller being able to hear. An indicator light shows when the phone is ringing, and phone rings through the TV's speaker system. Or you can mute the phone ringer so it does not disturb your TV viewing – you'll still be alerted to phone calls by the indicator light. Easy connection to any phone line (notify telephone company prior to installation). FCC regulations prohibit connection of this device to party lines or coin-operated telephones.



Simulated TV picture

Easy-to-use control panel gives you the ultimate in TV viewing convenience



Four-speaker sound features two 6" x 9" woofers and two 2" tweeters. Put the GR-2500's custom-installable, all-in-one chassis in a wall, your own cabinet, or save when you purchase your kit with one of the Heathkit cabinets (below). Includes crosshatch generator for alignment. While not required for set-up, a Hi-Z meter like the IM-5217 (listed below) is desirable for troubleshooting.

GR-2500, Shpg. wt. 113 lbs. Motor Freight 639.95

GRA-2500-1, Space Phone, Wt. 2 lbs. 44.95

SAVE \$10.00. Purchase the IM-5217 with your GR-2500 TV or TV/Cabinet System, Kit IM-5217, Shpg. wt. 4 lbs. 29.95

Large Classic Console Cabinet

For the GR-2500 (above). Oak veneer parquet top with antique brass-finished hinges, door pulls, metal lattice-work. Antique oak finish. 32 $\frac{3}{8}$ " H x 50 $\frac{1}{2}$ " W x 20" D including casters, tube cap.

GRA-714-25,
136 lbs., Mtr. Frt. 189.95

SAVE \$100.00. Cabinet with GR-2500
Color Television Kit.

GRS-2500-2, 249 lbs., Mtr. Frt. 729.90



Simulated TV picture

Compact Classic Cabinet

For GR-2500 TV (above). Antique brass-finish metal lattice-work, door pulls and hinges accent the antique oak finish. Oak veneer top. 33" H x 43" W x 20" D including casters, tube cap.

GRA-704-25,
112 lbs., Mtr. Frt. 139.95

SAVE \$100.00. Cabinet with GR-2500
Color Television Kit.

GRS-2500-1, 225 lbs. Mtr. Frt. 679.90



Simulated TV picture





Simulated TV picture

Optional GD-1185 Programmer lets you program up to 16 channel changes in a 12/24-hour period

GR-2001 SPECIFICATIONS: Deflection: Magnetic, 90° Focus: Electrostatic Convergence: Magnetic Picture IF Carrier: 45.74 MHz Sound IF Carrier: 41.25 MHz Color IF Subcarrier: 42.17 MHz Sound IF Frequency: 4.5 MHz Video IF Bandwidth: 4.08 MHz at 6 dB down Hi-Fi Output: Frequency Response: -3 dB, 50 Hz to 15 kHz Output Voltage: Greater than 1.0 V RMS Audio Output: 4 Ω or 8 Ω 2 watts Tuning Range: TV channels 2 through 83 Power: 120 VAC, 60 Hz 200 W



Program it like a computer — state-of-the-art GR-2001 25" Diagonal Color Television

\$769⁹⁵

- Optional computerized programmer lets you preselect an entire evening's viewing... then relax and enjoy
- Audio circuitry gives a difference you can hear in the wide-range speaker... or play it through your stereo

Use the optional GD-1185 Programmer to program your GR-2001 Color TV for an entire evening's viewing.

With the optional GD-1184 Antenna Rotator Control, you can program this computerized system to turn your antenna for different stations — up to 16 channels, 3 for each of 8 directions. PLL vertical and horizontal oscillators assure a rock steady picture. Fully-shielded picture tube maintaining outstanding color. Built-in dot generator, centering and convergence circuits, a test meter and detailed Heathkit manual will save you service dollars, too. Choose one of the optional assembled cabinets below.

Kit GR-2001, Shpg. wt. 146 lbs., Motor Freight **769.95**

GD-1185 Programmer for 2001. Changes up to 16 channels in each of two 12/24 time periods. Requires GRA-601. 8 lbs. **174.95**

GD-1184 Automatic Antenna Rotor Control. Automatically turns antenna to station you select. Requires GDA-1184-1. Shpg. wt. 6 lbs. **69.95**

GDA-1184-1 Rotor Motor. Req. 5-wire cable (not suppld.). 11 lbs. **39.95**

GRA-2000-7 Second speaker for GR-2001. Shpg. wt. 2 lbs. **9.95**

GRA-2001-6 Handheld Remote Control, 4 lbs. **99.95**

GRA-601 On-Screen Digital Clock. Displays time, channel number in 1" digits. Show continuously or at intervals. 1 lb. **29.95**

Save more, get more by purchasing a complete system

Save \$74.90. System includes GR-2001 Color TV, GD-1185 Programmer and GRA-601 On-Screen Digital Clock. \$974.85 if purchased separately. **GRS-2001**, Shpg. wt. 175 lbs., Mtr. Frt. **899.95**

Save \$84.85. Includes GR-2001, GD-1185, GRA-601 and GD-1184 Rotor Control. \$1044.80 if purchased separately. **GRS-2002**, 187 lbs., Mtr. Frt. **959.95**

Custom-mount this great looking 21" diagonal Color TV

\$549⁹⁵

- Exclusive Heathkit IF filter gives a rock-steady picture
- Modular PC boards, color-coded wiring harness aid kitbuilding

The Heathkit GR-2050 Color TV features a bright, sharp 21-inch (diagonal) color picture — at the lowest selling price for a Heathkit TV. The quality technical design and excellent performance Heathkit Color TV's are famous for, in a smaller package. An ultrasonic Remote Control and On-Screen Digital Clock are available, too.

Automatically, digitally select sixteen channels with just the push of a button. Screen displays large, easy-to-read channel numbers. Automatic fine tuning and an exclusive Heathkit IF filter maintain a perfectly tuned, rock-steady picture. Tuner shielding and a true 75-ohm VHF antenna terminal make the GR-2050 ideal for cable TV hookup.

The GR-2050 Color TV is easy to build. Extra-value features are built-in, too — including a set-up/troubleshooting meter, dot generator, service circuit board, centering and pincushioning circuits — all designed to facilitate easier adjustment and servicing. Kit includes chassis, picture tube and one speaker (less cabinet).

Kit GR-2050, 122 lbs., Mtr. Frt. **549.95**

Optional Ultrasonic Remote Control for GR-2050 TV.

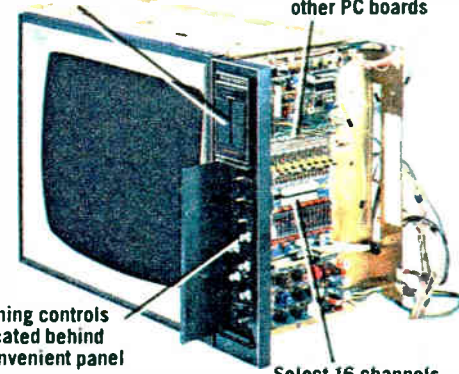
Kit GRA-2000-6, 4 lbs. **99.95**

Kit GRA-601, Optional Clock, 1 lb. **29.95**

GR-2050 SPECIFICATIONS: Picture Tube: 21" (diagonal) Deflection: Magnetic, 90 deg Antenna Input Impedance: VHF, 300 ohms balanced or 75 ohms unbalanced UHF, 300 ohms balanced Tuning Range: Channels 2 through 83 (Preset any 16) High-Fidelity Output: Impedance: 200Ω ohms Frequency Response: -1 dB, 50 Hz to 15 kHz Harmonic Distortion: Less than 1% at 1 kHz Output Voltage: Greater than 1.0 V RMS Audio Output: Impedance: 4 or 8 ohms Power Req.: 120 VAC, 60 Hz

Easy pushbutton channel selection

Easy access to display board, other PC boards



Tuning controls located behind convenient panel

Select 16 channels on tuning board

These cabinets make your GR-2001 look beautiful even when it's off

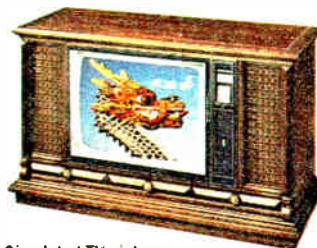
Mediterranean Cabinet

Dark oak finish, simulated wood-grain trim, antique gold hardware. Accepts 2 speakers. Assembled. 30.31" H x 49.94" W x 23.94" D.

GRA-604-25, 82 lbs., Mtr. Frt. **249.95**

Second Speaker for GR-2001 TV.

GRA-2000-7, Shpg. wt. 2 lbs. **9.95**



Simulated TV picture

Contemporary Cabinet

Wood solids and veneers. Oiled walnut finish. Takes 2 speakers. Assembled, finished. 23.38" H x 46.82" W x 23.63" D.

GRA-602-25, 66 lbs., Mtr. Frt. **229.95**

Second Speaker for GR-2001 TV.

GRA-2000-7, Shpg. wt. 2 lbs. **9.95**



Simulated TV picture



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

TELEVISION/101



Move into the Video Age with this Color Video Sound Camera

- Features Power/Manual Zoom Lens
- Built-in electret microphone
- 5½ lb camera fits on shoulder

- Viewfinder is an actual miniature B/W TV screen
- Macro lens allows close-up shots for filling frame with subject as close as 10 mm from lens

Record hours of family fun, school and sports activities, even vacations, document your work, even video tape the valuables in your home for insurance documentation... all on reusable video cassettes... with the new GDZ-1600 Color Video Sound Camera. Transfer movie film or slides easily to convenient video tape using the GRZ-1600 and a video recorder like the GDZ-9760 (at left). Light-weight, compact, easy-to-use format gives faithful color reproduction and high resolution. Combined 6:1 power/manual zoom lens (f1.4 with 11 to 70 mm focal length) and macro-lens included. Macro lens for close-up shots fills the frame with a small subject as close as 10 mm from the lens. White balance, Wave Form and color balance can all be performed and verified through B/W electronic viewfinder for excellent pictures every time. Peaking switch allows easy focusing. Color temperature conversion filter assures optimum color balance both indoors and out. Automatic exposure, gain controls provide stable operation over a wide lighting range.

Also features built-in electret condenser microphone for simultaneous pick-up of sound with picture, input jack for external microphone, earphone jack for monitoring sound as it is being recorded or playback of sound through the recorder. Includes electronic viewfinder, lens cap and earphone. 7⅞" H x 8⅞" W x 13⅞" D, including zoom lens, viewfinder and grip. Camera weighs 5 lbs. 5 oz. Viewfinder weighs 1 lb. 2 oz. 15-pin cable fits optional Adapter (at right).



Optional Power Supply Adapter



Camera and viewfinder weigh just 6.45 lbs.

GRZ-1600, Camera, Wt. 9 lbs. 1050.00

Power Supply Adapter. Adapts 15-pin cable from Camera to standard VCR video, sound, pause inputs. Includes 33' cable.

GRZ-1600-1, 6 lbs. 99.95

Case for Camera. Protect your investment.

GRZ-1600-2, Shpg. wt. 10 lbs. 49.95

Improved Zenith VCR is now cable-ready

- Assembled model is cable-ready (both mid-band A-1 and super-band J-W)
- Record 4 different channels in 14 days

The improved Zenith Video Director lets you record favorite shows while you're away, while watching... even record one show while viewing another. Add the optional GRZ-1600 Camera and GRZ-1600-1 Power Supply/Adapter (right) to record birthdays, holidays or sports - even use for surveillance.

Study a golfer's swing with frame-by-frame advance, variable-speed slow motion - virtually interference-free (in Beta III). Edit unwanted scenes with Remote Video Action Control. Search at 10 times normal speed, view at 3X normal speed (Beta III). Use "freeze-action," "instant replay" capabilities.

Program this VCR to record up to 4 shows over 14 days! Record or play up to 5 hours in Beta III. Add music and/or narration later with Audio Dub.

Has remote control, aux. 120 VAC outlet, 120 VAC, 60 Hz, 19.50" H x 6.50" W x 15.25" D.

GDZ-9760, Assembled, Shpg. wt. 45 lbs. . . 1095.00

Videotapes	Beta II	Beta III	Wt.	Price
GDZ-9700-5 (L-820)	3½ hrs.	5 hrs.	1 lb.	16.00
GDZ-9700-4 (L-750)	2 hrs.	4½ hrs.	1 lb.	14.00
GDZ-9700-3 (L-500)	2 hrs.	3 hrs.	1 lb.	12.00



Carry this TV/AM-FM Radio/Alarm Clock anywhere!

- Assembled, super-portable - wake to 5" (diag.) VHF/UHF TV, AM/FM radio or alarm!

Sleep switch turns set off after up to 59 minutes. Use built-in telescopic antenna or external 300 antenna (not included). Has earphone, 12 VDC car cord. Runs on 120/240 VAC. 12 VDC, optional rechargeable battery pack (below) or six alkaline "D" cells (not included). 7" H x 6" W x 11" D.

GRZ-5005, Assembled, Shpg. wt. 10 lbs. . . 199.95

GRZ-5005-1, Rechargeable Battery Pack for up to 4 hrs. of TV/40 hrs. of radio, 3 lbs. 24.95

102/TELEVISION



Simulated TV pictures

Take your TV shows along with this Zenith 13" diagonal Color TV

This assembled 13" (diagonal) Zenith Portable Color TV features Tri-focus Picture Tube for the sharpest picture in Zenith history. Triple-Plus Chassis for modular design, few interconnections and is cooler-running for longer life. Color Sentry corrects the picture automatically 30 times per second. Electronic Power Sentry voltage regulation and other energy-saving features combine for 25 percent less average energy use than comparable previous model. Space Command 800 Remote Control allows use from across the room. For 120 VAC, 60 Hz. This attractive portable measures 13.75" H x 20.13" W x 14.88" D.

GRZ-1325, Assembled and tested, 44 lbs. . . 459.95



Watch anywhere with improved Zenith B/W portable

New technology makes this assembled 9" (diagonal) B/W portable even more energy-efficient than its predecessor. And it goes anywhere... because it plays on 120 VAC for home viewing, 12 VDC in car, camper or RV, or optional 12 VDC rechargeable battery pack for picnic, beach. Includes 12 VDC car cord adapter, sunshield, earphone. The Zenith GRZ-93 B/W Portable TV measures 9.75" H x 14.6" W x 9.6" D.

GRZ-93, Shpg. wt. 17 lbs. 109.95

Rechargeable Battery Pack for Zenith GRZ-93 Portable TV (not for GRZ-92).

GRZ-93-1, Shpg. wt. 9 lbs. 44.95



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

At last! A home earth station comes with the Heathkit trademark of quality and reliability you can trust

NEW

Here's what sets the Heathkit Earth Station apart from the rest:

- A specially-prepared Site Survey Kit helps you determine the correct location for a satellite antenna
- Easy-to-follow assembly manuals and technical assistance by telephone or mail make our Earth Station easy to assemble and install!
- Integrated Low-Noise Amplifier/Down-Converter, 3-Meter Satellite Antenna and receiver electronics are made by Scientific-Atlanta, one of the world's foremost manufacturers of satellite communications equipment
- Satellite Receiver features drift-free reception, threshold extension for clear pictures at lower signal levels, digital channel selection, memory, clock and built-in security circuit (alarm not included)
- A special Zenith Space Command Remote Control – a satellite TV first – puts you in complete control from your armchair

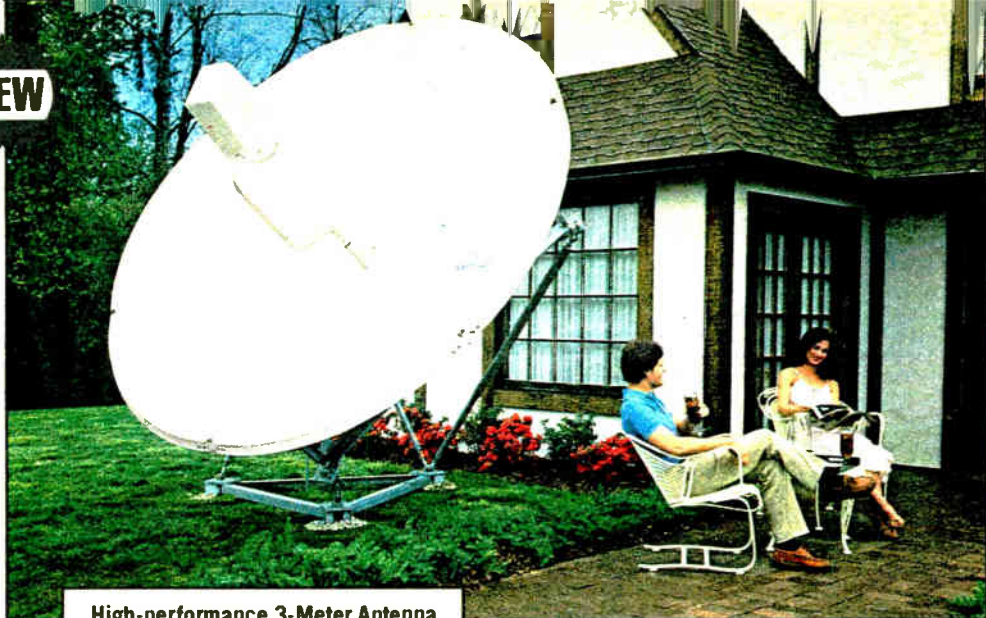
Comparable in quality with professionally-installed systems costing up to \$15,000, the basic Heathkit Earth Station will cost as little as \$6,995.

With the Heathkit Earth Station, you'll have a wide variety of TV entertainment at your fingertips! Many channels – most free of cuts, censorship and interruptions – are available on geosynchronous satellites. This includes movies, sports, musical specials, nightclub acts, concerts, Broadway plays and more!

Comprehensive manuals show you how to install the Heathkit Earth Station, from selecting a site to viewing your first satellite program. And technical help is available, by mail or by phone, to answer your questions.

Based on a design used by hundreds of commercial systems, our Earth Station gives you uncommon performance and convenience in its price range. You get:

1. **A Scientific-Atlanta 3-Meter Satellite Receiving Antenna:** Made by one of the most experienced names in satellite communications, this adjustable-mount antenna can receive signals from different geosynchronous satellites. Its precision-contoured dish provides the high gain needed for a sharp, clear picture. This heavy-duty Antenna will give long, reliable performance.
2. **An Earth Foundation Kit,** which enables you to anchor your 3-Meter Satellite Antenna in the ground – firmly enough to withstand winds as high as 100 mph.
3. **A Rotatable Feed Assembly,** which feeds the signal to the Low-Noise Amplifier (LNA)/Down Converter. It automatically rotates to the proper polarization for each channel – receive up to 24 channels from one satellite, with one feed.
4. **Scientific-Atlanta's Integrated LNA/Down-Converter,** which amplifies weak satellite signals while minimizing noise for a strong, clear signal. The signal is converted from 4 GHz down to the 500 MHz band – so it can be sent to the Receiver via regular coaxial cable.
5. **The Heathkit Satellite TV Receiver Kit,** with electronic tuning of 24 channels for stable, drift-free reception, a built-in memory allows instant switching between two pre-selected channels. Program the Receiver to turn itself on, for viewing or recording, at times you select. A special Zenith Space Command Remote Control – a satellite TV first – lets you turn the receiver on/off, enter channels directly, scan channels, change volume and mute sound – from your easy chair. Designed to be at home with your decor, the Receiver is housed in a handsome metal cabinet with walnut panels. A built-in security circuit allows connection of an alarm (not included) to alert you to any attempt to remove the Low-Noise Amplifier/Down-Converter.



High-performance 3-Meter Antenna



Integrated LNA/Down-Converter for better performance in less space

Antenna can be adjusted to view different satellites

Earth Foundation Kit allows 3-Meter Antenna to withstand 100 mph winds

Satellite Receiver has extra-value features



Threshold extension for clear pictures at lower signal levels

Built-in 12-hour (AM/PM) digital clock

Digital selection of 24 satellite channels

Designed to fit in with your home's decor

Select satellite programs from easy chair

Select from any of 24 satellite channels

Turn receiver on/off without getting up

Also scan all 24 channels

Change volume or mute sound

The SRA-8100-10 Site Survey Kit (below) has full information on our Earth Station, and will help determine if your site is acceptable for installation. Or if you would like a brochure containing more information on the Heathkit Earth Station and its Site Survey Kit, call 800-253-0570 TOLL-FREE – or write to Heath Company, Benton Harbor, MI 49022.

*Viewing of some satellite TV channels may require the customer to obtain permission from, or make payment(s) to, the programming company. The customer is responsible for compliance with all local, state and federal governmental laws and regulations, including but not limited to construction, placement and use. For use only in Continental U.S.

The first step: our Site Survey Kit

This kit will help you determine whether a Heathkit Earth Station can be installed at your proposed site. You'll receive a computer printout which shows satellite "look angles" for your address, a compass for determining the directions of different satellites, and an inclinometer to help determine the degree of elevation between the earth's surface and the satellite(s) – to assure a clear line-of-sight path to the satellites.

You also get a manual which explains satellite TV and the Heathkit Earth Station, how to use the compass and inclinometer, how to find the right ground conditions and how to configure the Heathkit Earth Station; a copy of "Sat Guide" to show the vast selection of programming available from just one satellite, and order forms for purchasing your Earth Station.

Deduct the cost of this kit when you purchase a Heathkit Earth Station.

To order the Site Survey Kit, call 800-253-0570 TOLL-FREE – or mail the catalog order blank. Be sure to include the address, city, state and Zip Code of the specific site where you plan to locate your Earth Station.

Kit SRA-8100-10, Shpg. wt. 2 lbs. 30.00



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



Great for learning, great for playing — Chess Challengers are an ideal gift

- Board lets computer "see" every move
- Skill levels for beginner or expert
- Varies its response to the same move
- Very fast response time cuts waiting

1 Sensory Chess Challenger has 8 skill levels

Sharpen your chess skills against an opponent that matches your skill level, whether you're beginner or veteran — the Sensory Chess Challenger. This Regular Sensory Chess Challenger tests your skill with 8 program levels of play, including "Mate in two" and "Postal Chess." Features random moves so it won't always react to the same move in the same way. The Sensory Chess Challenger can even change sides at any time you choose.

Easy-to-use entry system: just press down your piece, move, press down again to register the move. Special sensory board automatically "sees" your move and tells the computer. Computer shows its countermove with easy-to-follow LEDs.

Play chess anywhere. For portability you can operate it off four 1.5V "C" batteries (not included), or off house current with the 120 VAC adaptor that comes with it. The brown plastic case measures 2½" H x 10½" W x 11¼" D.

GDP-4410, Assembled, 4 lbs. Was \$139.95 in Cat. 852, NOW ONLY 99.95

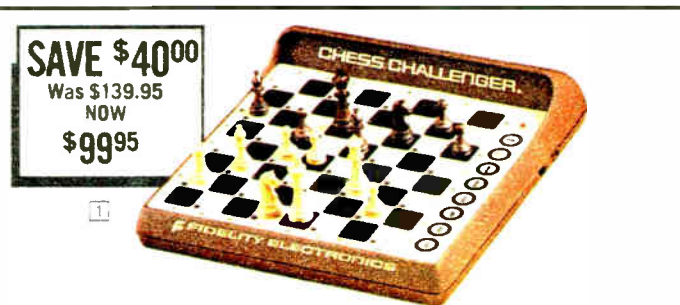
2 Talking Chess Challenger tells you moves

With its amazing 50-word vocabulary, this Talking Chess Challenger not only confirms the move you've just made, but also announces its countermove.

Want to learn to play chess from the Masters? This computer-controlled marvel knows 64 of the world's best chess games, move by move... and can teach them to you by allowing you to switch sides at any time. It will even teach you 100 different winning opening moves. The Talking Chess Challenger is great for beginner or veteran because it features nine programmed levels of play, including a special, super-tough, no random, "best move only" level of play.

We've seen plenty... and believe this game to be the best and most convenient to play chess game on the market today. Comes in a rich, solid-walnut housing measuring 3¾" H x 11¾" W x 13½" D. 120 VAC.

GDP-4411, Assembled, 10 lbs. Was \$349.95 in Cat. 852, NOW ONLY 249.95



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*Units of Ver-Technology Electronics Corporation

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Printed in U.S.A.

Phone toll free — get your kits faster



Operators are on duty from 8:00 A.M. to 8:00 P.M. Eastern Time to take your toll-free phone charge order. (Sorry, toll free service not available in Alaska, Hawaii or Michigan — but you can call — 616-982-3411 — to place your order 24 hours a day.) To save yourself time, fill order blank and have credit card handy before dialing.

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Now you can use your Heath Revolving Charge, Visa or MasterCard to purchase the kits you need for your home or business. See page 52 for details and ordering information.